Killer whale *(Orcinus orca)* Depredation on the Greenland Halibut *(Reinhardtius hippoglossoides)* Longline Fishery in the Sea of Okhotsk

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Introduction

Fishermen have faced the problem of killer whale (KW) depredation in longline fisheries for about 60 years. Scientists and fishermen have been trying for years to resolve this problem, but no effective solution has been found. The goal of the current study was to assess the impact of KW in the Greenland halibut (GH) longline fisheries in the Sea of Okhotsk, Russia.

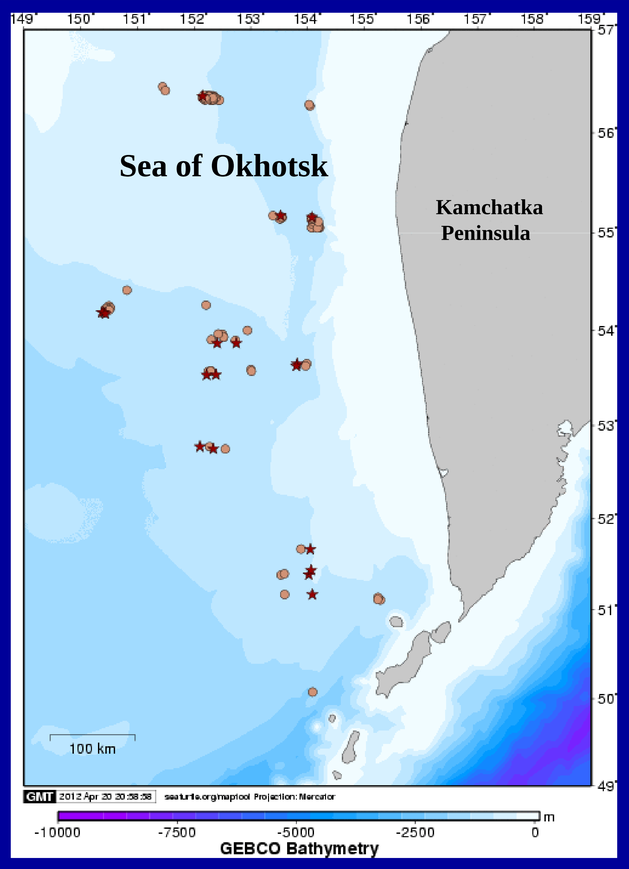
Methods

Observations of the presence and activity of KW were conducted daily during daylight hours from the deck or flying bridge between Feb. 29 and Apr. 14, 2012

Results

Number of soaked lines	88
Length of single line set (m)	10,080-15,120
Total number of observation days	45
Number of working days	38
Fishing depth (m)	569±57
Average hauling duration (hr)	3.75±0.82
Total observation time (hr)	540
Total catch	21,414 pc (≈ 33,000 kg)

Orcas present, hr	65 (12%)
Number of affected lines	18 (19.4%)
GH consumed by KW	~ 5,000 pc (20%)
KW groups	9 (1-10 individuals)



All longline set locations (brown dots) and locations of KW predation (red stars).

Behavior of a single KW

On April 10, 2012 a single KW was observed foraging around a fishing vessel. Before the whale came ~50 fishes per segment were landed. After the whale's arrival~12 fishes per segment were landed. The whale consumed ~152 pc (250-300 kg) of GH during this single approach. The KW stopped feeding before all lines were hauled in

Behavior of KW groups

One group of KW was encountered 3 times. Other groups were encountered only once. KW approached the vessel during hauling in times only. Most KW were feeding at least 0.5-2 km from the vessel, but females and calves foraged directly under the vessel when at shallow depths. KW groups were seen depredating in the bottom gill-net GH fishery in the northern part the Sea of Okhotsk in December 2010 and January 2011 (Nikulin S.V. pers. comm.). Fig.1.

Fig. 1. One KW in a group observed consuming fish from both long lines (2012) and bottom nets (2010/2011).

Predation

KW consumed only GH (ignoring all other species of fish) from lines leaving usually empty hooks or just GH jaws

Weather

KW depredation events occurred more often when the sea state was calm compared to stormy weather ($Z= -4.3$, $p<0.0001$, $n=38$) . Fishermen confirmed our finding that KW do not approach boats after the startup of gear retrieval in stormy weather.

Conclusions

- ✓ During 1.5 months of fishing operations in the Sea of Okhotsk KW consumed ~20% of the total catch of GH. The calculated minimum financial loss was more than $70,000.
- ✓ It might be harder for KW to find a vessel in stormy weather. This feature of KW behavior can be a key factor in solving the problem of KW depredation in the GH longline fishery.

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