

**Lake Shirley
Lunenburg/Shirley, Massachusetts
2025 Year-End Treatment Report**

November 26, 2025

Report Prepared by: SOLitude Lake Management
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Shrewsbury, MA 01545

Report Prepared for: Ms. Joanna Bilotta, President
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Dear Joanna:

In accordance with the aquatic plant management contract between SOLitude Lake Management (SOLitude) and the Lake Shirley Improvement Corporation (LSIC) for Lake Shirley, the following document serves to provide this year's treatment and survey results, as well as management recommendations for next season. The continued objective of the program is to manage non-native and nuisance aquatic vegetation as well as potentially harmful cyanobacteria (blue-green algae) blooms. Monitoring events, herbicide/algaecide treatments and reporting are key tasks of the project.

Based on recent conditions of the lake, a decision was made to implement a whole-lake treatment using fluridone herbicide in 2025. This represents a substantial change in the historical management approach in response to an increase in the extent of fanwort (*Cabomba caroliniana*) growth throughout the lake. The whole lake treatment is intended to be a "one-time" effort to reduce the lake's fanwort infestation before returning to a more typical approach of monitoring and localized treatments.

All management activities were consistent with the Order of Conditions [DEP File #284-0474 (Shirley), DEP File #208-1168 (Lunenburg)] and the License to Apply Chemicals issued by MA DEP (#WM04-0001866). The following is a chronology of this year's management events.



2025 Management Program Summary

| Program Task | Date Completed |
|--|---|
| Received Approved License to Apply Chemicals | April 14, 2025 |
| Initial Fluridone Herbicide Treatment | April 29, 2025 |
| Inspection and herbicide testing | May 12 & May 28, 2025 |
| 1st Follow-Up Fluridone Treatment | May 28, 2025 |
| Inspection and herbicide testing | June 11, 2025 |
| 2nd (Final) Fluridone Treatment | June 19, 2025 |
| Inspection and herbicide testing | June 25, July 21, August 21, September 22, 2025 |

Pre-Treatment Survey

Given that the fluridone treatments were planned to start early in the season, no formal pre-treatment survey was conducted this year. The treatment plan for 2025 was based on vegetation data from the last several years, especially the September 2024 survey conducted by Aquatic Restoration Consulting (ARC).

Herbicide Treatment

The goal of the 2025 treatment program was to maintain a target dose of 5-8 parts per billion (ppb) of fluridone throughout the lake for at least 90 days while reaching a peak concentration of 10-12 ppb somewhere between the 30 and 60 day point. This concentration regime is required to provide effective, multiple year control of fanwort and help to reduce or “regulate” the abundance of native vegetation. In order to achieve this, a series of applications using both pellet and liquid formulations of Sonar (fluridone) herbicide was proposed.

The initial herbicide application was conducted using the Sonar ONE herbicide on April 19th. The timing of the initial treatment was proposed to coincide with the start of active fanwort growth as this is the time when plants are most sensitive. While the dose for this treatment was calculated over the entire volume of the lake, the product was applied only to the ~150-acre littoral zone. The lakewide dose applied was 12 ppb which was anticipated to be released over a 4-6 week period.

As with all treatments, the lake community and the two towns were notified prior to treatment by LSIC. Several means of notification were utilized: placement of a written notice in the newspaper(s); placement of large, printed signs at major road intersections/locations around the lake and posting of numerous 8.5 inch by 11-inch orange colored, printed signs around the lake shoreline and other means of communication/notification.

The treatment was performed with a 20-foot airboat equipped with an electric spreader to distribute the pellets to the pre-determined treatment areas. GPS guidance was used to monitor the position of the boat and its relation to the



treatment areas. The treatment proceeded smoothly and without any issues. **Figure 1** shows the actual application areas and GPS recorded treatment tracks. A summary of the treatment specifications is shown below in **Table 1**.

Table 1 – Initial Herbicide Treatment Specifications

| | |
|------------------------|---|
| Treatment Date | April 29 th |
| Product | Sonar ONE (fluridone) |
| Treatment Area | 354 acres (Herbicide applied to 150 acre littoral zone) |
| Quantity | 1,600 lbs |
| GPS Tracks | See Figure 1 |
| Applicator name | Rocco Notaro, MA Certification #AL-0053966 |
| Site Conditions | Weather: Fair, winds 10-15 MPH SW, mid 70's°F Water Temp: 16.1°C at surface, 15.8°C near bottom Dissolved Oxygen: 10.27 mg/l at surface; 10.16 mg/l near bottom (9-feet) Water clarity: 7' |

A follow-up, booster treatment was conducted on May 28th using the same areas and herbicide formulation (see **Figure 2 & Table 2**). For this treatment a total lakewide dose of 7 ppb was applied to the littoral zone. Herbicide sampling conducted after the initial application on May 12th showed lower than desirable concentrations in the lake, averaging <2 ppb (see next section), so the dose for this booster treatment was adjusted upward to hopefully reach the concentration target level of >5 ppb. An above average amount of rainfall occurred in May (7.63") which caused increased dilution of fluridone following the initial application.

Table 2 – 1st Follow-Up Herbicide Treatment Specifications

| | |
|------------------------|---|
| Treatment Date | May 28th, 2025 |
| Product | Sonar ONE (fluridone) |
| Treatment Area | 354 acres (Herbicide applied to 150 acre littoral zone) |
| Quantity | 940 lbs |
| GPS Tracks | See Figure 2 |
| Applicator name | Rocco Notaro, MA Certification #AL-0053966 |
| Site Conditions | Weather: Fair, winds 5-8 MPH S, High 70's°F Water Temp: 19.2°C at surface, 17.5°C near bottom Dissolved Oxygen: 8.5 mg/l at surface; 3.5 mg/l near bottom (9-feet) Water clarity: 7'2" |



A final booster application was applied to the lake on June 19th (see **Figure 3**). Again with higher than average rainfall in May, fluridone levels were still a bit lower than desired (4.9 ppb average), so this application entailed using 7 ppb of Sonar ONE and 4 ppb of liquid Sonar Genesis to provide a rapid increase in concentration while adding to the previous pellet applications to support longer term support of target concentrations.

Table 3 – 2nd Follow-Up Herbicide Treatment Specifications

| | |
|------------------------|--|
| Treatment Date | June 19th, 2025 |
| Product | Sonar ONE (fluridone) & Sonar Genesis (fluridone) |
| Treatment Area | 354 acres (Herbicide applied to 150 acre littoral zone) |
| Quantity | 940 lbs Sonar ONE, 53.5 gallons Sonar Genesis |
| GPS Tracks | See Figure 3 |
| Applicator name | Rocco Notaro, MA Certification #AL-0053966 |
| Site Conditions | Weather: Fair, winds 8-12 MPH variable, Mid 80's°F Water Temp: 23.4°C at surface, 21.2°C near bottom Dissolved Oxygen: 8.1 mg/l at surface; 2.3mg/l near bottom (9-feet) Water clarity: 6'4" |

Based on plant inspections and monitoring following the June 19th application, no further herbicide treatments were required to meet the goals of the project. Given the adjustments made to the follow-up applications due to heavy rain in May, the liquid fluridone and the three pellet applications still releasing product sustained a desirable concentration of fluridone well into September.

Algaecide Treatments

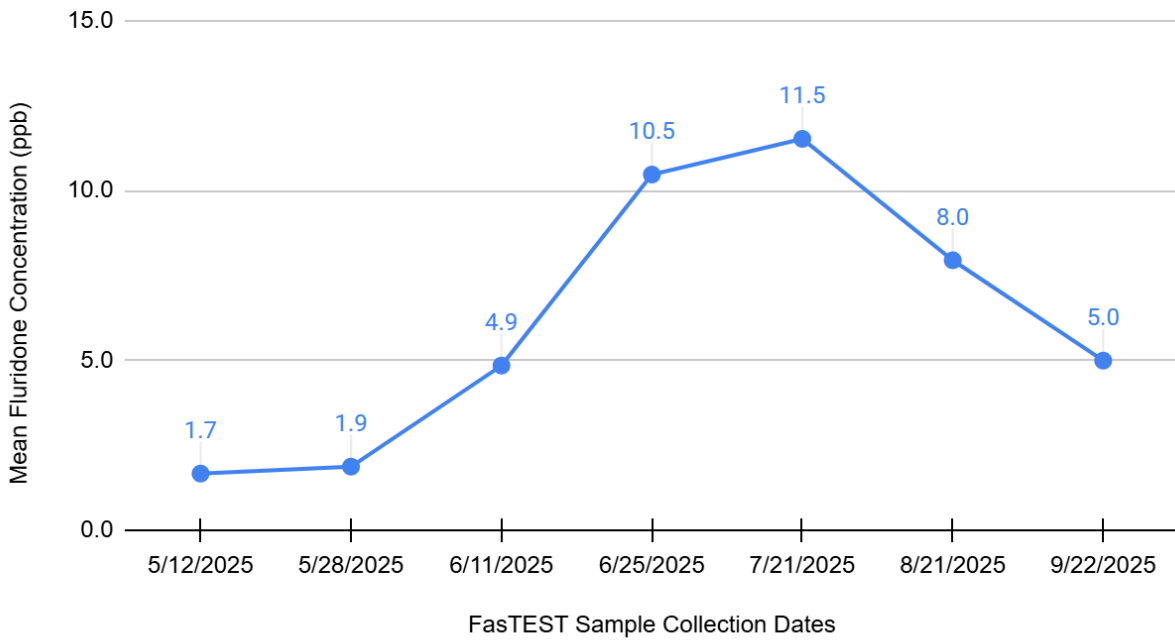
No algaecide treatments were required this year.

Herbicide Monitoring

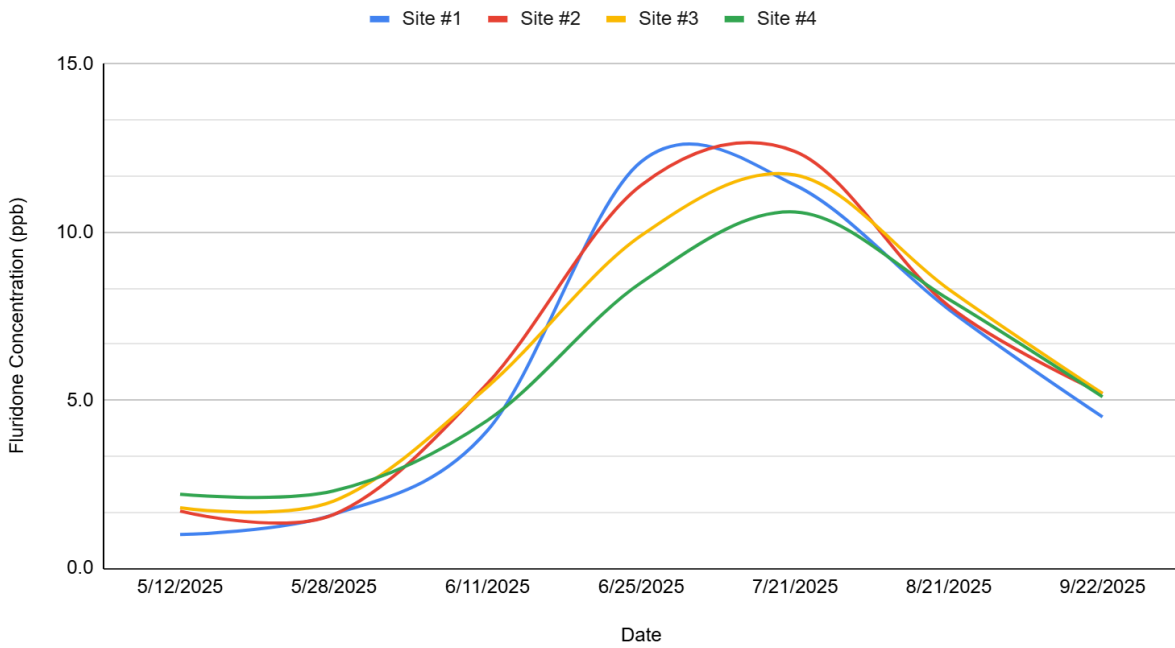
To monitor herbicide concentrations in the lake and help guide the timing and dose of the follow-up applications, seven sampling rounds at four different lake stations were collected. The sampling round occurred on May 12th, May 28th, June 11th, June 25th, July 21st, August 21st and September 22nd. Figure 4 shows the locations of the FasTEST sampling. Graph 1 shows the average fluridone concentration in the lake over time and Graph 2 shows the results at each sampling station over time.



Graph 1 - AVERAGE FLURIDONE CONCENTRATION



Graph 2 - Fluridone Concentration By Sample Site





Herbicide monitoring shows that concentrations took longer to build than expected given the above average rainfall in May, but a concentration of >5 ppb was maintained between mid June and late September (90+ days). The peak was also delayed, but reached 10.5 ppb in late June and 11.5 in late July. Concerns over dilution during the early stages of the treatment prompted us to accelerate the timing and dosing of the applications. Following May, rainfall amounts fell off sharply (2.08” in June, 1.55” in July) while the pellets were still releasing, so concentrations remained on the higher end of the desired range for longer than anticipated. In fact, the average lake concentration did not drop below 8 ppb until the later half of August.

Due to these circumstances, we expect excellent multi-year control of fanwort, however the year of treatment effects on native plant growth were more pronounced than anticipated. While we fully expect the native plant populations to rebound rapidly in 2026, it will likely be a longer period of time and desirable recovery could extend into the next year as well. Seed bearing plants are likely to rebound more quickly in the new year

Anticipated Management in 2026

With the successful fluridone treatment this past summer, we expect there to be minimal need for management of invasive species in 2026. In fact, the prolonged levels of fluridone due to higher than normal rain in May followed by lower than normal precipitation in June and July should also limit any treatment needs for native plants as well. Little or no treatment in 2026 will help to allow desirable plants to return more rapidly and robustly. The following table presents the proposed schedule of efforts in 2026.

Table 4 – Proposed Plan for 2026

| | Schedule | Notes/Criteria |
|--|------------------------------|---|
| Contingency DEP Permitting | March | Permit for contingency herbicide & algaecide treatments |
| Summer Survey | June/July | Full data point survey, survey and document plant populations, identify any areas of invasive or nuisance growth (unlikely) |
| Contingency Herbicide & Algaecide treatment (as needed) | July-September | Conduct any needed herbicide treatment based on summer survey and algaecide treatment based on water clarity monitoring and algae testing |
| Late Season Survey (conducted by ARC) | Late September/early October | Full data point survey |

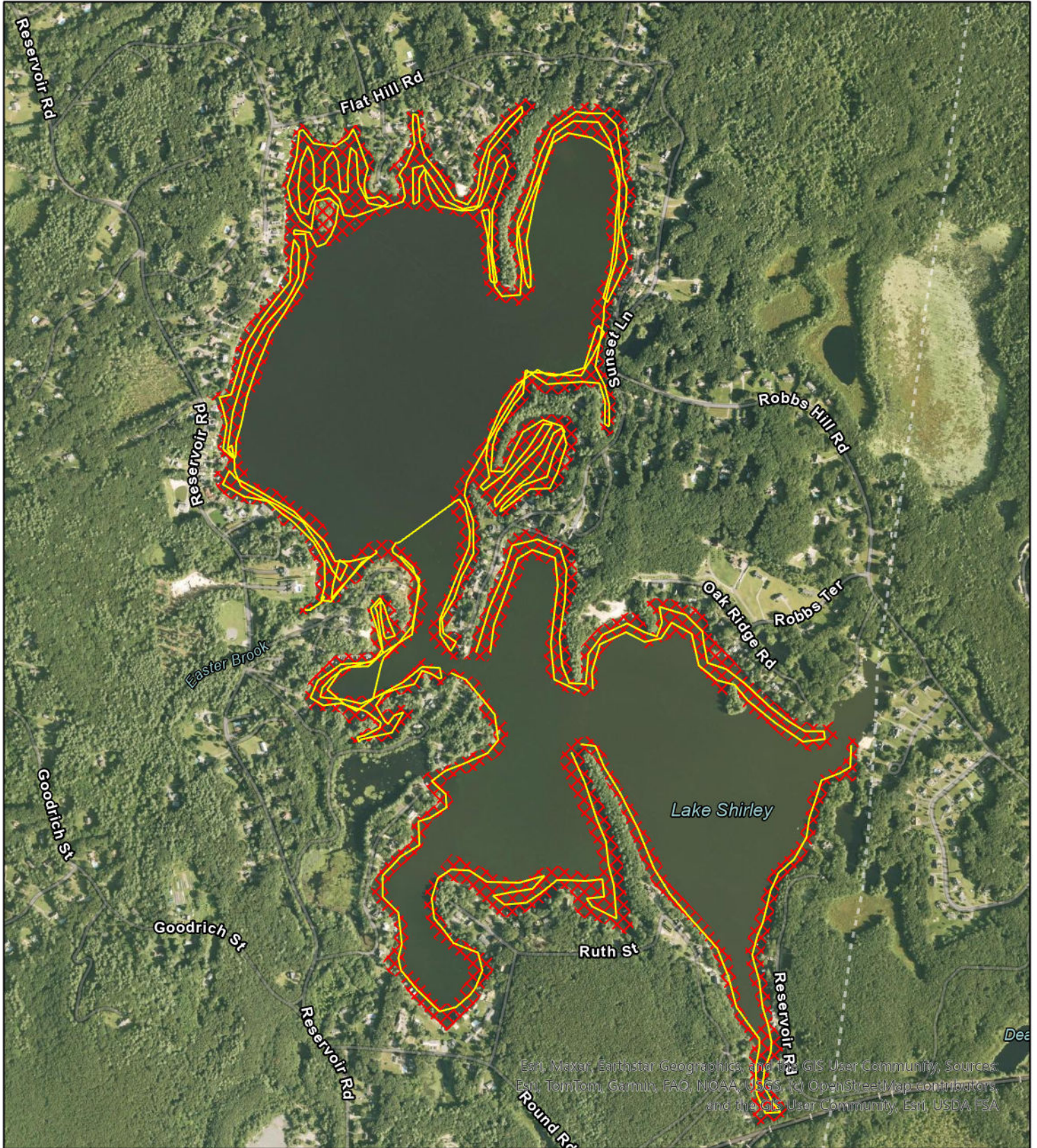
Monitoring of water clarity and algal populations (as necessary) provides timely information to guide algaecide treatments should such treatments be warranted. It continues to be of paramount importance to ensure that the water clarity monitoring is conducted on a regular basis (weekly or bi-weekly depending on general observation) from May-October and that results are provided to SOLitude and other project partners so that algaecide treatments are scheduled in a timely manner. Should treatment of cyanobacteria be required in 2026, copper sulfate is again proposed for use.



We recommend LSIC continue to pursue an integrated approach to manage nuisance plants and algae utilizing drawdown and herbicide/algaecide as required. To address overall lake management and long-term goals, the LSIC should continue the investigation and implementation of alternative in-lake methods, watershed management, public education and diagnostic assessments.

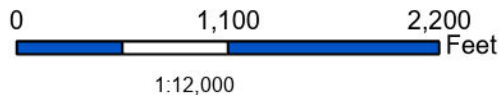
We hope this report will be of help to LSIC in planning for 2026 and beyond. If you have any questions regarding this report, please feel free to contact me. We look forward to working with you again in the future.

Figure 1: Lake Shirley - April Treatment Areas & Tracks



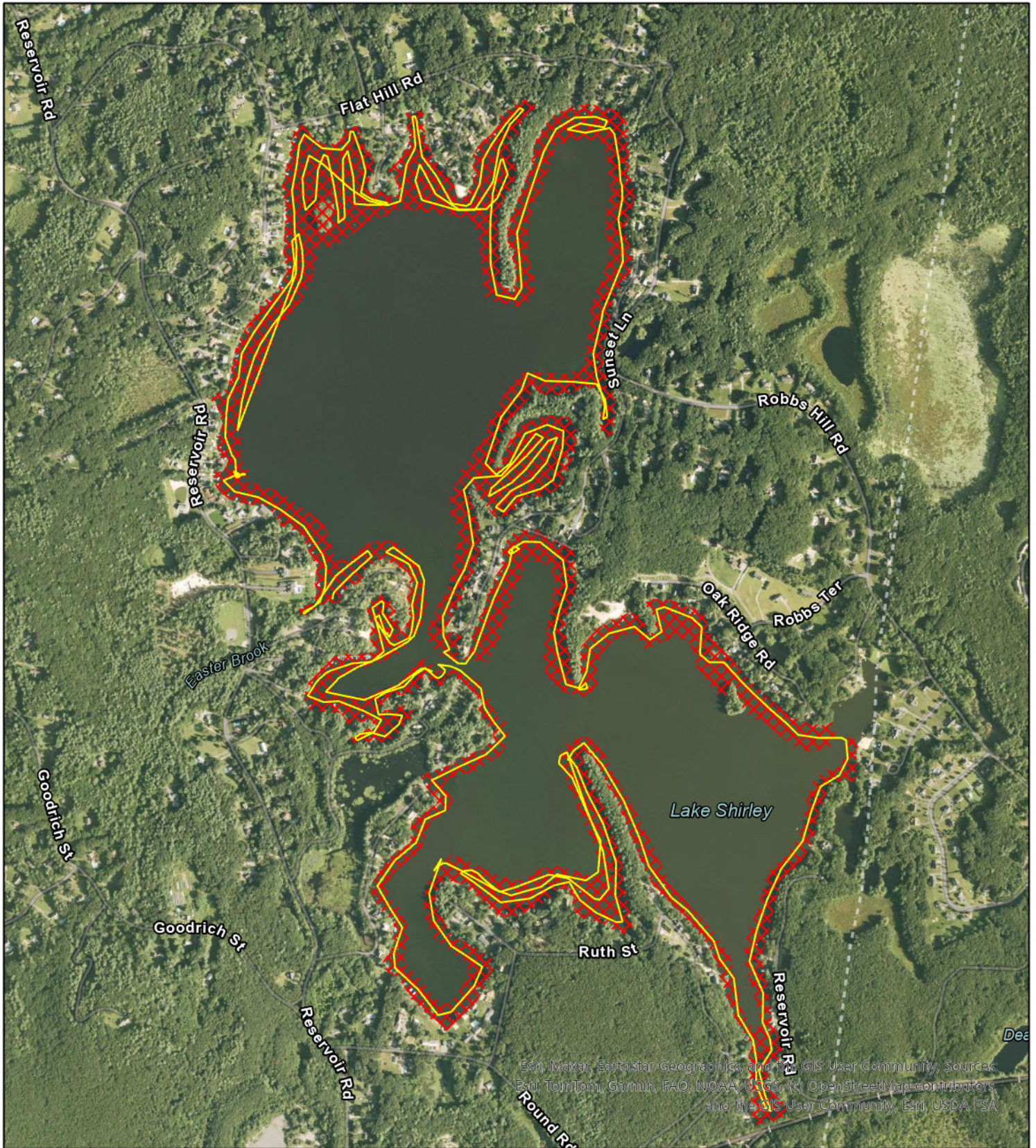
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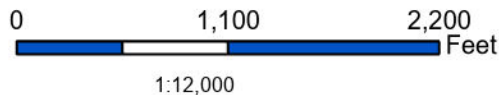


Map Date: 11/26/2025
Prepared by: D. Meringolo
Office: SHREWSBURY, MA

Figure 2: Lake Shirley - May Treatment Areas & Tracks

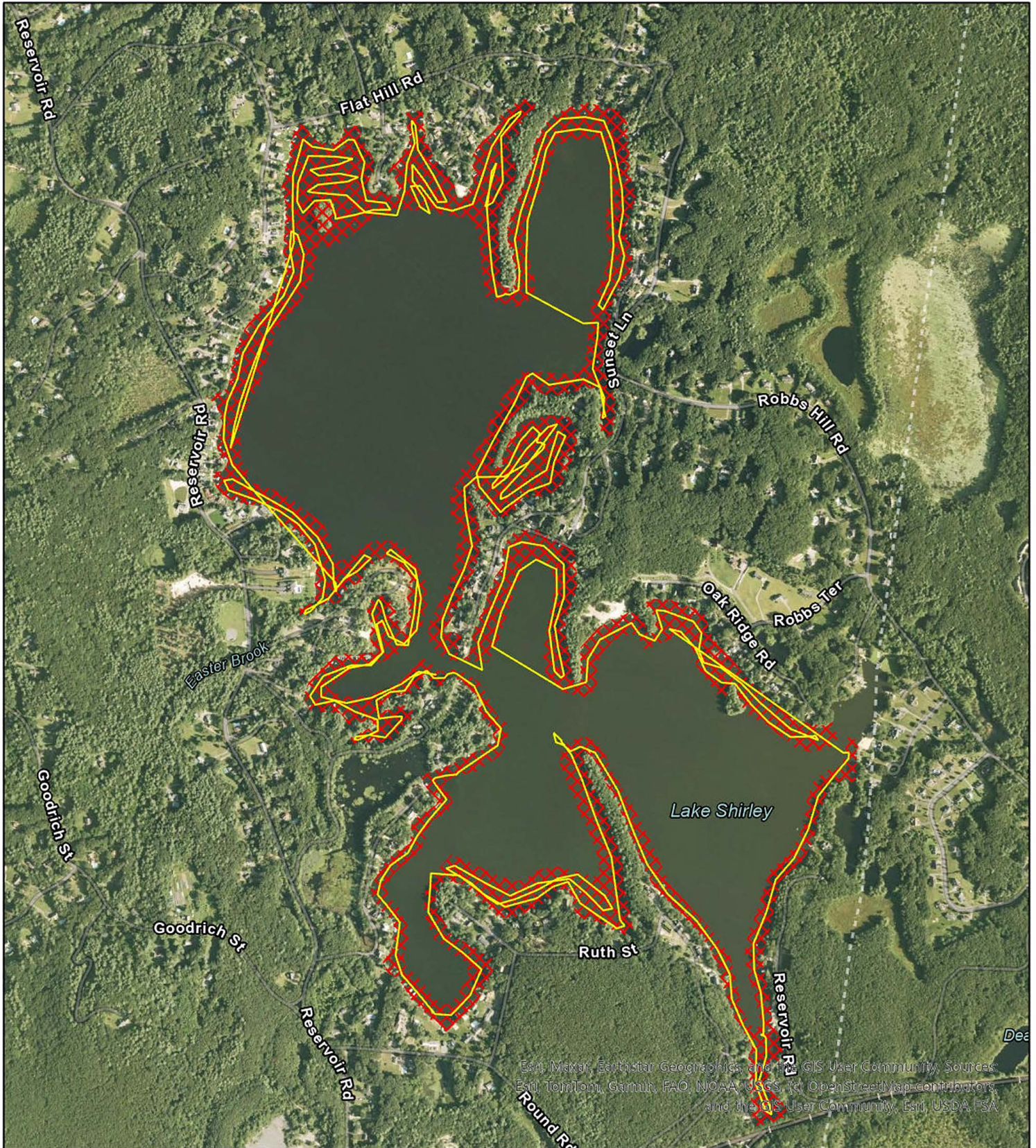


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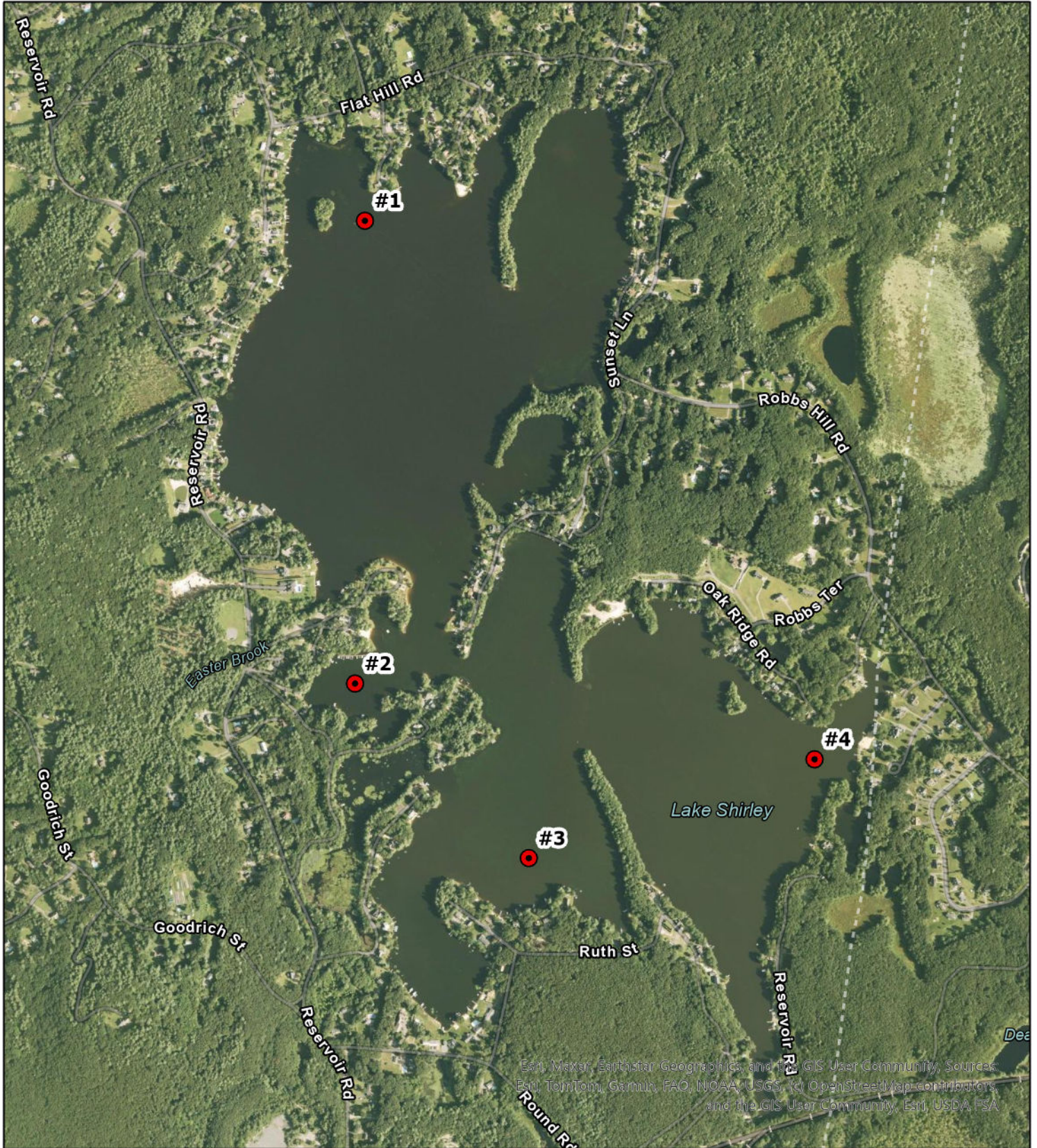
Figure 3: Lake Shirley - June Treatment Areas & Tracks



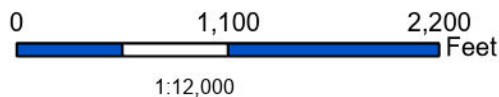
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Figure 4 - FastEST Sample Sites



Lake Shirley
Lunenburg/Shirley, MA
WORCESTER COUNTY



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Prepared by: D. Meringolo
Office: SHREWSBURY, MA