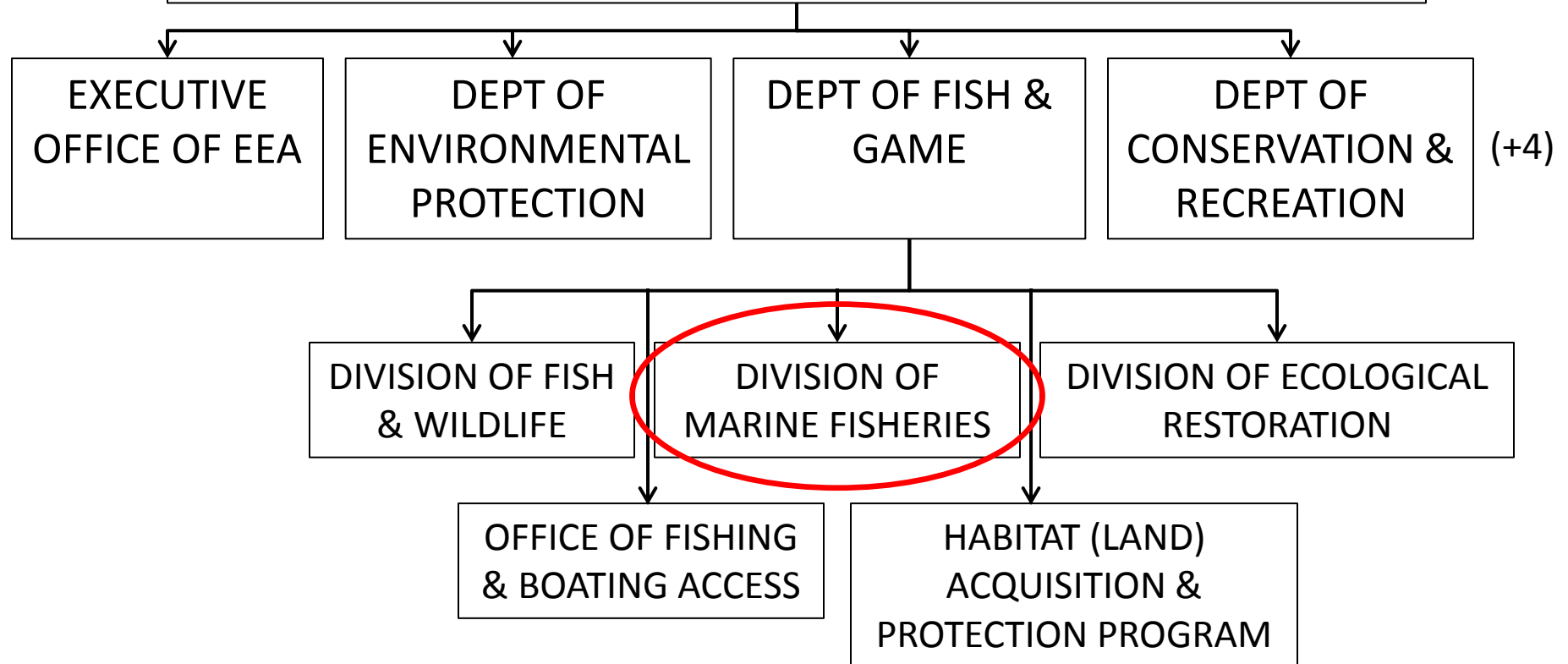


DROUGHT IMPACTS ON MASSACHUSETTS COASTAL FISH POPULATIONS

Sara M. Turner, Ph.D., MPA
Diadromous Fish Biologist
MA Division of Marine Fisheries



EXECUTIVE DEPARTMENT OF ENERGY AND ENVIRONMENTAL AFFAIRS



COASTAL SPECIES AFFECTED BY DROUGHT

Diadromous (“sea-run”)

- River herring
- American shad
- Striped bass
- Rainbow smelt
- Tomcod
- Atlantic & shortnose sturgeon
- Atlantic salmon
- Brook trout
- White perch
- Sea lamprey
- American eel



Nearshore / estuarine

- Menhaden
- Mummichog / killifish
- Sticklebacks
- Atlantic silverside
- Winter & summer flounder
- Bluefish
- Weakfish



Anadromous

Majority of life--growth

Spawn in freshwater

Headwaters

Estuary

River

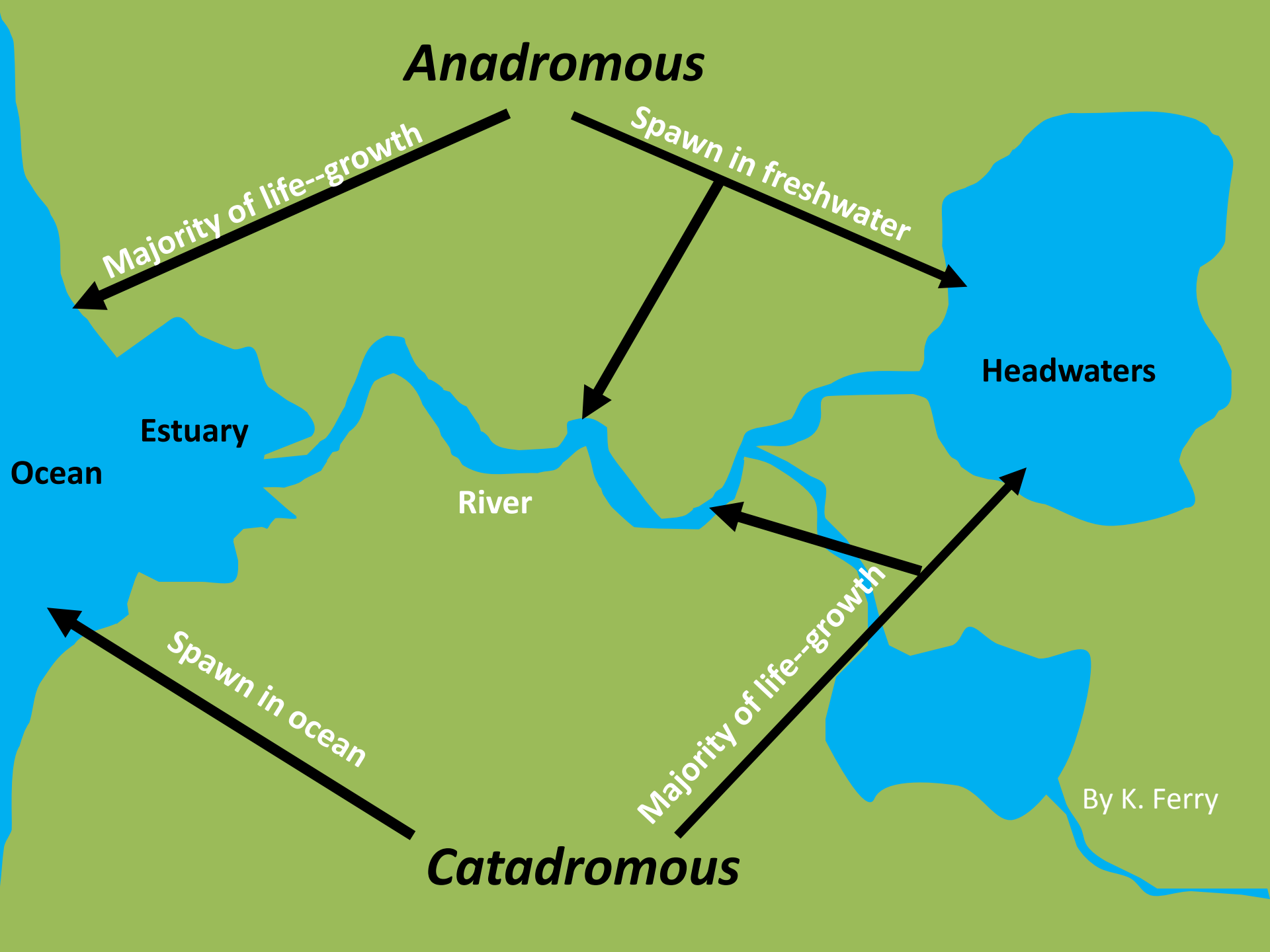
Ocean

Spawn in ocean

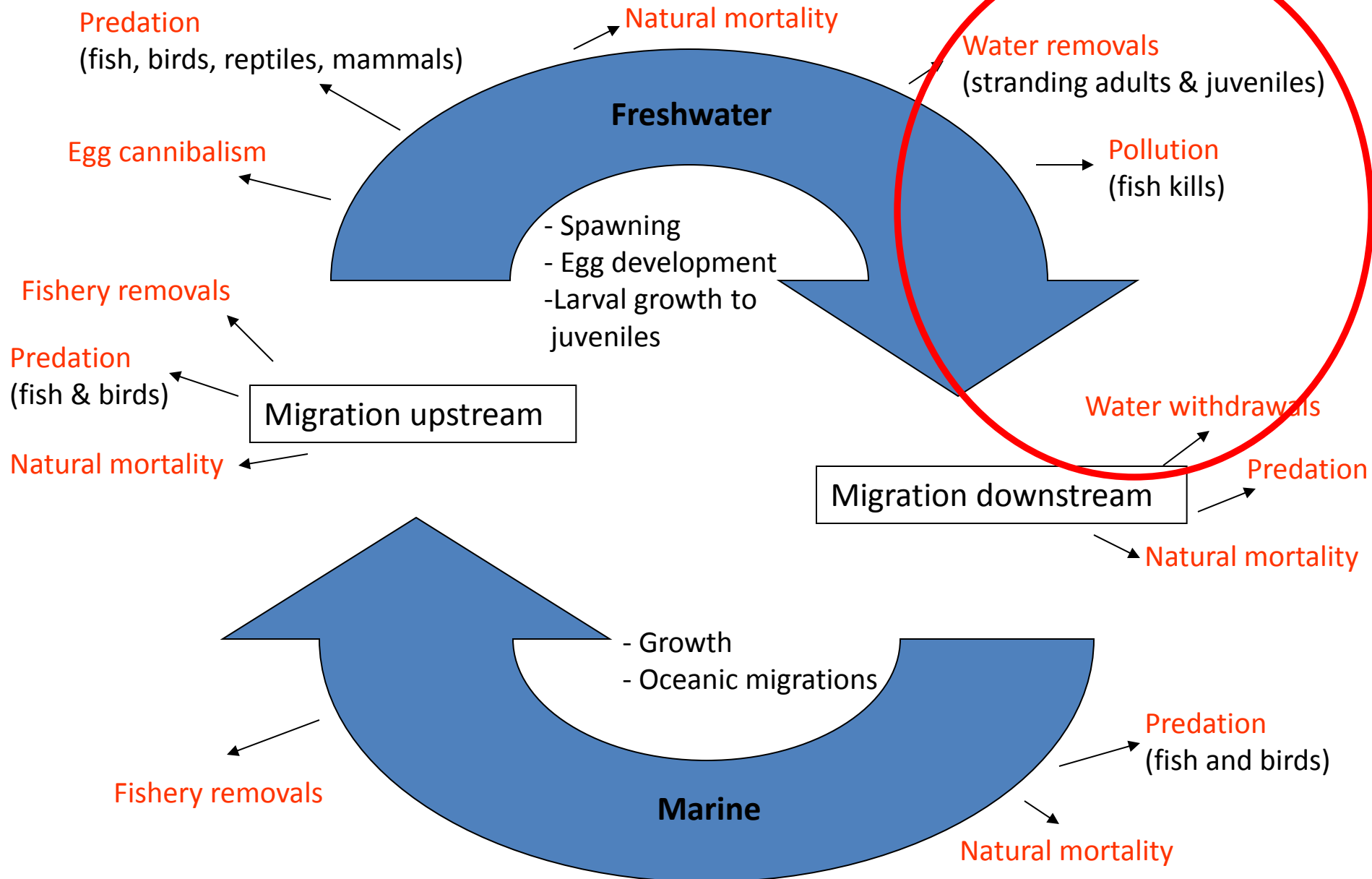
Majority of life--growth

Catadromous

By K. Ferry



Population losses



WHERE DOES DROUGHT IMPACT DIADROMOUS FISH?

- Ponds/ reservoirs:
 - Reduced habitat (lower water levels)
 - Increased temperature/ stratification
 - Hypoxia/ anoxia

Headwaters

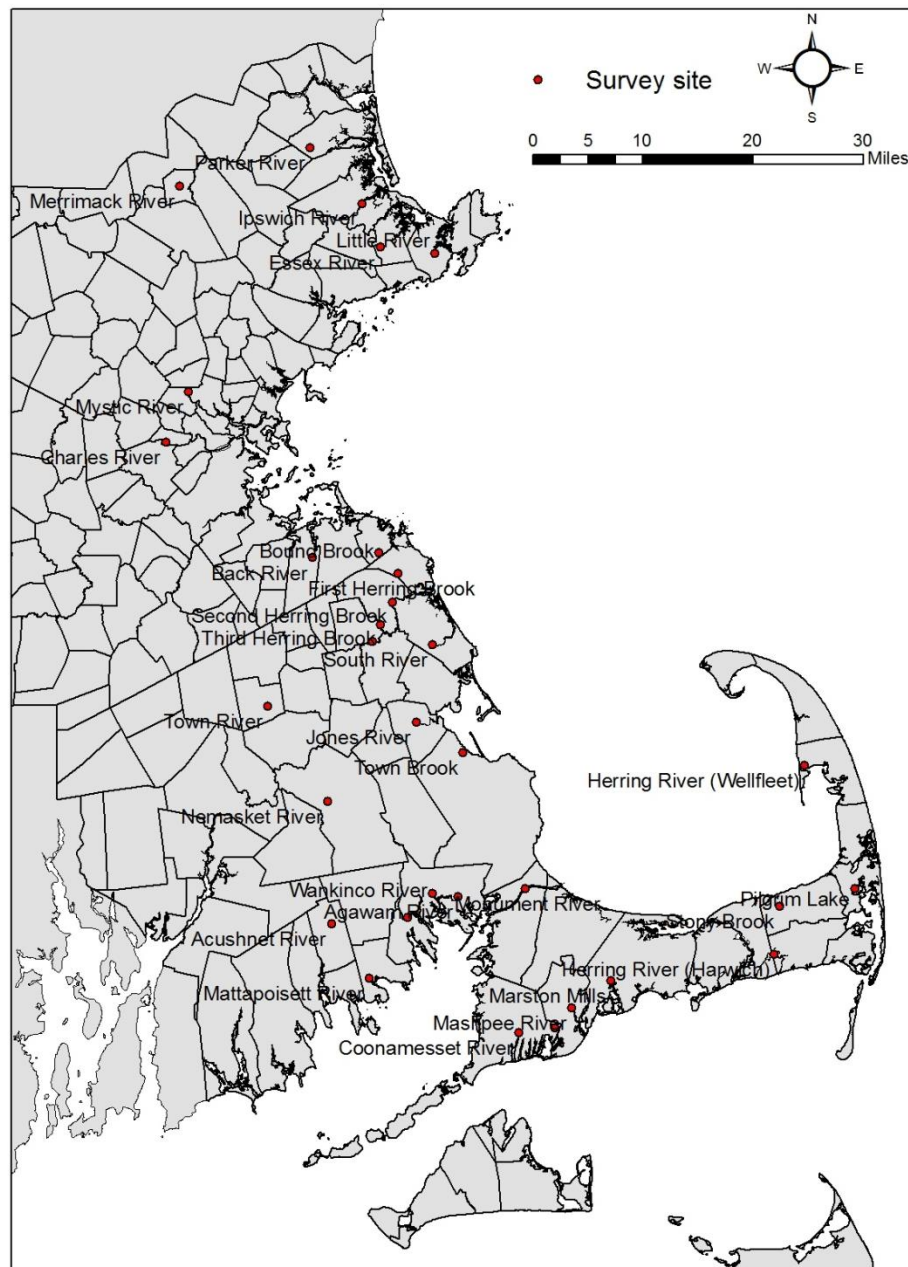
Estuary

River

- River & stream channels:
 - Reduced habitat (lower water levels)
 - Impossible flows
 - Increased temperature; reduced thermal refugia

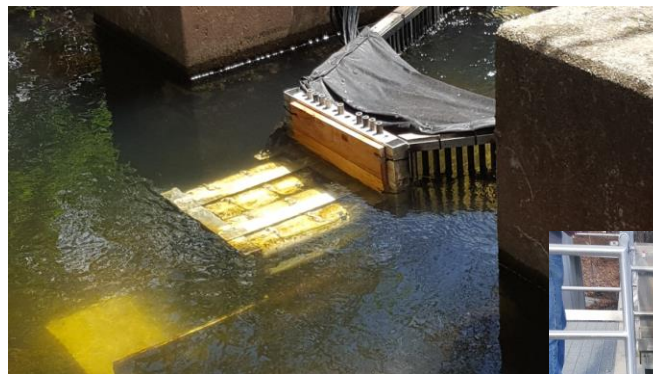
- Estuaries & nearshore:
 - Reduced habitat; less mid-salinity habitats
 - Hypoxia/ anoxia
 - Increased extent & duration algal blooms

Ocean



Marine Fisheries monitoring:

- River herring: 8 stations
- Rainbow smelt: 4 stations
- American eel: 7 stations

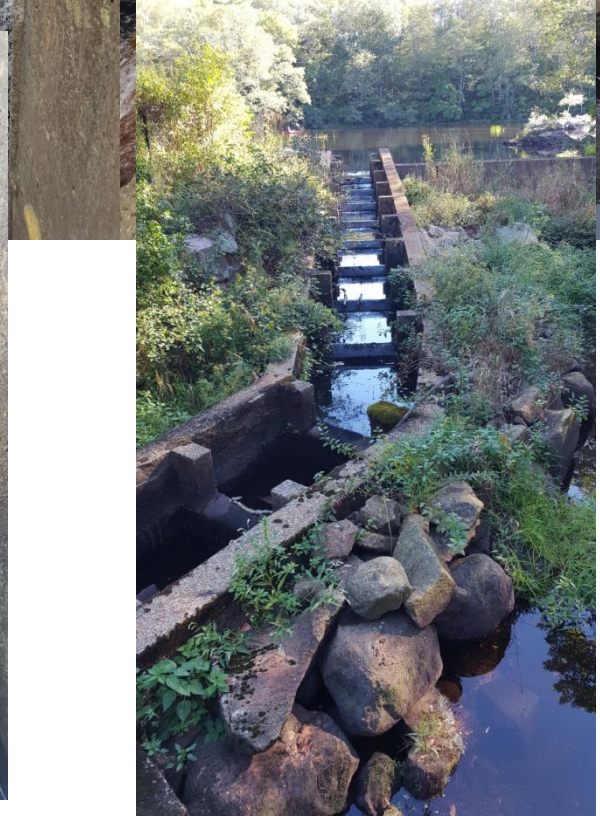


Essex River



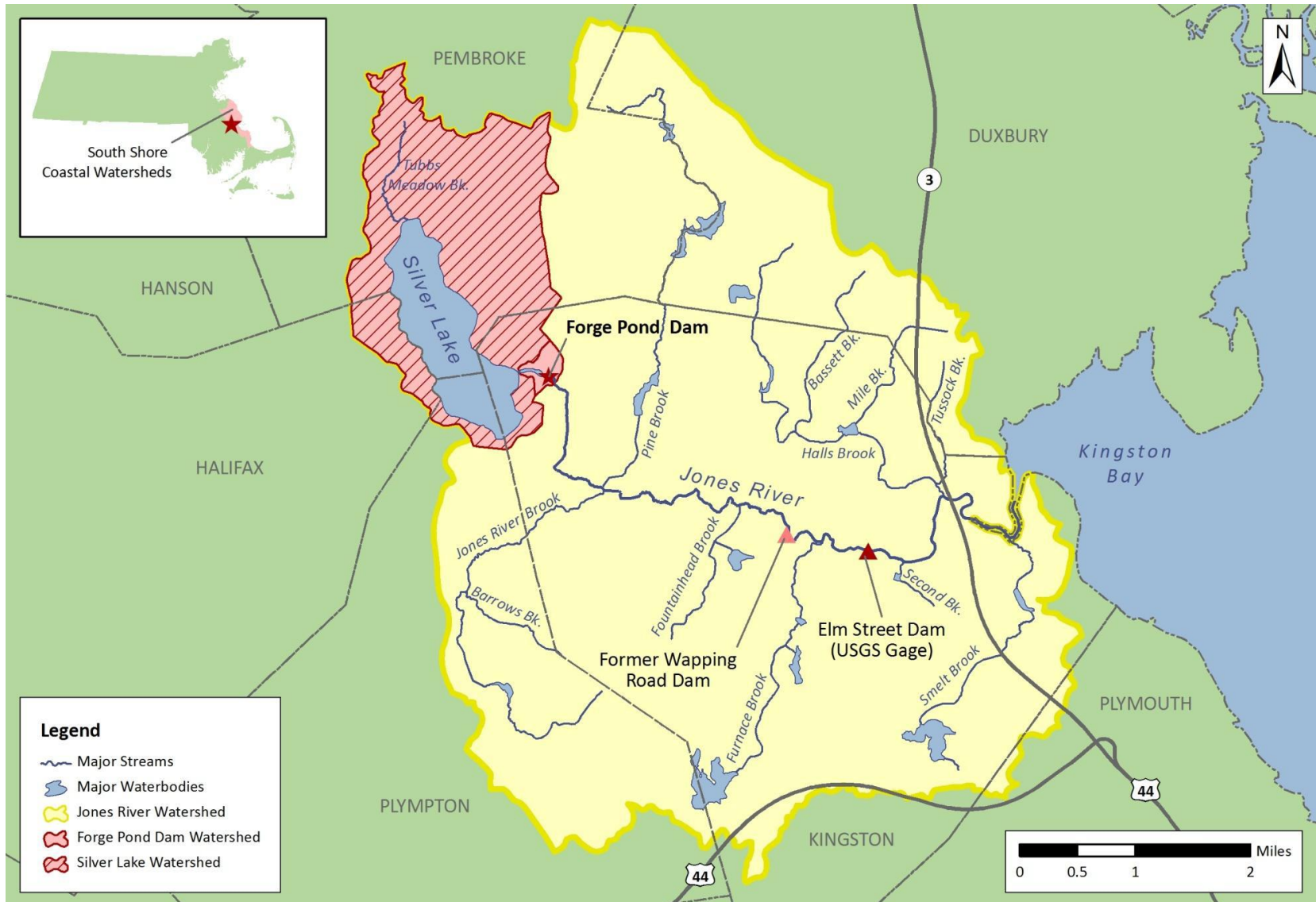
Ipswich River





Paskamansett River,
Dartmouth

Marine Fisheries Restoration Projects

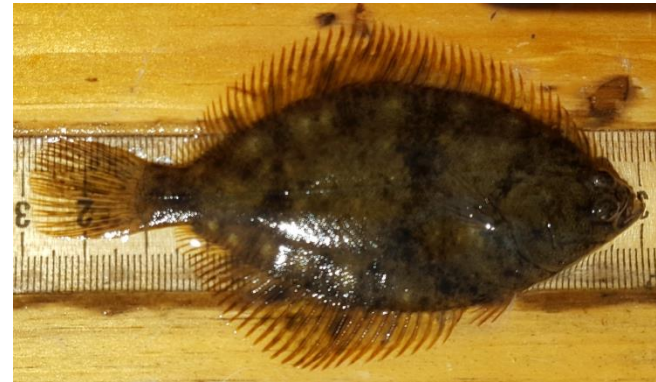


Forge Pond Dam, Silver Lake



Marine and estuarine species

- Estuaries = critical nursery habitat
 - Extremely high productivity
 - Vegetation = predation refuge
 - Reduced freshwater flow:
 - Alter estuary extent
 - Increased temperature
 - Decreased oxygen



J. Prezioso



Algal Blooms



COASTAL / ESTUARINE DROUGHT EFFECTS

- Hypoxia / anoxia
- Increased temperatures
- Increased salt water intrusion



HOW CAN EFFECTS BE REDUCED?



- Outreach and education
 - WHY cutting back is important
- Incentives?
- Multiple reservoir use
- Agreements between environmental agencies and reservoir managers
- Improve efficiency
 - Residential
 - Commercial
 - Agricultural



A large school of fish, possibly sardines or anchovies, is seen swimming in dark, choppy water. The fish are silvery and their movement creates a shimmering effect on the water's surface. The text "QUESTIONS??" is overlaid in the center in a bold, black, sans-serif font. In the bottom right corner, there is a small green plant with several leaves.

QUESTIONS??