



Engineers
Scientists
Consultants

December 11, 2003

Ms. Maryanne Leonard, Chair
Hull Conservation Commission
Town of Hull
253 Atlantic Avenue
Hull, Massachusetts 02045

888 Worcester Street
Suite 240
Wellesley
Massachusetts
02482
p 781.431.0500
f 781.431.7434

**Re: 2003 Midge Monitoring Data Analysis Report for Strait's Pond
Hull, Massachusetts
ESS Project No. H114-000**

Dear Ms. Leonard:

ESS Group, Inc. (ESS) is pleased to provide this 2003 Midge Monitoring Data Report as required under the Order of Conditions for DEP File No. NE35-756. This report was developed using data provided by the Town of Hull that was collected by volunteers and Town of Hull staff. The sampling protocols followed were the same as those used by ESS staff for the 2001 Straits Pond midge monitoring program, as described in the report *Midge Management Recommendations for Straits Pond*.¹ This program included midge sample collection by boat along the 5 predefined transects at three locations per transect (nearshore, offshore, and deep water) for a total of 15 samples (see Figure 1).²

Attached Figures 2-5 and Tables 1-8 summarize the 2003 midge data. Figure 2 is a bar chart showing historic midge concentration data by date as well as known Abate application dates. Although available data may be insufficient to draw definitive conclusions, a fairly consistent bell-shaped pattern is evident for midge concentrations across survey years, with a peak in the late-May and June period, for the years for which both midge data and Abate application dates are available (1994, 2001, 2002, and 2003). Peaks occur similarly for years in which Abate was applied prior to the late-May and early-June period (2001 and 2002) and subsequent to the late-May and early-June period (1994). The 2003 peak was considerably less than that of other years. Midge concentrations found in 2003 were similar immediately pre- (4/13/03) and post-Abate (4/19/03). This does not necessarily mean that the Abate was ineffective in controlling midges. It cannot be known if the 2003 midge population would have been substantially higher after 4/15/03 (the date of Abate application) if the Abate were not applied. The only year for which midge concentration data and the Abate application date are available and Abate was applied after the late-May and early-June period is 1994. The monitoring data for 1994 comes from Beres et al. (1994).³ Abate was applied on 6/23/94, yet the pattern of the midge concentration data for 1994 is similar to that found in 2001 and 2002. This may indicate a natural midge population trend in Straits Pond with a late-May and early-June peak.

The 2003 data indicate that there was no significant difference between nearshore, offshore, and deepwater midge concentration means (see Tables 4-6). There were significant differences between some 2001 means for these zones, but this was not observed in the 2002 or 2003 data. The overall means for years 1993, 1994, and 2002 were not significantly different than the 2003 overall mean (see Table 8), however, the overall mean for 2001 was

¹ ESS, 2002. *Midge Management Recommendations for Straits Pond*. February 22, 2002.

² Due to weather constraints, no sampling was done on Transects 1,3,5,7, and 9. No sampling was done in May.

³ Beres et al., 1994. *Straits Pond Report 1994* by Hull Environment and Service Corps.



significantly higher than the 2003 overall mean. (The 2001 was also significantly higher than any of the means for the other study years).

As is evident from a review of the complete midge concentration dataset for Straits Pond, there is considerable temporal (year-to-year and season-to-season) as well as spatial (location-to-location) variation in midge concentrations. The scientific literature suggests that a warmer winter and early spring would result in an earlier emergence of midge pupae from pond sediments and adults from the pond (Resh and Rosenberg, 1984).⁴ Midges are known to complete more or less life cycles based on the climatic zone in which they live. In the northeastern U.S., midges have generally been found to complete between two and three life-cycles per year (Resh and Rosenberg, 1984). Beres and Burbank (1992)⁵ and Beres et al. (1994) found that an initial midge emergence from Straits Pond sediments occurred in approximately mid-April, with subsequent emergences in June and August, and a decline in midge populations in September. Comparatively warm winter and spring temperatures may be an important factor influencing both midge life-cycle frequency and population densities.

It should also be noted that the Straits Pond midge concentration data set is still relatively small, and there are several potentially confounding factors that may be skewing the data (e.g., different tide gate management regimes and Abate application rates and approaches in each study year), so caution should be exercised when using these data for management decision-making. More years of data would tell a more complete story. The recent series of workshops sponsored by the Straits Pond Watershed Association, in which ESS Group was a participant, should be of great use to local officials and watershed stewards as they move forward with future management efforts. In addition, the implementation of initiatives already begun by the Town and watershed stakeholders to improve pond circulation and reduce pollutant inputs will likely lead to substantial improvements to water quality in Straits Pond and a reduction in the resident midge population in the longer-term.

If you should have questions regarding this information, please feel free to contact me at (781) 489-1133.

Sincerely,

ESS GROUP, INC.



Richard Kleiman
Vice President

C: Christopher McCabe
Margo Clerkin

⁴ Resh and Rosenberg, 1984. Resh, Vincent H. and Rosenberg, David M., 1984. The Ecology of Aquatic Insects. Praeger, New York.

⁵ Beres and Burbank, 1992. Beres, Linda and Burbank, Faith 1992. Report on Midge Mitigation Study. Town of Hull and Massachusetts Environmental Trust.

