AquaTechnex

"Advancing the Science of Lake Management"

Lake Campbell and Erie Management District

2005 Year End Report

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Introduction and Project Overview

Erie and Campbell Lakes are located in Washington State in western Skagit County. Lake Erie is a 110 acre water body with a mean depth of 6 feet and maximum depth of 14 feet. The lake has a relatively small drainage area with a watershed of 1.62 square miles. The shoreline is a mix of residential and commercial development with large areas remaining in a natural state. Lake Erie drains to Lake Campbell located approximately one mile to the south. Lake Campbell is a 370 acre water body with a mean depth of 8 feet and a maximum depth of 16 feet. The watershed draining into Campbell is 5.68 square miles in size.

These lakes have been negatively impacted by aquatic plants and algae for a number of years. This is primarily due to their shallow nature and nutrient loading from the watershed. In the early 1980's a Phase One Lake Restoration Study was performed on these lakes using grant funds from the Department of Ecology (DOE). This study resulted in additional grant funding to implement the Phase Two Lake Restoration Efforts. An Alum treatment was performed on these lakes and the County purchased an aquatic weed harvester which was used to help manage those problems. Over time, the harvester work was abandon due to the high costs of operation and the limited production capabilities of the system. By the early 2000's weed and algae growth were again posing major problems to the residents of these lakes and the public access users. Eurasian milfoil was discovered in these lakes in this time frame as well.

The citizens living around the lake began to work with the Skagit County Public Works Department to mitigate the impact of these weeds on their use and enjoyment of the lakes. They formed a working group and began to educate themselves on the problems and options for management. A number of public meetings were held to discuss this issue and get consensus from the community on management options.

The County Lakes staff assisted the community by developing an Integrated Aquatic Vegetation Management Plan (IAVMP). This process focused the community on developing workable solutions for the problems they face. Once adopted, the plan can also be used to request funding from the DOE for implementation.

In this time frame the citizens also formed a Lake Management District (LMD) to fund the implementation of the plan. This type of special local district is set up

after landowners, who benefit from the improvements to the lake, vote to create the district. The LMD has been active for approximately 4 years. Through the County, the LMD has contracted with Aquatechnex, LLC to provide aquatic plant management services since 2002 (prior year end reports provide additional information on specific tasks and accomplishments for previous years, these are on file with the County).

Herbicide treatments focused on milfoil in 2002. In early 2003, these lakes were stocked with Triploid Grass Carp. This fish is a native of the Amur River in northern China/Siberia. Grass carp are biological control agents for many species of submerged aquatic weeds. They consume plant material thereby suppressing the abundance of the problem growth.

There are regulatory hurtles to clear prior to stocking this fish. Outlets to the lakes need to be screened to insure the fish do not escape to downstream waters. This work requires a HPA permit from the Department of Fish and Wildlife (DFW). This permit was secured by Aquatechnex and the screens were designed and installed in the fall of 2002. The next step is to secure a stocking permit from the same department to allow the introduction of this biological control agent. The DFW has to balance the desire for weed control with the potential impact this biological control agent will have on the ecosystem in the lakes under consideration. If too many grass carp are placed in a lake, they will eventually consume all aquatic vegetation, often to the detriment of other species. Aquatic plants are a key component in an aquatic ecosystem; they provide structure and cover for fish and invertebrates. If all plant life is removed, it impacts the populations of these other species.

The permit issued for this lake system allowed approximately 700 fish for Lake Erie and 2,200 fish for Lake Campbell. Generally, the department allows up to 10 fish per vegetated acre but in recent years the trends have become lower. The permit is good for one year after the date of issue. The Department indicated that future stocking of this biological tool would be dependent on a monitoring program that documented the need for additional fish.

Approximately 100 fish were stocked in Lake Erie and 600 fish were added to Campbell Lake. This stocking rate is lower than that allowed by the DFW. The permit allowed stocking of up to 6 fish per surface acre of each lake. Aquatic vegetation does not impact this number of acres in reality however. Lake Erie was treated in 2002 for the rapidly expanding Eurasian milfoil problem with Sonar aquatic herbicide. This reduced the volume of aquatic plant life present

because the milfoil removed made up much of the infested volume of the lake. Lake Campbell has historically had an algae bloom limiting aquatic plant growth to the shallow margins of the lake. The actual acres that support aquatic plants are much lower than the 370 surface acres of the lake.

The LMD hired Aquatechnex to implement a monitoring program on these lakes to characterize the aquatic plant communities and help determine the need for additional aquatic plant management activities over the life of the LMD.

This report summarizes the monitoring performed during the summer of 2005 of the impact of the grass carp on the aquatic plant communities. It also documents other control work performed on the lakes as well as provides recommendations for 2006.

2005 Aquatic Plant Mapping Methods

The objectives of the field aquatic plant survey efforts for 2005 were as follows:

- To monitor the changes in the aquatic plant communities over time.
- Insure that the maps and data contain the information necessary to support aquatic plant management permit applications in future years.
- To characterize the conditions present in the lakes during the summer of 2005 and make recommendations to the community regarding additional control efforts.

Our first step was to review the previous aquatic plant mapping efforts performed on the lakes. There have been a number of surveys performed on these lakes in the past few years by the County and the Lake Management District. Planning and assembly of equipment was the next step undertaken in this effort. Boats, sampling equipment and data collection equipment were mobilized to the lake for the 2005 summer survey.

The survey team used a Trimble GeoXT Differential Global Positioning System (DGPS) receiver and data logger to support the data collection mission. Prior to going to the field a data dictionary was developed for the project. Using Trimble Pathfinder software, the Data Dictionary Editor function was used to build the Erie/Campbell Data Dictionary.

Three Features were entered into this system and they were:

Eurasian Milfoil, Point
Eurasian Milfoil, Area
Native Plant, Point

Default feature settings were established for each feature on the Trimble GeoXT. The logging interval was set for one second. This function directs the receiver to collect a GPS signal at one-second intervals. The accuracy default was set for "code". The default minimum number of positions collected for each feature was set for 10. Display symbols and colors for the symbols were also selected and set.

A number of attribute menus were established for the Native Plant, Point feature. These menus were set based on the types of plants that were expected in the survey area. They were:

Elodea	Coontail	Pot 1	Pot 2	Pot 3	
Pot 4	Pot 5	Pot 6	Macro	Algae	No Plants

Five pull down menus for native plant attributes were created for this feature, each having the species listed above. The Pot 1-6 attributes were established because a number of Potamogeton species were expected to be encountered during the survey. As these species were not known prior to the survey, each label would be assigned in the field to a particular species as the team moved around the lake.

The data dictionary (file name Erie/Campbell.ddf) was then transferred to the Trimble GeoXT using the docking station and Pathfinder Data Transfer Utility. Images of the lakes were also transferred using this utility to provide a visual reference of the survey team's location on the lakes. The Coordinate System used was UTM, zone 10 North and datum NAD 1983 (Conus).

The data collection was performed over a number of days in June. The Trimble GeoXT was initialized and the Terrasync software used for data collection was opened. A rover file was created for this project and the data dictionary and background image were opened and made ready for use.

The lake was survey in the following manner. A number of data collection points were sampled throughout the littoral area of the lake and at each point a rake was thrown to collect and identify the species of plants present at each point.

Transects were run across the lake and points were collected along the transect lines. Visual observations were also made between transects and points, and the conditions present were noted.

The point sampling was performed first. The boat crew established a grid across the littoral area of the lake using the GeoXT. At each survey point, the crew used a sampling rake and methodology developed by the Washington Department of Ecology to collect plant samples (Parsons, 2001). The GeoXT GPS unit has a Windows CE computer built into the system. Terrasync software allows for the display of a background aerial image of the lake, the location of the unit geographically referenced to the image and any data features collected. The boat operator used this view to navigate to the collection point. At the collection point, a sampling rake was thrown and retrieved. A double sided rake was used with a 50 foot rope. When the rake was retrieved, the species present were noted. Using the GeoXT and Terrasync software, a native plant feature was stored at the sampling location. Species attributes were then recorded for that point. The data logging system was set up to have five pull down menus with the species selection so that five species attributes could be established for each sampling point. The survey team recorded a species attribute for each species found at that point with the stylus from this menu selection. They also recorded a plant abundance rating of sparse, moderate or dense based on the amount of plant material collected on the rake.

The last step was to perform a complete visual inspection of the areas in the lake between each transect. This qualitative assessment was designed to give the survey team a better overall view of the conditions present. A number of additional GPS points were collected to establish the outside edge of the plant communities between transects to see if there was variation. The make up of the plant community was noted in greater detail. The team looked for other plant species that were not present on the transects or in the data collection as well.

On completion of the field efforts, the Trimble GeoXT was placed in the docking station and the Trimble Pathfinder software's data transfer utility was used to collect the rover file from the GPS receiver. Using the differential collection utility in Pathfinder, the data was converted to ESRI shape files and moved to Arc View GIS software for analysis.

Maps were created that document the location of the sampling sites and represent the aquatic plant communities present at the time of each survey.

Mapping Project Results

Erie and Campbell Lakes have different characteristics and history of aquatic weed issues. They will be discussed separately.

Lake Erie

There was no Eurasian Milfoil detected in Lake Erie. This lake was heavily impacted by this weed in 2002 and treated with Sonar aquatic herbicide prior to grass carp stocking. No milfoil was observed the first year post treatment. The point survey, diver observation and boat visual observation took a very close look at the lake for this noxious weed and it is absent. Continued vigilance is required to prevent this plant from re-establishing in the lake.

There was some concern expressed about potential herbicide impacts to the native water lilies present along the south shoreline of the lake. Our team did observe these plants and concluded that they were being impacted by insect feeding. This is fairly common in Washington State. There was no evidence of herbicide injury in these areas.

One of the unique things about Lake Erie is that the majority of the surface area of the lake is considered the littoral zone. The littoral zone of a lake is the area that supports aquatic plant growth. It is normally determined by the depth to which light penetrates the water column with sufficient intensity for aquatic plants to survive. The littoral area of a lake is generally the shallows areas along the shorelines and out to a depth contour where light levels are so low that plant life can not survive. As Lake Erie is shallow throughout, light reaches the lake bottom throughout and aquatic plant life can thrive anywhere in the system. As that is the case, the sampling protocols were established to survey the entire lake.

The point survey collected an increased number of aquatic plant species when compared to the 2003 survey data. Table 1 presents the common and scientific names for each of the species present in each year.

Table One, Aquatic Plant Species Detected during the 2003 and 2004 Aquatic Plant Surveys for Lake Erie

2003-2004-2005 PLANT SPECIES	2003 ABUNDANCE	2004 ABUNDANCE	2005 ABUNDANCE
Ceratophyllum demersum (Coontail)	83 of 127 survey points	0 of 127 survey points	0 of 93 survey points
Potamogeton pusillus (Small Pondweed)	46 of 127 survey points	2 of 127 survey points	0 of 93 survey points
Potamogeton amplifolius (Big Leaf Pondweed)	4 of 127 survey points	0 of 127 survey points	0 of 93 survey points
Potamogeton foliosus (Leafy Pondweed)	0 of 127 survey points	113 of 127 survey points	14 of 93 survey points
Potamogeton filiformis (slender leaved pondweed)	0 of 127 survey points	0 of 127 survey points	1 of 93 survey points
Stuckenia pectinatus (Sago Pondweed)	0 of 127 survey points	1 of 127 survey points	0 of 93 survey points
Ranunculus sp. (Water Buttercup)	0 of 127 survey points	2 of 127 survey points	0 of 93 survey points
Utricularia sp. (Common Bladderwart)	0 of 127 survey points	1 of 127 survey points	0 of 93 survey points
Chara/Nitella	0 of 127 survey points	93 of 127 survey points	60 of 93 survey points
Filamentous	Data not	51 of 127 survey	26 of 93 survey

Algae	collected for this species, very scattered distribution	points	points

As Table One shows, there has been a considerable change in the aquatic plant community in Lake Erie between the 2004 and 2005 surveys. There were 7 species of submerged aquatic plants sampled in the lake during 2004 and four species sampled in 2005. Big Leaf Pondweed was not found during the 2005 point survey while only one points yielded a new species such as Potamogeton filiformis. It should be noted that this survey collected plants at survey points in the lake. It is possible that this species is present elsewhere in the lake at very low densities.

In 2004 the dominant weed species was Potamogeton foliosus. During the 2005 survey, this plant was not found in the abundance it was in 2004. Small Pondweed and Leafy Pondweed numbers also decreased. It should be noted that these two Potamogeton species are very similar and during the 2003 survey the plants in these two families were very young small plants. It is hard to tell them apart at that stage (See Ecology's online site at http://www.ecy.wa.gov/programs/wq/plants/plantid2/descriptions/potpus.html).

During the 2005 survey, these plants were much more mature. It is possible that some of the 2003 finds were in fact Leafy Pondweed. Chara/Nitella and filamentous algae have not changed dramatically since 2004. Macro algae species such as Chara and Nitella are normally considered beneficial species. They take up space on the lake bottom that might otherwise be colonized by more aggressive aquatic plants. They are low growing and will not interfere with most beneficial uses of a lake except near docks in shallow waters. Triploid grass carp will generally not feed on these algae species.

The most notable difference between the 2004 and 2005 survey was the density of the aquatic plant growth in the lake. When the rake samples were collected, the biologists used a rating system to record the amount of vegetation retrieved from each site. A "sparse" rating indicated that plants were collected and 0 to 30 percent of the rake was covered with plant material. A "moderate" rating indicated that the plants collected covered from 30 to 60 percent of the rake. A

"dense" rating indicated that plants collected covered from 60 to 100 percent of the rake.

During the 2004 survey, the ratings for all sites were moderate to dense. During the 2005 survey, the majority of the sites had a sparse rating. This data was supported by the visual boat observation survey as well. During the 2004 survey, aquatic plant growth dominated by Leafy Pondweed approached the surface or formed mats on the surface of the lake. During 2005, no aquatic plants approached the surface of the lake that would be considered a problem. Many of the lake residents indicated at the 2004 fall public meeting that they considered the levels present in the lake problematic and noted an impact on beneficial uses including swimming, boating and fishing. Many also complained of fishing lines becoming tangled in the plant growth. Excessive plant growth was not a problem in 2005.

A number of maps were produced for Lake Erie. An overview map that shows the plant communities is presented here and the remaining maps of individual species locations are found in the appendix. As the overview map shows, the plant coverage on the lake has decreased dramatically from 2004. The dominate species in 2005 was Chara/Nitella. The maps in the appendix show the survey points and transect locations. There is also an individual map presented for each of the species found with their location.

Discussion

Our biologists have been working on the lake for a number of years, since approximately 1999. This lake has exhibited shifts in the makeup of the plant community a number of times prior and after institution of control measures. During the past three years that we have been monitoring the effectiveness of various treatment strategies on these plant communities with the objective of protecting beneficial uses. The Eurasian Milfoil that was dominating the lake prior to the Sonar treatment has been effectively removed from the system. This plant has not re-appeared. The lake was stocked with approximately 100 triploid grass carp at a rate of about 1 fish per vegetated acre in 2003 and the fish have kept plant growth at the desired level.

The use of a biological control agent such as grass carp is an ongoing process. Stocking the fish at high rates often will result on the complete removal of aquatic vegetation from the system. This is not a desired outcome. Some aquatic plant life is necessary to support a healthy aquatic ecosystem. Fish and other

organism rely on aquatic plant life for food, shelter and protection from predators. An overly aggressive stocking program results in the biological control agent consuming the vegetation present and then searching for any new plant growth emerging from the lake sediments. It is important to start at the low end of the stocking range and add fish gradually after evaluating the need.

It is our conclusion that Lake Erie can support additional grass carp. The permitting process in Washington State is managed by the Department of Fish and Wildlife. When stocking permits are issues, as was the case for the initial stocking of the lake, they are good for one year. We had permission to place 700 fish in the lake on the first stocking permit but chose to introduce 100 of those because of the low plant population.

At this point, other control options are not recommended for Lake Erie. The plant growth is wide spread and uniform throughout the lake. Herbicide treatments would be cost prohibitive when compared to additional grass carp stocking. Non-chemical treatment options such as mechanical or use of bottom barriers would also be cost prohibitive. There is no need at this point based on 2005 results to consider additional treatment options.

Lake Campbell

Eurasian milfoil was found at numerous places in Lake Campbell. This lake was infested in limited areas by this weed and treated with 2,4-D aquatic herbicide in 2002 prior to grass carp stocking. No Eurasian Milfoil was observed the first year post treatment. The 2005 point survey and boat visual observation took a very close look at the lake for this noxious weed and it is present in many locations around the lake.

Over the years we have been involved with Lakes Erie and Campbell the major difference between the two is water clarity. Lake Campbell has historically had a significant algae bloom each summer. Excessive amounts of algae cells in the water column will significantly reduce the light available to support aquatic plant life. While the lake is shallow, light penetration has limited plant growth to the shallow margins of the lake historically. This trend continued into 2004.

The point survey collected an increased number of aquatic plant species when compared to the 2004 survey data. Table 1 presents the common and scientific names for each of the species present in each year.

Table 3, Aquatic Plant Species Detected during the 2003 and 2004 Aquatic Plant Surveys for Lake Campbell

2003-2004 - 2005 PLANT SPECIES	2003 ABUNDANCE	2004 ABUNDANCE	2005 ABUNDANCE
Ceratophyllum demersum (Coontail)	15 of 88 survey points	33 of 100 survey points	12 of 142 survey points
Potamogeton amplifolius (Big Leaf Pondweed)	4 of 88 survey points	0 of 100 survey points	0 of 142 survey points
Potamogeton illinoensis (Illinois Pondweed)	0 of 88 survey points	12 of 100 survey points	5 of 142 survey points
Potamogeton richardsonii (Richardson's Pondweed)	14 of 88 survey points	0 of 100 survey points	0 of 142 survey points
Potamogeton filiformis (Slender-leaved Pondweed)	1 of 88 survey points	0 of 100 survey points	49 of 142 survey points
Potamogeton foliosus (Leafy Pondweed)	0 of 88 survey points	10 of 100 survey points	22 of 142 survey points
Potamogeton pectinatus (Sago Pondweed)	0 of 88 survey points	0 of 100 survey points	2 of 142 survey points
Elodea canadensis (common waterweed)	6 of 88 survey points	6 of 100 survey points	5 of 142 survey points

Myriophyllum sibericum (native milfoil)	23 of 88 survey points	6 of 100 survey points	39 of 142 survey points
Myriophyllum spicatum (Eurasian milfoil)	0 of 88 survey points	0 of 100 survey points	12 of 142 survey points
Najas sp. (Slender water nymph or Naiad)	0 of 100 survey points	12 or 100 survey points	37 of 142 survey points
Potamogeton cripus (Curly Leaf Pondweed)	0 or 100 survey points	1 of 100 survey points	0 of 142 survey points
Vallisneria americana (Tapegrass)	0 of 88 survey points	5 of 100 survey points	0 of 142 survey points
Chara/Nitella	56 of 88 survey points	23 of 100 survey points	48 of 142 survey points
Utricularia vulgaris (Bladderwort)	0 of 88 survey points	0 of 100 survey points	2 of 142 survey points
Filamentous Algae	0 of 88 survey points	0 of 100 survey points	5 of 142 survey points
No Plants Present	n/a	29 of 100 survey points	30 of 142 survey points

As Table Three shows there has been some change in the makeup of the aquatic plant community in terms of species present from 2004 to 2005. There were nine submersed aquatic plant species present in 2004 and twelve species of aquatic plants sampled in 2005 for an increase of three species present. New species found in the lake include Filamentous algae, Bladderwort and Sago Pondweed. Eurasian milfoil was also re-discovered in Lake Campbell in 2005. The point sampling did not locate Big Leaf Pondweed, Curley Leaf Pondweed, Richarson's Pondweed or Tapegrass, species which were found in 2004. As this is a point sampling method, it is probable that these species are still present in the lake but were not present at the sampling stations. Slender leaved pondweed has become

the most abundant plant in the Lake Campbell system based on our survey. The macro algae Chara was the second most abundant and we noted a slight increase in levels from the 2004 survey. Both native (northern) and non-native (Eurasian) saw increases in populations at sampling points.

It should be noted that Curly Leaf Pondweed was added to the Washington State Noxious Weed list in the fall of 2004. In 2004 one sampling site contained this species. While this plant should be a preferred species for grass carp, the populations of this weed should be monitored in the future. Curly Leaf Pondweed does well in low light conditions and can expand rapidly without management. The grass carp in the system will provide control of this plant when encountered.

The aquatic plant map for Lake Campbell is presented here. This map documents the location of aquatic plant beds in the lake and the dominant species. The appendix contains maps of the individual species locations and other information.

Discussion

The overall conditions in Lake Campbell have not changed much since the 2003 survey with the exception of the native and non-native milfoil populations. The aquatic plant communities continue to be limited to the shallow waters by the lack of light in deeper water due to extensive algae blooms. However, along the littoral edges of the lake, most notably along the north and south shorelines the plant communities are healthy. Aquatic plant growth is however expanding to the point that it may be impacting some beneficial uses such as swimming and boating around docks.

The majority of the lake shoreline is undeveloped and healthy aquatic plant beds along the undeveloped shorelines provide good habitat for fish and wildlife. There are however areas where this submerged aquatic plant growth is having an impact on individual property owner's access to the lake. Thick weed growth adjacent to their docks and beaches has caused problems such as plants becoming entangled in outboard motors and not being able to use areas for swimming and fishing. As there is an impact on these beneficial uses locally, control measures should be considered in these areas.

The Integrated Aquatic Vegetation Management Plan (IAVMP) developed by the County for these two lakes focuses on triploid grass carp as a primary control

method supplemented by herbicide treatments or other non-chemical control strategies as necessary.

One consideration the County and the LMD should take into account is that fish have to be stocked at a rate that will significantly suppress aquatic vegetation lake-wide in order to provide relief to the areas around the docks and beaches. Grass carp cannot provide focused control at one locale within a lake, such as an individual dock or beach, without being stocked at a rate that will provide that same level of control lake-wide. Other aquatic plant management options can provide focused control.

The County and LMD should consider other control strategies for these areas as well and weight the impacts vs. costs for each. Aquatic herbicides could be used to suppress this growth as necessary in the exact areas where they are problematic while not impacting the remaining aquatic vegetation in areas where it is not impacting beneficial uses. Bottom barriers could also be considered.

When making this decision, the County and the LMD should focus on the objective of the treatment and the impacts. Input from the LMD and community should be considered as well. At this point, it appears that small areas adjacent to some properties could use additional weed control, while aquatic plant communities in the remainder of the lake are not causing major problems.

Bottom barriers could also be considered. These are a more long term solution to this problem.

There is an invasive water lily species present in Lake Campbell and they have expanded somewhat from 2003 to 2005. These species are on the state noxious weed list as they degrade water quality and habitat in infested lakes. They are also a threat to swimmers. Grass carp will not feed on this plant species and other methods of control are necessary. The most effective treatment would be to apply glyphosate herbicide during the summer of 2005. The NPDES permit for noxious aquatic weed control does not have fees or require newspaper public notices.

2005 Treatment Operations

After presenting the findings of the mapping mission to Skagit County, our firm recommended the treatment of the noxious weed species present on Campbell

Lake with aquatic herbicides. These applications were approved. The following treatments took place in 2005.

The invasive water lilies on Campbell Lake were treated using Rodeo (glyphosate) aquatic herbicide and an aquatic surfactant. This herbicide is a systemic product and trans-locates through out the plant including the root systems. It is applied after the plants flower to maximize movement into the roots. Generally, there is very little recovery of these plants the year following treatment. A boat crew navigated the shoreline of Campbell Lake and treated these species where ever they were present.

We also recommended treatment of approximately 35 acres of Campbell Lake for Eurasian Milfoil. We located a number of areas that had growth present this year. The product used was Dow DMA 4 IVM (liquid 2,4-D). This product is the most cost effective systemic herbicide available for treatment of milfoil. It is also target specific for plants in the broadleaf family.

At the end of the season, we met with the Steering Committee to present our work for the summer and discuss issues with respect to the lake. There was considerable concern expressed by the Steering Committee that grass carp stocking did not occur during the summer of 2005. We initially stocked triploid grass carp in the spring of 2003. While we had permission to use up to 700 fish in Lake Erie and 2,200 in Campbell Lake, we did not apply that many fish at that point. The reasoning was the lower levels of actual plant growth present at the time of stocking.

One of the problems with the Washington State grass carp permit system is that the permits are good for only one year. As such, our first permit expired without us using all of the fish allowed. This was for environmental reasons however, overstocking a lake can be a serious issue. During the winter of 2004-2005, we worked with the Washington Department of Fish and Wildlife to renew this permit application. They did provide permission to add the additional fish.

We did not stock fish in 2005 under this permit. The reasoning for this was discussed with the Steering Committee at the fall meeting. During that meeting, we agreed that it would make more sense to perform this stocking just prior to the expiration of the stocking permit on May 5, 2006. This action would allow us to get a look at the lakes in the spring and make a decision on the numbers of fish that should be stocked. We recommend that the Steering Committee receive a stocking recommendation for approval in mid April and that we deliver the fish

necessary based on acceptance of that recommendation just before the May expiration date.

Future Considerations

Ongoing monitoring should focus on the results of the 2006 grass carp stocking on problem aquatic weed growth. If the entire amount allowed for stocking is not utilized, it may be possible to again approach WDFW to obtain a third stocking permit for the balance of the fish originally allowed and not placed in the lake. This should be discussed and considered.

The Washington Department of Ecology is in the process of developing a new aquatic herbicide permit because of the Washington Toxics Coalition Lawsuit discussed at the fall Steering Committee meeting. When more details of that are known, we will pass them along to the group.

Treatment decisions for 2006 will be based on the presence of noxious weeds and input or direction from the County and Steering Committee.

References

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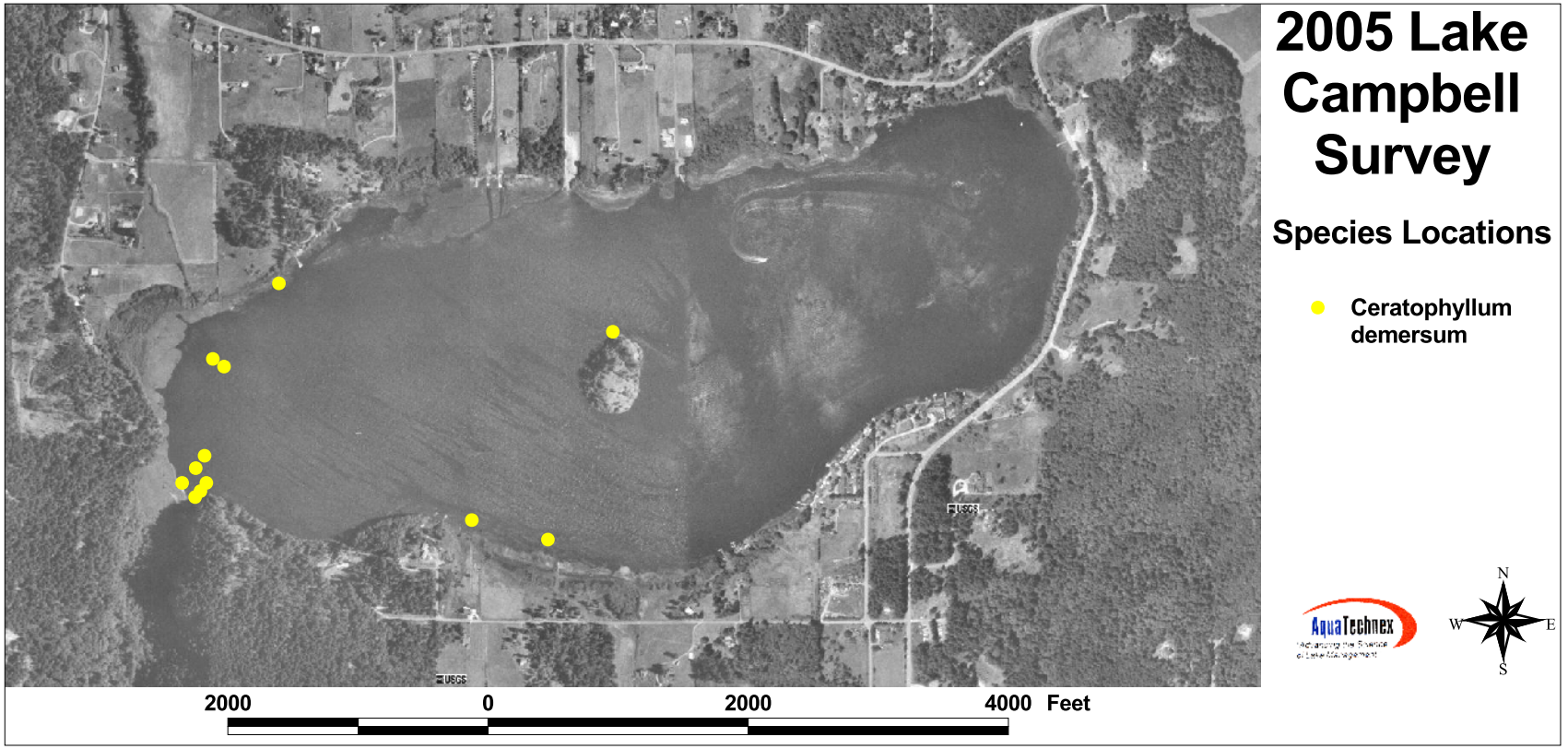
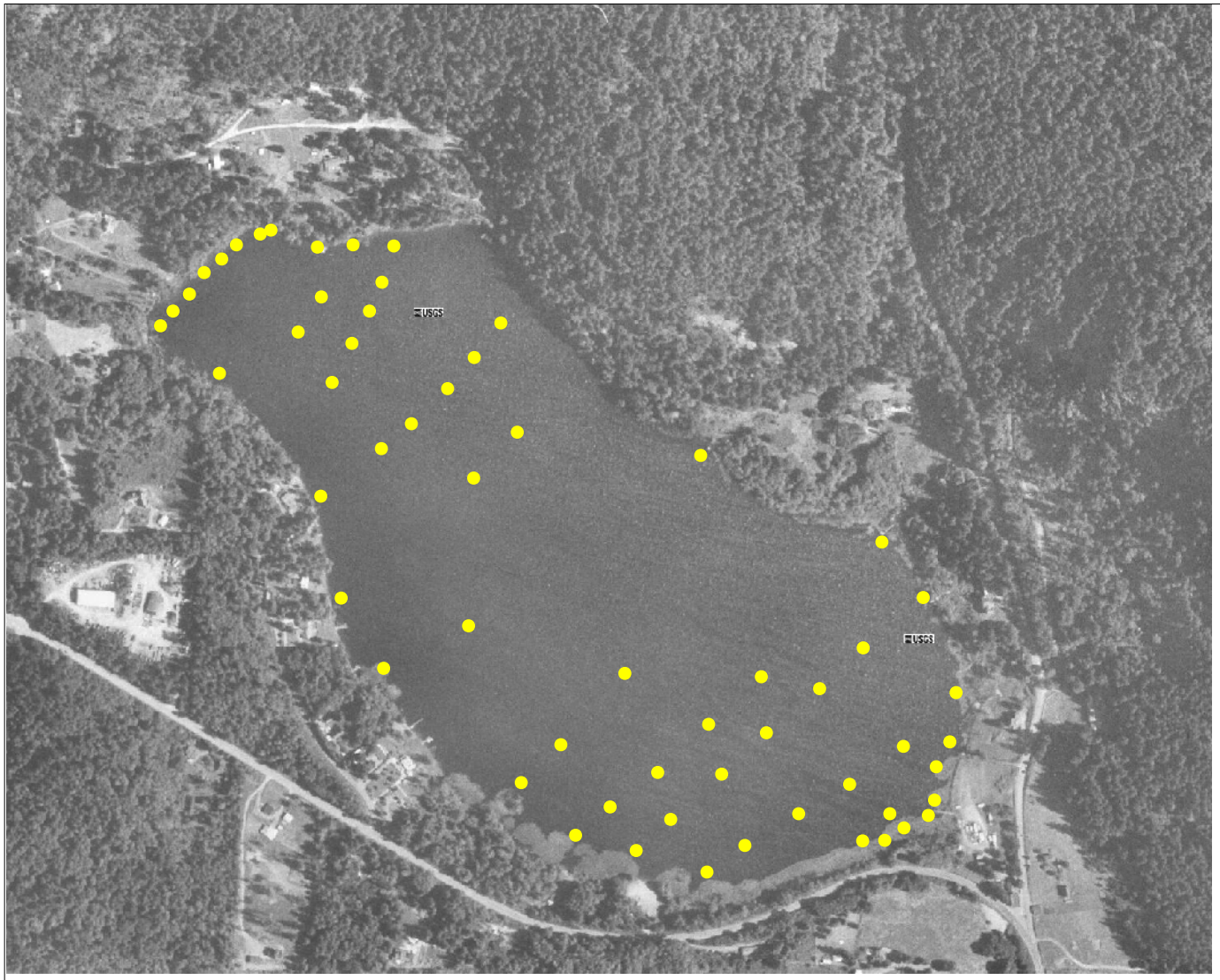

2005 Lake Campbell Survey
Species Locations
Ceratophyllum demersum
AquaTechnex
N
W
E
S
2000
0
2000
4000 Feet



Lake Erie 2005 Plant Survey

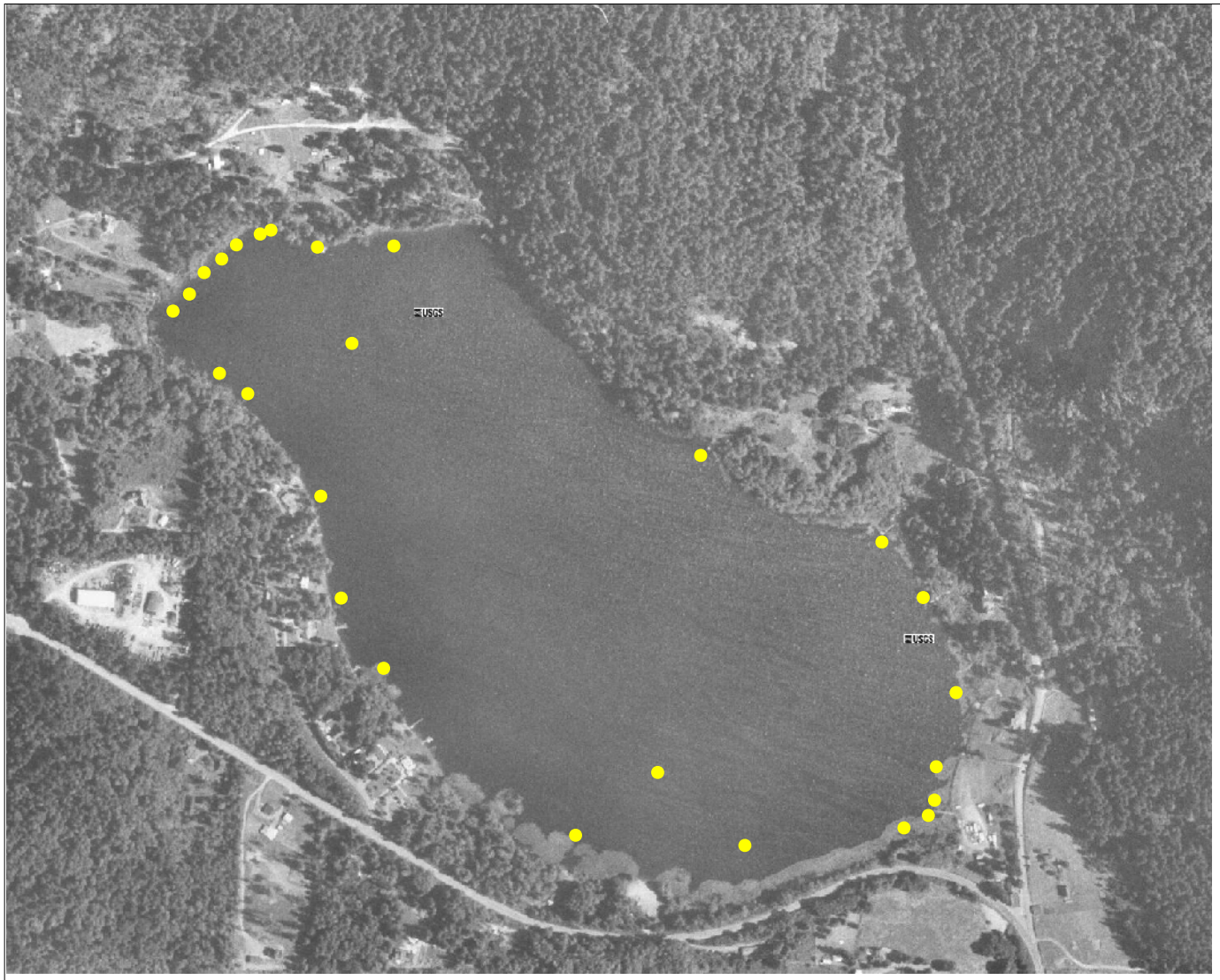
Species Locations

- Chara spp.

AquaTechnex

N
W
E
S

800 0 800 1600 2400 Feet



Lake Erie 2005 Plant Survey

Species Locations

- Filamentous algae

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N
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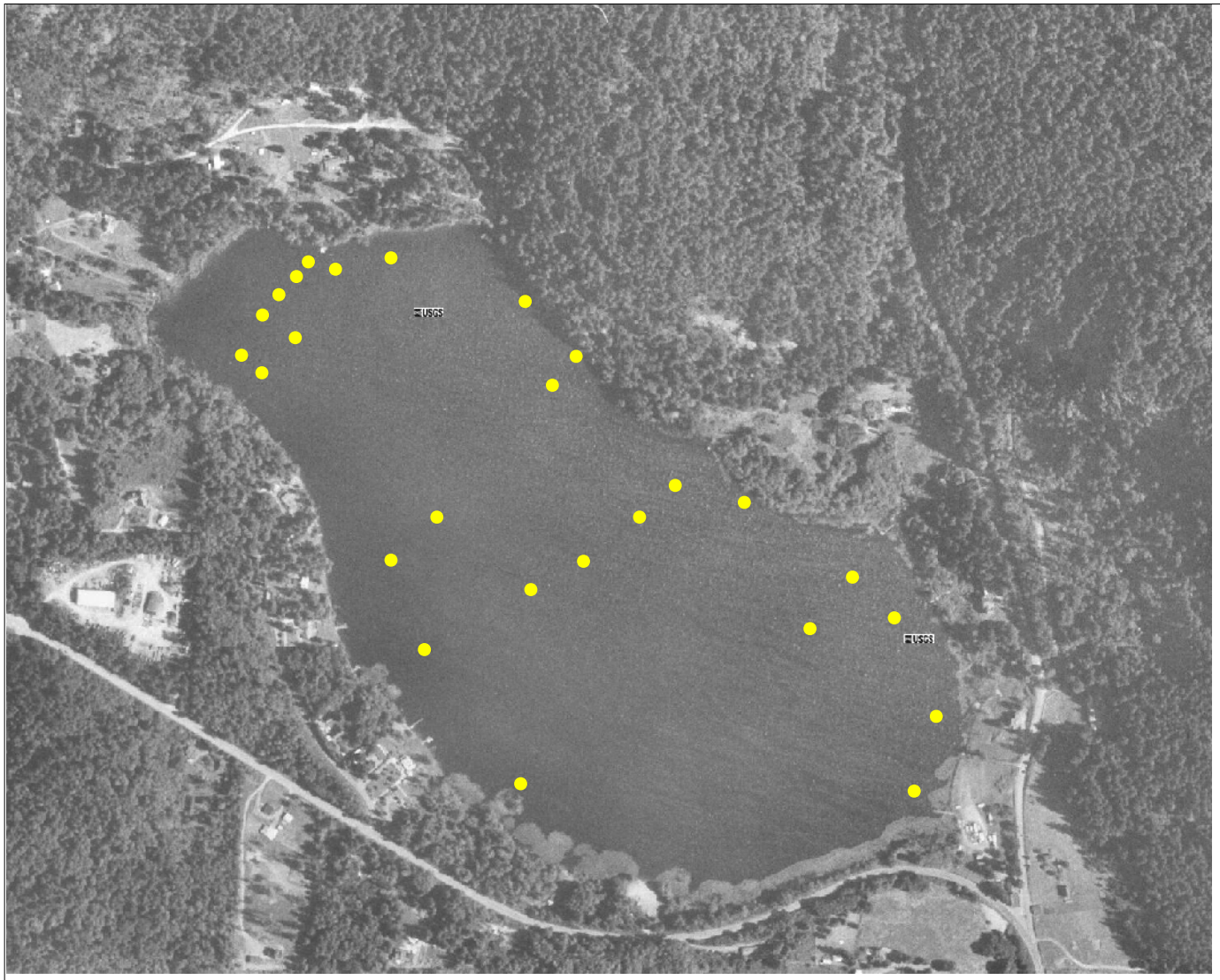
800 0 800 1600 2400 Feet



Lake Erie 2005 Plant Survey

Species Locations

- No Plants

800 0 800 1600 2400 Feet

N
W E
S

Lake Erie 2005 Plant Survey

Species Locations

- Potamogeton filiformis

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N
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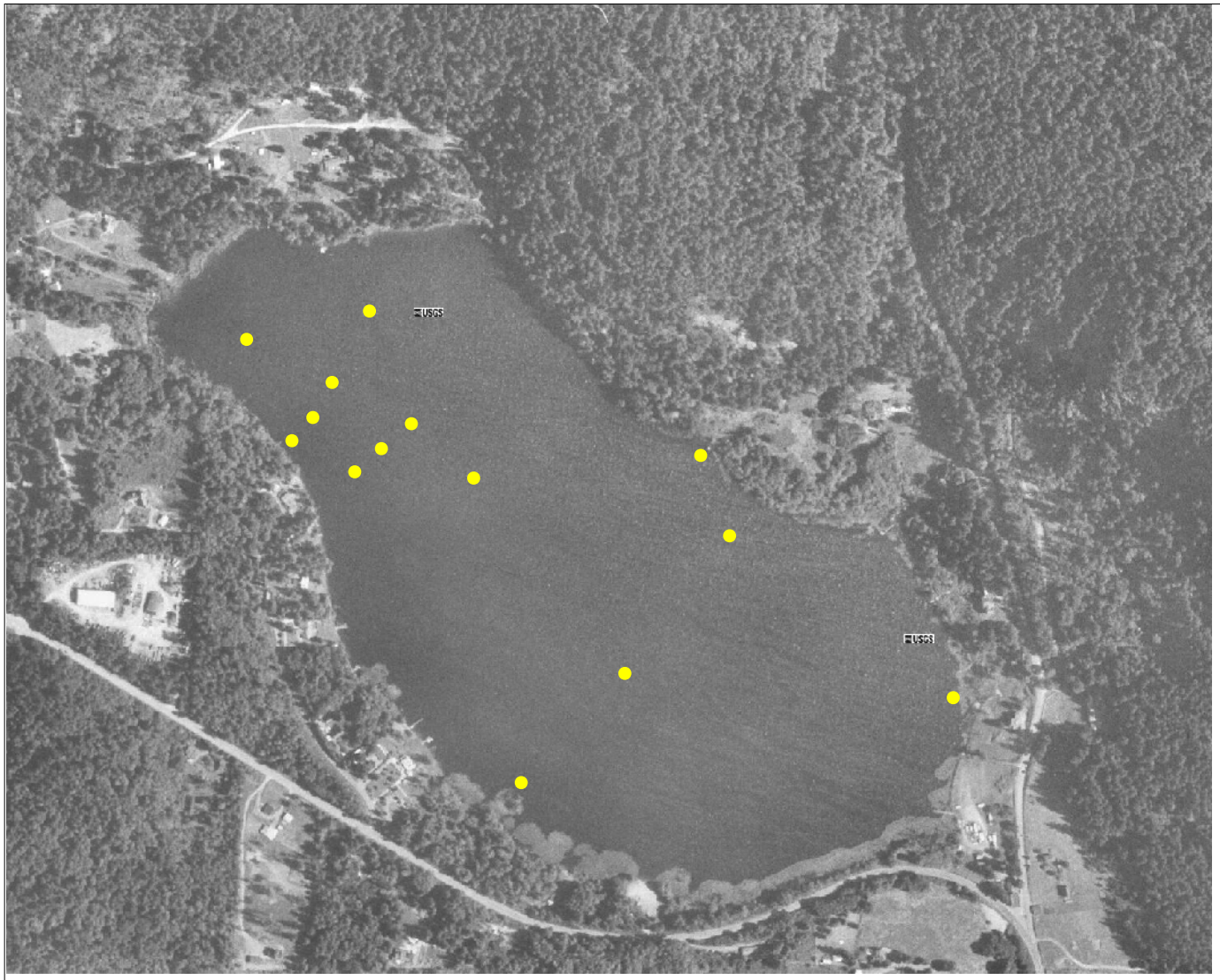
800 0 800 1600 2400 Feet



Lake Erie 2005 Plant Survey

Species Locations

- Potamogeton foliosus

AquaTechnex

N
W
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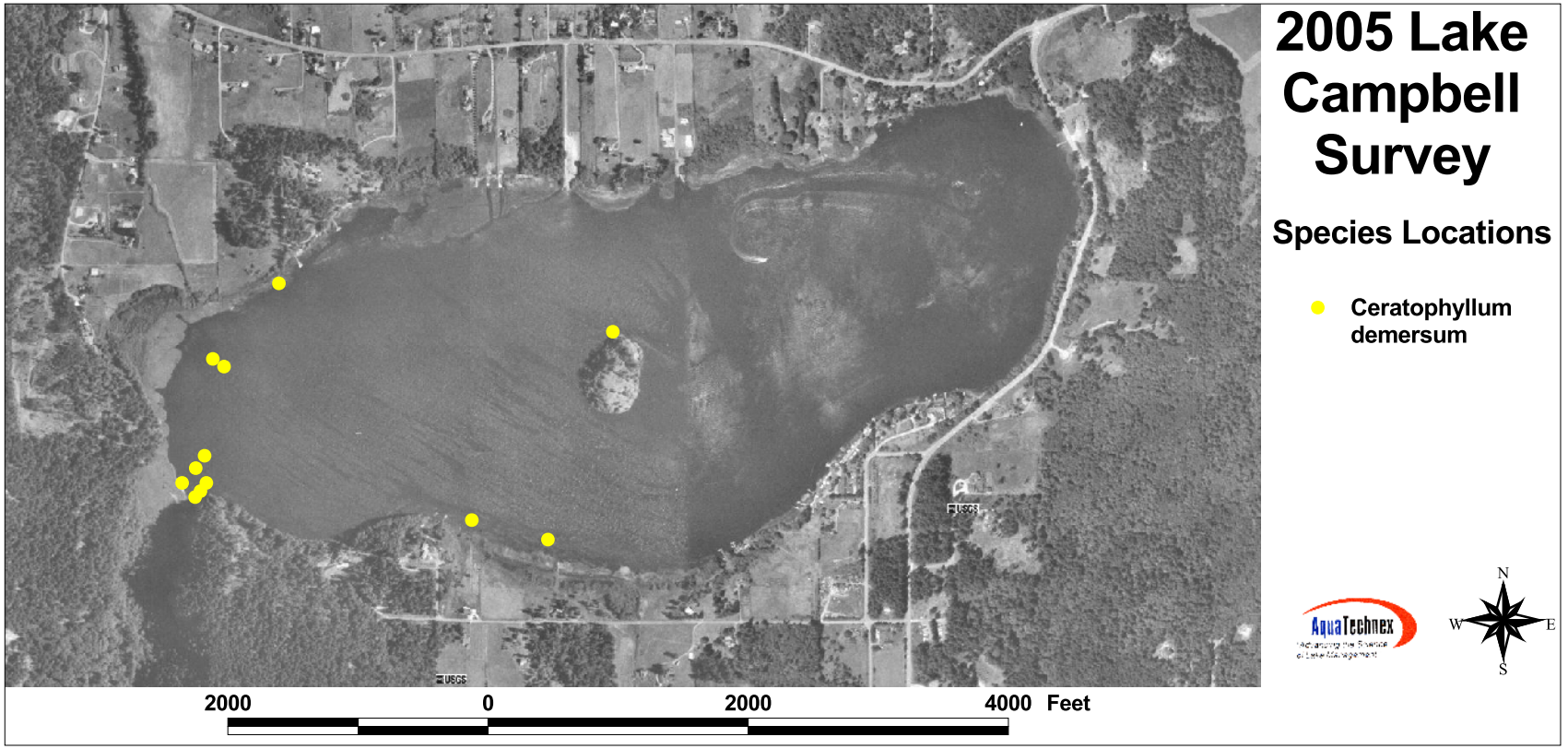
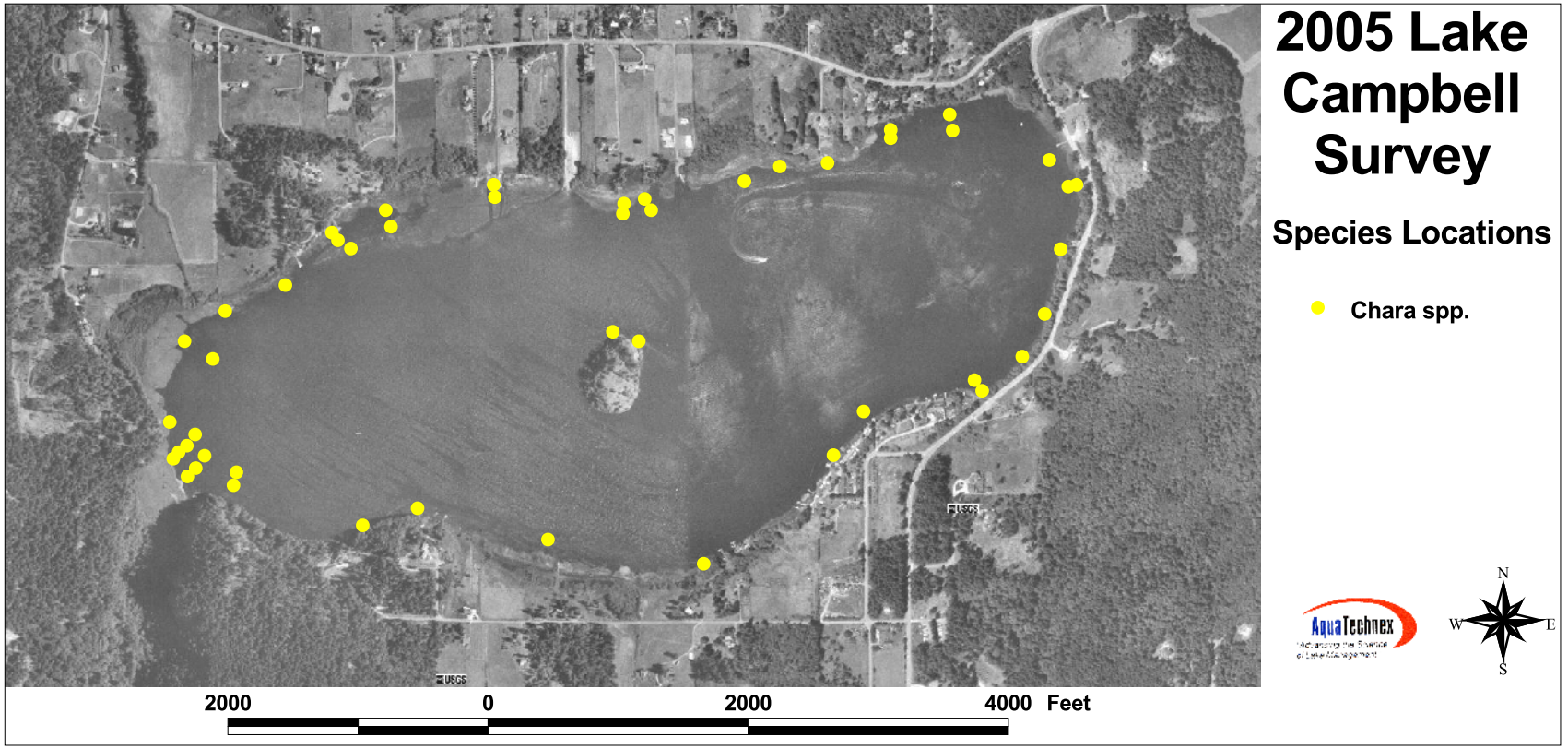
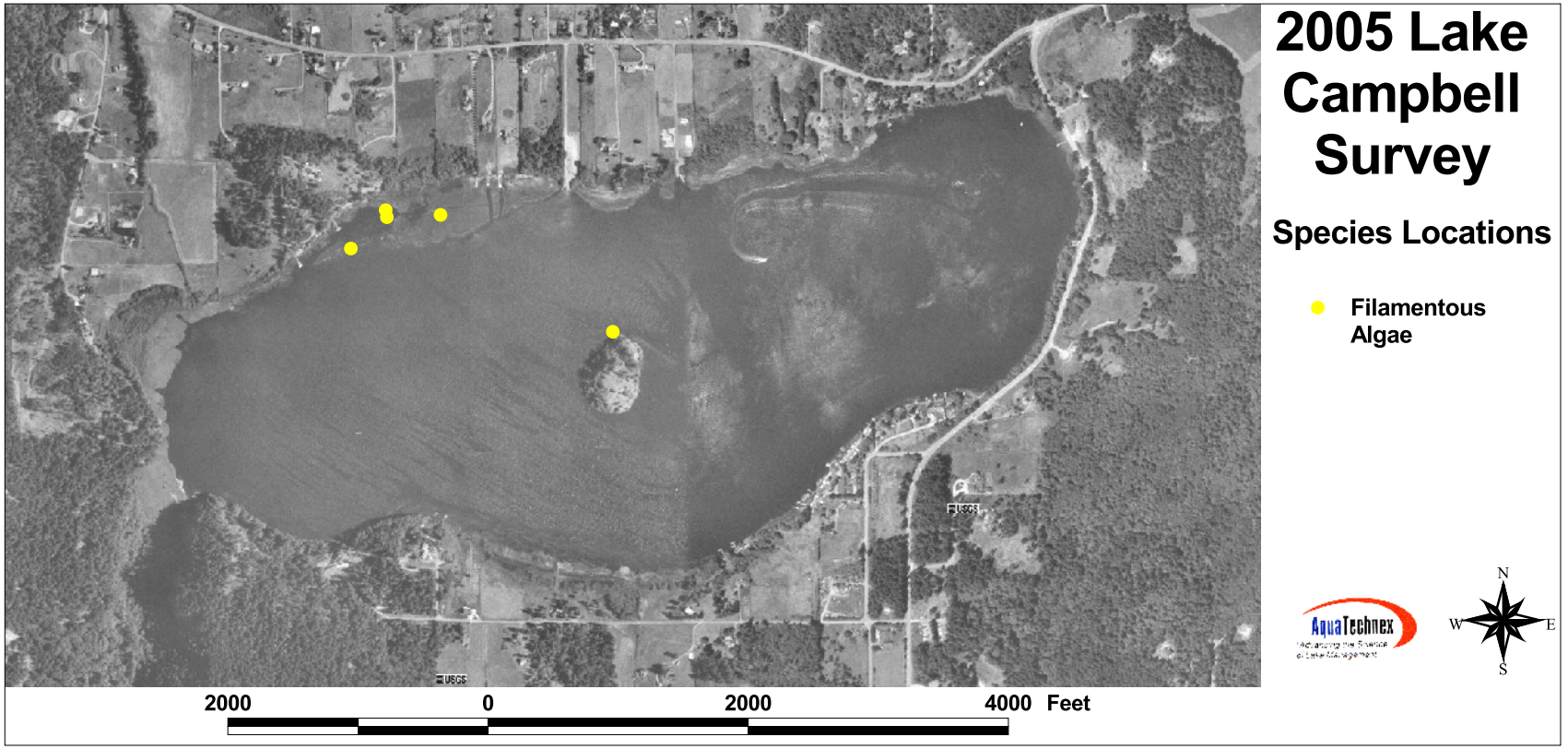
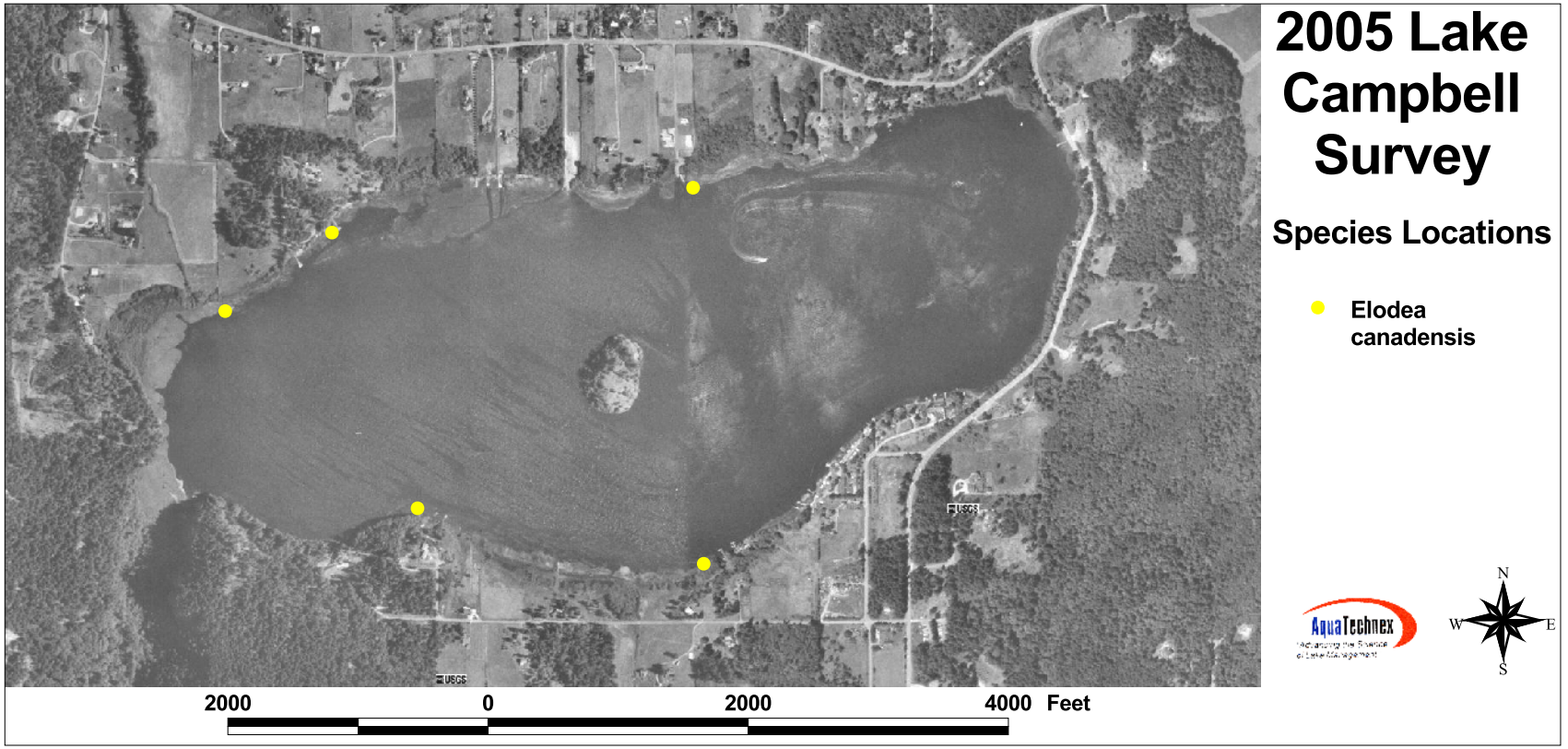
S

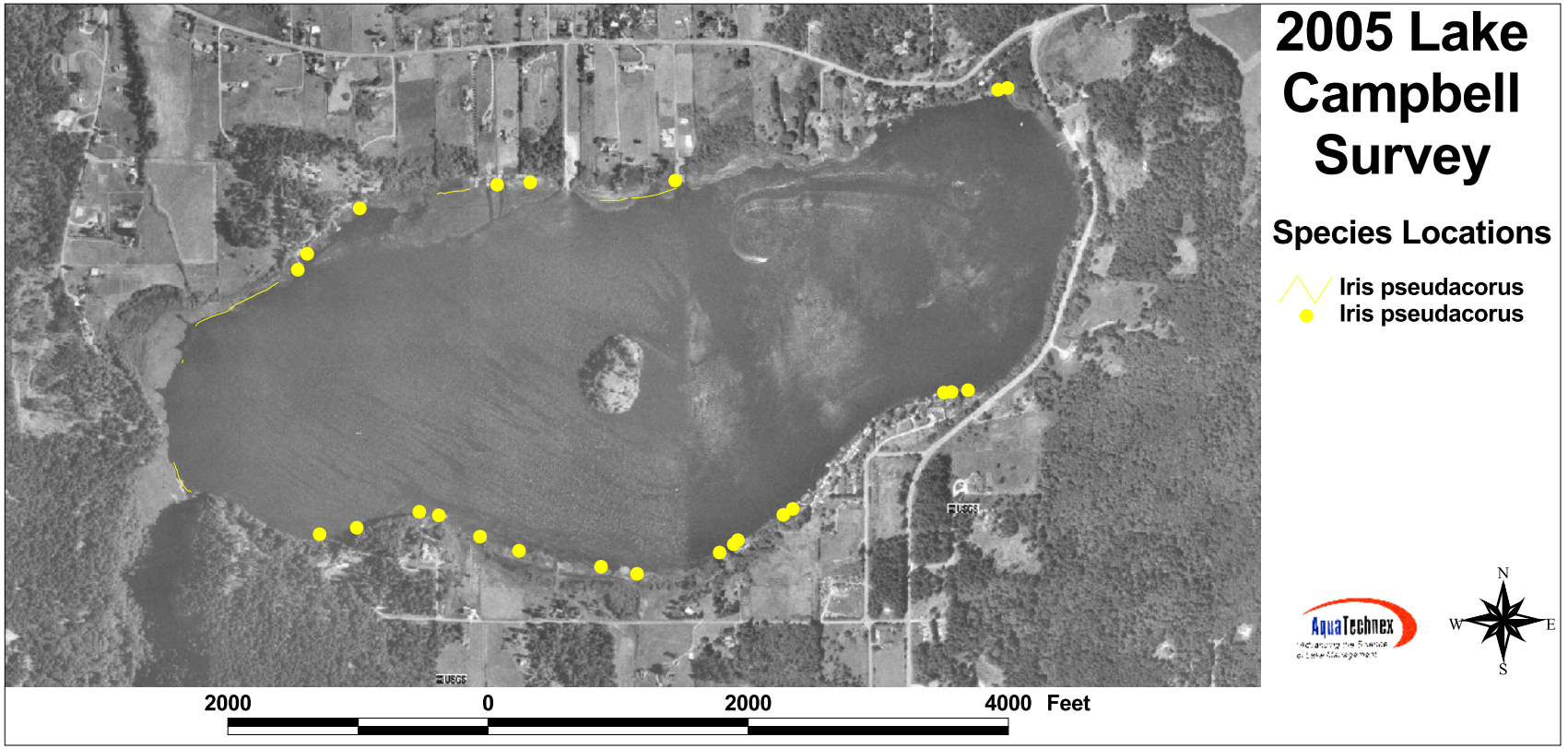
800 0 800 1600 2400 Feet

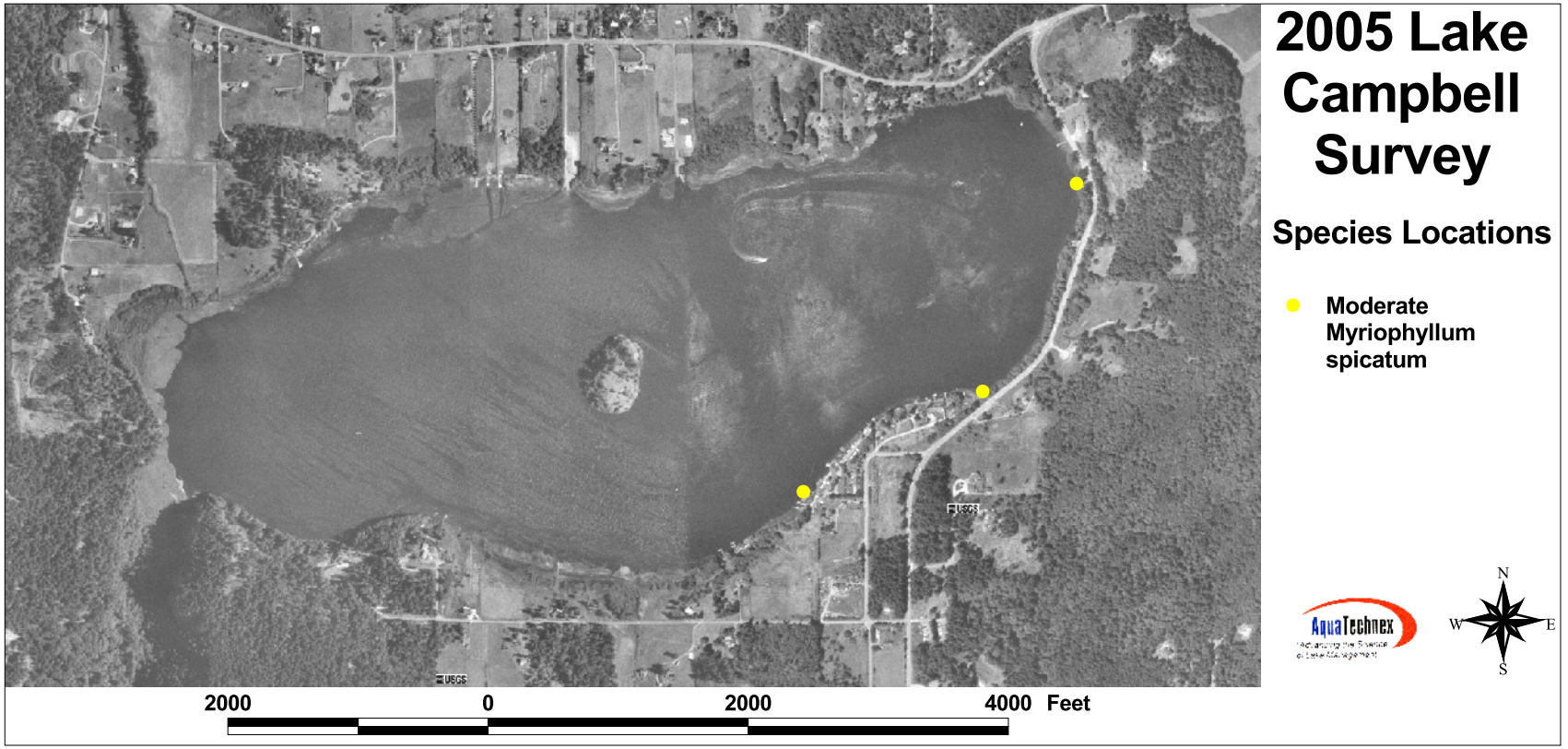

2005 Lake Campbell Survey
Species Locations
Ceratophyllum demersum
AquaTechnex
N
W
E
S
2000
0
2000
4000 Feet

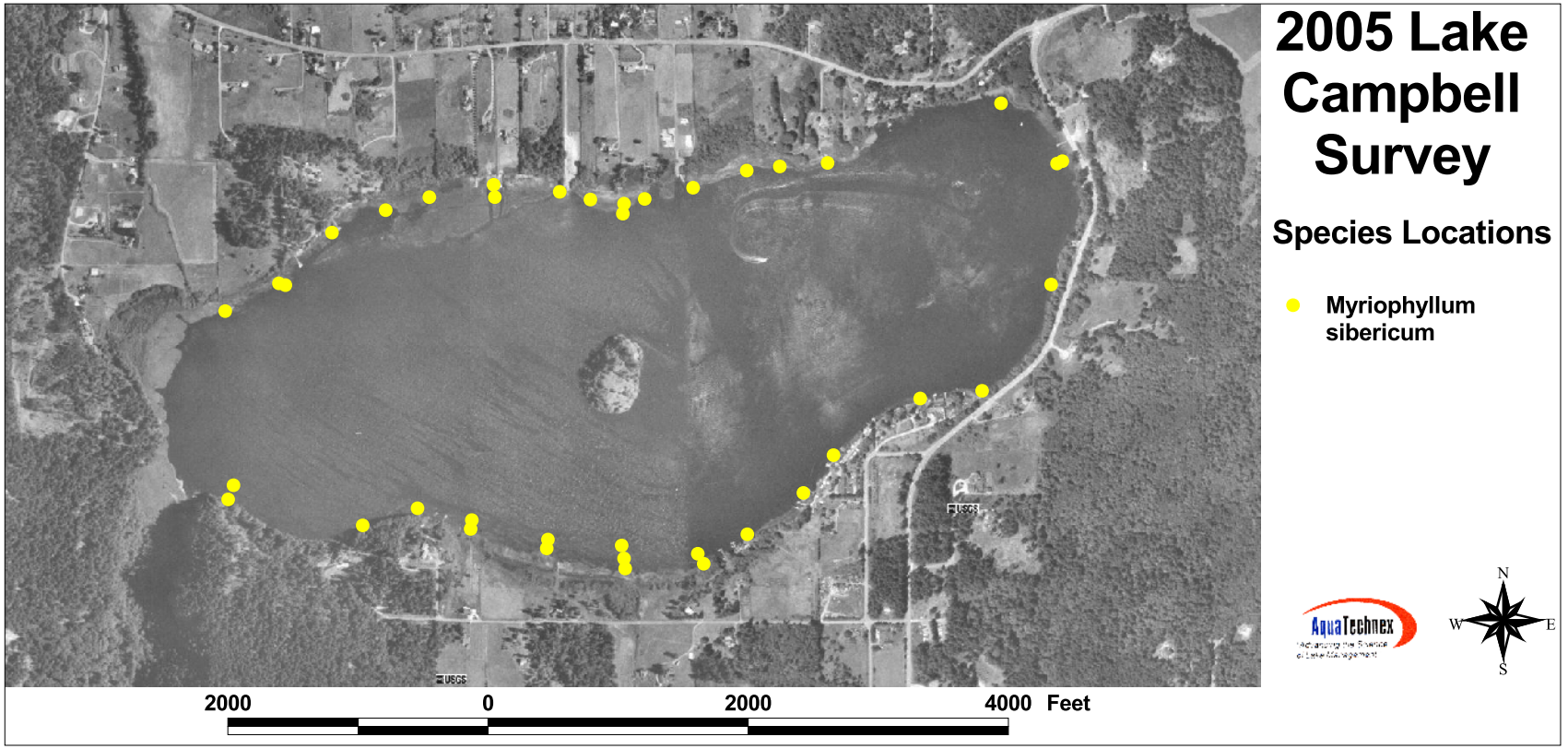

2005 Lake Campbell Survey
Species Locations
Chara spp.
AquaTechnex
N
W
E
S
2000
0
2000
4000 Feet

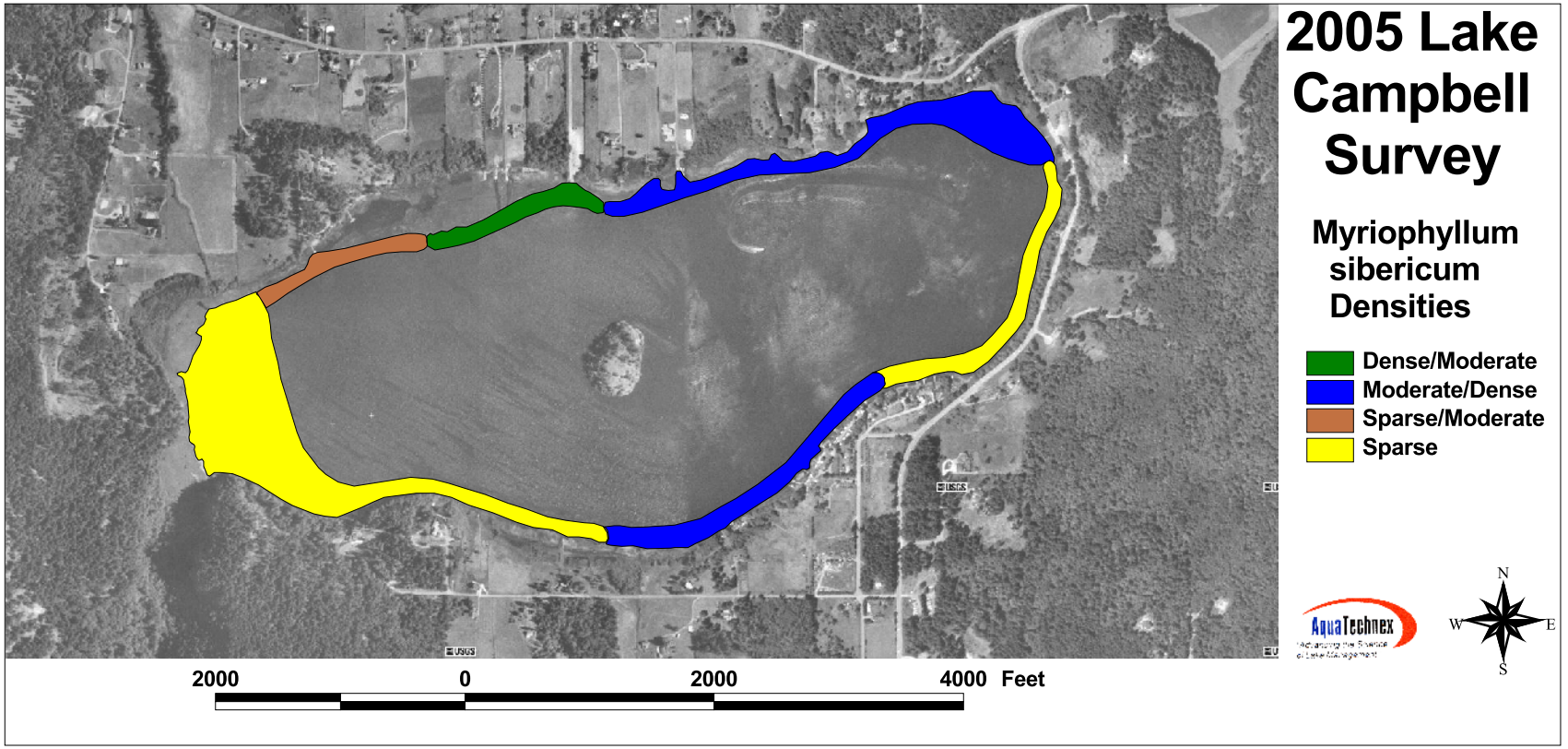

2005 Lake Campbell Survey
Species Locations
Filamentous Algae
AquaTechnex
N
W
E
S
2000
0
2000
4000 Feet

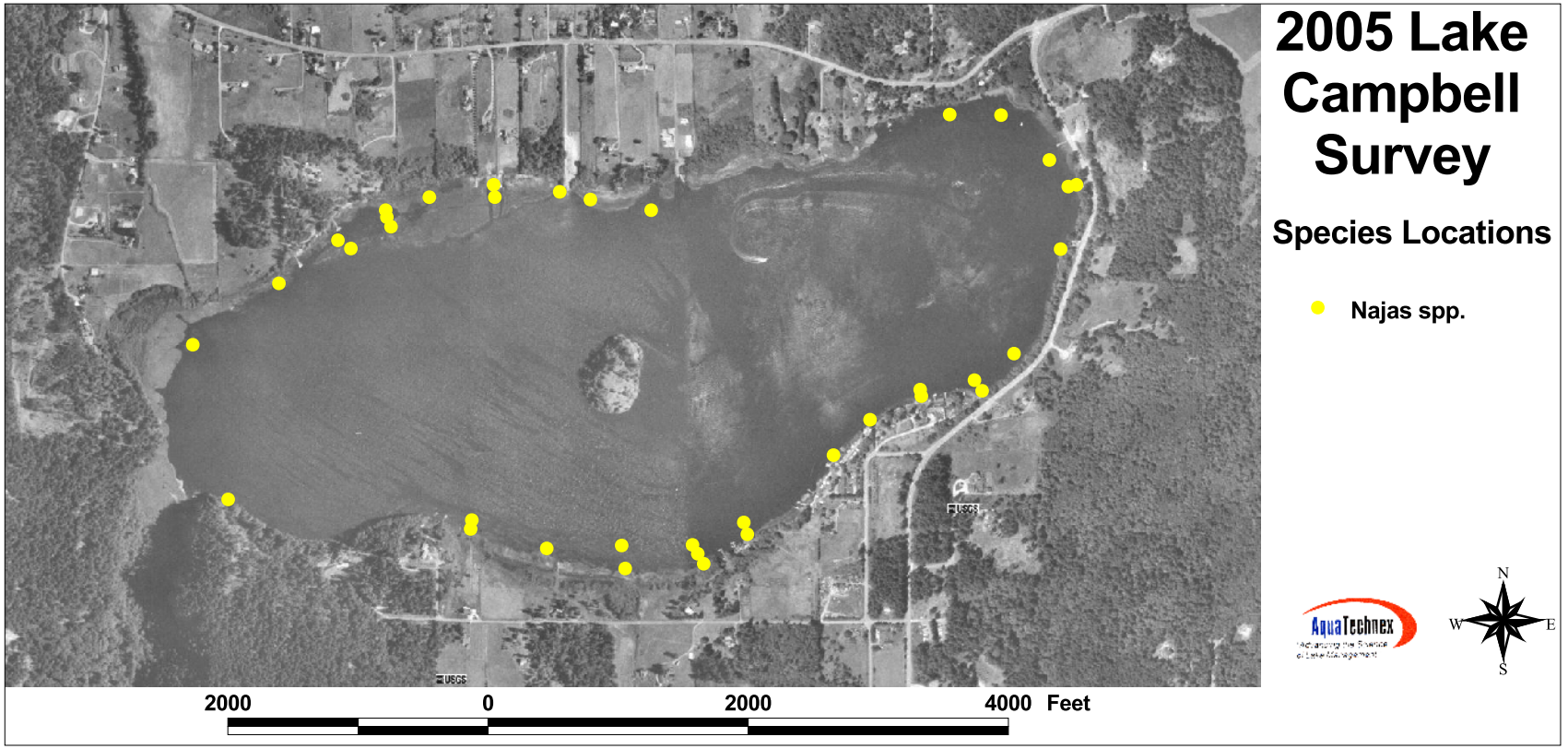

2005 Lake Campbell Survey
Species Locations
Elodea canadensis
AquaTechnex
N
W
E
S
2000
0
2000
4000 Feet

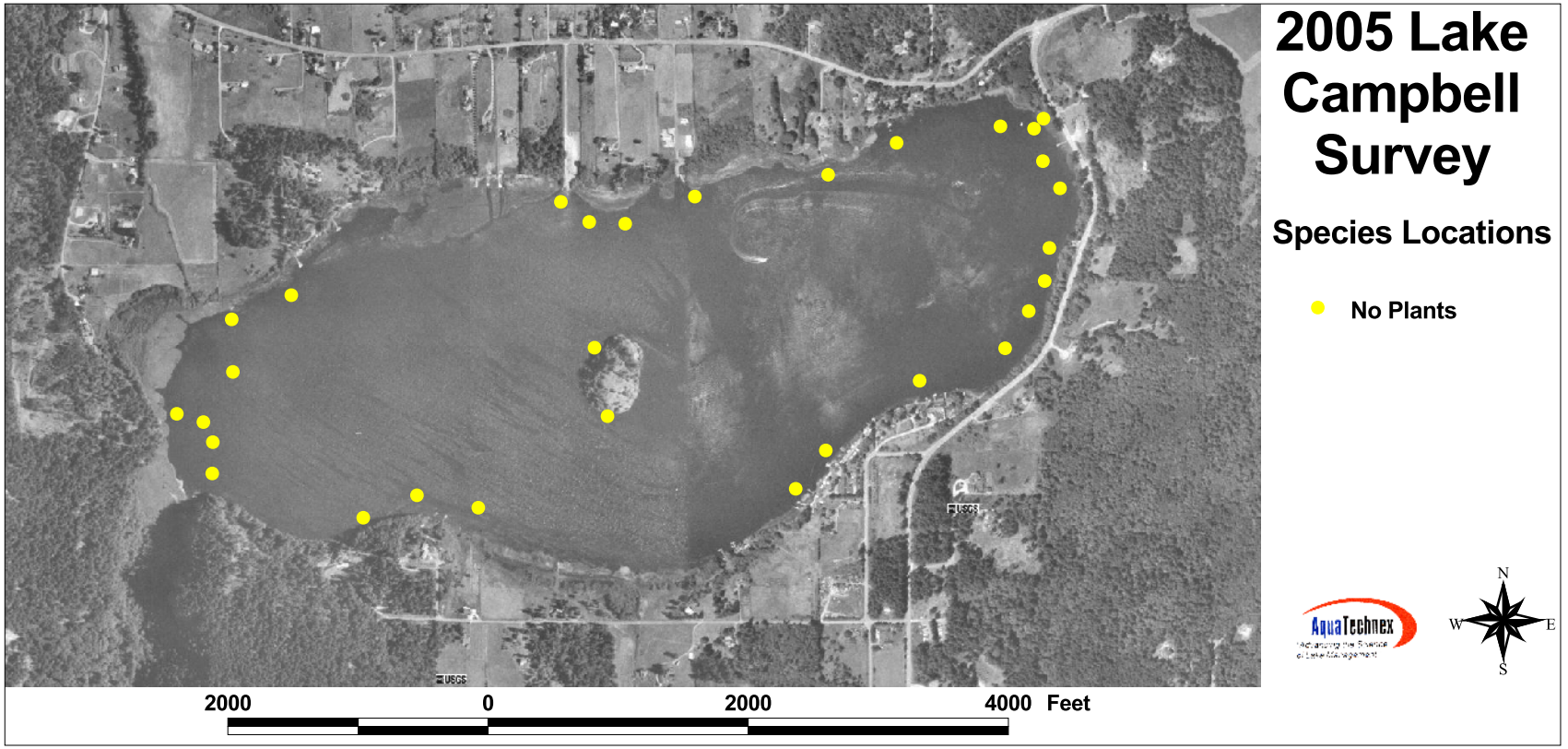

2005 Lake Campbell Survey
Species Locations
Iris pseudacorus
Iris pseudacorus
AquaTechnex
N
W
E
S
2000
0
2000
4000 Feet

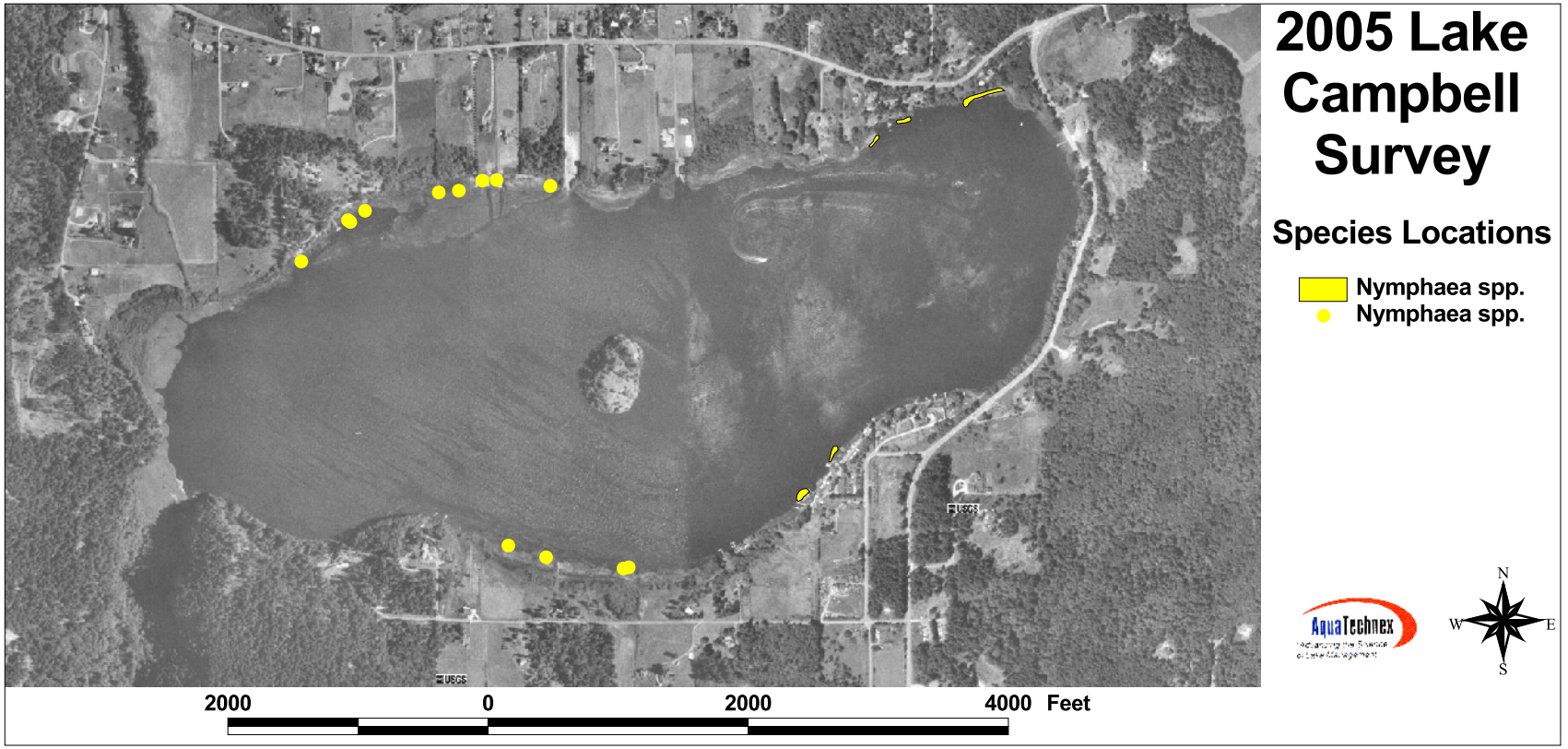

2005 Lake Campbell Survey
Species Locations
Moderate Myriophyllum spicatum
AquaTechnex
N
W
E
S
2000
0
2000
4000 Feet

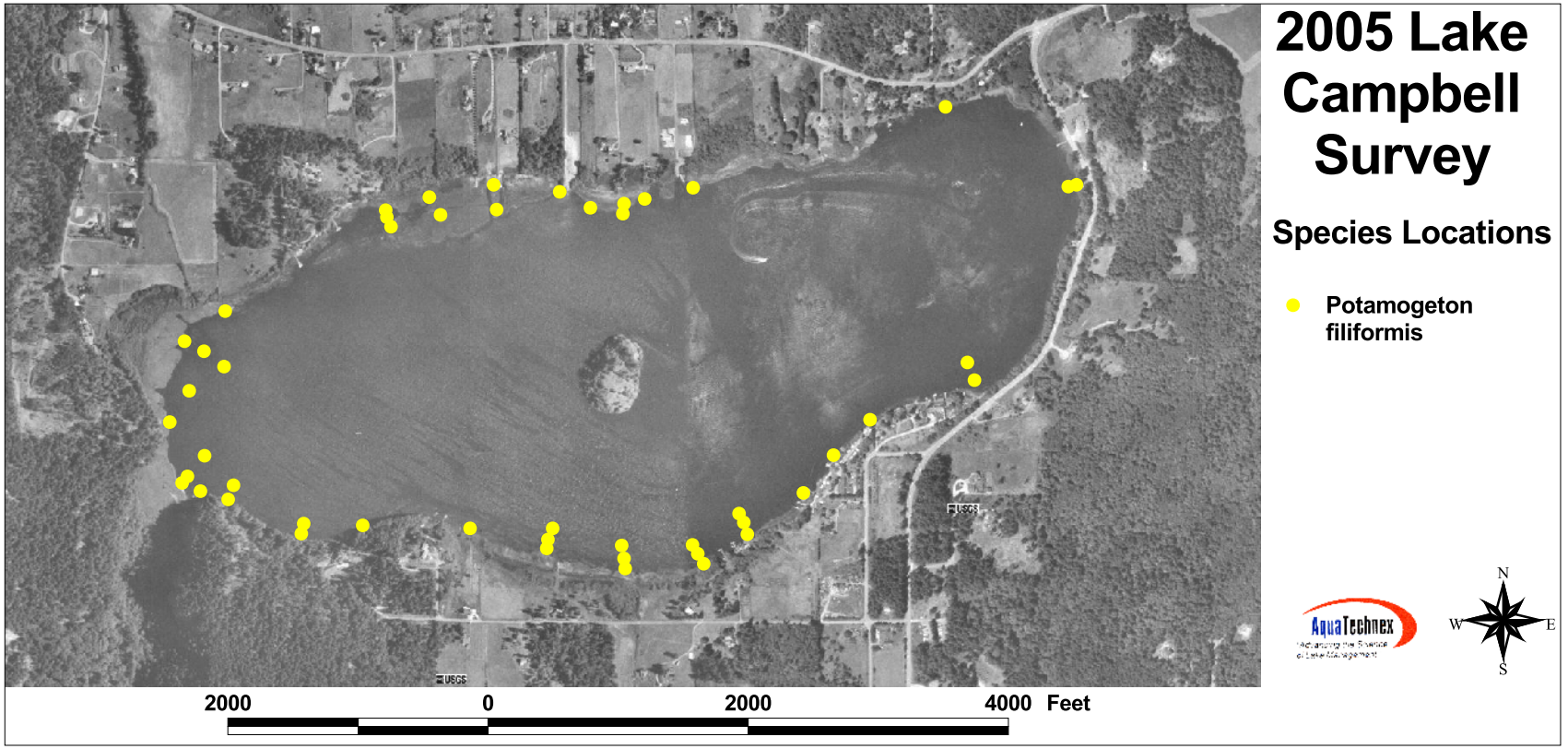

2005 Lake Campbell Survey
Species Locations
Myriophyllum sibericum
AquaTechnex
N
W
E
S
2000
0
2000
4000 Feet

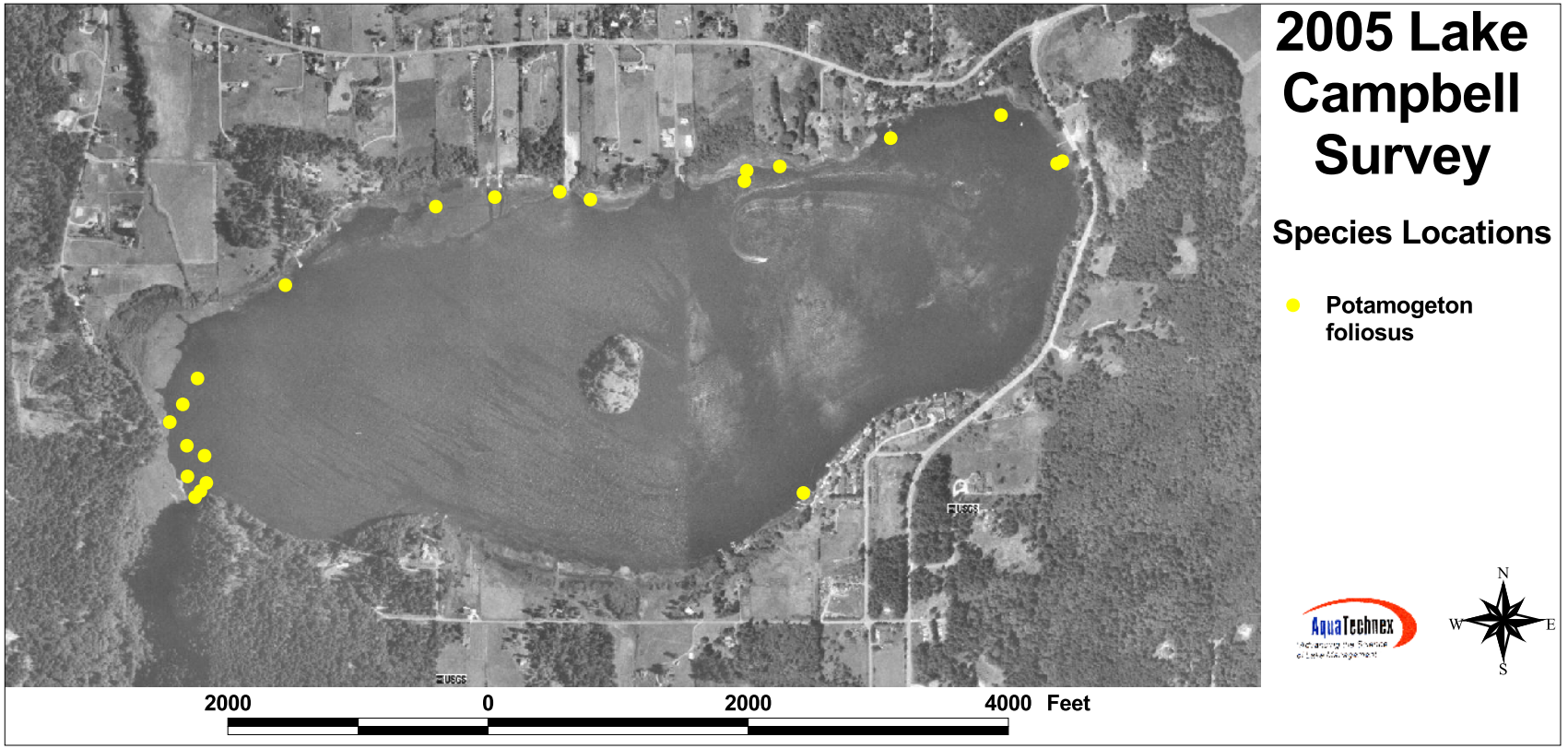

2005 Lake Campbell Survey
Myriophyllum sibericum Densities
Dense/Moderate
Moderate/Dense
Sparse/Moderate
Sparse
AquaTechnex
N
W
E
S
2000
0
2000
4000 Feet

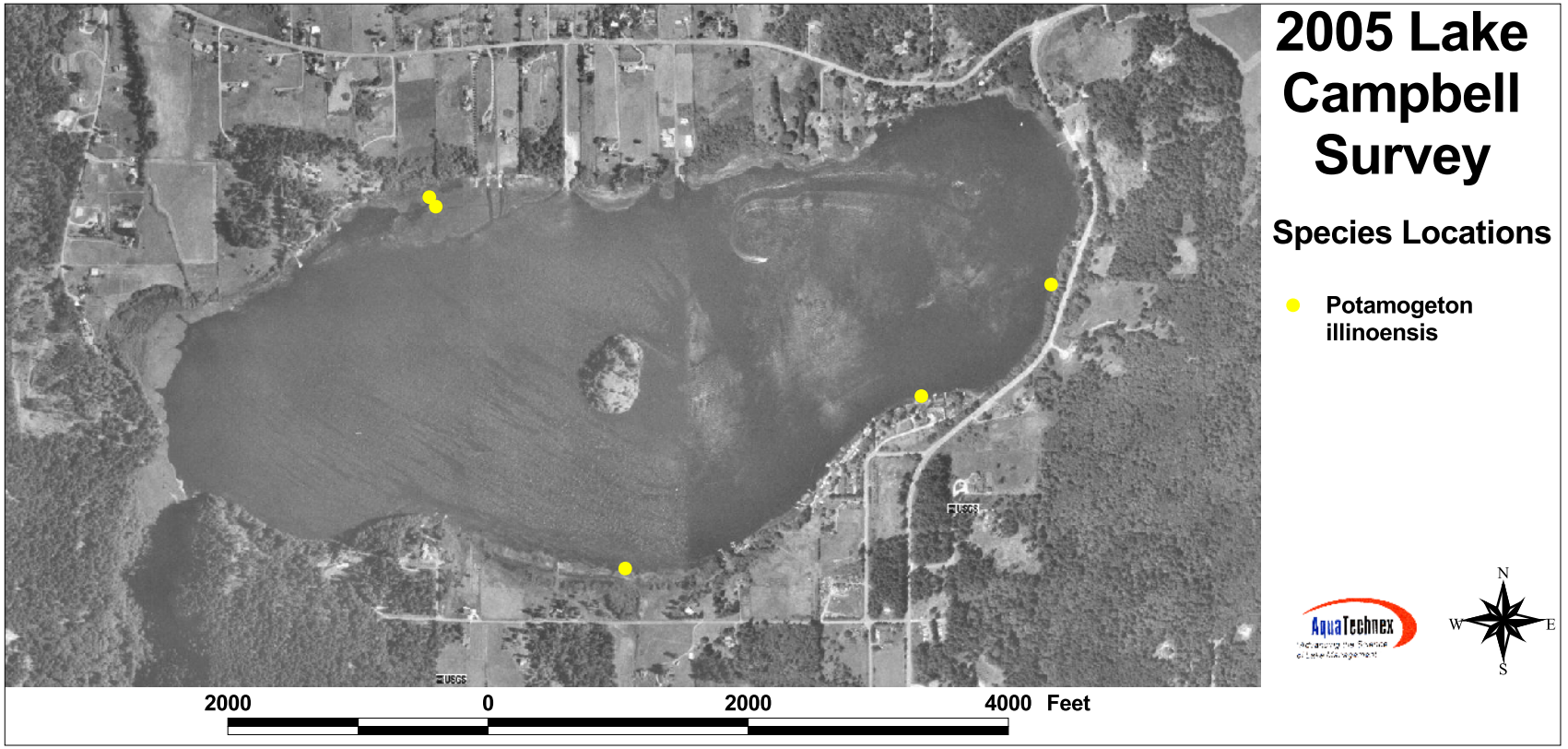

2005 Lake Campbell Survey
Species Locations
Najas spp.
AquaTechnex
N
W
E
S
2000
0
2000
4000 Feet

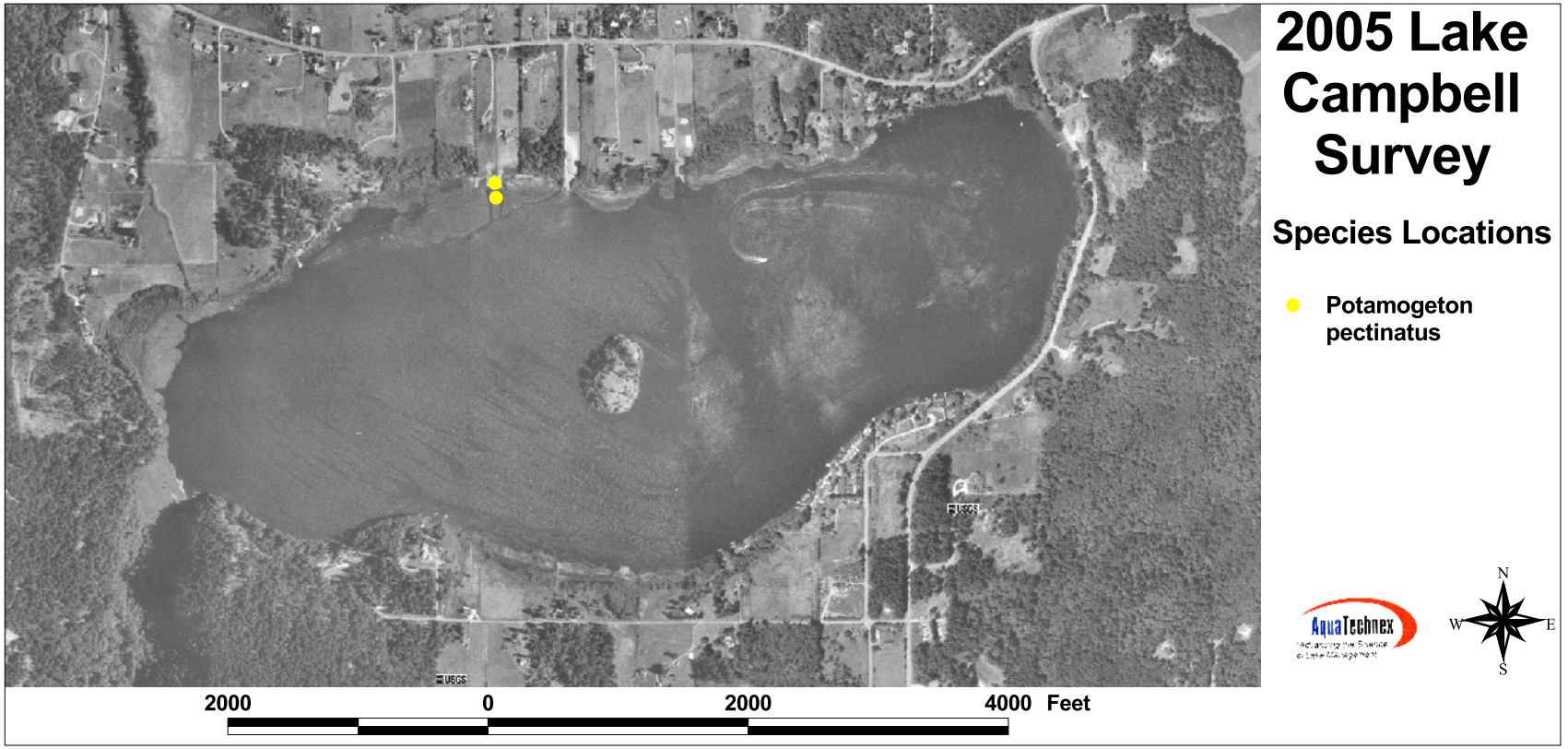

2005 Lake Campbell Survey
Species Locations
No Plants
AquaTechnex
N
W
E
S
2000
0
2000
4000 Feet

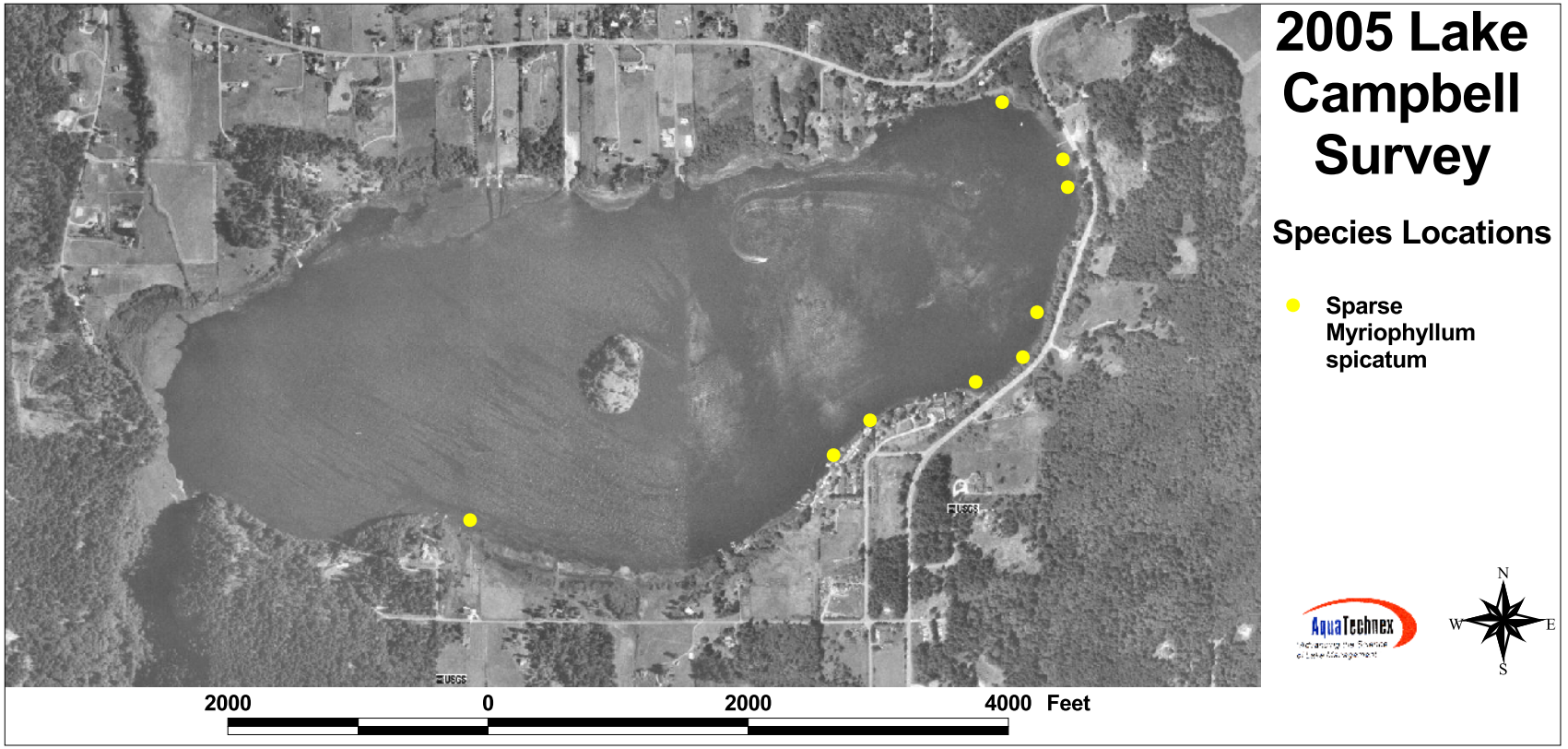

2005 Lake Campbell Survey
Species Locations
Nymphaea spp.
Nymphaea spp.
AquaTechnex
N
W
E
S
2000
0
2000
4000 Feet

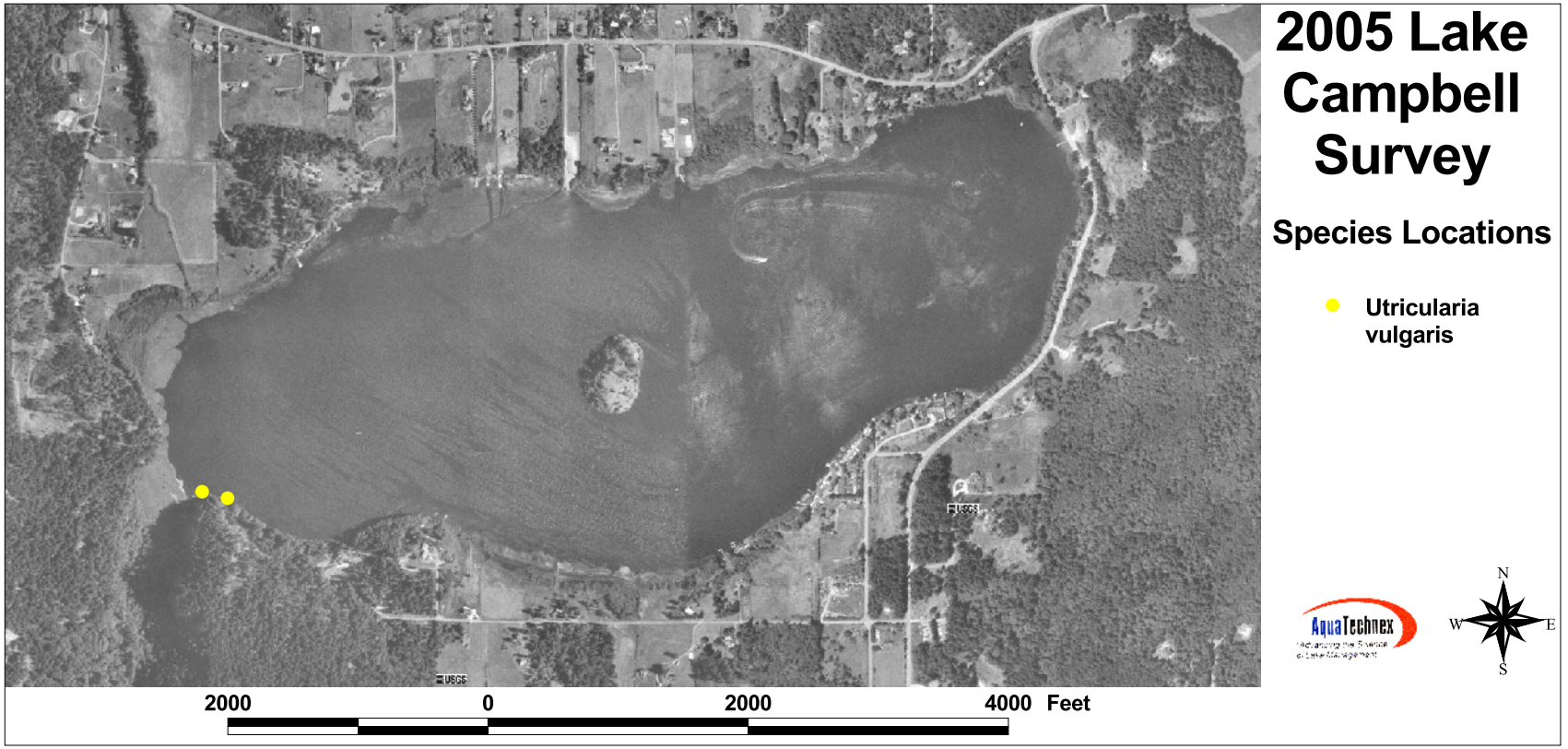

2005 Lake Campbell Survey
Species Locations
Potamogeton filiformis
AquaTechnex
N
W
E
S
2000
0
2000
4000 Feet


2005 Lake Campbell Survey
Species Locations
Potamogeton foliosus
AquaTechnex
N
W
E
S
2000
0
2000
4000 Feet


2005 Lake Campbell Survey
Species Locations
Potamogeton illinoensis
AquaTechnex
N
W
E
S
2000
0
2000
4000 Feet


2005 Lake Campbell Survey
Species Locations
Potamogeton pectinatus
AquaTechnex
N
W
E
S
2000
0
2000
4000 Feet


2005 Lake Campbell Survey
Species Locations
Sparse Myriophyllum spicatum
AquaTechnex
N
W
E
S
2000
0
2000
4000 Feet


2005 Lake Campbell Survey
Species Locations
Utricularia vulgaris
AquaTechnex
N
W
E
S
2000
0
2000
4000 Feet