

**LAKE SUPERIOR HYDROLOGY - SEICHES**

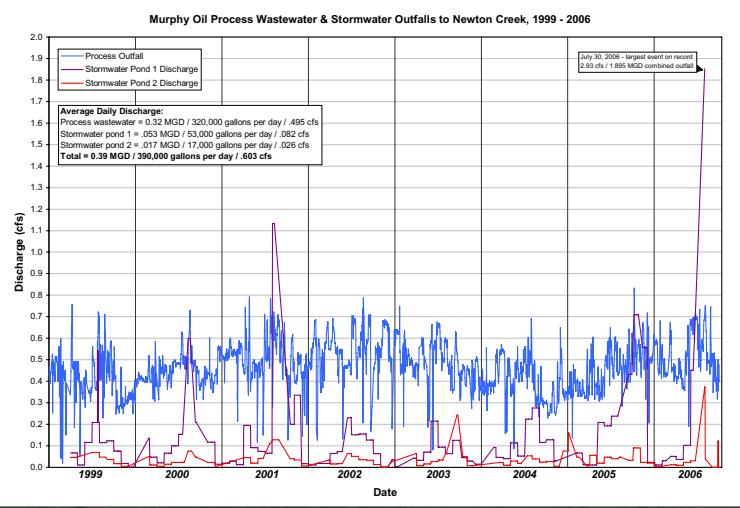
Lake superior experiences fluctuations in water surface elevation due to the influence of wind and freshwater input (including the inflow volume of the St Louis River). At Hog Island, these changes in lake level can vary up to 2 feet over the period of several months, and up to 1 foot daily (see graphs to the right).

These "seiches" have a profound effect upon the ecology along the lake margins, including the composition and distribution of wetland vegetation as well as the biological communities that they support. The regular "pulses" of freshwater along the lake fringe provides for transfer of essential nutrients and sediments, and helps to maintain a high level of biodiversity.

**NEWTON CREEK WATERSHED HYDROLOGY**

Watershed Size: 835 acres (1.3 square miles)  
 Length: 9,160 feet  
 Hydrologic Soil Type: D

Land Use	Acres	%	Notes
Roads / pavement	30.6	3.7%	assuming roads = 30' wide and all paved
Rooftop	55.8	6.7%	assumes 30% of lots are impervious
Turf Grasses	93.0	11.1%	assumes 50% of lot areas in turf grasses
Grasslands	262.4	31.4%	assumes 40% of remaining areas forested
Forest Cover (Canopy)	393.7	47.1%	assumes 60% of remaining areas in high grassland



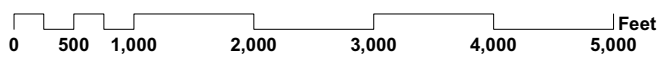
The hydrology of the Newton Creek watershed is primarily influenced by the industrial process and stormwater capture outfall at Murphy Oil, which constitutes the "headwaters" of Newton Creek. The graph below provides some indication that this discharge is fairly constant. Of course, there is some additional contribution from the stormdrain network during rainfall events, but a modeling analysis shows that this does not provide a large increase in peak flows. As a result, Newton Creek does not benefit from the magnitude of flows necessary to mobilize bed and bank sediments, or produce channel-shaping velocities. This infrequency of "bankfull" discharge results in lack of channel complexity, prevents the scour and cleansing of bed sediments, and prevents the deposition of sediments onto a bankfull floodplain, which would provide nutrients and beneficial habitat for native riparian vegetation. The lack of an active floodplain, and apparent lack of vegetative and aquatic macroinvertebrate biodiversity in and along the channel, is likely due to this controlled discharge and rarity of high flow events.



An additional result of this paradigm is that PAHs, VOCs, PCBs, lead, and other contaminants that remain in the channel sediments post-remediation are not mobilized. This is potentially beneficial, as those compounds remain sequestered and not bio-available, but also means that they will exist in perpetuity, as the oxidation and micro- biological processing that would occur if the sediments were mobilized would provide for the natural "cleansing" of those toxic compounds.

**HOG ISLAND & NEWTON CREEK HYDROLOGY**

1 inch equals 400 feet



- Legend**
- Roads
  - Railroads
  - Culvert
  - Stormdrain Piping
  - Sanitary Sewer
  - Watershed Boundary
  - Stormdrain Manhole
  - Sanitary Sewer Manhole