Final Report Summary

The CT DEP Hypoxic Monitoring Program reported that the summer of 2002 was one of the worst recorded hypoxic events to ever occur in LIS. DEP hypoxia maps reveal significant regions of LIS with water column dissolved oxygen levels < 1.0 mg/l (Figure 5.1). This is a functionally hypoxic-borderline anoxic state. Water temperature trends for the same time reveal higher than normal conditions at both the Battery in WLIS and the Race in ELIS commencing in July and lasting until mid-September (Figure 5.2). The results of the study reported on here were consistent with these observations. Near-bottom and bottom dissolved oxygen levels remained relatively low throughout the duration of this study and paralleled the DEP values. Near-bottom levels of DO recorded in this study were consistent with those measured by the DEP at approximately the same depth in the water column. Bottom water DO measurements were consistently lower than near-bottom waters and represent the influence of sediment oxygen demand, as well as lack of bottom water oxygen renewal, in the system. Highest levels for bottom water and near-bottom water DO were recorded in May and December, when colder water was present and WLIS was well mixed.

The measured levels of sulphide and ammonia do not exhibit a simple correlation to low oxygen, however; they do exhibit somewhat of a reverse correspondence. The highest levels of ammonia release from the sediments were measured in October whereas the highest level of sulphide release was measured in May. Both of these events were accompanied by a local bottom water decrease in dissolved oxygen levels, however, the overall oxygen content of the water column remained relatively high (> 4.5 mg/l). The low levels of bottom DO measured in October apparently result from the consumption of oxygen by the re-oxidation of anaerobic organic matter degradation products actively diffusing into the water column from the surface sediments. While the trends are the same as 2000, both sulphide and ammonia levels were detected in concentrations well over 1.0 umol/l in the fall of that year, compared to the lower levels detected this year. Nevertheless, since there was no sudden return to stratified conditions recorded for this time period, it becomes necessary to invoke some other explanation on this fall hypoxic occurrence. The data strongly support the idea that fall hypoxia is driven by processes occurring within the sediments and at the sediment-water interface.
Recommendations

Yearly inputs of organic matter to the sediments need to be monitored, in conjunction with surface and sediment temperatures, and benthic community development in WLIS in order to formulate a management plan that may allow for the existence of some commercial fishery in WLIS. More importantly, these factors and their products (sulphide and ammonia release from sediments, bottom water and water column hypoxia and anoxia, sediment-oxygen demand, stratification) need to be monitored and need to form the basis of a management plan for WLIS in an effort to prevent WLIS from becoming a dead zone akin to that which exists in the Gulf of Mexico at the present time.