

## **GILE FLOWAGE LITTORAL ZONE SURVEY, 2005**

### *INTRODUCTION*

The Gile Flowage is a 3,384 acre reservoir located in Iron Co., WI. The flowage is used as a water retention reservoir for downstream hydroelectric facilities at Saxon Falls and Superior Falls on the Montreal River. Full pool level is 1490 feet above mean sea level and a maximum drawdown of 15 feet is allowed. The flowage is usually drawn down twice a year, during both summer and winter. A typical annual water level regime includes a gradual summer drawdown beginning in May and averaging 6 feet by October. Refilling generally occurs in late fall. Winter drawdown begins in early December and typically averages 7 – 8 feet by early March. Refilling is usually achieved by early May.

The drawdowns have a number of negative effects on the flowage. The aquatic plant community is minimal since the entire littoral zone is regularly subjected to drying and freezing. A 1994 aquatic macrophyte survey showed the maximum depth of plant growth was 6.1 feet below the full pool level of 1490 ft. Eighty-five percent of the littoral area contained no aquatic plants.

Wave scour that occurs during drawdown probably further limits aquatic plant growth by removing and transporting fine sediment to deeper water. Seeds from aquatic plants are probably also flushed from the littoral zone in this manner.

The minimal presence of aquatic plants results in a lack of plant-related fish habitat. Panfish, especially bluegill and pumpkinseed need aquatic plant beds as nursery habitat. Also, the loss of a significant volume of water twice annually concentrates young panfish into a much reduced pool, increasing their vulnerability to predation. As a result, few survive and panfish populations are low in comparison to other waters. Over-winter drawdowns may be at least partially responsible for poor survival of young walleyes, due either to entrainment (passage downstream through the dam) or increased predation by adult walleyes (cannibalism) facilitated by the 58% reduction in winter pool area.

Spiny water fleas were discovered in the Gile Flowage in 1993. It is the first inland lake in Wisconsin to be invaded by this exotic species. Panfish predation on spiny water fleas may offer an effective control mechanism. That was the conclusion at Fish Lake, a Minnesota reservoir very similar to the Gile Flowage. Production of large year classes of bluegill and black crappie there coincided with the disappearance of spiny water fleas. The currently limited panfish population in the Gile Flowage prevents the development of this control mechanism.

Lack of a significant littoral zone aquatic plant community also limits a potential food source for waterfowl and aquatic mammals.

Recreational Impacts? –boat launching difficulty, riparian piers and access difficulty, reduced fishing potential, others?

## *SURVEY METHODS*

A physical survey of the Gile Flowage littoral zone was conducted in May of 2005. A total of 108 transect stations were established around the flowage perimeter (figure 1). Stations were placed every 1,270 feet along the 26.0 mile shoreline. Coordinates for stations were entered into a GPS unit to allow their location in the field. At each station a transect perpendicular to the shore was evaluated. Bottom locations at elevations of 1,488 ft, 1,486 ft, and 1,484 ft were determined (2 ft, 4 ft, and 6 ft below full pool elevation). At each bottom location, the distance to the ordinary high water mark (1,490 ft; full pool level) was measured using a laser range finder, and the substrate type was determined by probing.

## *SURVEY RESULTS*

Complete survey data is given in appendix 1. The mean widths and areas of the three contour intervals are listed in table 1, below:

Table 1. Widths and Areas of Gile Flowage Littoral Zone Contour Intervals

<u>Contour Interval</u>	<u>Mean Width (yds)(+/- 90% C.I.)</u>	<u>Total Area of Interval* (acres)</u>	<u>% of Total Flowage Area</u>
0 – 2 ft	7.3 (+/-1.4)	87.3	2.6
2 – 4 ft	23.3 (+/-7.6)	278.8	8.2
4 – 6 ft	27.9 (+/-7.2)	333.8	9.9

\*Assumes a countour interval length of 32.9 miles. This includes the perimeter shoreline length of 26 miles and island shoreline length of 6.9 miles.

The area of the contour intervals increases with increasing depth. A substantial area of littoral zone (333.8 acres) exists within the 4 – 6 ft contour interval.

Substrate data is summarized in table 2, below:

Table 2. Summarized Substrate Data for the Gile Flowage Littoral Zone

Substrate Type Groupings	% of Substrate Type Groupings at Each Depth		
	2 ft	4 ft	6 ft
1 - Bedrock, Boulder, Cobble	27.7	25.9	20.3
2 - Gravel, Gravel with cobble, Gravel with boulders	6.5	13.0	26.9
3 - Sand, Muck, Detritus	58.3	55.6	39.8
4 - Sand with Gravel, cobble, And/or boulders	7.4	5.6	13.0
2-4 – Substrates with Gravel and finer Material present	72.3	74.1	79.7

A substantial portion of the littoral zone has very coarse substrates present (bedrock, boulders, or cobble; 20.3 to 27.7%). However, the majority of the littoral zone has substrates present that could support the growth of aquatic plants. Areas of substrates with gravel and finer material present account for 72.3 to 79.7% of the littoral zone. Reductions in flowage drawdowns would be expected to enhance the suitability of littoral zone substrates for aquatic plant growth. Reducing the scouring action of drawdowns would result in enhanced deposition of fine sediment materials that are generally beneficial for most aquatic plants.

It was noted during the survey that some semi-aquatic vegetation is present around much of the shoreline. Reed canary grass and willow shrubs were observed at the majority of transect sites. Densities of reed canary grass were variable with higher densities occurring in bays. Willow shrub density was generally low. Reed canary grass grew to a maximum depth of 4 ft. below full pool level. Willow shrubs grew to a maximum depth of about 2 1/2 ft. below full pool level.

Both of these species are “semi-aquatic”. They cannot survive continuous submersion for multiple years, but are able to survive when regular drawdowns occur. They supply

useful aquatic habitat in the flowage when pool levels are high. During the survey numerous fish and ducks were observed at sites with more extensive beds of these plants.

A large stand of cattails was present in the vicinity of transect site 102. It grew to a maximum depth of 3.1 ft. below full pool level. Significant stands of other aquatic emergent vegetation were not observed.

### *CONCLUSIONS*

Reducing the extent of drawdowns in the Gile Flowage has the potential to greatly enhance the quality of the littoral zone. There are substantial areas with suitable substrates to allow the establishment of a significant aquatic plant community. This would benefit the flowage's fish and wildlife, enhance recreational opportunities, and potentially provide a control mechanism for spiny water fleas.