

Lake Campbell and Lake Erie 2017 Aquatic Plant Control Program

Prepared for:

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

Prepared by:
Northwest Aquatic Eco-Systems
855 Troster Road SW #108-313
Tumwater, WA 98512
360-357-3285
Pondweeds@comcast.net
www.nwaquaticecosystems.com

December 2017

Project Overview

This will be Northwest Aquatic Ecosystems' eighth consecutive year providing services to the Lake Erie and Campbell waterways. Components of the prior year reports have been incorporated into the 2017 report. Some of the past historical data is necessary in providing the reviewer adequate project baseline references. Our 2017 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. Lake Campbell, during the past few years, has shown an increase in the native plant community component of the lake's ecosystem. 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 have since been controlled. Milfoil colonies still reside hiding in the dense floating plant cover and germination of established seed beds are still actively producing plants. We have noted milfoil population increases in water bodies that have had little or no historical growth following eradication. As a result of the increased milfoil noted within Lake Campbell, additional efforts over the past two years have once again resulted in the decline of milfoil populations lake wide. Because of the increased budget, Lake Erie received a second submersed weed treatment during the late summer of 2017.

Survey Protocol

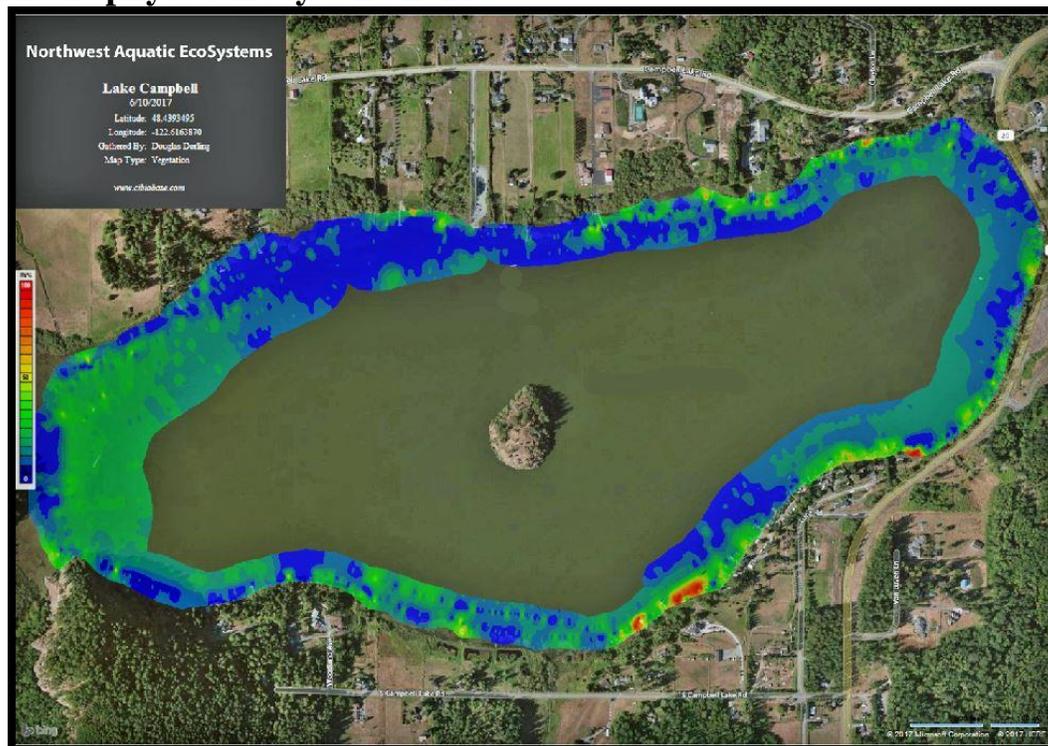
Survey techniques for 2017 were identical to those utilized during 2014, 2015 & 2016. Macrophyte data was collected utilizing wavelength specific transducers and bottom scanning equipment. Once collected, the SD card was uploaded via cloud based technology and the processing of the data was finalized. 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 resulting processed map 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.

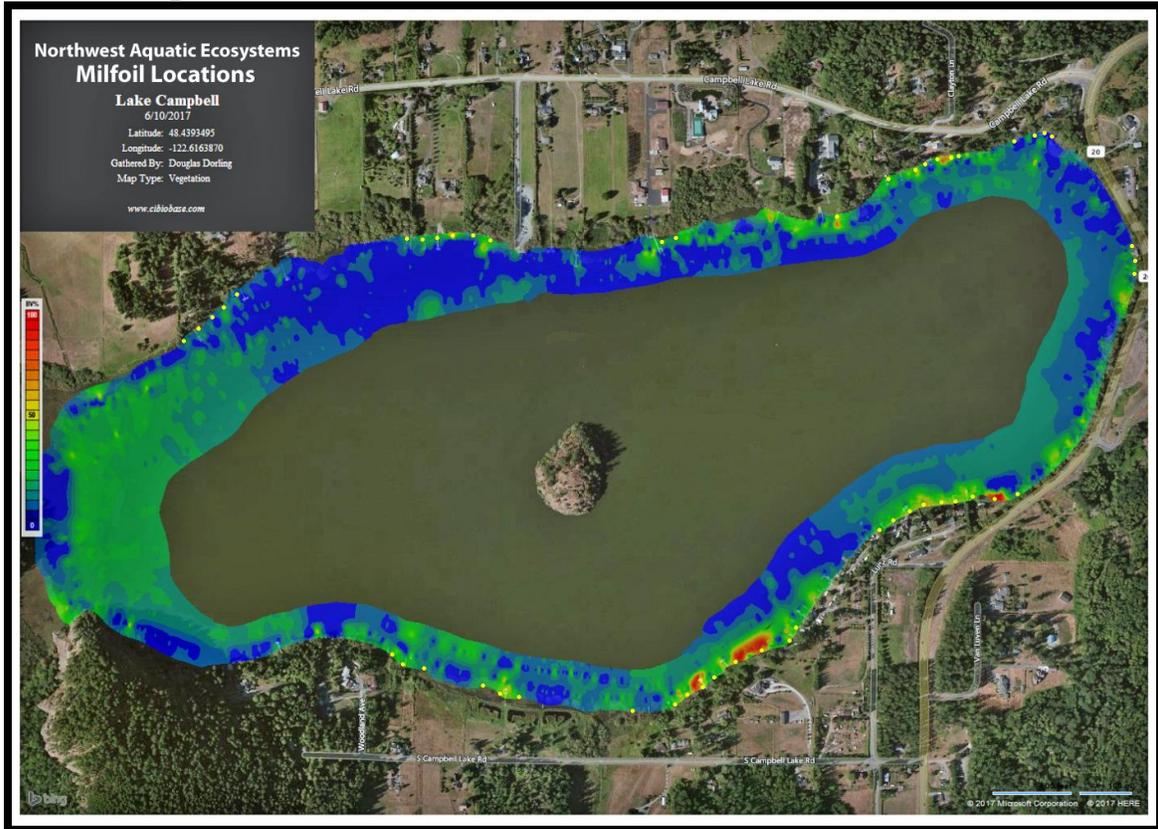
Lake Campbell Pre-Treatment Survey Results

Lake Campbell was surveyed on June 10, 2017. The main goal of this spring survey was to determine the effectiveness of the late milfoil treatment performed during 2016 and assess the need for additional site specific milfoil control. Water clarity was decreased because of suspended sediments resulting from the above normal spring rains and minor algae growth. Shoreline scum was not evident. Results of the spring survey identified no noticeable increases in native plant growth from 2016. However, filamentous algae growth (nitella) throughout the lake was evident. Milfoil growth within last yeras 2016 targeted sites had decreased. However, elevated growth was noted along the trailer park western shoreline. This has been a difficult area to coordinate treatment. The small swim area is used heavily and residents utilizing the immediate shoreline are not in favor of treatment. The lake area infested with native spadderdock is a difficult one to survey because of the dense spadderdock 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 6-10-2017



Lake Campbell Milfoil Locations June 2017



Residential Lake Campbell Milfoil Pond Inspection

During the main lake survey, the two private properties that were treated for milfoil during 2015 & 2016 were also inspected. Both parcels had only a few milfoil plants actively growing throughout the ponds. Densities of plants had been reduced to nearly 100%.

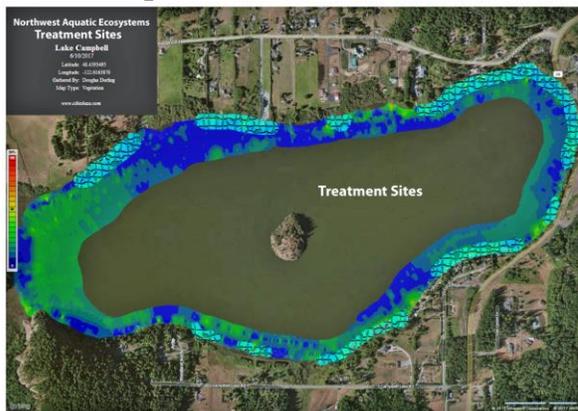


Lake Campbell Treatment

Lake Campbell was treated on July 25, 2017, one week later than our 2016 treatment date. Prior to treatment, the area was posted. The public boat launch was posted with two large signs and the residential shorelines received smaller signs. Postings noted the materials used and 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 unobstructed access to the lake. Three materials were applied during the application phase of the project. Lake shoreline treatments consisted of either the use of 2,4-D, diquat or 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 again 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.

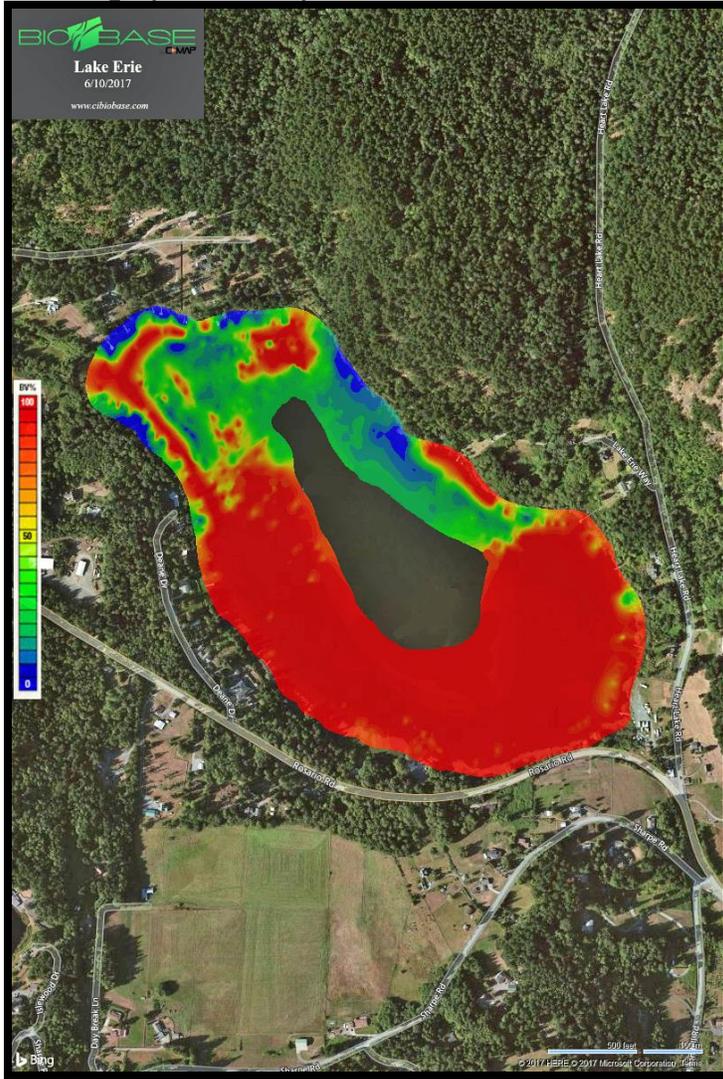
Lake Campbell Milfoil Treatment Sites

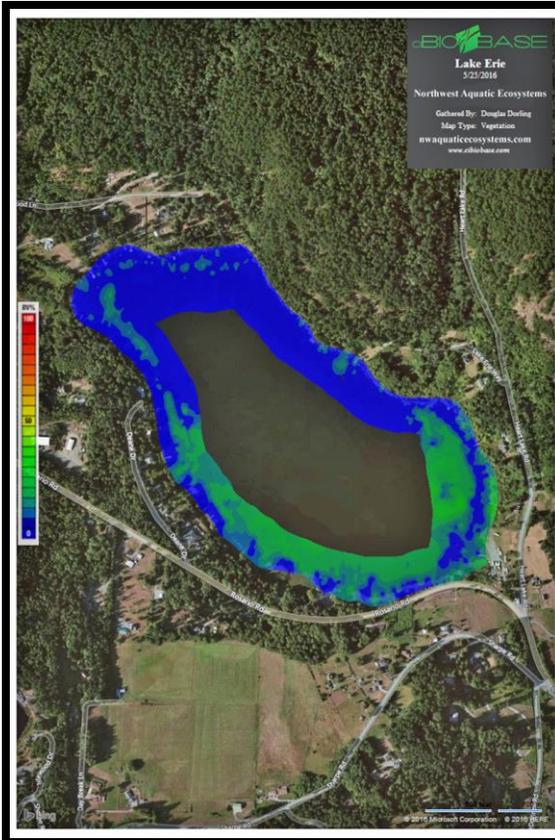


Lake Erie Pre-Treatment Survey Results

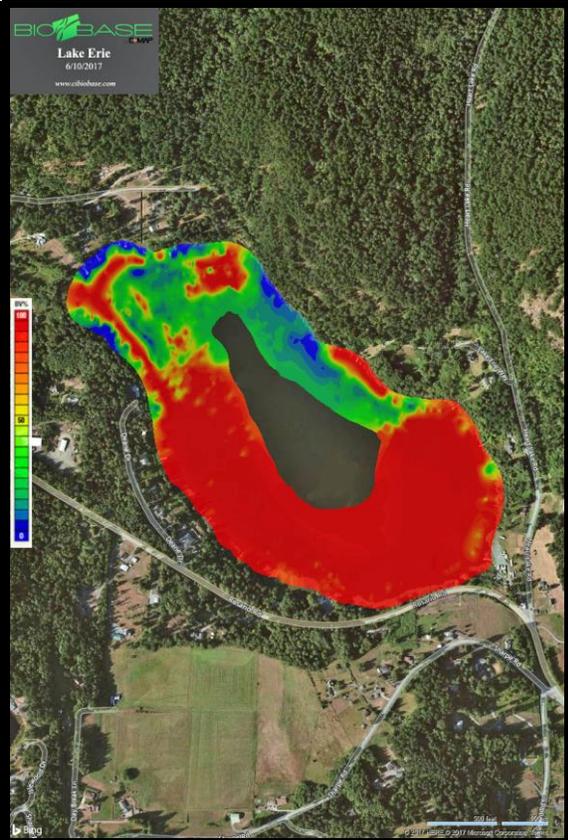
Lake Erie was surveyed on June 10, 2017. The lake was experiencing an algae bloom, water clarity was below 5 feet. Only three milfoil plants were identified near the trailer park located along the southern shoreline. This area has been historically noted in the past as supporting very limited sparse milfoil; growth. Native weed growth density had increased considerably lake wide in comparison to 2016 densities. Growth increases were surprising in nature since most lakes in the area were experiencing delayed macrophyte growth. One major reason for the increased growth can be attributed to the fact that a fall weed treatment was not performed during 2016 as in prior years. Najas is still the dominant weed species lake-wide. The thin leaf pondweed population is becoming more prevalent throughout the lake basin. This species had already started to surface in areas of the lake.

Macrophyte Survey 6-10-2017



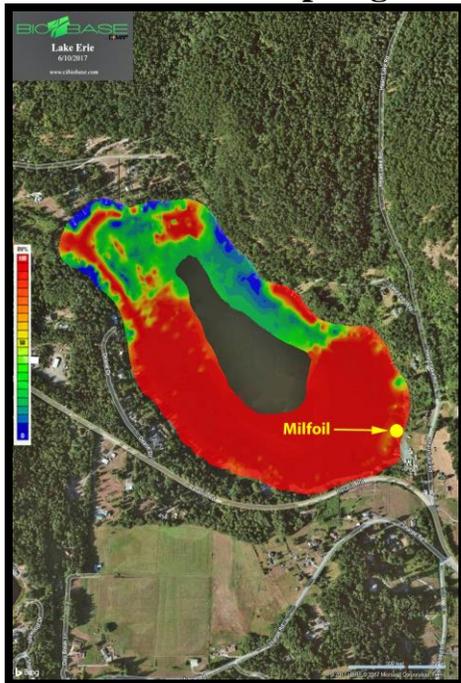


Spring 2016 Survey



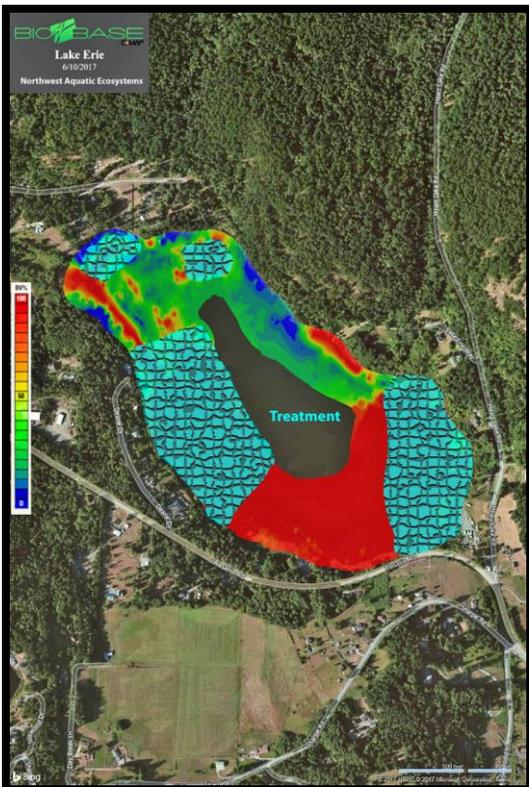
Spring Survey 2017

Milfoil Locations Spring 2017



Lake Erie Treatment June 15, 2017

Lake Erie was treated on June 15, 2017, one week earlier than our 2016 treatment date. Prior to treatment, the area was posted. The public boat launch was posted with two large signs and the residential shorelines received smaller signs. 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. NWAE utilized the public boat launch during treatment. 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. One property owner requested that no treatment occur within their lake parcel.



Lake Erie Treatment
2017

Lake Erie & Campbell Treatments August 15, 2017

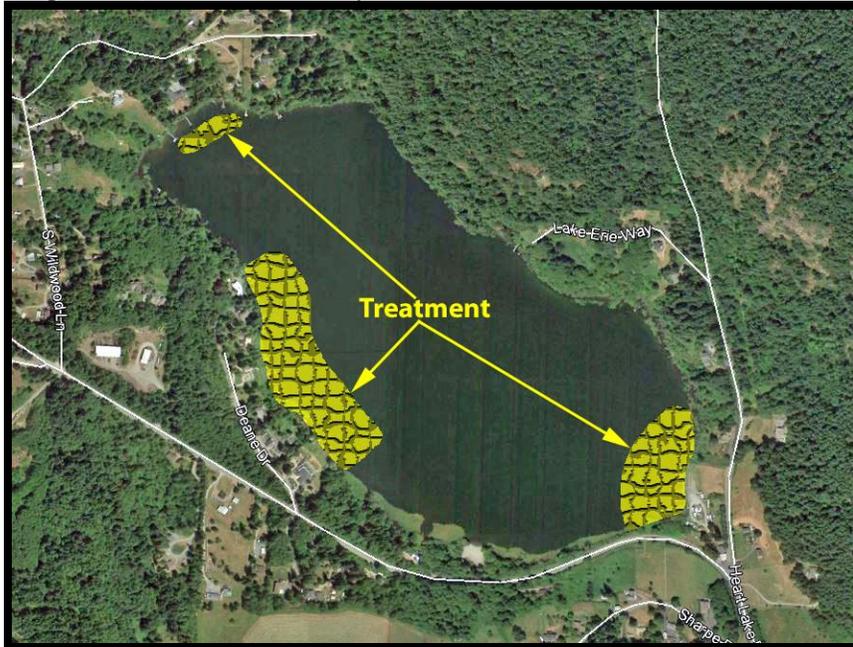
Erie

A secondary submersed weed treatment was performed on Lake Erie in an effort to reduce the late season weed growth noted during 2016. Approximately 15 acres of the lake was treated with diquat utilizing the same application and posting procedures employed earlier in the year. At the time of the treatment, it appeared that the lake had just experienced an algae bloom and that the bloom was in the later stages of dying off. Surprisingly numerous dead trout, approximately 10-12 dozen carcasses, were observed along the shoreline. NWAEE estimated that the fish had been dead for 7-10 days.



Trout are very susceptible to low oxygen levels. It is likely that this fish kill was the result of anoxic water column conditions resulting from algae respiration at night when the algae consume oxygen and cloudy overcast weather during the day that prevented oxygen production.

August 15, 2017 Secondary Treatment



Lake Campbell

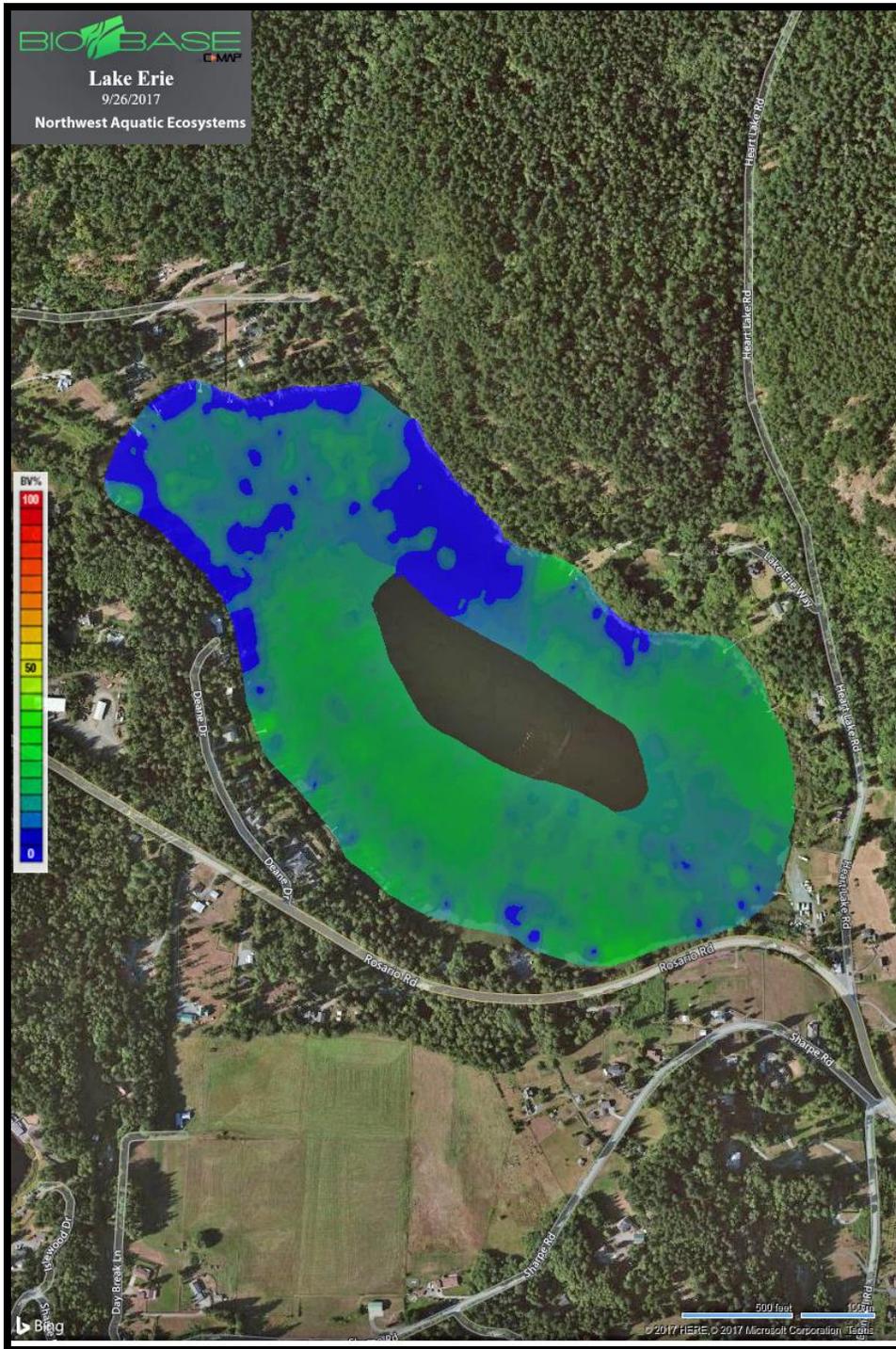
Glyphosate was applied to purple loosestrife, yellow flag iris and lily pads. Much of the activity transpired along the northwest shoreline west of the boat launch. Once again the shoreline's residents were notified of the treatment and the public boat launch was posted with mapped signage. There were considerable amounts of purple loosestrife extending more than 100 feet from the shoreline. It was unclear if the LMD was responsible for these infestations or if it was the property owners' responsibility. Areas open to discussion were not sprayed.

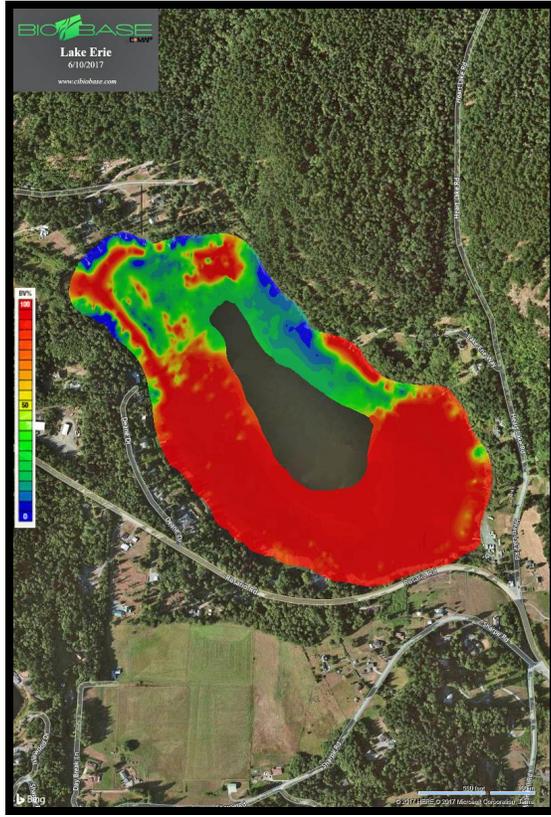
Lake Erie & Campbell Surveys September 26, 2017

Lake Erie and Campbell were both surveyed on September 26, 2017. No milfoil plants were identified during the Lake Erie survey. However small milfoil patches were documented again along isolated shoreline locations of Lake Campbell. Lake Erie was experiencing an algae bloom that limited water clarity to only 18 inches. Campbell also was blooming with over 50% of the lake impacted by the bloom. Past bloom conditions at Campbell have been worse. Densities and plant locations had been reduced considerably but minor sporadic colonies persisted.

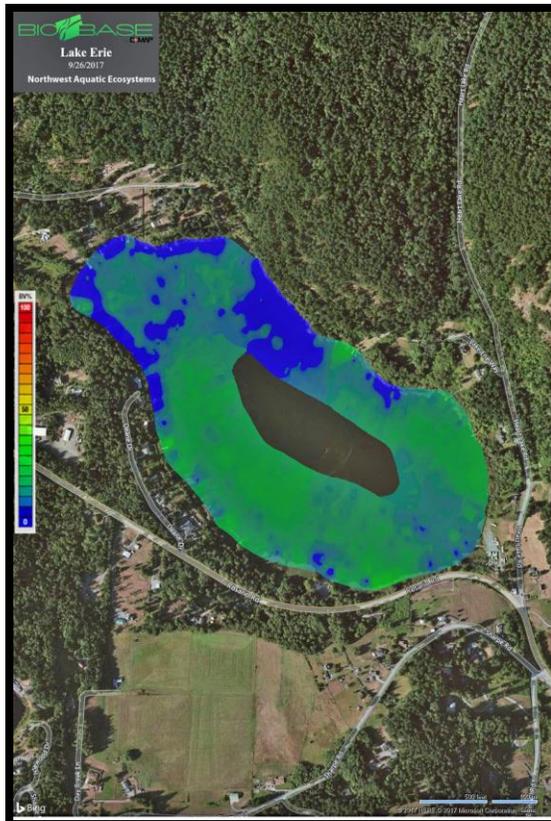
Lake Erie native plant growth had decreased considerably to levels below those noted during the spring survey. No milfoil was identified. Most of the vegetation noted on the survey consisted of the macro algae nitella. This filamentous form looks similar to aquatic plants but is a low growing algae species. Typically, the plant remains along the bottom but at times will grow up to the surface. The secondary treatment performed this year eliminated the problematic late season weed growth noted during last year. The shallow nature of Lake Erie encourages fall macrophyte concerns.

Lake Erie Survey September 26, 2017

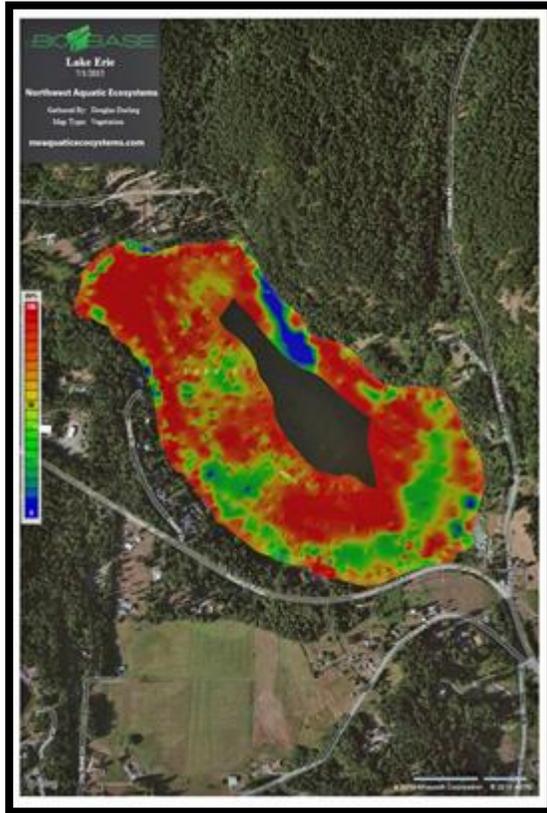




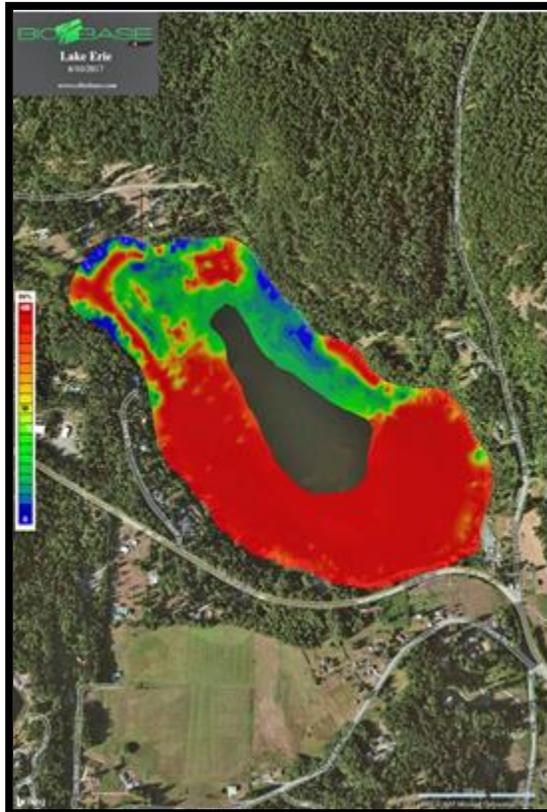
**Lake Erie
6-10-2017**



**Lake Erie
9-26-2017**



**Erie Pre-Treatment
 2015**

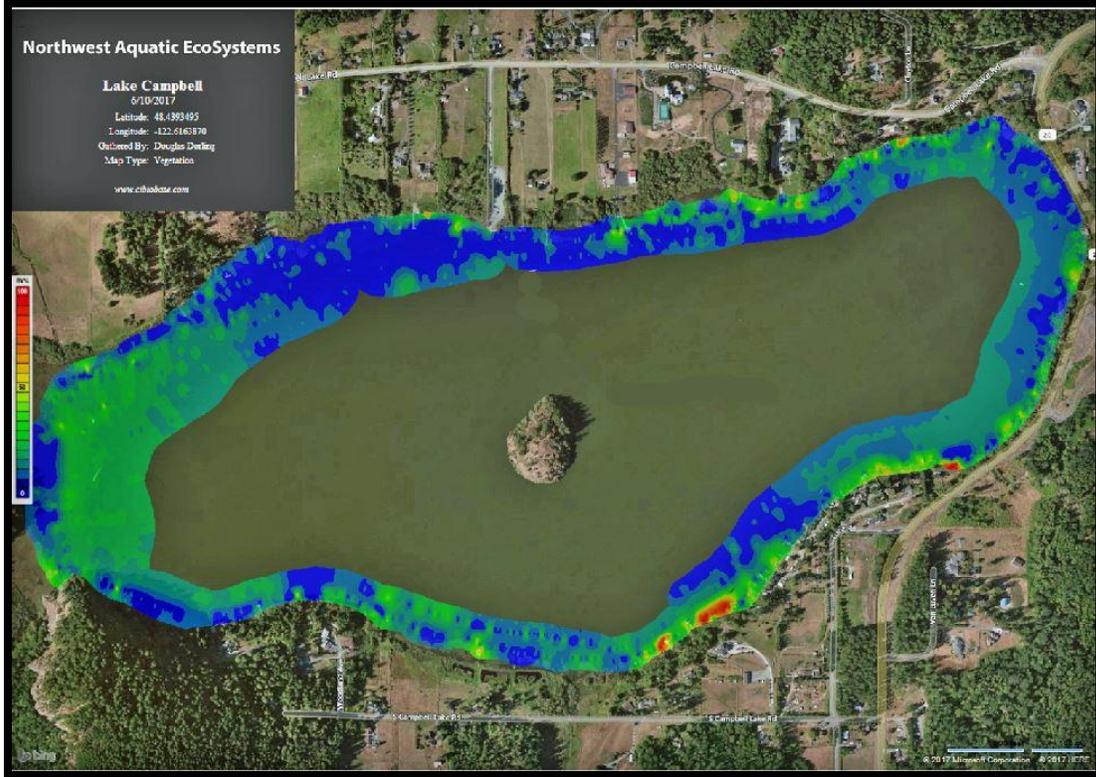


**Erie Pre-Treatment
 2017**

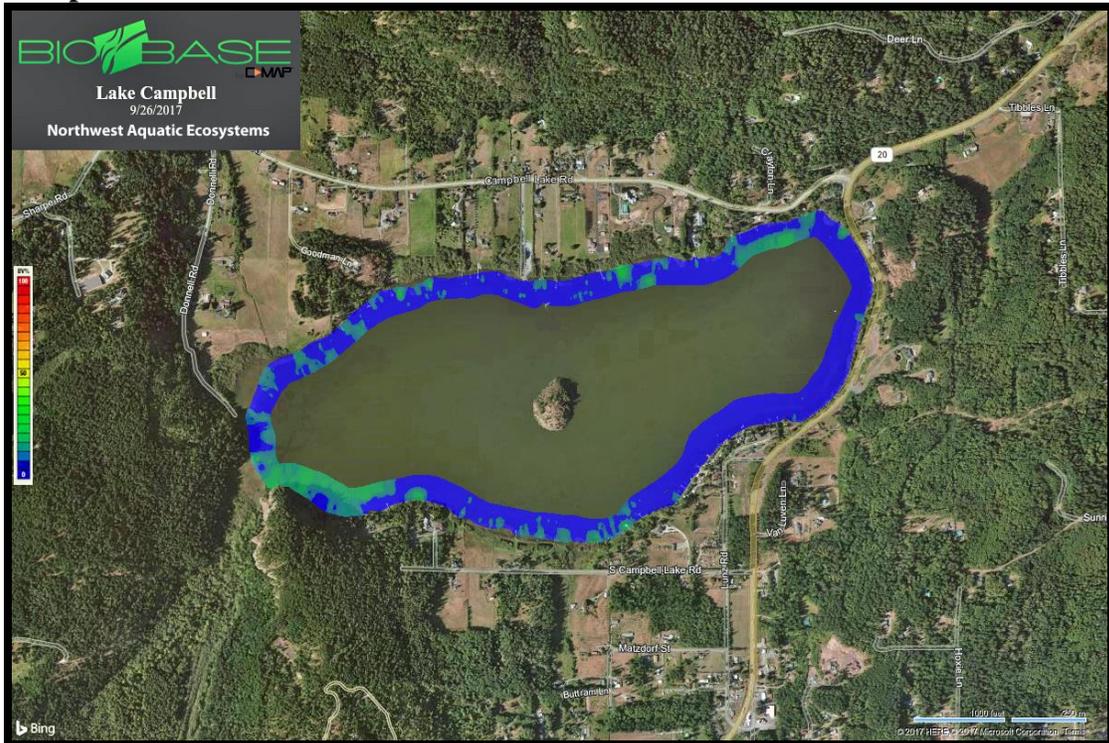
Lake Campbell Survey 9-26-2017



Campbell 6-10 2017 Pre-Treatment



Campbell 9-26-2017 Post Treatment



Recommendations For 2017

Milfoil growth within Lake Campbell has decreased from levels noted during 2016. Much of the late season growth was within areas noted during the earlier spring survey. Late season native plant growth within Lake Erie was not evident during 2017 as a result of the secondary submersed weed treatment performed later in the season. Native weed species will remain problematic at Lake Erie as the result of untreated lake areas. 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. The areas treated for problem milfoil growth at Lake Campbell will require monitoring during 2018 in an effort to reduce further plant expansion and will likely require additional applications in the upcoming years.

Northwest Aquatic Eco-Systems recommendations for the 2017 season:

1. Control of approximately 10-20 acres of lake shoreline that currently experiences sporadic milfoil growth of single stemmed milfoil plants within lake Campbell. The Lake Campbell infestation has not increased in range along the perimeter of the shoreline as was noted during 2016.
2. Continue surveys of the two individual private shoreline residential parcels containing small ponds for milfoil.
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.
4. The LMD needs to determine what distance from the shoreline is their responsibility for control of purple loosestrife?
5. Treatment of problematic Lake Erie native weed species when such species are hindering lake use. Treatments may prove to be cyclical in nature when only one treatment may be required one year and others two. The need for either one or two treatments will probably be weather dependent.
6. Lake Campbell management continues to focus solely on milfoil growth, while Lake Erie requires the ability to manage both noxious and troublesome 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.
7. 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.
8. Maintain established budgets for 2018 to account for the increased milfoil problems associated with Lake Campbell and potential secondary treatments on Lake Erie.