WATERSHED DISTURBANCE
and its
CONTRIBUTION TO ACCELERATED EUTROPHICATION:
A CASE STUDY OF
SHADOW LAKE, RIDGEFIELD, CONN.

AN ABSTRACT OF

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WATERSHED DISTURBANCES AND ITS CONTRIBUTION TO ACCELERATED EUTROPHICATION A CASE STUDY OF SHADOW LAKE, RIDGEFIELD, CONNECTICUT

ABSTRACT

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Shadow Lake is a small, approximately seven acre, man-made lake in Ridgefield, Connecticut. Extensive construction has recently taken place within the glacial valley where this lake is situated. The watershed includes extensive swamp areas with very poorly drained soils.

Swamp soils trap and hold large quantities of nutrients such as nitrates and phosphates. These nutrients are released with the sediments into receiving waters if swamp soils are disturbed. Only one part of phosphate is required for each seven parts of nitrate and forty parts of carbon to produce growth. Phosphate then becomes the limiting factor.

Uncontrolled erosion run-off from a large construction site immediately upstream allowed excessive enriched sediments to flow into Shadow Lake. Sediment build-up has been extreme. Throughout the lake three dominate macrophytes, sedges (Cyperus spp), pickerel weed (Pontederia cordata) and water lily (Nymphaea odorata) were consistent indicators of present depth to substrate.

The bottom sediments were cored and analyzed. This confirmed a number of episodic events of siltation. Sediment sizes varied from

clay to coarse sand indicating altered stream flow dynamics. Low to very low pH values ranging from 4 to 5.5 were also found in the sediments. Geochemical correlations delineate the layering in these recent sediments, and using compaction the base of the recent sediments is identified.

Analysis of the micro-organisms present found sulfur bacteria Thiopedia, Clathrochlorix, and Thiothrix present. These exist only under anaerobic conditions. Leptothrix ochracea, an iron bacteria, was reported along the eastern and northern side of Shadow Lake.

The four factors present, high phosphates in silt/clay sediments; the low pH, highly acidic soil conditions in the core samples; areas of anaerobic environments at the sediment-water interface; and iron enriched waters combine to accelerate normal cycling of phosphates within a lake system.

In this case greatly increased macrophytic and phytoplankton production results. Eutrophication occurs as lake processes are choked when production exceeds decomposition. Water testing here indicated high phosphate levels averaging .026 mg/l. Species populations of both lake bacteria and algae are determined by phosphate concentrations. Correlation of the species variations present, and the Trophic Stage of lake aging also indicate eutrophic conditions in Shadow Lake.

The clay/high-phosphate relationship to heavy siltation is important in instances such as Shadow Lake. Accelerated eutrophication of this lake has resulted from excessive phosphate loading.