Catfishes in the Sieg: Age and feeding of *Silurus glanis* in a tributary of the Rhine

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LIB Leibniz-Institut zur Analyse des Biodiversitätswandels

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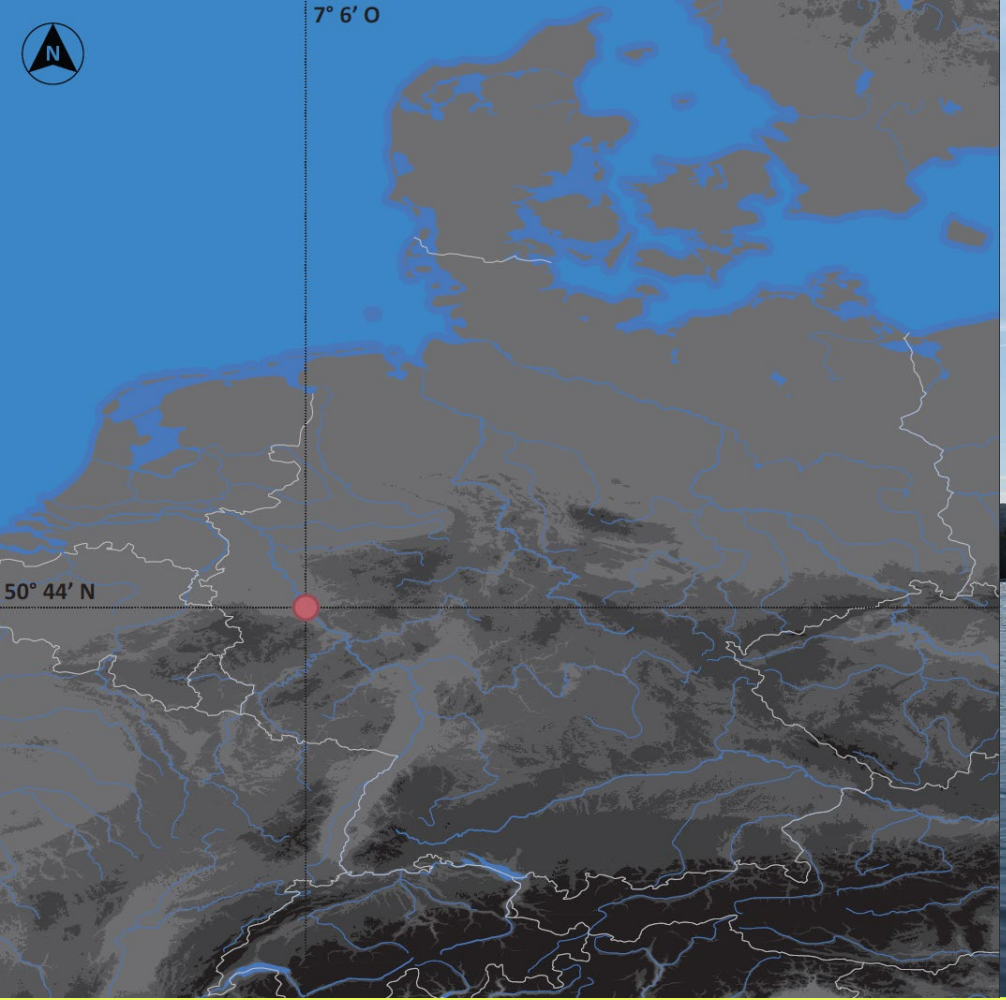
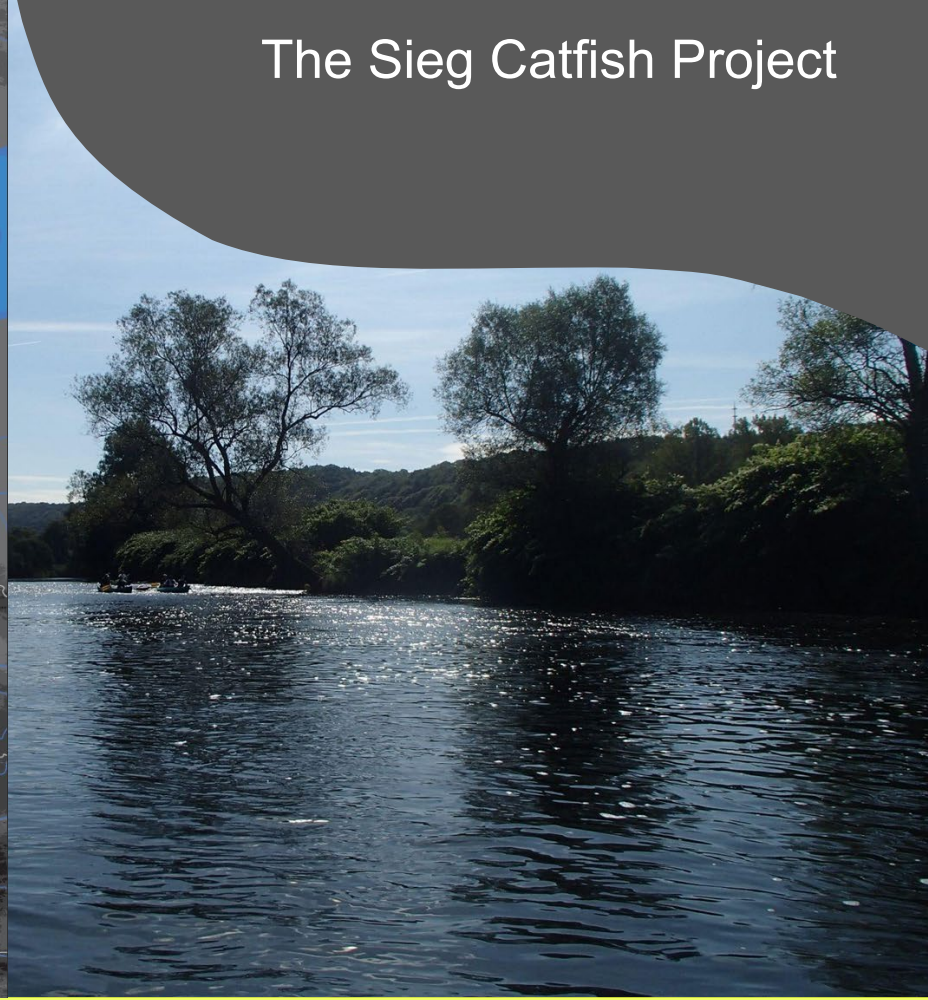
The Sieg Catfish Project





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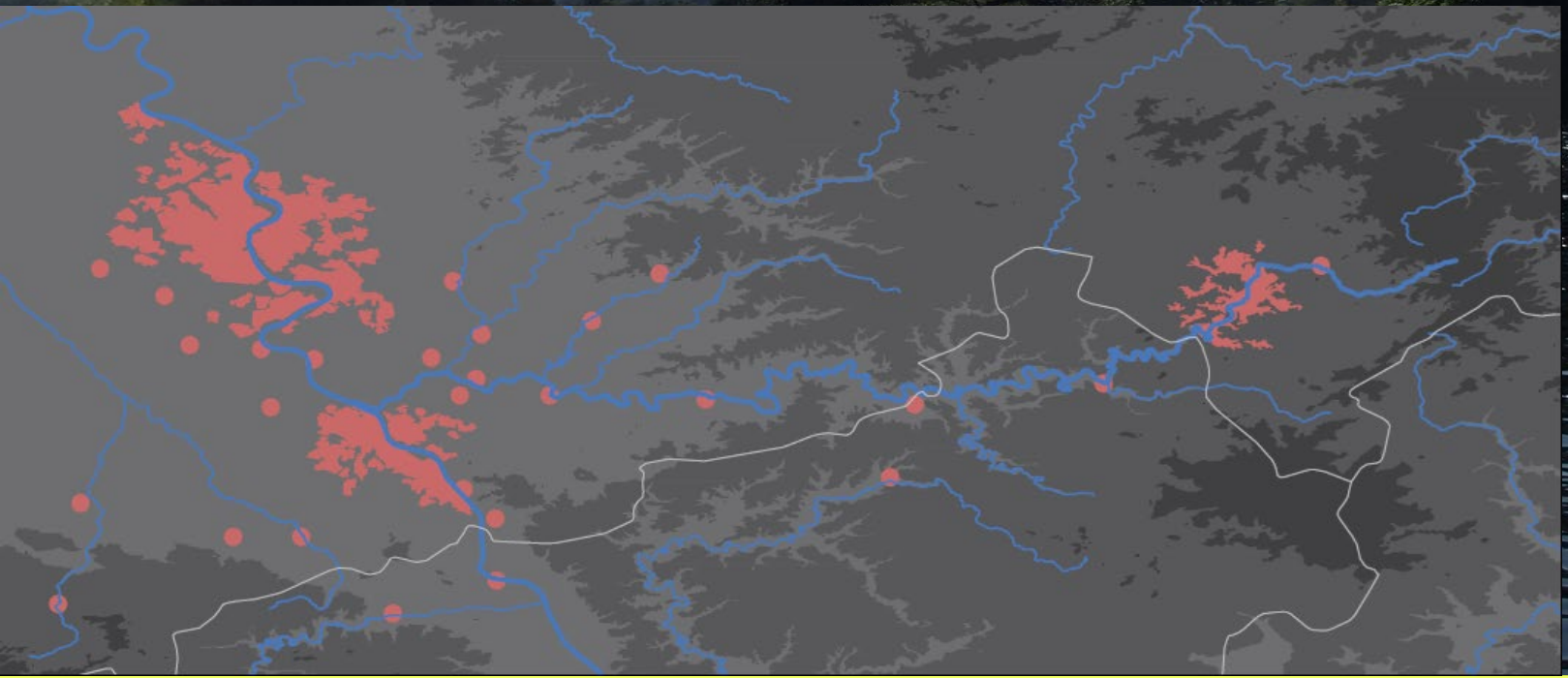

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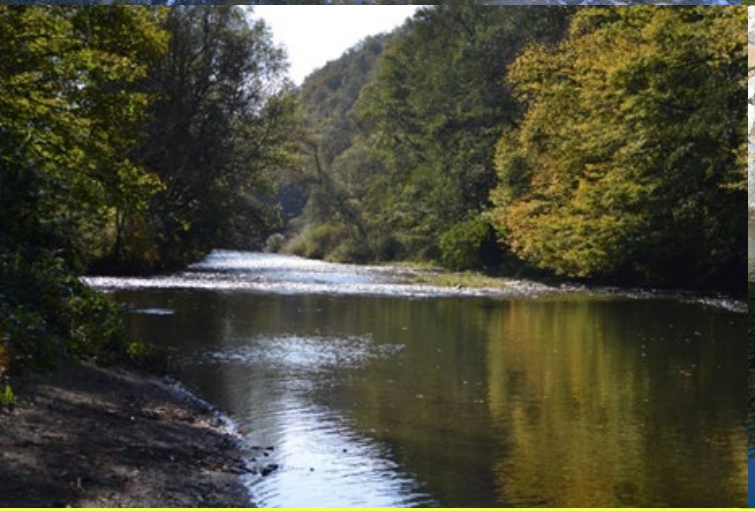
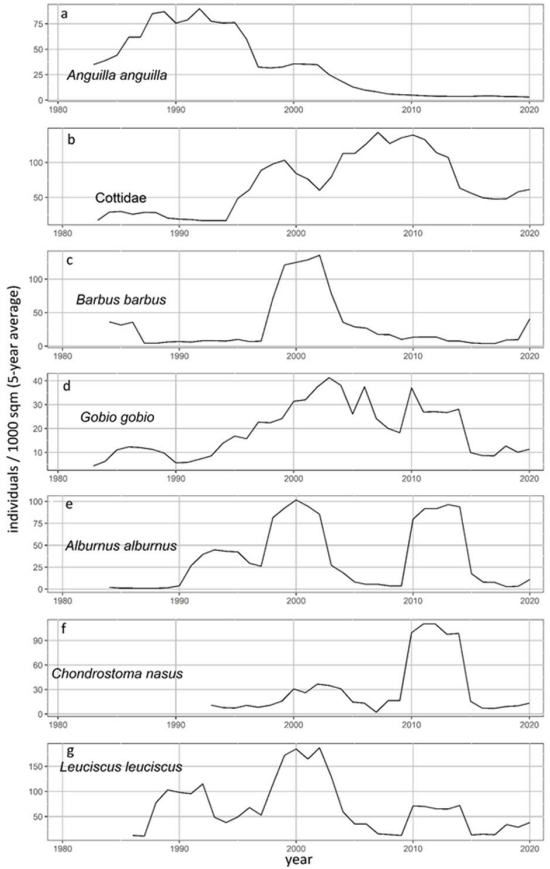
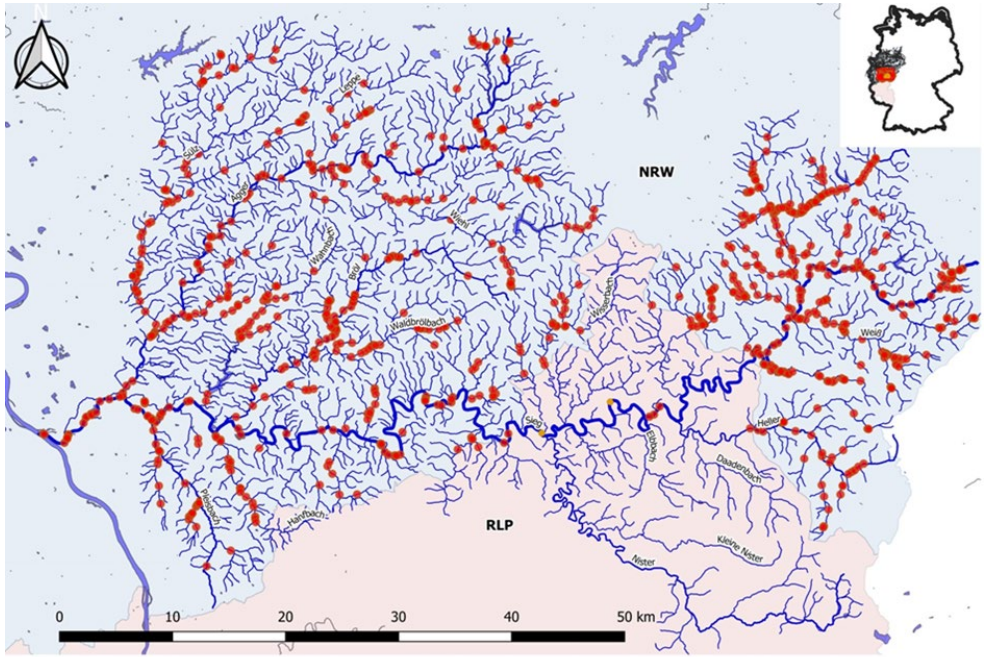


Dynamics and change



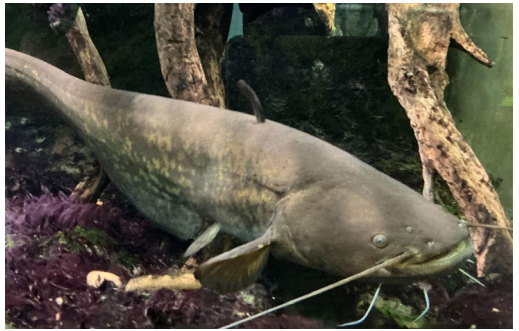
Wanke et al., in prep.

The Sieg Catfish Project



Observation: Increasing catfish records

- Catches increase steadily
- Rapid expansion
- Opportunistic predator



The Sieg Catfish Project

Photo 3: Wels, 186 cm, gefangen in der Sieg am 30.08.2022; Photo: Döring

Team:

- Sieg Fishing Cooperative (Sieg Fischerei-Genossenschaft Hennef)
- LIB Bonn / Museum Koenig

Funding: Chamber of Agriculture NRW

The Sieg Catfish Project

Photo 2:Mageninhalt und Eingeweide, Wels, 105 cm, Sieg, gefangen mittels Elektrofischfang am 23.09.2021, Photo: W. Kreutzmann (SFG)

Some questions:

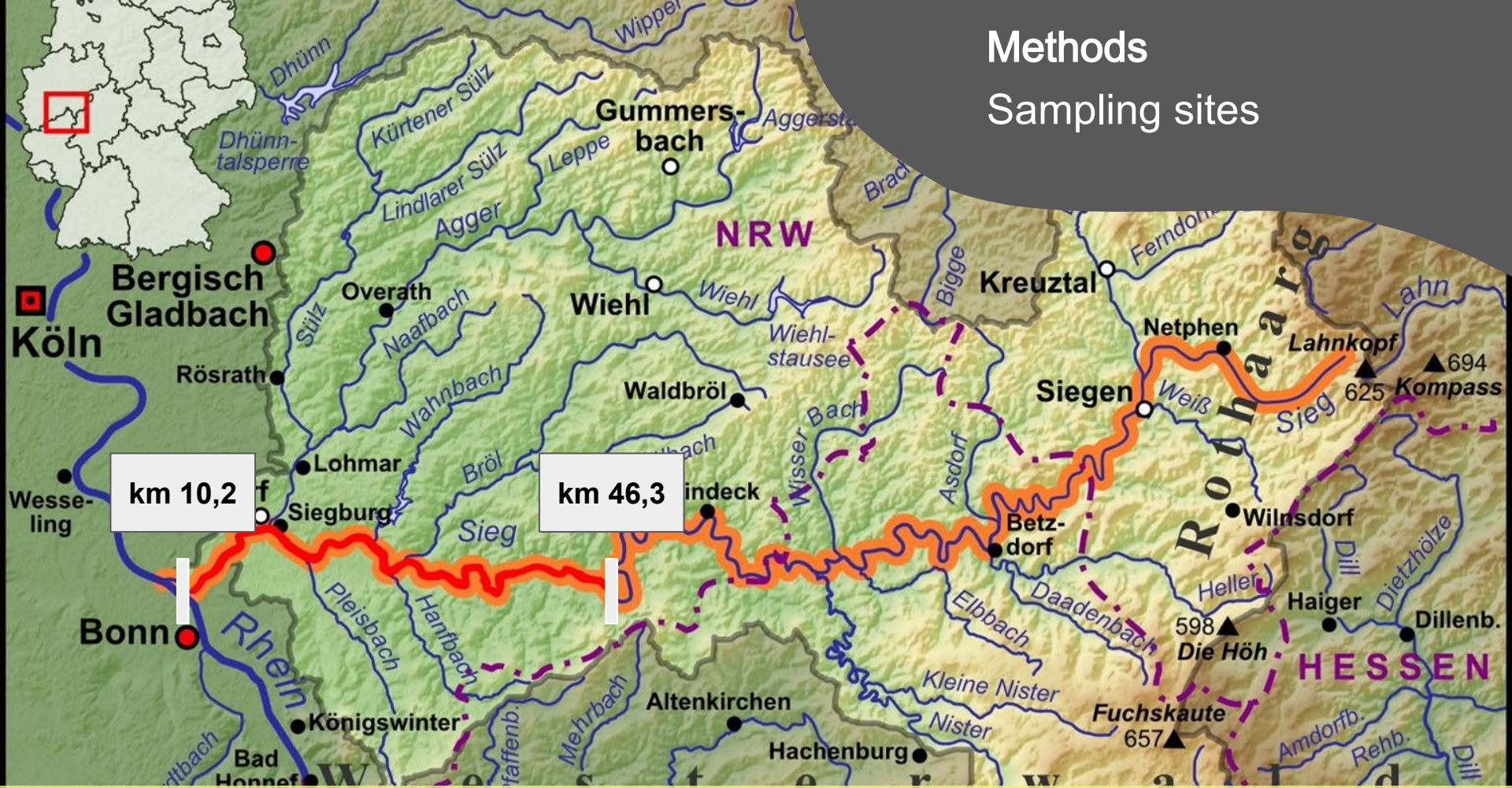
- Established population and/or migration?
- How fast do they grow?
- What do they feed on?

Methods

Sampling sites

Methods

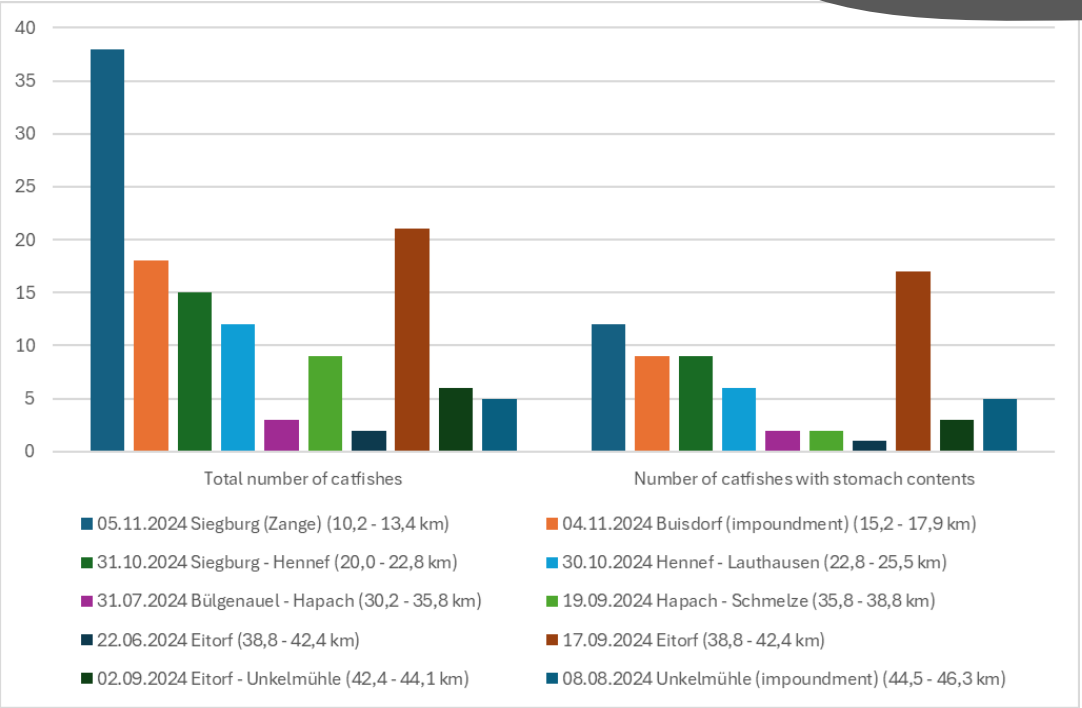
Sampling sites



Methods

Sampling sites

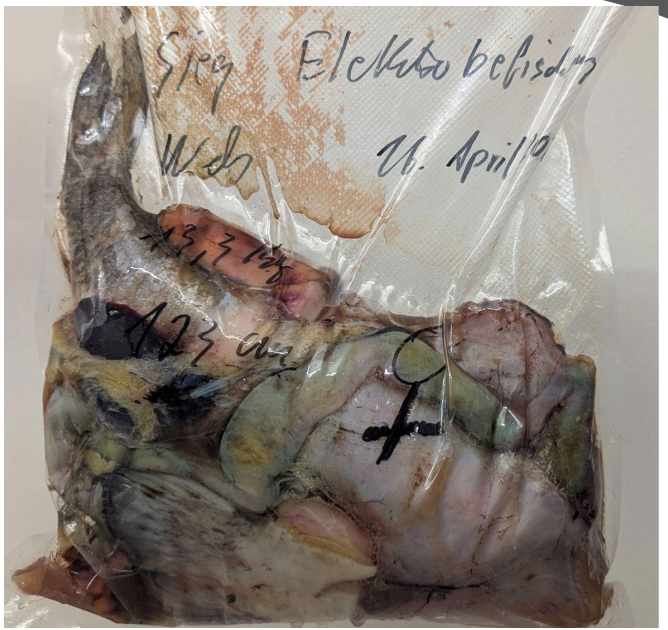
Spatial distribution



Methods

Sampling

Head

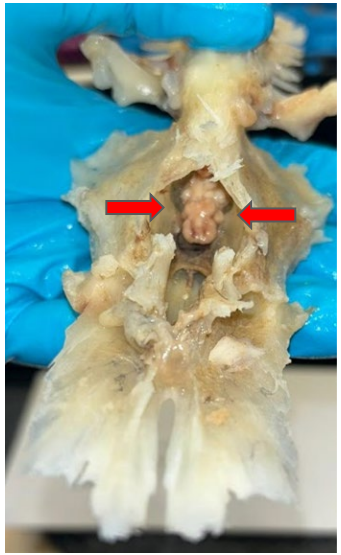


Intestines

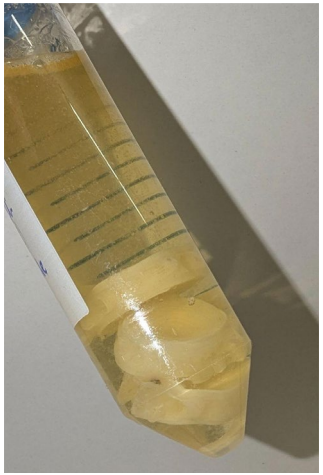
Age determination:
Vertebrae and otoliths

Cooking head to access neurocranium

Cracking neurocranium to remove otoliths



Bleaching of otoliths and vertebrae

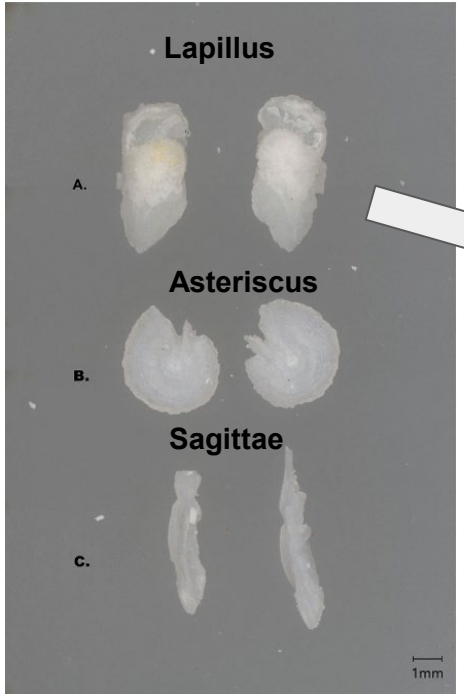


Drying

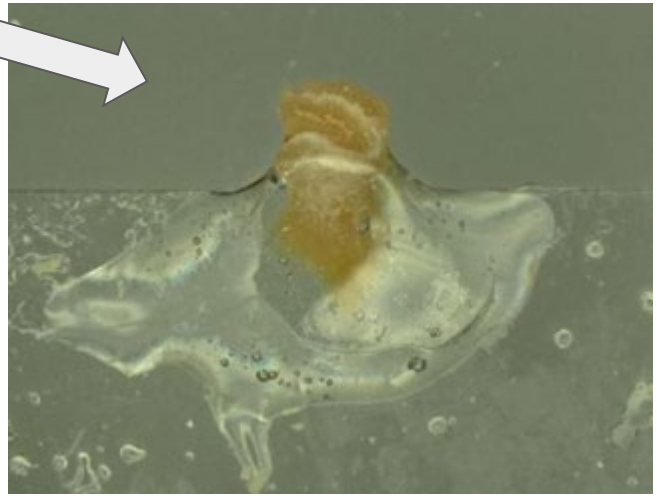
Otoliths: Lapillus is the best to handle

Methods

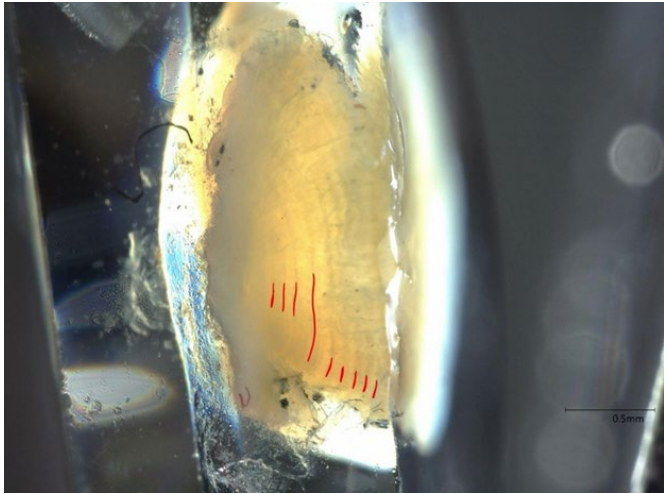
Age determination



Baked and glued to glass slide Lapillus



Lapillus under microscope suggesting 9 years

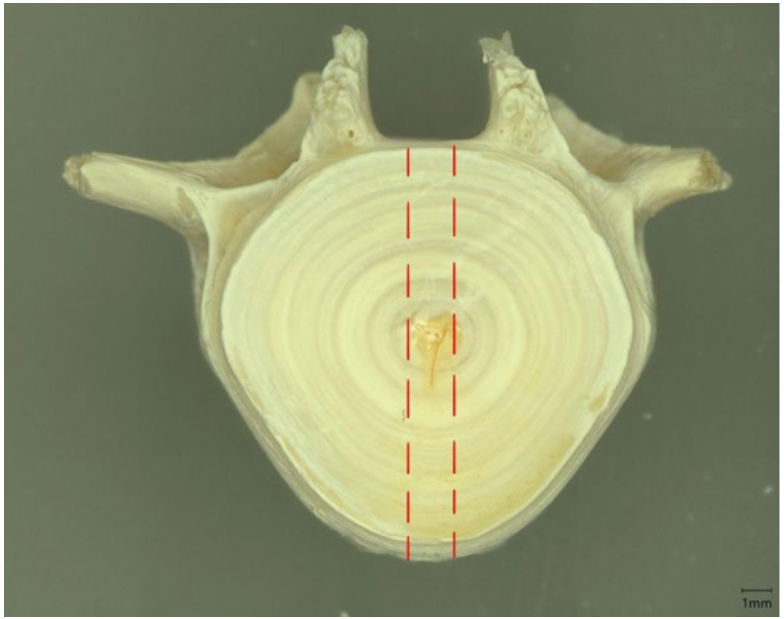


Methods

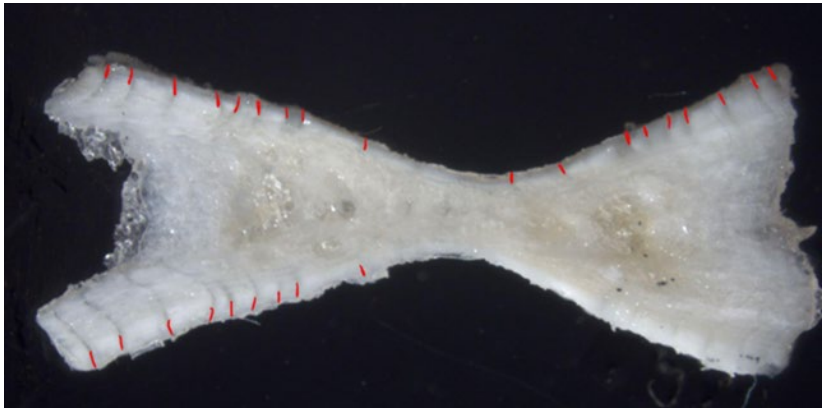
Age determination

Vetrebrae: The “cross - check”

Vertebra cross section



Count annual rings under the binocular (9 annuli)



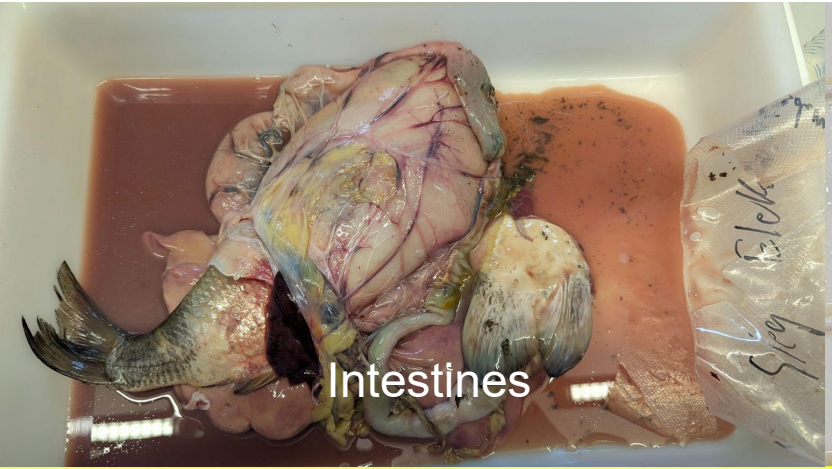
Methods

Analysis of stomach contents

Mass taken of

- Liver
- Stomach full and empty
- Colon full and empty
- Content of stomach and colon

Determination of fish remains : “Atlas der Fische Sachsens” (Füllner et al., 2016) and “A graphical key for the identification of German freshwater fishes” (Stahl et al., 2025).



Barbatula barbatula

Methods

Index of relative food importance

- The IRI can be calculated using the following formula (Hyslop, 1980):

  $IRI = (\%N + \%W) * \%F$

- %IRI (Hart et al., 2002):

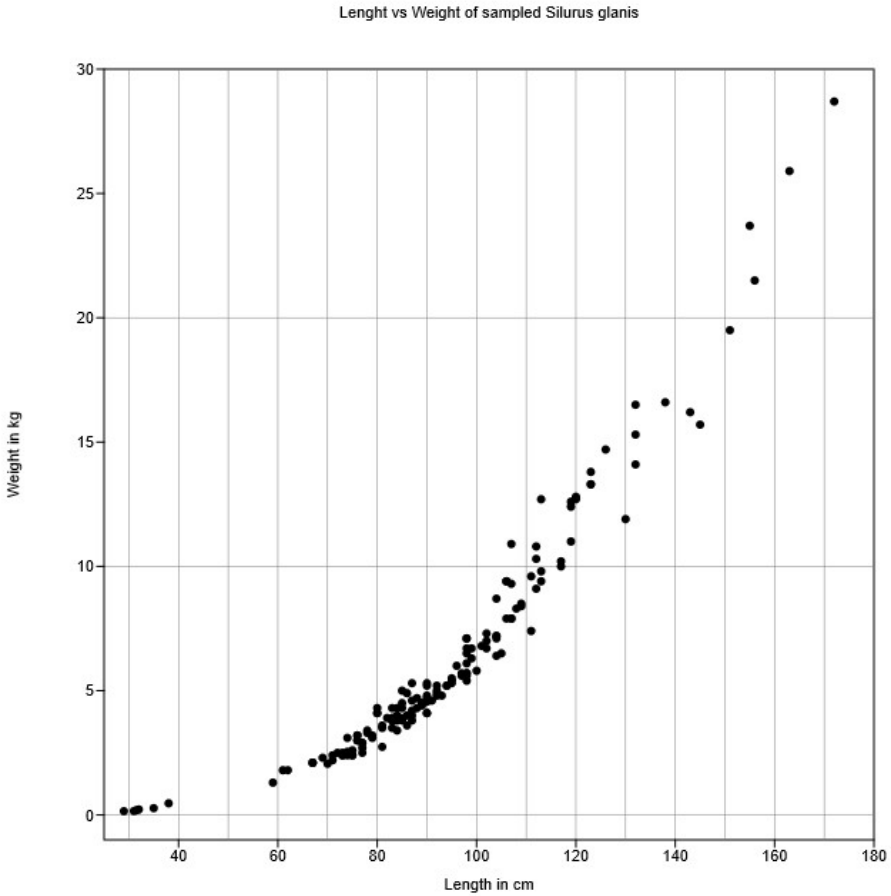
  $\%IRI = (IRI \text{ of Prey Item} / \sum IRI \text{ of all Items}) * 100$

%N = numerical percentage, how many of the prey item could be found in each stomach

%W = gravimetric percentage, how much the prey weighed

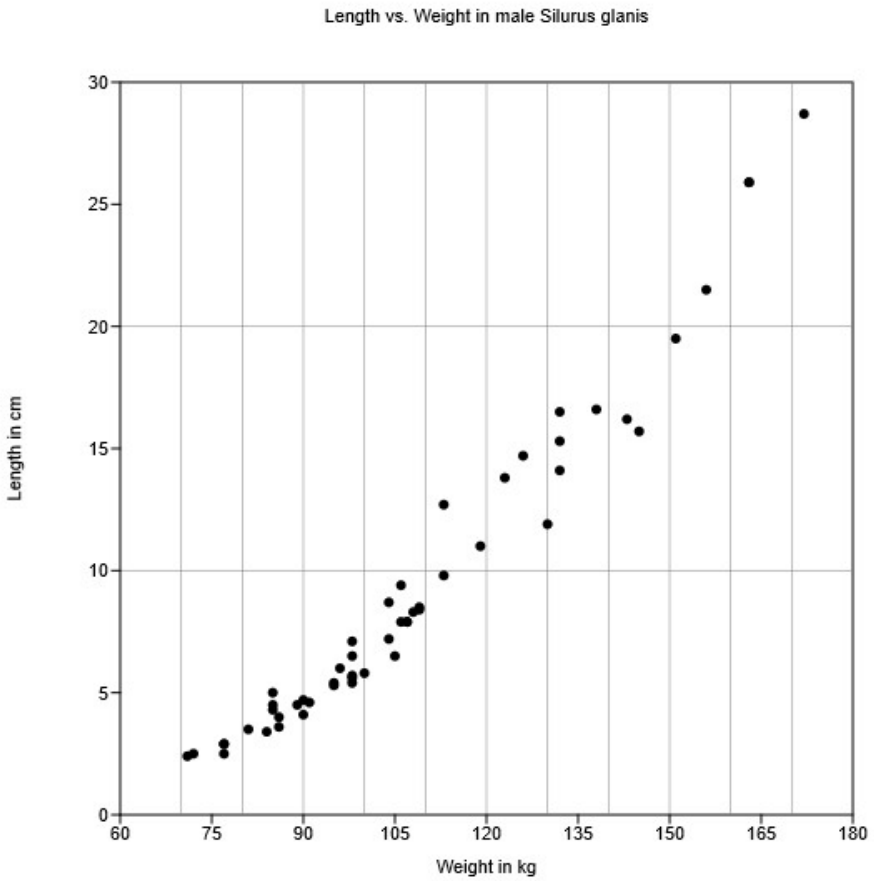
%F = frequency of occurence, in how many stomachs the prey item was found

Preliminary results



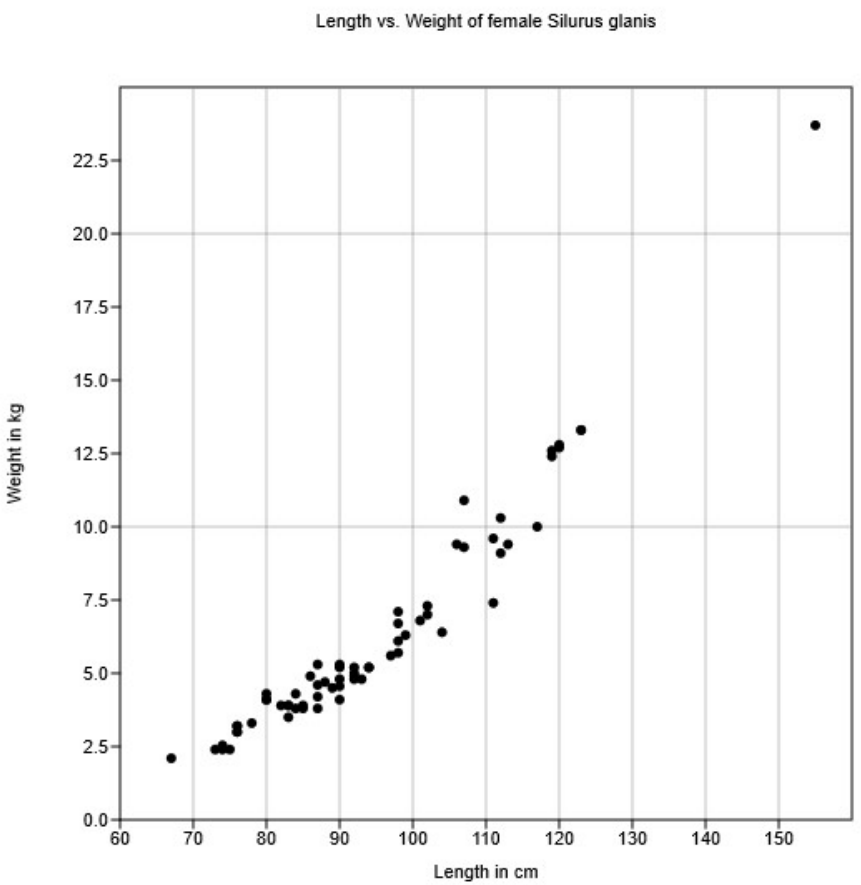
Length-weight distribution
of 158 *Silurus glanis*

Preliminary results



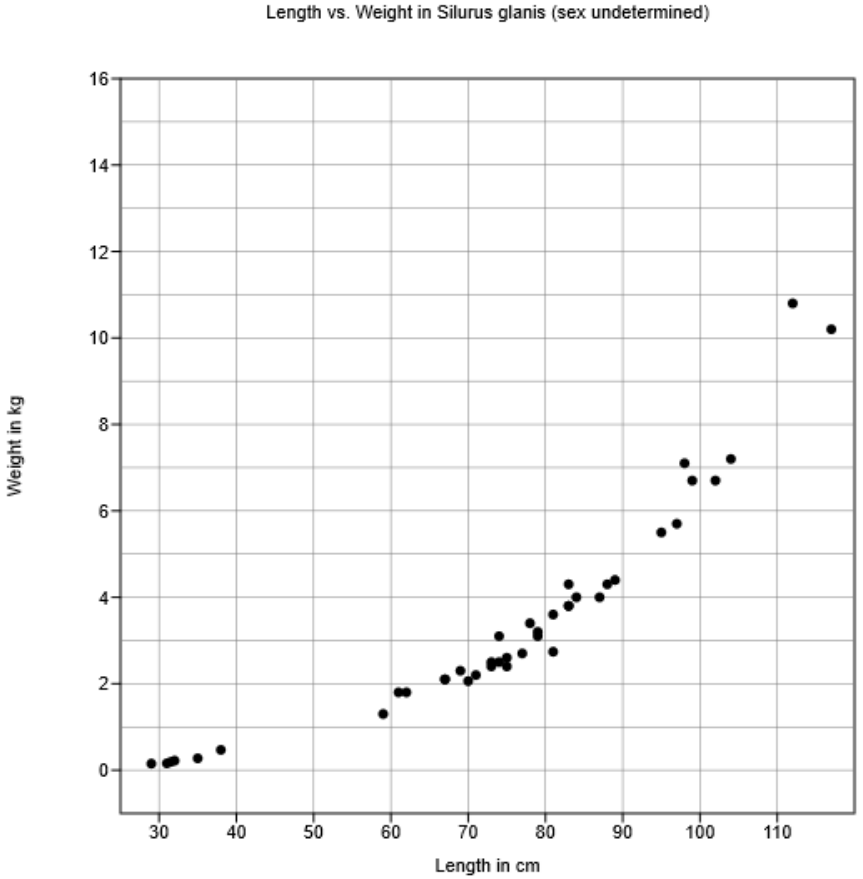
Length-weight distribution of 52 male *Silurus glanis*: Even distribution across sizes, from 70cm on

Preliminary results



Length-weight distribution of 66 female *Silurus glanis*: On average smaller than males (mostly 65 - 125cm)

Preliminary results



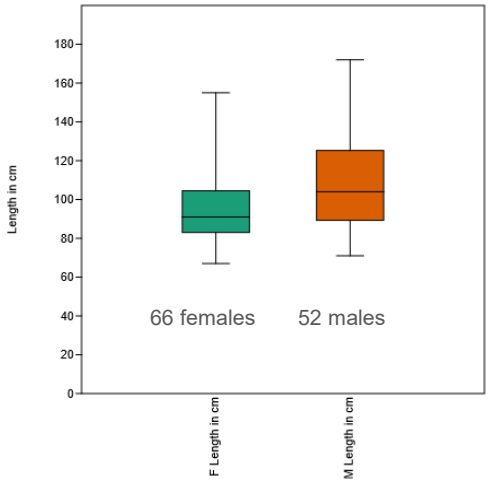
Length-weight distribution of 40 *Silurus glanis* of unclear sex (n = 40)

Some fishes might mature late

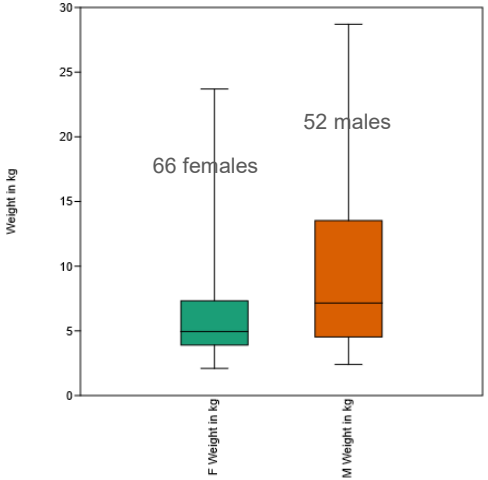
Preliminary results

Length comparison

Length



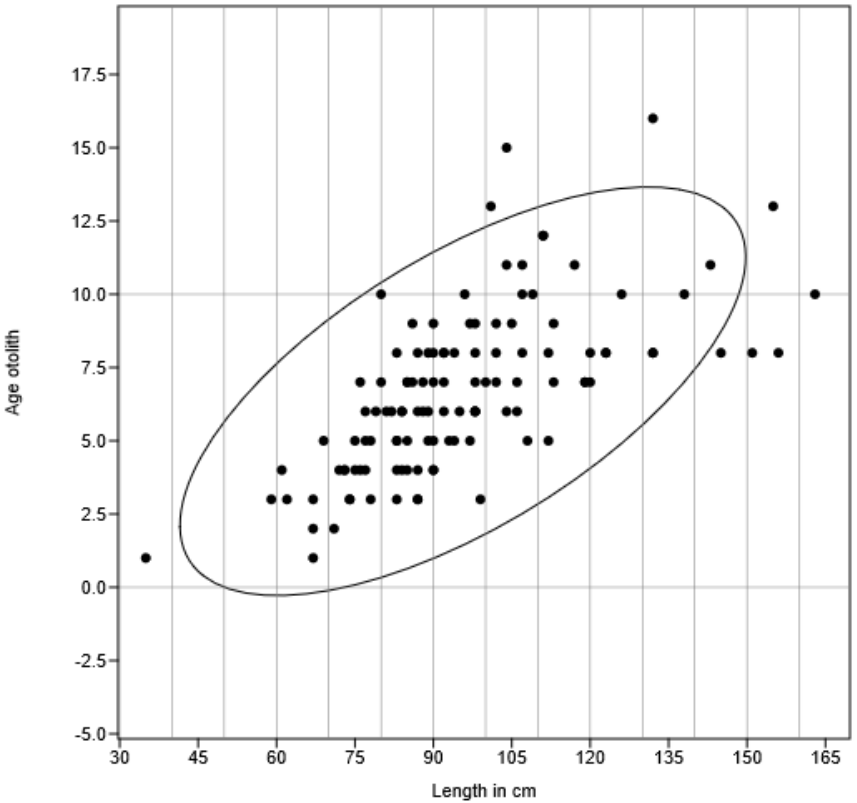
Weight



Males are on average larger and heavier than females

Preliminary results

Age - length relationship

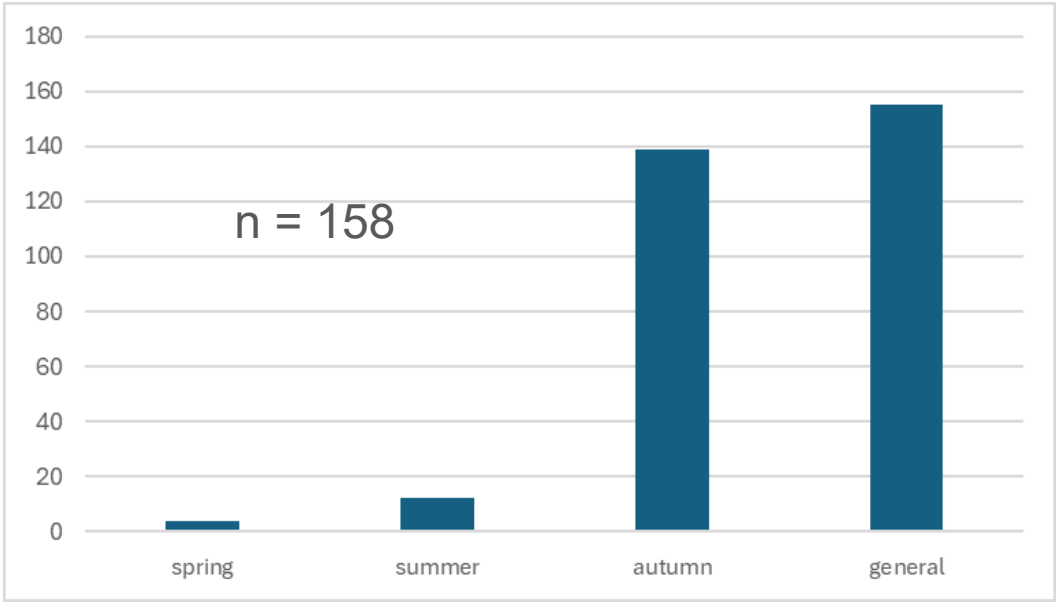


Age-length relationship

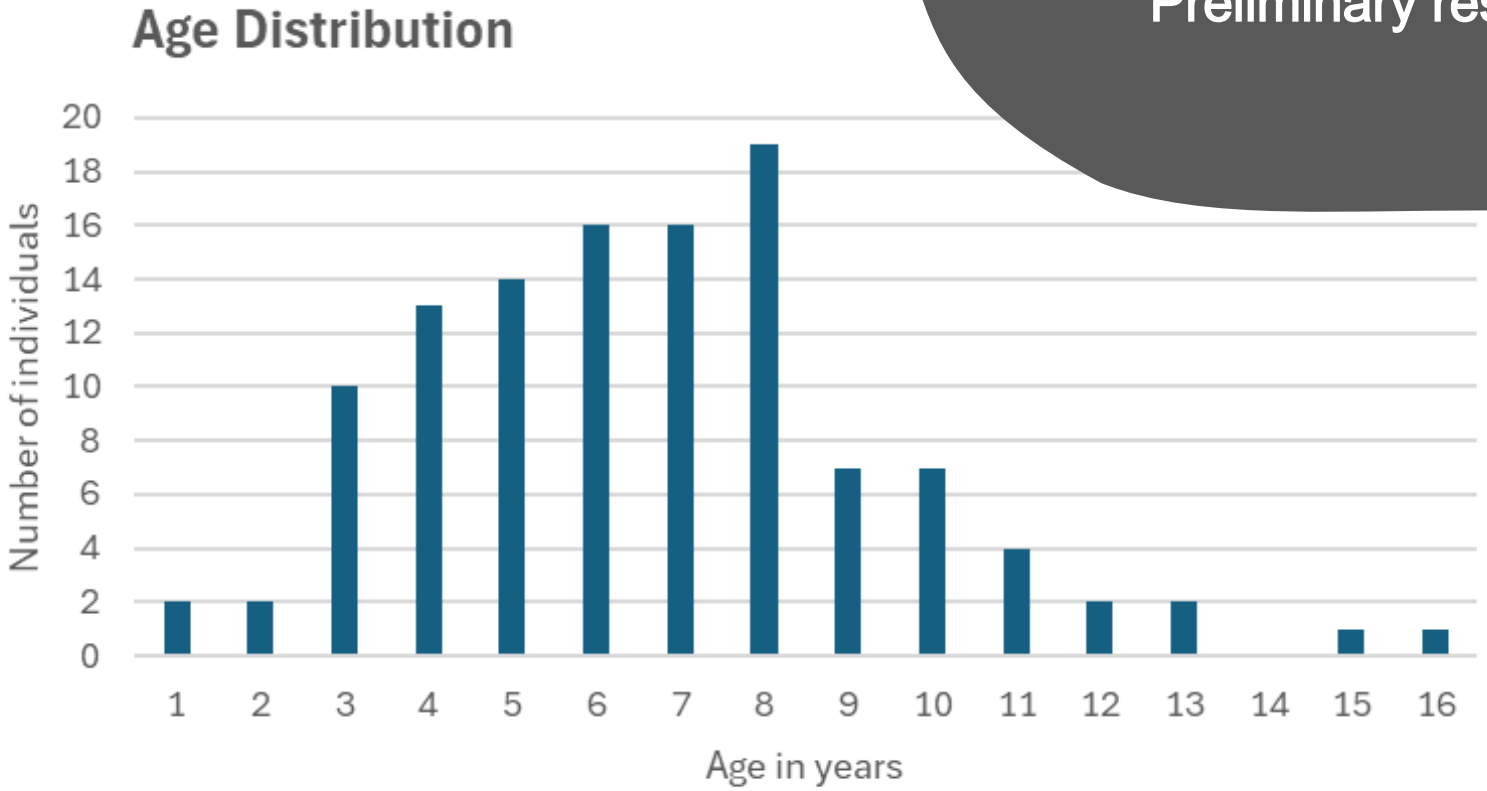
- Length differences of up to 50cm for individuals of the same age
- Values outside of the circle are outliers

Seasonal effects in the present sampling

➔ spring and summer sampling to be extended in 2026



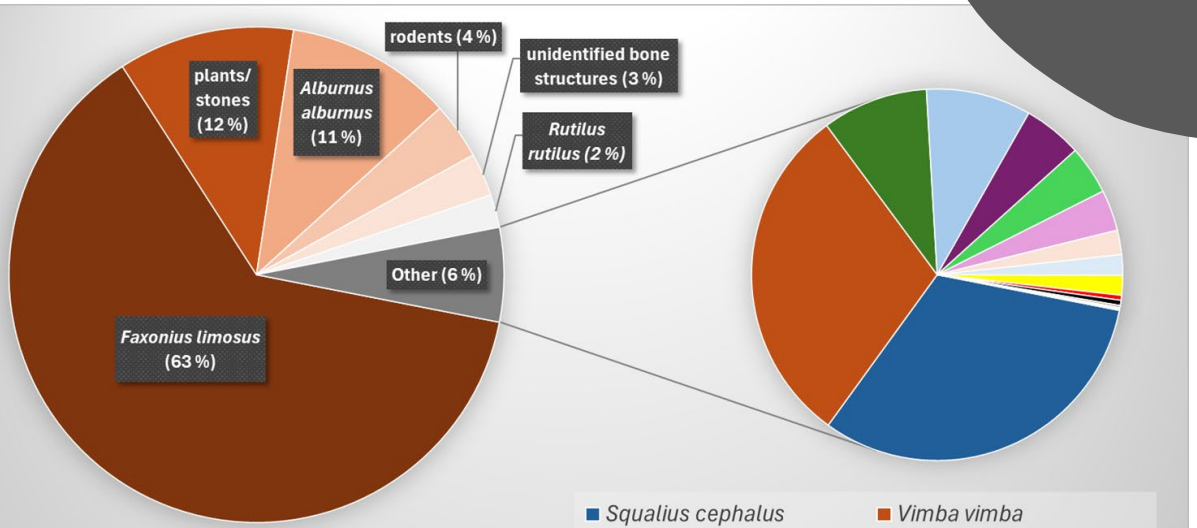
Preliminary results



Most catfishes are 4 to 8 years old (n = 116)

Feeding: Stomach contents

Preliminary results



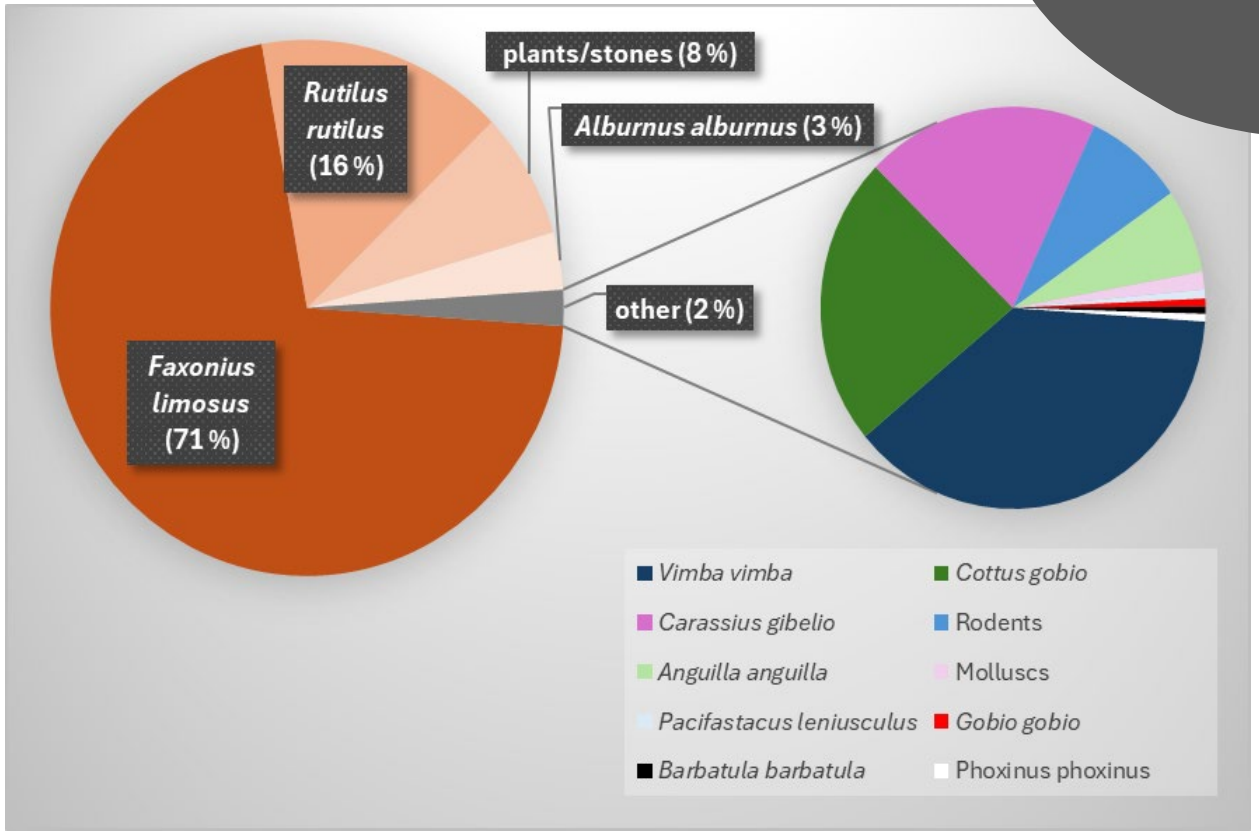
%IRI = (IRI of Prey Item / ∑IRI of all Items) ∗ 100

- Invasive crayfish (*Faxonius limosus*): dominant benthic prey
- Bleak (*A. alburnus*): key fish prey
- Plants and stones: incidental ingestion
- Rodents and other prey: minor but opportunistic components

➔ Overall diet: generalist, mainly benthic with piscivorous and occasional terrestrial items

Diet of young catfishes (≤6 years)

Preliminary results



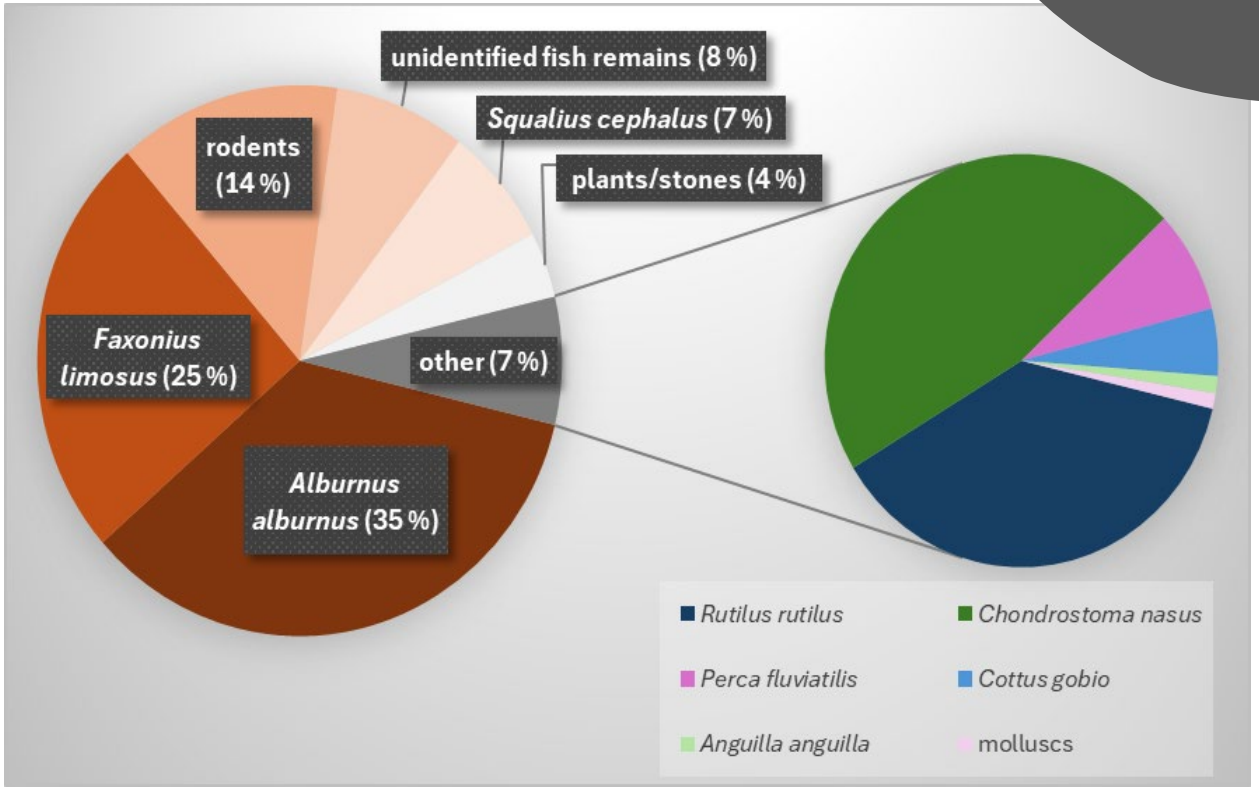
- Crayfish: dominant benthic prey
- Roach: main fish prey
- Plants and stones: incidental ingestion

➔ Mainly benthic

➔ Opportunistic terrestrial prey negligible

Diet of older catfishes (⩾ 7 years)

Preliminary results
Feeding habits



- Bleak: main fish prey
- Crayfish: important benthic component
- Rodents: notable share

➔ Large catfishes shift to stronger piscivory and occasional vertebrate prey

➔ Partly benthic but more opportunistic and broad-spectrum than subadults

Limitations

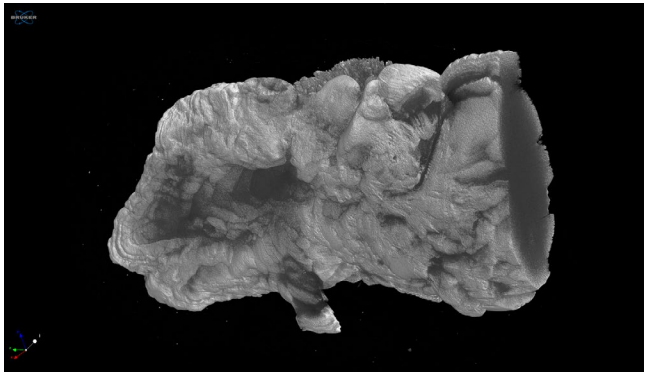
Limitations:

- (Electro)Fishing: Depends on water level
- Stomach content analysis: Depth of conventional determination limited in some cases. DNA barcoding?
- Age Determination: ± 1 year

Perspectives

What's next?

- Close remaining gaps in size distribution (very small and very large catfishes)
- Add more fishing campaigns in spring and early summer
- Extend sampling to upper Sieg, and tributaries
- Establish micro-CT to determine age of the fish by reading annuli of otolith



Fish of the year 2026

DEUTSCHER ANGELFISCHER-VERBAND e.V.

Bundesamt für Naturschutz

GFI

Thank you!