



# Fish Ecology & River Morphology of Border Mura

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# BORDER MURA – Part of the Danube fish fauna



<b>Lampetra planeri</b>	<b>Barbus barbus</b>	<b>Rutilus rutilus</b>	<b>Liza saliens</b>
<b>Eudontomyzon mariae</b>	<b>Barbus peloponnesius</b>	<b>Scardinius erythrophthalmus</b>	<b>Cottus gobio</b>
Acipenser güldenstädti	<b>Abramis bjoerkna</b>	<b>Tinca tinca</b>	<b>Cottus poecilopus</b>
Huso huso	<b>Carassius carassius</b>	<b>Vimba vimba</b>	<b>Hucho hucho</b>
Acipenser nudiventris	<b>Carassius gibelio</b>	<b>Cobitis elongatoides</b>	<b>Salmo labrax</b>
<b>Acipenser ruthenus</b>	<b>Chalcalburnus mento</b>	<b>Misgurnus fossilis</b>	<b>Salmo trutta</b>
Acipenser stellatus	<b>Chondrostoma nasus</b>	Sabanejewia balcanica	<b>Thymallus thymallus</b>
Acipenser sturio	<b>Cyprinus carpio</b>	<b>Sabanejewia bulgarica</b>	Platichthys flesus
<b>Anguilla anguilla</b>	<b>Gobio albipinnatus</b>	<b>Barbatula barbatula</b>	Benthophilus brauneri
Alosa immaculata	<b>Gobio gobio</b>	<b>Silurus glanis</b>	Benthophilus stellatus
Alosa tanaica	<b>Gobio kessleri</b>	<b>Gymnocephalus baloni</b>	Gobio ophiocephalus
Alosa maetotica	<b>Gobio uranoscopus</b>	<b>Gymnocephalus cernuus</b>	Knipowitschia cameliae
Clupeoella cultriventris	<b>Leucaspis delineatus</b>	<b>Gymnocephalus schraetser</b>	Knipowitschia caucasica
Atherina boyeri	Leuciscus borysthenicus	<b>Perca fluviatilis</b>	Neogobius eurycephalus
<b>Esox lucius</b>	<b>Leuciscus cephalus</b>	<b>Sander lucioperca</b>	Neogobius fluviatilis
<b>Umbra krameri</b>	<b>Leuciscus idus</b>	<b>Sander volgensis</b>	<b>Neogobius gymnotracheilus</b>
<b>Lota lota</b>	<b>Leuciscus leuciscus</b>	<b>Zingel streber</b>	<b>Neogobius kessleri</b>
<b>Abramis ballerus</b>	<b>Leuciscus souffia</b>	<b>Zingel zingel</b>	<b>Neogobius melanostomus</b>
<b>Abramis brama</b>	<b>Pelecus cultratus</b>	Syngnathus abaster	Neogobius syrman
<b>Abramis sapa</b>	<b>Phoxinus phoxinus</b>	<b>Gasterosteus aculeatus</b>	<b>Proterorhinus marmoratus</b>
<b>Alburnus alburnus</b>	<b>Rhodeus sericeus</b>	Pungitius platygaster	
<b>Alburnoides bipunctatus</b>	<b>Rutilus meidingeri</b>	Mugil cephalus	
<b>Aspius aspius</b>	<b>Rutilus pigus</b>	Liza aurata	

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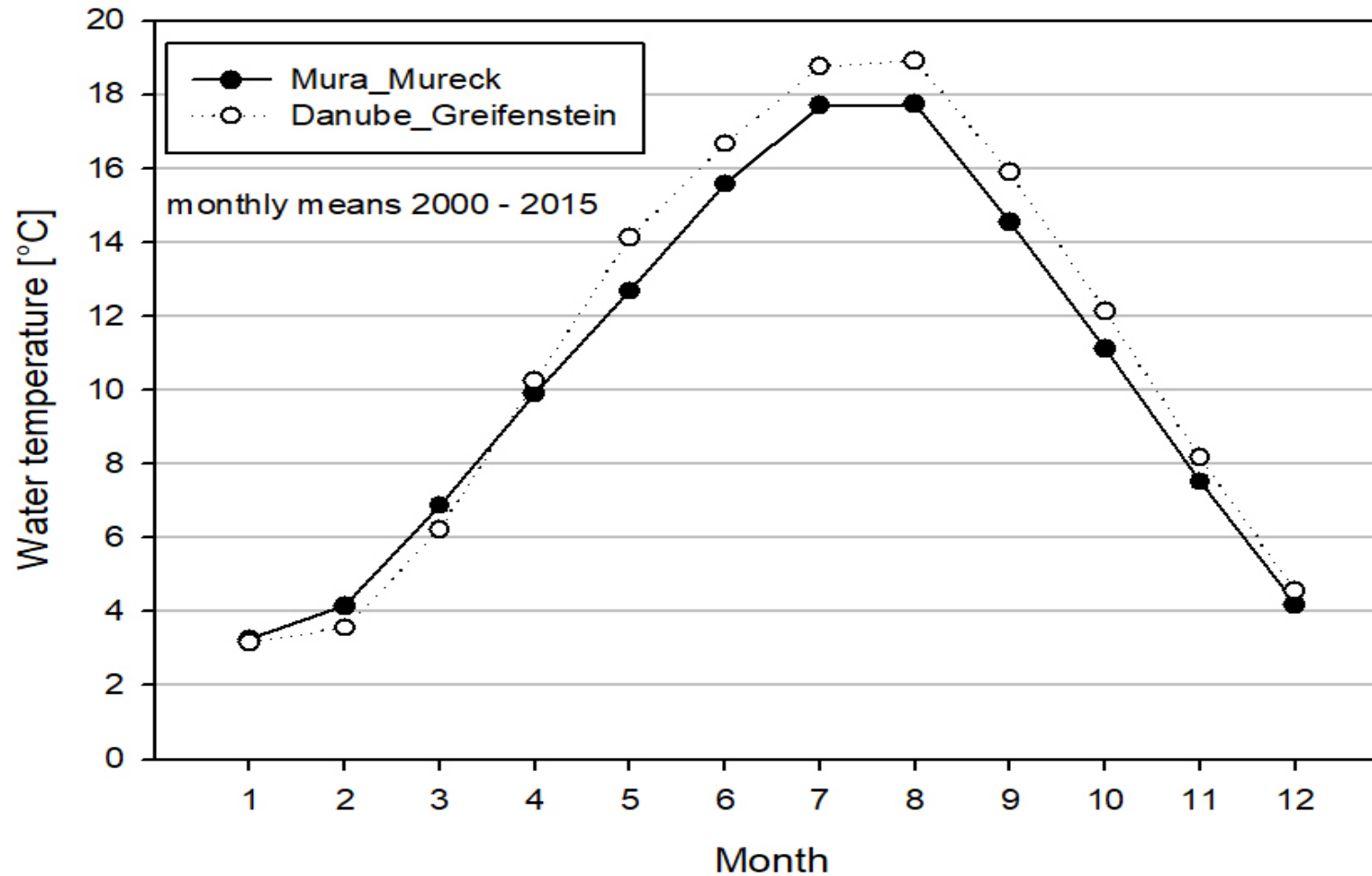
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# seasonal temperature regime



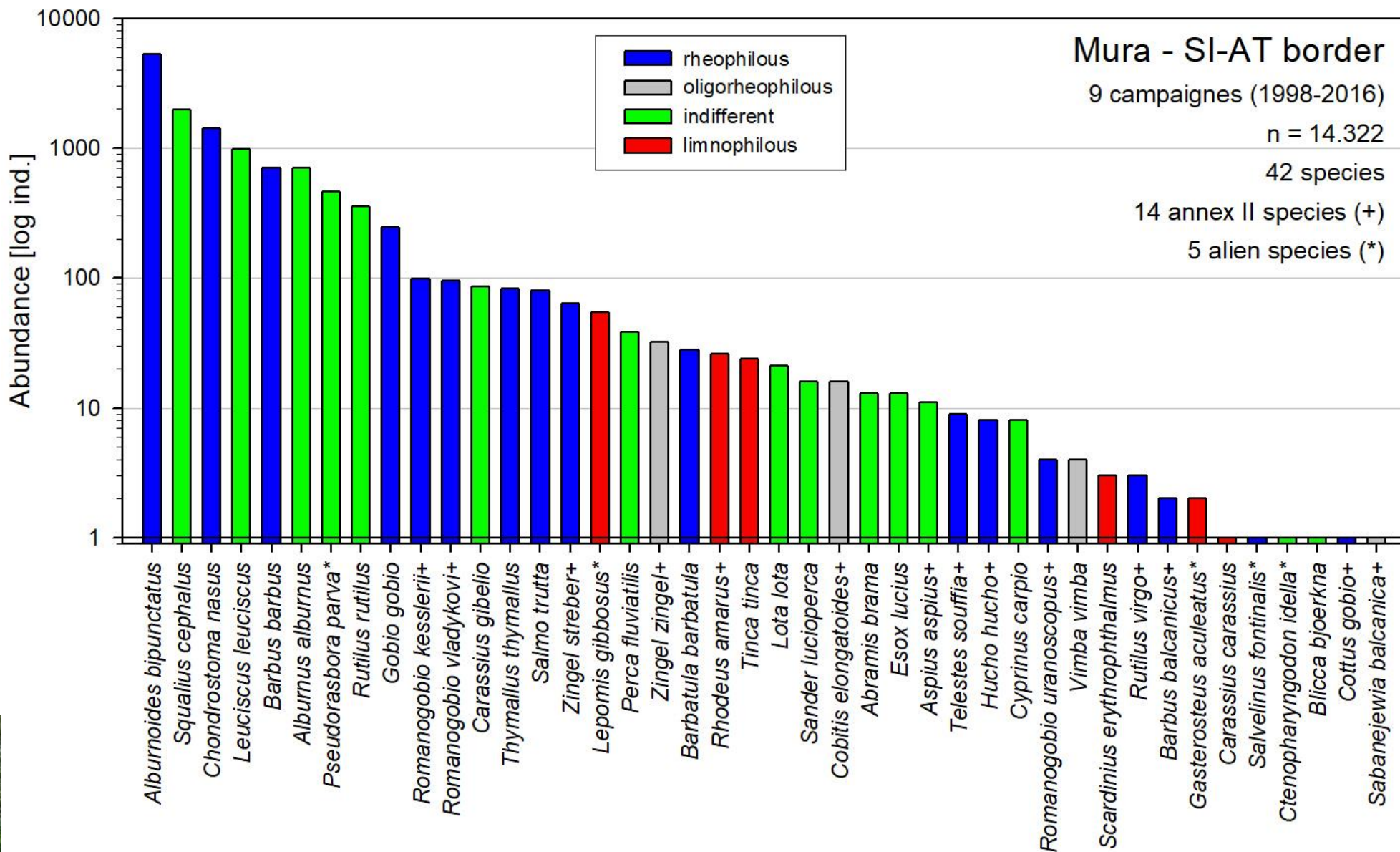
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# Fish community – present situation



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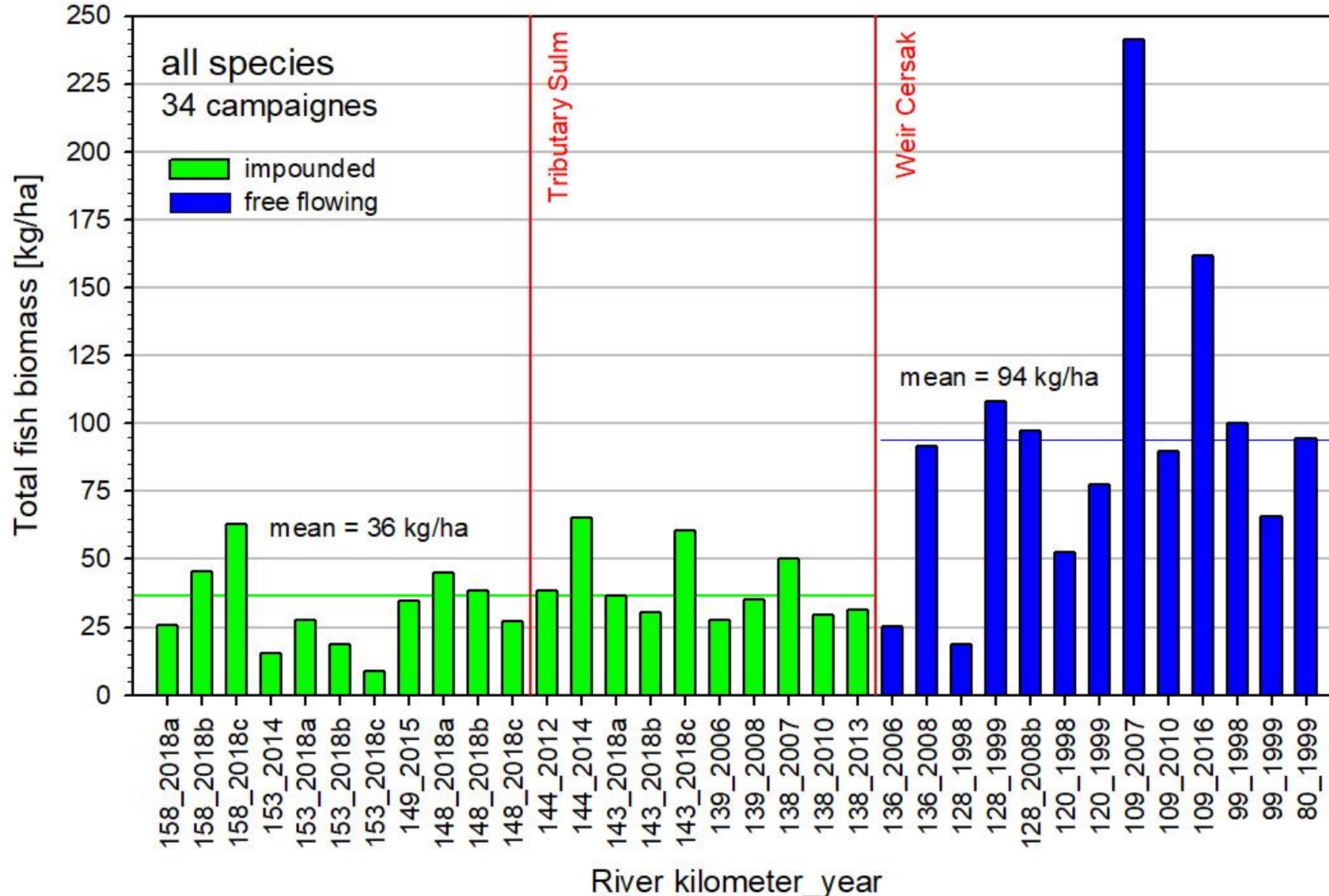
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# Fish community – present situation



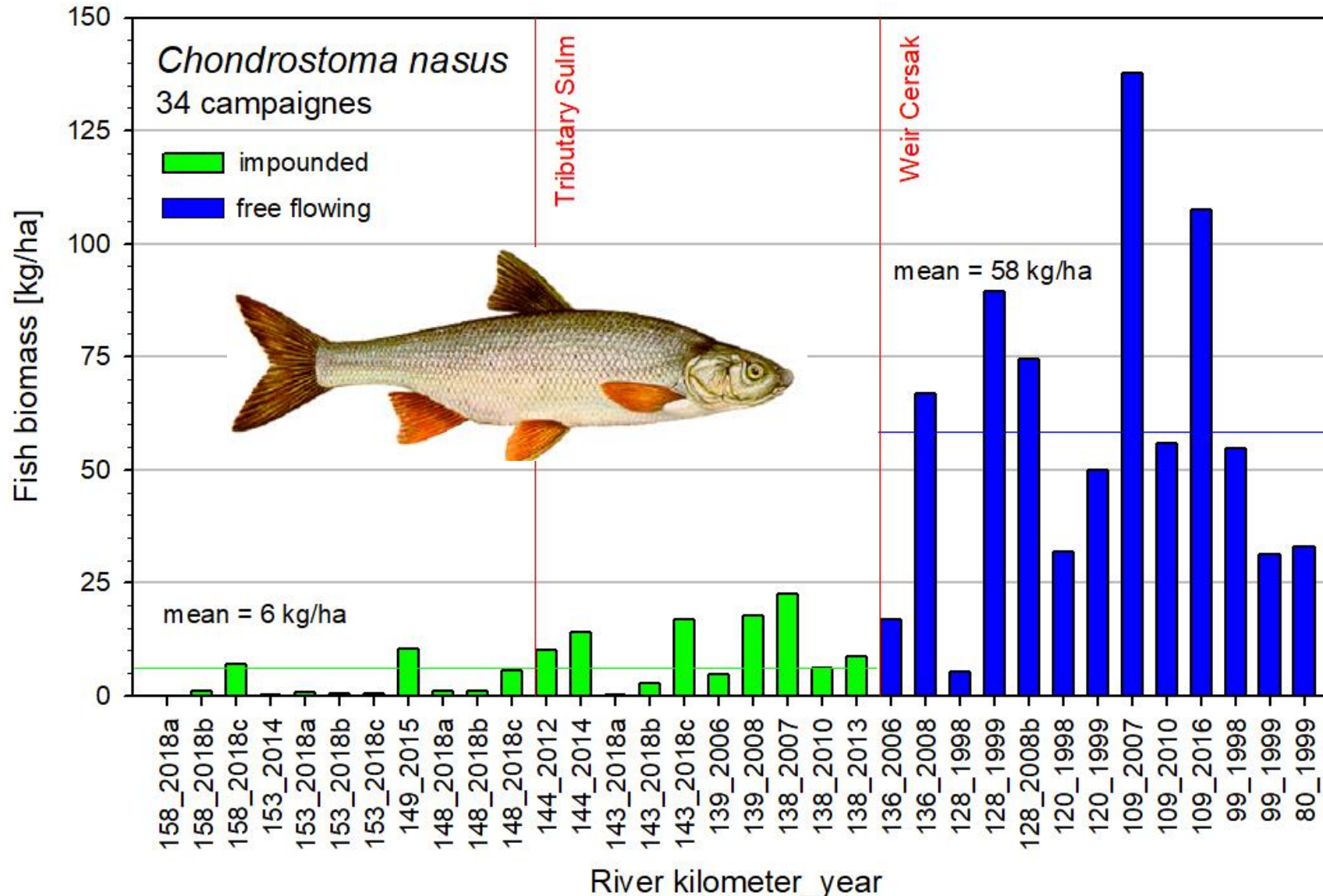
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# Fish community – present situation *goMURra*



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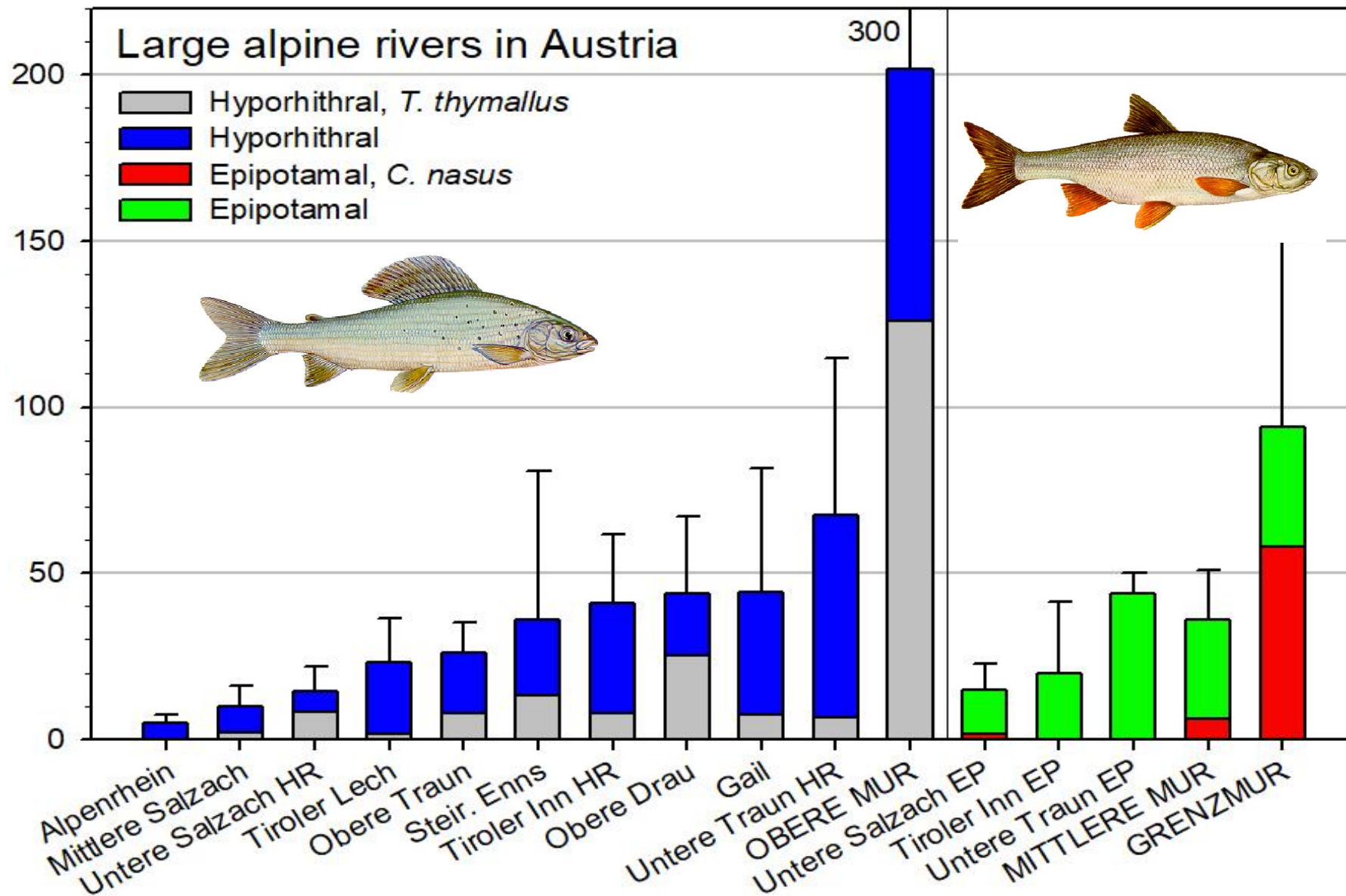




# fish stocks compared to other alpine rivers



Fish biomass [kg/ha] ± S.D.



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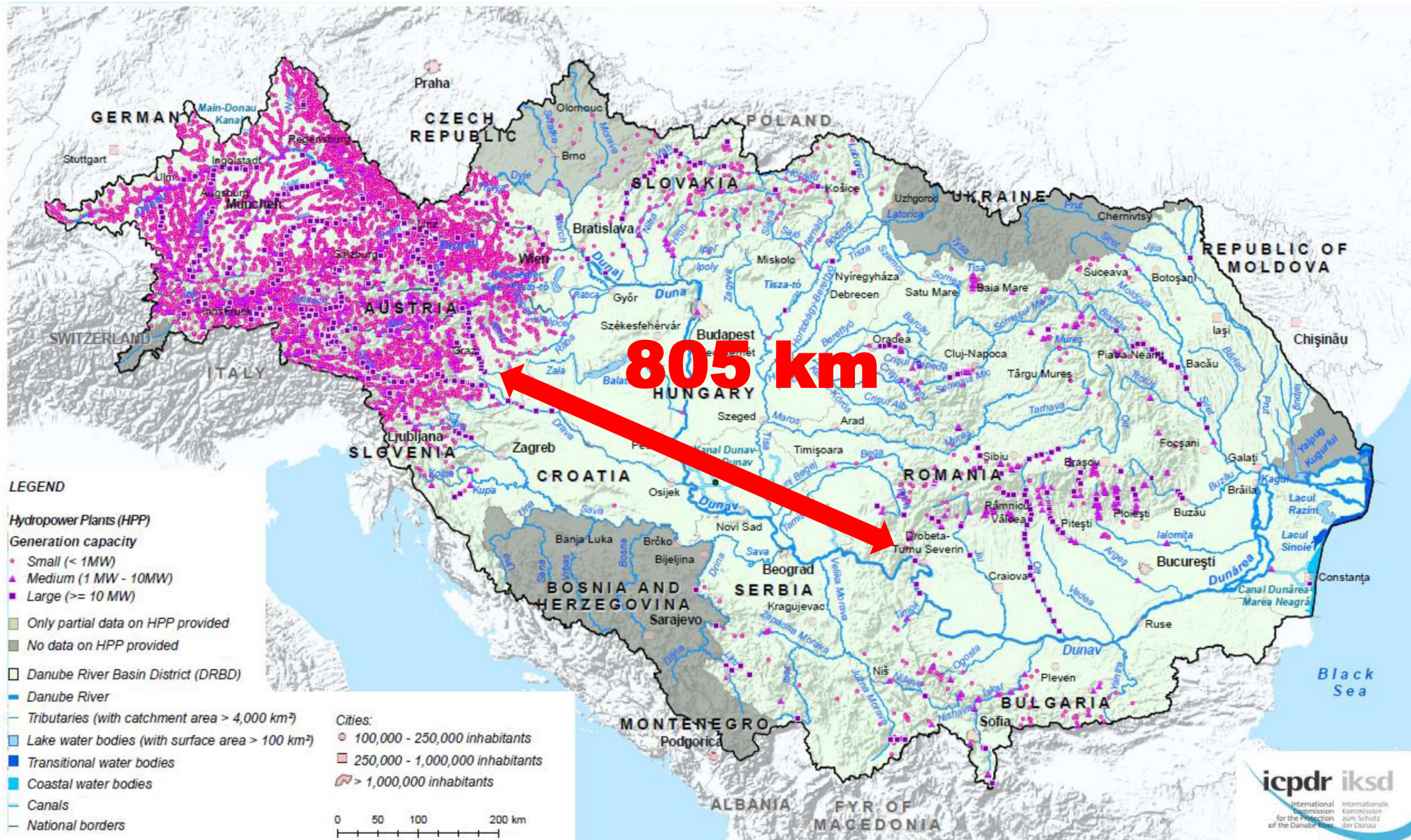
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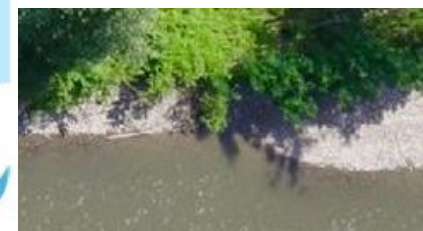
# FREE FLOWING SECTION to IRON GATE goMURra



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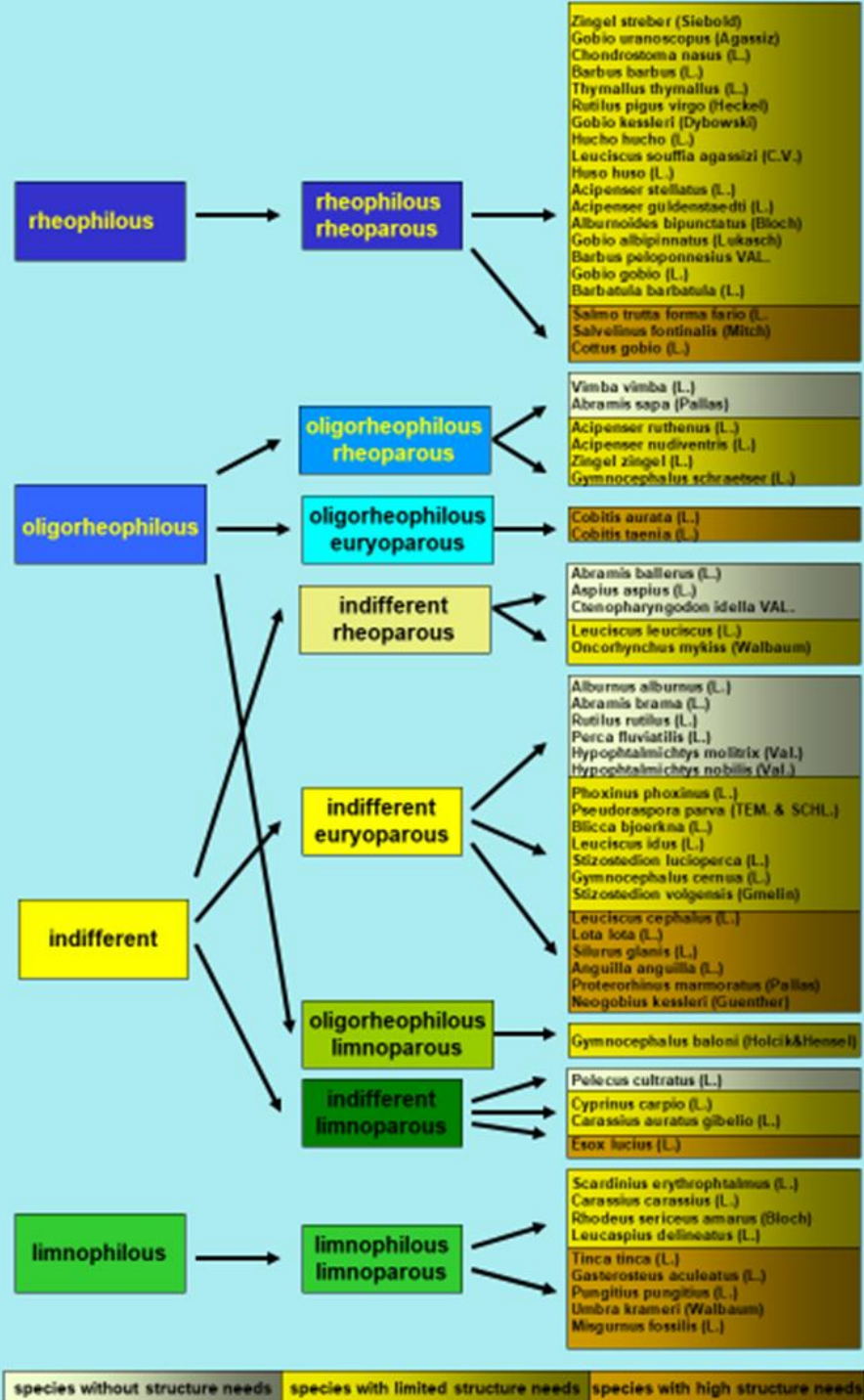
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# Border Mura Fish community

## Classification scheme of the Austrian fish fauna based on habitat requirements



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# Classification of river systems – analogue to the individual habitat requirements of the mentioned species



- High discharged river arms with extensive areas of low water depths and a high flow velocity gradient within the lateral profile
- Strongly flowed river arms with a high depth variance/diversity together with structural rich shore lines (e.g. woody debris)
- Weekly flowing arms with a high depth variance/diversity
- Permanently connected, deep oxbow systems with a low amount of macrophytes
- Temporary connected oxbows with a high amount of macrophytes
- Shallow ponds with blooming macrophytes (connected ponds)
- Tributaries with a fine substrate composition entering the main channel at the same water level

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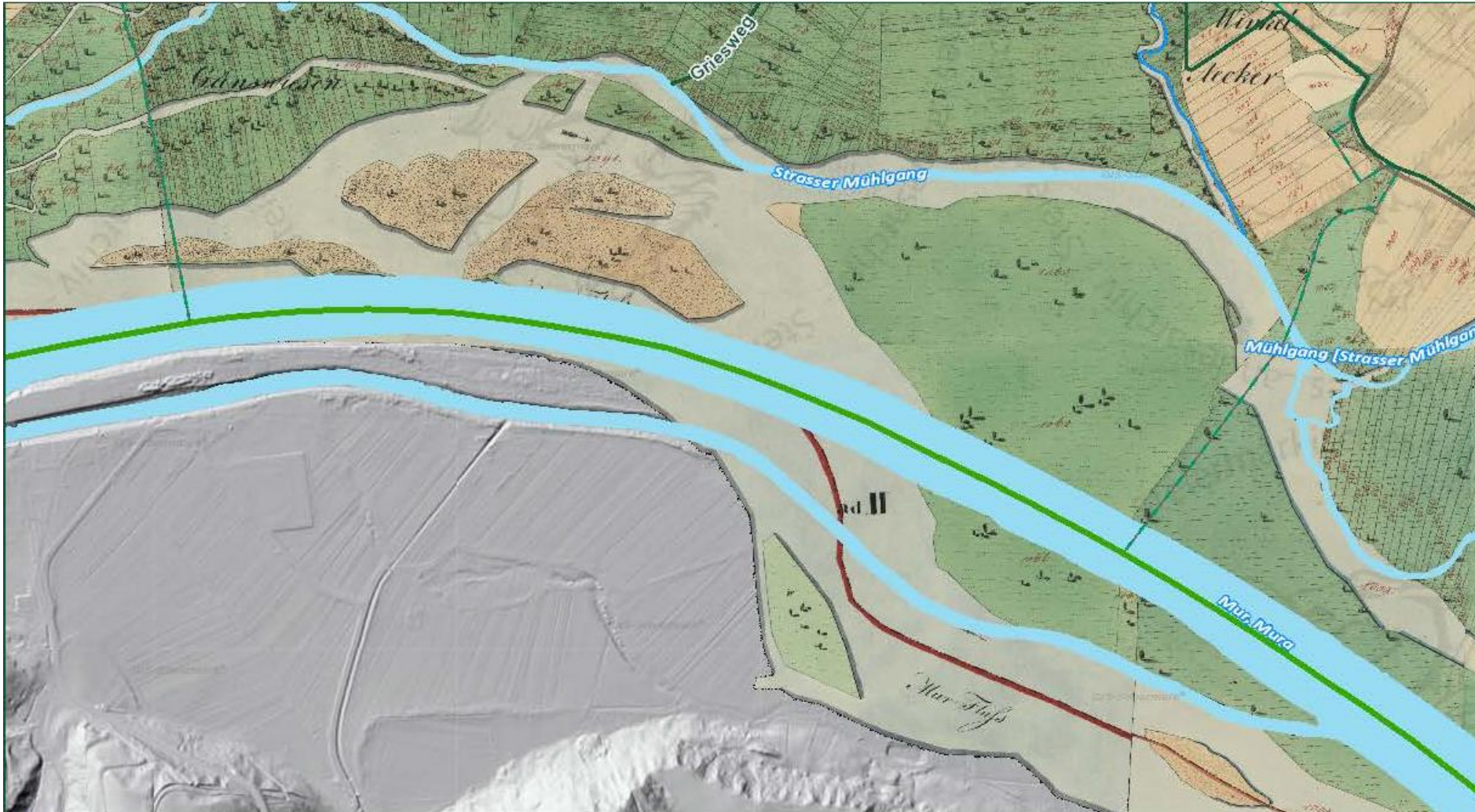
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# habitat diversity in a braided system



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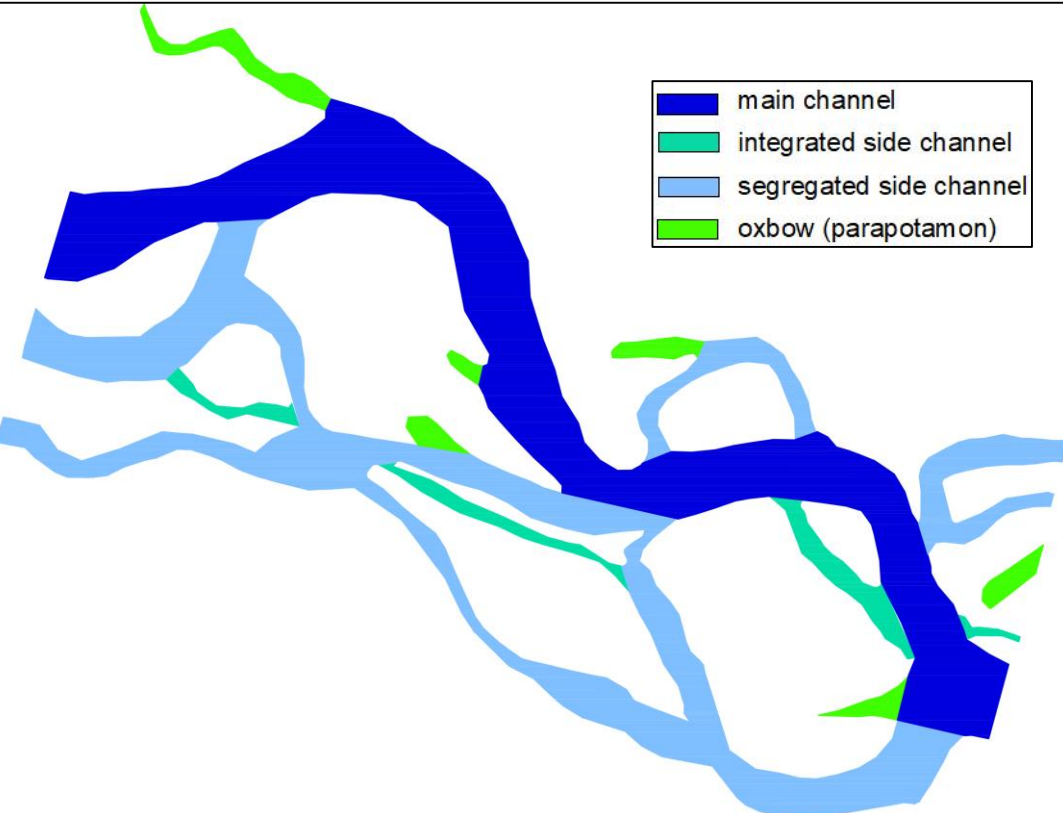
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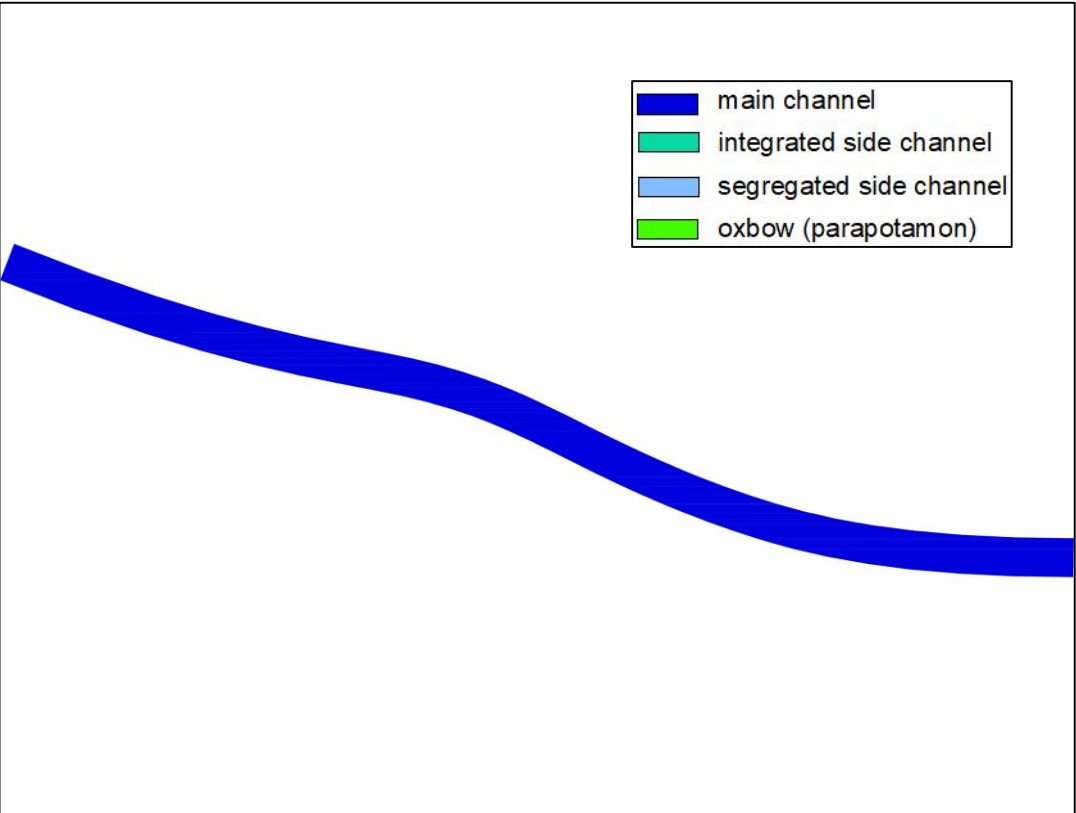




# Habitat diversity – natural vs present



1876  
River km 108-110

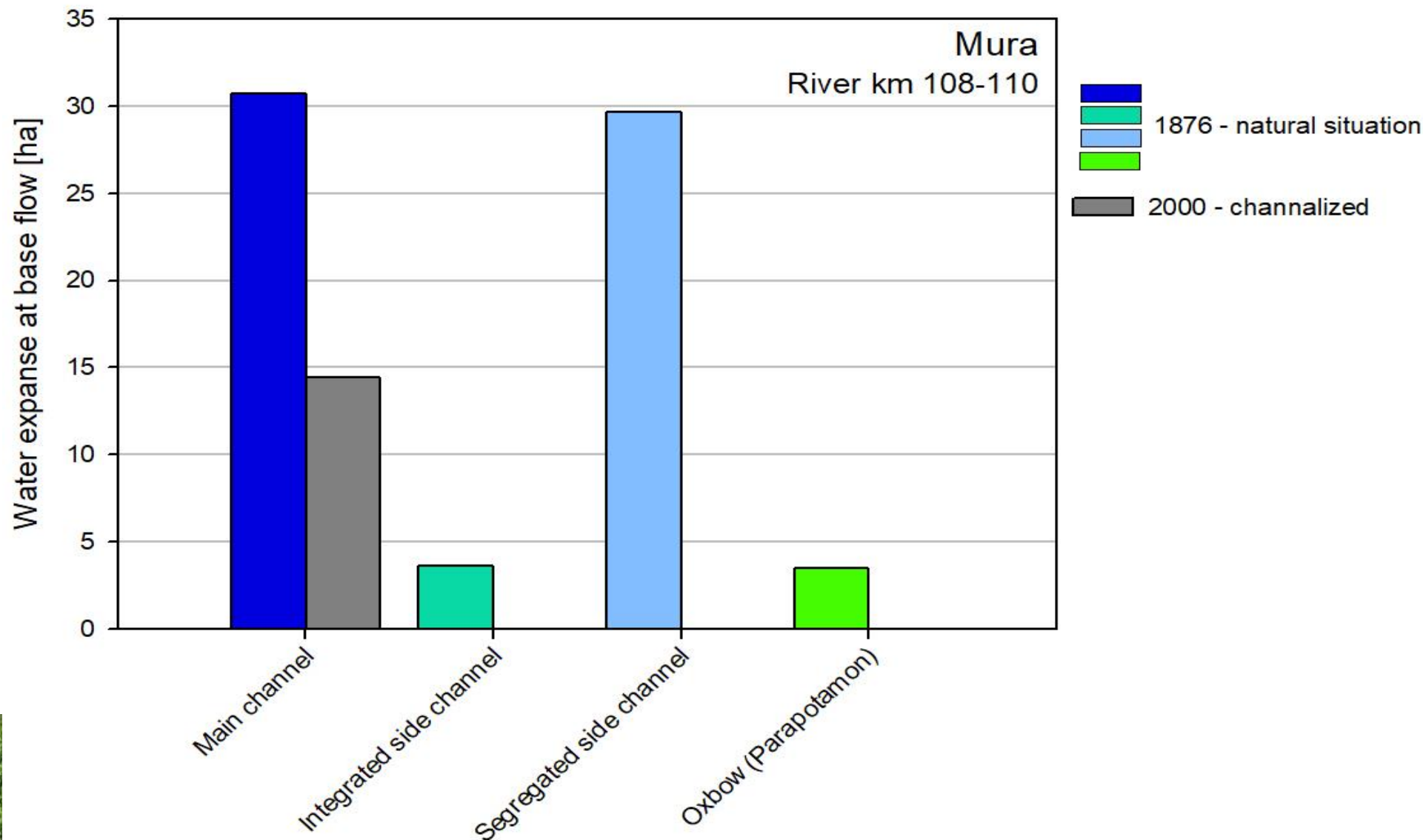


2000  
River km 108-110

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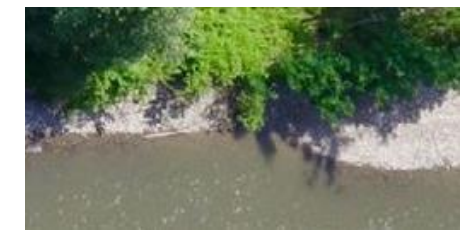
# Habitat diversity – natural vs present



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# Abiotic characteristics:

- High dynamics of sediment rearrangement
- Main channel / lateral waterbodies – intense connectivity
- Low distance from the adjacent ground to the groundwater level
- High proportion of permanently flowing channels
- Short-lived backwaters (para-, plesio und paleopotamon)
- High diversity of substrate and flow velocity

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# Historical fish stock in the border mura

	Fish biomass per hectar	Water expanse per linear distance	Fish biomass per linear distance
Present	65 kg/ha	7,2 ha/km	468 kg/km
Natural	299 kg/ha	33,7 ha/km	10.076 kg/km

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# Conclusion

Individual fish ecological habitat requirements can most likely be fulfilled in braided river systems with intensive furcation processes.

Which ensures the highest possible heterogeneity according to:

- flow velocity
- substrate composition
- topography (above and beneath the water surface)
- structuring the river bed and the shoreline

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# Ecological function: side channel



highly



low dynamic flow



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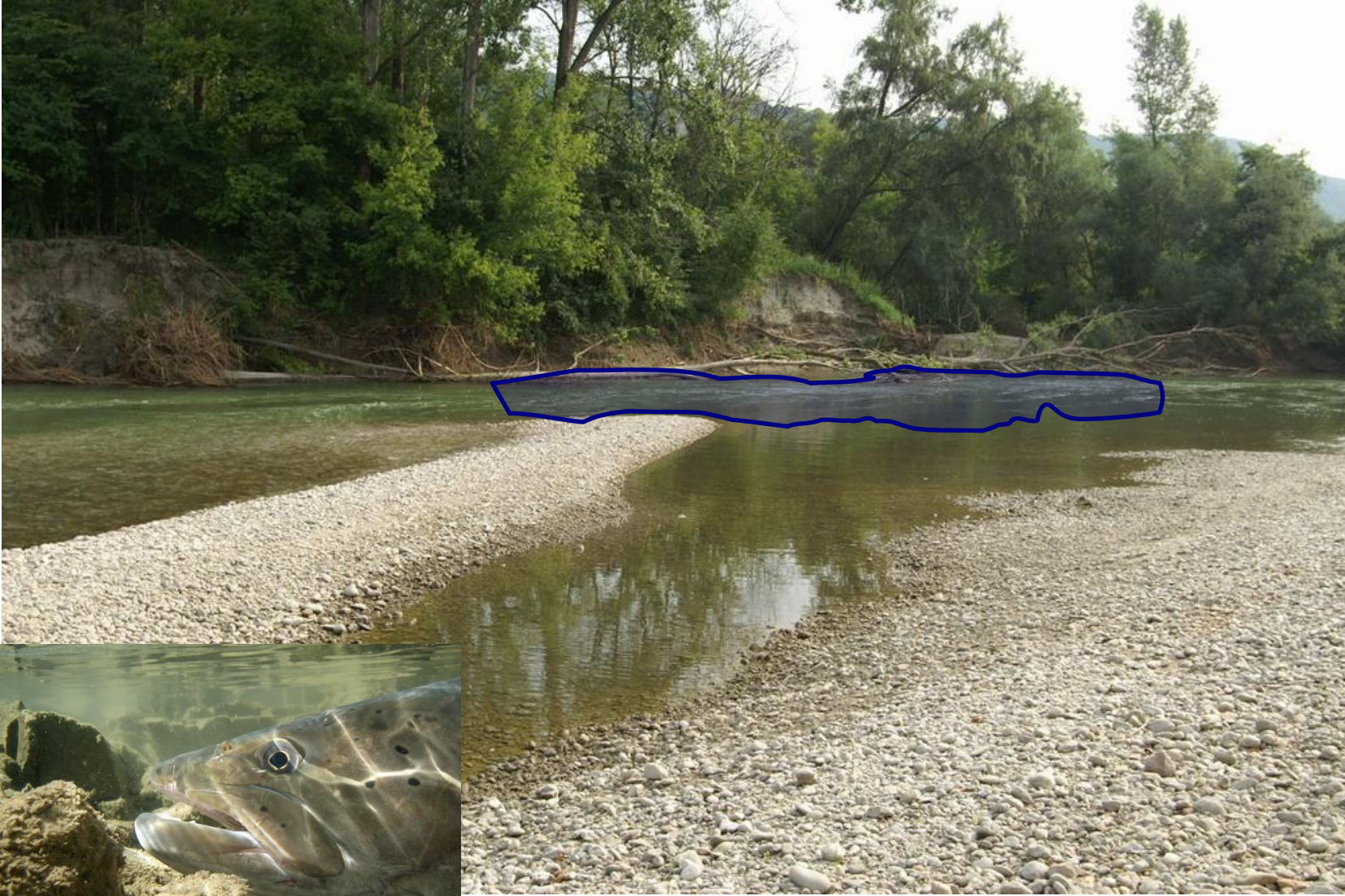
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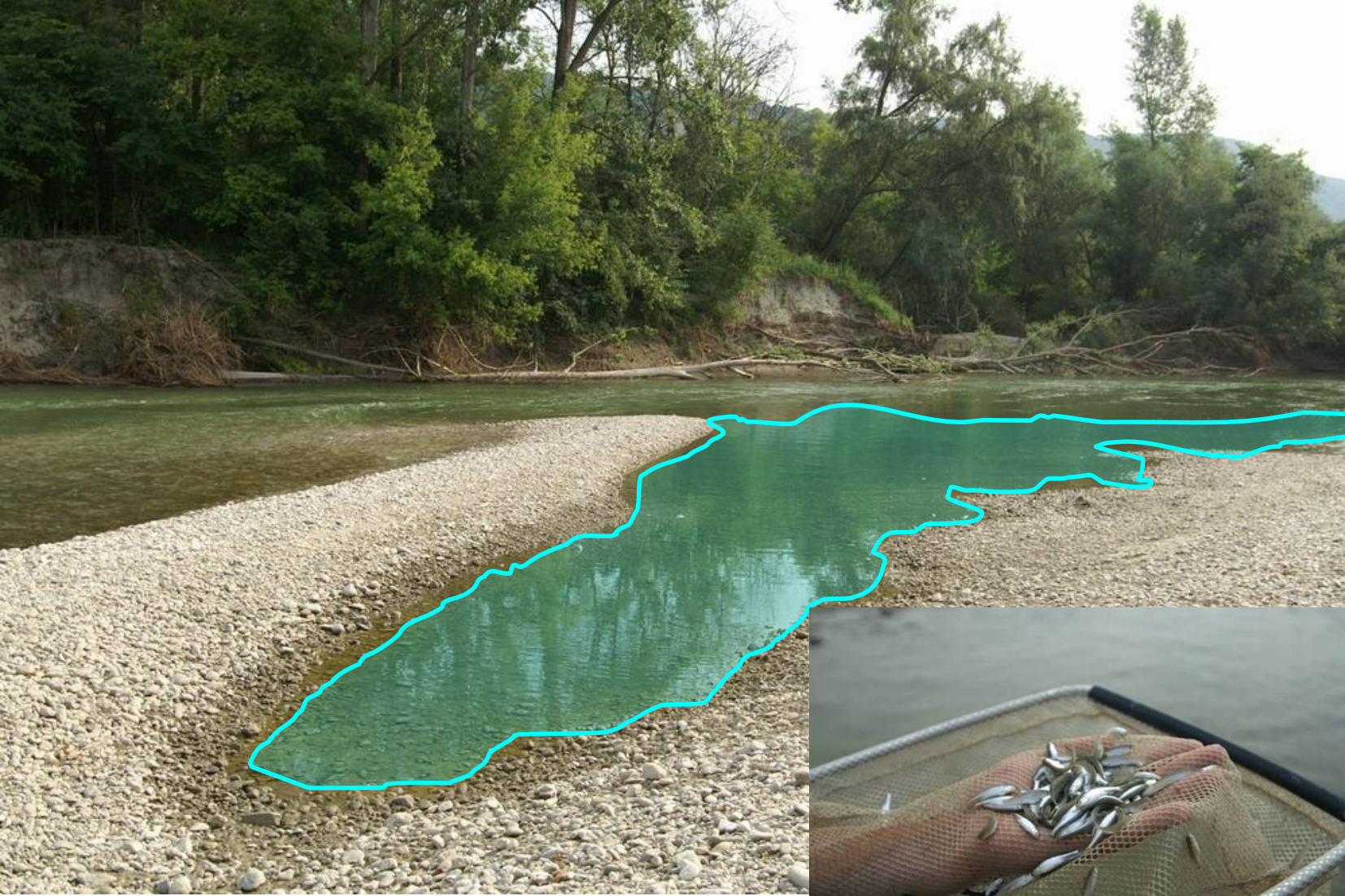
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# example: river Ybbs/Amstetten



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# example: danube / Wachau



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# inflow of an side channel



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