

Marine Fish Resources of the Neponset River



T.Watts 2004

Kristen H. Ferry



Important Marine Fish of the Neponset River

Historic/Current

River herring



American shad



Rainbow Smelt



River Herring

Actually, two closely related species...



alewife

Alosa pseudoharengus

Bigger!



blueback herring

Alosa aestivalis

Less common in MA

River Herring

Actually, two closely related species...



alewife

Alosa pseudoharengus



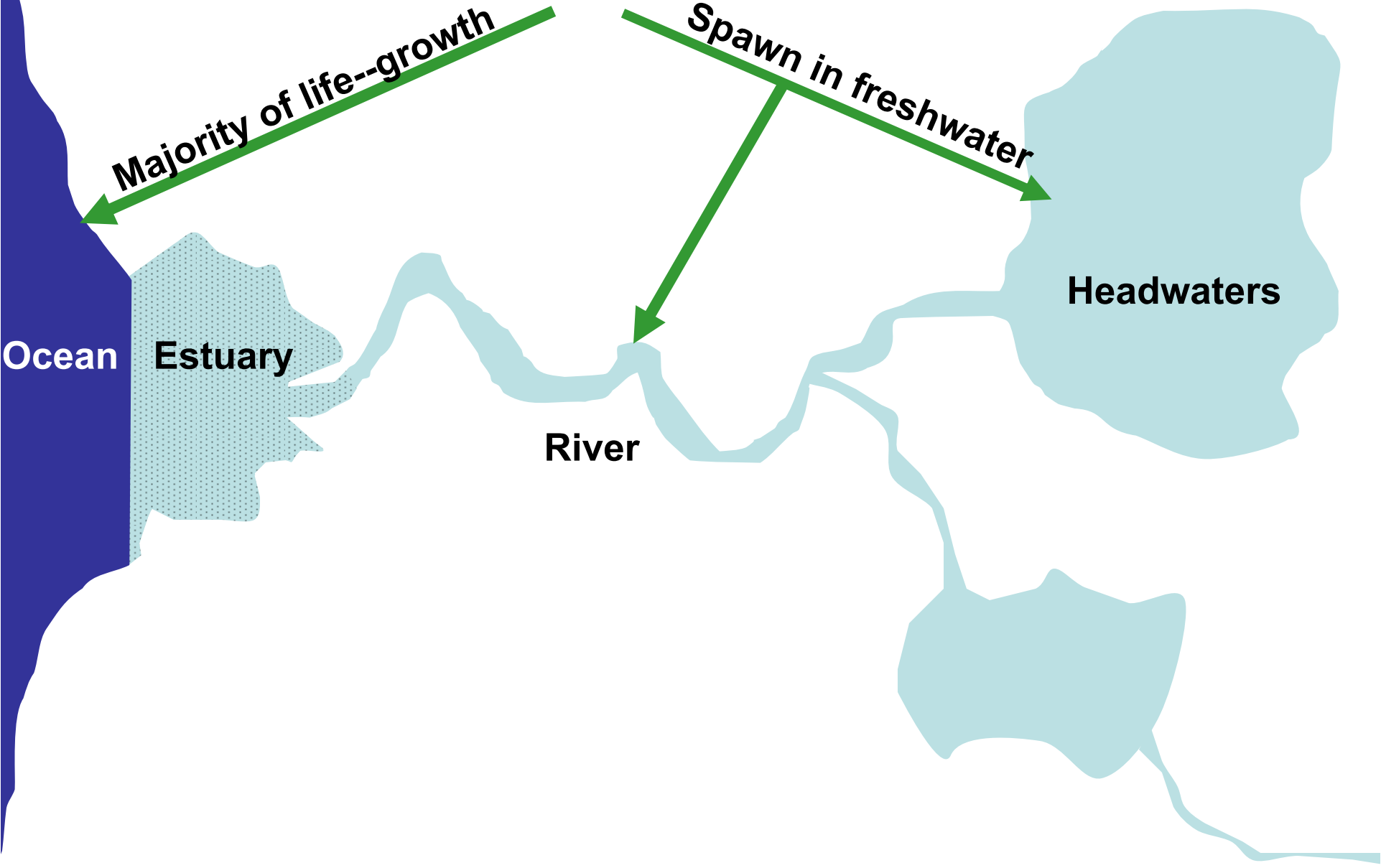
blueback herring

Alosa aestivalis

Managed together

- Traditional bait fishery
- Some consumption, roe

Anadromous



Majority of life--growth

Spawn in freshwater

Ocean

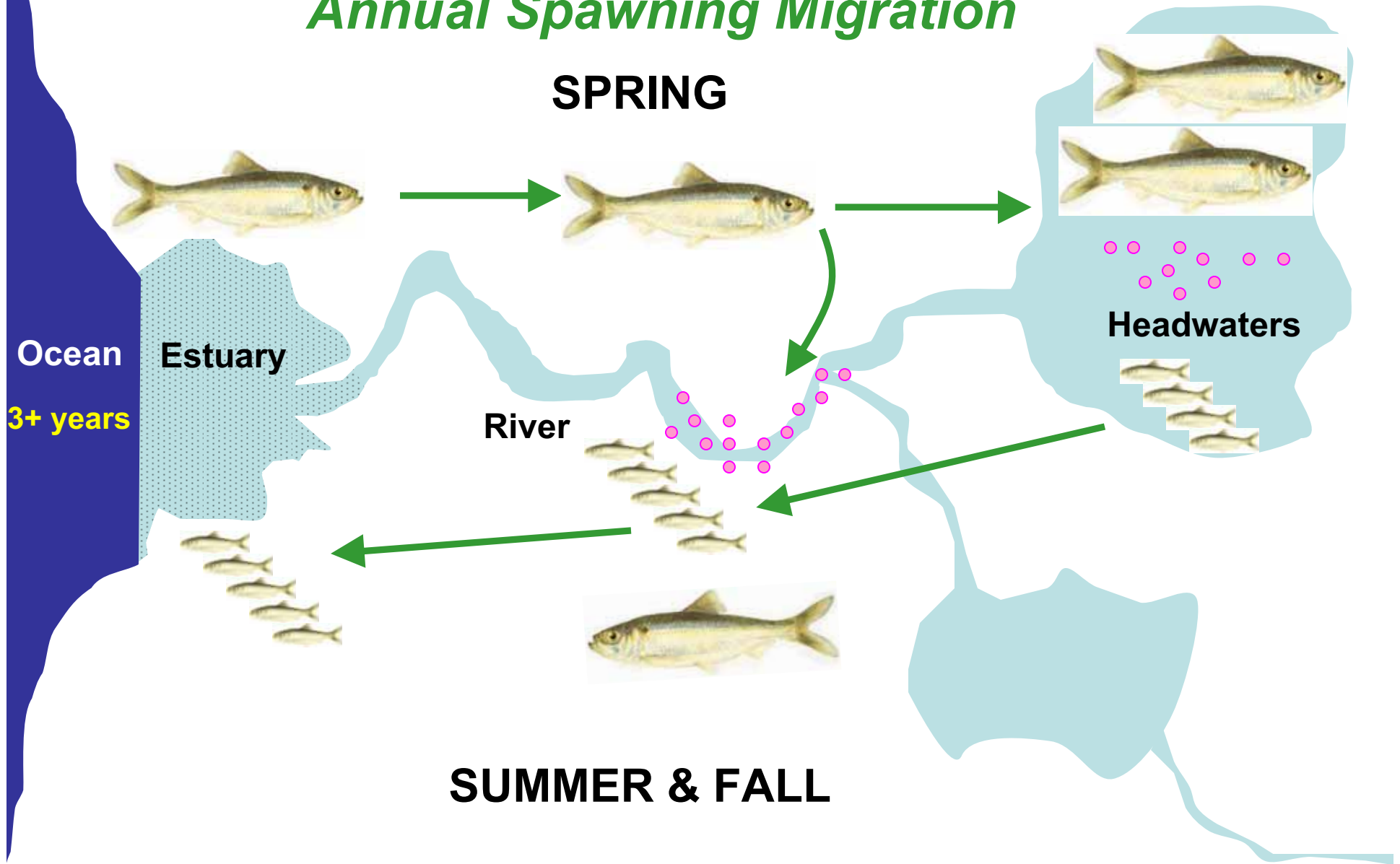
Estuary

River

Headwaters

Anadromous: River Herring Annual Spawning Migration

SPRING

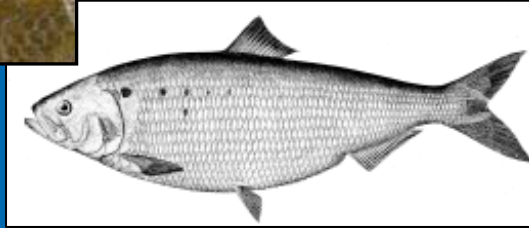


SUMMER & FALL



American shad

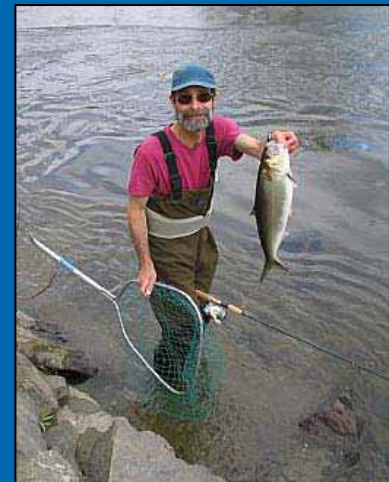
Alosa sapidissima



- Largest member of the herring family
- Inhabit/Inhabited larger coastal rivers

(MA: Connecticut, Merrimack, Neponset, and Charles.
Also Palmer and Indianhead)

- Popular sport fish/consumption



Rainbow Smelt

Osmerus mordax

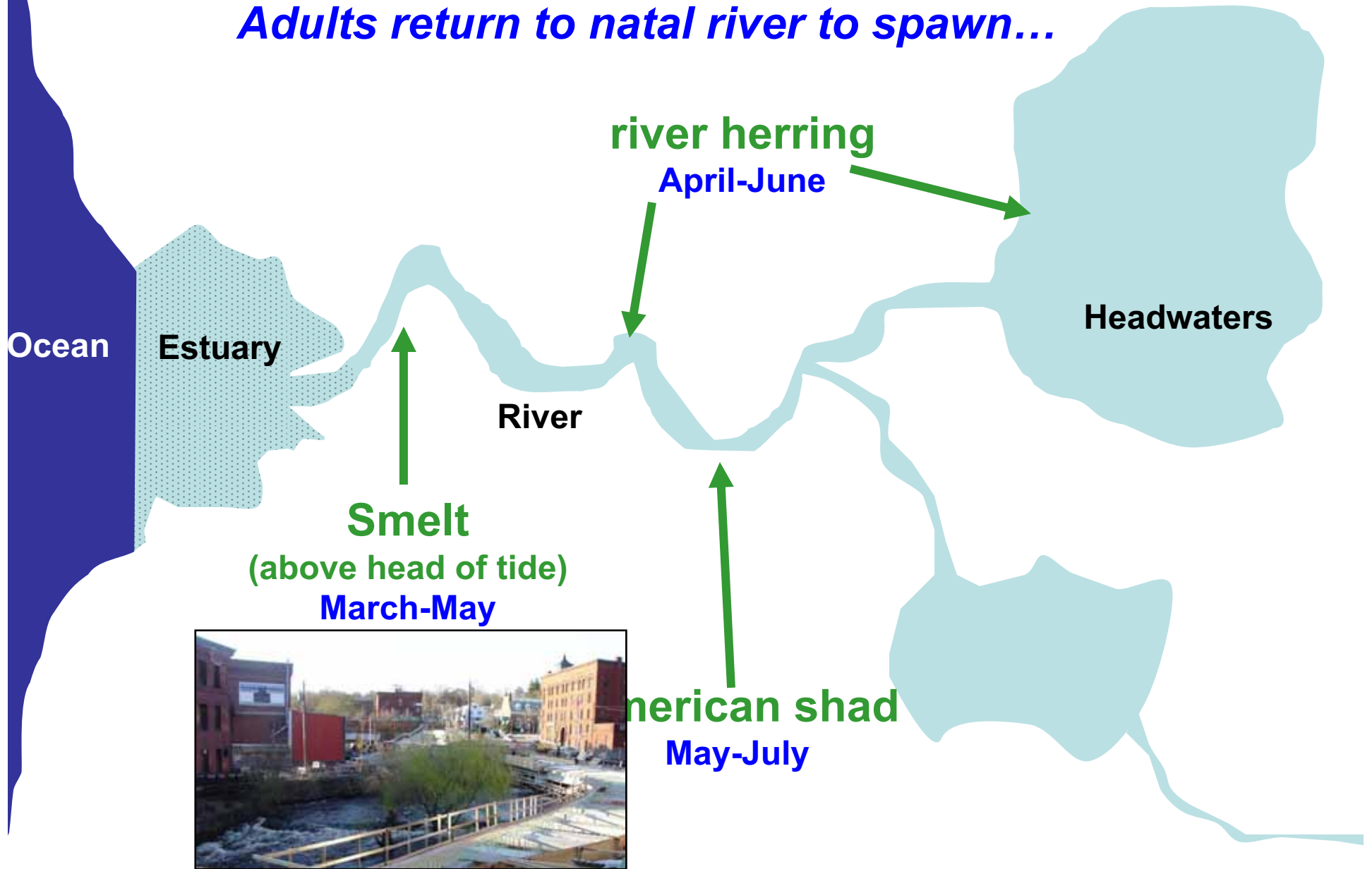


- Smaller bodied with large teeth
- Nearshore species, Canada to MA
- Spawn only at night
- Prized for taste
- Neponset, one of few remaining healthy spawning populations*

Marine Fisheries restoration program

Anadromous: Where and When?

Adults return to natal river to spawn...



So What?

Why Are Anadromous Fish Important?

Ecological

1. Provide food for other fish and sea birds
2. Important source of oceanic nutrients for rivers



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Social

- Historically important commercial & recreational fisheries
- Consumption
- Aesthetics—sign of spring & healthy river



A look at History and the Neponset...

1623—Plymouth Colony Fish Law, protects alewife

1709—Act passed to prevent obstructions to fish passage
in rivers

1741—Act passed requiring dam owners to provide
upstream passage

1797—



1797 and the Neponset...

- **Fishery established**
- **Herring Committee appointed**
- **Fish passage provisions**
- **Herring warden appointed**
- **Public sale of herring**

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**1900s(early)—Neponset River highly polluted with sewage &
industrial waste**

**1972—Passage of the Clean Water Act – water quality
improves**

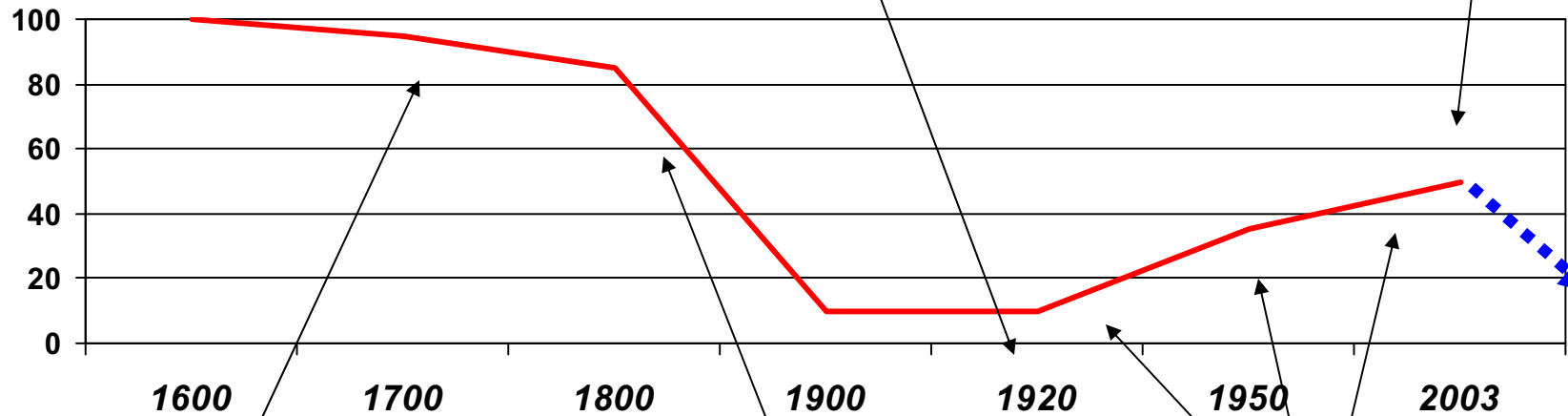
No herring fishery!

Historic River Herring Abundance in Massachusetts

**First Fishway 1620
Ca. 200 runs**

**9 runs in Mass Bay
(Belding 1920)**

100 runs

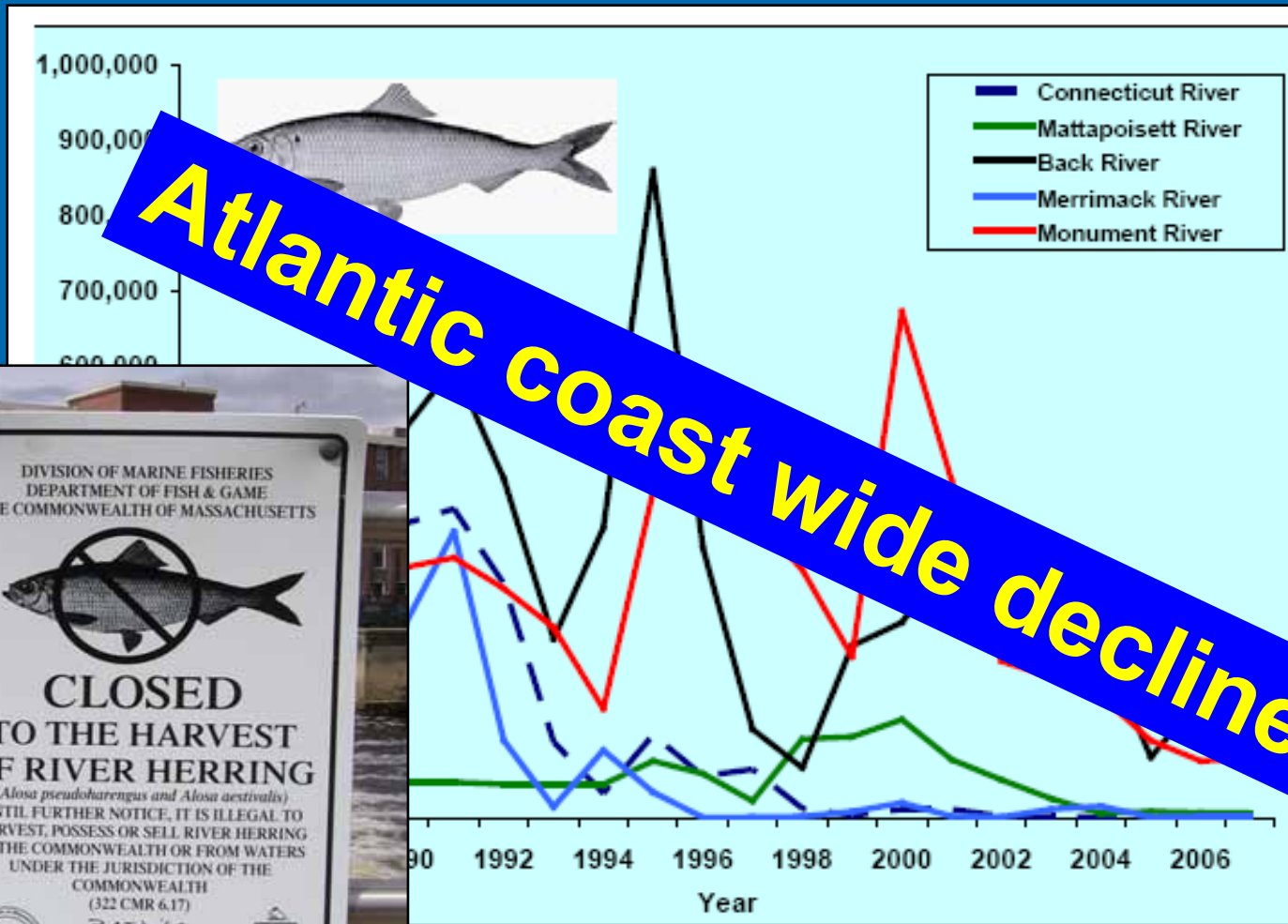


Colonial Dams

**Industrial
Revolution**

DMF fishway projects

Status of River Herring in MA



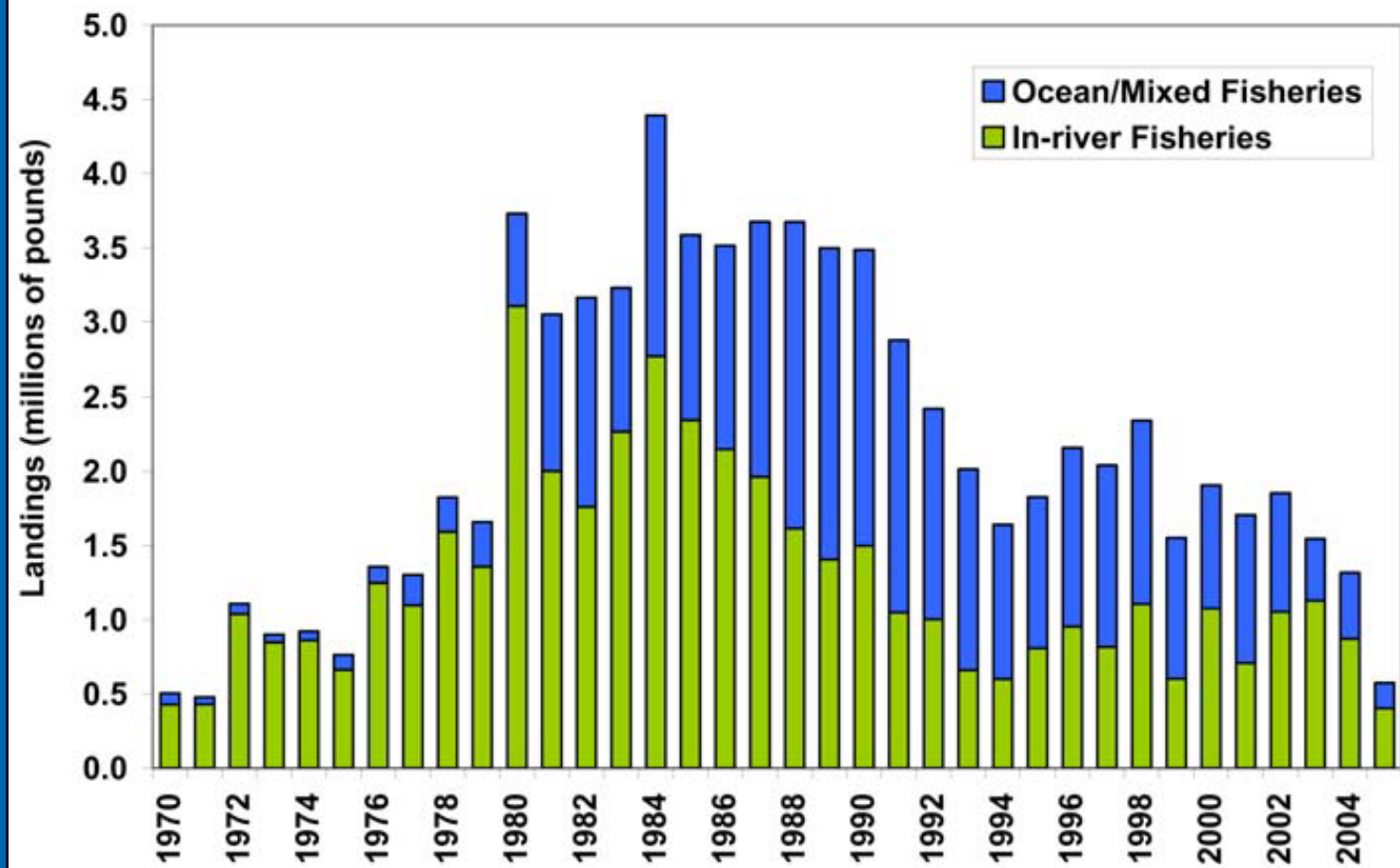
Atlantic coast wide decline



adult herring returns in various Massachusetts rivers from estimates derived from state agencies, town officials and ops.

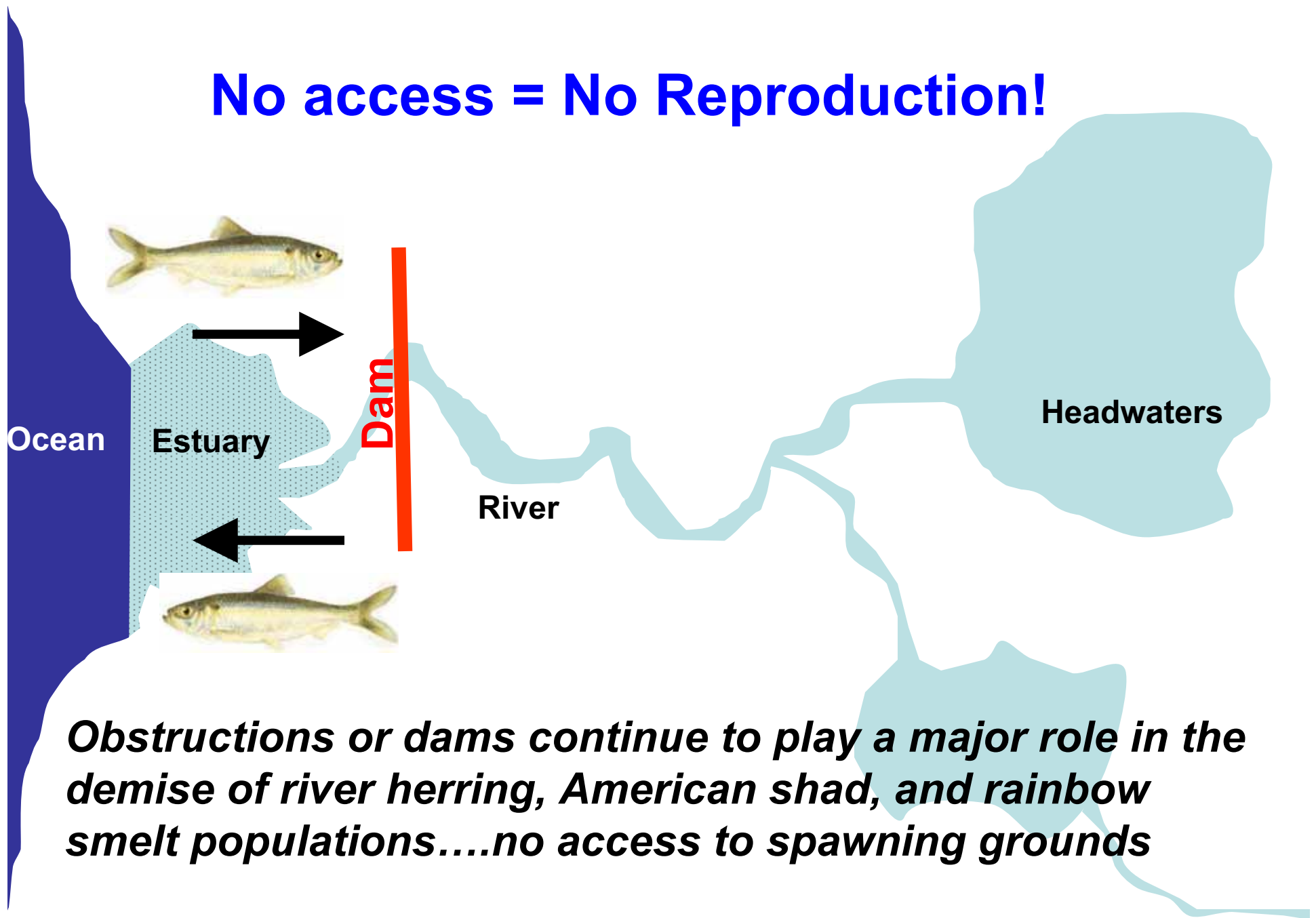
Same scenario for American shad and smelt...

Figure 1. American Shad Commercial Landings by In-river and Ocean/Mixed Fisheries, 1970 - 2005 (Source: ASMFC American Shad Stock Assessment Report for Peer Review, 2007)



Why?

No access = No Reproduction!

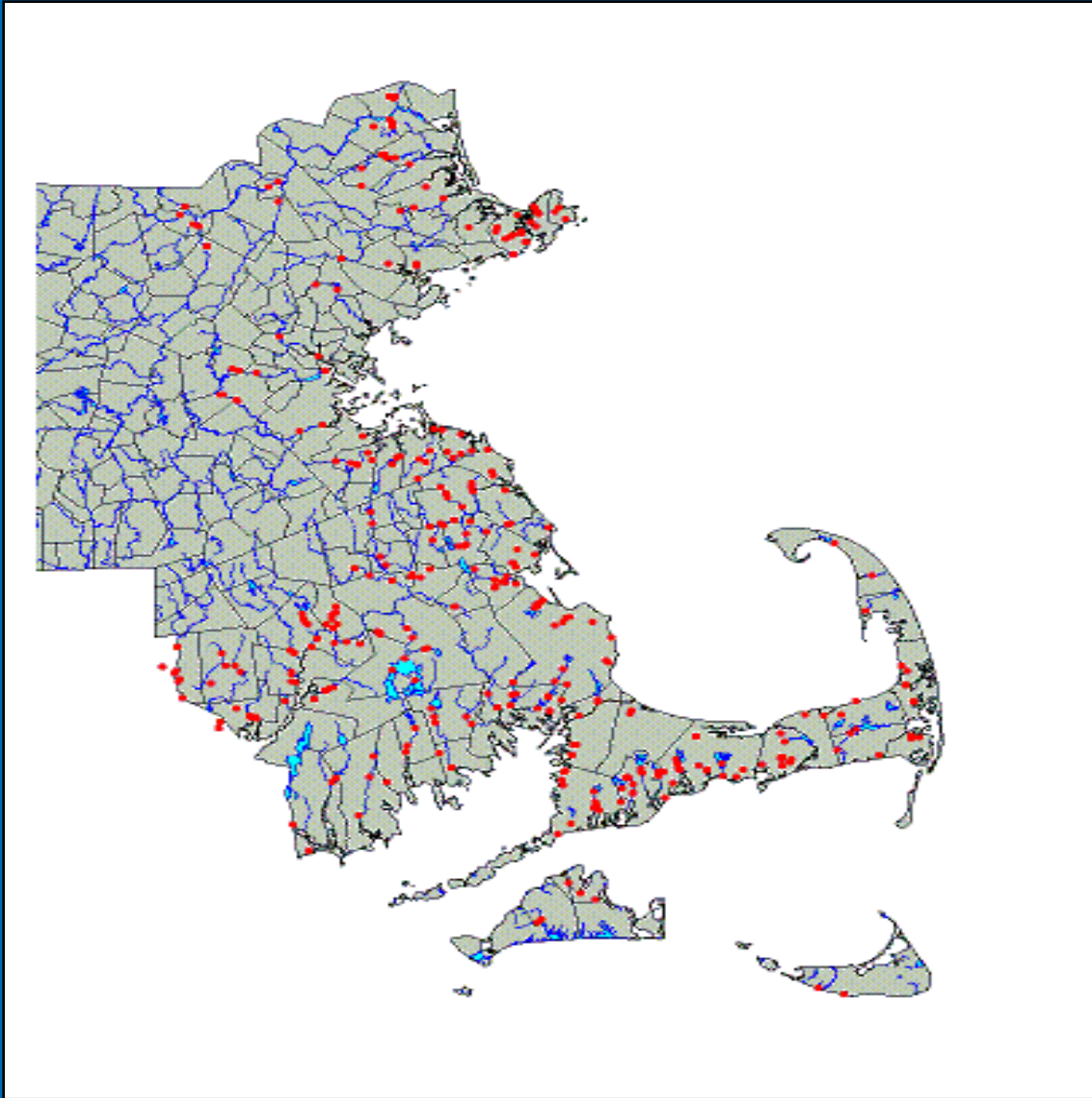


Obstructions or dams continue to play a major role in the demise of river herring, American shad, and rainbow smelt populations....no access to spawning grounds

Typical Massachusetts Dams



In Coastal MA Rivers...



380 Obstructions

175 Fishways

With so many dams, why the Neponset?

Because of its size and potential available spawning habitat, the Neponset could contribute more to resource recovery than any other system in MA.



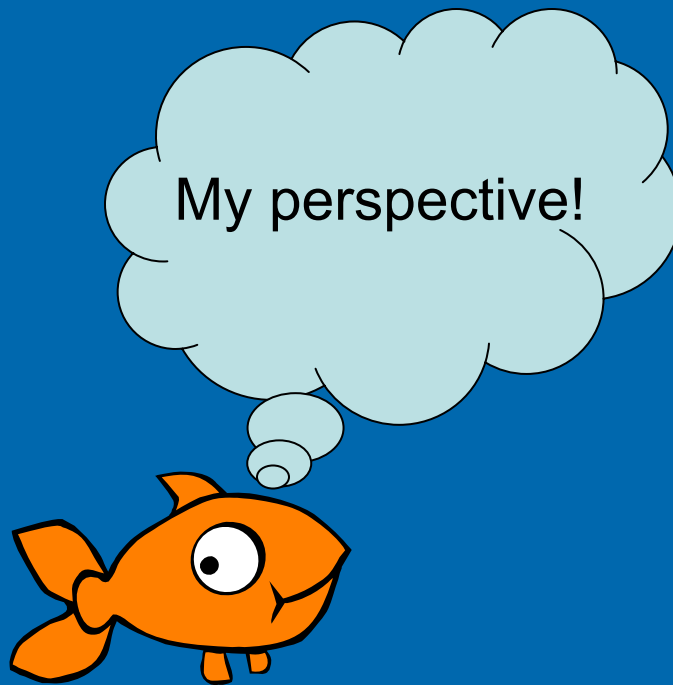
**Fish passage in the Neponset
is the highest priority for *Marine Fisheries***





NORM'S SPAWNING SERVICE
"When you gotta get upstream in a hurry!"

Options for the Neponset



Dam Removal



Ecological benefits

- Improved water quality
- Reduced sedimentation

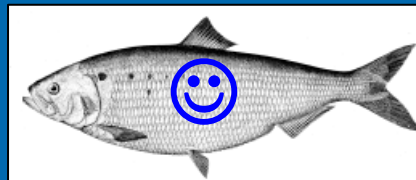
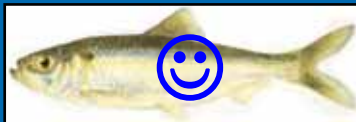
Full fish passage

System functionality

Merrimack Village Dam, Souhegan River, NH, August 2008 (M. Wamser)

***Partial dam removal can also be beneficial,
if properly designed.***

Passage:



Dam Removal

Billington Street Dam Town Brook, Plymouth

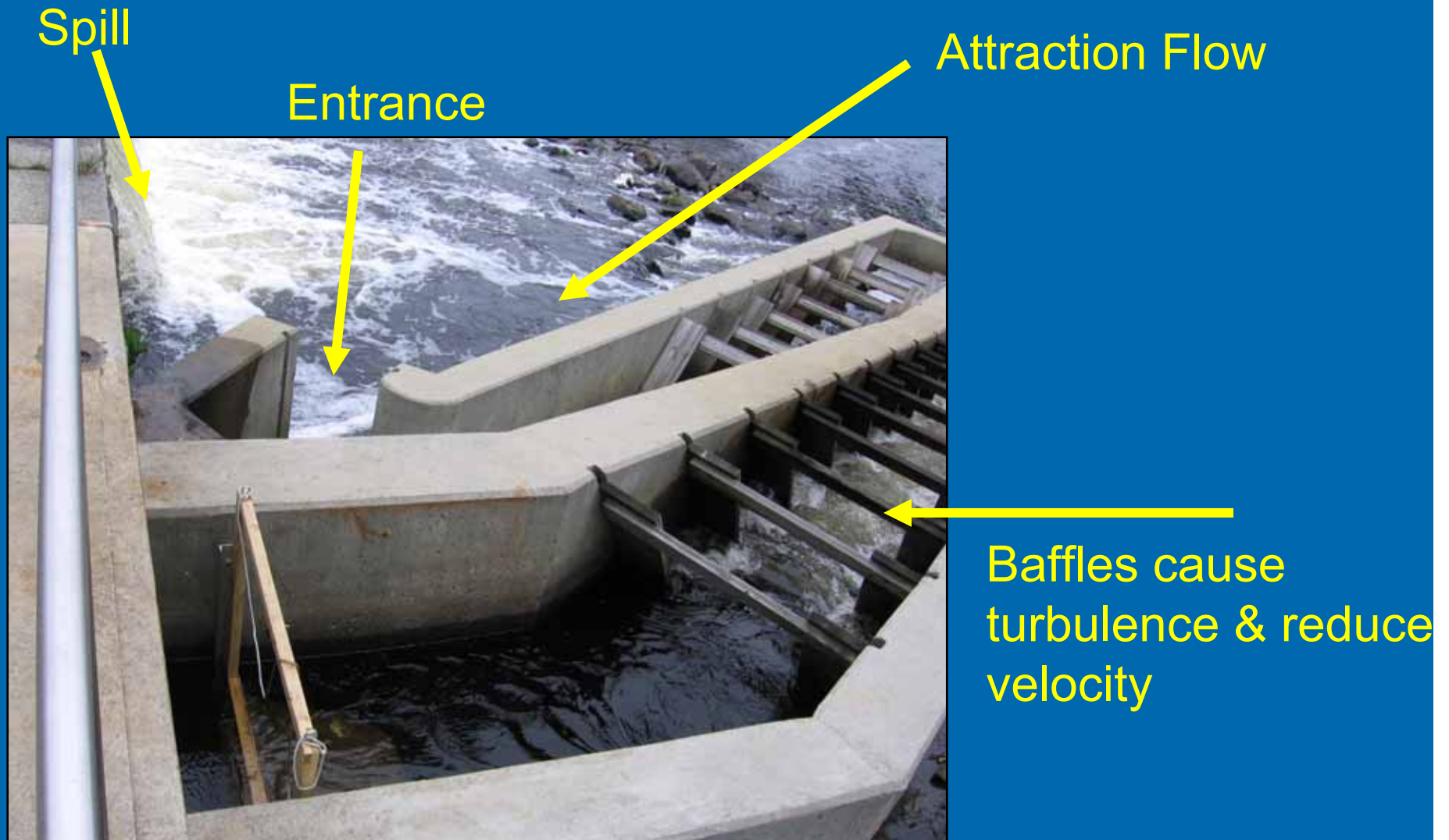


>90% passage
(Haro & Franklin)

Species present:



Fishway: Denil



Ipswich Mills Dam, Ipswich River

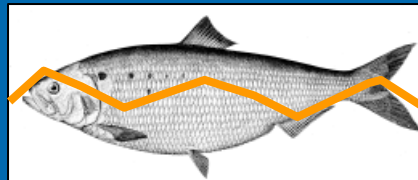
Fishway: Denil



Newton Lower Falls, Charles River

- For shad, must be 4 ft. wide—BIG!
- Baffle and cement maintenance
- Usually has “trash rack”:
requires regular debris removal
- Requires board adjustment
often in spring

Passage:



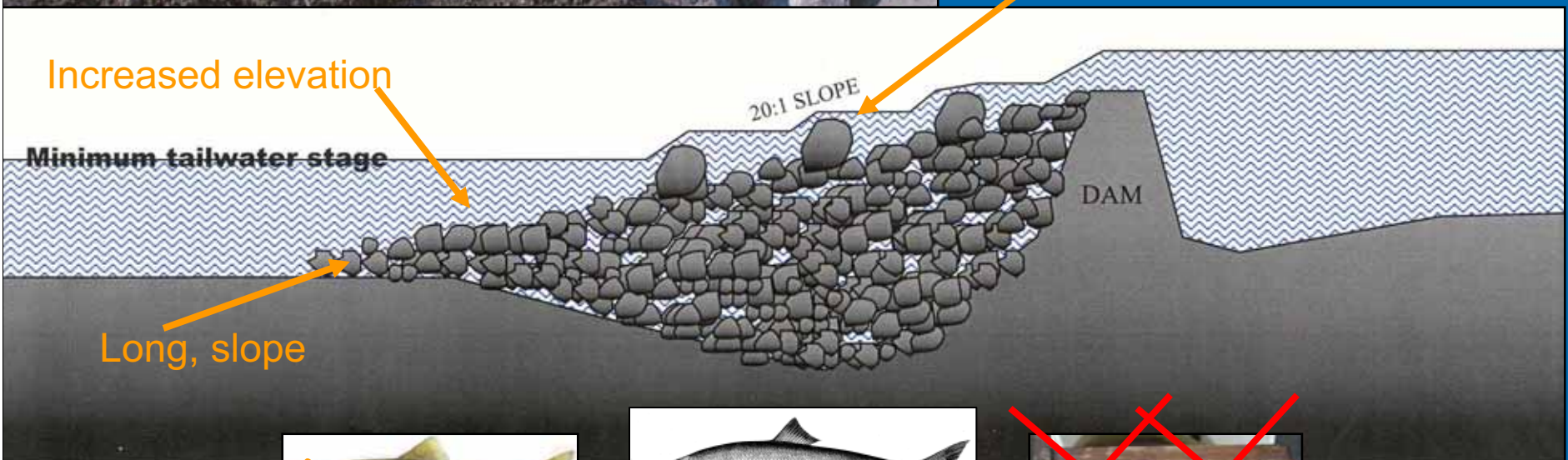
Fishway: Rock Ramp



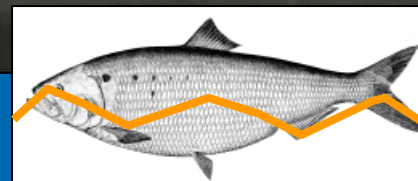
- Eliminates current smelt spawning habitat
- Prone to blowouts/ maintenance

For Neponset:

4,000 lb main stones



Passage:



Fishway: Vertical slot & mechanical lift

What will pass shad....
(Typically installed at hydropower dams)

BIG & N/A!



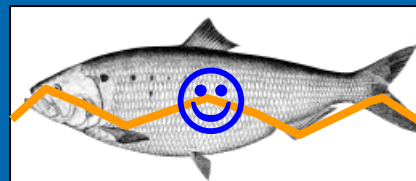
Pawtucket Dam, Merrimack, Lowell



Essex Dam, Merrimack, Lawrence

Shad can still be finicky and refuse to use.

Passage:



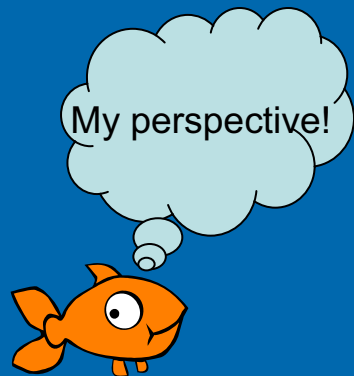
Restoration is Possible!

Charles River, American Shad Restoration



Hatchery origin juvenile
Charles River, 2007





Summary

Options for the Neponset

Dam Removal

- Most beneficial to fish resources and ecosystem function
- No maintenance for fish passage

Fishways...A number of tradeoffs

- Less beneficial to resource sustainability
- Active rainbow smelt spawning habitat protection
- Shad are picky, picky, picky
- Much structure for less passage
- Routine maintenance throughout spring is required
- Long term maintenance substantial (also the dam)
- Expensive & untried design due to flooding issue



Thank you!

Fishway: Alaskan Steeppass

Aluminum



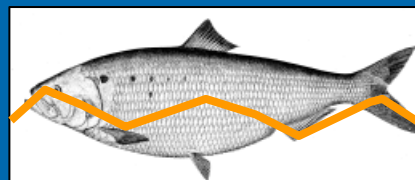
Plymouth



Kingston

- Inexpensive, smaller systems
- The jury is out on passage....

Passage:



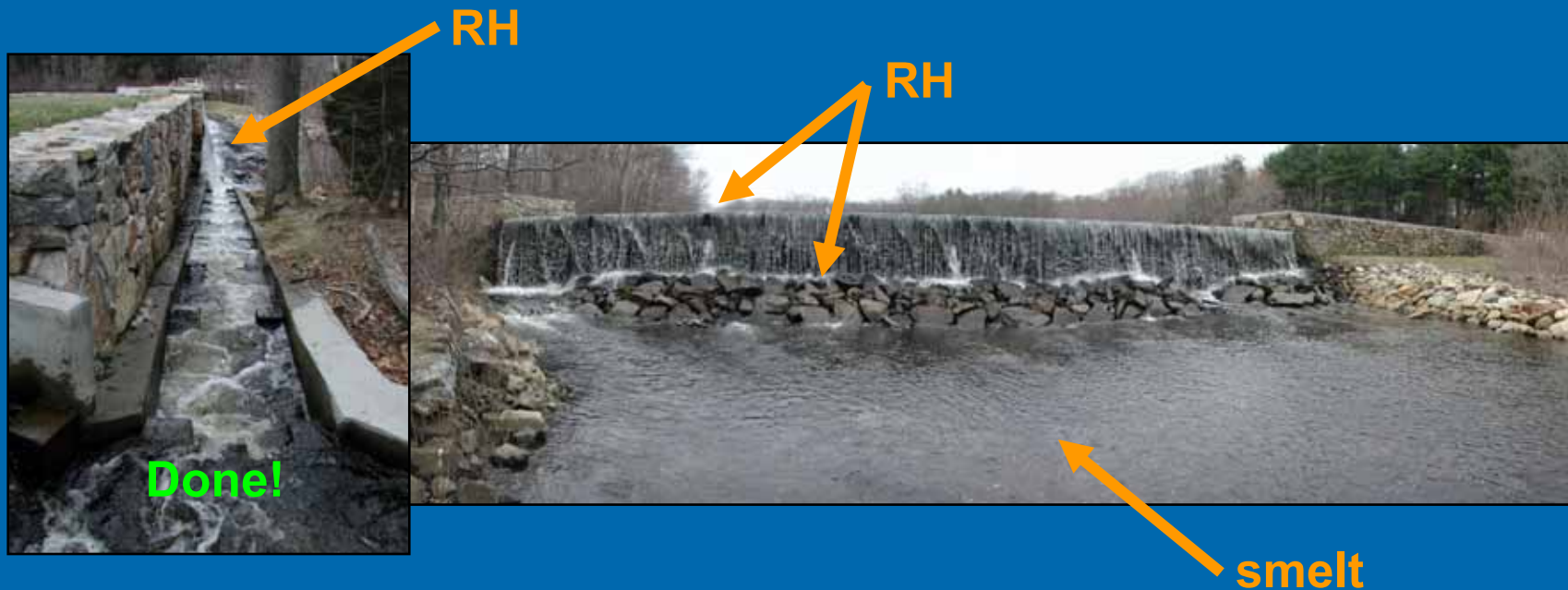
Fishway: Pool and Weir



This won't work,
river herring only

Major Improvement

Foundry Pond Dam, Weir River, Hingham



Goals: smelt habitat restoration; fishway repairs; water management; herring habitat and outmigration assessment (*DMF & Contract*)

New Passage

Lynn Waterways Dam, Saugus River



Partners

- Lynn Water and Sewer Commission
- Saugus River Watershed Council
- GOM Council/NOAA Restoration Partnership

Goal: Installation of custom ramp to create passage for American eels (*DMF*)

Feasibility

Fore River System, Braintree

Partners

- City of Braintree
- Fore River Watershed Association
- FX Messina Enterprises



Goal: evaluate feasibility of restoring river herring to Fore River--passage, habitat, etc. (*DMF & Contract*)



Research



Remote Digital Video Monitoring of River Herring

Martha Mather & Jack Finn

Massachusetts Cooperative Fish & Wildlife
Research Unit, USGS-BRD
UMass-Amherst

**Goal: Inexpensive, accurate technology
to assess passage & runs**





Massachusetts General Laws

Chapter 130. Marine Fish and Fisheries

Section 19: Providing passage for salt water fish into fresh water to spawn; refusal or neglect to repair or construct fishway; operation and maintenance of fishways