# DETERMINATION OF BIOLOGICAL INDICES

See also the following sections:

###### FA 1000 Administrative Procedures

###### FC 1000 Cleaning/Decontamination Procedures

###### FD 1000 Documentation Procedures

###### FM 1000 Field Planning and Mobilization

###### FQ 1000 Field Quality Control Requirements

###### FS 1000 General Sampling Procedures

###### FS 7000 Biological Community Sampling

###### FT 1000 General Field Testing and Measurement

###### FT 3000 Aquatic Habitat Characterization

###### LD 7000 Documentation of Biological Laboratory Procedures

###### LQ 7000 Quality Control for Biological Community Analysis

### LT 7010. Macroinvertebrate Sample Homogenization and Picking

##### Introduction. This section describes lab sample homogenization and picking of organisms from samples that contain aquatic macroinvertebrates and detritus preserved with formalin or non-formalin-based fixative that penetrates and stabilizes tissue without compromising analytical capability (e.g. NOTOXhisto®). Use this procedure for Lake Condition Index (LT 7300), and Wetland Condition Index (LT 7600) sample processing. For preparation and analysis of Hester Dendy samples or Dredge and Core samples, see LT 7710 or LT 7720, respectively.

##### Equipment and Supplies

###### Waterproof paper

###### Permanent marker

###### U.S. No. 30 mesh sieve (approximately 600 µm)

###### Ethanol-filled squeeze bottle (80%)

###### White pan marked with a grid of 24 5-cm squares (gridded pan)

###### Random number table

###### 250-mL glass jar

###### Dissecting microscope

###### Compound microscope

###### 100 x 15 mm petri dish or other appropriate container

###### Forceps

###### Vials for picked organisms (1 or 2 dram)

###### Laboratory counter

###### Macroinvertebrate Bench Sheet (may vary from lab to lab)

###### Discard bucket

###### Lighted magnifier

###### Ruler

###### Lab coat

###### Latex gloves

###### Properly fitted respirator

###### Safety glasses

##### Methods

##### Make a label to go into each of the vials of picked bugs that clearly identifies the sample. This could include information such as the sample identification number, station identification, date sampled, and replicate number.

##### Include the entire sample in this reduction and homogenization process.

##### Place sample material into a U.S. No. 30 mesh sieve over a discard bucket. Empty the contents of the sample into the sieve slowly, making sure not to lose any of the sample material. The formalin or non-formalin-based fixative should go through the sieve and collect in the bucket. Once the sample is finished draining, pour the waste formalin or fixative into the proper container. Follow proper safety protocols (personal protective equipment, ventilation and handling) when handling samples preserved with formalin or non-formalin-based fixatives.

##### Gently rinse the sample material with tap water. Pull out large twigs, leaves, plants, etc., and place into a gridded pan. Wash fine debris (silt, mud) through the (U.S. No. 30 mesh) sieve. Repeat steps 3.3 and 3.4 until the entire sample from all the jugs has been processed. Visually inspect large debris (leaves, plants, twigs) held in the pan for animals before discarding. This inspection is best accomplished by observing it with a lighted magnifier. Randomly place found organisms into the gridded pan with the rest of the unpicked sample.

##### Thoroughly mix the sample so that a homogeneous distribution of organisms is achieved in the detrital matrix. Place the sieved sample in a labeled, gridded pan. Each 5-cm square should have a pre-assigned number (1-24). Liquid present in the sample should be sufficiently reduced to prevent material from shifting among squares during the sorting process. There are 24 total 5-cm squares in a standard pan. If the sample is small and does not cover all 24 squares, spread it out across a number of squares that is divisible by three (e.g., 18,12, 21). Use a straightedge to delineate the edges of a grid while removing the sample.

##### Randomly select eight separate squares (or 1/3 of the total grids). A random number table is recommended. Remove the contents of these squares, in their entirety, and place in another labeled, gridded tray or pan. Thoroughly mix the sample in the second ray so that a homogeneous distribution of organisms is achieved in the detrital matrix. Use a straightedge to delineate the edges of a grid while removing the sample.

##### Randomly select one square from the second tray, remove the contents of this square in its entirety, and place it into a third container (such as a gridded ray or Petri dish). After selecting your square, you may need to add some ethanol or water (in addition to a cover) to the trays to prevent them from drying out.

##### The intent of this step is to achieve the final target count appropriate for the study objective (as defined in 3.9). Randomly select an aliquot (any fraction of the square; for example,,1/4, 1/8 etc.), remove its contents, and place it in a separate, labeled container. Divide this aliquot further, if necessary, to achieve the target number of organisms.

##### Use the target counts for field methods contained in DEP SOP FS 7000 as follows: 100-125 individuals for Lake Condition Index sampled per FS 7460; 100-125 individuals for Wetland Condition Index sampled per FS 7470.

##### Place the container under a dissecting scope set at low power (approximately 7x or 10x). In a deliberate, systematic manner, pick every organism from the final aliquot and place them into an alcohol-filled vial (clearly identified as per section 3.1). Keep a running total of the number of organisms picked. Once started, finish sorting this aliquot in its entirety.

##### Save the container (petri dish) until you have ten (10), and have a co-worker recheck the selected dish as described in LQ 7410. After a container has been checked, you may discard the material in the remaining containers.

##### If you have not reached the minimum target count as defined in step 3.9, repeat steps 3.7-3.11. Use whatever size aliquot is necessary in order to reach the target count of organisms.

##### If you have exceeded the target count, randomly subsample the target count of organisms. This may be accomplished by placing the organisms into a Petri dish that has been subdivided evenly into 16 squares. With the aid of a dissecting microscope, remove and discard any terrestrial organisms, pieces of worms and other organisms without heads which may have accidentally been included. If still not within the target range, randomly select a square in the Petri dish and remove **all** the organisms in that square. Repeat this process until you have the target number of individuals.

##### If an obvious organism is observed but its grid number was not selected and no examples of that organism were present in the grids that were selected, you may note on the benchsheet or in the database that the organism was qualitatively observed. Do not include the organism in the analysis.

##### Record the number of squares, grids and aliquots selected (e.g., 8/24, 2/12, 1/4) to enable conversion to total abundance present in the original sample. Failure to record the number of squares and grids selected (out of the total possible) compromises the usefulness of the data. Save any remaining material in the third container and the remaining squares from the second tray in separate air-tight containers until both portions have been completely processed. This material may be necessary if the target counts fall below the acceptable range during the identification process.

##### Record the date the sorting of the sample is completed.

#### **LT 7020. Macroinvertebrate Sample Slide Preparation**

#### (Based on Beckett, D.C. and Lewis, P.A. 1982. An efficient procedure for slide mounting of larval Chironomidae. Trans. Amer. Microsc. Soc. 101: 96-99; Epler, J. 1992, Identification manual for the larval Chironomidae (Diptera) of Florida; and Pluchino, E. 1984, Guide to the common water mite genera of Florida. Reference provided for informational purposes only and is not required for this procedure)

##### Introduction. This section describes the process for preparing slides for identification of midges, worms, aquatic mites, and sometimes parts of other organisms (*e.g*., mayfly labrums, etc.), which must be mounted for proper identification. Use this procedure for Lake Condition Index (LT 7300), Wetland Condition Index (LT 7600), Hester Dendy (LT 7710), and dredge and core (LT 7720) sample processing. See SCI 2100 for the process for preparing slides for identification of the organisms listed above for the Stream Condition Index.

##### Equipment and Supplies

###### Dissecting microscope

###### 25 x 75 mm glass microscope slides

###### 12-mm and 18-mm diameter round #0 or #1 cover slips

###### Transparent tape and razor blade

###### Pencil

###### Forceps or needle

###### 1 N KOH (potassium hydroxide)

###### Mounting medium (CMC-10)

##### Methods

##### Prepare the slides for labeling. This task is most easily accomplished by lining up several slides with long ends together and applying a row of transparent tape to the right side of each slide. Usually, three slides are left taped together until organisms are mounted. Use a razor blade to separate the slides during the identification process.

##### Label each slide so it can be uniquely identified. For example, write the sample number, sample date, and abbreviated site information on each slide label with a soft pencil. Other station identifiers along with the total number of slides, the initials of the mounter, and the date mounted can be written on a small piece of paper and attached to the tray on which the slides are placed to dry. This is often helpful when identifying organisms.

##### Place a drop of CMC-10 on the slide for each organism you are mounting. An excess of CMC may be used, which will help to form a seal around the cover slip when it is pressed down. Mount three midges/worms per slide, under separate 12-mm cover slips. In the case of very large specimens, mount two per slide under separate 18-mm cover slips.

##### Using a needle or forceps, place the specimen in the CMC-10, ventral side up if it is a midge or mite.

##### Using forceps, place the cover slip over the specimen.

##### Using forceps or the eraser of a pencil, press the cover slip onto the specimen. Apply sufficient pressure to spread the mandibles and labrum. At this point, you may also orient the specimen by pushing or pressing the cover slip in various ways. Be careful not to break the cover slip, as the pressure required to flatten the specimen may be great. Mounting of aquatic mites requires more CMC-10 along with a greater amount of pressure. Make sure you use enough of both. Otherwise, air will accumulate under the cover slip and the necessary structures will not be visible. Mites can be soaked in 1N KOH for softening before mounting.

##### Set the slides aside to dry; it may take 1 to 2 days for the slides to dry completely. Recheck the labels on the slides to make sure that each one has the correct sample number.

##### **LT 7030. Macroinvertebrate Organism Identification**

##### (Modified from section 10500C, *Benthic Macroinvertebrates, Sample Processing and Analysis*, inStandard Methods for the Examination of Water and Wastewater; see Standard Methods Online, <http://www.standardmethods.org/store/>); reference is provided for informational purposes only and is not required for this procedure.)

##### Introduction. Use this procedure for Lake Condition Index (LT 7300), Wetland Condition Index (LT 7600), Hester Dendy (LT 7710), and dredge and core (LT 7720) sample processing.

##### Equipment and Supplies

###### Dissecting microscope

###### Compound microscope

###### Identification references

###### Forceps

###### Vials (1- or 2-dram)

###### Petri dishes (100 x 15 mm or 60 x 15 mm) or Syracuse watch glasses

###### Laboratory counter (optional)

###### Microscope slides

###### 12-mm diameter cover slips

###### Macroinvertebrate Bench Sheet (may vary from lab to lab)

###### Pen

###### Pencil

##### Methods

##### Sort and process samples according to LT 7010. Make permanent slide mounts of worms and midges according to LT 7020 when needed.

##### Identify organisms other than worms, midges, and aquatic mites with a dissecting microscope, unless higher magnification is needed. Make permanent slide mounts of worms, midges, and water mites as necessary from the sample.

##### You may choose to separate the organisms into like groups. To do this, place the groups into smaller (60-mm diameter) individual petri dishes or Syracuse watch glasses, or group the animals within the larger dish.

##### Identify the organisms to the lowest practical taxonomic level, using the most appropriate identification reference for each group. See LT 7900 for guidance concerning “lowest practical taxonomic level”. Enumerate organisms concurrently, and then place them back into the labeled vial with the forceps. Remove the animals as you count them in order to avoid counting any of them twice. It will take some time until sufficient experience with identification procedures and references is gained. In addition to the identification manuals, maintain a reference collection that can be used to compare specimens and facilitate identification. After using a dichotomous key to arrive at the name of an unknown organism, check the organism’s geographic range, habitat preferences, and morphological diagnosis to confirm that the identification is correct. Do not identify an organism by simply flipping through some pictures and assigning a name based on a superficial resemblance. Another taxonomist will recheck sample identifications according to LQ 7000.

##### If a large number of one or a few taxa are present, use a laboratory counter to keep a running total to facilitate the enumeration process. Temporarily label counters to avoid mistakes. If you do not use a counter, tally the number of each taxon on your bench sheet.

##### If an organism is encountered in your laboratory for the first time, remove it and place it in an individual vial for inclusion in the reference collection. Make a note of this on the bench sheet, so that it can be located in the future, if necessary.

##### A compound microscope is required to identify worms, midges, and aquatic mites. Sometimes, parts of other organisms (*e.g*., mayfly labrums, etc.) must be mounted for proper identification. Most midges and mites can be recognized at 400x (40x objective and 10x eyepiece). Prepare specimens from these groups according to LT 7020

##### If the structures that must be observed cannot be seen, use a 100x oil immersion objective. This procedure will give a magnification of 1000x.

##### Identify the specimens to the lowest practical taxonomic level. See LT 7900 for guidance concerning “lowest practical taxonomic level”. Write the organism’s name or code directly on the slide label. If the specimen has no head or belongs to a group not classified as a benthic macroinvertebrate (e.g., nematode), draw a horizontal line through the slide label to indicate that it will not be counted. Specimens that are missing their heads are not counted. This situation will most often be encountered with the worms, as the heads are difficult to discern under the dissecting microscope when the pieces are mounted.

##### Record the individual taxa names and enumerate the organisms for each taxon on your bench sheet. Use of the laboratory counter will facilitate this operation, especially where large numbers of individuals are present.

##### Tally the number of organisms identified.

##### Follow proper Taxonomic Quality Assurance procedures (see LQ 7000).

##### **LT 7040. Procedures for Counting and Collapsing of Taxonomic Data**

##### Use this procedure for Lake Condition Index (LT 7300), Wetland Condition Index (LT 7600), Hester Dendy (LT 7710), and dredge and core (LT 7720) data processing.

##### When combining biological data (taxa and counts), the number of taxa may become artificially inflated by the incorporation of the same taxon under different names and by counting high-level identifications (family or genus). An erroneously high taxa count creates additional anomalies among metrics involving these counts, such as the number of Ephemeroptera and Trichoptera taxa.

##### Prepare a list of all the taxa in the sample identified to the lowest practical taxonomic level per LT 7900.

##### Collapse taxa further according to the following:

##### Starting at the bottom of the phylogenetic tree (usually species), determine if any entries have a "parent" entry (e.g., a genus level entry and entries for species within that genus). Remove the higher-level entry and add its number of individuals to the lower-level entries proportional to their counts, i.e., the genus level identification will be removed, and its number of individuals will be added proportionally to the species on the list within that genus.

##### Make sure that the sum of the counts is the same as it was before the collapsing step. It may be necessary to adjust the counts with the lowest number of individuals. For example, suppose there is a genus level entry with a count of 1 and entries for 3 species within that genus each with a count of 1. Only one of the species entries can have 1 added to it, otherwise, the number of individuals will become inflated. The first entry in the list is the one to have the 1 added to it.

##### Move one step up the phylogenetic tree and see if there are any family entries with genus and/or species under it. If there are remove the family entry and add its number of individuals proportionally to the entries below it phylogenetically. Continue up the phylogenetic tree until there are no more high-level entries to be evaluated and proportioned.

##### As an example, see the following species list:

*Conchapelopia* sp. (2)

*Helopelopia* sp. (4)

*Dicrotendipes simpsoni* (21)

*Dicrotendipes modestus* (1)

*Dicrotendipes* sp. (20)

*Hyalella azteca* (20)

*Planorbella* sp. (1)

7 taxa and 69 individuals

Upward collapsing, however, will combine *Conchapelopia* and *Helopelopia* as synonyms, and will apportion the individuals from *Dicrotendipes* sp. to the two identified species of that genus, resulting in:

*Conchapelopia* sp. (6)

*Dicrotendipes simpsoni* (40)

*Dicrotendipes modestus* (2)

*Hyalella azteca* (20)

*Planorbella* sp. (1)

5 taxa and 69 individuals

Note that if *“Dicrotendipes* sp.” had represented a distinct species level entity with no available or known name, it would have properly been entered as *“Dicrotendipes* sp. 14 Epler” or a similar name and would then not have been combined. Collapsing will also take place at other taxonomic levels: family level identifications will combine with generic level identifications, species will combine with subspecies, etc.

##### Keep a record of the original taxa list and the resulting collapsed list.

## BioRecon Determination (See BRN 2100)

## Stream Condition Index (SCI) Determination (See SCI 2100)

## Lake Condition Index (LCI) Determination

##### Definition: The LCI is a community based biological assessment of lake health using benthic macroinvertebrates sampled via 12 deployments of an Ekman or petite Ponar dredge, with organisms identified to the lowest practical taxonomic level per Table LT 7900-1. This SOP describes the procedures for determining index scores after sampling per SOP FS 7460.

##### Laboratory Analyses

##### Prepare the sample according to LT 7010.

##### Prepare slides according to LT 7020.

##### Identify the organisms according to LT 7030.

##### Data Reduction

##### For DEP staff, enter all data into the Florida Statewide Biological Database.

##### Follow the counting and collapsing procedures in LT 7040.

##### Index Calculation

##### Calculate and record the Shannon-Weaver Diversity Index (SWDI) score according to the following definition: *The Shannon-Weaver Diversity Index is the negative summation (from i = 1 to s) of (ni/N) log2 ni/N), where s is the number of species in a sample, N is the total number of individuals in a sample, and ni is the total number of individuals in species.*

##### Calculate and record the Hulbert Index (HI) score according to the list below.

Hulbert Index = (# in Class A × 2) + # in Class B

**Class A** (2 points per taxon)

*Hexagenia* spp.

*Cernotina truncona* (= *Polycentropus flavus*)

*Orthotrichia* spp.

*Oxyethira* spp.

*Oecetis* spp.

*Palaemonetes paludosus*

*Chaoborus albatus*

*Pagastiella* spp.

*Paralauterborniella nigrohalteralis*

*Pseudochironomus devinctus*

*Djalmabatista pulcher*

*Nilothauma* spp.

*Clinotanypus* spp.

*Stictochironomus devinctu*s

*Cryptotendipes* spp.

*Ablabesmyia* spp.

**Class B** (1 point per taxon)

*Caenis* spp.

*Gammarus* spp.

*Hyalella azteca*

*Gomphus* spp.

*Aphylla williamsoni*

*Pachydiplax longipennis*

*Nectopsyche* spp.

*Byssanodonta cubensis* (= *Eupera cubensis*)

*Corbicula fluminea* (= *C. manilensis*)

Unionidae

*Campeloma* spp.

*Procladius* spp.

*Polypedilum halterale* group (= *P. digitifer, P. griseopunctatum, P. halterale,* and *P. simulans*)

*Polypedilum illinoense* group (= *P. illinoense, P. ophioides,* and several undescribed species)

*Nimbocera pinderi* (= *Tanytarsus limnetica*)

*Einfeldia* spp.

##### Calculate and record the solutions to formulae 4.3.1-4.3.6 below.

##### Taxa Score = MIN(100, 100\*# Taxa/30.5)

##### EOT (Ephemeroptera + Odonata + Trichoptera) Taxa Score = MIN(100, 100\*# EOT Taxa/5.2)

##### % EOT Score = MIN(100, 100\*% EOT/34.4)

##### % Diptera Score = MIN(100, 100\*(100 - % Diptera)/(100-13.6))

##### SWDI Score = MIN(100, 100\*SWDI/4.39)

##### HI Score = MIN(100, 100\*HI/17.4)

##### Determine the LCI score by calculating the mean of the above six scores (4.3.1-4.3.6). Record the LCI score.

## Algal Sensitivity Index Determination (*reserved)*

## Lake Vegetation Index (LVI) Determination [removed] (See LVI 2200)

Table 7500-1 Plant Attributes for LVI Calculation [removed] (See Appendix LVI 1000-1)

## Determination of Wetland Condition Indices

See also the following SOPs:

###### FD 1000 Field Documentation

FS 7000 General Biological Community Sampling

### Determination of Wetland Condition Index for Freshwater Isolated Herbaceous Wetlands

#### Diatom Index (Reserved)

#### Vegetation Index for Freshwater Isolated Herbaceous Wetlands

##### Definition: The vegetation Wetland Condition Index (WCI) for isolated, herbaceous wetlands is a biological assessment of wetland health conducted by sampling vascular plants along transects, identifying them to the species level, and calculating metric values based on attributes of the plant community that change predictably along an independent gradient of human disturbance. For additional information on the index development, see Lane *et al.* 2003 (reference provided for informational purposes only and is not required for this procedure). This SOP describes the procedures for determining index scores after sampling per SOP FS 7330.

##### Index Calculation

##### The vegetation WCI for isolated, herbaceous wetlands has five metrics:

###### Proportion tolerant indicator species

###### Proportion sensitive indicator species

###### Proportion exotic macrophyte species

###### Annual to perennial ratio (A:P)

###### Average coefficient of conservatism (CC) score

##### NOTE: Taxa should be identified to the lowest practical taxonomic level, and species level is needed for the calculation of some metrics. For each metric, all taxa should be included for which the metric information is available, and only those taxa should be included in the counts for the denominator for each metric calculation. For example, if a taxon is identified at genus level and that genus contains native and exotic taxa, that taxon may not be used in the “percent exotic macrophyte species” metric.

##### Calculate and record the proportion tolerant indicator species as the number of tolerant indicator species, according to Table 7612-1, divided by the total number of species.

# Table LT 7612-1. Tolerant Macrophyte Indicator Species for Isolated Herbaceous Wetlands

| ***Tolerant Macrophyte Indicator Species*** | |
| --- | --- |
| *Alternanthera philoxeroides* | |
| *Symphyotrichum subulatum (syn. Aster subulatus)* | |
| *Bacopa monnieri* | |
| *Carex albolutescens* | |
| *Centella asiatica* | |
| *Commelina diffusa* | |
| *Cuphea carthagenensis* | |
| *Cynodon dactylon* | |
| *Cyperus haspan* | |
| *Cyperus odoratus* | |
| *Cyperus polystachyos* | |
| *Cyperus ovatus (syn. C. retrorsus)* | |
| *Cyperus surinamensis* | |
| *Diodia virginiana* | |
| *Eclipta prostrata* | |
| *Galium uniflorum* | |
| *Luziola fluitans (syn. Hydrochloa caroliniensis)* | |
| *Juncus effusus* | |
| *Cyperus brevifolius (syn.Kyllinga brevifolia)* |
| *Lindernia grandiflora* |
| *Ludwigia octovalvis* |
| *Ludwigia peruviana* |
| *Ludwigia repens* |
| *Melochia corchorifolia* |
| *Panicum repens* |
| *Paspalum acuminatum* |
| *Paspalum notatum* |
| *Paspalum urvillei* |
| *Phyla nodiflora* |
| *Persicaria punctata* |
| *Pontederia cordata* |
| *Sacciolepis striata* |
| *Sesbania herbacea* |
| *Setaria parviflora* |
| *Thelypteris interrupta* |
| *Typha latifolia* |

##### Calculate and record the proportion sensitive indicator species as the number of sensitive indicator species, according to Table LT 7612-2, divided by the total number of species.

# Table LT 7612-2. Sensitive Macrophyte Indicator Species for Isolated Herbaceous Wetlands

| ***Sensitive Macrophyte Indicator Species*** | |
| --- | --- |
| *Amphicarpum muehlenbergianum* | |
| *Andropogon virginicus* | |
| *Aristida purpurascens* | |
| *Brasenia schreberi* | |
| *Drosera capillaris* | |
| *Eriocaulon decangulare* | |
| *Fuirena scirpoidea* | |
| *Gratiola ramosa* | |
| *Hypericum brachyphyllum* | |
| *Hypericum fasciculatum* | |
| *Ilex glabra* | |
| *Iva microcephala* | |
| *Lachnanthes caroliniana* | |
| *Lachnocaulon anceps* | |
| *Lachnocaulon minus* | |
| *Ludwigia linifolia* | |
| *Lycopodiella appressa (syn.Lycopodium appressum)* | |
| *Nymphaea odorata* | |
| *Nyssa biflora* | |
| *Tiedemannia filiformis (syn. Oxypolis filiformis)* | |
| *Dichanthelium ensifolium (syn. Panicum chamaelonche)* | |
| *Dichanthelium erectifolium (syn.Panicum erectifolium)* | |
| *Hymenachne hemitoma (syn. Panicum hemitomon)* | |
| *Coleataenia rigidula (syn. Panicum rigidulum)* |
| *Coleataenia tenera (syn.Panicum tenerum)* |
| *Paspalum monostachyum* |
| *Paspalum praecox* |
| *Pinus elliottii* |
| *Proserpinaca pectinata* |
| *Rhexia mariana* |
| *Rhexia nashii* |
| *Rhynchospora filifolia* |
| *Rhynchospora rariflora* |
| *Rhynchospora tracyi* |
| *Rhynchospora wrightiana* |
| *Scleria baldwinii* |
| *Scleria reticularis* |
| *Serenoa repens* |
| *Stillingia aquatica* |
| *Syngonanthus flavidulus* |
| *Utricularia purpurea* |
| *Viola lanceolata* |
| *Woodwardia virginica* |
| *Xyris elliottii* |
| *Xyris jupicai* |
| *Xyris smalliana* |

##### Calculate and record the proportion exotic species as the number of exotic species divided by the total number of species for which exotic or native status can be assigned. Use Table LT 7600-1 to obtain native versus exotic (not native) status.

##### Calculate and record the annual to perennial ratio as the number of annual species divided by the number of perennial species, for species which can be assigned a duration. Use Table LT 7600-1 to determine duration (annual versus perennial) for each species.

##### Calculate and record the average Coefficient of Conservatism (CC) score of all species for which a CC score is available. Use Table LT 7600-1 to obtain CC scores.

##### Score the metrics using Table LT 7612-3. Allot the number of points indicated in the first row for each metric in accordance with the column containing the value for that metric in each sample.

# Table LT 7612-3. Metric Calculations for the Vegetation WCI for Isolated Herbaceous Wetlands

| **Metric** | **Score 0** | **Score 3** | **Score 7** | **Score 10** |
| --- | --- | --- | --- | --- |
| % Tolerant Indicator Species | >0.3723 | >0.1081-0.3723 | 0.0597-0.1081 | <0.0597 |
| % Sensitive Indicator Species | <0.0820 | 0.0820-0.2308 | 0.2308-0.4474 | >0.4474 |
| % Exotic Species | >0.1198 | >0.0385-0.1198 | 0.0001-0.0385 | 0 |
| Annual:Perennial Ratio | >0.1231 | >0.0625-0.1231 | 0.0352-0.0625 | <0.0352 |
| Average CC Score | <3.7015 | 3.7015-5.4085 | >5.4085-5.8874 | >5.8874 |

##### Add the five metric scores together to generate the Vegetation WCI score for isolated herbaceous wetlands.

##### Maintain records following LD 7151.

##### References

Lane, C.R., M.T. Brown, M. Murray-Hudson, M.B. Vivas. 2003. The Wetland Condition Index (WCI): Biological Indicators of Wetland Condition for Isolated Depressional Herbaceous Wetlands in Florida. Report to FDEP. September 2003 (reference provided for informational purposes only and is not required for this procedure).

#### Macroinvertebrate Index for Freshwater Isolated Herbaceous Wetlands

##### Definition: The Macroinvertebrate Wetland Condition Index is a community based biological assessment of wetland health using benthic macroinvertebrates sampled via 20 dipnet sweeps, with organisms collapsed to genus level. There are separate indices for isolated herbaceous and isolated forested wetlands. This section contains protocols for the isolated herbaceous wetland index. This SOP describes the procedures for determining index scores after sampling per SOP FS 7470.

##### Laboratory Analyses

##### Prepare the sample according to LT 7010.

##### Prepare slides according to LT 7020.

##### Identify the organisms according to LT 7030.

##### Data Reduction

##### For DEP staff, enter all data into the Florida Statewide Biological Database.

##### Using the counting and collapsing procedures listed in LT 7040, collapse all taxa to genus level.

##### Keep a record of the original taxa list and the resulting collapsed list.

##### Index Calculation

##### Taxa should be identified to the lowest practical taxonomic level. For each metric, all taxa should be included for which the metric information is available, and only those taxa should be included in the counts for the denominator for each metric calculation.

##### Calculate and record the percentsensitive genera as the percent of genera of the following list (from Lane *et al*. 2003) divided by the total genera identified (do not include higher level identifications in denominator). Multiply result times 100.

##### *Ablabesmyia*

##### *Chaoborus*

##### *Clinotanypus*

##### *Corethrella*

##### *Hydroporus*

##### *Ischnura*

##### *Labrundinia*

##### *Larsia*

##### *Lestes*

##### *Limnochares*

##### *Orthotrichia*

##### *Piona*

##### *Procladius*

##### *Sminthurinus*

##### Calculate and record the percent of tolerant genera as the number of total genera on the following list (from Lane *et al*. 2003; reference provided for informational purposes only and is not required for this procedure) found in the sample divided by the total genera identified (do not include higher level identifications in denominator). Multiply result times 100.

##### *Atrichopogon*

##### *Beardius*

##### *Enochrus*

##### *Goeldichironomus*

##### *Haliplus*

##### *Mansonia*

##### *Micromenetus*

##### *Monopelopia*

##### *Odontomyia*

##### *Pachydrus*

##### *Physa (*Florida species formerly known as *Physella)*

##### *Ranantra*

##### *Zavreliella*

##### Determine the number of individuals that are predators. Refer to the FDEP Statewide Biological Database webpage (<http://www.dep.state.fl.us/labs/cgi-bin/sbio/database.asp>) for the list of macroinvertebrates categorized as predators (categorization for insects taken from Merritt *et al*., An Introduction to the Aquatic Insects of North America). Calculate the percent predator metric as the number of predator individuals divided by the total number of individuals in the sample that could be assigned to a feeding group. Multiply result times 100.

##### Calculate the percent Odonata metric as the number of individuals of the order Odonata divided by the total number of individuals in the sample that could be assigned to an order. Multiply result times 100.

##### Calculate the percent Orthocladiinae metric as the number of individuals of the order Orthocladiinae divided by the total number of individuals in the sample that could be assigned to a family. Multiply result times 100.

##### Score the metrics using Table LT 7613-1. Allot the number of points indicated in the first row for each metric in accordance with the column containing the value for that metric in each sample.

##### ***Table LT 7613-1. Metric calculations for macroinvertebrate index for isolated herbaceous wetlands.***

| **Metric** | **Score 0** | **Score 3** | **Score 7** | **Score 10** |
| --- | --- | --- | --- | --- |
| % Sensitive Genera | < 1.27 | 1.27-5.28 | >5.28-13.06 | >13.06 |
| % Tolerant Genera | >12.58 | >3.45-12.58 | 0.85-3.45 | <0.85 |
| % Predator Individuals | <17.85 | 17.85-25.78 | >25.78-37.98 | >37.98 |
| % Odonata Individuals | <0.81 | 0.81-2.25 | >2.25-5.02 | >5.02 |
| % Orthocladiinae Individuals | >22.4 | >15.06-22.4 | 7.95-15.06 | <7.95 |

##### Maintain records following LD 7153.

##### References

##### Lane, C.R., M.T. Brown, M. Murray-Hudson, M.B. Vivas. 2003. The Wetland Condition Index (WCI): Biological Indicators of Wetland Condition for Isolated Depressional Herbaceous Wetlands in Florida. Report to FDEP. September 2003 (reference provided for informational purposes only and is not required for this procedure).

##### Merritt, R.W., Cummins, K.W., and M.B. Berg, An Introduction to the Aquatic Insects of North America, Fourth Edition, 2008.

### Determination of Wetland Condition Index for Freshwater Isolated Forested Wetlands

#### Diatom Index (Reserved)

#### Vegetation Index for Freshwater Isolated Forested Wetlands

##### Definition: The vegetation Wetland Condition Index (WCI) for isolated, forested wetlands is a biological assessment of wetland health conducted by sampling vascular plants along transects, identifying them to the species level, and calculating metric values based on attributes of the plant community that change predictably along an independent gradient of human disturbance. For additional information on the index development, see Riess and Brown 2005 (reference provided for informational purposes only and is not required for this procedure). This SOP describes the procedures for determining index scores after sampling per SOP FS 7330.

##### Index Calculation

##### The vegetation WCI for isolated, forested wetlands has 6 metrics:

###### Percent tolerant indicator species

###### Percent sensitive indicator species

###### Percent exotic macrophyte species

###### Average Coefficient of Conservatism (CC) score

###### Percent native perennial species

###### Percent wetland status species

##### NOTE: Taxa should be identified to the lowest practical taxonomic level, and species level is needed for the calculation of some metrics. For each metric, all taxa should be included for which the metric information is available, and only those taxa should be included in the counts for the denominator for each metric calculation. For example, if a taxon is identified at genus level and that genus contains native and exotic taxa, that taxon shall not be used in the “percent exotic macrophyte species” metric.

##### Calculate and record the percent tolerant indicator species as the number of tolerant indicator species divided by the total number of species, using Tables LT 7622-1 through LT 7622-4, *Tolerant Indicator Species for Isolated Forested Wetlands*. Use the table for the appropriate region, based on the map in Figure LT-7622-1. Multiply the result times 100.

# *Table LT 7622-1. Tolerant Macrophyte Indicator Species for Isolated Forested Wetlands, Panhandle Region*

| ***Tolerant Macrophyte Indicator Species –***  ***Panhandle Region*** |
| --- |
| *Boehmeria cylindrica* |
| *Cynodon dactylon* |
| *Diodia virginiana* |
| *Paspalum urvillei* |
| *Phytolacca americana* |
| *Persicaria hydropiperoides* |
| *Persicaria punctata* |

# *Table LT 7622-2. Tolerant Macrophyte Indicator Species for Isolated Forested Wetlands, North Region*

| ***Tolerant Macrophyte Indicator Species –***  ***North Region*** |
| --- |
| *Acer rubrum* |
| *Amaranthus spinosus* |
| *Boehmeria cylindrica* |
| *Carex longii* |
| *Commelina diffusa* |
| *Cuphea carthagenensis* |
| *Cynodon dactylon* |
| *Cyperus ovatus (syn. C. retrorsus)* |
| *Cyperus virens* |
| *Diodia virginiana* |
| *Eupatorium capillifolium* |
| *Galium tinctorium* |
| *Hypericum mutilum* |
| *Juncus effusus* |
| *Ludwigia repens* |
| *Melothria pendula* |
| *Oxalis corniculata* |
| *Parthenocissus quinquefolia* |
| *Paspalum notatum* |
| *Paspalum urvillei* |
| *Phyllanthus urinaria* |
| *Persicaria punctata* |
| *Rubus pensilvanicus (syn. R. argutus)* |
| *Sambucus nigra (syn. S. canadensis)* |
| *Saururus cernuus* |
| *Sida rhombifolia* |
| *Smilax pumila* |
| *Trifolium repens* |

# *Table LT 7622-3. Tolerant Macrophyte Indicator Species for Isolated Forested Wetlands, Central Region*

| ***Tolerant Macrophyte Indicator Species –***  ***Central Region*** |
| --- |
| *Blechnum serrulatum* |
| *Commelina diffusa* |
| *Cynodon dactylon* |
| *Cyperus ovatus (syn. C. retrorsus)* |
| *Galium tinctorium* |
| *Leersia hexandra* |
| *Stenotaphrum secundatum* |

# *Table LT 7622-4. Tolerant Macrophyte Indicator Species for Isolated Forested Wetlands, South Region*

| ***Tolerant Macrophyte Indicator Species –***  ***South Region*** |
| --- |
| *Centella asiatica* |
| *Commelina diffusa* |
| *Cuphea carthagenensis* |
| *Diodia virginiana* |
| *Hymenachne amplexicaulis* |
| *Melaleuca quinquenervia* |
| *Parthenocissus quinquefolia* |
| *Phyla nodiflora* |
| *Sabal palmetto* |
| *Urena lobata* |
| *Vitis rotundifolia* |
| *Sphagneticola trilobata (syn. Wedelia trilobata)* |

##### Calculate and record the percent sensitive indicator species as the number of sensitive indicator species divided by the total number of species, using Tables LT 7622-5 through LT 7622-8, *Sensitive Indicator Species for Isolated Forested Wetlands*. Use the table for the appropriate region, based on the map in Figure LT7622-1. Multiply the result times 100.

# *Table LT 7622-5. Sensitive Macrophyte Indicator Species for Isolated Forested Wetlands, Panhandle Region*

| ***Sensitive Macrophyte Indicator Species –***  ***Panhandle Region*** |
| --- |
| *Andropogon virginicus* |
| *Aristida stricta* |
| *Aristida purpurascens* |
| *Eriocaulon compressum* |
| *Eriocaulon decangulare* |
| *Fuirena scirpoidea* |
| *Gaylussacia frondosa* |
| *Hypericum chapmanii* |
| *Ilex glabra* |
| *Ilex myrtifolia* |
| *Lachnanthes caroliniana* |
| *Lachnocaulon anceps* |
| *Lobelia floridana* |
| *Lophiola aurea* |
| *Lycopodiella alopecuroides* |
| *Dichanthelium erectifolium (syn.Panicum erectifolium)* |
| *Coleataenia rigidula (syn. Panicum rigidulum)* |
| *Pinus elliottii* |
| *Polygala cymosa* |
| *Rhexia alifanus* |
| *Rhexia lutea* |
| *Rhexia petiolata* |
| *Rhus copallinum* |
| *Rhynchospora filifolia* |
| *Scleria triglomerata* |
| *Serenoa repens* |
| *Vaccinium corymbosum* |
| *Xyris caroliniana* |

# *Table LT 7622-6. Sensitive Macrophyte Indicator Species for Isolated Forested Wetlands, North Region*

| ***Sensitive Macrophyte Indicator Species –***  ***North Region*** | |
| --- | --- |
| *Amphicarpum muehlenbergianum* | |
| *Andropogon virginicus* | |
| *Aristida patula* | |
| *Aristida purpurascens* | |
| *Eriocaulon compressum* | |
| *Eriocaulon decangulare* | |
| *Hypericum myrtifolium* | |
| *Ilex glabra* | |
| *Lycopodiella alopecuroides* | |
| *Nymphaea odorata* | |
| *Dichanthelium erectifolium (syn.Panicum erectifolium)* |
| *Polygala cymosa* |
| *Rhexia lutea* |
| *Rhexia mariana* |
| *Rhynchospora inundata* |
| *Rhynchospora wrightiana* |
| *Sarracenia minor* |
| *Serenoa repens* |
| *Syngonanthus flavidulus* |

# *Table LT 7622-7. Sensitive Macrophyte Indicator Species for Isolated Forested Wetlands, Central Region*

| ***Sensitive Macrophyte Indicator Species – Central Region*** |
| --- |
| *Andropogon virginicus* |
| *Aristida purpurascens* |
| *Carex verrucosa* |
| *Cyperus haspan* |
| *Eriocaulon decangulare* |
| *Eupatorium leptophyllum* |
| *Fuirena scirpoidea* |
| *Gratiola ramosa* |
| *Hypericum fasciculatum* |
| *Ilex glabra* |
| *Lachnanthes caroliniana* |
| *Dichanthelium erectifolium (syn. Pancium erectifolium)* |
| *Hymenachne hemitoma (syn.Panicum hemitomon)* |
| *Pinus elliottii* |
| *Pluchea foetida* |
| *Pluchea baccharis (syn.Pluchea rosea)* |
| *Polygala cymosa* |
| *Rhexia mariana* |
| *Rhynchospora microcarpa* |
| *Sagittaria graminea* |
| *Spartina bakeri* |
| *Vaccinium corymbosum* |
| *Xyris elliottii* |
| *Xyris jupicai* |

# *Table LT 7622-8. Sensitive Macrophyte Indicator Species for Isolated Forested Wetlands, South Region*

| ***Sensitive Macrophyte Indicator Species – South Region*** |
| --- |
| *Cladium jamaicense* |
| *Saccharum giganteum (syn. Erianthus giganteus)* |
| *Eriocaulon decangulare* |
| *Fuirena scirpoidea* |
| *Hypericum fasciculatum* |
| *Dichanthelium erectifolium (syn. Panicum erectifolium)* |
| *Coleataenia tenera (syn. Panicum tenerum)* |
| *Pinus elliottii* |
| *Rhynchospora corniculata* |
| *Sagittaria lancifolia* |
| *Salix caroliniana* |
| *Stillingia aquatica* |
| *Utricularia purpurea* |

##### Calculate and record the percent exotic species as the number of exotic species divided by the total number of species for which nativity could be determined. Multiply the result times 100. Use Table LT 7600-1 to determine native versus exotic (not native) status.

##### Calculate and record the average Coefficient of Conservatism (CC) score of taxa for which CC scores are available. Use Table LT 7600-1 to determine the CC score for each species.

##### Calculate and record the percent native perennial species as the number of native perennial species, divided by the total number of species for which status of nativity and duration could be determined. Multiply the result times 100. Use Table LT 7600-1 to determine native versus exotic (not native) status and duration (annual vs. perennial) for each species. If the taxon is native and listed as annual/perennial, then include it in the native perennial group.

##### Calculate and record the percent wetland status species as the number of species with facultative wetland (FACW) or obligate wetland (OBL) status divided by the total number of species for which wetland status could be determined. Multiply the result times 100. Use Table LT 7600-1 to determine the Florida wetland status for each species.

##### For each value generated in steps 2.2-2.4, take the natural log (ln) of (raw metric value + 10). Insert that value as “x” in the calculation equations in Table LT 7622-9. Be sure to use the appropriate calculations based on regions (Figure LT 7622-1).

##### **Table LT 7622-9. Metric calculation equations Part I for the Vegetation WCI for isolated forested wetlands.**

| **Metric** | **Panhandle** | **North** | **Central** | **South** |
| --- | --- | --- | --- | --- |
| % Tolerant Species | 10-((x-2.30)\*(10/1.86)) | 10-((x-2.30)\*(10/1.83)) | 10-((x-2.64)\*(10/1.38)) | 10-((x-2.42)\*(10/1.49)) |
| % Sensitive Species | (x-2.30)\*(10/1.98) | (x-2.51)\*(10/1.66) | (x-2.30)\*(10/1.74) | (x-2.30)\*(10/1.80) |
| % Exotic Species | 10-((x-2.30)\*(10/1.33)) | 10-((x-2.30)\*(10/1.42)) | 10-((x-2.30)\*10/1.28)) | 10-((x-2.59)\*10/1.12)) |

##### For each value generated in steps 2.5-2.7, insert the raw metric value as “x” in the calculation equations in Table LT 7622-10. Be sure to use the appropriate calculations based on regions (Figure LT 7622-1).

##### **Table LT 7622-10. Metric calculation equations Part II for the Vegetation WCI for isolated forested wetlands.**

| **Metric** | **Panhandle** | **North** | **Central** | **South** |
| --- | --- | --- | --- | --- |
| Average CC Score | (x-2.68)\*(10/3.43) | (x-2.55)\*(10/3.15) | (x-2.83)\*(10/2.00) | (x-2.73)\*(10/2.35) |
| % Native Perennial Species | (x-67.72)\*(10/32.28) | (x-60.00)\*(10/40.00) | (x-63.57)\*(10/31.98) | (x-61.94)\*(10/33.79) |
| % Wetland Status | (x-38.28)\*(10/38.81) | (x-47.66)\*(10/35.35) | (x-41.96)\*(10/38.05) | (x-33.33)\*(10/53.72) |

##### If any result is less than zero, replace it with zero. If a score is greater than 10, replace with 10.

##### Add the six metric scores together to generate the Vegetation WCI for isolated forested wetlands.

##### Maintain records following LD 7152.

##### References

##### Riess, K.C. and M.T. Brown. 2005. The Florida Wetland Condition Index (FWCI): Developing Biological Indicators for Isolated Depressional Forested Wetlands. Howard T. Odum Center for Wetlands. University of Florida. 168 pp. (reference provided for informational purposes only and is not required for this procedure).

##### Map of Florida. Regions for Vegetation Wetland Condition Index for Isolated Forested Wetlands. 4 Regions: Panhandle, North, Central, and South.

##### **Figure LT 7622-1. Regions for Vegetation Wetland Condition Index for Isolated Forested Wetlands.**

#### Macroinvertebrate Index for Freshwater Isolated Forested Wetlands

##### Definition: The Macroinvertebrate Wetland Condition Index is a community based biological assessment of wetland health using benthic macroinvertebrates sampled via 20 dipnet sweeps, with organisms collapsed to genus level. There are separate indices for isolated herbaceous and isolated forested wetlands. This section contains protocols for the isolated forested wetland index (based on Riess and Brown 2005). This SOP describes the procedures for determining index scores after sampling per SOP FS 7470.

##### Laboratory Analyses

##### Prepare the sample according to LT 7010.

##### Prepare slides according to LT 7020.

##### Identify the organisms according to LT 7030.

##### Data Reduction

##### For DEP staff, enter all data into the Florida Statewide Biological Database.

##### Use the counting and collapsing procedures listed in LT 7040. Taxonomic identifications should be to the lowest practical taxonomic level.

##### Keep a record of the original taxa list and the resulting collapsed list.

##### Index Calculation

##### Calculate and record the percent of tolerant genera as the number of total genera on Table LT 7623-1 (Table 3-34 from Riess and Brown 2005) that were in the sample, divided by the total genera identified (do not include higher level identifications in denominator). Multiply the result times 100.

##### ***Table LT 7623-1. Tolerant genera of macroinvertebrate index for freshwater isolated forested wetlands.***

| **Phylum** | **Class** | **Order** | **Family** | **Genus** |
| --- | --- | --- | --- | --- |
| Arthropoda | Insecta | Coleoptera | Hydrophilidae | *Tropisternus* |
| Arthropoda | Insecta | Coleoptera | Orthocladiinae | *Goeldichironomus* |
| Arthropoda | Insecta | Coleoptera | Chironimidae | *Tanypus* |
| Arthropoda | Insecta | Heteroptera | Veliidae | *Microvelia* |
| Mollusca | Gastropoda | Basommatophora | Planorbidae | *Micromenetus* |
| Mollusca | Gastropoda | Basommatophora | Physidae | *Physa (Florida species* formerly known as *Physella)* |

##### Calculate and record the percent of sensitive genera as the number of genera from Table LT 7623-2 (Table 3-35 from Riess and Brown 2005) that are in the sample, divided by the total genera identified (do not include higher level identifications in denominator). Multiply the result times 100.

##### ***Table LT 7623-2. Sensitive genera of macroinvertebrate index for freshwater isolated forested wetlands.***

| **Phylum** | **Class** | **Order** | **Family** | **Genus** |
| --- | --- | --- | --- | --- |
| Annelida | Oligochaeta | Haplotaxida | Naididae | *Pristina* |
| Annelida | Oligochaeta | Haplotaxida | Naididae | *Pristinella* |
| Arthropoda | Arachnida | Acariformes | Hydrachnidae | *Hydrachna* |
| Arthropoda | Insecta | Coleoptera | Dytiscidae | *Laccophilus* |
| Arthropoda | Insecta | Coleoptera | Haliplidae | *Haliplus* |
| Arthropoda | Insecta | Coleoptera | Hydrophilidae | *Berosus* |
| Arthropoda | Insecta | Coleoptera | Noteridae | *Hydrocanthus* |
| Arthropoda | Insecta | Coleoptera | Noteridae | *Suphis* |
| Arthropoda | Insecta | Diptera | Chironomidae | *Larsia* |
| Arthropoda | Insecta | Diptera | Chrionomidae | *Paramerina* |
| Arthropoda | Insecta | Diptera | Chrionomidae | *Zavreliella* |
| Arthropoda | Insecta | Diptera | Orthocladiinae | *Dicrotendipes* |
| Arthropoda | Insecta | Trichoptera | Leptoceridae | *Oecetis* |
| Arthropoda | Insecta | Trichoptera | Hydroptilidae | *Oxyethira* |

##### Count the number of taxa included as Class I or Class II in Table LT 7623-3. Calculate the Florida Index as [2 X (# Class I taxa) + (# Class II taxa)].

##### ***Table LT 7623-3. Class I and Class II macroinvertebrate taxa.***

| **Macroinvertebrate Taxa** | **Class I or Class II** |
| --- | --- |
| Ablabesmyia aspera | I |
| Ablabesmyia mallochi | I |
| Argia (all species) | I |
| Boyeria (all species) | I |
| Brachycentrus (all species) | I |
| Calopteryx (= Agrion) (all species) | I |
| Chimarra (all species) | I |
| Corydalis cornutus | I |
| Corynoneura (all species) | I |
| Cricotopus bicinctus | I |
| Elimia ( = Goniobasis) (all species) | I |
| Eukiefferiella (all species) | I |
| Hetaerina americana | I |
| Hetaerina titia | I |
| Hydropsyche (all species) | I |
| Hydroptila (all species) | I |
| Labrundinia johannseni | I |
| Labrundinia neopilosella | I |
| Labrundinia pilosella | I |
| Labrundinia virescens | I |
| Macromia (all species) | I |
| Macronemum carolina | I |
| Oxyethira (all species) | I |
| Pentaneura inconspicua | I |
| Plecoptera | I |
| Polycentropus (all species) | I |
| Polypedilum fallax | I |
| Progomphus (all species) | I |
| Psectrocladius (all species) | I |
| Rheocricotopus robacki | I |
| Rheotanytarsus exiguus group | I |
| Simuliidae | I |
| Stenochironomus (all species) | I |
| Maccaffertium (formerly Stenonema) exiguum | I |
| Maccaffertium (formerly Stenonema) smithae | I |
| Stictochironomus devinctus | I |
| Thienamanniella (all species) | I |
| Tvetetnia (all species) | I |
| Xylotopus par (=Brillia par) | I |
| Ablabesmyia paleensis | II |
| Ablabesmyia ramphe group | II |
| Asellus (all species) | II |
| Cheumatopsyche (all species) | II |
| Clinotanypus (all species) | II |
| Cricotopus (all species ex. C. bicinctus) | II |
| Endochironomus nigricans | II |
| Gammaridae (all species) | II |
| Gomphus (all species) | II |
| Larsia decolorata (lurida) | II |
| Nectopsyche (=Leptocella) (all species) | II |
| Neurocordulia (all species) | II |
| Oecetis (all species) | II |
| Palaemonetes paludosus | II |
| Polypedilum halterale group | II |
| Polypedilum illinoense group | II |
| Procladius (all species) | II |
| Stenacron interpunctatum | II |
| Maccaffertium (formerly Stenonema) mexicanum integrum | II |
| Tricorythodes albilineatus | II |

##### Calculate the percent Mollusca metric as the number of individuals of the phylum Mollusca divided by the total number of individuals in the sample which could be assigned to a phylum. Multiply the result times 100.

##### Calculate the percent Noteridae metric as the number of individuals of the family Noteridae divided by the total number of individuals in the sample which could be assigned to a family. Multiply the result times 100.

##### Determine the number of individuals that are scrapers. Refer to the FDEP Statewide Biological Database webpage (<http://www.dep.state.fl.us/labs/cgi-bin/sbio/database.asp>) for the list of macroinvertebrates categorized as scrapers (categorization for insects taken from Merritt *et al*., An Introduction to the Aquatic Insects of North America). Calculate the percent scraper metric as the number of scraper individuals divided by the total number of individuals in the sample for which a feeding habit could be assigned. Multiply the result times 100.

##### For each value generated in steps 4.1-4.6, take the natural log of (raw metric value + 10). Insert that value as “x” in the calculation equations in Table LT 7623-4.

##### ***Table LT 7623-4. Metric calculation equations for the macroinvertebrate index for freshwater isolated forested wetlands.***

| **Metric** | **Calculation** |
| --- | --- |
| % Tolerant Genera | 10-((x-2.3)\*(10/1.74)) |
| % Sensitive Genera | (x-2.3)\*(10/1.43) |
| Florida Index | (x-2.3)\*(10/0.41) |
| % Mollusca Individuals | 10-((x-2.3)\*(10/1.43)) |
| % Noteridae Individuals | (x-2.3)\*(10/1.51) |
| % Scraper Individuals | 10-((x-2.3)\*(10/0.36)) |

##### If any result is less than zero, replace with zero, if a score is greater than 10, replace with 10.

##### Add the six metric scores together to generate the Macroinvertebrate Wetland Condition Index for isolated forested wetlands.

##### Maintain records following LD 7154

##### References

Merritt, R.W., Cummins, K.W., and M.B. Berg, An Introduction to the Aquatic Insects of North America, Fourth Edition, 2008.

##### Riess, K.C. and M.T. Brown. 2005. The Florida Wetland Condition Index (FWCI): Developing Biological Indicators for Isolated Depressional Forested Wetlands. Howard T. Odum Center for Wetlands. University of Florida. 168 pp. (reference provided for informational purposes only and is not required for this procedure).

### Table LT 7600-1

Plant taxa information used in the calculation of the Vegetation Wetland Condition Index

| **Taxa Name** | **Nativity** | **Duration** | **FL Wetland Status** | **C of C Score** |
| --- | --- | --- | --- | --- |
| *Abildgaardia ovata* | Native | Perennial | FACW | none |
| *Acalypha gracilens* | Native | Annual | Not listed | 3.29 |
| *Acer barbatum* | Native | Perennial | Not listed | 7.7 |
| *Acer rubrum* | Native | Perennial | FACW | 4.65 |
| *Acer saccharinum* | Native | Perennial | OBL | 6.89 |
| *Acmella oppositifolia (*syn. *Spilanthes americana)* | Native | Perennial | FACW | 2.83 |
| *Acrostichum danaeifolium* | Native | Perennial | OBL | 5.79 |
| *Aeschynomene americana* | Native | Perennial | Not listed | 2.47 |
| *Aeschynomene indica* | Nonnative | Annual/Perennial | FACW | 0.49 |
| *Agalinis fasciculata* | Native | Annual | FACW | 4.17 |
| *Agalinis filifolia* | Native | Annual | Upland | 6.69 |
| *Agalinis linifolia* | Native | Perennial | OBL | 7.04 |
| *Agalinis obtusifolia* | Native | Annual | Not listed | 6.5 |
| *Agarista populifolia* | Native | Perennial | FACW | 7.7 |
| *Albizia julibrissin* | Nonnative | Perennial | Upland | 0 |
| *Aleurites fordii* | Nonnative | Perennial | Not listed | 0 |
| *Alnus serrulata* | Native | Perennial | OBL | 5.5 |
| *Alternanthera philoxeroides* | Nonnative | Perennial | OBL | 0 |
| *Alternanthera sessilis (*syn. *Alternanthera tenella*) | Nonnative | Annual/Perennial | OBL | 0.11 |
| *Amaranthus australis* | Native | Annual | OBL | 1 |
| *Amaranthus blitum* | Nonnative | Annual | Not listed | 0 |
| *Amaranthus spinosus* | Nonnative | Annual | Not listed | 0.04 |
| *Ambrosia artemisiifolia* | Native | Annual | Not listed | 0.95 |
| *Ammannia coccinea* | Native | Annual | OBL | 5.06 |
| *Ammannia latifolia* | Native | Annual | OBL | 4.55 |
| *Amorpha fruticosa* | Native | Perennial | FACW | 4.31 |
| *Nekemias arborea (syn. Ampelopsis arborea)* | Native | Perennial | Not listed | 3.25 |
| *Amphicarpum muehlenbergianum* | Native | Perennial | FACW | 5.7 |
| *Andropogon glomeratus* | Native | Perennial | FACW | 3 |
| *Andropogon gyrans* | Native | Perennial | FAC | 6.07 |
| *Andropogon gyrans stenophyllus* (syn. *Andropogon perangustatus*) | Native | Perennial | FAC | 6.07 |
| *Andropogon liebmannii(*syn. *Andropogon mohrii)* | Native | Perennial | FACW | 7 |
| *Andropogon virginicus* | Native | Perennial | FAC | 3 |
| *Annona glabra* | Native | Perennial | OBL | 7 |
| *Apios americana* | Native | Perennial | Not listed | 3.85 |
| *Ardisia escallonioides* | Native | Perennial | FAC | 4.17 |
| *Aristida lanosa* | Native | Perennial | Not listed | 8.73 |
| *Aristida palustris (*syn. *Aristida affinis)* | Native | Perennial | OBL | 8.54 |
| *Aristida patula* | Native | Perennial | Not listed | 4.85 |
| *Aristida purpurascens* | Native | Perennial | FACW | 5.58 |
| *Aristida stricta* | Native | Perennial | FAC | 8.67 |
| *Arnoglossum sulcatum* | Native | Perennial | OBL | 7.13 |
| *Aronia arbutifolia* | Native | Perennial | FACW | 5.2 |
| *Arundinaria gigantea* | Native | Perennial | FACW | 5.25 |
| *Arundo donax* | Nonnative | Perennial | FAC | 0 |
| *Asclepias incarnata* | Native | Perennial | OBL | none |
| *Asclepias lanceolata* | Native | Perennial | OBL | 6.73 |
| *Aster tortifolius* | Native | Perennial | Not listed | 4.62 |
| *Avicennia germinans* | Native | Perennial | OBL | 4.5 |
| *Axonopus fissifolius (syn. Axonopus affinis)* | Native | Perennial | FAC | 1.89 |
| *Axonopus furcatus* | Native | Perennial | FAC | 2.12 |
| *Azolla filiculoides (syn.Azolla caroliniana)* | Native | Annual | OBL | 1.81 |
| *Azolla pinnata* | Nonnative | Annual | OBL | 0 |
| *Baccharis angustifolia* | Native | Perennial | OBL | 4.2 |
| *Baccharis glomeruliflora* | Native | Perennial | FAC | 3 |
| *Baccharis halimifolia* | Native | Perennial | FAC | 2.53 |
| *Bacopa caroliniana* | Native | Perennial | OBL | 4.5 |
| *Bacopa innominata* | Native | Perennial | OBL | 7.48 |
| *Bacopa monnieri* | Native | Perennial | OBL | 3.5 |
| *Bidens alba* | Native | Annual/Perennial | FAC | 1 |
| *Bidens discoidea* | Native | Annual | OBL | 4.5 |
| *Bidens laevis* | Native | Annual/Perennial | OBL | 5.5 |
| *Bidens mitis* | Native | Annual | OBL | 4.5 |
| *Bidens pilosa* | Nonnative | Annual | FAC | 1.64 |
| *Bigelowia nudata* | Native | Perennial | FACW | 7.59 |
| *Telmatoblechnum serrulatum (syn. Blechnum serrulatum)* | Native | Perennial | FACW | 5.5 |
| *Boehmeria cylindrica* | Native | Perennial | OBL | 5 |
| *Bolboschoenus robustus (syn. Schoenoplectus robustus)* | Native | Perennial | OBL | - |
| *Boltonia apalachicolensis* | Native | Perennial | FACW | 7.17 |
| *Boltonia diffusa* | Native | Perennial | FACW | 4.96 |
| *Brasenia schreberi* | Native | Perennial | OBL | 8.79 |
| *Burmannia capitata* | Native | Annual | OBL | 8.13 |
| *Cabomba caroliniana* | Native | Perennial | OBL | 5.5 |
| *Callicarpa americana* | Native | Perennial | Upland | 3.2 |
| *Callistemon viminalis* | Nonnative | Perennial | Not listed | 0 |
| *Campsis radicans* | Native | Perennial | Not listed | 2.53 |
| *Canna flaccida* | Native | Perennial | OBL | 5.5 |
| *Caperonia castaneifolia* | Native | Perennial | FACW | 4.94 |
| *Caperonia palustris* | Nonnative | Annual | FACW | 0 |
| *Cardamine pensylvanica* | Native | Annual | OBL | 4.42 |
| *Carex alata* | Native | Perennial | FACW | 4.27 |
| *Carex albolutescens* | Native | Perennial | FACW | 3.47 |
| *Carex comosa* | Native | Perennial | OBL | 1.5 |
| *Carex decomposita* | Native | Perennial | OBL | none |
| *Carex fissa* | Native | Perennial | FACW | 3.9 |
| *Carex gigantea* | Native | Perennial | OBL | 5.07 |
| *Carex glaucescens* | Native | Perennial | FACW | 4.7 |
| *Carex longii* | Native | Perennial | FACW | 2.25 |
| *Carex lupuliformis* | Native | Perennial | OBL | 5.5 |
| *Carex lupulina* | Native | Perennial | OBL | 5.5 |
| *Carex lurida* | Native | Perennial | OBL | 4.29 |
| *Carex stipata* | Native | Perennial | OBL | 4.46 |
| *Carex striata (*syn. *Carex walteriana)* | Native | Perennial | OBL | 4 |
| *Carex verrucosa* | Native | Perennial | FACW | 9.1 |
| *Carphephorus odoratissimus* | Native | Perennial | FAC | 6.93 |
| *Carpinus caroliniana* | Native | Perennial | FACW | 6.5 |
| *Carya aquatica* | Native | Perennial | OBL | 7 |
| *Cassia fistula* | Nonnative | Perennial | Not listed | 1.46 |
| *Cassytha filiformis* | Native | Perennial | Not listed | 3.34 |
| *Casuarina* | Nonnative | Perennial | FAC | 0 |
| *Casuarina equisetifolia* | Nonnative | Perennial | FAC | 0 |
| *Catalpa bignonioides* | Native | Perennial | Not listed | 3.27 |
| *Celtis laevigata* | Native | Perennial | FACW | 5.08 |
| *Centella asiatica (*syn. *Centella erecta*) | Native | Perennial | FACW | 1.92 |
| *Cephalanthus occidentalis* | Native | Perennial | OBL | 5 |
| *Ceratophyllum demersum* | Native | Perennial | OBL | 4.16 |
| *Ceratopteris pteridoides* | Native | Annual/Perennial | OBL | 2.67 |
| *Ceratopteris thalictroides* | Nonnative | Annual/Perennial | OBL | 0 |
| *Chamaecyparis thyoides* | Native | Perennial | OBL | 7.09 |
| *Chara* | Native | N/A | OBL | 3.9 |
| *Chasmanthium laxum* | Native | Perennial | FACW | 7.37 |
| *Chasmanthium nitidum* | Native | Perennial | FACW | 5.67 |
| *Chenopodium album* | Nonnative | Annual | Not listed | 0 |
| *Dysphania ambrosioides (syn, Chenopodium ambrosioides)* | Nonnative | Annual/Perennial | Not listed | 0 |
| *Chrysobalanus icaco* | Native | Perennial | FACW | 5.63 |
| *Chrysoma pauciflosculosa* | Native | Perennial | Not listed | 4.4 |
| *Chrysopsis mariana* | Native | Perennial | Upland | 3.7 |
| *Cicuta maculata (*syn. *Cicuta mexicana)* | Native | Perennial/Biennial | OBL | 4.54 |
| *Cinnamomum camphora* | Nonnative | Perennial | Upland | 0 |
| *Cirsium nuttallii* | Native | Perennial | FACW | 3.08 |
| *Cladium jamaicense* | Native | Perennial | OBL | 8 |
| *Clethra alnifolia* | Native | Perennial | FACW | 5.63 |
| *Cliftonia monophylla* | Native | Perennial | FACW | 5.63 |
| *Coccoloba uvifera* | Native | Perennial | Not listed | none |
| *Cocos nucifera* | Nonnative | Perennial | Upland | none |
| *Coelorachis cylindrica* | Native | Perennial | FAC | 7 |
| *Coelorachis rugosa* | Native | Perennial | FACW | 8.91 |
| *Coelorachis tuberculosa* | Native | Perennial | FACW | 9.03 |
| *Colocasia esculenta* | Nonnative | Perennial | OBL | 0 |
| *Commelina diffusa* | Nonnative | Perennial | FACW | 2.02 |
| *Commelina erecta* | Native | Perennial | Upland | 2 |
| *Commelina virginica* | Native | Perennial | FACW | 4.67 |
| *Conoclinium coelestinum* | Native | Perennial | FAC | 4.37 |
| *Conyza canadensis* | Native | Annual | Not listed | 1.01 |
| *Coreopsis gladiata* | Native | Perennial | FACW | 4 |
| *Coreopsis leavenworthii* | Native | Perennial | FACW | 3.43 |
| *Coreopsis tinctoria* | Native | Annual/Perennial | Not listed | 0.9 |
| *Cornus foemina* | Native | Perennial | FACW | 5.91 |
| *Cortaderia selloana* | Nonnative | Perennial | Not listed | 0 |
| *Crinum americanum* | Native | Perennial | OBL | 9 |
| *Crotalaria pallida* | Nonnative | Perennial | Not listed | 0 |
| *Crotalaria spectabilis* | Nonnative | Annual | Not listed | 0 |
| *Cupaniopsis anacardioides* | Nonnative | Perennial | FAC | 0 |
| *Cuphea carthagenensis* | Nonnative | Annual/Perennial | FAC | 1.92 |
| *Cynodon dactylon* | Nonnative | Perennial | Not listed | 0.29 |
| *Cyperus alopecuroides* | Nonnative | Perennial | FACW | 0 |
| *Dulichium arundinaceum (syn.Cyperus alternifolius)* | Nonnative | Perennial | OBL | 0 |
| *Cyperus articulatus* | Native | Perennial | OBL | 6.64 |
| *Cyperus brevifolius* | Native | Perennial | FACW | 1.42 |
| *Cyperus compressus* | Native | Annual/Perennial | FACW | 2.74 |
| *Cyperus croceus (*syn. *Cyperus globulosus)* | Native | Annual/Perennial | FAC | 1.3 |
| *Cyperus difformis* | Nonnative | Annual | OBL | 0 |
| *Cyperus distinctus* | Native | Perennial | OBL | 5 |
| *Cyperus drummondii* | Native | Perennial | OBL | 4.67 |
| *Cyperus entrerianus* | Nonnative | Perennial | OBL | 1.5 |
| *Cyperus erythrorhizos* | Native | Annual/Perennial | OBL | 2.89 |
| *Cyperus esculentus* | Nonnative | Perennial | FAC | 0 |
| *Cyperus flavescens* | Native | Annual | OBL | 2.17 |
| *Cyperus flavicomus (*syn. *Cyperus albomarginatus)* | Native | Annual | FACW | 1.17 |
| *Cyperus haspan* | Native | Perennial | OBL | 4 |
| *Cyperus involucratus* | Nonnative | Perennial | FACW | 0 |
| *Cyperus iria* | Nonnative | Annual | FACW | 1.69 |
| *Cyperus lanceolatus* | Nonnative | Perennial | OBL | 2.04 |
| *Cyperus lecontei* | Native | Perennial | FACW | 2.33 |
| *Cyperus ligularis* | Native | Perennial | FACW | 1.55 |
| *Cyperus odoratus* | Native | Annual/Perennial | FACW | 3 |
| *Cyperus papyrus* | Nonnative | Perennial | OBL | 0.31 |
| *Cyperus polystachyos* | Native | Perennial | FACW | 1.56 |
| *Cyperus prolifer* | Nonnative | Perennial | FACW | 0 |
| *Cyperus ovatus (syn. Cyperus retrorsus)* | Native | Perennial | FAC | 1.79 |
| *Cyperus rotundus* | Nonnative | Perennial | FAC | 0 |
| *Cyperus sphacelatus* | Nonnative | Annual | FACW | 0.43 |
| *Cyperus strigosus* | Native | Perennial | FACW | 4.49 |
| *Cyperus surinamensis* | Native | Perennial | FACW | 2.03 |
| *Cyperus virens* | Native | Perennial | FACW | 5.7 |
| *Cyrilla racemiflora* | Native | Perennial | FAC | 5 |
| *Dactyloctenium aegyptium* | Nonnative | Annual | Not listed | 0.67 |
| *Decodon verticillatus* | Native | Perennial | OBL | 6 |
| *Desmodium incanum* | Native | Perennial | Not listed | none |
| *Desmodium triflorum* | Nonnative | Perennial | Not listed | 0.43 |
| *Dichanthelium commutatum* | Native | Perennial | FAC | 6 |
| *Dichanthelium ensifolium (*syn. *Panicum chamaelonche)* | Native | Perennial | OBL | 7.69 |
| *Dichanthelium erectifolium (*syn. *Panicum erectifolium)* | Native | Perennial | OBL | 6 |
| *Dichanthelium laxiflorum* | Native | Perennial | Not listed | 6.79 |
| *Dichondra carolinensis* | Native | Perennial | FAC | 1.75 |
| *Rhynchospora colorata (syn. Dichromena colorata)* | Native | Perennial | FACW | 6.18 |
| *Rhynchospora latifolia (syn. Dichromena latifolia)* | Native | Perennial | OBL | 6.62 |
| *Digitaria bicornis* | Nonnative | Perennial | Not listed | 0 |
| *Digitaria ciliaris* | Native | Annual | Not listed | 1.3 |
| *Digitaria serotina* | Native | Annual | FAC | 1.39 |
| *Diodia virginiana* | Native | Perennial | FACW | 3 |
| *Dioscorea bulbifera* | Nonnative | Perennial | Not listed | 0 |
| *Diospyros virginiana* | Native | Perennial | FAC | 3 |
| *Drosera brevifolia* | Native | Perennial | FACW | 8.21 |
| *Drosera capillaris* | Native | Annual/Perennial | FACW | 3 |
| *Drosera filiformis* | Native | Perennial | OBL | 7 |
| *Drosera intermedia* | Native | Perennial | OBL | 8.23 |
| *Drymaria cordata* | Native | Annual | FAC | 2.72 |
| *Dryopteris ludoviciana* | Native | Perennial | FACW | 7 |
| *Dulichium arundinaceum* | Native | Perennial | OBL | 7.31 |
| *Echinochloa colona* | Nonnative | Annual | FACW | 0 |
| *Echinochloa crus-galli* | Nonnative | Annual | FACW | 0 |
| *Echinochloa muricata* | Native | Annual | FACW | 6.01 |
| *Echinochloa walteri* | Native | Annual | FACW | 2.5 |
| *Echinodorus cordifolius* | Native | Perennial | OBL | none |
| *Eclipta prostrata (*syn. *Eclipta alba)* | Native | Annual/Perennial | FACW | 2 |
| *Egeria densa* | Nonnative | Perennial | OBL | 0.49 |
| *Eichhornia crassipes* | Nonnative | Perennial | OBL | 0 |
| *Eleocharis* (submersed viviparous but unable to ID to species) | Native | Annual/Perennial | OBL | 3 |
| *Eleocharis acicularis* | Native | Annual/Perennial | OBL | 3.4 |
| *Eleocharis atropurpurea* | Native | Annual | OBL | 5.69 |
| *Eleocharis baldwinii* | Native | Perennial | OBL | 2.82 |
| *Eleocharis cellulosa* | Native | Perennial | OBL | 7.8 |
| *Eleocharis elongata* | Native | Perennial | OBL | 6.97 |
| *Eleocharis equisetoides* | Native | Perennial | OBL | 8 |
| *Eleocharis flavescens* | Native | Perennial | OBL | 2.1 |
| *Eleocharis geniculata* | Native | Annual | OBL | 2.5 |
| *Eleocharis interstincta* | Native | Perennial | OBL | 7.8 |
| *Eleocharis melanocarpa* | Native | Perennial | OBL | 1.83 |
| *Eleocharis microcarpa* | Native | Annual | OBL | 5.78 |
| *Eleocharis montana* | Native | Perennial | OBL | 3.17 |
| *Eleocharis montevidensis* | Native | Perennial | OBL | 5.2 |
| *Eleocharis obtusa* | Native | Annual/Perennial | OBL | 3.36 |
| *Eleocharis olivacea* | Native | Perennial | OBL | 1.4 |
| *Eleocharis quadrangulata* | Native | Perennial | OBL | 2.5 |
| *Eleocharis robbinsii* | Native | Perennial | OBL | 8 |
| *Eleocharis tuberculosa* | Native | Perennial | OBL | none |
| *Eleocharis vivipara* | Native | Annual | OBL | 3 |
| *Elephantopus elatus* | Native | Perennial | Not listed | 2.72 |
| *Eleusine indica* | Nonnative | Annual | Not listed | 0 |
| *Emilia fosbergii* | Nonnative | Annual | Upland | none |
| *Equisetum hyemale var. affine* | Native | Perennial | FACW | 5.5 |
| *Eragrostis atrovirens* | Nonnative | Perennial | FAC | 1.58 |
| *Eragrostis elliottii* | Native | Perennial | FAC | 4.14 |
| *Eragrostis spectabilis* | Native | Perennial | FAC | 3.44 |
| *Erechtites hieraciifolius* | Native | Annual | FAC | 1 |
| *Erigeron quercifolius* | Native | Annual | FAC | 3.31 |
| *Erigeron vernus* | Native | Perennial | FACW | none |
| *Eriocaulon compressum* | Native | Perennial | OBL | 7.5 |
| *Eriocaulon decangulare* | Native | Perennial | OBL | 8.31 |
| *Eriocaulon lineare* | Native | Perennial | OBL | 6 |
| *Eriocaulon ravenelii* | Native | Annual/Perennial | OBL | 5.9 |
| *Eriocaulon texense* | Native | Perennial | OBL | 8 |
| *Eriochloa michauxii* | Native | Annual/Perennial | FACW | none |
| *Eryngium prostratum* | Native | Perennial | FACW | none |
| *Eupatorium capillifolium* | Native | Perennial | FAC | 0.83 |
| *Eupatorium compositifolium* | Native | Perennial | FAC | 2.72 |
| *Eutrochium fistulosum (syn. Eupatorium fistulosum)* | Native | Perennial | FACW | 5 |
| *Eupatorium leptophyllum* | Native | Perennial | OBL | 3.5 |
| *Eupatorium mikanioides* | Native | Perennial | FACW | 5.08 |
| *Eupatorium mohrii (*syn. *Eupatorium recurvans)* | Native | Perennial | FAC | 6.87 |
| *Eupatorium perfoliatum* | Native | Perennial | FACW | 5.85 |
| *Eupatorium serotinum* | Native | Perennial | FAC | 3.43 |
| *Euphorbia cyathophora (*syn. *Poinsettia cyathophora)* | Native | Annual/Perennial | Not listed | 1.57 |
| *Eustachys petraea* | Native | Perennial | FAC | 1.93 |
| *Euthamia caroliniana (*syn. *Euthamia minor, E. tenuifolia tenuifolia)* | Native | Perennial | FAC | 2.45 |
| *Euthamia tenuifolia* | Native | Perennial | FAC | 3.25 |
| *Fatsia japonica* | Nonnative | Perennial | Not listed | 0 |
| *Ficus aurea* | Native | Perennial | FAC | 3.38 |
| *Ficus microcarpa* | Nonnative | Perennial | Not listed | 0 |
| *Fimbristylis autumnalis* | Native | Annual | OBL | 2.17 |
| *Fimbristylis caroliniana* | Native | Perennial | OBL | 5 |
| *Fimbristylis spadicea (syn. Fimbristylis castanea)* | Native | Perennial | OBL | 4.92 |
| *Fimbristylis cymosa (*syn. *Fimbristylis spathacea)* | Native | Perennial | FAC | 1 |
| *Fimbristylis dichotoma* | Native | Annual/Perennial | OBL | 3.55 |
| *Fimbristylis miliacea* | Nonnative | Annual | OBL | 1.95 |
| *Fimbristylis schoenoides* | Nonnative | Perennial | OBL | 1.83 |
| *Fontinalis* | Native | N/A (non-vascular) | Not listed | TBD |
| *Fraxinus americana* | Native | Perennial | Upland | 5.27 |
| *Fraxinus caroliniana* | Native | Perennial | OBL | 5.21 |
| *Fraxinus pennsylvanica (syn. Fraxinus profunda)* | Native | Perennial | OBL | 6 |
| *Froelichia floridana* | Native | Annual | Not listed | 3.21 |
| *Fuirena breviseta* | Native | Perennial | OBL | 3.5 |
| *Fuirena pumila* | Native | Annual | OBL | 4 |
| *Fuirena scirpoidea* | Native | Perennial | OBL | 5.5 |
| *Fuirena squarrosa* | Native | Perennial | OBL | 5.5 |
| *Galactia elliottii* | Native | Perennial | Upland | none |
| *Galium pilosum* | Native | Perennial | Not listed | 4.77 |
| *Galium tinctorium* | Native | Perennial | FACW | 5.08 |
| *Galium uniflorum* | Native | Perennial | Not listed | 5.8 |
| *Gaylussacia dumosa* | Native | Perennial | FAC | 5.44 |
| *Gelsemium sempervirens* | Native | Perennial | Not listed | 3.9 |
| *Gleditsia aquatica* | Native | Perennial | OBL | 7.09 |
| *Gleditsia triacanthos* | Native | Perennial | FACW | 3.83 |
| *Gomphrena serrata* | Nonnative | Annual/Perennial | Not listed | 0.87 |
| *Gordonia lasianthus* | Native | Perennial | FACW | 7 |
| *Sophronanthe pilosa (syn, Gratiola pilosa)* | Native | Perennial | FACW | 6.63 |
| *Gratiola ramosa* | Native | Perennial | FACW | 6.87 |
| *Habenaria repens* | Native | Perennial | FACW | 3.5 |
| *Hedychium coronarium* | Nonnative | Perennial | FACW only in the Keys | none |
| *Oldenlandia corymbose (syn. Hedyotis corymbose)* | Nonnative | Annual/Perennial | FACW | 2.31 |
| *Helenium autumnale* | Native | Perennial | FACW | 3.31 |
| *Helianthus angustifolius* | Native | Perennial | FACW | 3 |
| *Helianthus floridanus* | Native | Perennial | FAC | 5.85 |
| *Euploca polyphylla (syn. Heliotropium polyphyllum)* | Native | Perennial | FAC | 1.67 |
| *Hibiscus coccineus* | Native | Perennial | OBL | 5.45 |
| *Hibiscus furcellatus* | Native | Perennial | Not listed | 3.89 |
| *Hibiscus grandiflorus* | Native | Perennial | OBL | 6 |
| *Hibiscus laevis* | Native | Perennial | OBL | none |
| *Hibiscus moscheutos* | Native | Perennial | OBL | 4.75 |
| *Hydrilla verticillata* | Nonnative | Perennial | OBL | 0 |
| *Hydrocotyle ranunculoides* | Native | Perennial | OBL | 2 |
| *Hydrocotyle umbellata* | Native | Perennial | FACW | 1.92 |
| *Hydrolea corymbosa* | Native | Perennial | OBL | 5.85 |
| *Hydrolea quadrivalvis* | Native | Perennial | OBL | 2 |
| *Hygrophila costata (*syn. *Hygrophila lacustris)* | Native | Perennial | OBL | 3 |
| *Hygrophila polysperma* | Nonnative | Perennial | OBL | 0 |
| *Hymenachne amplexicaulis* | Nonnative | Perennial | OBL | 0 |
| *Hypericum brachyphyllum* | Native | Perennial | FACW | 7.55 |
| *Hypericum chapmanii* | Native | Perennial | OBL | 5.8 |
| *Hypericum cistifolium* | Native | Perennial | FACW | 6.32 |
| *Hypericum fasciculatum* | Native | Perennial | OBL | 8 |
| *Hypericum galioides* | Native | Perennial | FACW | 5.13 |
| *Hypericum gymnanthum* | Native | Perennial | FACW | 4.75 |
| *Hypericum hypericoides* | Native | Perennial | FAC | 5.44 |
| *Hypericum lissophloeus* | Native | Perennial | OBL | 9 |
| *Hypericum mutilum* | Native | Annual/Perennial | FACW | 4.04 |
| *Hypericum myrtifolium* | Native | Perennial | FACW | 6.56 |
| *Hypericum nitidum* | Native | Perennial | OBL | 6.5 |
| *Hypericum reductum* | Native | Perennial | Upland | 5 |
| *Hypericum tetrapetalum* | Native | Perennial | FAC | 6.38 |
| *Hypoxis* | Native | Perennial | FACW | 7.15 |
| *Hyptis alata* | Native | Perennial | FACW | 4.58 |
| *Ilex cassine* | Native | Perennial | OBL | 6 |
| *Ilex coriacea* | Native | Perennial | FACW | 3.1 |
| *Ilex glabra* | Native | Perennial | Not listed | 5.85 |
| *Ilex myrtifolia* | Native | Perennial | OBL | 7 |
| *Ilex opaca* | Native | Perennial | FAC | 4.55 |
| *Ilex verticillata* | Native | Perennial | OBL | 7.88 |
| *Ilex vomitoria* | Native | Perennial | FAC | 3 |
| *Imperata cylindrica* | Nonnative | Perennial | Not listed | 0 |
| *Indigofera hirsuta* | Nonnative | Annual | Not listed | none |
| *Ipomoea alba* | Native | Annual | Not listed | 2.45 |
| *Ipomoea aquatica* | Nonnative | Perennial | Not listed | 0 |
| *Ipomoea carnea fistulosa* | Nonnative | Perennial | Not listed | 0 |
| *Ipomoea indica* | Native | Annual/Perennial | Not listed | 1.23 |
| *Ipomoea quamoclit* | Nonnative | Annual | Not listed | 0.26 |
| *Ipomoea sagittata* | Native | Perennial | Not listed | 6.42 |
| *Iris hexagona* | Native | Perennial | OBL | 6.97 |
| *Iris pseudacorus* | Nonnative | Perennial | OBL | 0 |
| *Iris virginica* | Native | Perennial | OBL | 5.5 |
| *Itea virginica* | Native | Perennial | OBL | 7.09 |
| *Iva frutescens* | Native | Perennial | OBL | 5.08 |
| *Iva microcephala* | Native | Annual | FACW | 4.68 |
| *Juncus pelocarpus (syn. Juncus abortivus)* | Native | Perennial | OBL | 2 |
| *Juncus acuminatus* | Native | Perennial | OBL | 2.25 |
| *Juncus canadensis* | Native | Perennial | OBL | 5.5 |
| *Juncus coriaceus* | Native | Perennial | OBL | 8.51 |
| *Juncus dichotomus* | Native | Perennial | OBL | 2.83 |
| *Juncus diffusissimus* | Native | Perennial | OBL | 3 |
| *Juncus effusus* | Native | Perennial | OBL | 2 |
| *Juncus elliottii* | Native | Perennial | OBL | 3.11 |
| *Juncus marginatus* | Native | Perennial | FACW | 1.5 |
| *Juncus megacephalus* | Native | Perennial | OBL | 3.5 |
| *Juncus polycephalos* | Native | Perennial | OBL | 4.96 |
| *Juncus repens* | Native | Perennial | OBL | 5 |
| *Juncus roemerianus* | Native | Perennial | OBL | 7.09 |
| *Juncus scirpoides* | Native | Perennial | OBL | 4.33 |
| *Juncus tenuis* | Native | Perennial | FAC | 2.25 |
| *Juncus trigonocarpus* | Native | Perennial | OBL | 4.17 |
| *Juncus validus* | Native | Perennial | OBL | 3.63 |
| *Juniperus virginiana (*syn. *Juniperus silicicola)* | Native | Perennial | Not listed | 6.25 |
| *Justicia ovata* | Native | Perennial | OBL | 8.88 |
| *Kalmia latifolia* | Native | Perennial | FACW | 7 |
| *Kosteletzkya pentacarpos (*syn. *Kosteletzkya virginica)* | Native | Perennial | OBL | 6 |
| *Kummerowia striata* | Nonnative | Annual | Not listed | 0 |
| *Cyperus brevifolius (syn. Kyllinga brevifolia)* | Native | Perennial | FACW | 1.42 |
| *Cyperus sesquiflorus (syn. Kyllinga odorata)* | Native | Perennial | FACW | 2.17 |
| *Cyperus hortensis (syn. Kyllinga pumila)* | Native | Annual/Perennial | FACW | 1.38 |
| *Lachnanthes caroliniana* | Native | Perennial | FAC | 3.76 |
| *Lachnocaulon anceps* | Native | Perennial | FACW | 5.5 |
| *Lachnocaulon beyrichianum* | Native | Perennial | FACW | 9.18 |
| *Lachnocaulon engleri* | Native | Perennial | OBL | 1 |
| *Lachnocaulon minus* | Native | Perennial | OBL | 7.97 |
| *Landoltia punctata (*syn. *Spirodela punctata)* | Nonnative | Perennial | OBL | 0 |
| *Lechea cernua* | Native | Perennial | Not listed | 8.67 |
| *Leersia hexandra* | Native | Perennial | OBL | 5.61 |
| *Leersia oryzoides* | Native | Perennial | OBL | 4 |
| *Lemna* | Native | Perennial | OBL | 1 |
| *Lemna minor* | Native | Perennial | OBL | 1 |
| *Diplachne fusca subsp. fascicularis (syn.Leptochloa fascicularis)* | Native | Annual | FACW | 4.55 |
| *Leucaena leucocephala* | Nonnative | Perennial | Upland | 0 |
| *Leucothoe axillaris* | Native | Perennial | FACW | 6 |
| *Eubotrys racemosa (syn. Leucothoe racemosa)* | Native | Perennial | FACW | 8 |
| *Ligustrum sinense* | Nonnative | Perennial | Not listed | 0 |
| *Limnobium spongia* | Native | Perennial | OBL | 2.5 |
| *Limnophila sessiliflora* | Nonnative | Perennial | OBL | 0 |
| *Lindernia dubia (syn. Lindernia anagallidea)* | Native | Annual | FACW | 5.57 |
| *Torenia crustacea (Lindernia crustacea)* | Nonnative | Annual/Perennial | FAC | 0.27 |
| *Lindernia grandiflora* | Native | Annual | FACW | 3.6 |
| *Cyperus neotropicalis (syn. Lipocarpha maculata)* | Native | Annual | FACW | 4.55 |
| *Liquidambar styraciflua* | Native | Perennial | FACW | 2.5 |
| *Liriodendron tulipifera* | Native | Perennial | FACW | 6.67 |
| *Lobelia cardinalis* | Native | Perennial | OBL | 6 |
| *Lobelia glandulosa* | Native | Perennial | FACW | 6.03 |
| *Lobelia paludosa* | Native | Perennial | FACW | 8.08 |
| *Ludwigia alata* | Native | Perennial | OBL | 5.85 |
| *Ludwigia alternifolia* | Native | Perennial | OBL | 6.24 |
| *Ludwigia arcuata* | Native | Perennial | OBL | 3.5 |
| *Ludwigia decurrens* | Native | Annual/Perennial | OBL | 5.7 |
| *Ludwigia erecta* | Native | Annual/Perennial | OBL | 2.55 |
| *Ludwigia glandulosa* | Native | Perennial | OBL | 3.21 |
| *Ludwigia grandiflora (syn. Ludwigia hexapetala)* | Nonnative | Perennial | OBL | 0 |
|  |  |  |  |  |
| *Ludwigia lanceolata* | Native | Perennial | OBL | 6.15 |
| *Ludwigia leptocarpa* | Native | Perennial | OBL | 3 |
| *Ludwigia linearis* | Native | Perennial | OBL | 5.72 |
| *Ludwigia linifolia* | Native | Perennial | OBL | 7.04 |
| *Ludwigia maritima* | Native | Perennial | FACW | 5.85 |
| *Ludwigia microcarpa* | Native | Perennial | OBL | 4.81 |
| *Ludwigia octovalvis* | Native | Perennial | OBL | 2 |
| *Ludwigia palustris* | Native | Perennial | OBL | 4.77 |
| *Ludwigia peploides* | Native | Perennial | OBL | 4 |
| *Ludwigia peruviana* | Nonnative | Perennial | OBL | 0 |
| *Ludwigia pilosa* | Native | Perennial | OBL | 4.5 |
| *Ludwigia polycarpa* | Native | Perennial | OBL | none |
| *Ludwigia repens* | Native | Perennial | OBL | 3.2 |
| *Ludwigia sphaerocarpa* | Native | Perennial | OBL | 2.5 |
| *Ludwigia suffruticosa* | Native | Perennial | FACW | 6.23 |
|  |  |  |  |  |
| *Ludwigia virgata* | Native | Perennial | FACW | 6.73 |
| *Luziola bahiensis* | Native | Perennial | OBL | 2.67 |
| *Luziola fluitans (*syn. *Hydrochloa caroliniensis)* | Native | Perennial | OBL | 4 |
| *Lycopodiella alopecuroides (*syn. *Lycopodium alopecuroides)* | Native | Perennial | FACW | 5.27 |
| *Lycopodiella appressa (syn. Lycopodium appresum)* | Native | Perennial | FACW | 7.89 |
| *Lycopus americanus* | Native | Perennial | OBL | 3.17 |
| *Lycopus amplectens* | Native | Perennial | OBL | 2.88 |
| *Lycopus rubellus* | Native | Perennial | OBL | 4 |
| *Lycopus virginicus* | Native | Perennial | OBL | 5 |
| *Lygodium japonicum* | Nonnative | Perennial | Not listed | 0 |
| *Lygodium microphyllum* | Nonnative | Perennial | Not listed | 0 |
| *Lyonia ferruginea* | Native | Perennial | Not listed | 8.39 |
| *Lyonia fruticosa* | Native | Perennial | Not listed | 5.93 |
| *Lyonia ligustrina* | Native | Perennial | FAC | 8.67 |
| *Lyonia lucida* | Native | Perennial | FACW | 6 |
| *Lyonia mariana* | Native | Perennial | FACW | 4.8 |
| *Lythrum alatum* | Native | Perennial | OBL | 3.55 |
| *Lythrum lineare* | Native | Perennial | OBL | 3.82 |
| *Macroptilium lathyroides* | Nonnative | Perennial | Not listed | 0.41 |
| *Magnolia grandiflora* | Native | Perennial | Not listed | 4.36 |
| *Magnolia virginiana* | Native | Perennial | OBL | 7 |
| *Mayaca fluviatilis* | Native | Perennial | OBL | 8.45 |
| *Melaleuca quinquenervia* | Nonnative | Perennial | FAC | 0 |
| *Melanthera nivea* | Native | Perennial | FACW | 6.07 |
| *Melia azedarach* | Nonnative | Perennial | Not listed | 0 |
| *Melinis repens (*syn. *Rhynchelytrum repens)* | Nonnative | Annual/Perennial | Not listed | 0 |
| *Melochia corchorifolia* | Nonnative | Annual | FAC | 2.24 |
| *Melothria pendula* | Native | Perennial | Not listed | 3.31 |
| *Micranthemum glomeratum* | Native | Perennial | OBL | 5.85 |
| *Micranthemum umbros* | Native | Annual/Perennial | OBL | 5.66 |
| *Clinopodium brownei (syn.Micromeria brownei)* | Native | Perennial | OBL | 6.34 |
| *Mikania scandens* | Native | Perennial | Not listed | 1.95 |
| *Mimosa pigra* | Nonnative | Perennial | FAC | 0 |
| *Mitchella repens* | Native | Perennial | Not listed | 7.37 |
| *Mitreola petiolata* | Native | Annual | FACW | 5.41 |
| *Mitreola sessilifolia* | Native | Annual | FACW | 3.33 |
| *Mollugo verticillata* | Nonnative | Annual | Not listed | 1.3 |
| *Morinda royoc* | Native | Perennial | FACW | 2.88 |
| *Muhlenbergia capillaris* | Native | Perennial | OBL | 5.43 |
| *Murdannia keisak* | Nonnative | Perennial | FAC | 2.34 |
| *Murdannia nudiflora* | Nonnative | Annual/Perennial | FAC | 1.42 |
| *Musa sapientum* | Nonnative | Perennial | Upland | 0 |
| *Musa sapientum paradisiaca* | Nonnative | Perennial | Upland | 0 |
| *Morella caroliniensis (syn. Myrica caroliniensis)* | Native | Perennial | FACW | 4.33 |
| *Morella cerifera (syn. Myrica cerifera)* | Native | Perennial | FAC | 2 |
| *Myriophyllum aquaticum* | Nonnative | Perennial | OBL | 0.98 |
| *Myriophyllum heterophyllum* | Native | Perennial | OBL | 4.77 |
| *Myriophyllum laxum* | Native | Perennial | OBL | 7.5 |
| *Myriophyllum* native | Native | Perennial | OBL | 4.77 |
| *Myriophyllum pinnatum* | Native | Perennial | OBL | 5.85 |
| *Myriophyllum spicatum* | Nonnative | Perennial | OBL | 0 |
| *Najas filifolia* | Native | Annual | OBL | 8.45 |
| *Najas gracillima* | Native | Annual | OBL | 3 |
| *Najas guadalupensis* | Native | Annual | OBL | 5.07 |
| *Najas marina* | Native | Annual | OBL | 7.15 |
| *Najas minor* | Nonnative | Annual | OBL | 6 |
| *Nasturtium officinale (syn. Rorippa nasturtium-aquaticum)* | Nonnative | Perennial | OBL | 0 |
| *Nelumbo lutea* | Native | Perennial | OBL | 5.5 |
| *Nephrolepis cordifolia* | Nonnative | Perennial | FAC | none |
| *Nephrolepis exaltata* | Native | Perennial | FAC | 3 |
| *Neyraudia reynaudiana* | Nonnative | Perennial | FAC | 0 |
| *Nitella* | Native | N/A | OBL | 6 |
| *Nuphar* | Native | Perennial | OBL | 3.5 |
| *Nuphar luteum (*syn. *Nuphar advena)* | Native | Perennial | OBL | 3.5 |
| *Nymphaea capensis* | Nonnative | Perennial | OBL | 0.5 |
| *Nymphaea mexicana* | Native | Perennial | OBL | 6.5 |
| *Nymphaea odorata* | Native | Perennial | OBL | 5 |
| *Nymphoides aquatica* | Native | Perennial | OBL | 6.09 |
| *Nymphoides cristata* | Nonnative | Perennial | OBL | 0 |
| *Nymphoides cordata* | Native | Perennial | OBL | 8 |
| *Nyssa aquatica* | Native | Perennial | OBL | none |
| *Nyssa ogeche* | Native | Perennial | OBL | 7 |
| *Nyssa sylvatica biflora* | Native | Perennial | OBL | 7 |
| *Edrastima uniflora (*syn. *Oldenlandia uniflora)* | Native | Annual | FACW | 2.5 |
| *Orontium aquaticum* | Native | Perennial | OBL | 8.39 |
| *Osmundastrum cinnamomeum (syn. Osmunda cinnamomea)* | Native | Perennial | FACW | 6.44 |
| *Osmunda regalis* | Native | Perennial | OBL | 7.6 |
| *Ostrya virginiana* | Native | Perennial | Upland | 5.91 |
| *Oxalis corniculata* | Native | Annual/Perennial | Not listed | 1.37 |
| *Cyperus blepharoleptos (*syn. *Oxycaryum cubense)* | Nonnative | Perennial | OBL | 0 |
| *Tiedemannia filiformis (syn. Oxypolis filiformis)* | Native | Perennial | OBL | 8.69 |
| *Packera glabella (syn. Senecio glabellus)* | Native | Annual | OBL | 2.33 |
| *Pandanus veitchii* | Nonnative | Perennial | Not listed | none |
| *Coleataenia abscissa (syn. Panicum abscissum)* | Native | Perennial | FACW | 9.22 |
| *Coleataenia anceps (syn. Panicum anceps)* | Native | Perennial | FAC | 4.61 |
| *Panicum dichotomiflorum* | Native | Annual | FACW | 4.96 |
| *Dichanthelium dichotomum (syn. Panicum dichotomum)* | Native | Perennial | FACW | 5.61 |
| *Dichanthelium ensifolium (syn.Panicum ensifolium)* | Native | Perennial | OBL | 6.5 |
| *Hymenachne hemitomon (syn. Panicum hemitomon)* | Native | Perennial | OBL | 5.82 |
| *Steinchisma hians (*syn.*Panicum hians )* | Native | Perennial | FAC | 6.63 |
| *Urochloa maxima (syn. Panicum maximum)* | Nonnative | Perennial | Not listed | 0 |
| *Panicum repens* | Nonnative | Perennial | FACW | 0 |
| *Coleataenia rigidula (syn. Panicum rigidulum)* | Native | Perennial | FACW | 5.47 |
|  |  |  |  |  |
| *Dichanthelium scabriusculum (syn. Panicum scabriusculum))* | Native | Perennial | OBL | 5.5 |
| *Panicum spretum* | Native | Perennial | FACW | 6.63 |
| *Coleataenia tenera (syn. Panicum tenerum)* | Native | Perennial | OBL | 8.67 |
| *Panicum verrucosum* | Native | Annual | FACW | 6.83 |
| *Panicum virgatum* | Native | Perennial | FACW | 5.44 |
| *Parthenocissus quinquefolia* | Native | Perennial | Not listed | 3.43 |
| *Paspalidium geminatum* | Native | Perennial | OBL | 5.5 |
| *Paspalum acuminatum* | Nonnative | Perennial | FACW | 1.06 |
| *Paspalum conjugatum* | Nonnative | Perennial | FAC | 3.84 |
| *Paspalum dilatatum* | Nonnative | Perennial | FAC | 4.33 |
| *Paspalum distichum* | Native | Perennial | OBL | 5.54 |
| *Paspalum floridanum* | Native | Perennial | FACW | 6.11 |
| *Paspalum laeve* | Native | Perennial | FACW | 5.79 |
| *Paspalum monostachyum* | Native | Perennial | OBL | 9.8 |
| *Paspalum notatum* | Nonnative | Perennial | Not listed | 0.14 |
| *Paspalum praecox* | Native | Perennial | OBL | 6.5 |
| *Paspalum repens* | Native | Annual | OBL | 5.6 |
| *Paspalum setaceum* | Native | Perennial | FAC | 3.44 |
| *Paspalum urvillei* | Nonnative | Perennial | FAC | 0 |
| *Passiflora incarnata* | Native | Perennial | Not listed | 2.89 |
| *Peltandra* | Native | Perennial | OBL | 7.5 |
| *Peltandra virginica* | Native | Perennial | OBL | 7.5 |
| *Cenchrus purpureus (syn. Pennisetum purpureum)* | Nonnative | Perennial | FAC | 0 |
| *Persea borbonia* | Native | Perennial | Not listed | 8.02 |
| *Persea borbonia humilis* | Native | Perennial | Not listed | 7.43 |
| *Persea palustris* | Native | Perennial | OBL | 7 |
| *Persicaria glabra (syn. Polygonum densiflorum, P. glabrum)* | Native | Perennial | OBL | 4.5 |
| *Persicaria hirsute (syn. Polygonum hirsutum)* | Native | Perennial | OBL | 3 |
| *Persicaria hydropiperoides (syn. Polygonum hydropiperoides)* | Native | Perennial | OBL | 2.5 |
| *Persicaria lapathifolia (syn. Polygonum lapthifolium)* | Nonnative | Annual | OBL | 1.95 |
| *Persicaria meisneriana var. beyrichiana (syn. Polygonum meisnerianum var. beyrichianum)* | Native | Perennial | OBL | 3 |
| *Persicaria pensylvanica (syn. Polygonum pensylvanicum)* | Native | Annual | OBL | 2.13 |
| *Persicaria punctata (syn. Polygonum punctatum)* | Native | Perennial | OBL | 3 |
| *Persicaria setacea (Polygonum setaceum)* | Native | Perennial | OBL | 2.81 |
| *Persicaria virginiana (syn. Polygonum virginianum)* | Native | Perennial | FACW | 2.75 |
| *Phanopyrum gymnocarpon* | Native | Perennial | OBL | 4.25 |
| *Phlebodium aureum* | Native | Perennial | Not listed | 6.85 |
| *Phragmites berlanderia (syn. P. australis)* | Native | Perennial | OBL | 4.39 |
| *Phyla nodiflora* | Native | Perennial | FAC | 1.92 |
| *Phyllanthus urinaria* | Nonnative | Annual | FAC | 0.22 |
| *Phytolacca americana* | Native | Perennial | Not listed | 2.09 |
| *Pilea microphylla* | Native | Annual | FACW | 0.64 |
| *Pilea pumila* | Native | Annual | FACW | 4.29 |
| *Pinus clausa* | Native | Perennial | Not listed | none |
| *Pinus echinata* | Native | Perennial | Not listed | 2.78 |
| *Pinus elliottii* | Native | Perennial | Not listed | 4.21 |
| *Pinus glabra* | Native | Perennial | FACW | 5 |
| *Pinus palustris* | Native | Perennial | Not listed | 4.77 |
| *Pinus taeda* | Native | Perennial | Not listed | 5.34 |
| *Pistia stratiotes* | Nonnative | Perennial | OBL | 0 |
| *Platanus occidentalis* | Native | Perennial | FACW | 4.36 |
| *Pluchea baccharis (*syn. *Pluchea rosea)* | Native | Perennial | FACW | 5.45 |
| *Pluchea camphorata* | Native | Annual | FACW | 3 |
| *Pluchea foetida* | Native | Perennial | FACW | 6.65 |
| *Pluchea longifolia* | Native | Perennial | FACW | 5.85 |
| *Pluchea odorata* | Native | Annual/Perennial | FACW | 4.96 |
| *Polygala cymosa* | Native | Biennial | OBL | 7.67 |
| *Polygala rugelii* | Native | Annual/Biennial | FACW | 8.17 |
| *Polygonella gracilis* | Native | Annual | Not listed | 4.77 |
| *Polypogon monspeliensis* | Nonnative | Annual | FAC | 0 |
| *Polypremum procumbens* | Native | Perennial | FAC | 1.71 |
| *Pontederia cordata* | Native | Perennial | OBL | 5.38 |
| *Pontederia rotundifolia* | Nonnative | Perennial | OBL | 0 |
| *Portulaca amilis* | Nonnative | Annual | Not listed | 0.87 |
| *Potamogeton diversifolius* | Native | Perennial | OBL | 6 |
| *Potamogeton illinoensis* | Native | Perennial | OBL | 6.64 |
| *Stuckenia pectinate (syn. Potamogeton pectinatus)* | Native | Perennial | OBL | 7.8 |
| *Potamogeton pusillus* | Native | Perennial | OBL | 7.8 |
| *Proserpinaca palustris* | Native | Perennial | OBL | 5.85 |
| *Proserpinaca pectinata* | Native | Perennial | OBL | 5.5 |
| *Prunus caroliniana* | Native | Perennial | Not listed | 4.03 |
| *Prunus serotina* | Native | Perennial | Not listed | 3.9 |
| *Psychotria nervosa* | Native | Perennial | FAC | 3 |
| *Pteridium aquilinum* | Native | Perennial | Not listed | 3.9 |
| *Pteris tripartita* | Nonnative | Perennial | FACW | 0.27 |
| *Ptilimnium capillaceum* | Native | Annual | OBL | 2.73 |
| *Quercus laevis* | Native | Perennial | Upland | none |
| *Quercus laurifolia* | Native | Perennial | FACW | 4 |
| *Quercus nigra* | Native | Perennial | FACW | 2.5 |
| *Quercus virginiana* | Native | Perennial | Not listed | 4.85 |
| *Paspalum eglume (syn. Reimarochloa oligostachya)* | Native | Perennial | FACW | 1.75 |
| *Rhexia alifanus* | Native | Perennial | FACW | 4.6 |
| *Rhexia cubensis* | Native | Perennial | FACW | 7.22 |
| *Rhexia mariana* | Native | Perennial | FACW | 4 |
| *Rhexia nashii* | Native | Perennial | FACW | 7.8 |
| *Rhexia nuttallii* | Native | Perennial | FACW | 7.93 |
| *Rhexia petiolata* | Native | Perennial | FACW | 7.9 |
| *Rhexia salicifolia* | Native | Perennial | OBL | 7.14 |
| *Rhexia virginica* | Native | Perennial | FACW | 3.8 |
| *Rhizophora mangle* | Native | Perennial | OBL | 3 |
| *Rhododendron canescens* | Native | Perennial | Not listed | none |
| *Rhododendron viscosum* | Native | Perennial | FACW | 5.33 |
| *Rhodomyrtus tomentosa* | Nonnative | Perennial | FAC | 0 |
| *Rhus copallinum* | Native | Perennial | Not listed | 3.65 |
| *Rhynchospora baldwinii* | Native | Perennial | FACW | 6.44 |
| *Rhynchospora caduca* | Native | Perennial | FACW | 7.61 |
| *Rhynchospora leptocarpa (*syn. *Rhynchospora capitellata)* | Native | Perennial | FACW | 6.4 |
| *Rhynchospora cephalantha* | Native | Perennial | OBL | 6.19 |
| *Rhynchospora chalarocephala* | Native | Perennial | FACW | 3.5 |
| *Rhynchospora chapmanii* | Native | Perennial | OBL | 3.33 |
| *Rhynchospora corniculata* | Native | Perennial | OBL | 4 |
| *Rhynchospora curtissii* | Native | Perennial | FACW | 3.75 |
| *Rhynchospora debilis* | Native | Perennial | FACW | 7.8 |
| *Rhynchospora divergens* | Native | Annual/Perennial | OBL | 5.53 |
| *Rhynchospora fascicularis* | Native | Perennial | FACW | 5.92 |
| *Rhynchospora fernaldii* | Native | Perennial | FACW | 4.77 |
| *Rhynchospora filifolia* | Native | Perennial | FACW | 8.13 |
| *Rhynchospora globularis* | Native | Perennial | FACW | 3.45 |
| *Rhynchospora glomerata* | Native | Perennial | FACW | 4.13 |
| *Rhynchospora inundata* | Native | Perennial | OBL | 4 |
| *Rhynchospora megalocarpa* | Native | Perennial | Upland | none |
| *Rhynchospora microcarpa* | Native | Perennial | OBL | 5.29 |
| *Rhynchospora microcephala* | Native | Perennial | FACW | 3.5 |
| *Rhynchospora miliacea* | Native | Perennial | OBL | 4.67 |
| *Rhynchospora nitens (*syn. *Psilocarya nitens)* | Native | Annual | OBL | 4 |
| *Rhynchospora odorata* | Native | Perennial | FACW | 4.33 |
| *Rhynchospora perplexa* | Native | Perennial | FACW | 5.2 |
| *Rhynchospora pleiantha* | Native | Perennial | FACW | 4.63 |
| *Rhynchospora pusilla* | Native | Perennial | FACW | 7.54 |
| *Rhynchospora rariflora* | Native | Perennial | FACW | 8.63 |
| *Rhynchospora scirpoides (*syn. *Psilocarya scirpoides)* | Native | Annual | OBL | 3.29 |
| *Rhynchospora tracyi* | Native | Perennial | OBL | 8 |
| *Rhynchospora wrightiana* | Native | Perennial | FACW | 7.8 |
| *Riccia fluitans* | Native | N/A | OBL | none |
| *Ricciocarpus natans* | Native | Perennial | OBL | 6 |
| *Richardia scabra* | Nonnative | Annual | Not listed | 0 |
| *Ricinus communis* | Nonnative | Annual/Perennial | Upland | 0 |
|  |  |  |  |  |
| *Rorippa teres* | Native | Annual | OBL | 4.2 |
| *Rosa palustris* | Native | Perennial | OBL | 6.01 |
| *Rotala rotundifolia* | Nonnative | Perennial | OBL | 0 |
| *Roystonea regia (*syn. *Roystonea elata)* | Native | Perennial | FACW | 3.13 |
| *Rubus pensilvanicus (syn. Rubus argutus)* | Native | Perennial | FAC | 3.56 |
| *Rubus cuneifolius* | Native | Perennial | FAC | 3.9 |
| *Rubus trivialis* | Native | Perennial | FAC | 2.6 |
| *Ruellia simplex (*syn. *Ruellia brittoniana, R. tweediana)* | Nonnative | Perennial | FAC | 0 |
| *Rumex crispus* | Nonnative | Perennial | FACW | 0 |
| *Rumex obovatus* | Nonnative | Perennial | FACW | none |
| *Rumex verticillatus* | Native | Perennial | FACW | 3.17 |
| *Ruppia maritima* | Native | Perennial | OBL | 7.24 |
| *Sabal minor* | Native | Perennial | FACW | none |
| *Sabal palmetto* | Native | Perennial | FAC | 2.85 |
| *Sabatia brevifolia* | Native | Annual | FACW | 7.8 |
| *Sabatia campanulata* | Native | Perennial | FACW | 4.4 |
| *Sabatia gentianoides* | Native | Annual | FACW | none |
| *Sabatia grandiflora* | Native | Annual | FACW | 6 |
| *Saccharum baldwinii (*syn. *Erianthus strictus)* | Native | Perennial | OBL | 5 |
| *Saccharum brevibarbe (*syn. *Erianthus brevibarbis)* | Native | Perennial | FACW | none |
| *Saccharum coarctatum* | Native | Perennial | Not listed | none |
| *Saccharum giganteum (*syn. *Erianthus giganeus)* | Native | Perennial | OBL | 5.5 |
| *Sacciolepis indica* | Nonnative | Annual | FAC | 0.92 |
| *Sacciolepis striata* | Native | Perennial | OBL | 5.35 |
| *Sagittaria filiformis (*syn. *Sagittaria stagnorum)* | Native | Perennial | OBL | 7.24 |
| *Sagittaria graminea* | Native | Perennial | OBL | 5.53 |
| *Sagittaria isoetiformis* | Native | Perennial | OBL | 7 |
| *Sagittaria kurziana* | Native | Perennial | OBL | 9.75 |
| *Sagittaria lancifolia* | Native | Perennial | OBL | 3 |
| *Sagittaria latifolia* | Native | Perennial | OBL | 3.5 |
| *Sagittaria subulata* | Native | Perennial | OBL | 7 |
| *Salicornia bigelovii* | Native | Annual | OBL | none |
| *Salix babylonica* | Nonnative | Perennial | OBL | 0 |
| *Salix caroliniana* | Native | Perennial | OBL | 2.95 |
| *Salix eriocephala* | Native | Perennial | OBL | 4 |
| *Salix floridana* | Native | Perennial | OBL | 7.24 |
| *Salix nigra* | Native | Perennial | OBL | 2.13 |
| *Salvinia minima* | Nonnative | Perennial | OBL | 0 |
| *Sambucus nigra (*syn. *Sambucus canadensis)* | Native | Perennial | FAC | 1.48 |
| *Samolus* | Native | Perennial | OBL | 5.67 |
|  |  |  |  |  |
| *Funastrum clausum (syn. Sarcostemma clausum)* | Native | Perennial | FACW | 3.81 |
| *Sarracenia flava* | Native | Perennial | OBL | 7 |
| *Sarracenia leucophylla* | Native | Perennial | OBL | 7 |
| *Sarracenia minor* | Native | Perennial | FACW | 5.67 |
| *Sarracenia rosea (*syn. *Sarracenia purpurea)* | Native | Perennial | OBL | 7.67 |
| *Sarracenia rubra* | Native | Perennial | OBL | 8.33 |
| *Saururus cernuus* | Native | Perennial | OBL | 6.5 |
| *Schinus terebinthifolius* | Nonnative | Perennial | FAC | 0 |
| *Schizachyrium scoparium* | Native | Perennial | FAC | 5.44 |
| *Schoenolirion albiflorum* | Native | Perennial | FACW | 9.1 |
| *Schoenoplectus americanus (*syn. *Scirpus americanus)* | Native | Perennial | OBL | 6.5 |
| *Schoenoplectus californicus (*syn. *Scirpus californicus)* | Native | Perennial | OBL | 5 |
| *Schoenoplectus etuberculatus (*syn. *Scirpus etuberculatus)* | Native | Perennial | OBL | 4.67 |
| *Schoenoplectus pungens (*syn. *Scirpus pungens)* | Native | Perennial | OBL | 4 |
| *Bolboschoenus robustus (syn. Schoenoplectus robustus)* | Native | Perennial | OBL | 5 |
| *Schoenoplectus tabernaemontani (*syn. *Scirpus validus)* | Native | Perennial | OBL | 5.55 |
| *Scirpus cyperinus* | Native | Perennial | OBL | 3.5 |
| *Scleria baldwinii* | Native | Perennial | FACW | 8.67 |
| *Scleria ciliata* | Native | Perennial | FACW | 3.67 |
| *Scleria georgiana* | Native | Perennial | FACW | 8.78 |
| *Scleria lacustris* | Nonnative | Perennial | FACW | 0 |
| *Scleria microcarpa* | Nonnative | Perennial | FACW | 0 |
| *Scleria reticularis* | Native | Annual | FACW | 6.79 |
| *Scleria triglomerata* | Native | Perennial | FACW | 6.74 |
| *Scoparia dulcis* | Native | Perennial | FAC | 2.36 |
| *Scutellaria racemosa* | Nonnative | Perennial | OBL | none |
| *Senna obtusifolia* | Nonnative | Annual/Perennial | Not listed | 1.01 |
| *Senna occidentalis* | Nonnative | Annual/Perennial | Not listed | 0.37 |
| *Serenoa repens* | Native | Perennial | Upland | 7.03 |
| *Sesbania drummondii* | Native | Perennial | FAC | 1.8 |
| *Sesbania herbacea (*syn. *Sesbania exaltata)* | Native | Annual/Perennial | FAC | 1 |
| *Sesbania punicea* | Nonnative | Perennial | FAC | 0 |
| *Sesbania vesicaria* | Native | Annual | FAC | 1.44 |
| *Sesuvium maritimum* | Native | Annual | FACW | none |
| *Setaria magna* | Native | Annual | OBL | 3.25 |
| *Setaria parviflora (*syn. *Setaria geniculata)* | Native | Perennial | FAC | 2.5 |
| *Seymeria cassioides* | Native | Annual | FAC | none |
| *Sida rhombifolia* | Native | Annual/Perennial | Not listed | 1.65 |
| *Smilax auriculata* | Native | Perennial | Not listed | 3.96 |
| *Smilax bona-nox* | Native | Perennial | Not listed | 3.78 |
| *Smilax glauca* | Native | Perennial | Not listed | 2.7 |
| *Smilax laurifolia* | Native | Perennial | Not listed | 4 |
| *Smilax pumila* | Native | Perennial | Not listed | 6.01 |
| *Solanum americanum* | Native | Annual/Perennial | Not listed | 1.16 |
| *Solanum carolinense* | Native | Perennial | Not listed | 2.13 |
| *Solanum tampicense* | Nonnative | Perennial | Not listed | 0 |
| *Solanum viarum* | Nonnative | Perennial | Not listed | 0 |
| *Solidago canadensis* | Native | Perennial | Not listed | 2.45 |
| *Solidago fistulosa* | Native | Perennial | FACW | 4.49 |
| *Solidago latissimifolia (*syn. *Solidago elliottii)* | Native | Perennial | OBL | 7.45 |
| *Solidago leavenworthii* | Native | Perennial | FACW | 2.73 |
| *Solidago rugosa* | Native | Perennial | FAC | 3.75 |
| *Solidago sempervirens* | Native | Perennial | FACW | 4.36 |
| *Solidago stricta* | Native | Perennial | FACW | 5.49 |
| *Solidago tortifolia* | Native | Perennial | Not listed | 6.96 |
| *Sorghastrum secundum* | Native | Perennial | Not listed | 7.73 |
| *Sorghum bicolor* | Nonnative | Annual | Not listed | 0.11 |
| *Sparganium americanum* | Native | Perennial | OBL | 6.5 |
| *Spartina alterniflora* | Native | Perennial | OBL | 7.94 |
| *Spartina bakeri* | Native | Perennial | FACW | 5.98 |
| *Spartina patens* | Native | Perennial | FACW | 5.23 |
| *Spermacoce glabra* | Native | Perennial | FACW | 4 |
| *Spermacoce remota (*syn. *Spermacoce assurgens)* | Native | Annual/Perennial | Not listed | 3.09 |
| *Spermacoce verticillata* | Nonnative | Perennial | Not listed | 0 |
| *Sphagneticola trilobata (*syn. *Wedelia trilobata)* | Nonnative | Perennial | FACW | 0 |
| *Sphagnum* | Native | N/A | OBL | 7.43 |
| *Sphenoclea zeylanica* | Nonnative | Annual | FACW | 3 |
| *Spirodela polyrhiza* | Native | Perennial | OBL | 2.95 |
| *Sporobolus domingensis* | Native | Perennial | Not listed | 2.47 |
| *Sporobolus indicus* | Nonnative | Perennial | Not listed | 0.99 |
| *Stenotaphrum secundatum* | Native | Perennial | Not listed | 1.57 |
| *Stillingia aquatica* | Native | Perennial | OBL | 8.32 |
| *Stillingia sylvatica* | Native | Perennial | FAC | 7.3 |
| *Styrax americanus* | Native | Perennial | OBL | 4.5 |
| *Styrax grandifolius* | Native | Perennial | OBL | 6.25 |
| *Suaeda linearis* | Native | Annual | OBL | none |
| *Symphyotrichum bahamense* | Native | Annual/Biennial | OBL | none |
| *Symphyotrichum carolinianum (*syn. *Aster carolinianus)* | Native | Perennial | OBL | 3.93 |
| *Symphyotrichum dumosum (*syn. *Aster dumosus)* | Native | Perennial | FAC | 2.53 |
| *Symphyotrichum elliottii (*syn. *Aster elliottii)* | Native | Perennial | OBL | 6.76 |
| *Symphyotrichum pilosum (*syn. *Aster pilosus)* | Native | Perennial | Not listed | 2.38 |
| *Symphyotrichum subulatum (*syn. *Aster subulatus)* | Native | Perennial | OBL | 5.74 |
| *Symplocos tinctoria* | Native | Perennial | Not listed | none |
| *Syngonanthus flavidulus* | Native | Perennial | FACW | 6.93 |
| *Syngonium podophyllum* | Nonnative | Perennial | Not listed | 0 |
| *Syzygium cumini* | Nonnative | Perennial | FAC | 0 |
| *Taxodium* | Native | Perennial | OBL | 7 |
| *Taxodium ascendens* | Native | Perennial | OBL | 7 |
| *Taxodium distichum* | Native | Perennial | OBL | 7 |
| *Teucrium canadense* | Native | Perennial | FACW | 6.44 |
| *Thalia geniculata* | Native | Perennial | OBL | 6 |
| *Thelypteris dentata* | Nonnative | Perennial | FACW | 0 |
| *Thelypteris hispidula* | Native | Perennial | FACW | 2.69 |
| *Thelypteris interrupta* | Native | Perennial | FACW | 6.74 |
| *Thelypteris kunthii* | Native | Perennial | FACW | 2.83 |
| *Thelypteris ovata* | Native | Perennial | FACW | 2.86 |
| *Thelypteris palustris pubescens* | Native | Perennial | FACW | 5.31 |
| *Thespesia populnea* | Nonnative | Perennial | FAC | 0 |
| *Tilia americana* | Native | Perennial | FACW | 5.55 |
| *Toxicodendron radicans* | Native | Perennial | Not listed | 1.44 |
| *Toxicodendron vernix* | Native | Perennial | FACW | 7.5 |
| *Tradescantia ohiensis* | Native | Perennial | Not listed | none |
| *Tradescantia spathacea* | Nonnative | Perennial | Not listed | none |
| *Tradescantia zebrina* | Nonnative | Perennial | Upland | 0 |
| *Triadenum virginicum* | Native | Perennial | OBL | 5 |
| *Triadenum walteri* | Native | Perennial | OBL | 7.92 |
| *Triadica sebifera (syn. Sapium sebiferum)* | Nonnative | Perennial | FAC | 0 |
| *Tripsacum dactyloides* | Native | Perennial | FAC | 6.03 |
| *Typha* | Native | Perennial | OBL | 1 |
| *Typha domingensis* | Native | Perennial | OBL | 1 |
| *Typha latifolia* | Native | Perennial | OBL | 1 |
| *Ulmus americana* | Native | Perennial | FACW | 5 |
| *Ulmus parvifolia* | Nonnative | Perennial | FACW | 0 |
| *Uniola paniculata* | Native | Perennial | Upland | 6.43 |
| *Urena lobata* | Nonnative | Perennial | Upland | 0 |
| *Urochloa mutica (*syn. *Brachiaria mutica)* | Nonnative | Perennial | FACW | 0 |
| *Utricularia* | Native | Perennial | OBL | 6 |
| *Utricularia cornuta* | Native | Annual/Perennial | OBL | 5 |
| *Utricularia floridana* | Native | Perennial | OBL | 6.34 |
| *Utricularia foliosa* | Native | Perennial | OBL | 5 |
| *Utricularia gibba (*syn. *Utricularia biflora)* | Native | Annual/Perennial | OBL | 6.37 |
| *Utricularia inflata* | Native | Perennial | OBL | 5.85 |
| *Utricularia juncea* | Native | Annual/Perennial | OBL | 6.24 |
| *Utricularia olivacea* | Native | Annual/Perennial | OBL | 3.33 |
| *Utricularia purpurea* | Native | Annual/Perennial | OBL | 6.5 |
| *Utricularia radiata* | Native | Annual/Perennial | OBL | 6.01 |
| *Utricularia resupinata* | Native | Annual/Perennial | OBL | 5.46 |
| *Utricularia subulata* | Native | Annual/Perennial | OBL | 7.09 |
| *Vaccinium corymbosum* | Native | Perennial | FACW | 5.63 |
| *Vaccinium darrowii* | Native | Perennial | Not listed | 7.15 |
| *Vaccinium elliottii* | Native | Perennial | FAC | 4 |
| *Vaccinium myrsinites* | Native | Perennial | Upland | 5.64 |
| *Vallisneria americana* | Native | Perennial | OBL | 7 |
| *Verbena bonariensis* | Nonnative | Annual/Perennial | Not listed | 0.56 |
| *Verbena brasiliensis* | Nonnative | Perennial | Not listed | 0.35 |
| *Viburnum nudum* | Native | Perennial | FACW | 5.55 |
| *Vigna luteola* | Native | Perennial | Not listed | 2.31 |
| *Viola lanceolata* | Native | Perennial | OBL | 5.32 |
| *Viola primulifolia* | Native | Perennial | FACW | 6.11 |
| *Vitex trifolia* | Nonnative | Perennial | Not listed | 0 |
| *Vitis aestivalis* | Native | Perennial | Not listed | 2.48 |
| *Vitis cinerea* | Native | Perennial | Not listed | none |
| *Vitis rotundifolia* | Native | Perennial | Not listed | none |
| *Eleocharis confervoides (*syn. *Websteria confervoides )* | Native | Perennial | OBL | 7 |
| *Wolffiella* | Native | Perennial | OBL | 1 |
| *Woodwardia areolata* | Native | Perennial | OBL | 6.5 |
| *Woodwardia virginica* | Native | Perennial | FACW | 3.5 |
| *Xanthosoma sagittifolium* | Nonnative | Perennial | FACW | 0 |
| *Xyris ambigua* | Native | Perennial | OBL | 6.43 |
| *Xyris baldwiniana* | Native | Perennial | OBL | 6.97 |
| *Xyris brevifolia* | Native | Perennial | OBL | 7.2 |
| *Xyris caroliniana* | Native | Perennial | FACW | 6.14 |
| *Xyris difformis* | Native | Perennial | OBL | 7.5 |
| *Xyris drummondii* | Native | Perennial | OBL | 3.4 |
| *Xyris elliottii* | Native | Perennial | OBL | 6.69 |
| *Xyris fimbriata* | Native | Perennial | OBL | 5 |
| *Xyris flabelliformis* | Native | Perennial | OBL | 5 |
| *Xyris isoetifolia* | Native | Perennial | OBL | 9.75 |
| *Xyris jupicai* | Native | Annual | FACW | 3.51 |
| *Xyris laxifolia (*syn. *Xyris iridifolia)* | Native | Perennial | OBL | 5 |
| *Xyris laxifolia (syn. X. iridifolia)* | Native | Perennial | OBL | 5 |
| *Xyris platylepis* | Native | Perennial | OBL | 5.32 |
| *Xyris serotina* | Native | Perennial | OBL | 4 |
| *Xyris smalliana* | Native | Perennial | OBL | 7.8 |
| *Zizania aquatica* | Native | Annual | OBL | 7.5 |
| *Zizaniopsis miliacea* | Native | Perennial | OBL | 6.21 |
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## Macroinvertebrate Sample Preparation and Analysis for Hester-Dendy, Dredge, and Core Samples

### Hester-Dendy Sample Preparation and Analysis

##### Introduction: This method details the rinsing and storing of macroinvertebrate samples collected with a Hester-Dendy artificial substrate sampler. It is used for samples collected in environments deemed to have acceptable conditions for calculating macroinvertebrate community and diversity measures according to FS 7430 Hester-Dendy Sampling for the Biological Integrity Criterion. This method is based on section 10500C, *Benthic Macroinvertebrates, Sample Processing and Analysis* (2010), inStandard Methods for the Examination of Water and Wastewater (see Standard Methods Online, <http://www.standardmethods.org/store/>; reference provided for informational purposes only and is not required for this procedure).

##### Laboratory Analyses

##### Equipment and Supplies

##### U.S. #30 mesh sieve (approximately 600 µm)

##### Wrench for dismantling Hester-Dendy condos

##### Waterproof paper and pencil

##### Glass jars, 100 to 250 mL

##### Squeeze bottle of 80% Ethanol

##### zip-top bag

##### Ethanol (80%)

##### Methods

##### Hester-Dendy multi-plate samplers are not preserved in the field and therefore must be processed immediately upon arrival to the laboratory.

##### Pour the assembled Hester-Dendy and associated detritus out of the transport vessel (typically a Whirl-pak bag) into a U.S. #30 mesh sieve. Rinse the transport vessel with tap water to ensure all organisms are washed into the sieve.

##### Using a wrench to remove the bottom nut, dismantle the Hester-Dendy. Work over the sieve so that no organisms fall outside the sieve and get lost.

##### Gently rinse the sample material with tap water. If the water pressure is too high, the organisms can be damaged (a small hose attached to the faucet works best). Scrape and simultaneously rinse organisms off Hester-Dendy plates with fingers (or a soft brush), using care not to damage them. Wash fine debris (silt, mud) through the sieve. Any large debris (leaves, twigs) should be brushed clean of organisms, rinsed, and discarded. Rinse the organism plus detritus matrix to one small area of the sieve. If using a brush, rinse it and visually check to ensure that no organisms are trapped in the bristles.

##### Using an ethanol-filled (80% ethanol) squeeze bottle, rinse the organism plus detritus matrix into the smallest practical container (usually a 100 mL to 250 mL glass jar). Put a hand-written label with sample date, collector, and site information inside the jar.

##### Identify all organisms in the sample.

##### If organisms are unusually numerous, the sample could be subsampled. Subsampling may be accomplished with a box subsampler or a Folsom splitter. The same method must be used for all samples of a particular event or project. The subsampling factor is applied to the results to estimate the taxonomic content of the entire sample.

##### Prepare slides according to LT 7020.

##### Identify organisms according to LT 7030.

##### Data Reduction

##### Follow the counting and collapsing procedures listed in LT 7040.

Calculate and record the Shannon-Weaver Diversity Index (SWDI) score according to the following definition:  *The Shannon-Weaver Diversity Index is the negative summation (from i = 1 to s) of (ni/N) log2 ni/N), where s is the number of species in a sample, N is the total number of individuals in a sample, and ni is the total number of individuals in species.* SWDI scores calculated with less than 300 individuals have the potential for negative bias (Lande 1996).  FDEP recommends that sampling effort be sufficient to capture 300 individuals at each site to increase the likelihood that the results will produce statistically valid comparisons.

##### REFERENCES (provided for informational purposes only)

##### Lande, R. 1996. Statistics and partitioning of species diversity, and similarity among multiple communities. Oikos 76: 5‐13.

### Dredge and Core Sample Preparation and Analysis

##### Introduction: This method details the rinsing and storing of macroinvertebrate samples collected with a core or dredge from freshwater or marine environments. It is used for samples collected in environments deemed to have acceptable conditions for calculating macroinvertebrate community and diversity measures according to FS 7440 Core Sampling and FS 7450 Dredge Sampling, for the Biological Integrity Criterion. This method is based on section 10500C, *Benthic Macroinvertebrates, Sample Processing and Analysis* (2010), inStandard Methods for the Examination of Water and Wastewater (see Standard Methods Online, <http://www.standardmethods.org/store/>; reference provided for informational purposes only and is not required for this procedure). For Lake Condition Index determination, see LT 7400.

##### Laboratory Analyses

##### Equipment and Supplies

###### Waterproof paper

###### Permanent marker

###### U.S. No. 30 mesh sieve (approximately 600 µm)

###### Ethanol-filled squeeze bottle (80%)

###### Sample container

###### Dissecting microscope

###### Compound microscope

###### 100 x 15 mm petri dish or other appropriate container

###### Forceps

###### Vials for picked organisms (1 or 2 dram)

###### Laboratory counter

###### Macroinvertebrate Bench Sheet (may vary from lab to lab)

###### Discard bucket

###### Lighted magnifier

###### Rose Bengal dye (optional)

###### Lab coat

###### Latex gloves

###### Properly fitted respirator

###### Safety glasses

##### Methods

##### Make a label to go into each of the vials of picked bugs that clearly identifies the sample. This could include information such as the sample identification number, station identification, date sampled, and replicate number.

##### Place all sample material into a U.S. No. 30 mesh sieve over a discard bucket. Empty the contents of the sample into the sieve slowly, making sure not to lose any of the sample material. The formalin or non-formalin-based fixative (if used) should go through the sieve and collect in the bucket. Once the sample is finished draining, pour the waste formalin or fixative into the proper container. Follow proper safety protocols (personal protective equipment, ventilation and handling) when handling samples preserved with formalin or non-formalin-based fixatives.

##### Gently rinse the sample material with tap water. Carefully inspect any large debris (leaves, plants, twigs, shells) for organisms, place organisms into sieve, then discard large debris. A lighted magnifier may be used for this process. Wash fine debris (silt, mud) through the (U.S. No. 30 mesh) sieve.

##### Transfer organisms and remaining debris from the sieve to a pan or jar. To facilitate sorting organisms from detritus, the organisms may be stained with rose bengal dye (100 mg per liter or to achieve a light pink color) in the preservative for at least 24 hours.

##### Using a petri dish or other appropriate container, inspect the sample under a dissecting scope set at low power (approximately 7x or 10x). In a deliberate, systematic manner, pick every organism from the sample material and place it into an alcohol-filled vial (clearly identified as per section 2.2.1).

##### Sort all organisms in the sample.

##### If organisms are unusually numerous, the sample could be subsampled. Subsampling after sorting may be accomplished with a box subsampler or a Folsom splitter. Subsampling before sorting may be accomplished any accepted method that divides the sample in a tray or sieve. The same method must be used for all samples of a particular event or project. The subsampling factor is applied to the results to estimate the taxonomic content of the entire sample.

##### Prepare slides according to LT 7020.

##### Identify all organisms according to LT 7030.

##### Follow Quality Assurance procedures outlined in LQ 7400.

##### Data Reduction

##### Follow the counting and collapsing procedures listed in LT 7040.

##### Calculate and record the Shannon-Weaver Diversity Index (SWDI) score according to the following definition: The Shannon-Weaver Diversity Index is the negative summation (from i = 1 to s) of (ni/N) log2 ni/N), where s is the number of species in a sample, N is the total number of individuals in a sample, and ni is the total number of individuals in species. SWDI scores calculated with less than 300 individuals have the potential for negative bias (Lande 1996).  FDEP recommends that sampling effort be sufficient to capture 300 individuals at each site to increase the likelihood that the results will produce statistically valid comparisons. Per Chapter 62-302.530(10), ensure that a sample is collected and composited from a minimum of three natural substrate samples, taken with Ponar type samplers with minimum sampling area of 225 cm2 to determine compliance with the biological integrity criterion.

##### REFERENCES (provided for informational purposes only)

##### Lande, R. 1996. Statistics and partitioning of species diversity, and similarity among multiple communities. Oikos 76: 5‐13.

## Reserved

## LT 7900. Taxonomic Effort for Freshwater Macroinvertebrate Identifications (Also included as SCI 2230)

The table below is intended to provide guidance on defining lowest practical taxonomic level for freshwater taxa. Identify organisms at least to this level unless specified by another method. Recommended taxonomic references are available on the DEP Laboratory website: [Macroinvertebrate Taxonomic Keys | Florida Department of Environmental Protection](https://floridadep.gov/dear/bioassessment/content/macroinvertebrate-taxonomic-keys)

Table LT 7900-1

| **Phylum** | **Class** | **Order** | **Family** | **Genus** | **Species** | **ID Level** |
| --- | --- | --- | --- | --- | --- | --- |
| Annelida | Clitellata | Branchiobdellida | - | - | - | Order |
| Annelida | Hirudinea | - | - | - | - | Genus |
| Annelida | Hirudinea | Arhynchobdellida | Erpobdellidae | - | - | Family |
| Annelida | Hirudinea | Rhynchobdellida | Glossiphoniidae | Helobdella | stagnalis | Species |
| Annelida | Oligochaeta | - | - | - | - | Species |
| Annelida | Oligochaeta | Enchytraeida | Enchytraeidae | - | - | Family |
| Annelida | Oligochaeta | Opisthopora | Megascolecidae | - | - | Family |
| Annelida | Oligochaeta | Tubificida | Naididae | Dero | digitata complex | Complex |
| Annelida | Oligochaeta | Tubificida | Naididae | Nais | communis complex | Complex |
| Arthropoda | Arachnida | Acariformes | - | - | - | Genus |
| Arthropoda | Arachnida | Oribatida | - | - | - | Order |
| Arthropoda | Collembola | Collembola | - | - | - | Order |
| Arthropoda | Insecta | Coleoptera (A) | - | - | - | Species |
| Arthropoda | InsectaInsecta | Coleoptera (L) | - | - | - | Genus |
| Arthropoda | Insecta | Coleoptera | Chelonariidae | - | - | Family |
| Arthropoda | Insecta | Coleoptera (L) | Chrysomelidae | Agasicles | - | Species |
| Arthropoda | Insecta | Coleoptera (L) | Chrysomelidae | Galerucella | - | Species |
| Arthropoda | Insecta | Coleoptera | Curculionidae (A) | - | - | Genus |
| Arthropoda | Insecta | Coleoptera | Curculionidae (L) | - | - | Family |
| Arthropoda | Insecta | Coleoptera | Dryopidae (L) | - | - | Family |
| Arthropoda | Insecta | Coleoptera | Elmidae | - | - | Species |
| Arthropoda | Insecta | Coleoptera | Staphylinidae | - | - | Family |
| Arthropoda | Insecta | Coleoptera | Staphylinidae | Stenus | - | Genus |
| Arthropoda | Insecta | Diptera | - | - | - | Genus |
| Arthropoda | Insecta | Diptera | Ceratopogonidae | - | - | Family |
| Arthropoda | Insecta | Diptera | Ceratopogonidae | Atrichopogon | - | Genus |
| Arthropoda | Insecta | Diptera | Ceratopogonidae | Clinohelea | - | Genus |
| Arthropoda | Insecta | Diptera | Ceratopogonidae | Dasyhelea | - | Genus |
| Arthropoda | Insecta | Diptera | Ceratopogonidae | Forcipomyia | - | Genus |
| Arthropoda | Insecta | Diptera | Ceratopogonidae | Palpomyia/bezzia grp. | Palpomyia/bezzia grp | group |
| Arthropoda | Insecta | Diptera | Ceratopogonidae | Stilobezzia | - | Genus |
| Arthropoda | Insecta | Diptera | Chaoboridae | Chaoborus | - | Genus |
| Arthropoda | Insecta | Diptera | Chironomidae | - | - | Species |
| Arthropoda | Insecta | Diptera | Chironomidae | Ablabesmyia | (Karelia) grp. | group |
| Arthropoda | Insecta | Diptera | Chironomidae | Ablabesmyia | rhamphe grp. | group |
| Arthropoda | Insecta | Diptera | Chironomidae | Acamptocladius | - | Genus |
| Arthropoda | Insecta | Diptera | Chironomidae | Antillocladius | - | Genus |
| Arthropoda | Insecta | Diptera | Chironomidae | Apedilum | - | Genus |
| Arthropoda | Insecta | Diptera | Chironomidae | Axarus | - | Genus |
| Arthropoda | Insecta | Diptera | Chironomidae | Beardius | - | Genus |
| Arthropoda | Insecta | Diptera | Chironomidae | Beckidia | - | Genus |
| Arthropoda | Insecta | Diptera | Chironomidae | Brillia | - | Genus |
| Arthropoda | Insecta | Diptera | Chironomidae | Bryophaenocladius | - | Genus |
| Arthropoda | Insecta | Diptera | Chironomidae | Chaetocladius | - | Genus |
| Arthropoda | Insecta | Diptera | Chironomidae | Chernovskiia | - | Genus |
| Arthropoda | Insecta | Diptera | Chironomidae | Chironomus | - | Genus |
| Arthropoda | Insecta | Diptera | Chironomidae | Chironomus | natchitocheae | Species |
| Arthropoda | Insecta | Diptera | Chironomidae | Chironomus | crassicaudatus | Species |
| Arthropoda | Insecta | Diptera | Chironomidae | Chironomus | stigmaterus | Species |
| Arthropoda | Insecta | Diptera | Chironomidae | Cladopelma | - | Genus |
| Arthropoda | Insecta | Diptera | Chironomidae | Cladotanytarsus | - | Genus |
| Arthropoda | Insecta | Diptera | Chironomidae | Clinotanypus | - | Genus |
| Arthropoda | Insecta | Diptera | Chironomidae | Coelotanypus | - | Genus |
| Arthropoda | Insecta | Diptera | Chironomidae | Conchapelopia | - | Genus |
| Arthropoda | Insecta | Diptera | Chironomidae | Corynoneura | - | Genus |
| Arthropoda | Insecta | Diptera | Chironomidae | Cryptochironomus | - | Genus |
| Arthropoda | Insecta | Diptera | Chironomidae | Cryptotendipes | - | Genus |
| Arthropoda | Insecta | Diptera | Chironomidae | Demeijeria | - | Genus |
| Arthropoda | Insecta | Diptera | Chironomidae | Diamesinae genus P | - | Genus |
| Arthropoda | Insecta | Diptera | Chironomidae | Endochironomus | - | Genus |
| Arthropoda | Insecta | Diptera | Chironomidae | Georthocladius | - | Genus |
| Arthropoda | Insecta | Diptera | Chironomidae | Gymnometriocnemus | - | Genus |
| Arthropoda | Insecta | Diptera | Chironomidae | Harnischia | - | Genus |
| Arthropoda | Insecta | Diptera | Chironomidae | Helopelopia | - | Genus |
| Arthropoda | Insecta | Diptera | Chironomidae | Kiefferulus | - | Genus |
| Arthropoda | Insecta | Diptera | Chironomidae | Krenosmittia | - | Genus |
| Arthropoda | Insecta | Diptera | Chironomidae | Limnophyes | - | Genus |
| Arthropoda | Insecta | Diptera | Chironomidae | Lopescladius | - | Genus |
| Arthropoda | Insecta | Diptera | Chironomidae | Meropelopia | - | Genus |
| Arthropoda | Insecta | Diptera | Chironomidae | Mesosmittia | - | Genus |
| Arthropoda | Insecta | Diptera | Chironomidae | Microchironomus | Harnischia cplx | complex |
| Arthropoda | Insecta | Diptera | Chironomidae | Microtendipes | - | group |
| Arthropoda | Insecta | Diptera | Chironomidae | Monopelopia | - | Genus |
| Arthropoda | Insecta | Diptera | Chironomidae | Natarsia | - | Genus |
| Arthropoda | Insecta | Diptera | Chironomidae | Nilothauma | - | Genus |
| Arthropoda | Insecta | Diptera | Chironomidae | Omisus | - | Genus |
| Arthropoda | Insecta | Diptera | Chironomidae | Orthocladius | - | Genus |
| Arthropoda | Insecta | Diptera | Chironomidae | Pagastiella | - | Genus |
| Arthropoda | Insecta | Diptera | Chironomidae | Parachironomus | - | Genus |
| Arthropoda | Insecta | Diptera | Chironomidae | Parametriocnemus | - | Genus |
| Arthropoda | Insecta | Diptera | Chironomidae | Paraphaenocladius | - | Genus |
| Arthropoda | Insecta | Diptera | Chironomidae | Paratanytarsus | - | Genus |
| Arthropoda | Insecta | Diptera | Chironomidae | Phaenopsectra | - | group |
| Arthropoda | Insecta | Diptera | Chironomidae | Polypedilum | halterale grp. | group |
| Arthropoda | Insecta | Diptera | Chironomidae | Polypedilum | scalaenum grp | group |
| Arthropoda | Insecta | Diptera | Chironomidae | Procladius | - | Genus |
| Arthropoda | Insecta | Diptera | Chironomidae | Pontomyia | - | Genus |
| Arthropoda | Insecta | Diptera | Chironomidae | Psectrocladius | - | Genus |
| Arthropoda | Insecta | Diptera | Chironomidae | Pseudochironomus | - | Genus |
| Arthropoda | Insecta | Diptera | Chironomidae | Pseudorthocladius | - | Genus |
| Arthropoda | Insecta | Diptera | Chironomidae | Pseudosmittia | - | Genus |
| Arthropoda | Insecta | Diptera | Chironomidae | Psilometriocnemus | - | Genus |
| Arthropoda | Insecta | Diptera | Chironomidae | Rheopelopia | - | Genus |
| Arthropoda | Insecta | Diptera | Chironomidae | Smittia | - | Genus |
| Arthropoda | Insecta | Diptera | Chironomidae | Synorthocladius | - | Genus |
| Arthropoda | Insecta | Diptera | Chironomidae | Stenochironomus | - | Genus |
| Arthropoda | Insecta | Diptera | Chironomidae | Stictochironomus | - | Genus |
| Arthropoda | Insecta | Diptera | Chironomidae | Thienemannimyia | Thienemannimyia grp. | group |
| Arthropoda | Insecta | Diptera | Chironomidae | Tvetenia | bavarica grp | group |
| Arthropoda | Insecta | Diptera | Chironomidae | Xestochironomus | - | Genus |
| Arthropoda | Insecta | Diptera | Chironomidae | Zavrelimyia | - | Genus |
| Arthropoda | Insecta | Diptera | Chironomidae | Zavrelimyia | Paramerina | SubGenus |
| Arthropoda | Insecta | Diptera | Corethrellidae | - | - | Genus |
| Arthropoda | Insecta | Diptera | Culicidae | - | - | Genus |
| Arthropoda | Insecta | Diptera | Dixidae | - | - | Genus |
| Arthropoda | Insecta | Diptera | Dolichopodidae | - | - | Family |
| Arthropoda | Insecta | Diptera | Dolichopodidae | Raphium | - | Genus |
| Arthropoda | Insecta | Diptera | Empididae | - | - | Genus |
| Arthropoda | Insecta | Diptera | Ephydridae | - | - | Genus |
| Arthropoda | Insecta | Diptera | Muscidae | - | - | Family |
| Arthropoda | Insecta | Diptera | Psychodidae | - | - | Genus |
| Arthropoda | Insecta | Diptera | Ptychopteridae | - | - | Genus |
| Arthropoda | Insecta | Diptera | Sciaridae | - | - | Family |
| Arthropoda | Insecta | Diptera | Sciomyzidae | - | - | Family |
| Arthropoda | Insecta | Diptera | Simuliidae | - | - | Genus |
| Arthropoda | Insecta | Diptera | Stratiomyidae | - | - | Genus |
| Arthropoda | Insecta | Diptera | Tabanidae | - | - | Genus |
| Arthropoda | Insecta | Diptera | Thaumaleidae | - | - | Genus |
| Arthropoda | Insecta | Diptera | Tipulidae | - | - | Genus |
| Arthropoda | Insecta | Ephemeroptera | - | - | - | Species |
| Arthropoda | Insecta | Ephemeroptera | Caenidae | Caenis | - | Genus |
| Arthropoda | Insecta | Ephemeroptera | Ephemeridae | Hexagenia | - | Genus |
| Arthropoda | Insecta | Heteroptera | - | - | - | Species |
| Arthropoda | Insecta | Heteroptera | Pleidae | - | - | Genus |
| Arthropoda | Insecta | Hymenoptera | - | - | - | Order |
| Arthropoda | Insecta | Lepidoptera | - | - | - | Family |
| Arthropoda | Insecta | Lepidoptera | Crambidae | - | - | Genus |
| Arthropoda | Insecta | Megaloptera | - | - | - | Species |
| Arthropoda | Insecta | Odonata | - | - | - | Species |
| Arthropoda | Insecta | Plecoptera | Plecoptera | - | - | Species |
| Arthropoda | Insecta | Plecoptera | Capniidae | Allocapnia | - | Genus |
| Arthropoda | Insecta | Plecoptera | Leuctridae | - | - | Genus |
| Arthropoda | Insecta | Plecoptera | Nemouridae | Amphinemura | - | Genus |
| Arthropoda | Insecta | Plecoptera | Perlidae | Perlesta placida cplx. | - | complex |
| Arthropoda | Insecta | Plecoptera | Perlodidae | Isoperla | - | Genus |
| Arthropoda | Insecta | Trichoptera | - | - | - | Species |
| Arthropoda | Insecta | Trichoptera | Hydropsychidae | Cheumatopsyche | - | Genus |
| Arthropoda | Insecta | Trichoptera | Hydroptilidae | - | - | Genus |
| Arthropoda | Insecta | Trichoptera | Hydroptilidae | Mayatrichia | - | Species |
| Arthropoda | Insecta | Trichoptera | Lepidostomatidae | - | - | Genus |
| Arthropoda | Insecta | Trichoptera | Limnephilidae | - | - | Genus |
| Arthropoda | Insecta | Trichoptera | Limnephilidae | Ironoquia | - | Species |
| Arthropoda | Insecta | Trichoptera | Philopotamidae | - | - | Genus |
| Arthropoda | Insecta | Trichoptera | Phryganeidae | - | - | Genus |
| Arthropoda | Insecta | Trichoptera | Polycentropodidae | - | - | Genus |
| Arthropoda | Insecta | Trichoptera | Polycentropodidae | Cyrnellus | - | Species |
| Arthropoda | Insecta | Trichoptera | Polycentropodidae | Neureclipsis | - | Species |
| Arthropoda | Malacostraca | Amphipoda | - | - | - | Genus |
| Arthropoda | Malacostraca | Amphipoda | Hyalellidae | Hyalella | azteca | Species |
| Arthropoda | Malacostraca | Decapoda | - | - | - | Genus |
| Arthropoda | Malacostraca | Isopoda | - | - | - | Genus |
| Arthropoda | Malacostraca | Isopoda | Oniscidae | - | - | Family |
| Arthropoda | Malacostraca | Mysidacea | - | - | - | Family |
| Cnidaria | Hydrozoa | Hydroida | Hydridae | Hydra | - | Genus |
| Bryzoa | Phylactolaemata | Plumatellida | Pectinatellidae | Pectinatella | magnifica | Species |
| Bryozoa | Phylactolaemata | Plumatellida | Plumatellidae | Plumatella | - | Genus |
| Kamptozoa | Entoprocta | Loxosomatida | Urnatellidae | Urnatella | gracillis | Species |
| Mollusca | Bivalvia | - | - | - | - | Genus |
| Mollusca | Bivalvia | Veneroida | Corbiculiidae | Corbicula | fluminea | Species |
| Mollusca | Bivalvia | Veneroida | Sphaeriidae | - | - | Family |
| Mollusca | Bivalvia | Veneroida | Sphaeriidae | Eupera | cubensis | Species |
| Mollusca | Gastropoda | - | - | - | - | Genus |
| Mollusca | Gastropoda | Basommatophora | Ancylidae | - | - | Family |
| Mollusca | Gastropoda | Basommatophora | Lymnaeidae | - | - | Genus |
| Mollusca | Gastropoda | Basommatophora | Lymnaeidae | Lymnaea | collumella | Species |
| Mollusca | Gastropoda | Mesogastropoda | Hydrobiidae | - | - | Species |
| Nemertea | - | - | - | - | - | Phylum |
| Nemertea | Enopla | Hoplonemertea | Tetrastemmatidae | Prostoma | - | Genus |
| Platyhelminthes | - | - | - | - | - | Phylum |
| Porifera | - | - | - | - | - | Phylum |