Case study 9F – Lakes and resevoirs in Central Europe

Souza, **Allan T.,** Kubečka, J., Boukal, D., Blabolil P., Čech M., Frouzová J., Juza, T., Matěna, J., Moraes, K., Muška, M., Prchalová, M., Rahimi, A.M., Říha, M., Šmejkal, M., Tušer, M., Vašek, M.

Reference case

2020 International Forum on the Effects of Climate Change on Fisheries & Aquaculture
25-26 February 2020, Rome

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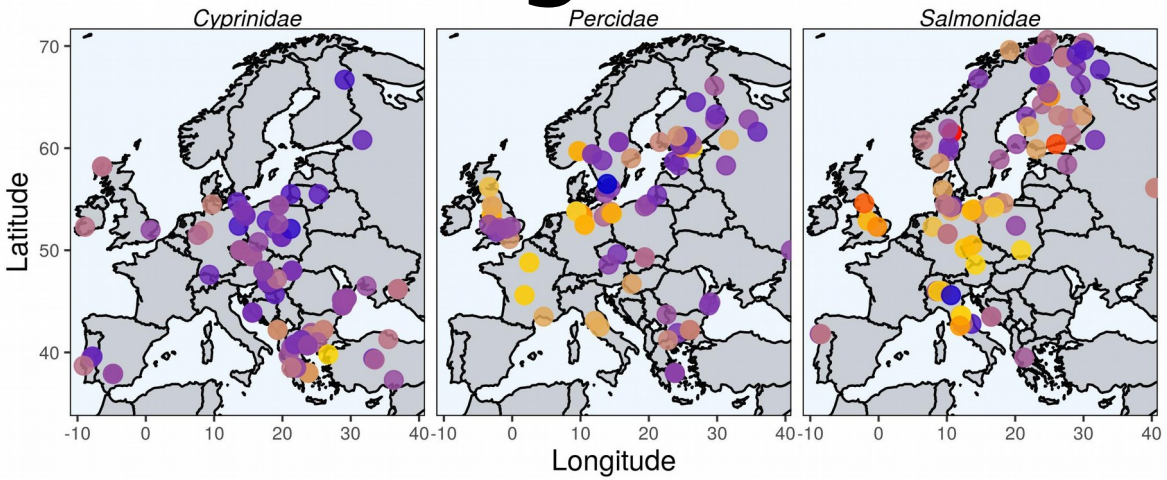
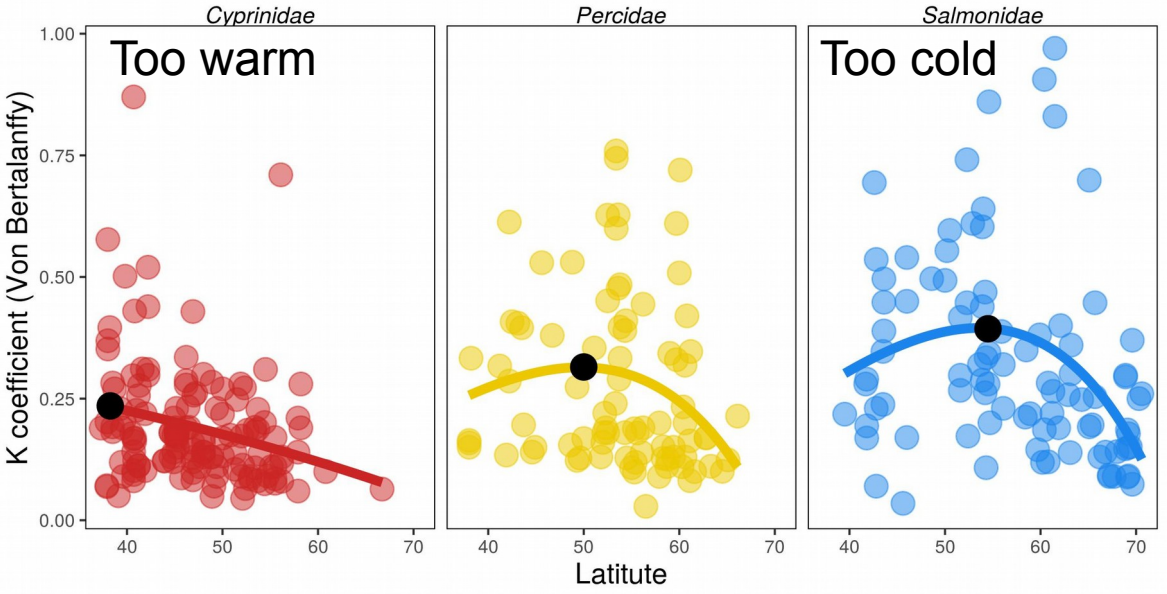
Biological forecasting and modelling

- Thermal optimum

- Differences among fish families





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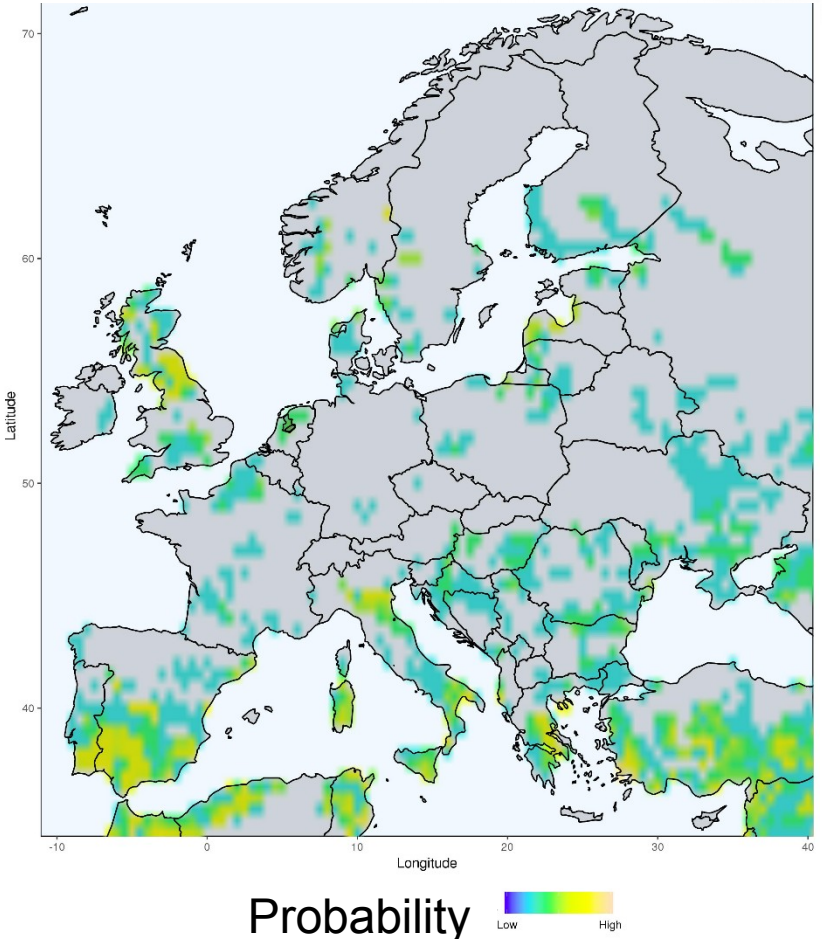
Biological forecasting of **reproduction of Carp**

- Viable populations
  - Climate effects
    - Precipitation
    - Temperature
  - Southern Europe
    - Indigenous areas
    - Non-indigenous areas



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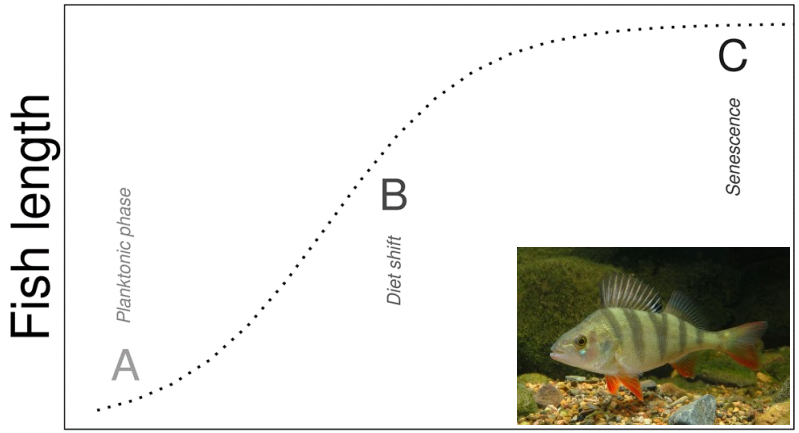
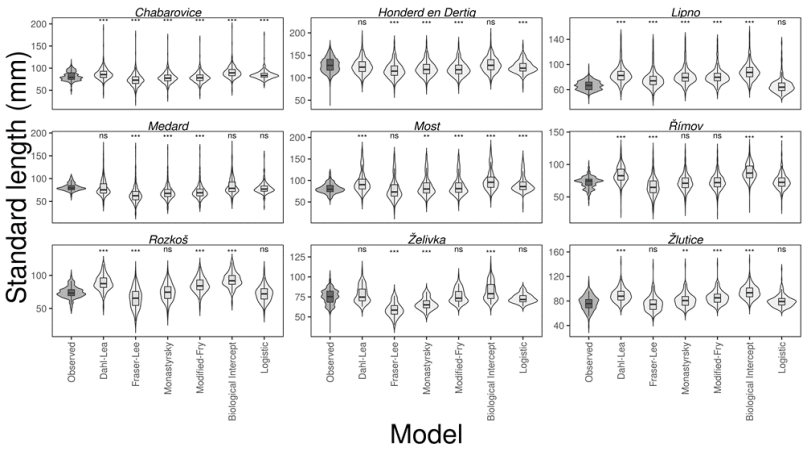
Biological forecasting of **growth**

- Issues when calculating fish growth
  - Ontogenetic changes on otolith shapes
  - Interpopulation differences
  - Development of a novel back-calculation model





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The main example of real life: fisheries of **Lipno reservoir**

- Largest Czech waterbody 5000 hectares
- Studied species
  - Pikeperch (*Sander lucioperca*)
  - Eurasian perch (*Perca fluviatilis*)
  - Common carp (*Cyprinus carpio*)
- Stakeholders
  - Angling Union, 10000+ anglers
  - 100000-150000 visits/year

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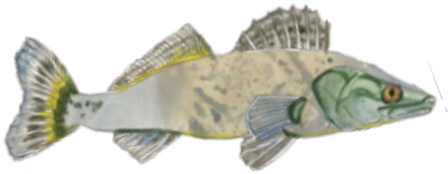
Biological forecasting

- Pikeperch
  - IBM forecasting the biomass and yield of pikeperch was developed
- Eurasian perch
  - New method to calculate the somatic growth was developed
  - Growth predictions
- Common carp, wels catfish
  - Modelled dynamics under angling pressure



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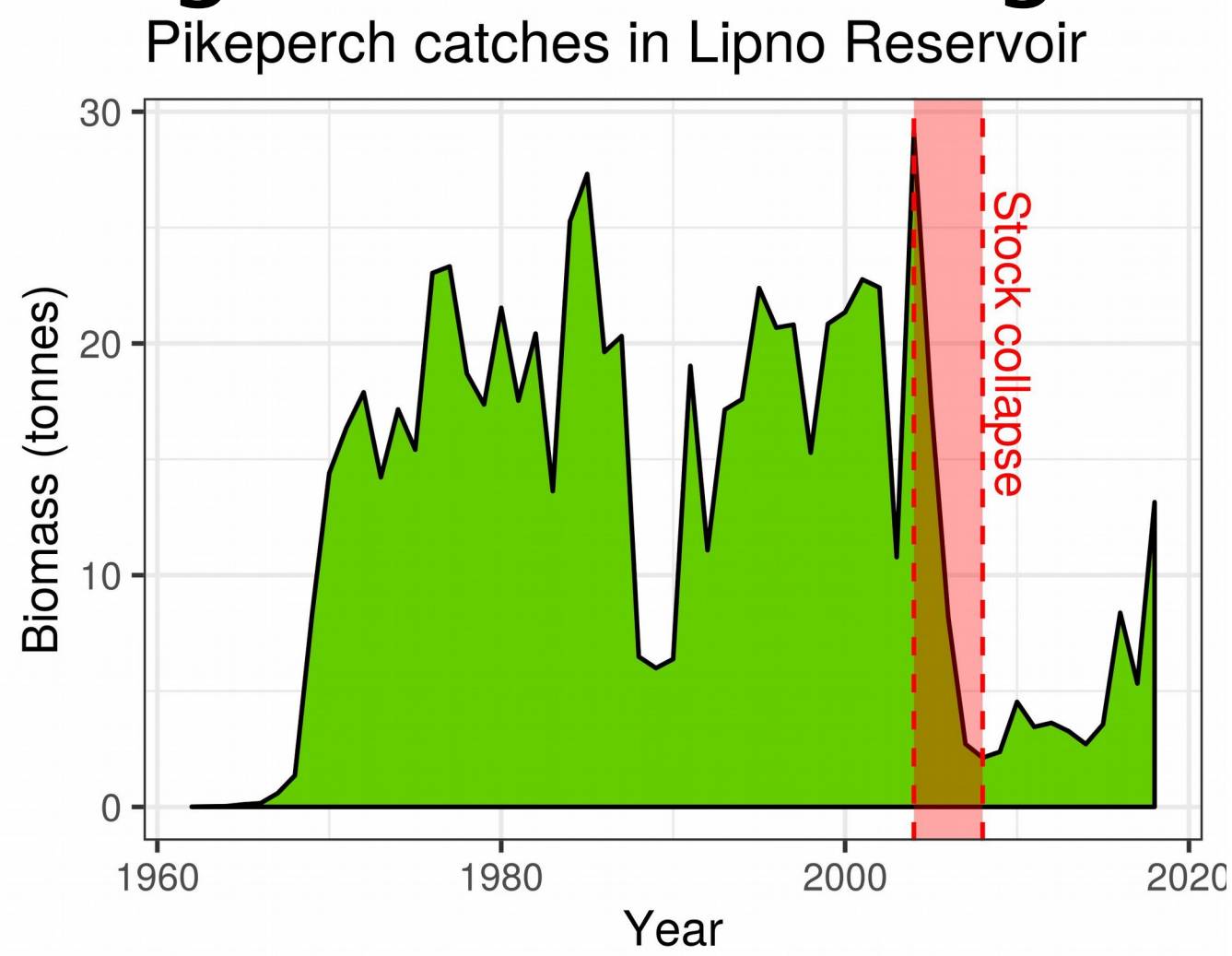
Biological forecasting



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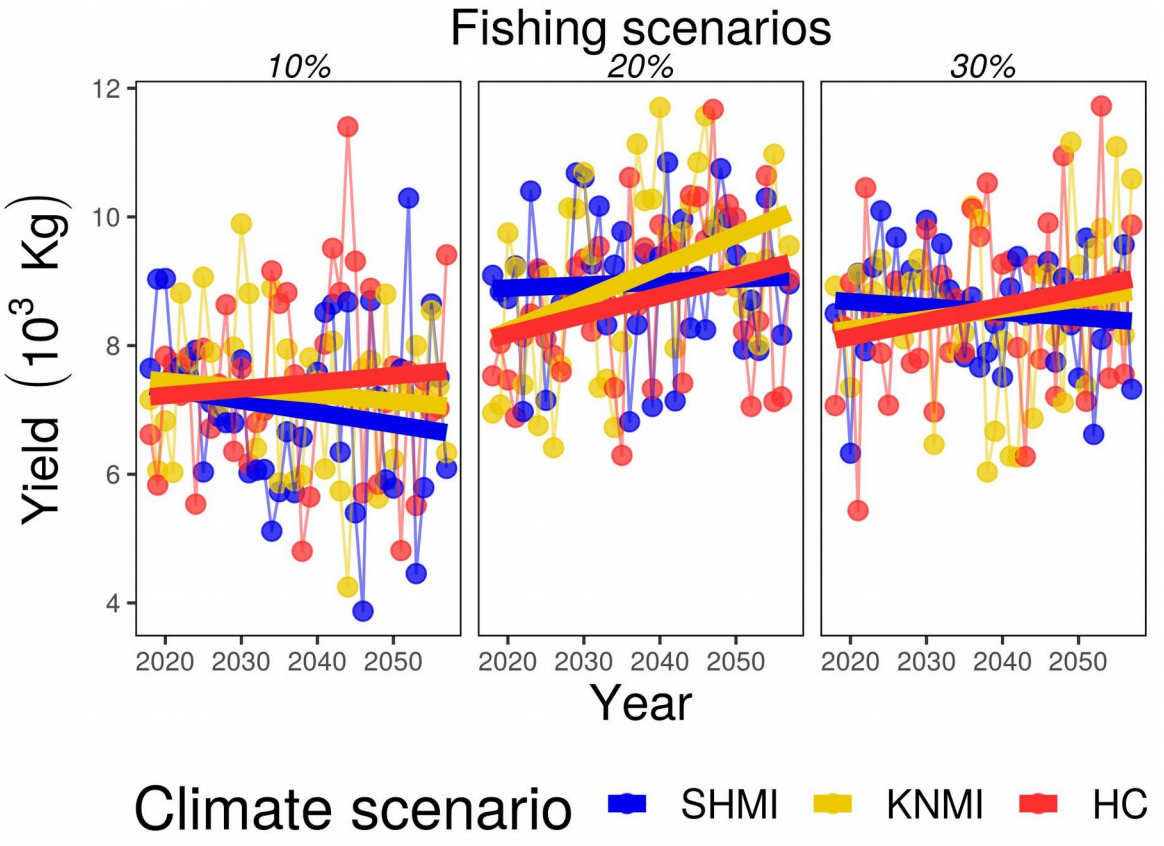
Biological forecasting

- Fishing pressure
  - Intermediary level
- Climate pressure
  - Mild effects
  - Productivity plays an important role



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Major risks and opportunities

- Risks
  - Loss of cold-water species
  - Overfishing of commercial species
  - Northwards expansion of carp populations
- Opportunities
  - Increased production of emerging warm water fish (catfish, pikeperch and carp)
  - Predatory species can be exploited as new biomanipulation tools

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Adaptation measures

- Protection of cold-water fish
  - Strict fishing management
  - Avoiding the establishing invasive species
- Fishery regulations
  - Fishermen's utilisation of emerging species
- Biomeliorative measures
  - Water level manipulation during spawning, stocking of predatory species
  - Biomeliorative catches

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Impact on local level

- Salmonid fish might be considered luxury goods
  - This may not mean the decrease of its economic importance if people are willing to pay for luxury goods
- Warm water fishery has to be changed
  - Finding the right balance of the developing food web may be a challenge as even emerging species can be overfished
  - Future challenges may lead to improving fisheries management as a whole

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- **Salmonids are luxury resources** which need maximum protection
- **Eat the carp instead!** Get ready to increased production of warmwater species! Utilize it!

Thank you for your attention

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