# Impacts of Ocean Sewage Treatment Plant Outfalls

## Abstract

**29 September 2020**

Seventeen cruises between January 2018 and December 2019 were completed to document conditions around The Cedar Creek and SWSD outfalls in order to

- Document current and wave activity
- Characterize the plankton community,
- Document the distribution of salinity, turbidity, DO, temperature.
- Characterize the sediment distribution and associated benthic communities using multibeam sonar survey results of the area surrounding each outfall as a basis for sampling

Any impact of these outfalls to the water column was local, limited and difficult to detect because the wastewater effluents diffused quickly into the seawater. The currents were found to be highly responsive to local winds. Up- and downwelling should be expected in response to both cross-shore and alongshore winds Northwesterly winds produced offshore flow in the surface layers and significant onshore flow at depth. Very little vertical salinity structure was seen in the winter, as expected, although higher salinity was seen at the sea floor on the winter survey with little evidence of dilution by fresh water from the outfalls. Southwest winds, prevalent in the summer, stratified period, produce surface drift towards the southeast, a westerly drift at mid-depth and onshore flow at depth. Salinity stratification occurs during the early summer, and persistent thermal stratification later in the summer leads to a decline in oxygen in bottom waters. Some salinity stratification events are associated with eastwardly directed surface currents advecting low salinity surface waters from the west. The compositional seasonal changes of microplanktonic species reflect the common pattern found in the natural population. The general patterns of planktonic coastal succession were found to be like those seen before the outfalls were in place, except for differences near to, and attributed to, Fire Island Inlet

Benthic sediment habitat appear to be influenced by the outfalls only as they alter the migration of sand ridges thus changing the substrate, rather than by the effluent of the discharge points themselves. The sea floor is comprised of uniform fine sand with active sediment transport. Although there is a large settling flux of suspended particulates to the sea floor only a small fraction is incorporated into the bottom sediment. Wave-induced sediment transport seem to cause scour of sand waves intersecting the diffusers. This disruption the natural migration of sand modifies the substrate and, consequently, is manifest in the benthic community structure. This impact seems to extend for at least one kilometer from the structures. The activity of the sea floor should be the same as other sites on the Long Island shelf; the distribution of bottom stress due to waves and currents of sediment transport should be widely explored in the context of site selection for any offshore structures.