

Lake Vegetation Index

2019 Team Proficiency Report



Division of Environmental Assessment and Restoration

Aquatic Ecology and Quality Assurance Section

2019

Executive Summary

Thirty-three teams participated in the 2019 Lake Vegetation Index (LVI) Team Proficiency exercise conducted at Ocheesee Pond (6 teams), Half Moon Lake (11 teams), and Lake Rochelle (16 teams). Thirty teams were within the acceptable score ranges (± 12 points of the expert median) within the initial sampling period. Variability in the results was associated primarily with two factors: the selection of dominant or co-dominant plants and plant identification errors in specific groups (*Eleocharis*, *Schoenoplectus*). The number of taxa identified at each lake was also quite variable, but did not always affect differences in scores. Consistency in overall scores, dominance selection, and identification of submersed taxa were similar to the 2017 proficiency exercise, and improved compared to older proficiency exercises. Those calculating the LVI with the LVI calculator provided by DEP should ensure that they use “1” to indicate presence of a taxon, rather than “X,” which can cause errors. Several samples required recalculation by DEP, for this reason. DEP is currently revising the online LVI calculator tool, and a more functional, user-friendly version will be available for the 2020 LVI season.

Introduction

The Lake Vegetation Index (LVI) is a rapid assessment of lake health based upon the associated aquatic and littoral zone plant community. To submit LVI data to the Florida Department of Environmental Protection (DEP), sampling teams must demonstrate proficiency in the LVI method by generating an LVI score that is within the acceptance criteria (± 12 points of median expert score), per DEP Standard Operating Procedure (SOP) LVI 1200. Expert teams used for setting the central tendency for 2019 were those teams that passed the 2017 LVI proficiency demonstration. Three lakes were sampled for LVI proficiency demonstration in 2019: Ocheesee Pond in Jackson County, Half Moon Lake in Marion County, and Lake Rochelle in Polk County (Figure 1). The sampling time window for all lakes was June 10-July 10, 2019.

To “pass” the proficiency demonstration, the LVI score generated from the data collected by each team (expert or non-expert) was required to be within 12 points (+/-) of the median expert LVI score. Each participating team conducted the LVI at one lake, following the sampling SOP LVI 1100 (effective January 2017, <https://floridadep.gov/dear/quality-assurance/content/dep-sops>). SOP LVI 1100 also requires that at least one person on an LVI sampling team be proficient in plant identification, by annually taking and passing the DEP test of the most common lake plants for the LVI. Sampling maps were provided by DEP, but the teams followed a random procedure to choose their starting section and subsequent sections, as directed by the SOP. Teams recorded the observed vegetation in each of the four lake sections. Plants that could not be identified with confidence in the field were collected and later identified in the lab, and when necessary verified by an expert botanist. Teams then calculated their LVI scores per SOP LVI 2200, either by using the Statewide Biological Database (SBIO2) (DEP teams) or the LVI calculator provided by DEP (version based on LVI 2200, <https://floridadep.gov/dear/bioassessment/content/bioassessment-training-evaluation-and-quality-assurance>).

2019 LVI Proficiency Exercise Results

This report describes the results of the 2019 LVI Proficiency Demonstration, with a comparison of team determinations of the LVI score and component metrics for each lake. Expert and non-expert teams should compare their scores to the expert scores to determine which elements may not be consistent with others' assessments. Teams should use this exercise as a method to correct any observed methodological deficiencies or deviations from the LVI SOP. Additionally, issues that arise during these exercises may prompt DEP to revise the LVI SOP to enhance clarity and consistency. Demonstration of proficiency by being within the expert range for this exercise provides DEP with assurance that various sampling entities are producing comparable data.

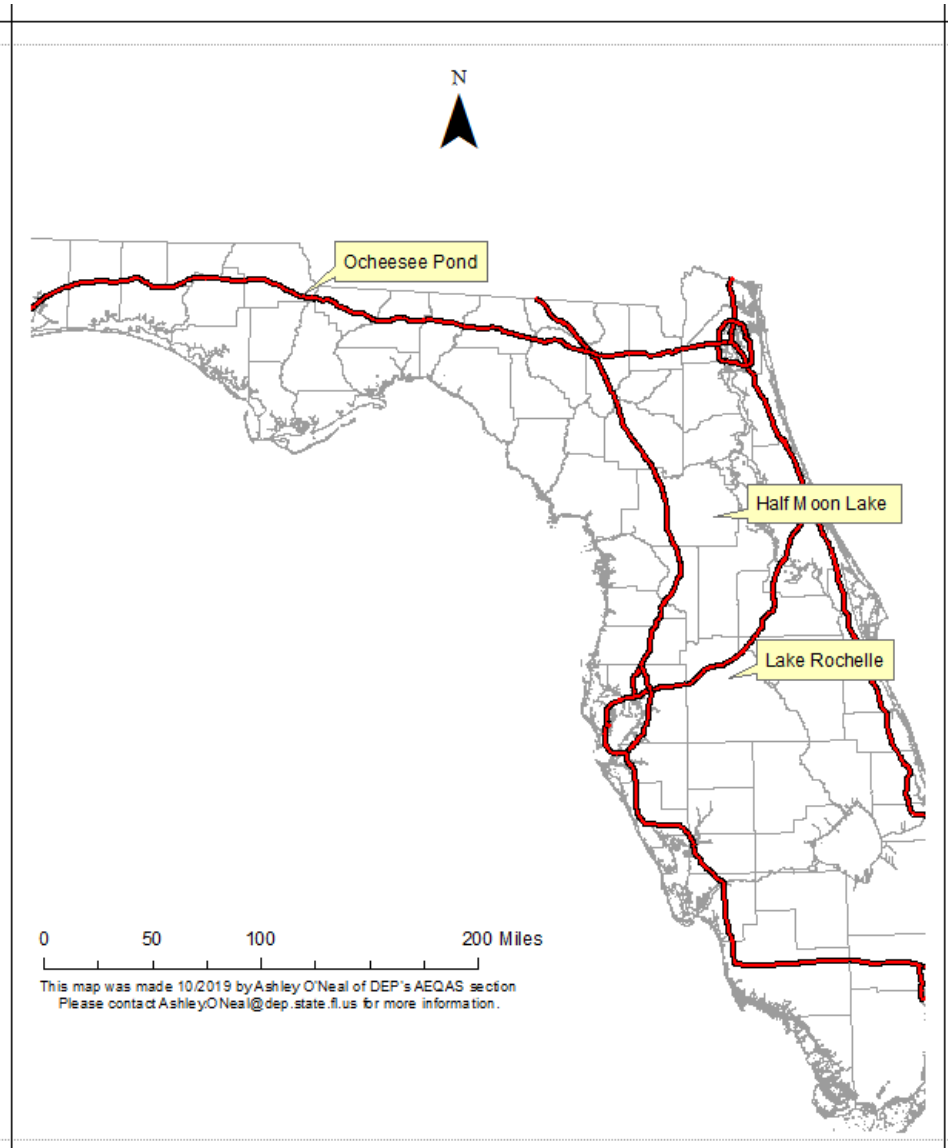


Figure 1. Location of lakes sampled for the LVI Proficiency Demonstration 2019.

Data Analysis

LVI scores were calculated per DEP SOP LVI 2200 and submitted to the DEP Aquatic Ecology and Quality Assurance Section (AEQAS). DEP sampling teams entered the data into SBIO2, and AEQAS staff retrieved those data. Most non-DEP teams used the Excel LVI calculator available on the FDEP website, and sent completed files to AEQAS. The LVI score is calculated for each lake section for each team. The overall LVI score is the average of the four individual lake section scores. The LVI scores for each section are derived from four metrics: Percent Native Taxa (% Native), Percent Category I Invasive Exotic Taxa from the Florida Exotic Pest Plant Council (FLEPPC) list (% FLEPPC I), Percent Sensitive Taxa (% Sensitive), and the Coefficient of Conservatism (CC) of Dominant/Co-dominant Taxa (CC_Dom_Codom). The median score of the expert teams was calculated for each lake. Per SOP LVI 1200, LVI scores that were within ± 12 points of the expert median were considered acceptable. Mean metric data for each team are provided to help teams determine why their scores might have been different from the median; however, in the actual calculation of the LVI, metric scores are not averaged among sections.

Overall Results

Scores

Thirty-two teams conducted LVI assessments for the 2019 LVI Proficiency exercise during the June 10-July 10, 2019 testing period, and one team conducted the exercise six days after the testing. Thirty teams successfully scored within ± 12 points of the expert median. Table 1 contains summary statistics for all LVI scores. Errors/inconsistencies with the SOP made by teams during the sampling or analysis phases are described below.

Table 1. Summary statistics of all LVI assessments conducted for the 2019 LVI Proficiency exercise.

Lake	Expert N	Expert Median	Passing Range	Total N	Median (all)	Mean (all)	Standard deviation (all)	Range (all)
Ocheesee Pond	6	72	60-84	6	72	73	5.2	67-80
Half Moon Lake	10	71	59-83	11	72	71	8.0	62-90
Lake Rochelle	14	43	31-55	16	42	40	8.5	21-51

Selection of Dominant/Co-dominant Taxa

The Coefficient of Conservatism (C of C) score of the dominant taxon or the average C of C score of two co-dominant taxa is one of the four LVI metrics. Previous LVI variability exercises have shown that the selection of the dominant or co-dominant taxa is one of the most important decisions made by a team conducting the LVI. The LVI SOP directs samplers to default to two co-dominants rather than a single dominant species if there is not one species that is clearly dominant (see excerpt below from SOP LVI 1100). The choice of *no* dominant taxon or co-dominant taxa should be made *only* when 3 or more taxa are equally abundant or when plants are so sparse that no taxon is abundant.

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3.2.7. Determine one dominant or two co-dominant taxa for the sampling unit as follows:

- 3.2.7.1. If a single taxon comprises a clear, overwhelming majority of the areal coverage of plants (e.g., if one taxon is twice as abundant as all others), record it as dominant.
- 3.2.7.2. Assign two co-dominant taxa if there are two taxa that are abundant and it is unclear that one taxon is definitively more abundant than the other.
- 3.2.7.3. Record dominance or co-dominance on the Lake Vegetation Index Data Sheet. Dominance can be observed for woody, emergent, floating, or submersed species. For woody species, consider the canopy overhanging the lake in the determination of areal coverage. Deploy the frotus additional times if necessary to determine potential dominance of submersed taxa.

3.2.8. If no one dominant or two co-dominant species are present, do not assign a dominance code for that sampling unit and note on the datasheet that no dominant was assigned.

Among the 33 LVI Proficiency samples, there were a total of 132 sections assessed. Teams assigned a single dominant for 61 lake sections, two co-dominants for 56 lake sections, and did not assign any dominant for 15 lake sections. In some lake sections, there was strong consistency among teams in dominance selection, and the selection of a single dominant for multiple sections was appropriate. At Ocheeese Pond, for example, *Taxodium* was identified as the single dominant for 20 of 24 sampling sections (Table 4), and evidence indicates it was twice as abundant as any other taxon in most areas of the lake. In other cases, it appears that there was not a single obvious dominant species and the assignment of two co-dominants was the more appropriate choice. At Half Moon Lake, for example, 8 different taxa were selected as dominants or co-dominants, co-dominants were chosen in 25 of 44 sections, and no dominance was assigned in 10 sections. At Lake Rochelle, the assignment of dominance was more evenly split—one dominant was chosen in 32 sections, and 2 co-dominants were chosen in 27 sections. DEP welcomes suggestions from all LVI samplers for improving consistency in dominance/co-dominance selection.

Taxonomic Verifications

Most LVI samplers agree that taxonomic identification is the most difficult part of the LVI method, and that is why taxonomic verification by outside experts is an important part of the method. Overall, taxa lists were comparable, but additional plant training is needed in some taxonomic areas. Groups for which there were noticeable differences among teams were the genera *Limnophila*, *Myriophyllum*, *Eleocharis*, and *Schoenoplectus*. Although some variability in these taxa is likely due to their patchiness throughout the lake and the differing chances of retrieving taxa with the frotus, the data suggest there were several incorrect identifications. Teams should review the discussions in the lake-specific sections below regarding which plants varied in ID at each lake, and review the full taxa lists in Appendix A. It is important that all teams have an outside expert available for consultation for difficult identifications. The SOP requires either sample collection or photo documentation of the dominant or co-dominant taxa, so verification is possible.

Determination of Lake Boundary and Taxa Inclusion Decisions

Determining the assessment area for the LVI and deciding which taxa are appropriate to include is an important part of the LVI method. There was notably high variability in the number of taxa identified by teams at all lakes. The range in number of total taxa for Ocheeese Pond, Half Moon Lake, and Lake Rochelle was 28, 30, and 39, respectively. This variability may be due to differences in determining the lake boundary, decisions about inclusion or exclusion of specific plants, and variable levels of effort. The

determination of the assessment area is covered in section 3.5 of the LVI Primer. Here are key guidelines for determining the assessment area:

- The assessment area should be to the seasonal high water level, defined as “the elevation to which the groundwater and surface water can be expected to rise in a normal wet season”
- The following hydrologic indicators, used with reasonable scientific judgment, can be used to estimate the seasonal high water level: algal mats, aquatic mosses and liverworts, aquatic plants, rafted debris lines, elevated lichen lines, morphological plant adaptations, and water marks. These indicators are useful in determining if plants are indeed “in the lake.”
- Do not include plants in woods or lawns above the seasonal high water level.
- Plants at the shoreline in saturated soil should be included.
- In the case of sites with extensive fringe wetlands (swamps or marshes), do not include plants in those areas (even though they are within seasonal high water), if they are inaccessible from the boat.

Only aquatic and wetland plant taxa should be included in the LVI assessment. Here are key guidelines:

- Aquatic plants include all floating and submersed taxa (any plant which typically floats on water or requires water for structural support).
- For most emergents, and all woody taxa, you must determine the wetland status, and include only taxa which have a wetland status of obligate (OBL), facultative wetland (FACW), or facultative (FAC).
- Do NOT include upland taxa. *Pinus elliottii* (slash pine) is the exception.
- Vines should be included ONLY if they are rooted in saturated soils, creeping out onto the water, growing intermixed with emergent vegetation, or covering a large portion of shoreline shrubs or trees that are part of the assessment. In addition to using the appropriate lake boundary and including only aquatic and wetland taxa, it is important to maintain consistency among teams in the level of effort. In the “drive-by” portion of the method, “you should not leave the boat or spend effort on difficult to access areas” (LVI SOP 3.2.3). Only during the transect portion of sampling each section should you spend additional effort: “if practical, get out of the boat and wade to identify plants that are small, hidden or in areas too shallow to reach by boat.” (LVI SOP 3.2.4).



Figure 2. Shoreline of Ocheesee Pond on 6/20/2019, with *Taxodium*, *Nymphaea odorata*, and trees felled by Hurricane Michael in October 2018 (photo: DEP AEQAS).

Excel Calculator Use Errors

Most non-DEP organizations used the Excel LVI calculator available on the DEP website for their LVI calculations. DEP checked this calculator for accuracy during its development and revision. One non-DEP organization used their own LVI database/calculator which, during a previous data review, was compared to SBIO2 calculations. DEP also compared scores and metrics generated by SBIO2 and the Excel calculator for several DEP samples as part of this LVI Proficiency exercise, and both tools generated the same result. Ocheesee Pond and Half Moon Lake are in the North region, and Lake Rochelle is in the South region. Different equations are used for each region, so it is important to assign the correct LVI region. All teams who used the LVI calculator applied the correct region. The most problematic error in the use of the LVI calculator was use of an “X,” rather than the correct “1” to denote presence of a taxon. Users should designate presence, dominance, and co-dominance by use of “1,” “D,” and “C,” respectively (not case-sensitive). A letter designation for presence in some instances causes an incorrect calculation. Use of the “X” resulted in several incorrect scores in this exercise, and these samples had to be re-calculated. All results presented in this report were generated with the corrected calculations.



Figure 3. Boat launch at Ochesees Pond (photo: City of Tallahassee).

Results by Lake

Ochesees Pond Results

Ochesees Pond is a highly tannic lake located in Jackson County. There is cypress swamp, upland mixed hardwood-coniferous forest, row crops, tree plantations, and low density residential development surrounding the lake. The shoreline of the lake is characterized by *Taxodium* (cypress), but also includes submersed, floating and herbaceous emergent taxa (Figure 2). The six teams who sampled Ochesees Pond identified between 82% and 92% native taxa. The submersed plant community was characterized by *Myriophyllum heterophyllum*, *Utricularia foliosa*, and *Utricularia floridana*. *Utricularia foliosa* was the most abundant submersed taxon. Common floating taxa included *Nymphaea odorata* and *Brasenia schreberi*. Common emergent taxa included *Panicum hemitomon*, native *Ludwigia*, and *Lycopus americanus*. In addition to the abundant *Taxodium*, common shoreline woody taxa were *Acer rubrum*, *Cephalanthus occidentalis*, and *Cyrilla racemiflora*. There were a few FLEPPC Category 1 and 2 taxa observed at Ochesees Pond, including *Alternanthera philoxeroides*, *Hydrilla verticillata*, and *Limnophila sessiliflora*, but none were abundant, and their individual distributions were patchy. Water levels at

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Ocheesee Pond were higher than normal during the proficiency testing window, due to the effects of Hurricane Michael (October 2018), and higher than average rainfall for winter and spring of 2018-19 (Figure 3). Water levels were significantly higher than in September 2018 (when the lake was last sampled by DEP), and there was less submersed biomass observed by staff who participated in both events. Felled trees and stumps made navigating Ocheesee Pond difficult, but no teams reported any inaccessible areas.

Six teams, all expert from 2017, sampled Ocheesee Pond in 2019 (Table 2) using the sampling map provided by DEP (Figure 4). One of the teams sampled six days beyond the prescribed sampling window, but results did not appear to be affected by that small difference in time, so results were included in the analysis. Team LVI and metric scores and dominant taxa selections are shown in Tables 3 and 4. The median LVI score for Ocheesee teams was 72, and the acceptable range was 60-84. All teams were within the acceptable range. The total number of taxa observed at Ocheesee Pond ranged from 17 to 45 taxa, while the overall average number (± 1 standard deviation) of taxa per section was 16.4 (± 4.7). The average metric values (± 1 standard deviation) per lake section across all teams were as follows: 88.7 (± 3.5) % Native, 3.0 (± 2.6) % FLEPPC Category 1, 13.0 (± 3.9) % Sensitive, and dominant/co-dominant C of C of 6.9 (± 0.1) (Table 3). See Appendix A for team taxa lists.

Table 2. Teams, team abbreviations, team members, expert status, and sampling date for Ocheesee Pond 2019 LVI Proficiency demonstration.

Team	Team Abbreviation	Status	Date Sampled	Team Members
DEP – TLH ROC	DEP TLH ROC	Expert	6/20/2019	Jon Woods, Jade Burtchett, Paul Blair
DEP - Northwest ROC	DEP NWROC	Expert	6/25/2019	Frank Butera, Mike King, Christopher Slade, Nathan Mulkey, Myranda Clark, Jimmy Pitts
DEP – Aquatic Ecology and Quality Assurance	DEP AEQAS	Expert	6/20/2019	Joy Jackson, Ashley O’Neal, Sarah Noble, Mike Dalsis
Frydenborg Ecologic	FRY ECO	Expert	7/16/2019	Russ Frydenborg, Beck Frydenborg
City of Tallahassee	City of TAL	Expert	6/26/2019	Ken Espy, Keith Lawhon
DEP—Watershed Assessment Section	DEP WAS	Expert	6/12/2019	Curtis Musson, Blake Spencer, Avril Wood-McGrath

Table 3. Summary results for each team at Ocheesee Pond, including final LVI score and total number of taxa observed, and the average of metric scores and number of taxa per sampling section. The acceptable LVI score range was 60-84.

Team	Sections	LVI	Total Taxa	Mean # Taxa	Mean % Native	Mean %	Mean % Sensitive	Mean CC_Dom_Codomin
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						FLEPPC 1		
DEP NWROC	2,5,8,11	67	45	23	86.3	3.9	8.9	6.9
DEP AEQAS	2,5,8,11	70	33	19.5	89.1	3.6	10.3	6.8
FRY ECO	2,5,8,11	71	17	10	82.9	7.3	17.6	7
City of TAL	3,6,9,12	79	20	12.5	91.0	1.8	16.6	6.8
DEP WAS	3,6,9,12	73	26	16.3	91.8	1.3	9.2	6.8
DEP TLH ROC	3,6,9,12	80	30	17	91.3	0	15.3	7

Table 4. Selected dominant or codominant taxa per lake section for each team at Ocheesee Pond.

Team	Sections	Section 1,2,3 Dominants	Section 4,5,6 Dominants	Section 7,8,9 Dominants	Section 10,11,12 Dominants
DEP NWROC	2,5,8,11	<i>Taxodium</i>	<i>Taxodium</i>	<i>Taxodium/Utricularia floridana</i>	<i>Taxodium</i>
DEP AEQAS	2,5,8,11	<i>Taxodium</i>	<i>Taxodium</i>	<i>Taxodium</i>	<i>Taxodium/Nymphaea odorata</i>
FRY ECO	2,5,8,11	<i>Taxodium</i>	<i>Taxodium</i>	<i>Taxodium</i>	<i>Taxodium</i>
City of TAL	3,6,9,12	<i>Taxodium</i>	<i>Taxodium</i>	<i>Taxodium</i>	<i>Taxodium/Nymphaea odorata</i>
DEP WAS	3,6,9,12	<i>Taxodium</i>	<i>Taxodium</i>	<i>Taxodium</i>	<i>Taxodium/Nymphaea odorata</i>
DEP TLHROC	3,6,9, 12	<i>Taxodium</i>	<i>Taxodium</i>	<i>Taxodium</i>	<i>Taxodium</i>

There are several items to note about the decision making and plant identifications among teams at Ocheesee Pond. All six teams selected *Taxodium* as the one dominant taxon for at least three sections. Two teams selected one dominant (*Taxodium*) for all four lake sections. Four teams had one section for which they selected two co-dominants. *Taxodium* (CC=7) was selected as one of the co-dominants for all four sections where two co-dominants were selected. The other co-dominants selected were *Nymphaea odorata* (CC=5, three sections) and *Utricularia floridana* (CC=6.34, one section). Of the 24

total sections assessed, *Taxodium* was dominant or codominant for all, *Nymphaea odorata* was co-dominant for three, and *Utricularia floridana* was co-dominant for one. All strata were represented in Ocheesee Pond. The woody stratum was abundant, and clearly dominated by *Taxodium*; other commonly observed woody taxa were *Acer rubrum* (6 teams, CC=4.65), *Cephalanthus occidentalis* (6 teams, CC=5), *Cyrilla racemiflora* (6 teams, CC=5), *Liquidambar styraciflua* (5 teams, CC= 2.5) and *Salix caroliniana* (4 teams, CC=2.95). Taxa commonly observed in the submersed community were *Utricularia foliosa* (6 teams, CC=5), *Utricularia floridana* (5 teams, CC=6.34), *Cabomba caroliniana* (4 teams, CC=5.5), *Limnophila sessiliflora* (4 teams, CC=0), and *Myriophyllum heterophyllum*/native (4 teams, CC=4.77). Floating taxa included *Nymphaea odorata* (6 teams, CC=5), *Brasenia schreberi* (5 teams, CC=8.79), *Salvinia minima* (5 teams, CC=0), *Luziola fluitans* (5 teams, CC=4), and *Nymphoides aquatica* (2 teams, CC= 6.09). Commonly observed taxa in the emergent stratum included *Alternanthera philoxeroides* (6 teams, CC=0), *Triadenum virginicum* (6 teams, CC=5), *Panicum hemitomon* (5 teams, CC=5.82), *Boehmeria cylindrica* (4 teams, CC=5), *Lycopus americanus* (3 teams, CC=3.17), and *Echinodorus cordifolius* (3 teams, no CC score).

There was variability among teams at Ocheesee Pond in the total number of plants identified at the lake, ranging from 17-45 taxa. It does not appear that an entire stratum of taxa (e.g. floating, or woody shoreline plants) was overlooked by teams with the shortest taxa lists, but it does appear that some common herbaceous emergents and wetland trees were overlooked by these teams. Teams with the longest lists appear to have included vines that typically are not part of the lake community, as well as upland trees that should not be included in the LVI. Patchiness in the distribution of plants, lake sections with more species, and different levels of effort or expertise in species-rich areas may also contribute to the variability in taxa lists.

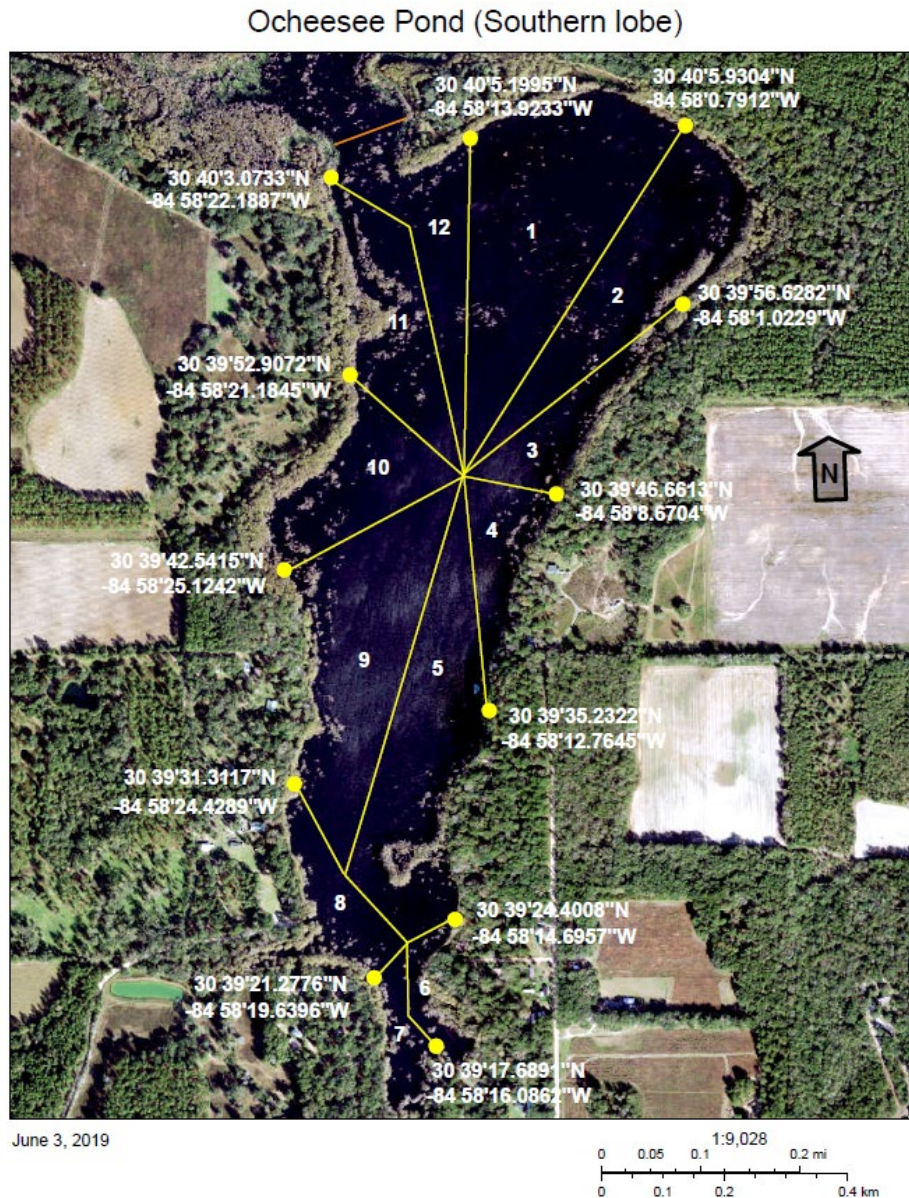


Figure 4. Lake Vegetation Index sampling map of Ocheesee Pond.

Ocheesee Pond Plant ID Discussion

All teams were within the acceptable scoring range, and the range was 13 points. In general, there was good accuracy and consistency in plant identification, but there were a few differences that are important to note. Eight taxa were identified by all six teams: *Acer rubrum*, *Alternanthera philoxeroides*, *Cephalanthus occidentalis*, *Cyrilla racemiflora*, *Nymphaea odorata*, *Taxodium*, *Triadenum virginicum*, and *Utricularia foliosa*. An additional five taxa were identified by five teams: *Brasenia schreberi*, *Liquidambar styraciflua*, *Luziola fluitans*, *Panicum hemitomon*, and *Utricularia floridana*. Other emergent and woody taxa that were identified frequently were *Boehmeria cylindrica*, *Echinodorus cordifolius*, *Lycopus americanus*, *Magnolia virginiana*, *Platanus occidentalis*, and *Xyris*. Other floating

and submersed taxa that were identified frequently were *Cabomba caroliniana*, *Hydrilla verticillata*, *Limnophila sessiliflora*, *Myriophyllum aquaticum*, and *Myriophyllum heterophyllum*. Although taxa lists varied among teams in the number of taxa and the composition, there were many commonly identified species, particularly those that were encountered in multiple sampling units.

Submersed macrophytes can be challenging to identify because it is difficult to observe them in their underwater habitat, plant material gets tangled and fragmented on the bottom, and there are several similar-looking species. *Limnophila sessiliflora* (4 teams) and *Myriophyllum aquaticum* (3 teams) were both identified at Ocheese Pond (one team observed both species). Photographs confirm *Limnophila sessiliflora* from Ocheese Pond, but *Myriophyllum aquaticum* has not yet been confirmed. These species can look very similar in their overall habits (Figure 5). They are both submersed/emergent species with finely textured, feathery leaves. The key difference is that *Limnophila* has dimorphic leaves, while *Myriophyllum* has only one type of leaf. The emergent leaves of *Limnophila* are dark green, roughly lance-shaped, and deeply lobed with crenate margins, while the submersed leaves are very finely dissected and whorled in a tree branching pattern (Figures 6 and 7, left). The submersed and emergent portions of *Myriophyllum aquaticum* are all finely divided, and the individual divisions are oppositely arranged, in a feather-like pattern (Figures 6 and 7, right).

Identification of *Utricularia* species was more consistent and accurate at Ocheese Pond than in past proficiency exercises. *Utricularia foliosa* was identified by all six teams. *U. foliosa* is a free-floating submersed species, with robust, laterally-spreading, triangle-shaped branches and a pale, flat, strap-like main stem (Figure 8). It is described as fern-like because of the triangular shape and thick spreading leaves. It also has separate, narrow, bladder-heavy branches. *Utricularia floridana* was observed by five of six teams. *U. floridana* has cylindrical, foxtail-like branches, that may fork, but do not have a spreading, triangular shape in the water. Both species have a yellow, 2-lipped flower on an emergent stalk.

An uncommon plant that was identified by 3 teams and occurred sporadically at Ocheese Pond, including at the boat ramp, was *Echinodorus cordifolius*. *E. cordifolius* is a shoreline emergent species in the same family as *Sagittaria*, which it resembles with its 3-petaled white flower and bur-like fruiting head. *E. cordifolius* has a long, heart-shaped leaf, with prominent veins (Figure 9). Like *Sagittaria*, the flowers are in whorls, but unlike *Sagittaria*, they are on a long, arching stem that can droop to the sediment and grow a new plantlet at the flowering node (Figure 10).

Panicum hemitomon was identified by 5 of 6 teams in all 4 sections, but one team identified the similar looking *Sacciolepis striata* in all 4 sections, suggesting that it was misidentified, or that a positive determination could not be made because of the absence of seedheads. *Panicum hemitomon* with flowering/fruiting inflorescences was confirmed from multiple sections of the lake (Figure 11), but it is unclear if *Sacciolepis* was also present.



Figure 5. (LEFT) *Limnophila sessiliflora* at Ocheesee Pond, June 2019 (photo: DEP AEQAS). (RIGHT) *Myriophyllum aquaticum* from Institute for Systematic Botany website (photo: Shirley Denton).



Figure 6. (LEFT) *Limnophila sessiliflora* at Ocheesee Pond (underwater view), June 2019 (photo: City of Tallahassee) and (RIGHT) *Myriophyllum aquaticum* at Quincy Creek, Gadsden Co., April, 2012 (photo: DEP AEQAS).

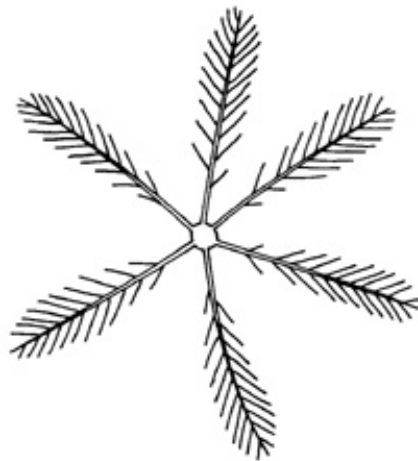


Figure 7. Structure of submersed leaves of *Limnophila sessiliflora* (left), and structure of all leaves of *Myriophyllum aquaticum* (right) (illustrations from IFAS, Center for Aquatic and Invasive Plants website: [IFAS plant profiles](#))



Figure 8. *Utricularia foliosa* at Ocheesee Pond (photo: DEP AEQAS).



Figure 9. *Echinodorus cordifolius* at Ocheesee Pond, 6/12/2019 (photo: DEP WAS).



Figure 10. *Echinodorus cordifolius* with long, arching flowering stalk, 6/26/2019 (photo: DEP AEQAS).



Figure 11. *Panicum hemitomon* in flower at Ocheese Pond on 6/26/2019 (photo: DEP AEQAS).

Half Moon Lake Results

Half Moon Lake is a 516 acre lake in Marion County, and is a clear, acidic, low-nutrient lake in the Ocala Scrub Lake region (Figure 12). The lake is within a recreation area in the Ocala National Forest, and is surrounded by freshwater marshes, sand pine scrub, silvicultural areas, and other lakes. There is a public boat ramp in the northeastern lobe of the lake. The plant community is characterized by extensive areas of woody species, mixed emergents, and floating taxa, but very few submersed plants. Extensive dead brambles of *Rubus* (blackberry) in the woody and emergent zones indicate that water levels have come up in recent years after an extended period with a lower lake level, which would have been necessary for this plant to become established. The *Rubus* appears to have died off with rising water levels, as it does not tolerate inundation.

Eleven teams (ten expert teams and one non-expert team) sampled Half Moon Lake within the proficiency sampling period (Table 5). Team LVI and metric scores and dominant/co-selections from Half Moon Lake are shown in Tables 6 and 7. The median LVI score for Half Moon Lake expert teams was 71, and the acceptable range was 59-83. Nine expert teams and one non-expert team were within the acceptable range, and one expert team exceeded the acceptable range by 7 points. The total number of taxa observed at Half Moon Lake ranged from 24 to 54 taxa, while the overall average number of taxa (± 1 standard deviation) per section was 23.5 (± 4.8). The average metric values (± 1 standard deviation) per lake section across all teams were as follows: 93.5 (± 3.6) % Native, 4.5 (± 2.1) %

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FLEPPC Category 1, 14.2 (± 3.5) % Sensitive, and dominant/co-dominant C of C of 4.8 (± 0.6) (Table 6).
See Appendix A for team taxa lists.

Halfmoon Lake, WBID 2781A (Marion Co.)

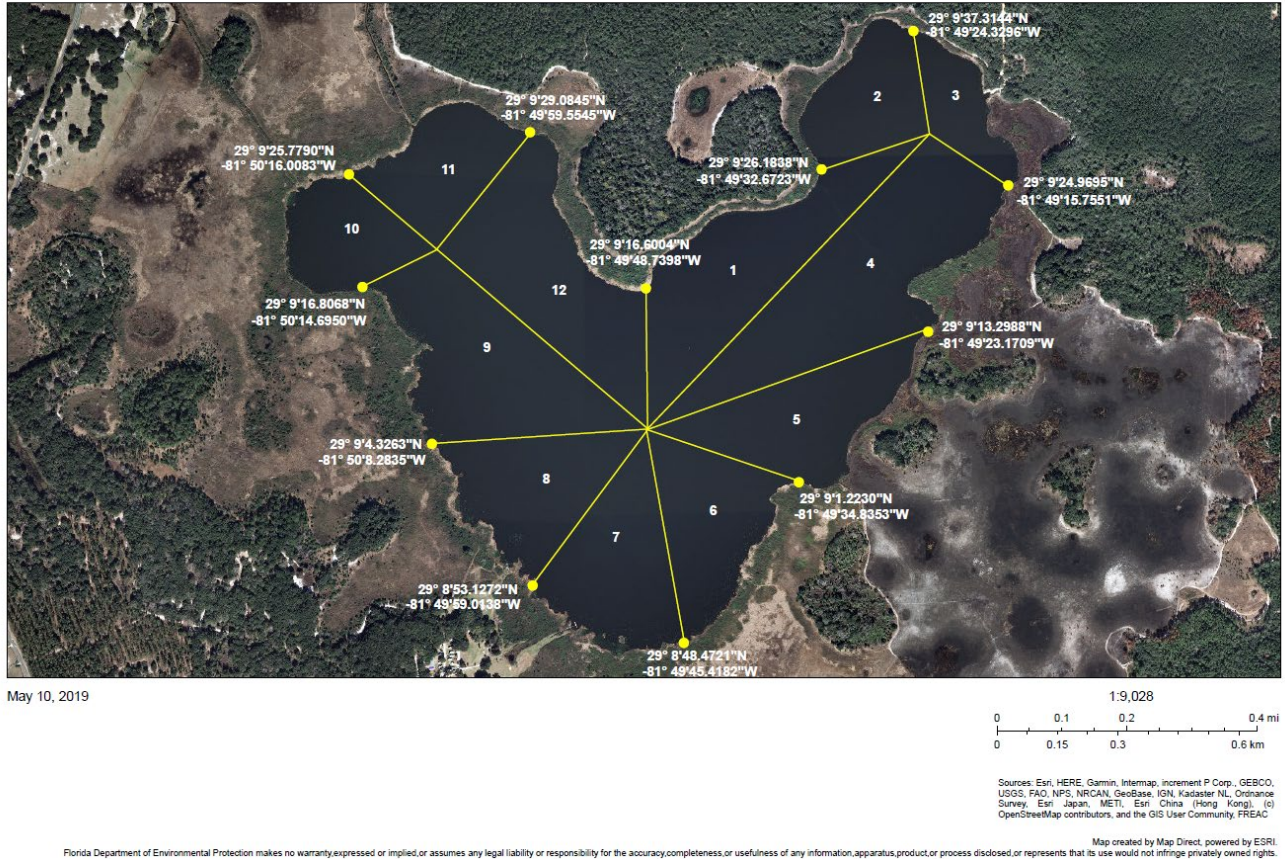


Figure 12. Lake Vegetation Index sampling map of Half Moon Lake.

Table 5. Teams, team abbreviations, team members, expert status, and sampling date for Half Moon Lake 2019 LVI Proficiency Demonstration

Team	Team Abbreviation	Status	Date Sampled	Team Members
DEP – Aquatic Ecology and Quality Assurance 2	DEP AEQAS 2	Expert	6/26/2019	Nia Wellendorf, Jessica Patronis, Ashley O’Neal
DEP – Northeast	DEP NE ROC	Expert	6/17/2019	Jeremy Parrish, Amy Kalmbacher, Brian Davis, Cheyanne Ruben
DEP – Central ROC 1	DEP CROC 1	Expert	6/26/2019	Natalie Ayala, Michael Linger,

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				Mike Drennan, Terry Riordan
DEP – Central ROC 2	DEP CROC 2	Expert	6/27/2019	Katie March, Kalina Warren, Leif Boman
Noel Cawley	Cawley	Expert	6/12/2019	Noel Cawley
St. Johns River Water Management District	SJRWMD	Expert	6/17/2019	Dianne Hall, Kimberli Ponzio, Jodi Slater, Casey Harris
Southwest Florida Water Management District	SWFWMD	Expert	7/1/2019	Kym Rouse Holzwart, Donna Campbell, Mark Hurst
Breedlove Dennis and Associates	BDA	Expert	6/28/2019	Jennifer Rosinski, Sthefanny Houghton, Jonathan McCurry, Virginia Soumar
Environmental Consulting and Technology	ECT	Non-Expert	6/27/2019	Tricia Callahan, Jeff Smith, Richard Morrissey, Robert Sierzega
Seminole County	Seminole	Expert	6/20/2019	Gloria Eby, Joey Cordell, Thomas Calhoun
Wood	Wood	Expert	6/24/2019	Shannon McMorrow, Joe Mansuetti, Craig Duxbury, Nichole Panico

Table 6. Summary results for each team at Half Moon Lake, including final LVI score, total taxa observed, the average of each metric score, and the average number of taxa in the 4 sampling sections. The acceptable LVI score range was 59-83.

Team	Sections Sampled	LVI score	Total Taxa	Mean # Taxa	Mean % Native	Mean % FLEPPC	Mean % Sensitive	Mean CC dom/cod om
DEP CROC 1	1,4,7,10	64	54	32.3	89.0	6.3	11.8	4.4*
Cawley	1,4,7,10	90	24	16.5	98.5	1.5	22.8	5.8*

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SWFWMD	1,4,7,10	75	33	19.5	95.4	4.6	15.6	5.5
DEP NE ROC	2,5,8,11	73	29	19.5	91.1	4.0	15.5	5.8
SJRWMD	2,5,8,11	72	37	23.0	97.0	3.0	12.1	5.1
BDA	2,5,8,11	74	38	24.3	96.9	3.1	14.6	4.6
ECT	2,5,8,11	75	40	20.8	97.4	2.6	16.2	4.1
Seminole	2,5,8,11	62	50	30.0	88.1	6.1	10.2	4.9
Wood	2,5,8,11	64	46	27.3	91.7	8.3	11.2	4.5
DEP AEQAS 2	3,6,9,12	64	35	23.8	91.7	6.4	13.0	4.1
DEP CROC 2	3,6,9,12	69	31	21.0	91.9	3.4	13.1	4.4

*CC score listed is from one section, because dominance was assigned only in one section

Table 7. Selected dominant or codominant taxa per lake section for each team at Half Moon Lake.

Team	Sections Sampled	Section 1,2,3 Dominants	Section 4,5,6 Dominants	Section 7,8,9 Dominants	Section 10, 11, 12 Dominants
DEP CROC 1	1,4,7,10	*	*	<i>Nuphar/Pontederia cordata</i>	*
Cawley	1,4,7,10	*	<i>Panicum hemitomon</i>	*	*
SWFWMD	1,4,7,10	<i>Cephalanthus occidentalis</i>	<i>Cephalanthus occidentalis/Cladium jamaicense</i>	<i>Cladium jamaicense</i>	<i>Myrica cerifera/Sagittaria lancifolia</i>
DEP NE ROC	2,5,8,11	<i>Cladium jamaicense/Panicum hemitomon</i>	<i>Panicum hemitomon</i>	<i>Nuphar/Panicum hemitomon</i>	<i>Panicum hemitomon</i>
SJRWMD	2,5,8,11	<i>Cephalanthus occidentalis/Sagittaria lancifolia</i>	<i>Cladium jamaicense/Panicum hemitomon</i>	<i>Cephalanthus occidentalis/Pontederia cordata</i>	<i>Pontederia cordata/Sagittaria lancifolia</i>

BDA	2,5,8,11	<i>Cephalanthus occidentalis/Sagittaria lancifolia</i>	<i>Cephalanthus occidentalis/Panicum hemitomon</i>	<i>Nuphar/Pontederia cordata</i>	*
ECT	2,5,8,11	<i>Panicum hemitomon/Sagittaria latifolia</i>	<i>Panicum hemitomon/Nuphar</i>	<i>Nuphar</i>	<i>Sagittaria latifolia</i>
Seminole	2,5,8,11	<i>Cephalanthus occidentalis/Sagittaria lancifolia</i>	<i>Cephalanthus occidentalis/Panicum hemitomon</i>	<i>Panicum hemitomon/Pontederia cordata</i>	<i>Panicum hemitomon/Sagittaria lancifolia</i>
Wood	2,5,8,11	<i>Cephalanthus occidentalis</i>	*	*	<i>Cephalanthus occidentalis/Sagittaria lancifolia</i>
DEP AEQAS 2	3,6,9,12	<i>Cephalanthus occidentalis/Panicum hemitomon</i>	<i>Cephalanthus occidentalis/Nuphar</i>	<i>Myrica cerifera/Nuphar</i>	<i>Cephalanthus occidentalis/Sagittaria lancifolia</i>
DEP CROC 2	3,6,9,12	<i>Panicum hemitomon</i>	*	<i>Nuphar/Sagittaria lancifolia</i>	<i>Cephalanthus occidentalis/Sagittaria lancifolia</i>

*Dominance not assigned for this section

There was good consistency in dominance selection among teams at Half Moon Lake, considering the high species diversity and the abundance of multiple taxa in each section of the lake. There were eight taxa selected as dominant or co-dominant: *Cephalanthus occidentalis* (CC=5), *Cladium jamaicense* (CC=8), *Myrica cerifera* (CC=2), *Nuphar* sp. (CC=3.5), *Panicum hemitomon* (5.82), *Pontederia cordata* (5.38), *Sagittaria lancifolia* (CC=3), and *Sagittaria latifolia* (CC=3.5). Eight teams selected *Panicum hemitomon* as dominant or codominant in at least one section, and it was selected as dominant or codominant in 14 sections out of a total of 44 sections. Seven teams selected *Cephalanthus occidentalis* as a dominant or co-dominant in at least one section, and it also was selected as dominant or co-dominant in 14 sections (Figure 13). Seven teams selected *Sagittaria lancifolia* as a codominant taxon, and it was selected as codominant in 13 sections. Six teams selected *Nuphar* sp. as a dominant or codominant taxon, and it was selected in 8 sections. Less commonly selected codominants and dominants included *Pontederia cordata* (4 teams, 5 sections), *Cladium jamaicense* (3 teams, 4 sections), *Myrica cerifera* (2 teams, 2 sections), and *Sagittaria latifolia* (1 team, 2 sections). (The *Sagittaria latifolia* was likely a misidentification, or inadvertent name mix-up, because it was seen by only one team, and *Sagittaria lancifolia* was confirmed in photographs by multiple sampling teams)

The emergent and woody taxa zones covered extensive surface area in Half Moon Lake (Figures 14 and 15). Floating taxa were common, but only *Nuphar* was abundant enough to be chosen as a dominant or codominant. Submersed taxa were sparse, and none were selected as dominant or codominant. Two codominant taxa were chosen for 25 of 44 sampling sections, one dominant taxon was chosen for 9

sampling sections, and no dominance was assigned in 10 sections. Many woody and emergent taxa, and one floating taxon, were abundant throughout the lake, so it is understandable that the assignment of dominance would not be clear cut. There is a concern, however, about a few teams that did not assign any dominance in multiple sections. For guidance on dominance selection, see the section “Selection of Co-dominant/Dominant Taxa,” above.

There was variability among teams at Half Moon Lake in the total number of plants identified at the lake, ranging from 24-54 taxa. It does not appear that an entire stratum of taxa (e.g. floating, or woody shoreline plants) was overlooked by some teams with shorter taxa lists, or that upland taxa were erroneously included by teams with longer taxa lists. Patchiness in the distribution of plants, lake sections with more species, or different levels of effort or expertise in species-rich areas were likely responsible for the difference.



Figure 13. The two most commonly selected dominant/co-dominant taxa at Half Moon Lake, *Cephalanthus occidentalis* (left), and *Panicum hemitomon* (right) (photos: FDEP AEQAS).



Figure 14. Photo of Half Moon Lake, showing extensive emergent zone with *Pontederia cordata*, *Sagittaria lancifolia*, *Panicum hemitomon*, and *Cladium jamaicense* (photo: DEP Central ROC).

Half Moon Lake Plant ID Discussion

Plant identification was generally consistent for Half Moon Lake. All eleven teams identified the woody taxa *Acer rubrum*, *Cephalanthus occidentalis*, *Myrica cerifera*, and *Salix caroliniana*. Additionally, *Ilex cassine* and *Sapium sebiferum* were identified by ten and nine teams, respectively. In the emergent zone, all eleven teams identified *Panicum hemitomon*, *Cladium jamaicense*, *Pontederia cordata*, and *Hypericum fasciculatum*. Additionally, between eight and ten teams identified *Hibiscus grandiflorus*, *Sagittaria lancifolia*, *Sambucus nigra*, *Schoenoplectus californicus*, *Woodwardia virginica*, *Hydrocotyle*, and *Panicum repens*. The floating plants most commonly identified were *Brasenia schreberi*, *Nuphar*, and *Nymphaea odorata* (all eleven teams), followed by *Nymphoides aquatica* (ten teams). Six teams identified the small floater *Salvinia minima*. Submersed taxa were infrequently identified, as they were not abundant, and were patchy in their distribution. Three teams identified *Cabomba caroliniana*, *Eleocharis baldwinii*, and submersed viviparous *Eleocharis*. Two teams identified *Potamogeton diversifolius* and *Utricularia foliosa*. *Chara*, *Eleocharis*, *Nitella*, *Utricularia*, and *Utricularia gibba* were each identified by one team.

One plant group that was variably identified was the genus *Eleocharis*. Three teams identified *Eleocharis baldwinii*, three teams identified “submersed viviparous *Eleocharis*,” and one team identified *Eleocharis* (genus level). These taxa are often patchy and can be inconspicuous, and this may have contributed to the variable observations of this group among teams. This group is also very challenging to identify, with significant morphological plasticity, and this also may have contributed to the variable identifications. Although *Eleocharis* was not abundant at Half Moon Lake and did not have a significant influence on the scoring, it is still important to identify these taxa correctly. Here are some tips for correctly identifying these taxa:

- Wiry, delicate specimens that have a mat-forming habit and short stems (<20 cm) can be identified as *Eleocharis baldwinii*, even without flowering or fruiting parts, because other wispy species do not form emergent mats like *E. baldwinii*.
- Wiry, delicate specimens that have a submersed habit and produce new plantlets at the tips of their stems (vivipary) should be identified for the LVI as “submersed viviparous *Eleocharis*.” This includes *Eleocharis baldwinii*, *Eleocharis vivipara*, and *Eleocharis acicularis*. These species don’t produce flowers or fruits in their submersed habit.



Figure 15. Photo of Half Moon Lake shoreline showing floating/emergent zone of *Nuphar*, *Panicum hemitomon*, *Cladium jamaicense*, and *Sagittaria lancifolia* and then a mixed woody zone of *Cephalanthus occidentalis*, *Acer rubrum*, and *Myrica cerifera*, followed by upland trees beyond the LVI assessment area (photo: FDEP Central ROC).

Two taxa worth highlighting from Half Moon Lake were *Schoenoplectus californicus* and *Hibiscus grandiflorus*. Both species were conspicuous, although not abundant, components of the plant community. *Schoenoplectus californicus* is a very large sedge, with stiff, dark green, rounded-triangular stems that can reach 3m in height (Figure 16). It has no leaves, only short sheaths around the stem. The inflorescence is at the stem tip, but appears to be on the side of the stem because of the bract that looks like a continuation of the stem. Mature achenes are dark gray or brown. Some perianth bristles are flattened, and others are feathery or fringed. *S. tabernaemontani* is a similar species that is slightly smaller and softer-stemmed than *S. californicus*, but the two are reliably separated by the mature achenes. *Hibiscus grandiflorus* is a large herbaceous perennial, that is often multi-stemmed and woody at the base. It has large, velvety, 3-lobed leaves, and a large pink (sometimes white) flower with a reddish-purple spot in the center (Figure 17). It is the only large, pink-flowered species of *Hibiscus* in this region of Florida. *Kosteletzkya pentacarpos* is a species in the hibiscus family that has a flower with a similar structure and color, although it is a much smaller plant than *Hibiscus grandiflorus*. Petals of *Kosteletzkya* flowers are approximately 2-4 inches long, while *Hibiscus grandiflorus* has 10-12 inch petals.



Figure 16. *Schoenoplectus californicus* habit (left) and mature achene (right, both photos: DEP Central ROC).

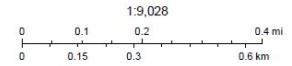
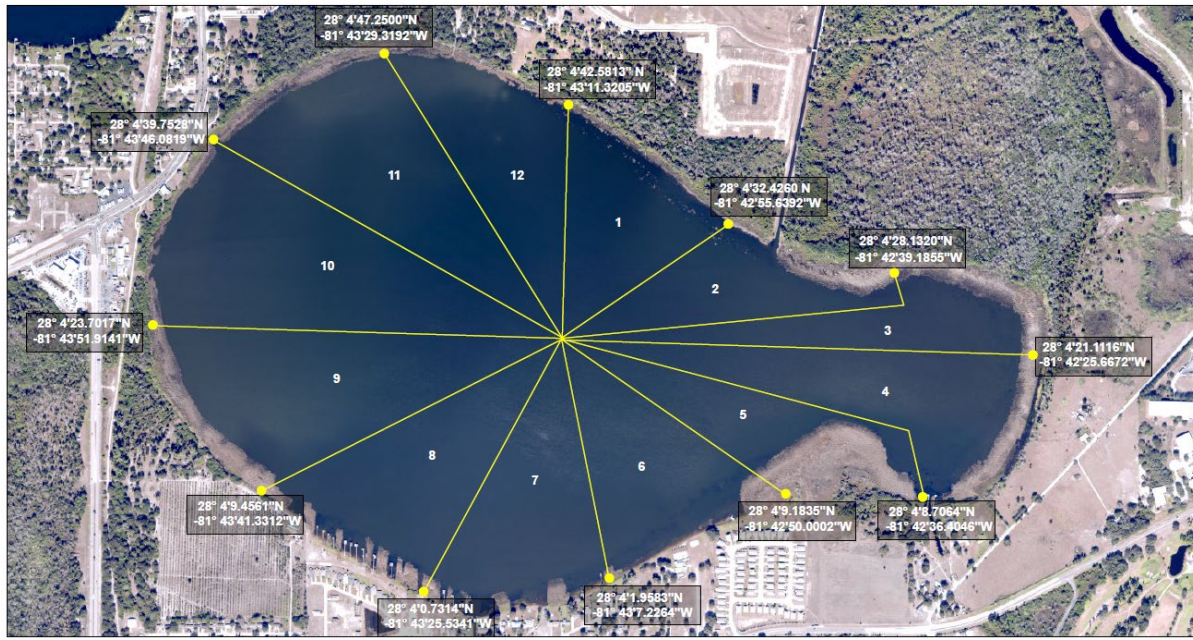


Figure 17. *Hibiscus grandiflorus* at Half Moon Lake (photo: DEP Central ROC).

Lake Rochelle Results

Lake Rochelle is a large lake in Polk County that is in a mixed land use setting (Figure 18). The land uses around the lake include residential development, wetland hardwood forest, institutional, commercial, and pasture land. The shoreline plant community included a mixed emergent zone characterized by *Typha latifolia* and *Panicum repens*, a woody zone with *Salix caroliniana*, *Ludwigia peruviana*, and *Schinus terebenthifolius*, and an abundance of submersed plants, including *Vallisneria americana*, *Nitella*, and *Hydrilla verticillata* (Figure 19).

Lake Rochelle, WBID 1488B (Polk County)



Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeBCO, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community FREAAC

Map created by Map Direct, powered by ESRI

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Figure 18. Lake Vegetation Index sampling map of Lake Rochelle.



Figure 19. Shoreline of Lake Rochelle on 6/20/2019, with *Typha*, *Panicum repens*, *Pontederia cordata*, and *Sagittaria* visible in the emergent zone. (photo: Sheri Huelster, Cardno).

Sixteen teams (fourteen expert and two non-expert) sampled Lake Rochelle within the sampling period (Table 8). Team LVI and metric scores and dominant selections from Lake Rochelle are shown in Tables 9 and 10. The median LVI score for Lake Rochelle expert teams was 43 and the acceptable range of LVI was 31-55. Fourteen teams were within the acceptable range (13 expert and 1 non-expert), and 2 teams were below the acceptable range (1 expert, 1 non-expert) by three and ten points. The total number of taxa observed at Lake Rochelle ranged from 32 to 71 taxa, while the overall average number of taxa per section was 29.3. The average (± 1 standard deviation) metric values per lake section across all teams were as follows: 73.2 (± 3.7) % Native, 20.3 (± 3.8) % FLEPPC Category 1, 11.9 (± 2.5) % Sensitive, and dominant/co-dominant C of C of 3.0 (± 1.4) (Table 9). See Appendix A for team taxa lists.

Table 8. Teams, team abbreviations, team members, expert status, and sampling date for Lake Rochelle 2019 LVI Proficiency demonstration.

Team	Team Abbreviation	Status	Date Sampled	Team Members
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2019 LVI Proficiency Exercise Results

Cardno	Cardno	Expert	6/20/2019	Sheri Huelster, Brandon Wanner, Winston Rutherford, Stephanie Healey
DEP South ROC 1	DEP S ROC 1	Expert	7/2/2019	Nicole Reistad, Kirby Wolfe, John Barrington, Miranda Carroll
DEP South ROC 2	DEP S ROC 2	Expert	6/26/2019	Chase Conley, Maryann Dugan, Gary Snorek
DEP Southeast ROC 1	DEP SE ROC 1	Expert	7/3/2019	Alexander Miranda, Jordan Skaggs
DEP Southeast ROC 2	DEP SE ROC 2	Expert	7/3/2019	Matt Sewell, Kristene Bonilla Taylor, Drew Liddick
DEP Southwest ROC 1	DEP SW ROC 1	Expert	6/17/2019	Sarah Meyer, Matt Bearden, Hannah Sprinkle, Francisco Faria
DEP Southwest ROC 2	DEP SW ROC 2	Expert	6/17/2019	Judy Ashton, Ben Paswater, Kelby Callahan
Highlands County	Highlands	Expert	7/9/2019	Mike McMillian, JD Foster, Dawn Ritter
Hillsborough County	Hillsborough	Non-Expert	7/2/2019	Troy Green, Garrison Beck, Ryan Riordan, Thomas Baker
City of Lakeland Lakes and Stormwater	Lakeland Lakes	Expert	6/25/2019	Sandra Pope, Jessica Schilling, Cody O'Gorman, Alton Johnson
City of Lakeland Seven Wetland	Lakeland Seven	Expert	6/25/2019	Sarah Malone, Julie Vogel, Vance James, Jessalyn Aretz
Orange County	Orange	Non-Expert	7/3/2019	Julie Bortles, Rob Renk, Caroline Cooper, Taylor Wood, Nicole Hughes

2019 LVI Proficiency Exercise Results

City of Orlando	Orlando	Expert	6/27/2019	Lisa Lotti, Jessica Goodstein, Kari Lara-Murabito, John Masters, Richard Copenhagen
Pinellas County	Pinellas	Expert	6/26/2019	Peggy Morgan, Robert Burnes, Robin Barnes, A. Mauer
USF Water Institute	USF	Expert	6/18/2019	David Eilers, Julie Lam, David McIlwaine, Heather Grant, Johnathon Chapin, Kristina O'Keefe
Wood, Inc	Wood	Expert	6/28/2019	Kevin Shelton, Mary Szafraniec, Erik Oij, Francesca Lauterman

Table 9. Summary results for each team at Lake Rochelle, including final LVI score and total taxa observed, and the average of metric scores and average number of taxa in each of the 4 sampling units. The acceptable LVI score range was 31-55.

Team	Sections	LVI	Total Taxa	Mean # Taxa	Mean % Native	Mean % FLEPPC	Mean % Sensitive	Mean CC_Dom_Co dom
DEP SW ROC 2	1,4,7,10	42	70	36	68.6	17.6	10.4	4.8
Highlands	1,4,7,10	49	71	37	75.4	15.7	8.2	5.3
Hillsborough	1,4,7,10	37	35	17	72.4	21.2	14.3	1.3*
Lakeland Lakes	1,4,7,10	51	45	27	76.9	16.6	12.9	3.9
Pinellas	1,4,7,10	46	40	21	74.5	19.8	13.8	3.6
Cardno	2,5,8,11	37	35	19	73.5	24.8	14.3	1.6
DEP S ROC 2	2,5,8,11	38	48	24	72.3	21.3	10.1	4*
DEP SE ROC 2	2,5,8,11	34	40	20	70.0	23.3	10.2	3.3

2019 LVI Proficiency Exercise Results

Orange	2,5,8,11	21	37	22	67.7	27.6	9.0	0.9
USF	2,5,8,11	41	43	25	73.4	22.5	12.0	3.1
DEP S ROC 1	3, 6, 9, 12	35	33	19	70.9	19.7	10.4	1.5*
DEP SE ROC 1	3,6,9,12	28	32	17	66.8	25.5	14.5	1*
DEP SW ROC 1	3,6,9,12	51	51	24	79.1	14.4	10.3	3.6
Lakeland Seven	3,6,9,12	50	48	26	74.5	18.6	10.6	4.4
Orlando	3,6,9,12	43	35	17	77.5	20.2	17.8	1.5
Wood	3,6,9,12	44	54	33	77.1	16.1	10.9	2.4

*mean CC calculated with fewer than 4 CC scores (dominance assigned in fewer than 4 sections)

Table 10. Dominant and co-dominant taxa selected at Lake Rochelle.

Team	Sections	Section 1,2,3 Dominants	Section 4,5,6 Dominants	Section 7,8,9 Dominants	Section 10,11,12 Dominants
DEP SW ROC 2	1,4,7,10	<i>Typha/Vallisneria americana</i>	<i>Typha/Vallisneria americana</i>	<i>Typha/Vallisneria americana</i>	<i>Typha/Vallisneria americana</i>
Highlands	1,4,7,10	<i>Hydrilla verticillata/Vallisneria americana</i>	<i>Vallisneria americana</i>	<i>Vallisneria americana</i>	<i>Hydrilla verticillata/Vallisneria americana</i>
Hillsborough	1,4,7,10	<i>Typha</i>	<i>Typha</i>	*	<i>Typha/Ludwigia leptocarpa</i>
Lakeland Lakes	1,4,7,10	<i>Typha/Vallisneria americana</i>	<i>Typha</i>	<i>Vallisneria americana</i>	<i>Vallisneria americana/Schinus terebinthifolius</i>
Pinellas	1,4,7,10	<i>Typha/Vallisneria americana</i>	<i>Typha/Vallisneria americana</i>	<i>Nitella</i>	<i>Typha/Hydrilla verticillata</i>
Cardno	2,5,8,11	<i>Typha</i>	<i>Typha</i>	<i>Typha/Vallisneria americana</i>	<i>Typha/Panicum repens</i>
DEP S ROC 2	2,5,8,11	<i>Typha</i>	<i>Typha/Vallisneria americana</i>	<i>Vallisneria americana</i>	*
DEP SE ROC 2	2,5,8,11	<i>Typha</i>	<i>Typha</i>	<i>Vallisneria americana</i>	<i>Typha/Vallisneria americana</i>
Orange	2,5,8,11	<i>Typha</i>	<i>Typha</i>	<i>Typha</i>	<i>Typha/Panicum repens</i>
USF	2,5,8,11	<i>Typha/Vallisneria americana</i>	<i>Typha</i>	<i>Vallisneria americana/Typha</i>	<i>Vallisneria americana/Hydrilla verticillata</i>
DEP S ROC 1	3, 6, 9, 12	<i>Typha/Vallisneria americana</i>	<i>Hydrilla verticillata</i>	<i>Typha/Ludwigia peruviana</i>	*

DEP SE ROC 1	3,6,9,12	<i>Typha</i>	<i>Typha</i>	*	*
DEP SW ROC 1	3,6,9,12	<i>Typha</i>	<i>Nitella</i>	<i>Typha/Vallisneria americana</i>	<i>Vallisneria americana/Panicum repens</i>
Lakeland Seven	3,6,9,12	<i>Hydrilla verticillata/Vallisneria americana</i>	<i>Nitella/Vallisneria americana</i>	<i>Ludwigia peruviana/Typha</i>	<i>Vallisneria americana</i>
Orlando	3,6,9,12	<i>Typha/Vallisneria americana</i>	<i>Typha</i>	<i>Typha</i>	<i>Panicum repens</i>
Wood	3,6,9,12	<i>Typha</i>	<i>Vallisneria americana</i>	<i>Typha</i>	<i>Typha/Panicum repens</i>

*Dominance not assigned for this section

There are several items to note about the decision-making regarding dominance selection among teams at Lake Rochelle. Emergent, floating, submersed, and woody plant strata were all present in the lake. Lake Rochelle was a challenging lake for the assignment of dominance because there were multiple abundant taxa, but there was good consistency among teams. Of the 64 total sampling sections, 32 had one dominant taxon assigned and 27 had two co-dominant taxa assigned. No dominance was assigned in 5 sections. There were 8 unique taxa chosen as dominant or co-dominant, and all were from the emergent or submersed strata. Teams strongly favored *Typha* (41 of 64 sections) and *Vallisneria americana* (27 of 64 sections) in selection of dominant and co-dominant taxa. *Hydrilla verticillata* (6 sections), *Panicum repens* (5), and *Nitella* (3) also were frequently chosen as dominant or co-dominant. Fifteen teams (out of a total of 16) chose *Typha* as dominant/co-dominant in at least one section, and 13 teams chose *Vallisneria americana* in at least one section. The results of dominance selection at Lake Rochelle indicate that despite the challenge of multiple abundant taxa in more than one stratum, teams made similar decisions in their assignment of dominant and co-dominant taxa.

Lake Rochelle Plant ID Discussion

Identifications of the most frequently encountered taxa at Lake Rochelle appear correct and consistent. Less abundant and more patchily distributed taxa were more challenging. Teams were divided on how many and which *Eleocharis* species were present. Ten of sixteen teams identified large species of *Eleocharis* at Lake Rochelle, either *Eleocharis cellulosa*, *Eleocharis interstincta*, or *Eleocharis equisetoides*. Four teams identified only *E. interstincta*. Three teams identified only *E. cellulosa*. Two teams identified *E. interstincta* and *E. cellulosa*, and one team identified *E. equisetoides* and *E. cellulosa*. *E. cellulosa* is a robust emergent, with a thick, somewhat spongy, round stem. *E. equisetoides* and *E. interstincta* are also robust emergents, but have conspicuously septate stems (cross partitions that are visible, even on the exterior of the stems) (Figure 20). *E. equisetoides* and *E. interstincta* are separated by their perianth bristles if achenes are present, but are difficult to speciate otherwise. Contrary to some sources, including Godfrey and Wooten's *Aquatic and Wetland Plants of Southeastern United States*, the Flora of North America ([Flora of North America Eleocharis interstincta](#)) states that sectioning the stems of both species shows that the septae are closer together near the spikelet than in the rest of the stem in both species. *E. interstincta* is primarily a southern peninsula species, while *E. equisetoides*

is primarily a panhandle to central peninsula species, but their ranges overlap in Polk County. The geographic range, therefore, is not useful in determining which of these two species is present at Lake Rochelle. *Eleocharis cellulosa* occurs throughout much of Florida, except for in the northeast region. *Eleocharis cellulosa* probably would not be confused with the other two species if observed at close range or handled, because of its lack of visible septate stems.

Teams sampling Lake Rochelle also were divided on how many and which species of large *Schoenoplectus* were present. Seven teams identified only *Schoenoplectus californicus*. Six teams identified *S. californicus* and *S. tabernaemontani*. Two teams identified only *S. tabernaemontani*. One team identified *S. californicus* and a third related species, *Scirpus cyperinus*. *S. californicus* and *S. tabernaemontani* are both very tall (to 3m), robust sedges, with rounded triangular upper stems, and no leaves, only short sheaths (*S. californicus* is covered above in the Half Moon Lake section). These two species are challenging to separate. Some sources describe field characters that distinguish the two: dark green, stiff stems (*S. californicus*) vs. light green, soft stems (*S. tabernaemontani*) (Figure 21). These features are variable, however, and are most helpful when specimens are compared side by side. *S. californicus* and *S. tabernaemontani* can be separated with mature achenes. *Scirpus cyperinus* is also a tall, robust species, but can be distinguished from the other two by its very long leaves and its wooly-looking, droopy inflorescence. The wooly appearance is from very long bristles around the achenes. Five teams also identified a species of *Scirpus*, *Scirpus pungens*, which is much smaller than three species described above (less than 1m tall). *S. pungens* has a sharply triangular stem, and a tight inflorescence of 1-5 spikelets that appear to be on the side of the stem, because of the terminal bract that appears as a continuation of the stem.



Figure 20. Robust species of *Eleocharis*. *Eleocharis cellulosa* (left), with smooth stems, and *Eleocharis interstincta* (right), with visibly jointed stems. (photos Vic Ramey/University of Florida)



Figure 21. *Schoenoplectus tabernaemontani* (left) and *Schoenoplectus californicus* (right) (photos: Institute for Systematic Botany website, Betty Wargo, left; Shirley Denton, right)

Conclusions

Results for the 2019 LVI Proficiency exercise indicate that thirty of the thirty-three participating teams were within the passing range of scores, and currently are eligible to submit LVI data to DEP. Variability in dominance selection and plant identification was comparable to prior years. There continues to be notable variability in plant identification in a few groups of plants. Guidance is needed in several areas of identification of species, including within the sedge genera *Eleocharis* and *Schoenoplectus*, and distinguishing between *Myriophyllum aquaticum* and *Limnophila sessiliflora*. Incorrect plant identifications did not result in significant differences in LVI scores for these test lakes, but teams should always strive to attain correct plant identifications for LVI sampling events. There was also notable variability in the number of taxa included in the assessment. Review of the guidance on determination of the lake boundary, inclusion of the appropriate taxa and consistency in level of effort is needed. Guidance also is needed on the assignment of dominance. Changes to the LVI SOP and LVI Primer that clarify the process of selecting dominant and co-dominant taxa may be warranted.

LVI sampling teams should use this exercise as a method to correct any observed methodological deficiencies or deviations from the LVI SOP. Team member status has been updated on the FDEP searchable audit registry, <http://fldeploc.dep.state.fl.us/sci/query.asp> .

Appendix A – Taxa Lists for Ocheesee Pond, Half Moon Lake, and Lake Rochelle during June-July 2019 LVI Proficiency Testing

Ocheesee Pond (For each team, the number of lake sections in which team observed taxon is displayed.)

Ocheesee Pond Taxa Observed	City of TAL	FRY ECO	DEP WAS	DEP TLH ROC	DEP AEQAS	DEP NW ROC	# teams that observed taxon
<i>Acer rubrum</i>	3	2	3	2	3	3	6
<i>Albizia julibrissin</i>						1	1
<i>Alternanthera philoxeroides</i>	1	1	2	2	2	2	6
<i>Baccharis</i>						1	1
<i>Bidens frondosa</i>						1	1
<i>Bidens mitis</i>						3	1
<i>Boehmeria cylindrica</i>	1		3	3	3		4
<i>Brasenia schreberi</i>		3	2	3	3	3	5
<i>Cabomba caroliniana</i>			4	1	3	2	4
<i>Campsis radicans</i>						3	1
<i>Cephalanthus occidentalis</i>	4	4	4	4	4	4	6
<i>Clethra alnifolia</i>					1		1
<i>Colocasia esculenta</i>	1						1
<i>Cyrilla racemiflora</i>	4	4	2	3	4	4	6
<i>Dioscorea bulbifera</i>						2	1
<i>Echinodorus cordifolius</i>	1				1	1	3
<i>Eleocharis baldwinii</i>			1	1			2
<i>Eleocharis submersed viviparous (species unknown)</i>					1		1
<i>Eleocharis vivipara</i>						1	1
<i>Erechtites hieraciifolius</i>						1	1
<i>Eupatorium capillifolium</i>				1		1	2
<i>Fraxinus</i>						1	1
<i>Hydrilla verticillata</i>		1			1	1	3
<i>Hydrocotyle</i>					2	2	2
<i>Lemna</i>			1				1
<i>Limnophila sessiliflora</i>	3	2			3	3	4
<i>Liquidambar styraciflua</i>	4		2	1	4	4	5
<i>Ludwigia (native)</i>			2		1		2
<i>Ludwigia (unknown nativity)</i>				2		1	2
<i>Ludwigia leptocarpa</i>	3						1
<i>Luziola fluitans</i>		1	1	2	1	1	5
<i>Lycopus</i>						4	1

2019 LVI Proficiency Exercise Results

Ocheese Pond							
Taxa Observed	City of TAL	FRY ECO	DEP WAS	DEP TLH ROC	DEP AEQAS	DEP NW ROC	# teams that observed taxon
<i>Lycopus americanus</i>			4	3	3		3
<i>Lycopus rubellus</i>	1						1
<i>Magnolia grandiflora</i>						1	1
<i>Magnolia virginiana</i>	1				1	1	3
<i>Mayaca fluviatilis</i>				3			1
<i>Micranthemum umbrosum</i>						1	1
<i>Myrica cerifera</i>				2	1		2
<i>Myriophyllum (native)</i>					4		1
<i>Myriophyllum aquaticum</i>		1	3	2			3
<i>Myriophyllum heterophyllum</i>			2	2		2	3
<i>Nymphaea odorata</i>	3	3	4	4	4	4	6
<i>Nymphoides aquatica</i>					2	3	2
<i>Nyssa sylvatica biflora</i>	3						1
<i>Osmunda cinnamomea</i>						1	1
<i>Panicum hemitomom</i>		4	4	4	4	4	5
<i>Platanus occidentalis</i>			1	1		1	3
<i>Polygonum</i>					1	2	2
<i>Polygonum hydropiperoides</i>				1			1
<i>Quercus nigra</i>					1	1	2
<i>Rubus</i>						1	1
<i>Sacciolepis striata</i>	4						1
<i>Sagittaria latifolia</i>	1	1					2
<i>Salix caroliniana</i>	1		1	1	1		4
<i>Salvinia minima</i>		2	1		2	1	4
<i>Smilax</i>						1	1
<i>Taxodium</i>	4	4	4	4	4	4	6
<i>Triadenum virginicum</i>	3	1	3	4	3	4	6
<i>Typha</i>				1			1
<i>Ulmus americana</i>					1		1
<i>Utricularia floridana</i>		3	4	4	4	4	5
<i>Utricularia foliosa</i>	4	3	4	4	4	4	6
<i>Utricularia gibba</i>			1	1			2
<i>Vitis</i>			2	1		4	3
<i>Xyris</i>				1	1	1	3
TOTAL TAXA PER TEAM	20	17	26	30	33	45	

Half Moon Lake (For each team, the number of lake sections in which team observed taxon is displayed.)

Half Moon Lake Taxa Observed	BDA	ECT	CAWLEY	SEMINOLE	SJRWMD	SWFWMD	WOOD	DEP NE ROC	DEP CEN ROC 2	DEP CEN ROC 1	DEP AEQAS	# teams that observed taxon
<i>Acer rubrum</i>	3	3	4	3	4	3	4	4	3	4	3	11
<i>Alternanthera philoxeroides</i>								1	1			2
<i>Andropogon</i>	1						2					2
<i>Andropogon virginicus</i>					1							1
<i>Baccharis</i>		1	1	2				2	2	1		6
<i>Baccharis halimifolia</i>	2				2							2
<i>Bacopa caroliniana</i>										1		1
<i>Bidens alba</i>									1			1
<i>Boehmeria cylindrica</i>										1		1
<i>Brasenia schreberi</i>	4	3	2	4	2	4	2	4	3	4	3	11
<i>Cabomba caroliniana</i>		1		1						3		3
<i>Cephalanthus occidentalis</i>	4	4	3	4	4	4	4	4	4	4	4	11
<i>Ceratopteris thalictroides</i>				2								1
<i>Chara</i>		1										1
<i>Cicuta maculata</i>				1								1
<i>Cladium jamaicense</i>	4	4	4	4	4	4	4	4	4	4	4	11
<i>Cyperus haspan</i>				1			1					2
<i>Cyperus odoratus</i>				2						1	2	3
<i>Decodon verticillatus</i>	1											1
<i>Diodia virginiana</i>						1				2		2
<i>Diospyros virginiana</i>	2	1	2		3		2			1		6
<i>Dryopteris ludoviciana</i>			1									1
<i>Eleocharis</i>					2							1
<i>Eleocharis baldwinii</i>		1		3						1		3

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Half Moon Lake												
Taxa Observed	BDA	ECT	CRAWLEY	SEMINOLE	SJRWMD	SWFWMD	WOOD	DEP NE ROC	DEP CEN ROC 2	DEP CEN ROC 1	DEP AEQAS	# teams that observed taxon
<i>Eleocharis submersed viviparous (species unknown)</i>									2	4	4	3
<i>Eleocharis vivipara</i>							1					1
<i>Erechtites hieraciifolius</i>										1		1
<i>Eupatorium capillifolium</i>				2	1		3		3	4	3	6
<i>Eupatorium leptophyllum</i>	1											1
<i>Fraxinus caroliniana</i>				2								1
<i>Fuirena scirpoidea</i>				1						1		2
<i>Gordonia lasianthus</i>	2											1
<i>Hibiscus grandiflorus</i>	4	4	4	4	1		4	4	4	4	3	10
<i>Hydrocotyle</i>		1		1		3	1	2	3	4	3	8
<i>Hypericum fasciculatum</i>	3	4	4	4	3	3	4	4	4	3	2	11
<i>Ilex cassine</i>	4	2		2	3	4	4	2	2	3	2	10
<i>Ilex myrtifolia</i>		1										1
<i>Juncus effusus</i>						1						1
<i>Juncus marginatus</i>		1		1			1					3
<i>Kosteletzkya pentacarpos</i>					4							1
<i>Lachnanthes caroliniana</i>		1		2	1		1			2		5
<i>Landoltia punctata</i>										4		1
<i>Leersia hexandra</i>	1	1				1			1	1	1	6
<i>Lemna</i>						1					1	2
<i>Liquidambar styraciflua</i>						1				1		2
<i>Ludwigia</i>	4			4								2
<i>Ludwigia (native)</i>											1	1
<i>Ludwigia arcuata</i>							2			1		2
<i>Ludwigia leptocarpa</i>		3			1		2	4	3	4	4	7

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Half Moon Lake												
Taxa Observed	BDA	ECT	CRAWLEY	SEMINOLE	SJRWMD	SWFWMD	WOOD	DEP NE ROC	DEP CEN ROC 2	DEP CEN ROC 1	DEP AEQAS	# teams that observed taxon
<i>Ludwigia octovalvis</i>				2	1	2						3
<i>Ludwigia peruviana</i>						2	4	2		2		4
<i>Ludwigia repens</i>				1								1
<i>Ludwigia suffruticosa</i>	1			3								2
<i>Magnolia virginiana</i>			2									1
<i>Micranthemum glomeratum</i>										1		1
<i>Mikania scandens</i>	3	3		3			4	1	2	2	3	8
<i>Myrica cerifera</i>	4	4	4	4	4	4	4	4	4	4	4	11
<i>Myriophyllum pinnatum</i>		1										1
<i>Nitella</i>							1					1
<i>Nuphar</i>	4	4	4	4	4	4	4	4	4	4	4	11
<i>Nymphaea odorata</i>	4	3	4	3	4	4	2	4	4	3	4	11
<i>Nymphoides aquatica</i>		2	2	4	2	3	4	2	4	2	4	10
<i>Nyssa sylvatica biflora</i>	1	1	2			1				3		5
<i>Osmunda cinnamomea</i>					1	1						2
<i>Osmunda regalis</i>					2		1			1	3	4
<i>Oxycaryum cubense</i>				1								1
<i>Panicum hemitomon</i>	4	4	4	4	4	4	4	4	4	4	4	11
<i>Panicum repens</i>		1	1	2	1		3		2	1	2	8
<i>Paspalidium geminatum</i>					2							1
<i>Persicaria</i>	1											1
<i>Persicaria setacea</i>		1										1
<i>Pinus elliotii</i>	1		2	1	4	1	1	1				7
<i>Pluchea</i>		1		2		1	2		1	2	3	7
<i>Pluchea baccharis</i>	2											1
<i>Persicaria hirsutum</i>										2		1

2019 LVI Proficiency Exercise Results

Half Moon Lake	BDA	ECT	CRAWLEY	SEMINOLE	SJRWMD	SWFWMD	WOOD	DEP NE ROC	DEP CEN ROC 2	DEP CEN ROC 1	DEP AEQAS	# teams that observed taxon
<i>Persicaria hydropiperoides</i>				2								1
<i>Pontederia cordata</i>	4	4	4	2	4	4	4	4	4	4	4	11
<i>Potamogeton diversifolius</i>				3							1	2
<i>Prunus serotina</i>								1				1
<i>Quercus laurifolia</i>					2		1					2
<i>Quercus virginiana</i>	1											1
<i>Rhexia mariana</i>	1						1					2
<i>Rhynchospora inundata</i>						1	1					2
<i>Rhynchospora microcephala</i>				1			1					2
<i>Ricciocarpus natans</i>										1	1	2
<i>Rubus</i>								1				1
<i>Rubus argutus</i>	3				3							2
<i>Sabal palmetto</i>			1									1
<i>Sacciolepis striata</i>										2		1
<i>Sagittaria lancifolia</i>	4		4	4	4	4	4	4	4	4	4	10
<i>Sagittaria latifolia</i>		4										1
<i>Salix caroliniana</i>	3	1	3	3	2	2	4	3	3	3	3	11
<i>Salvinia minima</i>		1		3		1	1			4	3	6
<i>Sambucus nigra</i>	3	2	1	1		3	1	2	2	3	2	10
<i>Sapium sebiferum</i>	3			2	2	1	1	1	1	1	1	9
<i>Saururus cernuus</i>	1	1		1								3
<i>Schoenoplectus californicus</i>		3	3	4	3	2	4	2	3	2	2	10
<i>Schoenoplectus tabernaemontani</i>	3											1
<i>Setaria magna</i>										1		1
<i>Spartina bakeri</i>		1		1								2
<i>Toxicodendron vernix</i>							1					1

2019 LVI Proficiency Exercise Results

Half Moon Lake	BDA	ECT	CRAWLEY	SEMINOLE	SJRWMD	SWFWMD	WOOD	DEP NE ROC	DEP CEN ROC 2	DEP CEN ROC 1	DEP AEQAS	# teams that observed taxon
Taxa Observed												
<i>Triadenum virginicum</i>				1						1		2
<i>Typha</i>	1	1			1	1	1		2	1		7
<i>Utricularia</i>							1					1
<i>Utricularia foliosa</i>					1						1	2
<i>Utricularia gibba</i>										4		1
<i>Vitis</i>	1											1
<i>Vitis rotundifolia</i>				3	3		3					3
<i>Woodwardia virginica</i>	4	2		4	2	2	3	4		2	2	9
<i>Xyris</i>		1		1			1			1		4
TOTAL TAXA PER TEAM	38	40	24	50	37	33	46	28	30	54	35	

Lake Rochelle

(For each team, the number of lake sections in which team observed taxon is displayed.)

Lake Rochelle Taxa Observed	CARDNO	CITY OF LAKE STORM	CITY OF LAKE SEVEN	ORLANDO	HIGHLANDS	HILLSBOROUGH	ORANGE	PINELLAS	USF WATER	DEP SE ROC 2	DEP SOUTH ROC 1	DEP SOUTH ROC 2	DEP SE ROC 1	DEP SW ROC 1	DEP SW ROC 2	WOOD	# teams that observed taxon
<i>Acer rubrum</i>	3	4	3	1	2	1	2	3	3	1	3	3		3	3	4	15
<i>Aeschynomene indica</i>															1		1
<i>Alternanthera philoxeroides</i>	1	4	3	1	4	2	1	2	3	1	2	2	1	2	4	3	16
<i>Aster carolinianus</i>					1												1
<i>Baccharis</i>															1	2	2
<i>Bacopa monnieri</i>		1	1		2	1								1	2		6
<i>Bidens alba</i>		1												1			2
<i>Bidens laevis</i>					1												1
<i>Blechnum serrulatum</i>					1			1							1	1	4
<i>Boehmeria cylindrica</i>					2										1	2	3
<i>Canna</i>							1										1
<i>Canna flaccida</i>									1	1		1	1				4
<i>Centella asiatica</i>					1												1
<i>Cephalanthus occidentalis</i>	2	3	3	2	3	1	3		3	3	2	3	3	3	4	3	15
<i>Ceratophyllum demersum</i>					1		2		2			1		1		1	6
<i>Ceratopteris thalictroides</i>					1										1		2
<i>Chara</i>			1														1
<i>Cladium jamaicense</i>	1								1								2
<i>Colocasia esculenta</i>	1	2	1	1	3	3	3	1	2	2		2	2	2	4		14
<i>Commelina</i>															4		1
<i>Commelina diffusa</i>					3											2	2
<i>Cyperus haspan</i>														1			1

2019 LVI Proficiency Exercise Results

Lake Rochelle Taxa Observed	CARDNO	CITY OF LAKE STORM	CITY OF LAKE SEVEN	ORLANDO	HIGHLANDS	HILLSBOROUGH	ORANGE	PINELLAS	USF WATER	DEP SE ROC 2	DEP SOUTH ROC 1	DEP SOUTH ROC 2	DEP SE ROC 1	DEP SW ROC 1	DEP SW ROC 2	WOOD	# teams that observed taxon
<i>Cyperus lecontei</i>					1									1	1		3
<i>Cyperus odoratus</i>		2	2	1	3	1		2	2	1	2			2	4	3	12
<i>Cyperus polystachyos</i>			1		2			1				1		1	2	1	7
<i>Cyperus retrorsus</i>	1																1
<i>Cyperus strigosus</i>																2	1
<i>Cyperus surinamensis</i>			1		2			2						1	2	1	6
<i>Diodia virginiana</i>					1												1
<i>Echinochloa crusgalli</i>										1		1	1				3
<i>Echinochloa walteri</i>		1			2	2		1	1					1	2	1	8
<i>Eclipta prostrata</i>			1		1										2	2	4
<i>Eichhornia crassipes</i>					1							1			1		3
<i>Eleocharis (submersed viviparous but unable to ID to species)</i>			1							2	1	1	1				5
<i>Eleocharis baldwinii</i>					2		1							1	1		4
<i>Eleocharis cellulosa</i>		1			1	2					1	1			1		6
<i>Eleocharis equisetoides</i>					1												1
<i>Eleocharis interstincta</i>		1						1	1	1			1		1		6
<i>Eleocharis vivipara</i>				1										1		1	3
<i>Emilia fosbergii</i>															1		1
<i>Eupatorium capillifolium</i>	1	3	4	2	2		3	1	2	1		2	1	3	3	4	14
<i>Fimbristylis autumnalis</i>															1		1
<i>Gordonia lasianthus</i>				1					1		1			3	1		5
<i>Habenaria repens</i>			1	1													2
<i>Hydrilla verticillata</i>	4	4	4	4	4	3	4	4	4	4	4	4	4	4	3	4	16
<i>Hydrocotyle</i>	1	4	4	3	4	4	2	3	2	1	3	3	2	3	4	3	16
<i>Ilex cassine</i>					2										1	2	3

2019 LVI Proficiency Exercise Results

Lake Rochelle Taxa Observed	CARDNO	CITY OF LAKE STORM	CITY OF LAKE SEVEN	ORLANDO	HIGHLANDS	HILLSBOROUGH	ORANGE	PINELLAS	USF WATER	DEP SE ROC 2	DEP SOUTH ROC 1	DEP SOUTH ROC 2	DEP SE ROC 1	DEP SW ROC 1	DEP SW ROC 2	WOOD	# teams that observed taxon
<i>Juncus effusus</i>					1							1			1		3
<i>Landoltia punctata</i>					2												1
<i>Leersia hexandra</i>												1					1
<i>Lemna</i>				1	1							1			2		4
<i>Ludwigia arcuata</i>														1			1
<i>Ludwigia decurrens</i>					1												1
<i>Ludwigia leptocarpa</i>		3	1	1	2	2						1		1	2	1	9
<i>Ludwigia linearis</i>								1									1
<i>Ludwigia octovalvis</i>		3	2	1	2				2	2		2	2	2	2	2	11
<i>Ludwigia peruviana</i>	4	3	4	1	4	2	4	4	4	4	3	3	3	4	4	4	16
<i>Ludwigia repens</i>	1																1
<i>Magnolia virginiana</i>	3	2	3	2	1		2	4	3	1				1	3	3	12
<i>Melaleuca quinquenervia</i>		1					1	1	1			1			1		6
<i>Micranthemum glomeratum</i>														1			1
<i>Mikania scandens</i>	1	4	3	1	3	1	4	2	2	2		2		2	2	1	14
<i>Myrica cerifera</i>	3	2	3	3	2		2	1	2	1	3	2	1	3	3	3	15
<i>Najas guadalupensis</i>	2	2			1	1	4	3	4		1	1			2		10
<i>Nitella</i>	1	2	1		1			2	2					2	1	1	9
<i>Nuphar</i>		1			1	1	2	1	1				1		1		8
<i>Nymphaea odorata</i>	2	1	1	2	2	1	2	1	2	2	1	3	2	1	1	1	16
<i>Nyssa sylvatica biflora</i>	1		2	1	1	1						2		1	1	3	9
<i>Osmunda cinnamomea</i>										2							1
<i>Cyperus blepharopleptos (Oxycarym cubense)</i>		3	4		3	1	3	3	1	2	3	2	2	2	3	4	14
<i>Panicum hemitomom</i>	2	4	3	4	4	3	2	3	3	4	4	3	4	4	2	4	16
<i>Panicum maximum</i>												1					1

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Lake Rochelle Taxa Observed	CARDNO	CITY OF LAKE STORM	CITY OF LAKE SEVEN	ORLANDO	HIGHLANDS	HILLSBOROUGH	ORANGE	PINELLAS	USF WATER	DEP SE ROC 2	DEP SOUTH ROC 1	DEP SOUTH ROC 2	DEP SE ROC 1	DEP SW ROC 1	DEP SW ROC 2	WOOD	# teams that observed taxon
<i>Panicum repens</i>	4	4	4	3	4	4	4	4	4	4	4	4	4	3	4	4	16
<i>Parthenocissus quinquefolia</i>																1	1
<i>Paspalidium geminatum</i>			1	1	2	1		1	3	1		1	1			2	10
<i>Paspalum distichum</i>		2															1
<i>Paspalum urvillei</i>															1		1
<i>Phyla nodiflora</i>					1												1
<i>Pinus elliotii</i>	2		2					1				3		1	2	2	7
<i>Pluchea</i>				1			1							1	1		4
<i>Pluchea baccharis</i>									2								1
<i>Pluchea odorata</i>			1													3	2
<i>Persicaria glabra</i>		2	1		3	1		1	2	2	2	1	2	1	2	2	13
<i>Persicaria hydropiperoides</i>					3												1
<i>Pontederia cordata</i>	3	3	4		3	2	2	3	2	4	4	2	3	3	3	4	15
<i>Potamogeton crispus</i>				1		1											2
<i>Potamogeton illinoensis</i>			2		1						1			1	1	1	6
<i>Potamogeton pusillus</i>		1															1
<i>Quercus laurifolia</i>					1	1					3	1		1			5
<i>Quercus nigra</i>										1						1	2
<i>Quercus virginiana</i>															1		1
<i>Roystonea regia</i>												1					1
<i>Rumex</i>															1		1
<i>Rumex verticillatus</i>					1												1
<i>Sabal palmetto</i>	2	2	1		2		2	2			2	1		1	2	2	11
<i>Sacciolepis striata</i>		3	2		3		1		1	1		2	1	2	2	1	11
<i>Sagittaria graminea</i>	1																1
<i>Sagittaria lancifolia</i>	3	4	4		4	3	3	4	3	4	4	3	3	2	4	4	15

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Lake Rochelle Taxa Observed	CARDNO	CITY OF LAKE STORM	CITY OF LAKE SEVEN	ORLANDO	HIGHLANDS	HILLSBOROUGH	ORANGE	PINELLAS	USF WATER	DEP SE ROC 2	DEP SOUTH ROC 1	DEP SOUTH ROC 2	DEP SE ROC 1	DEP SW ROC 1	DEP SW ROC 2	WOOD	# teams that observed taxon
<i>Salix caroliniana</i>	2	3	2	2	3	2	3	2	3	3	3	4	2	3	3	3	16
<i>Salvinia minima</i>	1	1	2		3	1		1			2			1	2		9
<i>Sambucus nigra</i>	3		1				3		3	3			2	2		3	8
<i>Sapium sebiferum</i>		1	1		1										2	2	5
<i>Schinus terebinthifolius</i>	4	2	2	2	2	1	2	1	3	2	2	2	2		3	3	15
<i>Schoenoplectus californicus</i>	2	2		1	1	2	1		2	1	2	2	1	2	2	2	14
<i>Schoenoplectus pungens</i>		2			1	1		2							2		5
<i>Schoenoplectus tabernaemontani</i>			2		1			2	1	1			1		1	1	8
<i>Scirpus cyperinus</i>				4													1
<i>Serenoa repens</i>										1		1					2
<i>Sesbania herbacea</i>					3												1
<i>Spartina bakeri</i>											1				1		2
<i>Taxodium</i>	2	4	2	2		3	2	2	2	2	2	2	3	1	4	4	15
<i>Taxodium distichum</i>					4												1
<i>Thelypteris interrupta</i>			1														1
<i>Thelypteris palustris pubescens</i>					1												1
<i>Tradescantia fluminensis</i>							1										1
<i>Typha</i>	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	16
<i>Urena lobata</i>							1										1
<i>Urochloa mutica</i>			1	2	1		3		3	1		3	1		1	4	10
<i>Utricularia</i>								1									1
<i>Utricularia floridana</i>											1						1
<i>Utricularia gibba</i>					3									1	2		3
<i>Vallisneria americana</i>	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	16
<i>Vitis</i>							1				1			2	2		4
<i>Vitis rotundifolia</i>	4	1		2		2			2			4				3	7

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Lake Rochelle Taxa Observed	CARDNO	CITY OF LAKE STORM	CITY OF LAKE SEVEN	ORLANDO	HIGHLANDS	HILLSBOROUGH	ORANGE	PINELLAS	USF WATER	DEP SE ROC 2	DEP SOUTH ROC 1	DEP SOUTH ROC 2	DEP SE ROC 1	DEP SW ROC 1	DEP SW ROC 2	WOOD	# teams that observed taxon
<i>Websteria confervoides</i>		1		2													2
<i>Wolffiella</i>										1							1
<i>Woodwardia virginica</i>																1	1
TOTAL TAXA PER TEAM	34	45	47	35	71	35	37	40	43	39	32	48	32	51	70	54	