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Proceeding of the preliminary test on the finless porpoise escaping device developing project, Korea

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Narrow-ridged finless porpoise (*Neophocaena asiaeorientalis*, FP) inhabits in the west, south and southern–east coast of the Korean peninsula and the most frequently bycaught cetacean species (65% of bycatch, 2009~2018) in Korea, which mainly happen in the west coast. The most blamed fishing gear is the Stow net on anchor (Fig 1).

Since the finless porpoise populations in Korean waters have been decreasing rapidly, Ministry of Oceans and Fisheries regulated FP in the protected marine organism list and banned the distribution of bycaught FP in the market since September, 2016. Also, National Institute of Fisheries Science of Korea had started the developing project of bycatch reduction stow net on anchor based on the jellyfish excluder device. In the previous bycatch data of FP by stow net, Cetacean Research Institute of NIFS noticed there were very few numbers were reported during summer when the jellyfish excluder was equipped. With the comparing test of bycatch FP numbers between the common stow net and the one with jellyfish excluder in 2016 (5 versus zero), CRI resulted the excluding device was worthy for the further trial. . NIFS modified the stow net which has upside escaping hole (EH) with guide net for the porpoises tend to head up (Fig 1.). The aims of this test are to reduce bycatches of the porpoise as well as to minimize the loss of catch, to provide the scientific data to convince the stow net fisheries and support MOF to popularize this modified fishing gear

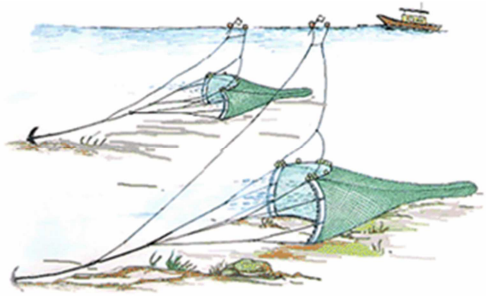

Figure 2. Illustration of the stow net in Korea

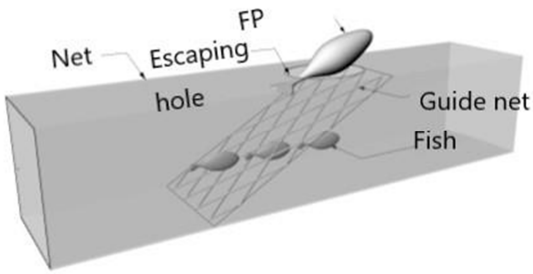

Figure 1. Schematic diagram of the escaping hole with the guide net developed by NIFS.

In this project, NIFS tested two main points; 1) Whether the FP could escape through the hole on net or not and 2) How much catch can be lost with this escaping hole. To reduce the losing catch and the bycatch rate of FP, the mesh size of the guide net is crucial in this device. As the size of mesh smaller, the bycaught possibility of the small FP gets lower but the average size of fishes in the catch does smaller or loses the catch. Therefore we tested the tools to get the biggest mesh size work as barriers to the small FP bypass to the escaping hole and minimize the loss of catch and checked its performance.

For the guide net, two kinds of mesh size were used; based on the physical size of FP (370mm mesh for 90% FP head to EH) and on visually threatening size (enough for FP to pass through but work as a barrier to be avoided, for 99% of FP can pass through the 500mm mesh)

In the test of measuring the loss of catch, two kinds of stow net were used: one is the Knotted net used in the coast with 25mm mesh in the cod end (bag net) and the other is the Rascel net did in the offshore with 7.4mm in cod end. Both were attached with escaping hole and covered with a net to check the escaping and loss of catch. From 2018 January to December, 1 time/month for every month, except July and August when the jellyfish excluder used, were implemented. From the 1st to 5th test, 500mm mesh was used and from the 6th to 10th, 370mm mesh was.

In table 1, the results of measuring the catch loss test were presented. The average escape rate of knotted and rascel of 500mm mesh guide net were 3.7% and 0.8%, respectively. The escape fish species were both the anchovy in knotted and rascel. And 370mm mesh size of guide net, the escape rates were 12.2% and 1.9% in knotted and rascel, respectively. Also, the most escaping species were anchovy. Whole in all, the average catch of each test were 127kg in knotted and 302kg in rascel net. The average escape rates were 7.9% in knotted and 1.4% in rascel and the difference was significant ($P < 0.05$, in Wilcoxon signed rank test). The differences between the combination of the mesh size and type of net, 370mm resulted in more loss rate than 500mm in both types of nets.

Table 1. The result of catch loss (escape rate)

		Total catch(g)		Escape(g)		Escape rate(%)		Escaped species	
Trial	Month	Knotted	Rascel	Knotted	Rascel	Knotted	Rascel	Knotted	Rascel
1st	Jan	52,217	64,579	39	1	0.074	0.002	Estuary tailfin anchovy, halfbeak	Estuary tailfin anchovy
2nd	Feb	10,644	31,378	4	158	0.033	0.502	Snailfish, indian flathead	Bastard halibut
3rd	Mar	19,087	5,627	-	-	0.000	0.000		
4th	Apr	20,747	47,614	26	-	0.126	0.000	Morse's bobtail, Estuary tailfin anchovy	
5th	May	319,219	666,356	57,607	23,064	18.046	3.461	Anchovy	Anchovy
6th	Jun	94,577	782,610	11,901	41,616	12.583	5.318	Anchovy	Anchovy
7th	Sep	157,980	156,732	3,186	2,976	2.017	1.899	Largehead hairtail	Largehead hairtail
8th	Oct	495,270	1,068,769	12,877	8,404	2.600	0.786	butterfish, Largehead hairtail	Anchovy
9th	Nov	90,064	159,667	13,785	2,551	15.306	1.598	Snailfish,cuttlefish	Anchovy
10th	Dec	10,146	37,864	2,885	17	28.438	0.046	Snailfish, indian flathead	indian flathead
Average		126,995	302,120	10,231	7,879	7.9	1.4		

The escaping tests were done 55 times from 13th of April to 26th of June, 2018, and until 6th of May (for 18 days) 500mm mesh and then (for 37 days) 370mm were used. If there were FP found in the cover net, then those were counted as ‘Escape’ and found in the cod end (back net) were as ‘bycaught’, respectively.

In the results, one FP (body length 132cm) was bycaught in the 500mm mesh guide net. With this length, it was calculated as escapable through the 430mm mesh in actual. Even though we expect the visual threatening mesh size could work as a kind of barrier to the porpoises, but this assumption was failed. In the 370mm mesh guide net, there was not found any finless porpoise in the cod-end nor in the cover net. This escaping test is proceeding in 2019.

Up to now, NIFS resulted in the proper mesh size of guide net to escaping hole for finless porpoise should be based on the physical smaller size, not the visual threatening barrier. To sure the 370mm mesh is enough for the FP and to keep the catch, further and more test should be implemented. Indeed, further trial to reduce the loss of catch is necessary, as well.

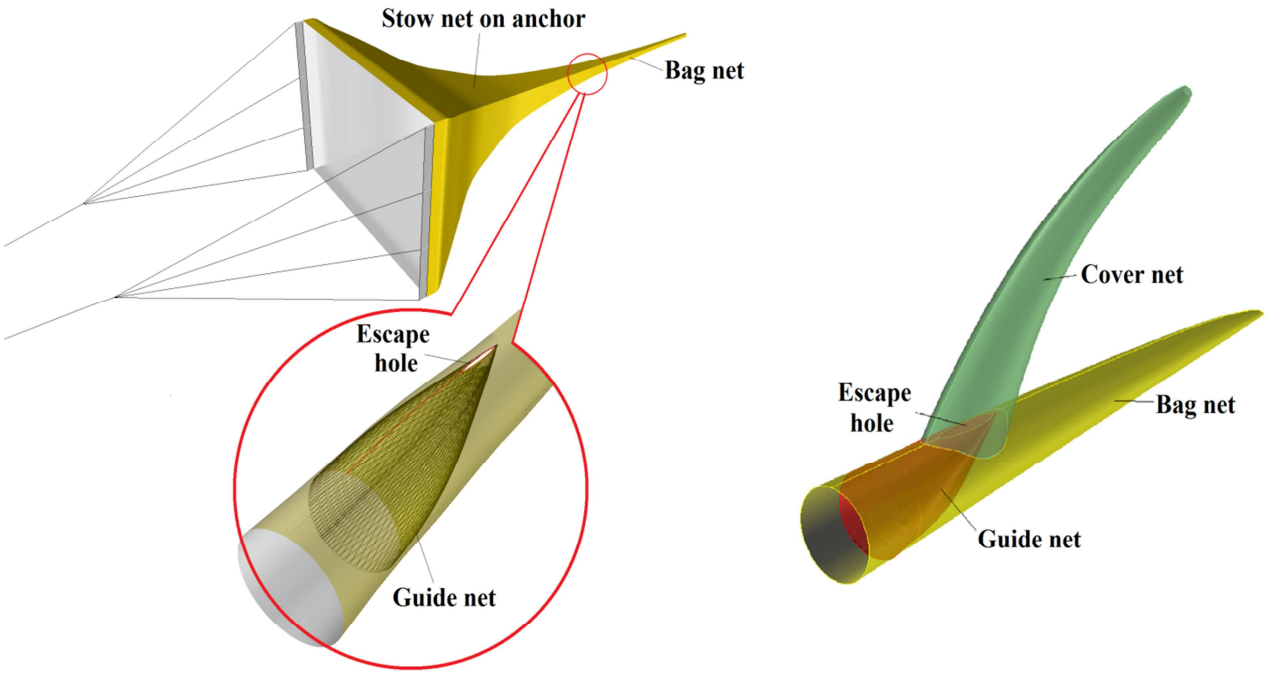

Figure 3. Images of modified stow net on anchor in the tide forming the funnel shape (Left). Testing stow net with a cover net over the escaping hole (Right) to check the loss of catch and the presence of Finless Porpoise.