



LVI Proficiency Exercise 2019

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Aquatic Ecology and Quality Assurance

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LVI Proficiency Requirements

- **DEP SOP LVI 1200** requires participation in a biennial LVI field exercise, achieving a score within 12pts of the expert median score, to submit LVI data to DEP
- One person on each team annually must pass (with a 90%) the online test of common lake plants
- These demonstrations ensure various sampling entities produce comparable data ²



2019 Lakes

Ocheesee Pond



- Jackson County
- LDI (2014) = 2.07
- Highly tannic, ringed by *Taxodium*
- Submersed, emergent and floating all significant
- Water levels still somewhat high from Hurricane Michael



2019 Lakes

Half Moon Lake



- Marion County, Ocala NF
- LDI (2005) = 3.28
- Clear, low nutrient, Ocala Scrub lake region, spring influence
- Mixed emergents, woody, floating all significant; little submersed
- Water levels recently higher after what appears to be extended dry period



Results

Summary statistics for the 2019 LVI

Proficiency

Lake	Expert N	Expert Median LVI	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

- **Thirty-two teams conducted LVI during the June 10-July 10 testing period**
- **One team conducted the exercise six days after the testing**
- **Thirty teams successfully scored within ± 12 points of the expert median 6**



Potential Sources of Dominance Selection

Ocheesees Pond

Taxodium dominant in 20/24 sections

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>



Dominance Selection at

Half Moon

- Multiple abundant taxa
- 8 taxa chosen as doms or codoms
- Codoms 25/44 sections
- No dominance in 10 sections

Team	Sections Sampled	Section 1,2,3 Dominants	Section 4,5,6 Dominants	Section 7,8,9 Dominants	Section 10, 11, 12 Dominants
DEP ROC	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 Selection at Lake

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		<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>

- Multiple abundant taxa

- 8 taxa chosen as doms or codoms

- Typha* 41/64 sections

- Vallisneria* 27/64 sections

- Codom/dom evenly split

- No dominance in 5 sections



Potential Sources of *Taxa List Length* Variability

- Notable variability in taxa list length at all lakes
- Effects on LVI score are variable
- Method is robust to differences, but QC still needed

Lake	Total N	Range in total taxa	Range in mean taxa per section
Ocheesee Pond	6	17-45	10-23
Half Moon Lake	11	24-54	17-32
Lake Rochelle	16	32-71	17-37



Potential Sources of *Why is taxa list length so variable?*

1. Differences in determination of lake boundary/assessment area
2. Decisions about inclusion or exclusion of specific taxa (e.g., vines)
3. Variable level of effort and expertise

Does it really matter?

Sometimes, but not always. LVI metrics are robust, but percentage-based metrics can be diluted or ballooned by long or short lists, respectively.



Potential Taxa List

LVI	Total Taxa	Mean # Taxa	Mean % Native	Mean % FLEPPC 1	Mean % Sensitive	Mean CC_Dom_Codom
67	45	23	86.3	3.9	8.9	6.9
70	33	19.5	89.1	3.6	10.3	6.8
71	17	10	82.9	7.3	17.6	7

Example 1: Short taxa list had higher %FLEPPC and %Sensitive, but resulting LVI score wasn't affected.

42	70	36	68.6	17.6	10.4	4.8
49	71	37	75.4	15.7	8.2	5.3
37	35	17	72.4	21.2	14.3	1.3*

Example 2: Short taxa list had higher %FLEPPC and %Sensitive, but resulting LVI score was more influenced by the dominance selection.

64	54	32.3	89.0	6.3	11.8	4.4*
90	24	16.5	98.5	1.5	22.8	5.8*
75	33	19.5	95.4	4.6	15.6	5.5

Example 3: Short taxa list had lower %FLEPPC and higher %Sensitive, and resulting LVI score was higher.



Determination of Lake Boundary

- LVI assessment area should be to the "seasonal high water level, the elevation to which the groundwater and surface water can be expected to rise in a normal wet season.."
- Indicators (use with reasonable scientific judgment)
 - algal mats
 - aquatic mosses and liverworts
 - aquatic plants
 - rafted debris lines
 - elevated lichen lines
 - morphological plant adaptations (buttressing, knees)
 - water marks



Determination of Lake Boundary

- **Include** plants at the shoreline in saturated soil
- **Do not include** plants in woods or lawns above the seasonal high water level.
- For lakes 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.





Inclusion or Exclusion of Specific Taxa

- **? Include** aquatic plants—anything that floats on water or requires water for structural support (all floating and submersed)
- **Include** emergent and woody taxa with wetland status—Obligate (OBL), Facultative Wetland (FACW), or Facultative (FAC)
- **Do not include** upland plants, with the exception of *Pinus elliottii* (slash pine)
- **Include** vines ONLY if:
 - Rooted in saturated soil,
 - Creeping out onto the water,
 - Intermixed with emergent vegetation, or
 - Covering a large portion of shoreline woody taxa that are included in assessment



Variable 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).
- The LVI is not designed to be a complete vegetative inventory!



Plant ID Challenges

Ocheesee Pond



***Limnophila sessiliflora* (left) was misidentified as *Myriophyllum aquaticum* (right) ; *Limnophila* has dimorphic leaves—submersed leaves are more feathery and dissected; *Myriophyllum* has one type**



Comparison of *Limnophila* and *Myriophyllum*



Submersed *Limnophila* (top and bottom left), submersed/emergent *Myriophyllum aquaticum* (top and bottom right)



Plant ID Challenges

Half Moon and Rochelle



Schoenoplectus tabernaemontani (left) and *Schoenoplectus californicus* (right) were both identified at Half Moon Lake and Lake Rochelle (photos: ISB website; Betty Wargo, left; Shirley Denton, right). The species are similar, but *S. californicus* is described by most sources as having taller, darker green, stiffer stems.



Plant ID Challenges

Half Moon and Rochelle



Schoenoplectus californicus was confirmed at Half Moon, photo of mature achene on the right. (photos: DEP Central ROC). 10 Teams at Half Moon identified *S. californicus*, and only one team identified *S. tabernaemontani*. At Rochelle, seven teams identified only *S. californicus*, 6 teams identified both species, and 2 teams identified only *S. tabernaemontani*.



Plant ID Challenges



***Schoenoplectus californicus* at Half Moon Lake (Photo: DEP AEQAS)**



Cool Plants Observed *Ocheesee*

Echinodorus cordifolius

- Alismataceae (Sagittaria family)
- Uncommon in Panhandle to central Peninsula
- 3-petaled white flower and bur-like fruiting head, whorled on stem
- Unlike *Sagittaria*, flowers on a long arching stem that can droop to the sediment and grow a new plantlet at the flowering node





Cool Plants Obser

Half Moon

Hibiscus grandiflorus

- Malvaceae (Hibiscus family), cotton, okra
- Occasional throughout state
- Large, herbaceous multi-stemmed perennial
- Large, fuzzy, 3-lobed leaves; big pink flower with purple center; pistils and stamens together on central tube



Photo: DEP Central ROC



Cool Plants Observed *Rochelle*

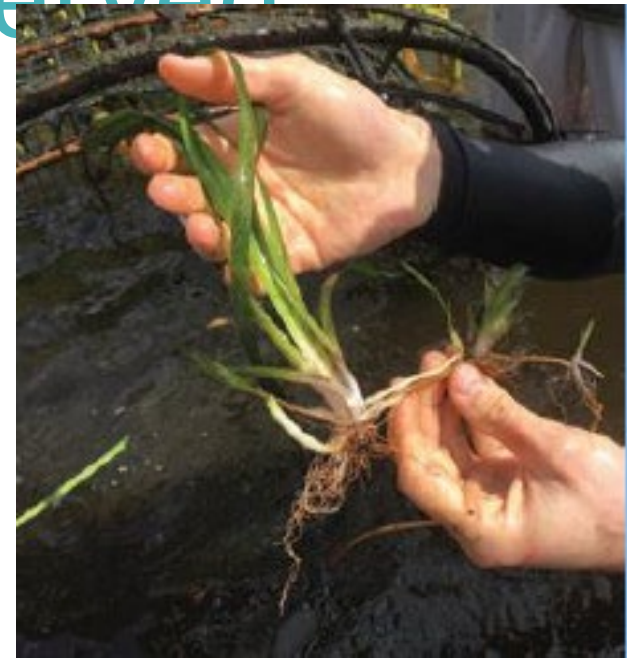
Vallisneria americana

- Hydrocharitaceae (family with *Hydrilla*, *Najas*, *Thalassia*)
- Frequent; throughout Florida
- Strap leaved, rooted submersed, grows toward surface from crown, spreads by runners along sediment
- Important species for habitat/ecosystem services



Photo by Cardno

- Most likely to be confused with *Sag kurziana*; tips rounded, blades not ridged



Vallisneria americana
Photo by Shirley Denton





LVI Calculator

- Most teams external to DEP use the excel based LVI calculator (DEP uses SBIO; some external teams have databases)
- QC reminders for calculator
 - Use the correct region for your sample (calculations are different) 😊
 - Use a "1" for present, a "C" for co-dominant, and a "D" for dominant. An "X" for present may result in calculation errors
- A new, improved LVI calculator will be available in 2020!



2019 Proficiency Report

- Draft version distributed to sampling teams
- Corrections and comments due 11/15
- Final report will be posted on DEP website

