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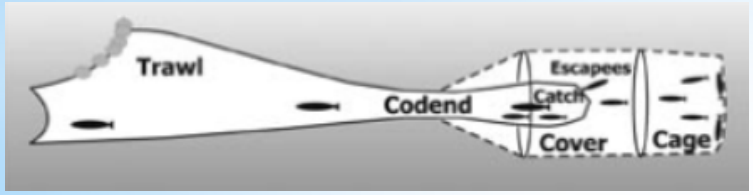
Results of positive partnership of WWF, scientists and fishermen in the VMEs conservation in the Arctic

Authors: K. Zgurovsky, PhD, Senior Advisor of the WWF RU;
A. Pavlenko, PINRO;



03.10.2017

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WWF RU has long-term partnership relations with responsible fishermen:

* Together with them and VNIRO we arranged two conferences on sustainability (with the Karat Group-Norebo);
* Published the FAO Code of Conduct with comments of fishermen, lawyers and environmentalists (with the Karat Group-Norebo);
* Arranged training classes for captains and crew on impact reduction (with ATF, UFN, Norebo;
* Training observers (with the TINRO, F-E. Fishery University with Pollock Association, seabirds bycatch reduction classes, etc.

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One of most promising direction of this cooperation is a reduction of the fishing operation impact of marine ecosystems:

* In particular, it is partnership with the PINRO, Marine Technology Co and with the recently established the Coordination Committee of four big MSC certified fishermen groups (Karat-Norebo, ATF, F.E.S.T., UFN) on mapping of vulnerable bottom marine ecosystems (VMEs) in the Barents Sea and the bottom trawl modernization:

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CODE OF CONDUCT FOR RESPONSIBLE FISHERIES

The Code, which was unanimously adopted on 31 October 1995 by the FAO Conference, provides a necessary framework for national and international *efforts to ensure sustainable exploitation of aquatic living resources in harmony with the environment*.

(http://www.fao.org/docrep/005/v9878e/v9878e00.htm)

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Background of our activity is
FAO CODE OF CONDUCT FOR RESPONSIBLE FISHERIES

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Code of Conduct for Responsible Fisheries

……..

8.5 Fishing gear selectivity

8.6 Energy optimization

8.7 Protection of the aquatic environment

……..

Food and Agriculture Organization of the United Nations for a world without hunger

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Energy optimization of Bottom trawl fishing

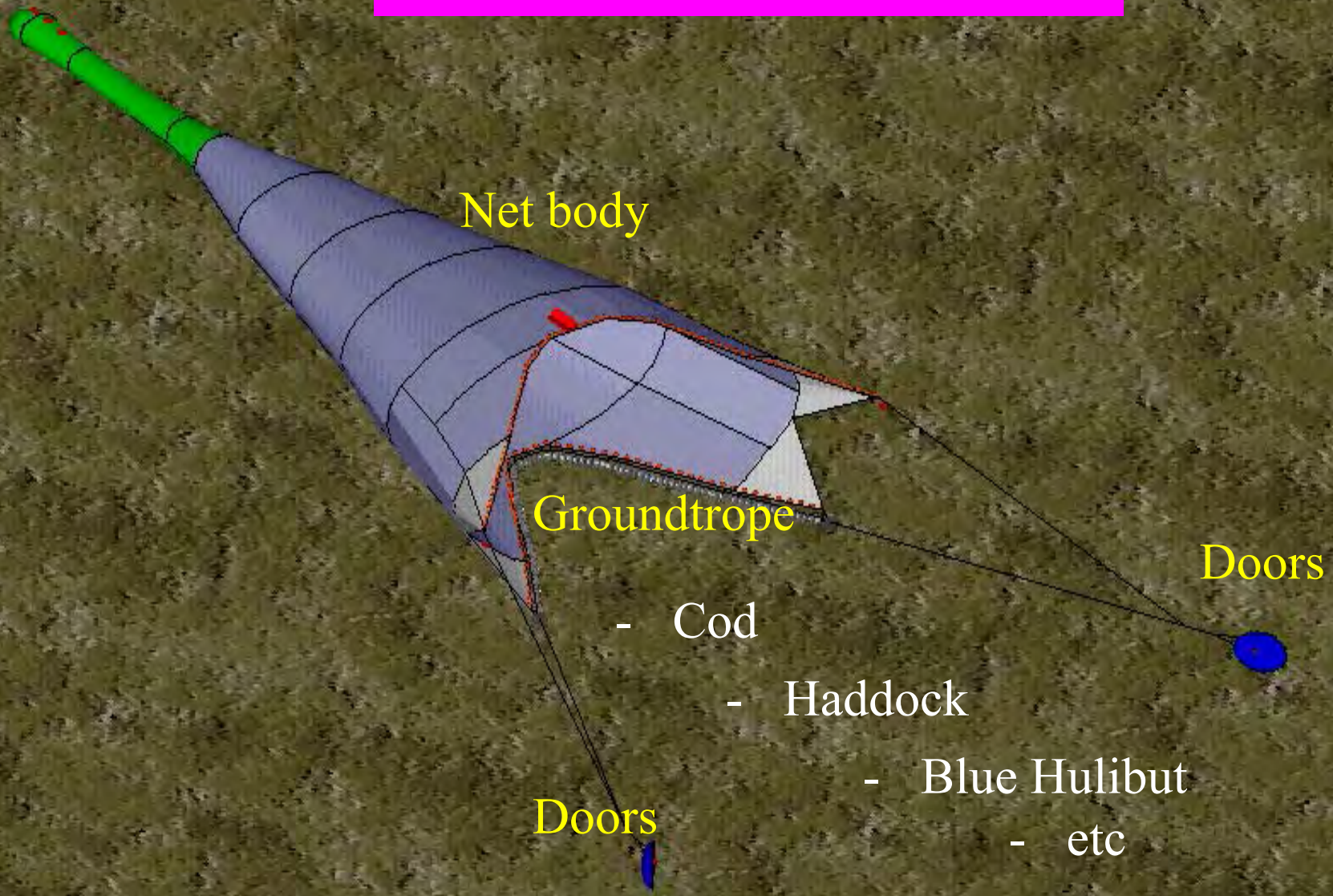
Minimize of trawl drag force

Minimize negative impact on the benthic communities

Minimize fuel consumption per unit catch

Minimize CO_2 pollution

Bottom trawl in Barents Sea



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The trawl drag force of the trawl consist from two parts:

Hydrodynamic force + Force of friction

The equations of these Forces

1 - Hydrodynamic force

Newton's equation

$$F_{hf} = C_x \frac{\rho v^2}{2} S_{m^2}$$

2- Force of friction, trawl-sea bottom

Law Amonton – Coulomb's equation

$$F_{\text{ff}} = \mu N$$

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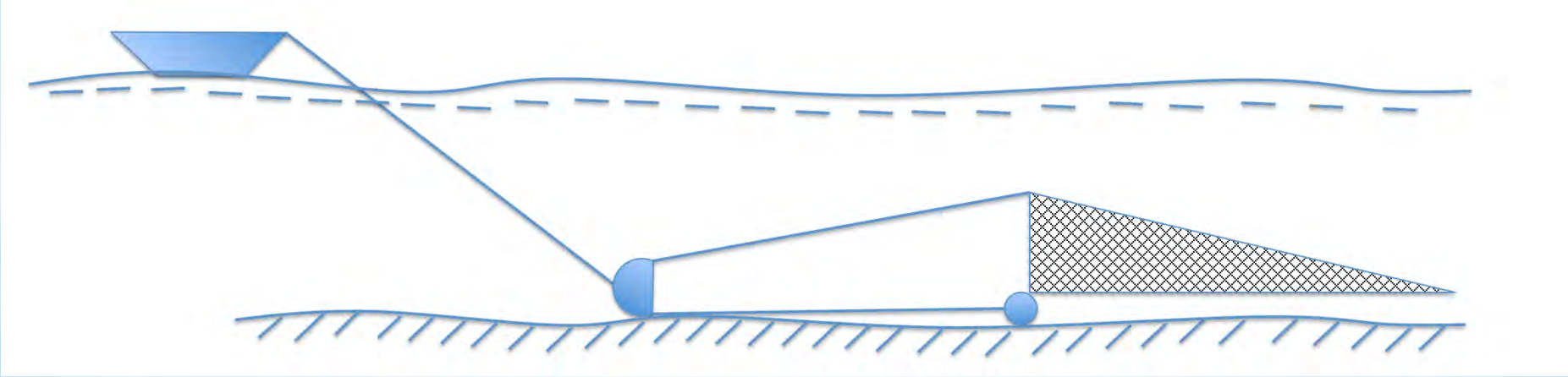
Principal Scheme of standard bottom trawling



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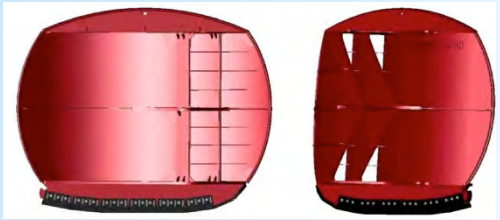
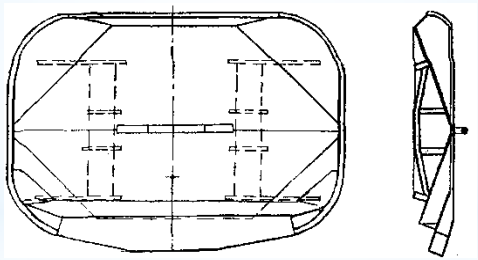
Main types of trawl doors of bottom trawls which used in fishing of demersal fishes in Barents Sea

a



b

c



d

a – Injector Shark trawldoor; b – Injector Scorpion trawldoor; c – Tuboron type 7 trawldoor; d –Kudrin type

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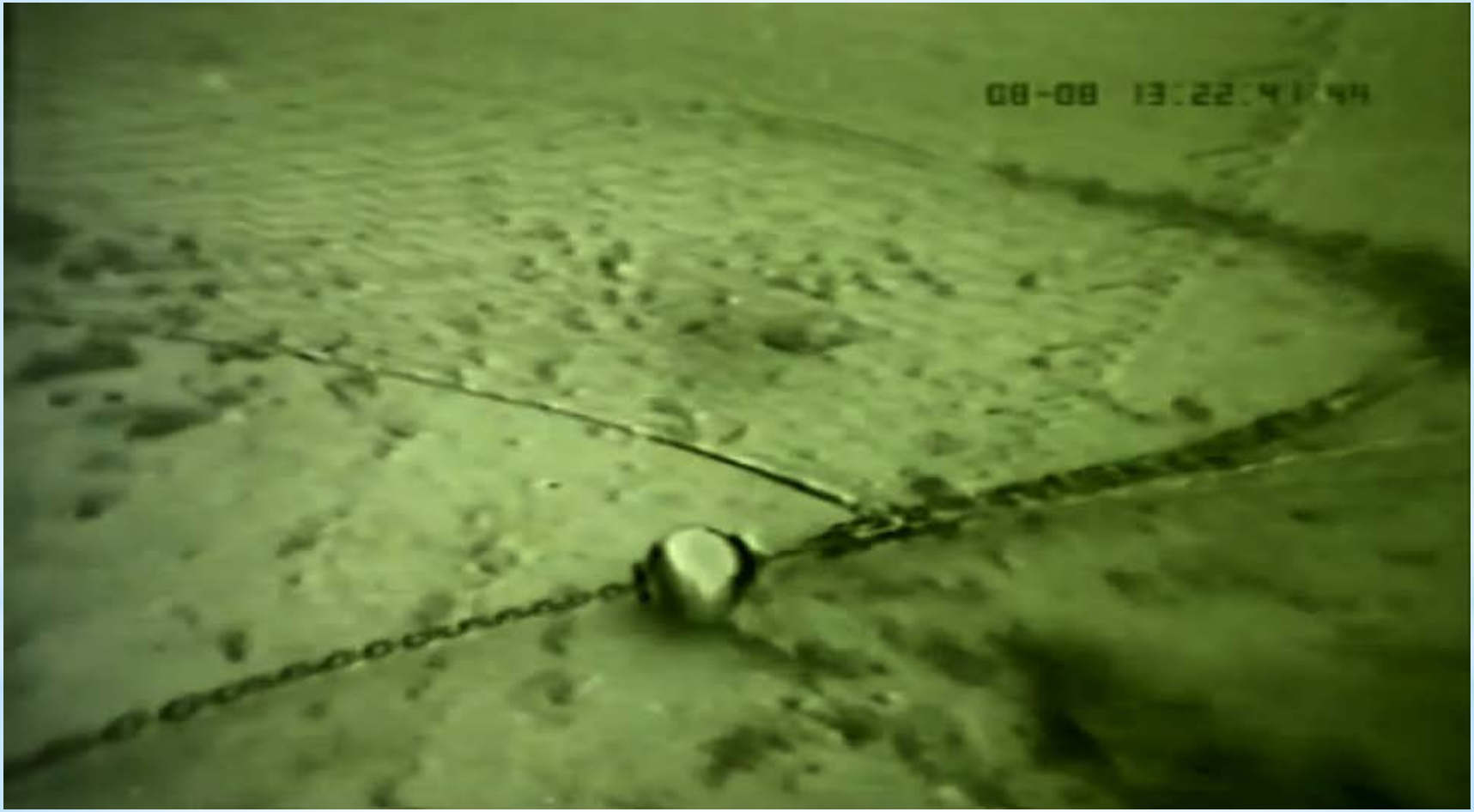
a)

Bottom trawl doors in work on sea bottom:

b)

Groundtrope of bottom trawl moves on the sea bottom



Fishing process of bottom trawl groundrope (rockhopper type)

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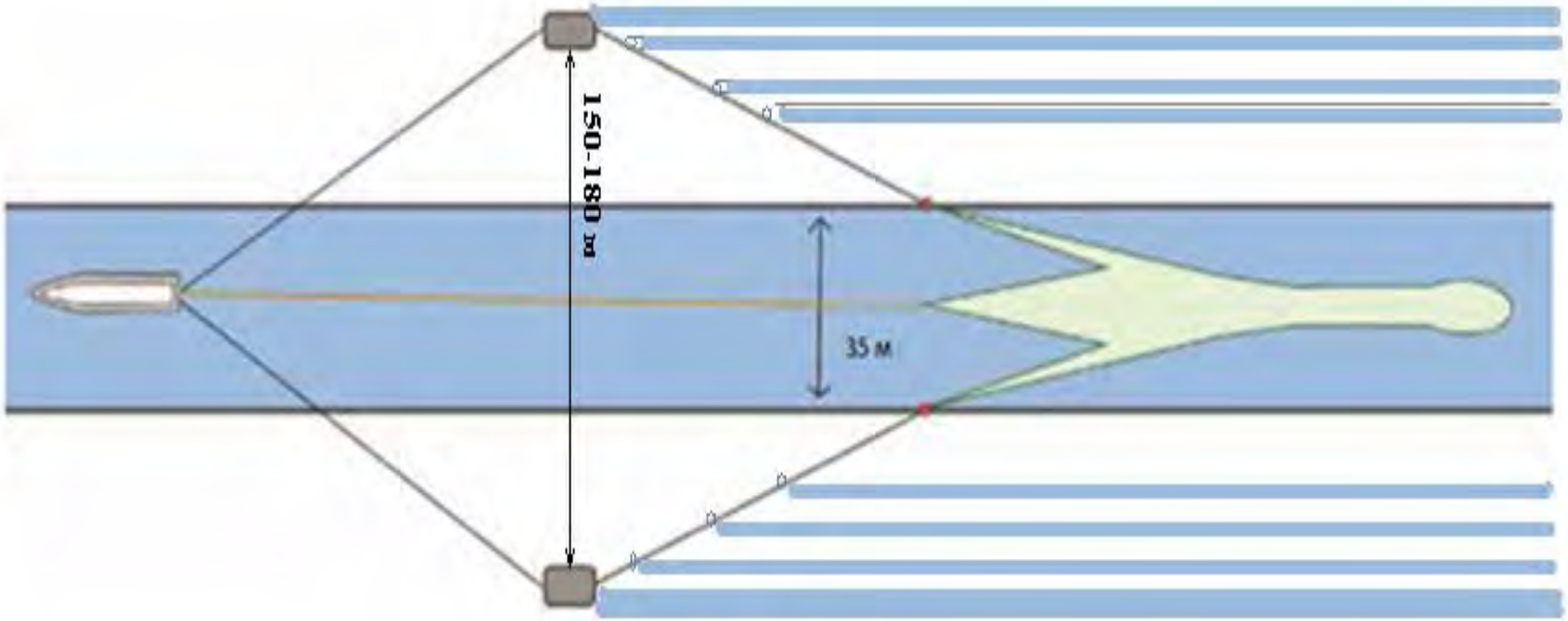
Area of the standard trawl contact with the sea bottom (blue line on the picture)



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<u>Proposed solutions for decrease drag force of the bottom trawl</u>:

1. Lift trawl doors over bottom;

2. Reduce area contact trawl groundrope with bottom;

3. Reduce friction force of groundrope with replacement of sliding friction by rolling.

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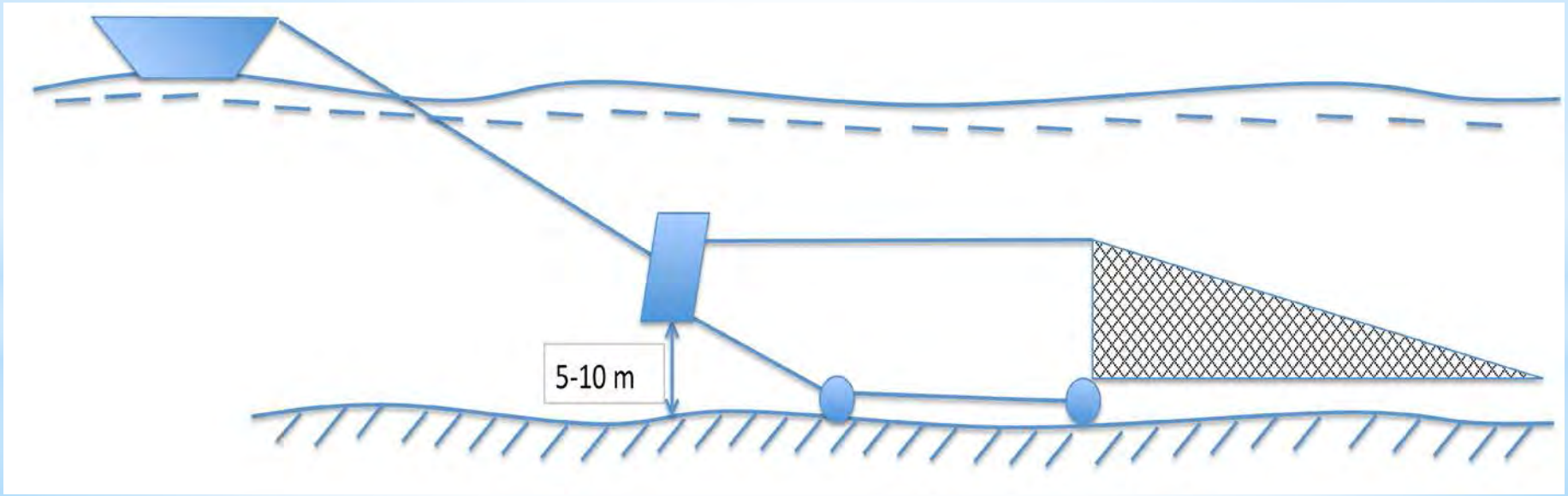
1. Lift trawl doors over the bottom



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Field exploration of the new model of the bottom trawl:

Fish capture division

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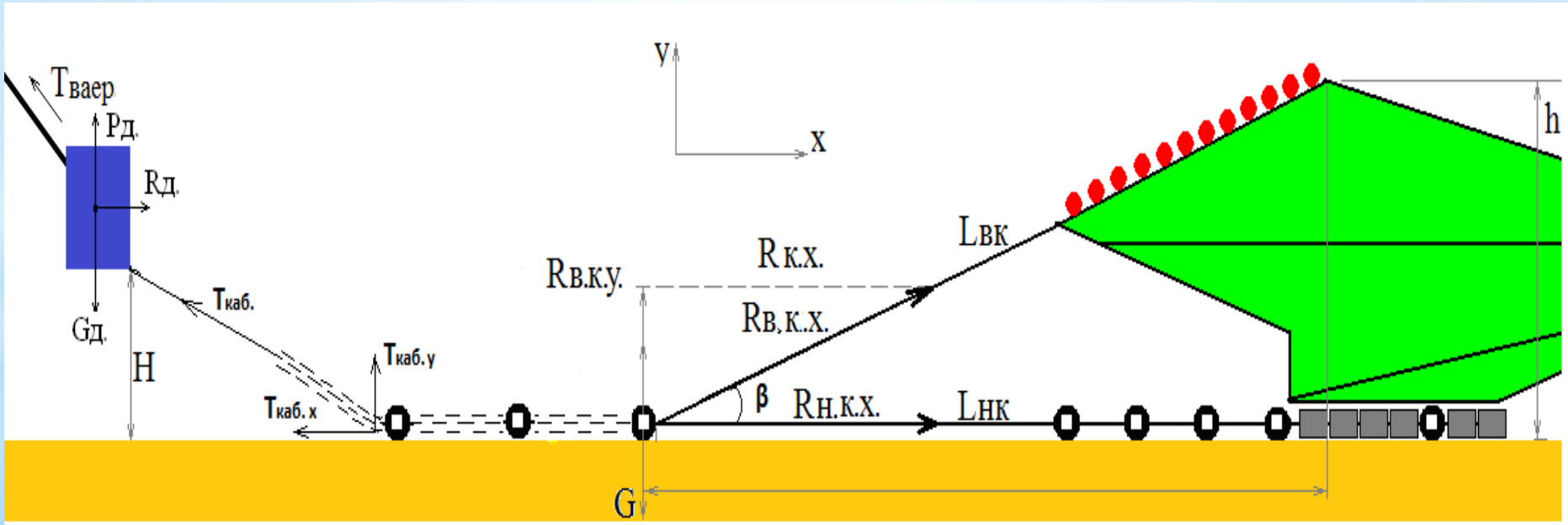
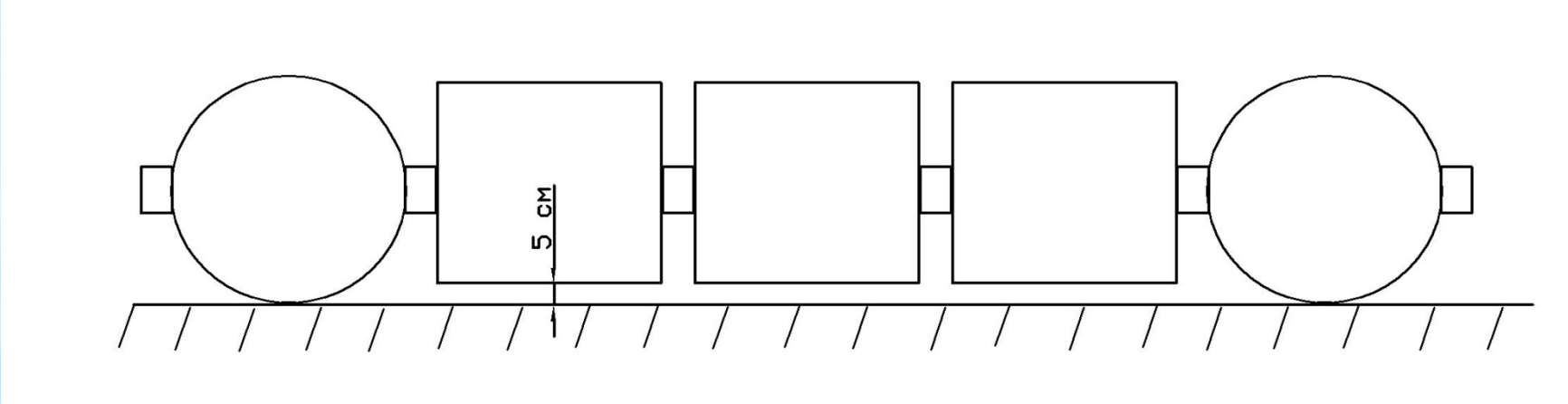
Calculation scheme of the load of trawl for ensure lifting doors above the ground. It was tested by test stand.

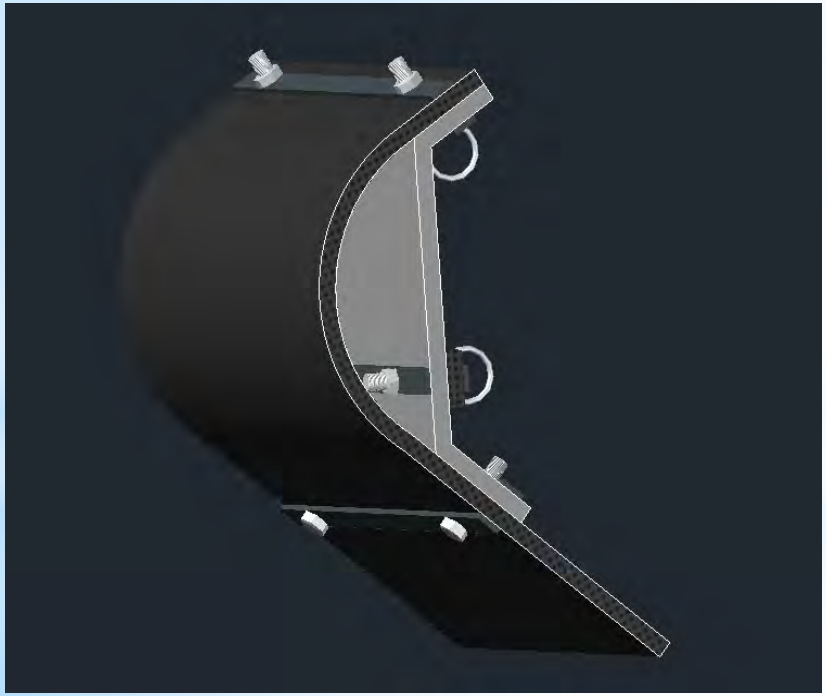


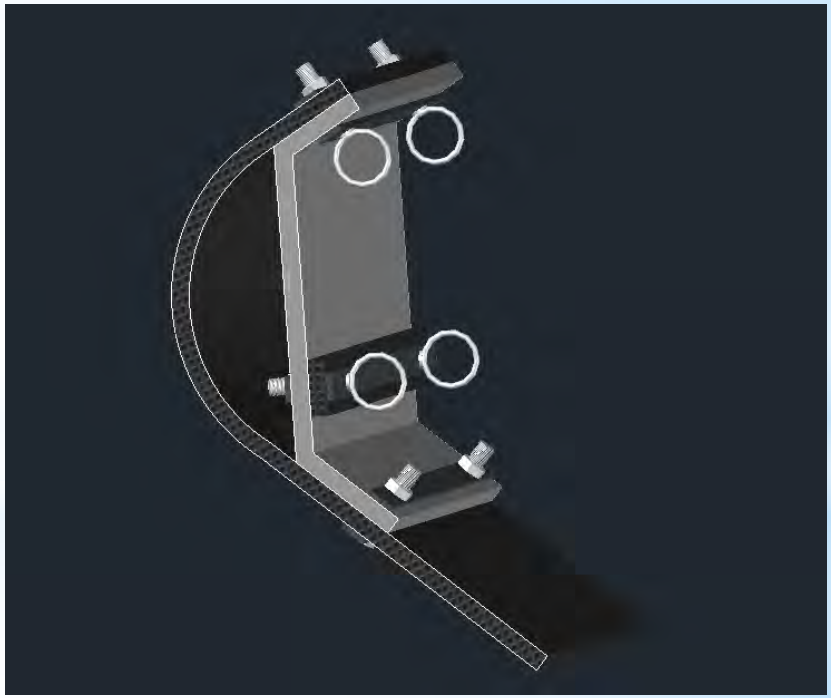
2. Reduce area contact trawl with the bottom



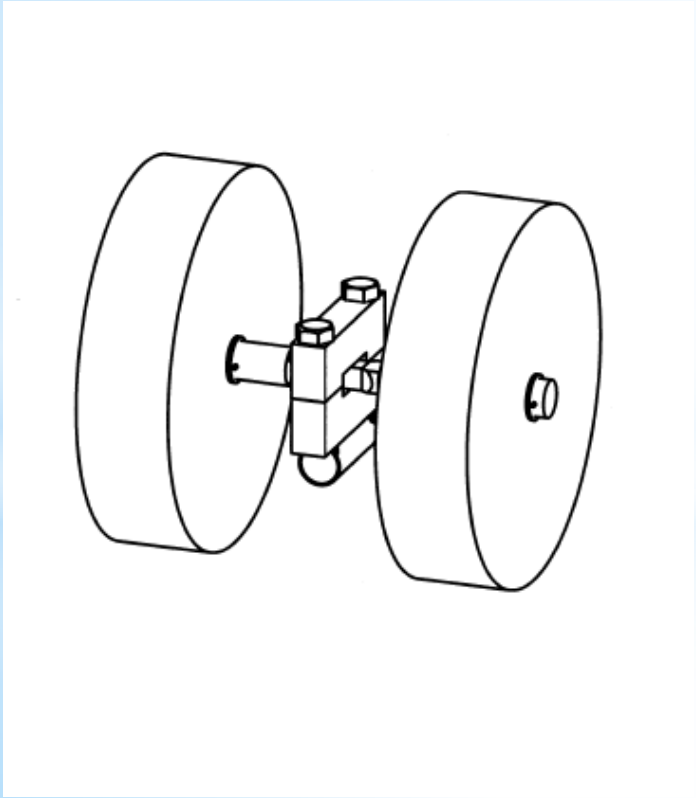
Modified footrope construction

Flexible plate





3. Reduce friction force of groundrope with replacement of sliding friction by rolling



Twisted bobbinets footrope is an element that provides it rolling friction instead of sliding friction

$$F_{\text{rolling friction}} < F_{\text{sliding friction}} = 250\text{-}300\%$$

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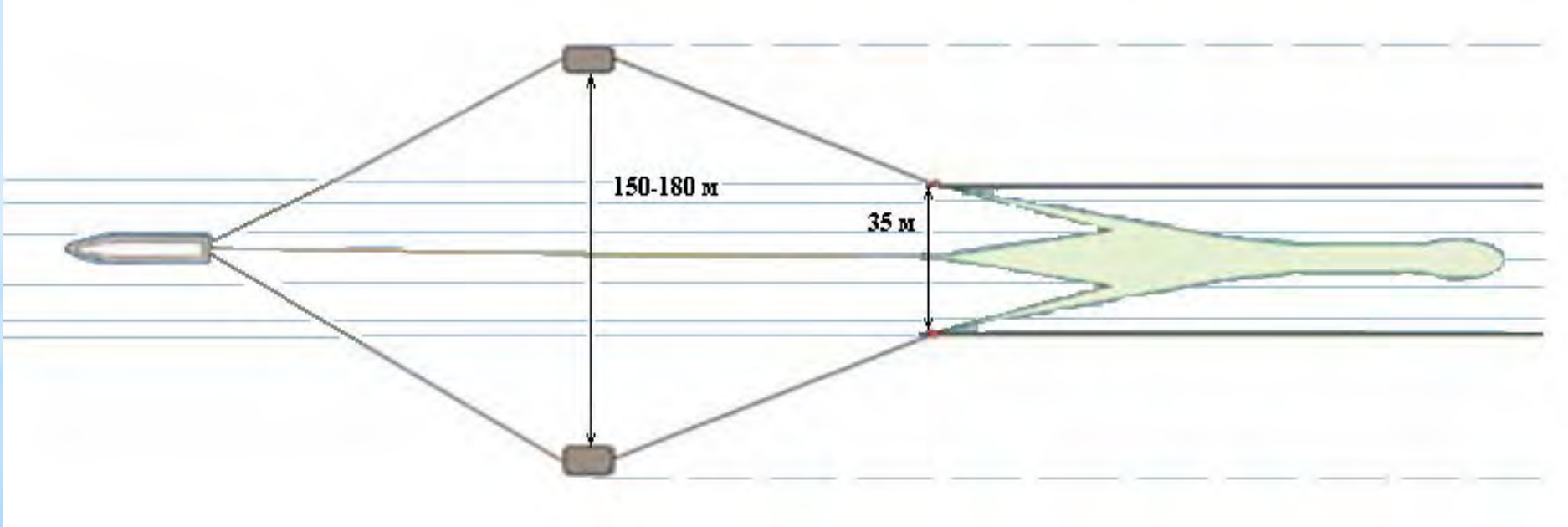
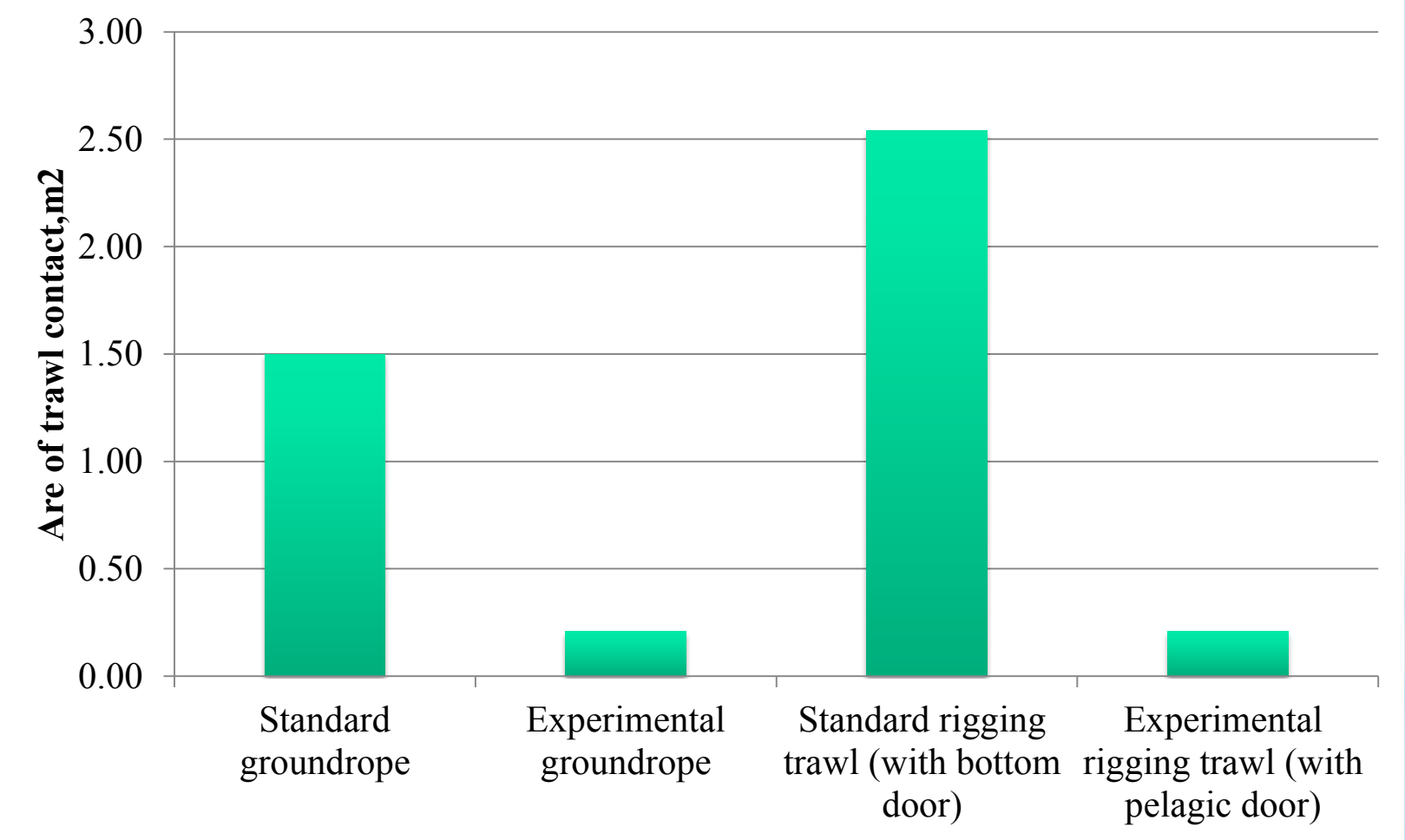
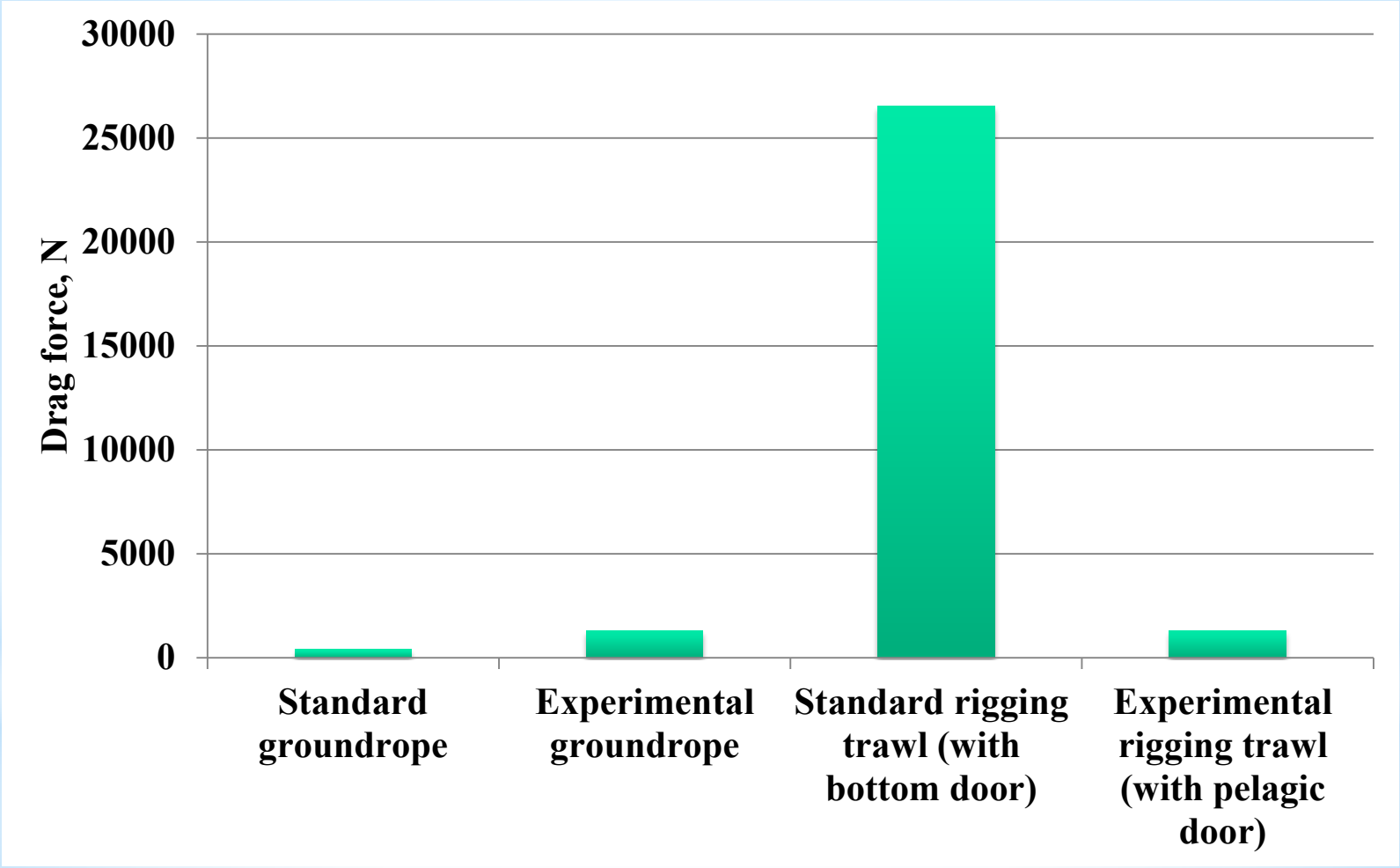
Area of experimental trawl contact on the sea bottom of standard bottom trawl (is shown by blue line on the picture)



Area of standard and experimental trawl contact with bottom, м2



Drag force standard and experimental rigging of bottom trawl



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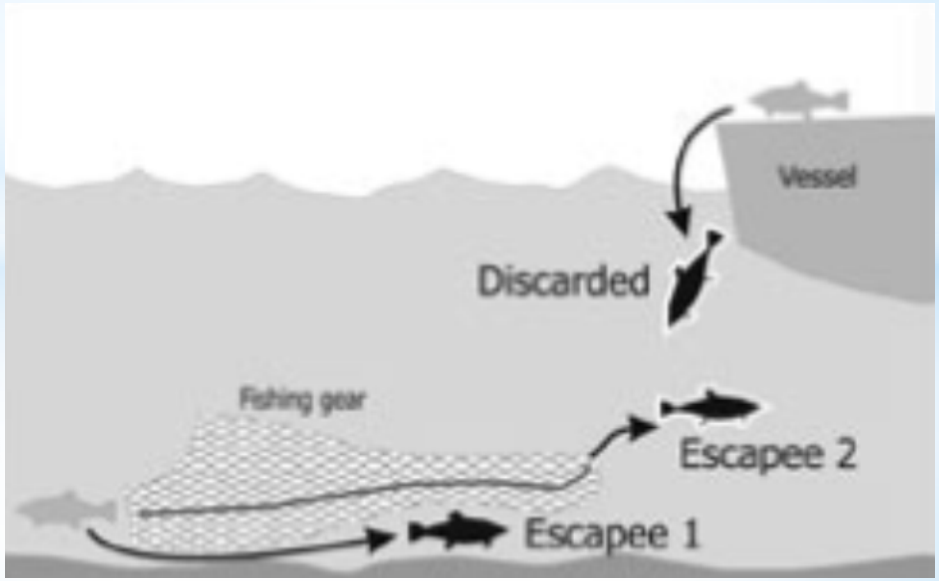
Conclusion:

It expected that the development and application of new experimental rigging for bottom trawl will:

- ✓ **Reduce the area of the adverse impacts of bottom trawl to *92%*;**
- ✓ **Reduce the drag force of bottom trawl;**



Let's work together!