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Commonwealth of Massachusetts

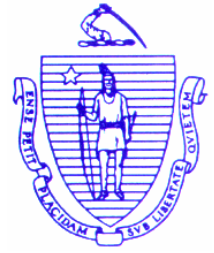
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July 20, 2011

Quincy Conservation Commission
1305 Hancock Street
Quincy, MA 02169

Dear Commissioners:

The Division of Marine Fisheries (*Marine Fisheries*) has reviewed the Notice of Intent by City of Quincy to re-align and enhance a section of Town Brook in the City of Quincy, with respect to potential impacts to marine fisheries resources and habitat.

The City of Quincy proposes the diversion of the existing Town Brook from a connecting point upstream of Quincy Center along the south side of the Concourse Roadway Improvement project, through 1,200 linear feet of closed and open channel culvert sections to the proposed connection point downstream of Quincy Center, where it will rejoin the existing Town Brook alignment. The Town Brook Enhancement Project is one of three Core Public Improvement projects the City of Quincy is undertaking to upgrade the aged infrastructure within Quincy Center and is the initial improvement project.

Town Brook originates from freshwater wetlands in the Blue Hill Reservation and flows into the Old Quincy Reservoir in Braintree. It continues to flow through 1,700 linear feet of culvert section where it eventually meets the tidal Town River Bay. The Town Brook River system is a diadromous fish run supporting rainbow smelt (*Osmerus mordax*) and American eel (*Anguilla rostrata*). Town Brook was considered a relatively large rainbow smelt spawning run with high egg densities relative to the amount of available riffle habitat (approximately 800 m in length and 3,241 m² in area; Chase 2006). However, in the late 1980's, the smelt run sustained acute impacts (egg mortality and spawning habitat loss). In addition, there are also chronic impacts to the smelt run (sedimentation, periphyton accumulation, reduced water depth and velocity) due to diminished base flow since the installation of flood control structures designed to reduce flooding in downtown Quincy in the late 1990s. The flood control projects caused habitat alteration and chronic decreases in water velocity and depth, reducing spawning attraction and egg survival. *Marine Fisheries*, the City of Quincy and other interested parties have been coordinating efforts since this time to find ways to augment brook flows and reverse the degradation of this valuable fish run.

The rainbow smelt are a pelagic, schooling species that spends most of its time in nearshore waters. The spawning season begins in early March and continues through May in MA. They deposit their eggs in small tributaries in swift, shallow riffles at night just upstream from the

meeting of salt and fresh water (Chase 2006). Most spawning occurs in fast flowing, turbulent water in stream sections dominated by gravel and aquatic vegetation. Fertilized eggs sink and adhere to each other and to any stationary material on the stream bottom. The National Marine Fisheries Service designated rainbow smelt as a “Species of Concern” in 2004 under their Endangered Species Act review process (NOAA 2004). Our staff has carefully reviewed the NOI with the intention of preventing further degradation of smelt spawning habitat in Town Brook and identifying potential for habitat and smelt population improvements.

Marine Fisheries offers the following comments and recommendations for your consideration:

A baffle was placed (see plan C-7.2) to prevent smelt from entering the old channel. We request further information about the height of this baffle and how storm water will drain from behind it. If water ponds behind the baffle and becomes degraded, it could then spill over and degrade the adjacent spawning habitat.

Project Description; page 1-2.

The existing 1,700 ft culvert will continue to receive stormwater and is proposed to be decommissioned over time as the redevelopment project continues. This decommissioning is stated to include stormwater improvements. We have concerns over permitting the immediate construction for brook alignment given the uncertainty over the future level of stormwater improvements. We recommend that the Conservation Commission authorization include detailed specifications and bond requirements related to future stormwater improvements.

Town Brook Proposed Layout; page 1-3 and 1-4.

We support the concept of daylighting sections of Town Brook to improve smelt spawning habitat and the riparian buffer. Our staff is committed to working with the City of Quincy and the proponent to reverse the degraded conditions of this valuable fish run. The proponent estimates that 165 ft. of newly created spawning habitat will be added. This linear distance calculation assumes that the entire length will be newly created spawning habitat. In fact, 242 ft. of total daylighting proposed overlaps with 122 feet of existing open channel. Therefore, our calculations of the net gain of created daylighted channel are 120 ft., not 165 ft.

A gain of 120 ft., or even 165 ft., is a marginal improvement given the scope of the proposed realignment and potential to make significant improvements. The property between Hancock Street and Mechanic Street will have about 240 ft. in brook length available of which only 136 ft is proposed for daylighted brook. We strongly recommend that the proponent redesign the daylighted sections to increase the length of daylighted brook to over 200 ft.

Resting Pools; page 1-5.

Inline resting pools that are extensions of the low flow channel may perform as intended. The locations selected for resting pools are suitable. Large pools that extend towards the channel walls will likely become sediment deposition zones and may not assist the spawning run. The second resting pool proposed at the existing open channel section may be larger than needed and therefore should be reevaluated with our assistance.

Wetlands Planting, page 1-7

The proposed plantings have relatively few individual shade producing trees on the south side of the realignment path and none on the north side. We recommend increasing the number of shade producing trees on the south side and adding a few small sized native trees or bushes on the north side of each daylighted section to enhance the vegetative buffering and shading.

Monitoring, page 1-8; and **Operations and Maintenance**, page 7-20

Add requirement to monitor constructed smelt spawning channels for three smelt spawning seasons (March 1st to May 31st) to confirm suitable target of water velocity and depth are achieved and that successful smelt egg deposition and survival occurs. *Marine Fisheries* will assist the monitoring design and approve the final monitoring plan. If suitable conditions are not confirmed by the monitoring the proponent should be required to make improvements.

Fisheries, page 5-6, third paragraph

This section should reference Chase (2006) which contains detailed information on the Town Brook smelt run including documented measurements of spatial and temporal use of Town Brook as smelt spawning habitat.

Flow Restoration in Town Brook, page 5-33

The NOI mentions the DMF flow restoration project (Gomez & Sullivan 2011) but offers little detail on how the project will coordinate with the recommendations of the flow restoration project. In pre-application meetings, the proponent consistently indicated that they would be willing to contribute to the flow restoration option selected by the City of Quincy. Improving flows in Town Brook is the highest priority among restoration options for improving the smelt population. We recommend that the proponent contribute to this process, and design the low flow channel to accommodate future scenarios of improved flow.

Mitigation Summary, page 5-33 and 5-34.

The proponent recommends the use of 6" diameter round stone substrate. We do not recommend round stone as suitable for smelt egg attachment and survival and instead recommend 4-8" cracked stone as smelt spawning substrate. The Town Brook Watershed Master Plan is a very good concept. We look forward to working with the proponent and City of Quincy on a watershed plan.

Low Base Flow, page 7-3; **Design Flows**, page 7-16; and **Hydraulics**, page 7-16, last paragraph.

In order to ensure adult smelt attraction and smelt egg survival to sustain a smelt spawning run, water flow levels must provide suitable conditions of depth and velocity. As the proponent has identified, maintaining base flow in Town Brook is critical to smelt survival. However, we have questions over the proponent's definition of low base flow and the use of this parameter to design low flow channels.

The proponent uses a low base flow value of 2.2 cfs as the design threshold value. We recommend the proponent define how this was calculated. To illustrate our concern, consider that the mean of monthly minimum daily discharge measurements for May in Town Brook during 1998-2008 is 2.7 cfs (same dataset as used in Gomez & Sullivan 2011). Even 2.7 cfs is well below what we would consider as base flow and marginally suitable to support smelt spawning habitat. We recommend that the low flow channel be designed to carry the mean daily

discharge for Town Brook in April. The mean daily discharge for April from 1998-2008 was 7.0 cfs (Gomez & Sullivan 2011). The lower 6 inches of the trapezoidal low flow channel should be able to support in the range of 3-5 cfs and the area above this base should be able to accommodate additional flow in the 3-5 cfs range.

Since the 2.2 cfs low base flow target is not the appropriate threshold, the calculated width of the low flow channel of 2 feet should be increased to accommodate higher flow rates. The targeted water velocity (1.6 to 3.2 ft/s) and water depth (0.5 to 1.0 ft) are suitable for smelt spawning habitat (Chase 2006 and 2010). Also, the two foot width indicated on page 7-16 differs from the 48 inch width stated on page 1-4. The questions over flow targets and dimensions of the low flow channel are critical to the success of this structure in providing smelt spawning habitat.

Low Base Flow, page 7-3

The last sentence in the last paragraph should replace the words “could” with “shall” and read as follows: “When flows at the gauge are below 2 cfs and no significant rainfall is in the immediate forecast, low flow augmentation **shall** be considered, and if there is agreement that the flow augmentation at Miller Stile Road is more important than maintaining the level of Old Quincy Reservoir, flow augmentation **shall** be implemented by the City of Quincy”.

Peak Flow, page 7-4, third paragraph

This section correctly describes the flood control project’s structures for diverting storm flows. However, a comment is needed to allow the reader to understand that the Centre Street Junction Structure causes flow diversions in excess of the project’s threshold of 100 cfs that was designed into the Deep Rock Tunnel diversion. This is a critical piece of information explaining why base flows, monthly mean discharge and monthly minimum discharge have been reduced during the smelt spawning period since the flood control structures became operational in 1997-1998.

Materials, page 7-9

The “vegetative plantings” stated in the last sentence should be specified to be native aquatic moss of the *Fontinalus* genus, which is suitable substrate for smelt egg survival.

Table 7.3, page 7-11

The slopes proposed for the constructed spawning riffles are 0.33%. This is below the recommended slopes to provide suitable velocities for smelt spawning and egg incubation of 0.5 to 1.0% (Chase 2010). We recommend that the slopes are increased at this location to 0.5% or higher.

Alternative Analysis, section 8

We have no objections to the proponent exploring alternative paths for the realignment of Town Brook. However, our purview and focus has been to review the hydrology and hydraulics of the preferred path in relation to the life history requirements of rainbow smelt. We would not object to alternative brook alignments that produce suitable conditions of water flow, velocity, depth and substrate for smelt spawning attraction and egg survival.

Questions regarding this review may be directed to Eileen Feeney in our New Bedford office at (508) 990- 2860 extension 117.

Sincerely,



Paul J. Diodati
Director

cc: Jon Stephenson, Stephenson Design Group, LLC
Christopher Lucas, Lucas Environmental, LLC
Richard Lehan, DFG
Christopher Boelke, NMFS
Ken Chin, DEP
Robert Boeri, CZM
Ed Reiner, EPA
Eric Hutchins, NMFS
Michael Johnson, NMFS
Feeney, Ford, Chase, Sheppard, Evans, Ostrikis, Petitpas

EF/BC/KF/cp

References

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