

**LOON LAKE
HYDRO ACOUSTIC
SURVEY RESULTS AND
TREATMENT DATA
2012**



**MARINE BIOCHEMISTS
6302 W. Eastwood Drive
Mequon, WI**

Survey Background

Hydro acoustics utilizes sound energy to detect objects and contours underwater. By integrating digital echo sounders with computer processors, GPS (Global Positioning System) data and GIS (geographical information system) software, graphic representation can be generated of bathymetry (depth contours and shape), fisheries, bottom sediment type, and submersed aquatic vegetation coverage and height within the water column.

On April 10, 2012, and on August 8, 2012, hydro acoustic surveys were conducted on Loon Lake, Shawano County, WI. Bathymetry and Submersed Aquatic Vegetation (SAV) data was generated, processed, and then graphically represented.

Utilizing GPS-interfaced imagery, navigation transects of the lake were made with an average of 75 to 100 feet between transects depending on the depth. This pattern allowed for complete mapping of the lake within 30 to 50 feet of the shoreline areas. Docks, wetland emergent vegetation, and shallow depths limited many near-shore areas.

Over 140,000 individual soundings were taken during each survey. These were analyzed and processed into over 6,000 individual data points for each survey, which were extrapolated into graphic representation of the bathymetry and SAV findings. An additional 1272 shoreline and elevation points were marked for further delineation.

Treatment of Loon Lake occurred on April 17, 2012 utilizing the Loon Lake Management District's predetermined treatment areas, chemicals, and chemical amounts. Weather was overcast with mild winds and temperatures in the upper 40's to low 50's. The following pages contain:

- Survey and Treatment Discussion
- Survey Transect and Treatment Area Track Data
- Bathymetry Maps
- Submerged Aquatic Vegetation Mean Canopy Height Maps
- Submerged Aquatic Vegetation Height Maps
- Submerged Aquatic Vegetation Percent Coverage Maps
- Treatment Areas, Treatment Acreages and Average Depths

Survey and Treatment Discussion

The result of the hydro acoustic survey shows an uneven bottom contour with shallow areas from the island extending eastward and then two sand bar areas east and southeast of the island. Maximum depth on April 10, 2012 was 22.07 feet, and average depth was calculated at 9.43 feet. Maximum depth on August 8, 2012 was 21.28 feet, and average depth was calculated at 9.02 feet. The surface acreage on April 10, 2012 was calculated at 323.5 acres with a calculated volume of 3050.82 acre-feet (994,166,164 gallons). The surface acreage on August 8, 2012 was calculated at 323.1 acres with a calculated volume of 2915.4 acre-feet (950,039,878 gallons). The calculated surface areas were greater than historical listings, but are consistent with satellite imagery. Photos of the water levels of the lake were taken on each survey day as shown on the following page for reference.

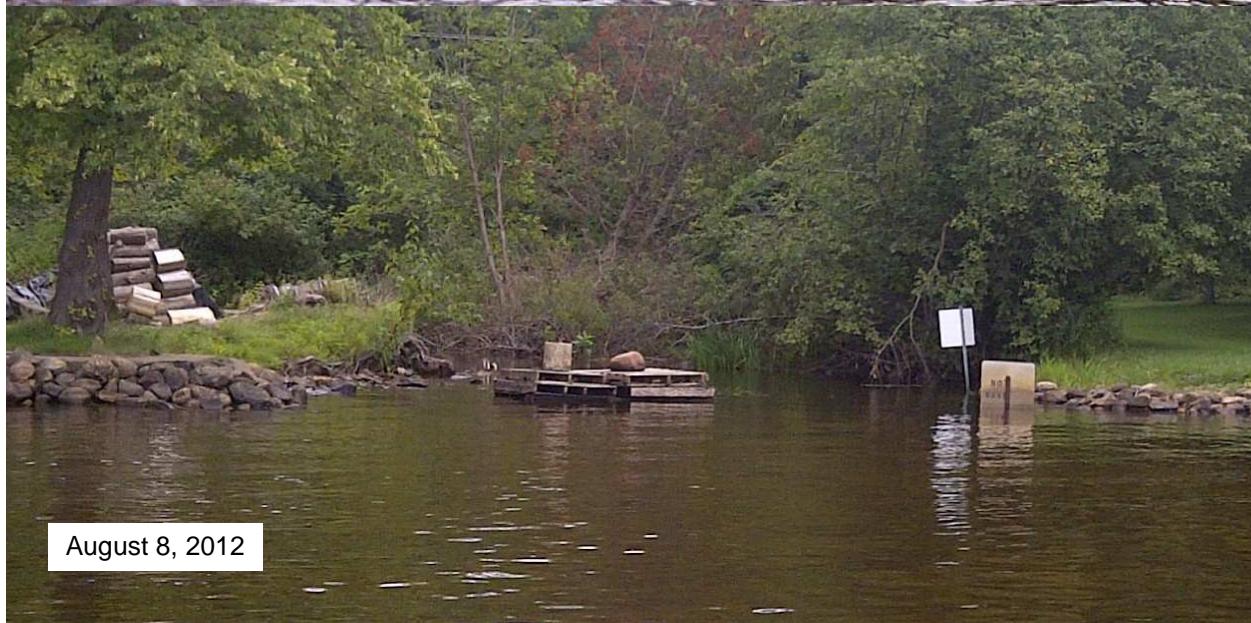
The pre-treatment Submersed Aquatic Vegetation (SAV) maps show very low growing plants mostly in the intended treatment areas. Active growth of the target species, Eurasian Watermilfoil (EWM), was observed on day of survey via rake samples. The Mean Canopy Height Map shows the SAV plant height multiplied by the percent coverage of SAV in the area. This is a calculated method for incorporating the SAV height and SAV percent coverage in a single parameter.

The treatment on April 17, 2012 occurred without incident. The treatment boat utilized weighted drop lines to disperse the products below the surface eliminating any potential of airborne spray drift. Water use restrictions for DMA-4IVM were posted at every property on the lake. Volume data was adjusted for the conditions observed on treatment day.

The August 2012 SAV maps show slightly reduced depth and an increase in aquatic plants. Floating and emergent vegetation appeared fairly healthy along the western and southwestern shoreline areas. These areas could not be navigated for SAV data collection. The August survey did show increased plant coverage, and increase amounts of native growth including some visibly noticeable pondweeds. Filamentous algae was present in many of the plant bed areas. Small amounts of Eurasian Watermilfoil (EWM) were seen, but no significant EWM beds were noticed.

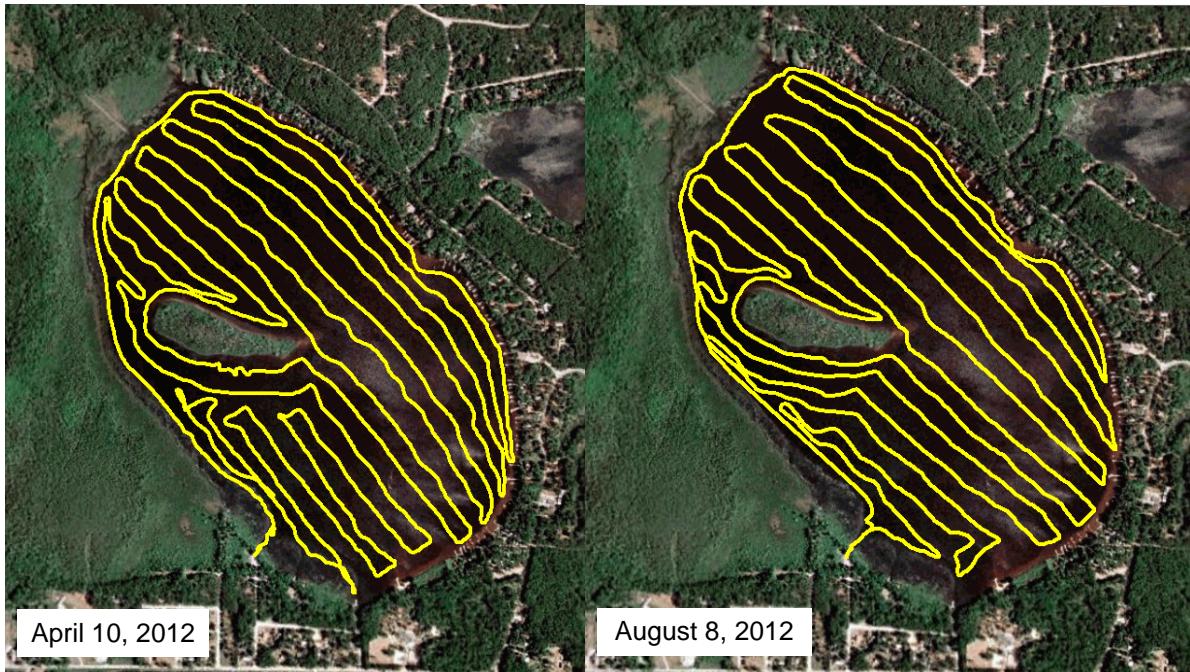
Variations or additional copies of the survey maps are available upon request.

Survey and Treatment Discussion

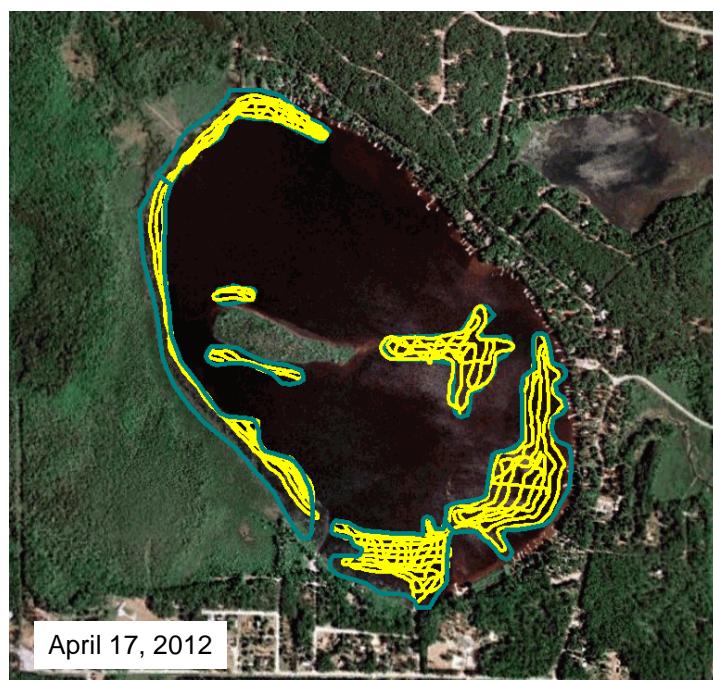


Water levels as seen on survey days.

Survey Transect Data



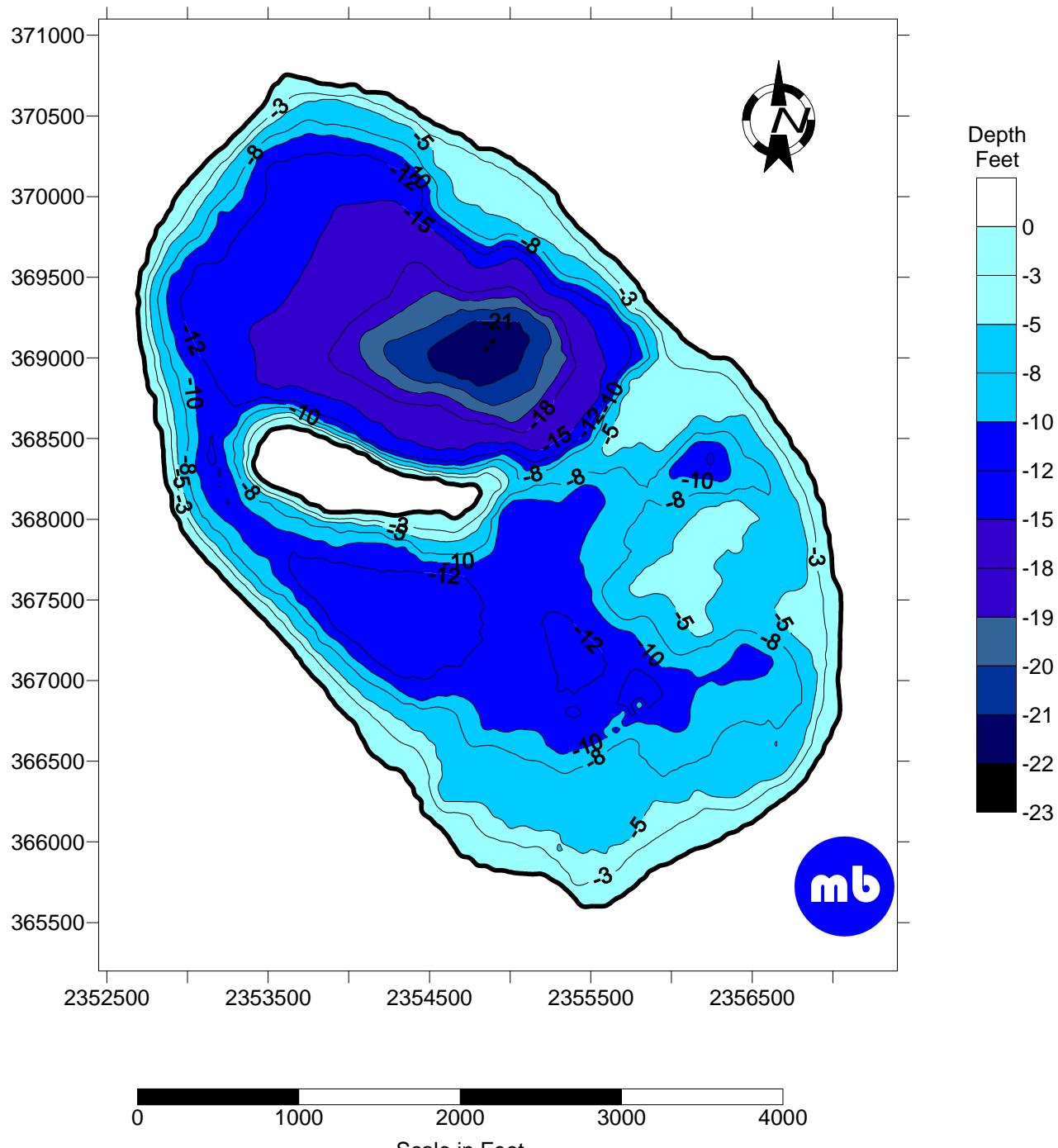
Approximate Survey Track Data overlaid on satellite imagery



Approximate Treatment Track Data overlaid on satellite imagery

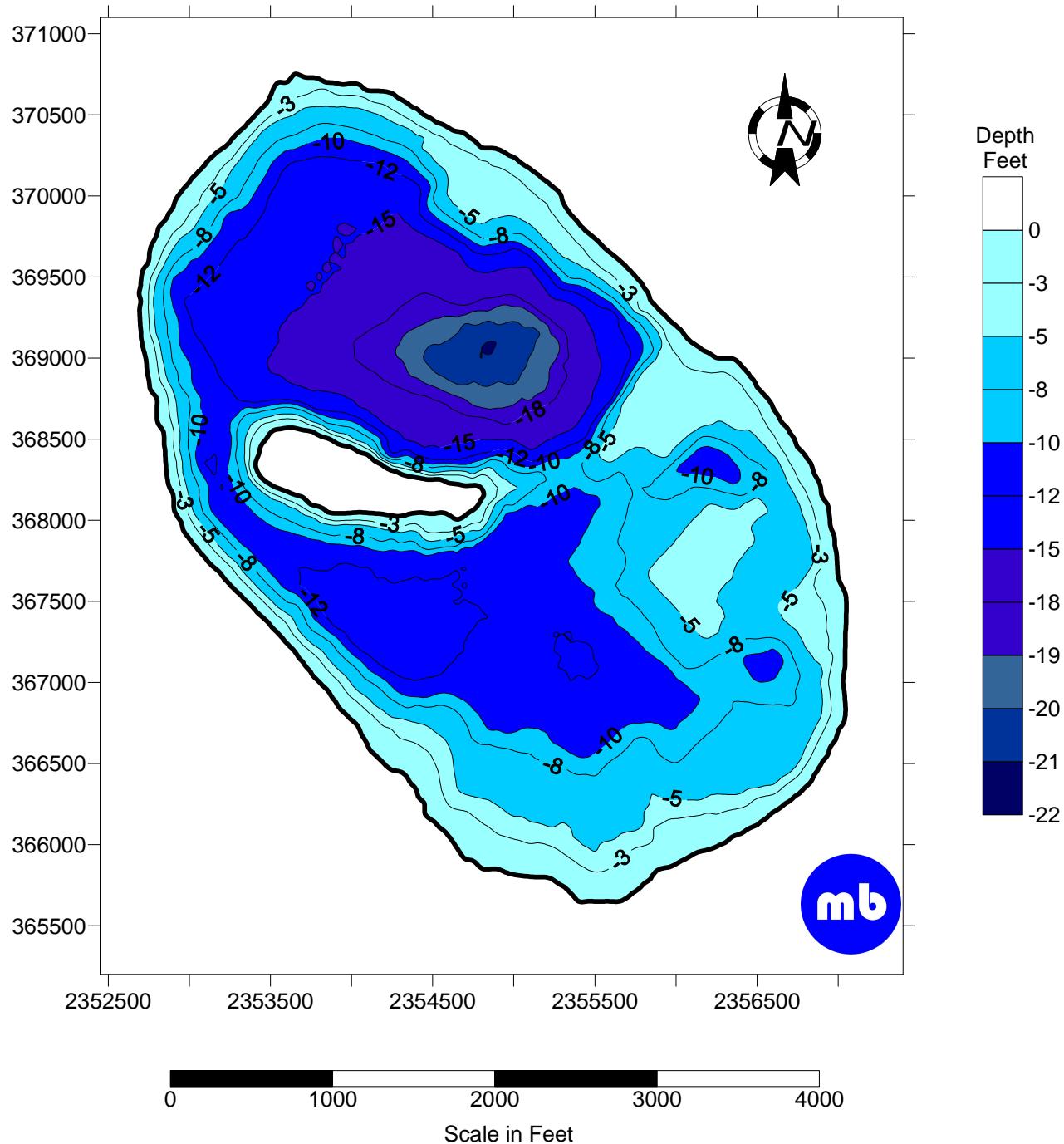
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Loon Lake, WI - April 10, 2012
Bathymetry-Feet
Wisconsin State Plane Central- NAD83



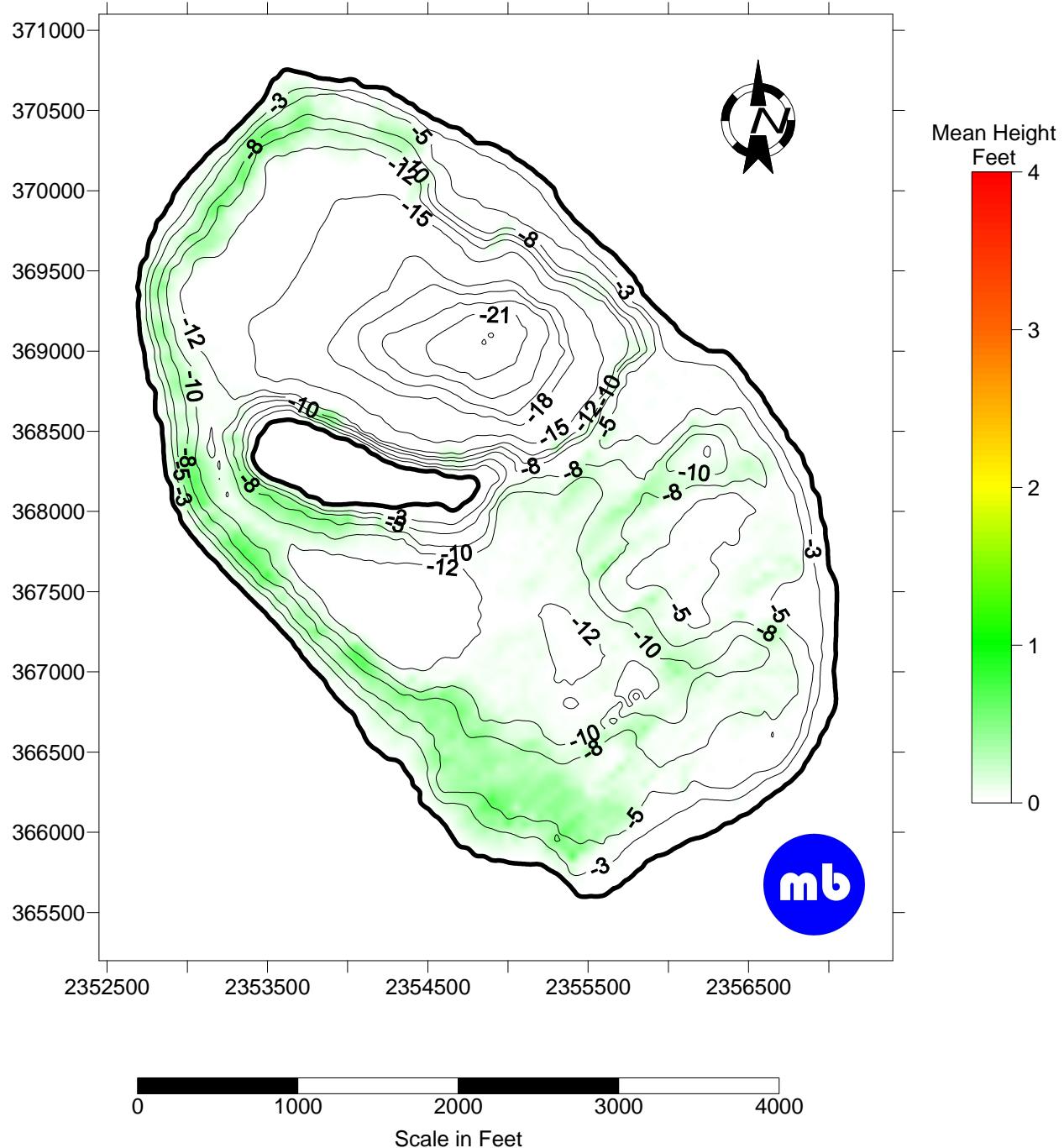
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Loon Lake, WI - August 8, 2012
Bathymetry-Feet
Wisconsin State Plane Central- NAD83



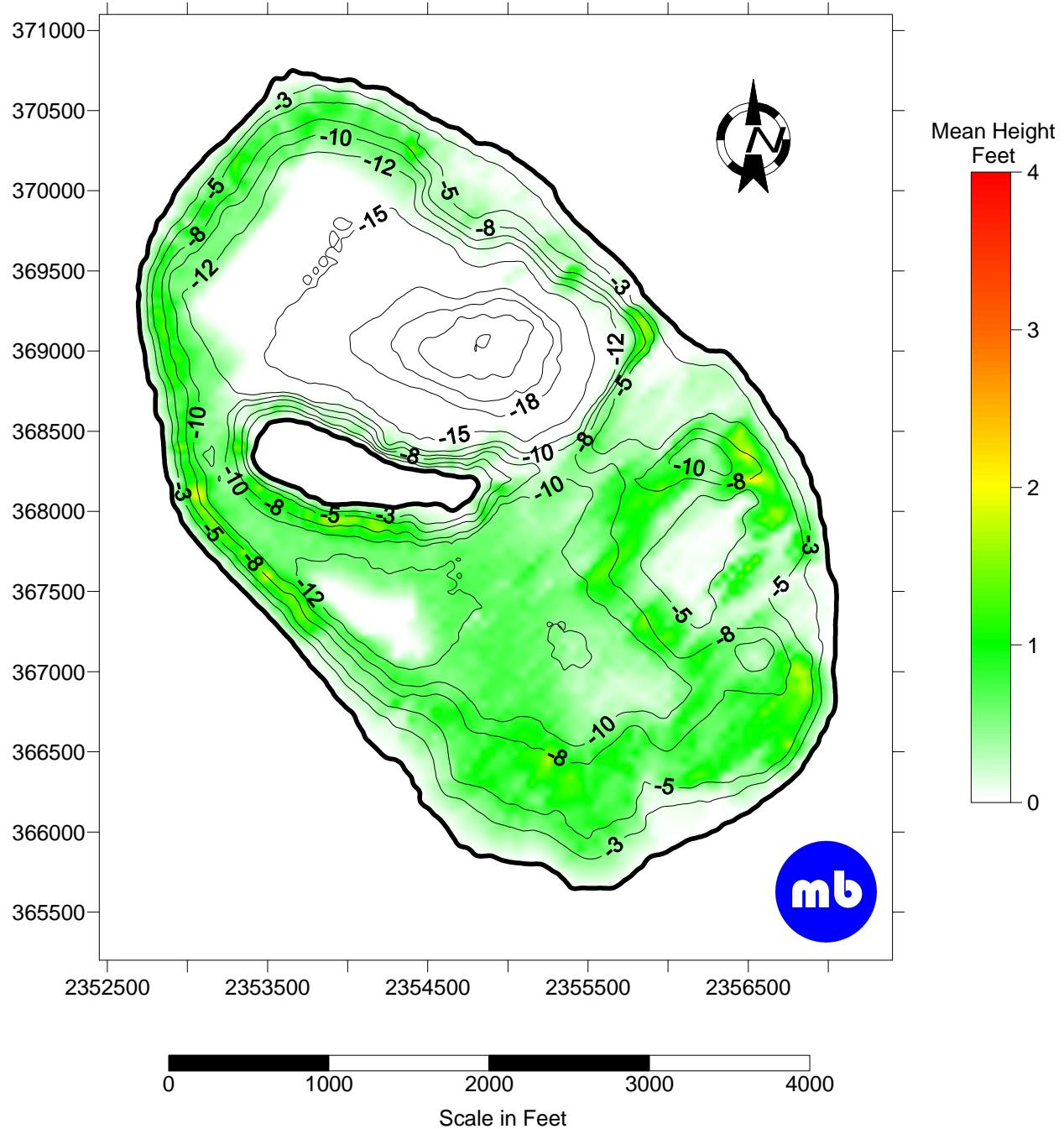
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Loon Lake, WI - April 10, 2012
Submersed Aquatic Vegetation Mean Canopy Height
Wisconsin State Plane Central- NAD83



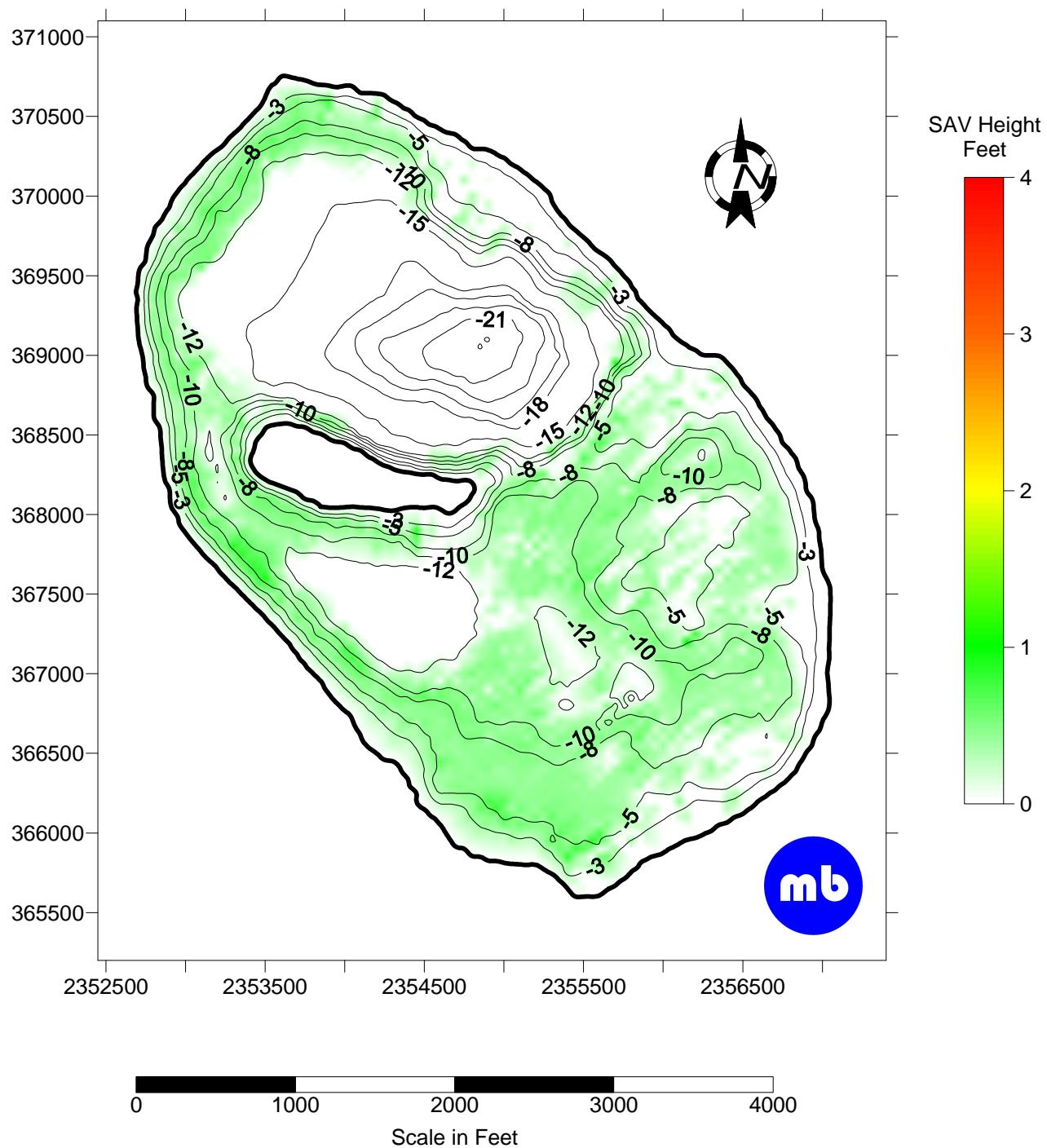
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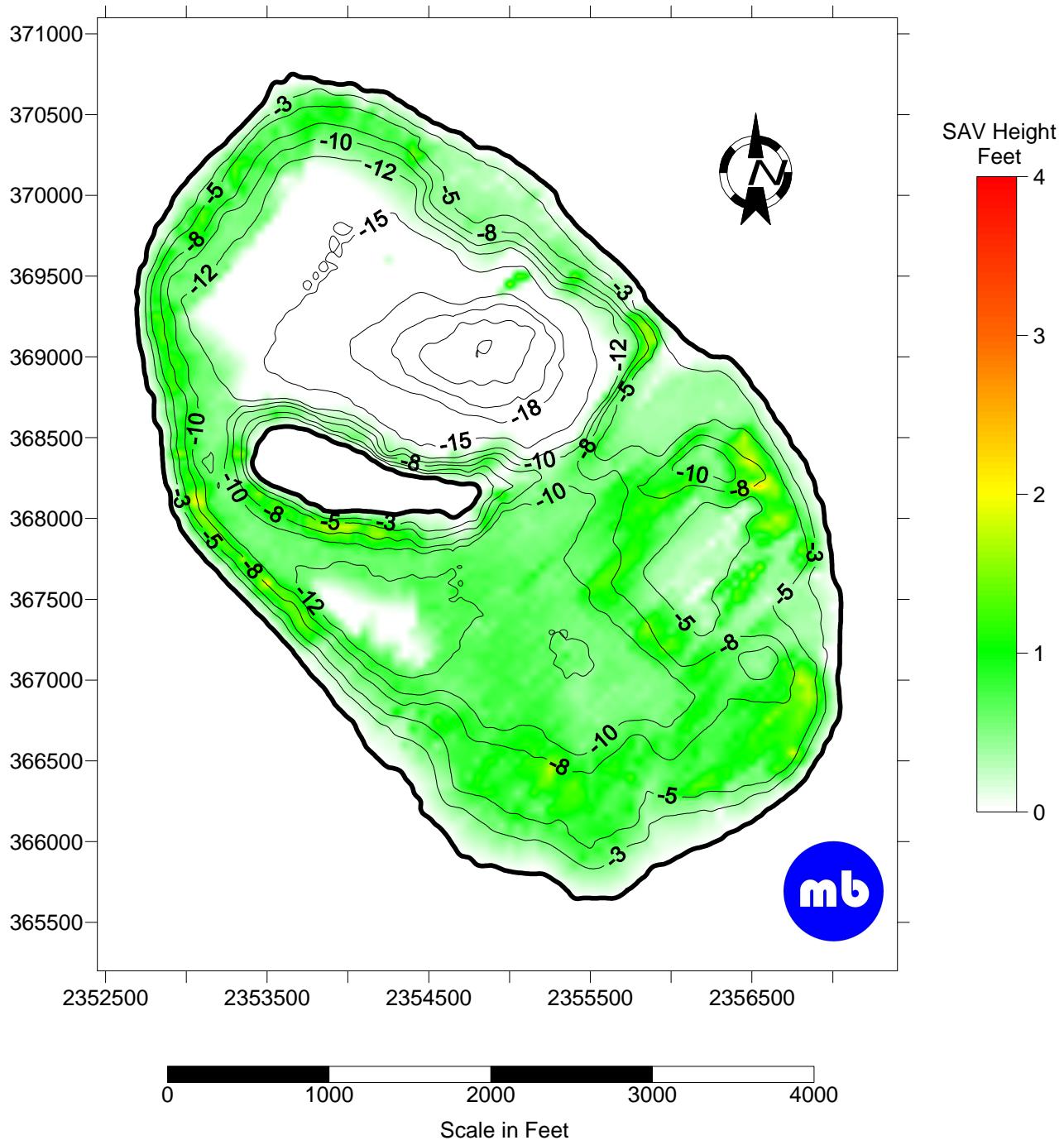
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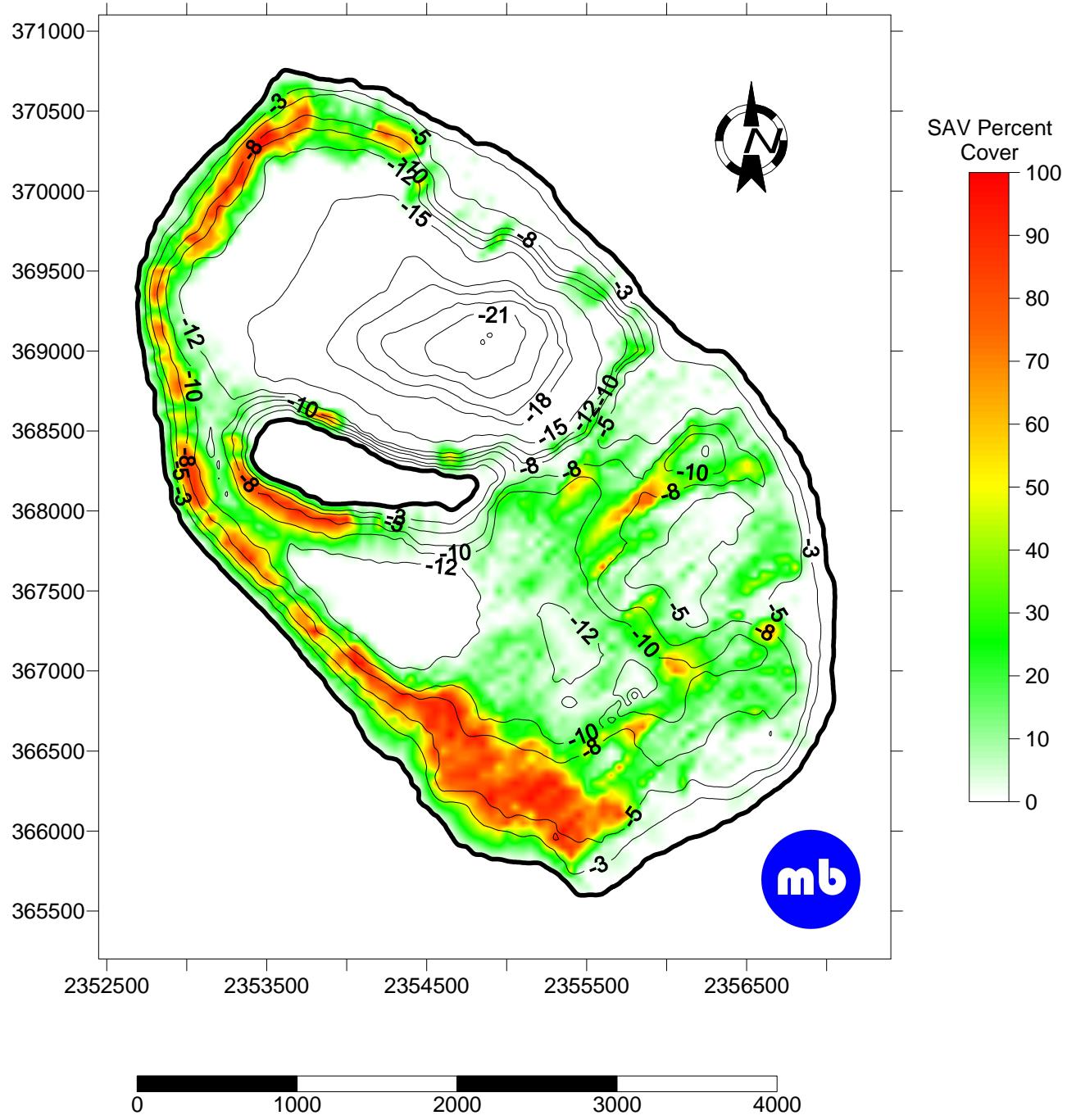
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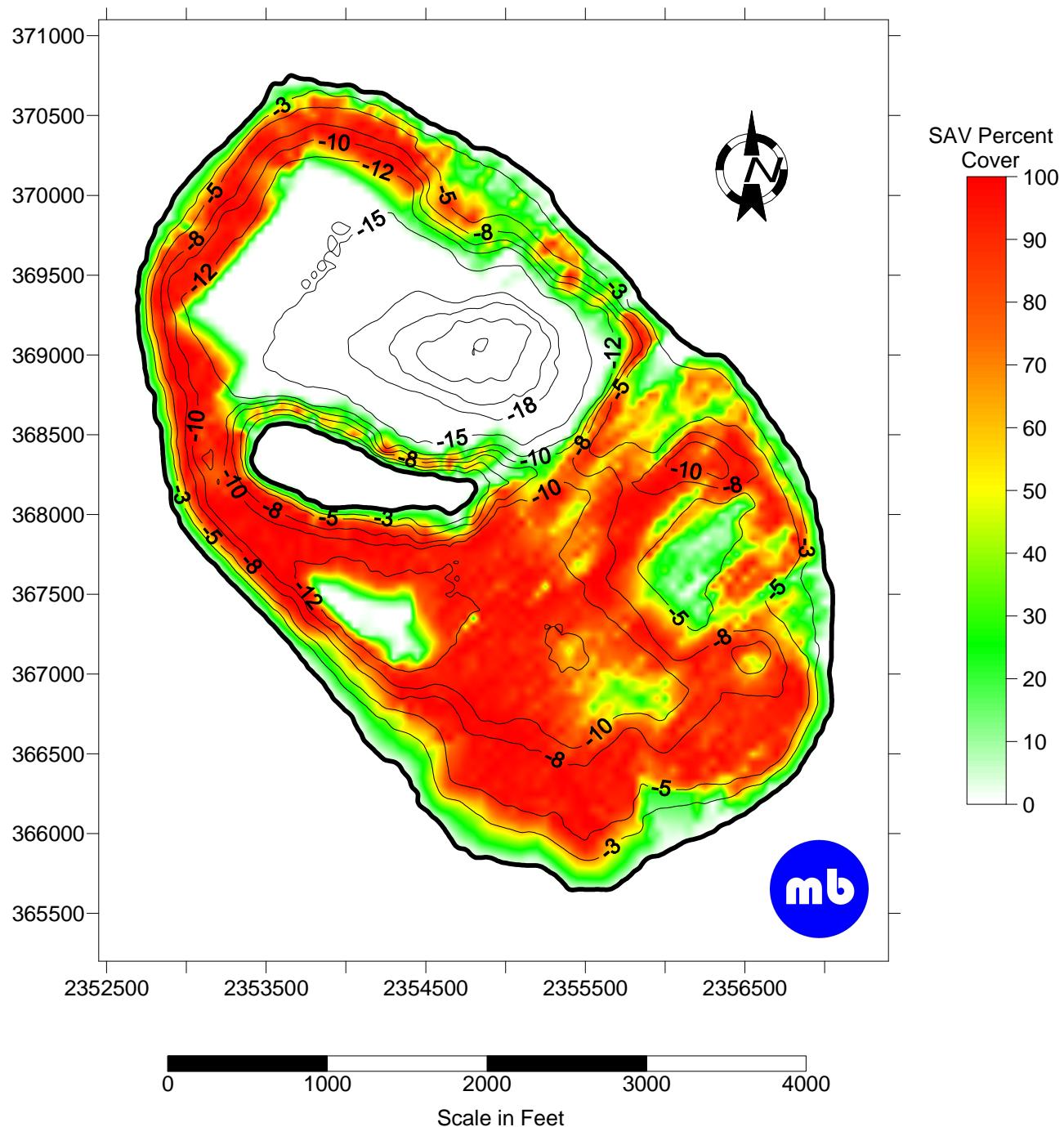
Loon Lake, WI - April 10, 2012
Submersed Aquatic Vegetation Percent Coverage
Wisconsin State Plane Central- NAD83

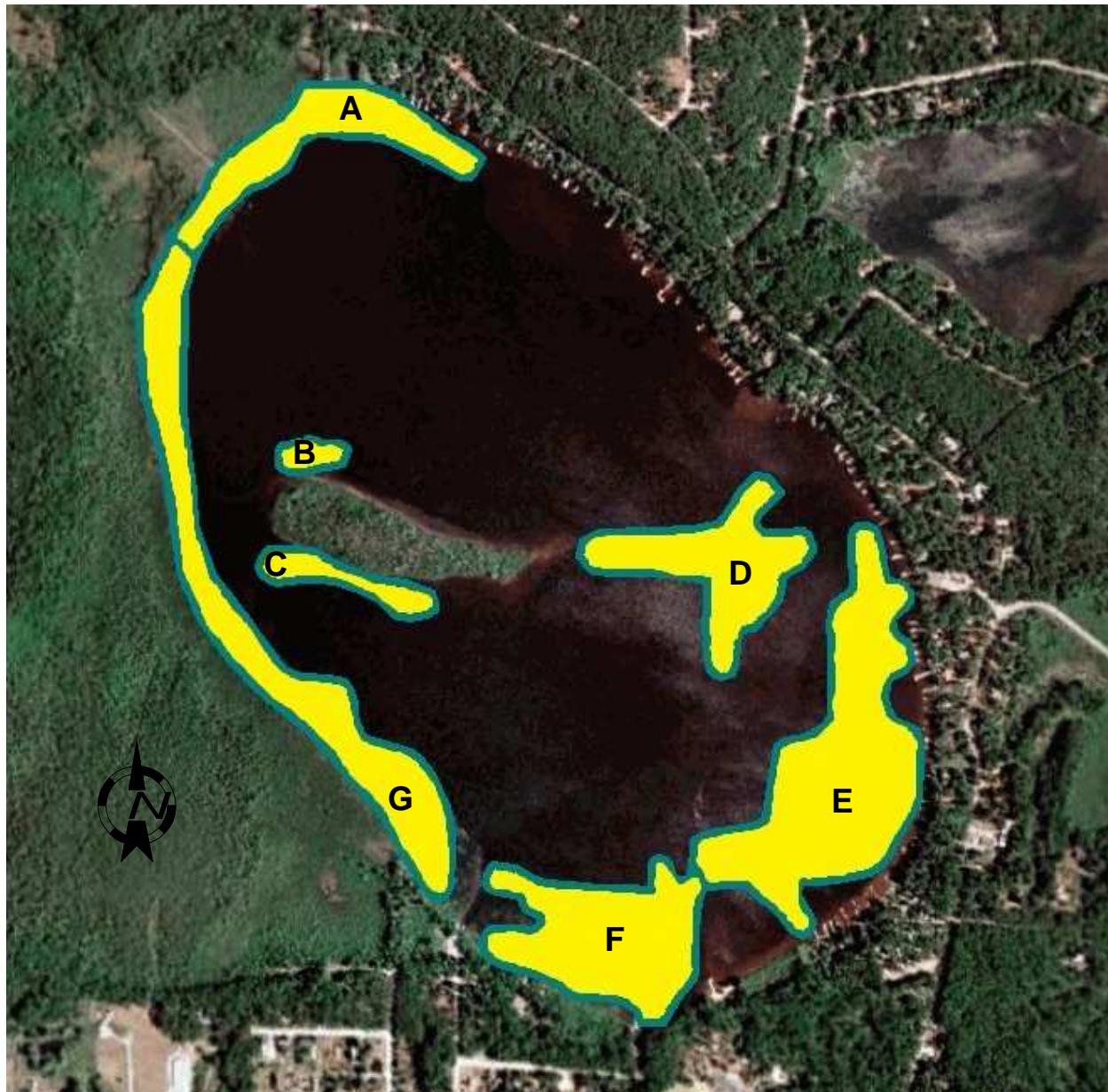


0 1000 2000 3000 4000
Scale in Feet

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Loon Lake, WI - August 8, 2012
Submersed Aquatic Vegetation Percent Coverage
Wisconsin State Plane Central- NAD83





Treatment Area	Area Location	Acres	Ave. Depth
A	North Area	13.8	5.5
B	North Island Area	1.60	5.5
C	South Island Area	2.5	5.5
D	East Central Area	11.4	5.5
E	SE Area	20	5.5
F	South Area	18.70	5.5
G	West Area	19.60	5.5
	Totals	87.60	

4-17-2012 Treatment Areas and Acreages