The invasive round goby (*Neogobius melanostomus*) in the eastern Gulf of Finland

Anastasia Yurtseva[1], Anton Uspenskiy[2], Elena Borovikova[3], Dmitry Bogdanov[2]

[1] Zoological Institute RAS, Saint-Petersburg, Russia

[2] State Research Institute on Lake and River Fisheries n.a. L.S. Berg, St.-Petersburg, Russia

[3] Papanin Institute for Biology of Inland Waters RAS, Borok, Russia

Photo from Gallery.nangfa.org

International Scientific Forum "Gulf of Finland - natural dynamics and anthropogenic impact“
October 17-18,2018 St. Petersburg, Russia

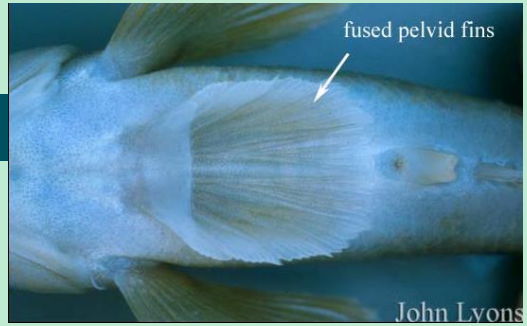
Round goby (*Neogobius melanostomus*)

Length: up to 20 cm

Characters to distinguish the species

The prominent blotch at the posterior of the 1st dorsal fin

The pelvic fins are fused to form a disc



❖ **Native range of this species covers mainly marine waters of Ponto-Caspian basin**

N. melanostomus **exhibits a wide tolerance**

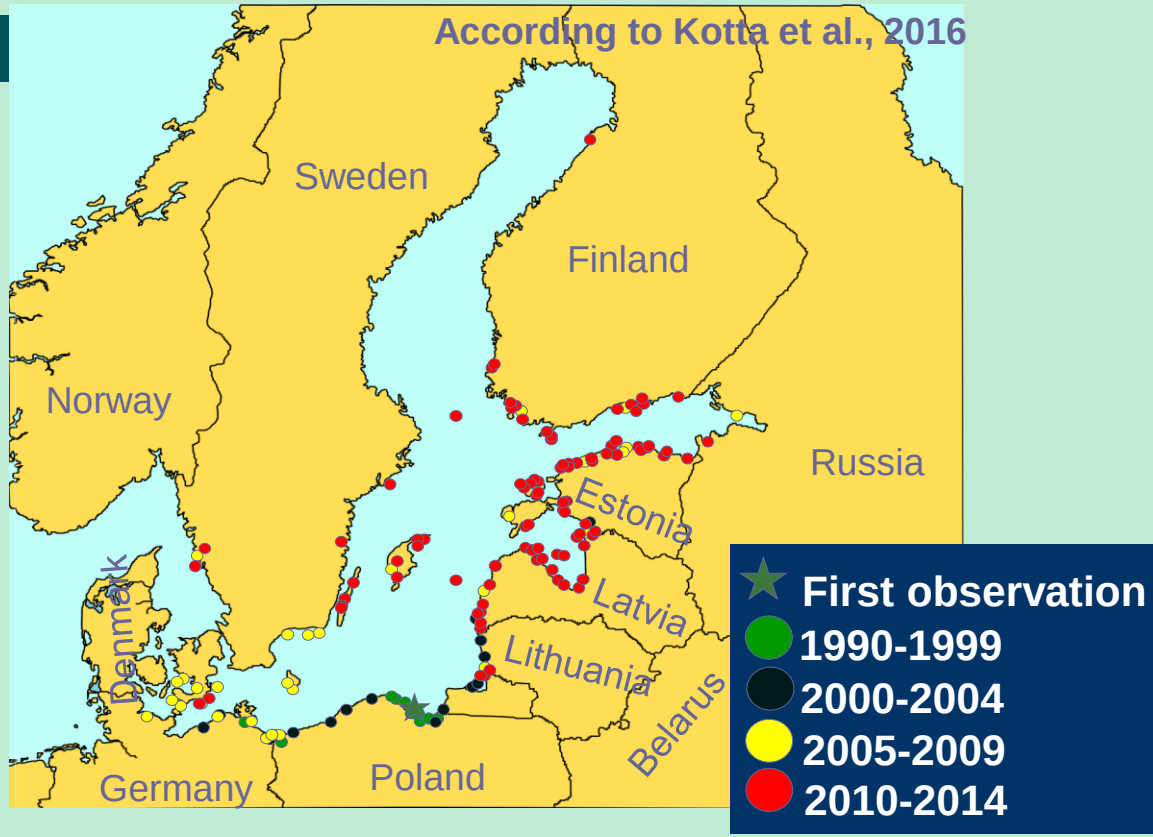
- ❖ **salinity: up to 40.5‰**
- ❖ **temperature: from -1°C to +30°C**
- ❖ **low levels of dissolved oxygen: from 0.4 to 1.3 mg1^{-1}**

Round goby in the Baltic Sea

❖ **amongst the top invasive species in the Baltic Sea (Kornis et al. 2012).**

Round goby was first observed in Gulf of Gdansk (Poland) in 1990. During the next two decades the species has widely expanded its range, and established in all Baltic Sea sub-basins

Invasive range: the Baltic Sea



The aim of the current study is to obtain first data about population structure and morphological characters of the round goby in the eastern Gulf of Finland in the Russian EEZ.

Material and Methods

Sampling

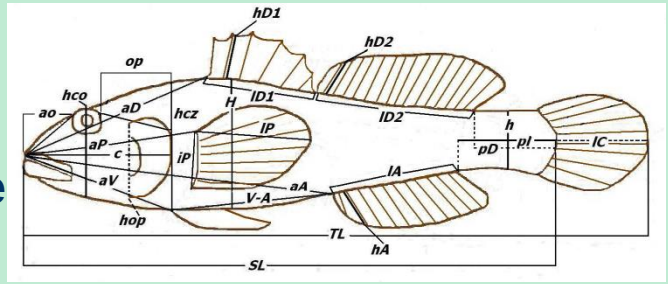
- beach seine and fishing rod in coastal areas
- gill nets in deeper waters

❖ Population structure

density | sex ratio | fish size | fish age

distribution | fecundity | growth rate

❖ Analysis of external morphology



6 meristic: number of rays in dorsal, anal, pectoral and ventral fins, and scales in the lateral surface of the body

35 morphometric (Zabroda & Deripasko 2009)

❖ Genetics

the sequences of part of the mitochondrial gene encoding cytochrome *c* oxidase subunit 1

Results

Densities of adult round gobies in 2016-2018, inds/100m^2

- Sampling by a beach seine in coastal areas (depth <1.5 m):
  - juveniles predominate, density up to 10 inds/100m^2 (Koporye Bay, 2016)
  - density of adults: 0.2-0.3 inds/100m^2
- Fishing by gill nets in deeper waters (depth 6-12 m):
  - adults predominate, density 2.6-16.1 inds/100m^2 (in Narva Bay, 2018)

Results

Length and weight of round gobies in the Gulf of Finland

Juveniles | **Adults**

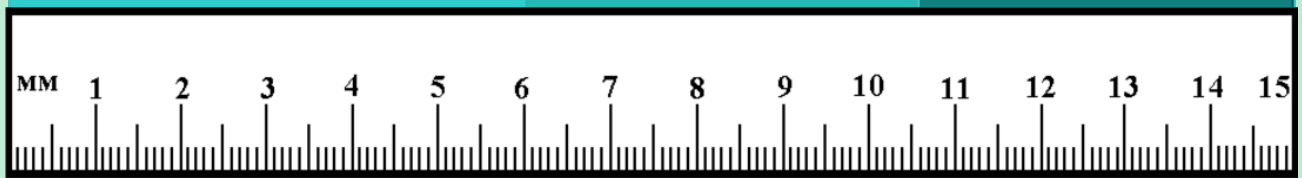
Koporye Bay, 2016

15-30 mm
0.07-0.65 g
Age: young-of-the-year juv.

Narva Bay, June 2018

69-106 mm
5.6-22.5 g
Age: 2-3 years

60-155 mm
16.5-99.2 g
Age: 2-4 years

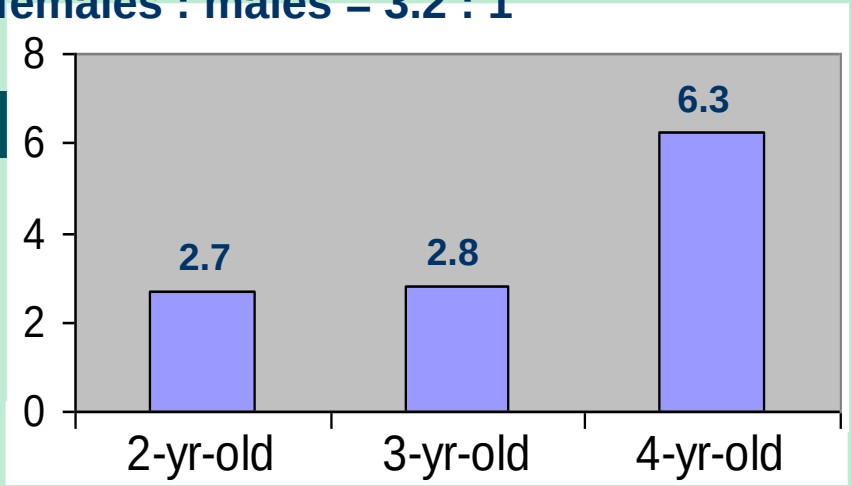


Results
Population structure

Narva Bay (June 2018, N = 172 inds.)

- **Females predominate in number**

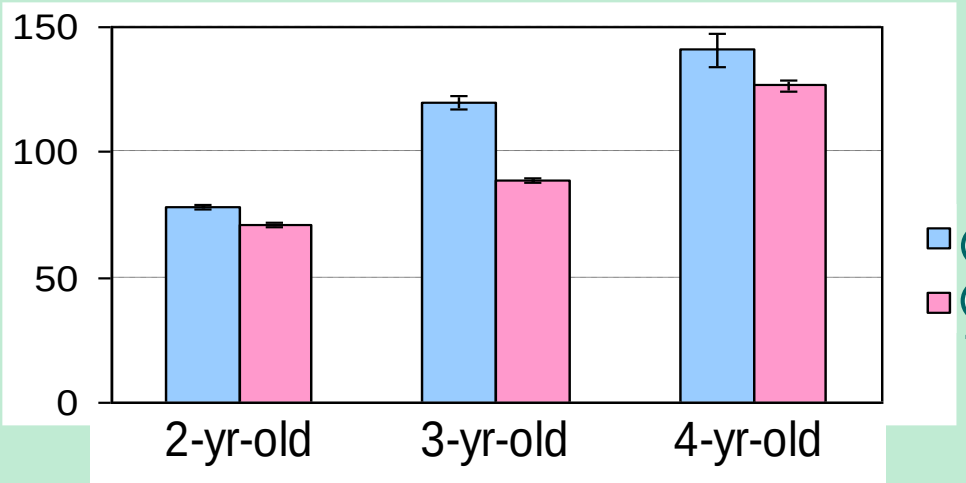
  Average ratio females : males = 3.2 : 1



- **Males are bigger than females**

  Fish length, mm

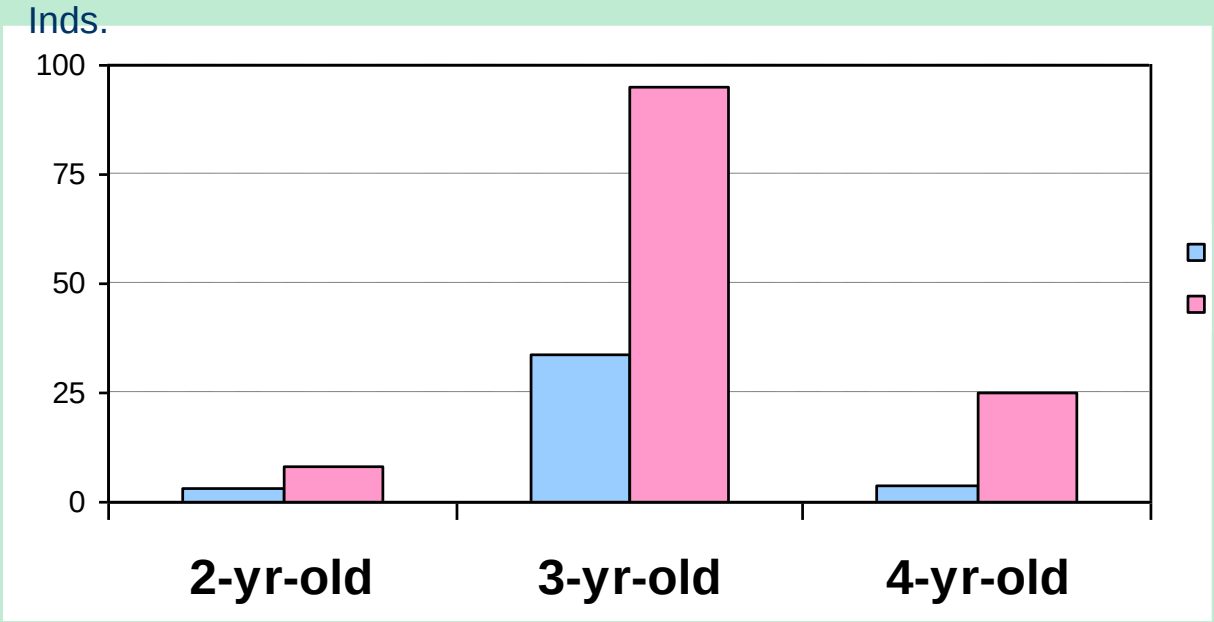
Suggestion:
higher mortality in males



Results
Population structure

Narva Bay (June 2018, N=172 inds.)

Age composition

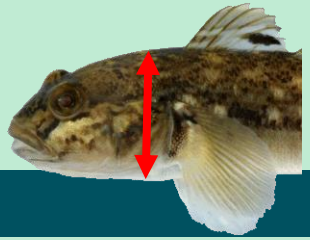
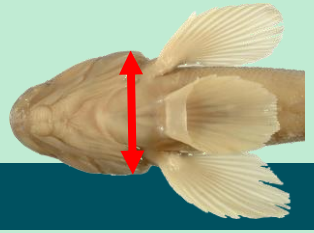
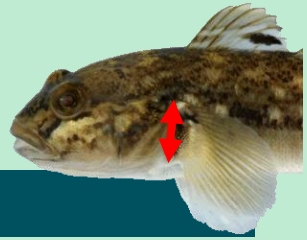
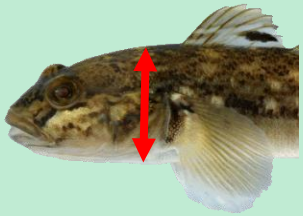
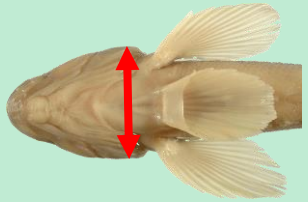
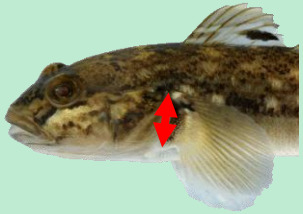


3-yr-old individuals prevail in a sample, the most of them are females

Results

Morphology

Higher

	head height	head width	height of the pectoral fin basement
Males			
Females			

Lower

❖Males had higher indices (% of standart length) of head width and height and height of the pectoral fin basement ($p < 0.05$)

❖Number of fin rays was in the same range as in native and other invasive populations

Genetics

❖Specimens from the Gulf of Finland were similar in the sequences of part of the mitochondrial gene encoding cytochrome *c* oxidase subunit 1 between each other, as well as with other invasive populations of the Baltic and North Seas, and the Great Lakes of North America.

❖This result suggests the spread of the invasive round goby from the same donor region, namely north and/or south-western parts of the Black Sea basin.

Conclusions

- Invasive round goby is common along the southern coast of the eastern Gulf of Finland, but was not observed along its northern coast, as well as to the east of the St-Petersburg flood-prevention facility complex
- Juvenile round gobies are abundant at shallows, reaching densities up to 10 individuals per 100m^2
- Adult round gobies are more common in deeper waters than at shallows. At depths 6-12 m their densities can reach up to 16 individuals per 100m^2
- Obtained results allow us to conclude about successful naturalization of the invasive round goby in the eastern Gulf of Finland. The species is more and more common in new habitats, and populations include numerous fry, juveniles and adults. We suggest further increase of the species abundance and distribution in the studied area and increase of its influence on native populations of other species.

Thank you for attention!

The study was supported by the Russian Foundation for Basic Research (grant number 17-05-00782A). Coastal shallow water investigation in 2012-2014 was supported by the South-East Finland – Russia "TOPCONS" project ENPI 2011-022-SE511.