

# THE SPECIFIC TRAITS OF PACIFIC HALIBUT FISHERY IN THE WESTERN PART OF THE NORTH PACIFIC OCEAN

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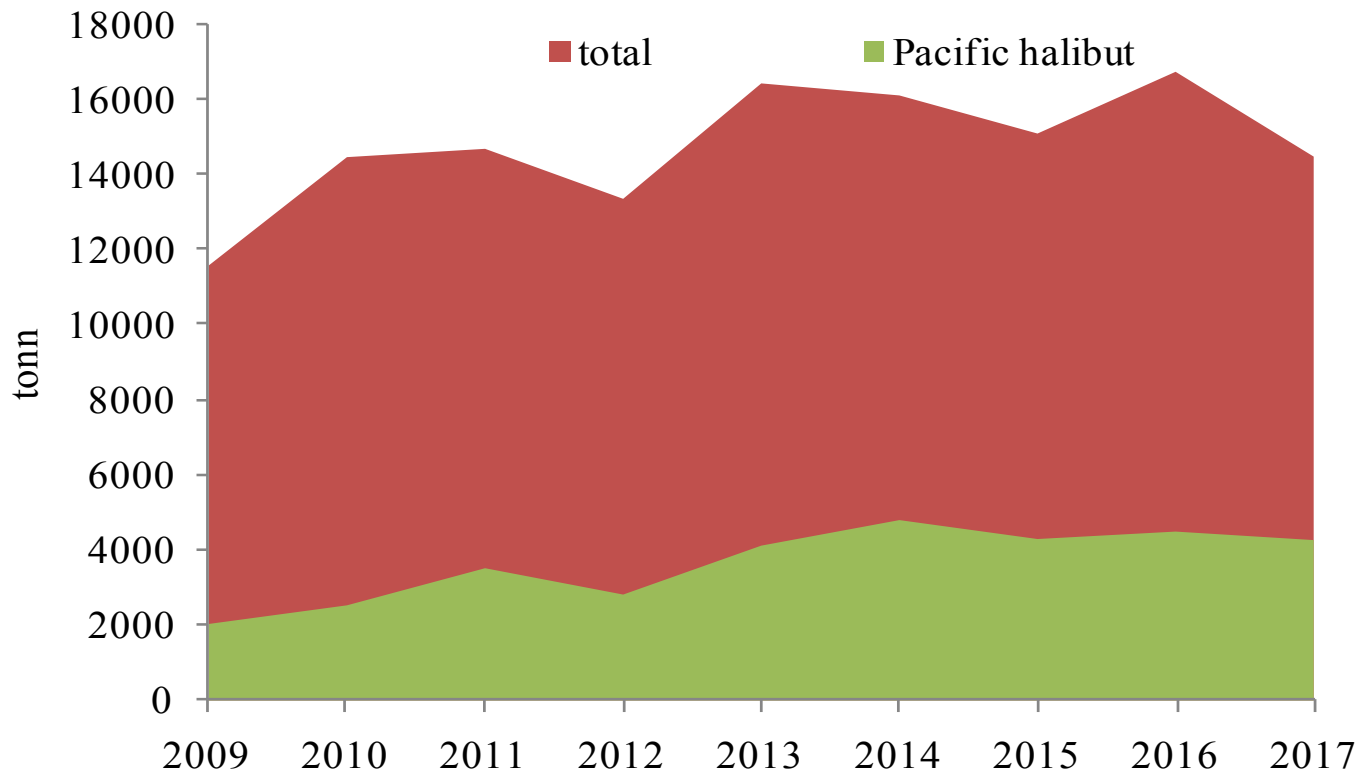
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## Objective:

Pacific halibut and Greenland turbot are representatives of highly appreciable group of commercial species steady demanded as in Russian home market, as abroad.

The total catch of all halibut species for the period in the exclusive economic zone of Russia varied as 11–17 thousand tons, and Pacific halibut contribution into the catch was about 24,2% (3,62 thousand tons).



The catch of Pacific halibut and the total catch of halibuts in the seas of Far East, t



## Objective:

The most detailed and overwhelming analysis has been provided for walleye pollock fishing in the Far Eastern seas (Shuntov, 1993; Antonov, 2011; Bulatov, 2014, 2015; Varkentin, Sergeeva, 2002, 2017). Rather detailed analysis exists for the fishery of Pacific cod (Vinnikov, 2009) and Far Eastern flounders. As for Pacific halibut, there are several papers (Novikov, 1974; Kodolov, Savin, 1997; Palm, Chikilev, 1999; Gudkov, Khovansky, 2002; Novikov, 2004, 2008; Fadeev, 2005; Terentyev, Vasilets, 2007; Tuponogov et al., 2013; Kodolov, 1994) providing fragmentary data about catches, districts, fishing gears etc.

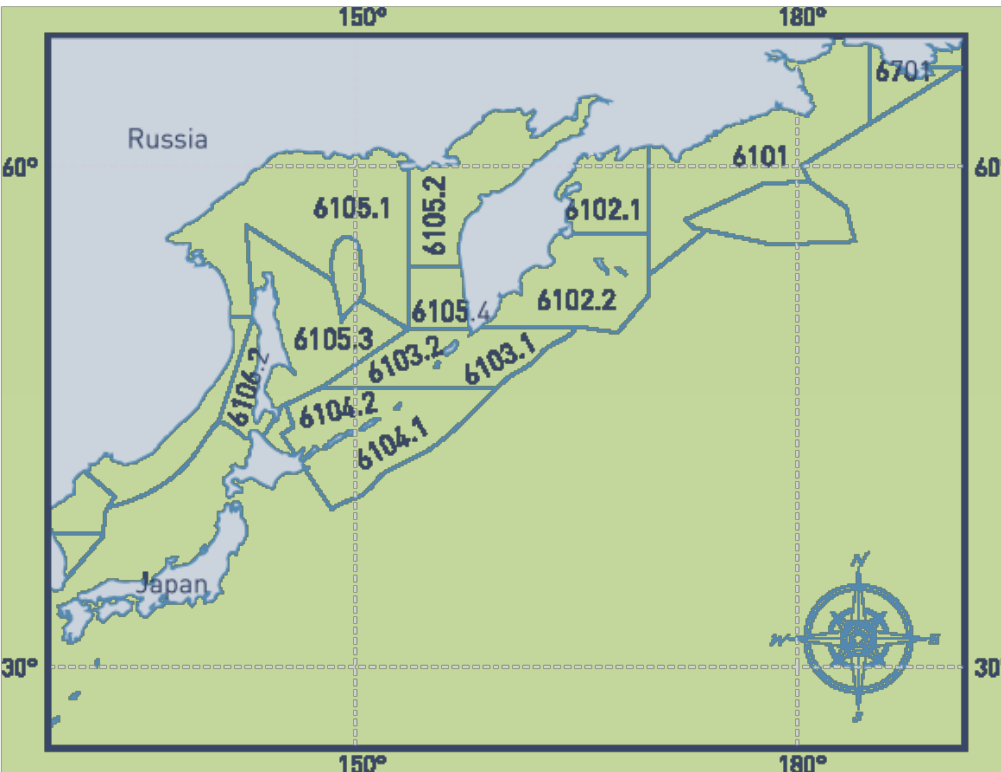
**GOAL:** to give characterization of the Pacific halibut fishery in the Western part of the North Pacific ocean (waters of Far East)

- TASKS:** to make analysis of the catch dynamics and to find out how does it answer values of the catch recommended;
- to examine year-to-year catch dynamics depending fishing gears;
  - to evaluate the interannual and seasonal dynamics of the CPUE and efforts;
  - to figure out traits of the fishery of Pacific halibut in waters of Far East;

# Data and methods

In our research we used statistics obtained from daily reports and the Statistical System Rybolovstvo for the period 2009-2017. For the purpose of processing the statistical data we used accepted division into commercial subzones.

The program «FMS analyst» (Vasilets, 2015) was used in the work with the Statistical System and processing primary data for 2009-2017. The Microsoft Office 2007 package was used to build diagrams, to form the text and the presentation.



6101 – the West Bering Sea zone (*The Northwestern Bering Sea*)

6102.1 – the Karaginsk subzone (*the Southwestern Bering Sea*)

6102.2 – the Petropavlovsk-Commander subzone (*Pacific waters of Kamchatka*)

6103 – the North Kuril zone

6104 – the South Kuril zone

6105 – the Sea of Okhotsk zone

6105.1 – the North Okhotsk Sea subzone (*The Northern part Sea of Okhotsk*)

6105.2 – the West Kamchatka subzone (*The Eastern part Sea of Okhotsk*)

6105.3 – the East Sakhalin subzone

6105.4 – the Kamchatka-Kuril subzone (*The Eastern part Sea of Okhotsk*)

6105.3 – the East Sakhalin subzone

*Schematic fishery zoning in Russian Far East (Order of the Ministry of Fisheries of the USSR No. 408 from 09.09.1980)*

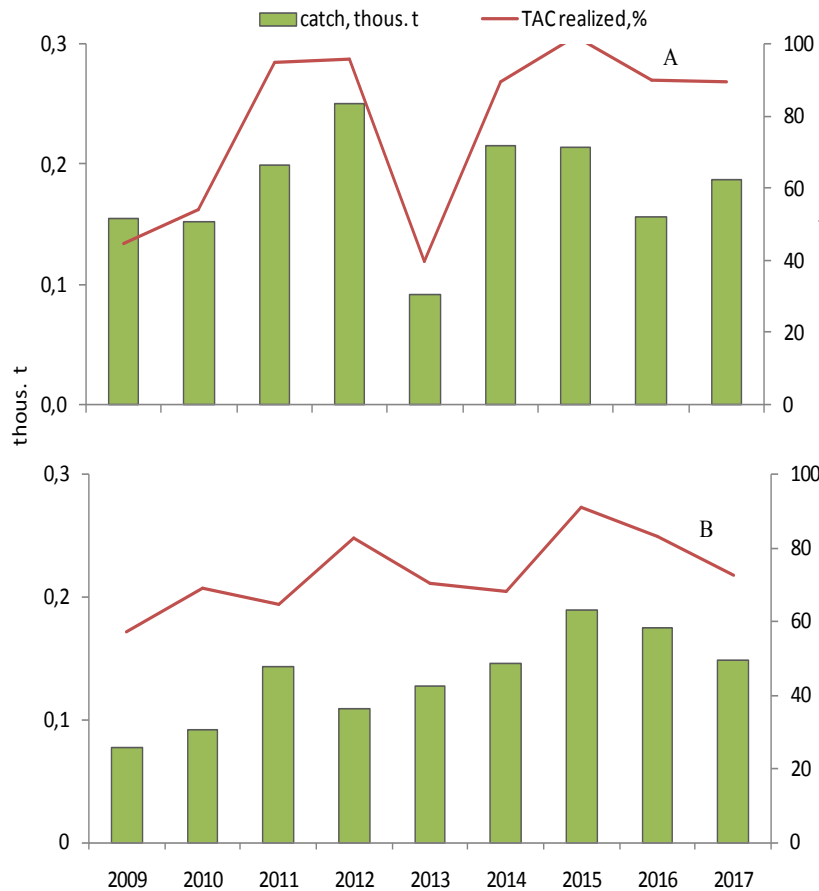
# Introduction

In Russian waters the fishery existed from the beginning of the 20th century, when Russian and Japanese fishermen for Sakhalin, Kuriles and Kamchatka used small-sized fleet (longboats, dori, kavasaks etc.) and applied hook gears to fish Pacific halibut during nearshore feeding migration (Polutov et al., 1964).

Until 1958 the Pacific halibut fishing in the Bering Sea was of casual character. Later American fishermen in the East and Japanese in the western part of the Bering Sea intensified the fishery. Japanese succeeded in delivering small longliners into distant locations by floating bases and in the late 1960s they developed longline fishing near the shores of Russia. The main objects of the fishing were halibuts and cod. In summer of 1960 soviet fishermen also tried mechanic longlines in the Olyutorsky-Navarin district (Polutov et al., 1964).

The first attempt of the Pacific halibut fishery in the post-soviet time was undertaken in the Olyutolsky-Navarin district in November-December of 1990 (Kodlov, Savin, 1998).

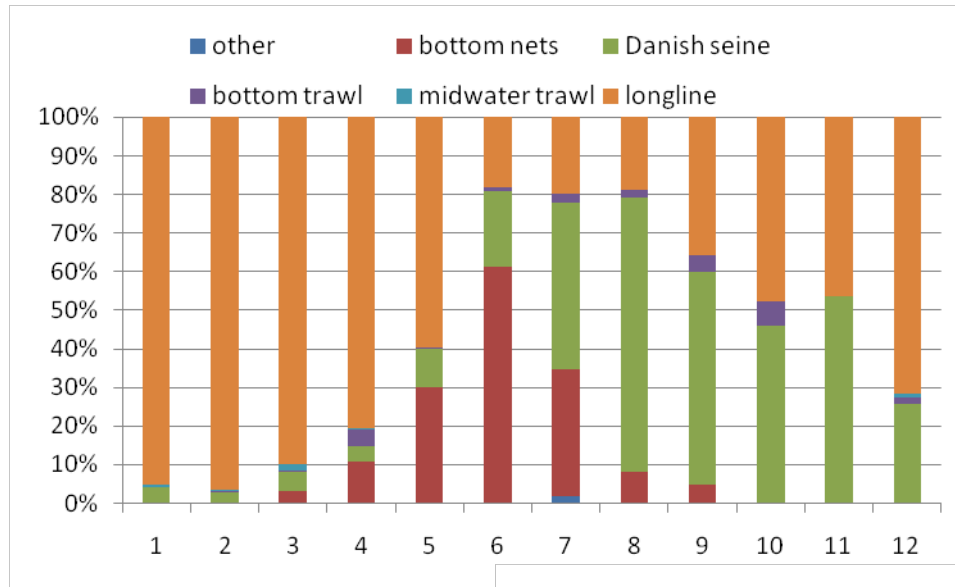




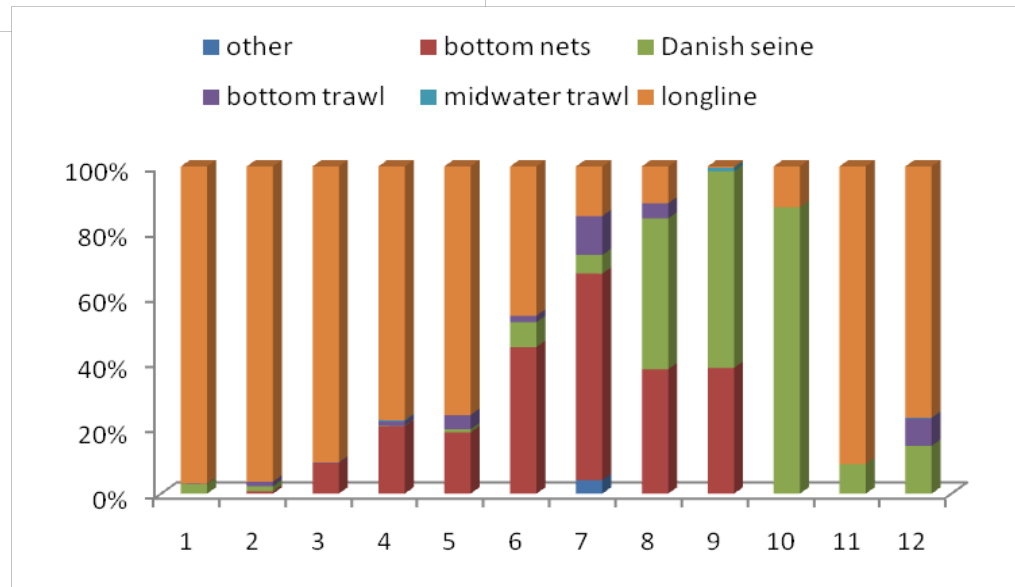
The dynamics of the catches of Pacific halibut in the eastern part of the Sea of Okhotsk. A – 61.05.4; B – 61.05.2.



The interannual dynamics of the catch of Pacific halibut by different fishing gears. A – 61.05.4; B – 61.05.2.



A



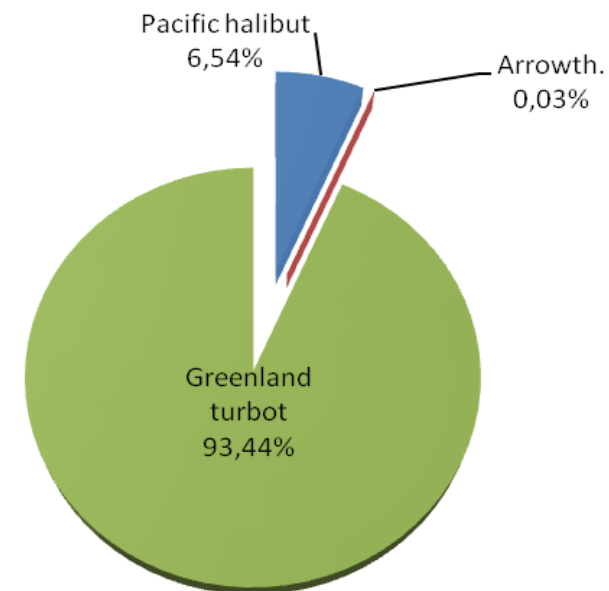
B

The seasonal dynamics of the catch of Pacific halibut by different fishing gears for the period 2009-2017. A – 61.05.4; B – 61.05.2.

The contribution of the major types of vessels into the catch of Pacific halibut in 2009-2017.

A – 61.05.4; B – 61.05.2.

A	large, %	small ship, %	medium, %	B	large, %	small ship, %	medium, %
2009	0,1	5,1	94,8	2009	0,1	2,7	97,2
2010	0,2	1,6	98,1	2010	0,6	0,8	98,6
2011	1,9	22,0	76,1	2011	0,1	0,4	99,5
2012	1,1	6,5	92,4	2012	0,0	1,9	98,1
2013	3,2	10,6	86,2	2013	4,1	0,3	95,6
2014	1,9	7,6	90,5	2014	3,6	0,2	96,2
2015	1,3	3,5	95,2	2015	3,0	2,3	94,7
2016	8,3	1,6	90,1	2016	3,2	0,0	96,8
2017	7,0	1,2	91,8	2017	3,9	0,0	96,1
	2,8	6,6	<b>90,6</b>		2,1	0,9	<b>97,0</b>

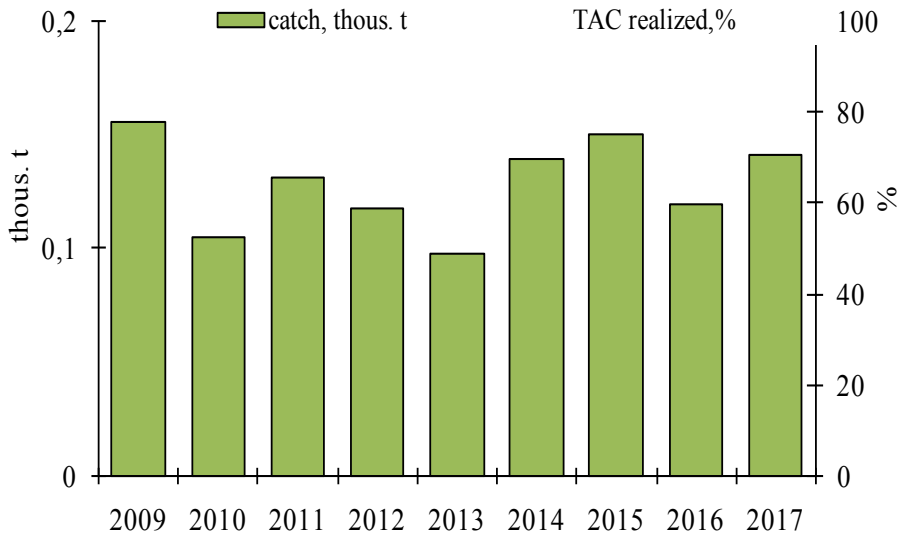


The contribution of Pacific halibut into the total catch of halibut in the eastern part of the Sea of Okhotsk

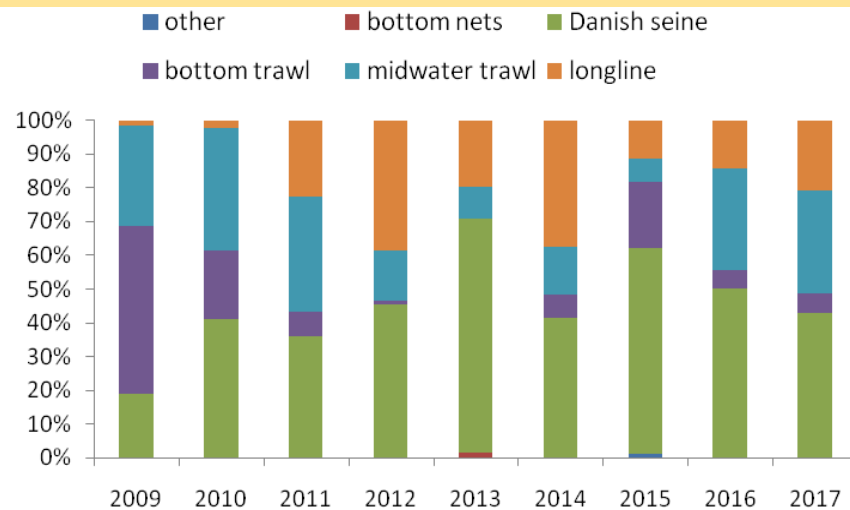


The interannual dynamics of the number of efforts and the catches per an effort(t) in fishing by major fishing gears in the eastern part of the Sea of Okhotsk

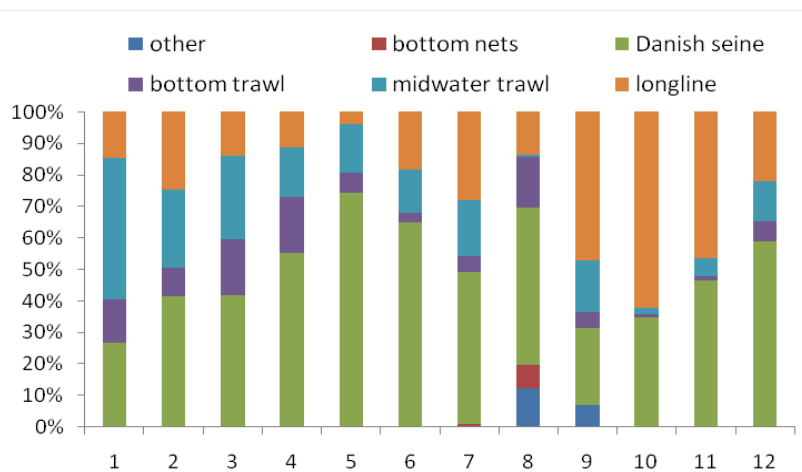
	longline		the Danish seine		bottom nets	
	v/d	aver. catch per effort	v/d	aver. catch per effort	v/d	aver. catch per effort
2009	528	0,447	155	0,268	28	0,150
2010	590	0,272	80	0,168	37	0,234
2011	683	0,345	435	0,158	39	0,406
2012	686	0,535	371	0,213	57	0,403
2013	516	0,475	262	0,165	42	0,506
2014	552	0,633	262	0,142	51	0,629
2015	485	0,602	161	0,21	89	0,523
2016	598	0,477	99	0,101	147	0,522
2017	744	0,307	44	0,201	153	0,729



The dynamics of the catches of Pacific halibut in the Pacific waters off Kamchatka



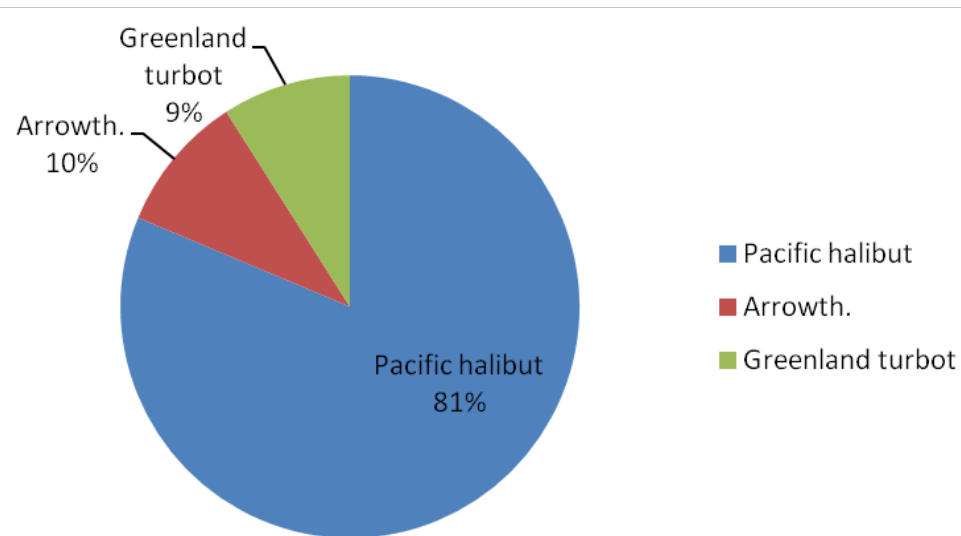
The interannual dynamics of the catch of Pacific halibut by different fishing gears.



The seasonal dynamics of the catch of Pacific halibut by all fishing gears by years

The contribution of the major types of vessels into the catch of Pacific halibut in 2009-2017

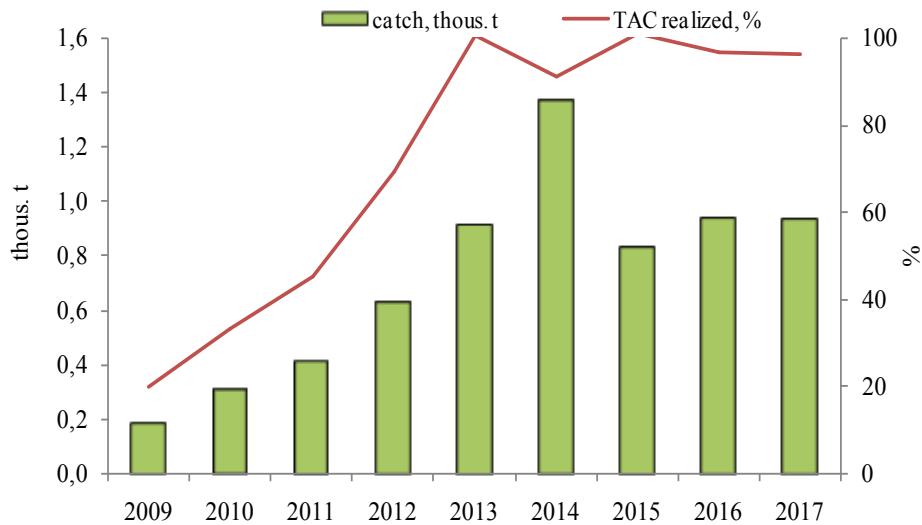
	large, %	small ship, %	medium, %
2009	16,1	9,7	74,2
2010	21,3	26,8	52,0
2011	16,8	23,4	59,8
2012	6,1	19,9	74,0
2013	0,0	29,3	70,7
2014	4,0	11,0	85,0
2015	0,0	27,9	72,1
2016	9,8	13,2	77,0
2017	6,4	12,6	81,0
	8,9	19,3	<b>71,7</b>



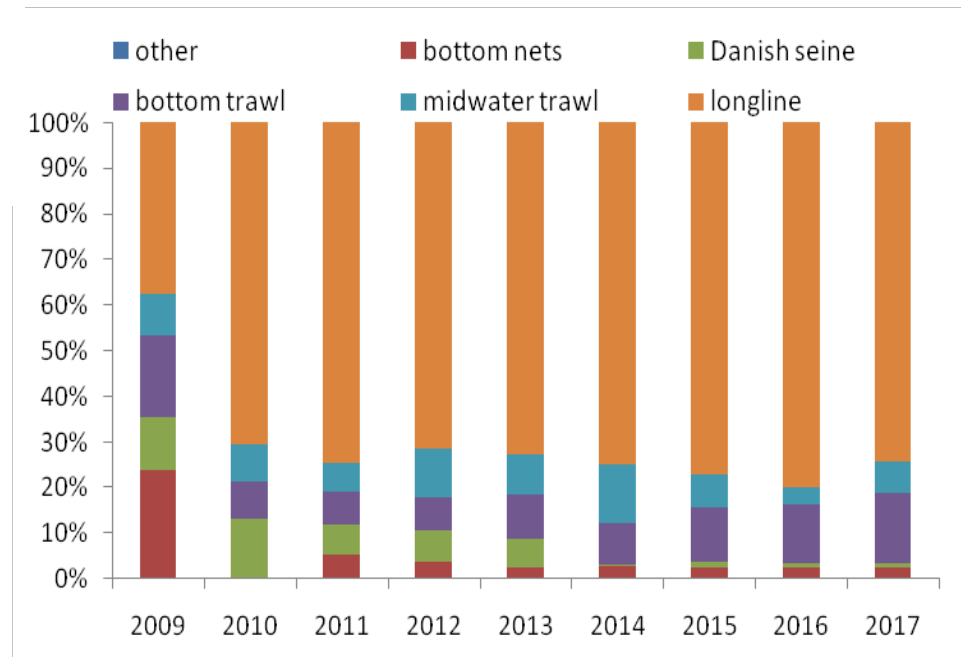
The contribution of Pacific halibut into the total catch of halibuts in the Pacific waters of Kamchatka

The interannual dynamics of the number of efforts and the catches per an effort (t) in fishing by major fishing gears

	longline		the Danish seine		trawl	
	v/d	aver. catch per effort	v/d	aver. catch per effort	v/d	aver. catch per effort
2009	12	0,146	101	0,270	44	0,957
2010	10	0,151	170	0,307	91	0,517
2011	176	0,441	198	0,236	69	0,821
2012	258	0,064	265	0,147	28	0,481
2013	74	0,110	260	0,218	13	0,495
2014	269	0,171	380	0,155	25	0,860
2015	63	0,203	335	0,242	20	1,180
2016	176	0,076	327	0,180	75	0,525
2017	150	0,162	471	0,159	53	0,802

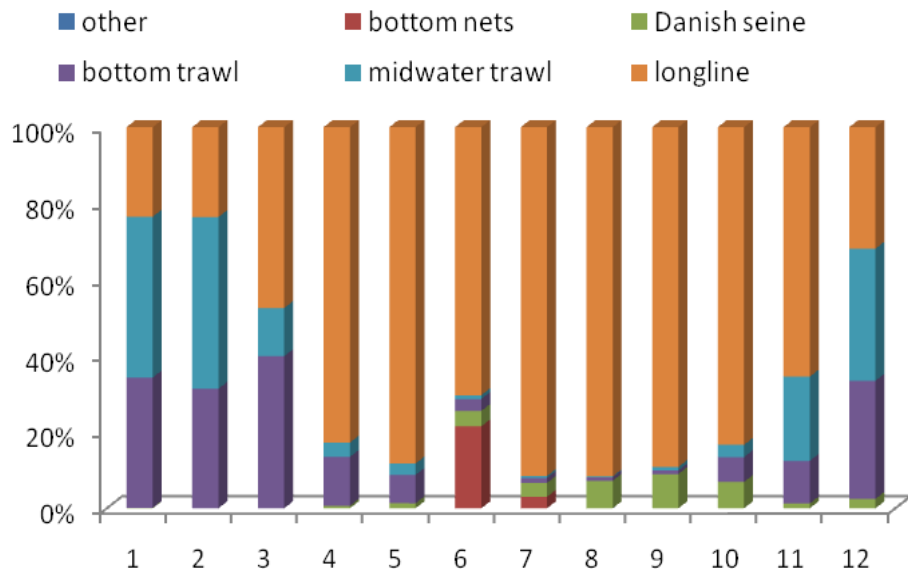


The dynamics of the catches of Pacific halibut in Southwestern Bering Sea



The interannual dynamics of the catch of Pacific halibut by different fishing gears





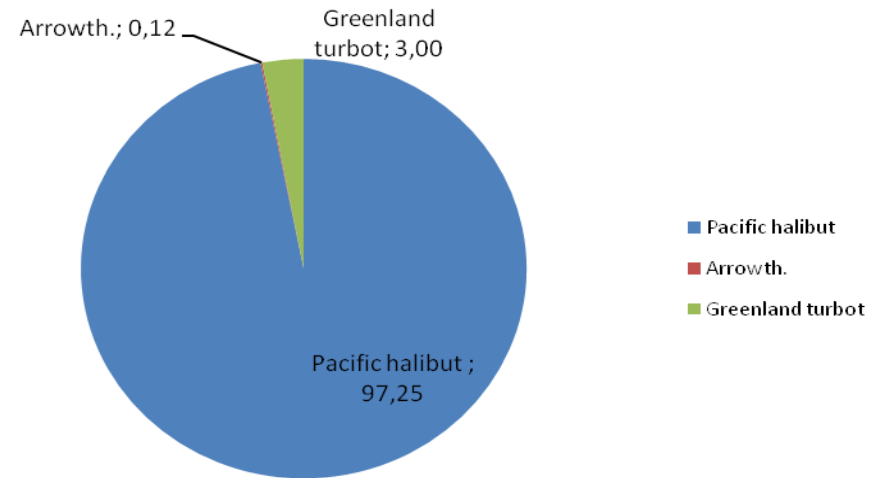
The contribution of the major types of vessels into the catch of Pacific halibut in 2009-2017

The seasonal dynamics of the catch of Pacific halibut by different fishing gears for the period 2009-2017

	large, %	small ship, %	medium, %
2009	39,1	11,5	49,4
2010	11,2	11,9	76,9
2011	9,1	5,7	85,2
2012	4,8	5,4	89,7
2013	8,2	6,1	85,7
2014	8,9	0,3	90,8
2015	4,6	1,0	94,4
2016	6,5	0,6	92,9
2017	10,9	0,5	88,6
	11,5	4,8	<b>83,7</b>

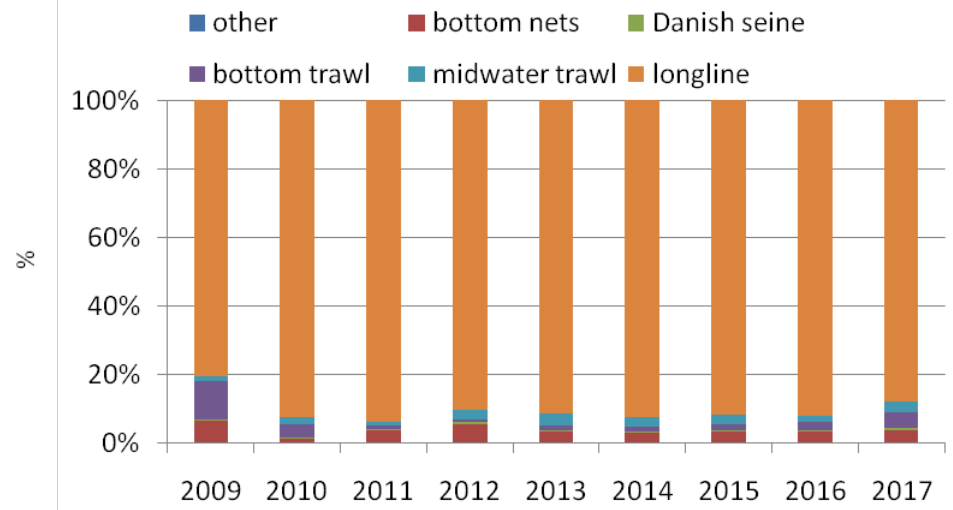
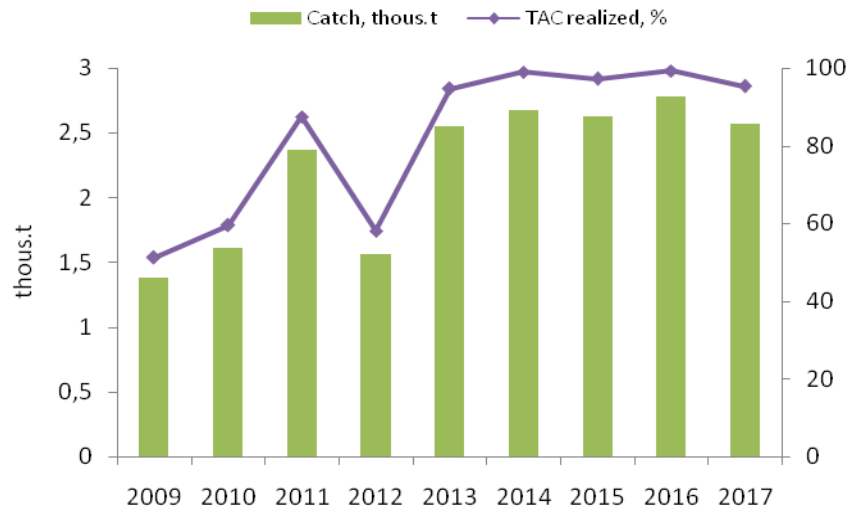
# Results

The contribution of Pacific halibut into the total catch of halibuts in the Southwestern Bering Sea



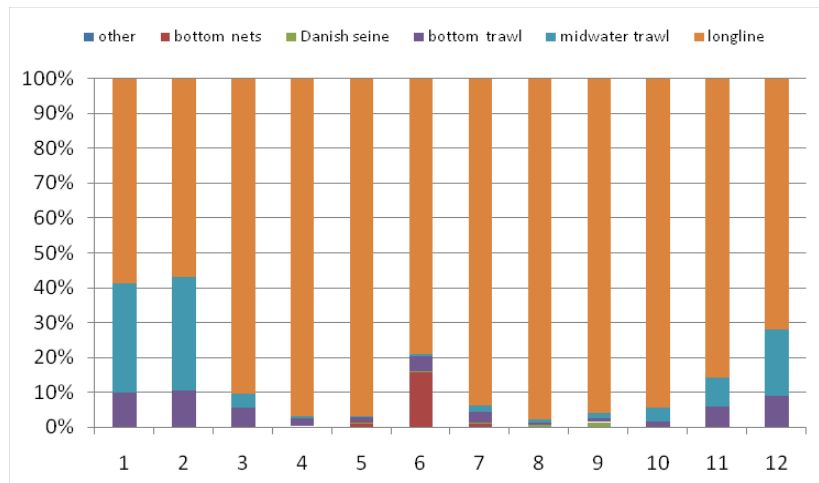
The interannual dynamics of the number of efforts and the catches per an effort (t) in fishing by major fishing gears

	longline		the Danish seine		trawl	
	v/d	aver. catch per effort	v/d	aver. catch per effort	v/d	aver. catch per effort
2009	114	0,483	229	0,187	47	1,034
2010	268	3,055	277	0,171	55	0,937
2011	364	1,595	170	0,210	34	1,504
2012	329	1,474	336	0,263	90	0,792
2013	408	1,671	497	0,135	103	1,492
2014	734	1,467	80	0,105	249	1,108
2015	687	0,780	80	0,093	169	0,948
2016	765	0,995	67	0,129	150	0,945
2017	676	0,999	82	0,095	190	1,070



The dynamics of the catches of Pacific halibut in the Northwestern Bering Sea

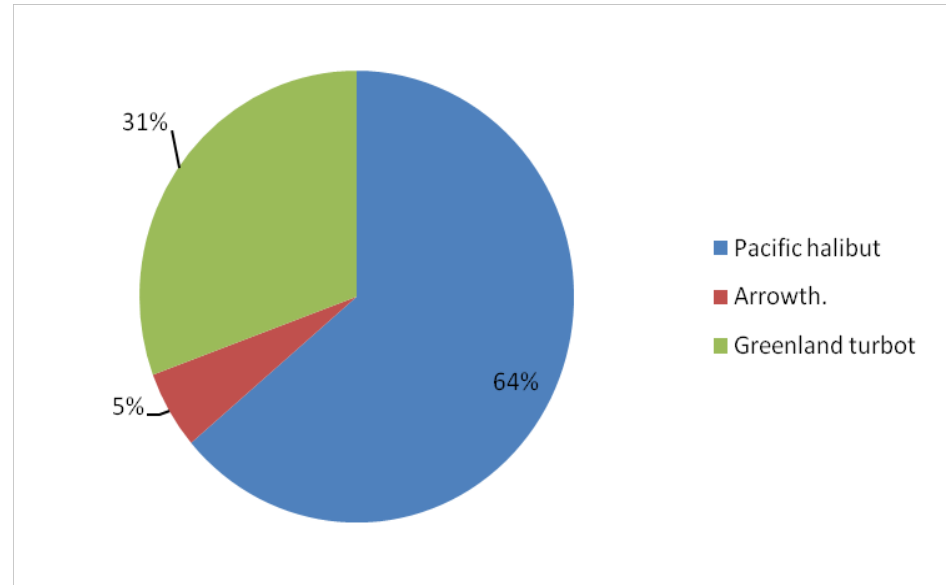
The interannual dynamics of the catch of Pacific halibut by different fishing gears.



The seasonal dynamics of the catch of Pacific halibut by different fishing gears for the period 2009-2017

The contribution of the major types of vessels into the catch of Pacific halibut in 2009-2017

	large, %	small ship, %	medium,%
2009	8,1	0,1	91,7
2010	2,0	0,2	97,8
2011	4,6	0,0	95,4
2012	6,6	0,3	93,1
2013	6,3	0,9	92,8
2014	4,4	1,1	94,5
2015	4,6	0,0	95,4
2016	4,4	0,0	95,6
2017	4,3	0,8	94,9
	5,0	0,4	<b>94,6</b>



The contribution of Pacific halibut into the total catch of halibuts in the Northwestern Bering Sea

The interannual dynamics of the number of efforts and the catches per an effort (t) in fishing by major fishing gears

	longline		the Danish seine		trawl	
	v/d	aver. catch per effort	v/d	aver. catch per effort	v/d	aver. catch per effort
2009	697	1,636	3	0,514	184	0,748
2010	1031	1,433	13	0,411	272	0,404
2011	936	1,989	6	0,105	103	0,573
2012	670	1,828	22	0,506	100	0,591
2013	1131	1,448	20	0,150	112	1,453
2014	890	2,140	12	0,078	103	0,931
2015	1111	2,174	40	0,141	137	0,857
2016	1077	2,226	85	0,148	157	0,762
2017	1474	1,333	91	0,201	226	0,799



# Conclusion

❖ For the period 2009-2017 the catch of Pacific halibut in the waters of Far Eastern seas varied from 2.0 to 4,5 thousand tons with the trend to increase. The major part of the catch (83%) is provided by the western Bering Sea (63% by the northwestern part of the Bering sea and 20% by the Southwestern Bering Sea). The catch of Pacific halibut is about recommended values of the TAC in all commercial districts.

❖ Bottom longline was the main fishing gear in the Pacific halibut fishing in 2009-2017 till now. The role of the longline fishing is different depending commercial area. It is maximum (more than 90%) in the western Bering Sea and minimal (less than 70%) in the Pacific waters off Kamchatka. The major part of the total catch of Pacific halibut in the Western Bering Sea and Pacific waters of Kamchatka is provided from May to September, and in the Northeastern Okhotsk Sea – in January-July. The medium tonnage vessels play the main role in the fishing.

❖ In this way, the Pacific halibut fishing in the waters of Far Eastern seas has the specific traits including: the major catch goes from the bycatch comparing to Alaska and the Eastern Bering Sea, where target fishing plays the main role. It should be noted as well, that the middle tonnage fleet equipped by longlines provides the main contribution into the total catch in the Western Bering Sea, the Pacific waters off Kamchatka and the Sea of Okhotsk, compared to Alaska and the Eastern Bering Sea.

❖ The maximum average catch per a longline vessel day in the northeast part of the Sea of Okhotsk (0,633 tons) was in 2014, and now the volume is increasing at simultaneous growth of commercial efforts. Any definite tendencies are not observed on longline fishing in the Pacific waters of Kamchatka. The maximal average catch per a vessel day in the longline fishing within the Southwestern Bering Sea (3,055 tons) was in 2010. The maximal average catch per a vessel day in the longline fishing within the northwestern part of the Bering sea (2,226 tons) was in 2016. The number of the efforts in Northeastern Okhotsk Sea of the Danish seine vessels visibly decreased, and the catch per an effort a little bit increased. The number of the vessel days for the vessels with bottom nets grows, and the catch per an effort increases (from 0,52 to 0,70 tons). The maximum average catch per a vessel day in the Danish seine fishery within in the Pacific waters of Kamchatka (0,305 tons) was in 2010, but it is decreasing.



An aerial photograph of a vast, deep blue ocean. The water's surface is covered in small, rhythmic waves. Several birds, likely seabirds, are scattered across the scene, some in flight and others near the water's surface. The text "Thank you for your attention!" is overlaid in a green, italicized font with a white outline, centered in the lower half of the image.

*Thank you for your  
attention!*