**Sensor Array Design Questionnaire (5/11/2022)**

Lake Name: Lovely Lake

Why did you select this lake?

Concerns about shrinking oxythermal habitat for lake whitefish; whitefish populations are often relegated to a small sliver of suitable habitat near the thermocline during summer stratification where water temperatures and dissolved oxygen levels are sufficient for them. Water temperature increases due to climate change and increased human caused eutrophication of these lakes has shrunk the already small amount of lake whitefish habitat in some of our Lakes, which can lead to fish kill events, and in some cases, extirpation from local basins.

Does the lake support a high-quality fishery? If so, what kind? (e.g., cold water)

Yes, lake whitefish. Also supports good crappie and tullibee populations, and is a decent walleye fishery.

Any other notable characteristics?

Mesotrophic Lake. Good water clarity. Inlet, outlet (Ball Club River) flows into the Mississippi River. Recently was infested with zebra mussels.

What is the depth of the location where you’re planning to deploy the array?

85 ft

Is the lake stratified or polymictic[[1]](#footnote-1)?

stratified

If it is stratified, at what depth (or range of depths) is the thermocline typically located?

Based on available discrete profile data, 27-35 ft

Level of human activity/potential for vandalism – would you rate this as low, medium or high? Are motorized boats allowed?

Popular fishing destination with several resorts. Potential for vandalism is probably medium. Motorized boats are allowed.

Water levels – how much do they fluctuate?

Water levels are not prone to much fluctuation outside of abnormal water years.

Are there any rules and regulations on buoys? (e.g., are sub-surface deployments allowed? Do surface buoys need to meet certain specifications?)

No.

Prevailing wind speed and direction – will the array be deployed in an area that is exposed to high winds and large waves?

The wind is most often from the south for 6.5 months, from May 6 to November 21, with a peak percentage of 41% on September 4. Average wind speed is 3.82 m/s. The area will be exposed to high winds and large waves. The lake has a fairly large fetch from north to south.

Bottom substrate – soft or hard? How well do you think an anchor will hold? If it’s soft, how deep do you think the anchor is likely to sink into the substrate?

Mostly hard bottom composed of sand. The anchor should hold well.

How easy is the site to access? Can you drive to the lake and access it from a boat ramp, or do you need to hike things in?

Public access is available.

What kind of boat will you be using for the deployment? Heavy/stable or light/tippy?

Heavy/stable

Do you plan to deploy the array year-round, or will you be taking it out in the winter?

We will be taking it out in the winter.

Is there already existing equipment at this site? (e.g., a weather station)

Not to my knowledge. There may be a water level logger operated by MN DNR.

1. Deep lakes that thermally stratify generally have three identifiable horizontal layers: the [epilimnion](https://en.wikipedia.org/wiki/Epilimnion) (upper, warmer, wind-mixed layer), metalimnion (middle or transitional zone) and the [hypolimnion](https://en.wikipedia.org/wiki/Hypolimnion) (bottom, coldest, most dense layer). In lakes in northern temperate regions, a fairly common pattern is for the lake to ‘turn over’ (or mix throughout the water column) twice a year, during the spring and autumn. These are referred to as ‘dimictic’ lakes. During these mixing events, the lake is at the same temperature from the top to the bottom, versus the rest of the year, when temperature (and density) differences between upper and lower water layers are more pronounced, causing the formation of the three distinct horizontal layers. In contrast, polymictic lakes, which are typically shallow, do not thermally stratify and their waters mix from top to bottom throughout the ice-free period. [↑](#footnote-ref-1)