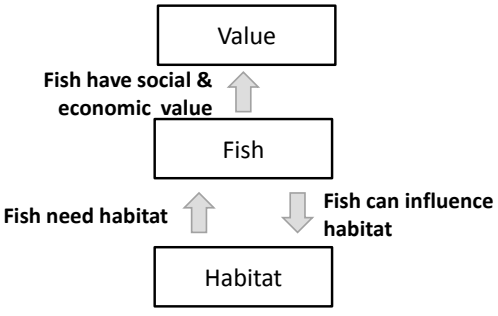
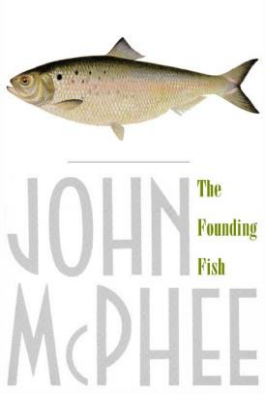
WF4113-Fisheries Science

Class 19 – Habitat & Ecology I

The big picture

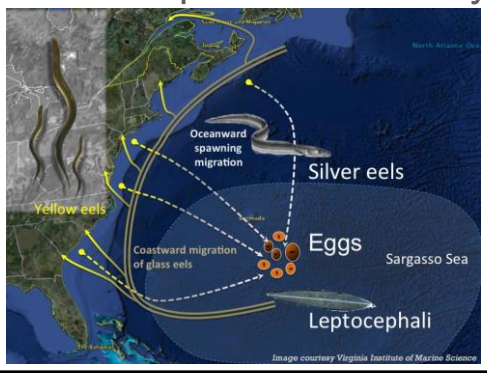




Why is habitat important?

- Reproduction
  - Spawning
- Growth
  - Foraging
  - Rearing
- Migration
- Refuge
  - Predation
  - Thermal

Habitat depends on life history



2012 elver landings expected to exceed $40 million, more than 5 times 2011 haul

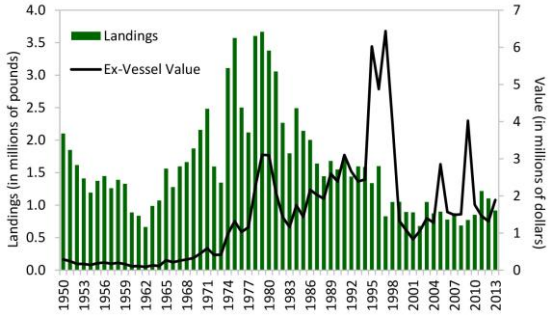
Robert F. Bukaty | AP

A fisherman in Maine holds elvers, baby eels worth more than $2,000 a pound.

Fyke net set in Somesville, Maine. Elvers collect in the narrow end at the far right. *Laurie Schrieber Photo*

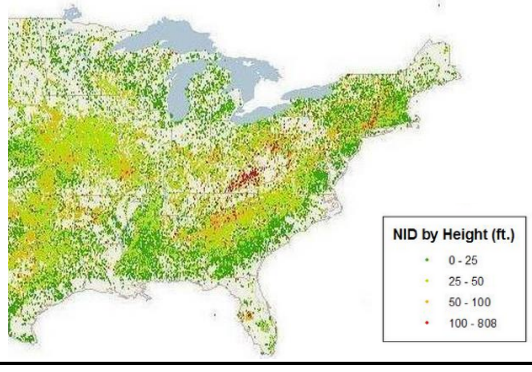
American Eel Total Commercial Landings and Value

Source: 2012 American Eel Benchmark Stock Assessment Report (2012), ASMFC State Compliance Reports & NMFS Fisheries Statistics Division, 2014

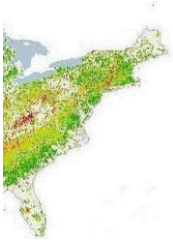


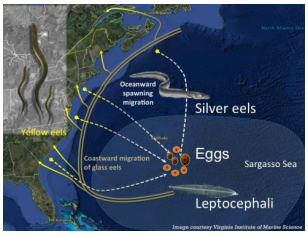
Unagi-roasted eel

US Dams



Access to habitat is important





The Mary Steube fishway in Old Lyme, CT. The structure on the left is an eel pass and on the right is a herring fishway. Credit: CT Department of Environmental Protection

What happens when you open up habitat?

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Dam Removal Increases American Eel Abundance in Distant Headwater Streams

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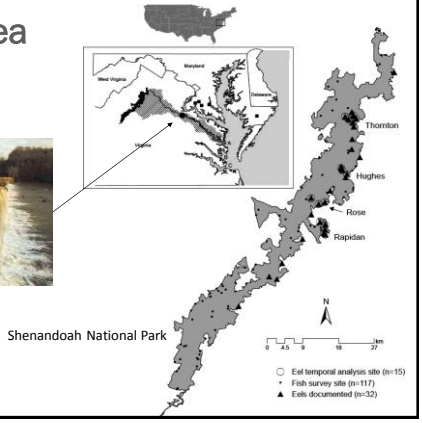
Study objectives

Used a 15-year data set to evaluate how American eel populations in headwater streams responded to the removal a large downstream dam on the Rappahannock River in Virginia.

1. evaluated temporal trends in American eel abundance, biomass, and body size before and after dam removal
2. evaluated evidence for competing hypotheses involving changes in local physical habitats and population dynamics across larger spatial scales. Our study provides the first analysis of American eel responses to dam removal at the stream network scale (>100 river kilometers [rkm]).

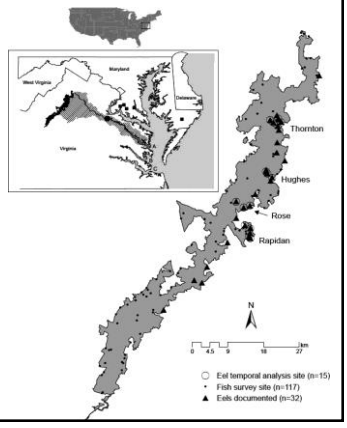
Study area



On February 23, 2004, the U.S. Army Corps of Engineers breached the dam.

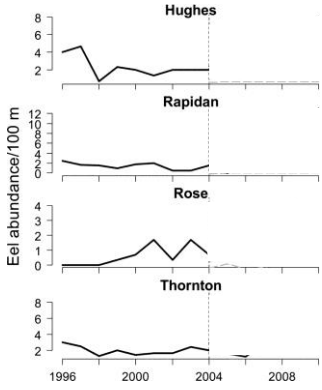
Expectation

Watersheds with Eels present will increase in abundance



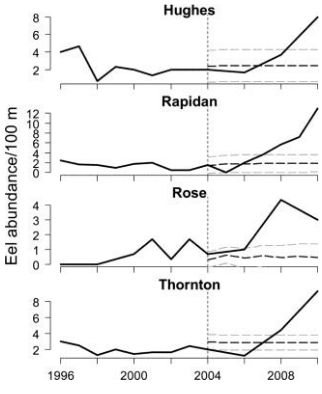
Results

Shenandoah National Park watersheds



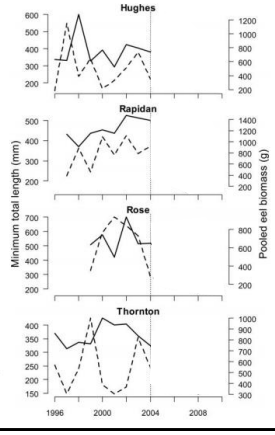
Results

Shenandoah National Park watersheds



Results

- Minimum length
- Biomass



Results

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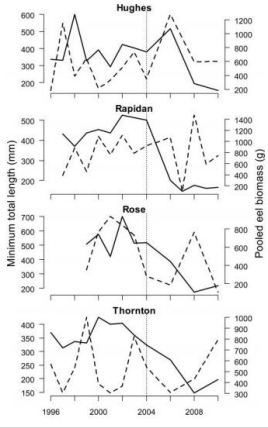
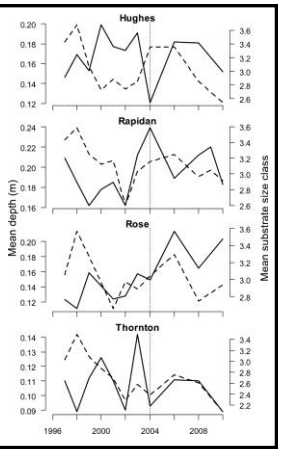
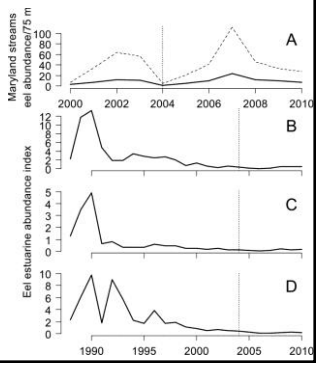


Could it be habitat?



Could it be there were more eels around?



Interpretation of results

- Results also show that the immigration of small-bodied individuals (<300mmTL) was primarily responsible for the observed increases in eel numbers.
- Although Embrey Dam did not prevent eel passage, results indicate that it depressed eel abundances and altered eel size structure within connected headwater catchments.

Effects of habitat loss

FEATURE
FISH HABITAT

Fish Community and Food Web Responses to a Whole-lake Removal of Coarse Woody Habitat

Greg G. Sass
James F. Kitchell
Stephen R. Carpenter
Thomas R. Hrabik
Anna E. Marburg
Monica G. Turner

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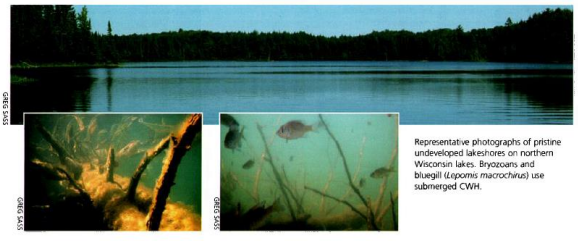
ABSTRACT: As lakeshores are developed, property owners often thin the riparian forest and remove older logs or fallen limbs from the adjacent littoral zone. This practice alters fish habitat and produces unknown ecosystem changes. To assess potential effects on fish communities and food web interactions, we removed more than 75% of the coarse woody habitat (CWH) from the treatment basin of Little Rock Lake, Wisconsin, while leaving the reference basin unaltered. Prior to CWH removal, the food webs in both basins were similar and dominated by aquatic prey. After CWH removal, largemouth bass (*Micropterus salmoides*) in the treatment basin consumed less fish, ate more terrestrial prey, and grew more slowly relative to the population in the reference basin. Yellow perch (*Perca flavescens*) in the treatment basin declined to extremely low densities as a consequence of predation and little or no recruitment. In contrast, perch in the reference basin were replenished by several successful cohorts produced in consecutive years. Maintenance of CWH appears to be crucial for sustaining desir-

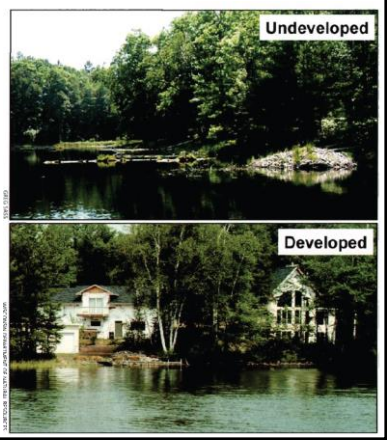
Study species: Largemouth Bass

A largemouth bass (*Micropterus salmoides*) swims among submerged CWH in Anderson Lake, Vilas County, WI.



Representative photographs of pristine undeveloped lakeshores on northern Wisconsin lakes. Bryozoans and bluegill (*Lepomis macrochirus*) use submerged CWH.

Habitat

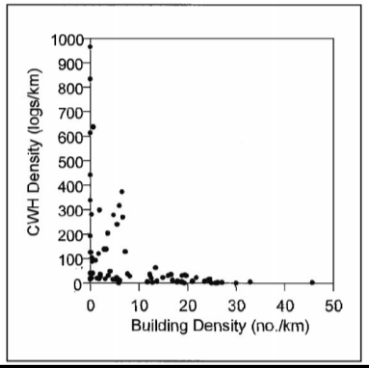


Coarse wood debris and buildings

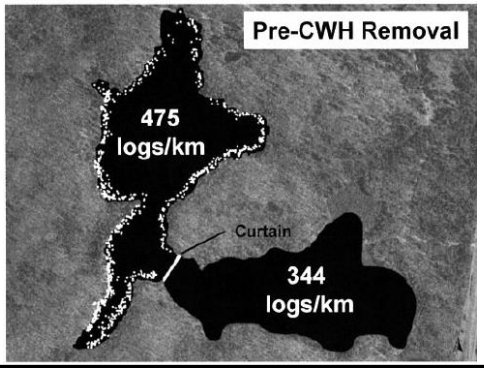
Study area

What did they do?

Coarse wood debris and buildings



Effect of CW Habitat removal



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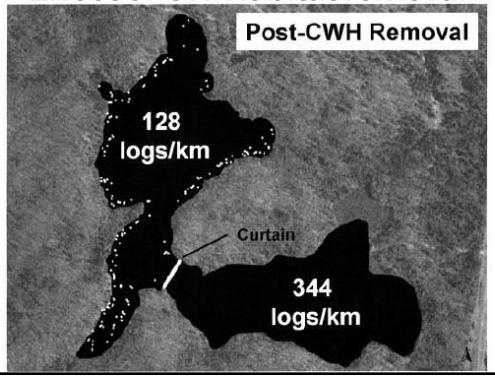
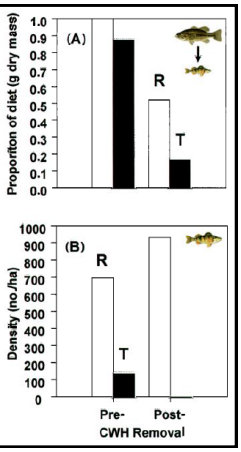
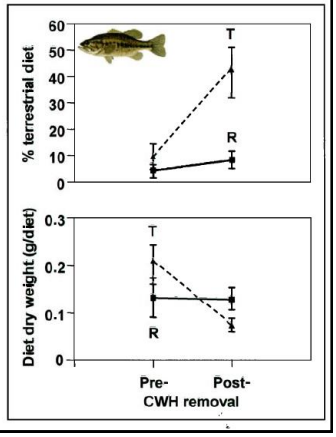


How did habitat effect diet?



How did habitat effect diet?

Increased reliance on terrestrial inputs
T = Treatment
R = Reference



How did habitat effect growth?

- Ratio of growth rate (Treatment/ Reference)
- ~1 is no difference
- Big effect on smaller fish
- Growth rate decreased post coarse wood removal