DROUGHT IMPACTS ON MASSACHUSETTS COASTAL FISH POPULATIONS

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

- Ocean
- River
- Estuary

Catadromous

- Headwaters

By K. Ferry
Population losses

- Predation (fish, birds, reptiles, mammals)
- Egg cannibalism
- Fishery removals
- Natural mortality

Freshwater
- Spawning
- Egg development
- Larval growth to juveniles
- Migration upstream
- Migration downstream
- Growth
- Oceanic migrations

Marine
- Predation (fish and birds)
- Natural mortality

Water removals (stranding adults & juveniles)
- Pollution (fish kills)
- Water withdrawals
- Predation
- Natural mortality

Migration upstream

Migration downstream
WHERE DOES DROUGHT IMPACT DIADROMOUS FISH?

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

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

- **Estuaries & nearshore:**
  - Reduced habitat; less mid-salinity habitats
  - Hypoxia/ anoxia
  - Increased extent & duration algal blooms
Marine Fisheries monitoring:
- River herring: 8 stations
- Rainbow smelt: 4 stations
- American eel: 7 stations
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
Algal Blooms

Oct. 6-13, 2016

Legend
- P. tricornutum (cells/liter)
- > 100
- 100-999
- 1,000-9,999
- 10,000-99,999
- 100,000-499,999
- >= 500,000
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