# fish population status report
## – results overview

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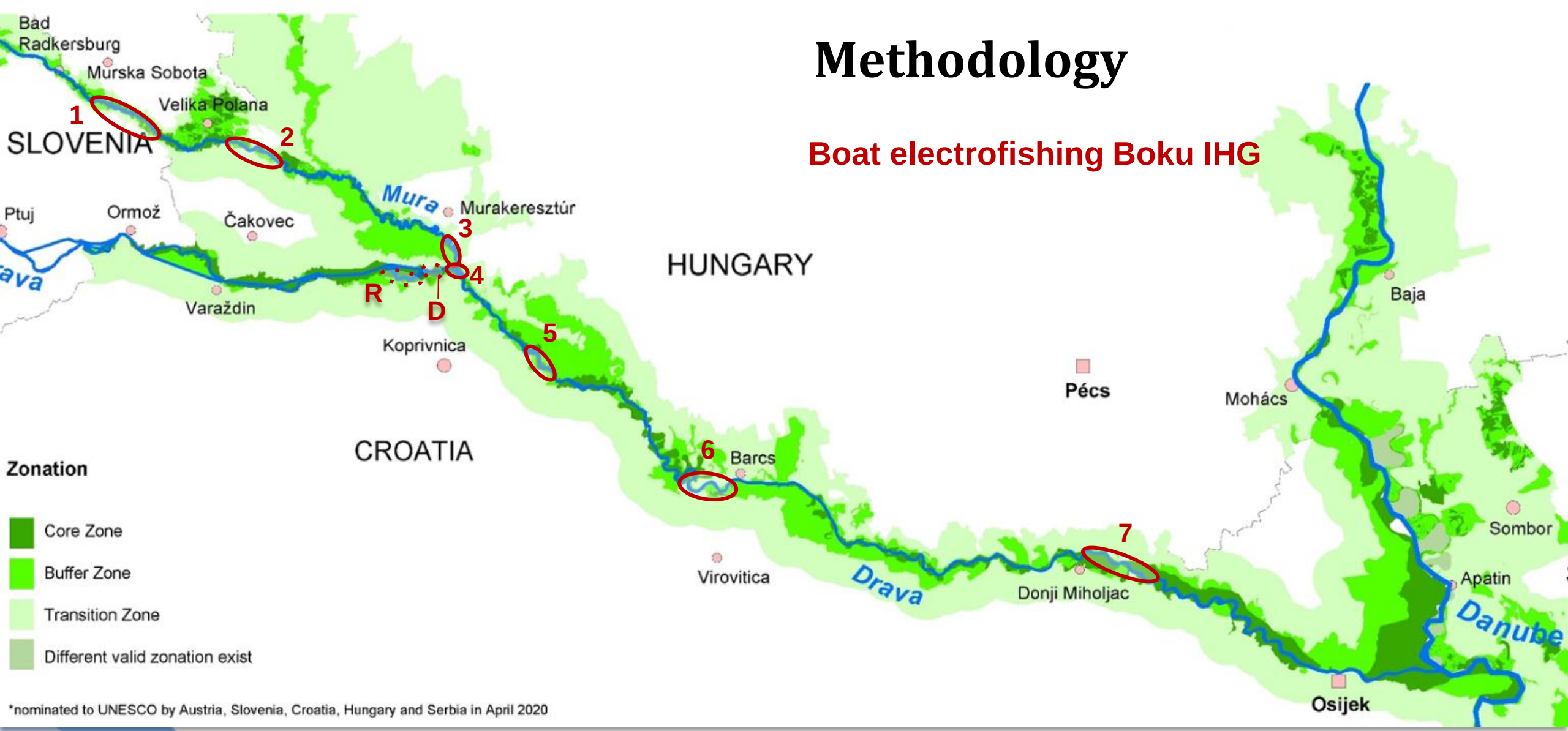
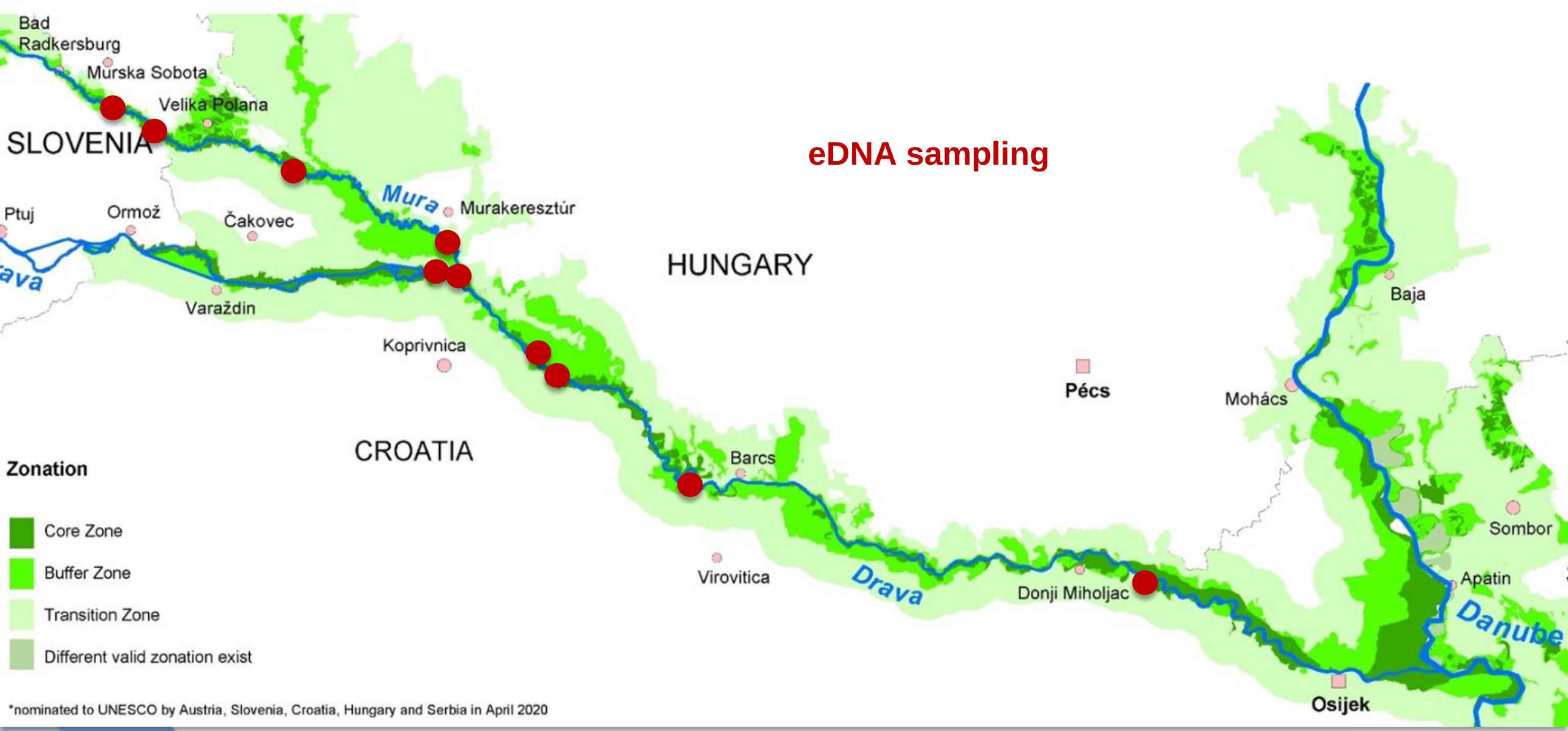
**lifelineMDD mid-term conference**
**November 24, 2021**

# Methodology

## Boat electrofishing Boku IHG

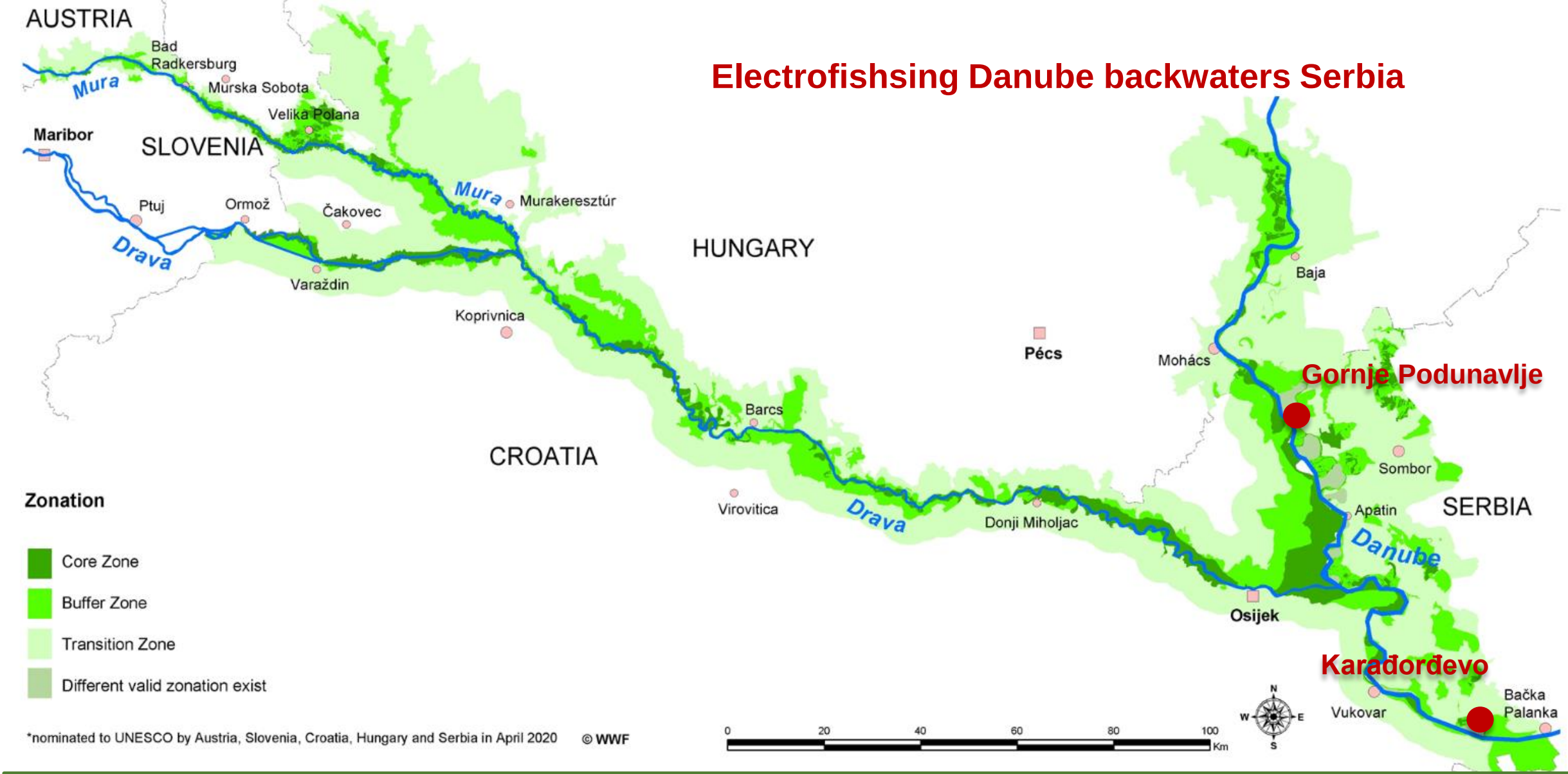



- Boat electrofishing in Mura & Drava – July 2021 – 7 (9) sections *// Boku IHG*

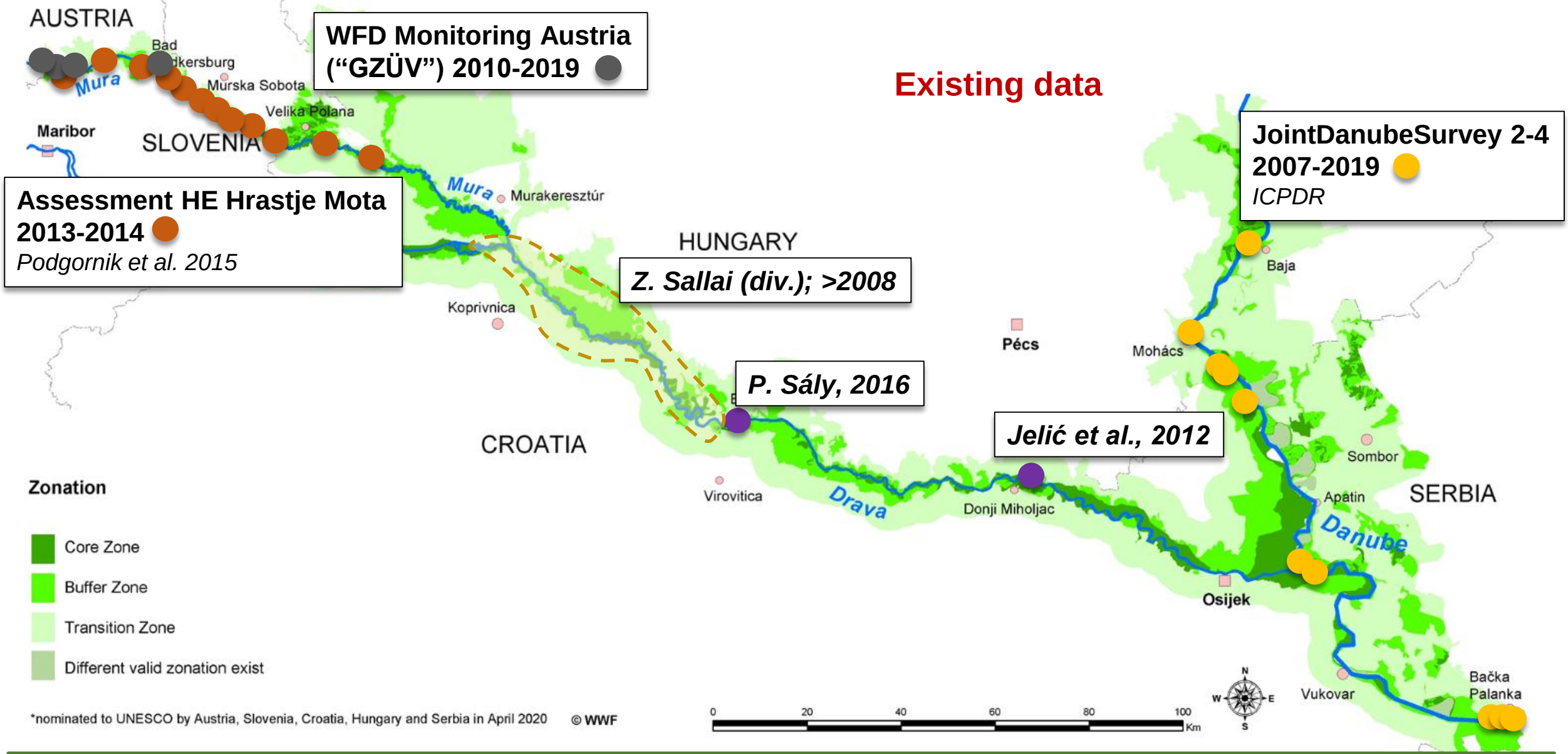



- eDNA sampling Mura & Drava – July 2021 – 10 locations // *Boku IHG* (results pending)

# Electrofishsing Danube backwaters Serbia




- Electrofishing in Danube-backwaters at two locations in Serbia – July-August 2021
  *// coordinated by INCVP – (Univ. Novi Sad, Bajić & Miljanović 2021)*




- Existing data (quantitative and qualitative fish surveys) are included.
  - Data quality and availability very heterogenous

# Quantitative vs. Qualitative data

- Fish stock quantification expressed as **standardized fish abundance** (Individuals per hectar of water surface area) and **fish biomass** (kg per hectar).
  Prerequisites:
  - sampling effort (areal extension) needs to be known and
  - habitat distribution needs to be known/estimated

Quantitative

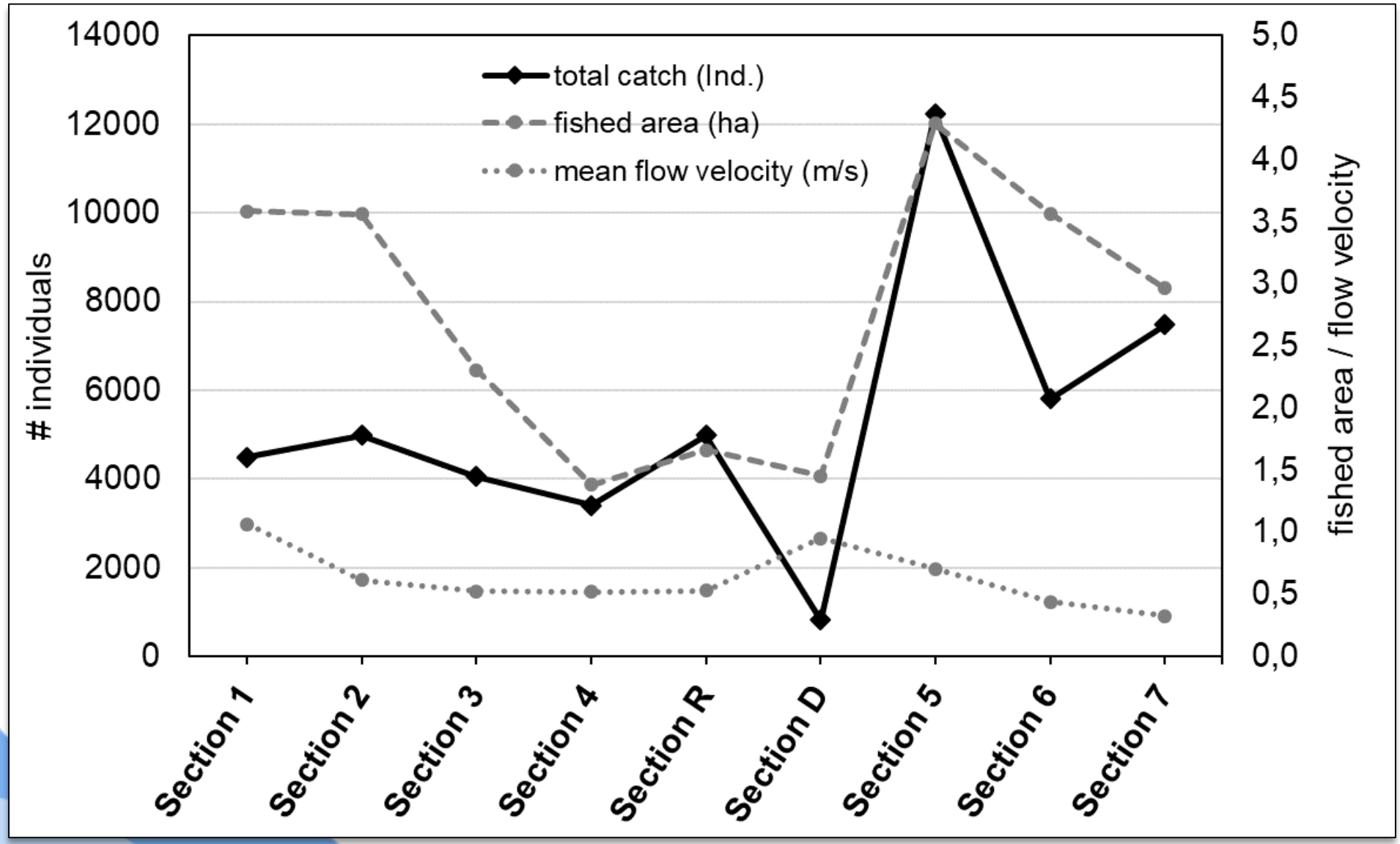
- Relative fish abundances (species/guild share of total catch)
  - allow comparisons despite differing methodology/degree of data availability.

Semi-Quantitative

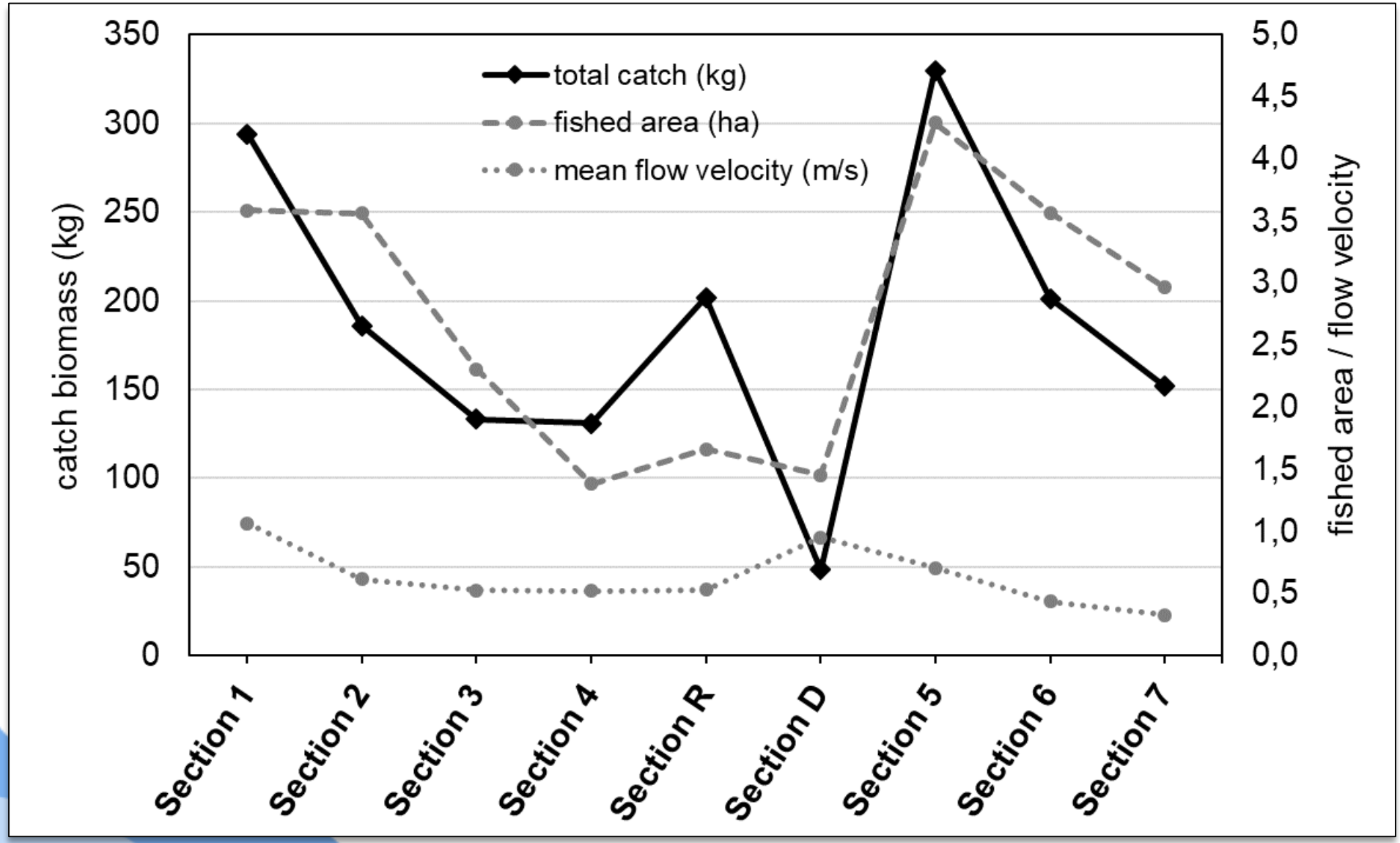
- Species lists can give rough overview/indications, but „detailed status assessment“ not possible.

Qualitative

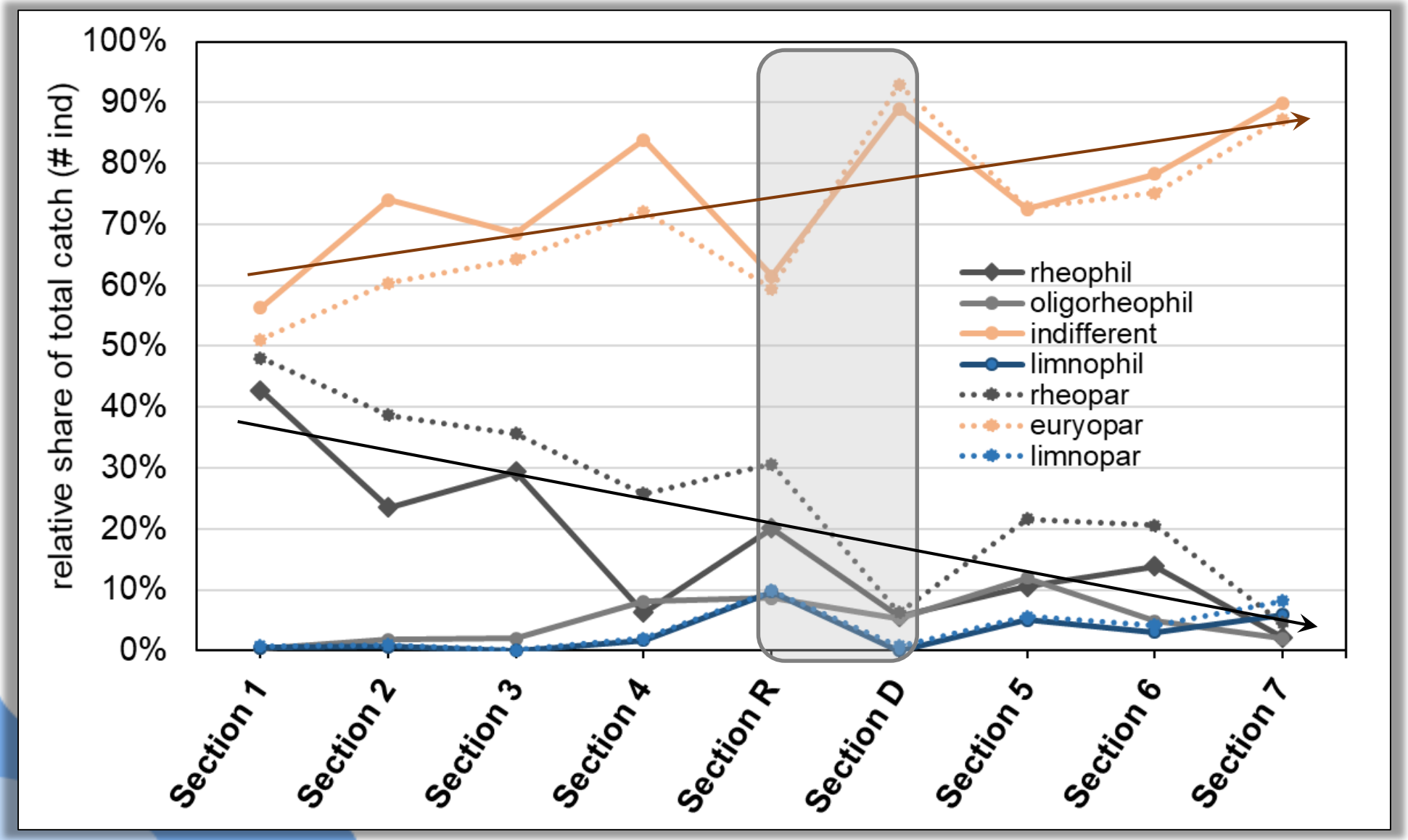
# Longitudinal zonation
## Mura & Drava



# Longitudinal zonation
## Mura & Drava



# Longitudinal zonation
## Mura & Drava



# Species ocurrence and dominance
## rheophilic and oligorheophilic

| Flow preference | Spawning habitat pref. | Species name | Section # | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1 | 2 | 3 | 4 | R | D | 5 | 6 | 7 | GP | KA |
| rheophil | rheopar | Alburnoides bipunctatus | 16% | 9% | 4% | 1% | 8% | 3% | 1% | | | | |
| rheophil | rheopar | Barbus barbus | 15% | 12% | 7% | 7% | 4% | 7% | 3% | 3% | 1% | | |
| rheophil | rheopar | Barbatula barbatula | 1% | | <1% | | <1% | | | | | | |
| rheophil | rheopar | Chondrostoma nasus | 19% | 7% | 16% | 15% | 5% | 32% | 14% | 10% | 2% | | <1% |
| rheophil | rheopar | Cottus gobio | <1% | | <1% | | | | | | | | |
| rheophil | rheopar | Gobio obtusirotris | 1% | 1% | | | <1% | | | | | | |
| rheophil | rheopar | Romanogobio carpathorossicus | <1% | 1% | | | | | | | | | |
| rheophil | rheopar | Romanogobio uranoscopus | <1% | | | | 2% | | | | | | |
| rheophil | rheopar | Romanogobio vladykovi | 1% | <1% | <1% | <1% | <1% | | <1% | 1% | <1% | | |
| rheophil | rheopar | Rutilus virgo | | <1% | 2% | <1% | | 1% | 1% | 1% | 3% | | |
| rheophil | rheopar | Salmo trutta fario | | | | | <1% | | | | | | |
| rheophil | rheopar | Zingel streber | | <1% | | | 2% | | <1% | | | | |
| oligorheophil | rheopar | Ballerus sapa | | | <1% | | | | | | 1% | | |
| oligorheophil | rheopar | Eudontomyzon mariae | <1% | <1% | <1% | | | | | <1% | <1% | | |
| oligorheophil | rheopar | Gymnocephalus schraetser | | | | | | | | <1% | | | |
| oligorheophil | rheopar | Vimba vimba | <1% | 1% | 1% | 2% | 5% | 1% | 4% | 1% | 1% | | |
| oligorheophil | rheopar | Zingel zingel | <1% | <1% | 2% | | <1% | | | | | | |
| oligorheophil | euryopar | Cobitis elongatoides | <1% | 1% | <1% | 3% | 2% | 1% | 1% | 2% | 2% | | 1% |

| Flow preference | Spawning habitat pref. | Species name | Section # | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1 | 2 | 3 | 4 | R | D | 5 | 6 | 7 | GP | KA |
| indifferent | rheopar | Aspius aspius | <1% | 1% | 1% | 4% | <1% | <1% | 1% | 1% | 1% | 2% | 4% |
| indifferent | rheopar | Leuciscus leuciscus | 4% | 10% | 3% | 16% | 6% | | <1% | 2% | 1% | | |
| indifferent | rheopar | Ballerus ballerus | | | | | | | | | | 1% | |
| indifferent | euryopar | Abramis brama | <1% | <1% | | 1% | | | <1% | 1% | <1% | 3% | 6% |
| indifferent | euryopar | Alburnus alburnus | 32% | 43% | 5% | 41% | 27% | 4% | 61% | 60% | 59% | 39% | 34% |
| indifferent | euryopar | Babka gymnotrachelus | | | | | | | | | <1% | | |
| indifferent | euryopar | Blicca bjoerkna | | <1% | | | | 3% | 2% | 1% | <1% | <1% | 7% |
| indifferent | euryopar | Gymnocephalus cernua | | | | <1% | | | | | | | <1% |
| indifferent | euryopar | Hypophthalmichthys molitrix | | | <1% | | | | <1% | 1% | 1% | | 1% |
| indifferent | euryopar | Leuciscus idus | 1% | 1% | | | <1% | | 1% | <1% | 1% | 1% | 3% |
| indifferent | euryopar | Lota lota | | <1% | | | <1% | | | | | | |
| indifferent | euryopar | Neogobius fluviatilis | | 1% | <1% | <1% | <1% | | <1% | <1% | <1% | <1% | |
| indifferent | euryopar | Neogobius melanostomus | | | | | | | | | <1% | | |
| indifferent | euryopar | Perca fluviatilis | | 1% | 1% | <1% | 1% | 1% | 1% | 1% | 1% | <1% | <1% |
| indifferent | euryopar | Phoxinus phoxinus | | | | | 4% | | | | | | |
| indifferent | euryopar | Ponticola kessleri | | | | | | | | | 1% | | |
| indifferent | euryopar | Proterorhinus marmoratus | | | | | | | | | <1% | <1% | <1% |
| indifferent | euryopar | Pseudorasbora parva | <1% | | | | 2% | 4% | | <1% | 2% | 1% | 3% |
| indifferent | euryopar | Rutilus rutilus | 1% | 1% | <1% | 5% | 7% | 7% | 5% | 2% | 1% | 15% | 14% |
| indifferent | euryopar | Sander lucioperca | 1% | <1% | <1% | | <1% | | <1% | <1% | <1% | <1% | <1% |
| indifferent | euryopar | Silurus glanis | 1% | | <1% | <1% | <1% | | | | <1% | | <1% |
| indifferent | euryopar | Squalius cephalus | 9% | 12% | 13% | 5% | 18% | 6% | 4% | 13% | 8% | | <1% |
| indifferent | - | Ameiurus melas | | | | | | | | | <1% | 13% | <1% |
| indifferent | - | Micropterus salmoides | | | | | | | | | | 1% | |
| indifferent | limnopar | Carassius gibelio | <1% | <1% | | | <1% | 2% | <1% | <1% | 1% | 6% | 12% |
| indifferent | limnopar | Cyprinus carpio | | <1% | | 1% | | | <1% | 1% | | <1% | 2% |
| indifferent | limnopar | Esox lucius | <1% | 1% | <1% | <1% | 1% | 1% | <1% | 1% | <1% | <1% | 1% |

| Flow preference | Spawning habitat pref. | Species name | Section # | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1 | 2 | 3 | 4 | R | D | 5 | 6 | 7 | GP | KA |
| limnophil | limnopar | Gasterosteus gymnurus | 1% | | | | | | | <1% | | | |
| limnophil | limnopar | Lepomis gibbosus | <1% | <1% | | | 2% | | <1% | <1% | <1% | 12% | 5% |
| limnophil | limnopar | Rhodeus amarus | <1% | <1% | | <1% | 2% | | 2% | 2% | 6% | 1% | 2% |
| limnophil | limnopar | Scardinius erythrophthalmus | | | | | | | <1% | <1% | <1% | 3% | 2% |
| limnophil | limnopar | Tinca tinca | | | | | <1% | | | <1% | | <1% | <1% |

| | SECTION | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | R | D | 5 | 6 | 7 | GP | KA | Total |
| total fished area (ha) | 3,587 | 3,563 | 2,539 | 1,383 | 1,663 | 1,455 | 4,292 | 3,566 | 2,965 | | | 24,779 |
| **n_species total** | **28** | **29** | **24** | **20** | **30** | **15** | **26** | **29** | **32** | **21** | **24** | **50** |
| n_spec_rheophilic | 9 | 8 | 7 | 5 | 9 | 4 | 6 | 4 | 4 | - | 1 | 12 |
| n_spec_oligorheophilic | 4 | 4 | 5 | 2 | 3 | 2 | 2 | 4 | 4 | - | 1 | 6 |
| n_spec_indifferent | 12 | 15 | 12 | 12 | 15 | 9 | 15 | 16 | 21 | 17 | 18 | 27 |
| n_spec_limnophilic | 3 | 2 | - | 1 | 3 | - | 3 | 5 | 3 | 4 | 4 | 5 |

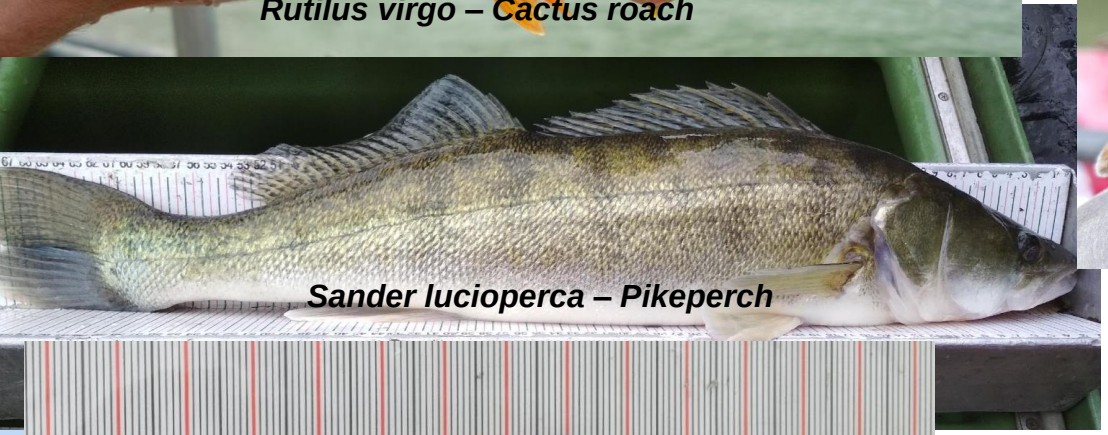

Chondrostoma nasus - Nase


Barbus barbus – Barbel


Zingel streber – Streber


Rutilus virgo – Cactus roach


Aspius aspius – Asp


Sander lucioperca – Pikeperch

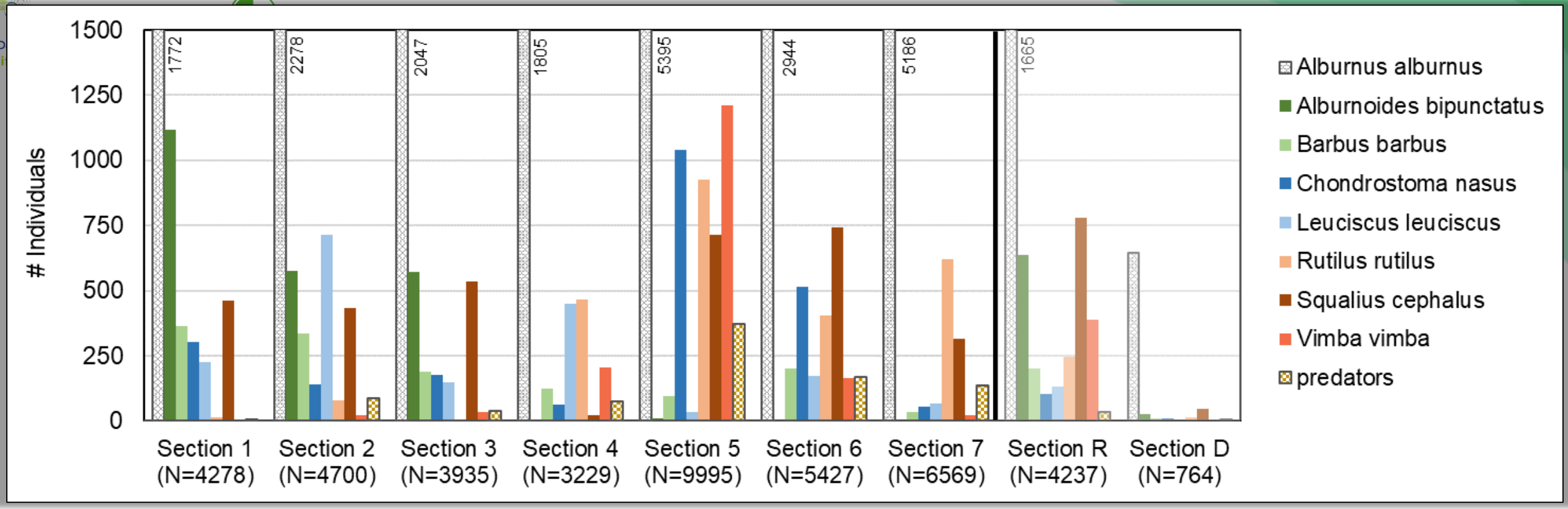

Neogobius melanostomus – Round goby

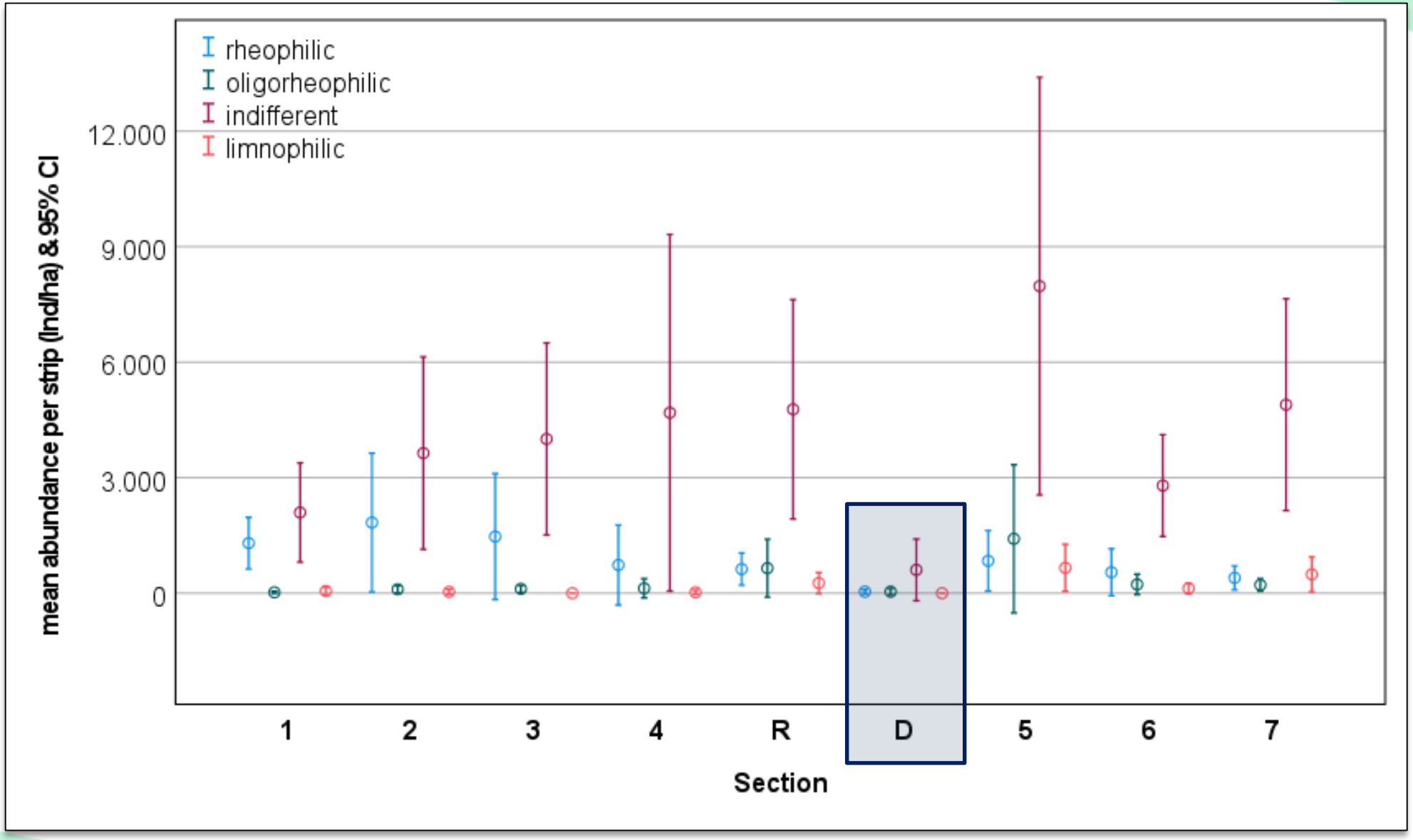

Cobitis elongatoides – Spined loach

Vimba vimba – Vimba bream


Rhodeus amarus – Bitterling

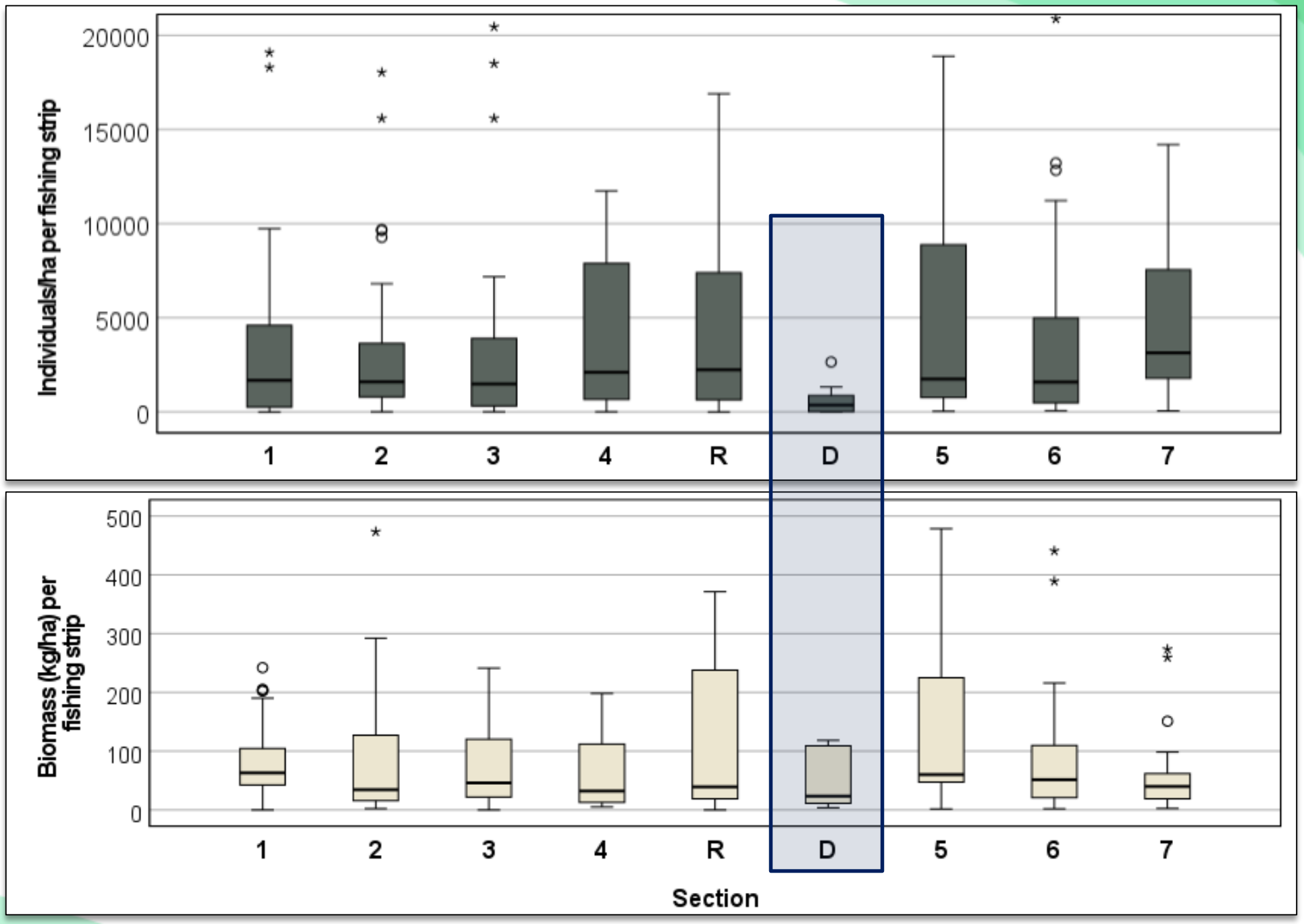

Lepomis gibbosus - Pumpkinseed


1500
1250
1000
750
500
250
0
# Individuals
1772
2278
2047
1805
5395
2944
5186
1665
Section 1 (N=4278)
Section 2 (N=4700)
Section 3 (N=3935)
Section 4 (N=3229)
Section 5 (N=9995)
Section 6 (N=5427)
Section 7 (N=6569)
Section R (N=4237)
Section D (N=764)
Alburnus alburnus
Alburnoides bipunctatus
Barbus barbus
Chondrostoma nasus
Leuciscus leuciscus
Rutilus rutilus
Squalius cephalus
Vimba vimba
predators

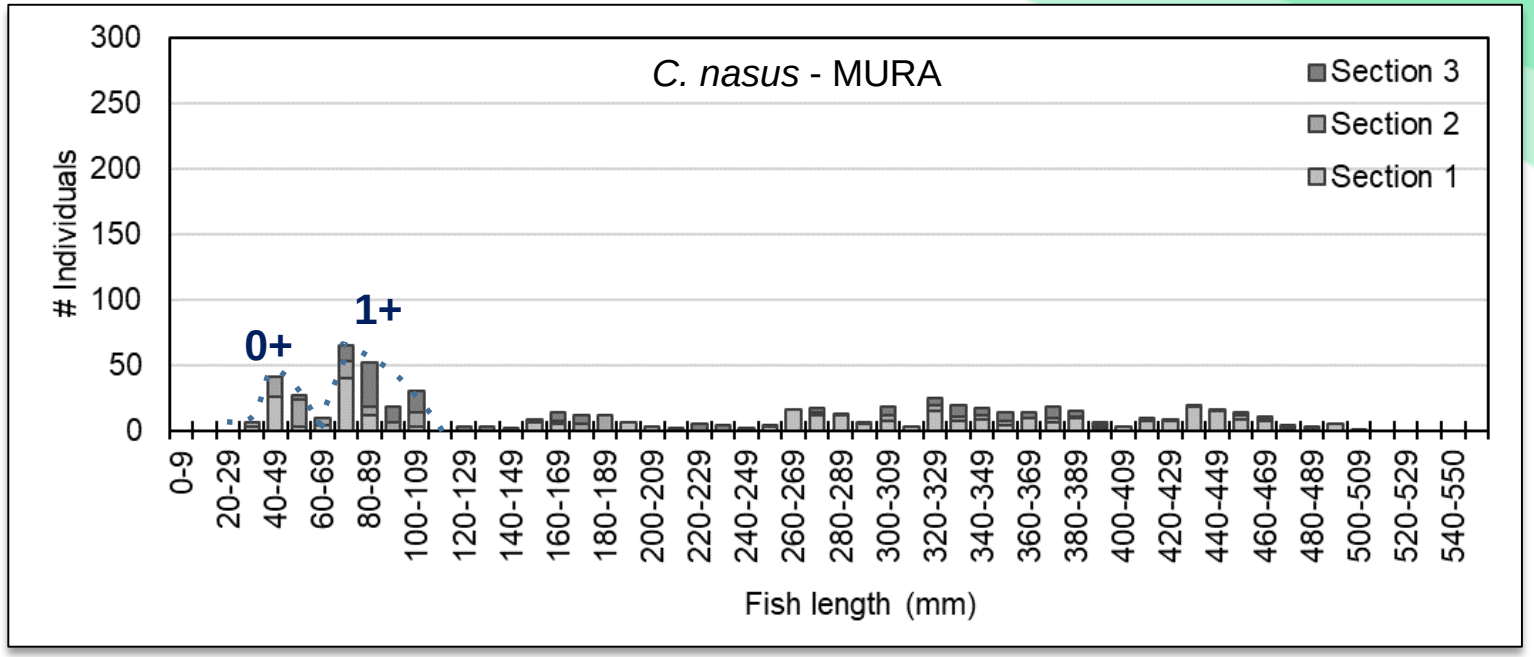

rheophilic
oligorheophilic
indifferent
limnophilic
mean abundance per strip (Ind/ha) & 95% CI
12.000
9.000
6.000
3.000
0
1
2
3
4
R
D
5
6
7
Section

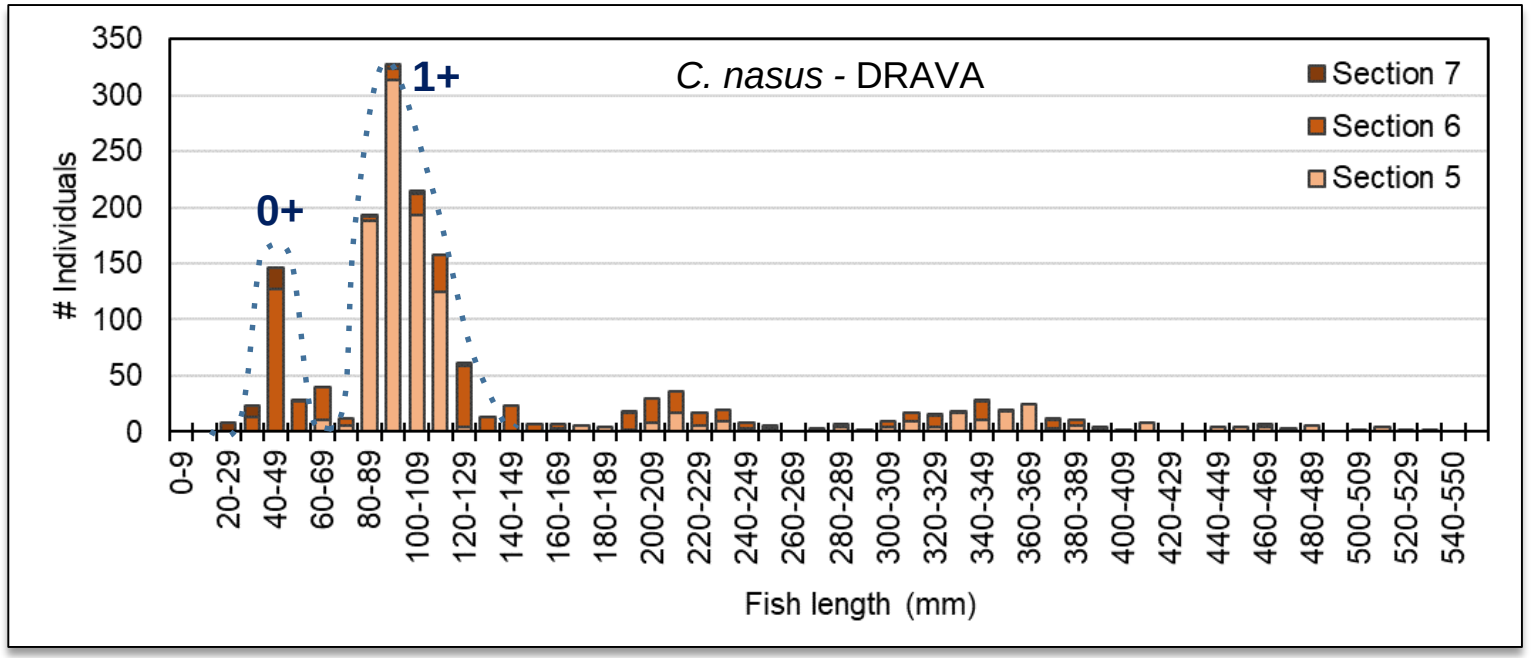
Abundance median:
**~1.900 Ind/ha**

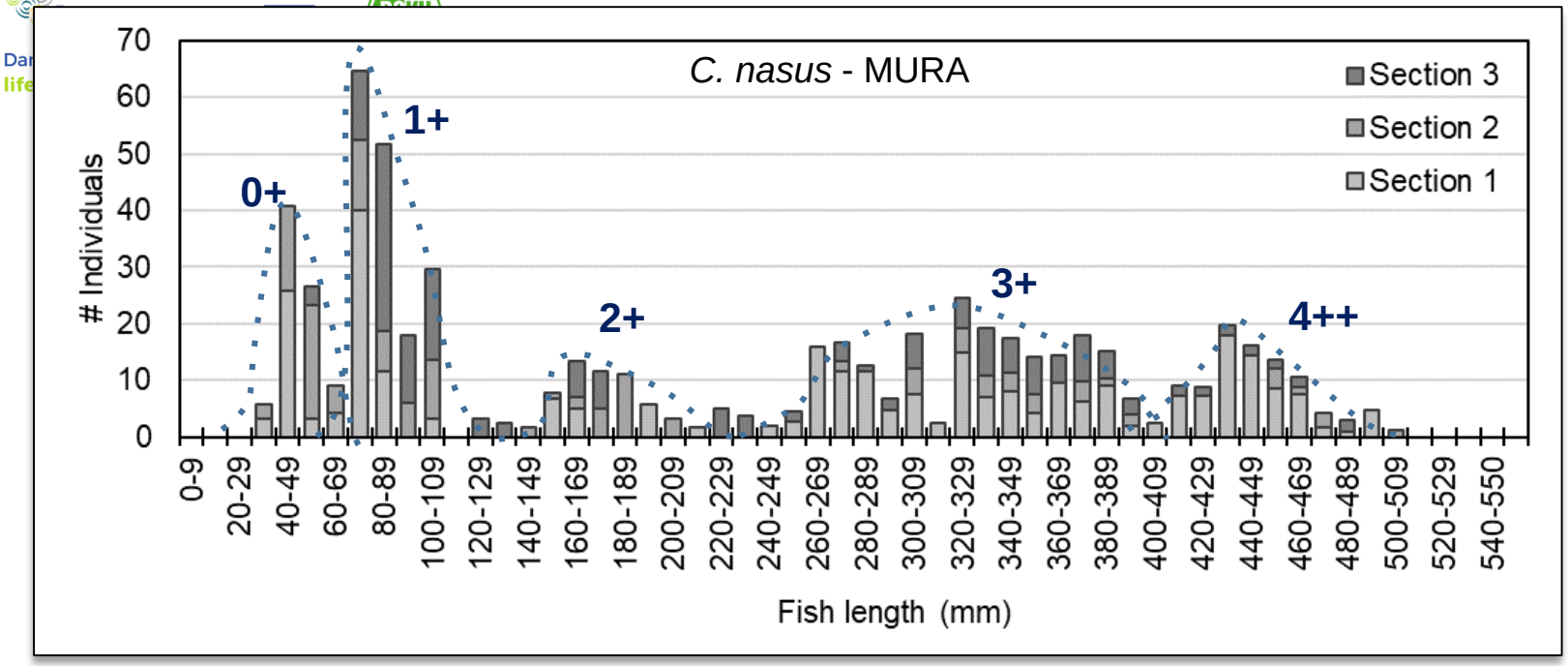
Biomass median:
**~50 kg/ha**

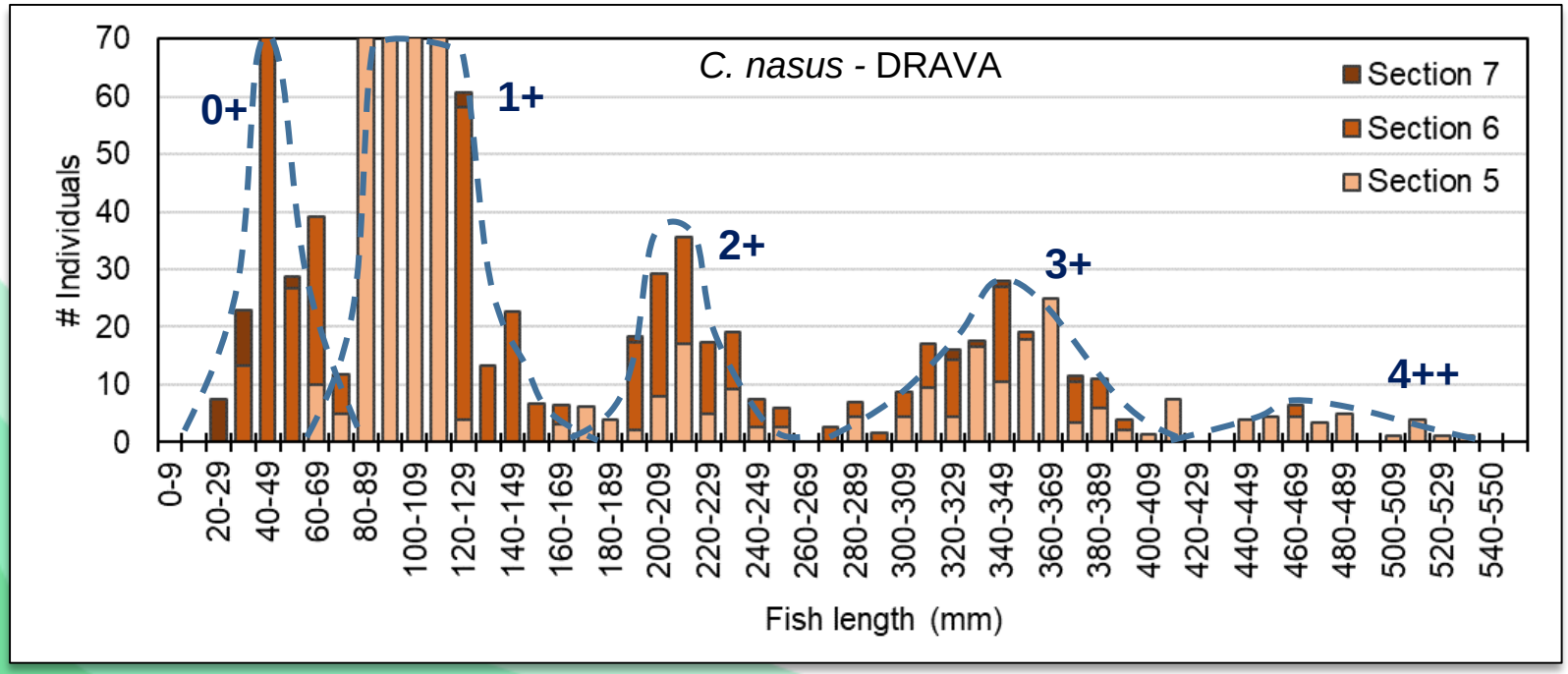


- vital population of nase.
- Multiple year classes visible.
- More juvenile nase caught in Drava sections.
  Adult density higher in Mura.
- High seasonal fluctuations ??






C. nasus population structure July 2021:

**0+** 30-70mm
**1+** 70-135 (170)mm
**2+** 135-250mm
**3+** 250-405mm
**4+** >405mm

# Highlights

- High species diversity (50 species overall, 48 in Mura and Drava).
- Results from eDNA sampling may increase this number.
- Natural longitudinal continuum and zonation of fish-fauna along Mura and Drava.

# limitations

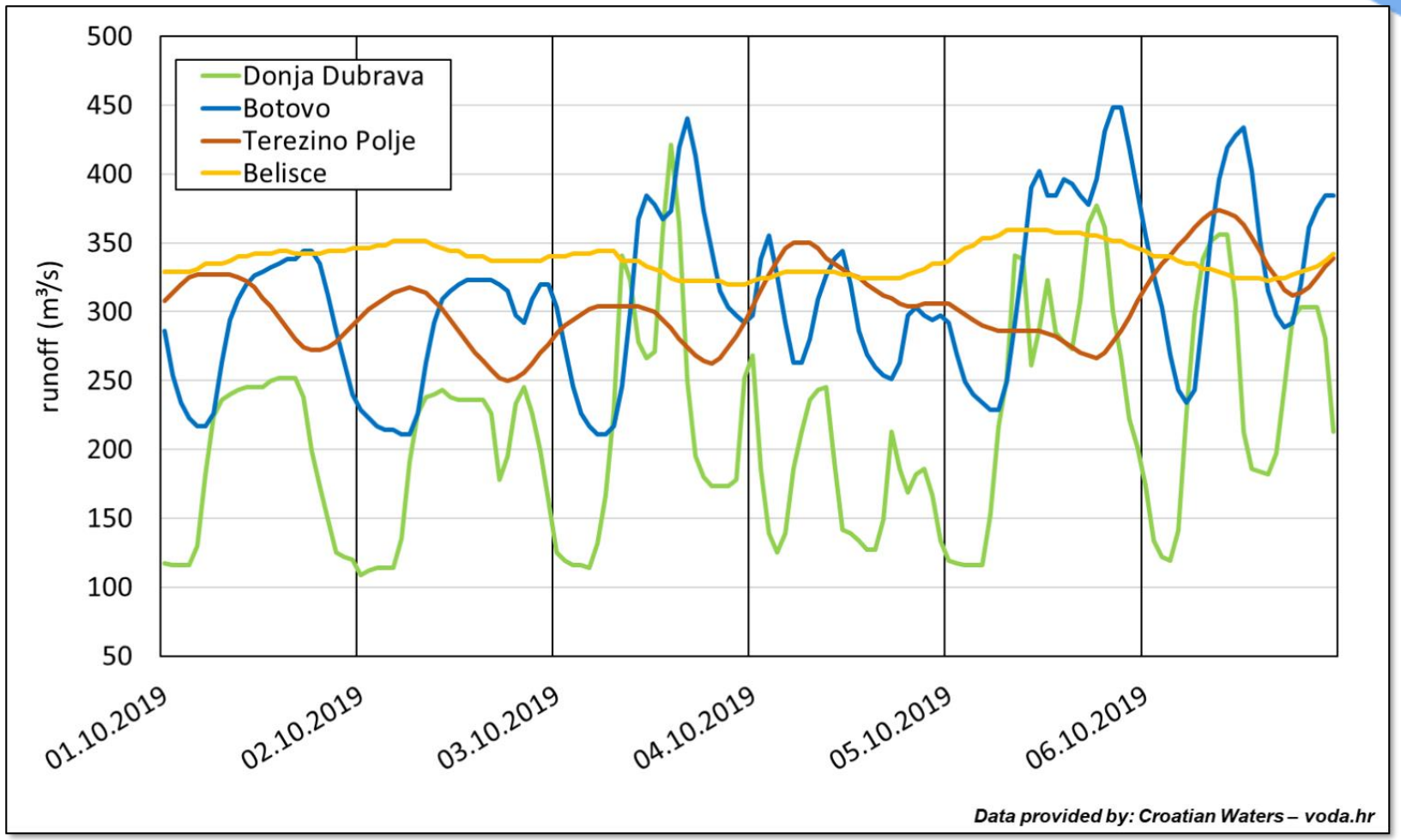
- Habitat variability not fully covered by sampling (oxbows, backwaters, etc).
  - sampling intensity should increase
  - relatively low biomass can be in part be explained
- Significant seasonal fluctuations of fish coenosis are suspected *(Sallai, 2005; Podgornik et al., 2015)*

# Identified deficits

- Very low fish density in sections below HPP Donja Dubrava
  - hydropeaking most probable impact factor

Hydropeaking at HPP Donja Dubrava:

- 1-3 peaks per day at low flow conditions
- Peaks „visible“ 90km downstream of HPP!

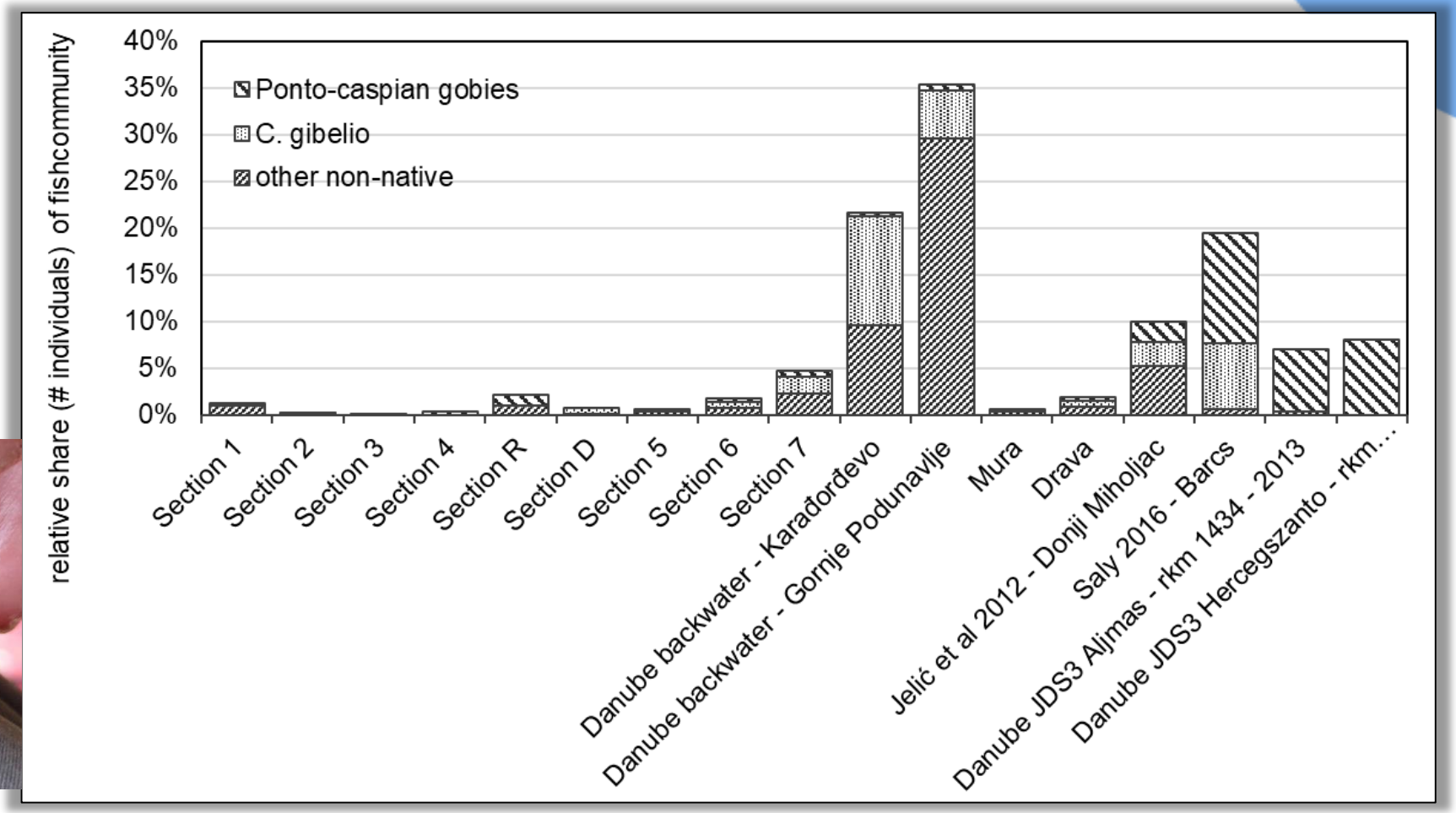


# Potential threats

- Presence of invasive/non-native fish species in the TBR MDD

Ponto-caspian gobies are expanding their range from the Danube upwards.

 Further river regulation will be beneficial for these species!



Interreg
Danube Transnational Programme
lifelineMDD

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# Thank you!

Thanks to the fishing team from Boku (…too many to name…) and INCVP (Laszlo)

Thanks to project partners WWF AT, WWF Adria, IRSNC, WWF HU and for assisting with filed work and coordination:
Aleksander, Tadej, Monika + team, Blaz, Eva, Branka, Ana, Kerstin, Emöke, Tamas, …

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