

Abstract

An ecological and public health assessment study was completed in 2016 for the Grand Canal and adjacent wetlands in the Town of Islip, Suffolk County, New York. The objective of the study was to collect and analyze data needed to evaluate both the public and ecological health of the Grand Canal, and to develop a methodology for assessing whether dredging combined with Integrated Marsh Management (IMM) would alleviate documented impairments. Conclusions regarding the environmental condition of the Grand Canal and adjacent wetlands are made, and recommendations for actions to improve the health of the study area are discussed. Data collected as part of the study included: surface water samples, water quality parameters, sediment cores, bathymetric data, tidal flow and flushing characterization data, flora and fauna data (vegetation, benthic, fishery, avian), and wetland characterization data. Past reports and existing data were also reviewed as part of the assessment.

The study found that the Grand Canal has experienced impaired environmental quality due to pollution sources (such as septic and stormwater) and excessive nutrient enrichment which has been exacerbated by canal geometry, inadequate tidal flow and flushing. Cultural eutrophication is evidenced by the poor water quality observed within the canal system, particularly the low levels of dissolved oxygen and elevated nutrient levels (nitrogen and phosphorus). Bacterial indicator testing showed that bacterial contamination is a potentially significant public health issue throughout the Grand Canal, as elevated coliform levels were frequently observed. Additionally, results of chemical analysis of sediments collected from the study area were found to contain some chemical constituents, including DDT and its related breakdown products, as well as various heavy metals. However, concentrations were generally consistent with other surface water bodies in the area. Bathymetric surveys of the Grand Canal indicated reduced channel depths throughout the canal system. The marshes in the study area were found to be severely stressed, particularly due to invasive species proliferation and limited tidal flushing.

The public health assessment indicated that, due to bacterial contamination, surface waters in the Grand Canal are unlikely to be safe for primary contact recreation, and that the quality of the fish inhabiting the Canal may also be compromised (e.g., for purposes of human consumption) due to contamination. Potential human health risks from the chemical contaminants detected in surface water and sediment did not exceed non-cancer thresholds or USEPA target cancer risk range. These impairments are not considered to be unique to the Grand Canal; other canals in Suffolk County have been documented as experiencing similar conditions due to the proximity of homes, recreational activities (e.g., boats), and stormwater runoff. Mosquito breeding public health risk has not been documented.

Dredging and deepening of inner portions of the canal, without widening or deepening of its connections to the Connetquot River or adjacent wetlands, would not improve flushing rates for the canal. It is not feasible to widen the canal entrances because there is residential and commercial properties on each side. In fact, deepening of the canal without increasing water flow could result in greater volumes of stagnant water in the canal and could potentially worsen environmental conditions. There are multiple anthropogenic sources of contamination associated with existing land uses that will continue to affect the canal unless long-term abatement measures are taken.

Erosion of the banks, especially along the man-made berm, is continuing along with shoreline failure from deteriorated bulkheads. These sources of sediments will continue, and dredging could actually accelerate sedimentation by causing increased instability of the canal bottom and banks. Sediment control measures, including shoreline stabilization, are needed to prevent further sedimentation in the canal. Even if dredging were determined to be a beneficial action, standard Suffolk County protocols and procedures relating to set backs from shorelines and bulkheads and maximum allowed side slopes of dredge areas could not be followed in many areas of the canal because the canal is very narrow and its banks contain bulkheads on private property.

The wetlands adjacent to the canal along the south side are experiencing continued serious degradation from inadequate tidal exchange, reduced salinity, and the spread of invasive species. Although the wetland still provides a valuable habitat for water fowl, fish and other wildlife, the quality of the wetland will continue to degrade unless remedial measures are taken. Long-term health and viability of the wetlands can be improved by implementing marsh management which significantly increases tidal exchange into and out of the wetlands. Integrated Marsh Management (IMM) would have multiple benefits of improving the quality of the wetland, improving water quality conditions in the canal, decreasing the potential for mosquito larvae production and need for mosquito control measures, and providing improved coastal resiliency and buffering during coastal storms and long-term sea level rise. Tidal exchange into the wetlands could be increased by removing significant portions or all of the man-made berms presently separating the wetlands from the canal. Significantly improving tidal exchange for the wetland would provide improved flushing of the canal by providing additional volumes of water within the tidal range which would be subject to tidal action on a daily basis. Removing the berm would allow greater volumes of water to enter and exit the canal with each tidal cycle. IMM improvements including berm alterations for the adjacent wetlands would provide long-term water quality and habitat improvements to the canal and associated wetlands.

In summary, this evaluation recommends a preferred action of an integrated marsh management (IMM) program and berm removal, to benefit the health of the proximate marsh, as well as to increase water movement/exchange in the canal. This would help alleviate eutrophic stresses, which are manifested in high nutrient concentrations and low dissolved oxygen. Selective dredging at the mouths of the northern and southern entrances to the canal could further improve circulation, but this action would be ancillary to the primary remedial measure of IMM.

Overall, this evaluation demonstrates that dredging the canal itself would not alleviate potential public health risks from pathogens, or improve an ecological impairment. Source reduction (e.g., upgrade on-site sanitary systems, or connect them to a community sewer system) could decrease discharge of bacteria and nutrients and assist in long-term water quality improvement. Further investigation beyond the scope of this study would be needed to accurately determine level of contribution from on-site sanitary systems, as well as evaluation of alternatives and design of a preferred alternative.