

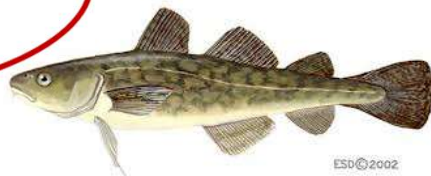
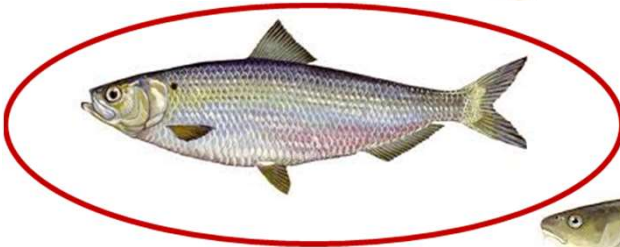
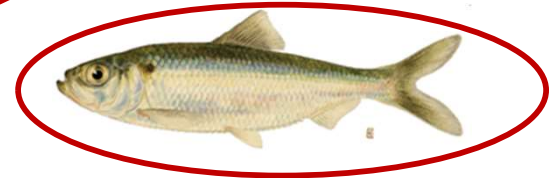
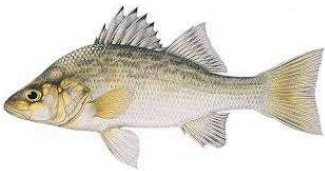
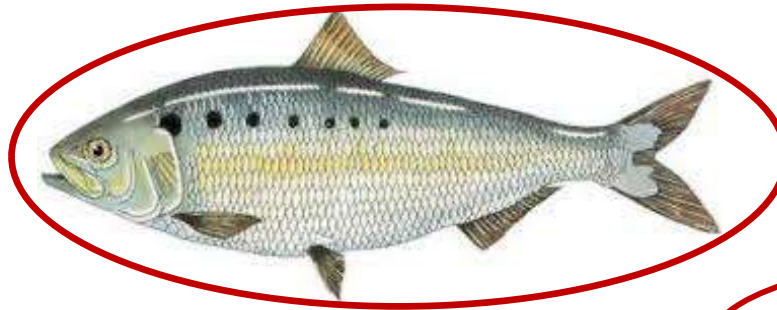
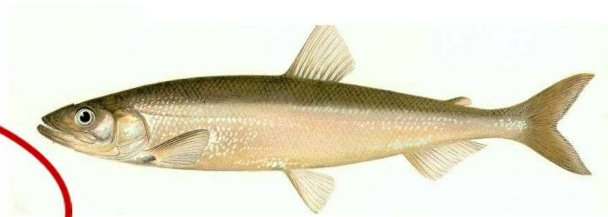
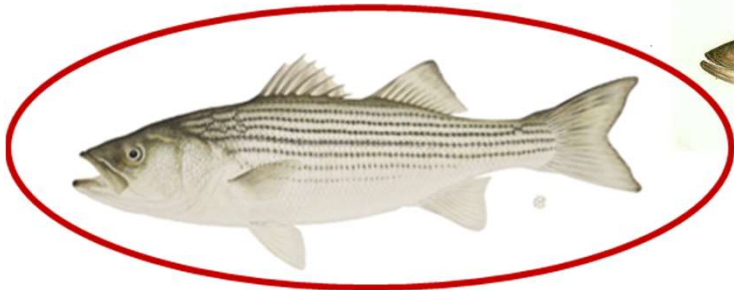
# Shifting Baselines for Anadromous Fish & Freshwater-Saltwater Connectivity

Wild Things in the  
Narragansett Bay Region  
Conference

John Waldman  
Queens College, NY



# The Atlantic Assemblage



# Managing Anadromous Fishes: *Promise & Perils*





# In the Past Rivers “*Ran Silver*”

“Alewives came up to the fresh rivers to spawn in *such multitudes* it is *almost incredible*, pressing up such shallow waters as will scarce permit them to swim”

William Wood, *New England's Prospect*, 1634

“. . . in April there is a fish much like a herring that comes up into the small brooks to spawn, and when the water is not knee deep they will presse up through your hands, yea, thow you beat at them with cudgels, and in *such abundance as is incredible*.”

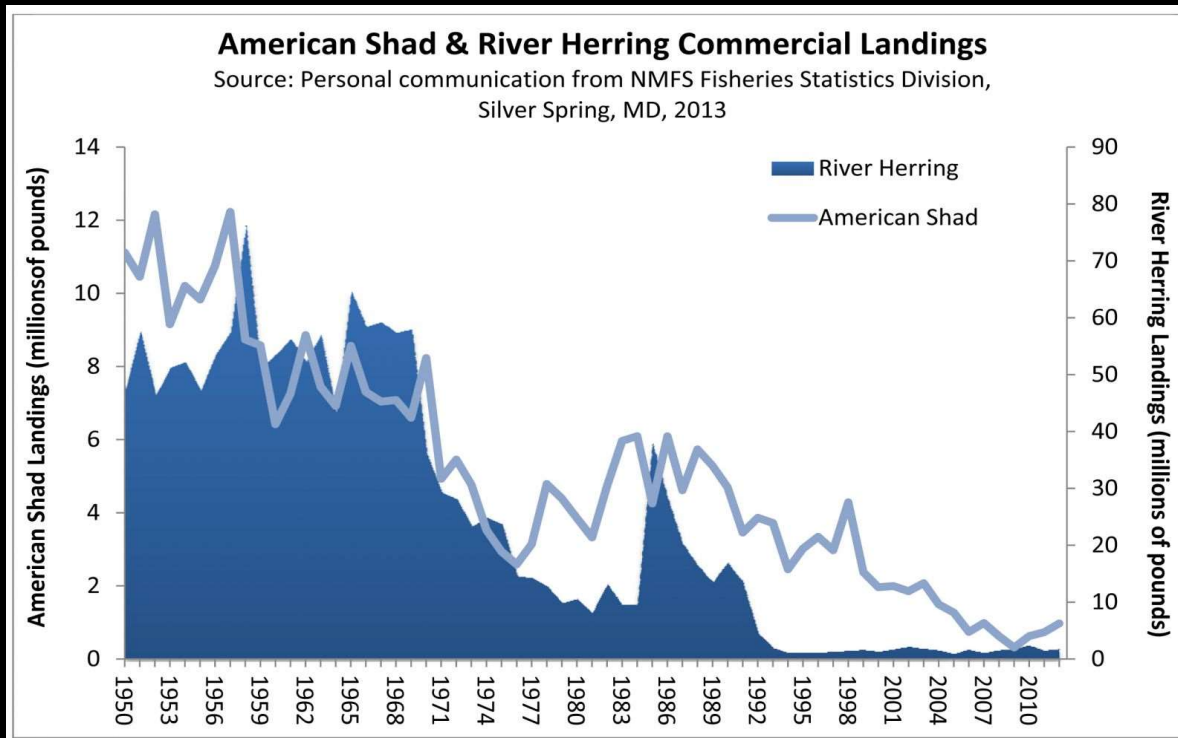
Capt. Chartles Whitborne, 1616

“In a word, it is *unbelievable*, indeed, *undescribable*, as also *incomprehensible*, what quantity is found there. One must behold oneself.”

William Byrd, *Natural History of Virginia*, 1728

# River Herring Today in the Northeast

## “Passenger Pigeons”



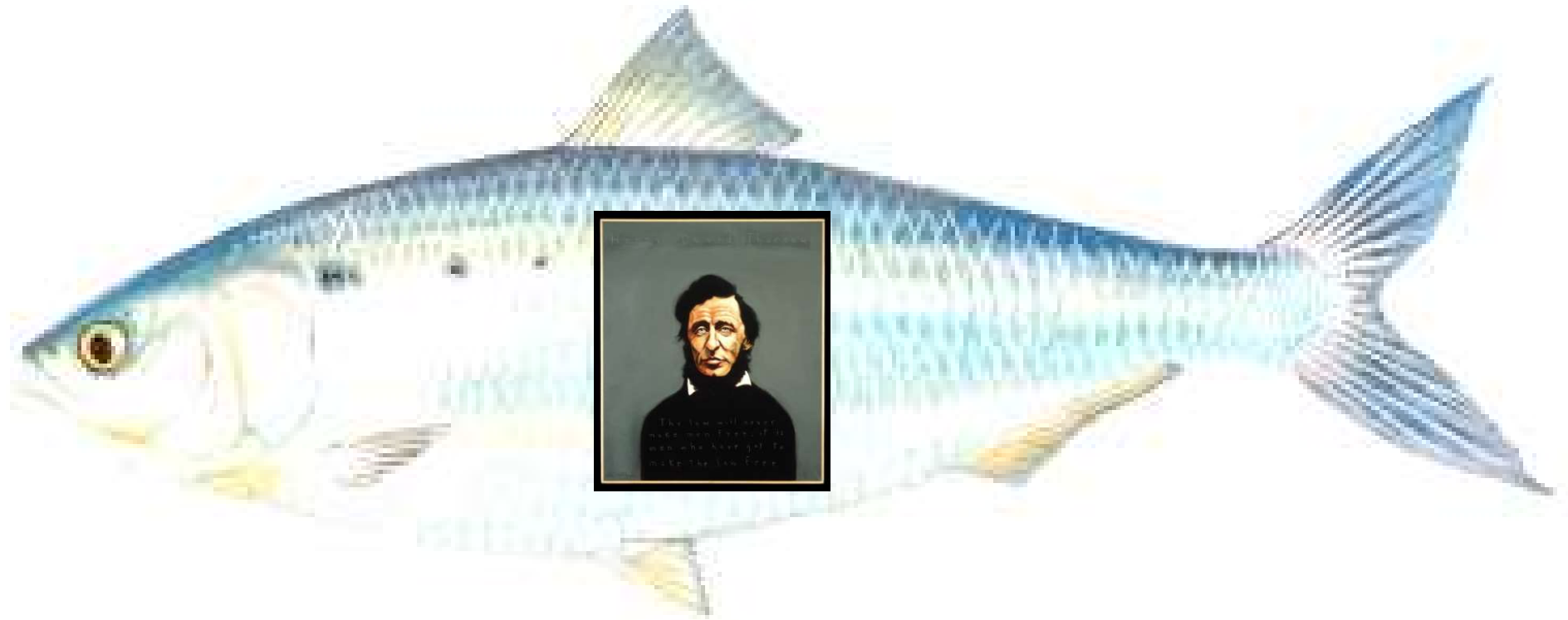
**MA** – total closure since 2005

**RI** – total closure since 2006

**CT** – near total closure since 2002

**NY** – reduced in HR; closed elsewhere

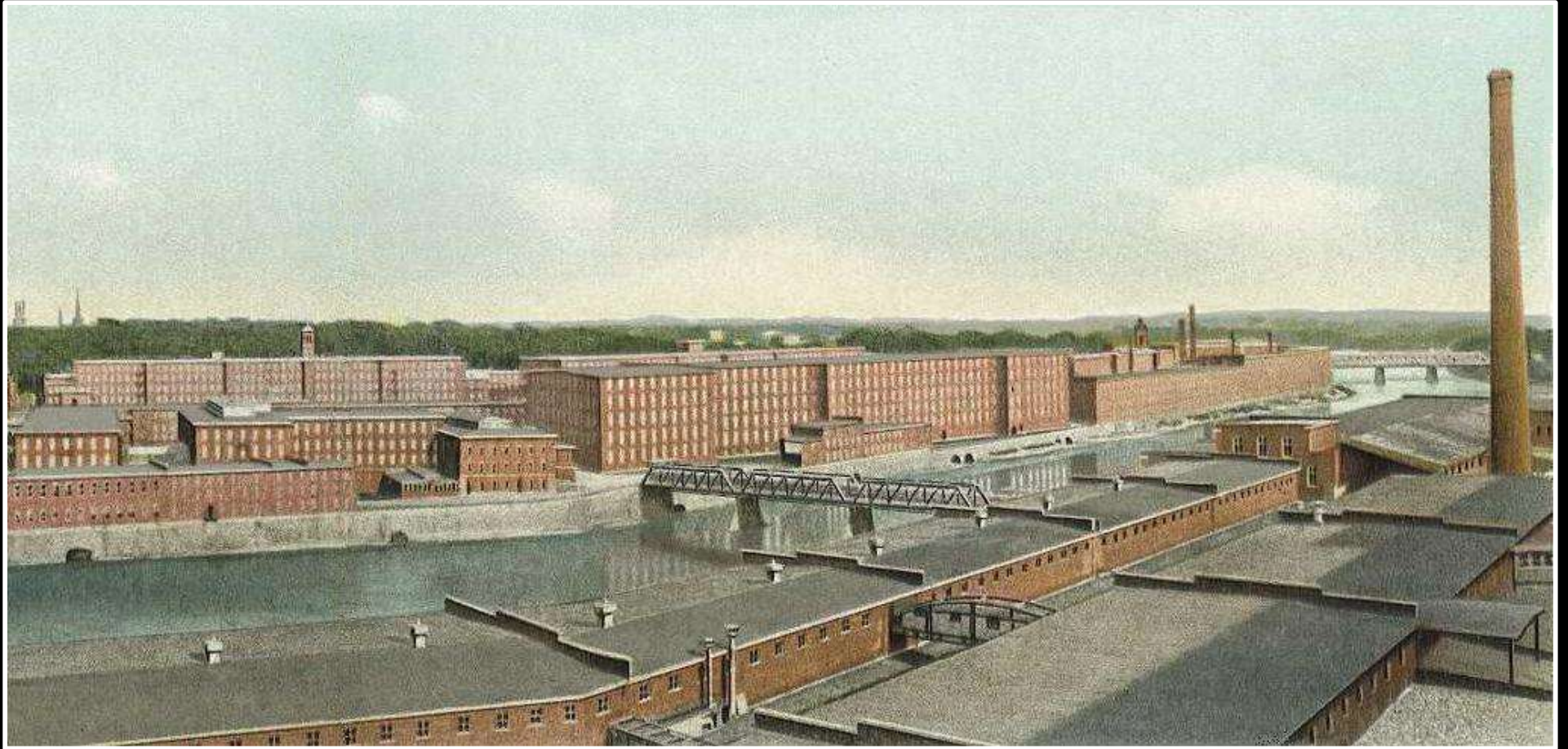
*A Week on the Concord and Merrimack Rivers*  
Henry David Thoreau (1849; trip made in 1839)



*Who Hears the Fishes When They Cry?*



# Amoskeag Mills



# “Celebrate the Magic of the Merrimack”





# What's Changed? Size



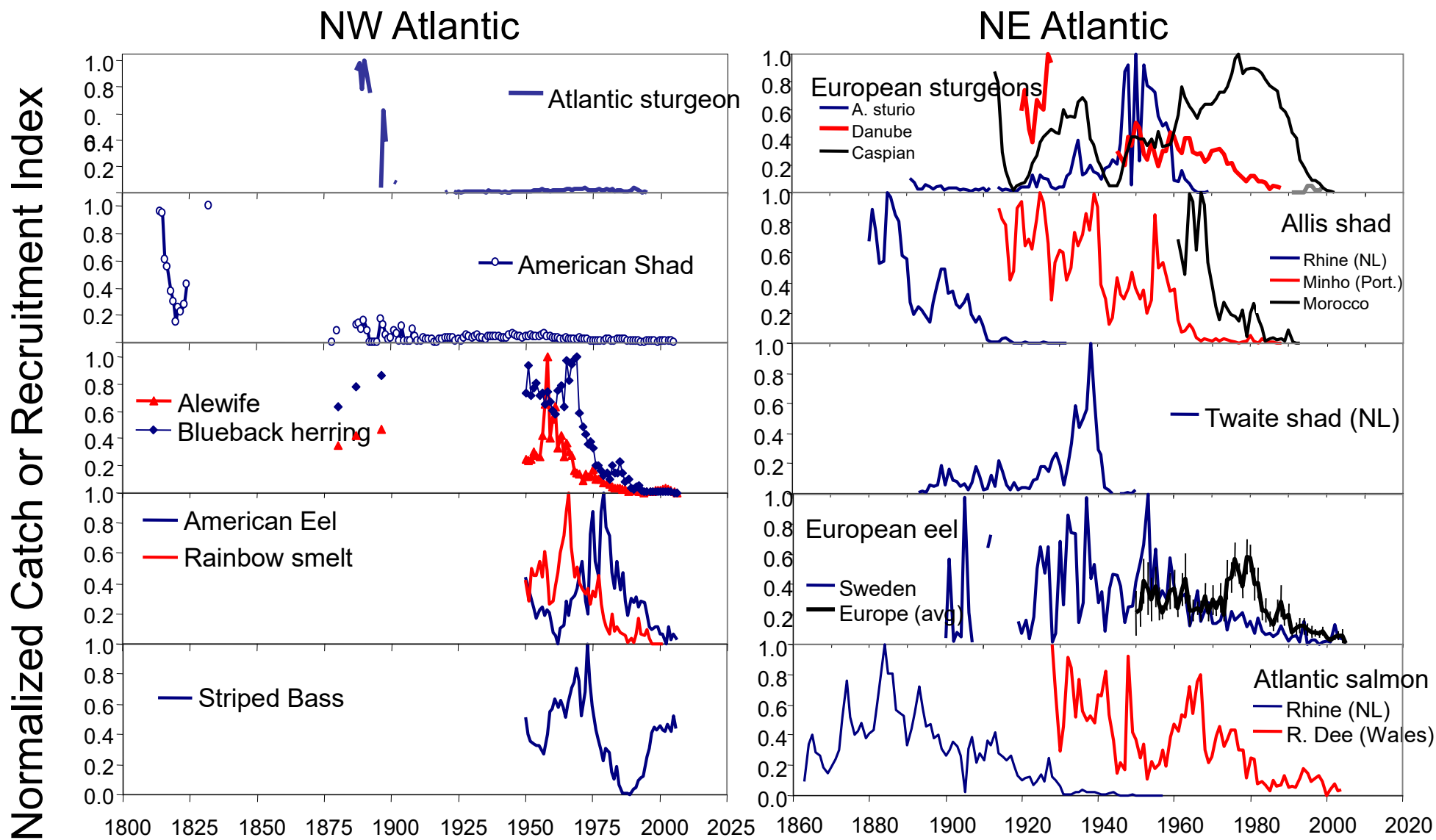
Oliver Hewitt, 1st row Right, Large Shad Catch, Fishs Eddy, NY



# Species & Population Persistence

(Limburg & Waldman, Bioscience 2009)

- 22 Species found in Europe, NA, or both
  - Insufficient data on  $\frac{1}{2}$  (mainly lower value species)
- All others lost populations
  - American shad 70 of 138 lost (51%)
  - ~33% North American Atlantic salmon pops extirpated



*For 31 time series of N. Atlantic anadromous fishes, relative abundances:*

- 98% decline from historic highs in 13,
- 90% in additional 11 (Limburg & Waldman: Bioscience 2009)



# Changes in Abundance *Atlantic Salmon*

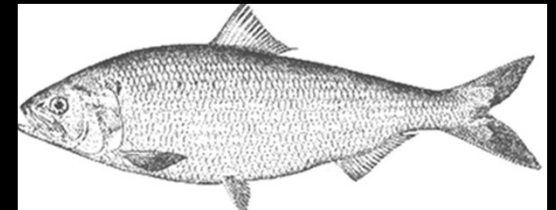
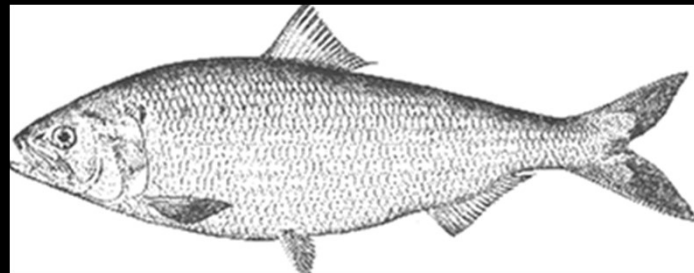
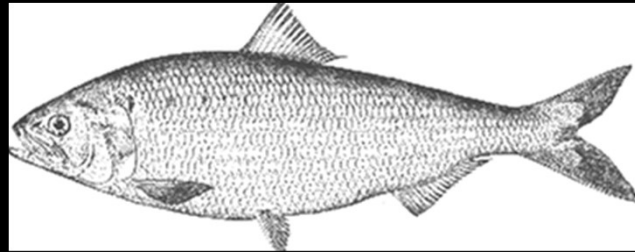
- Historical U.S. estimates 300,000 – 500,000 annually
- 2014: <400!; 2022 ~1500
- Federally endangered in Gulf of Maine rivers\*\*\*\*\*





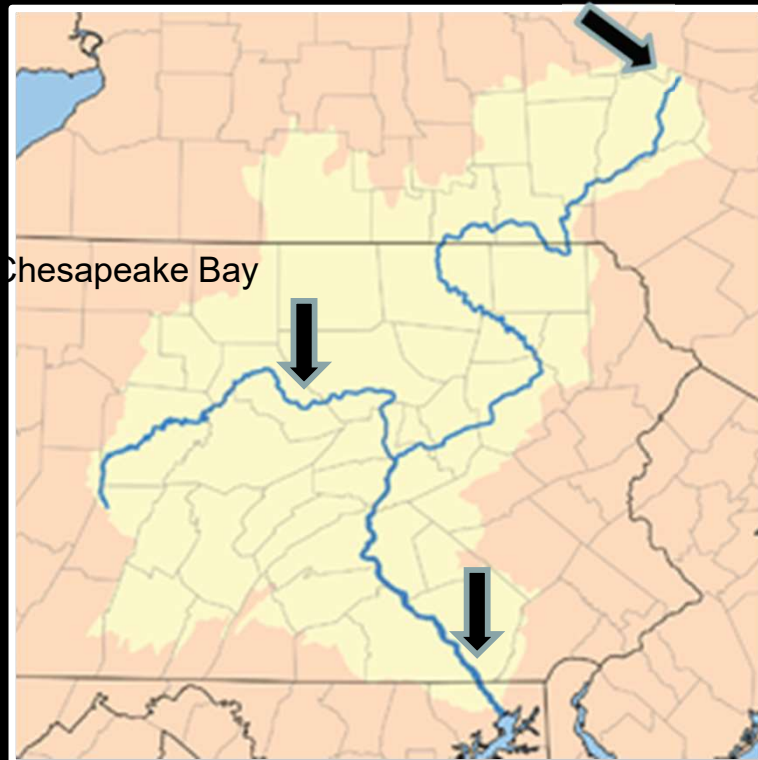
## ***Swimmable Distance,*” American Shad**

- **Originally: 11,221km**
- **In yr 2000: 6,856 km**
- **Net Loss: 4,364 km (~40%)**





# Susquehanna River Shad





# Susquehanna River Shad



Goal = 750,000 past York Haven Dam      Actual Counts 2014

<u>Conowingo</u>	<u>Holtwood</u>	<u>Safe Harbor</u>	<u>York Haven</u>
10,425	2,528	1,336	8

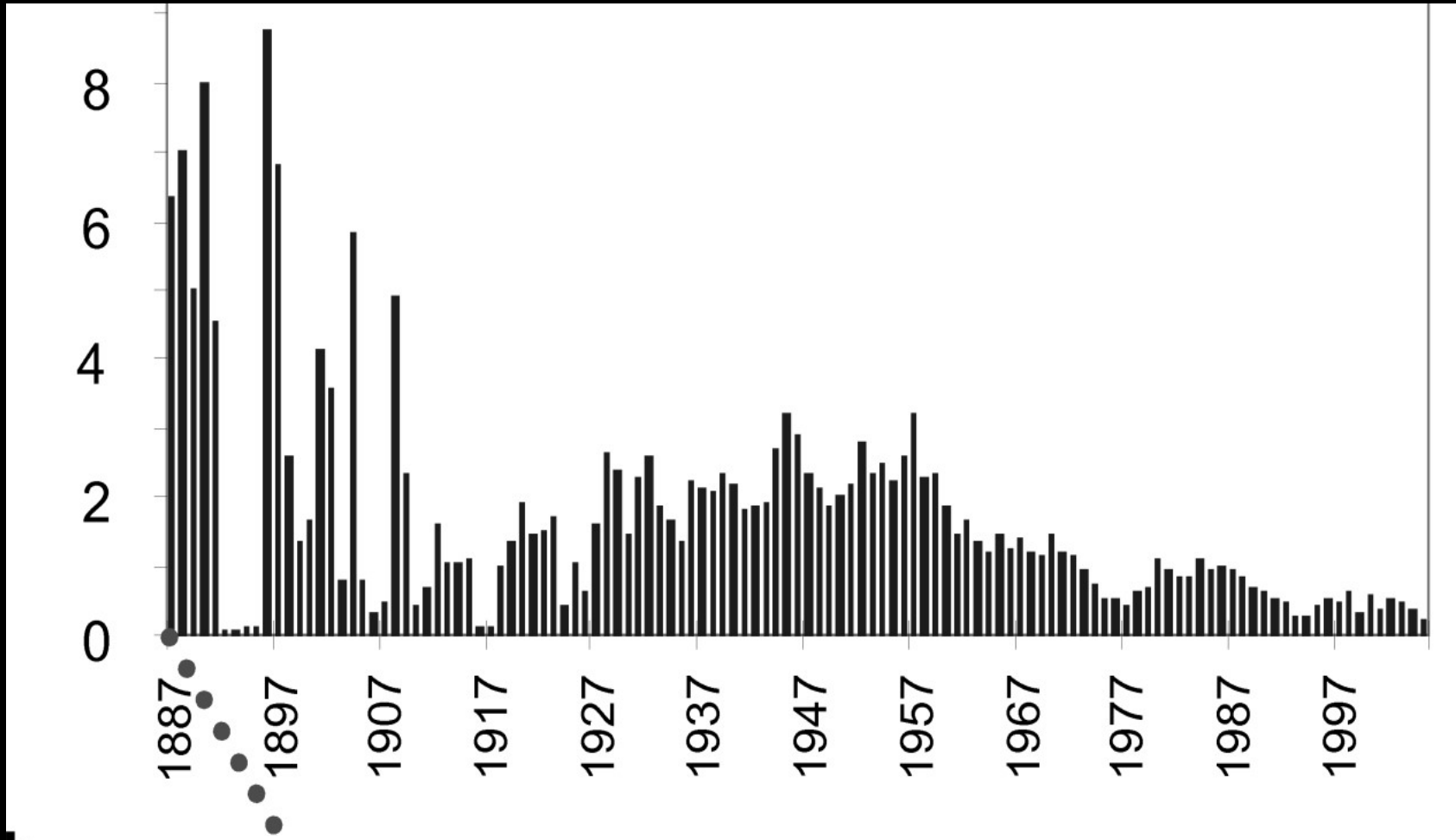
# A Pervasive Problem – Faded Memories

## *The Shifting Baseline Syndrome*

- “Each generation of fisheries scientists accepts as a baseline the stock size . . . that occurred at the beginning of their careers and uses this to evaluate changes. When the next generation starts its career, the stocks have further declined, but it is the stocks at that time that serve as a new baseline.”
- *-Daniel Pauly (1995)*

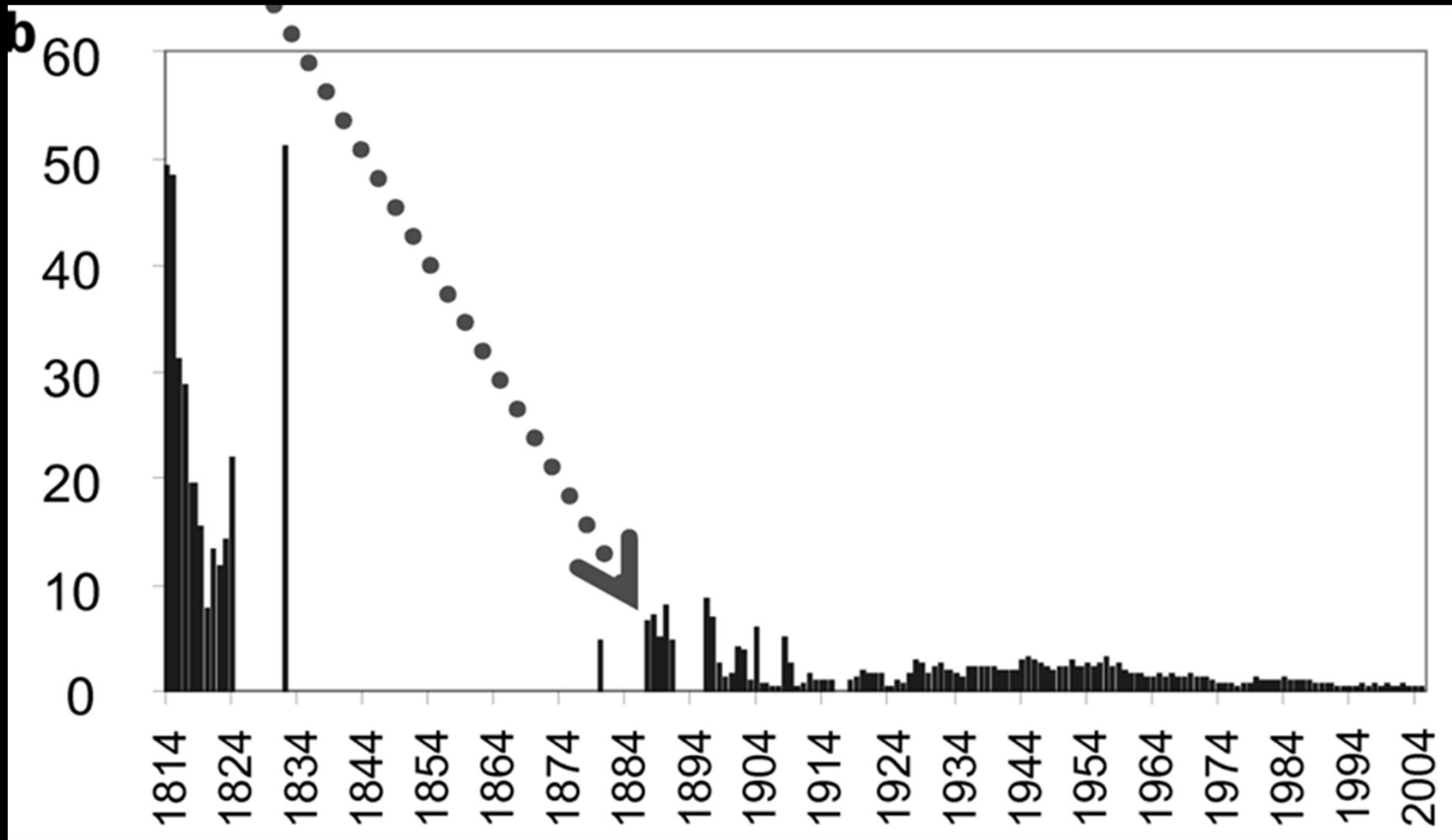


# Potomac R. Shad Landings (millions/kg)





# Potomac R. Shad Landings (millions/kg)



# What Can Be Done?

Largely Rectified  
- Pollution

Essentially  
Untractable

- Non-native Species
- Climate

Tractable &  
(Mostly) Applied  
- Overfishing  
- Power Plants

Tractable but  
Unrectified ???

# What is Tractable but *Still Unrectified*?

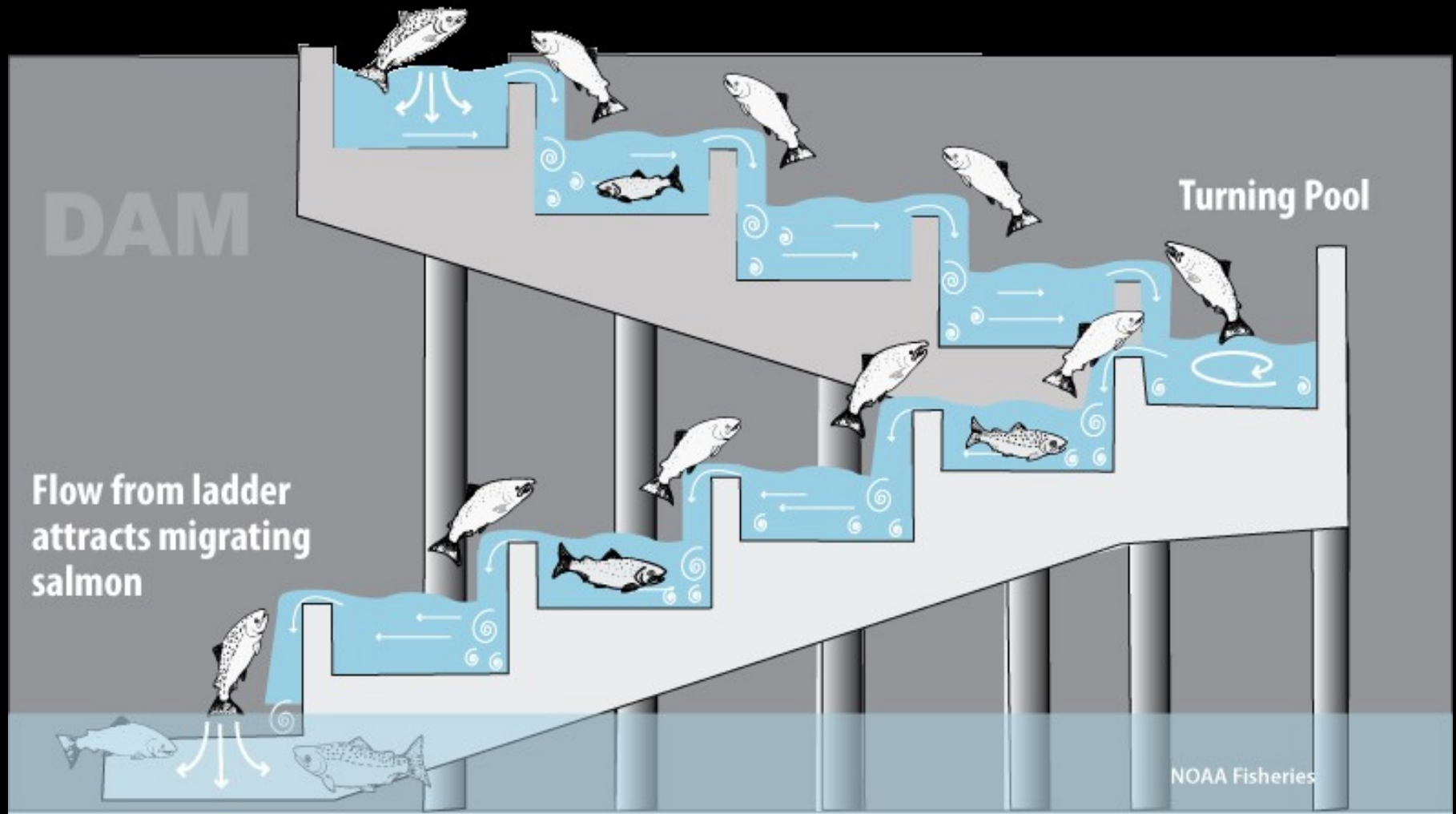


Conowingo Dam, Susquehanna River



# How Do Fish Pass Dams?

## *Fish Ladders*



# How Do Fish Pass Dams?

## *Fish Elevators*

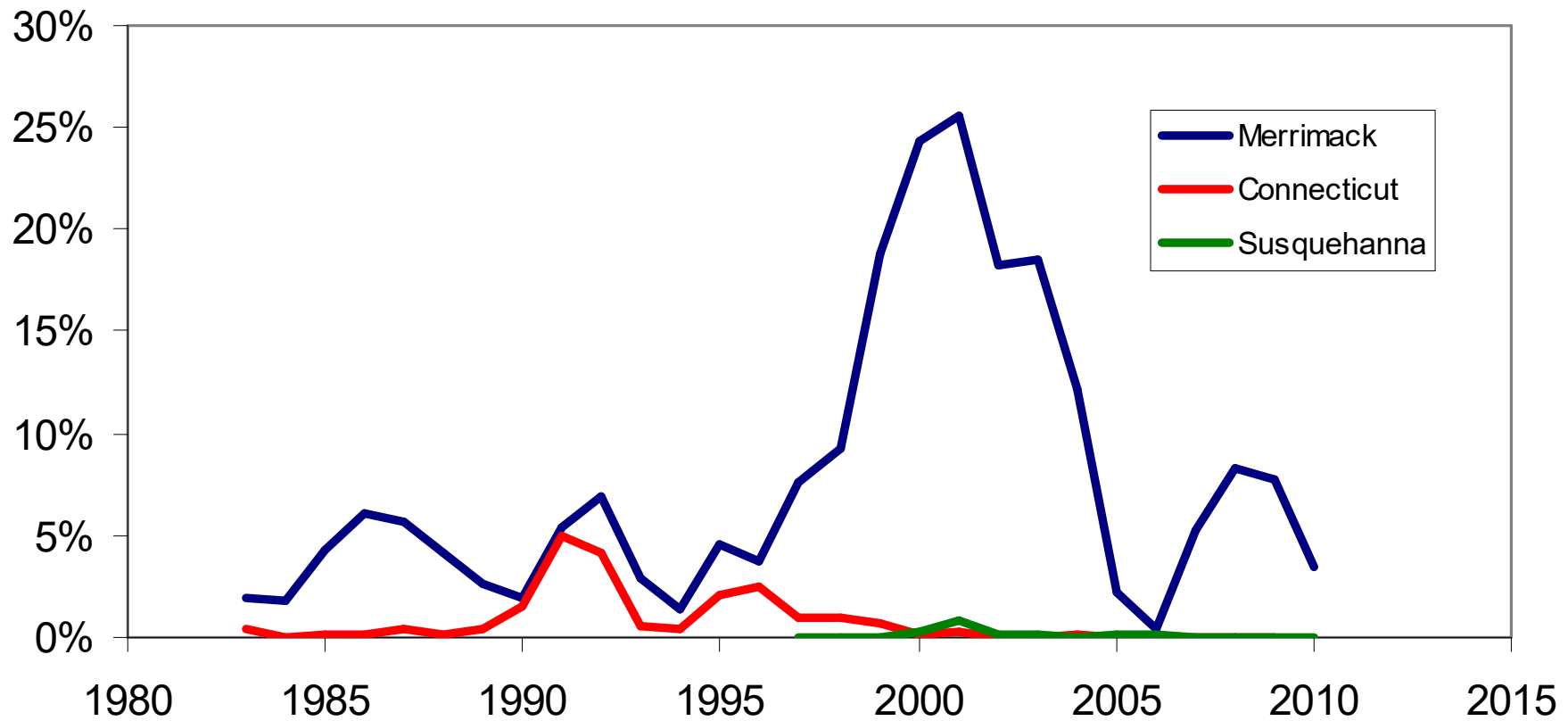




# *Migration Via Internal Combustion Engine*



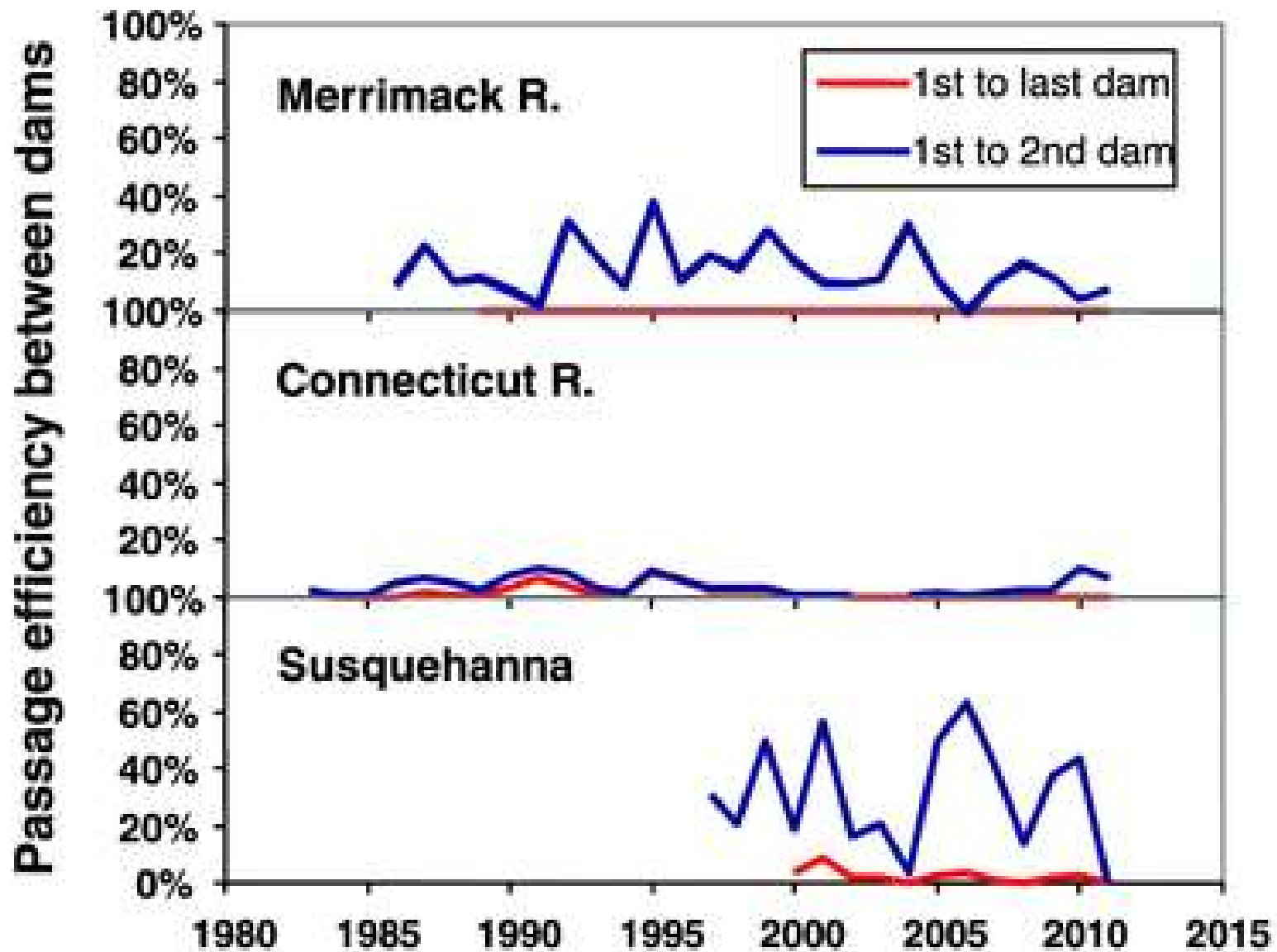
# Number of Shad Passed as Percent of Target



(Brown et al. 2013)



# Passage Efficiencies for Shad

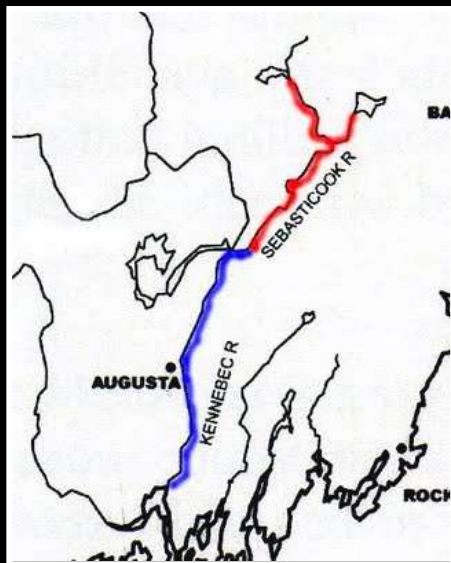


# The Great Atlantic Coast Precedent



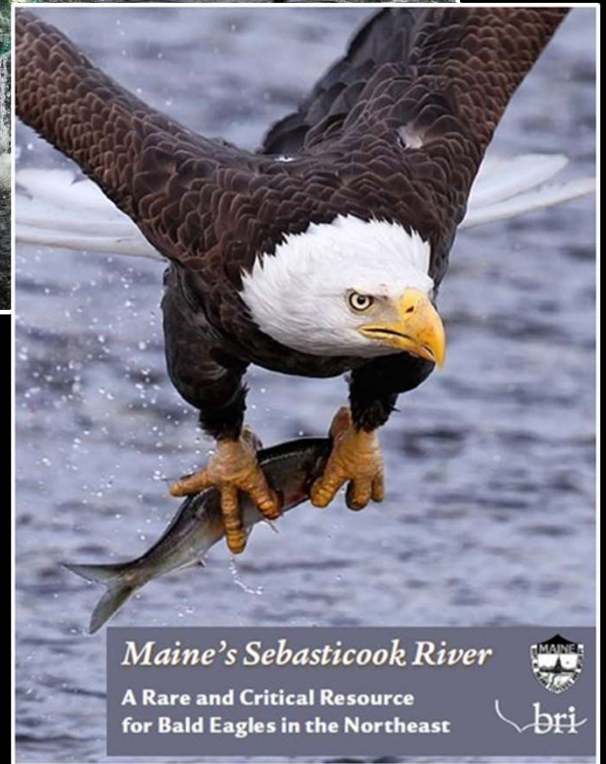
Edwards Dam, Kennebec River, built 1837  
(Augusta, Maine) 3.5 MW!

July 1, 1999



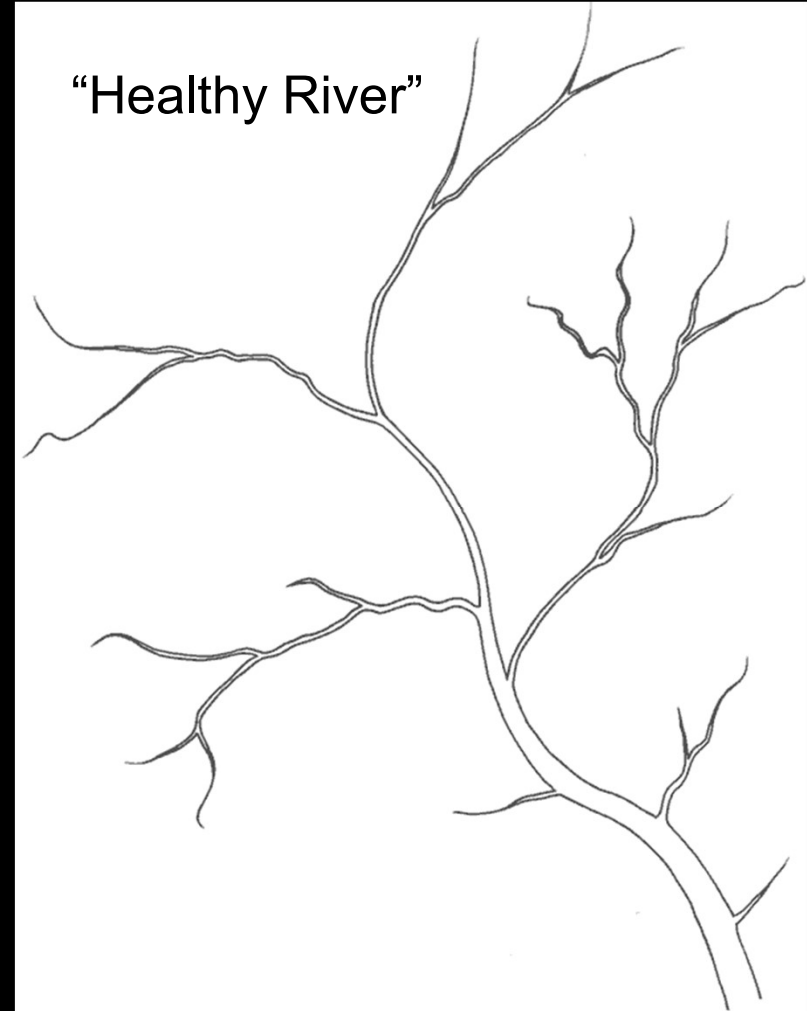
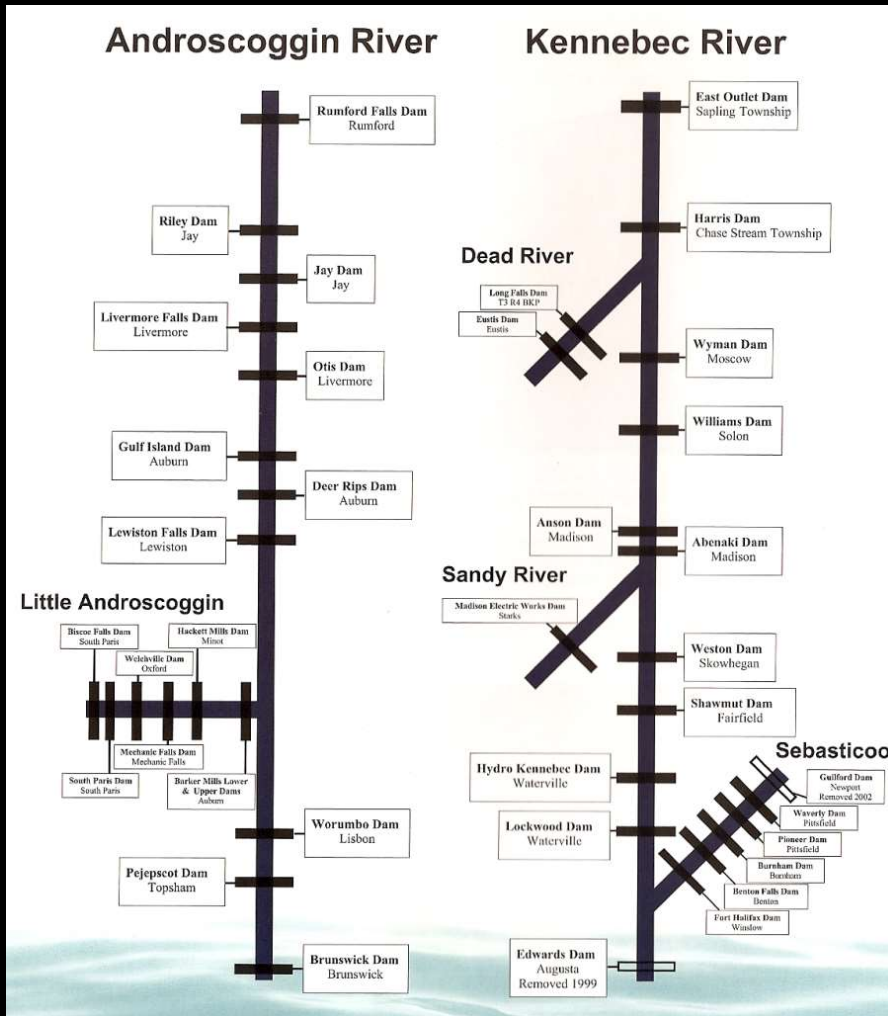


# Sebasticook River



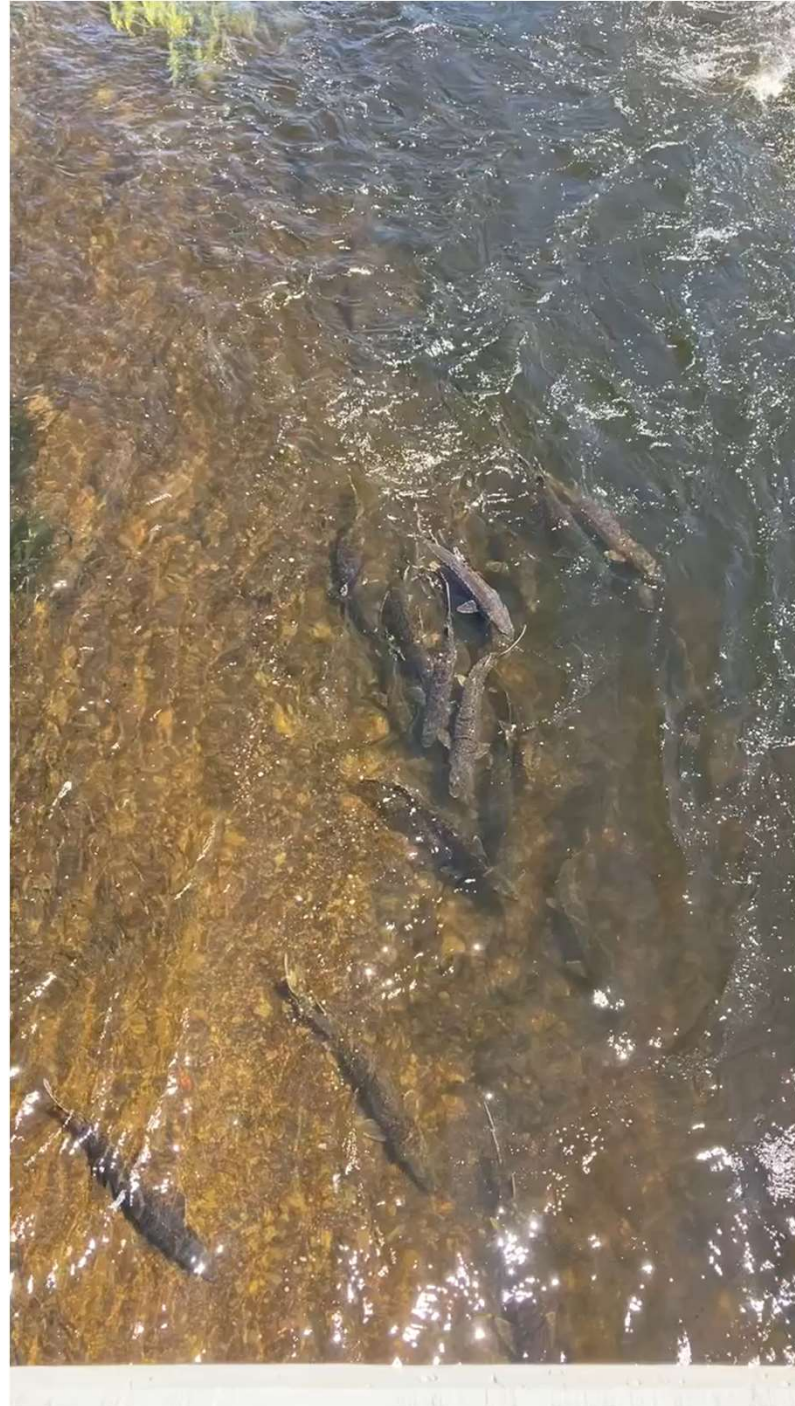
# What Can Be Done?

*Ultimately - Need to Free Rivers in Space & Time!*





Atlantic Sturgeon  
Cobbossee Stream  
June 2023



Nate  
Gray

# Dams in Just Two Rhode Island Watersheds

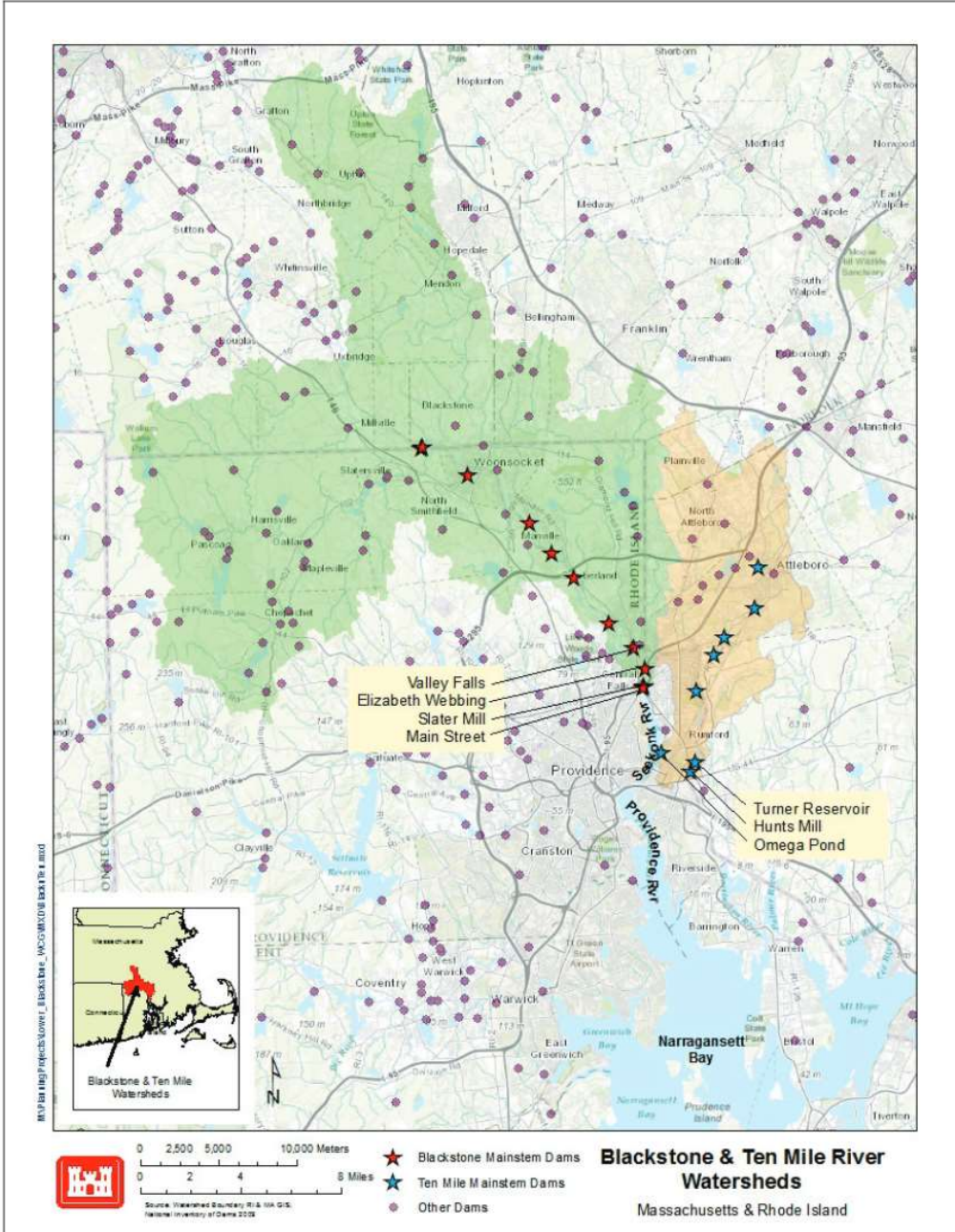


Figure 1. Blackstone and Ten Mile River watersheds and sites considered in this report.



# Slater Mill Dam - Blackstone River



# Why Did the Fish Cross the Road?

