Reconnecting the Hudson Watershed & Other Atlantic Rivers: A Focus on the Fishes

John Waldman Queens College

A Focus on the Fishes - Diadromous



A Focus on the Fishes - Potamodromous



Costs and Benefits of Diadromy

Benefits

- Relative mortality differences between habitats
- Relative food resources between habitats

<u>Costs</u>

- Physiological adjustments
- Migrations
 - Bioenergetics
 - Predation risk
- Suitability of *two* habitats





Diadromous Species are Iconic



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

Passenger Pigeons of the Sea? River Herring Today in the Northeast





MA – total closure since 2005
RI –total closure since 2006
CT – near total closure since 2002
NY – reduced in HR; closed elsewhere

Managing Anadromous Fishes: Promise & Perils



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







Species & Population Persistence (Limburg & Waldman, Bioscience 2009)

- 22 Species found in Europe, NA, or both
 Insufficient data on ½ (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
- In 2014: <400!
- Federally endangered in Gulf of Maine rivers





Susquehanna River Shad





Susquehanna River Shad



Goal = 2,000,000 past York Haven Dam Actual Counts 2014

Conowingo	Holtwood	Safe Harbor	York Haven
10,425	2,528	1,336	8



Swimmable Distance," American Shad

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







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)



Shad Landings (millions/kg)



Shad Landings (millions/kg)



What Can Be Done? Drivers & Tractability

Largely Rectified

Essentially Untractable

- Non-native Species
- Climate Rivers & Marine

Tractable & (Mostly) Applied

- Overfishing
- Power Plants

Tractable but Unrectified What did the fish say when it swam into the wall?

Oh Dam!



Conowingo Dam, Susquehanna River

Dam Removal - The Great Atlantic Coast Precedent



Edwards Dam, Kennebec River, July 1, 1999 (built 1837 - Augusta, Maine)





"Fish Passage"





Ladders

Elevators



Trucks!

River Herring



David Calantuono



Watershed Action Alliance

Are We at a Turning Point?

 Dams don't last forever - aging and sedimentation & many are coming up for FERC relicensing



A Bigger Toolbox - Nature-Like Fishways



Yale Environment 360 Undamming Rivers: A Chance For New Clean Energy Source by john waldman and karin limburg





SHARED RIVERS CONCEPT











National: **516,878** hectares needed for solar to replace <u>ALL</u> **2603** hydropower dams in lower 48 states. This is equal in size to Delaware and is **0.07%** of lower 48 states land area.

The Hudson River Watershed







Wynantskill – May 2016







A Focus on the Fishes - New York Harbor and Long Island







Long Island Diadromous Fish Restoration Project



Why Did the Fish Cross the Road?

