Seasonal and ontogenetic dietary changes of round goby (Neogobius melanostomus) in the exposed coastal waters of SE Baltic Sea

Jūratė Lesutienė¹, Artūras Skabeikis² and Andrius Šiaulys¹

¹Coastal Research and Planning Institute, Marine Science and Technology Center, Klaipėda University, Manto 84, LT-92294, Klaipėda, Lithuania
²Lithuanian Sea Museum, Smiltynės 3, LT-93100, Klaipėda, Lithuania

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Effects of round goby in the coastal ecosystem

Round goby changes invaded ecosystem by reducing abundances of its feeding objects – predominantly molluscs, competing for food resources with native demersal fish and bird species or becoming an important component in the diet of piscivorous fish, birds and mammals.
In Lithuanian coastal areas *Mytilus* abundance at 0-15 m depth decreased ~95% during a decade after invasion of roundgoby.
Mytilus decline coinsided with the decreased abundance of wintering Long tailed Duck (Clangula hyamalis) and complete

1) Monitoring data of wintering waterfowl; 2) L. Šniaukšta Results of wintering waterfowl counts 2014. BIRDS The magazine of Lithuanian Ornithological Society 2014/1
Diet composition of Long-tailed Duck

By Žydelis (2002)

Rasa Morkūnė, Jūratė Lesutienė, Julius Morkūnas FOOD SOURCES OF WINTERING VELVET SCOTER AND LONG-TAILED DUCK ON THE SE BALTIC SEA: TRIPLE STABLE ISOTOPE AND GUT CONTENT ANALYSIS
Diet composition of Velvet Scoter

By Žydelis (2002)

Recent study

Proportion

100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%

1998-2001 (N=47)
Empty stomachs 11.4%
By Žydelis (2002)

2012 (N=31)
Empty stomachs 29.8%
Recent study

Other*
Saduria entomon
Polychaetes
Macoma balthica
Cerastoderma glaucum
Mya arenaria
The main objective of the study was to determine seasonal and ontogenetic dietary changes of round goby in the soft bottom area adjacent to artificial substrate i.e. harbour mole.

During May - October 2012, guts of 282 individuals were analysed.

Skabeikis A., Morkūnė R. Barisevičiūtė and Lesutienė J. Seasonal and ontogenetic changes in the diet of round goby (Neogobius melanostomus) in the coastal waters of SE Baltic Sea (submitted manuscript)
Juveniles were collected using a trap at 2-3m depth, larger gobies using gill nets at 6-11m depth
Seabed at the sampling site is dominated by soft and sandy sediments, strongly affected by wave action.

Soft bottom fauna is dominated by polychaetes at 2-3m depth and *Macoma balthica* at 6-11m.
MDS ordination plot of biomasses of prey items, determined in the guts of differently sized round gobies.

PERMANOVA results of season effect:

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<thead>
<tr>
<th>Size group</th>
<th>Pseudo - F</th>
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<tbody>
<tr>
<td>&lt;5 cm</td>
<td>1.169</td>
<td>0.317</td>
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<td>5 - 9.9 cm</td>
<td>1.148</td>
<td>0.29</td>
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<td>10-14.9 cm</td>
<td>2.652</td>
<td>0.013</td>
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<td>14.9-19.9 cm</td>
<td>2.216</td>
<td>0.049</td>
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<td>≥20 cm</td>
<td>1.743</td>
<td>0.118</td>
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Spring

Size groups, cm

IRI, %

Other prey
- Pisces
- Amphipoda
- Crangon crangon
- Polychaeta
- Balanus improvisus
- Mytilus trossulus
- Macoma balthica
Dynamic of gut fullness of female and male individuals

**FEMALE**

**MALE**

<table>
<thead>
<tr>
<th>Month</th>
<th>10 - 14.9 cm</th>
<th>15 - 19.9 cm</th>
<th>&gt;20 cm</th>
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Skrandžio užpildymo indeksas

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Conclusions

Juvenile round gobies forage on zooplankton, meiobenthic organisms and amphipods. Importance of mollusks in the diet increases significantly at the size of ≥10 cm.

The share of mollusks increases with a fish size. Largest specimens >20cm have relatively consistent diet composition with highest amounts of *Macoma*, while individuals of intermediate 10-20cm size switch to polychaetes during the summer, fish and other mollusks (*Mytilus*?) during the fall.

These findings indicate size specific partitioning of spawning-foraging grounds within the population of round goby. It seems that largest individuals occupy areas with the highest abundance of *Macoma*, while smaller individuals are pushed towards shallower waters with polychaete dominated benthic community.

Population size structure and spatial (depth specific) distribution of round goby should be investigated during the autumn to evaluate the mollusk prey loss in the bird diving areas.