

Thermal Plume Assessment

AQUATIC IMPACT PROJECT

Site Location: Western Massachusetts
Client: Confidential Client
Date: 2008

Heated effluent reduces the richness of invertebrate communities and may either decrease or increase their productivity depending on the species tolerance to the increase in temperature. While under contract to Kleinschmidt Associates, O'Reilly, Talbot & Okun (OTO) compared the differences of benthic invertebrate communities located outside of and within the influence of the discharge effluent plume. Aspects of the community of interest include species composition and the tolerance of the community to pollution, thermal and otherwise.

Benthic invertebrate grab samples were collected by others at three control stations and three thermal plume impact stations. In addition to the modified family-level Hilsenhoff biotic index, functional feeding group, % EPT, and the ratio of EPT to Chironimidae abundance were also assessed. Community metrics included the Shannon-Weiner diversity index (H) and community equitability (J). The degree of species turnover was assessed with the Morisita Index of Similarity (MS_{ij}). Invertebrate count data were compared between the plume and control sites with a negative binomial regression count model while differences in % EPT between the control and the impact sites was assessed with a non-parametric Wilcoxon rank sum test.

A suite of invertebrate species were observed including members of the Amphipoda, Ostracoda, Ephemeroptera, Trichoptera, Diptera, and Nemertea amongst others. The Diptera (true flies) exhibited the greatest species richness of all of the Orders represented. Slightly over half of the invertebrate collections are comprised of predators and collector/gatherers. The composition of the dominant taxa observed between the control and the plume impact sites is virtually identical. Using the benthic invertebrate assemblages, the Hilsenhoff biotic indicates that the control and plume sites exhibit fairly poor water quality (significant organic pollution). The invertebrates observed are dominated by pollution tolerant species, with very few intolerant species.

CONCLUSIONS The control and the plume impacted sites are very similar and it is believed that the Diptera are largely responsible for the lack of any difference. There is evidence suggesting that environmental conditions in the river other than the thermal plume are such that the Diptera are overwhelmingly favored at the expense of more pollution sensitive species, e.g., EPT. The trend in Diptera abundance will need to be analyzed over successive sample events.