



Commonwealth of Massachusetts

Division of Fisheries & Wildlife

Wayne F. MacCallum, *Director*

Massachusetts Eastern Brook Trout Conservation Strategies

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Massachusetts is home to more than 700 wild brook trout streams. Western Massachusetts, particularly the Berkshires has long been known for its brook trout habitat. Less known is that brook trout are distributed statewide, from the high elevation Berkshire streams to the sea-level coastal streams of Cape Cod. Although all brook trout streams are at risk in a small state inhabited by more than 6 million people, the streams in the eastern part of the state are particularly imperiled by many of the threats identified by the Eastern Brook Trout Joint Venture. Massachusetts has brook trout populations in all watersheds, at nearly all elevations (sea level to high elevation Berkshire streams) and both resident and sea-run populations.

Coldwater habitat is shared by several other species besides brook trout. Slimy sculpin, longnose sucker, Atlantic salmon, rainbow and brown trout can all be found within some of the same streams as brook trout. In the western part of the state, brook trout typically coexist with slimy sculpin and, on rare occasion, longnose sucker. This species of sucker is listed as a species of special concern under our State Endangered Species Act and occurs in low abundance with brook trout. Brown trout are self-sustaining in many of the same streams as brook trout and gain an advantage particularly in those streams with extensive habitat degradation. Rainbow trout are self-sustaining in only a few of streams within one watershed. Atlantic salmon are found with brook trout only in those streams selected (based on habitat characteristics) which are included in the Atlantic salmon restoration effort. More than 40 streams that are stocked with Atlantic salmon fry annually and monitored each year to track growth and survival of New England's historically extirpated salmon species.

Brook trout are a coldwater species associated with small streams in Massachusetts, partly due to a near total loss of brook trout in larger stream ecosystems. The specific habitats within these small streams are highly varied. Substrates from ledge to silt are all used to some extent by brook trout. They, like all fluvial specialists, require flows that mimic the natural hydrograph to meet their seasonal habitat needs. Brook Trout are also susceptible to degradations in water quality and have been impacted in many streams statewide. Physical habitat alteration, and changes to water quality and quantity continue to reduce and restrict the amount of habitat available to brook trout in Massachusetts. Some streams no longer support the coldwater fishery resources they once supported; other streams have lost the habitat that supports high abundance of coldwater fish. Brook trout are an indicator species of cold, clean water, that the public values.

Small streams experience a wide array of environmental conditions throughout the year. Summer flows are typically the lowest annual flows and can, at times, be near zero. Aquatic organisms that can find refuge during these extreme climate conditions can survive to repopulate. Spring flows are extreme in fluctuation and magnitude (excluding single events such as hurricanes which are not annual). These habitats depend on high flows to redistribute sediments and provide water to floodplain ecosystems. Many species key in on these high flows to initiate the reproductive cycle. Fall and winter flows are typically moderate compared to spring and summer, but the environmental conditions can still be extreme due to New England weather. Cold winters can cause the formation of anchor ice that can freeze stream

www.masswildlife.org

Division of Fisheries and Wildlife

Field Headquarters, One Rabbit Hill Road, Westborough, MA 01581 (508) 389-6300 Fax (508) 389-7890

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channels solid. Fish will find small refugia in which to survive or move downstream to medium and large streams that will likely have more refugia. Small streams are relatively unstable (stochastic) environments with associated flora and fauna that have come to adapt and, in some cases, rely on dramatic environmental perturbations. It is the frequency and duration of these extreme events that will change as small streams are impacted by the threats listed below and it is the conservation actions also outlined below that will help protect these resources.

Many species that inhabit small streams are tolerant of wide fluctuations found naturally, but cannot adapt to further degradations to already extreme fluctuations. Extreme low flows at natural recurrence intervals can cause population level effects in brook trout that take years to recover from. Water withdrawals that increase the low flow occurrence interval from 20 years to 3 years will result in populations that never recover. Likewise, exacerbating the extremity of low flows may result in population extirpations requiring more costly restoration efforts.

Dams on small streams cause several impacts to aquatic habitats. First, they create unsuitable habitat for native fluvial species and preferred by native and non-native pond species. Second, they stop the flow and transfer of energy, sediments, and nutrients. Water retained in small stream impoundments warms with increased exposure to sunlight and nutrients trapped in the impoundments become available for macrophyte or algal growth. All of these impacts translate into altered water quality downstream of the impoundment. Third, dams create barriers to fish passage that result in isolated populations of fluvial fish less able to cope with environmental extremes. Finally, most dams have no provision for minimum flow and, other than leakage, provide no flow downstream in the summer months or other low flow periods. Low or no flow events then increase in frequency and magnitude and reduce the ability of the fish population to recover. All of these impacts will affect surrounding habitats as well.

Priority 1: Assessment

Short Term Goals

- 1.1 **Continue Massachusetts' brook trout distribution assessment.**
Strategy: Continue to determine the spatial distribution of brook trout populations by 2010 using sampling protocols developed for attainment of this goal.
- 1.2 **Develop a comprehensive brook trout data GIS layer.**
Strategy: Archive and map historic and current brook trout distribution by 2010 and further incorporate fish database into GIS.

Long Term Goals

- 1.3 **Annually monitor Massachusetts' brook trout populations.**
Strategy: Develop statewide monitoring protocol that includes index brook trout streams to analyze shifts in species composition and health of brook trout populations.
Strategy: Employ a coldwater and/or brook trout-specific Index of Biotic Integrity to address site-specific measures of brook trout population health.
Strategy: Monitor temperature regimes in brook trout streams.

Priority 2: Habitat Protection

Short Term Goal

- 2.1 **Protect brook trout habitat.**
Strategy: Develop GIS-based tools for regulatory agencies that describe and quantify brook trout habitat. Develop BMP based on EBTJV threats assessment to provide

regulatory agencies and local Conservation Commissions the tools to better protect brook trout habitat using the Wetlands Protection Act, the Clean Water Act, Stormwater Management Standards, Water Management Act and other regulatory frameworks.

Long Term Goal

2.2 Improve brook trout habitat.

Strategy: Develop selection criteria for brook trout habitat improvement projects based on need, and distribution information, land ownership, likelihood for success, and angling access.

Strategy: Use GIS land use overlays and results of *Eastern Brook Trout: Status and Threats* as well as additional products provided by the EBTJV to develop a predictive model of those watersheds most likely to change status negatively (From “Intact” to “Reduced” to “Greatly Reduced”) due to anthropogenic changes. This model will be used to provide focus and priorities for protective measures. The same model will be used to predict which watersheds have the greatest potential to improve their status (from “Greatly Reduced” to “Reduced” to “Intact”) to focus restoration efforts in a positive direction. These models will be used with the mapping and outreach examples provided in section 2.1.

Priority 3: Outreach

Short Term Goal

3.1 Create/enhance public interest in brook trout.

Strategy: Produce and employ educational materials (e.g., maps, brochures, posters, articles, videos, live fish displays, etc.) highlighting the importance of Massachusetts brook trout and associated management activities. Venues include the agency website and magazine, schools, stakeholder meetings, and fishing shows.

Strategy: Promote the Eastern Brook Trout Joint Venture (EBTJV) on the agency web site and other media outlets.

Long Term Goals

3.2 Increase landowner participation in habitat improvement programs.

Strategy: Publicize (via the agency website, magazine, and other outlets) information regarding all current Federal and State grants and programs, such as the Landowner Incentive Program (LIP), available to landowners for protecting and improving water quality and habitat in brook trout streams. Provide technical assistance as needed.

Strategy: Publicize the application of BMPs, as well as the benefits of protecting and improving water/habitat quality, by presenting success stories (in local newspapers, on the agency website, etc.) that show how entire communities benefit, not just fish and anglers.

3.3 Develop partnerships that foster brook trout conservation.

Strategy: Facilitate achievement of brook trout conservation goals by establishing relationships with NGOs, city and county governments, land trusts, and other organizations.

Priority 4: Brook Trout Protection and Restoration

Strategy: Develop partnerships with other federal and state agencies, NGOs and other stakeholders to conduct restoration projects.

Strategy: Monitor restored or enhanced brook trout populations to evaluate project success.

Priority 5: Recreational Fishing

Long Term Goals

5.1 Make brook trout angling opportunities readily available.

Strategy: Provide some brook trout fisheries in waters that are readily accessible (e.g., tailwaters and larger hatchery-streams with road access) so that anglers have the opportunity to catch and develop an appreciation for brook trout.

5.2 Comprehensively manage brook trout fisheries.

Strategy: Periodically conduct creel surveys on selected brook trout streams to document angler use, exploitation rates, and preferences. Use this information, along with brook trout population monitoring data, to adjust angling regulations if necessary or provide special fishing opportunities.