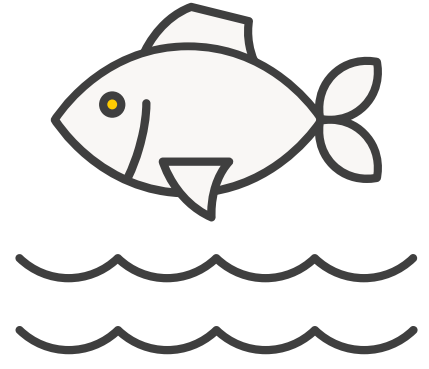


# Foreign fish in the mountains

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## The Background

- **Sportfish** (prize fish for catching, not for eating), such as Brown Trout, Brook Trout and Rainbow Trout, were introduced into lakes in Canada's provincial and national parks up until the 1980's.
- They are predators which eat the biggest and most colourful invertebrates (*bugs*).
- More predators meant fewer bugs. Fewer bugs means less algae gets eaten. At the same time more algae is able to grow from nutrients introduced by the fish (*their poop!*)
- More algae uses more oxygen and lowers the water quality, changing the entire ecosystem.
- **Climate Change** is causing temperatures to rise in summer, and ice to form later and melt earlier, which effects which organisms survive and thrive.
- Small phytoplankton and zooplankton appear to be more successful in warmer conditions, but larger consumers are less responsive to these changes.



*If smaller invertebrates are better at adapting to warmer temperatures, and sportfish are eating the larger invertebrates, they may be helping smaller invertebrates by reducing their competition and predators. If smaller, more resilient invertebrates are more common in the lake it may make the ecosystem more resilient overall to temperature change.*

How do naturally fishless lakes respond to the combined effects of non-native sportfish and increased temperature, and will they require rescue by the regional species pool?



*"Rescue by the regional species pool" means will we need to re-introduce more of the natural species in order to maintain the biodiversity in the lakes.*

## The Research

**Mesocosms** of water and zooplankton were taken from naturally fishless alpine lakes and montane lakes into which sportfish had once been introduced, but have since returned to their fishless state. Some samples were given a warming treatment of about 4°C and small rainbow trout, called fingerlings, were introduced.



**mesocosm**- any outdoor experimental system that examines the natural environment under controlled conditions. A way to bridge laboratory and natural conditions!

The effects of sportfish combined with rising temperatures created an "ecological surprise" in montane lake samples, where the effect of both factors is the opposite of either factor on its own.

## Alpine lakes may require rescue from warming temperatures and introduced sportfish.



The fishless alpine lake samples that were also warmed, showed a decrease in biomass and biodiversity. However, when a range of regional zooplankton species were introduced to the samples, they not only rescued their biodiversity but also increased biodiversity and biomass!