



THE COMMONWEALTH OF MASSACHUSETTS

WATER RESOURCES COMMISSION

100 CAMBRIDGE STREET, BOSTON MA 02114

Stress Level Reclassification for the Weir River subbasin of the Boston Harbor Basin

July 14, 2005

Background

In April 2005, the Riverways Program of the Massachusetts Department of Fish and Game, Division of Fish and Wildlife (Riverways) requested that the Massachusetts Water Resources Commission (WRC) revise its classification of the Weir River from its current designation as unclassified (unassessed) to High Stress. The WRC reviewed the request and directed its Staff to conduct an analysis, using the methodology approved in the 2001 Stressed Basins in Massachusetts report. Based on this analysis, the WRC designated the Weir River basin, shown in Figure 1, as Highly Stressed on July 14, 2005.

Analysis

The Riverways request for stress level reclassification was reviewed by staff from the Office of Water Resources, Department of Conservation and Recreation. Much of the data reviewed by staff were obtained from the June 2002 GZA GeoEnvironmental report, "Status of and Potential Impacts on Water Budget for the Weir River Watershed, Final Report" that was completed with funding by the EOEa Watershed Initiative and with the technical review of WRC staff, then working for the Department of Environmental Management.

Data contained within the GZA report, the Riverways request, and the "Stressed Basins in Massachusetts" report (WRC, December 2001) were reviewed to determine the appropriate level of stress for the Weir River basin. In addition, staff reviewed public and environmental agency comments on an Environmental Notification Form filed by Aquarion Water Company for its proposed Free Street Well #4 to consider environmental conditions and concerns in the river basin.

The Weir River is not serviced by a US Geological Survey stream gage, from which historic streamflow could be used for analysis of flow statistics required for the December 2001 Stressed Basins in Massachusetts analysis. However, the Stressed Basins report outlined an alternative method for classifying river basin stress based on an evaluation of inflow and outflow within the basin. The GZA report provided the bulk of data needed to assess water withdrawals within the Weir River basin, and wastewater recharge via septic disposal. The net outflow from the basin was then compared with a naturally-expected (i.e. in the absence of human impacts) median August streamflow determined using the US Geological Survey StreamStats analysis.

Based upon the statistics contained in the GZA report for 1996 through 2000, water withdrawals within the Weir River basin totaled an average of 4.12 million gallons per day (MGD). Septic return wastewater to the basin was estimated as 1.14 MGD. This resulted in a net outflow from the basin of 2.98 MGD. This net outflow is then compared with two low-flow statistics to determine the level of basin stress, as illustrated in Table 1, below.

Table 1. Stress Classification Criteria

Stress Classification	Criteria
High	Net outflow equals or exceeds estimated natural August median flow
Medium	Net outflow equals or exceeds estimated natural 7Q10 flow

August median flow for the Weir River was estimated at several locations in the USGS StreamStats program. The further downstream in the basin that the analysis is performed, the higher the August median flow. Results of the analysis are summarized below in Table 2.

**Table 2. Summary of August Median Flow and 7Q10 Flow, Weir River
Based on USGS StreamStats Analysis
(<http://ststdmamrl.er.usgs.gov/streamstats/>)**

Location for analysis	Drainage Area, Square miles	August median flow, cfs	August median flow, MGD	7Q10 flow, cfs	7Q10 flow, MGD
Upstream of confluence with Accord Brook	7.85	1.83	1.18	0.28	0.18
Upstream of Foundry Pond (Route 3A)	14.51	3.52	2.27	0.55	0.36
Ocean, downstream of Foundry Pond (Rockland Street)	15.08	3.62	2.34	0.57	0.37

The streamflow statistics estimated by StreamStats are consistent with values estimated for a low-flow partial record USGS gage on the Weir River upstream of Foundry Pond. The gage is USGS station number 01105640 and was in operation between 1969 and 1971, and between 1989 and 1991. In its 1998 “Streamflow measurements, basin characteristics, and streamflow statistics for low-flow partial record stations operated in Massachusetts from 1989 through 1996: USGS Water Resources Investigations Report 98-4006” the August median flow for the gage is estimated as 2.51 cfs (1.62 MGD) and the 7Q10 as 0.33 cfs (0.21 MGD). It

should be noted that these flows are impacted by upstream dams and water withdrawals; however, they confirm that the StreamStats values appear to be in the correct range.

Based upon a net outflow of 2.98 MGD, the basin is classified as Highly stressed down to its outflow to the ocean (Rockland Street), since the net outflow exceeds the estimated August median flow at this location. The net outflow also exceeds the 7Q10 flow statistic (ranging from 0.18 to 0.37 MGD) by an order of magnitude at all three of the locations considered.

Additional biological data supporting a High stress designation was provided by Riverways, supported by the GZA report, and consistent with concerns expressed in public comments from the Massachusetts Division of Marine Fisheries and the Division of Fish and Wildlife on Aquarion's Free Street Well #4 ENF. Herring runs on the Weir River have been impacted by low flows and by the presence of dams without fish passage. The fish community measured in the Weir River consists of primarily macrohabitat generalists, rather than having a significant proportion of riverine (fluvial) fish. GZA observed dry segments of river downstream of Accord Pond during field visits associated with its study, and also documented reduced numbers and types of macroinvertebrates in Accord Brook when compared to reference sites within the watershed.

Classification

The Weir River, from its discharge to the Ocean near Rockland Street in Hingham to the uppermost boundaries of its watershed, is classified as Highly Stressed in accordance with the "Stressed Basins in Massachusetts" methodology approved by the WRC in December 2001. The Stressed Basins map will be modified to depict the Weir River as High Stress.

