# MINING AS A THREAT TO NEW YORK'S DEER CREEK MARSH

Breck Trautwein and John Dragonetti

Deer Creek Marsh is located in the coastal zone of eastern Lake Ontario in the Town of Richland, Oswego County, New York. The marsh is bounded on the west by Lake Ontario, on the south by a tongue of glacial drift separating it from the estuary of the Salmon River, by State Route 3 on the east, and by Rainbow Shores Road on the north. The marsh is seasonly contiguous to South Pond in the north during the spring innundation season. Deer Creek Marsh, South and North Sandy Ponds, and Cranberry Pond and Marsh together form a system of barrier dunes and beaches, back dune freshwater wetlands and ponds, and a major coastal tributary. This dune-bay-wetland complex covers an area of approximately 20 square miles with a total linear lake frontage of 10.2 miles. The area has been designated as a Geographic Area of Particular Concern (GAPC) by both the Saint Lawrence-Eastern Ontario Commission (SLEOC) and the New York State Department of Environmental Conservation (NYSDEC) because the dune-protected wetlands are uniquely atypical to the Lake Ontario shoreline.

Deer Creek Marsh is the largest wetland in the area, encompassing approximately 1,300 acres of ecologically contiguous swamp. It is the most advanced in its eutrophic succession to a land area, the end result being a polder of prime agricultural significance. The marsh is made up of 30 percent wooded swamp, 30 percent shrub swamp, 5 percent inland deep marsh, and 35 percent inland shallow fresh marsh. Mature woodlands of American beech, red maple, sugar maple, and basswood as canopy species serve as a protective buffer on the north, southeast, and south. The northern woodlands buffer is presently in a greatly disturbed condition due to the presence of the Rainbow Shores trailer park and campsite development: the protective effect of this area is rapidly diminishing.

The Rice Creek Biological Field Station rates the Deer Creek wetland as the most important and most highly vulnerable breeding and feeding area in the Oswego County coastal zone. The number and diversity of waterfowl and marsh bird species in this marsh is higher than in any other marsh in this area. Grebes, heron, teal, duck and mallards, geese, hawks and various shore birds are abundant. The Black-Crowned Night Heron, a species in imminent danger of expiration, breeds in the marsh. Eight other declining species of fowl are common migrants and breeders. The Bald Eagle could possibly be reestablished in this area as a nesting species. Gerald Smith, of the Rice Creek Biological Station states flatly that "... it is impossible to overemphasize the importance of the area to nesting marshbirds and waterfowl and other aspects of bird communities: population levels of marsh nesting species in the coastal zone are closely tied to this area's species."

The marsh also serves as a particularly important habitat for large numbers of reptiles and ambhibians noted for their value to pest control and to the food chain. Bullhead, Largemouth Bass, Northern Pike and Redfin Pickerel are abundant, stimulating the value of the marsh as a sport fishery. The area is also important to larger mammals, notably whitetail deer, muskrats, fox, mink and weasels. Beaver could be reestablished if management devices could be devised that would insure their survival. Plant communities include a large

grove of native Tamarack, which is an excellent habitat area for heron, as well as sensitive and diverse wetland trees, shrubs, rooted, floating, and bog mat species that are dependent on periodic or permanent flooding in order to survive. The ecological diversity and large areal extent of Deer Creek Marsh render it particularly important to the ecosystemic stability of the eastern Lake Ontario coastal zone.

Additional values inherent to any substantial wetland are emphasized in Deer Creek Marsh. The unusually large biomass of the marsh ameliorates the detrimental effects of oxygen-consuming pollutants. The ability of the marsh to retain large quantities of seasonal flood waters not only mitigates headward erosion by the streams that flow into the swamp but also traps significant amounts of fine sediments that would otherwise stress the delicate ecosystems of Lake Ontario by maintaining photosynthetic activity that would otherwise be reduced by turbid conditions. Oswego County is economically depressed relative to some of the more highly industrialized areas surrounding Lake Ontario due to the seasonal nature of employment possibilities inherent to tourism and primary resource utilization economies. Many full-time residents supplement their larder with game from the marshes and with incidental income derived by servicing recreationists and sportsmen.

The present marsh-barrier beach configuration represents the midpoint of a cycle that starts with open embayment and erosion of glacial deposits and ends with flatlands suitable for pasturelands. The earlier stages of this phenomenon may be seen in North Sandy Pond, to the north of Deer Creek Marsh. This area is characterized by shallow, open waters in which emergent vegetation is struggling to gain a foothold. Left alone, this area may also develop into a significant wetland but the present intensive recreational use of the developing sand spits causes recurrent failures in the closing mechanisms due to the constant disruption of stabilizing vegetation. Wave action due to both lake storms and motorboats constantly flush this area of the fine sediments necessary to build an adequate marshland. The series of geological events leading to the present geomorphology of the dune-bay-wetland complex is relatively simple to deduce. Marsh areas have developed as a result of infilling of kettle holes in post-Wisconsin glacial terrain. As lake levels receeded to their present flux, kettle holes near the shoreline were first deepened by erosion due to wave action and then, as lake levels stabilized, bays were formed which were subsequently closed by the encroachment of sand spits across the outer lacustrine margins. The beaches were built by deposition of silicate sediments carried to the North from the active depositional area at the mouth of the Salmon River by a local southerly flowing cell of the general littoral draft pattern. Once in place, the beaches were stabilized by the introduction of volunteer vegetation, notably beach grasses and wormwood. The deposit was subsequently reworked by aeolian mechanisms, sizing and rounding the sand grains. Successive vegetative evolution has favored species that are more limited in habitat and stress ranges, resulting in a gradation of species that did not comingle until the littoral forces involved in the building of the barrier beaches allowed species cross-referencing which enforced ecotypical stability of the barrier dunes. The beach is classic in its geomorphology, forming a single elongate sand ridge which parallels the lake shore, rising to a crest of $\pm$ 50 feet above the current lake level.

Thus, Deer Creek Marsh is maintained by the barrier beach which protects it from lake effect storms and the tidal ambience of Lake Ontario. Most of the 2½ mile barrier consists of sand dunes and beaches, ranging in width from 50 to 300 feet and in height up to 50 feet above mean lake levels. Deer Creek exits from the marsh by passing southward between two dunes and turning sharply to the west, flowing directly into Lake Ontario. The creek mouth is protected from storm-generated erosion by a crescentic off shore bar, made up of lacustrine sediments deposited in the energy sink caused by the eddying confluence of lake and stream currents. This feature, similar to a baymouth bar, protects the marsh in two ways. It prevents lake waves, which can reach a height of six feet, from entering the creek channel and eroding the fine sands which make up the dunes from the marshward side. The bar also prevents water levels in the marsh from fluctuating as rapidly as water levels in the lake, thus preventing flushing of the sediments and nutrients which support vegetation in the marsh. Marsh water levels have been observed that are as much as two feet higher than the lake when exceptional wind regimes have tilted Lake Ontario to the west. The opposite situation, occurring when marsh water levels are low and prevalent storm winds raise the lake to the east, have resulted in water levels as much as six inches higher in the lake than in the marsh. The net effect of the bar-barrier beach complex is to permit nutrient exchanges between the lake and marsh while preventing destruction of the fragile marsh ecosystem by wave action.

The uniform rounded grains of sand and lack of organic contaminants which form the beach make it suitable for use as a foundry sand. This type of sand has been sought historically and has been mined along the shores of Lake Ontario since the turn of the century. Sand is extracted by means of a front loader and is dumped directly into trucks and transported to users. Mining sites have been converted to campsites by replacing sand mined near the water table with gravel.

Present mining activity is found at the southern end of the backshore dune, directly in line with the mouth of Deer Creek. The position of the mining operation poses a grave potential threat to the integrity of the marsh. Lake effect storms of more than a ten-year frequency are sufficiently energetic and of long enough duration to breach the bar at the creek mouth. Removal of the bar then leaves the fine sand berm separating mining activities from the creek vulnerable to wave attack. This berm is inadequate to withstand an erosional event of any duration and would soon wash out, allowing the lake to directly enter the marsh. Should this occur, the marsh would drain when the lake returned to its normal levels.

The inherent conflict of competing land uses has brought pressures to bear on both the mining activities and the integrity of the marsh. Environmental agencies fear that continuing indiscriminate mining would create an obvious potential for breaching the bar, allowing communication between the fragile wetlands ecosystems and the comparatively hostile lake environment. Remedies offered by regulation varied from cessation of mining activity to permitting mining in the existing activity, risking destruction of the marsh.

• Development activities along the barrier beaches create further potential for destruction of the wetland. High density campsites are created as sand is mined from other areas. These campsites focus human impacts during the summer, the most sensitive time for the growth of beach vegetation. Establishment of adequate vegetation is prevented by intensive use of level areas, especially by trail bikes, cars, and dune buggies. These barren areas are particularly susceptible to aeolian erosion resulting in further lowering of the beaches. Deflation features, or blowouts, allow large quantities of sand to encroach into the marsh, infilling portions of it and destroying fragile waterline habitats. The potential for storm breaching of these artificially low areas is markedly increased, further endangering the integrity of the marsh.

Other significant impacts arising from the intensive summertime use of the beaches includes high BOD and COD loadings of the marsh's ecosystem. Nutrient pollution is common due to the inability of beach sands to effectively trap septic wastes. The wetlands and uplands are used as disposal sites for solid wastes from the campsites. Litter is common and largely uncontrollable due to high winds.

It should be noted that any solution that incorporates the preservation of the wetland involves drastically reducing human activity on the barrier beaches. All options also presume the need for major reclamation efforts involving stabilizing vegetation, use of windtraps to reduce immediate aedian erosion, and rebuilding of most of the low areas that are in imminent danger of breaching. Management of the area after short-term stabilization of the dunes is accomplished should be based on the geomorphological dynamics of the dune-marsh complex.

Purchase of the entire marsh and barrier beach property, utilizing funds available for fresh water wetlands purchase, is the most desirable alternative, insuring long-term protection for the area. This option is likely to be expensive, especially in consideration of the ambitions of the current landowners. The present ownership situation is confused, involving an estate, numerous small holders, and some leases on the area currently held by sportsmen's organizations. Delays inherent to the process of clarifying the ownership situation and subsequent negotiations may not provide immediate relief from the pressures that threaten the area.

Mechanisms to lessen the impacts of the current mining operation originally included an exchange of land, trading the beach lands for a deposit of commercially acceptable foundry sand on State reforestation lands in McConnellsville Oneida County, New York. The transfer option would have been mutually advantageo giving the mine owner a viable mineral deposit quite close to his processing operation and giving the State desirable dune lands. However, reforestation lands in Oneida County are protected by Article 14 of the State Constitution which extends the "forever wild" designation to that county and forbids the sale or exchange of such lands.

The third option available to the Department of Environmental Conservation to mitigate potential negative impacts from the mining operation is to deny the miner an operating permit. Grounds for such denial can be best expressed by Article 71 of the New York State Environmental Conservation Law, which states that the Commissioner, after investigation, may discontinue or abate a condition or activity which is likely to result in irreversible or irreparable damage to natural resources. It will be necessary to fully balance a decision of this sort, weighing the value of the marsh against the value of the mineral resource in question. The mining operation may bemarginally profitable due to a 35 mile transportation disadvantage, the replacement of natural foundry sands in the marketplace by artificial substitutes such as ceramic and zirconium molding materials, and the general decline in the generic market for foundry sands. However, standards which allow comparison between natural resources which are inquantifiable in economic terms, such as a wetland, and resources for which a cost/benefit evaluation may be easily presented are arbitrary at best. Also, denial of the mining permit does little to relieve the intense erosion potentials caused by development on the outer barriers.

Issuance of a permit conditioned on selective mining methods and extensive concurrent reclamation procedures presents further difficulties. A mining plan based on proscribing mining below the contour which represents the wave heights typical of a lake storm of 100-year frequency, in this case six feet above mean lake level, significantly reduces the volume of available economic sand. Conditions present in the Freshwater Wetlands Act proscribe disturbing a buffer zone of 100 feet from the vegetative boundary of the wetland. Laws governing the protection of streams proscribe mining within 25 feet of a classified stream in this case, Deer Creek, without a permit. Additional constraints, such as immediate revegetation and the use of temporary structural protective devices, may prove to be both inadequate and expensive. The net effect resulting from compromise conditions would undoubtedly severely limit the profitability of the deposit and may be ineffective in ensuring preservation of the marsh.