Delavan Lake North Inlet Dredging Project

Summary of Project Benefits and Future Actions

Questions have arisen recently regarding the benefits received from completing the long awaited Inlet dredging project, and I have thus provided a summary of the primary and ancillary benefits that will result from these recent restoration efforts. The Inlet has long been impacted by nutrient rich sediment that has contributed to shallow water depths, excessive macrophyte growth, algae blooms, habitat degradation and severe impacts to recreational access. In addition to being impacted by sediment deposition and phosphorus loadings originating from external or watershed based sources, the Inlet and adjoining Delavan Lake has been subjected to reoccurring high wind events and boat induced activity that has disturbed and re-suspended the soft, shallow, nutrient rich sediment back into the water column allowing phosphorus to become re-mobilized to contribute to eutrophic conditions within the Inlet and into the main body of the lake.

By hydraulically dredging approximately 45,330 cubic yards of this soft nutrient rich sediment located primarily in the most shallow, exposed and disturbed area of the inlet, the extent of internal sediment and nutrient re-suspension within the western, less vegetated and exposed portion of the Inlet will have been significantly reduced by dredging to depths not easily impacted by wind and boat activity. Based on laboratory analyses of sediment core samples obtained from the Inlet dredging area, the average total phosphorus concentrations were found to be approximately 1,200 mg/kg or 0.000545 pounds of total phosphorus per pound of dredged sediment. Therefore, we estimate that approximately 33,350 pounds of phosphorus will have been removed from the Inlet as a result of the dredging project. In addition to greatly reducing internal nutrient loadings within the Inlet, the increased water depths within the deepened area will provide improved trapping efficiency levels to allow incoming sediment and phosphorus from external watershed based sources to settle within the Inlet rather than being transported further downstream into the main body of Delavan Lake. Although increased trapping efficiencies may have been derived by removing more sediment throughout the Inlet to provide increased storage capacity to reduce flow velocities and allow higher percentages of suspended sediment to settle, the Inlet Project will have provided approximately 9.1 million gallons of additional storage capacity to assist in protecting the main body of the lake from future nutrient loadings.

The extent of the project dredging limits was restricted by the presence of high quality aquatic habitat that had developed in many areas of the highly vegetated, eastern portion of the Inlet and had been designated as a WDNR Sensitive Area, thus limiting the allowable extent of the Inlet dredging efforts. However, this historically vegetated "Sensitive Area" portion of the Inlet also provides many benefits besides aquatic habitat. The rooted macrophytes help to stabilize the underlying soft sediment and assist in limiting sediment and phosphorus re-suspension during high summer wind events, while providing a filtering mechanism for incoming suspended solids and phosphorus.

Phosphorus Inactivation though controlled alum treatments, similar to the relatively successful efforts implemented within the deeper hypolimnetic main body of Delavan Lake in 1990, were considered for the Inlet, but were not deemed to be viable for various reasons. The Inlet is a shallow unstratified, sediment laden forebay with extensive aquatic macrophyte coverage that is subjected to reoccurring external sediment and nutrient loadings. These basic conditions, that include a high watershed to lake size ratio and subsequent sediment deposition rates, greatly reduce the effectiveness and longevity of alum treatments by rapidly covering the alum floc that was applied. In addition, the extensive

macrophyte growth within the inlet, which includes Eurasian water milfoil and many native species, would likely limit effectiveness by intercepting alum floc and contributing to uneven distribution on the sediment surface. (Restoration and Management of Lakes and Reservoirs, Cooke, Peterson, Welch, Nichols, 2005). It has also been observed that the extensive organic carbon present in high density macrophyte zones can occupy binding sites for the alum floc, further limiting the effectiveness of each application. In addition to being a relatively ineffective and costly alternative for controlling phosphorus within the Inlet, alum treatments were not determined to be an environmentally acceptable solution due to the presence of the adjacent designated WDNR Sensitive Area and its potential impacts to larval fish and macro-invertebrates thriving within the high quality aquatic habitat.

The Inlet dredging project will complement the recently re-designed and renovated Mound Road wetland complex that was upstream of the Inlet to function as an enhanced sediment and nutrient trap to assist in protecting Delavan Lake from external, watershed based nutrient loadings. Additional watershed-based projects designed to reduce soil erosion and runoff from agricultural and construction based sources, stream bank and channel instability, and other in-lake management alternatives previously described in the Delavan Lake Management Plan are strongly recommended for future consideration and implementation.

If anyone reading the above has questions or would like additional explanation and elaboration, please feel free to e-mail me and I will do my best to answer you in a prompt, concise manner.

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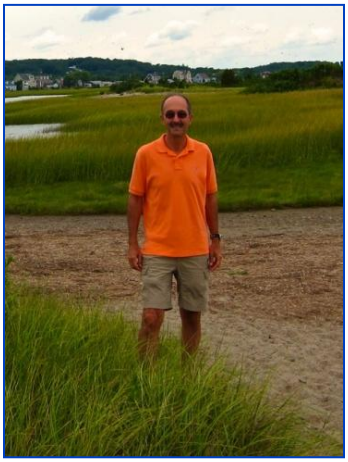

Peter has significant project experience in all aspects of lake and reservoir restoration and has specialized in planning and implementing lake dredging projects throughout the United States for more than 25 years. He has been involved with more than 40 completed dredging and dewatering projects ranging in size from 300 cubic yards to 3,000,000 cubic yards.