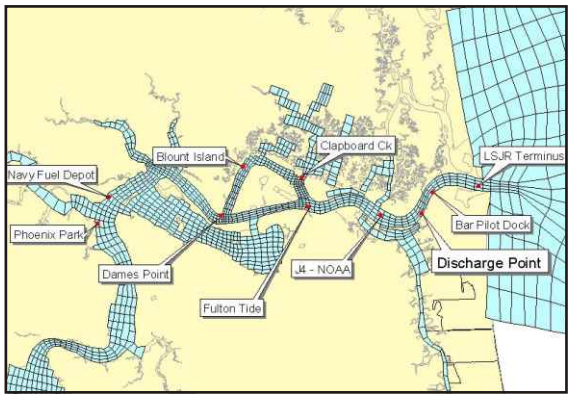
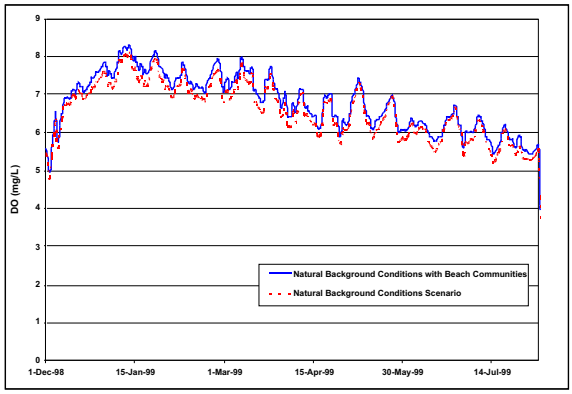
Jacksonville Coastal Communities WWTF Effluent Modeling Study

Jacksonville Beach, Neptune Beach, and Atlantic Beach, Florida

Services Rendered

- Three-Dimensional Hydrodynamic Modeling (EFDC)
- Three-Dimensional Water Quality Modeling (CE-QUAL-ICM)
- Comparative Impact Analyses for Circulation, Dissolved Oxygen, Nutrients
- Determination of Individual Discharge Relative Impacts





Project Summary

ATM was retained by the communities of Jacksonville Beach, Neptune Beach, and Atlantic Beach to investigate the dissolved oxygen effects of the communities' combined effluent discharge into the Lower St. Johns River (LSJR). As part of this project, ATM applied calibrated LSJR Total Maximum Daily Load (TMDL) versions of the EFDC and CE-QUAL-ICM models for comparative analyses considering various adjustments to the combined discharge. The investigation included a circulation and transport assessment, which used the hydrodynamic EFDC model to determine whether the combined effluent ever reaches the Fulton Cut/Dames Point area upstream of the outfall, and a water quality analysis using the CE-QUAL-ICM model to assess the effects of the beach communities' discharge on water column dissolved oxygen, chlorophyll-a, and nutrients.

The circulation analysis showed that the average Dames Point dilutions would be expected to range between 0.014% and 0.025% of the beach communities' effluent concentration. Using total nitrogen as a surrogate, the expected Dames Point dilution range led to an estimated range of the expected beach communities' nitrogen load at Dames Point between 0.435 and 0.775 lbs/day. The CE-QUAL-ICM water quality analysis also indicated that the beach communities' impact was minor, contributing less than 0.001 mg/L to the dissolved oxygen deficit throughout the LSJR reach. These analyses showed it to be highly unlikely that the combined WWTP effluents were contributing, in any measurable way, to the dissolved oxygen depressions at Dames Point.