

Streamflow Restoration & Drought Resilience



Massachusetts Department of Fish and Game
Division of
Ecological
Restoration

Invested in Nature and Community

Michelle Craddock, Watershed Ecologist
Massachusetts Division of Ecological Restoration

Division of Ecological Restoration

The mission of the DER is to restore and protect the Commonwealth's rivers, wetlands and watersheds for the benefit of people and the environment.

- Aquatic Ecosystem Restoration
 - ▣ Wetland Restoration
 - ▣ River Restoration
 - ▣ Streamflow Restoration

- Technical Assistance
 - ▣ Urban River Revitalization
 - ▣ Stream Crossing Surveys

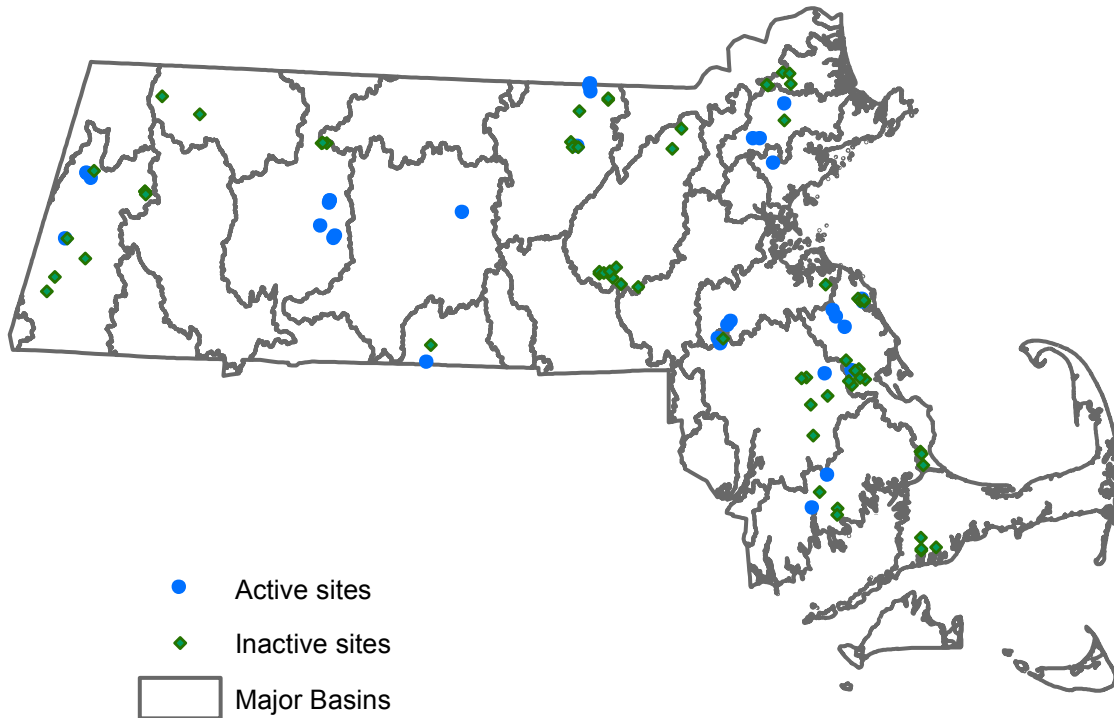


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DER's Streamflow Restoration Program



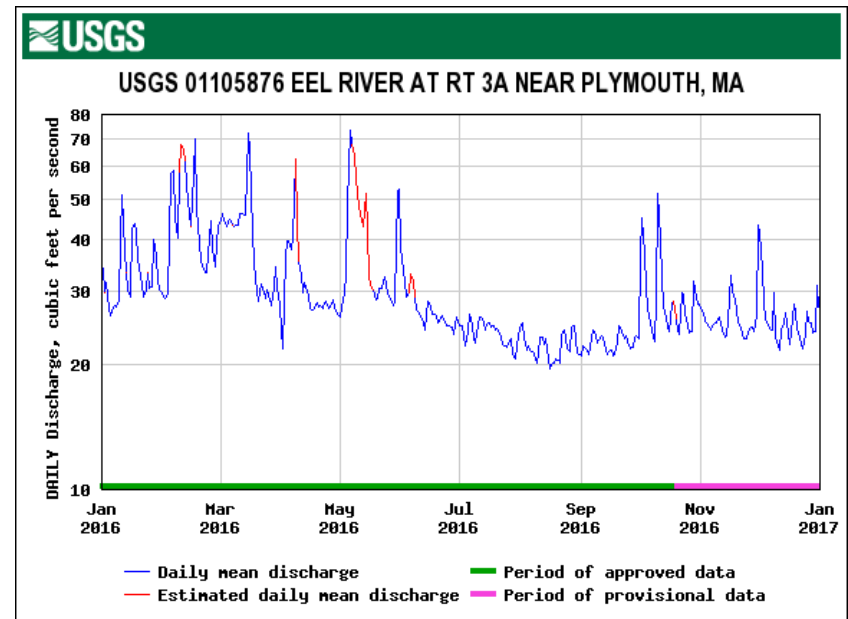
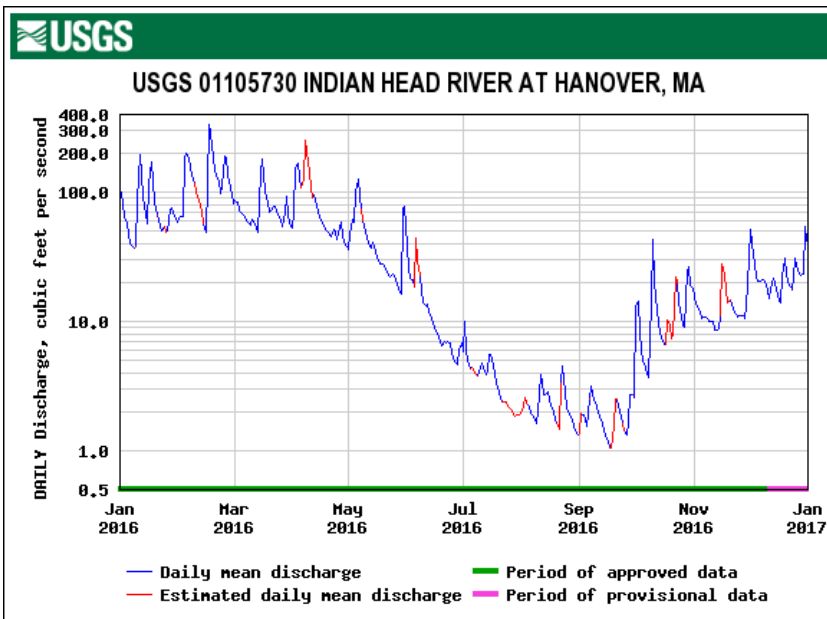
DER monitors streamflow across the state; site selection driven by local request

35 active sites;
6 Priority Projects

What is streamflow?

Flow of water in streams, rivers and channels

- Precipitation
- Groundwater
- Overland flow, runoff



Why is streamflow important

- Flow is considered the “master variable” in streams and the primary driver of stream ecology/health

- Flow is strongly correlated with:
 - ▣ Volume, availability and connectivity of habitat
 - ▣ Water quality and temperature
 - ▣ Channel geomorphology
 - ▣ Availability and type of food resources
 - ▣ Biological cues (e.g. fish migration and spawning)

Many factors can impact streamflow

- Water withdrawals/water use
 - surface or groundwater
 - private wells
- Urbanization/Impervious surfaces
- Dams
 - regulated and unregulated
- Interbasin transfers
- Climate change
- Drought



Drought impacts on streamflow

- Decrease in streamflow and baseflow
 - Less groundwater recharge, declining groundwater levels, decrease in surface water elevation
- Declining water quality (concentration of nutrients, pollutants)
- Increased water temperature
- Reduced habitat quantity and quality
 - Aquatic organisms subject to predation and stress due to water quality, temperature, limited habitat
 - During extended periods of drought, streams can turn into a series of pools or dry up completely

2016 Drought impacts on streamflow



Third Herring Brook, Norwell 9/28/16



First Herring Brook, Scituate 8/31/16

2016 Drought impacts on streamflow



Mattapoisett River, Mattapoisett 9/1/16



Weir River, Hingham 8/10/16

Improving streamflow/drought resilience

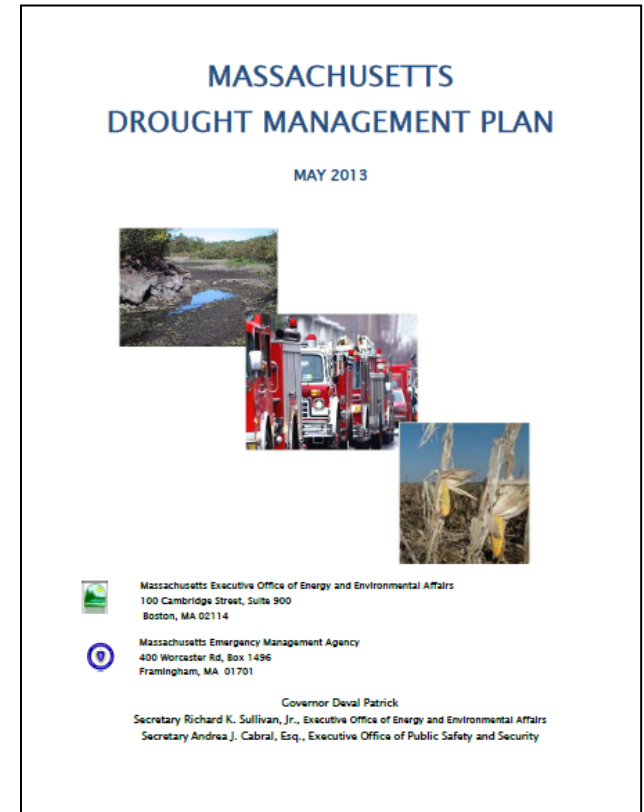
Actions:

- Surface water releases/dam management
- Stormwater management for groundwater recharge
- Demand management/watering restrictions
- Reduce wastewater inflow/infiltration
- Water reuse/gray water
- New water supply sources, optimize water withdrawals for streamflow
- Dam/flow barrier removal
- Land acquisition/conservation

Improving streamflow/drought resilience

Policies:

- Stormwater utility/bylaw
- Water use restriction bylaw
- Private well bylaw
- Drought management plan for water supply
- Low impact development/water neutral development



Seasonal Streamflow Releases

First Herring Brook, Scituate

- Tributary to North River and historic herring run
- Brook and associated reservoirs provide water supply
- No herring observed in recent memory, periods of no flow



Seasonal Streamflow Releases

First Herring Brook, Scituate

- Worked with many partners on streamflow release plan – needed to balance water supply and streamflow goals
- Watering restrictions enacted to allow for more water supply and possibility of releases
- Started releases in 2012
- Herring were observed in Spring 2012!



July 2012



RiverWatch
THE NORTH AND SOUTH RIVERS WATERSHED ASSOCIATION, INC.
Protecting And Restoring The Rivers Since 1970



Herring Return to First Herring Brook!

Streamflow management collaboration with Scituate hits important milestone

Late this April, after decades of work, our volunteers counted the first river herring to enter First Herring Brook (1HB) past Scituate's lower reservoir dam in memory. This event is a major milestone in our efforts to restore natural flows and fish passage to North and South River tributaries, and a validation of NSRWA's patient, collaborative, and science-based approach to preserving and protecting the watershed.

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Recreational Dam Management

Onota Lake & Pecks Brook, Pittsfield

- Lake managed for recreational uses, including fall drawdown and spring refill for control of aquatic vegetation
- Developed dam management guidance document to be used along the Order of Conditions, allows for drawdown and refill of the Lake while minimizing impacts to downstream flow
- Streamflow and macroinvertebrate community have improved since implementation, no periods of zero flow in summer



Summary

- Streamflow is a primary driver of stream ecology and health
 - Many factors can impact streamflow, including drought
- There are a variety of tools to help alleviate impacts of drought on water supply and streamflow
 - Utilizing multiple tools will be the most effective
 - Most effective tool will depend on the specific streamflow stressors in watershed

