# Lake Oscaleta + Lake Rippowam

*2020 Aquatic Macrophyte Surveys at Three Lakes*

SOLITUDE LAKE MANAGEMENT

310 Washington Ave Suite C

Washington NJ 07882

Phone: 908-850-0303

Fax: 908-850-4994

www.solitudelakemanagement.com

# Contents

# 2020 Aquatic Macrophyte Surveys at Lake Oscaleta & Rippowam

*The Three Lakes Council*

Lewisboro, New York

## Introduction

In 2008, the discovery of Brazilian elodea (*Egeria densa*) in Lake Waccabuc, rose concerns of potential infestations present in the other two waterbodies in the interconnected lake system (Lakes Oscaleta and Rippowam). Aquatic macrophyte surveys were performed at each lake in 2020. Aquatic macrophyte surveys have been performed at Lakes Oscaleta and Rippowam in 2008, 2016, 2018, and 2020. This report will include the following: aquatic macrophyte abundance, distribution, as well as a discussion. Maps from the aquatic macrophyte survey are included in the appendix of this report.

Solitude Lake Management was pleased to conduct a detailed aquatic macrophyte survey at Lake Oscaleta and Lake Rippowam on July 28, 2020. The surveys were conducted utilizing the Point Intercept Method (PIM) with two biologists on site. These surveys were conducted to determine the aquatic macrophyte community at Lakes Oscaleta and Rippowam to identify changes to the community structures based on the previous data collected in 2008, 2016, and 2018.

## Methodology

The Point Intercept Method (PIM) of sampling macrophytes is designed to determine the extent of submersed aquatic plant growth within an area of concern. The total number of sample locations is typically based on the total acreage of a waterbody, where one sample location per acre is surveyed at a given site. At Lake Oscaleta 88 sites were sampled on July 28, 2020. At Lake Rippowam 60 sites were sampled on July 28, 2020. At each point, the real-time GPS coordinates of the sample location were recorded using a Trimble Geo 7X, a handheld GNSS system. Due to aquatic system characteristics, visual documentation was also used to augment this survey.

The Point Intercept Methodology, developed by the US Army Corps of Engineers and modified by Cornell University was used for this survey (Lord and Johnson 2006). However, the referred methodology only requires one rake toss. At Lakes Oscaleta and Rippowam **two rake tosses** were conducted at each site, as historically performed before. The tosses were conducted from opposite sides of the boat and were labeled and recorded as A and B. The following data was collected for each rake toss: overall abundance of floating and submersed macrophyte growth, relative abundance of each species, and any other pertinent field notes regarding the sample location. The abundance scale defined by this methodology was used to categorize the observed macrophyte growth for each rake toss:

| Table 1: PIM Abundance Descriptions | |
|---|---|
| **Abundance** | **Description** |
| Z: Zero | no plants on rake |
| T: Trace | Fingerful on rake |
| S: Sparse | Handful on rake |
| M: Medium | Rakeful of plants |
| D: Dense | Difficult to bring into boat |

The overall and relative abundance values from the two rake tosses were translated into a numeric value before further data analysis: 0 for no plants, 1 for trace, 2 for sparse, 3 for medium, and 4 for dense plants. For example, if toss A was Dense (4) and toss B was Sparse (2) for the same macrophyte, the mean abundance would be Medium (4+2=6/2=3). Raw abundance data with mean calculations can be found in the Appendix.

Any macrophyte specimen requiring further identification was collected and placed in a Ziploc-type bag with a reference to the sampled location. Regionally appropriate taxonomic keys were used for identification.

# Lake Oscaleta

## Macrophyte Abundance and Discussion

Table 2 provides the presence of all species from each survey year and the percent change from 2018 to 2020 per species. Graphs displaying the abundance and distribution from year to year for each macrophyte are located in Appendix.

Two invasive macrophytes were present during the 2020 survey: brittle naiad and Eurasian watermilfoil. Throughout the four-year data set a range from one to three invasive macrophytes have been found.

Comparing from 2018 to 2020, floating filamentous algae in Lake Oscaleta increased the most with a percent change of +20.0%. Only three other aquatic macrophytes exhibited a positive percent change in abundance: Robbin's pondweed (+17.4%), watershield (+13.6%), and Eurasian watermilfoil (+1.5%). Spiral-fruited pondweed was observed for the first time during this year's survey. Aquatic macrophytes that displayed a negative percent change were: arrowhead, bassweed, benthic filamentous algae, brittle naiad, common waterweed, coontail, creeping bladderwort, curly-leaf pondweed, floating bur-reed, pondweed species, ribbon-leaf pondweed and white-water lily. Aquatic macrophytes that showed no percent change include leafy pondweed, small duckweed, southern naiad, spatterdock, stonewort, water bulrush, water-thread pondweed, and wild celery.

Located in Table 2 is a summary of the species collected/observed during each survey since 2008. The results of each species are discussed below. Red entries indicate invasive species and Green entries indicate algae species.

| Common Name | Scientific Name | 2008 | 2016 | 2018 | 2020 | % Change 2018 – 2020 |
|---|---|---|---|---|---|---|
| Arrowhead (rosette) | *Sagittaria sp.* | X | X | X | X | -80.0% |
| Bassweed | *Potamogeton amplifolius* | X | X | X | X | -20.7% |
| Benthic Filamentous Algae | | X | X | X | X | -43.7% |
| Brittle Naiad | *Najas minor* | | X | X | X | -40.0% |
| Common Waterweed | *Elodea canadensis* | X | X | X | X | -33.3% |
| Coontail | *Ceratophyllum demersum* | X | X | X | X | -40.0% |
| Creeping Bladderwort | *Utricularia gibba* | X | X | X | X | -38.9% |
| Curly-leaf Pondweed | *Potamogeton crispus* | | | X | | -100.0% |
| Eurasian Water Milfoil | *Myriophyllum spicatum* | X | X | X | X | +1.5% |
| Floating Bur-reed | *Sparganium fluctuans* | | X | X | | -100.0% |
| Floating Filamentous Algae | | | X | X | X | +20.0% |
| Leafy Pondweed | *Potamogeton foliosus* | X | X | X | X | 0.0% |
| Pondweed Species | *Potamogeton sp.* | | | X | | -100.0% |
| Ribbon-leaf Pondweed | *Potamogeton epihydrus* | X | X | X | | -100.0% |
| Robbin's Pondweed | *Potamogeton robbinsii* | X | X | X | X | +17.4% |
| Small Duckweed | *Lemna minor* | | X | X | X | 0.0% |
| Southern Naiad | *Najas guadalupensis* | | X | | | 0.0% |
| Spatterdock | *Nuphar variegata* | X | X | X | X | 0.0% |
| Spiral Fruited Pondweed | *Potamogeton spirillus* | | | | X | +100.0% |
| Stonewort | *Nitella sp.* | X | | | | 0.0% |
| Water Bulrush | *Schoenoplectus subterminalis* | | | X | X | 0.0% |
| Watershield | *Brasenia schreberi* | X | X | X | X | +13.6% |
| Water-thread Pondweed | *Potamogeton diversifolius* | | X | | | 0.0% |
| White Water Lily | *Nymphaea odorata* | X | X | X | X | -1.3% |
| Wild Celery | *Vallisneria americana* | | X | X | | 0.0% |

**Table 2**. shows the macrophytes found in Lake Oscaleta. Each year details the species that were or were not found compared to the previous survey years. The percent change represents whether or not a shift in plant abundance occurred from the previous year (2018) to the current year (2020). Change is represented in a positive (+) or negative (-) shift. No change is indicated by a 0.0%

At Lake Oscaleta, 88 sites were assessed to determine the abundance and distribution of submersed and floating vegetation on July 28, 2020. Submersed vegetation was collected at 68 sites or at 77% abundance in the basin. Overall, 17 different aquatic plants (including benthic and filamentous algae) were observed. Two invasive aquatic macrophyte species were found in Lake Oscaleta. Dense abundance of submersed macrophytes were recorded at 13 (or 19%) sites. Medium abundances were also observed at 13 sites (or 19%), while sparse amounts were present at 14 sites (or 21%). Trace abundances of submersed macrophytes were observed at 28 sites (or 41%).

Dense amounts of Eurasian watermilfoil, an invasive species, were observed at two sites (3%), while eight sites (14%) were observed at medium abundance. Sparse levels of abundance were present at 15 sites (25%) and trace abundances were observed at 34 sites (58%). This invasive species was observed lining the majority of the basin with a few heavier densities located towards the eastern end of the basin.

Bassweed was observed at 37 sites (42%) at Lake Oscaleta. Nine sites (24%) were considered dense, while the four sites (11%) were considered medium. Sparse abundances occurred at seven sites (19%) and trace abundances were observed at 17 sites (46%).

Coontail was present at 21 (or 24%) of the sites surveyed. One site (5%) was considered dense, while there was no coontail observed in medium densities at any site. Spares abundances were observed at one site (5%) and 19 sites (90%) recorded trace amounts.

Creeping bladderwort was documented at 19 sites (22%). Dense abundances were recorded at two sites (11%). Medium abundance supported one site (5%), while a sparse abundance was observed at one (or 5%). Trace amounts of creeping bladderwort were observed at 15 sites (79%).

Robbin's pondweed, a desirable native, occurred at 24 sites (or 27%). Dense abundances were observed at three sites (13%), while one other site (4%) was found at medium abundances. Sparse abundances were found at three sites (13%). Trace abundances were observed at 17 sites (71%).

Benthic filamentous algae were observed at eight sites (or 9%). One site (13%) supported a dense abundance. A medium abundance was found at one site (13%). Sparse abundance was observed at one site (13%) and trace abundances were recorded at five sites (63%).

Arrowhead rosettes were observed at two sites (or 2%). Both sites supported trace level abundance.

Brittle naiad, one of the invasive species found in Lake Oscaleta, was observed at three sites (3%). Medium abundance was observed at one site (33%) while two sites (67%) reported trace abundances.

Common waterweed was observed at two sites (or 2%) at trace abundances.

Leafy pondweed, a native species, was present at two sites (2%). One site was documented at sparse abundance (50%), while the other site was accounted for at trace abundance (50%).

Spiral fruited pondweed was observed at two sites (or 2%). Both sites were recorded at trace abundances.

Six floating macrophyte species were observed at Lake Oscaleta. A total of 71 sites (81%) supported floating macrophyte growth. Dense abundances of floating macrophytes were present at 33 (or 46%) sites. Medium abundances were observed at 18 sites (or 25%) and sparse abundances were observed at 12 sites (or 17%). Trace amounts of floating macrophytes were accounted for at eight sites (or 11%).

White water lily, being the dominate species in the basin, was observed at 65 sites (or 74%) near the launch and clustered along the main shorelines. Dense abundances were observed at 22 sites (34%), while medium abundances occurred at 16 sites (25%). Sparse amounts were observed 11 sites (17%) and trace abundances were recorded at 16 sites (25%).

Watershield occurred at 44 sites (or 50%). Dense levels were observed at eight sites (or 18%) and medium abundances were accounted for at eight sites (18%). Sparse amounts were observed at four sites (9%). Trace abundances were documented at 24 sites (55%).

Spatterdock was present among other lilies, occurring at 37 sites (42%). Dense abundances were observed at four sites (11%) and medium amounts were assessed at six sites (16%). Sparse abundances also were observed at nine sites (24%) and trace amounts were observed at 18 sites (49%).

Floating filamentous algae was observed at five (6%) of the sites surveyed. Sparse abundance was recorded at one site (20%) and the other four sites (80%) were observed at trace abundances.

Water bulrush was observed at two sites (2%) in the lake, both sites were recorded at trace abundances.

Small duckweed occurred at two (or 2%) of the sites surveyed, all at trace abundances.

# Lake Rippowam

**Table 3.** is a summary of the species collected/observed during each survey since 2008 at Lake Rippowam. The results of each species are discussed below. Red entries indicate invasive species and Green entries indicate algae species.

| Common Name | Scientific Name | 2008 | 2016 | 2018 | 2020 | % Change 2018-2020 |
|---|---|---|---|---|---|---|
| Arrowhead (rosette) | *Sagittaria sp.* | | X | X | | -100.0% |
| Bassweed | *Potamogeton amplifolius* | | X | X | X | 0.0% |
| Benthic Filamentous Algae | | X | X | | | 0.0% |
| Coontail | *Ceratophyllum demersum* | | X | X | | -100.0% |
| Eurasian Water Milfoil | *Myriophyllum spicatum* | X | X | X | X | -13.8% |
| Floating Filamentous Algae | | X | X | X | X | -75.0% |
| Small Duckweed | *Lemna minor* | | X | | | 0.0% |
| Spatterdock | *Nuphar variegata* | X | X | X | X | -7.6% |
| Watermoss | *Fontinalis sp.* | | X | | | 0.0% |
| White Water Lily | *Nymphaea odorata* | X | X | x | x | +28.6% |

**Table. 3** shows the macrophytes found in Lake Rippowam. Each year details the species that were or were not found compared to the previous survey years. The percent change represents whether or not a shift in plant abundance occurred from the previous year (2018) to the current year (2020). Change is represented in a positive (+) or negative (-) shift. No change is indicated by a 0.0%

Since the last survey in 2018, White Water Lily has shown the highest positive percent change (+28.6%) in Lake Rippowam. No other species showed a positive percent change throughout the survey. Aquatic macrophytes that showed negative percent changes were arrowhead (rosette), coontail, Eurasian watermilfoil, floating filamentous algae, and spatterdock. All other species showed no shift in percent change.

Biologists surveyed 60 sites at Lake Rippowam to determine the abundance and distribution of submersed and floating vegetation on July 28, 2020. Submersed vegetation was collected at 30 sites or 50% abundance in the lake. Floating vegetation was collected at 29 sites (48%). Overall, only 5 different aquatic plants (including floating filamentous algae) were observed. One invasive species, Eurasian water milfoil, was found in Lake Rippowam.

For overall aquatic macrophyte vegetation in Lake Rippowam, dense abundances were recorded at 16 sites (or 27%). Medium densities were observed at nine sites (or 15%). Sparse densities were observed at 13 sites (or 22%), and trace densities were recorded at 22 sites (or 37%).

Three floating macrophyte species were observed at Lake Rippowam. Of the 29 sites supporting floating macrophyte growth, 14 sites (48%) were present at dense abundances. Medium abundances were observed at four sites (or 14%). Sparse abundances were observed at five sites (or 17%), and trace abundances were observed at six sites (or 21%).

White water lilies were observed at 27 sites (or 45%) at Lake Rippowam. Dense abundances were recorded at 13 sites (or 48%) of the total 60 sites surveyed. Medium densities were recorded at 2 sites (or 7%). Sparse and trace abundances were both recorded at six sites each (or 22% each). Heavy concentrations of white-water lilies were located along the west shoreline. Scattered densities of the water lilies were found along the southern shoreline extending towards the eastern shoreline where the concentration of lilies increases again.

Spatterdock was observed at seven (or 12%) of the total sites surveyed. One dense abundance (or 13%) was recorded along the eastern shoreline. Medium, sparse, and trace abundances were all observed at two sites per density (or 29% per density). Densities were recorded at either western or eastern shorelines with one trace density found along the northern shoreline.

The least abundance floating aquatic macrophyte was floating filamentous algae; recorded at only one site (2%) at trace abundance found along the southern shoreline.

Two submersed macrophyte species were observed at Lake RIppowam. Of the 30 sites supporting submersed macrophyte growth, two sites (6%) were observed with dense level abundance. Five sites (16%) supported medium abundance. Sparse abundance was observed at eight sites (26%) and trace level abundance was recorded at 16 sites (52%).

Eurasian water milfoil, a submersed invasive aquatic macrophyte, was the dominate species of the plant assemblage, occurring at 30 (50%) of the 60 sites surveyed. Dense abundances were found at 3 sites (or 10%). Medium abundances were observed at 4 sites (or 13%). Sparse abundances were observed at 8 sites (or 27%), and trace abundances were observed at 15 sites (or 50%). A heavy concentration of Eurasian water milfoil was found along the western shoreline.

Scattered amounts of trace and sparse abundances extend across the southern shoreline towards the eastern shoreline where trace, dense, and moderate amounts of Eurasian water milfoil were found.

Bassweed was the only other submersed macrophyte species present in lake Rippowam. Bassweed was observed at only two sites (or 3%) out of the total 60 sites surveyed. Both sites were recorded at trace level abundance and were found along the north west shoreline.

# Summary of Findings

## Lake Oscaleta:

- Eurasian watermilfoil, an invasive species, continues to be the most dominant macrophyte overall.
- **No Brazilian elodea and water chestnut were found in 2020**
- One other non-native macrophyte was documented during the 2020 survey: brittle naiad.
- Spiral-fruited pondweed was observed for the first time.
- White water lily, a native species, continues to be the dominant floating-leaf macrophyte.
- Five plants found in 2018 were not observed in 2020: curly-leaf pondweed, floating bur-weed, pondweed species, ribbon-leaf pondweed, and wild celery.
- Since 2018, the number of invasive species found decreased from three to two, as curly-leaf pondweed was not observed in 2020.
- The total number of aquatic macrophyte species observed decreased from 21 in 2018 to 17 in 2020.

## Lake Rippowam:

- Eurasian watermilfoil, an invasive species, continues to be the dominant macrophyte.
- **No Brazilian elodea and water chestnut were found in 2020.**
- White water lily, a native species, continues to be the dominant floating-leaf macrophyte.
- White water lily was the only aquatic macrophyte to increase in abundance in 2020 (+28.6%).
- Compared to 2018, three observed macrophyte species decreased in abundance: Eurasian watermilfoil (-13.8%), floating filamentous algae (-75%), and spatterdock (-7.6%).
- 2008 and 2020 both have the least macrophyte species diversity with five species.
- Throughout the dataset, Eurasian watermilfoil was the only invasive species consistently found each survey year.
- Arrowhead and coontail, present in both 2016 and 2018, were not observed in 2020.

# Recommendations:

We highly recommend a repetition of the SAV mapping in 2021. Monitoring is important for examining and understanding the abundance and distribution of non-native and native macrophytes throughout the aquatic systems.

The point-intercept methodology continues to work well in monitoring and quantifying the growth of aquatic macrophytes in Lake Oscaleta and Rippowam. If Brazilian elodea or water chestnut should re-infest Lake Waccabuc, this will pose a threat to the other two systems for infestation and create a need for more intensive effort for surveys. The point-intercept survey will direct the point-intercept survey is ideal to direct short- or long-term management efforts in a cost-effective manner. We should increase the frequency of surveying yearly if this situation occurs. Since Lake Waccabuc was not surveyed in the 2020 season, we recommend that it be surveyed in the next season, 2021.

However, it's possible that other infestations (like hydrilla, as it becomes more established in the region) could appear or may not be within the boundaries of the survey. Non-native growth can be overlooked, especially when an infestation is small or intermittent. While not a priority, the growth of Eurasian watermilfoil is concerning as it continues to dominate in all three systems. The Eurasian water milfoil population of both lake systems appears to be stable and local management via hand-pulling is likely enough to reduce impacts to recreational activity.

As always, Solitude Lake Management would like to take this opportunity to thank you for allowing us to be of service to the 3LC. We look forward to working with you in the 2021 season.

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# Appendix: Lake Oscaleta

Aquatic macrophyte Library (includes all macrophyte species from each lake)

2008 – 2020 Percent Abundance Graphs

2020 Survey Maps

Plant Density Guide

2020 Macrophyte Abundance Distribution Table

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# Arrowhead – submersed rosette (*Sagittaria* sp.)

**Arrowhead** Native (Submersed Rosette): This is the submersed rosette of a species of arrowhead. The submersed rosette lacks both flowers and seeds, so further identification is not possible. Arrowhead has emergent leaves, and usually inhabits shallow waters at pond or lake edges, or along sluggish streams. It can tolerate a wide variety of sediment types and pH ranges. Arrowhead is very suitable for constructed wetland development due to its tolerance of habitats, and ability to act as a nutrient sink for phosphorous. Typical arrowhead reproduction is via rhizomes and tubers although seed production is possible if conditions are ideal. Arrowhead has high wildlife value, providing high-energy food sources for waterfowl, muskrats and beavers. Arrowhead beds provide suitable shelter and forage opportunities for juvenile fish as well.

# Bassweed (*Potamogeton amplifolius*)

## Large-leaf pondweed, Musky weed

**Bass Weed** Native: Bass weed has robust stems that originate from black-scaled rhizomes. The submersed leaves of bass weed are among the broadest in the region. The submersed leaves are arched and slightly folded, attached to stems via stalks, and possess many (25-37 veins). Floating leaves are produced on long stalks (8-30 cm). Stipules are large, free and taper to a sharp point. Flowers, and later in the season fruit are densely packed onto a spike. Bass weed prefers soft sediments in water one to 4 meters deep. This plant is sensitive to increased turbidity and also has difficulty recovering from top-cutting, from such devices as boat propellers and aquatic plant harvesters. As its name implies the broad leaves of this submersed plant provides abundant shade, shelter and foraging opportunities for fish. The high number of nutlets produced per plant make it an excellent waterfowl food source.

# Brazilian Elodea (*Egeria densa*)

## Egeria, Anacharis, Brazilian waterweed

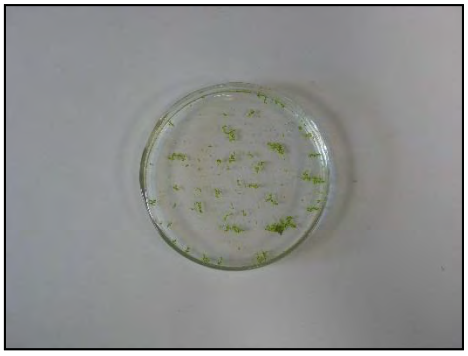
**Brazilian Elodea** Invasive: Brazilian elodea is an aggressive exotic invasive submersed plant that originated from South America. It was introduced via the aquarium hobby trade, and is a top selling plant used as an oxygenator. The stems can be several meters long, and the strap-like leaves are situated in whorls of three to six, but usually four. The leaves are finely serrated, and are tightly packed together near the end of the stem. Brazilian elodea can be rooted or free floating, and due to its highly branching nature, can quickly reach nuisance densities and crowd out or block light penetration for desirable native submersed plants. Although it can be confused with *Hydrilla*, another invasive submersed plant, its lack of tuber production and leaf structure differentiates it. Although it can produce white flowers, it reproduces vegetatively in the United States. Waterfowl consume Brazilian elodea, and fish and invertebrates use the stems for refuge and habitat.

# Brittle Naiad (*Najas minor*)

## Brittle water nymph, European naiad

**Brittle Naiad** Invasive: Brittle naiad is a submersed annual that flowers in August to October. It resembles other naiads, except its leaves are highly toothed with 6-15 spinules on each side of the leaf, visible without the aid of magnification. The leaves are opposite, simple, thread-like, and usually lime-green in color, often with a "brittle" feel to them. Brittle naiad fruit are narrow, slightly curved, and marked with 10-18 longitudinal ribs, resembling a ladder. Brittle Naiad has been introduced from Europe in the early 1900's, and can be found in most of the northeastern states. Brittle naiad prefers sandy and gravel substrates, but can tolerate a wide range of bottom types. It's tolerant of turbid and eutrophic conditions. Waterfowl graze on the fruit.

## Common Watermeal (*Wolffia columbiana*)



**Common Watermeal** Native: Common watermeal appears as pale green globes of vegetative matter without roots, stems or true leaves. Its one of the world's smallest flowering plants, but flowers are rarely found and require magnification to see. Watermeal usually reproduces by budding. Watermeal is typically found on the surface, intermingled with duckweeds. Its drifts with the water's current or wind, and therefore it grows independent of water depth, clarity or sediment type. In the fall it produces winter buds that sink to the bottom. In the spring, the buds become buoyant and float to the surface. Waterfowl, fish, and muskrats all include watermeal in their diets.

## Common Waterweed (*Elodea canadensis*)

### Elodea

**Common Waterweed** Native: Common waterweed has slender stems that can reach a meter in length, and a shallow root system. The stem is adorned with lance-like leaves that are attached directly to the stalk that tend to congregate near the stem tip. The leaves are populated by a variety of aquatic invertebrates. Male and female flowers occur on separate plants, but it can also reproduce via stem fragmentation. Since common waterweed is disease resistant, and tolerant to low-light conditions, it can reach nuisance levels, creating dense mats that can obstruct fish movement, and the operation of boat motors.

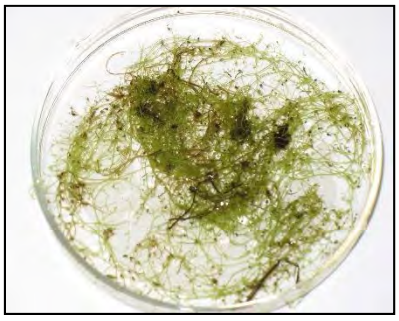
# Coontail (*Ceratophyllum demersum*)

## Hornwort

**Coontail** Native: Coontail has long trailing stems that lack true roots, although it can become loosely anchored to sediment by modified leaves. The leaves are stiff, and arranged in whorls of 5-12 at each node. Each leaf is forked once or twice, and has teeth along the margins. The whorls of leaves are spaced closer at the end of the stem, creating a raccoon tail appearance. Coontail is tolerant of low light conditions, and since it is not rooted, it can drift into different depth zones. Coontail can also tolerate cool water and can over winter as a green plant under the ice. Typically, it reproduces via fragmentation. Bushy stems of coontail provide valuable habitat for invertebrates and fish (especially during winter), and the leaves are grazed on by waterfowl.

# Creeping Bladderwort (*Utricularia gibba*)

## Humped bladderwort, cone-spur bladderwort



**Creeping Bladderwort** Native**:** Creeping bladderwort is a small (usually less than 10 cm long), delicate, free-floating stem. It often forms tangled mats in quiet shallow waters, often associated with bogs, or stranded on soil. It is sometimes mistaken for algae. It has short side braches that fork once or twice, a defining characteristic. Small bladders, used to capture live prey, are situated on these side branches. Small yellow snap-dragon-like flowers are produce on a short stalk. Mats of creeping bladderwort offer limited cover and foraging opportunities for fish.

## Curly-leaf Pondweed (*Potamogeton crispus*)

**Curly-leaf Pondweed** Invasive: Curly-leaf pondweed has spaghetti-like stems that often reach the surface by mid-June. Its submersed leaves are oblong, and attached directly to the stem in an alternate pattern. The margins of the leaves are wavy and finely serrated, hence its name. No floating leaves are produced. Curly-leaf pondweed can tolerate turbid water conditions better than most other macrophytes. In late summer, Curly-leaf pondweed enters its summer dormancy stage. It naturally dies off (often creating a sudden loss of habitat and releasing nutrients into the water to fuel algae growth) and produces vegetative buds called turions. These turions germinate when the water gets cooler in the autumn and give way to a winter growth form that allows it to thrive under ice and snow cover, providing habitat for fish and invertebrates.

## Dwarf Water Milfoil (*Myriophyllum tenellum*)

**Dwarf Water Milfoil** Native: Dwarf milfoil, which does not look anything like other milfoil species, has slender unbranched stems ranging from 2 cm to 15 cm in height. The leaves are reduced to scales or “bumps”. If the tips rise out of the water, they are capable of producing pale flowers and nut-like fruits. The toothpick-like stems arise from rhizomes in a chain. Dwarf milfoil is often small and overlooked, preferring sandy bottoms in waters up to four meters deep. Dwarf water milfoil provides suitable spawning habitat for panfish and adequate shelter for small invertebrates. The rhizome networks also help stabilize bottom sediments.

# Eurasian Watermilfoil (*Myriophyllum spicatum*)

## Asian Water Milfoil

**Eurasian Watermilfoil** Invasive: Eurasian water milfoil has long (2 meters or more) spaghetti-like stems that grow from submerged rhizomes. The stems often branch repeatedly at the water's surface creating a canopy that can crowd out other vegetation, and obstruct recreation and navigation. The leaves are arranged in whorls of 4 to 5, and spread out along the stem. The leaves are divided like a feather, resembling the bones on a fish spine. Eurasian watermilfoil is an exotic originating in Europe and Asia, but its range now includes most of the United States. It's ability to grow in cool water and at low light conditions gives it an early season advantage over other native submersed plants. In addition to reproducing via fruit production, it can also reproduce via fragmentation. Waterfowl graze on Eurasian watermilfoil, and its vegetation provides habitat for invertebrates. However, studies have determined mixed beds of pondweeds and wild celery can support more diverse invertebrate populations.

# Filamentous Algae

## Floating Filamentous Algae, Benthic Filamentous Algae

**Filamentous Algae**: Filamentous algae is a chain or series of similar algae cells arranged in an end to end manner. Benthic filamentous algae is attached to a hard substrate, such as logs, rocks, a lake bottom, or even other aquatic plants. When growing in heavy densities, benthic filamentous algae can appear as brown or green mats of vegetation that can reach the surface. When large pieces break off the bottom substrate they become floating filamentous algae patches. Benthic filamentous algae can comprise an entire range of morphologies, but flagellated taxa are far less common.

## Flat-stem Pondweed (*Potamogeton zosteriformis*)

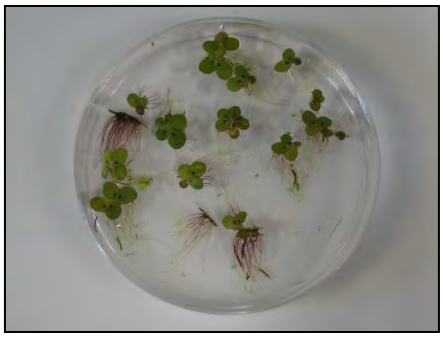
**Flat-stem Pondweed** Native: Flat-stem pondweed is freely branched, emerging from a delicate rhizome system. The stems are strongly flattened with an angled appearance. The long leaves are stiff and linear with a prominent midvein, and numerous fine parallel veins. This prominent midvein distinguishes this pondweed from water stargrass. The stipules are firm and free situated in the leaf axils. Flat-stem pondweed lacks floating leaves. Flat-stem pondweed inhabits a variety of water depths from shallow water to water several meters deep. It prefers soft sediment types. Although it produces nut-like fruits, it over winters primarily by rhizomes and winter buds. It can be a locally important food source to fauna, such as waterfowl, muskrat, deer, beaver, and moose. It also provides suitable habitat and food for fish and aquatic invertebrates.

## Floating Bur-reed (*Sparganium fluctuans*)

**Floating Bur-reed** Native: Floating bur-reed is an aquatic perennial that grows along rhizomes in static or slow-moving water. The leaves are limp, strap-shaped, float on the water's surface, often growing in the direction of any flow. At maturity (July-September), the floating bur-reed produce an emergent flowering spike that supports few white flowers with an appearance of small, fluffy cotton balls. From the flowers, floating bur-reed produces spiky fruits (seed heads) that are primarily dispersed by water. The fruits are water-repellent and can remain floating for several months. Various species of bur-reed display the floating leaves.

# Great Duckweed (*Spirodela polyrhiza)*

## *Large Duckweed*



**Great Duckweed** Native: Great duckweed is the largest of the duckweeds, but it is still very small compared to other aquatic macrophytes. It has simple flattened fronds with irregular oval shapes, often up to 1 cm in length and 2.5 to 8.0 mm long. The frond surface is usually green with a conspicuous purple dot. The underside of the frond is magenta with a cluster of 5-12 roots that dangle into the water. Indeed, peering at great duckweed from under the water grants it the appearance a tiny jellyfish. Although great duckweed produces flowers, it usually reproduces via budding, and like other duckweeds, it is capable of rapid growth. It often occurs with other duckweeds, and since it is free floating, it can be moved via the wind or water currents. It derives its nutrients from the water column and often occurs in eutrophic systems. It's an excellent food source for waterfowl, and is also used by muskrat and fish. The dense mats offer shade and cover for fish.

# Leafy Pondweed (*Potamogeton foliosus*)

**Leafy Pondweed** Native: Leafy pondweed has freely branched stems that hold slender submersed leaves that become slightly narrower as they approach the stem. The leaf contains 3-5 veins and often tapers to a point. No floating leaves are produced. It produces early season fruits in tight clusters on short stalks in the leaf axils. These early season fruits are often the first grazed upon by waterfowl during the season. Muskrat, beaver, deer and even moose also graze on the fruit. It inhabits a wide range of habitats, but usually prefers shallow water. It has a high tolerance for eutrophic conditions, allowing it to even colonize secondary water treatment ponds.

## Quillwort (*Isoetes sp.*)

**Quillwort** Native: Quillwort is a low-growing, submersed aquatic plant with many leaves forming from a basal structure called a corm. The size of the hollow leaves is dependent on the species. Quillwort is actually a lycopod, and does not have 'true' rhizomes or seeds. Instead, quillwort has pseudo-rhizomes and megaspores. The megaspores act like seeds, and are found in the expanded bases of each leaf; the megaspores are the primary method for species identification of quillwort genus.

## Ribbon-leaf Pondweed (*Potamogeton epihydrus*)

**Ribbon-leaf Pondweed** Native: Ribbon-leaf pondweed has flattened stems and two types of leaves. The submersed leaves are alternate on the stem, lack a leaf stalk, and are long tape-like in shape. Each leaf, which can reach lengths up to 2 meters long, has a prominent stripe of pale green hollow cells flanking the midvein, and 5 to 13 other veins. Stipules are not fused to the leaf. Floating leaves are egg or ellipse-shaped, and supported by a leaf stalk about as long as the leaf itself. Fruiting stalks are located at the top of the stem and packed with flattened disk-shaped fruits. It is typically found growing in low alkalinity environments, and in a variety of substrates. Seeds are highly sought after by all manner of waterfowl.

# Robbins Pondweed (*Potamogeton robbinsii*)

## Fern Pondweed

**Robbins Pondweed** Native: Robbins pondweed has robust stems that emerge from spreading rhizomes. The leaves are strongly ranked creating a fern-like appearance most clearly seen while still submerged. Its distinct closely-spaced fern-like leaves give it a unique appearance among the pondweeds of our region. Each leaf is firm and linear, with a base that wraps around the stem. At the stem it has ear-like lobes fused with a fibrous stipule. No floating leaves are produced.
Robbins pondweed thrives in deeper water, and under some circumstances, it can over winter green. Robbins pondweed creates suitable invertebrate habitat, and cover for lie-in-wait predaceous fish, such as pickerel and pike.

# Slender Naiad (*Najas flexilis*)

## Bushy Pondweed

**Slender Naiad** Native: Slender naiad has fine-branched stems that can taper to lengths of one meter, originating from delicate rootstalks. Plant shape varies; sometimes compact and bushy, other times long and slender, depending on growing conditions. The leaves are short (1-4 cm long) and finely serrated, tapering to a point. It is found in a variety of habitats, and can colonize sandy or gravelly substrates. If conditions are ideal, it can reach nuisance densities. It is a true annual, and dies off in the fall, relying on seed dispersal to return the next year. It is an important food source for waterfowl.

# Small Duckweed (*Lemna minor*)

## Water Lentil, Lesser Duckweed


**Small Duckweed** Native: Small duckweed is a free floating plant, with round to oval-shaped leaf bodies typically referred to as fronds. The fronds are small (typically less than 0.5 cm in diameter), and it can occur in large densities that can create a dense mat on the water's surface. Each frond contains three faint nerves, a single root (a characteristic used to distinguish it from other duckweeds), and no stem. Although it can produce flowers, it usually reproduces via budding at a tremendous rate. Its population can double in three to five days. Since it is free floating, it drifts with the wind or water current, and is often found intermixed with other duckweeds. Since it's not attached to the sediment, it derives nutrients directly from the water, and is often associated with eutrophic conditions. It over winters by producing turions late in the season. Small duckweed is extremely nutritious and can provide up to 90% of the dietary needs for waterfowl. It's also consumed by muskrat, beaver and fish, and dense mats of duckweed can actually inhibit mosquito breeding.

# Southern Naiad (*Najas guadalupensis*)

## Southern Water Nymph, Bushy Pondweed

**Southern Naiad Native** (*Najas guadalupensis*. Common Names: Southern water nymph, bushy pondweed.): Southern naiad is an annual aquatic plant that can form dense stands of rooted vegetation. Its ribbon-like leaves are dark-green to greenish-purple, and are wider and less pointed than slender naiad. Flowers occur at the base of the leaves, but are so small, they usually require magnification to detect. Southern naiad is widely distributed, but is less common than slender naiad in northern zones. Southern naiad reproduces by seeds and fragmentation.

## Spatterdock (*Nuphar variegata*)

### Yellow Pond Lily, Bullhead Pond Lily

**Spatterdock** Native: Spatterdock leaf stalks emerge directly from a submerged fleshy rhizome. Spatterdock has heart-shaped leaves with a prominent notch. Depending on the habitat, these leaves can be held aloft via erect stems. A distinguishing characteristic of spatterdock is the leaf stalk, which bears a winged margin. Flowering occurs in the summer and, the flowers open during the day and close at night. Spatterdock typically inhabits quiet water less than two meters deep with a soft substrate, such as ponds, shallow lakes and slow-moving streams. The leaves offer shade and protection for fish, and the leaves, stems, and flowers are grazed upon by muskrats, beaver, and sometimes, even deer.

## Spiral-fruited Pondweed (*Potamogeton spirillus*)

**Spiral-fruited Pondweed** Native: Spiral-fruited pondweed has slender stems that originate from a delicate, spreading rhizome. The stems tend to be compact and have numerous branches. Submersed leaves are linear with a curved appearance. Floating leaves are delicate, ellipse-shaped and range from 7 to 35 mm long and two to 13 mm wide. Stipules are fused to the leaf blade for more than half of their length. Nut-like fruits are produced on stalks of varies lengths. Shorter stalks tend to be on lower axils with fruit arranged in a compact head, while longer stalks tend to appear on upper axils, with fruit arranged in a cylindrical head. The fruit itself is a flatten disc with a sharply-toothed margin. Its smooth sides appear like a tightly coiled embryo, a distinguishing characteristic. Spiral-fruited pondweed prefers shallow water with sandy substrate, but can inhabit a wide range of bottom substrates. It serves as an important stabilizer and cover for fish fry and invertebrates.

# Water Bulrush (*Scirpus subterminalis, Schoenoplectus subterminalis)*

## Bulrush

**Water bulrush** Native (*Scirpus subterminalis*; = *Schoenoplectus subterminalis*). Common names: water bulrush, bulrush. Water bulrush is a truly aquatic bulrush, with only the tips of fertile stems poking above the water's surface, if any. The slender, limp stems originate from a delicate rhizome, typically less than 2.0 mm diameter. The hair-like stems can reach lengths up to 1.0 meter, and occur in flowing or still-water environments. The leaves are sheathed at the base, and become crescent-shaped above the sheath. This basal sheathing is a distinct characteristic that sets water bulrush apart from spikerush species. The leaves have one to five length-wise veins and scattered cross-veins. The leaves are often covered with a fine coating of algae in nutrient-poor environments. Researchers believe the bulrush plants are a phosphorus source for the algae. When nutlets are produced, they are three-angled with a slender beak. Water bulrush prefers shallow water, but can become established in depths exceeding 1.0 meter. Water bulrush stands produce grass-like meadows which provide suitable habitat for invertebrates and juvenile fish.

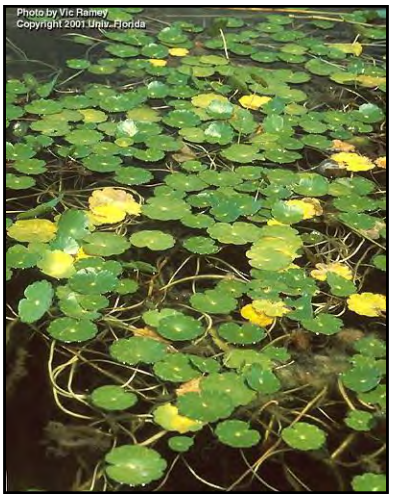
# Water Chestnut (*Trapa natans*)

## Water nut

**Water Chestnut** Invasive: Water chestnut is native to Europe and Asia, and was first observed in the United States in the late 1800's in Massachusetts. Water chestnut has two types of leaves, submerged and floating rosettes. The submersed leaves are delicate, opposite and contain numerous adventitious roots. Floating leaves are strongly toothed triangular leaves displayed in a rosette fashion, supported by long petioles with spongy inflated bladders for buoyancy. These petioles can reach lengths of up to 16 feet. Water chestnut prefers to inhabit nutrient-rich slow moving waters in lakes, ponds or streams. Although water chestnut can reproduce via fragmented rosettes, the plant produces numerous single-seeded horned nuts armed with sharp ½" barbs. After maturation, these nuts fall off the plant and over winter, producing 10-15 new rosettes the

following season. These nuts can inflict painful wounds to swimmers if stepped on. Studies have shown a water chestnut can lie dormant on a lake bottom for up to 12 years, and still germinate. Water chestnut is a poor source of food for waterfowl. High densities of water chestnut can inhibit boating and fishing.

## Water Pennywort (*Hydrocotyle sp.*)




**Water Pennywort**: Water pennywort varies in appearance depending on the species, but most possess the same general characteristics. The leaves are circular, umbrella-shaped, and about the size of a half-dollar coin. The leaves are shiny green and leathery in texture with long leaf stalks attached to the center. The color of pennywort flowers can be white, green, or yellow. Fruit are typically egg-shaped with a flattened appearance. Pennywort can become a nuisance as they can form dense mats in lakes, pond, rivers, or marshes. The seeds of pennywort provide food for some waterfowl and the plants themselves provide habitat for aquatic biota. Several species of water pennywort, including native and invasive, are common throughout the United States, especially in Florida.

## Water Stargrass (*Zosterella dubia*)

**Water Stargrass** Native: Water stargrass has slender free-branched stems that originate from rhizomes. The leaves are narrow and alternate, attaching directly to the stem. Leaves can be up to 15 cm long, and lack a prominent midvein, a distinguishing characteristic. Water stargrass can inhabit a wide range of water depths and sediment types, and can tolerate reduced clarity environments. Yellow star-shaped flowers are produced by midsummer, but reproduction is usually via over wintering rhizomes. Water stargrass is a locally important waterfowl food source, and provides suitable cover and foraging for fish.

## Water-thread Pondweed (*Potamogeton diversifolius*)

### Variable-leaf Pondweed, Snailseed Pondweed

**Water-thread Pondweed** Native (*Potamogeton diversifolius*. Common Names: Water-thread pondweed, variable-leaf pondweed, snailseed pondweed.): Variable-leaf pondweed have freely-branched stems emerging from slender rhizomes. The submersed leaves are narrow and linear with one obvious midvein bordered by a row of hollow cells. The floating leaves are shaped like an ellipse, but are usually less than 4 cm long, Variable-leaf pondweed fruit spikes are produced in two distinct forms. It occurs in lakes, ponds, rivers and streams and prefers soft sediment and water less than 2 meters deep. Waterfowl graze on the fruit, and local fauna often graze on the stems and leaves.

## Water Moss (*Fontinalis* sp.)

**Water Moss** Native: Water mosses are submerged mosses that are attached to rocks, trees, logs, and other hard substrates by false rootlets located at the base of their stems. The stems are dark-green to brown, and about one foot long. The leaves share a similar color as the stems, and are usually ovate with fine-toothed margins. Water moss is utilized by aquatic invertebrates, and as a breeding site for small fish. Water moss rarely reaches nuisance levels.

## Watershield (*Brasenia schreberi*)

**Watershield** Native: Watershield is a floating-leaf aquatic plant similar to water lilies. Its stem and leaves are elastic, and are attached to a rooted rhizome that acts as an anchor and source of stored nutrients. The leaf stalks are attached to the middle of the leaf, creating a bull's eye effect, hence its name water target. The leaves are green on the upper surface, and purple underneath. Maroon to purple flowers peak above the water's surface on short, stout stalks. Watershield is usually coated with a clear gelatinous slime on leaves. Watershield prefers soft-water lakes and ponds in the stem and underside of the

sediments containing decomposing organic matter. The whole plant is consumed by waterfowl, and the floating leaves provide shade and cover for fish.

## White Water Lily (*Nymphaea* odorata)

### Fragrant Water Lily

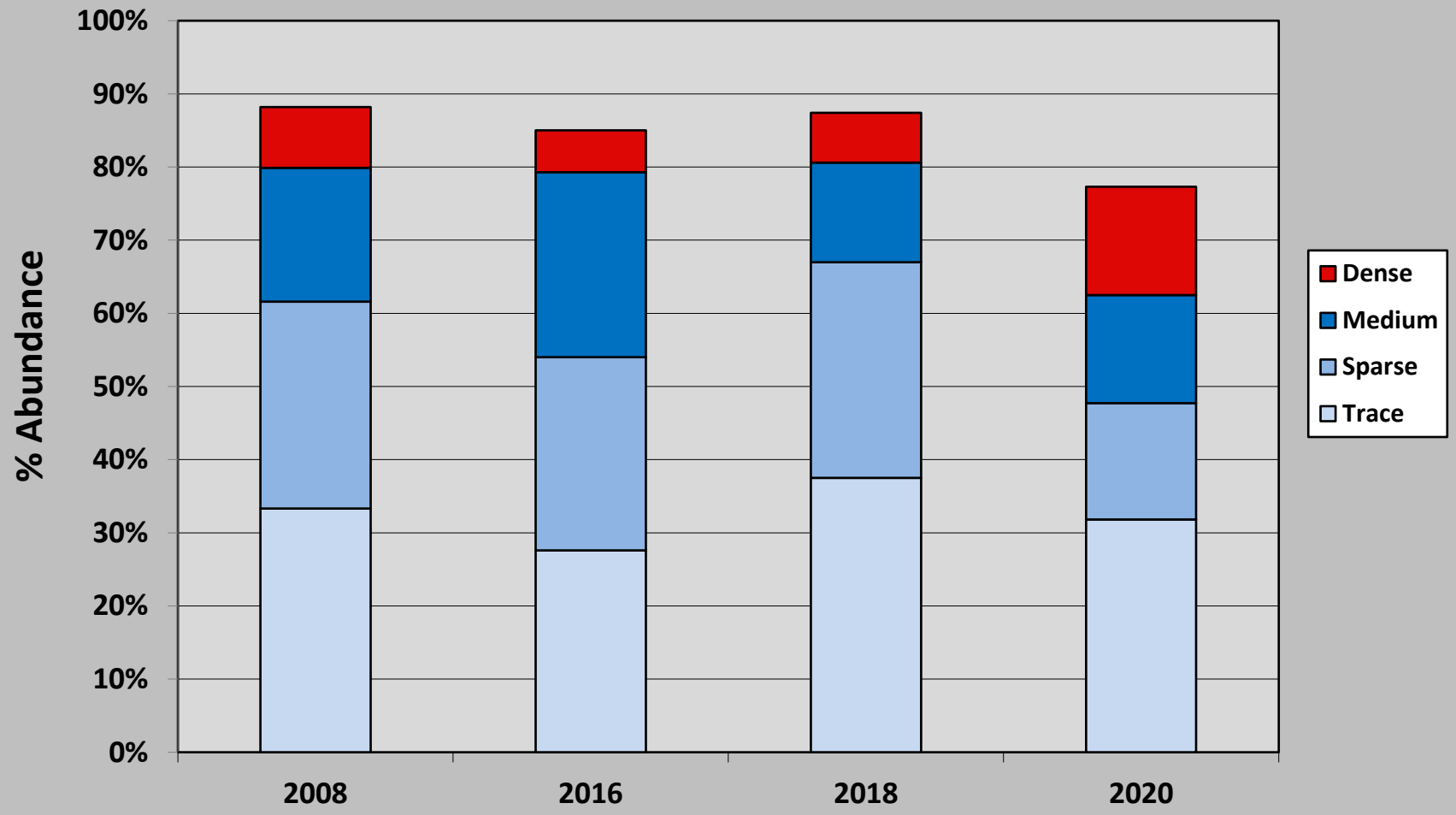
**White Water Lily** Native: White water lily leaf stalks emerge directly from a submerged fleshy rhizome. White water lilies have round floating leaves. Flowering occurs during the summer, and the flowers open during the day, and close during the night. Water lilies typically inhabit quiet water less than two meters deep, such as ponds, shallow lakes and slow-moving streams. The leaves offer shade and protection for fish, and the leaves, stems, and flowers are grazed upon by muskrats, beaver, and sometimes even deer.

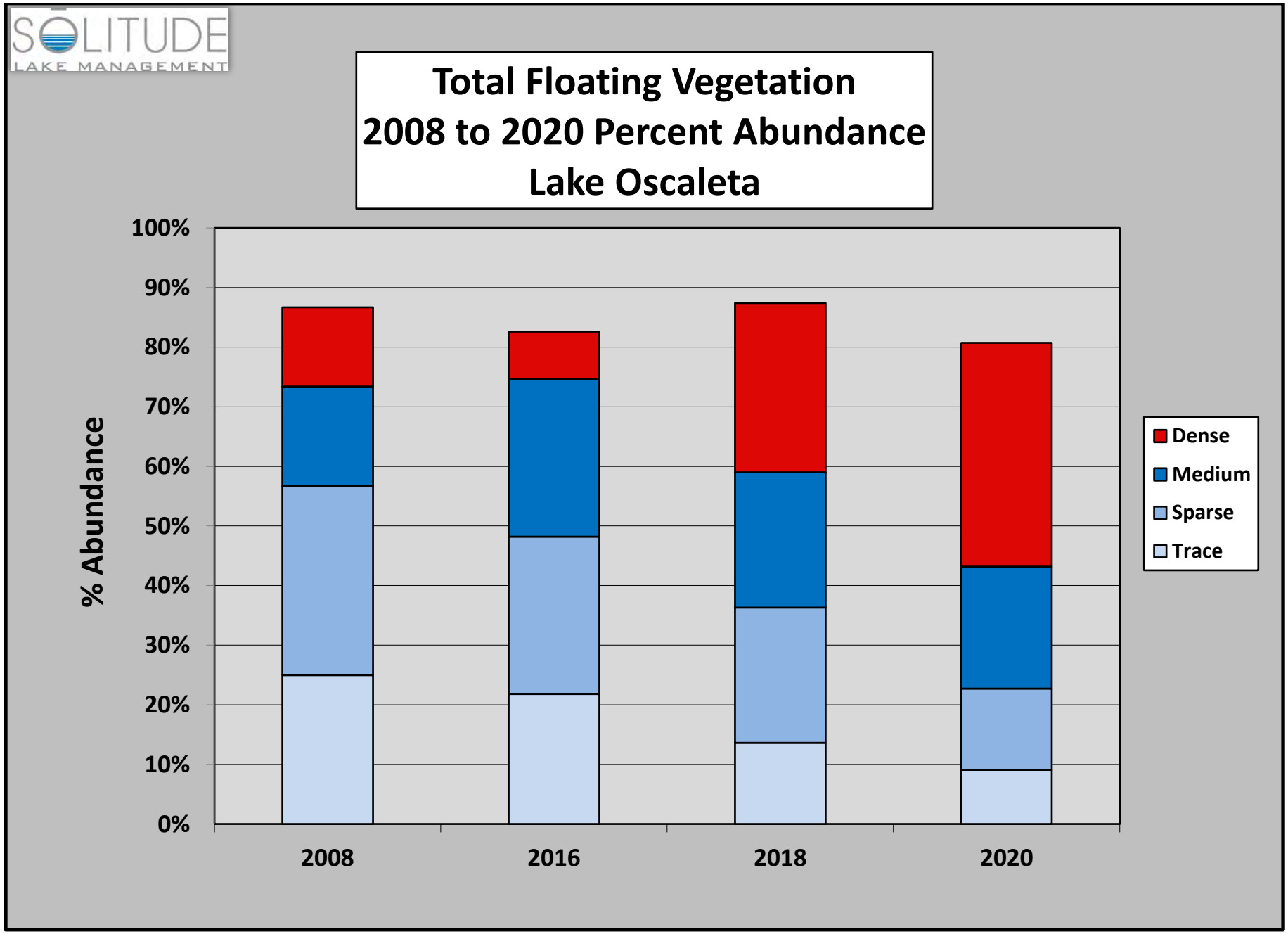
## Wild celery (*Vallisneria Americana*)

### Eel-grass, Tape-grass

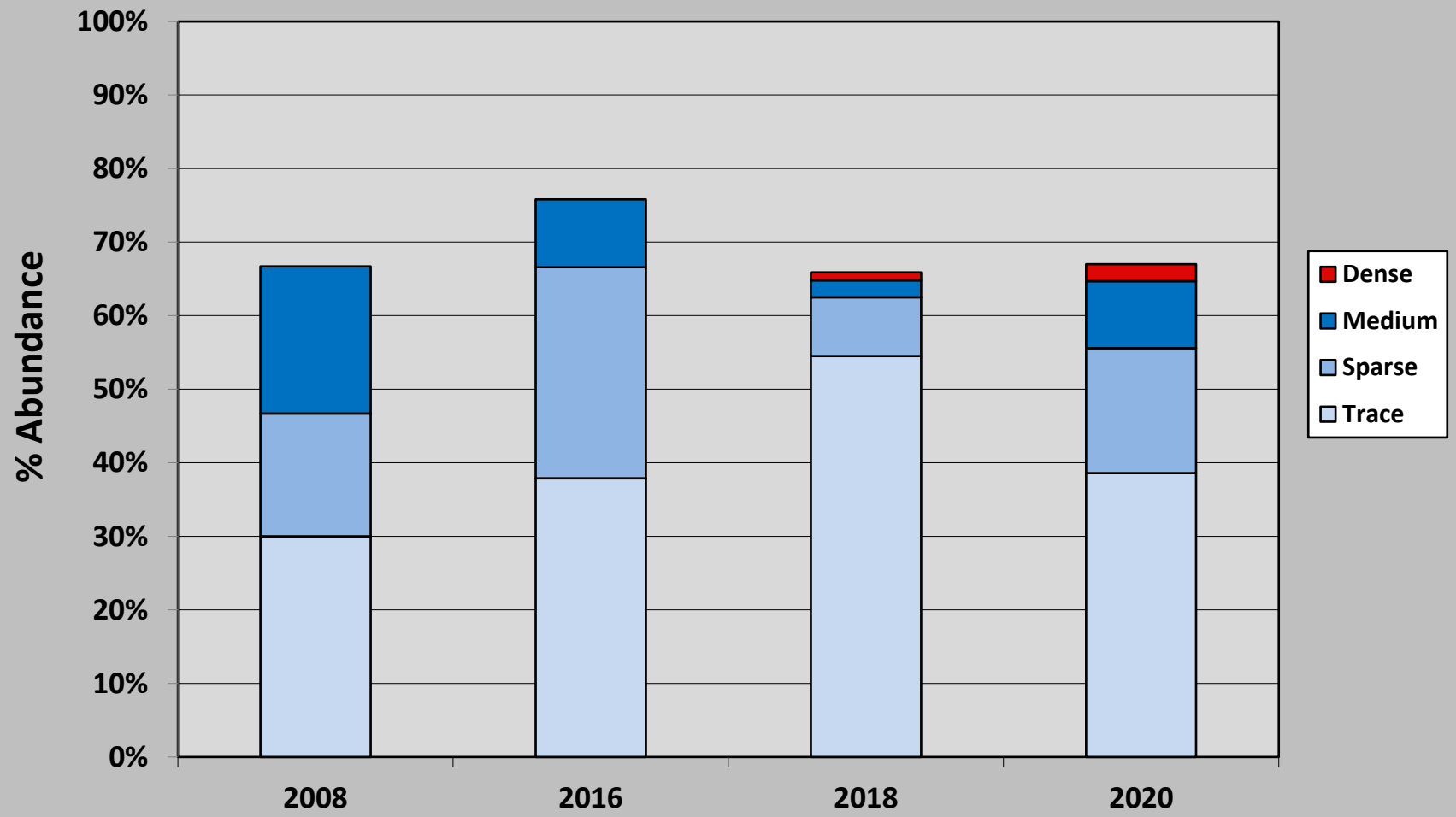
**Tape-grass** (*Vallisneria americana*. Common Names: Wild celery, eel-grass, tape-grass. **Native**.): Tape-grass has long flowing ribbon-like leaves that have a basal arrangement from a creeping rhizome. The leaves can be up to two meters long, have a cellophane-like texture, with a prominent center stripe and finely serrated edges. The leaves are mostly submersed, although they can reach the surface allowing the tips to trail. Male and female flowers are produced on separate plants, but reproduction is usually via over wintering rhizomes and tubers. Tape-grass usually inhabits hard substrate bottoms in shallow to deep water. It can tolerate a wide variety of water chemistries. Tape-grass is the premiere food source for waterfowl, which greedily consume all parts of the plant. Canvasback ducks (*Aythya valisneria*) enjoy a strong relationship with tape-grass, going so far to alter their migration routes based on tape-grass abundance. Extensive beds of tape-grass are considered good shade, habitat and feeding opportunities for fish.

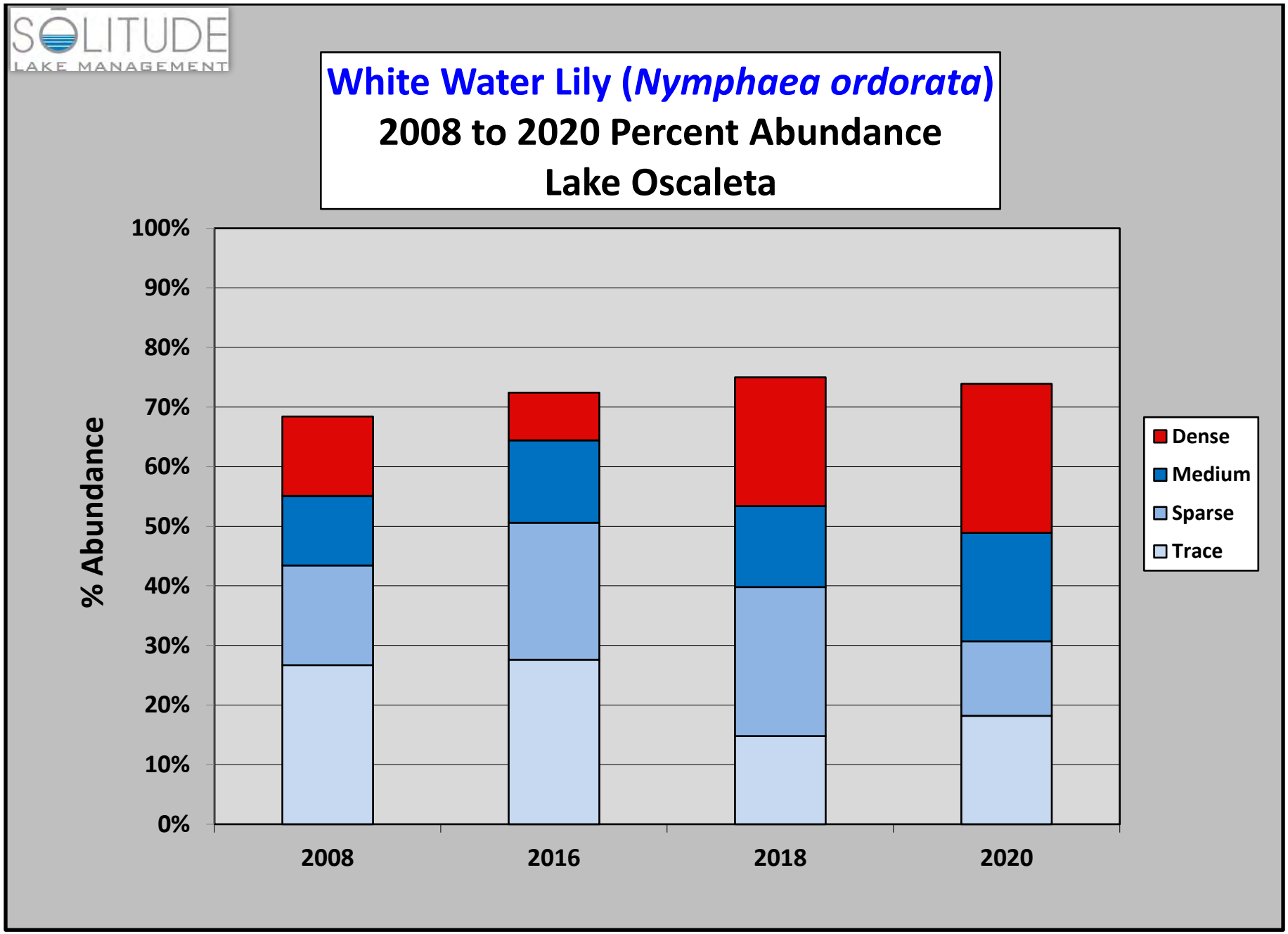
# Total Submersed Vegetation 2008 to 2020 Percent Abundance Lake Oscaleta

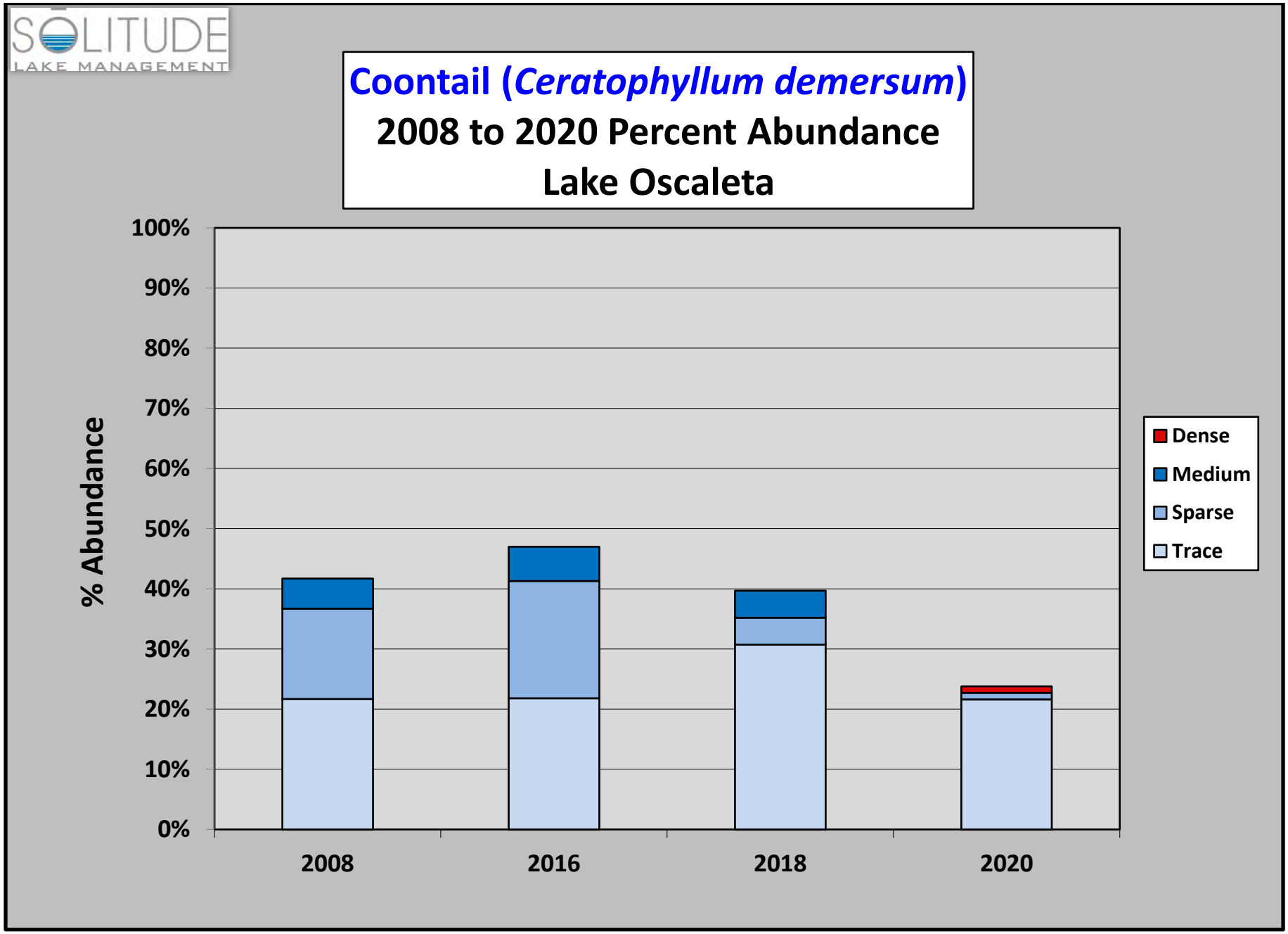



SOLITUDE
LAKE MANAGEMENT
Total Floating Vegetation
2008 to 2020 Percent Abundance
Lake Oscaleta
% Abundance
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2008
2016
2018
2020
Dense
Medium
Sparse
Trace

# Eurasian Water Milfoil (*Myriophyllum spicatum*)
## 2008 to 2020 Percent Abundance
## Lake Oscaleta




SOLITUDE
LAKE MANAGEMENT
White Water Lily (Nymphaea ordorata)
2008 to 2020 Percent Abundance
Lake Oscaleta
% Abundance
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2008
2016
2018
2020
Dense
Medium
Sparse
Trace


SOLITUDE
LAKE MANAGEMENT
Coontail (Ceratophyllum demersum)
2008 to 2020 Percent Abundance
Lake Oscaleta
% Abundance
100%
90%
80%
70%
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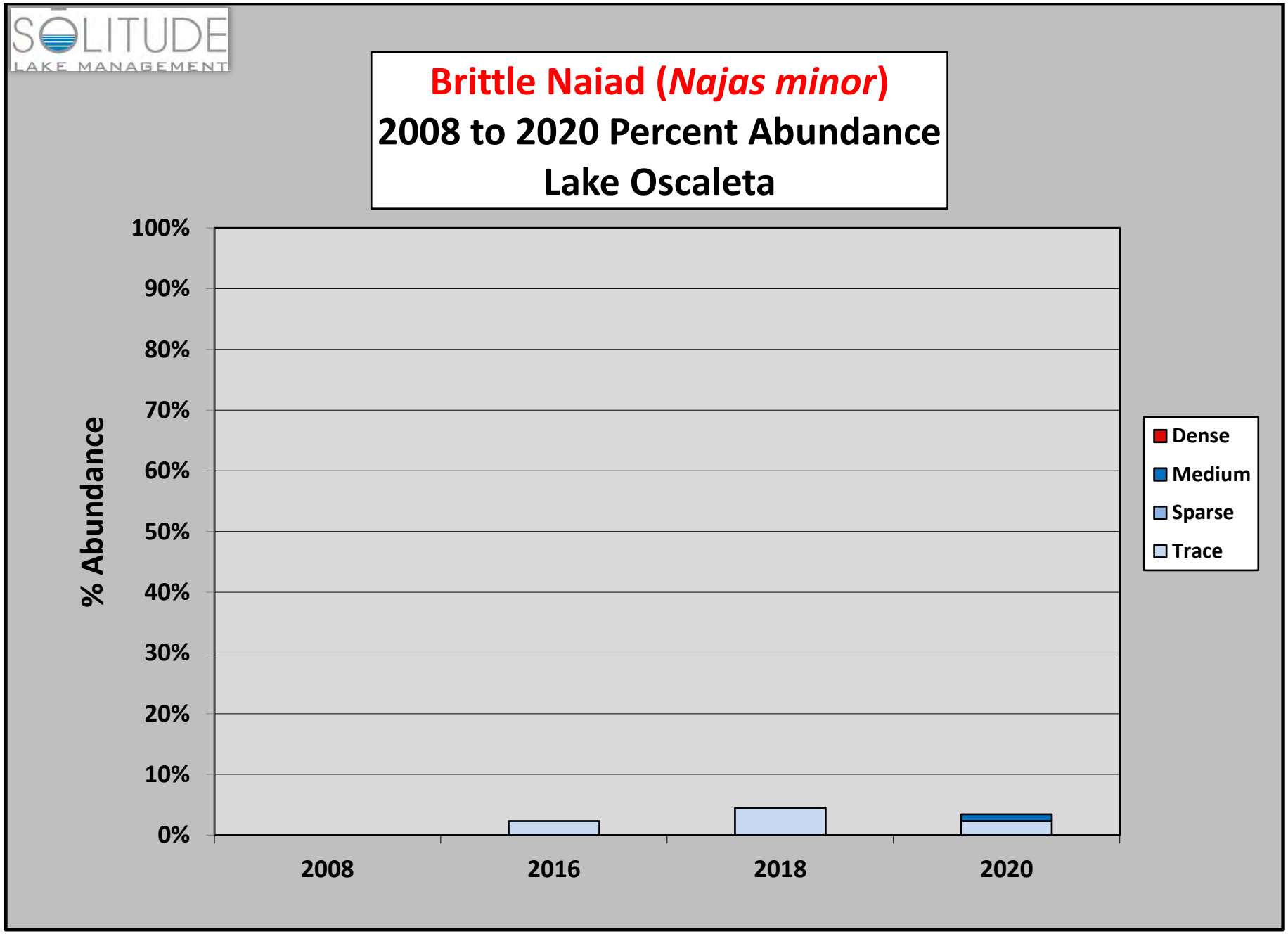
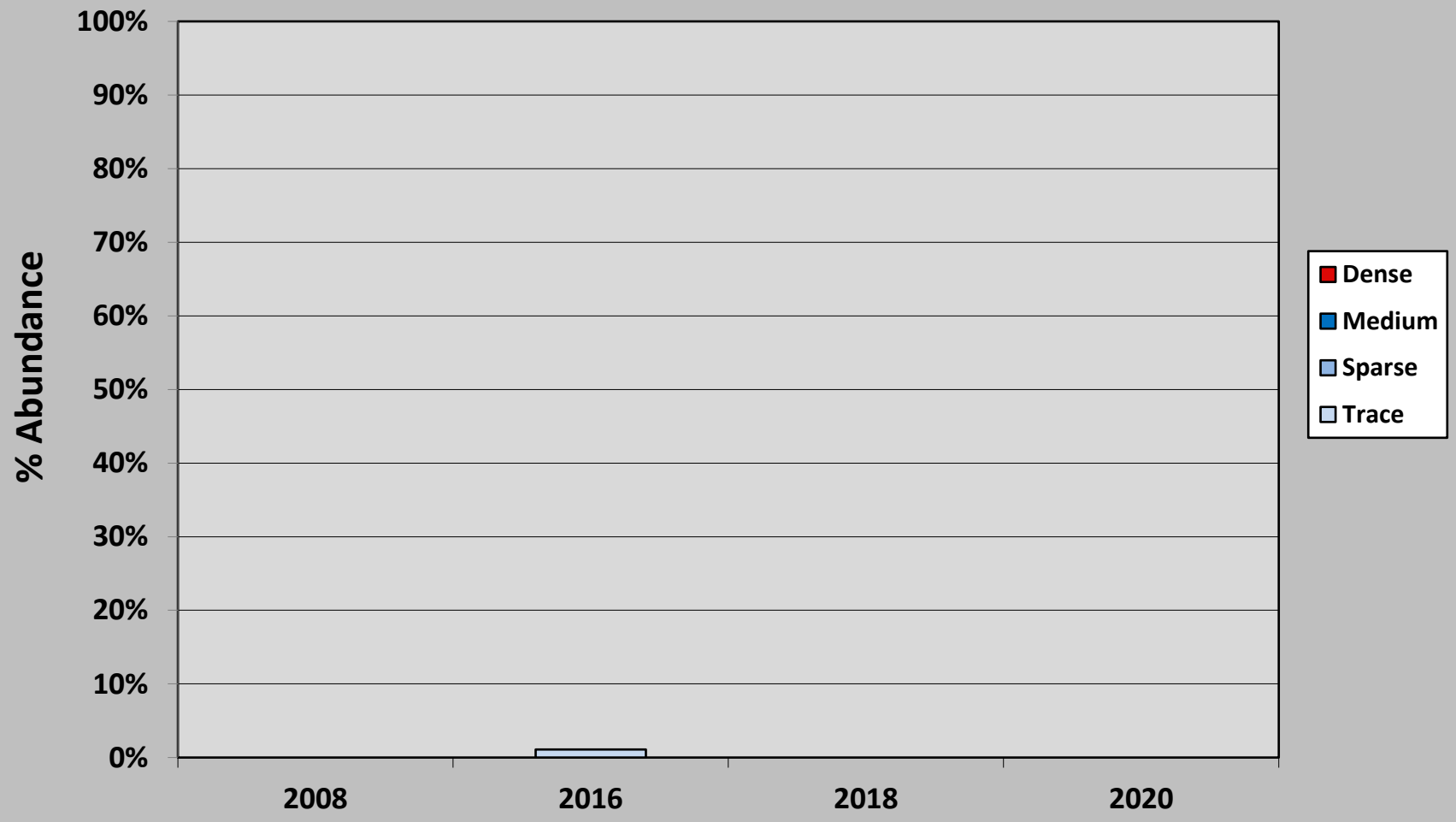
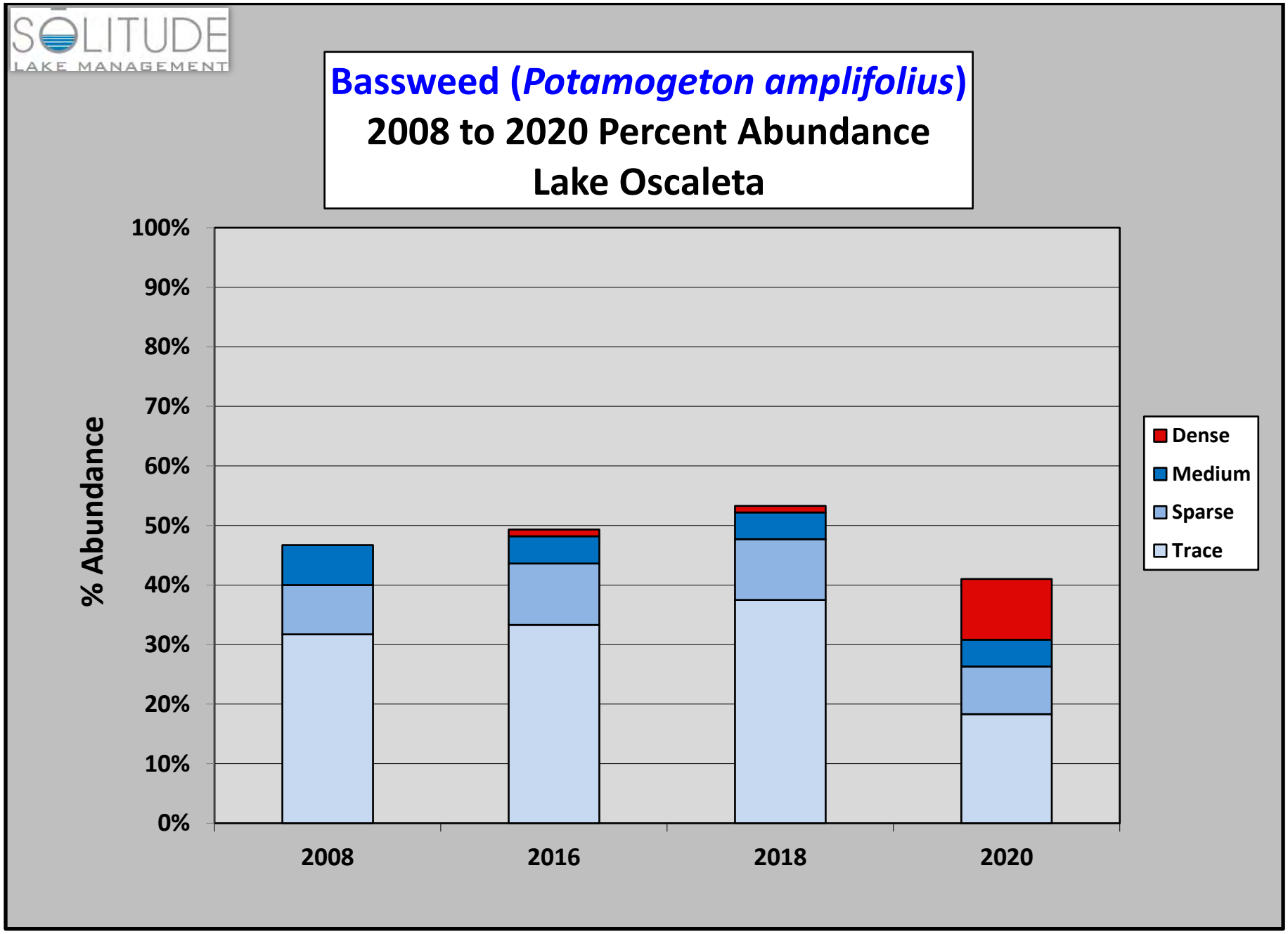
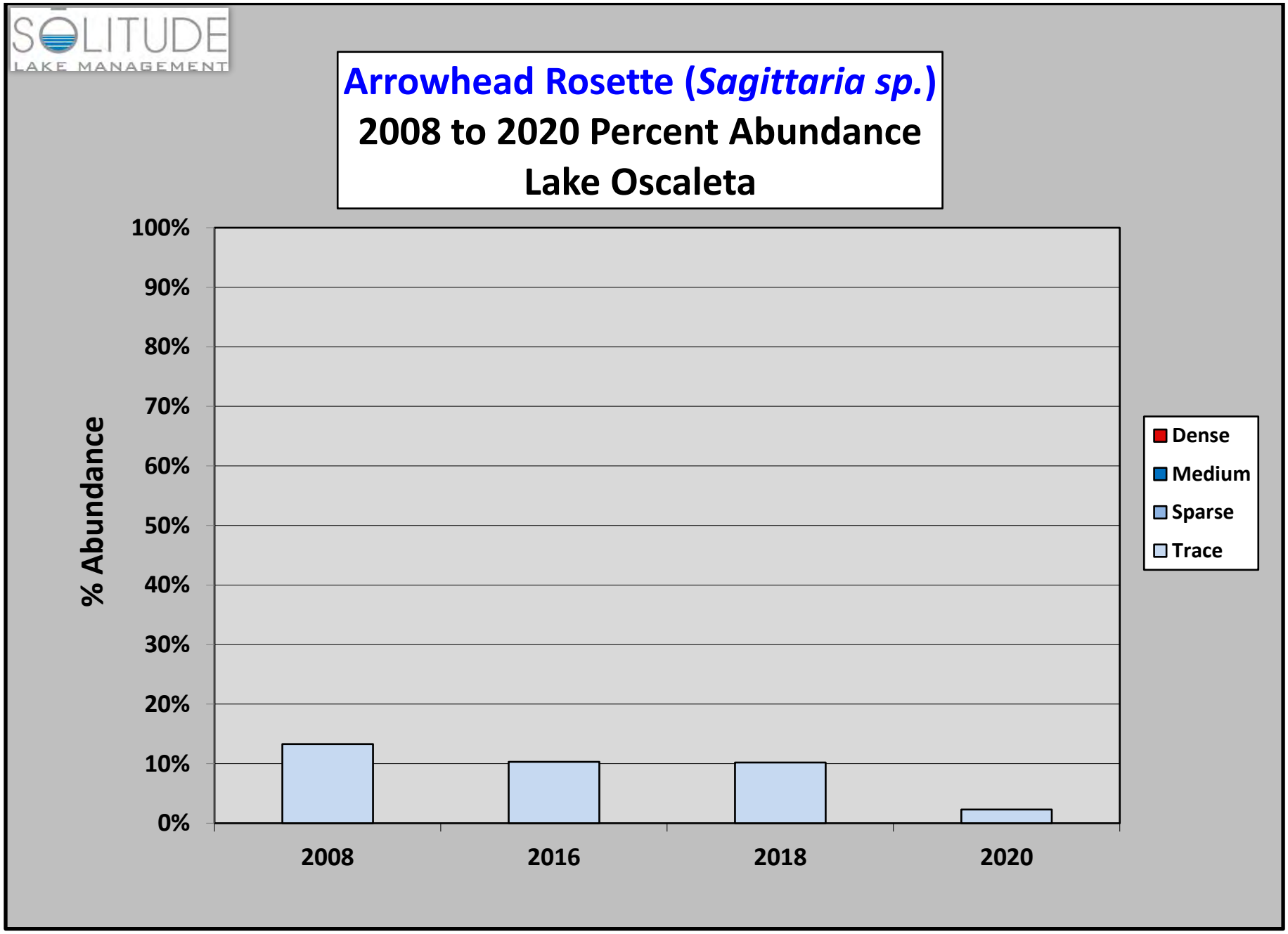
50%
40%
30%
20%
10%
0%
2008
2016
2018
2020
Dense
Medium
Sparse
Trace


SOLITUDE
LAKE MANAGEMENT
Brittle Naiad (*Najas minor*)
2008 to 2020 Percent Abundance
Lake Oscaleta
% Abundance
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2008
2016
2018
2020
Dense
Medium
Sparse
Trace

## Water-thread Pondweed (*Potamogeton diversifolius*)
## 2008 to 2020 Percent Abundance
## Lake Oscaleta




SOLITUDE
LAKE MANAGEMENT
Bassweed (Potamogeton amplifolius)
2008 to 2020 Percent Abundance
Lake Oscaleta
% Abundance
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2008
2016
2018
2020
Dense
Medium
Sparse
Trace


SOLITUDE
LAKE MANAGEMENT
Arrowhead Rosette (Sagittaria sp.)
2008 to 2020 Percent Abundance
Lake Oscaleta
% Abundance
100%
90%
80%
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40%
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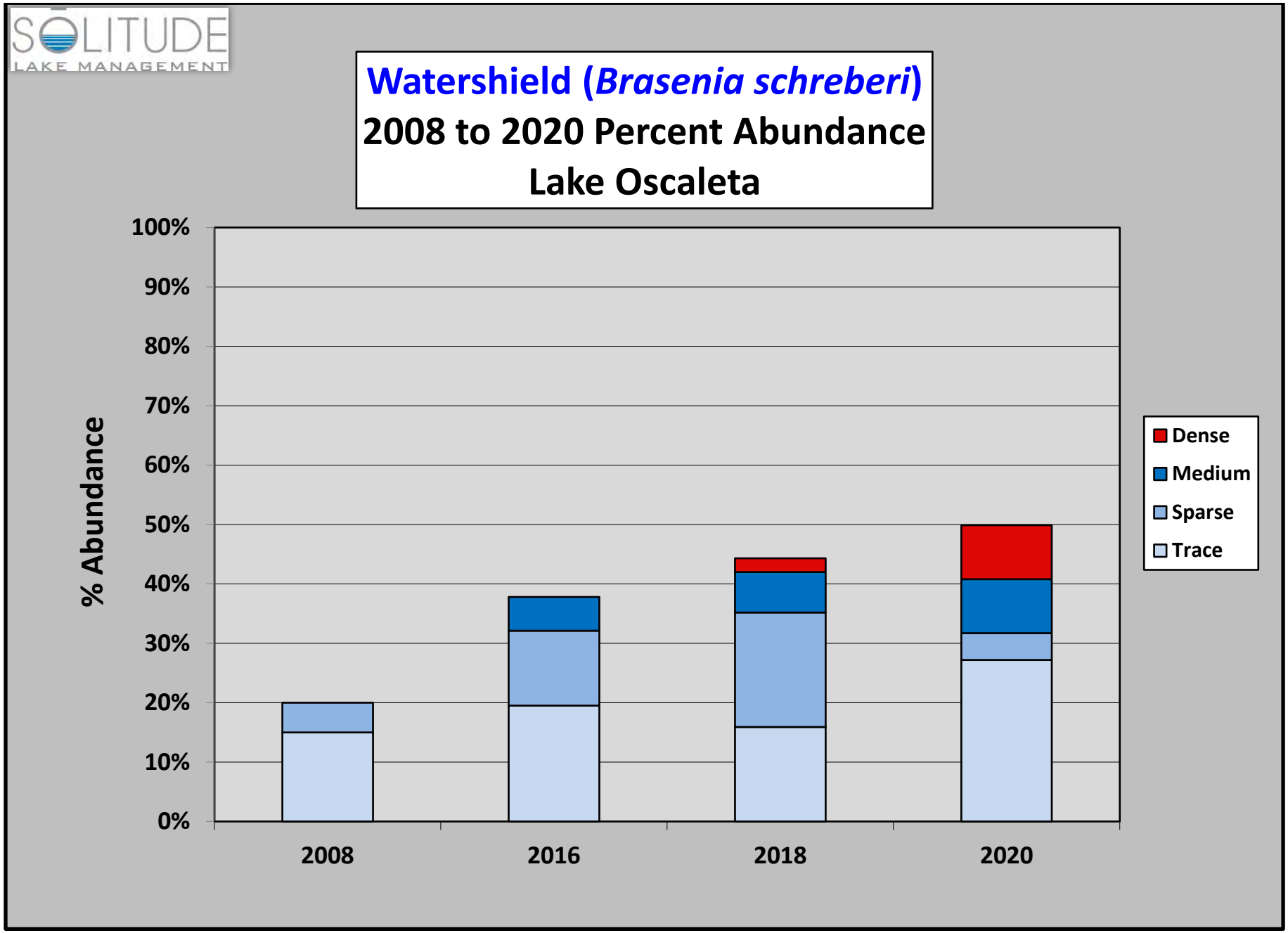
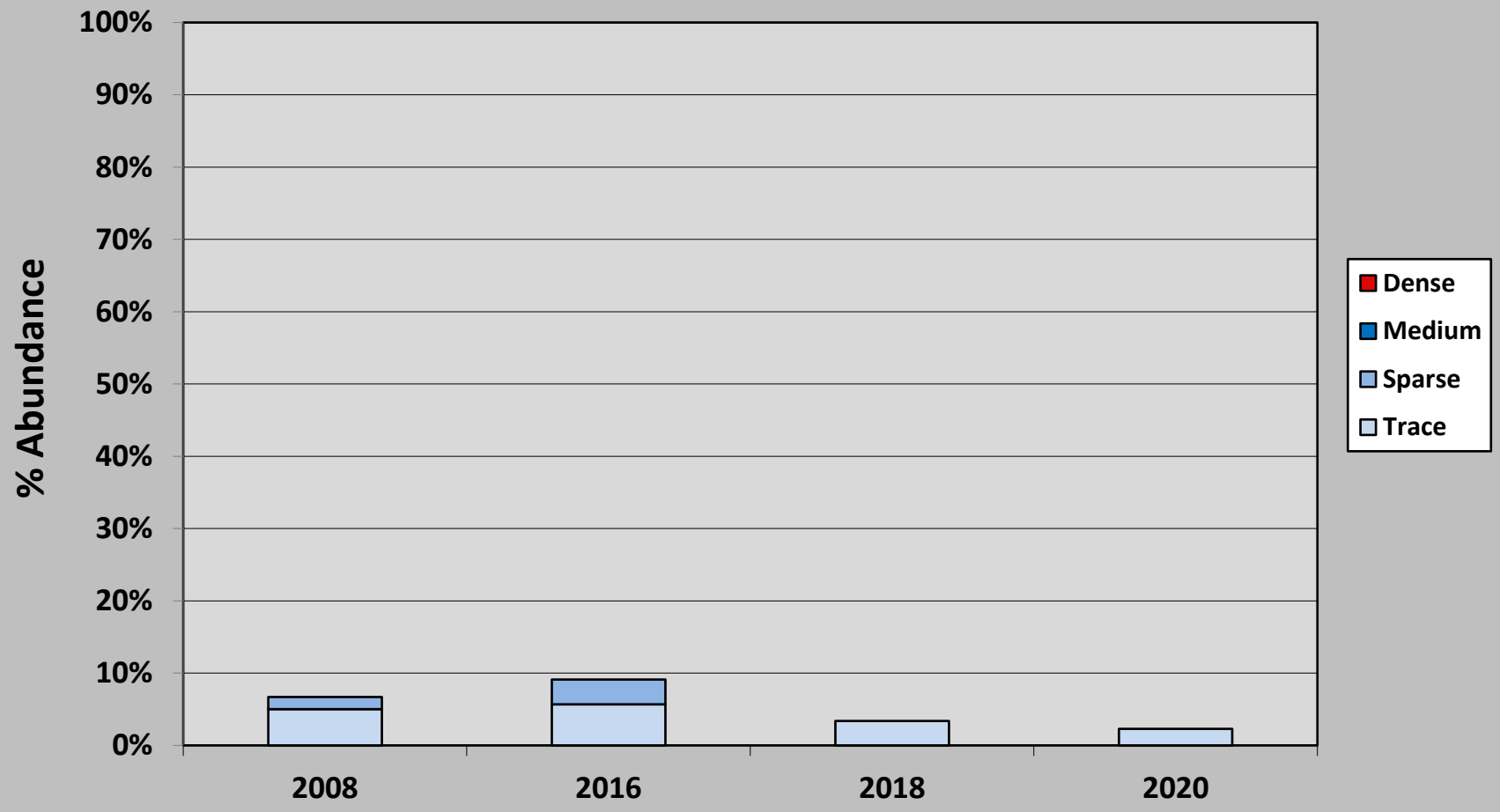
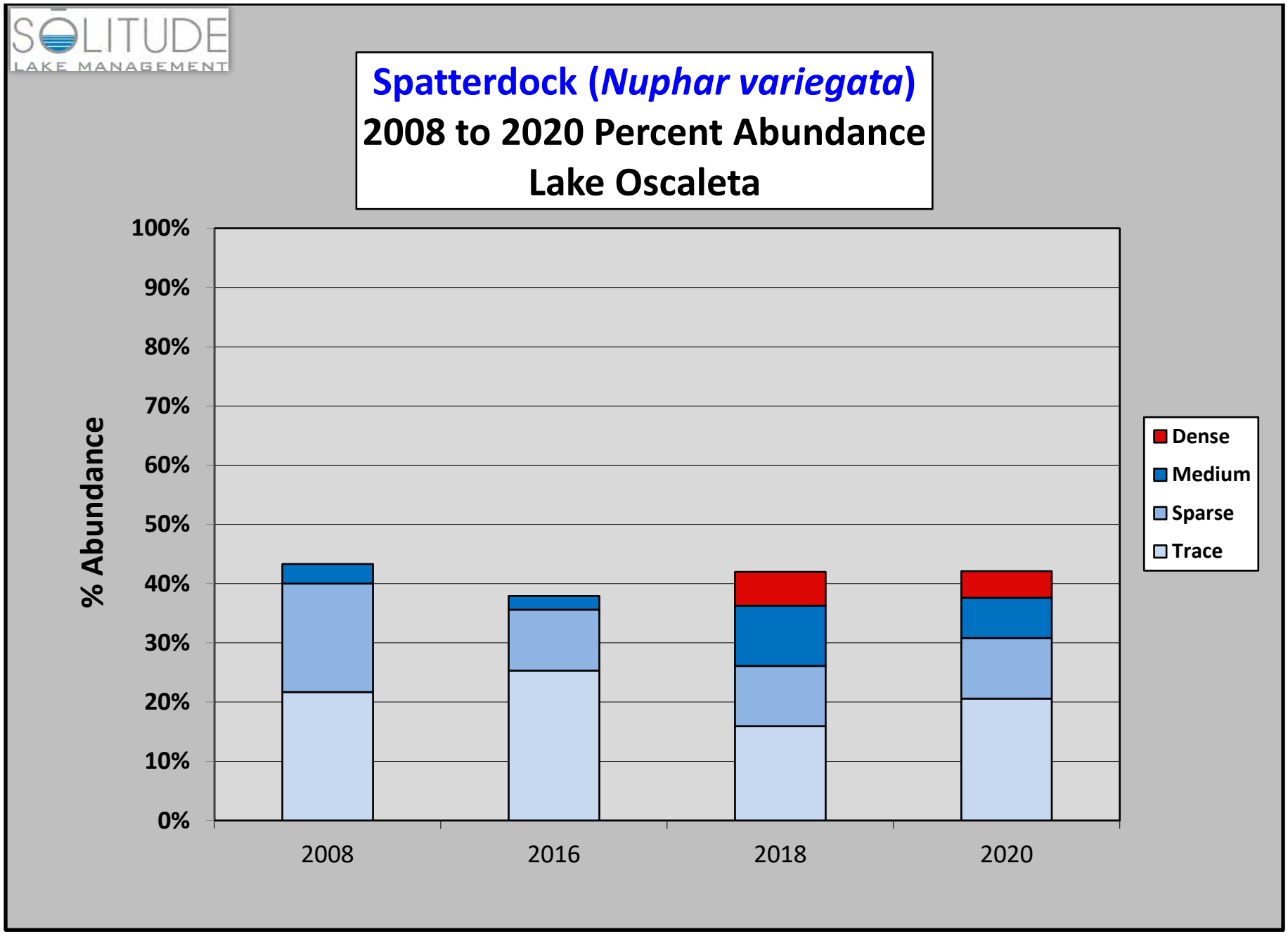
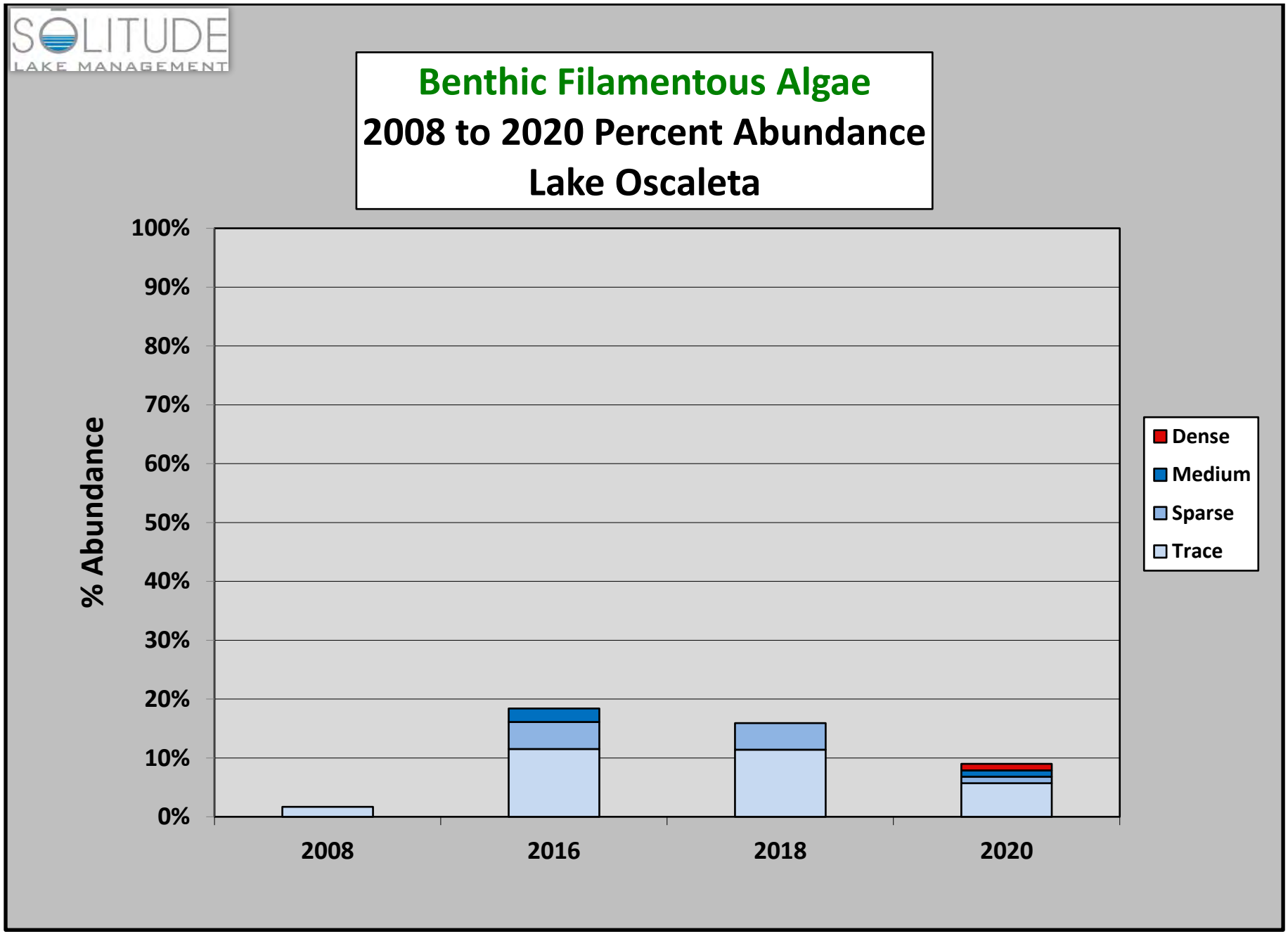
0%
2008
2016
2018
2020
Dense
Medium
Sparse
Trace


SOLITUDE
LAKE MANAGEMENT
Watershield (Brasenia schreberi)
2008 to 2020 Percent Abundance
Lake Oscaleta
% Abundance
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2008
2016
2018
2020
Dense
Medium
Sparse
Trace

# Common Waterweed (*Elodea canadensis*)
## 2008 to 2020 Percent Abundance
## Lake Oscaleta




SOLITUDE
LAKE MANAGEMENT
Spatterdock (Nuphar variegata)
2008 to 2020 Percent Abundance
Lake Oscaleta
% Abundance
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2008
2016
2018
2020
Dense
Medium
Sparse
Trace


SOLITUDE
LAKE MANAGEMENT
Benthic Filamentous Algae
2008 to 2020 Percent Abundance
Lake Oscaleta
% Abundance
100%
90%
80%
70%
60%
50%
40%
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2020
Dense
Medium
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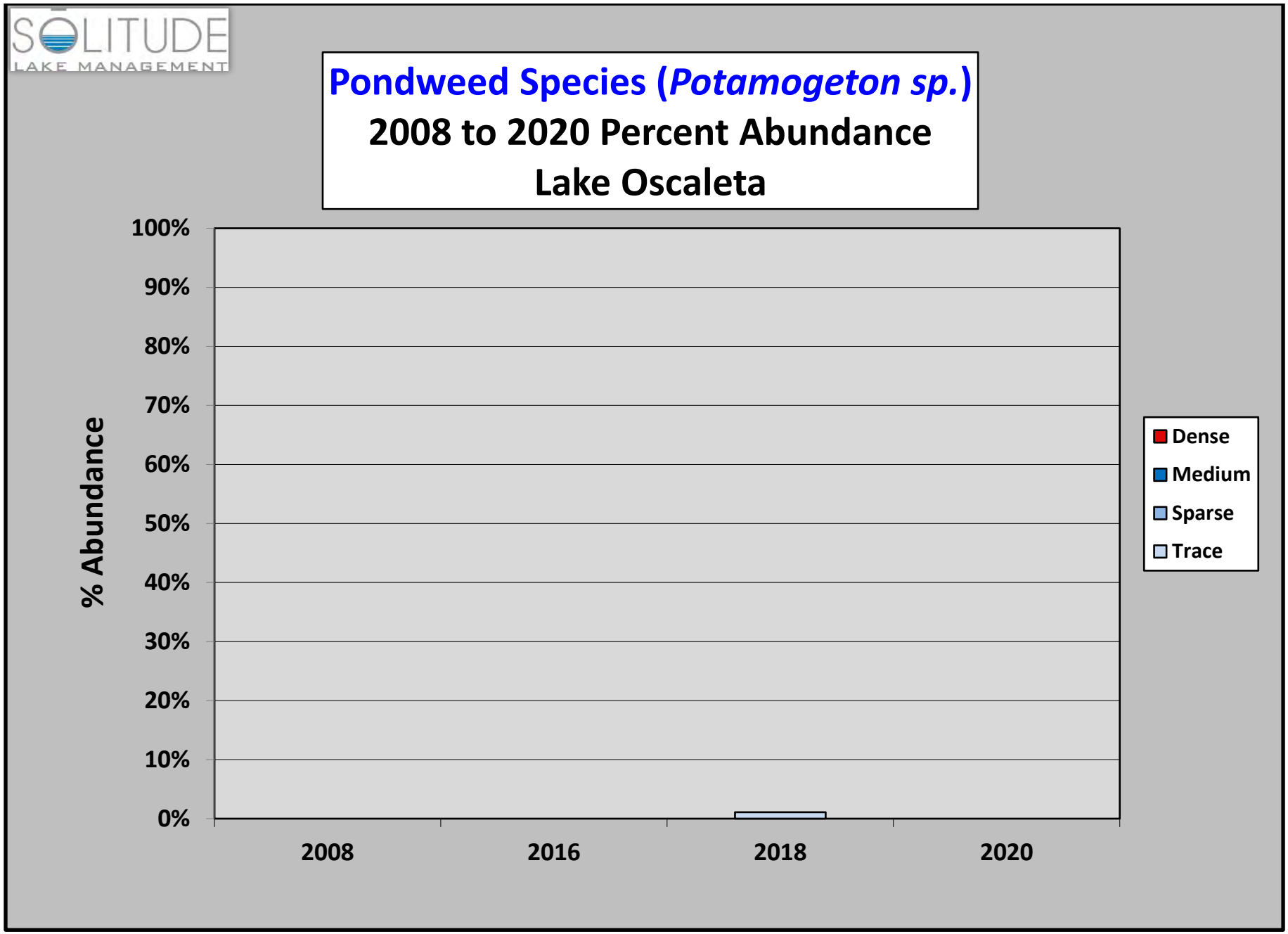
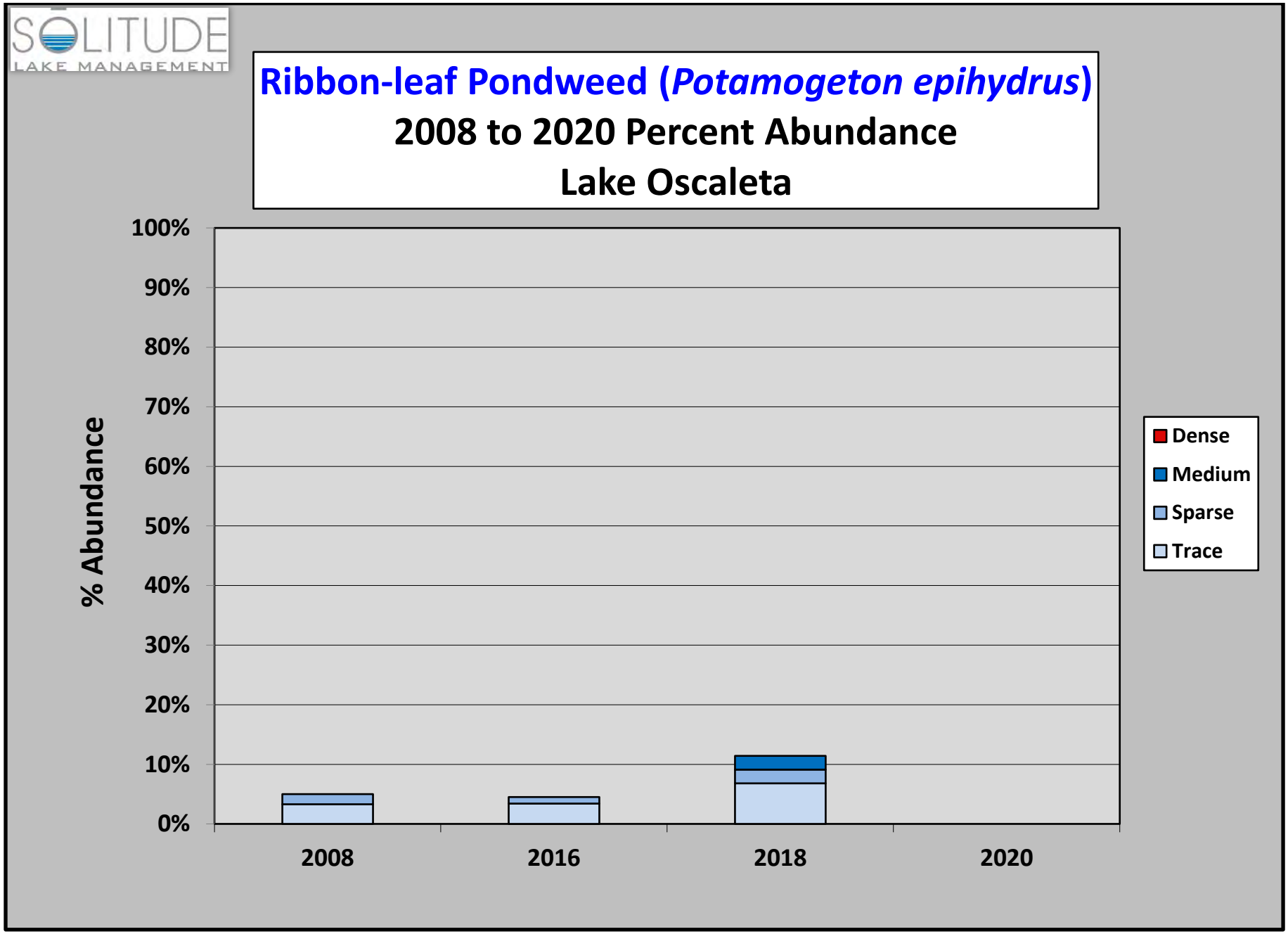
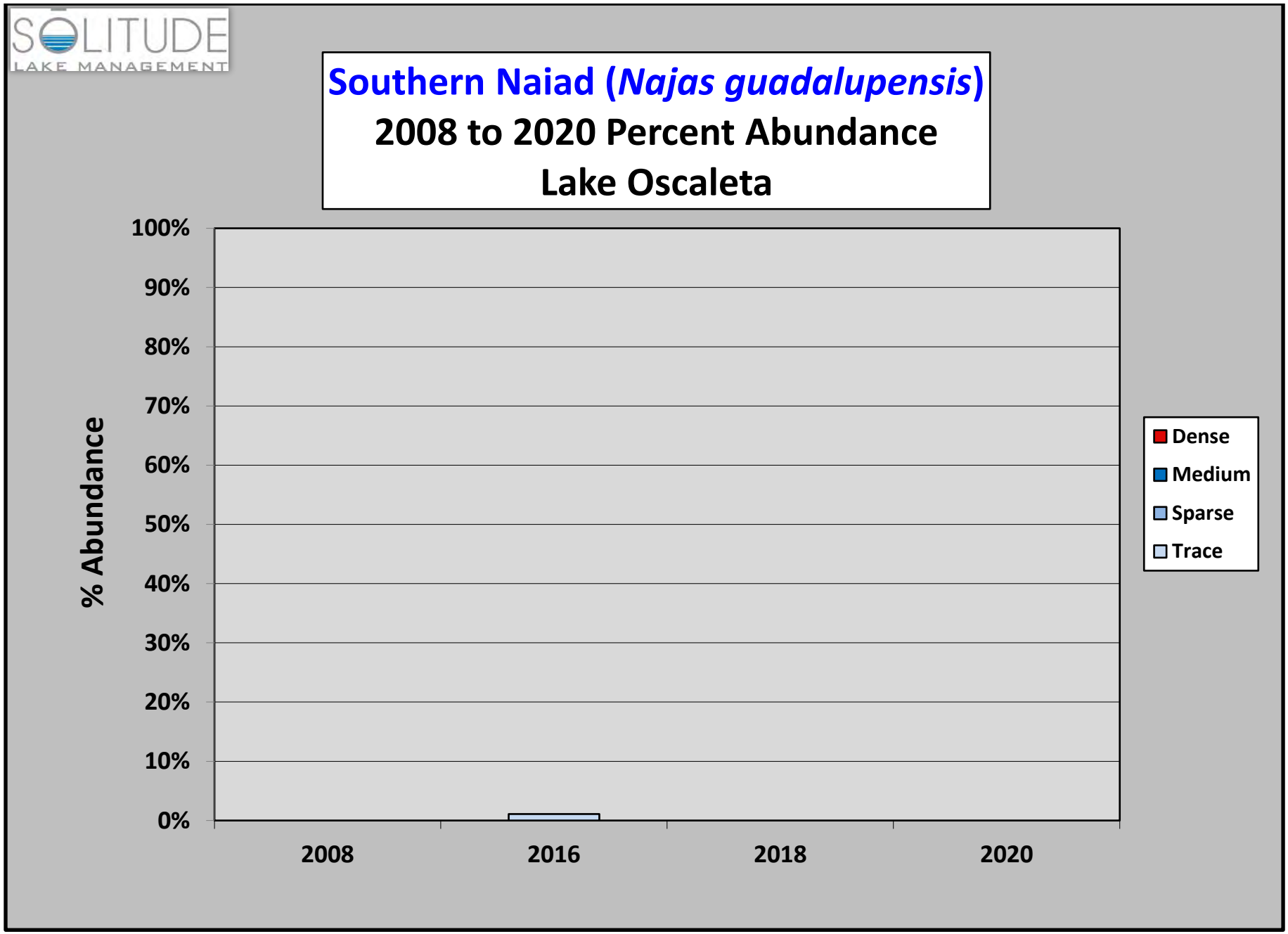
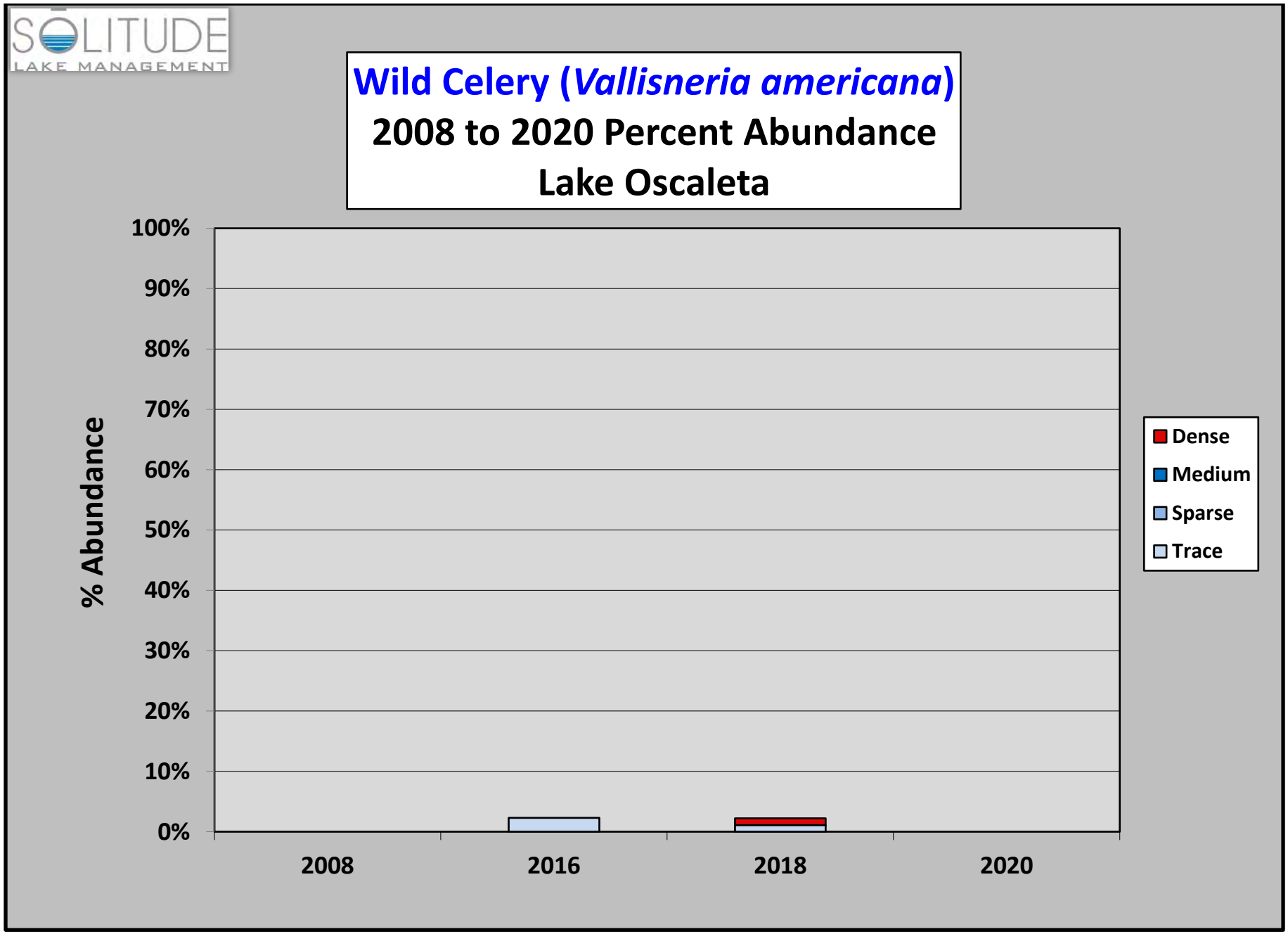
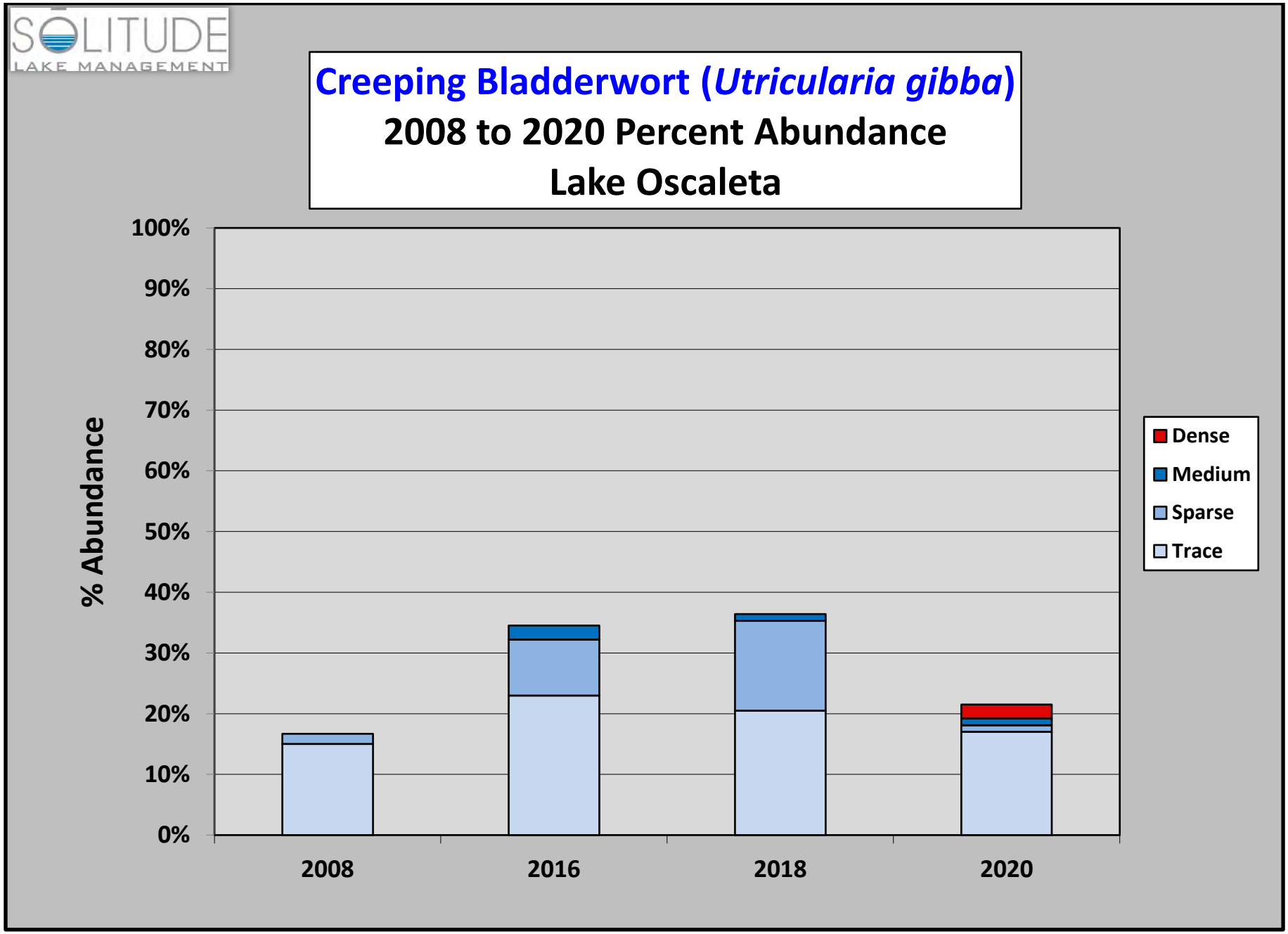
Trace

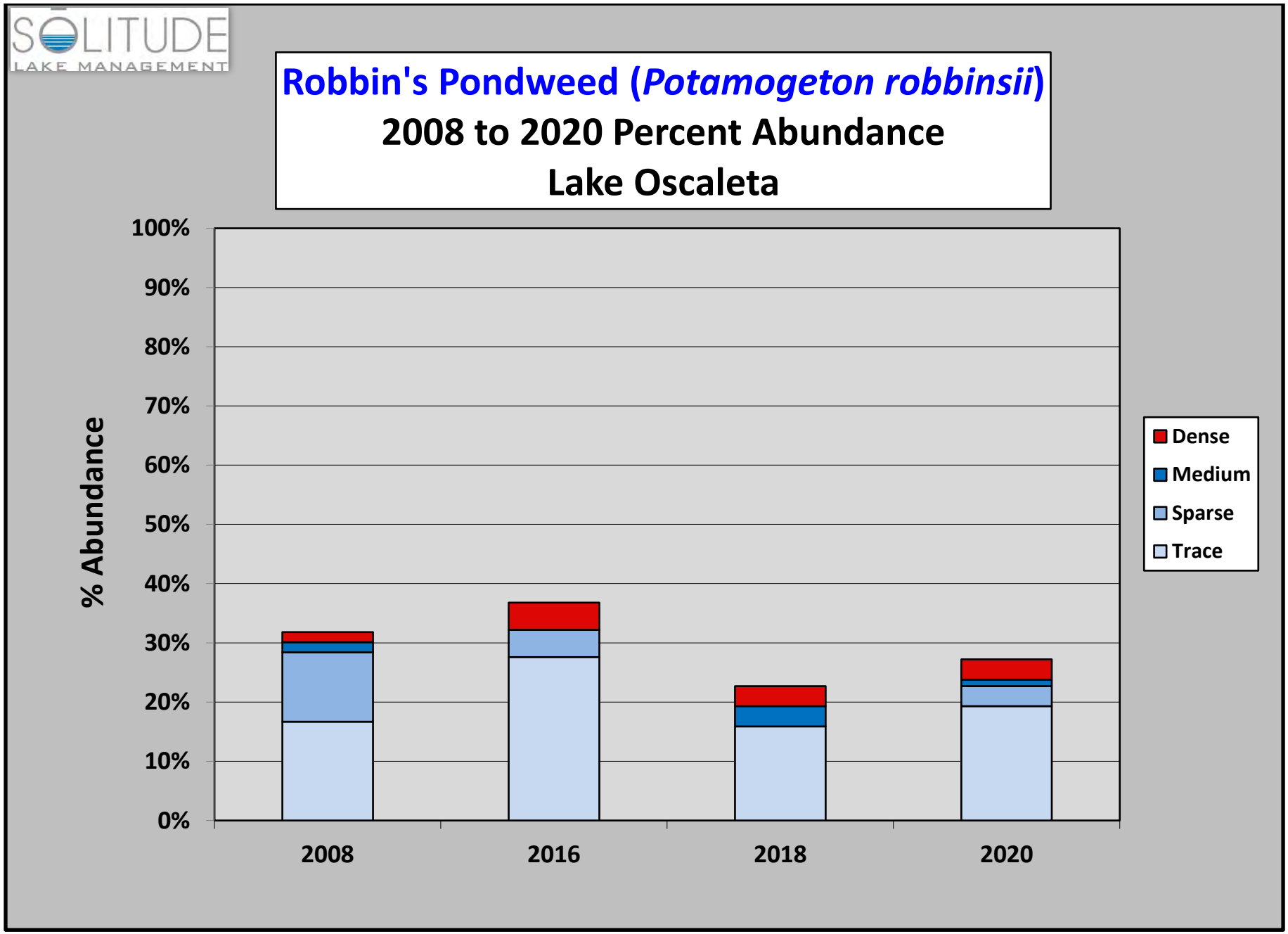

SOLITUDE
LAKE MANAGEMENT
Pondweed Species (Potamogeton sp.)
2008 to 2020 Percent Abundance
Lake Oscaleta
% Abundance
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2008
2016
2018
2020
Dense
Medium
Sparse
Trace

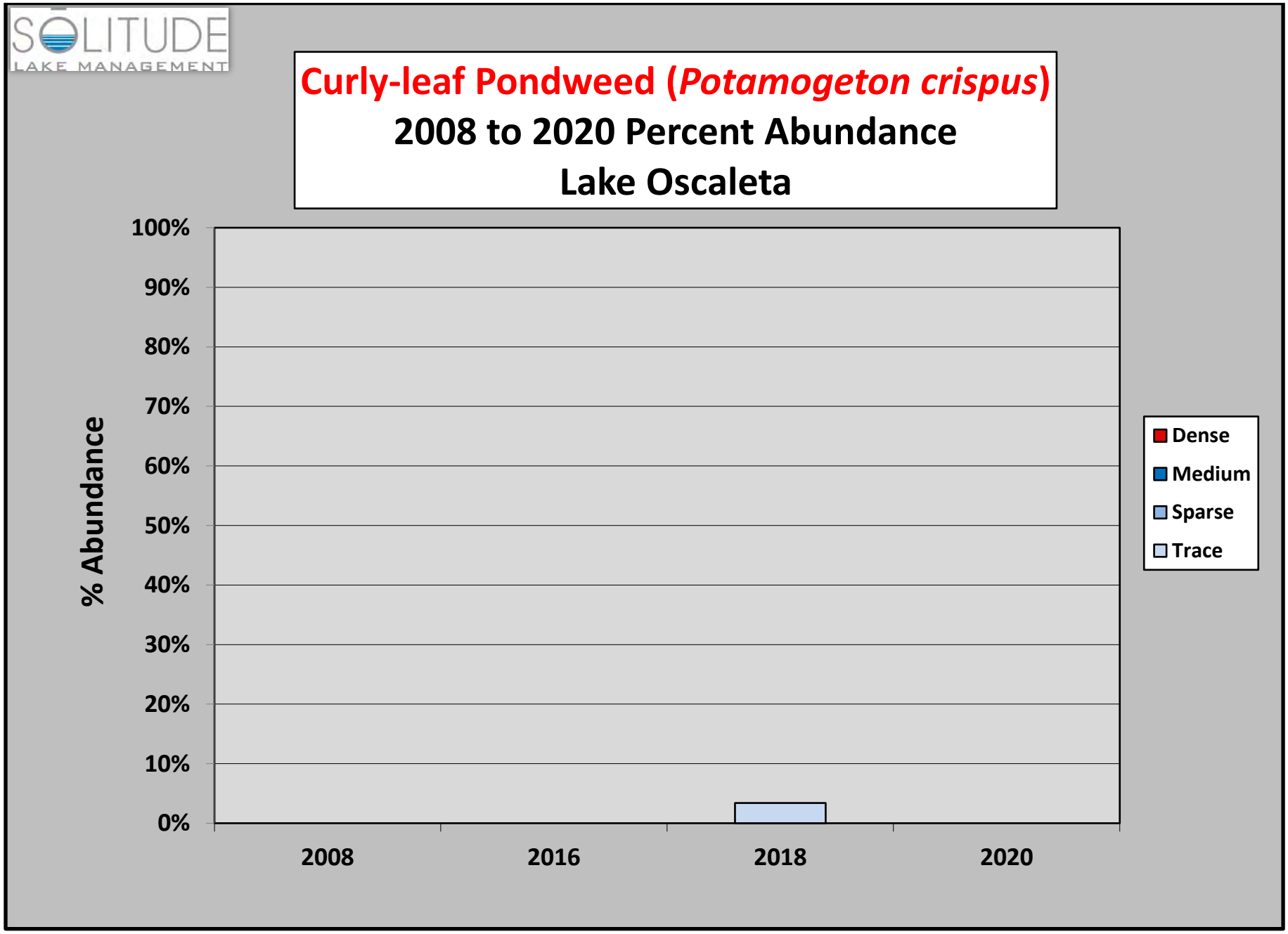

SOLITUDE
LAKE MANAGEMENT
Ribbon-leaf Pondweed (Potamogeton epihydrus)
2008 to 2020 Percent Abundance
Lake Oscaleta
% Abundance
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2008
2016
2018
2020
Dense
Medium
Sparse
Trace

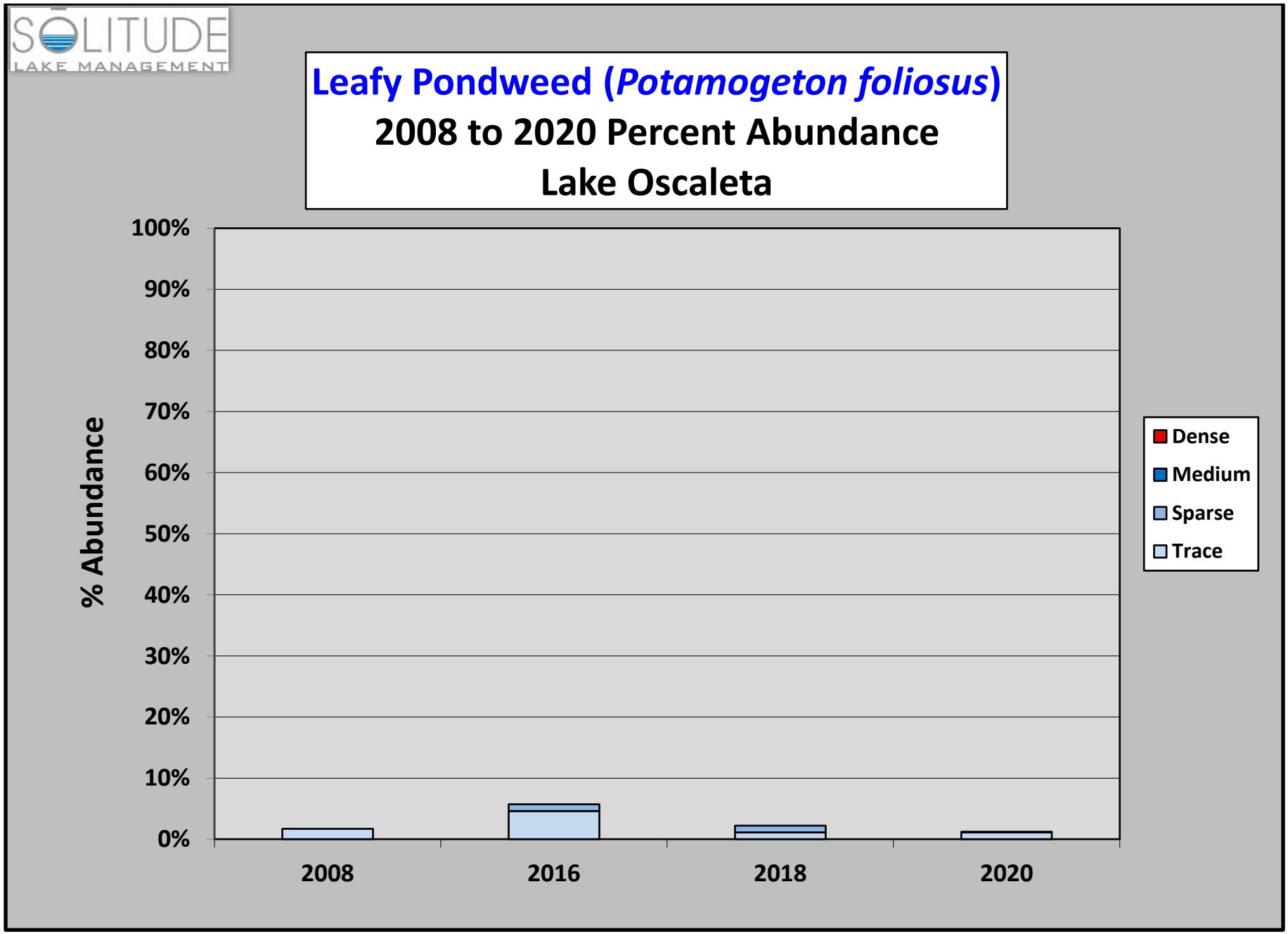

SOLITUDE
LAKE MANAGEMENT
Southern Naiad (*Najas guadalupensis*)
2008 to 2020 Percent Abundance
Lake Oscaleta
% Abundance
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2008
2016
2018
2020
Dense
Medium
Sparse
Trace

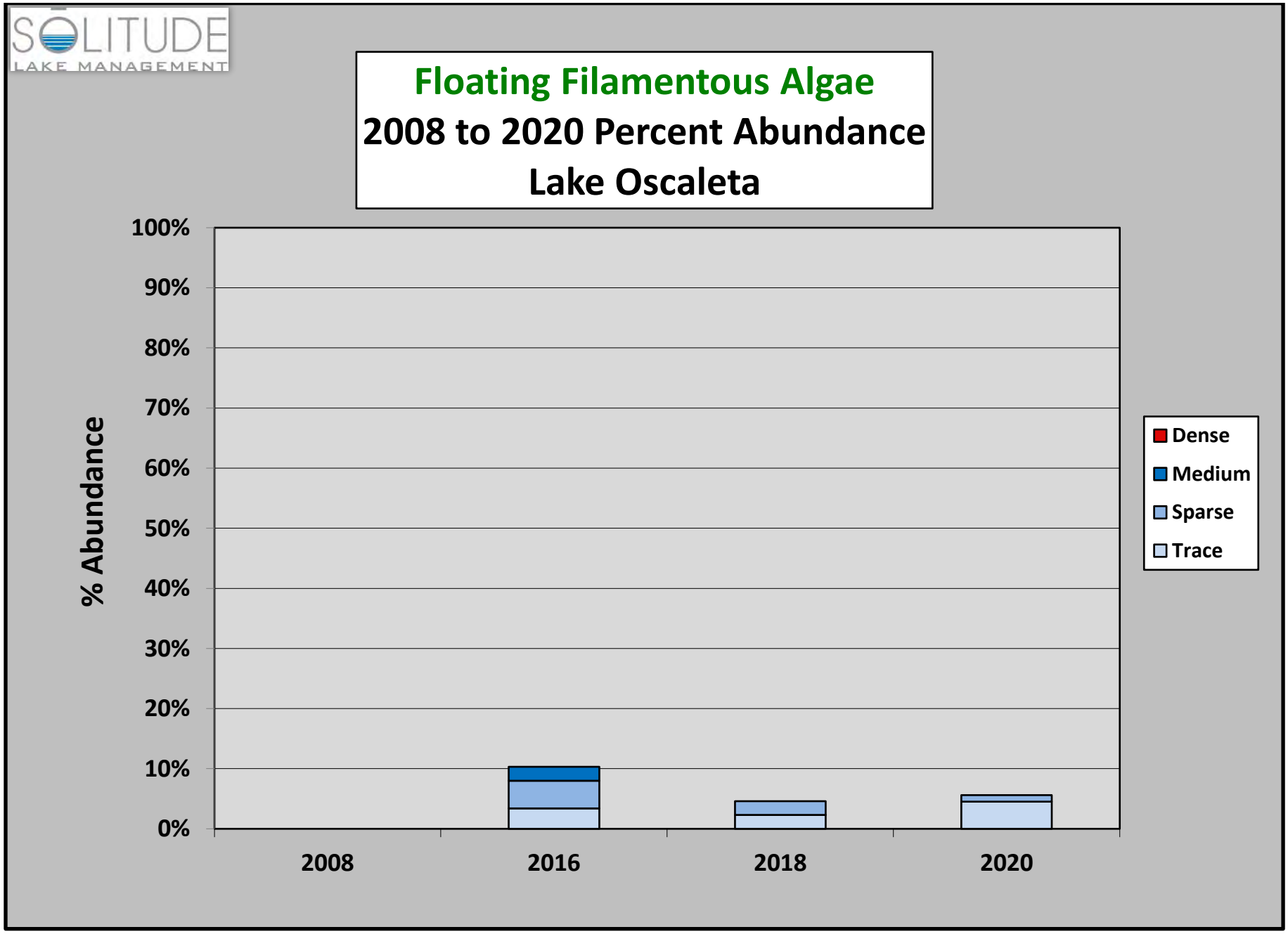

SOLITUDE
LAKE MANAGEMENT
Wild Celery (Vallisneria americana)
2008 to 2020 Percent Abundance
Lake Oscaleta
% Abundance
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2008
2016
2018
2020
Dense
Medium
Sparse
Trace

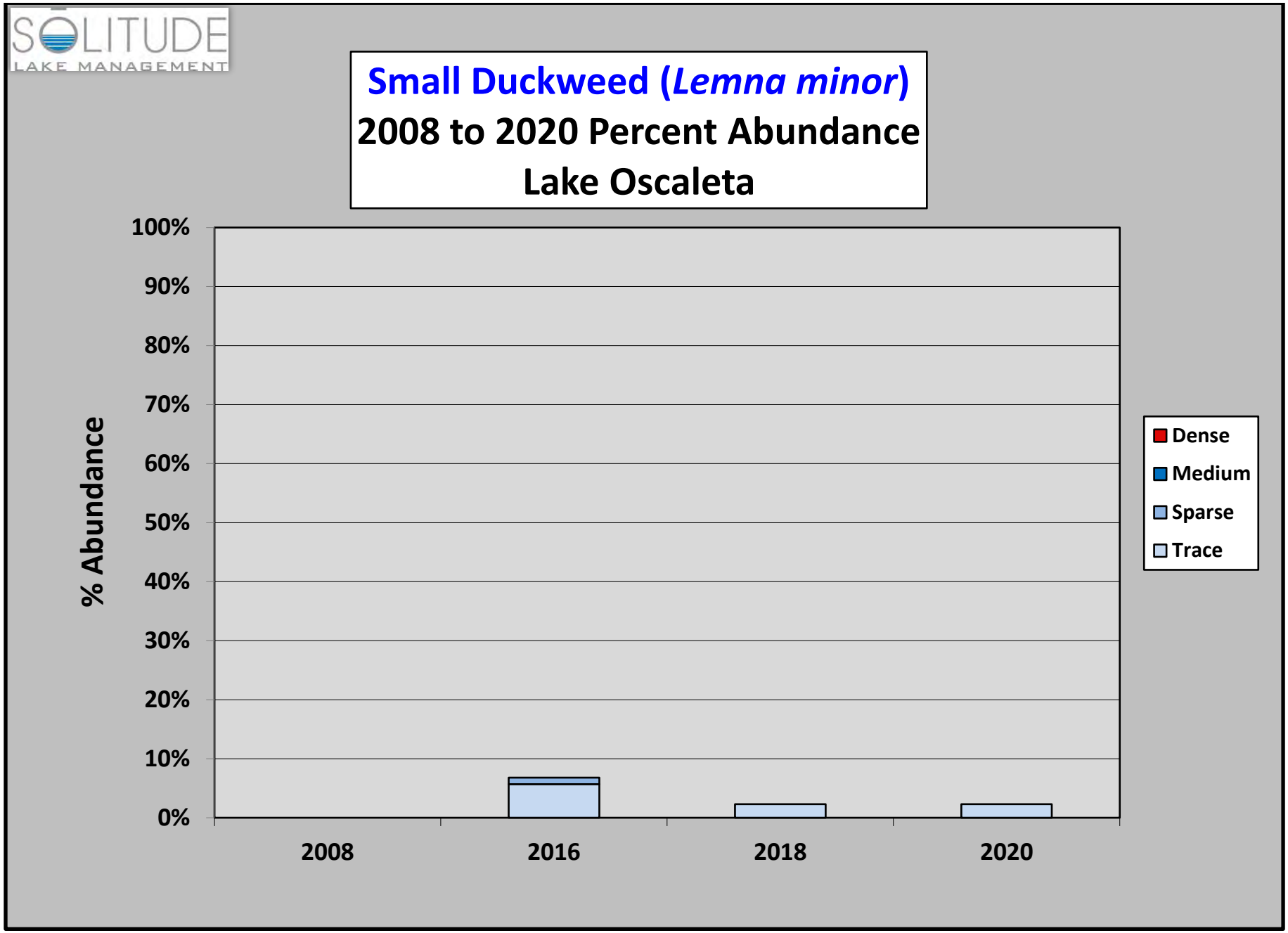

SOLITUDE
LAKE MANAGEMENT
Creeping Bladderwort (*Utricularia gibba*)
2008 to 2020 Percent Abundance
Lake Oscaleta
% Abundance
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2008
2016
2018
2020
Dense
Medium
Sparse
Trace

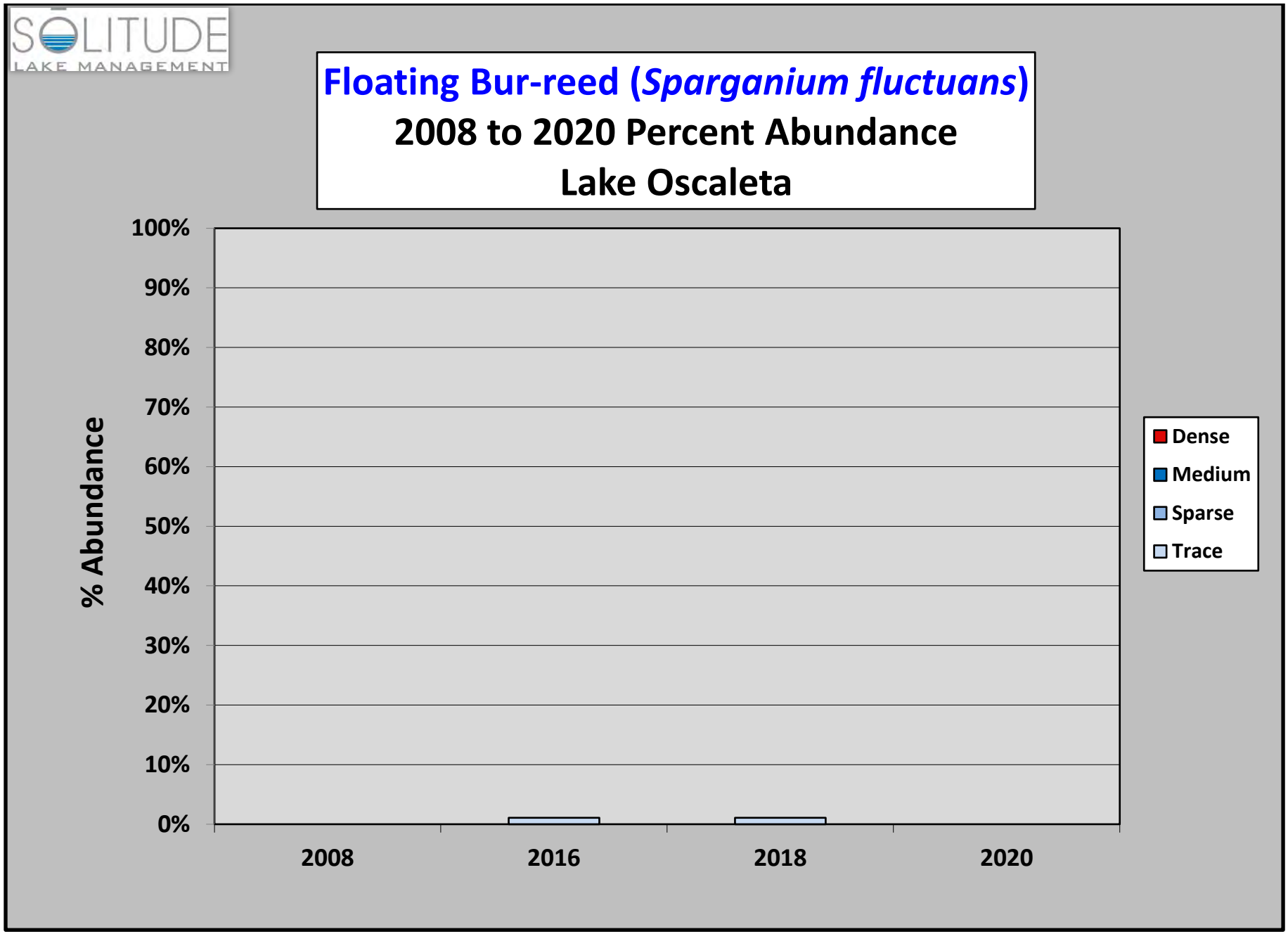

SOLITUDE
LAKE MANAGEMENT
Robbin's Pondweed (Potamogeton robbinsii)
2008 to 2020 Percent Abundance
Lake Oscaleta
% Abundance
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2008
2016
2018
2020
Dense
Medium
Sparse
Trace

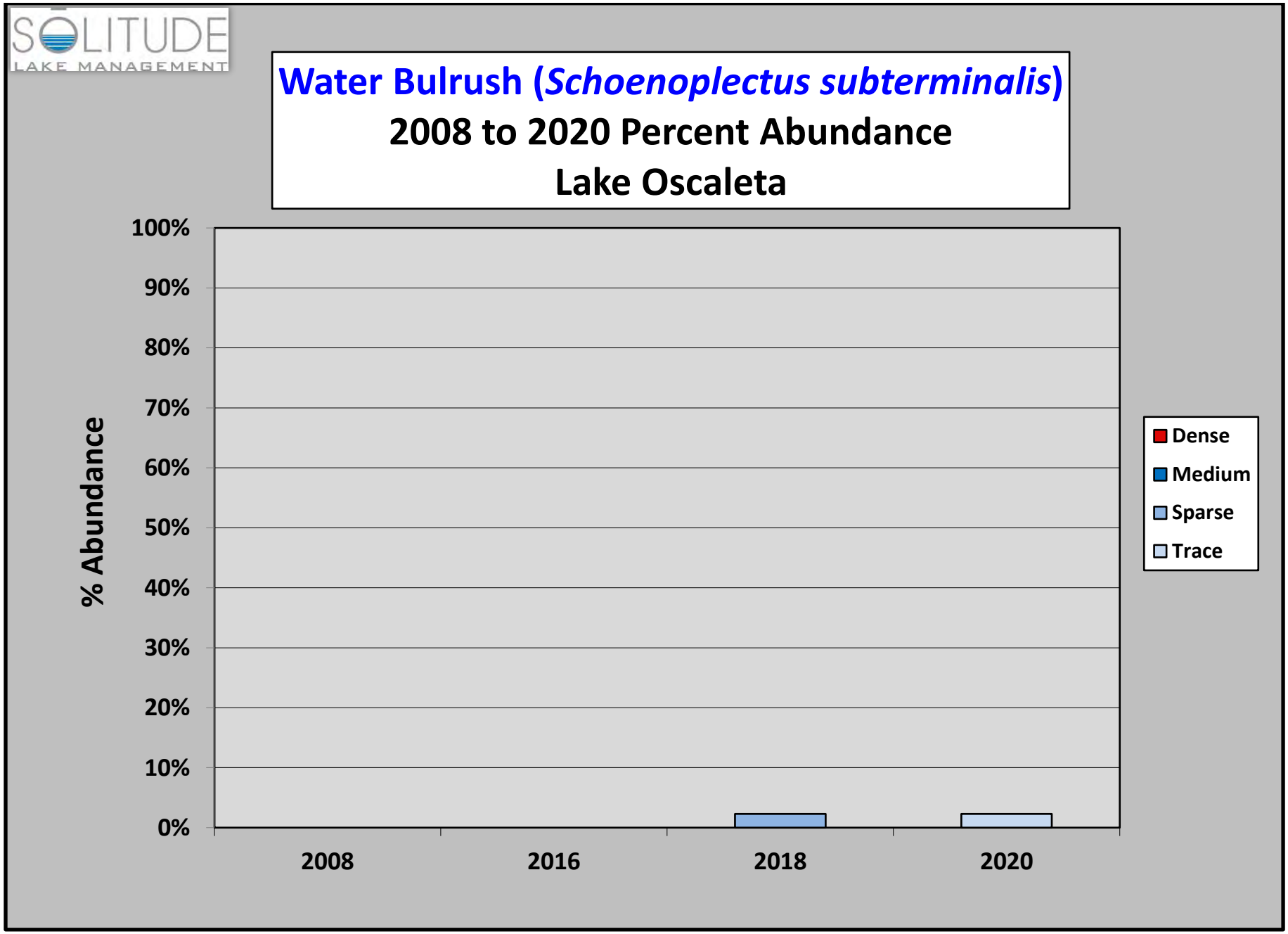

SOLITUDE
LAKE MANAGEMENT
Curly-leaf Pondweed (Potamogeton crispus)
2008 to 2020 Percent Abundance
Lake Oscaleta
% Abundance
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2008
2016
2018
2020
Dense
Medium
Sparse
Trace

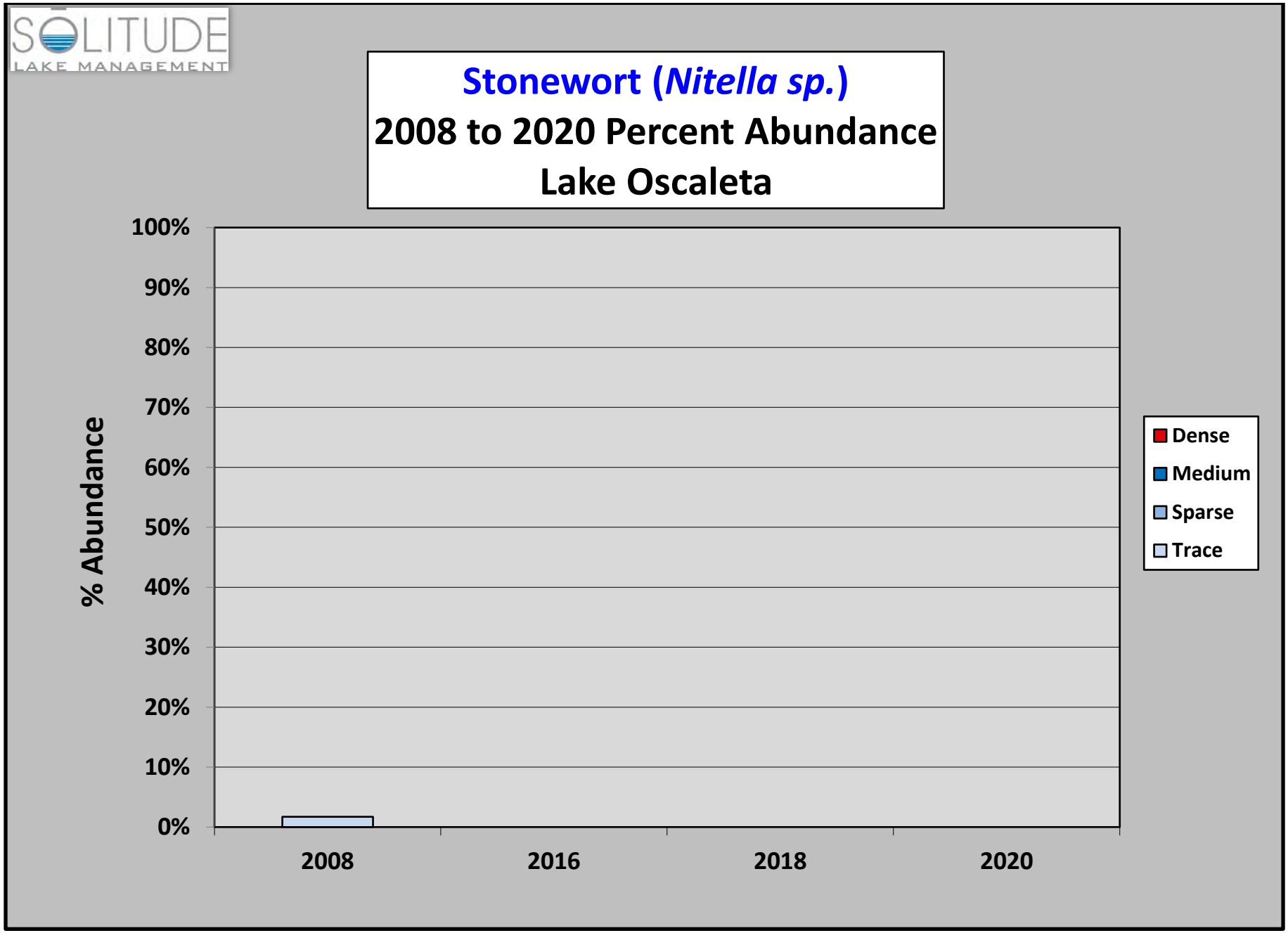

SOLITUDE
LAKE MANAGEMENT
Leafy Pondweed (Potamogeton foliosus)
2008 to 2020 Percent Abundance
Lake Oscaleta
% Abundance
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2008
2016
2018
2020
Dense
Medium
Sparse
Trace

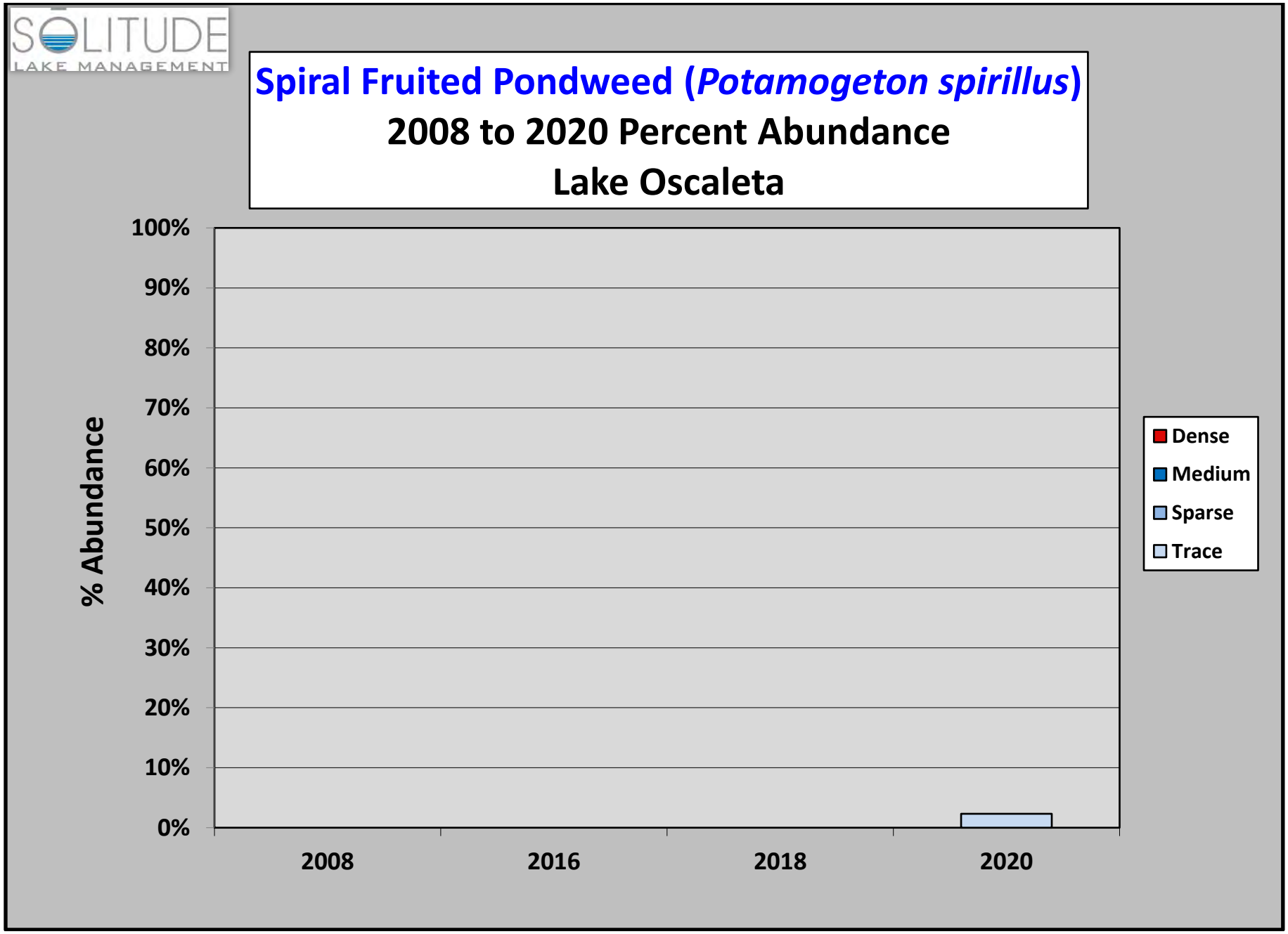

SOLITUDE
LAKE MANAGEMENT
Floating Filamentous Algae
2008 to 2020 Percent Abundance
Lake Oscaleta
% Abundance
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2008
2016
2018
2020
Dense
Medium
Sparse
Trace


SOLITUDE
LAKE MANAGEMENT
Small Duckweed (*Lemna minor*)
2008 to 2020 Percent Abundance
Lake Oscaleta
% Abundance
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2008
2016
2018
2020
Dense
Medium
Sparse
Trace

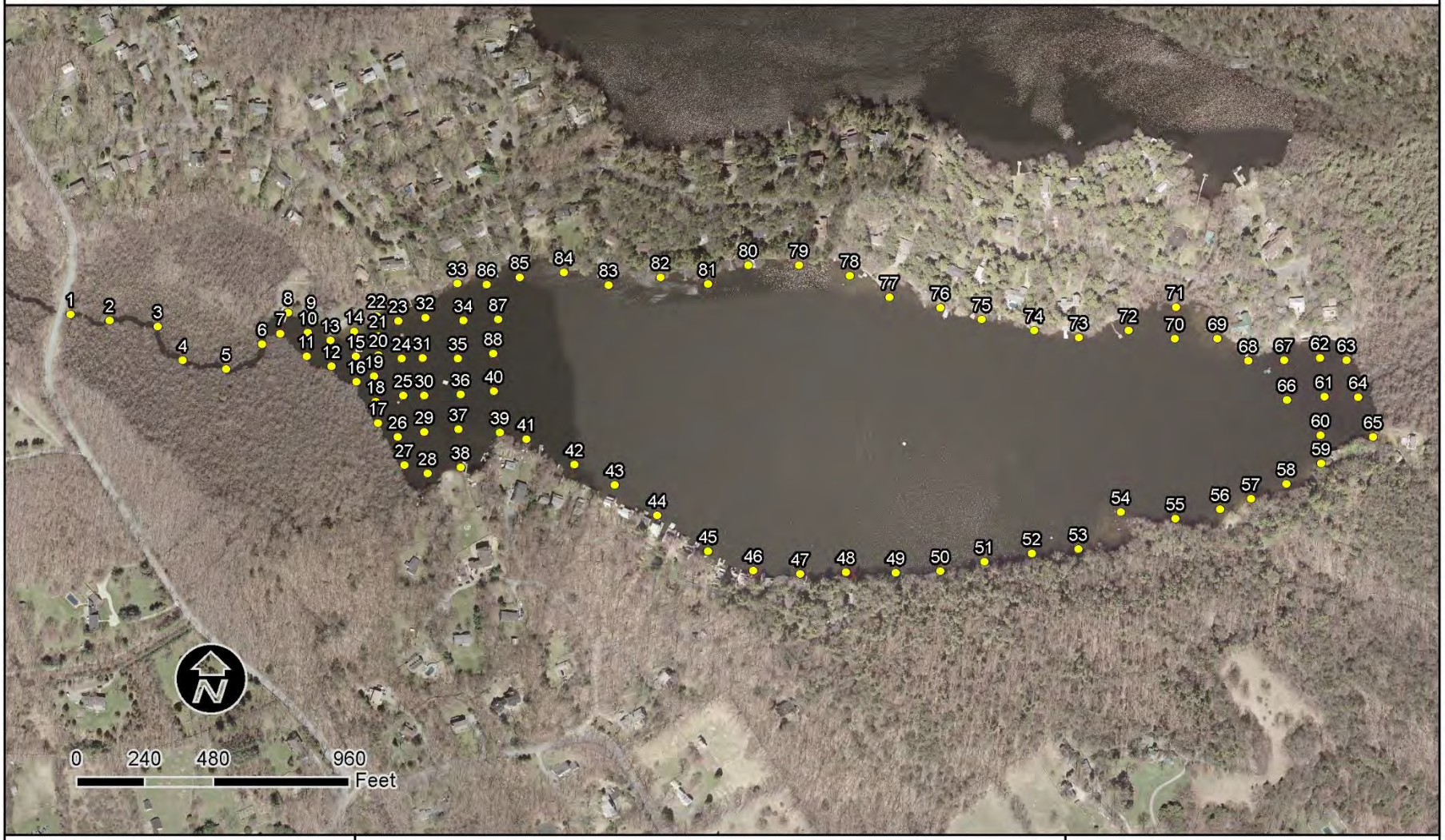

SOLITUDE
LAKE MANAGEMENT
Floating Bur-reed (Sparganium fluctuans)
2008 to 2020 Percent Abundance
Lake Oscaleta
% Abundance
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2008
2016
2018
2020
Dense
Medium
Sparse
Trace


SOLITUDE
LAKE MANAGEMENT
Water Bulrush (*Schoenoplectus subterminalis*)
2008 to 2020 Percent Abundance
Lake Oscaleta
% Abundance
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2008
2016
2018
2020
Dense
Medium
Sparse
Trace


SOLITUDE
LAKE MANAGEMENT
Stonewort (Nitella sp.)
2008 to 2020 Percent Abundance
Lake Oscaleta
% Abundance
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2008
2016
2018
2020
Dense
Medium
Sparse
Trace


SOLITUDE
LAKE MANAGEMENT
Spiral Fruited Pondweed (Potamogeton spirillus)
2008 to 2020 Percent Abundance
Lake Oscaleta
% Abundance
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2008
2016
2018
2020
Dense
Medium
Sparse
Trace

# Sample Point Location




**Lake Oscaleta**
**Aquatic Vegetation Survey**
**July 28, 2020**

Total Sample Sites: 88

Sample Point

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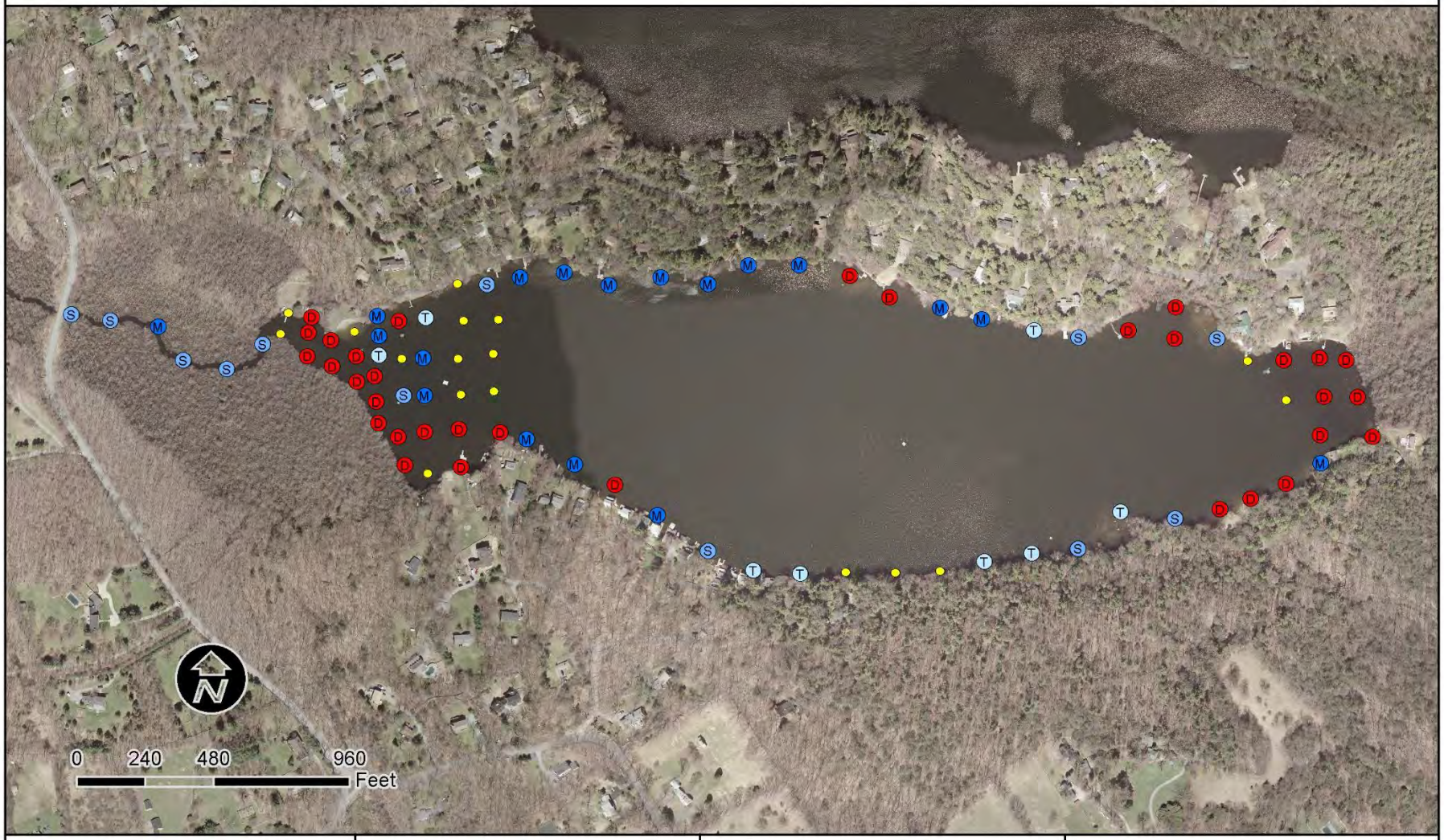
# Total Floating Vegetation Distribution




**Lake Oscaleta**
**Aquatic Vegetation Survey**
**July 28, 2020**

Total Sample Sites: 88

Plant Density Legend

- = No Plants
- T = Trace Plants
- S = Sparse Plants
- M = Medium Plants
- D = Dense Plants

Percent Distribution

| Abundance | Sites | Percent |
|---|---|---|
| Total | 71 | 81% |
| Trace | 8 | 11% |
| Sparse | 12 | 17% |
| Medium | 18 | 25% |
| Dense | 33 | 46% |

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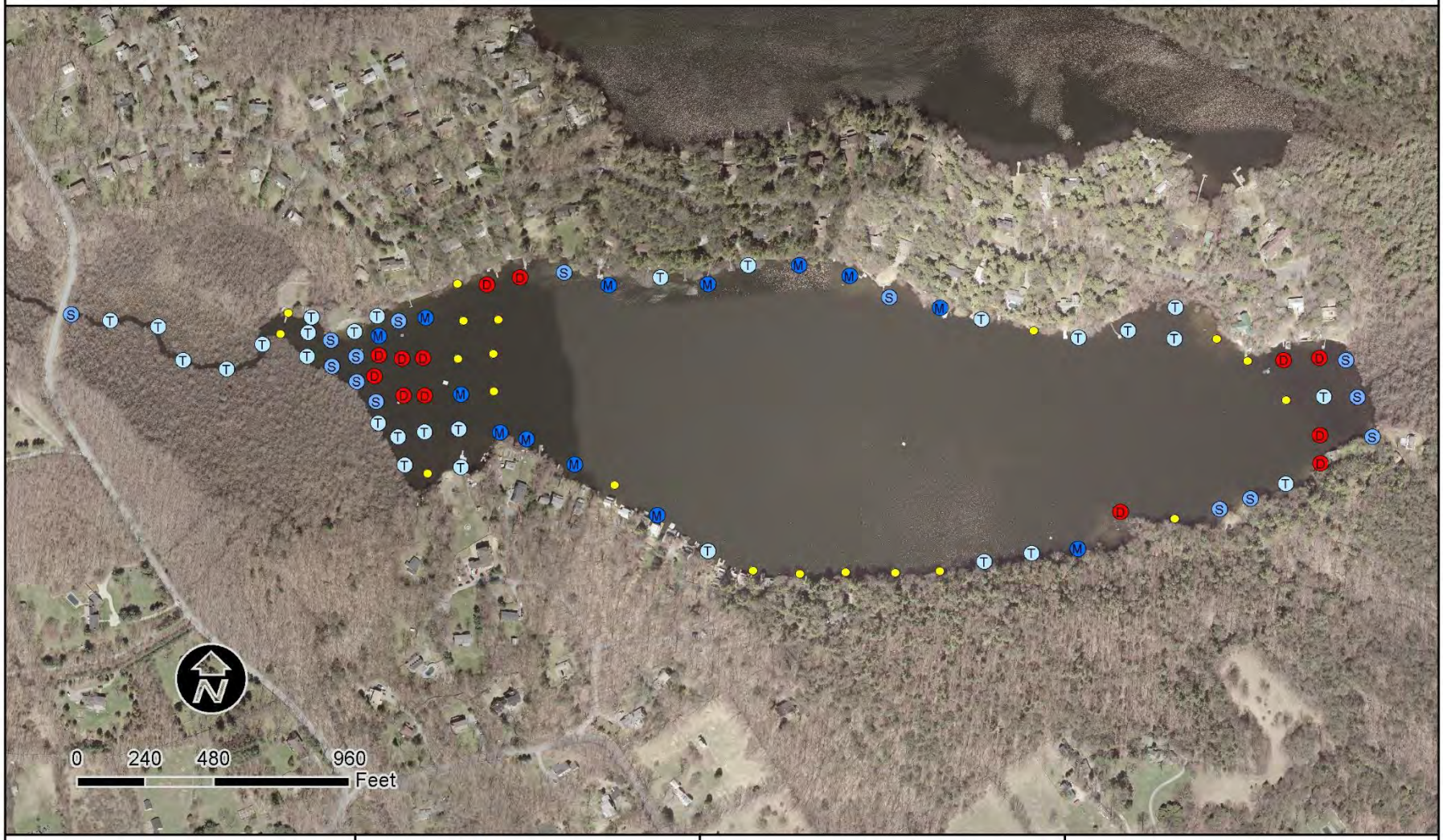
# Total Submersed Vegetation Distribution




**Lake Oscaleta**
**Aquatic Vegetation Survey**
**July 28, 2020**

Total Sample Sites: 88

Plant Density Legend

- = No Plants
- T = Trace Plants
- S = Sparse Plants
- M = Medium Plants
- D = Dense Plants

Percent Text Distribution

| Abundance | Sites | Percent |
|---|---|---|
| Total | 68 | 77% |
| Trace | 28 | 41% |
| Sparse | 14 | 21% |
| Medium | 13 | 19% |
| Dense | 13 | 19% |

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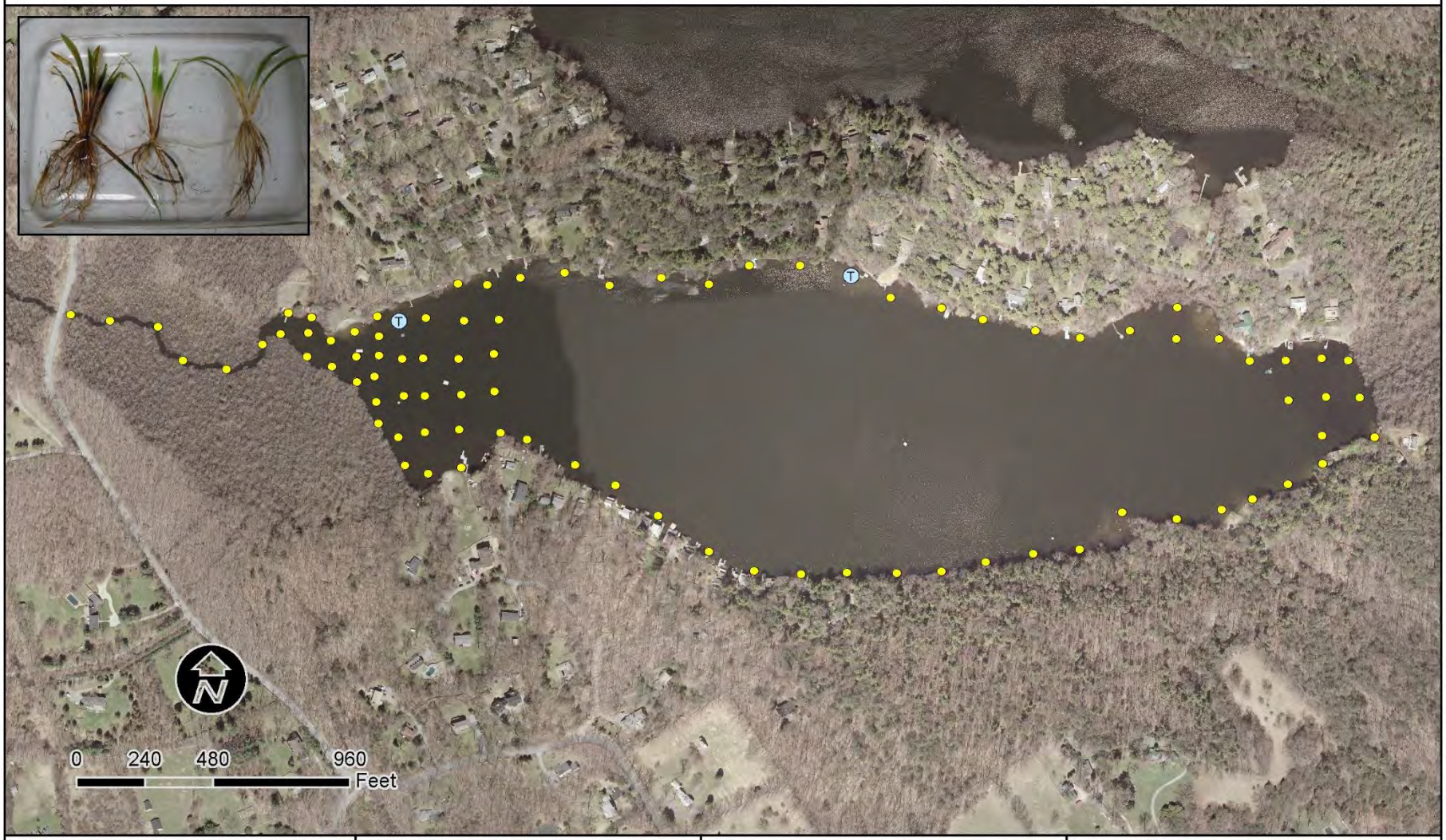
# Arrowhead Rosette (*Sagittaria* sp.) Distribution




**Lake Oscaleta**
**Aquatic Vegetation Survey**
**July 28, 2020**

Total Sample Sites: 88

Plant Density Legend

- = No Plants
- = Trace Plants
- = Sparse Plants
- = Medium Plants
- = Dense Plants

Percent Distribution

| Abundance | Sites | Percent |
|---|---|---|
| Total | 2 | 2% |
| Trace | 2 | 100% |
| Sparse | 0 | 0% |
| Medium | 0 | 0% |
| Dense | 0 | 0% |

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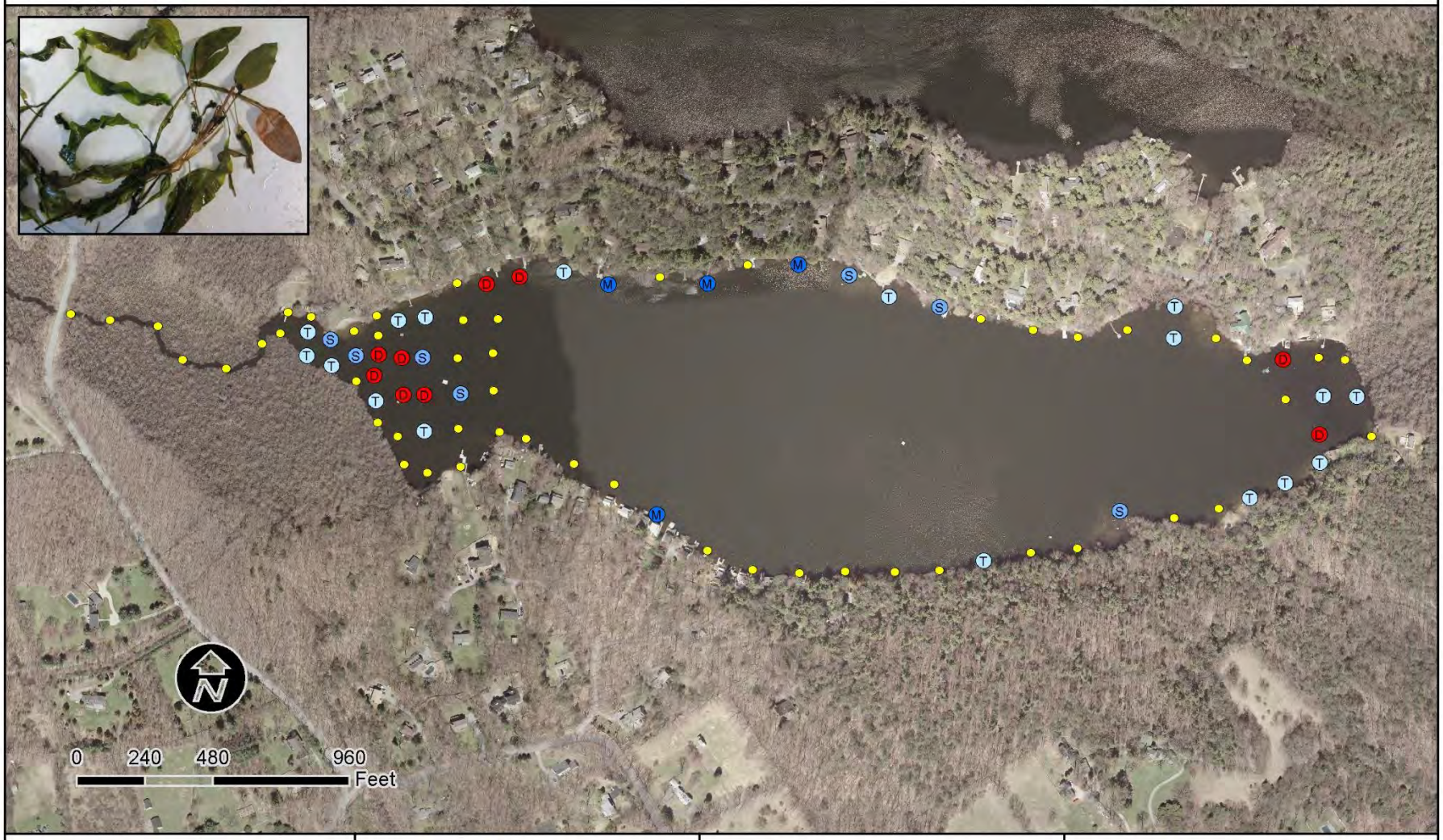
# Bassweed (*Potamogeton amplifolius*) Distribution




**Lake Oscaleta**
**Aquatic Vegetation Survey**
**July 28, 2020**

Total Sample Sites: 88

Plant Density Legend

- = No Plants
- T = Trace Plants
- S = Sparse Plants
- M = Medium Plants
- D = Dense Plants

Percent Distribution

| Abundance | Sites | Percent |
|---|---|---|
| Total | 37 | 42% |
| Trace | 17 | 46% |
| Sparse | 7 | 19% |
| Medium | 4 | 11% |
| Dense | 9 | 24% |

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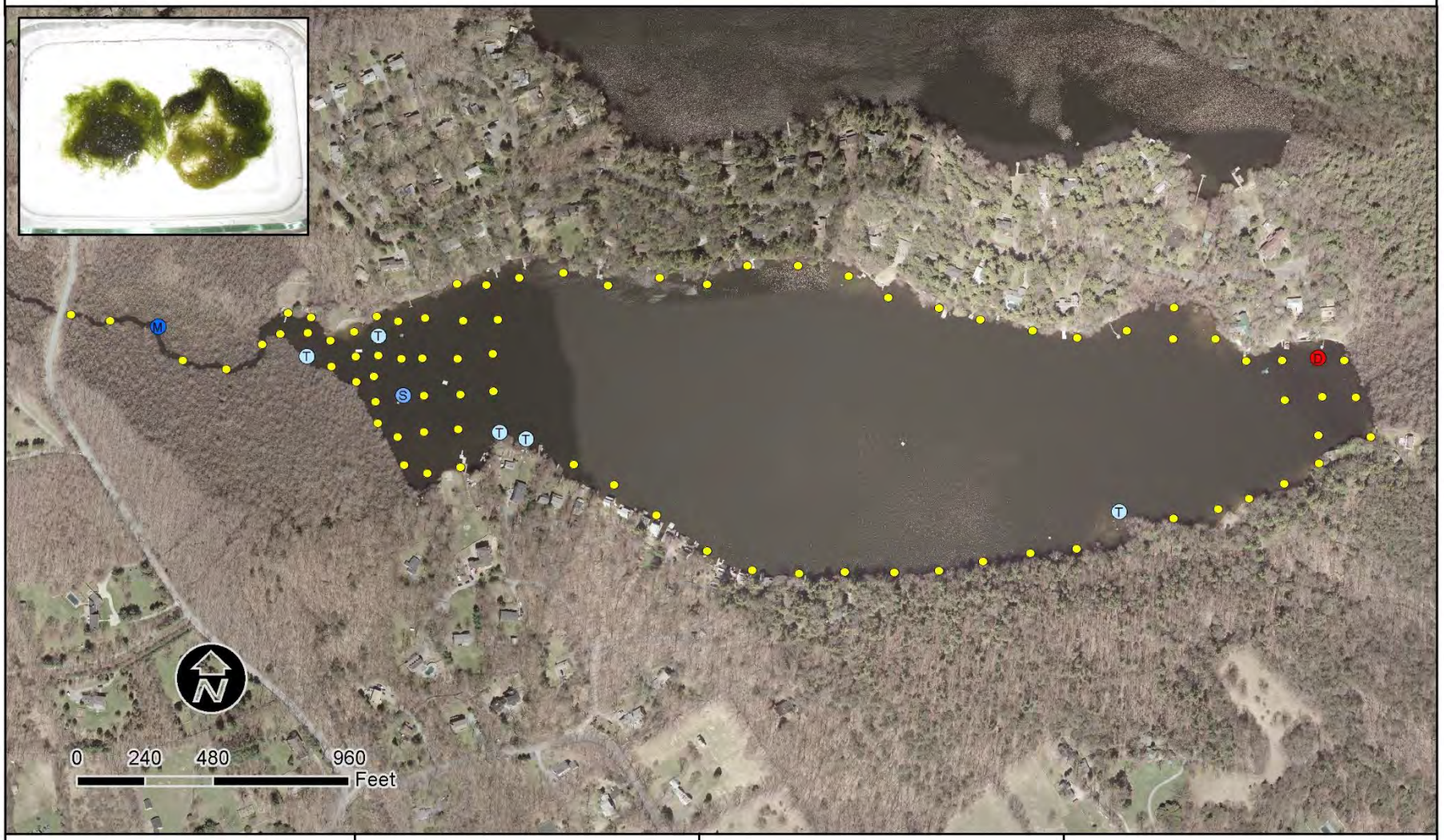
# Benthic Filamentous Algae Distribution




**Lake Oscaleta**
**Aquatic Vegetation Survey**
**July 28, 2020**

Total Sample Sites: 88

Plant Density Legend

- = No Plants
- = Trace Plants
- = Sparse Plants
- = Medium Plants
- = Dense Plants

Percent Distribution

| Abundance | Sites | Percent |
|---|---|---|
| Total | 8 | 9% |
| Trace | 5 | 63% |
| Sparse | 1 | 13% |
| Medium | 1 | 13% |
| Dense | 1 | 13% |

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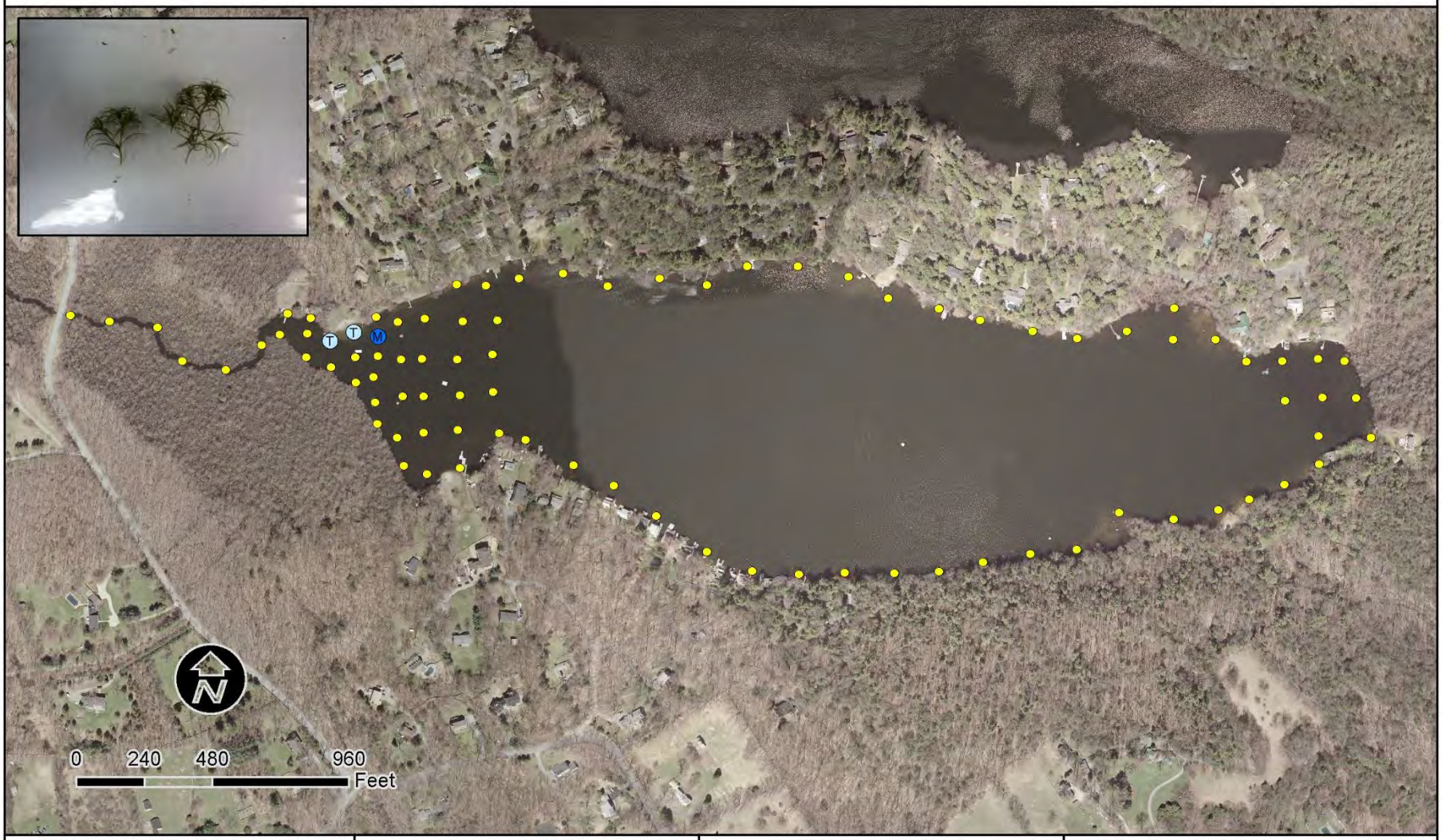
# Brittle Naiad (*Najas minor*) Distribution




**Lake Oscaleta**
**Aquatic Vegetation Survey**
**July 28, 2020**

Total Sample Sites: 88

Plant Density Legend

- = No Plants
- = Trace Plants
- = Sparse Plants
- = Medium Plants
- = Dense Plants

Percent Distribution

| Abundance | Sites | Percent |
|---|---|---|
| Total | 3 | 3% |
| Trace | 2 | 67% |
| Sparse | 0 | 0% |
| Medium | 1 | 33% |
| Dense | 0 | 0% |

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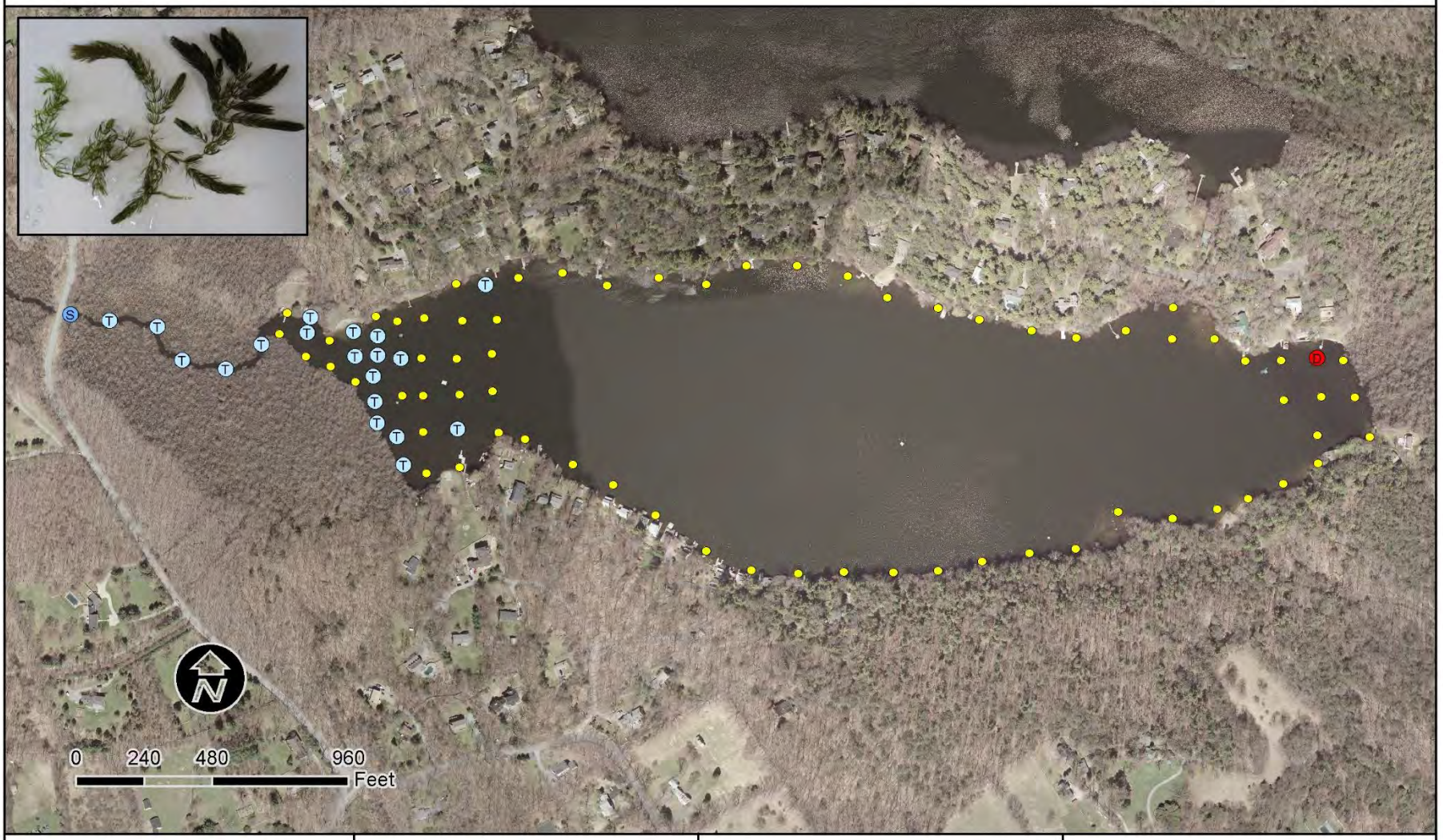
# Coontail (*Ceratophyllum demersum*) Distribution




**Lake Oscaleta**
**Aquatic Vegetation Survey**
**July 28, 2020**

Total Sample Sites: 88

Plant Density Legend

- = No Plants
- = Trace Plants
- = Sparse Plants
- = Medium Plants
- = Dense Plants

Percent Distribution

| Abundance | Sites | Percent |
|---|---|---|
| Total | 21 | 24% |
| Trace | 19 | 90% |
| Sparse | 1 | 5% |
| Medium | 0 | 0% |
| Dense | 1 | 5% |

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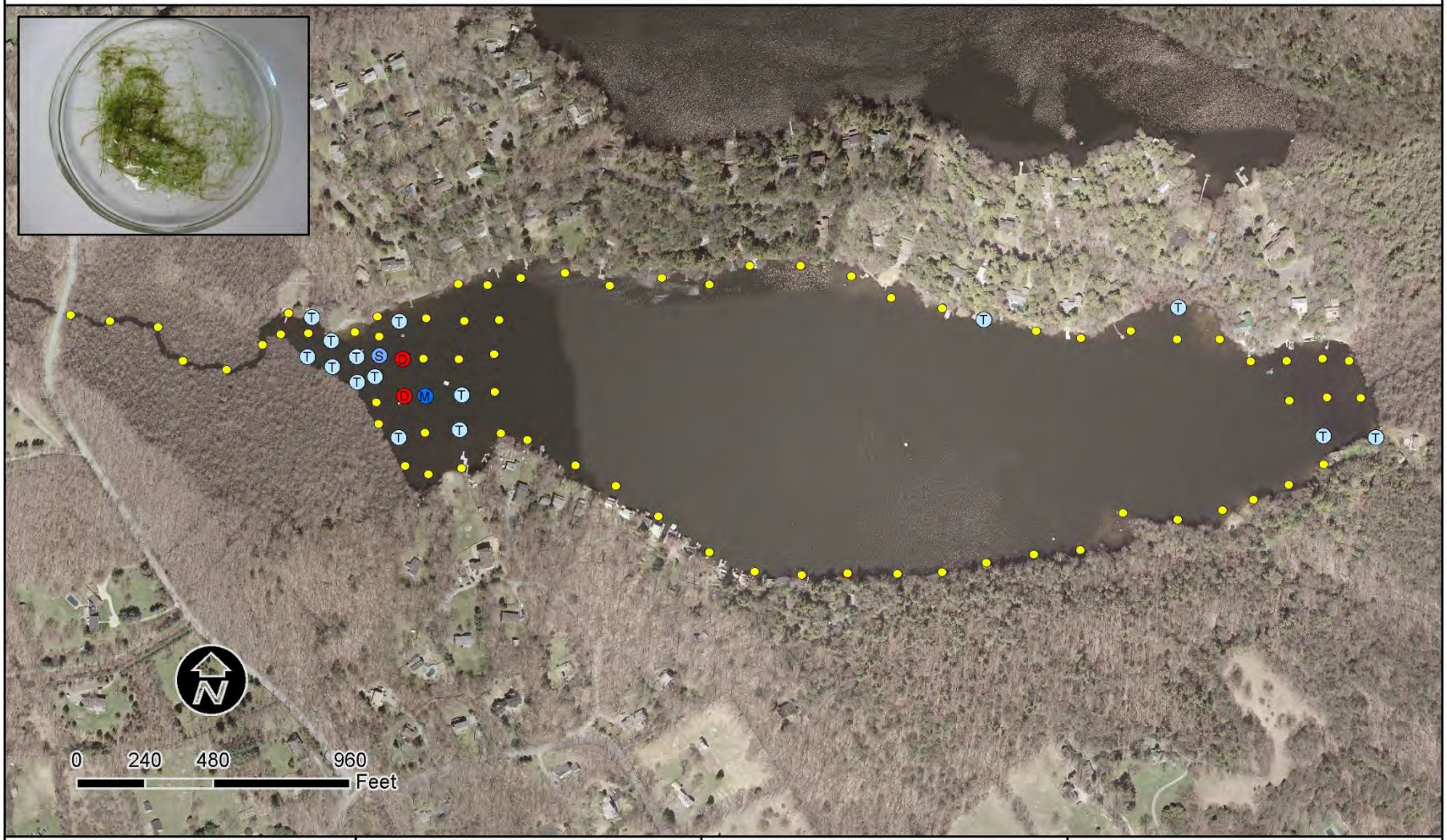
# Creeping Bladderwort (*Utricularia gibba*) Distribution




**Lake Oscaleta**
**Aquatic Vegetation Survey**
**July 28, 2020**

Total Sample Sites: 88

Plant Density Legend

- = No Plants
- = Trace Plants
- = Sparse Plants
- = Medium Plants
- = Dense Plants

Percent Distribution

| Abundance | Sites | Percent |
|---|---|---|
| Total | 19 | 22% |
| Trace | 15 | 79% |
| Sparse | 1 | 5% |
| Medium | 1 | 5% |
| Dense | 2 | 11% |

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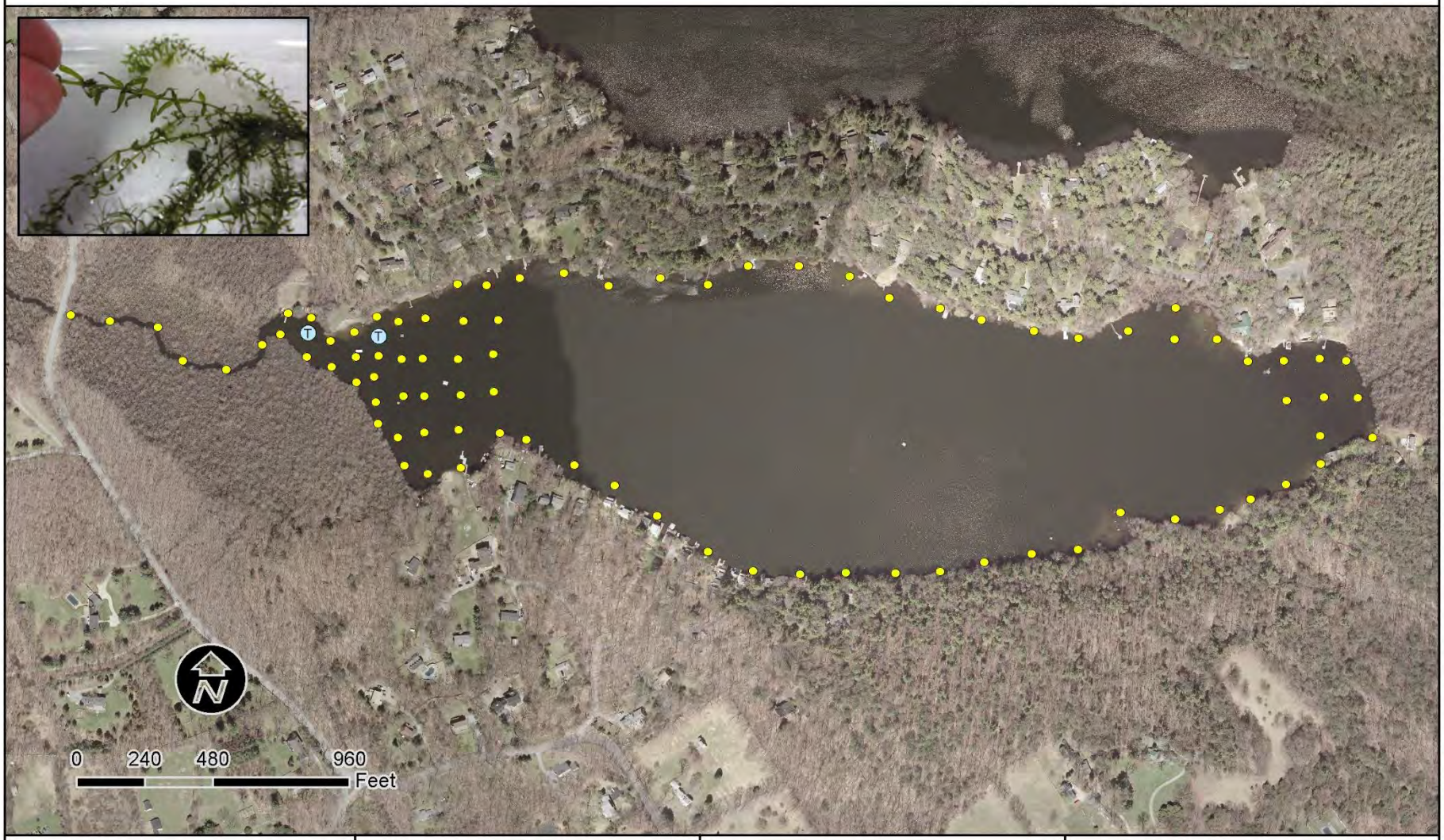
# Common Waterweed (*Elodea canadensis*) Distribution




**Lake Oscaleta**
**Aquatic Vegetation Survey**
**July 28, 2020**

Total Sample Sites: 88

Plant Density Legend

- = No Plants
- T = Trace Plants
- S = Sparse Plants
- = Medium Plants
- = Dense Plants

Percent Distribution

| Abundance | Sites | Percent |
|---|---|---|
| Total | 2 | 2% |
| Trace | 2 | 100% |
| Sparse | 0 | 0% |
| Medium | 0 | 0% |
| Dense | 0 | 0% |

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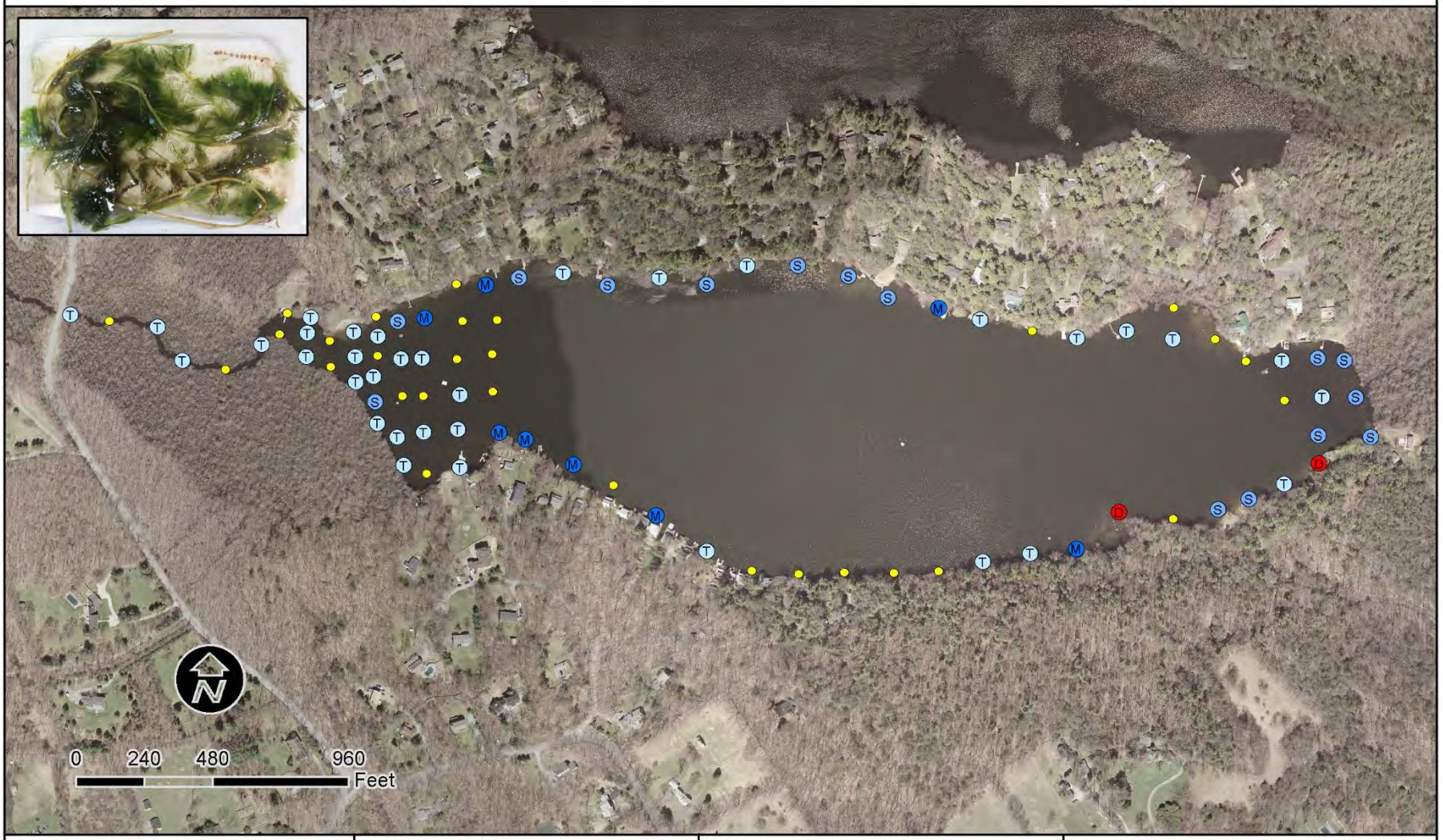
# Eurasian Water Milfoil (*Myriophyllum spicatum*) Distribution




**Lake Oscaleta**
**Aquatic Vegetation Survey**
**July 28, 2020**

Total Sample Sites: 88

Plant Density Legend

- = No Plants
- T = Trace Plants
- S = Sparse Plants
- M = Medium Plants
- D = Dense Plants

Percent Distribution

| Abundance | Sites | Percent |
|---|---|---|
| Total | 59 | 67% |
| Trace | 34 | 58% |
| Sparse | 15 | 25% |
| Medium | 8 | 14% |
| Dense | 2 | 3% |

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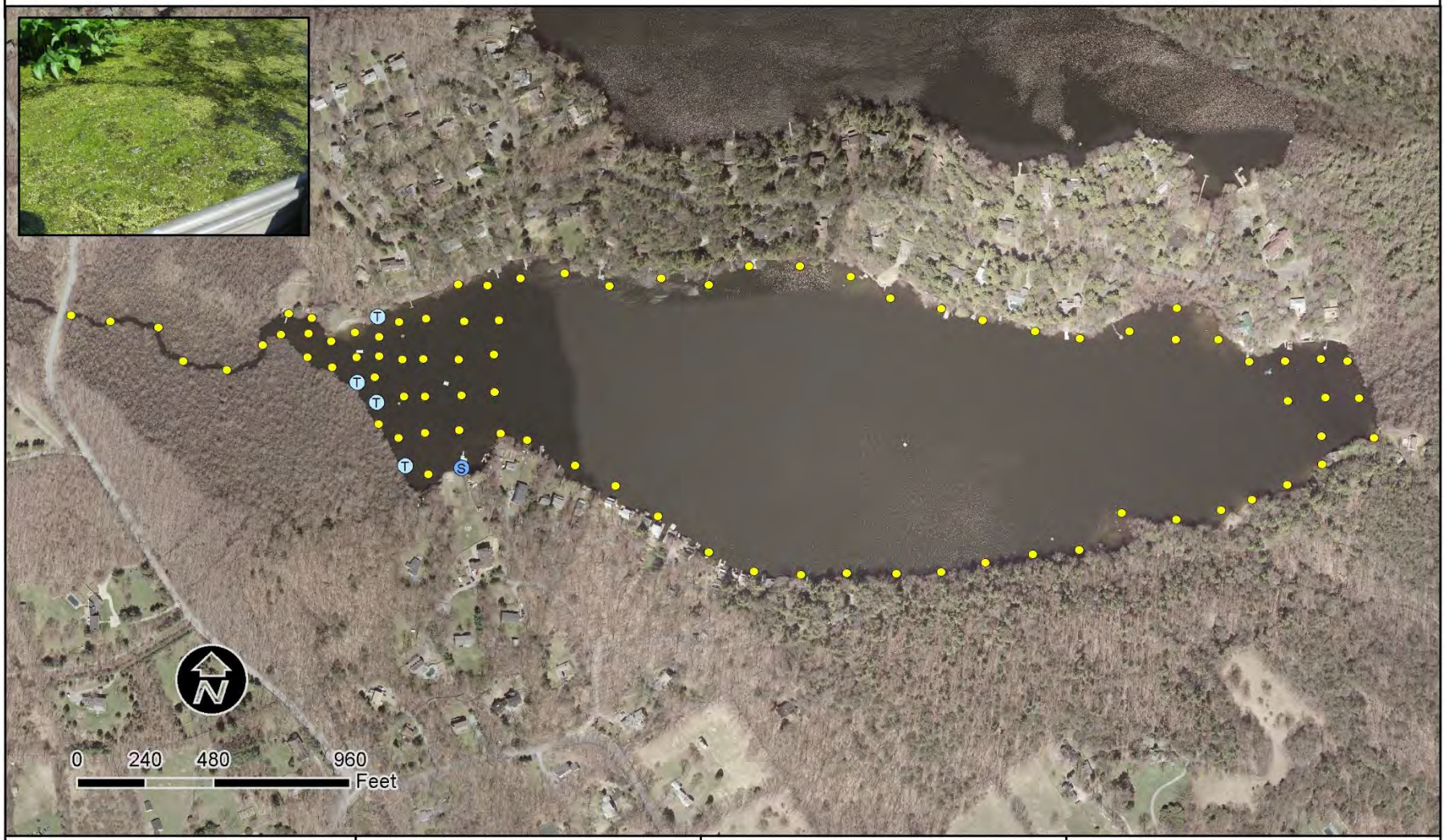
# Floating Filamentous Algae Distribution




**Lake Oscaleta**
**Aquatic Vegetation Survey**
**July 28, 2020**

Total Sample Sites: 88

Plant Density Legend

- = No Plants
- = Trace Plants
- = Sparse Plants
- = Medium Plants
- = Dense Plants

Percent Distribution

| Abundance | Sites | Percent |
|---|---|---|
| Total | 5 | 6% |
| Trace | 4 | 80% |
| Sparse | 1 | 20% |
| Medium | 0 | 0% |
| Dense | 0 | 0% |

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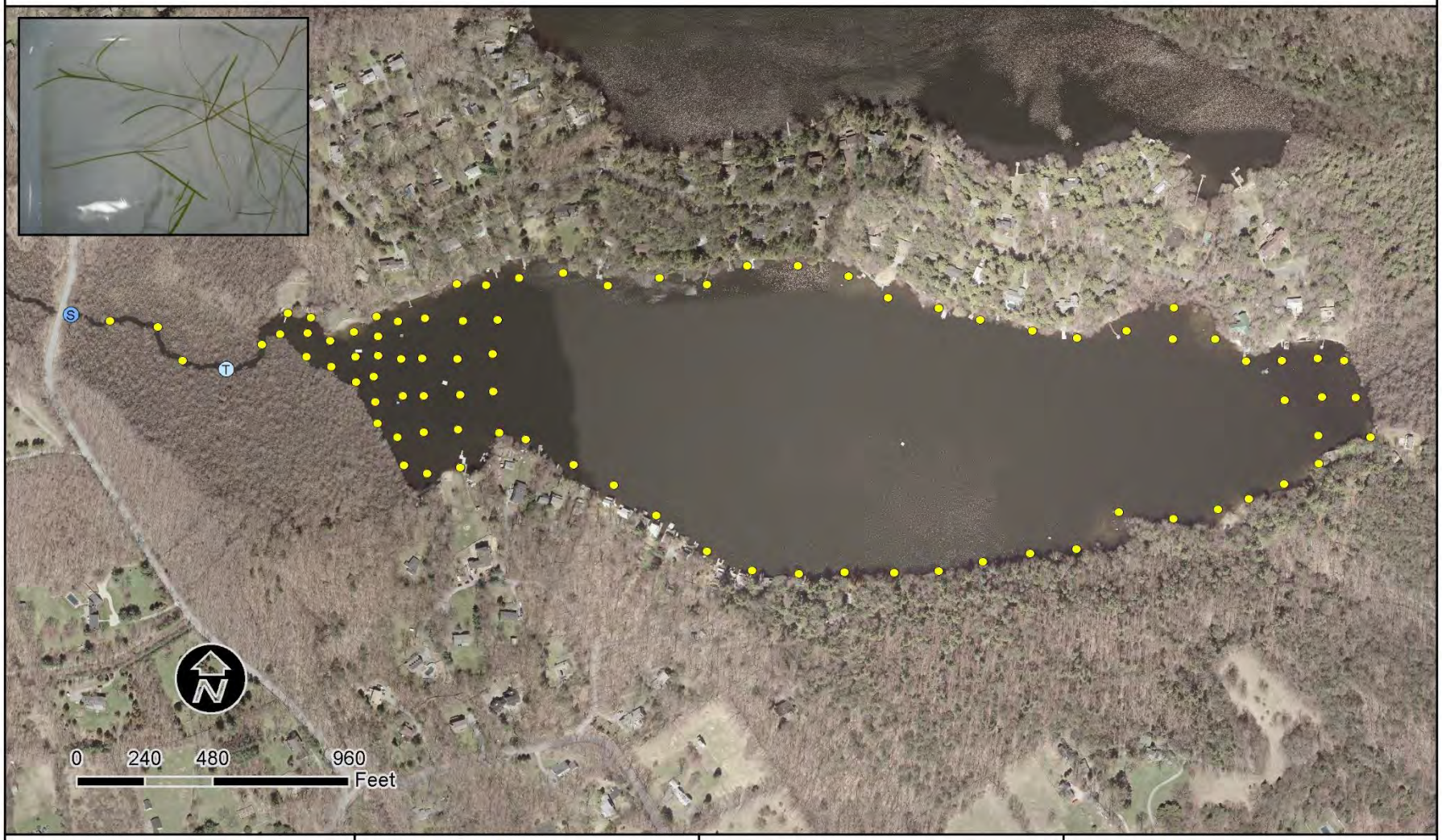
# Leafy Pondweed (*Potamogeton foliosus*) Distribution




**Lake Oscaleta**
**Aquatic Vegetation Survey**
**July 28, 2020**

Total Sample Sites: 88

Plant Density Legend

- = No Plants
- T = Trace Plants
- S = Sparse Plants
- M = Medium Plants
- = Dense Plants

Percent Distribution

| Abundance | Sites | Percent |
|---|---|---|
| Total | 2 | 2% |
| Trace | 1 | 50% |
| Sparse | 1 | 50% |
| Medium | 0 | 0% |
| Dense | 0 | 0% |

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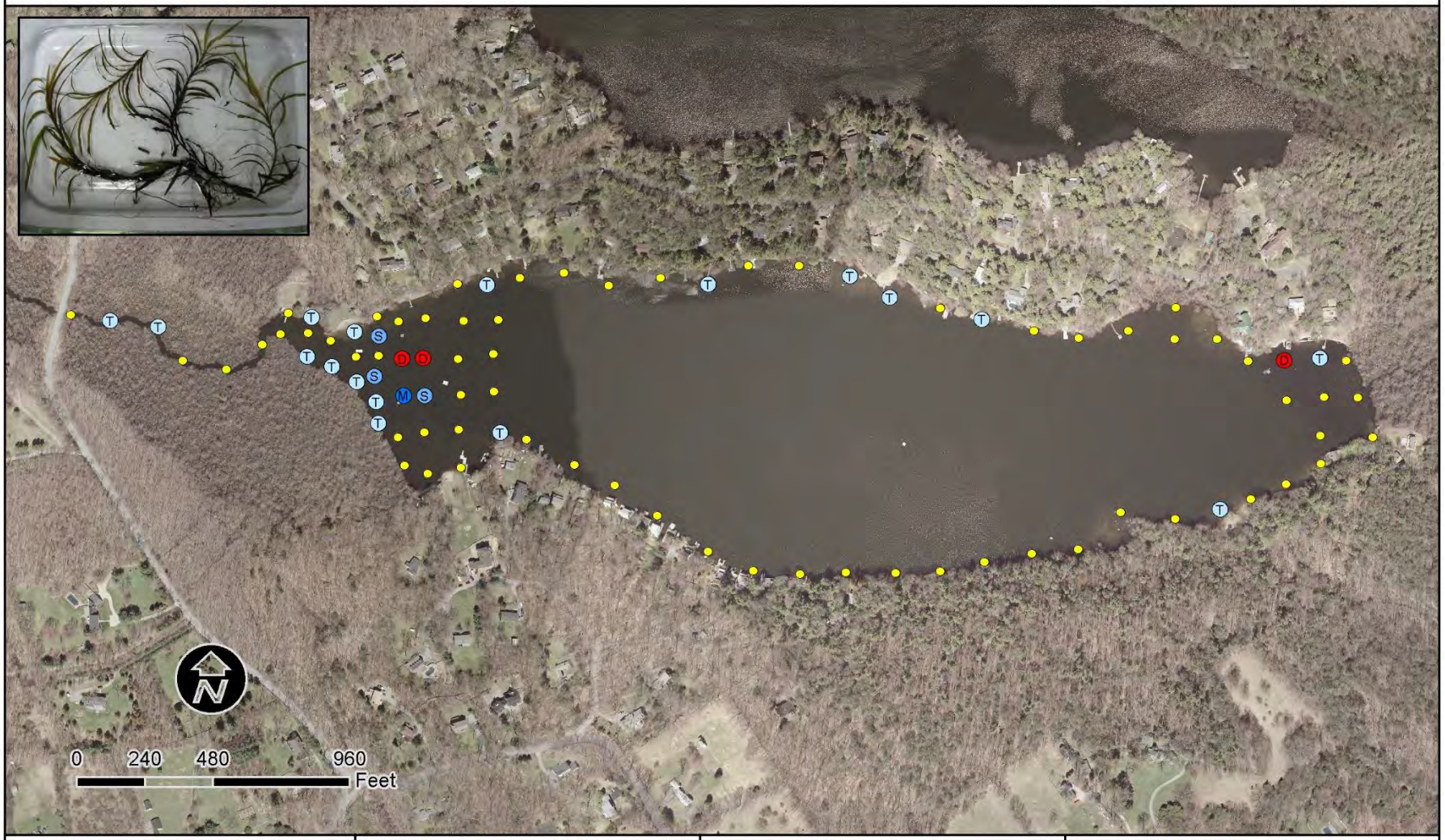
# Robbin's Pondweed (*Potamogeton robbinsii*) Distribution




**Lake Oscaleta**
**Aquatic Vegetation Survey**
**July 28, 2020**

Total Sample Sites: 88

Plant Density Legend

- = No Plants
- = Trace Plants
- = Sparse Plants
- = Medium Plants
- = Dense Plants

Percent Distribution

| Abundance | Sites | Percent |
|---|---|---|
| Total | 24 | 27% |
| Trace | 17 | 71% |
| Sparse | 3 | 13% |
| Medium | 1 | 4% |
| Dense | 3 | 13% |

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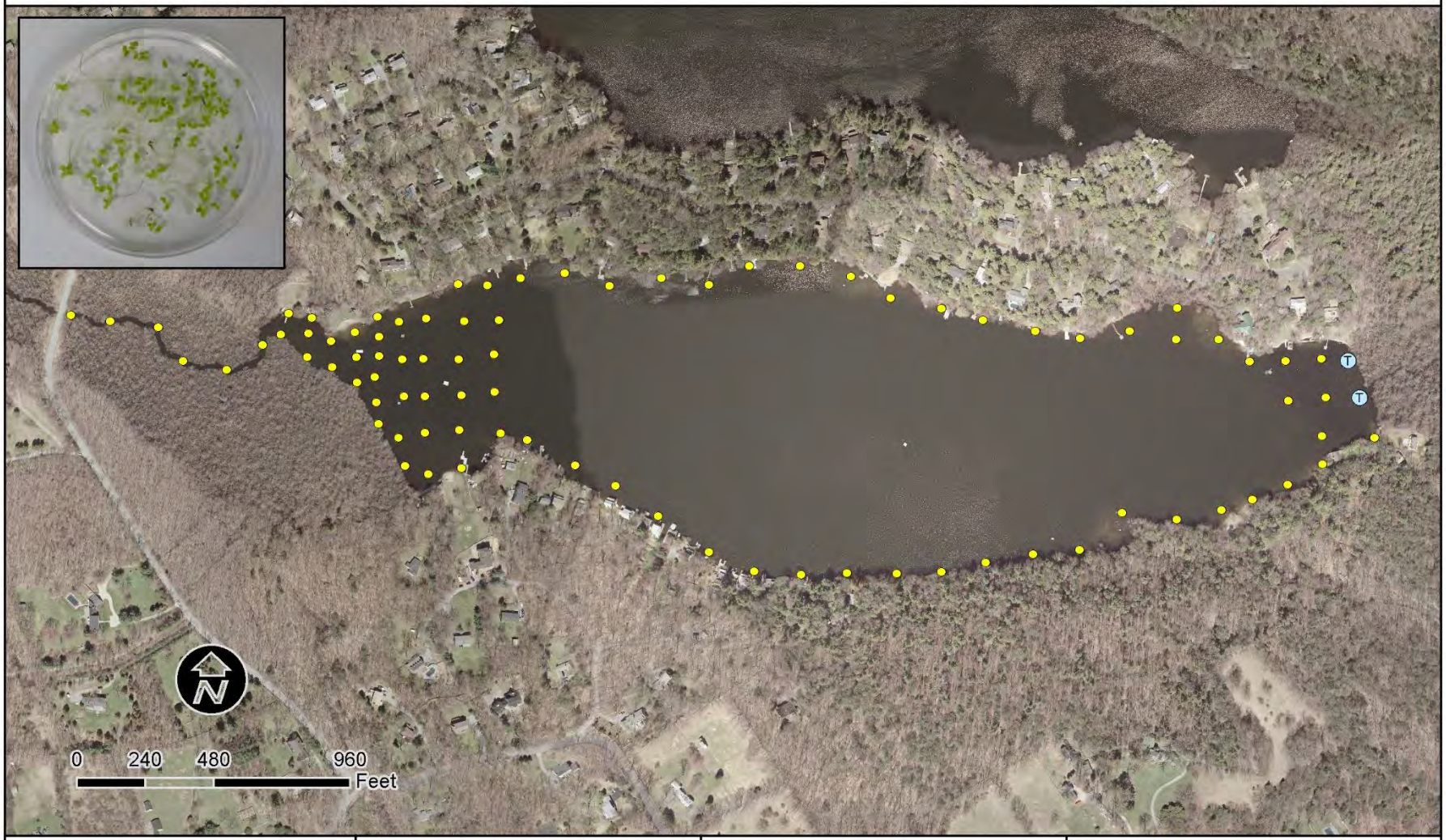
# Small Duckweed (*Lemna minor*) Distribution




**Lake Oscaleta**
**Aquatic Vegetation Survey**
**July 28, 2020**

Total Sample Sites: 88

Plant Density Legend

- = No Plants
- = Trace Plants
- = Sparse Plants
- = Medium Plants
- = Dense Plants

Percent Distribution

| Abundance | Sites | Percent |
|---|---|---|
| Total | 2 | 2% |
| Trace | 2 | 100% |
| Sparse | 0 | 0% |
| Medium | 0 | 0% |
| Dense | 0 | 0% |

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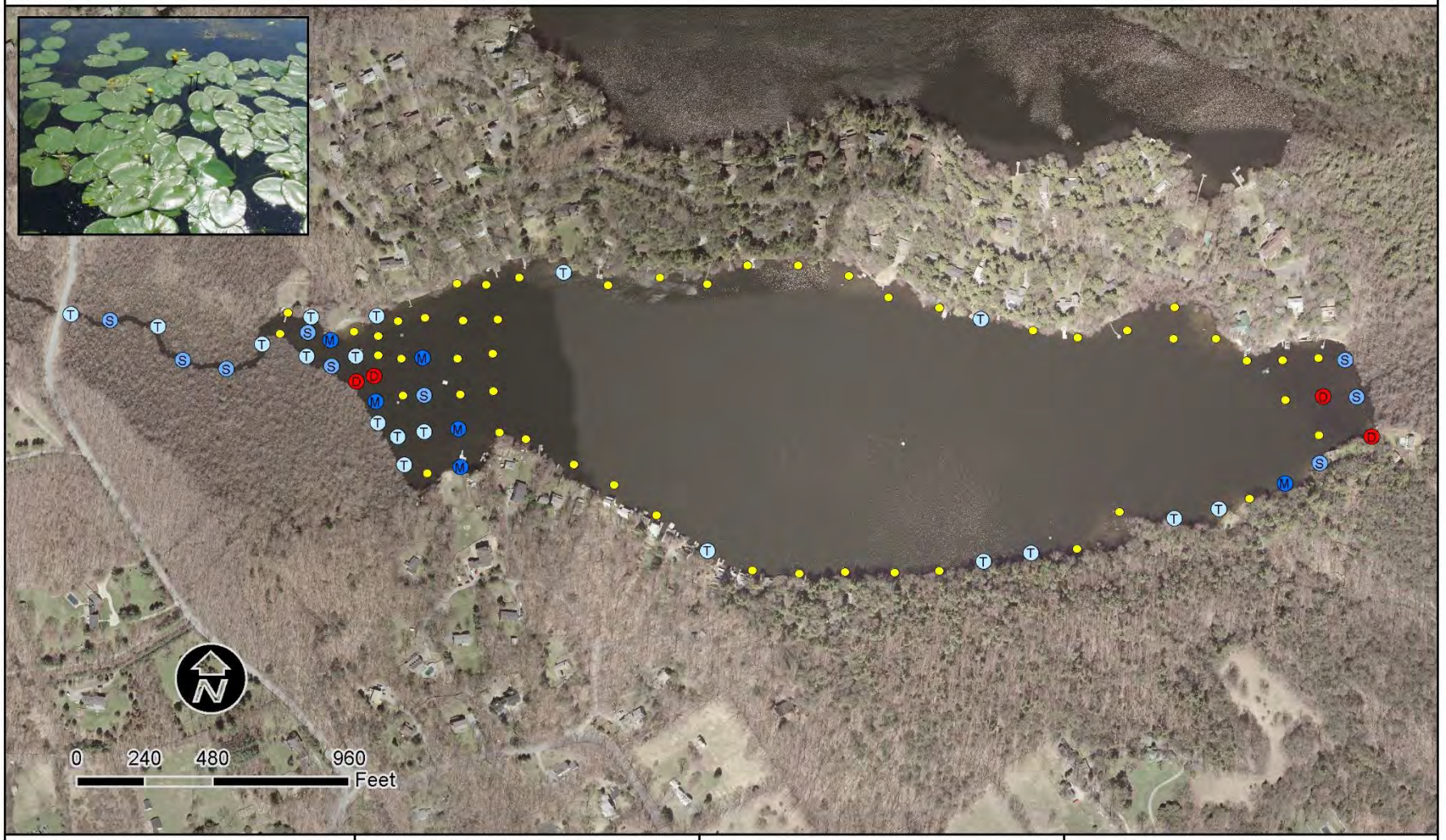
# Spatterdock (*Nuphar variegata*) Distribution




**Lake Oscaleta**
**Aquatic Vegetation Survey**
**July 28, 2020**

Total Sample Sites: 88

Plant Density Legend

- = No Plants
- = Trace Plants
- = Sparse Plants
- = Medium Plants
- = Dense Plants

Percent Distribution

| Abundance | Sites | Percent |
|---|---|---|
| Total | 37 | 42% |
| Trace | 18 | 49% |
| Sparse | 9 | 24% |
| Medium | 6 | 16% |
| Dense | 4 | 11% |

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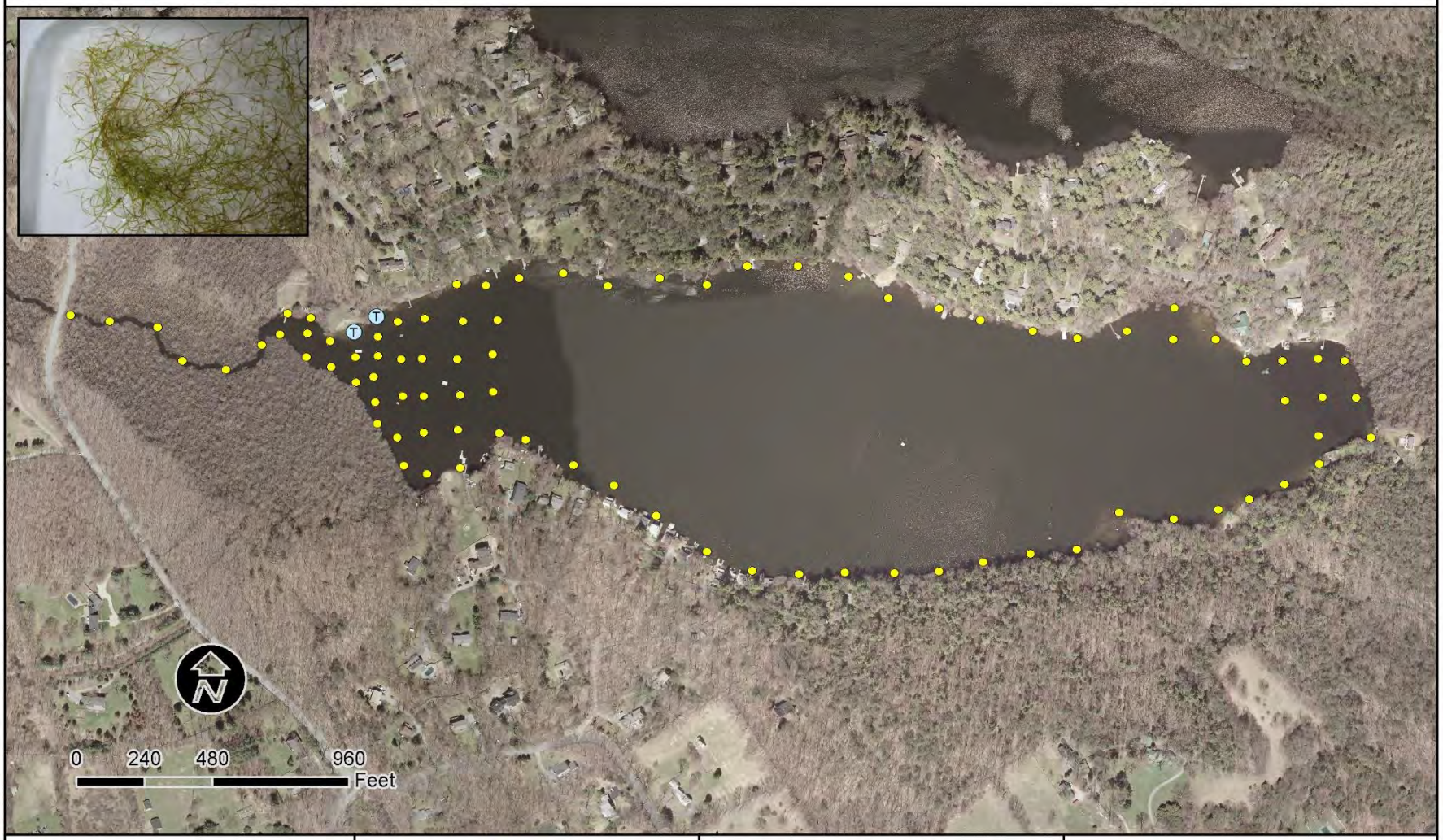
# Spiral-Fruited Pondweed (*Potamogeton spirillus*) Distribution




**Lake Oscaleta**
**Aquatic Vegetation Survey**
**July 28, 2020**

Total Sample Sites: 88

Plant Density Legend

- = No Plants
- = Trace Plants
- = Sparse Plants
- = Medium Plants
- = Dense Plants

Percent Distribution

| Abundance | Sites | Percent |
|---|---|---|
| Total | 2 | 2% |
| Trace | 2 | 100% |
| Sparse | 0 | 0% |
| Medium | 0 | 0% |
| Dense | 0 | 0% |

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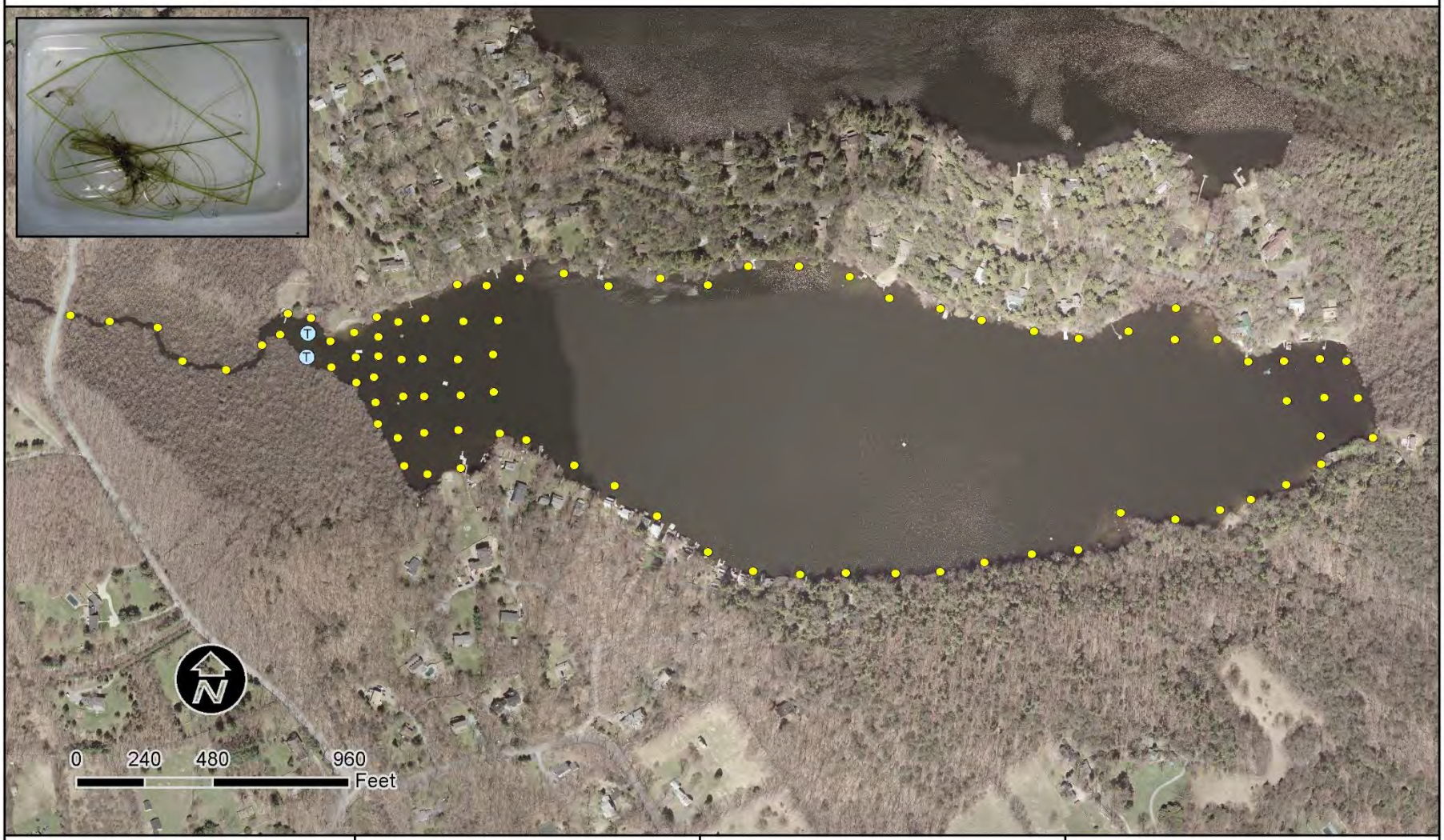
# Water Bulrush (*Scirpus subterminalis*) Distribution




**Lake Oscaleta**
**Aquatic Vegetation Survey**
**July 28, 2020**

Total Sample Sites: 88

Plant Density Legend

- = No Plants
- = Trace Plants
- = Sparse Plants
- = Medium Plants
- = Dense Plants

Percent Distribution

| Abundance | Sites | Percent |
|---|---|---|
| Total | 2 | 2% |
| Trace | 2 | 100% |
| Sparse | 0 | 0% |
| Medium | 0 | 0% |
| Dense | 0 | 0% |

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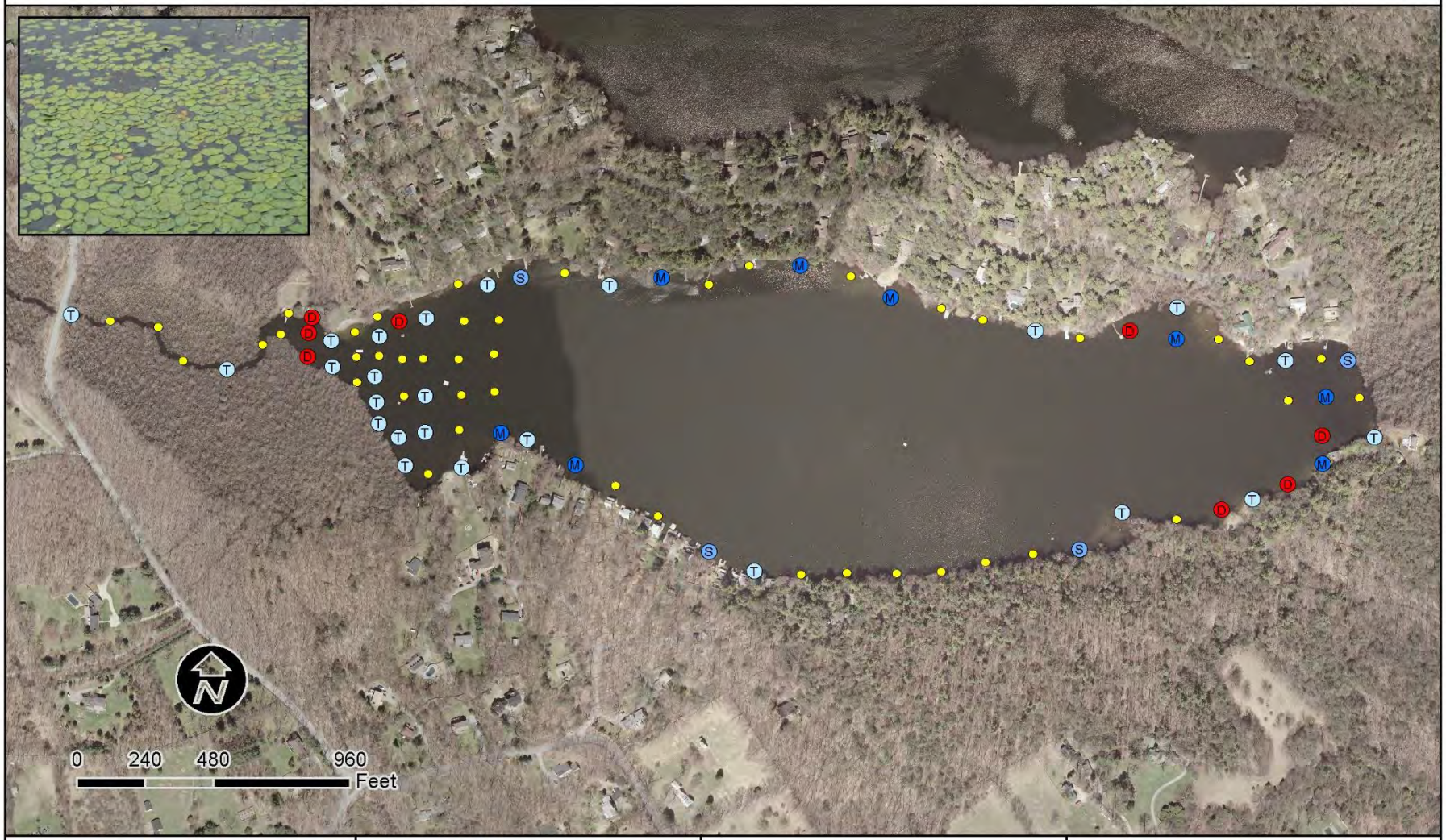
# Watershield (*Brasenia schreberi*) Distribution




**Lake Oscaleta**
**Aquatic Vegetation Survey**
**July 28, 2020**

Total Sample Sites: 88

Plant Density Legend

- = No Plants
- T = Trace Plants
- S = Sparse Plants
- M = Medium Plants
- D = Dense Plants

Percent Distribution

| Abundance | Sites | Percent |
|---|---|---|
| Total | 44 | 50% |
| Trace | 24 | 55% |
| Sparse | 4 | 9% |
| Medium | 8 | 18% |
| Dense | 8 | 18% |

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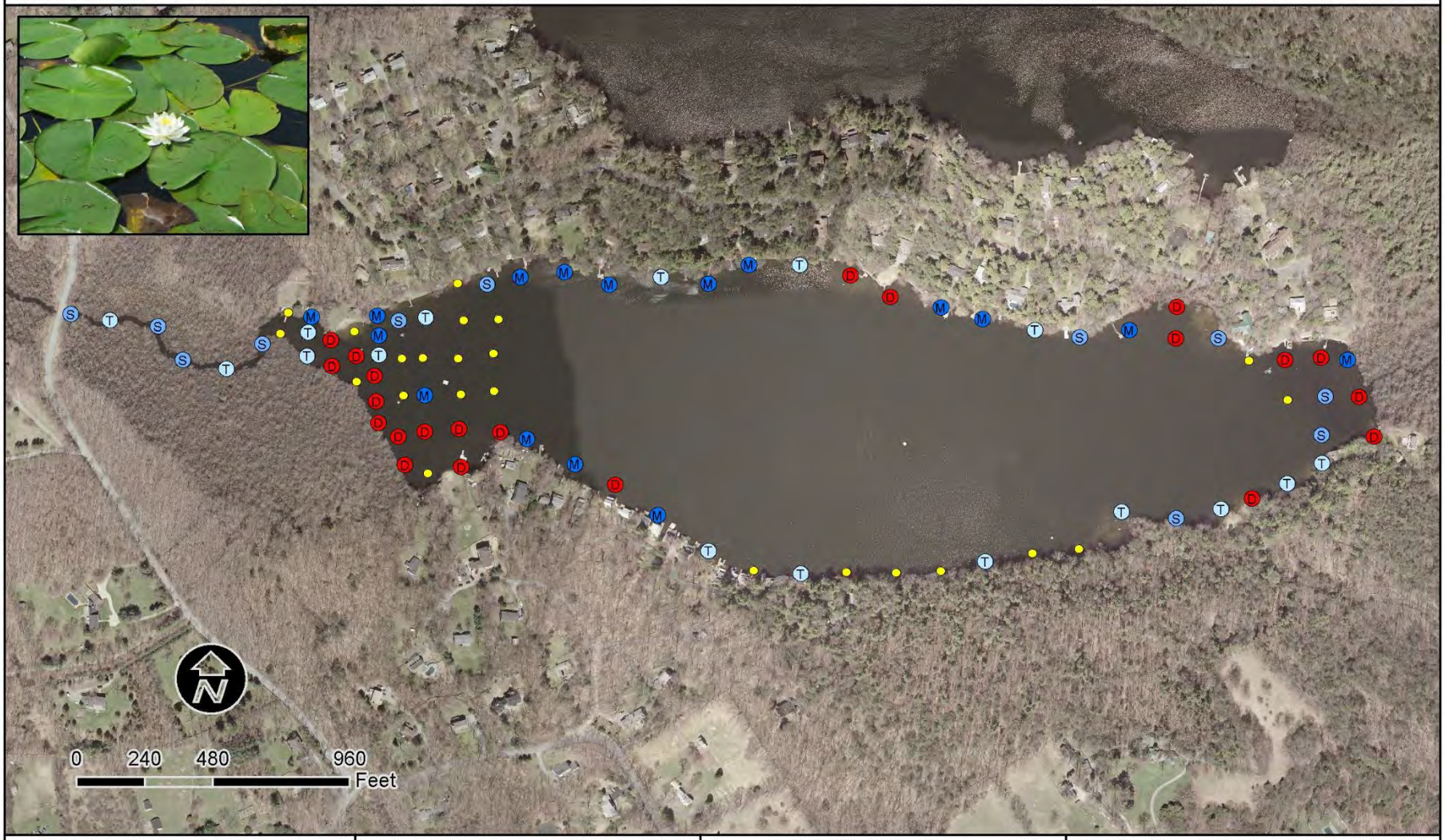
# White Water Lily (*Nymphaea odorata*) Distribution




**Lake Oscaleta**
**Aquatic Vegetation Survey**
**July 28, 2020**

Total Sample Sites: 88

Plant Density Legend

- = No Plants
- = Trace Plants
- = Sparse Plants
- = Medium Plants
- = Dense Plants

Percent Distribution

| Abundance | Sites | Percent |
|---|---|---|
| Total | 65 | 74% |
| Trace | 16 | 25% |
| Sparse | 11 | 17% |
| Medium | 16 | 25% |
| Dense | 22 | 34% |

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# Floating Aquatic Plant Density

**Trace**

**Medium**

**Sparse**

**Dense**

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# Submersed Aquatic Plant Density

**Trace**

**Medium**

**Sparse**

**Dense**

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Lake Oscaleta
Aquatic Macrophyte Abundance Distribution
July 28, 2020

| | Total | | Trace | | Sparse | | Medium | | Dense | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Sites | % | Sites | % | Sites | % | Sites | % | Sites | % |
| **TOTAL SITES** | 88 | | | | | | | | | |
| **TOTAL SUBMERSED VEGETATION** | 68 | 77% | 28 | 41% | 14 | 21% | 13 | 19% | 13 | 19% |
| Eurasian Water Milfoil | 59 | 67% | 34 | 58% | 15 | 25% | 8 | 14% | 2 | 3% |
| Bassweed | 37 | 42% | 17 | 46% | 7 | 19% | 4 | 11% | 9 | 24% |
| Robbin's Pondweed | 24 | 27% | 17 | 71% | 3 | 13% | 1 | 4% | 3 | 13% |
| Coontail | 21 | 24% | 19 | 90% | 1 | 5% | 0 | 0% | 1 | 5% |
| Creeping Bladderwort | 19 | 22% | 15 | 79% | 1 | 5% | 1 | 5% | 2 | 11% |
| Benthic Filamentous Algae | 8 | 9% | 5 | 63% | 1 | 13% | 1 | 13% | 1 | 13% |
| Brittle Naiad | 3 | 3% | 2 | 67% | 0 | 0% | 1 | 33% | 0 | 0% |
| Leafy Pondweed | 2 | 2% | 1 | 50% | 1 | 50% | 0 | 0% | 0 | 0% |
| Spiral Fruited Pondweed | 2 | 2% | 2 | 100% | 0 | 0% | 0 | 0% | 0 | 0% |
| Common Waterweed | 2 | 2% | 2 | 100% | 0 | 0% | 0 | 0% | 0 | 0% |
| Arrowhead (Rosette) | 2 | 2% | 2 | 100% | 0 | 0% | 0 | 0% | 0 | 0% |
| | | | | | | | | | | |
| **TOTAL FLOATING VEGETATION** | 71 | 81% | 8 | 11% | 12 | 17% | 18 | 25% | 33 | 46% |
| White Water Lily | 65 | 74% | 16 | 25% | 11 | 17% | 16 | 25% | 22 | 34% |
| Watershield | 44 | 50% | 24 | 55% | 4 | 9% | 8 | 18% | 8 | 18% |
| Spatterdock | 37 | 42% | 18 | 49% | 9 | 24% | 6 | 16% | 4 | 11% |
| Floating Filamentous Algae | 5 | 6% | 4 | 80% | 1 | 20% | 0 | 0% | 0 | 0% |
| Water Bulrush | 2 | 2% | 2 | 100% | 0 | 0% | 0 | 0% | 0 | 0% |
| Small Duckweed | 2 | 2% | 2 | 100% | 0 | 0% | 0 | 0% | 0 | 0% |

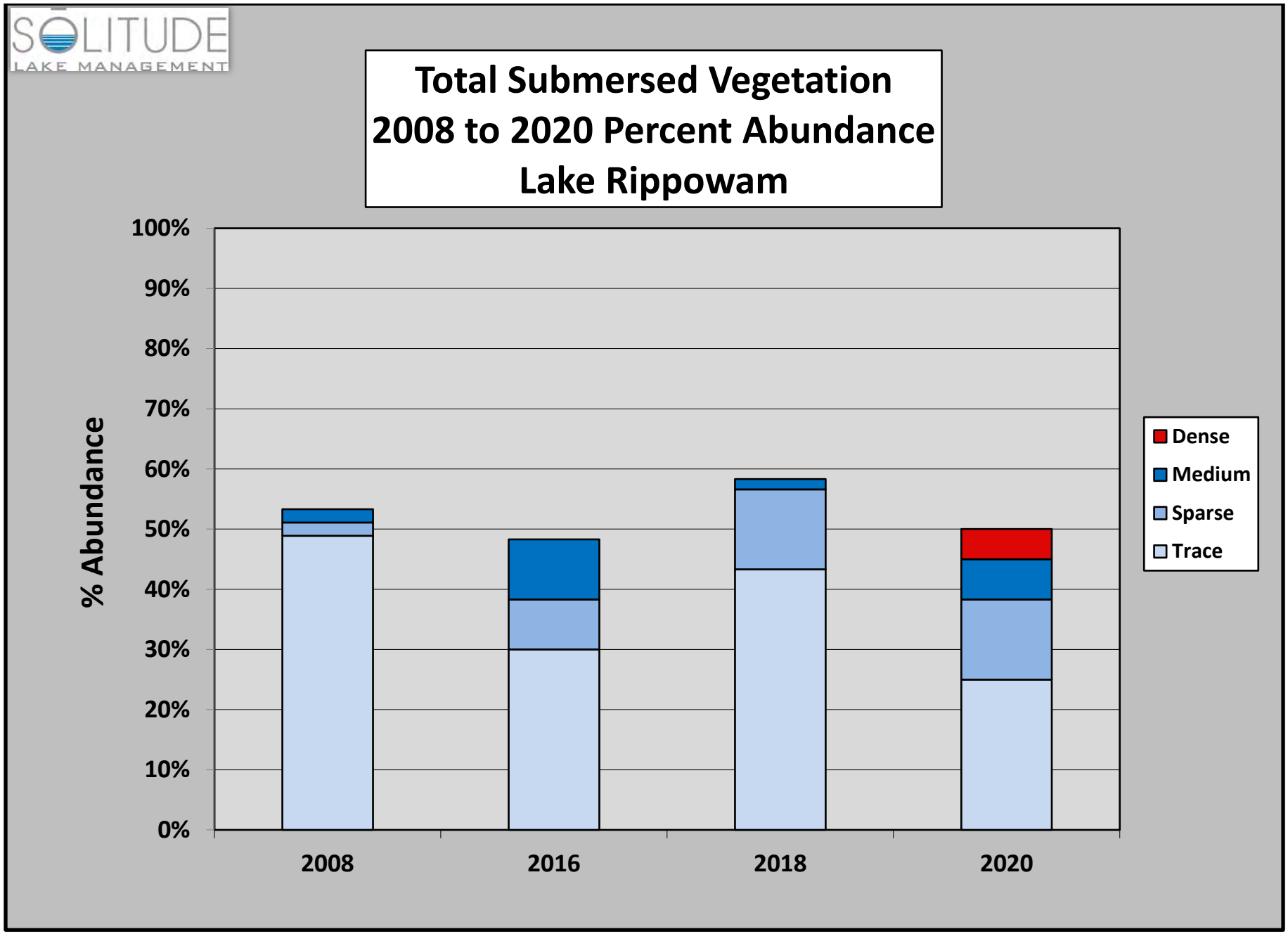
# Appendix: Lake Rippowam

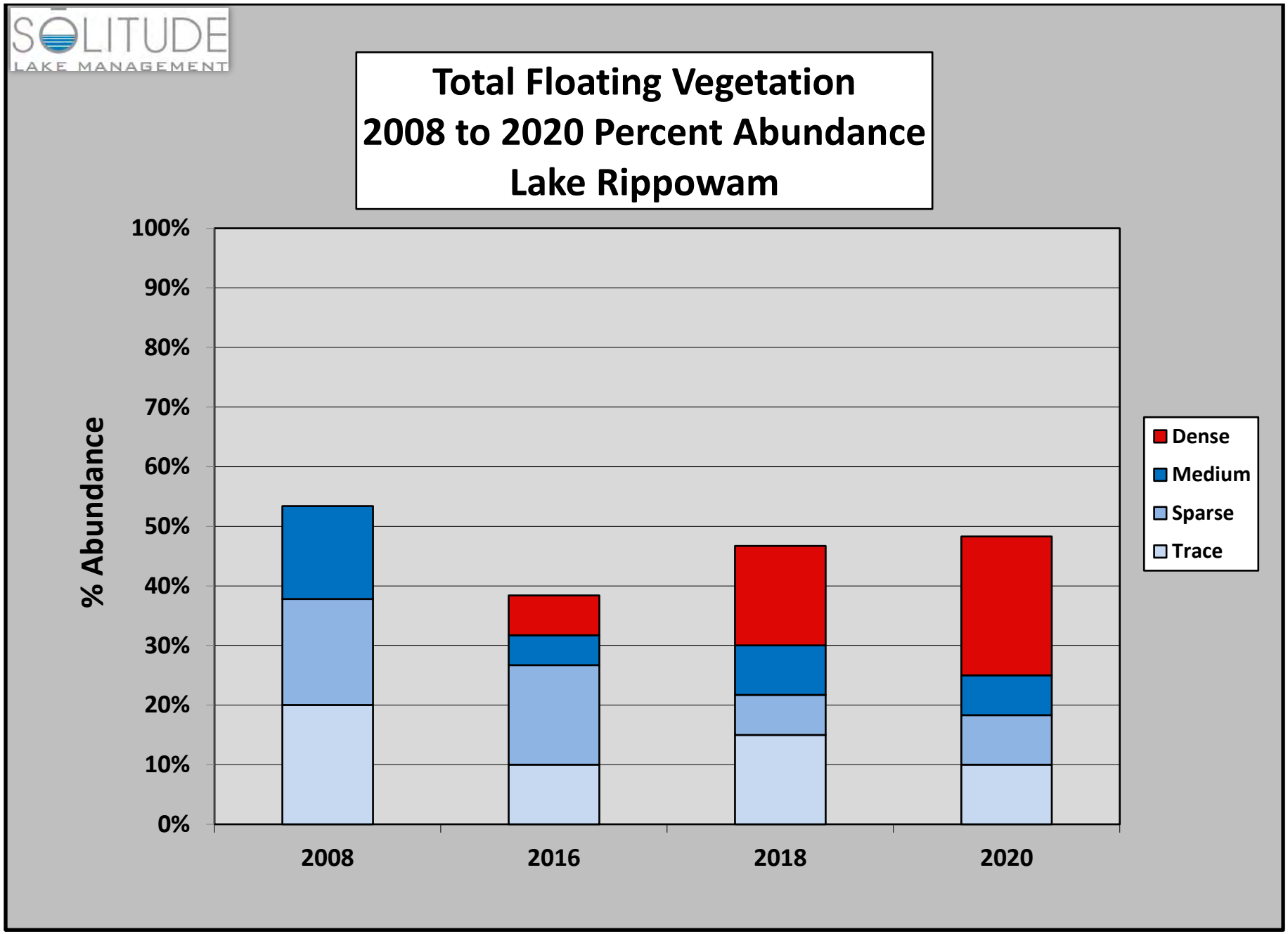
2008 – 2020 Percent Abundance Graphs

2020 Survey Maps

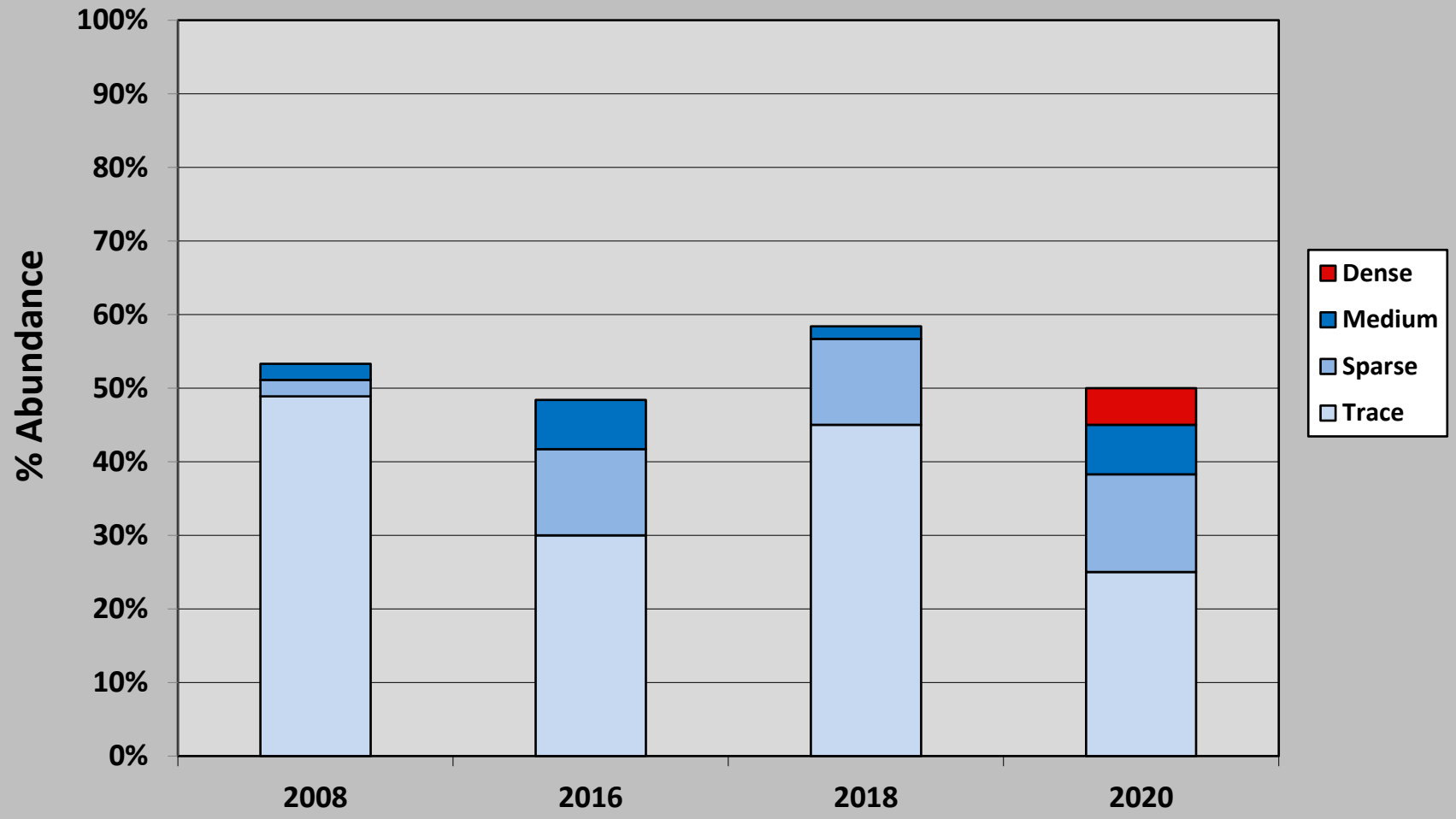
Plant Density Guide

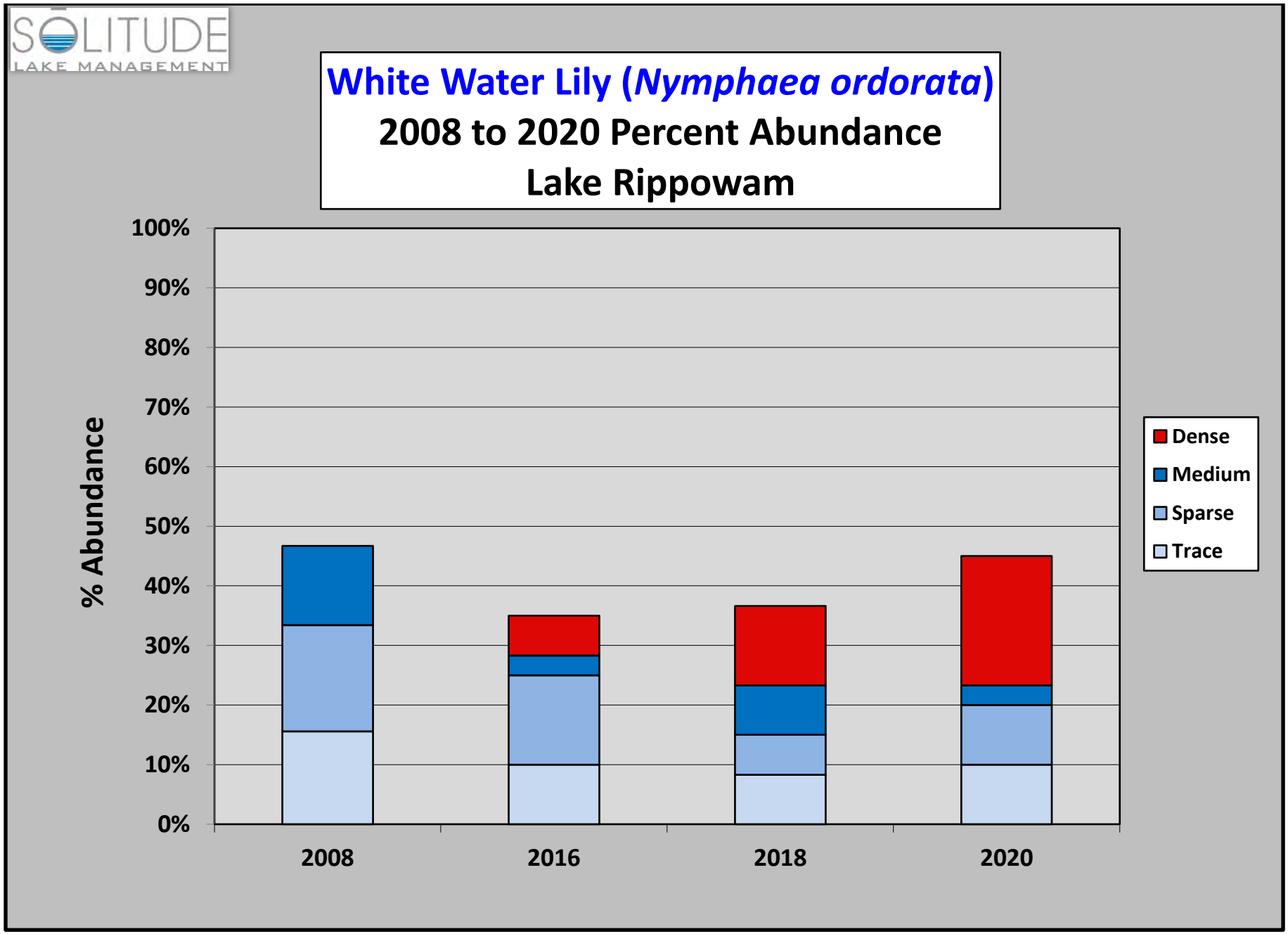
2020 Macrophyte Abundance Distribution Table

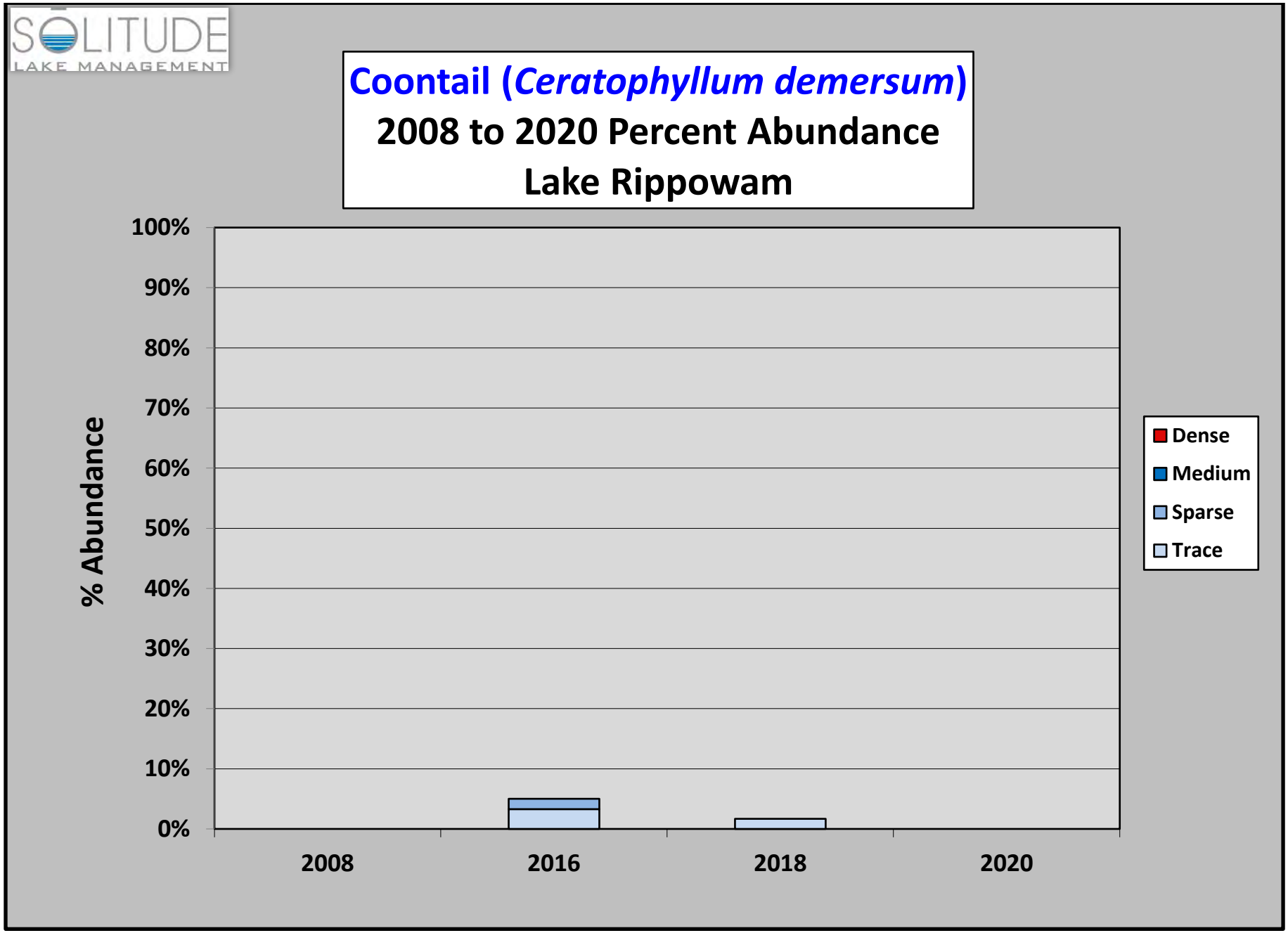

SOLITUDE
LAKE MANAGEMENT
Total Submersed Vegetation
2008 to 2020 Percent Abundance
Lake Rippowam
% Abundance
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2008
2016
2018
2020
Dense
Medium
Sparse
Trace

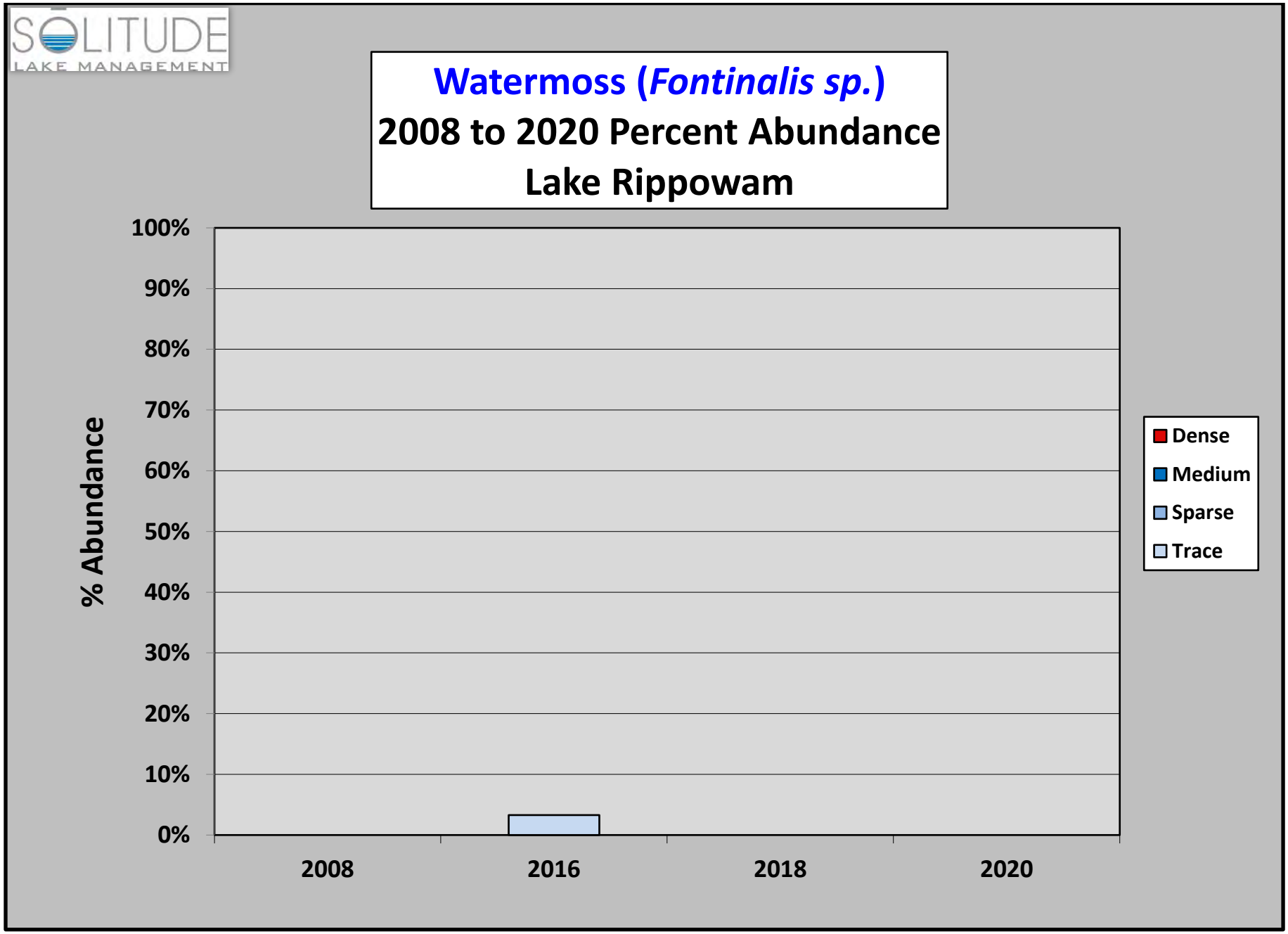

SOLITUDE
LAKE MANAGEMENT
Total Floating Vegetation
2008 to 2020 Percent Abundance
Lake Rippowam
% Abundance
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2008
2016
2018
2020
Dense
Medium
Sparse
Trace

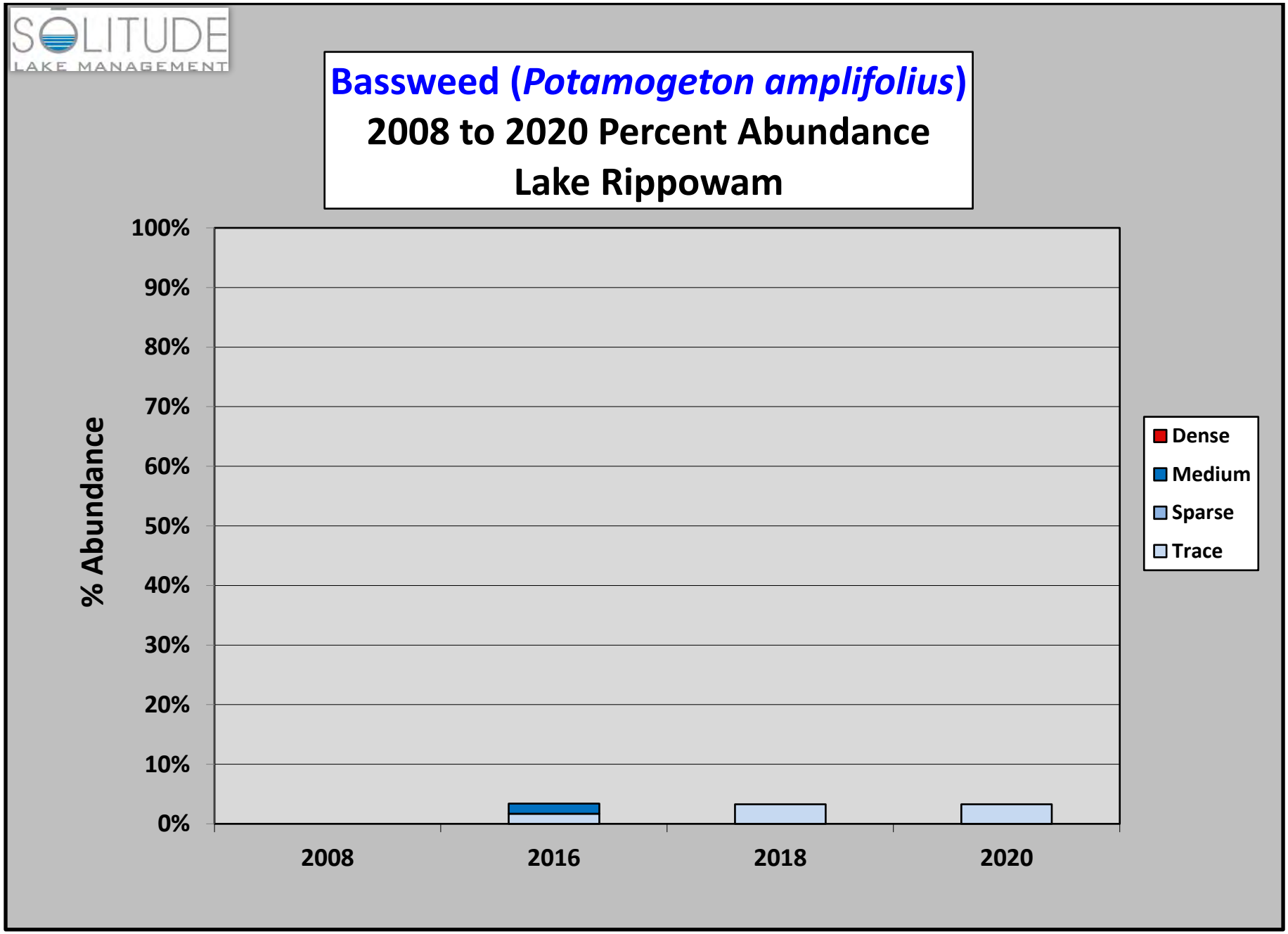
# Eurasian Water Milfoil (*Myriophyllum spicatum*)
## 2008 to 2020 Percent Abundance
## Lake Rippowam

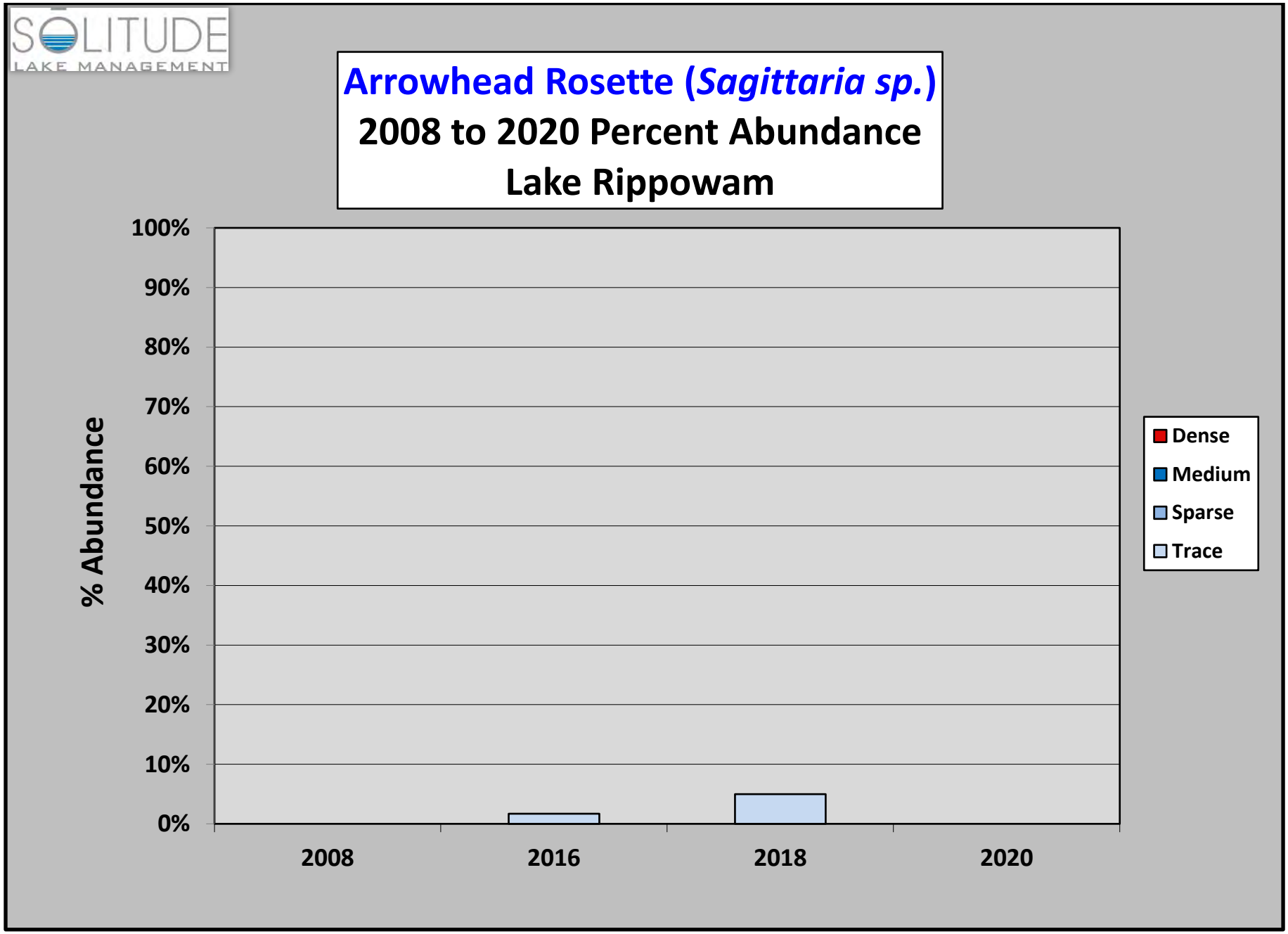


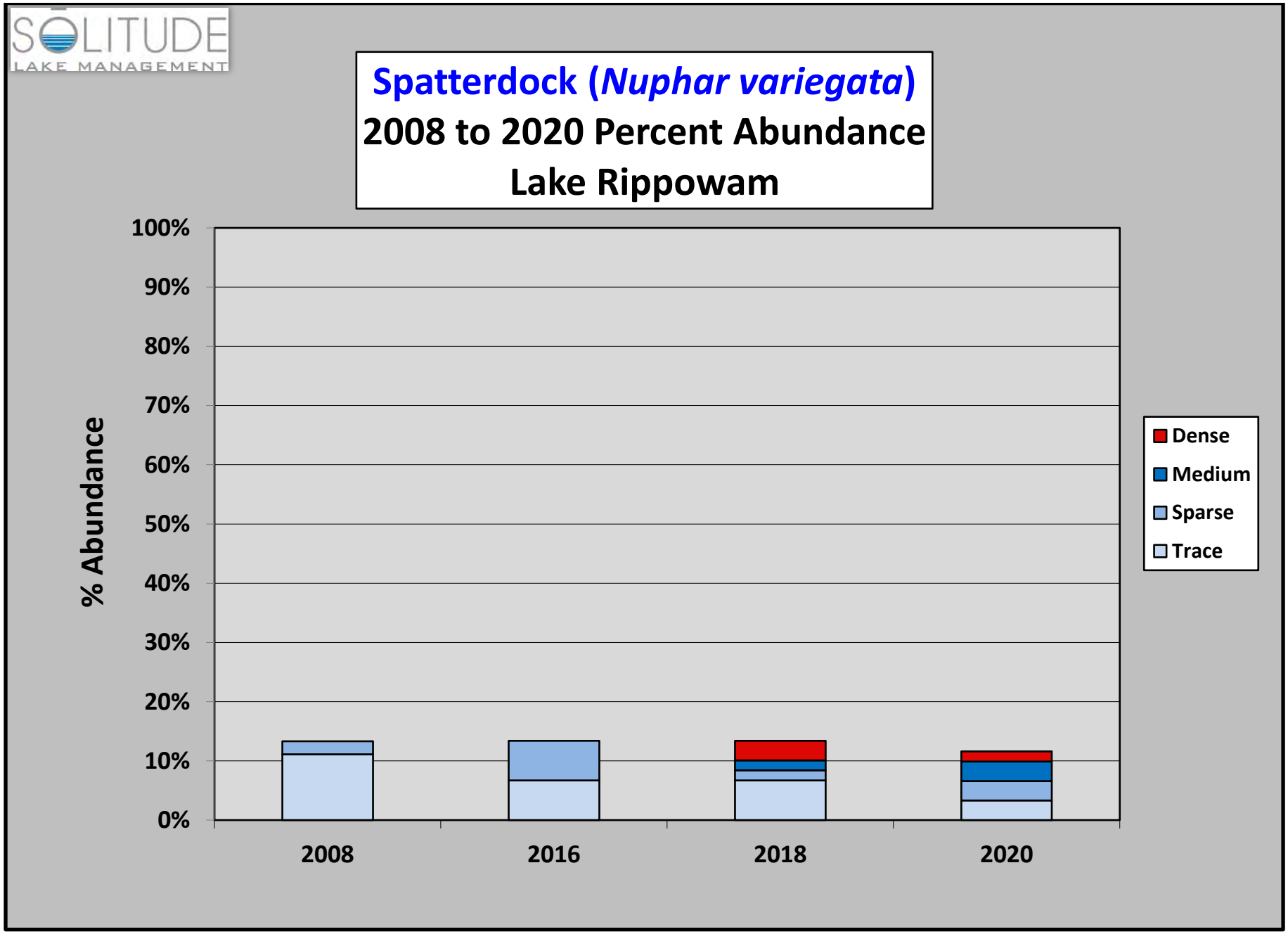

SOLITUDE
LAKE MANAGEMENT
White Water Lily (Nymphaea ordorata)
2008 to 2020 Percent Abundance
Lake Rippowam
% Abundance
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2008
2016
2018
2020
Dense
Medium
Sparse
Trace

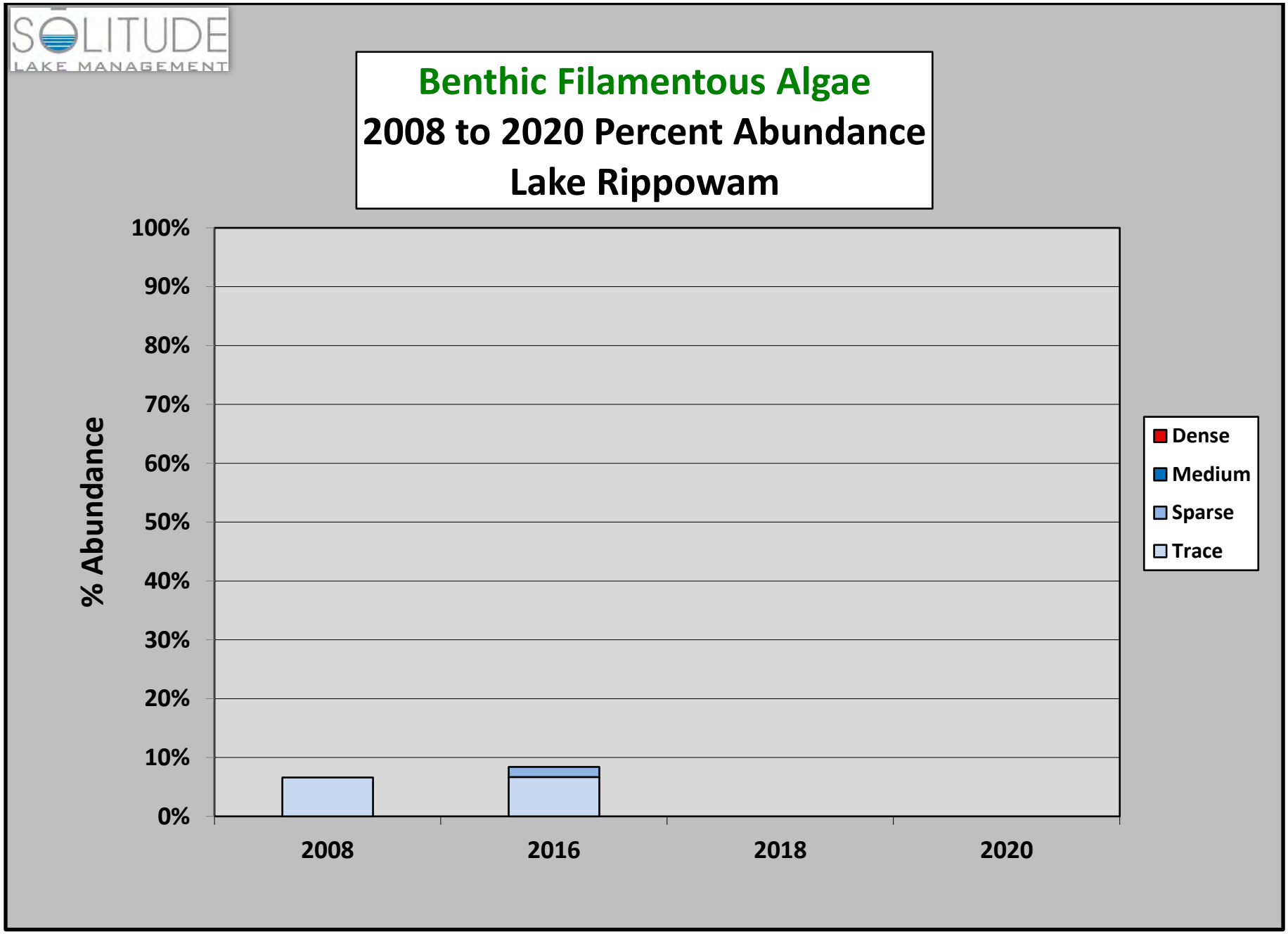

SOLITUDE
LAKE MANAGEMENT
Coontail (Ceratophyllum demersum)
2008 to 2020 Percent Abundance
Lake Rippowam
% Abundance
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2008
2016
2018
2020
Dense
Medium
Sparse
Trace

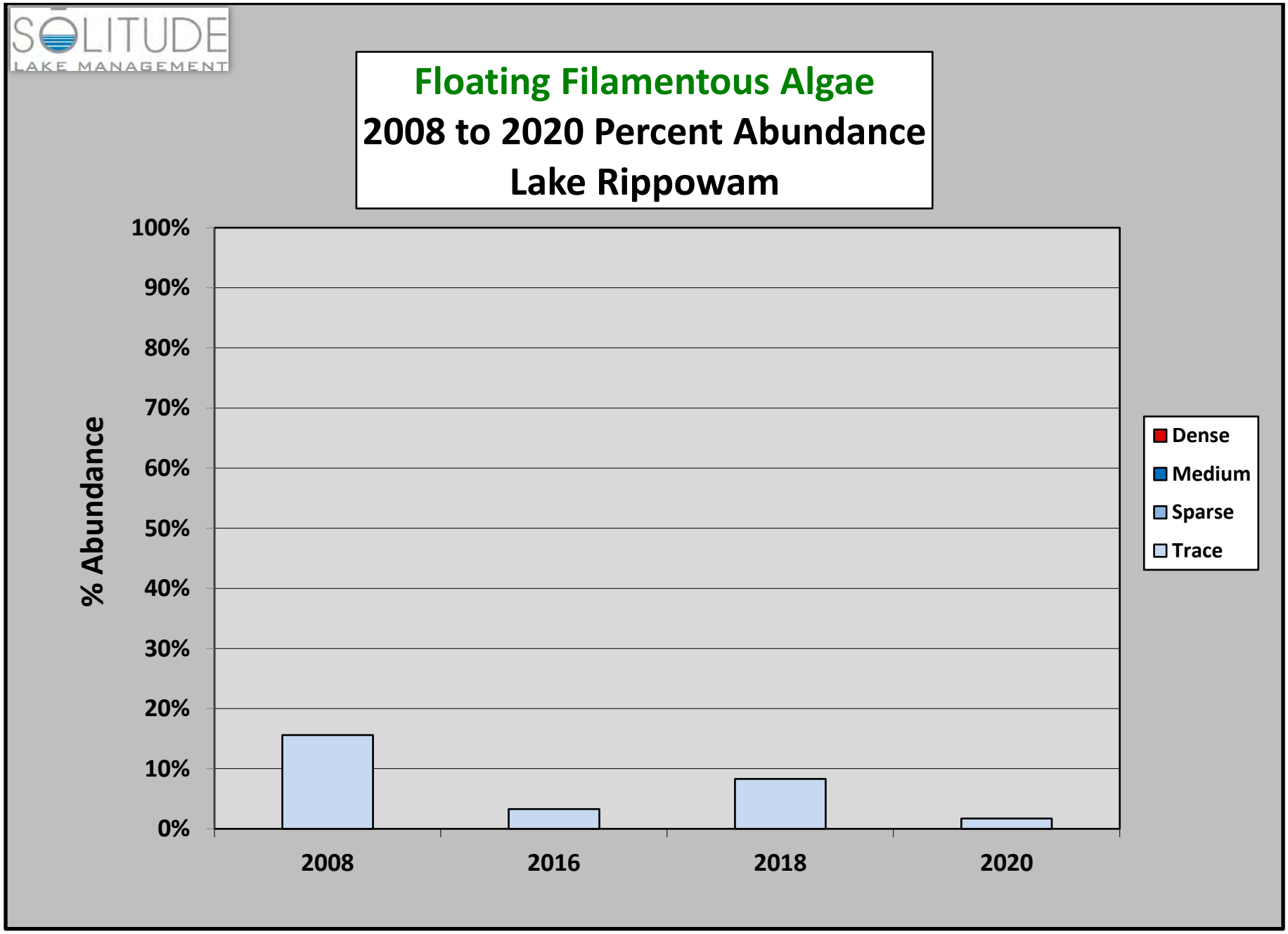

SOLITUDE
LAKE MANAGEMENT
Watermoss (Fontinalis sp.)
2008 to 2020 Percent Abundance
Lake Rippowam
% Abundance
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2008
2016
2018
2020
Dense
Medium
Sparse
Trace

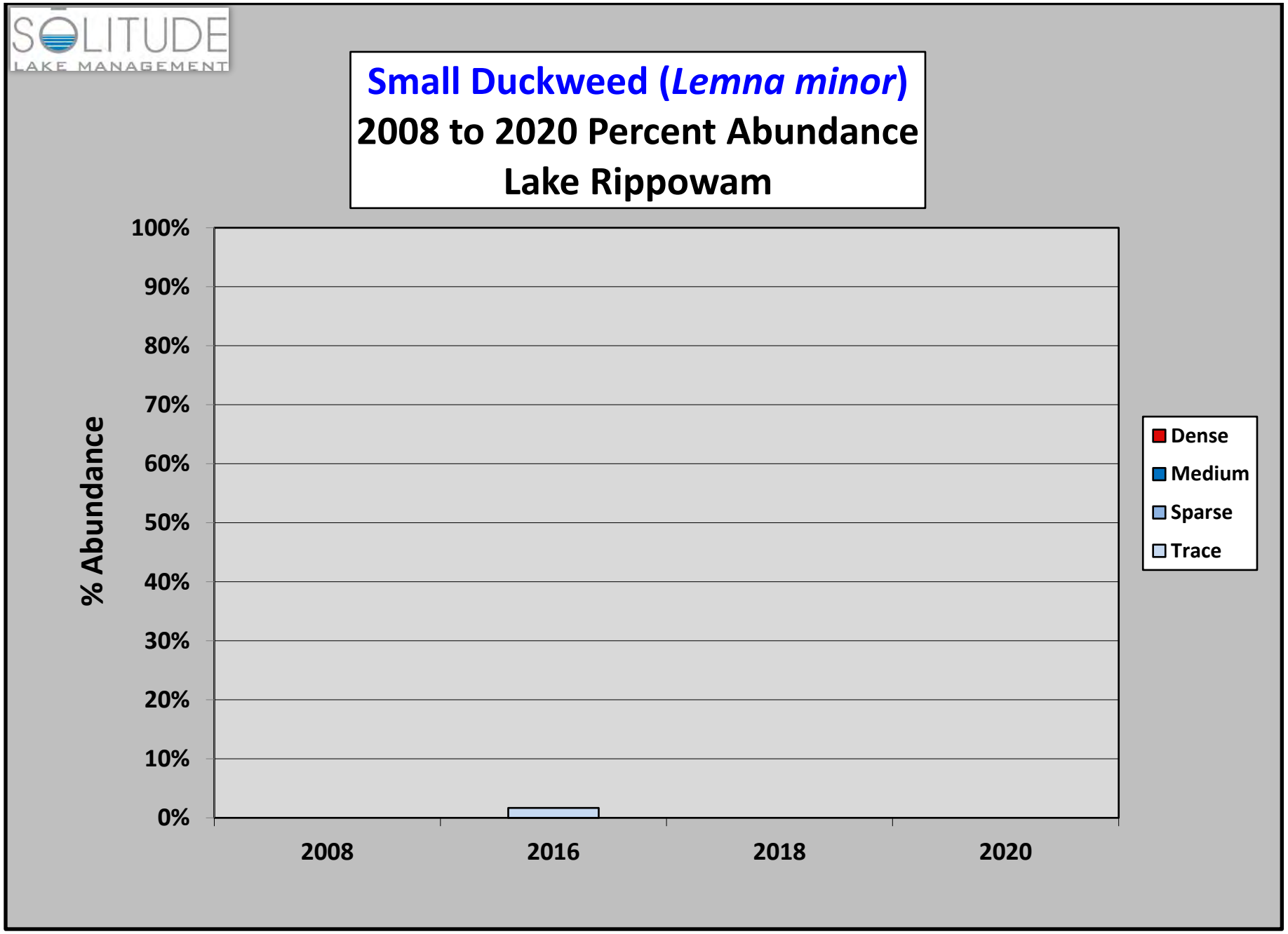

SOLITUDE
LAKE MANAGEMENT
Bassweed (Potamogeton amplifolius)
2008 to 2020 Percent Abundance
Lake Rippowam
% Abundance
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2008
2016
2018
2020
Dense
Medium
Sparse
Trace


SOLITUDE
LAKE MANAGEMENT
Arrowhead Rosette (Sagittaria sp.)
2008 to 2020 Percent Abundance
Lake Rippowam
% Abundance
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2008
2016
2018
2020
Dense
Medium
Sparse
Trace

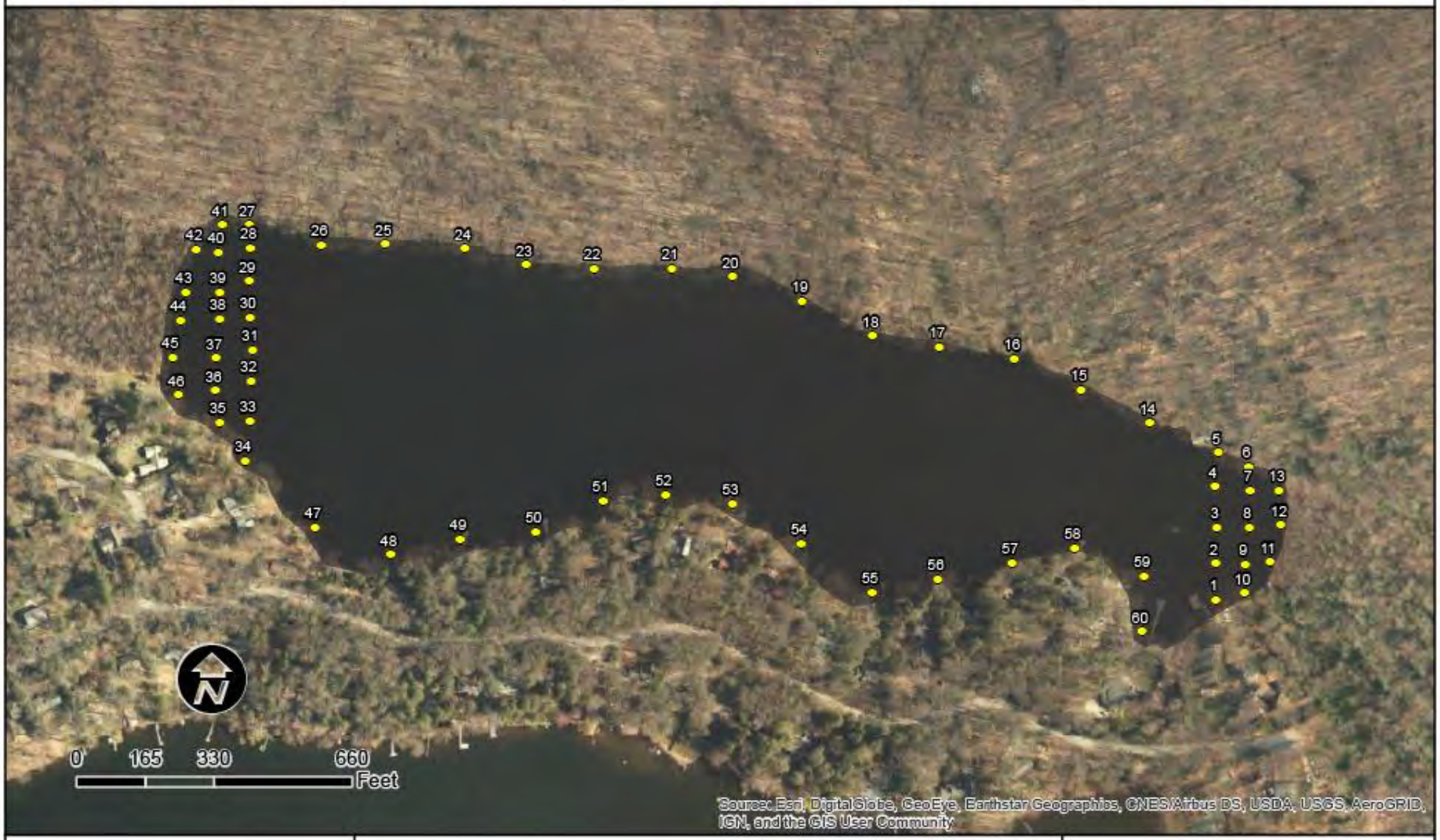

SOLITUDE
LAKE MANAGEMENT
Spatterdock (Nuphar variegata)
2008 to 2020 Percent Abundance
Lake Rippowam
% Abundance
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2008
2016
2018
2020
Dense
Medium
Sparse
Trace


SOLITUDE
LAKE MANAGEMENT
Benthic Filamentous Algae
2008 to 2020 Percent Abundance
Lake Rippowam
% Abundance
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2008
2016
2018
2020
Dense
Medium
Sparse
Trace


SOLITUDE
LAKE MANAGEMENT
Floating Filamentous Algae
2008 to 2020 Percent Abundance
Lake Rippowam
% Abundance
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2008
2016
2018
2020
Dense
Medium
Sparse
Trace


SOLITUDE
LAKE MANAGEMENT
Small Duckweed (Lemna minor)
2008 to 2020 Percent Abundance
Lake Rippowam
% Abundance
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2008
2016
2018
2020
Dense
Medium
Sparse
Trace

# SAMPLE POINT LOCATION




**Lake Rippowam**
**Aquatic Vegetation Survey**
**July 28, 2020**

Total Sample Sites: 60

Sample Point

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# Total Floating Vegetation Distribution


**Lake Rippowam**
**Aquatic Vegetation Survey**
**July 28, 2020**

Total Sample Sites: 60

Plant Density

- = No Plants
- = Trace Plants
- = Sparse Plants
- = Medium Plants
- = Dense Plants

Percent Distribution

| Abundance | Sites | Percent |
|---|---|---|
| Total | 29 | 48% |
| Trace | 6 | 21% |
| Sparse | 5 | 17% |
| Medium | 4 | 14% |
| Dense | 14 | 48% |

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# Total Submersed Vegetation Distribution


**Lake Rippowam**
**Aquatic Vegetation Survey**
**July 28, 2020**

Total Sample Sites: 60

Plant Density

- = No Plants
- = Trace Plants
- = Sparse Plants
- = Medium Plants
- = Dense Plants

Percent Distribution

| Abundance | Sites | Percent |
|---|---|---|
| Total | 30 | 50% |
| Trace | 15 | 50% |
| Sparse | 8 | 27% |
| Medium | 4 | 13% |
| Dense | 3 | 10% |

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# BASS WEED (*Potamogeton amplifolius*) DISTRIBUTION




**Lake Rippowam**
**Aquatic Vegetation Survey**
**July 28, 2020**

Total Sample Sites: 60

Plant Density

- = No Plants
- T = Trace Plants
- S = Sparse Plants
- M = Medium Plants
- D = Dense Plants

Percent Distribution

| Abundance | Sites | Percent |
|---|---|---|
| Total | 2 | 3% |
| Trace | 2 | 100% |
| Sparse | 0 | 0% |
| Medium | 0 | 0% |
| Dense | 0 | 0% |

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# EURASIAN WATER MILFOIL (*Myriophyllum spicatum*) DISTRIBUTION


**Lake Rippowam**
**Aquatic Vegetation Survey**
**July 28, 2020**

Total Sample Sites: 60

Plant Density

- = No Plants
- = Trace Plants
- = Sparse Plants
- = Medium Plants
- = Dense Plants

Percent Distribution

| Abundance | Sites | Percent |
|---|---|---|
| Total | 30 | 50% |
| Trace | 15 | 50% |
| Sparse | 8 | 27% |
| Medium | 4 | 13% |
| Dense | 3 | 10% |

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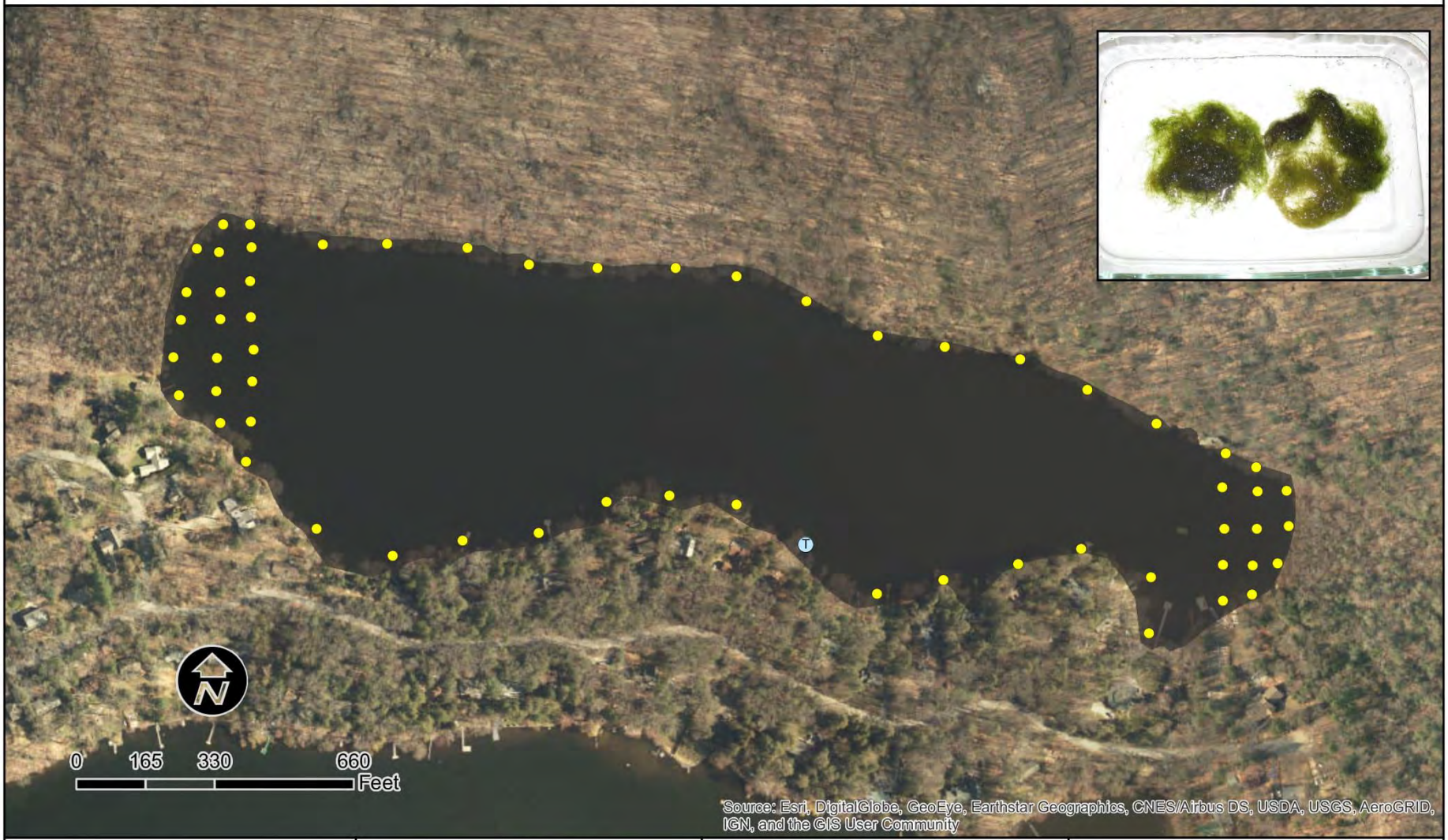
# FLOATING FILAMENTOUS ALGAE DISTRIBUTION




**Lake Rippowam**
**Aquatic Vegetation Survey**
**July 28, 2020**

Total Sample Sites: 60

Plant Density

- = No Plants
- = Trace Plants
- = Sparse Plants
- = Medium Plants
- = Dense Plants

Percent Distribution

| Abundance | Sites | Percent |
|---|---|---|
| Total | 1 | 2% |
| Trace | 1 | 100% |
| Sparse | 0 | 0% |
| Medium | 0 | 0% |
| Dense | 0 | 0% |

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# SPATTERDOCK (*Nuphar variegata*) DISTRIBUTION


**Lake Rippowam**
**Aquatic Vegetation Survey**
**July 28, 2020**

Total Sample Sites: 60

Plant Density

- = No Plants
- T = Trace Plants
- S = Sparse Plants
- M = Medium Plants
- D = Dense Plants

Percent Distribution

| Abundance | Sites | Percent |
|---|---|---|
| Total | 7 | 12% |
| Trace | 2 | 29% |
| Sparse | 2 | 29% |
| Medium | 2 | 29% |
| Dense | 1 | 14% |

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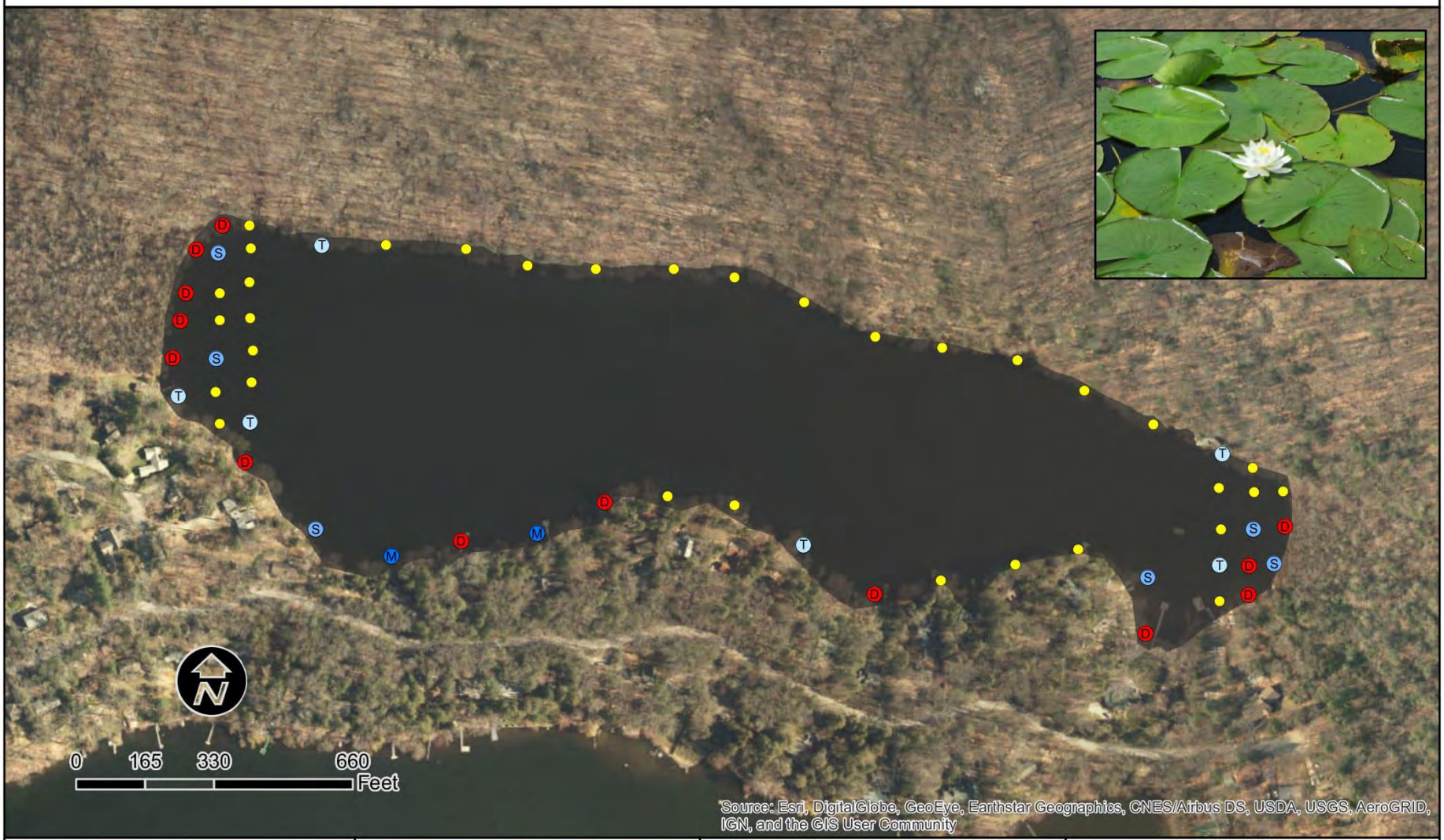
# WHITE WATER LILY (*Nymphaea odorata*) DISTRIBUTION




**Lake Rippowam**
**Aquatic Vegetation Survey**
**July 28, 2020**

Total Sample Sites: 60

Plant Density

- = No Plants
- = Trace Plants
- = Sparse Plants
- = Medium Plants
- = Dense Plants

Percent Distribution

| Abundance | Sites | Percent |
|---|---|---|
| Total | 27 | 45% |
| Trace | 6 | 22% |
| Sparse | 6 | 22% |
| Medium | 2 | 7% |
| Dense | 13 | 48% |

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# Floating Aquatic Plant Density

**Trace**

**Medium**

**Sparse**

**Dense**

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# Submersed Aquatic Plant Density

**Trace**

**Medium**

**Sparse**

**Dense**

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Lake Rippowam
Aquatic Macrophyte Abundance Distribution
July 28, 2020

| | Total | | Trace | | Sparse | | Medium | | Dense | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Sites | % | Sites | % | Sites | % | Sites | % | Sites | % |
| **TOTAL SITES** | 60 | | | | | | | | | |
| **Total Submersed Vegetation** | 30 | 50% | 15 | 50% | 8 | 27% | 4 | 13% | 3 | 10% |
| Eurasian Water Milfoil | 30 | 50% | 15 | 50% | 8 | 27% | 4 | 13% | 3 | 10% |
| Bassweed | 2 | 3% | 2 | 100% | 0 | 0% | 0 | 0% | 0 | 0% |
| | | | | | | | | | | |
| **Total Floating Vegetation** | 29 | 48% | 6 | 21% | 5 | 17% | 4 | 14% | 14 | 48% |
| White Water Lily | 27 | 45% | 6 | 22% | 6 | 22% | 2 | 7% | 13 | 48% |
| Spatterdock | 7 | 12% | 2 | 29% | 2 | 29% | 2 | 29% | 1 | 14% |
| Floating Filamentous Algae | 1 | 2% | 1 | 100% | 0 | 0% | 0 | 0% | 0 | 0% |