Fishery Interactions with Skate Eggs and Nurseries in the Eastern Bering Sea

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Since early 2015, fishery observers in the North Pacific Groundfish and Halibut Observer Program have been receiving training in the identification and sampling of skate egg cases. The goal of this training has been to investigate interactions of fisheries with skate egg cases.

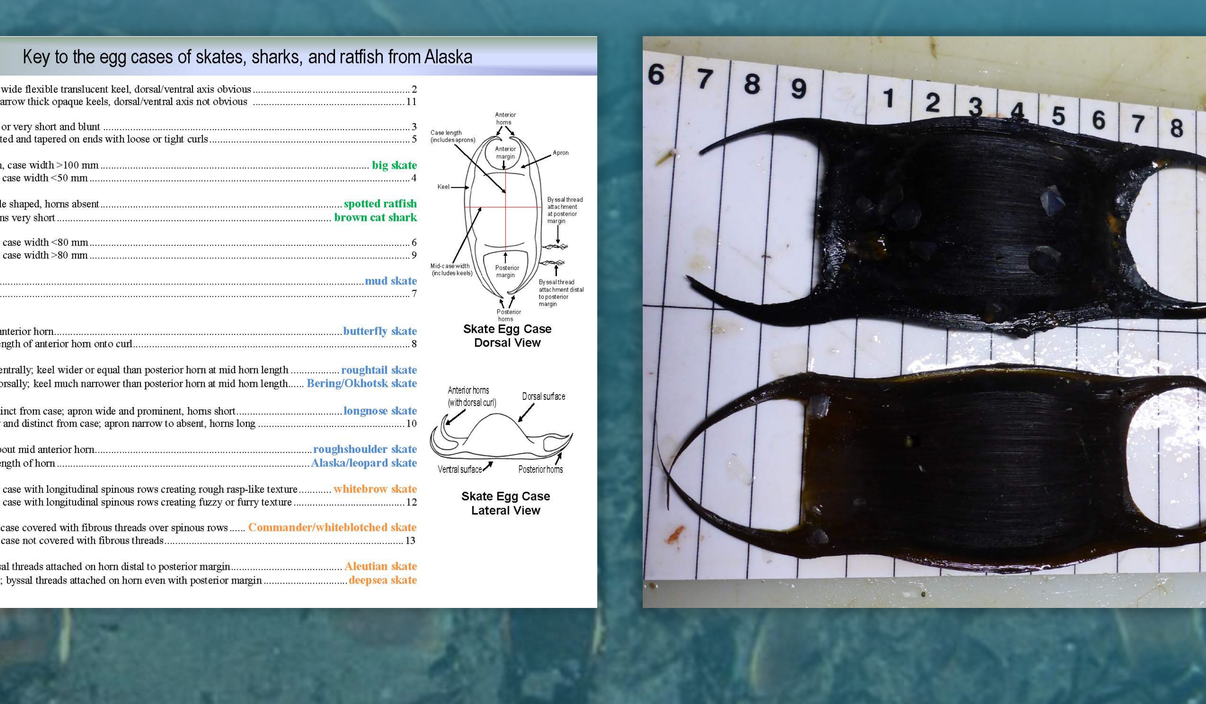
Predominant Species (presumed target)									
Gear Type	Pacific cod	Arrowtooth /Turbot	Pollock	Misc. flatfish	Rockfish	Halibut	Other	Sablefish	TOTAL
Non-pelagic trawl	15	900	104	38	21				1078
Pelagic trawl			157				2		159
Pot	2							1	3
Longline	8888	6		1	5	21	2		8923
TOTAL	**8905**	**906**	**261**	**39**	**26**	**21**	**4**	**1**	**10163**

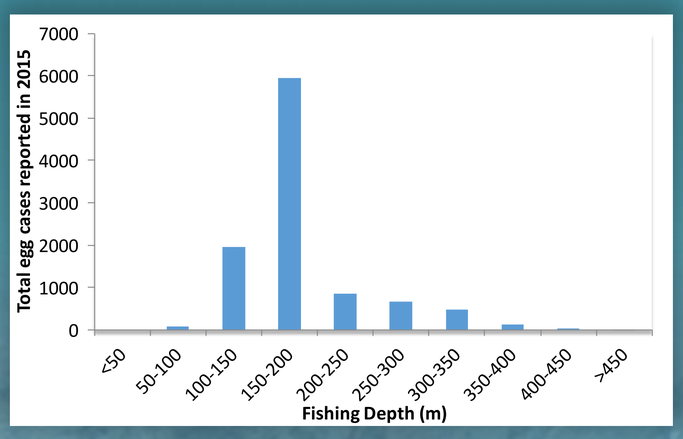
Table 1. All egg cases reported by observers in 2015, by fishery and gear type

Species	Viable	Non-viable	Total
Bathyraja parmifera (Alaska skate)	271	319	590
B. aleutica (Aleutian skate)	33	226	259
B. interrupta (Bering skate)	23	91	114
B. taranetzi (mud skate)	5	14	19
B. minispinosa (whitebrow skate)	5	12	17
B. lindbergi/maculata (Commander/whiteblotched)	0	8	8
Raja rhina (longnose skate)	1	3	4
Raja binoculata (big skate)	0	3	3
B. abyssicola (deepsea skate)	0	2	2
B. trachura (roughtail skate)	0	1	1
TOTAL	**338**	**681**	**1019**

Table 2. Summary of egg case taxa identified by observers

Over 10,000 skate egg cases were encountered by observers in the Bering Sea in 2015 (Table 1). The majority of those egg cases (87%) were encountered on longliners targeting Pacific cod. Egg case encounters were concentrated on the outer shelf of the eastern Bering Sea, primarily in depths of 150-200 m, and over half of all egg cases reported were encountered in the area of Bering Canyon.





A subset of approximately 230 observers received training in egg case identification. These observers recorded identification and viability data on over 1000 skate egg cases in 2015. A total of 11 skate taxa (Table 2) were identified from egg cases, and over half (58%) of the egg cases were identified as Alaska skate (*Bathyraja parmifera*). Observers scored each egg case as either "viable", meaning it contained an intact egg or embryo in some stage of development, or "non-viable", meaning it was either empty or full of mud. Approximately 33% of the egg cases sampled by observers were classified as viable.

Key to the egg cases of skates, sharks, and ratfish from Alaska

1 Case smooth texture, wide flexible translucent keel, dorsal/ventral axis obvious 2
1 Case rough texture, narrow thick opaque keels, dorsal/ventral axis not obvious 11

2 Horns on case absent or very short and blunt 3
2 Horns on case elongated and tapered on ends with loose or tight curls 5

3 Case length >175 mm, case width >100 mm ..... **big skate**
3 Case length <75 mm, case width <50 mm 4

4 Case elongated spindle shaped, horns absent ..... **spotted ratfish**
4 Case rectangular, horns very short ..... **brown cat shark**

5 Case length <95 mm; case width <80 mm 6
5 Case length >95 mm; case width >80 mm 9

6 Case width <50 mm ..... **mud skate**
6 Case width >50 mm 7

7 Keel ends middle of anterior horn ..... **butterfly skate**
7 Keel extends entire length of anterior horn onto curl 8

8 Anterior horns curl ventrally; keel wider or equal than posterior horn at mid horn length ..... **roughtail skate**
8 Anterior horns curl dorsally; keel much narrower than posterior horn at mid horn length ..... **Bering/Okhotsk skate**

9 Keels wide and indistinct from case; apron wide and prominent, horns short ..... **longnose skate**
9 Keels wide or narrow and distinct from case; apron narrow to absent, horns long 10

10 Keel ends abruptly about mid anterior horn ..... **roughshoulder skate**
10 Keel extends entire length of horn ..... **Alaska/leopard skate**

11 Case length <80 mm; case with longitudinal spinous rows creating rough rasp-like texture ..... **whitebrow skate**
11 Case length >80 mm; case with longitudinal spinous rows creating fuzzy or furry texture 12

12 Case width <65 mm; case covered with fibrous threads over spinous rows ..... **Commander/whiteblotched skate**
12 Case width >65 mm: case not covered with fibrous threads 13

13 Keel thick, dark; byssal threads attached on horn distal to posterior margin ..... **Aleutian skate**
13 Keel thin, translucent; byssal threads attached on horn even with posterior margin ..... **deepsea skate**

Skate Egg Case Dorsal View

Skate Egg Case Lateral View

NMFS Observer R. Haehn

Data collection for this project will continue through 2017, by which time we hope to have a comprehensive overview of fishery interactions with skate nursery areas in the eastern Bering Sea.