

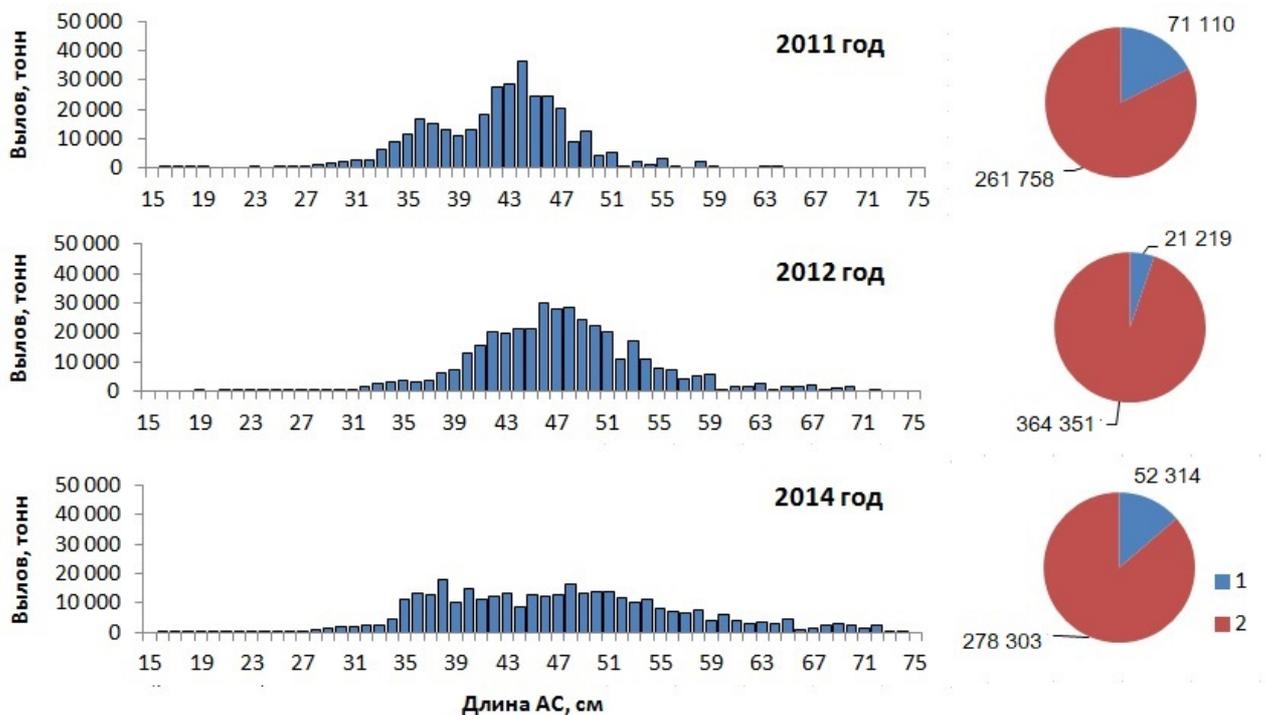
## TINRO note on pollock juvenile by-catch in the WBS zone

TINRO studies have shown that percentage of juvenile pollock in the catches during its target trawl fishery can differ from area to area. This is related to both peculiarities of the juveniles' spatial distribution and level of individual year-classes' strength.

The northwestern part of the Bering Sea (West Bering Sea zone) is one of the regions where increased concentrations of juveniles are typically observed. In the years when the stock is recruited by juveniles of strong year-classes, by-catch of non-commercial-sized pollock in the catches of fishing vessels in the summer-autumn period rises and can average to 40% within a fishery season, according to the data of scientific observers.

Unlike other regions, for instance, the Sea of Okhotsk where pollock juveniles usually form aggregations in a relatively local area (northern slopes of TINRO Trench – a region between the 57-58 parallels; this local area is currently closed for target pollock fishery), they are distributed quite widely in the West Bering Sea zone and their concentrations can distribute over different local sites, which does not allow closing the specific region; at the same time, location of such sites with increased by-catches of non-commercial fish may vary in space during a fishery season.

According to TINRO scientific observers' data in previous years, juvenile by-catch during target pollock fishery in the WBS zone in some years could exceed a limit of 20%. Pollock juvenile by-catch during target pollock fishery in the WBS zone was estimated at 36,5% by numbers in 2011, 14,1% in 2012, and 33,5% in 2014. Juvenile by-catch share by weight varied from 5,5% to 21%. See fig. 1.



1 (blue) – catch of fish less than 37 cm, tons  
 2 (red) – catch of fish over 37 cm, tons

Figure 1 – Weight composition of pollock catches (charts) and estimates of catch of juveniles and commercial-sized pollock in tons (circular diagrams) in 2011-2014

By-catch limit for the WBS zone was increased from 20% up to 40% (by numbers of fish per trawl) in the Fishing rules in 2015. The adoption was introduced by MoA order #281 of 07/07/2015 and fully started to be implemented since season of 2016.

According to paragraph 38.1 of the Fishing Rules, the by-catch of pollock juveniles during target fishery in the West Bering Sea zone was determined in the amount not more than 40% per fishing operation (by numbers, not by mass). According to paragraph 38.4, in case of exceeding the allowed by-catch of juveniles per fishing operation, all caught juveniles are subject to processing with making corresponding entries in the fishing and (or) technological logs. At the same time, the captain of the vessel is obliged to change the location of the catch by at least 5 nautical miles from the point of the fishing operation, enter the corresponding information in ship documents, the fishing log and send the information to the relevant authority of the Federal Agency for Fishery.

Due to these measures catches of pollock juveniles get processed and are counted in the official statistics, and prompt reporting to the official authorities of the Federal Agency for Fishery about the locations of juveniles' catch allows for tracking the vessels not to perform fishery on their aggregations. It should also be said that fishermen themselves are trying to avoid catching small pollock using modern equipment that allows to distinguish aggregation of small fish. This statement is supported by scientific observers' reports.

In October 2020, additional measures towards undersized pollock by-catch management were agreed at the DVNPS. It was suggested to adopt existing regulation with additional requirements on move-on rule (section 38.4 of the Fishing rules). In case of exceeding juvenile by-catch limit set for the particular fishing area the vessel must move on for 5 miles, and also not to come back in that area for 24 hours. Also, the vessel will report not only the fact of juvenile by-catch limit exceed but also specify a share of undersized pollock in the catch. The adjustments will come into force with next version of the Fishing rules (expected for 2021 season).

By TINRO estimates, the amount of pollock juveniles' by-catch from its annual catch (in thousand tons) in the West Bering Sea is small. As an instance TINRO provides estimates obtained on the basis of the data on the size composition of commercial catches collected by scientific observers during target pollock fishery in the West Bering Sea zone in 2018 - 2020.

In 2018, undersized pollock by-catch was estimated at 7,3% by weight and 12,7% by numbers for the whole season (fig. 2). The catch of fish under 37 cm was about 28 420 t out of 382 805 t total catch in the WBS zone.

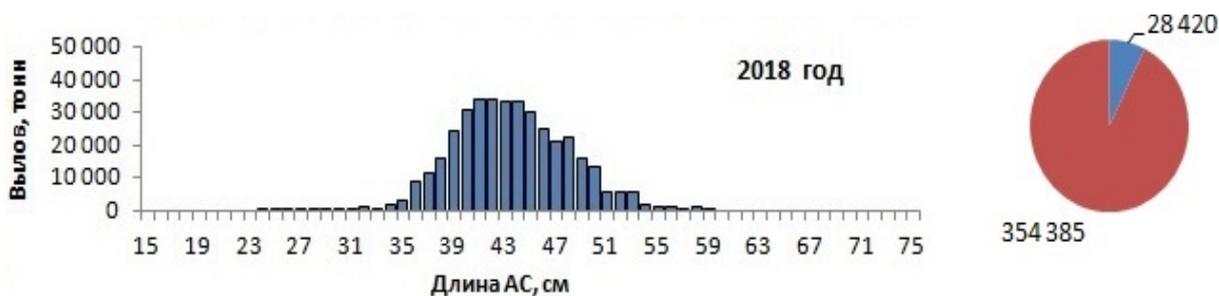
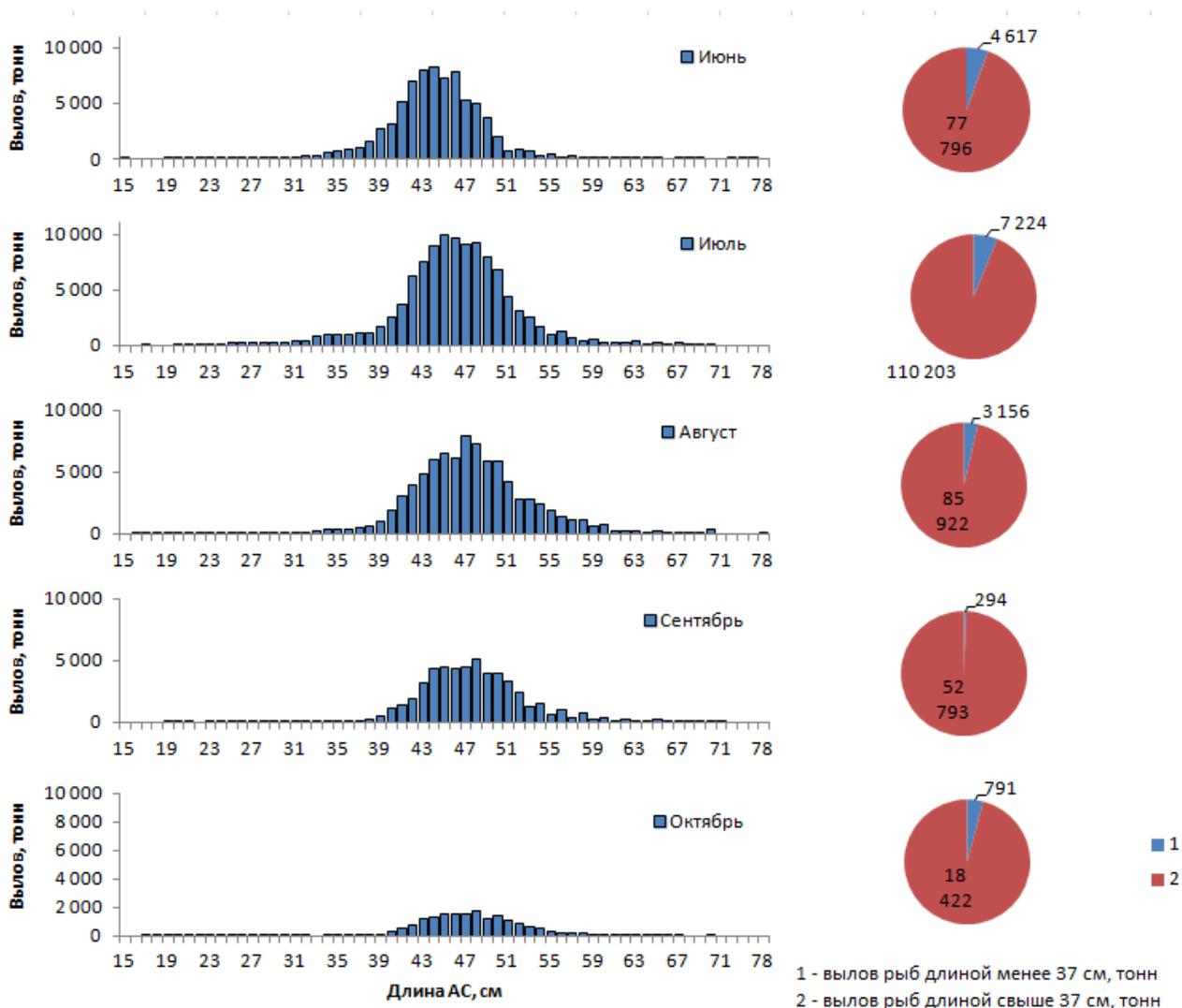


Figure 2 – Weight composition of pollock catches (chart) and estimates of catch of juveniles and commercial-sized pollock in tons (circular diagrams) in 2018

Month-by-month analysis is provided for recent seasons of 2019 and 2020. Fig. 3 on the charts shows the weight composition of pollock catches, and the circular diagrams – estimates of catch of juveniles and commercial-sized pollock in tons in the summer-autumn period of 2019. In different months, the percentage of pollock juveniles from the weight of the catch for a particular month varied from 0.6 to 6.6%. According to TINRO calculations, in total, the catch of pollock juveniles for the fishing season is estimated at about 18.0 thousand tons or 4.7% of the annual catch of pollock (386.2 thousand tons).

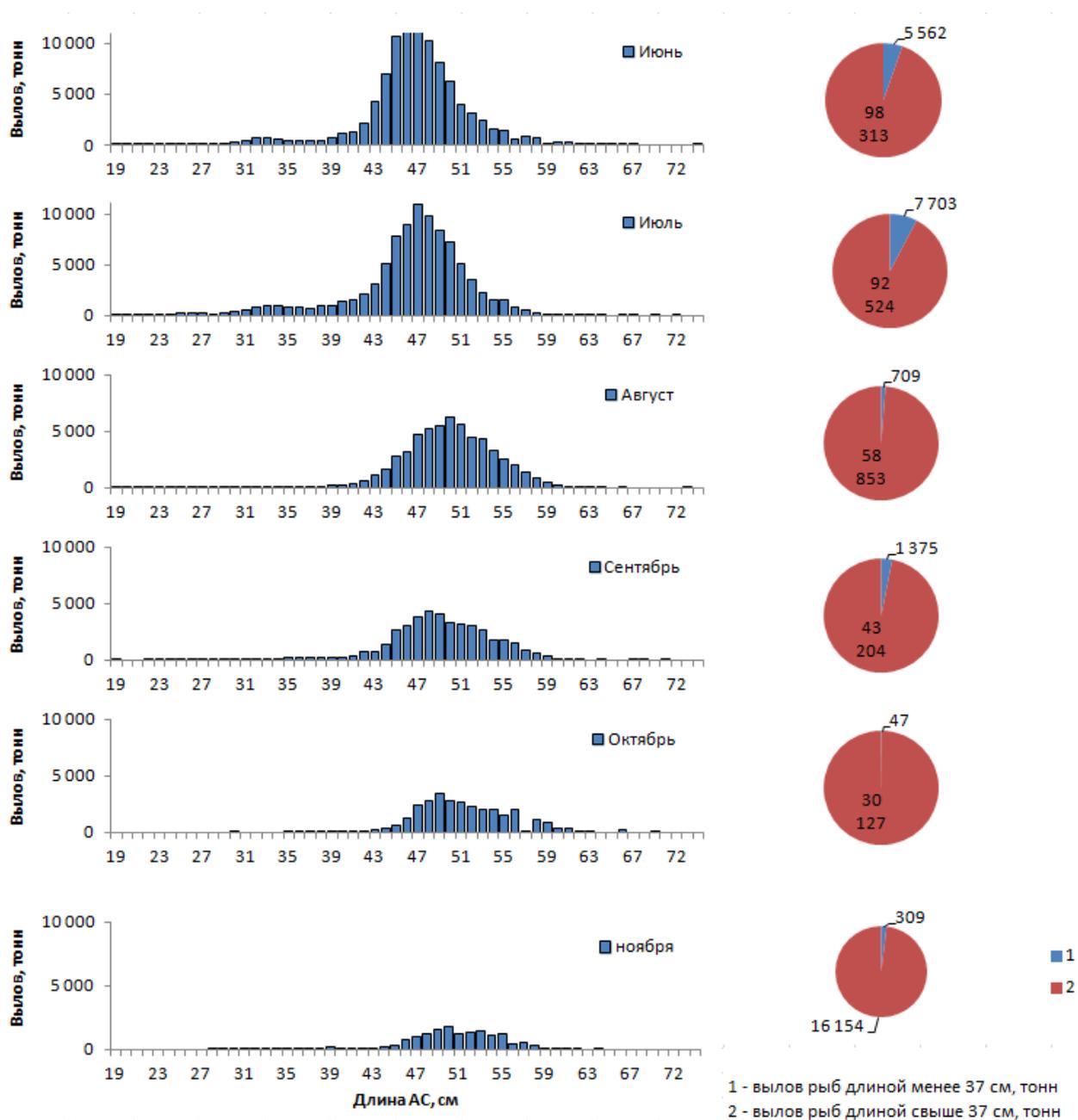


1 (blue) – catch of fish less than 37 cm, tons

2 (red) – catch of fish over 37 cm, tons

Figure 3 – Weight composition of pollock catches (chart) and estimates of catch of juveniles and commercial-sized pollock in tons (circular diagrams) in the summer-autumn period of 2019

In various months of 2020 (fig. 4) percentage of pollock juveniles from the weight of the catch for a particular month varied from 0.2 to 8.3%. In total, the catch of pollock juveniles for the fishing season is estimated at about 18.7 thousand tons or 5.1% of the annual catch of pollock (367.5 thousand tons as of December 10).



1 (blue) – catch of fish less than 37 cm, tons  
2 (red) – catch of fish over 37 cm, tons

Figure 4 – Weight composition of pollock catches (chart) and estimates of catch of juveniles and commercial-sized pollock in tons (circular diagrams) in the summer-autumn period of 2020

Therefore, in the West Bering Sea zone, a catch of pollock juveniles per year is currently a small value of about 17-18 thousand tons with its summarized annual catch at about 400 thousand tons, which is significantly lower than the natural mortality level and the amount of consumption of pollock by predators. Thus, by estimates of [V.P. Shuntov and O.A. Ivanov \(2015\)](#), in the Bering sea, the annual consumption of pollock by marine mammals and seabirds can amount to 1.5 million tons, by predatory fish – 4.5 million tons and by large pollock (cannibalism) – 0.9 million tons.