

Species Identification Manual

Compiled by the staff of the
Fisheries Monitoring and Analysis Division
Alaska Fisheries Science Center
National Marine Fisheries Service
Seattle, Washington

**Revised
January 2015**

Contents of the Species Identification Manual

- Wanted – List of Species Requiring Confirmation..... (1 page)
- Fish Identification: Methods and Definitions (5 pages)
- Key to Jawless and Cartilaginous Fishes..... (2 pages)
- Key to Families of Bony Fishes (17 pages)
- Key to Selected Sculpins..... (3 pages)
- Key to Flatfishes (12 pages)
- Key to Cods..... (2 pages)
- Key to Salmonids (3 pages)
- Field Guide to Skates (15 pages)
- Key to Crabs..... (10 pages)
- Guide to Corals and Other Invertebrates (7 pages)
- Color Field Guide to Pacific Salmon..... (4 pages)
- Sex Determination in Fishes (6 pages)
- Maturity Determination in Skates (1 page)
- Stomach Sampling Methods (2 pages)
- Pollock Maturity Codes..... (2 pages)
- Pacific Cod Maturity Codes..... (2 pages)
- Right Whale Identification..... (2 pages)
- Albatross Guide..... (2 pages)

This document is for internal use only, not to be cited or reproduced without permission.

WANTED!

CONFIRMATION REQUIRED!

THE FOLLOWING SPECIES HAVE NOT BEEN CONFIRMED IN ALASKAN WATERS OR ARE RARE ENOUGH TO NEED FURTHER CONFIRMATION. FOR CONFIRMATION, YOU MUST RETURN WITH A SPECIMEN OR PHOTOGRAPHIC DOCUMENTATION.

ANY SPECIES ENCOUNTERED OUT OF RANGE ALSO REQUIRES CONFIRMATION, INCLUDING ALL SPECIES NOT LISTED IN YOUR FIELD GUIDES.



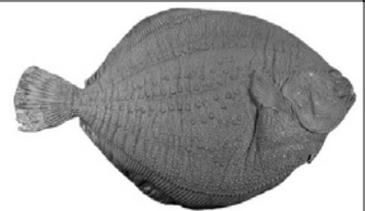
ROCKFISHES:

ALEUTIAN SCORPIONFISH
BLUE ROCKFISH
BROADBANDED THORNYHEAD
COPPER ROCKFISH
GRAY ROCKFISH
PYGMY ROCKFISH
STRIPETAILED ROCKFISH
VERMILION ROCKFISH
YELLOWMOUTH ROCKFISH



SKATES:

DEEPSEA
ROUGHSHOULDER



FLATFISHES:

C-O SOLE
CURLFIN SOLE
ROUGHSCALE SOLE
SAKHALIN SOLE
SAND SOLE*
SOUTHERN ROCK SOLE**



OTHERS:

ARCTIC COD
ATLANTIC SALMON
STURGEON

* DOCUMENTATION NOT REQUIRED FOR SAND SOLES IN THE GULF OF ALASKA

** DOCUMENTATION REQUIRED ONLY FOR SRS IN THE BERING SEA NORTH OF 56°

Fish Identification: Methods and Definitions

The figures and accompanying glossary of terms in the following pages are taken from Miller and Lea's *Guide to the Coastal Marine Fishes of California*, and are designed as an introduction and reference to the terminology used in identifying fishes. Although we cannot cover all the terminology used to describe fish anatomy, we have tried to include the most important and commonly encountered terms. The terminology figured here is reasonably standardized among a variety of identification aids that observers may use.

This introduction to terminology is designed especially for observers who have not taken courses in ichthyology. To the extent possible, observers should attempt to familiarize themselves with the methods and definitions presented in the figures prior to the laboratory sessions, and ask the laboratory instructor questions regarding problems with terms and methods during the lecture and lab sessions.

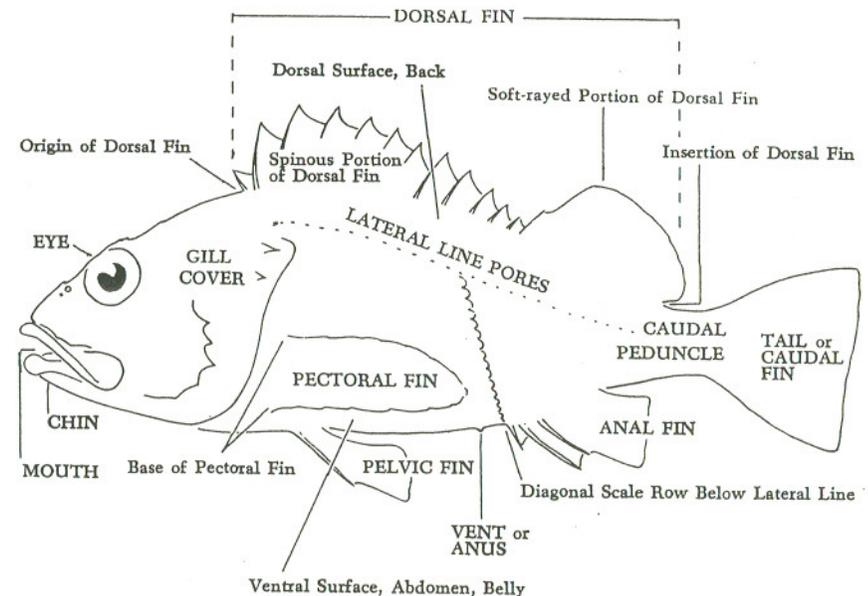
The identification keys that follow the introductory section have been developed by NMFS staff specifically to meet the needs of groundfish observers. These keys are designed to guide observers to the expected level of identification for each species, and to provide all the information necessary to distinguish a specimen in hand from all similar species that are likely to be encountered.

Accurate and consistent identification of fishes and crabs requires a good working knowledge of anatomical characteristics and their terminology, as well as methods of measurement and counting used in field guides and keys. All observer trainees are required to demonstrate a level of proficiency in fish and crab identification by passing an exam prior to deployment. Familiarization with the field identification materials contained in this manual is a necessary step in the development of the identification skills that all groundfish observers need to produce high-quality data.

GLOSSARY AND INDEX TO ILLUSTRATED GLOSSARY

ABDOMEN: belly, Figure 1.
ABDOMINAL: pelvic fin placement, Fig. 5a.
ADIPOSE: fin, Figure 6l., fatty.
ANADROMOUS: an ocean fish that spawns in freshwater.
ANAL FIN: Figure 1.
ANTERIOR: toward the head.
ANUS: vent, Figure 1.
AXIL, AXILLA: Figure 3.
BAR: A vertical band.
BARBEL: An elongate, fleshy appendage.
BASE: (of fin) Figure 2.
BEAK: Figure 10d.
BELLY: area covering viscera.
BIFID: with two points.
BRANCHIOSTEGALS: Figure 3.
BREAST: Figure 4a.
CANINE: (teeth) Figure 8c
CAUDAL FIN: Figure 1.
CAUDAL PEDUNCLE: Figures 1, 2.
CHIN: Figure 1.
CIRRUS: a thin, usually fringed flap. Figure 3.
COMPRESSED: (body form) Figure 9d.
CONCAVE: depressed inward. Figure 9f.
CONVEX: bulging outward. Figure 9d.
CONTIGUOUS: adjoining. Figure 6j.
CONTINUOUS: (fins) Figure 6i.
DEEP, DEPTH: (body form) Figure 9d.
DENTIGEROUS: with small teeth.
DEPRESSED: (body form) Figure 9e; held down, pressed onto body.
DORSAL FIN: Figures 1, 6i,j.
EEL-LIKE: (body form) figure 9a.
ELEVATED: above. Figure 3.
ELONGATE: (body form) Figure 9a, 9b.
EYE: (orbit) Figures 1, 3.
FILAMENTOUS: threadlike. Figure 3.
FIN: (shapes) Figure 6.
FINLET: Figure 6k.
FLAP: a thick extension of skin, Figure 3.
FORKED: (tail shape) Figure 6e.
GILL: rakers, cavity, arch, filaments; Figure 7; membrane Figure 4.
GILL COVER: Figures 1, 3, 4a.
HEAD: Figure 3.
HYPURAL: (bone in tail) Figures 2, 6k.
INCISED: notched. Figure 3.
INCISOR: (teeth) Figure 8d.
INDENTED: (tail form) Figure 6a.
INFERIOR: (mouth form) Figure 10c.
INNER: (fin ray placement) Figure 5c.
INSERTION: posterior attachment of a fin to body. Figure 1.
ISOLATED: not connected by a membrane.
ISTHMUS: Figure 4.
JAWS: Figure 10.
KEEL: Figure 6k.
LATERAL LINE: Figure 1.
LENGTH: Figure 2.
LIPS: Figures 3, 10e,f.
LONGITUDINAL: lengthwise, horizontal.
MANDIBLE: lower jaw. Figure 8b.
MAXILLARY: upper jaw. Figures 3, 8a.
MEMBRANE: thin connective tissue.
MOLARLIKE: (teeth) Figure 8e.
MOUTH: Figures 1, 10.
MULTIFID: With many points.
NAKED: without scales or rays. Figure 6h.
NOSTRIL: Figure 3.
OBSOLETE: nearly gone or missing.
OPERCULUM, OPERCLE: Figs. 3, 7.
ORBIT, ORBITAL: Figure 3.
ORIGIN: anterior attachment of a fin to body. Figure 1.
OVATE: (body form) Figure 9c.
OVERHANGING: (snout form) Figure 10c.
PALATINE: (bone and teeth) Figure 8a.
PAPILLAE: short, broad-based fleshy protuberances.
PECTORAL: (fin and girdle) Figures 1, 5c.
PELVIC: (fin and girdle) Figures 1, 5.
POINTED: (tail form) Figure 6f,g.
PORE: a sensory organ in skin.
POSTERIOR: toward the tail.
PROJECTING: ahead of. Figure 10a.

PYLORIC CAECAE: fleshy appendages attached to posterior end of stomach.
RAKER: (gill) Figure 7.
RAYS: (in fins) Figure 2.
ROUNDED: (tail form) Figure 6b.
SCUTE: thickened, hardened scale on midline of belly.
SHIELD: thickened, hardened scale on lateral line or sides.
SHOULDER: (girdle) Figure 5c, pectoral.
SIMPLE: not divided.
SNOUT: Figures 3, 10b,c.
SOFT-RAY: Figure 2.
SPINE: Figures 2, 3.
SPINULATED: with minute spines or hooks.
SQUARE: (tail form) straight. Figure 6d.
STRIATED: with close-set lines or grooves.
STRIPE: lengthwise or horizontal line.
SUBORBITAL STAY: Figure 3.
TAIL: Figures 1, 6.
TERMINAL: at the end. Figure 10e.
THORACIC: (fin placement) Figure 5b.
TONGUE: Figure 8b.
TRUNCATE: Figure 9c.
TUBULAR: (snout form) Figure 10b.
UNITED: joined. Figure 4b.
UPPER JAW: Figure 8a.
VENT: Figure 1.
VENTRAL: lower surface, pelvic fin.
VERTICAL: upright, as bar or band on sides.
VOMER: (bone, teeth) Figure 8a.
WIDTH: (body form) Figure 9d.

FIGURE 1. A spiny-rayed fish, *Sebastes*, naming fins and general body areas.

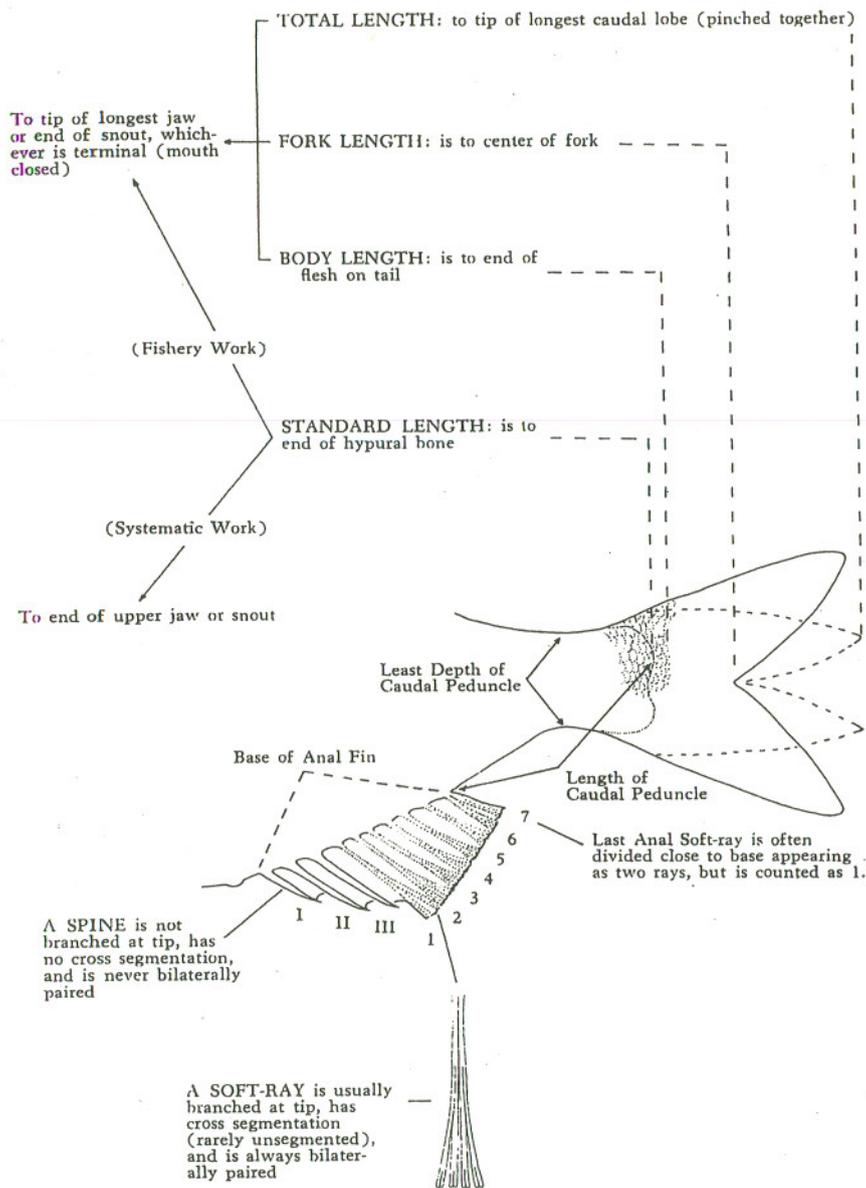


FIGURE 2. Tail area of a rockfish, *Sebastes*, showing lengths, fin ray construction, and other structures.

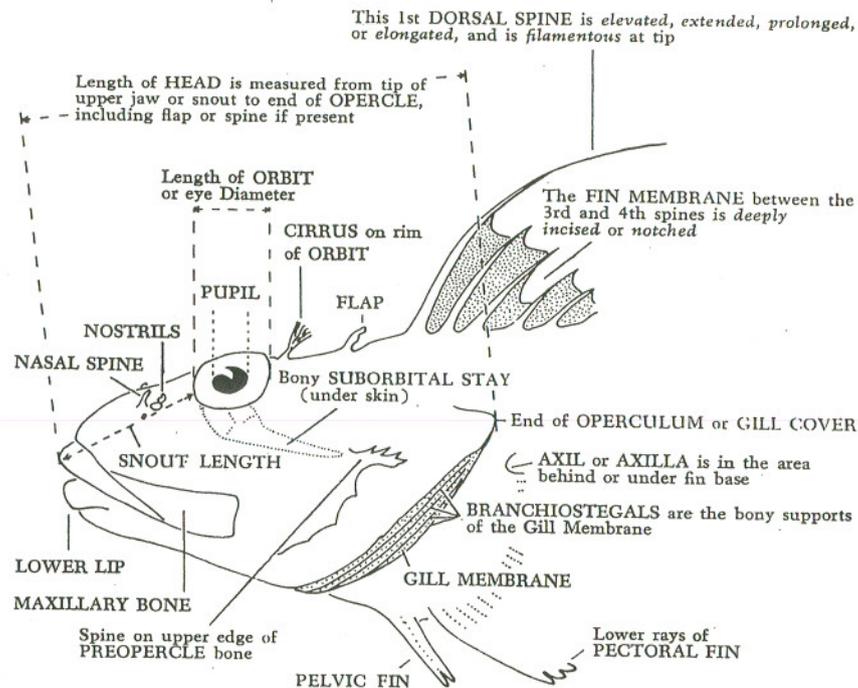


FIGURE 3. A hypothetical sculpin showing some head and fin structures.

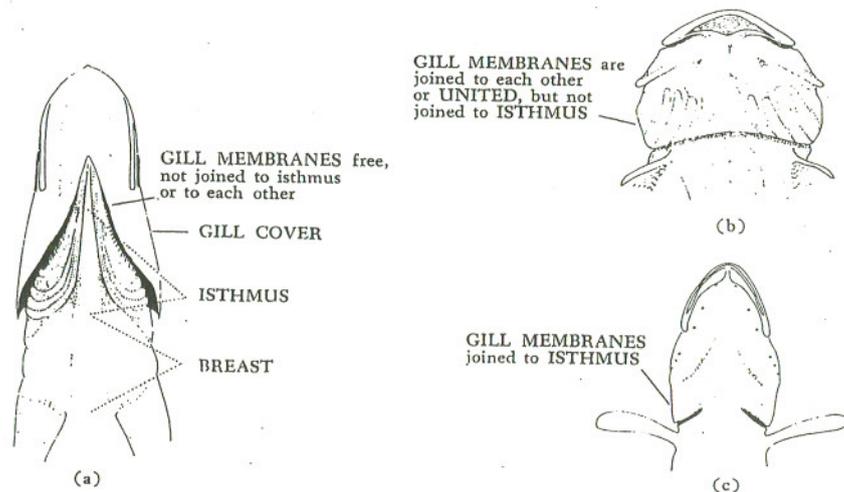


FIGURE 4. Gill membranes and their attachment (Ventral view of: a, *Spirinchus starksi*; b, *Clinocottus globiceps*; c, *Anoplarchus purpurescens*).

GUIDE TO THE COASTAL MARINE

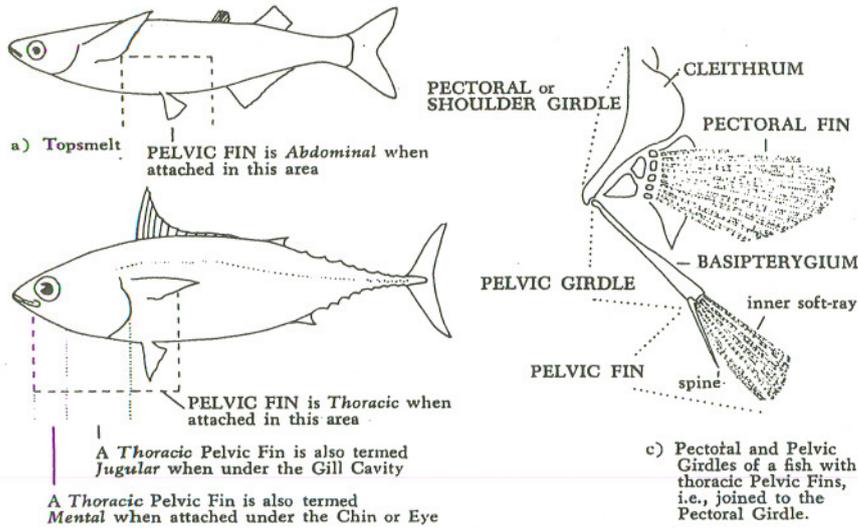


FIGURE 5. Abdominal and thoracic fin placement and construction.

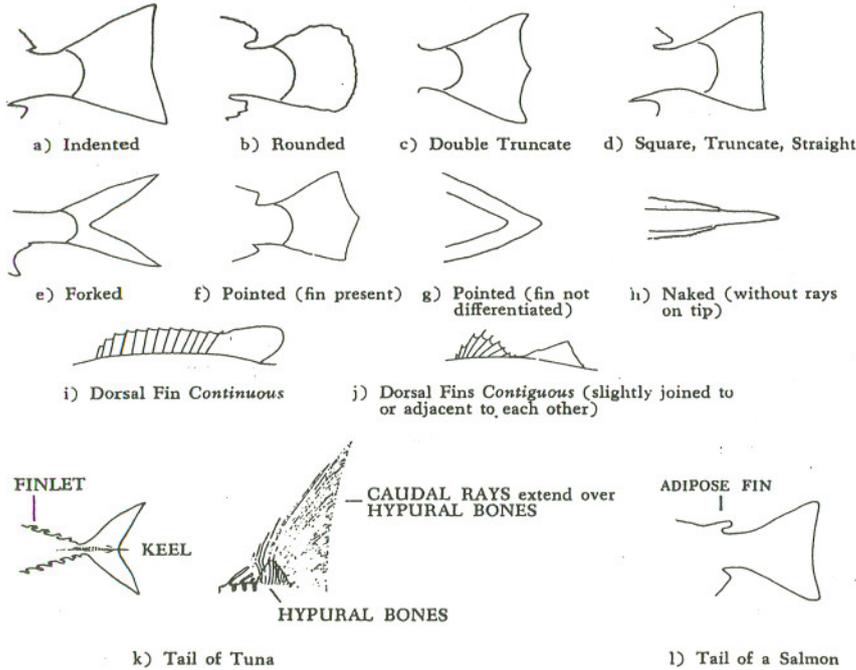


FIGURE 6. Tail and dorsal fin shapes and construction.

FISHES OF CALIFORNIA

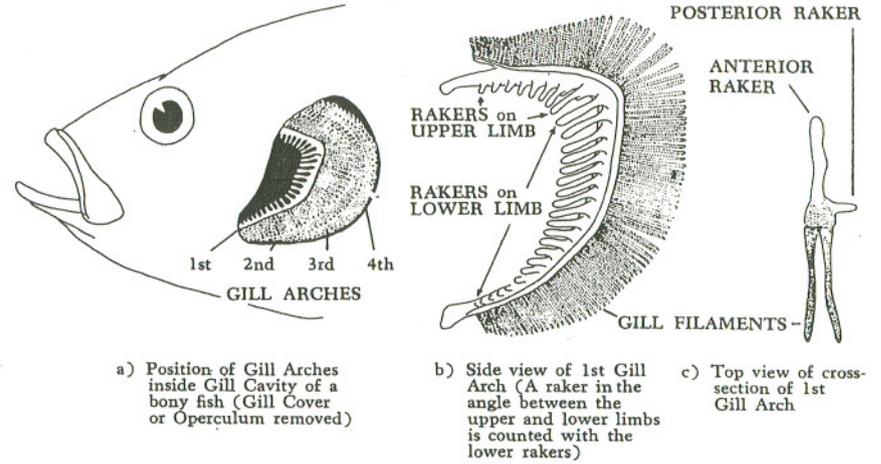


FIGURE 7. Gill rakers and gill arches of a bony fish.

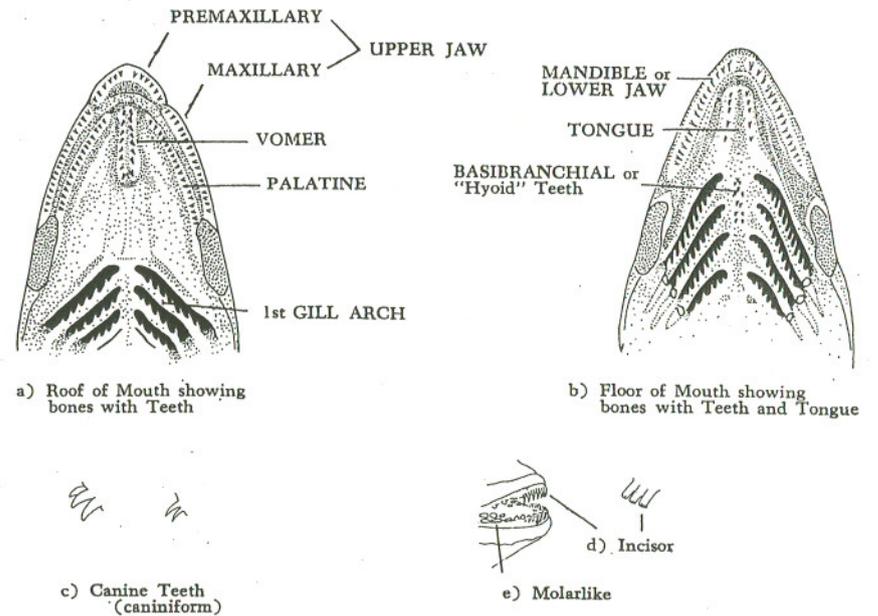


FIGURE 8. Bones and teeth inside mouth or bucal cavity.

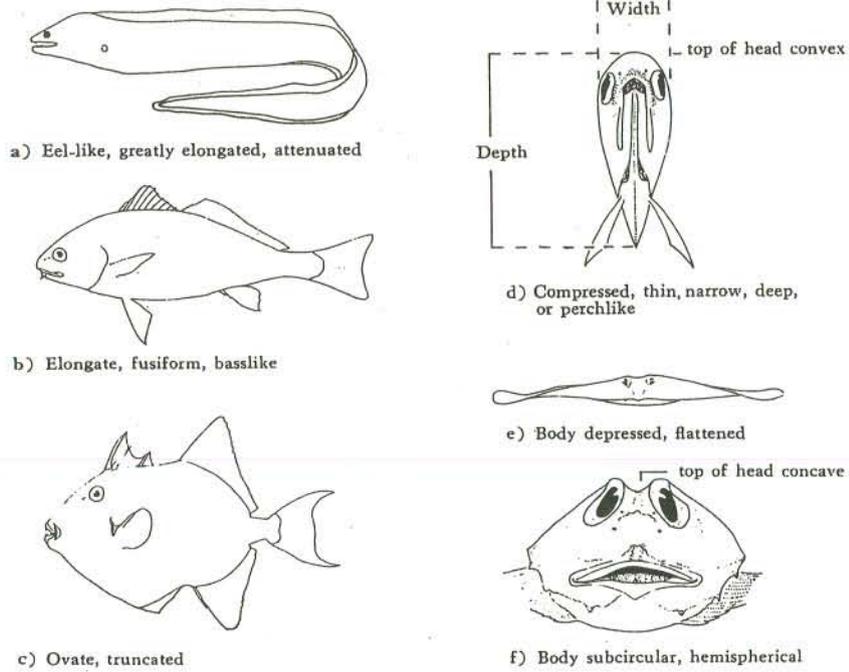


FIGURE 9. Some body forms of fishes.

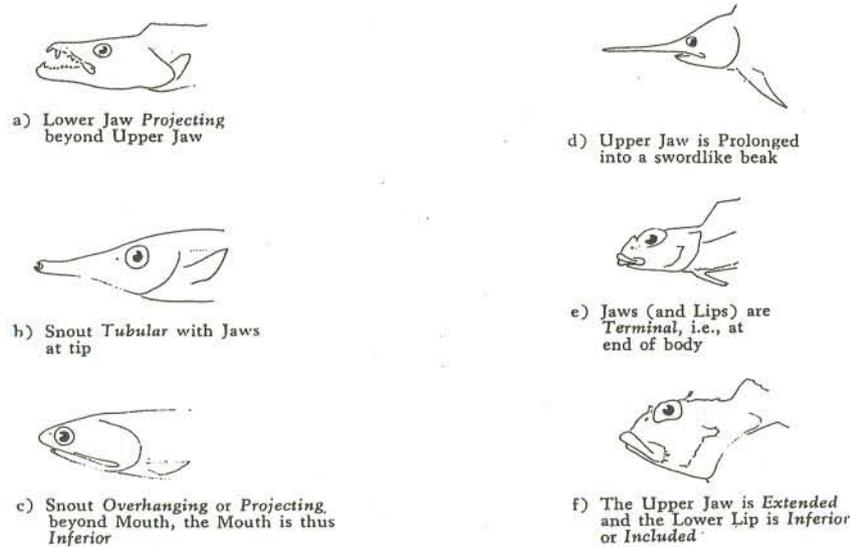
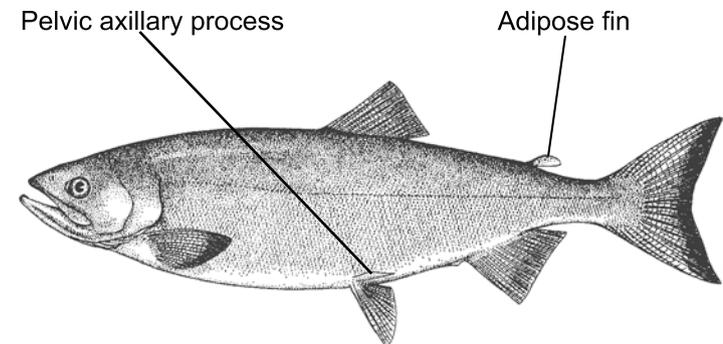


FIGURE 10. Terminology of mouth and snout forms.

KEY TO JAWLESS AND CARTILAGINOUS FISHES ENCOUNTERED IN THE NORTHEAST PACIFIC GROUNDFISHERY (Agnatha and Chondrichthyes)

November 2013

- 1 Mouth without jaws; one median nostril; body more or less cylindrical; no paired fins or scales; 7-15 pore-like gill openings2
- 1 Jaws present; nostrils paired; paired pelvic and/or pectoral fins present; gill openings usually as slits, or covered by a flap-like operculum; body in a wide variety of shapes, with or without scales3

- 2(1) Gill openings 10-15; barbels around mouth and nostrils.....**Myxinidae – Hagfish**



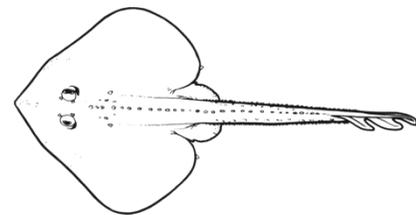
- 2 Gill openings 7; no barbels around mouth and nostrils...**Petromyzontidae – Lampreys**



- 3(1) Gill openings 5 to 7, on sides or underside of head; body without overlapping scales, frequently with rough denticles.....**Chondrichthyes (in part)**4

- 3 One gill opening on each side of head, covered by an operculum8

- 4(3) Body very depressed (flattened vertically); Pectoral fins large, giving the body a horizontal disc shape.....**Rajiformes – Skates**
(see separate key)

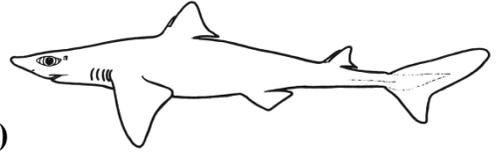


- 4 Body round in cross section; pectoral fins do not define the shape of the body as a disc.....**Elasmobranchii – Sharks**5

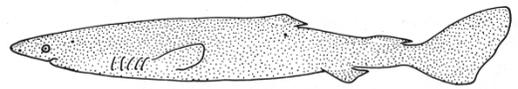
5(4) Anal fin absent (no ventral fin posterior to anus)...**Squalidae – Dogfish sharks**...6

5 Anal fin present.....7

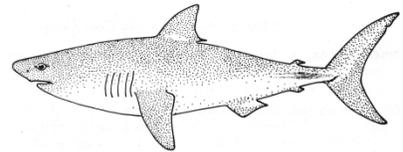
6(5) Spine at origin of each dorsal fin; first dorsal fin larger than second; pectoral fins large and pointed; caudal fin with two distinct lobes.....
.....**Spiny Dogfish (*Squalus acanthias*)**



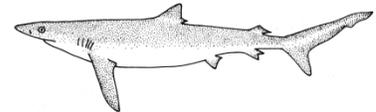
6 No spine at origin of dorsal fins; first and second dorsal fin about same size; pectoral fins small and rounded; caudal fin flap-like, without two distinct lobes.....**Pacific Sleeper Shark (*Somniosus pacificus*)**



7(5) Robust, heavy body; head somewhat cone-shaped; upper and lower caudal lobes nearly equal in size; pectoral fins short and broad.....**Salmon Shark (*Lamna ditropis*)**



7 Slender, elongate body; head flattened; upper caudal lobe significantly larger than lower lobe; pectoral fins long and narrow.....**Blue Shark (*Prionace glauca*)**



8(3) Operculum without bones; first dorsal fin with long, sharp spine; teeth fused to form a grinding plate; mouth inferior; caudal fin continuing to a point.....**Spotted Ratfish (*Hydrolagus colliciei*)**

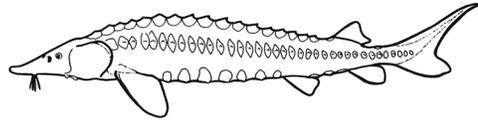


8 Operculum a bony flap; fins erectile and flexible, supported by rays that are usually joined by membranes..... **Osteichthyes – Bony fishes**
(next page)

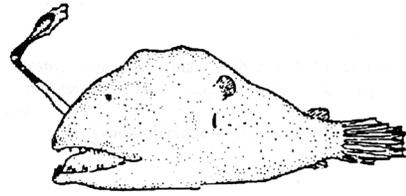
KEY TO FAMILIES OF BONY FISHES ENCOUNTERED IN THE NORTHEAST PACIFIC GROUNDFISHERY (Osteichthyes)

November 2013

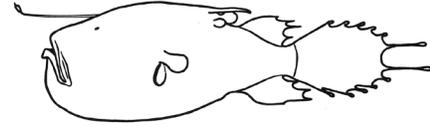
- 1 Caudal fin with dorsal lobe supported by an upward extension of the vertebral column and distinctly larger than ventral lobe; five well-separated rows of bony plates arranged longitudinally along body; mouth inferior, protrusible, preceded by 4 prominent barbels in a transverse row **Acipenseridae** – Sturgeons
- 1 Caudal fin not with an obviously enlarged dorsal lobe supported by vertebral column; without 5 rows of bony plates along body; mouth not preceded by 4 barbels 2
- 2(1) Body compressed asymmetrically with both eyes on same side of head and eyed side of body more strongly pigmented..... **Flatfishes** (see separate key)
- 2 Body shape variable but symmetrical; one eye on each side of head; color similar on both sides 3
- 3(2) A movable, jointed, protrusible organ on anterior part of head modified as a fishing lure 4
- 3 No specialized fishing lure on anterior part of head 5



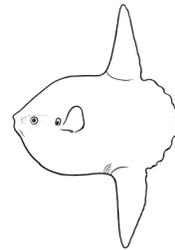
4(3) Size small (< 25 cm); skin smooth.....
Oneirodidae – Dreamers



4 Size large (> 30 cm); skin covered with conical spines.....**Ceratiidae** – Seadevils



5(3) Body truncate (abruptly ending just behind the dorsal and anal fins), laterally compressed and deep; dorsal and anal fins thin, narrow and high; no rayed caudal fin..... **Ocean Sunfish** (*Mola mola*)



5 Body and anal fins not as above; caudal fin (when present) with rays.....6

6(5) Pelvic fins absent or buried in flesh.....7

6 Pelvic fins present (may be small or modified to form a ventral sucking disc).....18

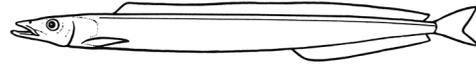
7(6) Body extremely elongate, total length more than 40 times body depth; jaws long and strongly curved.....

Nemichthyidae – Snipe eels



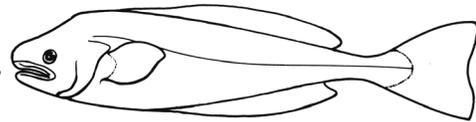
7 Body moderately elongate or not elongate, total length less than 20 times body depth.....8

- 8(7) Lateral line high on body, near dorsal fin; elongate raised fleshy ridge on either side of ventral midline; scales minute; standard length 8-12 times body depth; caudal fin forked (maximum size 26 cm).....**Ammodytidae** – Sand lances



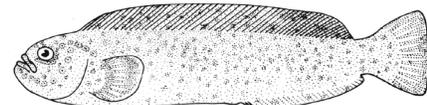
- 8 Lateral line (if present) not near dorsal fin; no raised fleshy ridge on either side of ventral midline; body elongate or not; caudal fin forked or not9

- 9(8) Caudal fin slightly forked; body limp and laterally compressed; skin smooth, scaleless; eye small**Icosteidae** – Ragfish (adult)



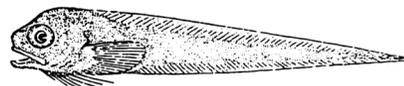
- 9 Caudal fin not forked; body robust and moderately compressed or not compressed.....10

- 10(9) Large conspicuous pores with white borders on head, particularly near jaw and eye; mouth directed upward; fins smooth and rounded; dorsal fin long.....**Zaproridae** – Prowfish



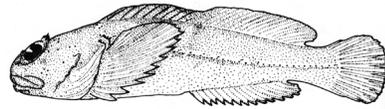
- 10 Pores on head not conspicuous, without white borders; fins not smoothly rounded.....11

- 11(10) Skin loose and delicate; gill openings small and pore-like, not extending below uppermost 15-16 rays of pectoral fin.....**Liparidae** – Snailfishes (in part)



- 11 Skin not loose and delicate; gill openings slit-like and not restricted to level of origin of uppermost 15-16 rays of pectoral fin12

12(11) Body robust; preopercle with hooked spine;
 distinct caudal peduncle.....**Cottidae** – Sculpins
 (in part; see separate key)

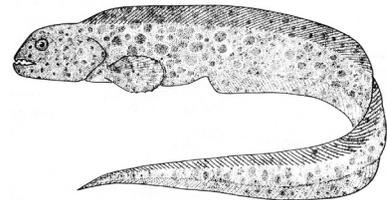


12 No distinct spine on preopercle; body elongate.....13

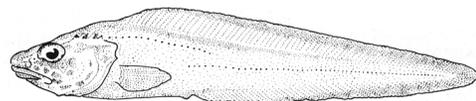
13(12) Caudal fin continuous with dorsal and anal fins; no distinct caudal peduncle; body
 more or less tapering to a point.....14

13 Caudal fin distinct (may be partially attached to dorsal and anal fins); body not
 tapering to a point15

14(13) Teeth large and conical, developed as crushing molars
 at back of mouth; dorsal fin composed entirely of
 spines; body covered with large black spots, on
 juveniles spots edged in white.....**Wolf-eel**
 (*Anarrhichthys ocellatus*)



14 Teeth not as described above; dorsal fin
 composed entirely of soft rays; color
 uniform or speckled with tiny black
 spots.....**Zoarcidae** – Eelpouts (in part)

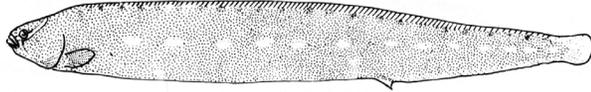


15(13) Teeth developed as large canines in front of mouth,
 and as crushing molars in back.....
Bering Wolffish (*Anarhichas orientalis*)

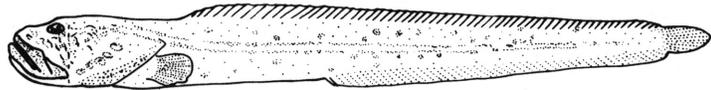


15 Teeth small, not developed as described above.....16

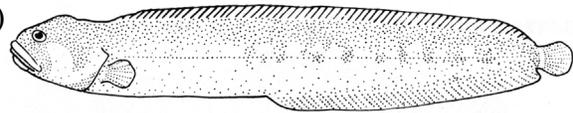
- 16(15)** Lateral line absent; dorsal fin spines soft and flexible; distance from anal fin origin to caudal fin base less than distance from snout to anal fin origin.....**Pholidae** – Gunnels (in part)
- 16** Lateral line(s) 1 to 4, composed of faint pores; dorsal fin spines stiff; distance from anal fin origin to caudal fin base greater than distance from snout to anal fin origin.....**17**



- 17(16)** Mouth strongly upturned, with lower jaw projecting; eyes high on head; pits on side of head and along lower jaw; head depressed, broad, flat on top, without crest of cirri; lateral line 1.....**Cryptacanthodidae** – Wrymouths



- 17** Mouth horizontal or slightly upturned; eyes on side of head; no pits on head or lower jaw; head laterally compressed; lateral lines 1 or 4; species with 1 lateral line also with a crest of cirri on top of head**Stichaeidae** – Pricklebacks (in part)



- 18(6)** Pelvic fins abdominal, with insertion well back on the body (at least 1/3 of distance from pectoral fin to anal fin).....**19**

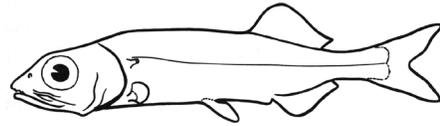
- 18** Pelvic fins thoracic or jugular, with insertion closer to pectoral fin than anal fin**38**

- 19(18)** Photophores or luminescent organs present (may be round or elongate), usually arranged in rows along abdomen and/or along base of anal fin**20**

- 19** Photophores and luminescent organs absent.....**25**

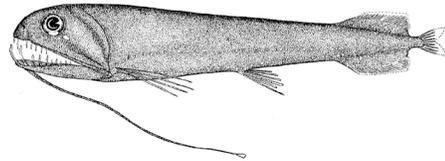
- 20(19) Adipose fin absent.....21
- 20 Adipose fin present23

21(20) Several large photophores forming elongate transverse bars across abdomen; tube-like projection directed posteriorly above pectoral fin.....**Platyroctidae** – Tubeshoulders

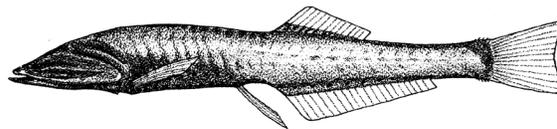


- 21 Photophores small and round or absent; no tubelike projection above pectoral fin22

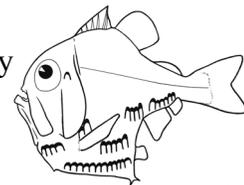
22(21) Teeth in jaws prominent; dorsal fin placed very far back, leaving extremely short caudal peduncle.....**Stomiidae** – Dragonfishes



22 Teeth in jaws small; dorsal fin about mid-body.....
Gonostomatidae – Lightfishes

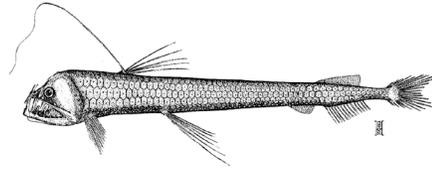


23(20) Body strongly compressed; several series of enlarged, vertically elongate photophores on ventral side of body.....
Sternoptychidae – Hatchetfishes

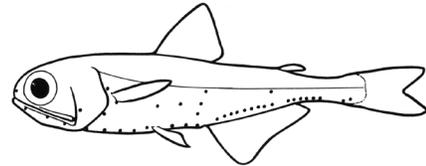


- 23 Body moderately compressed; photophores on sides of body (if present) not enlarged.....24

24(23) Teeth extremely large; dorsal fin placed far forward on body, its first ray greatly prolonged; dorsal and ventral adipose fin present; ventral adipose fin anterior to anal fin; small round photophores arranged in two rows along lower body.....**Chauliodontidae** – Viperfishes



24 Teeth small or moderate in size; dorsal fin about midbody, its first ray not greatly prolonged; ventral adipose fin absent; small round photophores arranged in rows or patches along lower body or on caudal peduncle.... **Myctophidae** – Lanternfishes



25(19) Adipose fin absent.....26

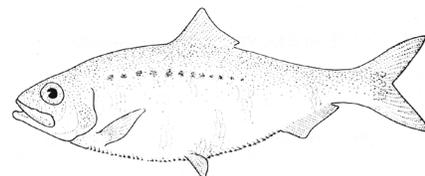
25 Adipose fin present.....29

26(25) Pelvic fin anterior to dorsal fin; mouth very large and inferior; upper jaw longer than lower jaw...
Northern Anchovy (*Engraulis mordax*)



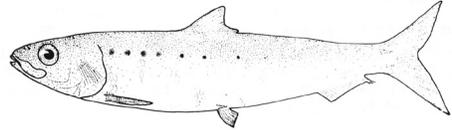
26 Pelvic fin below dorsal fin; mouth moderate in size, terminal – (Herrings).....27

27(26) Body deep and compressed; ventral scutes with strong bony keel; a row of dark spots on body.....
American Shad (*Alosa sapidissima*)

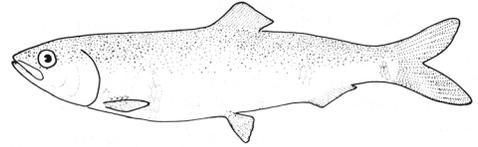


27 Body elongate, nearly cylindrical; ventral scutes with weak keel or fine points...28

28(27) One or two rows of dark spots on body; ventral scutes with fine points; last anal ray elongate.....
Pacific Sardine (*Sardinops sagax*)



28 No spots on body; ventral scutes without points; last anal ray not elongate.....
Pacific Herring (*Clupea harengus*)

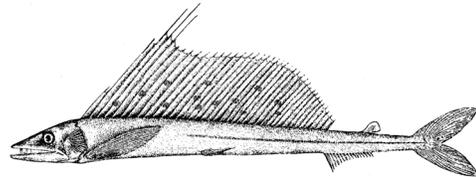


29(25) Dorsal fin absent; mouth very large, with strongly projecting lower jaw and prominent symphyseal knob; 8-10 large dagger-like teeth in two rows on palatine, numerous smaller teeth on premaxillary and mandible
Anotopteridae – Daggertooshs



29 Dorsal fin present; mouth small or large, but without strongly projecting lower jaw; prominent symphyseal knob absent; 2-4 large dagger-like teeth on palatine, or dagger-like teeth absent.....30

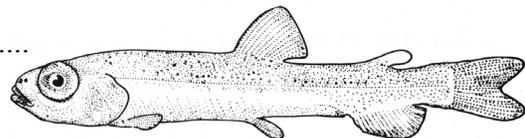
30(29) Dorsal fin sail-like (with long base and very long rays), brittle and easily damaged; teeth prominent.....
Alepisauridae – Lancetfishes



30 Dorsal fin not sail-like (with moderate base and rays)31

31(30) Eye relatively small, diameter less than 1/3 head length32

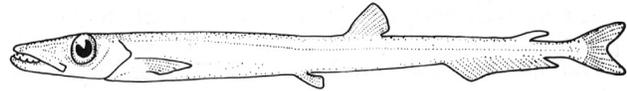
31 Eye large, diameter about 1/3 head length.....
Bathylagidae – Deepsea smelts



32(31) Anus well forward of anal fin, just behind pelvic fins; body slender; head narrow and pointed.....33

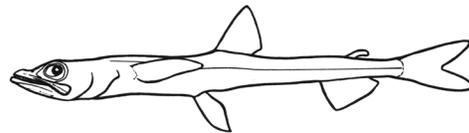
32 Anus directly anterior to anal fin; body robust or slender; head blunt or moderately pointed.....34

33(32) Head laterally compressed; interorbital width much less than body depth; eye round; anal fin with 20-50 rays.....



Paralepididae – Barracudinas

33 Head nearly round in cross-section; interorbital width nearly equal to body depth; eye oval; anal fin with fewer than 20 rays.....

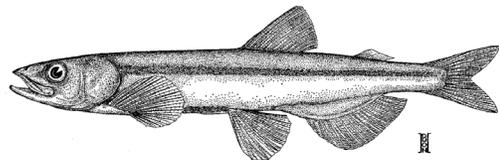


Notosudidae – Paperbones and Waryfishes

34(32) Pelvic axillary process present..... **Salmonidae** – Salmon and Trouts (see separate key)

34 Pelvic axillary process absent – (Smelts).....35

35(34) Adipose fin rectangular, attached along its entire length; teeth small, of uniform size; scales very small, more than 170 along lateral line.....

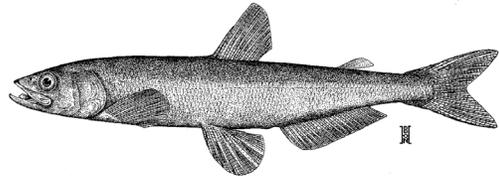


Capelin (*Mallotus villosus*)
Strait of Juan de Fuca to Bering Sea

35 Adipose fin rounded, attached only in front; teeth small to large, canines may be present or absent; scales moderate, fewer than 80 along lateral line36

36(35) Opercle with distinct striations; pelvic fin origin anterior to dorsal fin origin; gill rakers less than 25.....

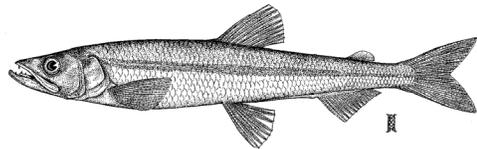
Eulachon (*Thaleichthys pacificus*)
 Monterey Bay to Bering Sea



36 Opercle without striations; pelvic fin origin posterior to dorsal fin origin; gill rakers more than 25.....37

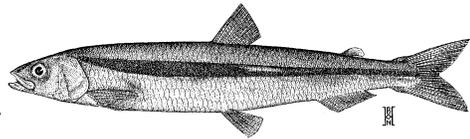
37(36) Mouth large, maxilla extending to posterior margin of eye; 2 large canine teeth on roof of mouth, teeth on tongue.....

Rainbow Smelt (*Osmerus mordax*)
 Vancouver to Bering Sea

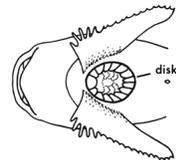


37 Mouth small, maxilla not extending beyond mid-eye; canine teeth absent, teeth small and of uniform size.....

Surf Smelt (*Hypomesus pretiosus*)
 Southern California to Gulf of Alaska

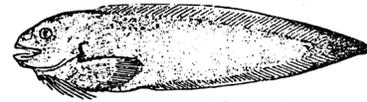


38(18) Pelvic fins fused, modified to form adhesive disc.....39

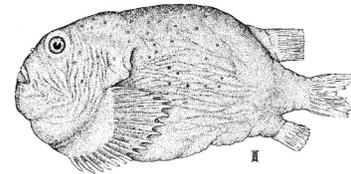


38 Pelvic fins separate, not modified to form adhesive disc.....40

39(38) Caudal fin continuous with dorsal and anal fins, may or may not taper to a point; no distinct caudal peduncle; body laterally compressed from anus to caudal fin; skin loose, with underlying flesh soft and gelatinous; pelvic disk may be small and/or obscured by lower pectoral fin rays.....**Liparidae** – Snailfishes (in part)



39 Caudal fin not continuous with dorsal and anal fins; caudal peduncle distinct; body not laterally compressed but spherical; skin may be covered with large conical tubercles; pelvic disk large.....**Cyclopteridae** – Lumpsumbers

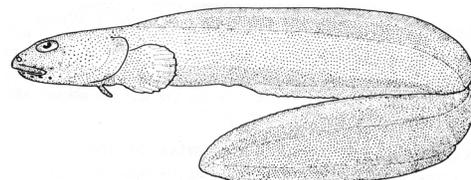


40(38) Dorsal and anal fins continuous with caudal fin.....**41**

40 Dorsal and anal fins not continuous with caudal fin.....**43**

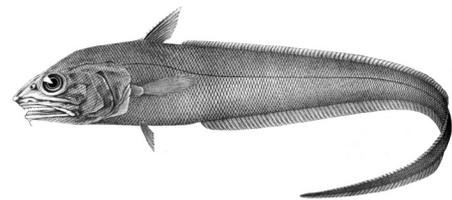
41(40) Two dorsal fins; single barbel on lower jaw.....**42**

41 One dorsal fin; barbel on lower jaw absent....**Zoarcidae** – Eelpouts (in part)



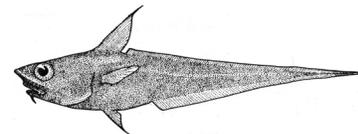
42(41) Pelvic fin short, not extending to anus; mouth large, with maxilla extending to or beyond posterior margin of eye.....

Giant Grenadier (*Albatrossia pectoralis*)
Baja California to Bering Sea, Russia, Japan

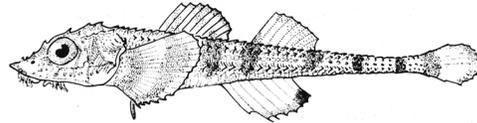


42 Pelvic fin elongate, extending to or beyond anus; mouth small to medium, with maxilla not extending to posterior margin of eye.....

Macrouridae – Rattails or Grenadiers



43(40) Body completely encased in bony plates.....**Agonidae** – Poachers



43 Body not completely encased in bony plates, although rows of bony or horny plates may be present.....44

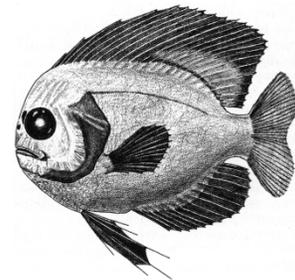
44(43) Three separate dorsal fins; two separate anal fins**Gadidae** – Cods
(see separate key)

44 One or two dorsal fins; one anal fin.....45

45(44) A single dorsal fin (or two connected dorsal fins)46

45 Two separate dorsal fins59

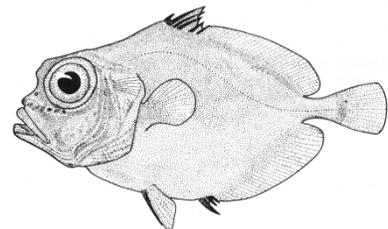
46(45) Second and subsequent spines of dorsal fin greatly elongated, forming mane extending nearly to caudal fin (dorsal and anal fin may be recessed into a sheath along the sides of the fin); pelvic fin rays greatly elongate; snout blunt.....**Caristiidae** – Manefishes



46 Dorsal fin not modified as above; pelvic fins may be elongate or not; snout blunt or otherwise.....47

47(46) Eye round and very large, its diameter more than 1/3 head length; body strongly compressed; juveniles with rows of horny protuberances on body.....

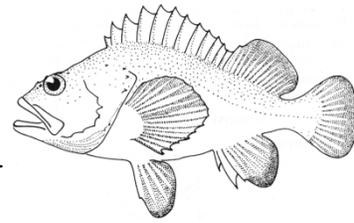
Oreosomatidae – Oreos



47 Eye diameter less than 1/3 head length or oval; no horny protuberances on body.....48

48(47) Dorsal fin with 12-17 (rarely 19) stiff spines; anal fin with 3 spines, the second usually more robust and longer than the others; body deep and robust; spines on preopercle, opercle, and usually elsewhere on head...

Scorpaenidae – Rockfishes and Thornyheads
(see separate key)



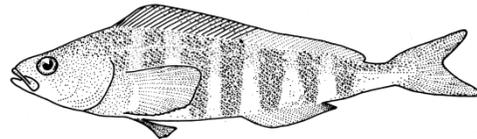
48 Fishes not as described above**49**

49(48) Caudal fin deeply forked.....**50**

49 Caudal fin rounded, truncate, or slightly forked.....**52**

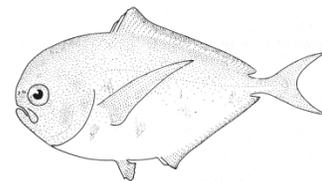
50(49) Five lateral lines; body with green and yellow vertical bars.....

Hexagrammidae (in part) – Atka Mackerel
(*Pleurogrammus monoptyerius*)

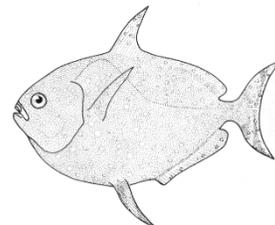


50 One lateral line; body without vertical bars.....**51**

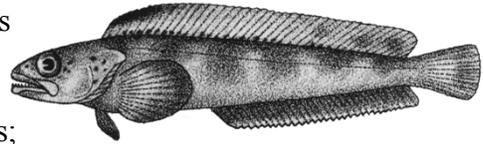
51(50) Color uniform gray or brown (including fins); lateral line with a curve over the pectoral fin; size moderate (< 1 meter).....**Bramidae** – Pomfrets



51 Color gray with white spots, fins bright red; lateral line with a high arch almost reaching the dorsal fin; often very large (> 1 meter).....**Lampridae** – Opahs



52(49) Body completely covered with scales; conspicuous small pores on top of head and/or preopercle; caudal fin completely separate from dorsal and anal fins; dorsal fin of soft flexible spines and rays; dorsal and anal fins long, smoothly rounded, and of consistent height.....**Bathymasteridae** – Ronquils and Searchers



52 Body and fins not as described above.....53

53(52) Body elongate and laterally compressed, total length 7 or more times body depth; spines and rays of dorsal and anal fins nearly equal in length.....54

53 Body robust and round in cross-section or compressed and deep, total length 5 times body depth or less; spines and rays of the dorsal and/or anal fins of variable length.....55

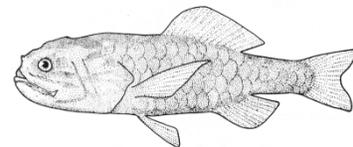
54(53) Pelvic fins small, with 1 spine and 3-4 soft rays; dorsal fin with stout, sharp spines; distance from snout to anus usually less than distance from anus to caudal fin base**Stichaeidae** – Pricklebacks (in part)



54 Pelvic fins minute, with 1 spine and 1 soft ray; dorsal fin with soft flexible spines; distance from snout to anus usually greater than distance from anus to caudal fin base **Pholidae** – Gunnels (in part)



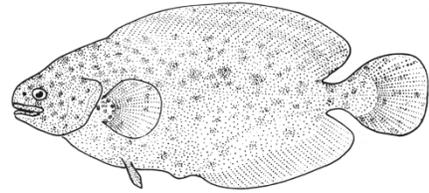
55(53) Lateral line absent; dorsal fin with short base, placed well back on body; head heavily sculptured with ridges, crests, and spines...**Melamphaidae** – Bigscales



55 At least one lateral line present; dorsal fin with long base; head not heavily sculptured, although spines and cirri may be present on head.....56

56(55) Dorsal and anal fins composed entirely of soft rays; caudal fin rounded; body deep and laterally compressed; single lateral line on each side.....

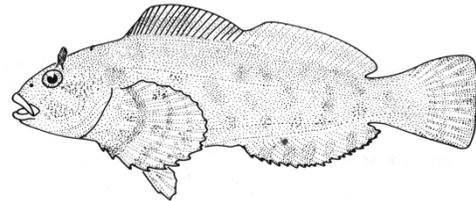
Icosteidae – Ragfish (immature)



56 Dorsal fin composed of spines and soft rays; caudal fin truncate; body generally cylindrical, not compressed; one to five lateral lines on each side.....**57**

57(56) Four or five lateral lines on each side.....

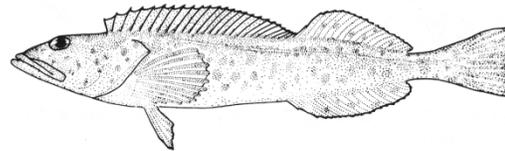
Hexagrammidae – Greenlings (in part)



57 One lateral line on each side**58**

58(57) Body completely covered with scales; spines in fins soft and flexible; head without spines; mouth large, with large conical teeth.....

Hexagrammidae (in part) – Lingcod
(*Ophiodon elongatus*)



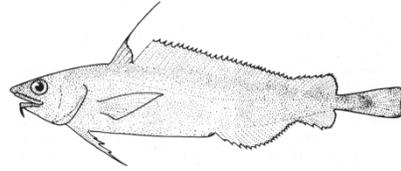
58 Scales reduced to tiny spines (spinules) or arranged in distinct rows; dorsal fin with 6-17 spines, often stout and sharp; gill cover and head usually with spines, frequently well developed; teeth never large and conical.....

..... **Cottidae** – Sculpins (in part)
(see separate key)

59(45) Second dorsal fin and anal fin clearly indented**60**

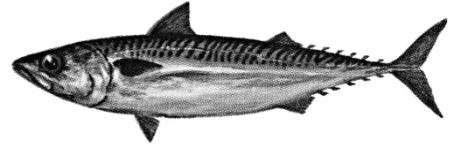
59 Second dorsal fin and anal fin not clearly indented (finlets or spines separated from soft rays may be present).....**61**

60(59) First ray of dorsal and pelvic fins elongate, much longer than other rays; mouth strongly inferior; elongate rostrum projecting back below eye as a prominent ridge.....**Moridae** – Pacific Flatnose (*Antimora microlepis*)



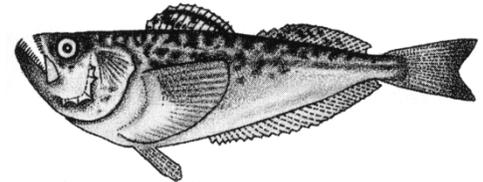
60 First ray of dorsal and pelvic fins not elongate; mouth not strongly inferior**Merlucciidae** – Hake (see separate key)

61(59) Second dorsal and anal fin followed by 5 or more finlets; second dorsal fin shorter than first..**Scombridae** – Mackerels and Tunas



61 No finlets following second dorsal or anal fin.....62

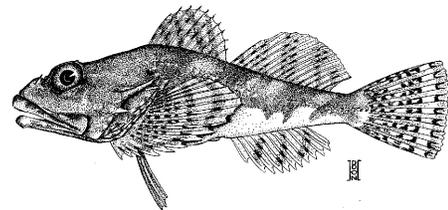
62(61) Fleshy fringes on both lips; body compressed and deep; mouth directed upward.....**Trichodontidae** – Sandfishes



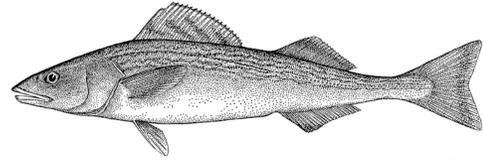
62 No fringes on lips; body round in cross-section; mouth nearly horizontal.....63

63(62) No spines or cirri on head; pectoral fin base approximately vertical, not extending anteriorly below opercle64

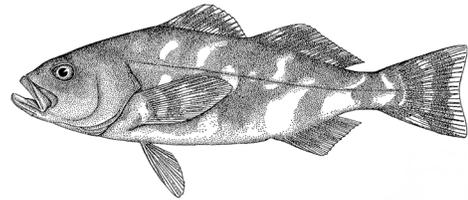
63 Spines and/or cirri usually present on head; pectoral fin base extending anteriorly below opercle.....**Cottidae** – Sculpins (in part) (see separate key)



64(63) Color uniformly gray to black, without blotches; dorsal fins separated by more than twice eye diameter; second dorsal-fin base approximately equal in length to anal-fin base.....**Sablefish**
(*Anoplopoma fimbria*)



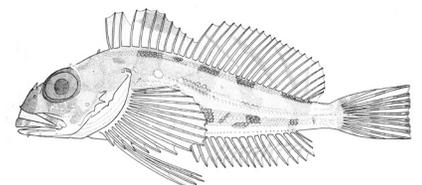
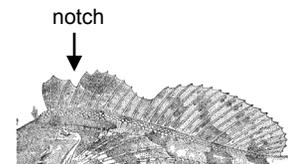
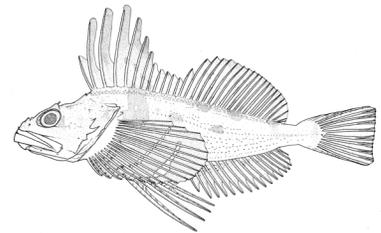
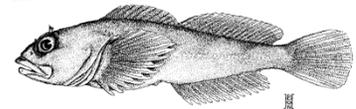
64 Color gray to black with conspicuous white blotches and spots; dorsal fins very close together, separated by less than eye diameter; second dorsal-fin base clearly longer than anal-fin base.....**Skilfish**
(*Erilepis zonifer*)



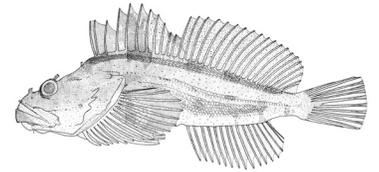
KEY TO SELECTED NORTH PACIFIC SCULPINS

Figures from *Pacific Fishes of Canada* (1973) and *Fishes of Alaska* (2002)
October 2013

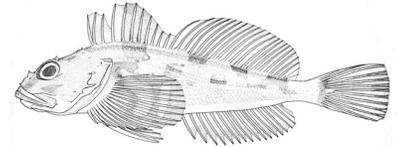
- 1 Spinous and soft dorsal fins broadly connected.....2
- 1 Spinous and soft dorsal fins separate or adjacent6
- 2(1) Broad band of scales (3-8 rows) at base of dorsal fin and another band below lateral line ..
(*Hemilepidotus*).....3
- 2 Scales not arranged in two broad bands..... **Cottidae sp.**
- 3(2) Third dorsal-fin spine longer than second; dorsal scale band consisting of 3-4 rows of scales; scales of ventral band much smaller than those of other bands; spinous dorsal fin not distinctly notched in females, with two deep notches in males..
..... **Butterfly Sculpin (*Hemilepidotus papilio*)**
North of Pribilofs only
(max length: 40 cm; max weight: <2 kg)
- 3 Third dorsal-fin spine equal to or shorter than second; dorsal scale band consisting of 4-8 rows of scales; scales of ventral band approximately the same size as other bands; spinous dorsal fin distinctly notched.....4
- 4(3) Anal scale row present as a single row of scales directly above anal fin; pelvic fins elongate in mature males
..... **Longfin Irish Lord (*Hemilepidotus zapus*)**
Aleutian Islands only
(max length: 29 cm; max weight: <2 kg)
- 4 Anal scale row absent; pelvic fins not elongate.....5



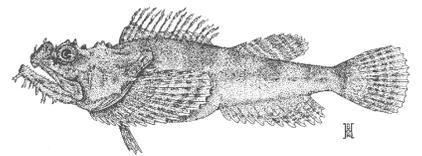
5(4) Color generally red to brown; branchiostegal membranes and lower body peppered with small brown spots.....
 **Red Irish Lord (*Hemilepidotus hemilepidotus*)**
 Gulf of Alaska, eastern Aleutian Islands, southern Bering Sea
 (max length: 51 cm; max weight: <2 kg)



5 Color generally yellow to brown, occasionally with red blotches; branchiostegal membranes and lower body uniform white to yellow.....
 **Yellow Irish Lord (*Hemilepidotus jordani*)**
 Western Gulf of Alaska, Aleutian Islands, Bering Sea
 (max length: 53 cm; max weight: 2.4 kg)



6(1) *Entire head and body covered with minute prickles*; head large, broad and depressed, with numerous cirri
 **Bigmouth Sculpin (*Hemitripterus bolini*)**
 Gulf of Alaska, Aleutian Islands, Bering Sea
 (max length: 82 cm; max weight: 13.2 kg)



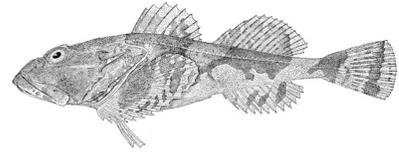
6 Head and body not entirely covered with minute prickles, or, if covered with minute prickles then head small, narrow and compressed.....7

7(6) Upper preopercular spine long, relatively straight, nail-like8

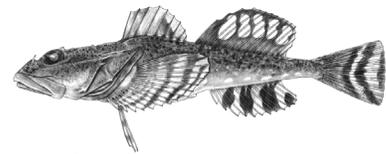
7 Upper preopercular spine short, hooked, serrated, or branched10

8(7) Round, stellate scales with numerous minute spines present above lateral line.....9

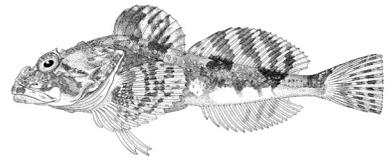
8 Stellate scales absent above lateral line
..... **Great Sculpin (*Myoxocephalus polyacanthocephalus*)**
Western Gulf of Alaska, Aleutian Islands, Bering Sea
(max length: 82 cm; max weight: 9.9 kg)



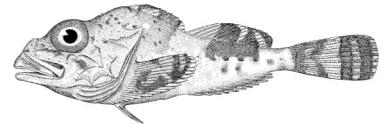
9(8) Bands on caudal fin continuous; dorsal surface of body with irregular dark spots and blotches, not bands or saddles; ventral surface not brightly colored
..... **Plain Sculpin (*Myoxocephalus jaok*)**
Western Gulf of Alaska, Bering Sea
(max length: 60 cm; max weight: 3.6 kg)



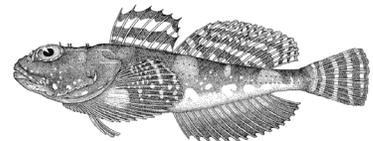
9 Bands on caudal fin interrupted; dorsal surface of body with prominent dark saddles; ventral surface often brightly colored (may be yellow, orange, or green)
..... **Warty Sculpin (*Myoxocephalus verrucosus*)**
Bering Sea only
(max length: 58 cm; max weight: 2.9 kg)



10(7) Skin on body loose, without conspicuous scales, prickles, or cirri; upper preopercular spine short and straight
..... **Darkfin Sculpin (*Malacocottus zonurus*)**
Gulf of Alaska, Aleutian Islands, Bering Sea
(max length: 29 cm; max weight: 0.74 kg)



10 Skin on body not as described above; skin tight, with scales, prickles or cirri; upper preopercular spine elongate, hooked, or branched..... **Cottidae sp.**



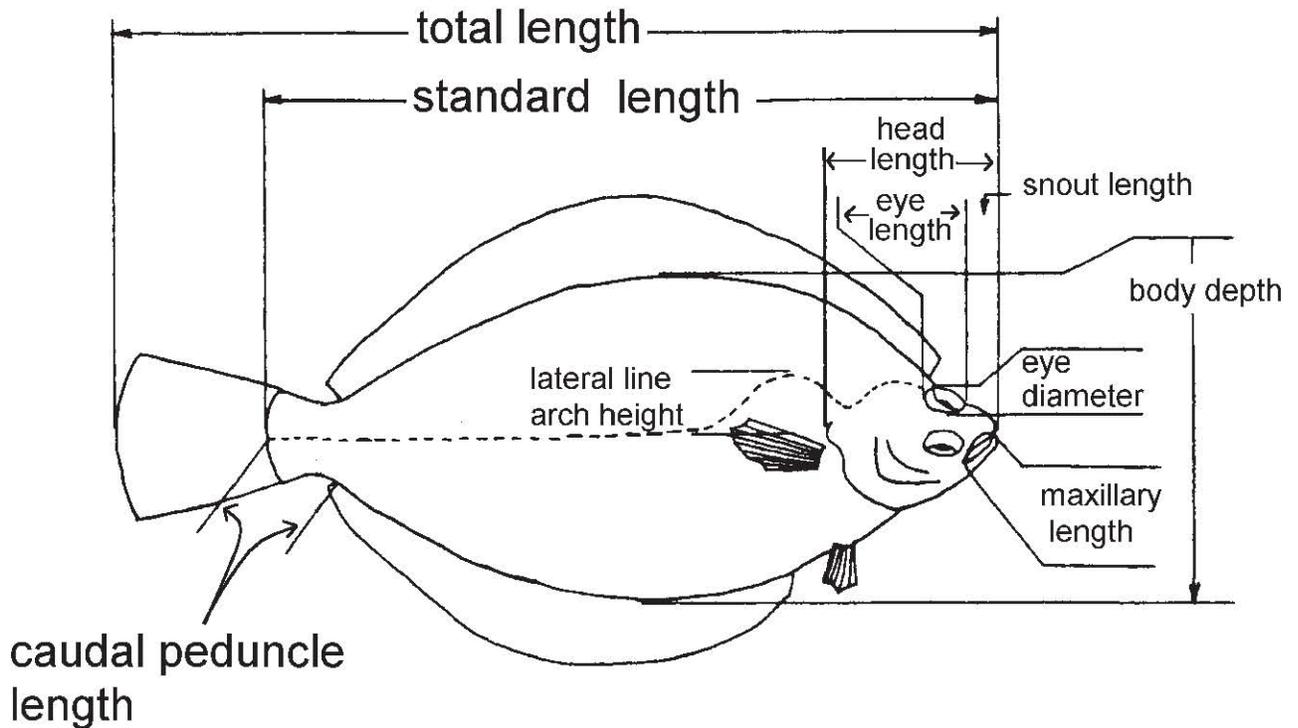
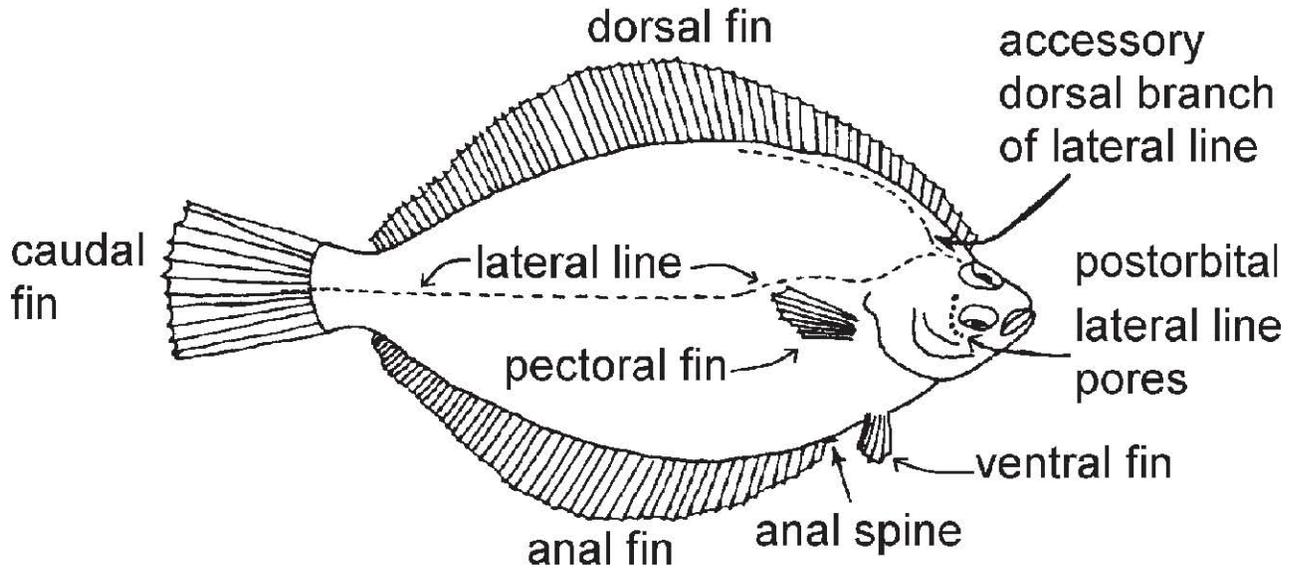
KEY TO THE FLATFISHES OF ALASKA

Original version by

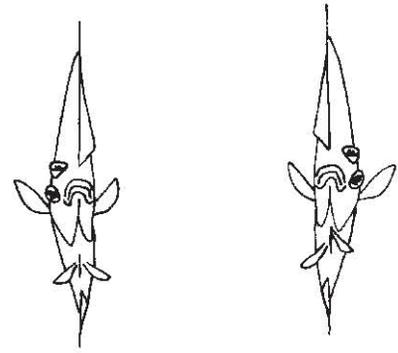
J. W. Orr, D. C. Baker, and M. A. Brown

Figures from *A Systematic Monograph of the Flatfishes* (Norman, 1934)

October 2013



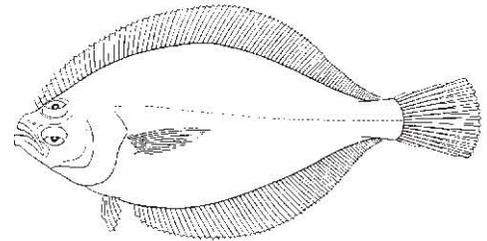
- 1 Eyes typically on right side of head; pelvic fins symmetrically placed along abdominal ridge.
Right-eyed Flounders
Family Pleuronectidae.....2



Pleuronectidae

Bothidae

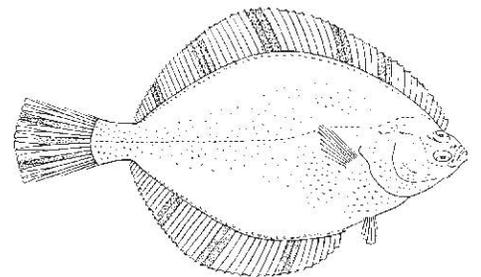
- 1 (1) Eyes typically on left side of head; pelvic fins asymmetrically placed along abdominal ridge; large, maximum total length to 41 cm.
Left-eye Flounders
Family Bothidae
Pacific Sanddab
Citharichthys sordidus
 Bering Sea to Central California



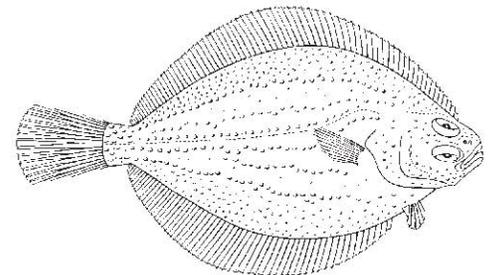
- 2 (1) Large tuberculate scales appearing as star-shaped or round bony knobs on large areas of eyed side.....3

- 2 Large tuberculate scales typically absent but may be present on anterior portion of eyed side.....4

- 3 (2) Dorsal, anal, and caudal fins with bold black and white or yellow stripes; scattered, star-shaped tuberculate scales on both eyed and blind sides; often left-eyed.
Starry Flounder
Platichthys stellatus
 Arctic to Southern California



- 3 All fins uniformly brown; eyed side completely covered with rounded tuberculate scales, largest in 6 vague rows, blind side smooth; uncommon, deep-water.
Roughscale Sole
Clidoderma asperrimum
 Bering Sea to Oregon

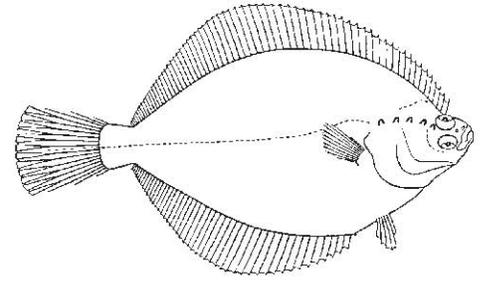


4 (2) Eyed side with 4 to 7 large bony cones behind upper orbit; blind side bright yellow.

Alaska Plaice

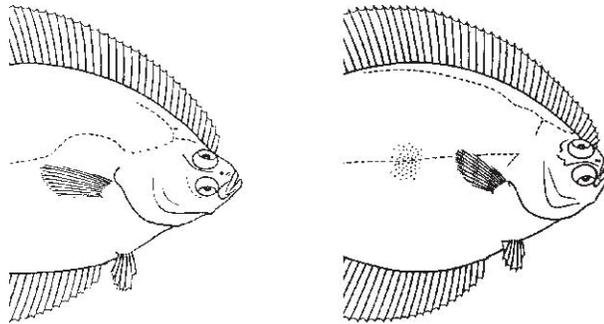
Pleuronectes quadrituberculatus

Bering Sea to Southeast Alaska



4 Eyed side without large bony cones; blind side not bright yellow (except in Longhead Dab) 5

5(4) Accessory dorsal branch (ADB) of the lateral line present 19

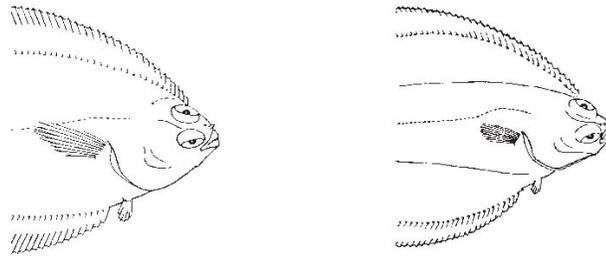


5 Accessory dorsal branch (ADB) absent 6

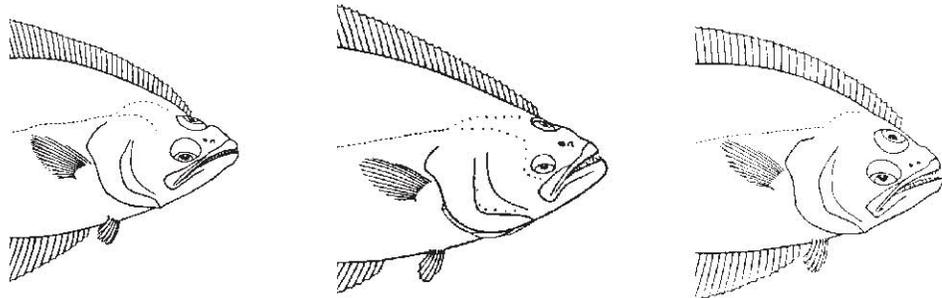
6(5) Anal spine present, can be felt just anterior to anal fin base 11

6 Anal spine absent, cannot be felt just anterior to anal fin base 7

7(6) Mouth small, maxilla does not extend to mid-orbit; teeth small..... 10

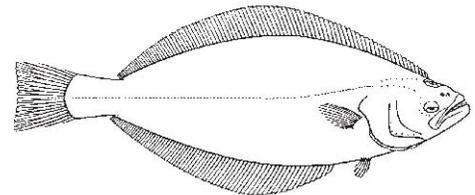


7 Mouth large, maxilla extends to mid-orbit or beyond; teeth large..... 8



8 (7) Preopercle "L"-shaped; dorsal fin origin posterior to orbit; scales small and smooth; prominent, fang-like teeth on roof of mouth; blind side dark grey, with light speckling.

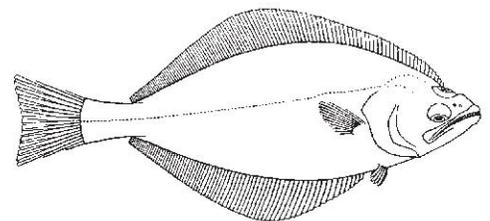
Greenland Turbot
Reinhardtius hippoglossoides
Arctic to Baja California



8 Preopercle rounded; dorsal fin origin anterior to orbit or at midorbit; scales large and rough; no prominent teeth on roof of mouth; blind side off-white..... 9

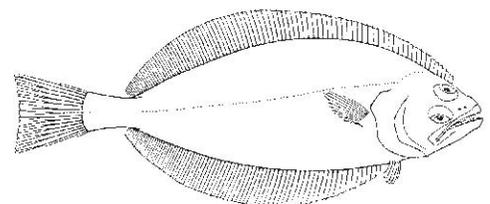
9 (8) Eye embedded on dorsal ridge, visible from blind side; gill rakers: total count on first arch more than 14, count on upper part of second arch = 2.

Arrowtooth Flounder
Atheresthes stomias
Bering Sea to Southern California



9 Eye on side of body, not visible from blind side; gill rakers: total count on first arch less than 14, count on upper part of second arch = 1.

Kamchatka Flounder
Atheresthes evermanni
Bering Sea to Northern Gulf of Alaska

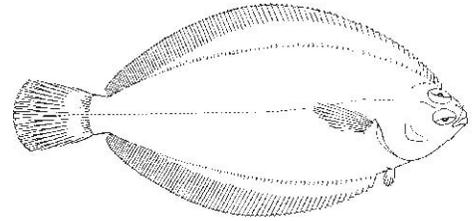


- 10 (7) Caudal fin of moderate size, with posterior margin straight or slightly rounded; caudal peduncle length greater than orbit length; body color pattern brown with dark spots.

Dover Sole

Microstomus pacificus

Bering Sea to Baja California

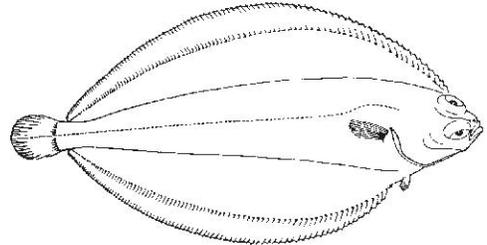


- 10 Caudal fin small and circular; caudal peduncle length less than orbit length; body color pattern mottled.

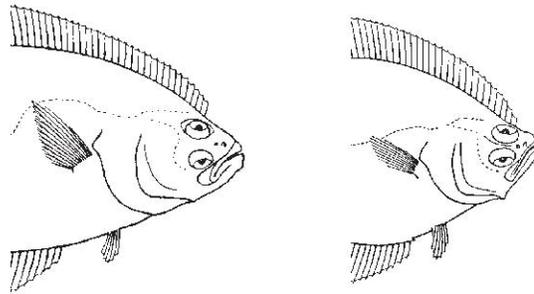
Deepsea Sole

Embassichthys bathybius

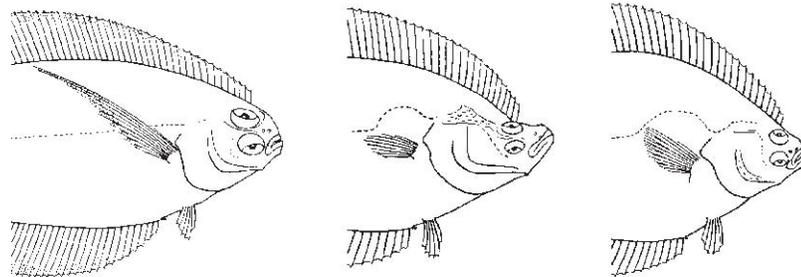
Bering Sea to Southern California



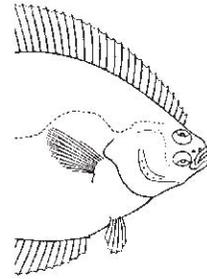
- 11 (6) Mouth moderate to large, maxilla extends to mid-orbit or beyond..... 16



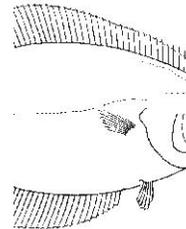
- 11 Mouth small, maxilla does not extend to mid-orbit 12



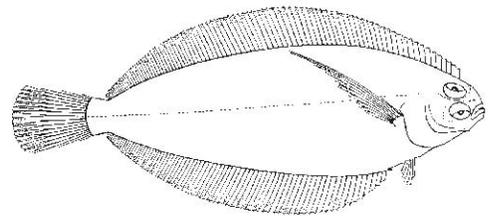
12(11) Lateral line with moderate to high arch over pectoral fin.....14



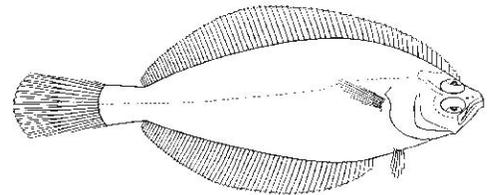
12 Lateral line straight or with slight curve.....13



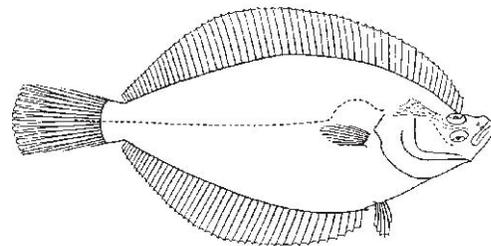
13(12) Pectoral fin black, longer than head length; scales small (< 3 mm), not deciduous, more than 20 scale rows between lateral line and dorsal fin at widest point of body; 5-12 gill rakers on first arch.
Rex Sole *Glyptocephalus zachirus*
 Bering Sea to Baja California



13 Pectoral fin brownish, shorter than head length; scales unusually large (> 3 mm) and deciduous (fall off easily); fewer than 20 scale rows between lateral line and dorsal fin at widest point of the body; 11-14 gill rakers on first arch.
Slender Sole
Lyopsetta exilis
 Northern Gulf of Alaska to Baja California



14(12) Dorsal margin of head strongly concave; blind side bright yellow; head elongate, at least 30% standard length; orbit length less than 20% head length; postocular ridge large and triangular with rough patches.
Longhead Dab
Limanda proboscidea Bering Sea



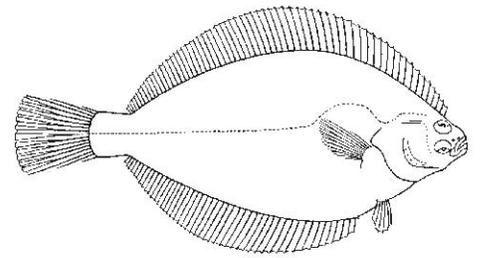
14 Dorsal margin of head convex or slightly concave; blind side white; head length less than 30% standard length; orbit length greater than 20% head length; postocular ridge smooth 15

15 (14) Dorsal and anal fins washed with yellow, black lines at base; blind side snowy white.

Yellowfin Sole

Limanda aspera

Bering Sea to British Columbia

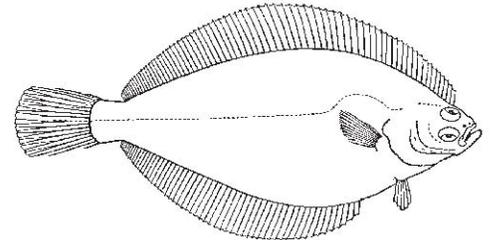


15 Dorsal and anal fins brownish, without black lines at base; blind side off-white.

Sakhalin Sole

Limanda sakhalinensis

Bering Sea

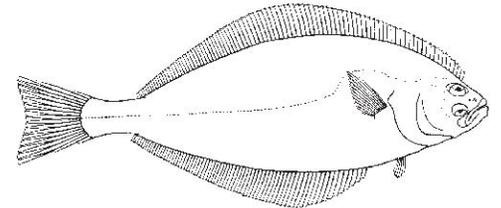


16 (11) Lateral line with high arch over pectoral fin; caudal fin forked or doubly truncate; 16 or more pectoral rays; body shape elongate diamond; white or light brown spots on eyed side in juveniles.

Pacific Halibut

Hippoglossus stenolepis

Bering Sea to Baja California



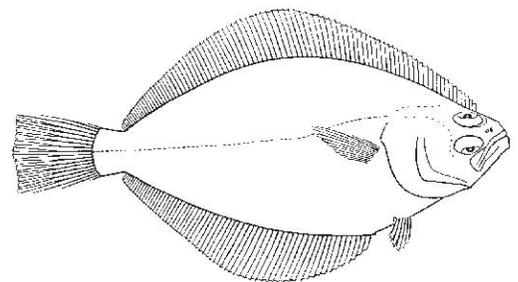
16 Lateral line slightly curved or straight; caudal fin pointed or truncate; less than 16 pectoral rays; body shape elliptical 17

17 (16) Interorbital space wide and flat, with 4 to 5 scale rows; caudal membranes pigmented

Petrale Sole

Eopsetta jordani

Northern Gulf of Alaska to Baja California

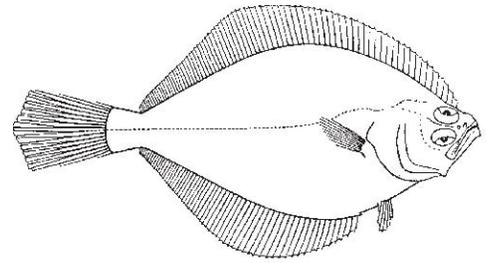


17 Interorbital space narrow with ridge, with 0 to 3 scale rows; caudal membranes unpigmented 18

- 18 (17) Gill rakers: lower part of first arch, more than 14; total count on first arch, 17 or more, typically at least 20.

Flathead Sole

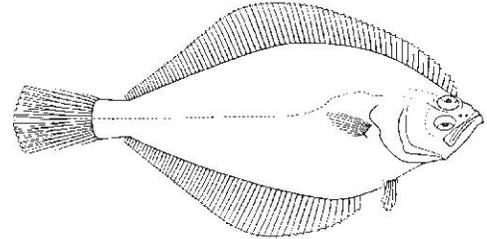
Hippoglossoides elassodon
Bering Sea to Central California



- 18 Gill rakers: lower part of first arch, less than 13; total count on first arch, 17 or less.

Bering Flounder

Hippoglossoides robustus
Bering Sea



- 19 (5) Accessory dorsal branch (ADB) of lateral line extends at least half the standard length; anterior 4-12 dorsal fin rays inserted on blind side....20

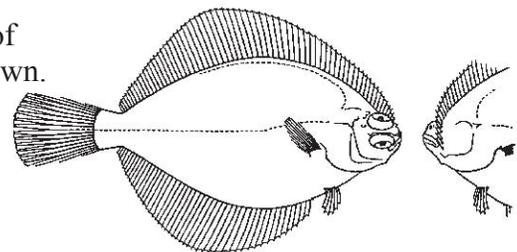


- 19 Accessory dorsal branch (ADB) of lateral line less than half the standard length; anterior portion of dorsal fin not extending onto blind side 21

- 20 (19) Anterior 9-12 dorsal fin rays inserted on blind side; dorsal fin origin directly posterior to end of maxilla; eyed side and caudal fin uniformly brown.

Curlfin Sole

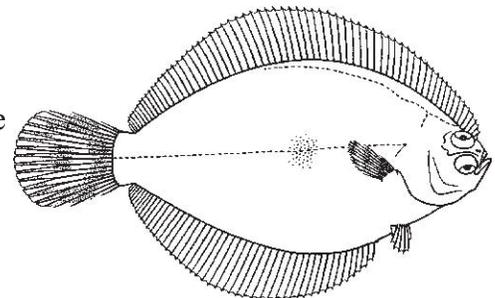
Pleuronichthys decurrens
Southeast Alaska to Baja California



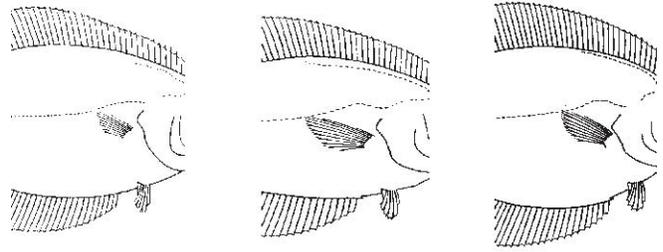
- 20 Anterior 4-6 dorsal rays inserted on blind side; dorsal fin origin directly posterior to upper lip; distinct dark spot at center of body on eyed side; caudal fin with a dark reverse "C" at base and a large dark spot forming an "O."

C-O Sole

Pleuronichthys coenosus
Southeast Alaska to Baja California

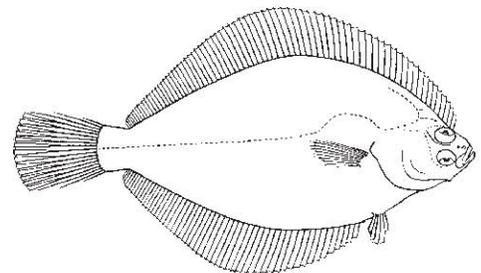


21 (19) Lateral line with straight to low arch; ADB extends to or beyond opercular margin..... 23

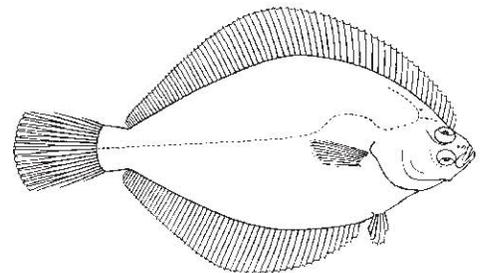


21 Lateral line with high arch over pectoral fin; ADB not extending beyond opercular margin
Rock soles Genus *Lepidopsetta* 22

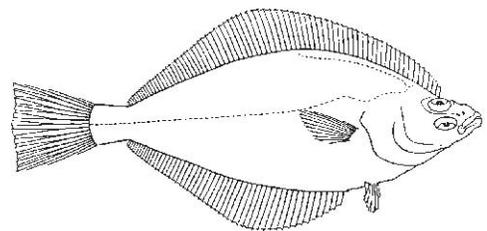
22(21) Gill rakers 7 or more on lower part of first arch, typically slender and pointed; blind side uniform creamy white, without glossy white highlights.
Northern Rock Sole
Lepidopsetta polyxystra
 Bering Sea to Puget Sound



22 Gill rakers 6 or fewer on lower part of first arch, typically broad and blunt; blind side typically with glossy white highlights corresponding to muscle bands, especially on anterior portion of body.
Southern Rock Sole
Lepidopsetta bilineata
 Southern Bering Sea to Baja California
 *Retain any southern rock soles identified in the Bering Sea north of 56°N.



23 (21) Eye visible from blind side; mouth strongly asymmetrical; scales do not extend onto rays of dorsal and anal fins; scales cycloid, giving body a smooth, shiny appearance.
English Sole
Parophrys vetulus
 Bering Sea to Baja California



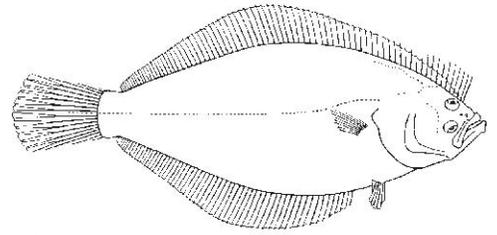
23 Eye not visible from blind side; mouth slightly asymmetrical; scales do extend onto rays of dorsal and anal fins; scales ctenoid, giving body a rough appearance..... 24

- 24 (23)** First 4-8 dorsal rays long and mostly free from membrane; maxilla typically extends to midorbit or beyond; lateral line with slight curve; body medium brown and speckled.

Sand Sole

Psettichthys melanostictus

Southern Bering Sea to Southern California

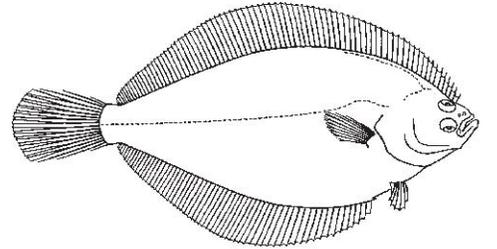


- 24** First 4-8 dorsal rays not long or free from membrane; maxilla typically extends to anterior edge of orbit; lateral line with low arch; body uniform light brown, often with yellowish fins.

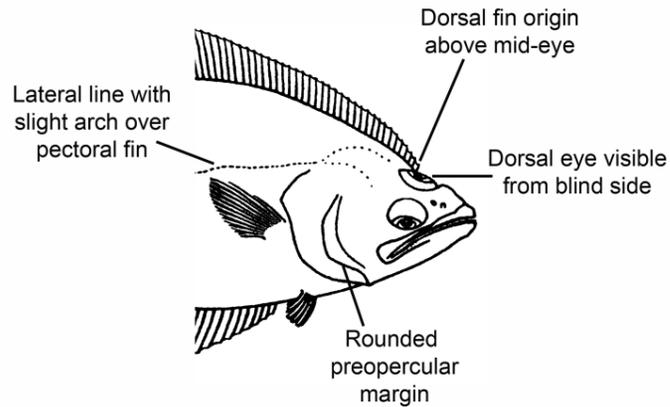
Butter Sole

Isopsetta isolepis

Southern Bering Sea to Southern California

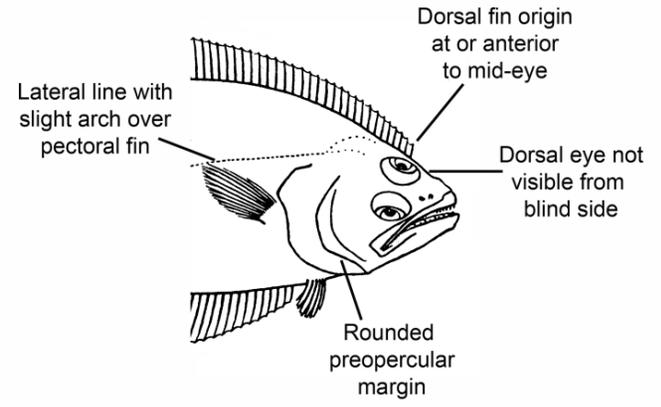


ARROWTOOTH FLOUNDER



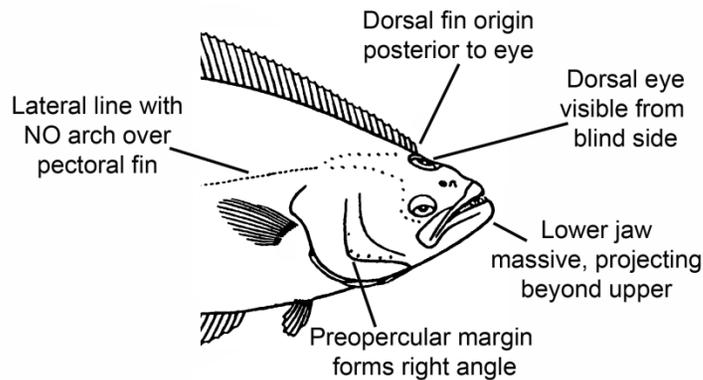
scales relatively large, ragged looking
 blind side off white
 gill rakers on first arch 14-17
 gill rakers on upper part of second arch 2

KAMCHATKA FLOUNDER



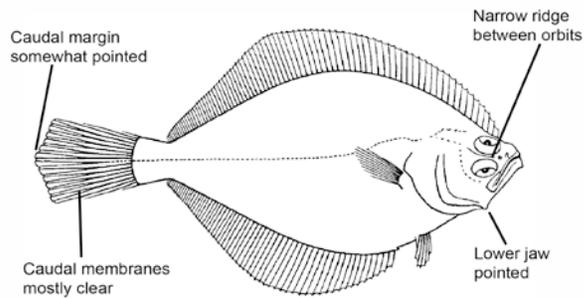
scales relatively large, ragged looking
 blind side off white
 gill rakers on first arch 11-14
 gill rakers on upper part of second arch 1

GREENLAND TURBOT

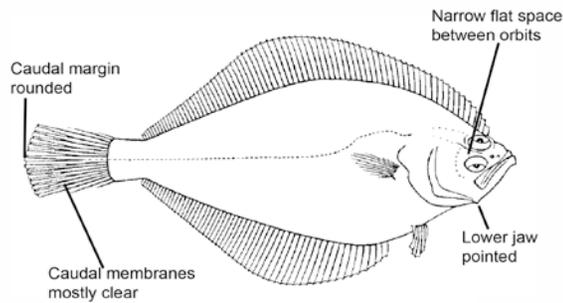


scales relatively small, smooth looking
 blind side dark gray, but variable
 large sharp teeth on roof of mouth

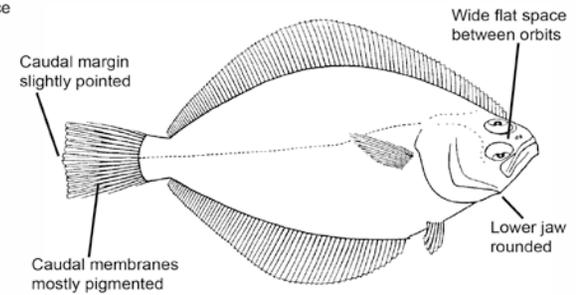
FLATHEAD SOLE



BERING FLOUNDER



PETRALE SOLE



	FLATHEAD SOLE	BERING FLOUNDER	PETRALE SOLE
Gill rakers on first arch	≥ 17	≤ 17	> 17
Gill rakers on lower part of first arch	≥ 14	≤ 14	≥ 14
Geographic range	AI, BS, GOA	BS	GOA
Depth range	0-1000 m	Usually < 100 m	0-500 m
Rows of teeth in upper jaw	1	1	2 (small)

*Gill raker counts are the primary, and most reliable, characteristic for differentiating flathead sole from Bering flounder.

KEY TO THE CODS AND HAKES OF ALASKA

Figures from FAO Species Catalogue, Vol. 10 (1990)
October 2013

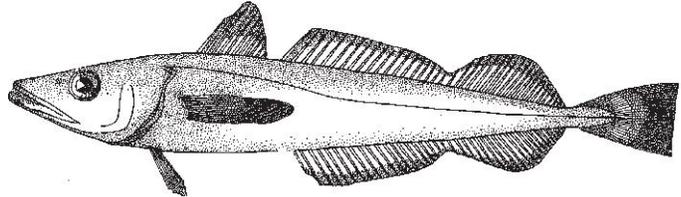
- 1 Dorsal fins 2; anal fins 1; chin barbel absent.

Pacific Hake

Merluccius productus

Gulf of California to Gulf of Alaska

Maximum size: 2.5 kg



- 1 Dorsal fins 3; anal fins 2; chin barbel present, although minute in some species 2

- 2(1) Tip of snout posterior to tip of lower jaw; chin barbel minute, its length much less than pupil length..... 3

- 2 Tip of snout anterior to tip of lower jaw; chin barbel medium to large, its length greater than or equal to pupil length 4

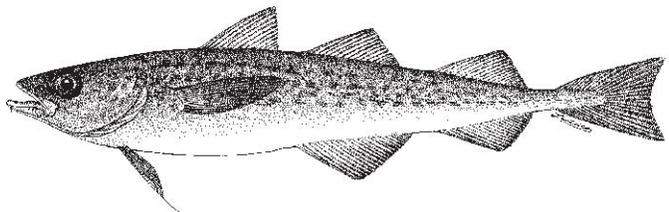
- 3(2) Caudal fin truncate or slightly forked; lateral line interrupted at origin of second dorsal and posterior; body mottled or blotched dorsally; fins grey to brown.

Walleye Pollock

Theragra chalcogramma (Gadus chalcogrammus)

Central California to Bering Sea

Maximum size: 5.2 kg



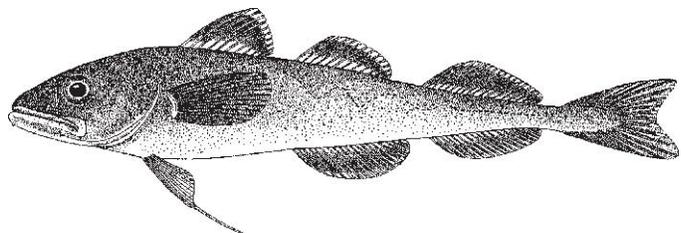
- 3 Caudal fin deeply forked, with rounded lobes; lateral line broken, forming wavy curves; body with small, dark spots dorsally.

Arctic Cod

Boreogadus saida

Bering Sea

Maximum size: <1 kg



4(2) Barbel thin and small, barbel length much less than diameter of orbit, about equal to diameter of pupil..... 5

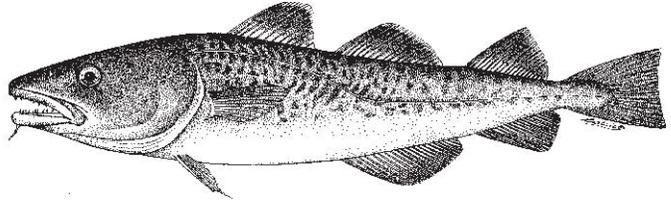
4 Barbel fleshy and long, barbel length greater than or equal to the diameter of orbit.

Pacific Cod

Gadus macrocephalus

Southern California to Bering Sea

Maximum size: 20 kg



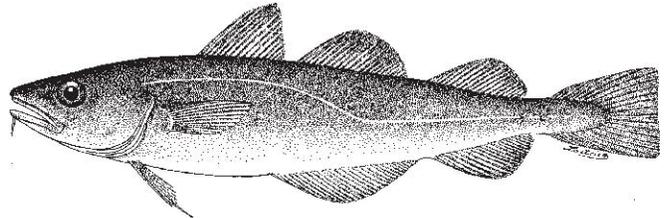
5(4) Anus positioned under first dorsal fin; lateral line interrupted only on caudal peduncle; gill rakers 26-28; fins grey to brown; body tan to brown.

Pacific Tomcod

Microgadus proximus

Central California to South Bristol Bay

Maximum size: <1 kg



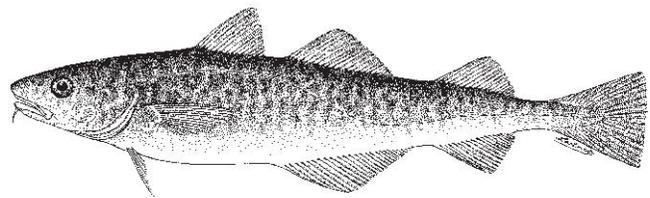
5 Anus positioned between first and second dorsal fins or under second dorsal fin; lateral line interrupted at about origin of second dorsal fin and posterior; gill rakers 14-25; fins and body washed with yellow.

Saffron Cod

Eleginus gracilis

Gulf of Alaska to Bering Sea

Maximum size: <1 kg

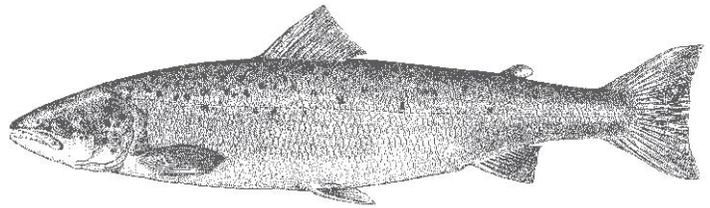


KEY TO THE SALMONIDS OF THE EASTERN NORTH PACIFIC

Figures from *Pacific Fishes of Canada* (Hart, 1973) and
Atlantic Fishes of Canada (Scott and Scott, 1988)
 October 2013

- 1 One or more large dark blotches on operculum; several X-shaped spots on body; mouth generally small, with jaw extending to about middle of eye.....

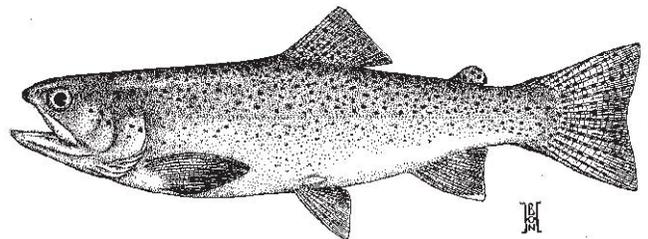
Atlantic Salmon
Salmo salar



- 1 Opercle without large dark blotches; spots on body, if present, round or irregular in shape, not X-shaped; mouth generally large, extending beyond eye.....2

- 2(1) Numerous spots on body below the lateral line; caudal fin slightly forked, emarginate, or truncate, with dark spots along rays on upper and lower lobe (10-13 per ray), and often with silver streaks along middle rays; anal fin rays 8-12.

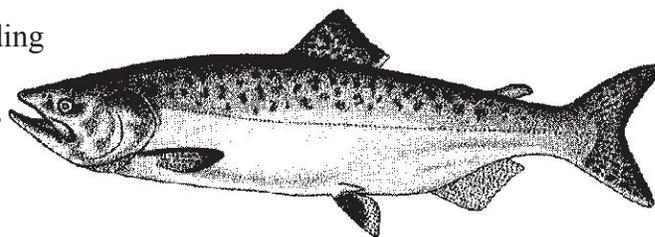
Steelhead (Rainbow Trout)
Oncorhynchus mykiss



- 2 Very few spots on body below the lateral line; caudal fin distinctly forked, with or without spots and silvering; anal fin rays 13-19.....3

3(2) Caudal fin with uniform silver wash extending nearly to tips of rays, usually with spots on both lobes (may be difficult to distinguish), 4-8 per ray; mouth black at base of teeth; dark spots on back.

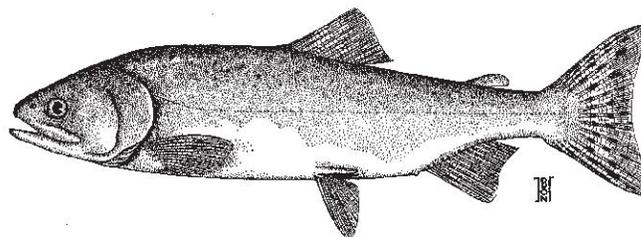
Chinook (King) Salmon
Oncorhynchus tshawytscha



3 Caudal fin with or without silver wash, if present extending only 2/3 to 3/4 of fin length; caudal fin with or without spots, if present either 1-4 blotches per ray or spots limited to upper lobe; mouth not black at base of teeth (but may be mottled or gray); dark spots on back present or absent.....4

4(3) Caudal fin without silver wash; caudal fin with oval blotches on both lobes, 1-4 per ray; scales small, 170 or more along lateral line, more than 30 scale rows between lateral line and dorsal fin; dark spots on back.

Pink (Humpback) Salmon
Oncorhynchus gorbuscha

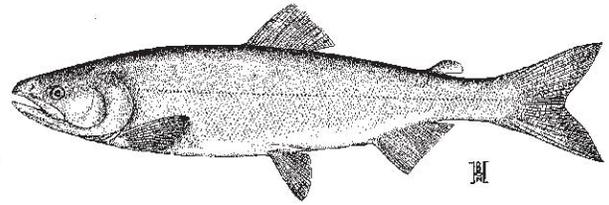


4 Caudal fin with or without silver wash; caudal fin without oval blotches, but may have small rounded spots on upper lobe; scales large, fewer than 155 along lateral line, 30 or fewer scale rows between lateral line and dorsal fin; dark spots on back present or absent5

- 5(4) Caudal fin uniform dark without spots or silver; gill rakers long and thin, 28-40 rakers on first arch; body without spots, typically dark above and lighter below, head appears capped with dark.

Sockeye (Red) Salmon

Oncorhynchus nerka

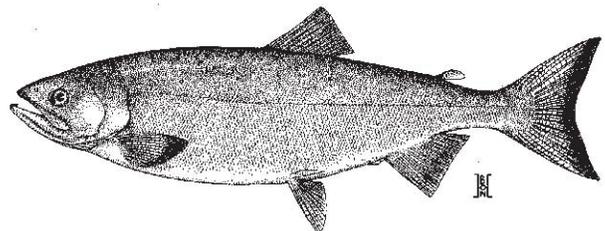


- 5 Caudal fin with spots and/or silver; gill rakers short and stout, 28 or fewer rakers on first arch; body with or without spots but without two-toned appearance6

- 6(5) Caudal fin with discrete silver streaking on rays but not on membranes, streaks extending about 1/2 length of rays, caudal fin without spots; body without distinct spots on dorsal surface; caudal peduncle long and slender, its depth about 14 into standard length; teeth on lower edge of maxilla cannot be felt with mouth closed.

Chum (Dog) Salmon

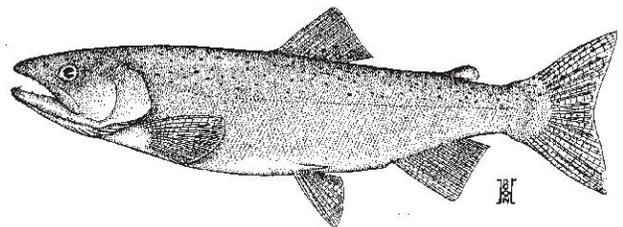
Oncorhynchus keta



- 6 Caudal fin with silver wash on both rays and membranes, extending about 3/4 length of rays, caudal fin may have small rounded spots on upper lobe; body with dark spots on dorsal surface; caudal peduncle short and thick, its depth about 11 into standard length; teeth on lower edge of maxilla can be felt with mouth closed.

Coho (Silver) Salmon

Oncorhynchus kisutch

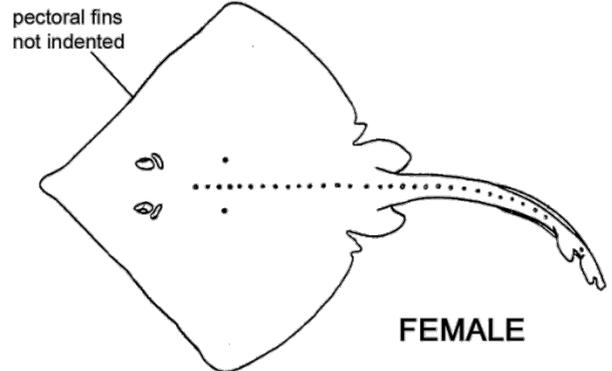
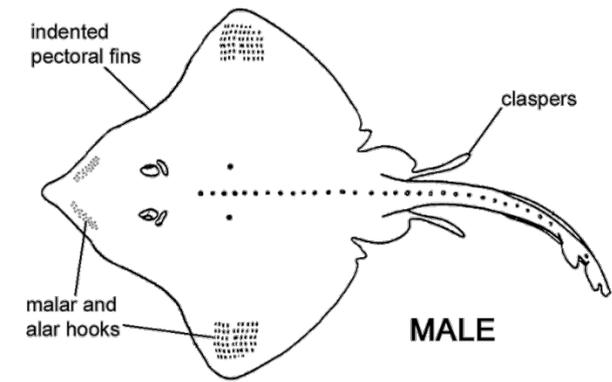
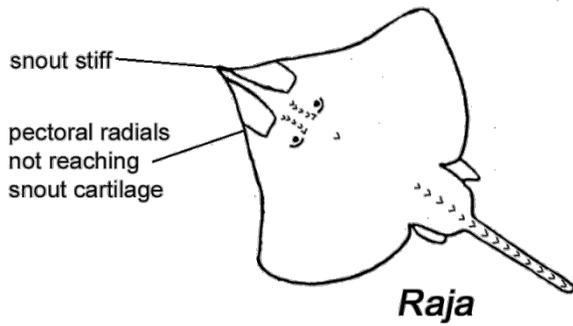
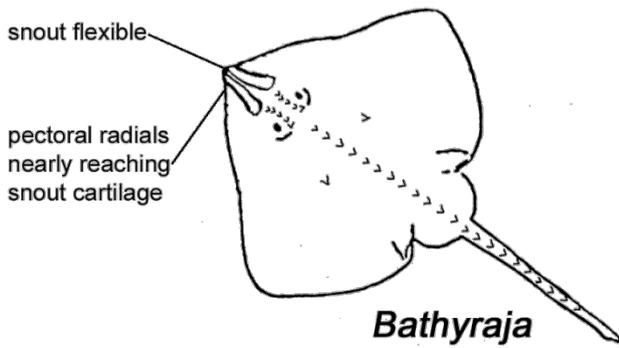
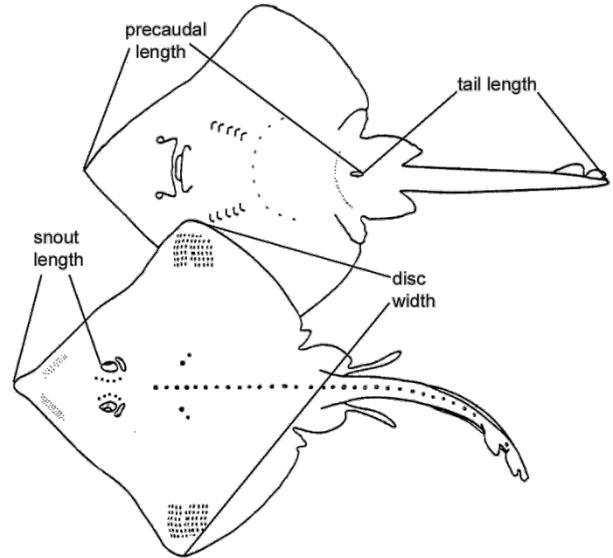
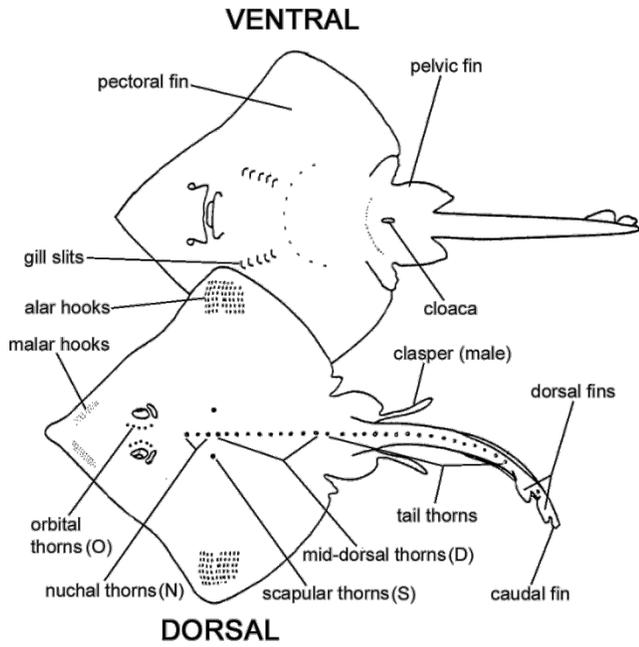


A FIELD GUIDE TO THE SKATES (RAJIDAE) OF ALASKA

Extracted from:

Stevenson, D. E., J. W. Orr, G. R. Hoff, and J. D. McEachran. 2007.
Field guide to sharks, skates, and ratfish of Alaska. Alaska Sea
Grant College Program, University of Alaska Fairbanks.

October 2013



KEY TO THE SKATES (RAJIDAE) OF ALASKA

- 1 Snout firm to tip (may be broken); pectoral fin rays not reaching close to tip of snout, creating squared off “windows” beside snout (genus *Raja*).....2
- 1 Snout flexible, especially near tip; pectoral fin rays nearly reach tip of snout, leaving narrow crescent-shaped “windows” beside snout.....(genus *Bathyraja*)...4

- 2(1) Prominent thorns present near tip of snout; two or three pairs of scapular thorns
 ***Roughshoulder Skate** (*Raja badia* p. 4)
- 2 No prominent thorns near tip of snout; scapular thorns absent3

- 3(2) Posterolateral margin of pelvic fin slightly concave; base of pectoral fin with large ocellus surrounded by ring of light spots; ventral surface nearly white; body diamond-shaped..... **Big Skate** (*Raja binoculata* p. 5)
- 3 Posterolateral margin of pelvic fin deeply notched; base of pectoral fin with ring of dark pigment; ventral surface dark; body elongate with very long snout
 **Longnose Skate** (*Raja rhina* p. 6)

- 4(1) Scapular thorns present.....5
- 4 Scapular thorns absent7

- 5(4) Denticles absent from area surrounding tail thorns; orbital thorns present (but often obscure).....**Alaska Skate** (*Bathyraja parmifera* p. 7)
- 5 Denticles surrounding tail thorns; orbital thorns absent.....6

- 6(5) Mid-dorsal row of thorns usually interrupted; thorns on disc significantly reduced in some specimens; tail thorns reduced along length of tail, 0-2 reduced thorns between dorsal fins; dorsal surface brown.....**Bering Skate** (*Bathyraja interrupta* p. 8)
- 6 Mid-dorsal row of thorns continuous (may be worn down in older specimens); tail thorns not reduced along length of tail, 1-2 strong thorns between dorsal fins; dorsal surface gray.....**Aleutian Skate** (*Bathyraja aleutica* p. 9)

7(4)	Ventral surface typically white, or light with dusky blotches	8
7	Ventral surface predominantly dark	9
8(7)	Disc thorns absent; dorsal surface in life brown, often with black and/or yellowish blotches; ventral surface of disc creamy white, without a distinct line separating dark tail.....	
 Mud Skate (<i>Bathyraja taranetzi</i> p. 10)	
8	Nuchal thorns present; dorsal surface gray with white blotches; ventral surface of disk light and blotchy, with dark tail typically separated from lighter disk by a distinct line.....	
 Whiteblotched Skate (<i>Bathyraja maculata</i> p. 11)	
9(7)	Fine denticles on VENTRAL surface (underside) of disc and tail.....	
 *Deepsea Skate (<i>Bathyraja abyssicola</i> p. 12)	
9	Ventral surface of disc and tail smooth.....	10
10(9)	Mid-dorsal thorns present.....	Commander Skate (<i>Bathyraja lindbergi</i> p. 13)
10	Mid-dorsal thorns absent	11
11(10)	Nuchal thorns absent; dorsal surface uniformly dark brown to black.....	
 Roughtail Skate (<i>Bathyraja trachura</i> p. 14)	
11	Nuchal thorns present; dorsal surface dark, usually with white patches between eyes.....	
 Whitebrow Skate (<i>Bathyraja minispinosa</i> p. 15)	

***Confirmation is required for Roughshoulder and Deepsea skates, as well as any skate not found in this key or any skate found out of range.**

Raja badia

Roughshoulder Skate

****CONFIRMATION REQUIRED****

Diagnosis: The only Alaskan species of skate with rostral thornlets. Also the only Alaskan species of *Raja* with scapular thorns.

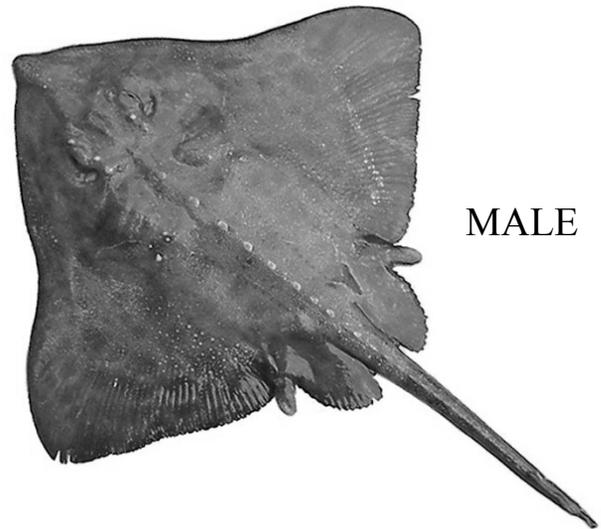
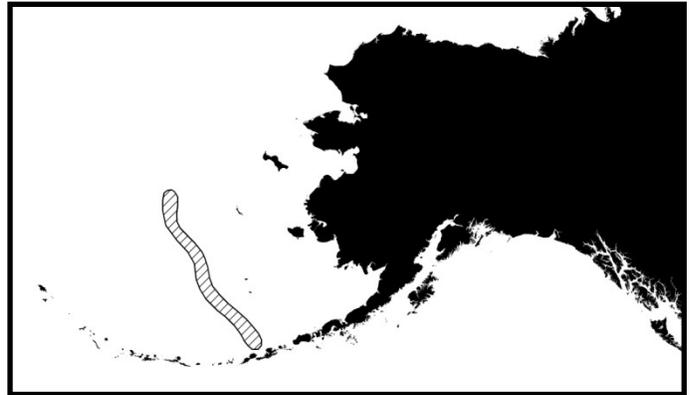
Coloration: Dorsal surface gray-brown, with darker spots and blotches; ventral surface gray-brown, with white blotches on snout, abdomen, and near mouth.

Body Shape: Disc somewhat diamond-shaped, with slightly concave anterior margin; precaudal length greater than tail length.

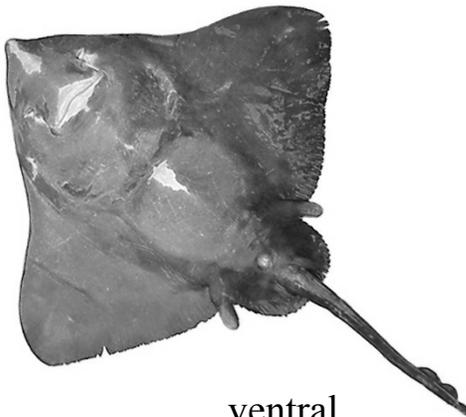
Maximum Size: 98 cm

Range: Bering Sea to California

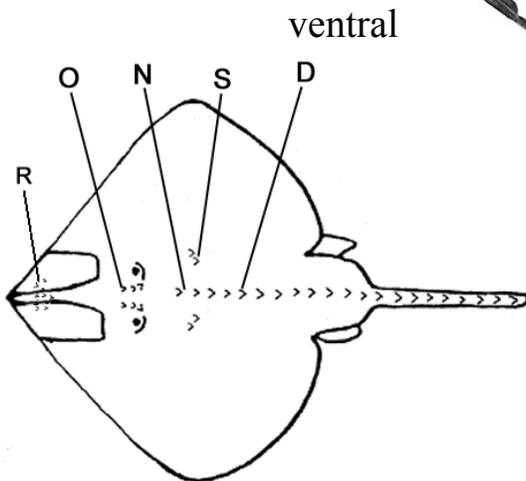
Depth: 1280-2322 m



MALE



FEMALE



Raja binoculata

Big Skate

Diagnosis: The only Alaskan species of *Raja* with the following combination of characters: anterior margin of disk concave; posterolateral margin of pelvic fin slightly concave; and base of pectoral fin with large ocellus surrounded by light spots.

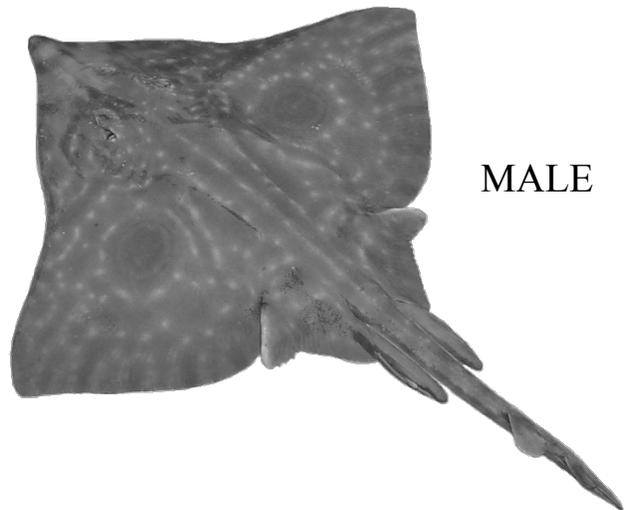
Coloration: Dorsal surface brown, gray-brown or reddish brown, often with large ocellus surrounded by smaller spots on pectoral fin; ventral surface white to light gray.

Body Shape: Disc wide, somewhat diamond-shaped, with concave anterior margin; posterolateral margin of pelvic fin slightly concave.

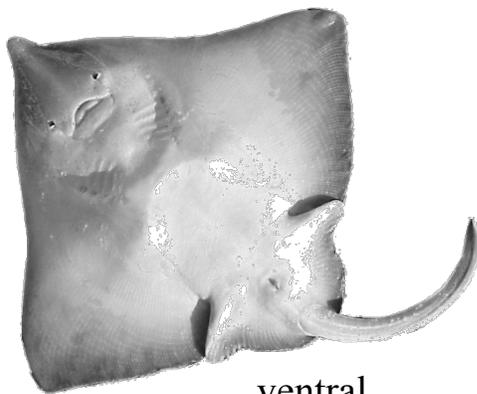
Maximum Size: 244 cm (>50 kg)

Range: SE Bering Sea to California

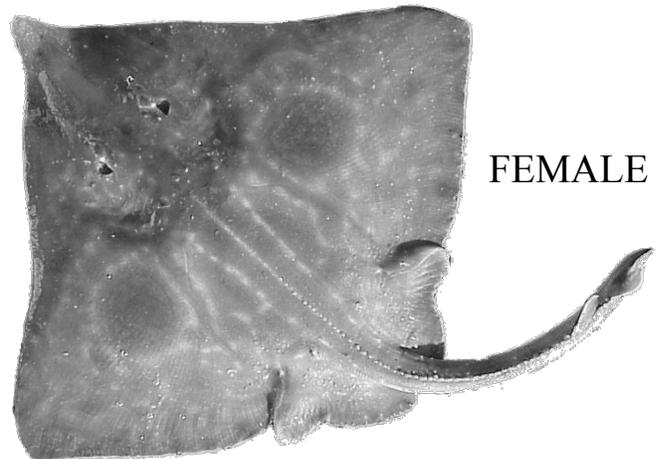
Depth: 16-800 m



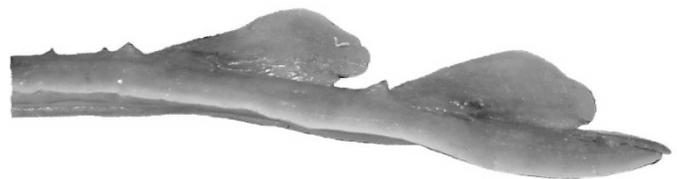
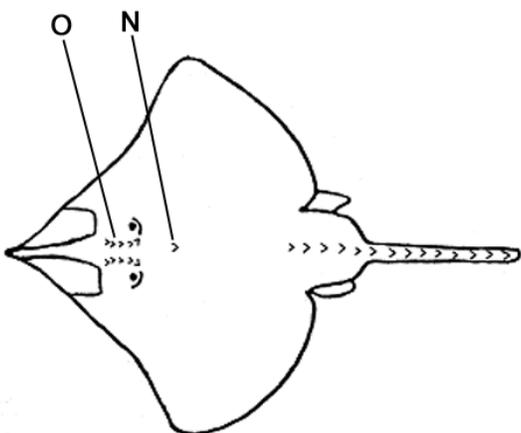
MALE



ventral



FEMALE



Raja rhina
Longnose Skate

Diagnosis: The only Alaskan species of *Raja* with an elongate snout and deeply notched pelvic fins.

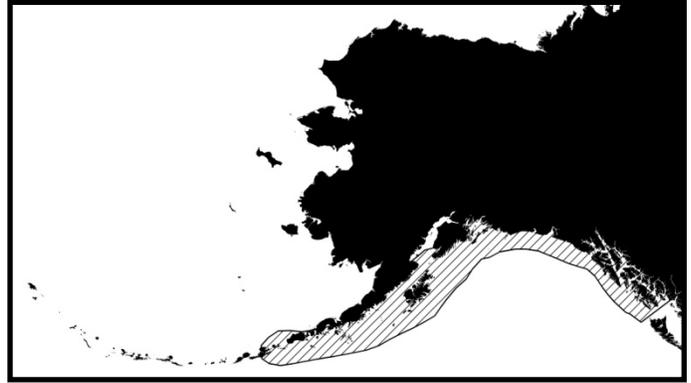
Coloration: Dorsal surface brown with dark blotches, may have ocelli on disk; ventral surface gray to black.

Body Shape: Disc elongate with pronounced snout; posterolateral margin of pelvic fin deeply notched.

Maximum Size: 180 cm (45 kg)

Range: Bering Sea to California

Depth: 24-675 m



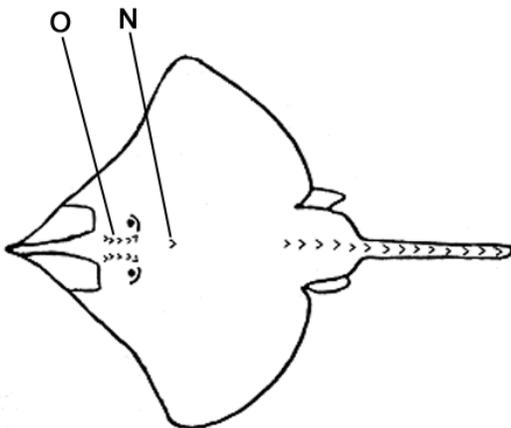
ventral



MALE



FEMALE



Bathyraja parmifera

Alaska Skate

Diagnosis: The only Alaskan species of *Bathyraja* with orbital thorns present and scapular thorns present. Also the only species with naked area surrounding tail thorns. Row of mid-dorsal thorns may be complete or interrupted. (*B. rosispinis* may be a synonym.)

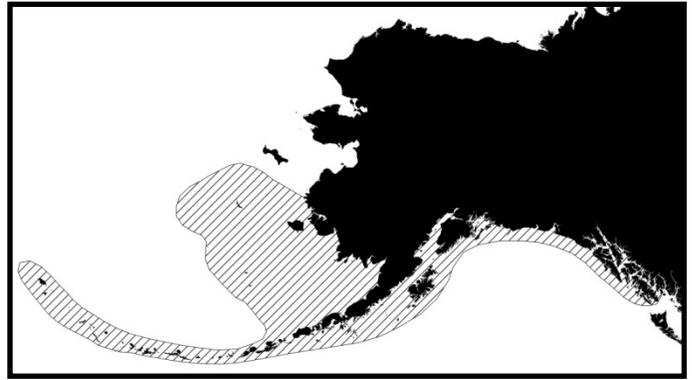
Coloration: Dorsal surface dark brown or golden brown, often with lighter spots or blotches; ventral surface brown to white.

Body Shape: Tail length usually shorter than precaudal length.

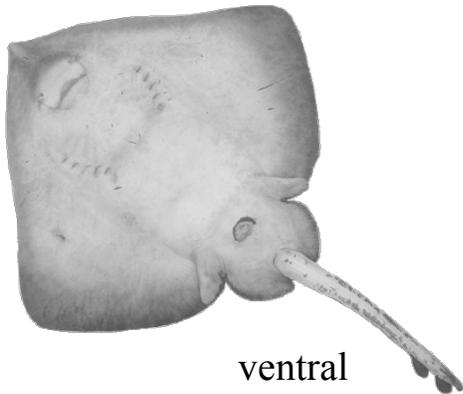
Maximum Size: 179 cm (18 kg)

Range: Aleutian Islands, Gulf of Alaska, Bering Sea

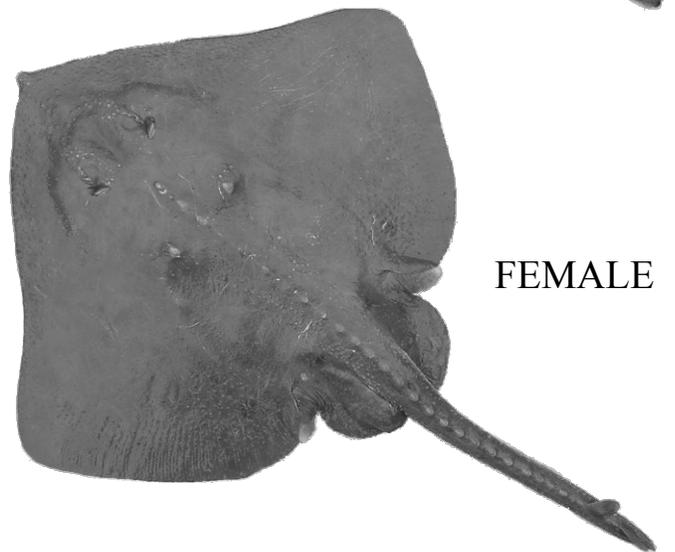
Depth: 17-600 m



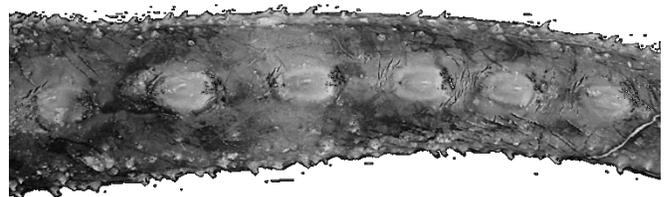
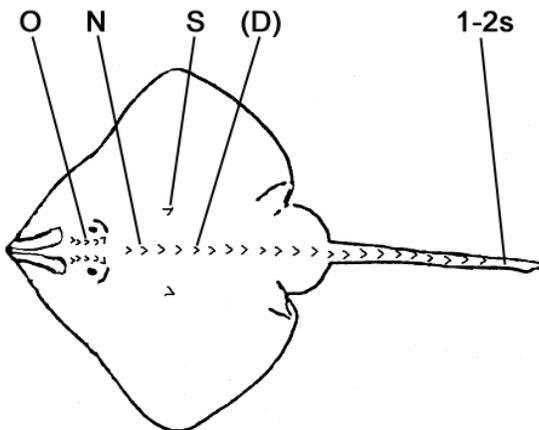
MALE



ventral



FEMALE



Bathyraja interrupta

Bering Skate

Diagnosis: The only Alaskan species of *Bathyraja* with the following combination of characters: orbital thorns absent; scapular thorns present; row of mid-dorsal thorns usually interrupted; tail thorns reduced, with 0-2 reduced thorns between dorsal fins.

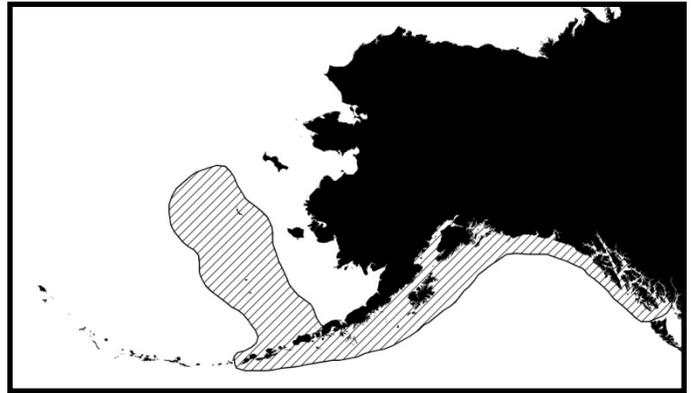
Coloration: Dorsal surface light to dark brown; ventral surface white.

Body Shape: Body roundish with short snout; tail length equal to or greater than precaudal length.

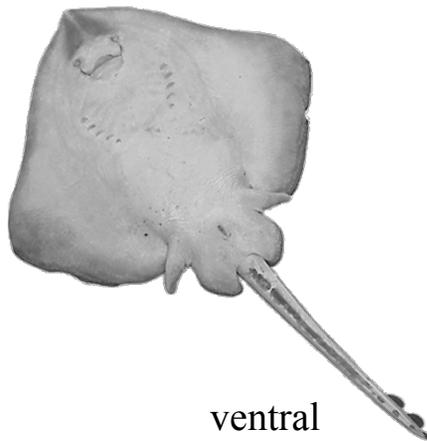
Maximum Size: 107 cm (4.2 kg)

Range: Bering Sea to California

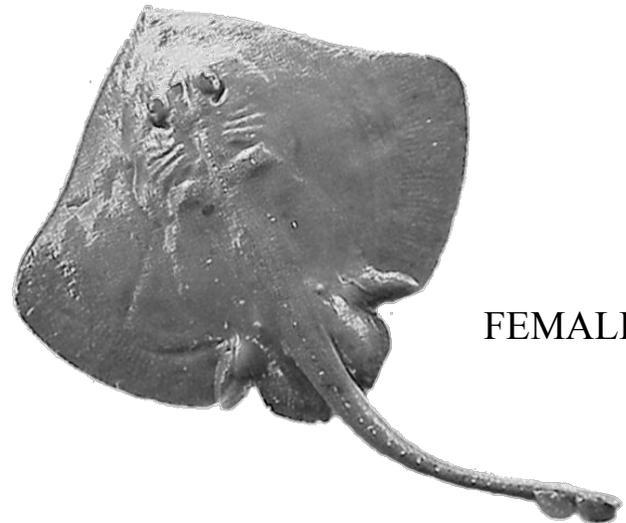
Depth: 37-1372 m



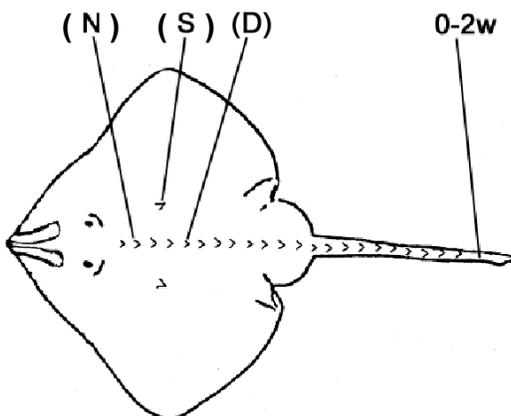
MALE



ventral



FEMALE



Bathyraja aleutica
Aleutian Skate

Diagnosis: The only Alaskan species of *Bathyraja* with the following combination of characters: orbital thorns absent; scapular thorns present; row of mid-dorsal thorns usually continuous; tail thorns large, with 1-2 strong thorns between dorsal fins.

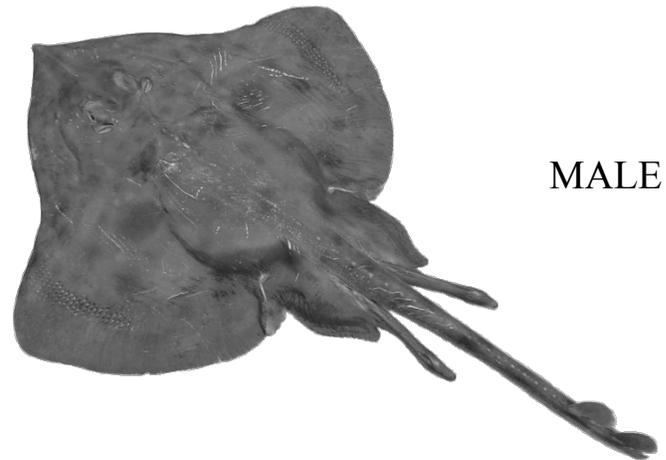
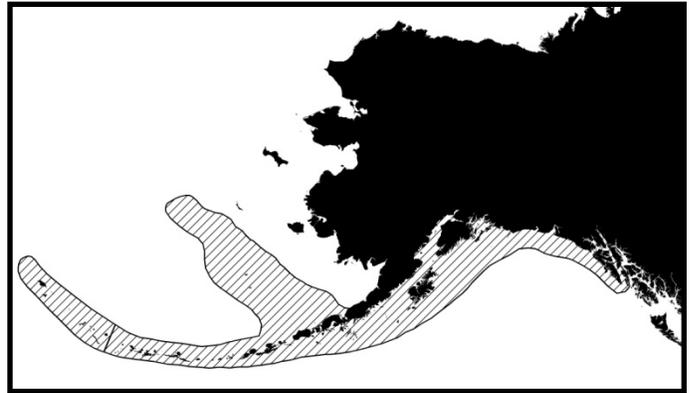
Coloration: Dorsal surface gray, with or without vague black ocellus on pectoral fin; ventral surface white with gray margin.

Body Shape: Body angled with elongate snout; tail length equal to or greater than precaudal length.

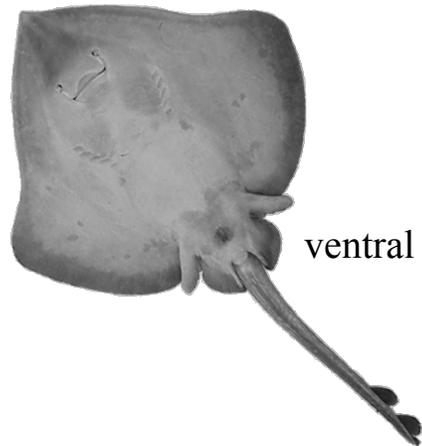
Maximum Size: 177 cm (27 kg)

Range: Aleutian Islands, Gulf of Alaska, Bering Sea

Depth: 29-950 m



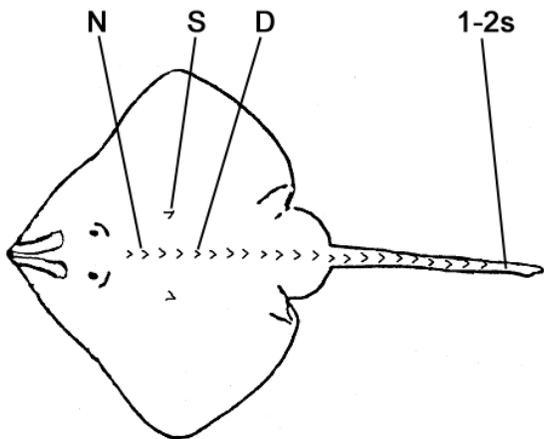
MALE



ventral



FEMALE



Bathyraja taranetzi
Mud Skate

Diagnosis: The only Alaskan species of *Bathyraja* with the following combination of characters: disc free of thorns; body small and rounded, with tail length greater than precaudal length; ventral surface white or cream colored.

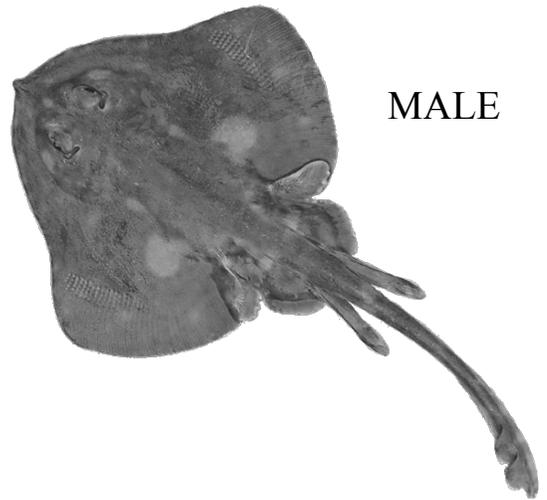
Coloration: Dorsal surface brown with small darker blotches, and usually a large lighter spot on posterior part of pectoral fin; ventral surface white or cream colored.

Body Shape: Body small and rounded; tail length greater than precaudal length

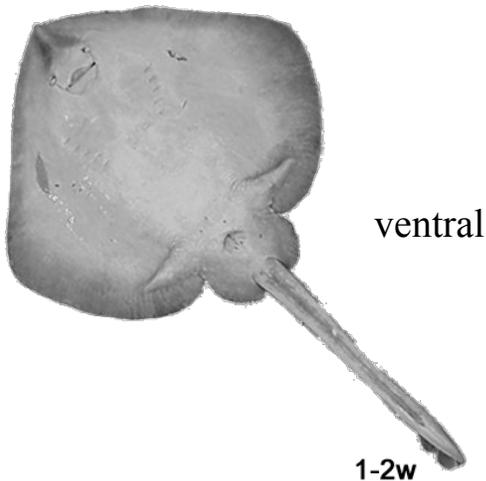
Maximum Size: 79 cm (2.7 kg)

Range: Aleutian Islands, Bering Sea

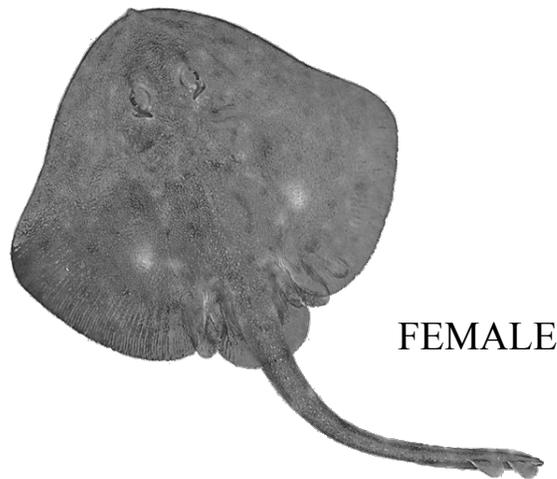
Depth: 58-1054 m



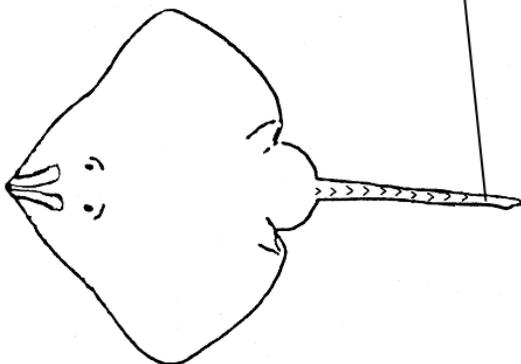
MALE



ventral



FEMALE



1-2w



Bathyraja maculata Whiteblotched Skate

Diagnosis: The only Alaskan species of *Bathyraja* with a distinct line on the ventral surface separating the dark tail from the light body. Also distinguished by the following combination of characters: scapular, orbital, and mid-dorsal thorns absent; nuchal thorns present and strong; dorsal surface with strong denticles, ventral surface without denticles.

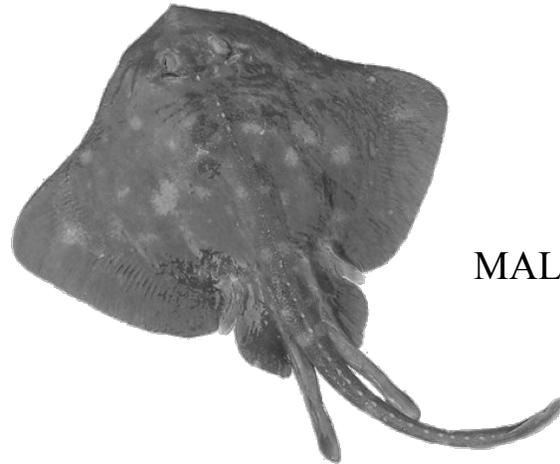
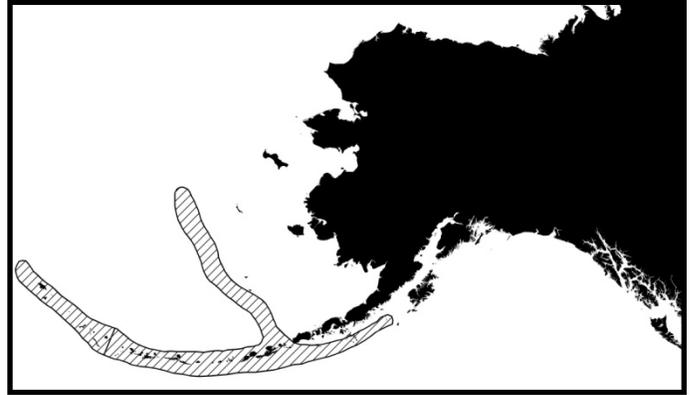
Coloration: Dorsal surface gray with white or yellow blotches; ventral surface blotchy gray, with dark border; underside of tail dark, separated from lighter ventral surface of body by distinct line.

Body Shape:

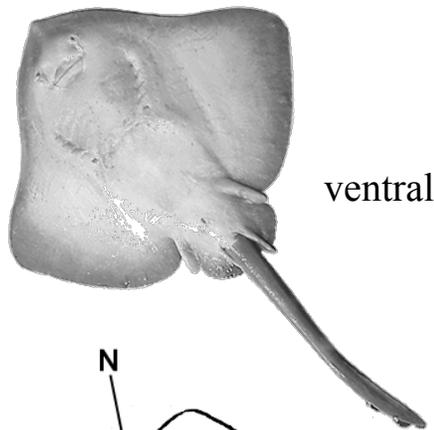
Maximum Size: 147 cm (14.5 kg)

Range: Aleutian Islands, Bering Sea, Russia

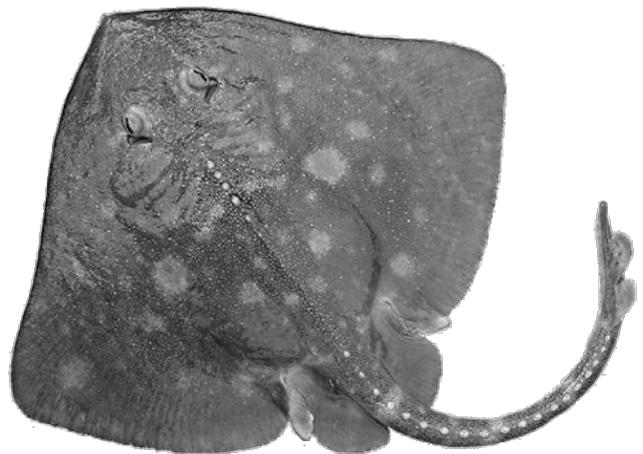
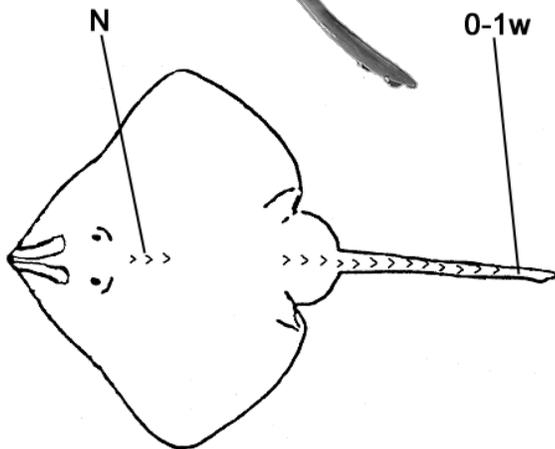
Depth: 84-1193 m



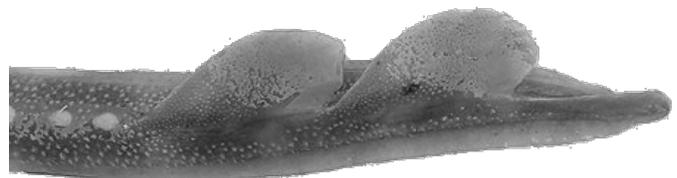
MALE



ventral



FEMALE



Bathyraja abyssicola
Deepsea Skate

****CONFIRMATION REQUIRED****

Diagnosis: The only Alaskan species of *Bathyraja* with fine denticles on the ventral surface.

Denticles: Fine, evenly distributed denticles on dorsal and ventral surface.

Coloration: Dorsal surface gray to brown; ventral surface gray to black, mouth and cloaca whitish, may have white blotches.

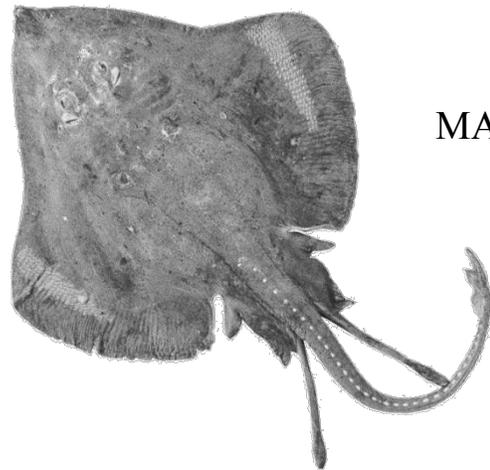
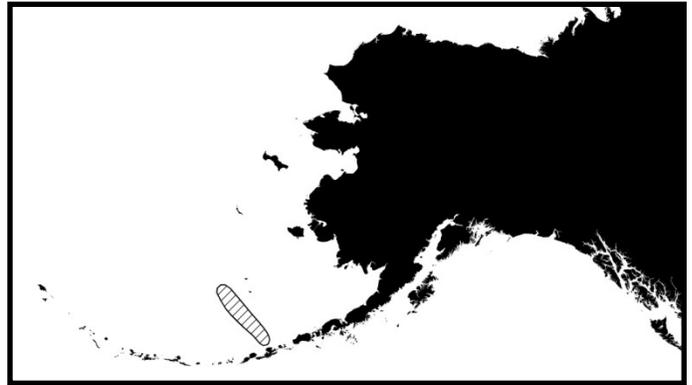
Body Shape: Tail length greater than or equal to precaudal length.

Juveniles: No denticles on ventral surface.

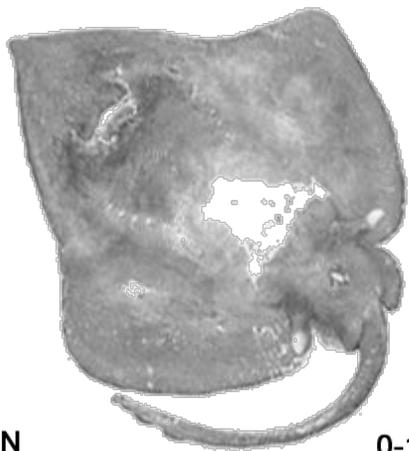
Maximum Size: 150 cm

Range: Japan to California, Bering Sea

Depth: 362-2904 m



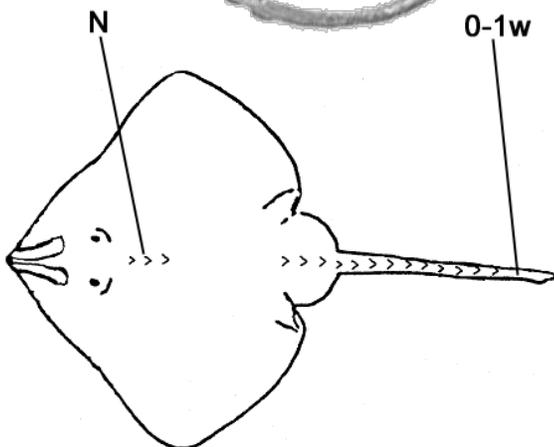
MALE



ventral



FEMALE



Bathyraja lindbergi
Commander Skate

Diagnosis: The only Alaskan species of *Bathyraja* with the following combination of characters: scapular and orbital thorns absent; nuchal and mid-dorsal thorns present; ventral surface without denticles.

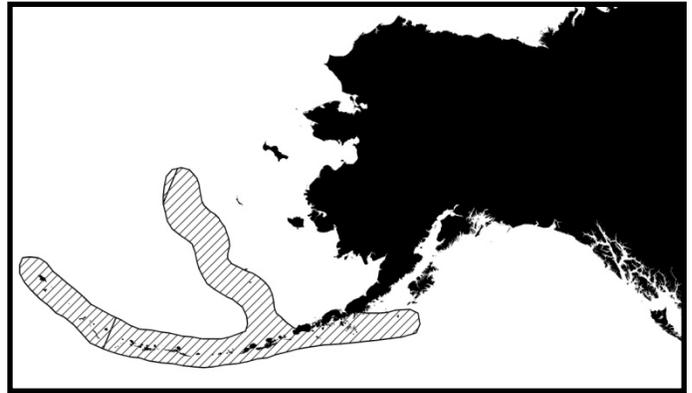
Coloration: Dorsal surface gray brown to black; ventral surface gray to black, darker around pectoral and pelvic fin margins, white around mouth and nostrils.

Body Shape: Tail length greater than precaudal length.

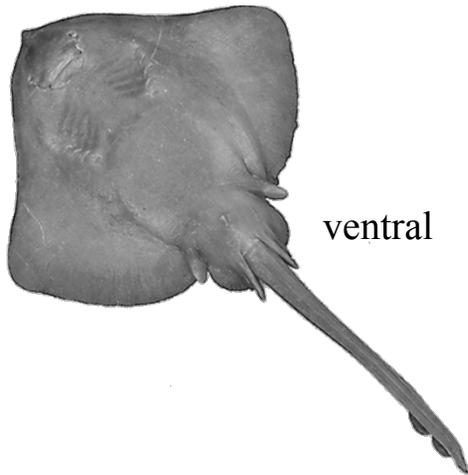
Maximum Size: 121 cm (9.5 kg)

Range: Bering Sea, Aleutian Islands, Japan

Depth: 160-1193 m



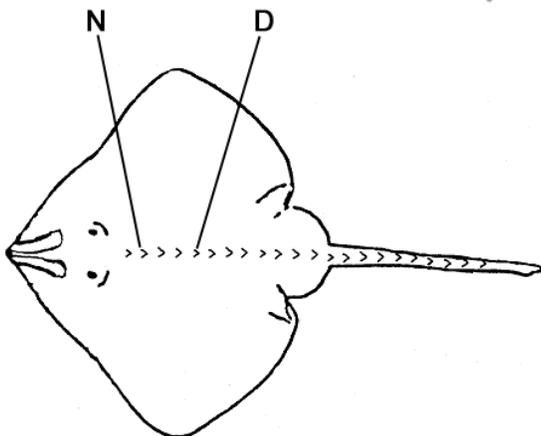
MALE



ventral



FEMALE



Bathyraja trachura Roughtail Skate

Diagnosis: The only Alaskan species of *Bathyraja* with the disc free of thorns and a dark ventral surface.

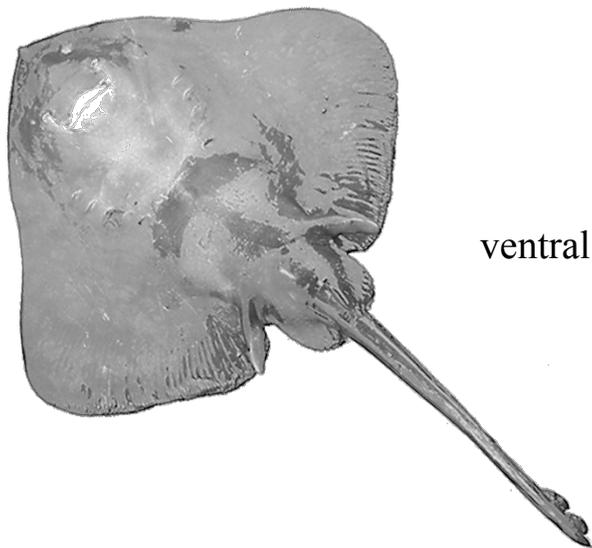
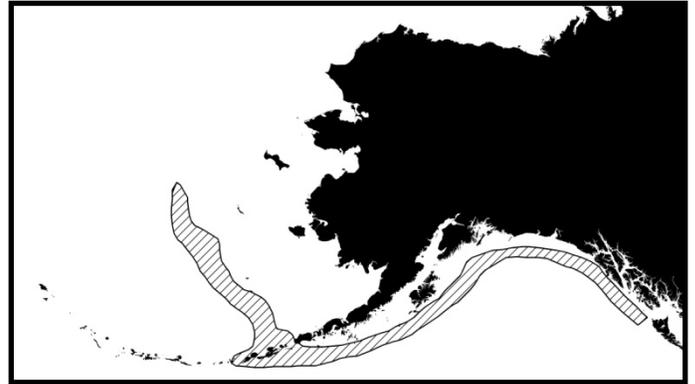
Coloration: Dorsal and ventral surfaces dark brown to black, mouth and cloaca whitish.

Body Shape: Tail length less than precaudal length.

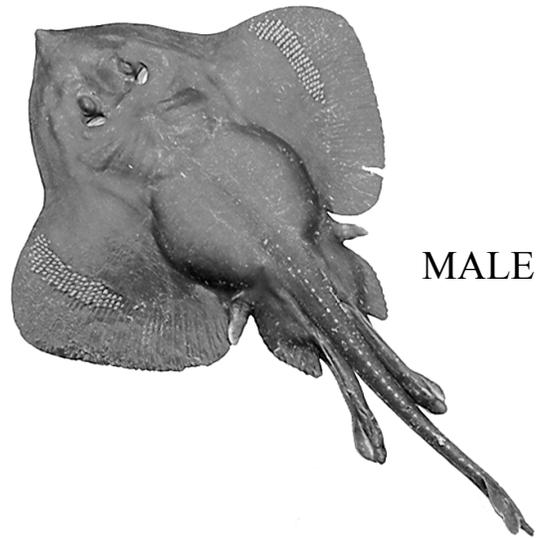
Maximum Size: 92 cm (4.5 kg)

Range: Japan to California, Bering Sea

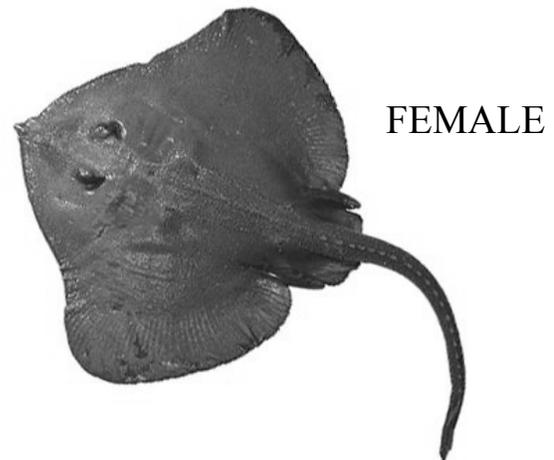
Depth: 213-1504 m



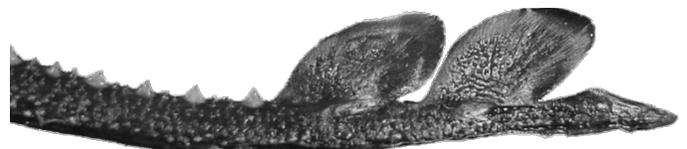
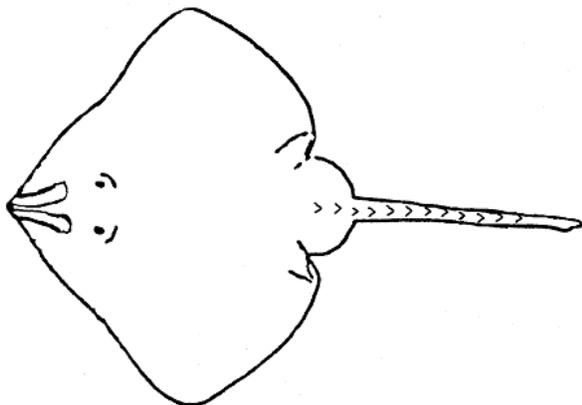
ventral



MALE



FEMALE



Bathyraja minispinosa
Whitebrow Skate

Diagnosis: The only Alaskan species of *Bathyraja* with white patches around the eyes. Also distinguished by the following combination of characters: scapular, orbital, and mid-dorsal thorns absent; nuchal thorns present, but weak (occasionally absent); dorsal surface with fine denticles, ventral surface without denticles.

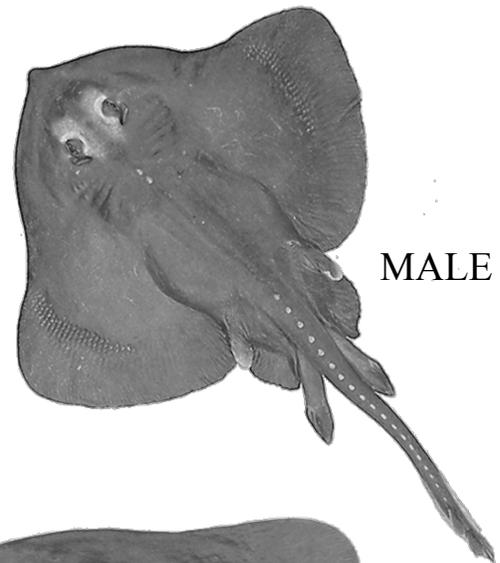
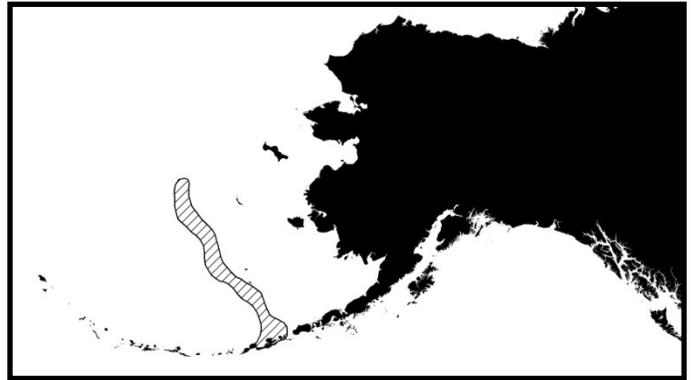
Coloration: Dorsal surface gray brown to dark brown, interorbital region and margins of orbits white; ventral surface light to medium brown, mouth white.

Body Shape:

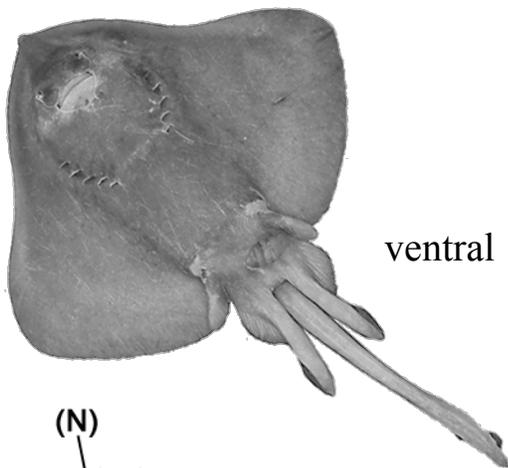
Maximum Size: 98 cm (4.5 kg)

Range: Bering Sea, Aleutian Islands, Japan

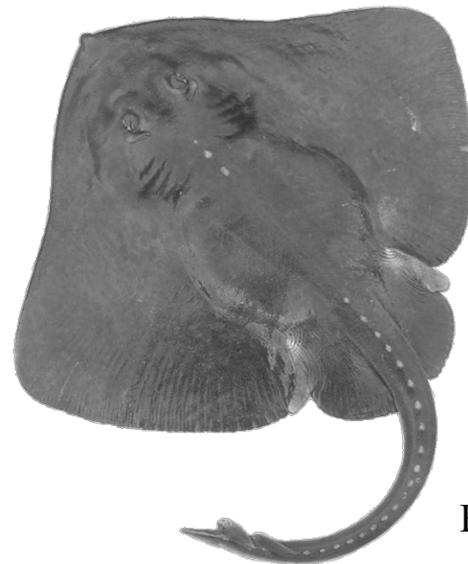
Depth: 160-1420 m



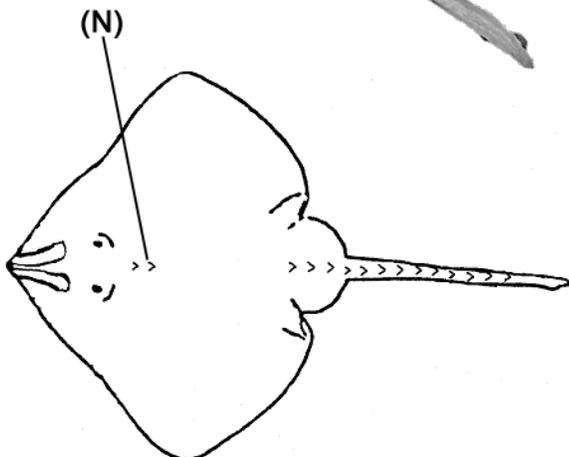
MALE



ventral

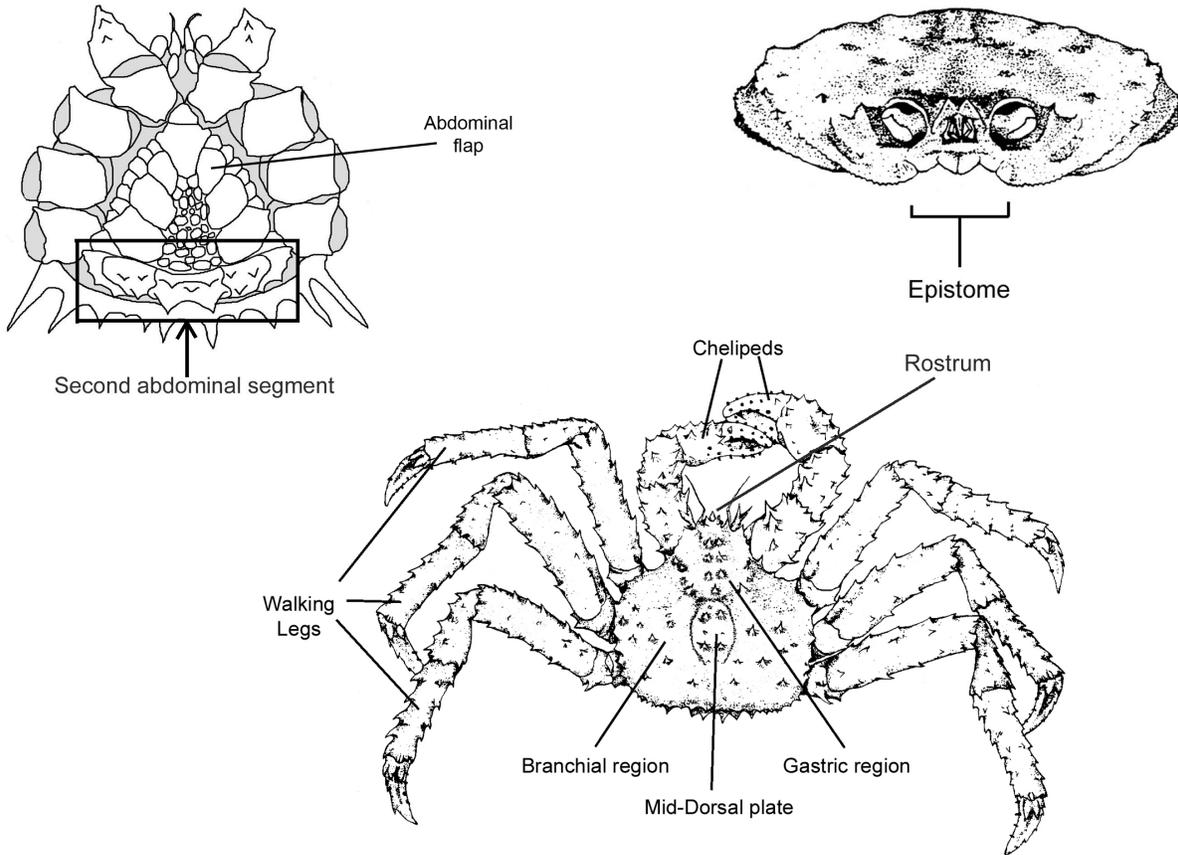


FEMALE

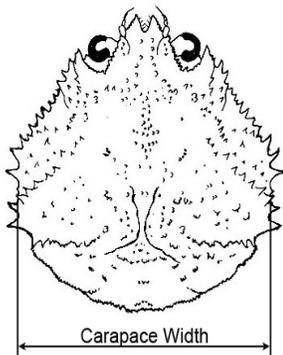


KEY TO THE CRABS OF ALASKA FOUND IN COMMERCIAL FISHERIES

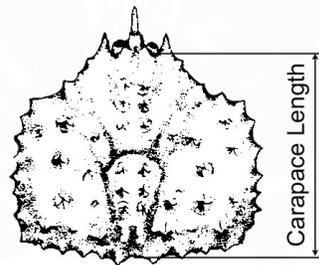
October 2013



Tanner crab measurement

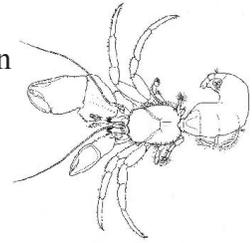


King crab measurement



****This key does not include all crab species found in Alaskan waters. Specimens not fitting this key should be identified as “crab unident” and retained.**

1 Abdomen soft and curled; tail fan modified for use as anchor within hollow objects; third pair of walking legs reduced and usually hidden.....**Family Paguridae (hermit crabs)**

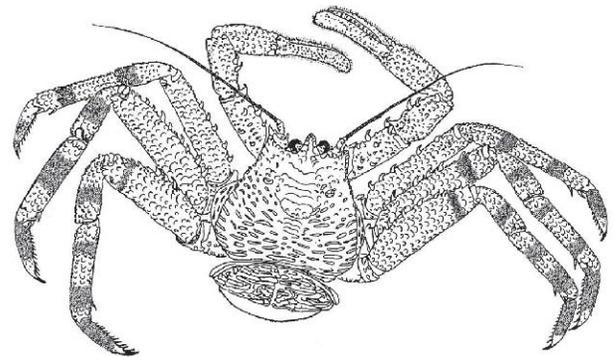


1 Abdomen with calcified plates, or if soft then not curled; tail fan not modified as above; third pair of walking legs not reduced or hidden.....**2**

2(1) Three pairs walking legs in addition to chelipeds (claws).....**Family Lithodidae3**

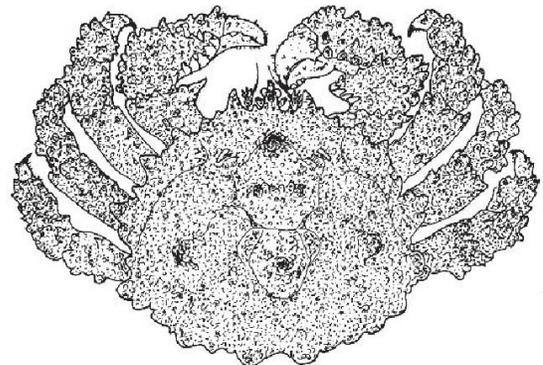
2 Four pairs walking legs in addition to chelipeds (claws).....**12**

3(2) Carapace, chelipeds, and walking legs covered with leathery scales; legs with burgundy or brick-red bands.....
Scaled Crab (*Placetron wosnessenskii*)
 Bering Sea, Aleutians, GOA (0-250 m)



3 Chelipeds, walking legs, and usually carapace covered with spines, warty protuberances, or hairs.....**4**

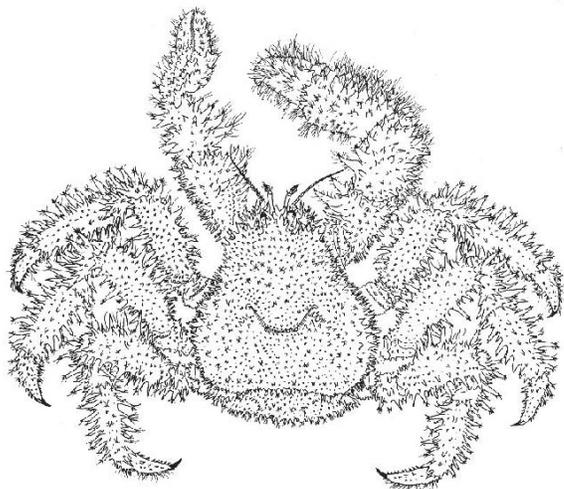
4(3) Body box-shaped, with short stubby legs that can be folded tightly against body to form a solid mass.....
Box crabs (Genus *Lopholithodes*)
 Aleutians, GOA (50-700 m)



4 Body not box-shaped, legs long.....**5**

5(4) Abdomen not clearly segmented, without calcified plates, forming a soft, membranous pouch.....

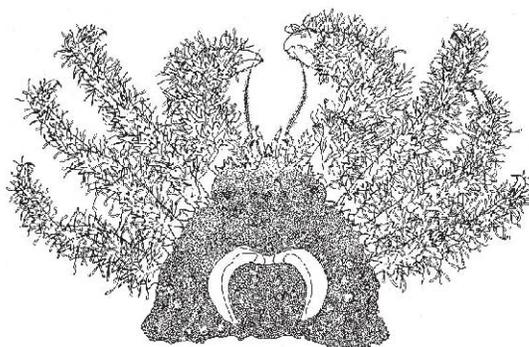
Fuzzy crabs (*Acantholithodes* and *Hapalogaster*)
 Bering Sea, Aleutians, GOA (10-240 m)



5 Abdomen clearly segmented, covered with calcified plates..... 6

6(5) Carapace somewhat triangular, with a smooth round ball-like area surrounded by deep semicircular grooves.....

Rhinoceros Crab (*Rhinolithodes wosnessenskii*)
 Aleutians, western GOA (20-200 m)

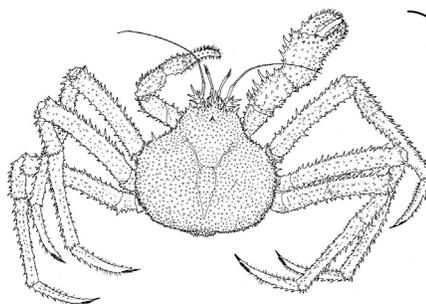


6 Carapace outline generally oval, without deep semicircular grooves..... 7

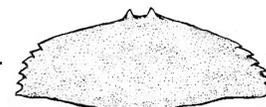
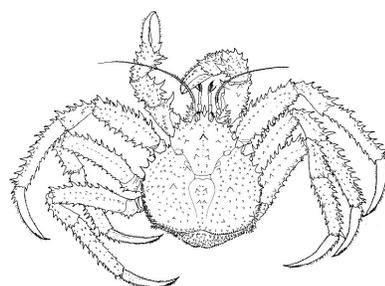
7(6) Carapace densely covered with short, blunt spines or tubercles; one prominent spine on dorsal surface of carapace posterior to rostrum; second abdominal segment covered by one plate Genus *Paralomis*..... 8

7 Carapace covered with widely spaced sharp spines; no single prominent spine posterior to rostrum; second abdominal segment covered by 3-5 plates.....King crabs..... 9

8(7) Carapace covered with small spines;
walking legs angular in cross-section..
Paralomis multispina
Bering Sea, Aleutians (250-1400 m)

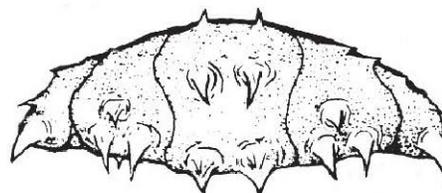
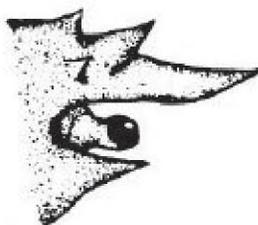
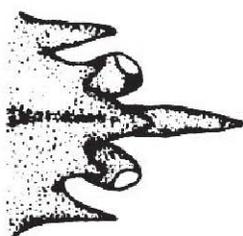


8 Carapace covered with rounded tubercles,
spines mainly confined to margins of
carapace; walking legs flattened.....
Paralomis verrilli
Bering Sea, GOA (1200-1500 m)

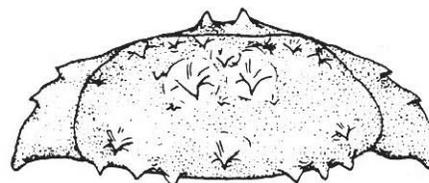
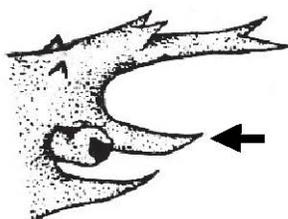
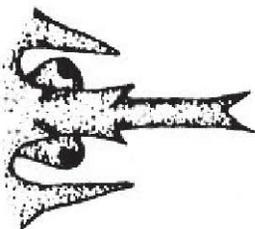


One plate
on second
abdominal
segment

9(7) Rostrum ending in a single thorn-like spine; ventral rostrum spine absent; second abdominal segment covered by 5 plates 10



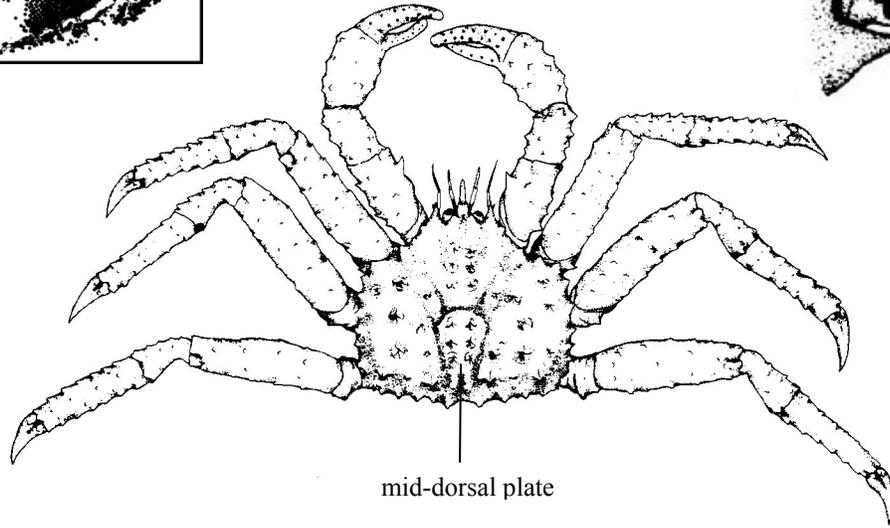
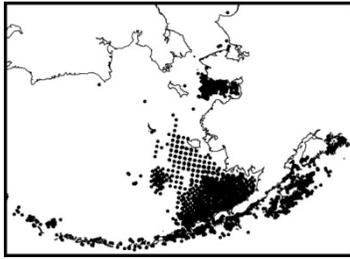
9 Rostrum forked; strong ventral rostrum spine present; second abdominal segment covered by 3 plates 11



10(9) Rostrum long, usually with terminal median dorsal spine followed by pair of spines; 3 paired prominent spines on mid-dorsal plate; color red to purple.....

Red King Crab (*Paralithodes camtschaticus*)

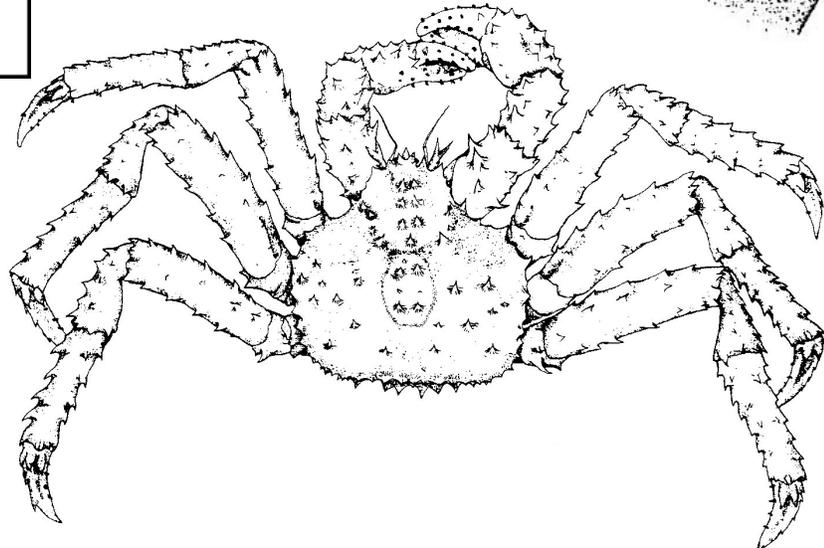
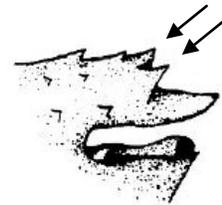
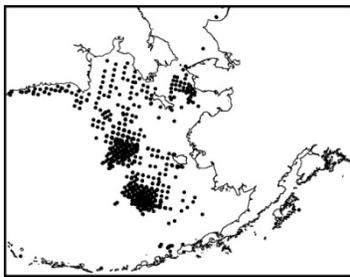
Bering Sea, Aleutians, GOA (0-300 m)



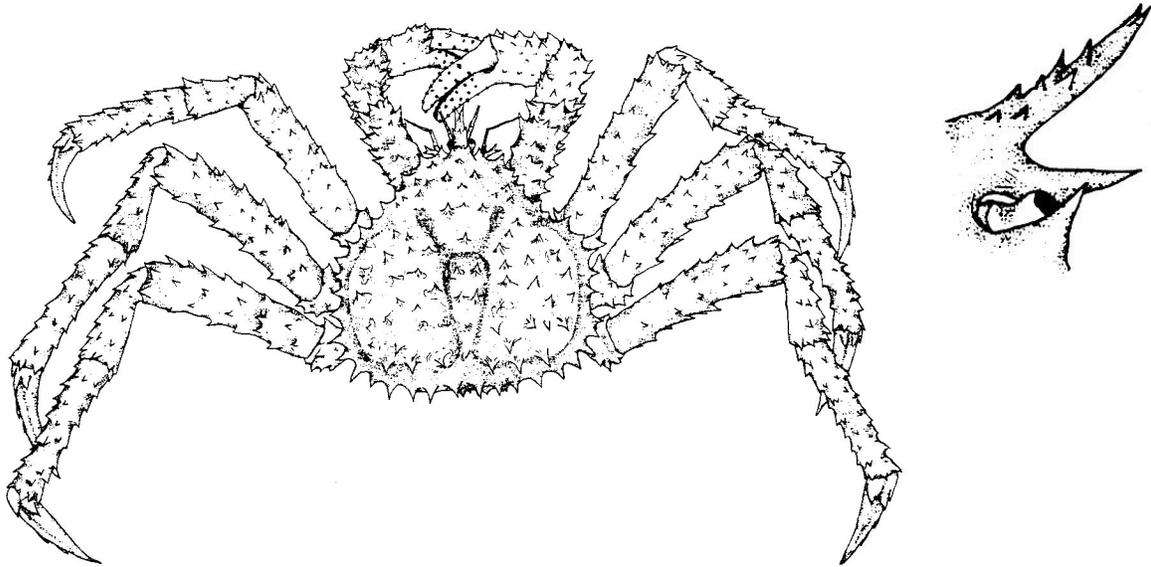
10 Rostrum short, commonly with terminal pair of dorsal spines; 2 pairs of prominent spines on mid dorsal plate; color blue or purple

Blue King Crab (*Paralithodes platypus*)

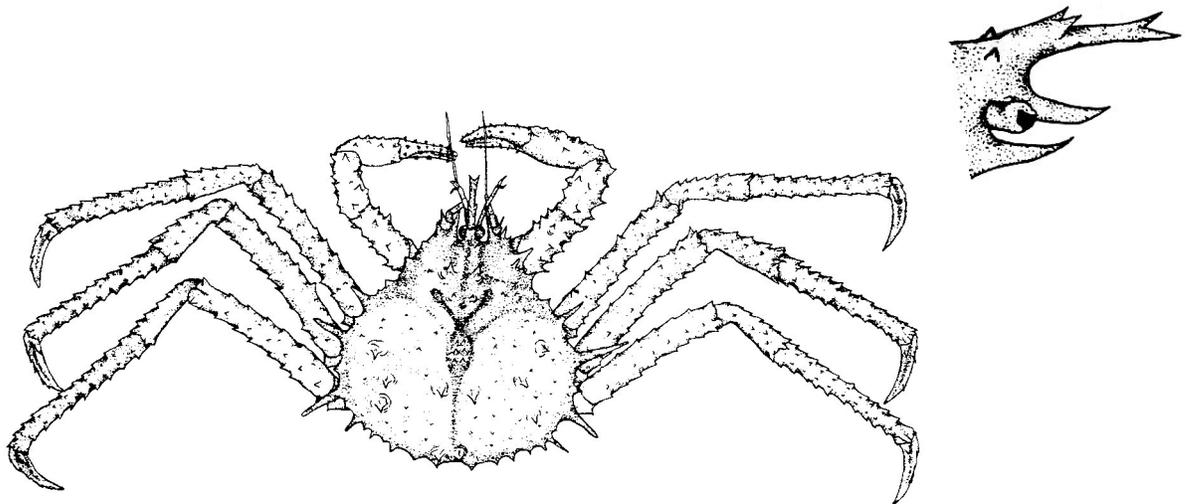
Bering Sea, Aleutians, western GOA (20-400 m)



- 11(9) Spines on lateral margins of carapace and spines on dorsal surface of carapace approximately equal in size; rostrum with 9-10 spines, a median spine anterior to each pair of dorsal rostrum spines; color brown to golden brown..... **Golden or Brown King Crab (*Lithodes aequispina*)**
 Bering Sea, Aleutians, GOA (50-700 m)



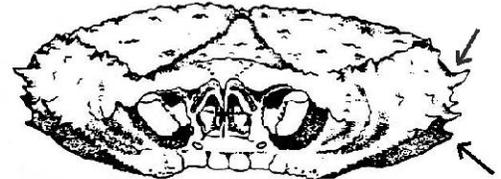
- 11 Spines on lateral margins of carapace notably longer than those on dorsal surface of carapace; rostrum with 7 spines, no median spine anterior to each pair of dorsal rostrum spines; color pink to scarlet red..... **Couesi King Crab (*Lithodes couesi*)**
 Bering Sea, Aleutians, GOA (200-1500 m)



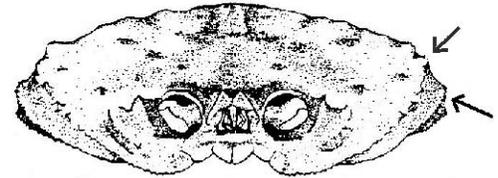
12(2) Carapace round to oval, with spines or low tubercles arranged in triangular shape on carapace
 Tanner crabs 13

12 Carapace guitar-shaped, triangular, hexagonal, or oval without spines or low tubercles arranged in
 triangular shape on carapace 16

13(12) Lower lateral margin of carapace not protruding beyond
 margin of branchial region; dorsal triangle prominent,
 composed of spines; dorsal surface of carapace with
 shallow or deep notch in center 14

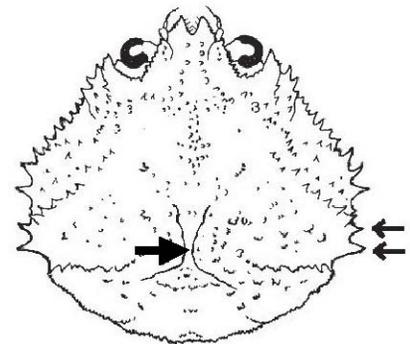


13 Lower lateral margin of carapace protruding beyond
 margin of branchial region; dorsal triangle not prominent,
 composed of low tubercles; dorsal surface of carapace
 without notch in center 15



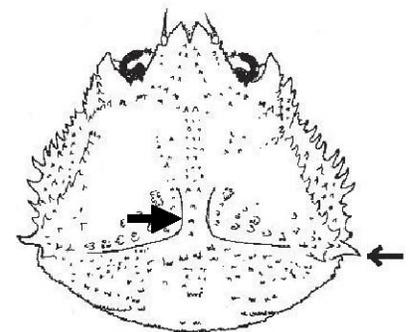
14(13) Branchial regions of carapace separated by deep, narrow
 groove; lateral apex of dorsal triangle U-shaped, with two
 spines at margin of carapace.....

Tanneri Tanner Crab (*Chionoecetes tanneri*)
 Bering Sea, Aleutians, GOA (20-1500 m)



14 Branchial regions of carapace separated by shallow groove
 and central ridge; lateral apex of dorsal triangle V-shaped,
 with one spine at margin of carapace.....

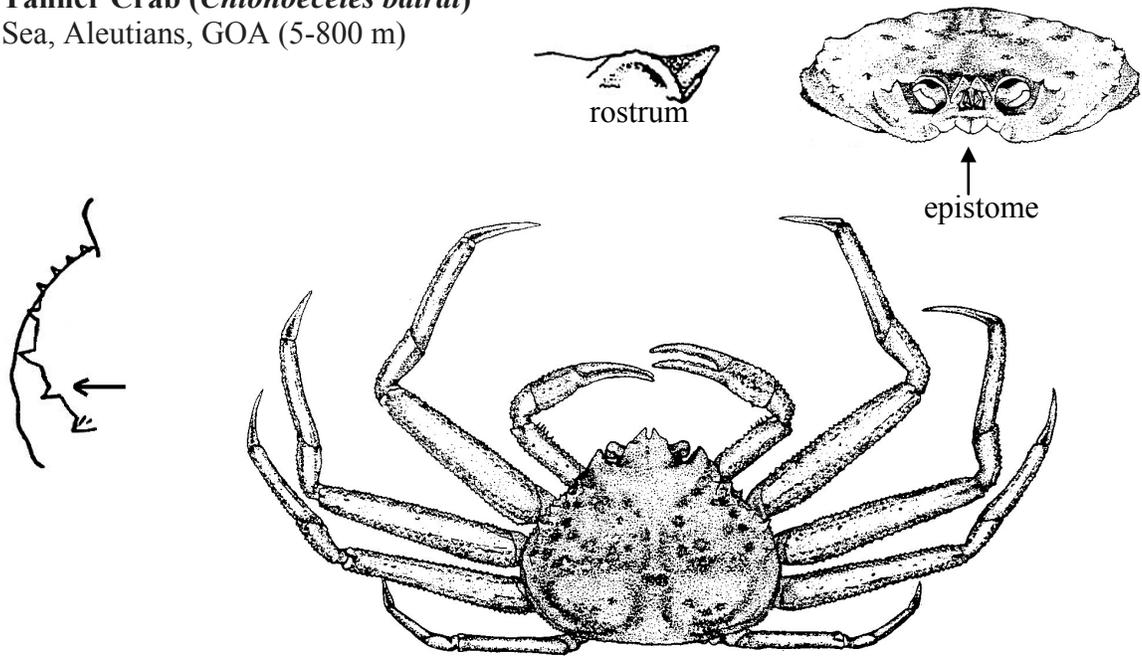
Angulatus Tanner Crab (*Chionoecetes angulatus*)
 Bering Sea, Aleutians, GOA (75-1500 m)



15(13) Epistome M-shaped; rostral spines sharply pointed and tilted upward; lateral spines in row above carapace margin unequal in size and spacing; eyes usually red.....

Bairdi Tanner Crab (*Chionoecetes bairdi*)

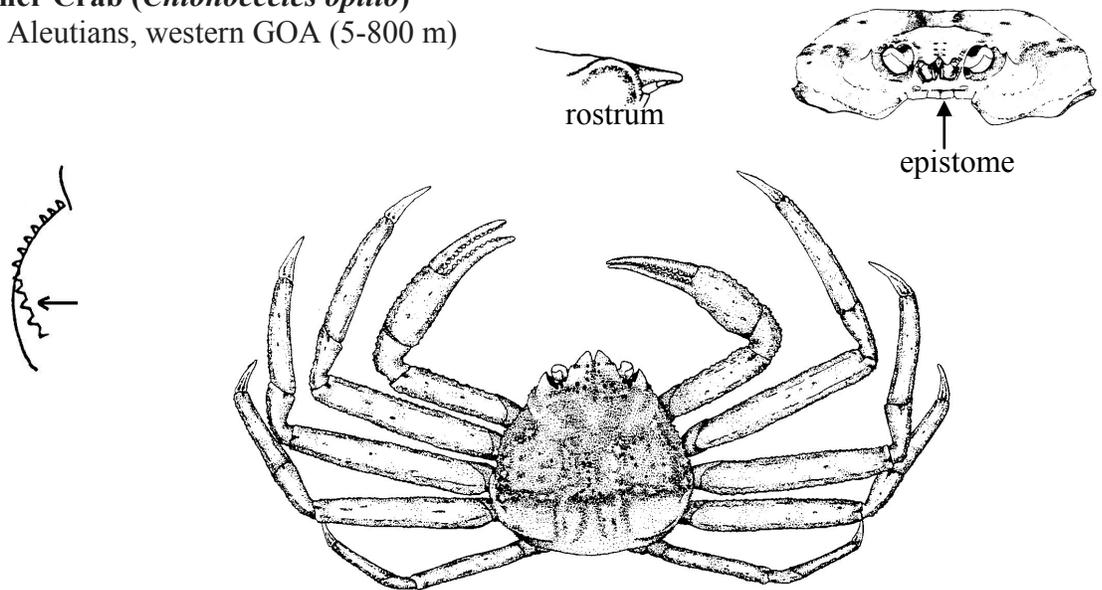
Bering Sea, Aleutians, GOA (5-800 m)



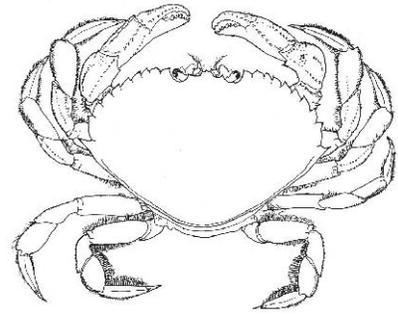
15 Epistome nearly horizontal; rostral spines rounded and nearly horizontal; lateral spines in row above carapace margin uniform in size and spacing; eyes usually greenish.....

Opilio Tanner Crab (*Chionoecetes opilio*)

Bering Sea, Aleutians, western GOA (5-800 m)



16(12) Carapace oval, with smooth dorsal surface; claw tips white....
Dungeness Crab (*Cancer magister*)
 SE Bering Sea, GOA (5-500 m)

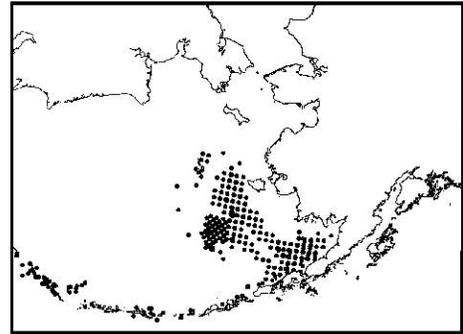
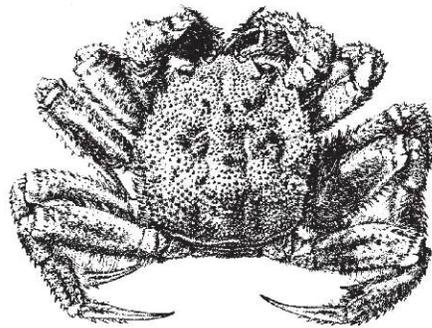


16 Carapace hexagonal, triangular, or lyre-shaped..... 17

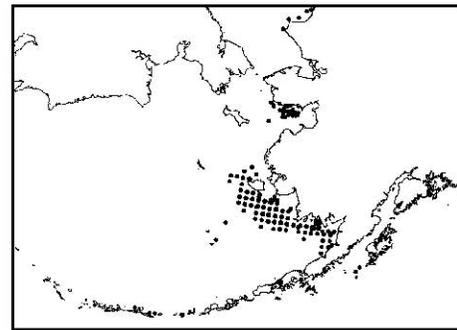
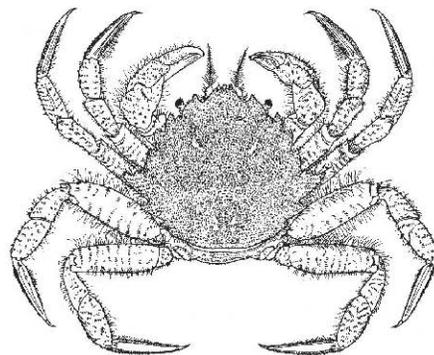
17(16) Carapace generally hexagonal, covered with bristle-like hairs..... 18

17 Carapace acutely triangular or lyre-shaped; carapace and legs may be decorated, but not covered with bristle-like hairs..... 19

18(17) Tips of claws light in color; carapace weakly hexagonal, with seven lateral spines posterior to eye; spines generally point forward.....
Korean Horsehair Crab (*Erimacrus isenbeckii*)
 Bering Sea, Aleutians, GOA from Kodiak west (20-400 m)



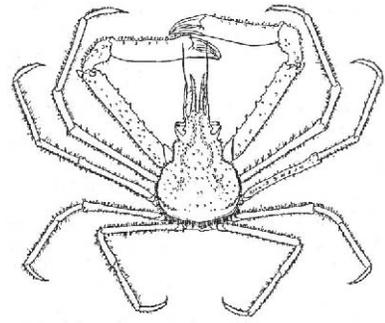
18 Tips of claws black; carapace strongly hexagonal, with six lateral spines posterior to eye; spines generally point outward..... **Telmessus Crab (*Telmessus cheiragonus*)**
 Bering Sea, Aleutians west to Atka, GOA from Kodiak west (0-300 m)



19(17) Carapace acutely triangular, teardrop-shaped; rostral spines long, slender, parallel; body and legs usually profusely decorated with kelp, hydroids, sponges, etc....

Decorator Crab (*Oregonia gracilis*)

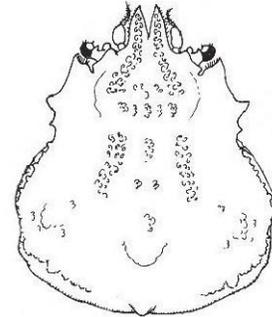
Bering Sea, Aleutians, GOA (10-1000 m)



19 Carapace guitar-shaped; rostral spines short, triangular; body and legs not profusely decorated (carapace may have some decoration).....

lyre crabs (Genus *Hyas*)

Bering Sea, Aleutians, GOA (10-900 m)



CORALS

Hydrocorals (Anthoathecatae) – code 815

Colonial corals with a hard inflexible calcareous skeleton. Colonies may be up to one meter tall but are often highly fragmented on deck as they are extremely fragile.



Stony corals (Scleractinia) – code 816

Small solitary ‘cup’ corals with a hard calcareous skeleton.



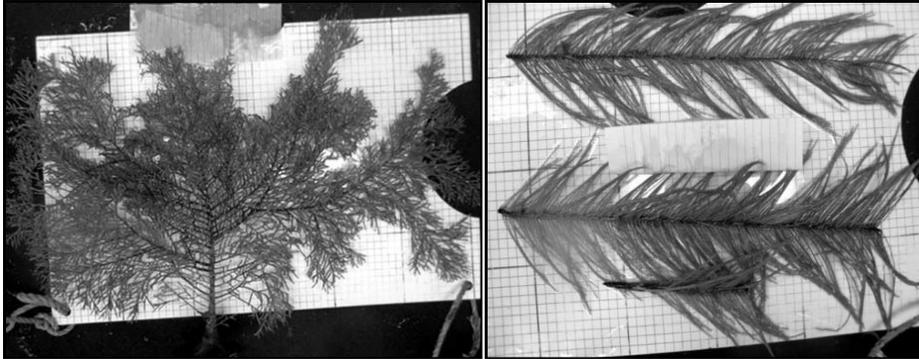
Gorgonians (Gorgonacea) – code 817

Colonial corals that may be bushy or uniplanar and quite large (more than 1 m tall or wide), resembling small trees, fans, or bushes. Internal skeleton is firm but flexible and may be ‘woody’ (dark protein material) or calcified (white bone-like) to some degree.



Black corals (Antipatharia) – code 818

Axial skeleton black or dark brown, highly flexible and covered with small thorn-like projections. Live specimens covered with a **mucus-rich** soft tissue with small non-retractable polyps.



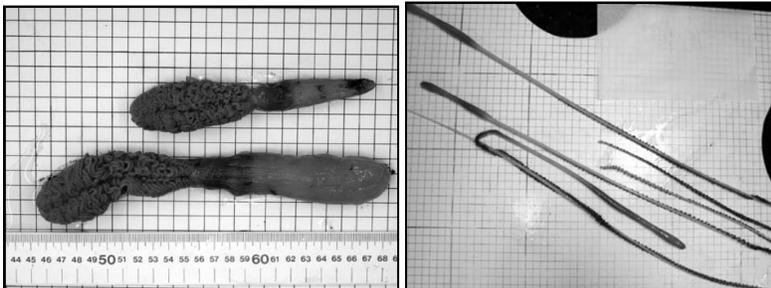
Soft corals (Alcyonacea) – code 819

Colonies have fleshy bodies without an axial skeleton, usually resembling mushrooms, berries, or cauliflower.



Sea pens and sea whips (Pennatulacea) – code 58

Colonies consist of an elongated fleshy stalk supported by an internal stiff calcium carbonate rod.

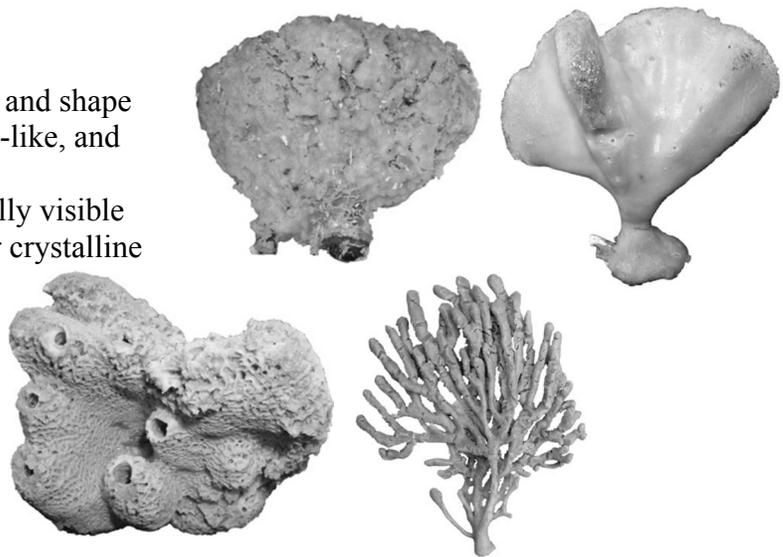


OTHER INVERTEBRATES

This section is a basic orientation to the major groups of invertebrates that observers are likely to encounter in their samples. The illustrations of typical species provided here are intended to aid observers in general invertebrate identification. However, observers should keep in mind that the identification of fish species is a top priority, and therefore they are generally not expected to put substantial effort into invertebrate identification. Line drawings courtesy of the Florida Center for Instructional Technology (<http://etc.usf.edu/clipart/>).

Phylum Porifera: sponges (code 26)

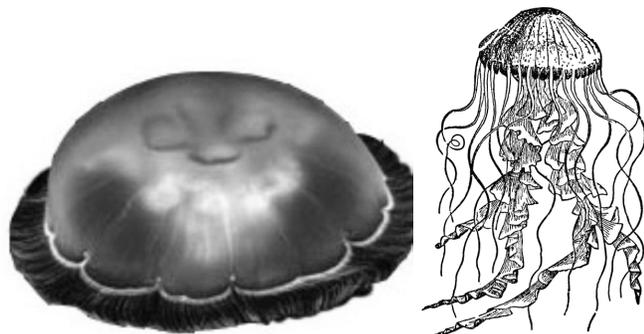
- sessile, highly variable in size, color, and shape
- includes encrusting, ball-shaped, tree-like, and various other morphologies
- exterior pores for water transfer usually visible
- texture may be soft, rubbery, hard, or crystalline



Phylum Cnidaria: jellyfish, anemones

Class Scyphozoa: jellyfish (code 35)

- consist of a bell and tentacles
- may be up to 50 cm wide
- clear, yellow, pink, or purple



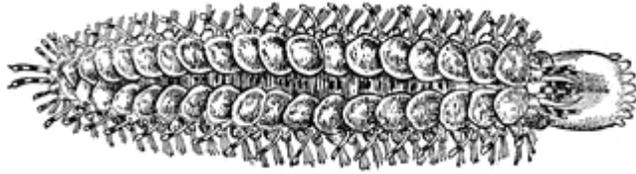
Class Anthozoa: Order Actiniaria: sea anemones (code 55)

- body is a thick column with crown of tentacles
- tentacles often retract out of water
- may be brightly colored, very slimy
- typically attached to rocks or shells

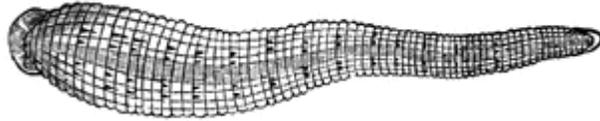


Phylum Annelida: worms and leeches

Class Polychaeta: bristleworms (**code 54**)
-body generally cylindrical and segmented
-multiple appendages with hairlike setae

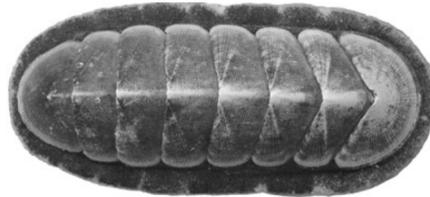


Class Hirudinea: leeches (**code 52**)
-flattened body with tapered anterior end
-suckers at both ends
-usually distinctly banded

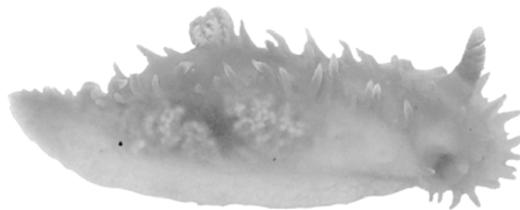


Phylum Mollusca: snails, clams, squids, octopus

Class Polyplacophora: chitons (**code 44**)
-dorsoventrally flattened, ovoid
-8 articulating shell plates on dorsal surface
-edges may have bristles



Class Gastropoda: snails (**code 30**) and nudibranchs (**code 25**)
-marine snails highly variable in size, color, shape
-nudibranchs lack shells, often very colorful



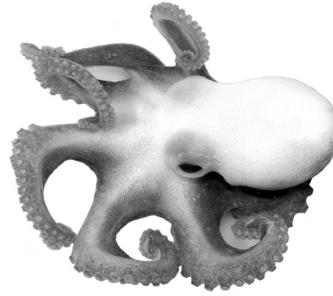
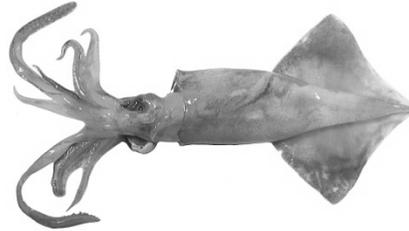
Class Bivalvia: clams, mussels, oysters, scallops (**code 29**)
-shell consists of two hinged halves, or valves
-size, shape, sculpturing, and colors highly variable



Class Cephalopoda: squids (**code 50**) and octopus (**code 60**)

-squids are generally elongate, with fins on the mantle and 10 appendages (8 arms and 2 tentacles)

-octopuses have a robust, rounded mantle, and 8 arms

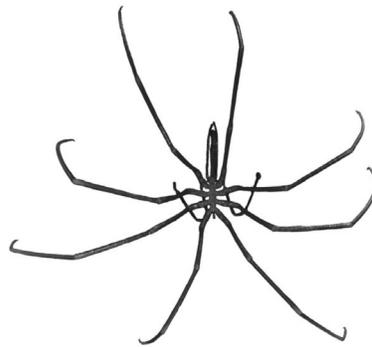


Phylum Arthropoda

Class Pycnogonida: sea spiders (**code 56**)

-very elongate, narrow body and 4-6 pairs of legs

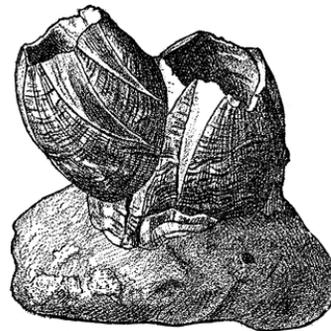
-often bright red or green



Class Cirripedia: barnacles (**code 48**)

-sessile filter-feeders usually attached to rocks

-smaller species may also attach to crabs and snails



Class Malacostraca: shrimps (**code 70**)

-various sizes and color patterns

-females carry eggs under tail segments



- Class Isopoda: isopods (**code 33**)
- dorsoventrally flattened, segmented
 - usually small (less than 5 cm long)
 - often pink or red, may be parasitic

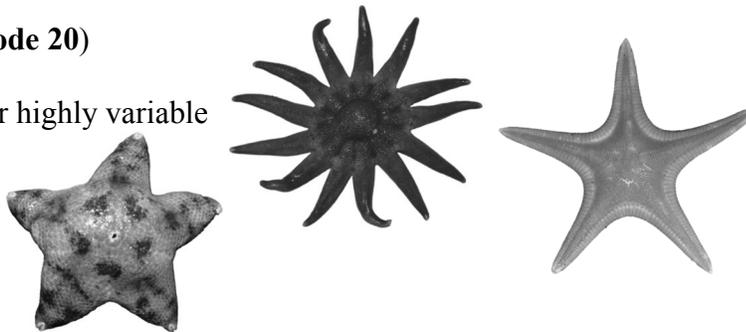


Phylum Echinodermata: crinoids, sea stars, urchins, cucumbers, etc.

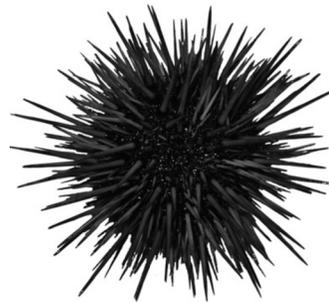
- Class Crinoidea: crinoids (**code 53**)
- commonly known as sea lilies or feather stars
 - crown has pentameral symmetry, with 5 forked arms
 - stalk jointed



- Class Asteroidea: sea stars (**code 20**)
- may have 5 to over 20 arms
 - size, shape, texture, and color highly variable



- Class Echinoidea: sea urchins, sand dollars (**code 40**)
- usually less than 15 cm in diameter
 - spherical shell covered with long spines
 - shell (test) divided into 10 radial sections
 - may be white, green, or purple

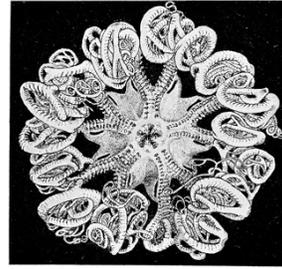


- Class Holothuroidea: sea cucumbers (**code 41**)
- elongate tube-shaped body
 - leathery or slimy texture
 - may be bright yellow, orange, or purple
 - appendages (tube feet) arranged in five rows on body
 - when irritated, organs forcibly expelled from anus

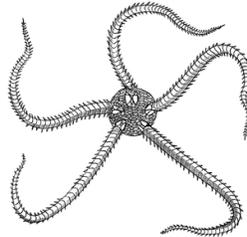


Class Ophiuroidea: basket stars (**code 21**) and brittle stars (**code 22**)

- basket stars have 5 highly branched arms, each of which ends in a coiled mass
- basket stars are generally yellow to orange, and may be relatively large (20-30 cm wide)



- brittle stars have a very small rounded disc and 5 long slender arms
- brittle stars are generally red to brown, but the color is variable



Phylum Chordata

Class Ascidiacea: tunicates and sea squirts (**code 43**)

- tunicates may be solitary or colonial
- solitary tunicates include sea squirts, and may be attached directly to the substrate or stalked
- solitary tunicates have one incurrent and one excurrent siphon
- colonial tunicates form large ball-shaped or club-shaped colonies
- colonial tunicates vary in color including gray, brown, yellow, or orange





ATLANTIC SALMON

(Salmo salar)

- (1) large dark spots on operculum
- (2) black x-shaped spots on back
- (3) narrow caudal peduncle
- (4) large scales
- (5) truncate caudal fin



spots on operculum

NOTE: If found, bring back the entire fish.



STEELHEAD TROUT

(Oncorhynchus mykiss)

- (1) many small black spots on body and fins
- (2) thick caudal peduncle
- (3) caudal fin truncate to weakly forked
- (4) dark spots along all caudal rays

PINK SALMON *(Oncorhynchus gorbuscha)*

- (1) scales small, 170 or more along lateral line, >30 rows between lateral line and dorsal fin
- (2) large oval blotches on both lobes of caudal fin
- (3) some spotting on back



mouth not a distinctive characteristic



blotches on both lobes and a dull gray background



scale size comparison between pink and Chinook salmon

CHINOOK SALMON (*Oncorhynchus tshawytscha*)

(1) mouth black at base of teeth (2) caudal fin with spots on both lobes and silver wash (3) irregular shaped but distinct black spots on back (4) dorsal area greenish-blue and black, silvery on sides



mouth black at base of teeth



faint spotting on both lobes



distinct spots on dorsum



prominent spots on both lobes

SOCKEYE SALMON (*Oncorhynchus nerka*)

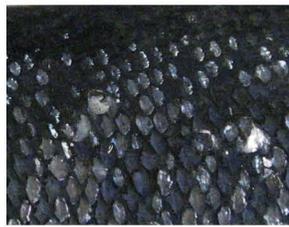
(1) no spots or silver on caudal fin (2) dorsum blue-black, without spots (3) gill rakers long, thin, >28 on first arch



long, thin gill rakers



mouth not a distinctive characteristic



no distinct spots on dorsum and blue-black color



no spots or silver on caudal fin

CHUM SALMON (*Oncorhynchus keta*)

(1) no spots on caudal fin (2) discrete silver streaks on caudal rays for half the length, not on membranes (3) no distinct spots on dorsal surface or caudal fin



mouth not a distinctive characteristic



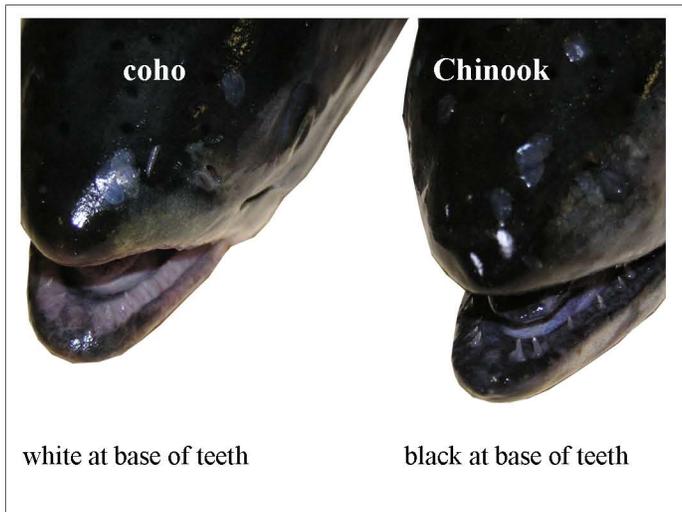
silver streaks on rays, but not on the membranes



no distinct spots on dorsal surface

COHO SALMON (*Oncorhynchus kisutch*)

(1) caudal fin typically with spots on upper lobe (2) silver wash on caudal rays AND membranes, extending about 3/4 length (3) dark spots on dorsal surface (4) gums white at base of teeth



SEX DETERMINATION

ROUNDFISH

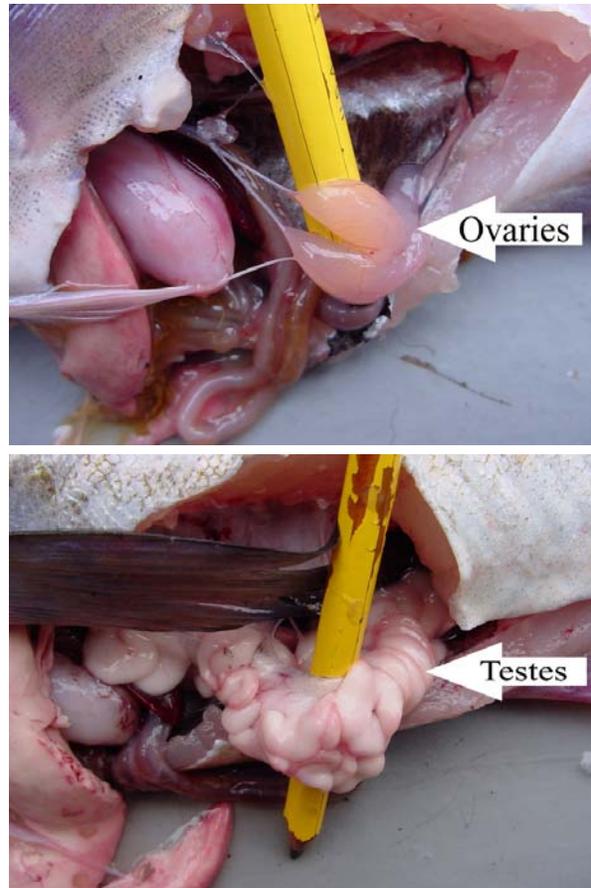
Roundfish gonads are in the visceral cavity, ahead of the vent. Insert your knife or scalpel blade in or near the anus and cut forward toward the head. There will be only two organs attached directly to the anus - the intestine and the gonads. If you carefully move the other organs aside until you get a clear view of the tubes attached to the anus, you can then pull on the tubes and discern intestine (which is coiled and attached to the stomach) from gonads (which end as paired structures near the backbone).

Cod, Pollock, and Giant Grenadier

The gonads are directly above the vent and are attached to the vent. Slit the skin of the belly near the vent and look behind the stomach area for the paired organs.

Ovaries are paired sacs which are typically pink or orange (or clear when immature). When ovaries are mature, you should be able to see the eggs inside. The sacs should look granular. Pacific cod ovaries often have a black covering on each sac.

Testes look very different from ovaries. When mature, the testes are convoluted, opaque and smooth in texture. In a mature male, the testes are best described as “greasy-looking, white, twisted Ramen noodles.” Immature testes will be pink or cream colored, located near the backbone and have a ruffled look to the edges of the tubes.



Rockfish

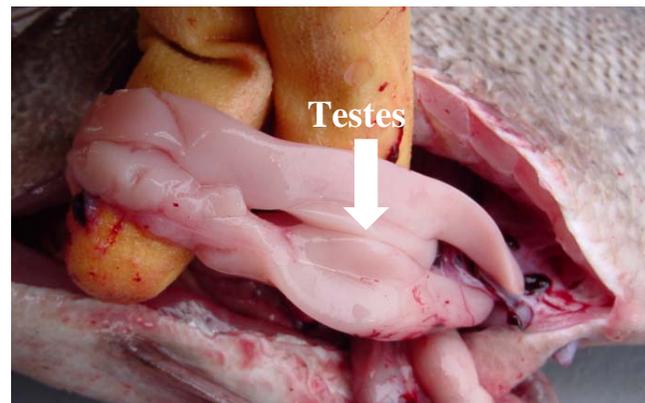
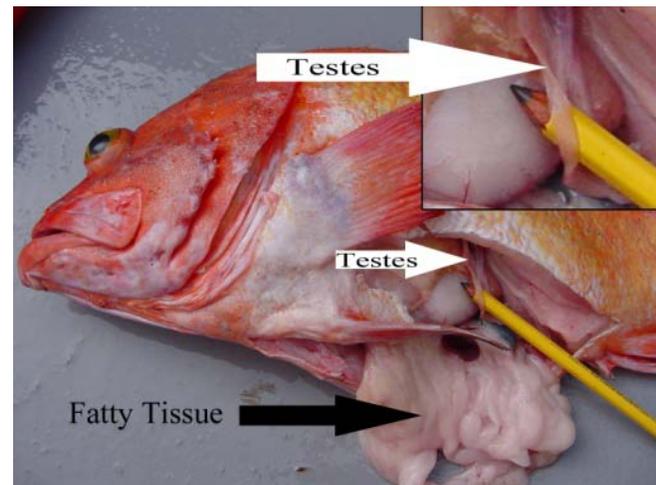
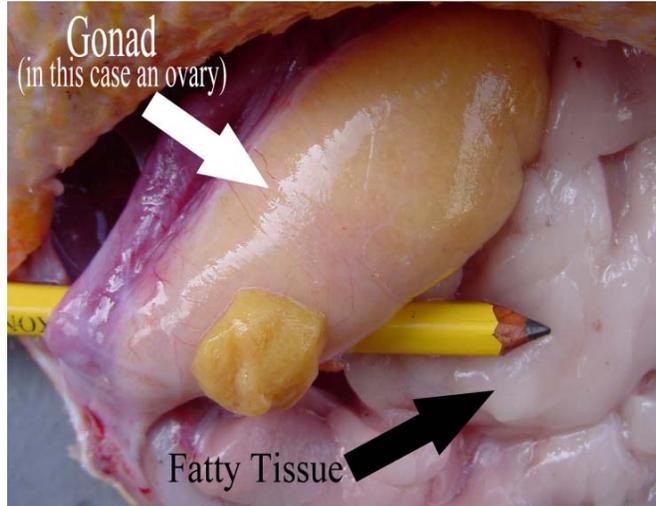
Rockfish gonads are found near the backbone in the visceral cavity. Trace the gonad strings from the vent upwards until you see the paired organs. There will always be two strings near the anus that have to be traced some ways before you can find the sacs. Sometimes there is another structure directly at the vent that appears to be a single gonad sac, but this is not the sex organ! You must follow the string-like tubes up to the *paired* gonads. Though you may notice external structures at the vent that seem sexually dimorphic, *never sex rockfish using external characteristics*. It is too easy to judge an immature male as a female or a huge female as a male when using external characteristics.

There can be a significant amount of fatty tissue in the visceral cavity of both male and female rockfish. Those observers accustomed to sexing pollock, Pacific cod and grenadier have mistaken this tissue for testes, because it is whitish and ribbon like. Rockfish gonads are smooth and discernible as paired structures: you must move any fatty tissue aside and look dorsally in the visceral cavity to see the gonads!

Ovaries are elongate ovals with granular insides. They will be pink, orange, yellow, or white. The two sacs will have smoothly rounded sides, as opposed to the male testes which have a three-sided, triangular shape in cross-section. If immature, look closely or cut the gonad open to see the granular insides which identify it as female. Rockfishes are live spawners, so a spawning female will have larvae in the cavity.

Testes are cream colored or pink, elongate (5 times as long as they are wide) and smooth in texture. They have three “edges” to the tubes. Instead of a rounded oval tube, testes look triangular in cross section due to the distinct edges. Testes will look like flat tubes when immature, but when examined closely you will see the defined edges and the triangular shape.

Don't mistake the fatty tissue found in the visceral cavity of some rockfish as testes! The testes of rockfish look nothing like those of pollock, Pacific cod and grenadier!

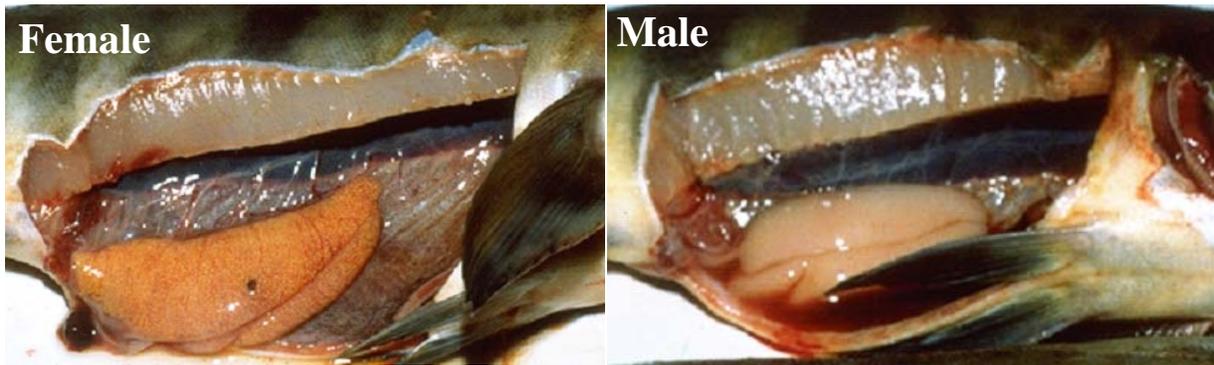


Atka Mackerel

Like rockfish, Atka mackerel gonads are at the top of the visceral cavity, close to the backbone. Externally, mature males have a yellow tinge to the white stripes but external color differences cannot be used to sex these fish. The cut and gonad location is the same as with rockfish.

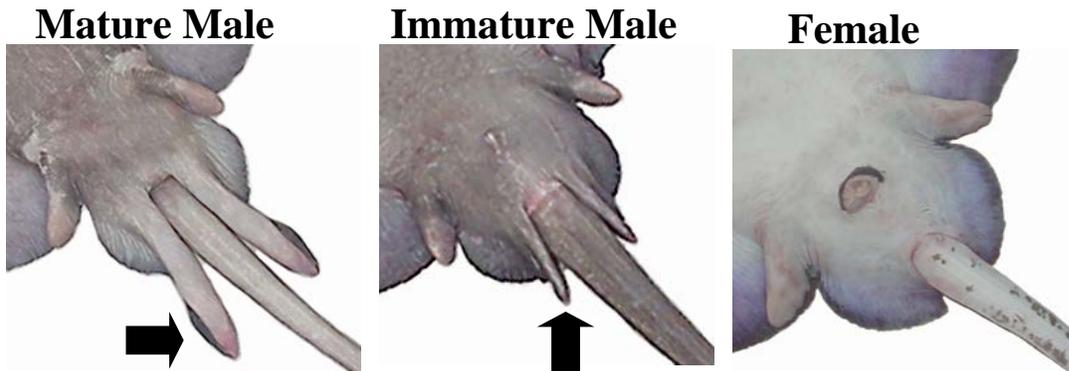
Ovaries are two clear sacs filled with small round eggs that are olive green, tan or brown. Atka mackerel spawn in spurts, so eggs in the ovaries will be a mix of different sizes and stages of development.

Testes are similar to those in rockfish. The two tubes will be smooth in texture, cream colored and longer than wide. Be aware that males eat the eggs from other Atka mackerel nests. Don't confuse a stomach full of eggs, or eggs loose in the cavity as a female mackerel.



Skates

Skates can easily be sexed externally by noting the presence or absence of claspers. The claspers are paired reproductive structures located between the pelvic fin and the base of the tail. In mature males the claspers are large (possibly half the length of the tail), rigid and are easily identified. In immature males the claspers are much smaller and flexible, and may be more difficult to distinguish from the pelvic fin.



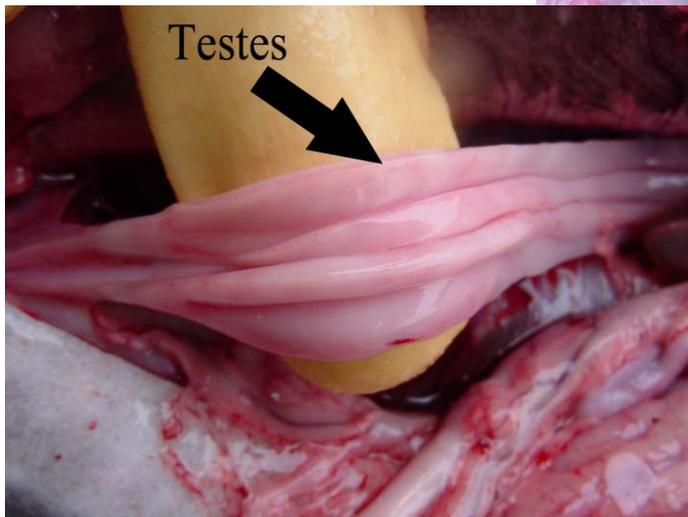
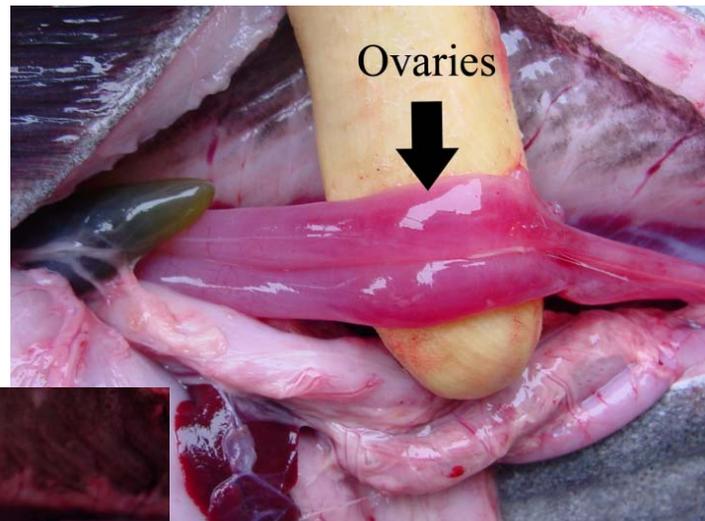
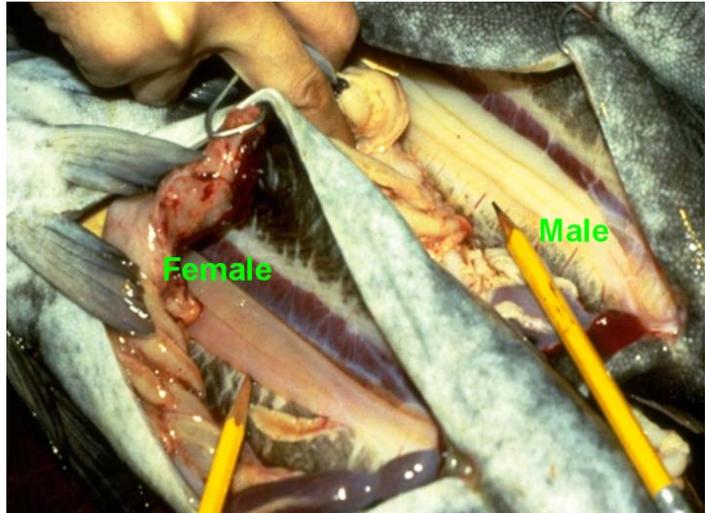
Sablefish

The gonads of sablefish are very different from all other roundfish; they lie directly on the backbone. Remove all the other organs from the visceral cavity and peer at the backbone area near the posterior of the visceral cavity for the gonad tubes. Immature fish will have nearly see-through ribbons, so you will need to probe them apart to count the correct number of lobes.

It is important to count the lobes at the posterior portion of the gonad, since the lobes will be fused anteriorly and will always look like just two lobes.

Both females and males have fleshy smooth tubes of a cream or pink color. Mature fish have liver colored gonad tubes. There are no reliable differences in color or texture between non-ripe males and females. You can reliably tell the difference between males and females based on whether the gonads have two (females) or four (males) lobes. When mature, the ovaries may have a partial fold through each of the two lobes, giving a false impression of four lobes. Cut across the gonad strands and distinguish the true number of lobes.

Male sablefish gonad lobes are fused at the anterior point, making it easy to mistake a male as female. When checking the gonad lobes, look at the posterior portion!



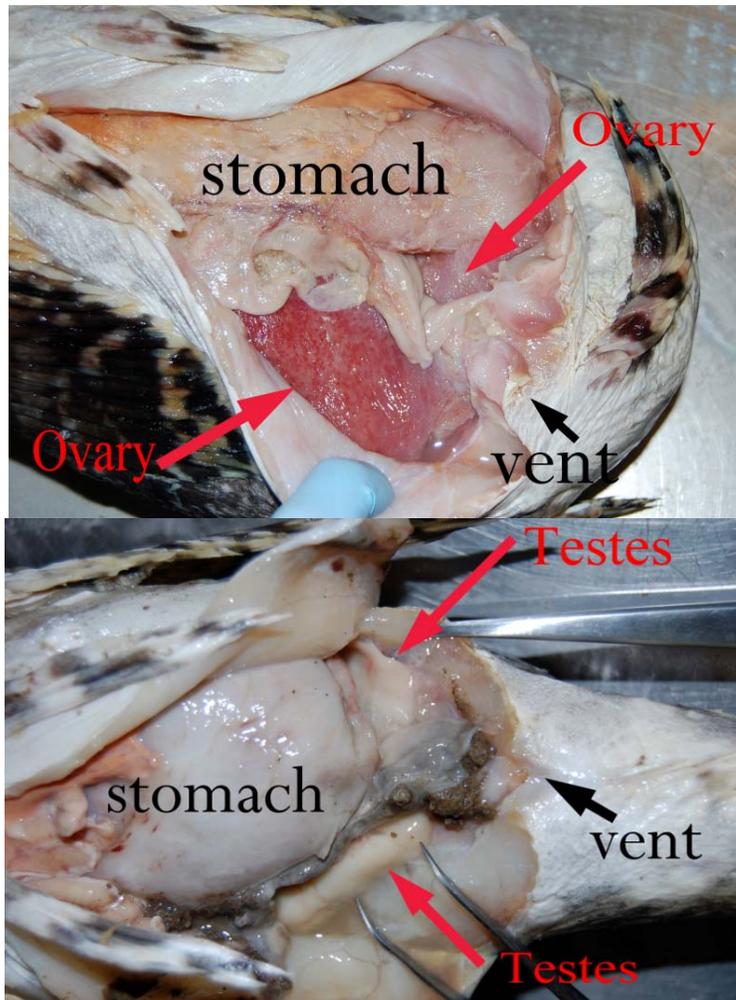
Sculpins

The gonads are directly above the vent and are attached to the vent. Slit the skin lengthwise from the vent forward (anterior/towards the head) and look behind the stomach area for the paired organs. To avoid cutting the stomach first make a gentle cut just below the skin, allowing you to move the stomach to the either side, then make a larger cut to allow for identification. Cutting the stomach may make sexing more difficult because the stomach contents may fill the visceral cavity. For Yellow Irish Lord, this step is very important, as the stomach often protrudes outward right next to the cavity wall near the gonads and the skin can be very thin in this area.

Ovaries are paired sacs which will be typically pink or orange (or clear when immature). When the ovaries are mature, you should be able to see the eggs inside. The sacs should look granular. Sculpin ovaries often have a translucent covering on each sac, but sometimes may be dark. For immature specimens, look for small paired sacs.

Ripe mature female great and plain sculpins are typically caught during the late fall and winter; their ovaries will be large (up to 20% of body weight) and eggs will be visible. Ripe mature yellow Irish Lord females are typically caught in summer and early fall. During the spawning season, some ovaries may be spent, and they are much smaller after having released the eggs.

Testes look very different from ovaries. Male gonads in all species will be flat, often with discernible edges. When mature, the testes will be opaque and smooth in texture. Immature testes will be pink or cream colored, long and thin, and located near the backbone.



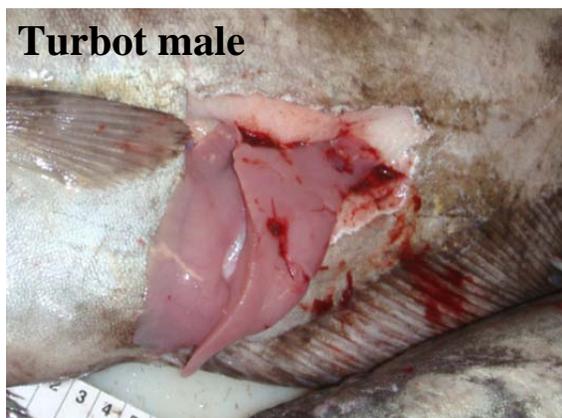
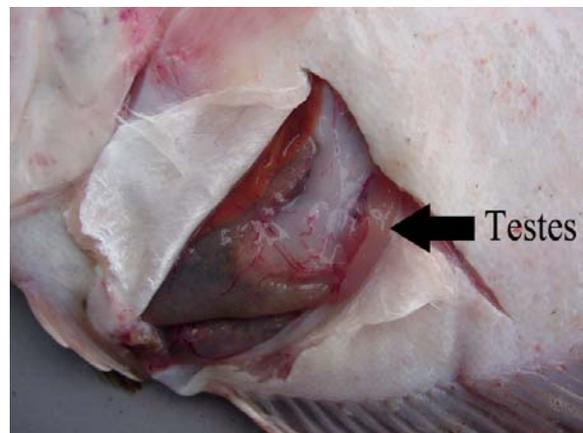
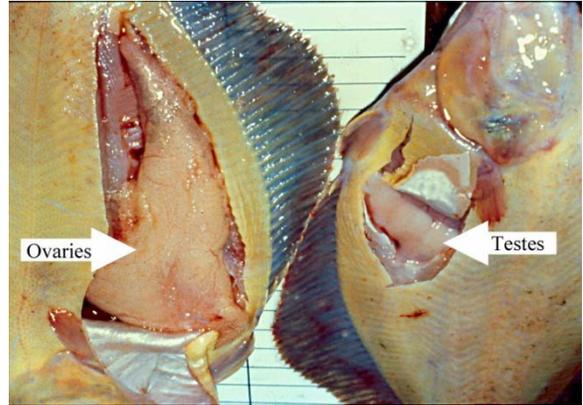
FLATFISH

Flatfish gonads are also paired, but are located behind the visceral cavity. If the flatfish has an anal spine, the gonads will begin just behind it. Cut from the anal spine location back toward the tail of the fish. When you gain experience determining sexes using a larger cut, your cut can be made smaller, faster, and in the correct spot for seeing the sex difference.

Flatfish gonads are posterior to the visceral cavity (and the anal spine if present) and extend just under the flesh on both sides of the fish, although it is easier to cut on the blind side. Cut back toward the tail from the anus as if skinning the fish. Lift the skin flap and check for a triangular shaped gonad.

Ovaries: Female flatfishes have elongate triangle ovaries that extend from behind the anal spine area almost to the tail when mature. When immature, the ovaries will be almost equilateral triangles with one angle shaped like a smoothly rounded tube extending only slightly back toward the tail (the triangle looks like a funnel in shape). The color will be pink (spent, immature) or orange (ready to spawn). Ovaries always have rounded edges.

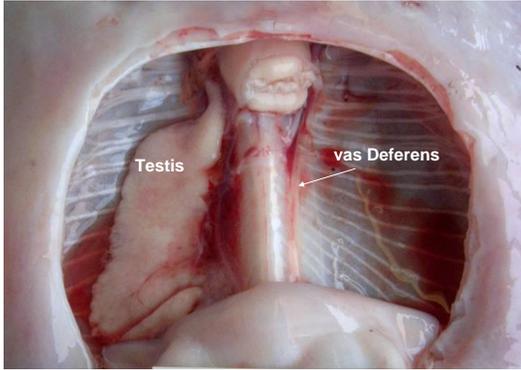
Testes: Male flatfishes have a white, equilateral triangle shaped gonad on each side. The triangle will not have a tail extending back toward the caudal fin. Immature males have a small crescent moon shaped, tan colored gonad laying right at or behind the anal spine location. All male flatfishes have “edges” to the triangle. If you lift the gonad with the knife or scalpel and examine the sides of the triangle, you can distinguish the sharp edges (male) or rounded sides (female), even on an immature flatfish.



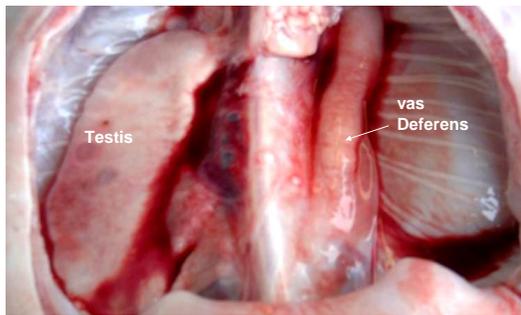
Note: Mature Greenland turbot males may have elongate testes that extend beyond the visceral cavity. However, they still have the typical edges and the same consistency as other testes.

Skate Maturity Stages

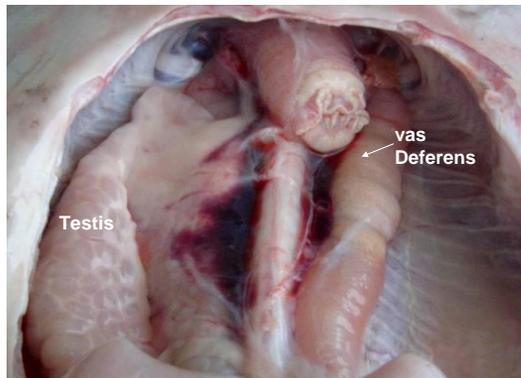
MALES



Immature (Maturity Stage 1)

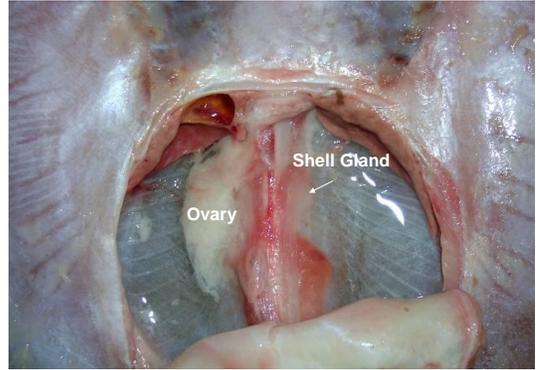


Developing (Maturity Stage 2)

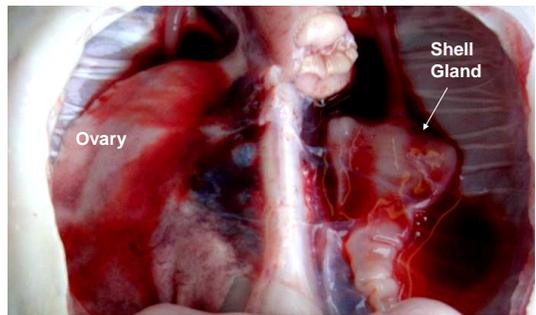


Pre-Spawn (Maturity Stage 3)

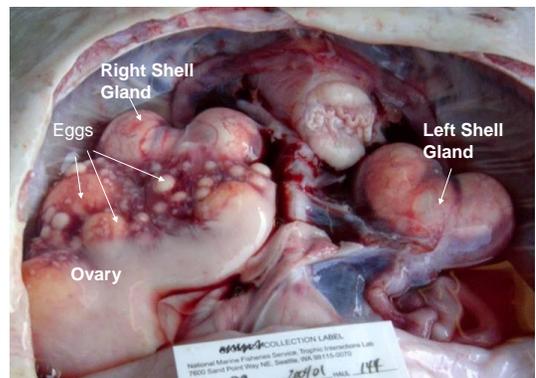
FEMALES



Immature (Maturity Stage 1)



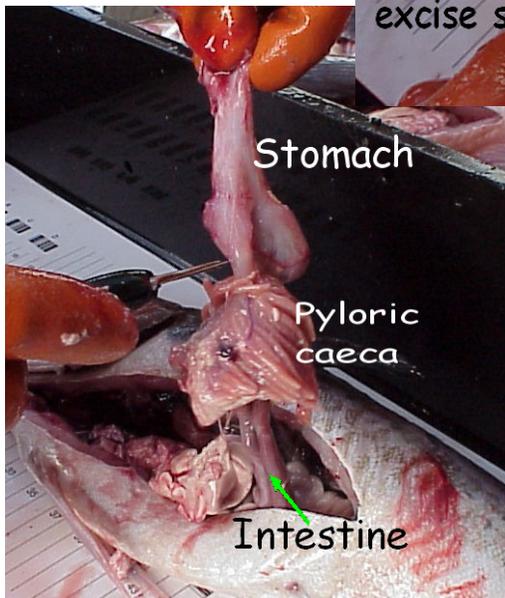
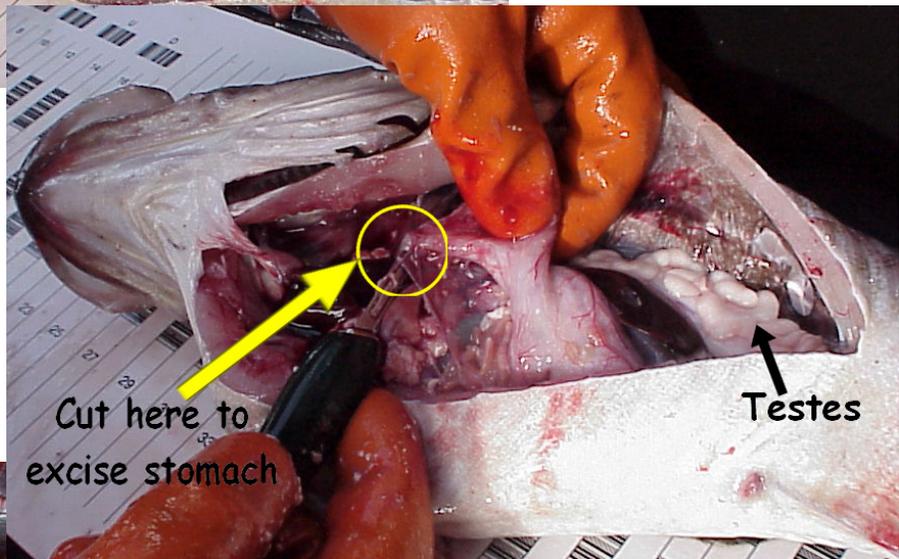
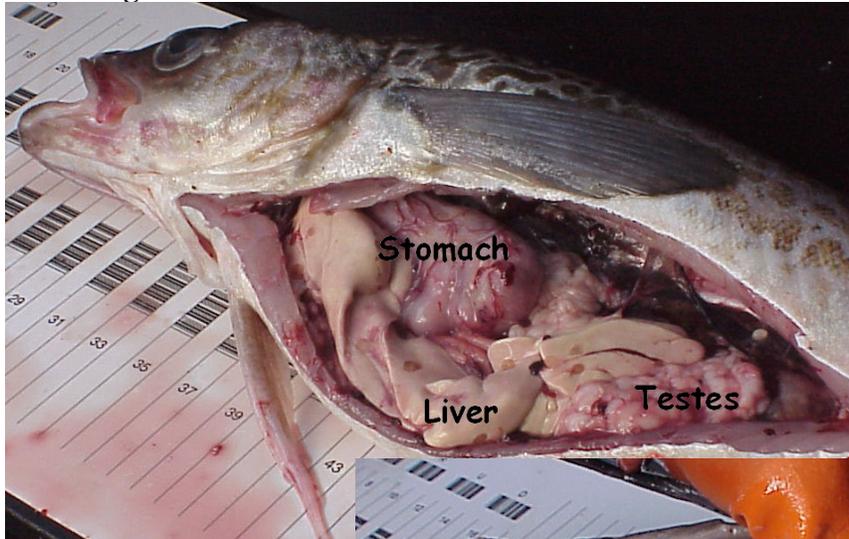
Developing (Maturity Stage 2)



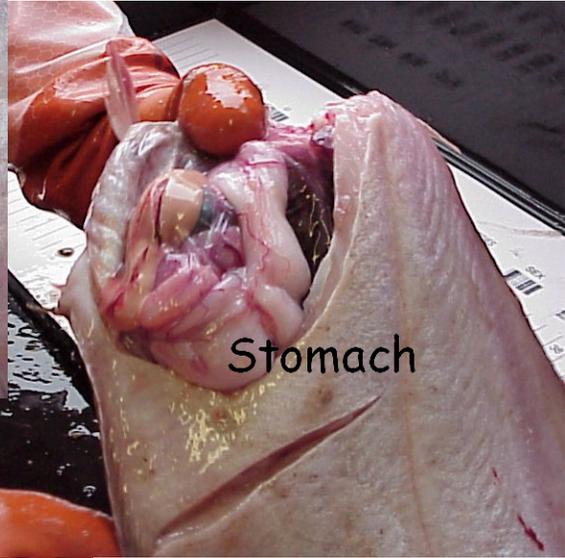
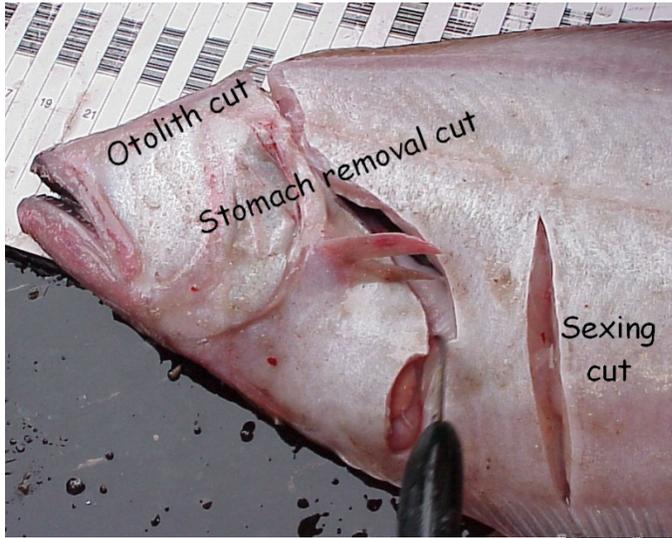
Pre-Spawn (Maturity Stage 3)

STOMACH SAMPLING

Removing a Gadid Stomach



Removing a Flatfish Stomach



Pollock Maturity Codes (female)

Stage

Description

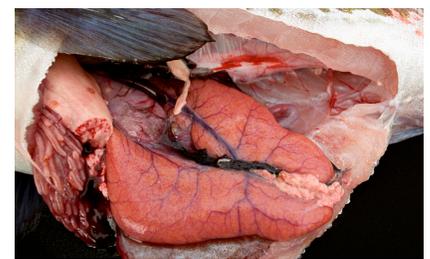
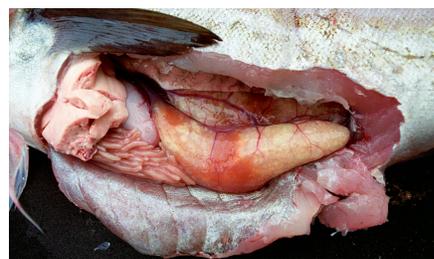
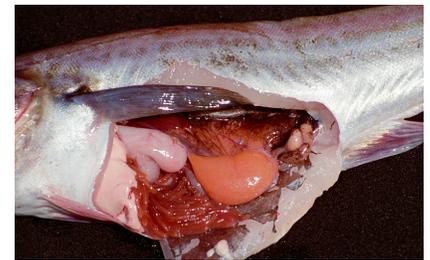
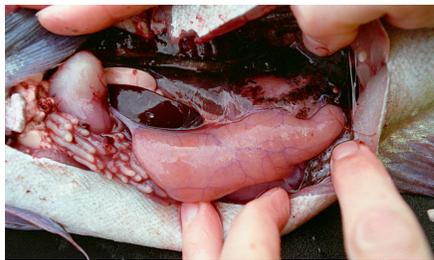
1. Immature

Ovaries small, transparent to translucent, grayish-red. Eggs not visible to the eye.



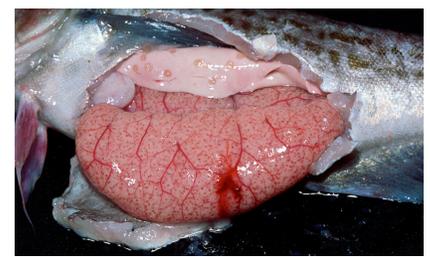
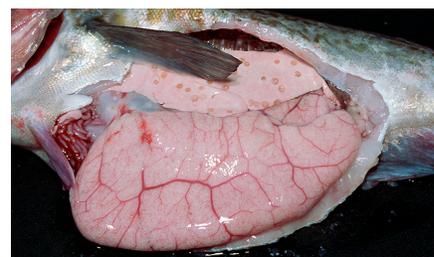
2. Developing

Ovaries occupy about half the length of the ventral cavity. Color ranges from opaque grayish-red to reddish-yellow and orange. Eggs usually are present but may not be visible to eye.



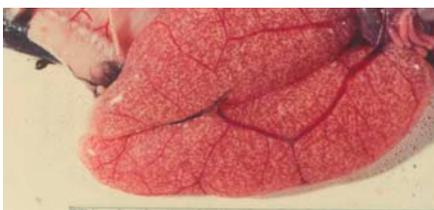
3. Pre-spawning

Ovaries occupy about 2/3 or more of the ventral cavity. Color becomes more opaque. As eggs begin to hydrate, some become translucent.



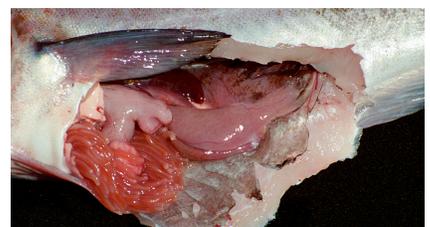
4. Spawning

Roe runs with slight pressure. Most eggs hydrated (translucent) with few opaque eggs left in ovary.



5. Spent

Ovaries almost, to completely empty. May contain a few opaque eggs or eggs in a state of reabsorption. Ovaries are flaccid, watery and bloodshot.



Visual Maturity Scan Reminders and Suggestions: (see observer manual and visual maturity PowerPoint for complete instructions)

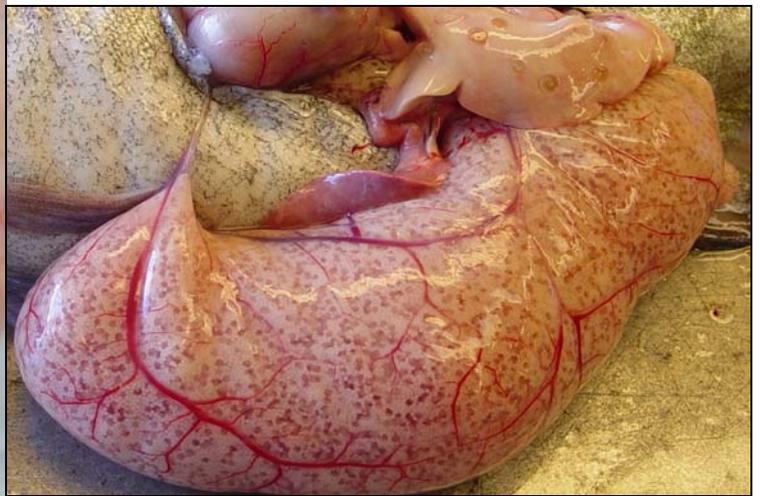
- Visual maturity is assessed on female otolith specimen fish only
- Be careful not to damage the internal structures (especially the stomach) while cutting the abdomen
- Consider all three characteristics listed below before assigning a visual maturity stage
- Remove only the ovaries before reweighing the fish
- The weight obtained after removing the ovaries is entered where weight data is required for the visual maturity specimen
- Use the otolith vial number for the visual maturity specimen number on the data sheets and in Atlas

Additional photographs:

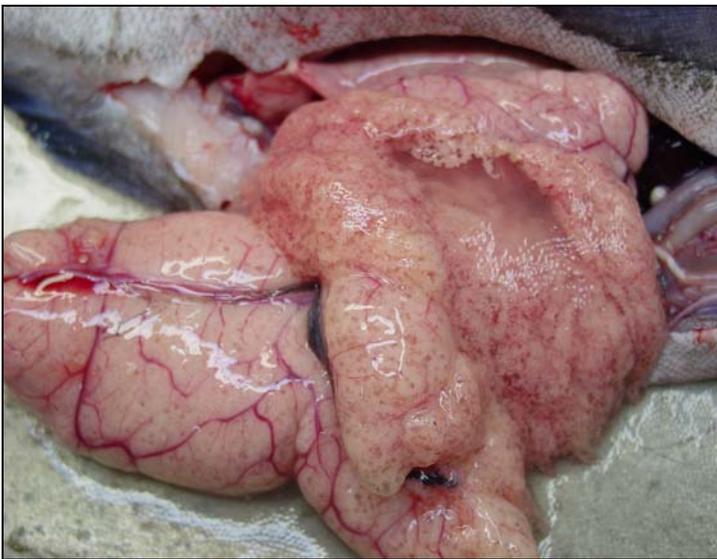
A



B



C



Photograph A: developing; yellow- orange in color, well developed blood vessels, visible eggs

Photograph B: Prespawning; occupies 2/3 or more of abdominal cavity, color becoming more opaque, and eggs begin to hydrate

Photograph C; potential spawning (if eggs emitted with slight pressure to the abdominal cavity).

Note: development is more advanced in the center of the ovary. Hydrated and free flowing eggs are surrounding less hydrated, pre-spawning stage eggs. This example confirms the need to cut open a pollock ovary to verify maturity stage evaluation. Assign most advanced stage observed to the whole ovary cavity)

For questions regarding Pacific cod key contact Sandi.Neidetcher@noaa.gov with the Fisheries Interaction Team, Alaska Fisheries Science Center

PACIFIC COD MATURITY CODES (FEMALE)

<p>1. Immature</p> <ul style="list-style-type: none"> Ovaries appear as pink or transparent paired sacs, no oocytes (eggs at earlier stage of development) are visible to the eye. Very small ovaries are close to vertebral column and may be difficult to sex. 		<p>* Look for transparent pinkish coloration. There may be slight silver or dark blotching on the surface, but the ovary should be small and new looking as shown.</p>
<p>2. Developing</p> <ul style="list-style-type: none"> Ovaries are smallish to about 1/2 the length of body cavity. Ovaries form 2 tapered, distinct lobes with well-developed blood vessels. Oocytes are distinct and visible through the ovary wall and typically appear orange to yellowish in color. Oocytes stick together forming a solid mass. 		
<p>3. Pre-Spawn</p> <ul style="list-style-type: none"> Ovaries form 2 large distinct lobes 1/2 or greater the length of the abdominal cavity. Most oocytes have matured to opaque or almost clear ova (mature eggs) Ova are less adhesive resembling the color and consistency of Cream of Wheat- the breakfast cereal. 		
<p>4. Spawning</p> <ul style="list-style-type: none"> Ova are loose in the ovary and run under slight pressure to the body. (The ovary shown was cut upon sexing; the ova fill the abdominal cavity and flow into the bin.) <p>* To differentiate ovary stages 2 through 4 look at the adhesive quality of the eggs. Stage 2 eggs form a solid mass while stage 3 eggs are looser and stage 4 eggs flow freely.</p>		
<p>5. Spent</p> <ul style="list-style-type: none"> Ovaries appearing flaccid, dark, and watery or bloody. Ovaries may contain remnants of disintegrating ova and associated structures. 		<p>* Spawning females who have released their eggs may have some loose eggs in the ovary, but the ovary will look flaccid where the ovary starts to shrink, looking wrinkled or bumpy. Disintegrating ova and structures look bloody.</p>
<p>6. Resting</p> <ul style="list-style-type: none"> Ovaries are small and firm, may have some black or silver color. No oocytes are visible to the eye. 		<p>* Look for small ovaries (as shown or slightly larger) in larger fish. The surface may be dark or silver and fibrous. The shape is more triangular and thicker than an immature ovary.</p>

Visual Maturity Scan Reminders and Suggestions: (see observer manual and visual maturity PowerPoint for complete instructions)

- Visual maturity is assessed on female otolith specimen fish only
- Be careful not to damage the internal structures (especially the stomach) while cutting the abdomen
- Consider all three characteristics listed below before assigning a visual maturity stage
- Remove only the ovaries before reweighing the fish
- The weight obtained after removing the ovaries is entered where weight data is required for the visual maturity specimen
- Use the otolith vial number for the visual maturity specimen number on the data sheets and in Atlas

Three main characteristics of visual maturity:

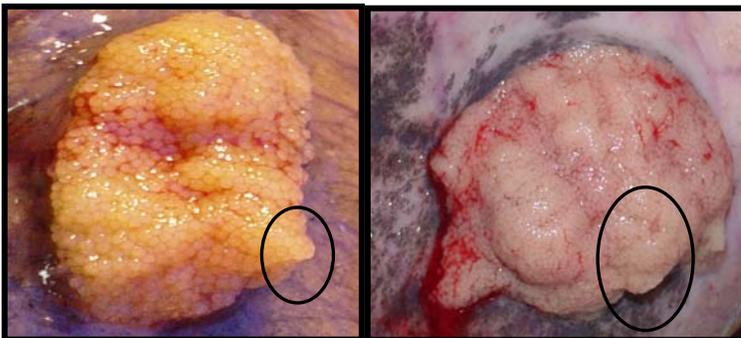
- 1) The size of the ovary in comparison to the size of the abdominal cavity.



- 2) The color of the ovary and the individual oocytes (ova)



- 3) The adhesiveness of the oocytes – do they stick tightly together or can they be separated easily; do they run freely.

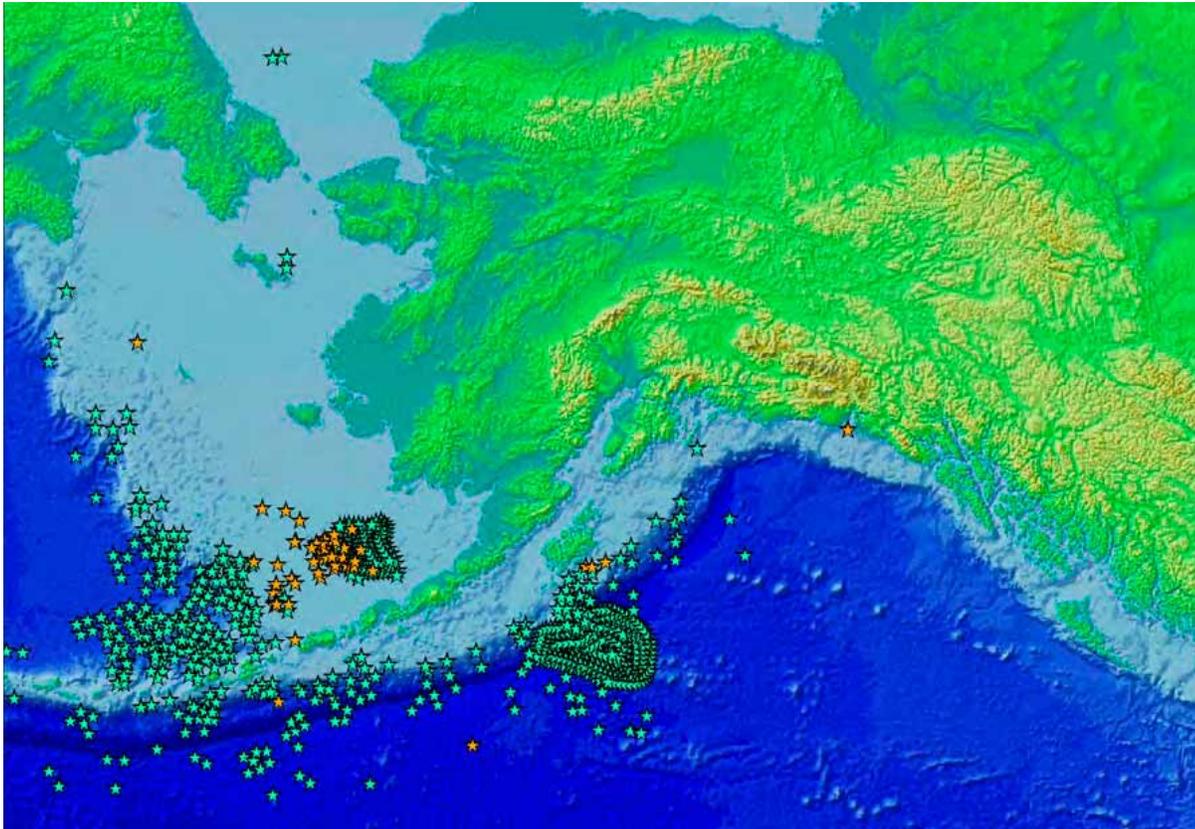


For questions regarding Pacific cod key contact Sandi.Neidetcher@noaa.gov with the Fisheries Interaction Team, Alaska Fisheries Science Center

North Pacific Right Whales

MARINER ADVISORY

The right whale population in the eastern North Pacific is the most endangered stock of whales in the world, with fewer than 100 individuals remaining. Right whales are slow swimmers that sometimes feed at or near the surface. They show little or no instinct to avoid vessels and are vulnerable to ship strikes. They also tend to roll when they meet an obstacle, which may result in gear entanglement. North Pacific right whales have been observed over the central Bering Sea shelf and off Kodiak Island in recent years.



★ sightings from 1979 – 2004

★ sightings from 1941 – 1967

DO

1. Look out for whales.
2. Log the time and location of right whale sightings.
3. Immediately notify federal fisheries observer of right whale sightings.
4. If no federal fisheries observer, photograph whale for sighting confirmation and send sighting report to address on reverse side.
5. Notify nearby vessels and ask them to stay away.
6. Remain at least 100 yards from whales.
7. If a whale approaches your vessel, take the vessel out of gear (neutral) and allow the whale to pass.
8. Leave the area at a slow, safe speed, ASAP.



DON'T

1. Set or haul gear of any type close to whales.
2. Approach within 100 yards of any whale.
3. Place your vessel in the path of oncoming whales, forcing them to surface.
4. Remain near a right whale.
5. Operate your vessel at anything greater than a slow, safe speed near whales.



Marine Conservation Alliance
promoting sustainable fisheries to feed the world



RIGHT WHALE



V-shaped, bushy blow



Callosities on head



No dorsal fin, smooth back



Triangular, all-black tail

HUMPBACK WHALE



Tall, slender and/or low, bushy



Grooves and knobs on head



Dorsal fin, hump sometimes with knuckles



Scalloped edge on tail

GRAY WHALE



Bushy, heart shaped



Barnacles all over



No dorsal fin, prominent knuckles



Broad and rounded tail

Right whales may be confused with humpback and gray whales. Look for these important differences. Right whales are baleen (filter-feeding) whales. They have bowed lower lips that enfold a narrow arching rostrum, the narrow upper jaw. North Pacific right whales grow to about 60 feet (18.3 meters) in length, and adults average 50 tons. They have robust bodies with large heads that are one fourth of the body length. There are a series of callosities – areas of raised, roughened, white-colored skin – on the chin, above the eyes, on the lower lip, behind the blowholes and on the rostrum. The skin is usually black, with white patches on the belly. Right whales have no dorsal (back) fin, and no throat grooves. They have large paddle-like flippers and very broad triangular tails with straight edges. Their blow is V-shaped and up to 16 feet (5 meters) high. Note: never use blow shape alone to identify whales because this characteristic will change depending on weather conditions and whale behavior.

Take photos if possible! Right whales can be individually identified by the pattern of callosities on their head and by other features, so photographs - especially of the head and any scars - are of great value to researchers. At a minimum: report date, number of animals, location (lat/long).

REPORT SIGHTINGS AND SEND PHOTOGRAPHS TO:

Director
National Marine Mammal Lab
Alaska Fisheries Science Center
NMFS, NOAA
7600 Sand Point Way N.E.
Seattle, WA 98115-6349

(206) 526-4045 voice
(206) 526-6615 fax

<http://nmml.afsc.noaa.gov/>



North Pacific Albatrosses



2
JUVENILE/IMMATURE



2
JUVENILE/IMMATURE



4
SUB-ADULT



4
SUB-ADULT



3
IMMATURE



3
IMMATURE



5
ADULT-FULL GROWN



5
ADULT-FULL GROWN



JUVENILE-FIRST 2 MONTHS AT SEA

1

SHORT-TAILED ALBATROSS



7

ADULT



BLACK-FOOTED ALBATROSS (6 AND 7)

SHORT-TAILED ALBATROSS (2)



6

JUVENILE



7



6

BLACK-FOOTED ALBATROSS



8

ALL AGES

LAYSAN ALBATROSS (8)



SHORT-TAILED ALBATROSS (5)



8

ALL AGES

LAYSAN ALBATROSS

D. Weisler/VIREO

Identification of Live Birds:

Please match numbers with photos on front.
Bill outlines are life-size for positive identification.

SHORT-TAILED ALBATROSS

Female

BLACK-FOOTED ALBATROSS

Male

Female

LAYSAN ALBATROSS

Male

SHORT-TAILED ALBATROSS

BLACK-FOOTED AND LAYSAN ALBATROSS

GENERAL DESCRIPTIONS

(1) SHORT-TAILED, Juvenile

(6) BLACK-FOOTED, Juvenile

Short-tailed Albatross
Phoebastria albatrus

Can occur anywhere in the North Pacific Ocean during ALL months. Currently less than 200 breeding pairs. Multiple threats throughout its range require international cooperation to prevent its extinction. During various stages, can be confused with black-footed and Laysan albatrosses. Full grown chicks completely brown; dark legs; large bill grayish with pink traces (1). Not known exactly when *bill develops distinctive pink color* (2) but thought to occur during first two months at sea. As they mature, legs become pale; white patches replace brown plumage (3 and 4). Eventually exhibits nearly all-white body; white head and neck with yellow tinge; *white and dark brown wings; white back* (5).

Breeds: Japan
Estimated breeding pairs: 180

Black-footed Albatross
Phoebastria nigripes

Mostly brown throughout its life and *always has white at base of dark bill* (6 and 7). Dark legs. Develops a *white rump* and more white on the face and chest as it matures (7).

Breeds: Hawaiian Islands, Japan
Estimated breeding pairs: 71,000

Laysan Albatross
Phoebastria immutabilis

A white-bodied albatross, like the adult short-tailed albatross, but *solid dark brown from wing tip to wing tip on upper side; dark back* (8). Pink bill but can vary. Legs pale. Plumage colors do not change.

Breeds: Hawaiian Islands, Japan, Mexico
Estimated breeding pairs: 630,000

OTHER FACTS

Albatrosses are adult-size when they leave the nest and spend their first several years at sea. They mate for life. Both sexes of these three species raise a single chick annually, which takes 5 to 6 months. If one parent is killed, the chick also dies and the mate is not replaced for up to three years. These three species have an approximate 7-foot wingspan and range across the entire North Pacific Ocean. They can live 40 years or more.

Please report sightings of short-tailed albatrosses to the U.S. Fish & Wildlife Service: 1-800-272-4174. The only way of knowing the short-tailed albatross' age is from leg bands placed on them as chicks. By reporting the following information, you are contributing to the knowledge of this endangered seabird's pelagic range: 1) Date and time 2) Vessel's position 3) Plumage characteristics 4) The leg-band color combinations (both right and left leg)

Photographs:
Hiroshi Hasegawa, Elizabeth Mitchell, VIREO
Text/Design/Art/Graphics:
Elizabeth Mitchell, Greta Tristram

First two months at sea

Similarities

- Difficult to distinguish; completely brown body and wings, dark bill and legs

Differences

- Large, light gray bill with traces of pink
- Smaller dark gray bill
- White on face at base of bill

Note: Bill of young short-tailed albatross changes to pink probably within its first two months at sea. It departs from nest mid-May to early June.

(2) SHORT-TAILED, Juvenile/Immature

- Confusion with other species unlikely at this stage
- Completely brown body and wings
- Large pink bill
- Pale legs (sometimes dark)

(3) SHORT-TAILED, Immature

(7) BLACK-FOOTED, Old adult

Similarities

- Brown body, some white on chest and face

Differences

- Large pink bill
- Pale legs
- Brown rump and undertail
- Brown wings with white patches on upperwings
- Smaller dark bill
- Dark legs
- White rump and undertail
- Wings all brown

(4) SHORT-TAILED, Sub-adult

(8) LAYSAN ALBATROSS, All ages

Similarities

- Pink bill (Laysan bill varies yellowish to pinkish-beige)
- White body with brown back
- Pale legs

Differences

- Dark cap on back of head/neck
- Brown and white upperwings
- Lacks eye patch
- Back more mottled brown
- White head/neck
- Brown back and upperwings
- Dark gray eye patch

Note: Can breed at this stage.

(5) SHORT-TAILED, Adult-full grown

(8) LAYSAN ALBATROSS, All ages

Similarities

- Pink bill (Laysan bill varies yellowish to pinkish beige)
- White body
- Pale legs

Differences

- White head/neck with yellow tinge
- White back
- Brown and white upperwings
- Lacks eye patch
- White head/neck without yellow tinge
- Brown back and upperwings
- Dark gray eye patch

Support: U.S. Fish & Wildlife Service
National Marine Fisheries Service
International Pacific Halibut Commission
A & A Printing, Seattle



North Pacific Longline Association

