

**Lake Campbell and Lake Erie  
2018 Aquatic Plant  
Control Program  
LMD #3**

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Prepared for:

Lake Erie & Campbell LMD #3  
Skagit County Public Works  
Mount Vernon, Washington

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## **Project Overview**

This will be Northwest Aquatic Ecosystems' ninth consecutive year providing services to the Lake Erie and Campbell waterways. Components of the prior year reports have been incorporated into the 2018 report. Some of the past historical data is necessary in providing the reviewer adequate project baseline references. Our 2018 contract encompassed many of the same objectives and components as the earlier agreements. Management objectives have always focused on noxious weed activities as such species have been managed to reduce their appearance lake-wide. Native plants have recently begun to pose similar recreational hazards as the noxious macrophytes. Although not prevalent yet within Lake Campbell, native species have expanded throughout Lake Erie and have required management to provide a safe recreational environment to abutting property owners and the local community. We have learned over the years that Lake Erie requires early and late submersed weed treatments some years and only one treatment during other years. More importantly, if a late season Lake Erie treatment is necessary but not performed, dense growth is present during the following spring. Lake Campbell, during the past few years, has shown an increase in the native plant community component of the lake's ecosystem. Densities noted up to date have not warranted treatment. As both lakes continue to reestablish native plant growth, management objectives will be required to consider the benefit of such species while also recognizing the potential danger unchecked growth may pose to lake users. Prior to the onset of 2015, Lake Erie retained only small problematic patches of milfoil that historically have been identified to reside within specific lake areas. Lake Campbell however, over the past few years, has shown a marked increase in milfoil occurrences in both the eastern and western shoreline areas. Some of this milfoil increase was likely attributed to two shoreline parcels that contained milfoil infested ponds that are currently under control. Milfoil colonies still reside hiding in the dense floating plant cover and germination of established seed beds are still actively producing plants. As a result of the increased milfoil noted within Lake Campbell, additional efforts over the past two years have continued into 2018 and once again resulted in the decline of milfoil populations lake wide. Our milfoil efforts directed at Lake Campbell throughout 2018 has resulted in low single sporadic plant densities in areas that have historically supported milfoil growth.

## **Survey Protocol**

Survey techniques for 2018 were identical to those utilized during 2016 & 2017. The methodology is now an industry standard. Macrophyte data was collected utilizing wavelength specific transducers and bottom scanning equipment. Once collected, the SD card was uploaded via cloud based technology and the processing of the data was finalized. During the survey when milfoil plants were identified, their locations were noted along the transect line and their GPS coordinates were recorded. Each milfoil data point was identified by a red dot. The result is a color-coded map of the lake bottom identifying weed growth areas, plant densities and milfoil locations. Not only is a well-defined map produced but a sonar log of the survey is saved allowing a complete review and evaluation of the survey to occur in house. The sonar log affords you the ability to

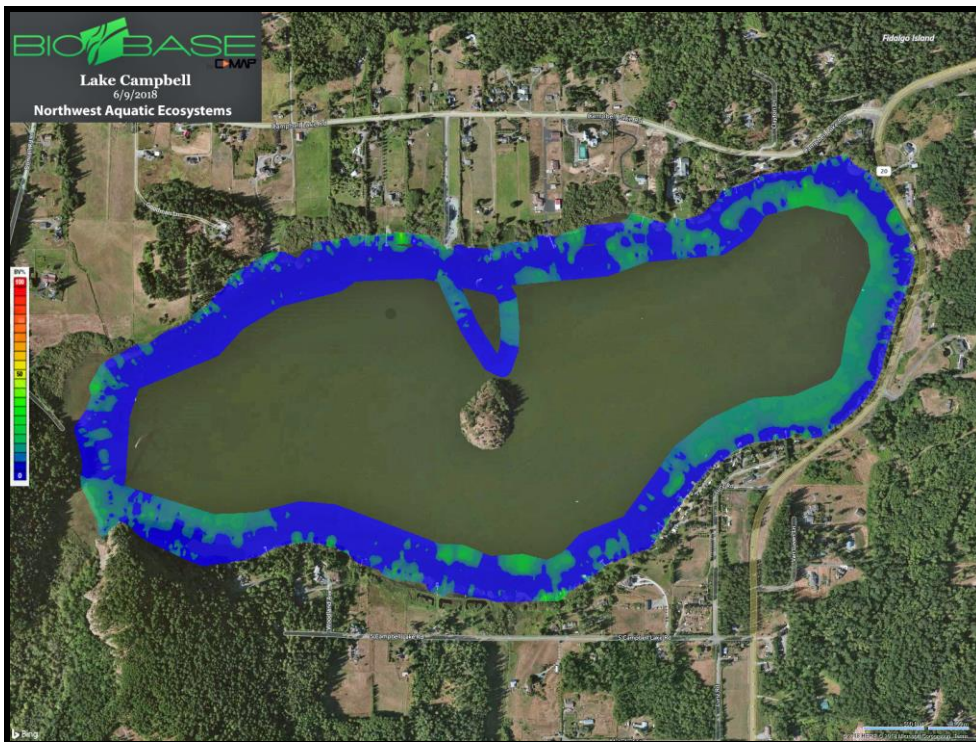
view all plant growth along the boat's survey track. This new protocol avoids the possibility of missing plants between bottom survey data points.

Data is collected by a survey vehicle transecting the lake along the littoral zone. Boat tracks are designed to be approximately 100 feet apart. To ensure the efficacy of the survey, a bottom sampling rake was thrown from the boat at various locations lake-wide. The rake was then drawn across the lake bottom, brought to the surface and into the boat. Plants attached to the rake were identified and confirmed as being the same species as noted through the structure scan or visually through the water column. The system automatically calculates maps and stores the position of every data point.

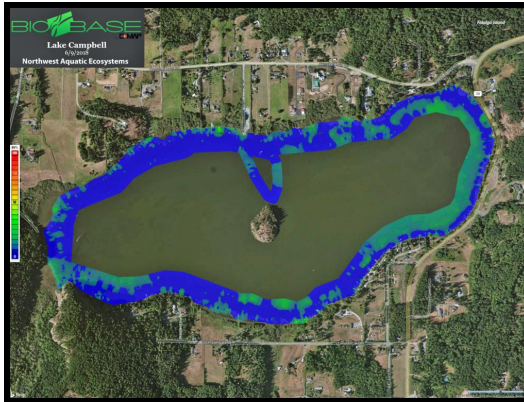
### **Lake Campbell Pre-Treatment Survey Results**

Lake Campbell was surveyed on June 09, 2018. One day earlier than the 2017 survey. The main goal of this spring survey was to determine the effectiveness of our increased milfoil efforts during the 2017 season and assess the need for additional site specific milfoil control. Water clarity was normal with limited suspended algae throughout the water column. Milfoil growth within the 2017 targeted sites had decreased. Sporadic plants were noted. The eastern shoreline lake area infested with native spatterdock is a difficult one to survey because of the dense floating plant growth. Milfoil plants and/or fragments can remain undetected beneath the pads and then surface later in the season as the pads begin to die back.

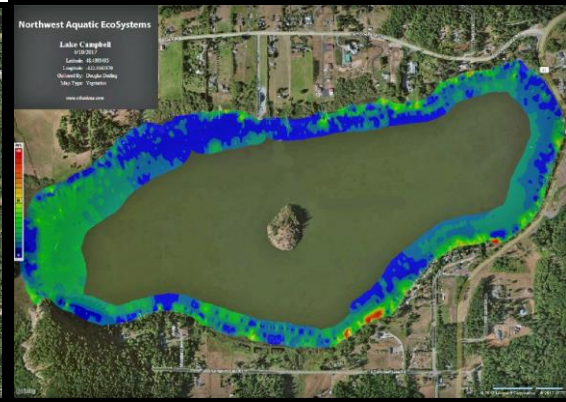
### **Macrophyte Survey 6-09-2018**



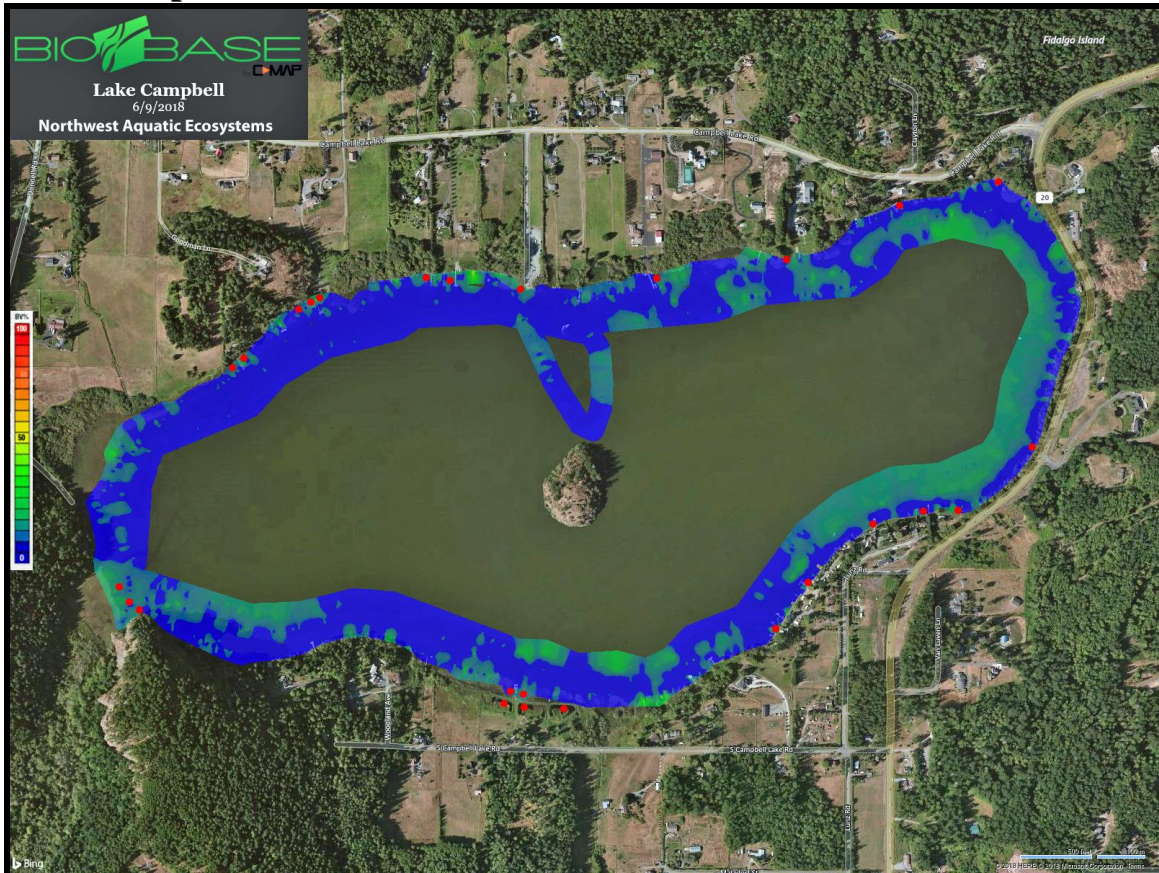
## 6-09 2018 Survey



## 6-10-2017 Survey



## Lake Campbell Milfoil Locations June 2018



## Residential Lake Campbell Milfoil Pond Inspection

During the main lake survey, the two private properties that were treated for milfoil during 2016 & 2017 were also inspected. Three of the ponds had only a few limited plants while one pond was void of milfoil.

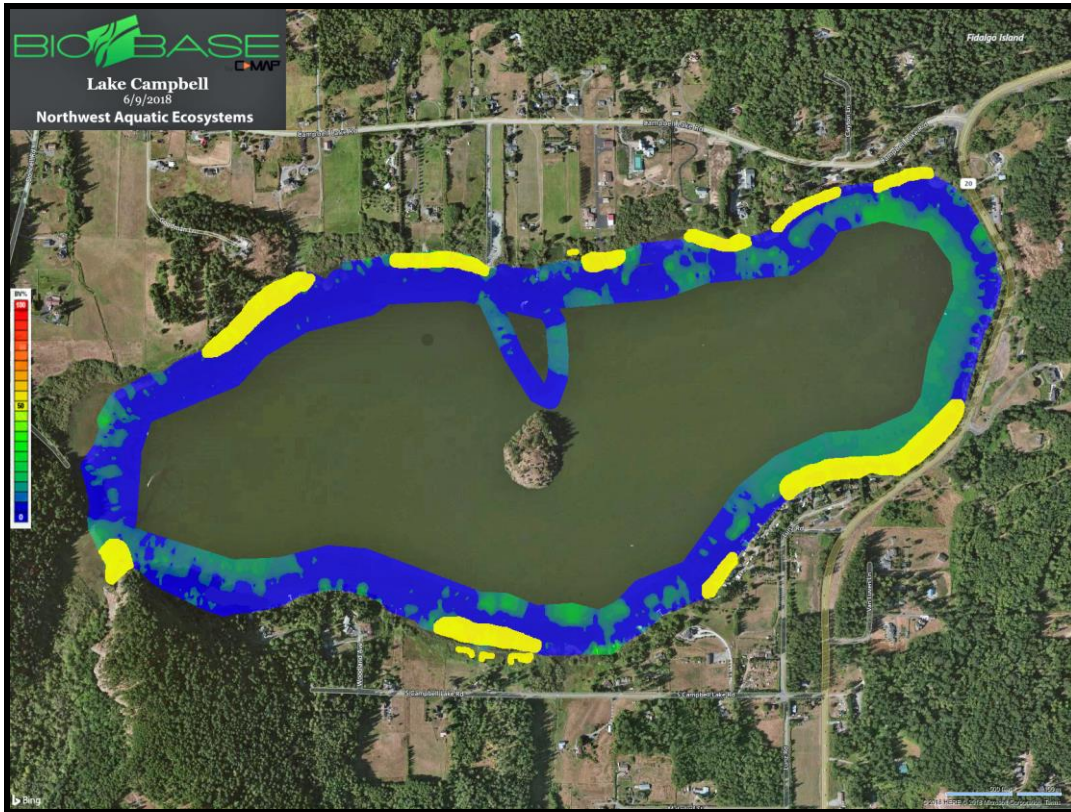


## **Lake Campbell Treatment**

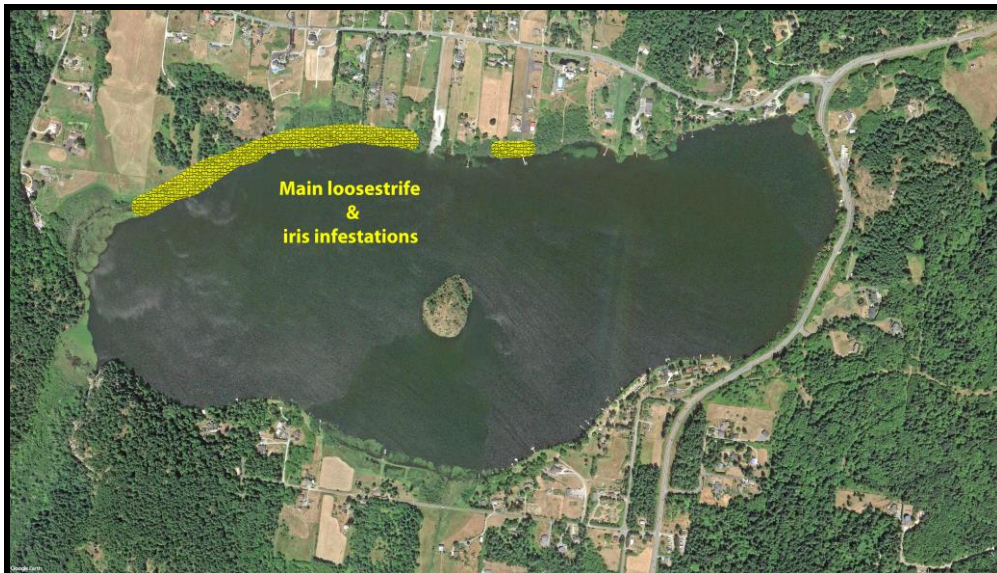
Lake Campbell was treated on July 24, 2018, one day earlier week later than our 2017 treatment date. The site was posted one day prior to treatment on July 23, 2018. In conjunction with the shoreline posting, the public boat launch was posted with two large signs. All postings stated the materials that were planned for use and their water use restrictions. A private staging area just north of the public boat launch was employed during treatment. This is the same staging area NWAEE has utilized since our involvement with the project several years ago. The site provides easy, safe unobstructed access to the lake. Three herbicides were applied during the application phase of the project. Submersed weeds were treated with 2,4-D while lily pads, spatterdock, purple loosestrife and yellow flag iris were treated with a 1% solution of glyphosate.

Material was off loaded from a locked cargo truck and emptied into two 25 gallon spray tanks secured within the application boat. As the boat discharged the material, it was refilled at the staging area. The process continued until all the targeted milfoil sites were treated. Once completed the boats tanks were rinsed and filled with a 1% solution of glyphosate. The glyphosate mixture was then discharged targeting purple loosestrife, lily pads, and yellow flag iris. Most of the loosestrife and iris treatment occurred along the northwest shoreline of the lake just west of the public boat launch. Additional minor individual patches were addressed lake wide.

## Lake Campbell Milfoil Treatment Sites



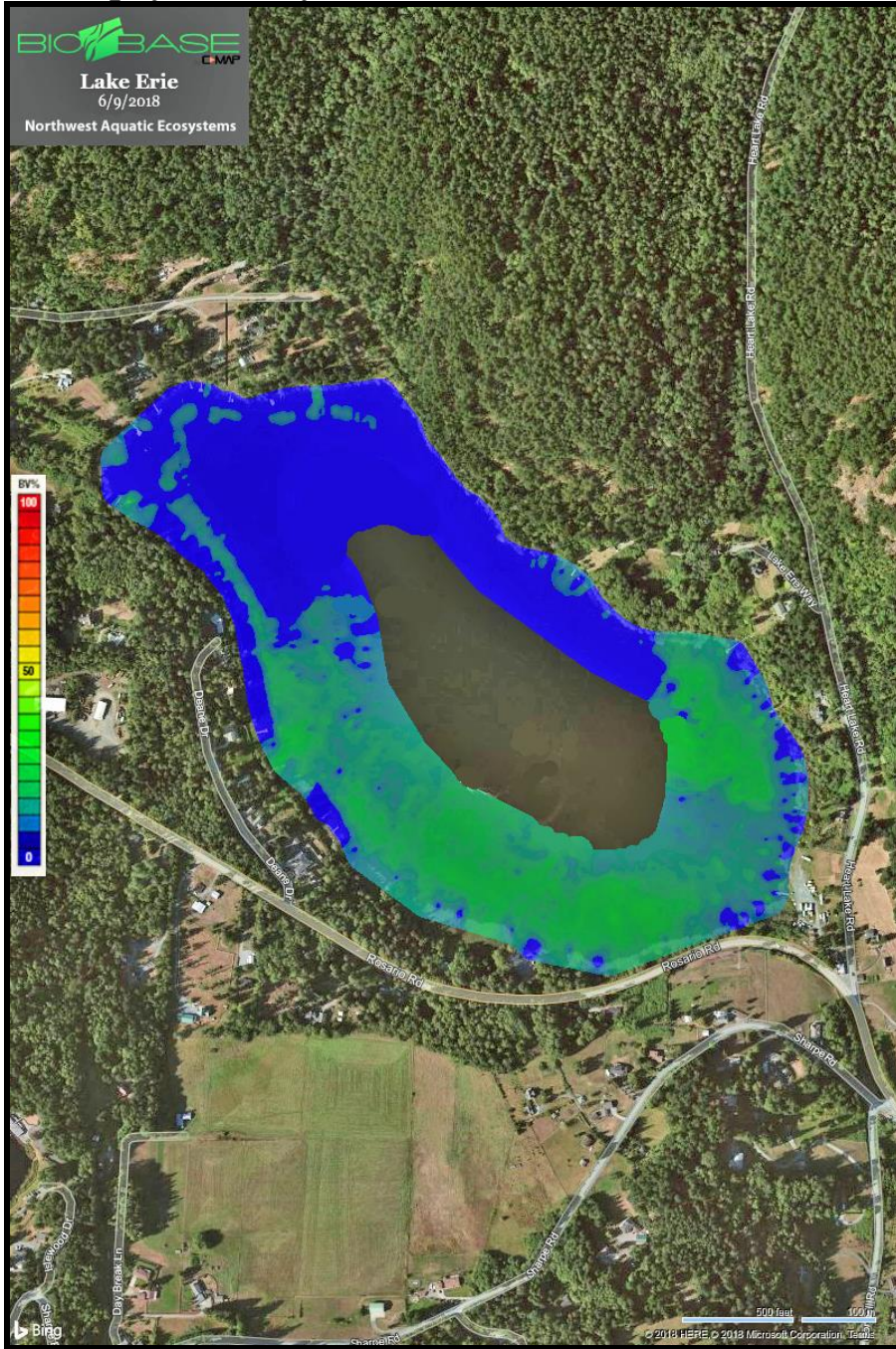
## Lake Campbell Main Shoreline Emergent Plant Treatment Sites



## **Lake Erie Pre-Treatment Survey Results**

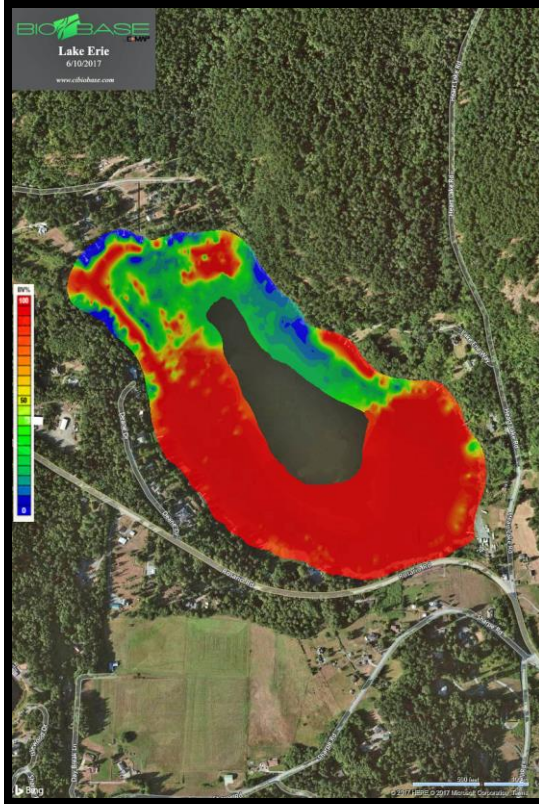
Lake Erie was surveyed on June 09, 2018. Water clarity was average with no noted scum observed lake-wide. No milfoil plants were identified in any of the lake areas that historically supported sparse growth. Plant growth was light but still occupied most of the areas that supported growth in prior years. There was decreased growth in the northern portion of the lake likely a result from the late season weed treatment performed during 2017. Najas is still the dominant low growing species while thin leaf pondweed occupied the upper regions of the water column when present. No species had yet reached the water's surface.

# Macrophyte Survey 6-09-2018

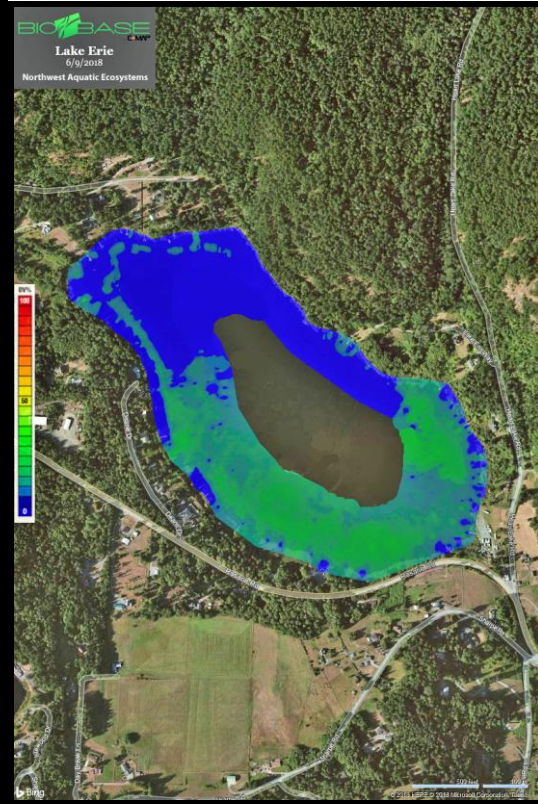




## 6-10-2017 Survey



## 6-09-2018 Survey



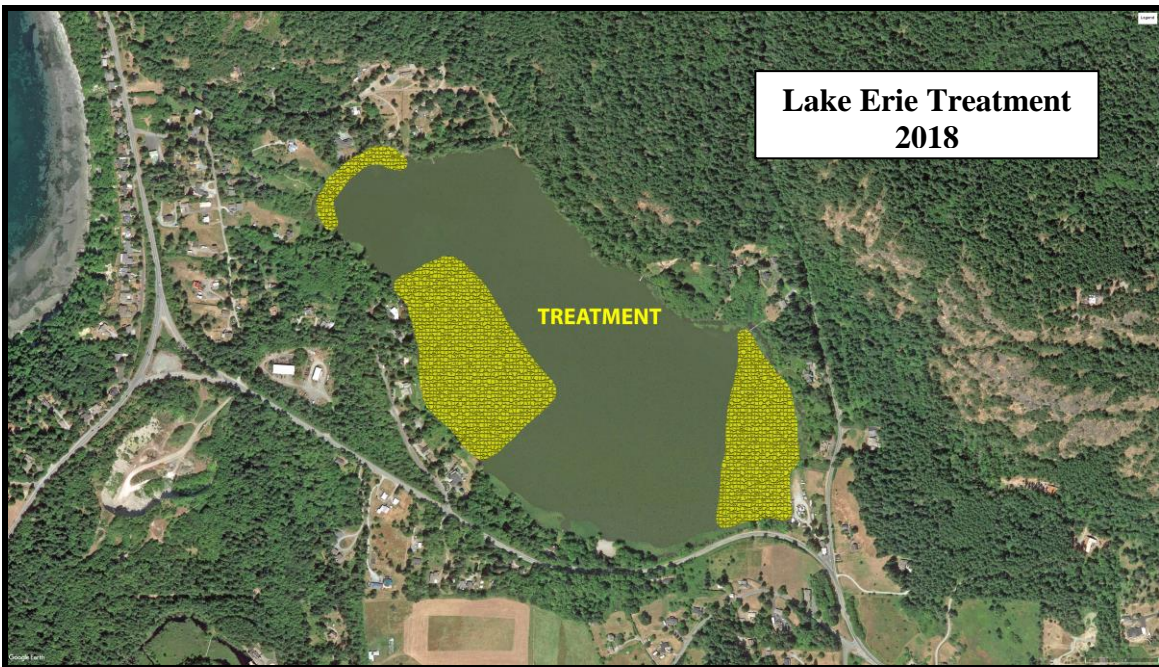
*Note – Green areas represent 20-40% plant cover red areas 100% plant cover*

## Lake Erie Treatment July 24, 2018

Lake Erie was treated on July 24, 2018, approximately one month later than the 2017 campaign. Treatment was delayed this year as a result of the spring survey and in hopes of avoiding a late season spray event. The public boat launch was posted with two large signs and the residential shorelines received smaller signs. Posting was accomplished on July 23. Postings noted the materials used and water use restrictions. The larger public access signs identified where the material was applied and what material was used. NWAEE utilized the public boat launch during treatment as their staging area. Materials were injected directly over the targeted weed beds via a boom system designed to disperse the mixture vertically throughout the macrophyte column. The treatment boat was equipped with a GPS system that ensured the application vehicle remained within the boundaries of the treatment zone. Lake treatment consisted of the application of diquat at a one/two gallon per surface acre rate. All of the properties on the lake were targeted this year. During 2017 the one parcel that had requested no spraying was sold.



Spatterdock and lily pads were treated with a 1% solution of glyphosate. This application was a maintenance type of application since all of the prior main floating infestations had been eradicated.



### **Lake Erie & Campbell Secondary Treatments**

No secondary treatments were required at either lake during 2018. Initial treatments sustained weed growth at acceptable levels throughout the season.

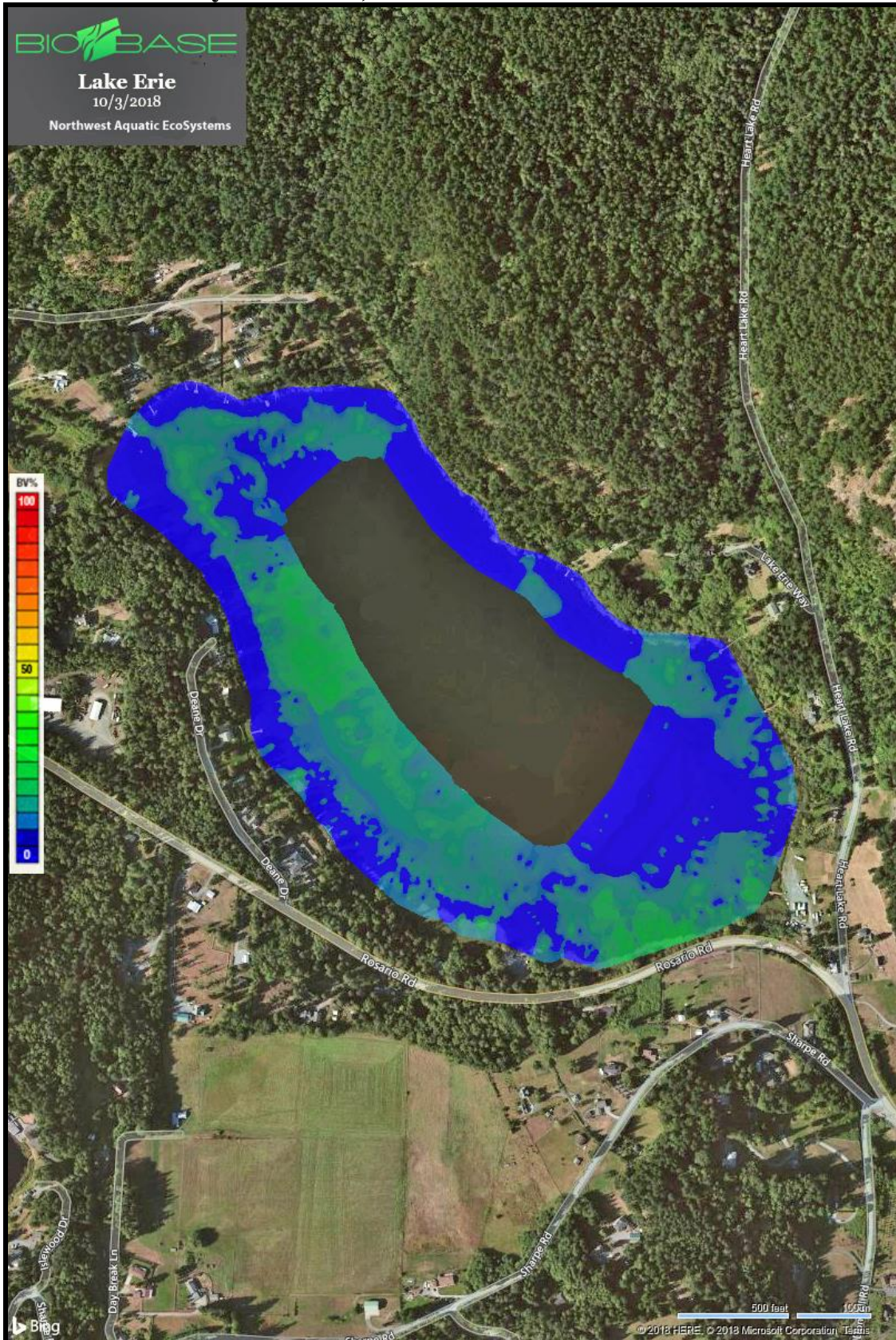
## **Lake Erie & Campbell Surveys October 3, 2018**

Lake Erie and Campbell were both surveyed on October 3, 2018. No milfoil plants were identified during the Lake Erie survey and only a few isolated plants were noted at Lake Campbell. October is the time of year when milfoil plants fragment and appear floating along the shoreline. No shoreline milfoil fragments were observed at either Lake Campbell or Erie.

Lake Erie native plant growth was not problematic and no secondary treatment was necessary. Once again most of the vegetation noted on both surveys consisted of the macro algae nitella. This filamentous form looks similar to aquatic plants but is a low growing algae species. Typically, the plant remains along the bottom but at times will grow up to the surface.

Typically the shallow nature of Lake Erie encourages fall macrophyte regrowth concerns. The low plant densities noted earlier in the season and later seasonal treatment provided during 2018 resulted in minimal growth at the close of the year requiring no additional treatment. Lake Campbell exhibited continued encouraging results from the summer application directed at the milfoil population. Only very limited single milfoil plants were noted within the main lake basin and no plants were observed in the private ponds adjacent to the lake.

# Lake Erie Survey October 3, 2018



# Lake Campbell Survey 10-03-2018



# Lake Campbell Milfoil Locations 10-03-2018



## **Recommendations For 2019**

Milfoil growth within Lake Campbell continues to decrease from levels noted during 2016. Plants are sporadic exhibiting single plant appearances within small shoreline lake areas that historically have supported growth. Why some areas of the lake respond well to treatment and others not can be attributed to a number of factors. This phenomenon of some plants not responding to treatments that effectively control other milfoil infestations within the same waterbody is not uncommon and is noted state-wide throughout numerous lake systems. No milfoil was noted within Lake Erie and late season native plant growth was limited and posed no recreational hazards or safety concerns. Untreated areas of Lake Erie will continue to provide a seed source for future problematic native weed outbreaks. These lake areas continue to produce viable seeds that are typically spread lake-wide during the fall months. Lake Erie native weed growth will probably follow cycles where one year growth may require two treatments and others only one. It is safe to assume that Lake Erie will require some degree of native weed control on a year to year basis.

Lake Campbell will likely not require any degree of native plant growth within the next few years as the system continues to encourage native plant expansion throughout the waterbody. This is an encouraging milestone since prior to 2015 virtually no native plants resided within Lake Campbell except for macro algae. Sporadic milfoil treatments however will likely be required on a yearly basis.

## **Northwest Aquatic Eco-Systems recommendations for the 2018 season:**

1. Control of sporadic milfoil colonies along the Lake Campbell shoreline as has been previously conducted in the past. Acreages targeted will vary on a year to year basis but should not exceed 20 acres. The efforts exhibited during the 2017 & 2018 seasons have reduced the infestations to minor small occurrences
2. Continue surveys of the two individual private shoreline residential parcels containing small ponds exhibiting milfoil growth and respond accordingly.
3. Targeted control of spatterdock at both lake sites to manage the encroachment of this species into the main basin and along residential shorelines. Control of the noxious species fragrant waterlily, purple loosestrife and yellow iris should continue lake wide as the budget permits. Progress has been made in controlling both purple loosestrife and yellow flag iris as can be noted along the shoreline areas targeted now exhibiting brown dead vegetation.
4. Treatment of problematic Lake Erie native weed species when such species are hindering lake use. Treatments may prove to be cyclical in nature with only one treatment being required one year and others two. The need for either one or two treatments will probably be weather dependent.
5. Lake Campbell management continues to focus solely on milfoil growth, while Lake Erie requires the ability to manage both noxious and troublesome native species in an effort at keeping the best interest of the property owners and the lake system's health in perspective. Milfoil treatments should be designed to control the targeted species while resulting in the least negative effect to the Nuphar.

6. Continue use of the new survey technology. This technology and mapping has proven to provide a broad-based evaluation of the macrophyte communities. Yearly surveys are now capable of providing simple color coded maps reflecting yearly changes in plant densities. Current mapping technology is the industry standard.
7. Adjust budgets to reflect the yearly potential change in native plant control required for Lake Erie and milfoil control at Lake Campbell. Budgets should reflect the worst case scenario of providing funding for two weed treatments at Lake Erie and milfoil control for Campbell.
8. Iron like alum has been utilized to remove phosphorous from lakes that contain excessive nutrients. The Department of Ecology is in the process of adding iron to the current NPDES permit and should be a permitted use product for the 2019 season. In the past, iron was classified as an experimental use product that required burdensome and costly paperwork that first had to be approved by DOE. Once included as a permit mainstay, this additional paperwork will not be necessary.

Iron provides the same benefits as alum but at a considerable less expense and is a much safer product for the environment. Iron is already a component of lake water chemistry. When applied it possesses no danger to humans, the lake's pH, fisheries or other aquatic life. All negative components of alum use.

Seasonal control of problematic cyanobacteria blooms could be eliminated with a spring application of iron to Lake Erie. NWAE has been experimenting with the use of iron for nutrient inactivation over the last four years and during 2018 the results of such use removed all of the phosphorous from an 8 acre water body that had experienced cyanobacteria blooms averaging two to three times a year over the last 10 years.

Costs associated with applying iron to Lake Erie would not exceed \$40,000.00.