Explaining growth variation over large spatial scales: Effects of temperature and food on walleye growth

Most fishes exhibit strong spatial variation in growth. Because fish growth and production are tightly linked, quantifying and explaining variation in growth can mean the difference between successful management and unforeseen collapse. However, disentangling the factors that are responsible for among-lake variation in growth (e.g., food and temperature) has proved very difficult. Here, we use length at age and temperature data from hundreds of water bodies between 44°N to 53°N latitude to explain variation in immature growth of walleye (Sander vitreus), one of the most economically valuable freshwater fish species in North America. We then use length at age data from yellow perch (Perca flavescens) to identify the mechanisms behind the remaining variation in the length at age–temperature relationship for walleye. A positive perch–walleye relationship indicates that the mechanism behind the variation is productivity and a negative relationship indicates density-dependence. We found that variation in walleye growth among water bodies is largely explained by food productivity - not density-dependence. These results suggest that we can't detect density-dependence among lakes when density-dependent effects are swamped by differences in productivity.
Projects:

Life history adaptation in marine fishes

National Institute of Aquatic Resources
Period: 15/12/2010 → 15/08/2013
Number of participants: 3
Phd Student:
Mosgaard, Thomas (Intern)
Supervisor:
Rindorf, Anna (Intern)
Main Supervisor:
Gislason, Henrik (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: Institut, samfinansiering
Project: PhD

Scaling from individuals to populations (SLIP) (38726)
The research school SLIP (Scaling from Individuals to Populations) focuses on how individual behavior and mutual interactions generate the dynamics observed at the population level. This topic forms the link between the basic and applied marine ecological research environments in Denmark and requires input from biology, mathematics and statistics. SLIP is one of the five research networks and research schools under the Danish Network for Aquaculture and Fisheries Research (Fishnet). SLIP has arranged a number of national and international PhD courses and workshops and has served to focus the interest on size and trait-based modeling, as well as on improved understanding of the physiology, genetics and behavior of marine organisms, in particular fish.

The project is coordinated by DTU Aqua.
DTU Data Analysis
National Institute of Aquatic Resources
Section for Marine Living Resources
Roskilde University
Royal Veterinary and Agricultural University
Aarhus University
University of Copenhagen
Period: 01/01/2000 → 31/12/2008
Number of participants: 9
Research area: Marine Populations and Ecosystem Dynamics
Project participant:
Höffle, Hannes (Intern)
Gürkan, Zeren (Intern)
Therkildsen, Nina Overgaard (Intern)
Sichlau, Mie Hylstofte (Intern)
Mosgaard, Thomas (Intern)
Frisk, Christina (Intern)
Project Manager, academic:
Gislason, Henrik (Intern)
Kiørboe, Thomas (Intern)
Eg Nielsen, Einar (Intern)