# Stream Condition Index Methods

The Stream Condition Index (SCI) sampling procedure requires specific training and a demonstration of competency due to the expert judgment exercised during field sampling. Individuals conducting this procedure must train with DEP staff (via SCI training workshops and/or participating in field sampling), complete the training requirements outlined in SCI 1200 and pass initial and continuing proficiency demonstrations per SCI 1300. All SCI sampling and analysis shall be conducted according to the requirements of this SCI method and the SCI Primer (Sampling and Use of the Stream Condition Index [SCI] for Assessing Flowing Waters: A Primer [DEP-SAS-001/11]). The SCI Primer provides comprehensive guidance on use of the SCI and other biological measures in the context of specific study objectives. The use of this SCI method must adhere to the assessment principles discussed in the SCI Primer.

## Stream Condition Index Sampling

(Based on *Plafkin, et al., 1989, Rapid bioassessment protocols for use in streams and rivers: benthic macroinvertebrates and fish, EPA/444/4-89-001*; and, *Barbour, et al., Rapid Bioassessment Protocol Manual, EPA/841/B-99-002;* references provided for informational purposes only)

See also the following sections:

###### FT 3001 Physical/Chemical Characterization

###### FT 3100 Aquatic Habitat Characterization

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

##### Equipment and Supplies

###### Completed Physical/Chemical Characterization Field Sheet (FD 9000-3) or other datasheet to capture documentation required in FD 5311

###### Completed Stream/River Habitat Sketch Sheet (FD 9000-4) or other datasheet to capture documentation required in FD 5312

###### Completed Stream/River Habitat Assessment Field Sheet (FD 9000-5)

###### D-frame Dip net (approximate width 0.3m) with No. 30 mesh (approximately 600 µm) and handle marked in 0.1-m increments

###### Two 4-liter wide-mouth plastic jugs (Take extra in case more are needed.)

###### Buffered formalin (See FS 7001, section 1), or non-formalin-based fixative that penetrates and stabilizes tissue without compromising analytical capability (e.g. NOTOXhisto®). Samples may be placed on ice, if sorting is completed within 24 hours of sample collection.

###### Brush

###### Permanent marker

##### Methods

##### The SCI Primer must be read and followed prior to carrying out this SOP. Ensure that the site and conditions are appropriate for the study objectives (see SCI Primer). Visually examine the area or reach to be sampled. Either walk or boat throughout the aquatic system, paying close attention to its physical and habitat characteristics. Be very careful when walking through the system not to disturb aquatic habitats. Such disturbances could lead to inaccurate SCI and/or habitat assessment results. The length of a discrete SCI station consists of a 100-m stretch of stream, and the width is from bank to bank. When possible, establish the 100-m stretch in stream reaches with adequate substrate diversity and availability, intact stream morphology (little or no artificial channelization), adequate flow, and optimal riparian buffer zones, unless study objectives dictate otherwise. Do not sample if site conditions (habitat, hydrology, etc.) are not consistent with study objectives, as described in the SCI Primer.

##### You must be familiar with the rainfall, stage height patterns, and stream flows in the area to be sampled. If you do not know how the water has fluctuated in the stream, do not sample. You must ensure that antecedent hydrologic conditions were sufficient to support the expected stream macroinvertebrate community appropriate for that site, and to avoid SCI failures which are due to natural water level fluctuations.

##### Do not conduct SCI sampling if the velocity is less than 0.05 m/sec (unless study objectives dictate otherwise, see SCI Primer). If the stream has had low flow (low water level and velocity, but not completely dry) with insufficient habitat or velocity for sampling, do not perform the SCI until sufficient habitat has been wetted and the stream has maintained a minimum of 0.05 m/sec velocity for at least 28 days (unless study objectives dictate otherwise, see SCI Primer).

##### If information indicates that the stream has been completely dry (i.e., with no refugia for the aquatic organisms), wait a minimum of six months (180 days) after dry conditions have abated to allow for biological recolonization from the desiccation event. However, if site specific information indicates that a particular stream invertebrate community recovers more quickly than six months, then that site may be sampled prior to 6 months, but not sooner than 3 months after desiccation event. Ensure that the stream has maintained a minimum of 0.05 m/sec velocity for 28 days before performing the SCI (unless study objectives dictate otherwise, see SCI Primer).

##### If the water level is >0.5 meters above recent levels, preventing access to substrates that are inhabited by invertebrates, delay sampling until those substrates are accessible or wait 28 days for the invertebrates to colonize the newly inundated substrates. If you are not confident that the reachable substrates have been inundated for greater than 28 days, do not sample. If water levels have risen, but are < 0.5 meter above the previous level, sample only the ‘deep” habitats where organisms are expected. If the normal stream channel is not accessible (water in floodplain), postpone sampling until the normal stream channel and habitats may be accessed.

##### Complete the Physical/Chemical Characterization per FT 3001 and Stream/River Habitat Assessment per FT 3100. The percent coverage of substrate type refers to how much of each habitat type is actually present and in the water (able to be sampled) at the sampling site.

##### Determine which productive habitats can be considered “major” and the number of sweeps to perform in each habitat type out of the twenty total sweeps per station. Determine the number of major productive habitats at the site per FT 3000. To be considered “major” productive substrate, the habitat must be a productive habitat type and have at least 2m2 area. Generally, the most productive habitat types are as follows: leaf packs, roots, snags, aquatic vegetation (including aquatic mosses such as *Fontinalis*), and rocks. Fine fibrous roots are preferred over larger diameter roots, since they have more surface area, and therefore more areas for organisms to hide. Snags with rough, peeling bark are preferred because they have more hiding places and attachment points for organisms than fresh, smooth snags (e.g., cypress knees, live trees). Jagged rocks with rough architecture (i.e., with nooks and crannies for organisms to hide) are preferred over smooth rocks.

Then, use the following conventions to determine the number of sweeps to perform in each habitat type:

##### If one major productive habitat is present, perform 10 sweeps in that habitat and 10 sweeps in a minor habitat (e.g., sand).

##### If two major productive habitats are present, perform 7 sweeps in each of those habitats and 6 sweeps in a minor habitat (e.g., sand).

##### If three major productive habitats are present, perform 5 sweeps in each of those habitats and 5 sweeps in a minor habitat (e.g., sand).

##### If four major productive habitats are present, perform 4 sweeps in each of those habitats and 4 sweeps in a minor habitat (e.g., sand).

##### If five major productive habitats are present, perform 3 sweeps in each of those habitats and 5 sweeps in a minor habitat (e.g., sand).

Sand, mud/muck, pebbles, and shell hash are sampled as “minor” habitats. Any productive habitats that are present but not abundant enough to be considered “major” must be swept as part of the minor habitats. If sufficient material is not available for performing the specified number of sweeps in a given major productive habitat (e.g., if only 5 sweeps of habitat were available, but 7 sweeps are required as per above), do as many as possible in that habitat type, and perform extra sweeps (in this example, 2 more sweeps) in the other productive habitats. Proper interpretation of benthic collections requires that samples be collected from multiple, best available habitats that are representative of the site.

##### Perform 20 discrete 0.5 m sweeps with the D-frame dip net. A sweep is defined as the area sampled based on the width of the net (approximately 0..3 m) by a 0.5 m length of habitat, and a thickness of 1-2 cm (for leaves, roots, submersed aquatic macrophytes, sand). Sample the available substrates as determined by the above procedures. See the SCI Primer for additional sampling technique information.

##### The most effective way to capture invertebrates is to place the bottom rim of the dip net directly downstream of the area to be sampled. Agitate or dislodge organisms (with hands or brush, where appropriate) from substrates (snags, etc.) working as closely to the net (within 10 cm) as possible. Use your hands or the brush to create water flow into the net and make sure the disturbed material and organism mixture is completely collected by the net. Start with the net at the downstream portion of the habitat and move in an upstream pattern until organisms from the 0.5 m area have been captured. Three passes over the same 0.5-meter area are required to capture all organisms. This sampling effort in a discrete 0.5-meter spot is considered to be one sweep. Where a continuous 0.5 m sweep is not available, take two 0.25 m sweeps or three 0.17 m sweeps of the same habitat type to obtain a full 0.5 m sweep.

##### To avoid organism loss, agitate roots, removeable rocks and snags, and submersed macrophytes inside the bag of the dip net. Sample large snags, rocks, macrophytes, and sand as close to the dip net opening as possible. Capture organisms by using your hands or a brush to dislodge them from the substrate and by creating a flow of water into the net, where needed. Make sure the disturbed material and organism mixture is completely collected by the net.

##### To sample aquatic vegetation, place the vegetation in the net when possible, or place the net directly downstream of the vegetation, and dislodge organisms using your hand, covering a 0.5 m area. Do not sample inundated terrestrial vegetation; if terrestrial vegetation has been inundated due to elevated water level, sampling may not be appropriate. Sample submersed aquatic mosses such as *Fontinalis* as aquatic vegetation, if the predominant length is 15 cm or greater (approximately the length of your hand). If the moss is shorter and more mat-like, it should be included as part of the substrate to which it is attached (typically snag).

##### Leaf packs are preferred over leaf mats, but if you collect all the leaf packs in your 100 m sampling area and still need additional sweeps of leaf material, you may finish with leaf mats. Sample leaf packs by placing the net downstream of the leaf pack and use your hands to directly transfer the leaves into the net. The volume of leaves collected must be equivalent to an area described by the width of the dipnet (approximately 0.3 m) by 0.5 m long, with a 1 to 2 cm thickness of leaf material. Once the appropriate volume of leaf material is in the net, leaf material should be reduced in the field. Every effort should be made to reduce the sample volume so that the entire 20 sweep sample will fit into two to three 2- liter jugs. The organisms must be dislodged “one leaf at a time” before discarding “cleaned” leaves. It is critical that there be NO LOSS of organisms during any field reduction of leaf material. When sampling leaf mats, make sure that only the top 1-2 cm of material is collected, and ensure that anaerobic leaf material is not included.

##### When sampling sand or finer sediment, penetrate the sand/sediment with fingers, to approximately 2 cm deep, and lift the organisms from the sand into the waiting dip net. If the flow is weak, create a flow toward the net with your fingers. Feel for partially buried bivalves and ensure they are placed in the net. If the net is pushed into coarse sand or coarse detritus, very little of the sand or detritus will be washed through the net, resulting in a sample that contains few organisms and is hard to process, thus compromising the quality of the entire sample.

##### When performing an upstream/downstream type of study, sample the downstream station first to prevent upstream invertebrates from drifting into a location they did not originally inhabit. If you are sampling from a boat, you can get out of the boat and wade in shallow shore areas to obtain the sweeps. You can also approach a habitat with the boat from downstream, agitate and sweep the reachable portion of the habitat (typically by leaning from the bow of the boat), to capture organisms.

##### Record the number of sweeps for each habitat.

##### Reduce the sample volume after sample collection by dislodging organisms from larger debris (but retaining invertebrates in the net) and discarding the debris. Save finer debris plus organism mixture in large wide-mouth jugs. Every effort should be made to reduce enough of the sample volume in the field so that no more than four to eight liters (two to four 2-liter jugs) of material are collected. If this is not possible due to unusual circumstances, put the material into additional jugs. Additional sample reduction will occur in the laboratory. The relative proportions of the organisms collected must be maintained intact to calculate many community metrics. Indicate on the label in how many jugs the entire sample is contained (e.g., “1 of 2,” “2 of 2”).

##### Sample Preservation and Handling

##### Preserve with 10% buffered formalin or non-formalin fixative that penetrates and stabilizes tissue without compromising analytical capability (e.g.NOTOXhisto®) (do this by adding one part of 100% buffered formalin to the jug with nine parts ambient water, or by filling up the entire jug with 10% buffered formalin or non-formalin fixative as described above).

##### If samples are immediately iced and can be sorted within 24 hours, the use of a chemical fixative is optional. Use 10% formalin or non-formalin fixative, per section 3.1 above, to preserve iced samples that will not be sorted within 24 hours.

##### See SCI 2100 for laboratory and calculation procedures for Stream Condition Index determination.

### Stream Condition Index Sampling Records

##### Document required information for the Physical/Chemical Characterization (see FD 5311) and Stream/River Habitat Assessment (Form FD 9000-5) appropriate for the water body sampled.

##### Record the following for each sample:

###### Number of sweeps for each habitat

###### Number of containers per sample

* Preservative used

## Training for SCI Sampling

##### Training for SCI Sampling: Personnel anticipating performing Stream Condition Index (SCI) sampling according to SCI 1100 shall complete the training specified in FDEP Form FD 9000-35, Stream Condition Index Training and Evaluation Checklist and Event Log.

##### Qualifications for SCI Sampling: Personnel submitting data to DEP from macroinvertebrate sampling according to SCI 1100, Stream Condition Index Sampling for the purpose of determining biological indices as calculated per SCI 2100, Stream Condition Index (SCI) Determination shall successfully complete an audit administered by DEP according to SCI 1300, Proficiency Criteria for SCI Sampling.

## Proficiency Criteria for SCI Sampling

##### Scope and Applicability

This auditing protocol is applicable to stream and river benthic macroinvertebrate sampling procedures described in SCI 1100 and the SCI Primer.

##### Personnel must complete the training topics in SCI 1200, section 1 and be familiar with FA 5720 prior to requesting an audit.

##### Personnel wishing to submit data to DEP associated with the procedures in SCI 1100, Stream Condition Index sampling for the purpose of determining biological indices as calculated per SCI 2100, Stream Condition Index (SCI) Determination shall be audited by DEP according to the auditing protocol described in section 2 below and produce a satisfactory evaluation and score according to the audit and scoring criteria listed below in sections 3 & 4 prior to collecting samples.

##### After the initial demonstration of proficiency, personnel performing the procedures in SCI 1100, Stream Condition Index sampling for the purpose of determining the SCI as calculated per SCI 2100, Stream Condition Index (SCI) Determination shall undergo a refresher audit every five years as described below in sections 5 & 6.

##### First-Time Auditing Protocol for SCI Sampling

##### First-Time audit candidates must pass a test of SCI concepts and provide a copy of completed training form FD 9000-35 before undergoing the field audit.

##### General Field Auditing Protocols

##### Audits are conducted in an appropriate field setting selected by DEP.

##### Audit candidates are required to provide proper equipment in good working order necessary to conduct sampling.

##### Audit candidates will be asked a series of questions designed to evaluate their conceptual knowledge of appropriate sampling methods.

##### Audit candidates are expected to demonstrate satisfactory skill in performing the procedures detailed in the SCI sampling SOPs.

##### Audit candidates are expected to discuss habitat assessment concepts at the SCI audit site (FT 3100).

##### First-Time Auditing Evaluation Criteria for SCI Sampling

Personnel must demonstrate a satisfactory working knowledge of and demonstrate the ability to perform the following:

##### Identify the best available habitats in a 100-meter stream reach (snags, leaf packs, roots, aquatic plants, rock (e.g., limestone, weathered concrete).

##### Identification of best available habitat must include the following:

##### Length of inundation considered

##### Siltation and sedimentation effects considered

##### Condition of leaf packs

##### Flow considerations taken into account

##### Discuss and recognize circumstances where SCI sampling should be postponed, (e.g., in the event of recent increase in water level or prolonged dry period).

##### Know correct number of dip net sweeps for SCI (20).

##### Properly apportion dip net sweeps to available habitats.

##### Efficiently capture invertebrates during dip net sweeps while properly agitating substrates with at least 3 passes of the dip net along a 0.5-meter sample sweep length (sweep length sampled is 0.5 meters, plus or minus 0.1 m, without consistently high or low bias).

##### Sample only productive portions of habitats while not diluting sample with unproductive detritus.

##### Properly transfer sampled material to sample container (SCI) without sample loss.

##### First-Time Audit Evaluation Scoring for SCI Sampling

To pass the test in section 2 above, the audit candidate must attain a score of 90% correct answers. For mastery of each component in section 3 above, 1 point is awarded. Only 0.5 point is awarded if the applicable component is evaluated as partially correct. To pass, only 0.5 point can be missed.

##### Refresher Auditing Protocol for SCI Sampling

##### Refresher audit candidates must pass a test of SCI sampling concepts. The test shall be completed by each individual wishing to conduct SCI sampling and submit SCI results to FDEP, without assistance from others.

##### Field refresher audit consistency demonstration procedures for SCI

##### Refresher audit candidates shall coordinate refresher SCI sampling with FDEP to avoid sampling by multiple teams within a short timeframe.

##### Refresher audit candidates shall conduct SCI sampling, following SCI 1100, at a designated stream site, known to exhibit low variability of SCI scores. Sampling shall be conducted by a typical team of one or more samplers from the same organization. More than one sampler on the team may be conducting the SCI for a refresher audit, but the team must only collect one sample for the audit. Process the SCI sample as directed in SCI 2100 by the means typical for the audit candidate organization. The sampling organization should ensure by sufficient communication with the analyzing laboratory that processing of the SCI sample and calculation of the SCI score conforms to the requirements of SCI 2100.

##### Submit the resulting SCI score to DEP.

##### DEP may solicit additional field or lab documentation, listed in SCI 1110, SCI 2110, SCI 2211 and SCI 2221, as needed. The field and lab documentation will be evaluated separately to determine that the sampling and analysis were performed according to applicable requirements in SCI 1000.

##### Refresher Audit Evaluation Scoring for SCI Sampling

##### To pass the test in section 5.1 above, the audit candidate must attain a score of 90% correct answers.

##### The resulting score from the sampling event in section 5.2.1 above must not be more than 20 points lower than the median SCI score for the designated site. This 20-point margin represents 1.5 times the Minimum Detectable Difference for the SCI method.

# Stream Macroinvertebrate Laboratory Procedures and Index Determination

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

## Stream Condition Index (SCI) Determination

##### Definition: The SCI is a community-based biological assessment of stream health using benthic macroinvertebrates sampled via 20 sweeps of a D-frame dip net, with organisms identified to the lowest practical taxonomic level (SCI 2230).

##### Sampling

##### Perform physical/chemical characterization and habitat mapping according to FT 3001.

##### Perform a habitat assessment according to FT 3100.

##### Conduct SCI sampling according to SCI 1100.

##### See the SCI Primer for additional information about sampling.

##### Laboratory Analyses

##### Sample Preparation

##### Equipment and Supplies

###### Waterproof paper

###### Permanent marker

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

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

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

###### Random number table

###### 250-mL glass jars

###### 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 or equivalent safety gloves

###### Properly fitted respirator

###### Safety glasses

##### Methods

##### Make two labels to go into each vial of picked bugs (one vial for each of two replicates) that clearly identify 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 should go through the sieve and collect in the bucket. Once the sample is finished draining, pour the waste formalin into the proper container. Follow proper safety protocols (personal protective equipment, ventilation and handling) when handling samples preserved with formalin.

##### 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 3.1.2.3 and 3.1.2.4 until the entire sample from all the jugs has been processed. Visually inspect large debris (leaves, plants, twigs) held in the pan for organisms before discarding. This inspection is best accomplished by observing the material with a lighted magnifier. Randomly place found organisms into the sieve.

##### 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 the selected squares, in their entirety, and place in another labeled, gridded tray. Thoroughly mix the sample in the second tray 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 gridded tray. 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 a final target count of 150 (with an acceptable range of 140-160) organisms**. Note that if the correct counting range cannot be achieved, the calculation of a reliable final score is diminished.** Divide the material in the third tray into aliquots of size sufficiently small to achieve the target number of organisms.

##### Select one aliquot and place it in a Petri dish or other small container. Place the dish under a dissecting scope set at low power (approximately 7x or 10x). In a deliberate, systematic manner, pick every organism from the aliquot and place it into an alcohol-filled vial (clearly identified as per section 3.1.2.1). Do not include any terrestrial organisms or pieces of worms and other organisms without heads. Keep a running total of the number of organisms picked. When started, finish sorting this aliquot in its entirety. Use additional containers to pick organisms from additional aliquots until you reach the target count of 150 (with an acceptable range of 140-160) organisms**.**

##### Save the containers (petri dishes) until you have ten (10), and have a co-worker recheck one randomly selected container as described in SCI 2200. After a container has been checked, you may discard the material in the remaining containers.

##### If you have not reached the minimum target count of 150 (with an acceptable range of 140-160) after completely sorting the previous square from 3.1.2.7, go back to the second tray, randomly select a new square, and continue steps 3.1.2.8-3.1.2.10 until the target count has been obtained. Use whatever size aliquot is necessary to reach the target count of organisms.

##### If you have exceeded the maximum count of 160 organisms, randomly sub sample 150 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 in a gridded tray but its grid number was not selected and no examples of that organism were present in the grids that were selected, you may note that organism as qualitatively observed. Do not include the organism in the analysis.

##### Record the number of squares, grids and aliquots selected from each tray (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. Record the number of aliquots left in the third container and the number of grid squares saved from the second tray. This information will be needed to re-create the divisions the target organism counts fall below the acceptable range during the identification process and more material needs to be sorted.

##### Return to the tray in step 3.1.2.6 and, without re-homogenizing, repeat the entire process from steps 3.1.2.7-3.1.2.14 to obtain a second 150 (with acceptable range of 140-160) count. Place the organisms in a second vial. Both subsamples of 150 organisms will be taxonomically identified as described in sections 3.2 and 3.3 below and used in the SCI calculation.

##### If the entire sample is processed, and there are insufficient individuals for both (or one) of the replicates to achieve the minimum of 140 organisms, this indicates an extremely unusual condition such as an environmental stressor (e.g., toxicity, lack of habitat, desiccation, etc.) or sampling error (e.g., sampling during flood conditions). **If this occurs, a final Stream Condition Index score should not be calculated, and the “X” qualifier should be used during reporting. “X” means there were insufficient individuals present in the sample, suggesting an extreme environmental stressor or sampling error.**

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

##### Slide Preparation: The following procedures are 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* (references provided for informational purposes only).

##### 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

###### 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 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, 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 aquatic mites requires more CMC 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.

##### Retain slides, vials, and associated records for a minimum of five years.

##### Organism Identification (Modified from *Standard Methods for the Examination of Water and Wastewater,* Section *10500C,* Biological Examination, Benthic Macroinvertebrates, Sample Processing and Analysis; reference provided for informational purposes only)

##### 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 section 3.1. Make permanent slide mounts of worms, midges, and mites as necessary according to section 3.2.

##### Identify organisms other than worms, midges, and aquatic mites with a dissecting microscope, unless higher magnification is needed.

##### 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 SCI 2230 for guidance concerning “lowest practical taxonomic level”. Record the individual taxon names on your benchsheet. Enumerate organisms concurrently. Remove the organisms and place them back into the labeled vial with the forceps as you count them 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 SCI 2200. Note reason(s) when specimens are not identified to the lower practical level per Table 2230-1.

##### If several 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, labeled 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 section 3.2.

##### 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 mounted specimens to the lowest practical taxonomic level. See SCI 2230 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 for that taxon 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 taxon 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 SCI 2200).

##### Data Reduction

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

##### Follow the counting and collapsing procedures listed below. Keep a record of the original taxa list and the resulting collapsed list.

##### 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 SCI 2230.

##### 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.

##### Index Calculation

##### Perform the following calculations based on collapsed data as outlined in Section 4.2.

##### Calculate and record the number of long-lived taxa score according to Table SCI 2000-1 (based on Fore et al., 2007 with minor modifications). Use the taxonomic order, family, and genus (or species) name of each taxon to calculate long-lived taxa richness. Taxonomic synonyms present in the current Florida database are also shown as additional information. Long-lived taxa require more than one year to complete their life cycles. Indication of all genera or all species includes only those genera and species found in Florida.

##### Table SCI 2000-1. Long-lived macroinvertebrate taxa of Stream Condition Index (SCI).

| **Order** | **Family** | **Genus** | **Species (Long-lived)** | **Synonyms** |
| --- | --- | --- | --- | --- |
| Decapoda | All families | All genera | All species | NA |
| Basommatophora | Lymnaeidae | *Fossaria* | All species | NA |
| Mesogastropoda | Ampulariidae | *Pomacea* | All species | NA |
| Veneroida | Corbiculiidae | *Corbicula* | All species | NA |
| Unionoida | Unionidae | All genera | All species | NA |
| Odonata | Aeshnidae | *Basiaeschna* | *Basiaeschna janata* | NA |
| Odonata | Aeshnidae | *Boyeria* | All species | NA |
| Odonata | Cordulegastridae | *-* | All species | NA |
| Odonata | Gomphidae | *Gomphus* | All species | *Gomphurus* |
| Odonata | Gomphidae | *Hagenius* | All species | NA |
| Odonata | Gomphidae | *Progomphus* | All species | NA |
| Odonata | Macromiidae | *Macromia* | All species | NA |
| Odonata | Libelluidae | *Somatochlora* | All species | NA |
| Odonata | Libelluidae | *Tetragoneuria* | All species | *Epitheca* |
| Odonata | Petaluridae | *Tachopteryx* | *Tachopteryx thoreyi* | NA |
| Plecoptera | Pteronarcidae | *Pteronarcys* | All species | *Allonarcys* |
| Plecoptera | Leuctridae | All genera | All species | NA |
| Plecoptera | Peltoperlidae | *Tallaperla* | *Tallaperla cornelia* | NA |
| Plecoptera | Perlidae | *Acroneuria* | All species | NA |
| Plecoptera | Perlidae | *Agnetina* | *Agnetina annulipes* | NA |
| Plecoptera | Perlidae | *Eccoptura* | *Eccoptura xanthenes* | *Acroneuria xanthenes* |
| Plecoptera | Perlidae | *Neoperla* | All species | NA |
| Plecoptera | Perlidae | *Paragnetina* | All species | *Banksiana*  *Banksiella* |
| Plecoptera | Perlodidae | *Clioperla* | *Clioperla clio* | *Isoperla clio* |
| Plecoptera | Perlodidae | *Perlinella* | *Perlinella drymo* | *Atoperla ephyre* |
| Plecoptera | Perlodidae | *Perlinella* | *Perlinella ephyre/zwick*i | NA |
| Plecoptera | Perlodidae | *Isoperla* | *Isoperla orata* | NA |
| Megaloptera | Corydalidae | All genera | All species | NA |
| Trichoptera | Brachycentridae | *Brachycentrus* | *Brachycentrus americanus* | *Oligoplectrum amercanum* |
| Trichoptera | Brachycentridae | *Micrasema* | All species | NA |
| Trichoptera | Calamoceratidae | *Heteroplectron* | *Heteroplectron americanum* | NA |
| Trichoptera | Hydropsychidae | *Diplectrona* | *Diplectrona modesta* | NA |
| Trichoptera | Hydropsychidae | *Macrostemum* | *Macrostemum carolina* | *Macronema carolina*  *Macronemum carolina* |
| Trichoptera | Lepidostomidae | *Lepidostoma* | All species | NA |
| Trichoptera | Leptoceridae | *Ceraclea* | All species | *Athripsodes* |
| Trichoptera | Limnephilidae | *Ironoquia* | *Ironoquia punctatissisma* | NA |
| Trichoptera | Limnephilidae | *Pycnopsyche* | All species | NA |
| Trichoptera | Molannidae | *Molanna* | All species | NA |
| Trichoptera | Phryganeidae | *Banksiola* | *Banksiola concatenata* | *Neuronia concatenata* |
| Trichoptera | Phryganeidae | *Ptilostomis* | *Ptilostomis postica* | *Neuronia postica* |
| Trichoptera | Phryganeidae | *Agrypnia* | *Agrypnia vestita* | NA |
| Trichoptera | Psychomyiidae | *Lype* | *Lype diversa* | NA |
| Trichoptera | Rhyacophilidae | *Rhyacophila* | All species | NA |
| Trichoptera | Uenoidae | *Neophylax* | All species | NA |

##### Calculate and record the number of sensitive taxa, score according to Table SCI 2000-2 (based on Fore et al., 2007 with minor modifications). These taxa are identified as sensitive to human disturbance. Synonyms in the current Florida database are also included as additional information. Indication of all genera or all species includes only those genera and species found in Florida.

##### Table SCI 2000-2. Sensitive macroinvertebrate taxa of Stream Condition Index (SCI).

| **Order** | **Family** | **Genus** | **Taxon (sensitive)** | **Synonyms** |
| --- | --- | --- | --- | --- |
| Acariformes | Lebertiidae | *Lebertia* | All species | NA |
| Amphipoda | Crangonyctidae | *Crangonyx* | All species | NA |
| Coleoptera | Elmidae | *Ancyronyx* | *Ancyronyx variegatus* | NA |
| Coleoptera | Elmidae | *Gonielmis* | All species | NA |
| Coleoptera | Elmidae | *Macronychus* | All species | NA |
| Diptera | Chironomidae | *Microtendipes* | All species | NA |
| Diptera | Chironomidae | *Parametriocnemus* | All species | NA |
| Diptera | Chironomidae | *Polypedilum* | *Polypedilum aviceps* | NA |
| Diptera | Chironomidae | *Rheocricotopus* | All species | NA |
| Diptera | Chironomidae | *Stempellinella* | All species | NA |
| Diptera | Chironomidae | *Tanytarsus* | *Tanytarsus sp. D epler* | NA |
| Diptera | Chironomidae | *Tanytarsus* | *Tanytarsus sp. M epler* | NA |
| Diptera | Chironomidae | *Tribelos* | *Tribelos jucundum* | NA |
| Diptera | Empididae | *Hemerodromia* | All species | NA |
| Diptera | Simuliidae | All genera | All species | NA |
| Ephemeroptera | Baetidae | *Acerpenna* | *Acerpenna pygmaea* | *Baetis pygmaeus* |
| Ephemeroptera | Ephemerellidae | All genera | All species | NA |
| Ephemeroptera | Heptageniidae | All genera | All species | NA |
| Ephemeroptera | Leptophlebiidae | All genera | All species | NA |
| Ephemeroptera | Leptohyphidae | All genera | All species | Tricorythidae |
| Isopoda | Asellidae | *Caecidotea* | All species | *Asellus* |
| Odonata | Macromiidae | *Macromia* | All species | NA |
| Plecoptera | All families | All genera | All species | NA |
| Trichoptera | Hydropsychidae | *Hydropsyche* | All species | NA |
| Trichoptera | Leptoceridae | *Triaenodes* | All species | NA |
| Trichoptera | Philopotamidae | *Chimarra* | All species | NA |
| Trichoptera | Psychomyiidae | *Lype* | *Lype diversa* | NA |

##### Calculate and record the % very tolerant individuals as the number of individuals of very tolerant taxa divided by the total number of individuals in the aliquot, according to the taxa list in Table SCI 2000-3 (based on Fore et al., 2007 with minor modifications). These taxa are identified as very tolerant to human disturbance. Synonyms in the current Florida database are also included as additional information. Indication of all genera or all species includes only those genera and species found in Florida.

##### Table SCI 2000-3. Very tolerant macroinvertebrate taxa of Stream Condition Index (SCI).

| **Order** | **Family** | **Genus** | **Taxon (very tolerant)** | **Synonyms** |
| --- | --- | --- | --- | --- |
| Basommatophora | Ancylidae | *Hebetancylus* | *Hebetancylus excentricus* | NA |
| Basommatophora | Ancylidae | *Laevapex* | All species | NA |
| Basommatophora | Physidae | *Physa* | All species | NA |
| Basommatophora | Planorbidae | All genera | All species | NA |
| Coleoptera | Haliplidae | *Peltodytes* | All species |  |
| Diptera | Chironomidae | *Larsia* | All species |  |
| Diptera | Chironomidae | *Chironomus* | *All species* | *Tendipes, Chaetolabis* |
| Diptera | Chironomidae | *Cladopelma* | All species | NA |
| Diptera | Chironomidae | *Cricotopus* | All species | NA |
| Diptera | Chironomidae | *Cryptochironomus* | All species | NA |
| Diptera | Chironomidae | *Dicrotendipes* | *Dicrotendipes modestus* | NA |
|  |  |  | *Dicrotendipes neomodestus* |  |
| Diptera | Chironomidae | *Glyptotendipes* | All species | NA |
| Diptera | Chironomidae | *Goeldichironomus* | All species | NA |
| Diptera | Chironomidae | *Kiefferulus* | All species | NA |
| Diptera | Chironomidae | *Polypedilum* | *Polypedilum beckae* | *Asheum beckae* *Pedionomus beckae* |
| Diptera | Chironomidae | *Polypedilum* | *Polypedilum illinoiense grp.* | *Polypedilum illnoense* |
| Diptera | Chironomidae | *Polypedilum* | *Polypedilum tritum* | *Chironomus tritum* |
| Diptera | Chironomidae | *Tanypus* | All species | *Pelopia* |
| Diptera | Chironomidae | *Tanytarsus* | *Tanytarsus sp. F epler* | NA |
| Diptera | Stratiomyidae | *Odontomyia* | All species | *Eulalia* |
| Diptera | Tipulidae | *Tipula* | All species | *Nippotipula Playttipula Yamatotipula* |
| Haplotaxida | Naididae | *Bratislavia* | *Bratislavia unidentata* | NA |
| Haplotaxida | Naididae | *Dero* | All species | NA |
| Haplotaxida | Naididae | *Nais* | *Nais communis* complex | *Nais communis*  *Nais elinguis*  *Nais pardalis*  *Nais variabilis* |
| Haplotaxida | Naididae | *Pristina* | *Pristina synclites* | NA |
| Haplotaxida | Tubificidae | *Haber* | *Haber speciosus* | NA |
| Haplotaxida | Tubificidae | *Limnodrilus* | All species | *Camptodrilus* |
| Heteroptera | Mesoveliidae | All genera | All species | NA |
| Hoplonemertea | Tetrastemmatidae | *Prostoma* | All species | NA |
| Lepidoptera | Pyralidae | All genera | All species | NA |
| Lepidoptera | Crambidae | All genera | All species | NA |
| Lumbriculida | Lumbriculidae | *Lumbriculus* | All species | NA |
| Odonata | Libellulidae | *Pachydiplax* | All species | NA |
| Odonata | Coenagrionidae | *Argia* | *Argia sedula* | NA |
| Odonata | Coenagrionidae | *Enallagma* | *Enallagma coecum* | *Enallagma cardenium* |
| Odonata | Coenagrionidae | *Ischnura* | All species | *Anomalagrion* |
| Neotaenioglossa | Hydrobiidae | *Pyrgophorus* | *Pyrgophorus platyrachis* | *Pyrogophorus platyrachis* |
| Neotaenioglossa | Thiaridae | *Melanoides* | All species | NA |
| Rhynchobdellida | Glossiphoniidae | All genera | All species | NA |

##### Count the number of total taxa (taxa richness), Ephemeroptera taxa, and Trichoptera taxa. Calculate the % Dominance (number of individuals of the most abundant taxon divided by the total number of individuals in the aliquot) and % Tanytarsini (number of individuals in the Tanytarsini tribe divided by the total number of individuals in the aliquot).

##### Refer to the FDEP Statewide Biological Database webpage ([https://floridadep.gov/dear/florida-dep-laboratory/content/statewide-biological-database)](https://floridadep.gov/dear/florida-dep-laboratory/content/statewide-biological-database) for the list of macroinvertebrates categorized as clinger and filter feeder (categorization for insects taken from Merritt *et al*., An Introduction to the Aquatic Insects of North America 4th Edition). For clinger taxa, include only those taxa whose sole habit is listed as “clinger.” Calculate percent filter feeders as the number of individuals that are filter feeders divided by the total number of individuals in the aliquot. Count an individual of a taxon for which filter feeding is one of two feeding strategies as 0.5 individuals.

##### Determine region according to Figure SCI 2100-1. Evaluate and record the biological metrics according to the scoring system in Table SCI 2100-1.

##### Follow Steps 5.8-5.12 for each of the two 150 aliquots. If there are less than two aliquots, stop at Step 1 and report a null result with a qualifier of “X” (“too few to calculate”). See also, SCI 2100, section 3.1.2.17, above.

##### Determine the bioregion for the sample and calculate each of the 10 SCI metrics using the appropriate equation in the table above. Based on reference site community similarity, four SCI Bioregions have been established for Florida: the Panhandle West, the Big Bend, the Northeast, and the Peninsula. Note: The SCI is not calibrated for Everglades Bioregion, the Southern Florida Coastal Plain, where few natural streams exist.

##### Change any of the resulting individual SCI metrics score that are >10 to 10 and any that are <0 to 0.

##### Sum the 10 SCI metric scores.

##### Divide the sum of scores by 0.9. Do not round the result to get the aliquot score.

##### Average the two aliquot scores from step 5 and round to the nearest integer (decimal portions <.50 round down; >=.50 round up). If the value is greater than 100, report 100 as the result.

##### References

##### Beckett, D.C. and Lewis, P.A., An Efficient Procedure for Slide Mounting of Larval Chironomidae, Trans. Amer. Microsc. Soc. V. 101, pp. 96-99, 1982. (reference provided for informational purposes only)

##### Epler, J., Identification Manual for the Larval Chironomidae (Diptera) of Florida,1992. (reference provided for informational purposes only)

##### Pluchino, E., Guide to the Common Water Mite Genera of Florida,1984. (reference provided for informational purposes only)

##### Merritt, R.W., Cummins, K.W., and M.B. Berg, An Introduction to the Aquatic Insects of North America, Fourth Edition, 2008 (reference provided for informational purposes only).

##### Fore, L., R.B. Frydenborg, D. Miller, T. Frick, D. Whiting, J. Espy, and L. Wolfe. Development and Testing of Biomonitoring Tools for Macroinvertebrates in Florida Streams, Florida Department of Environmental Protection, 2007. (reference provided for informational purposes only)

##### “Sampling and Use of the Stream Condition Index (SCI) for Assessing Flowing Waters: A Primer”, FDEP, Standards and Assessment Section, DEP-SAS-001/11.

Map

Description automatically generated

**Figure SCI 2100-1. Map of SCI-2012 Regions.**

The Panhandle region includes the Perdido Hydrologic Unit Code (HUC), the Ochlockonee HUC, and all HUCs in between these basins. The Big Bend region includes the St. Marks HUC on its western side, the Upper Suwannee, Santa Fe, and Lower Suwannee on its eastern side, and all HUCs in between. The Northeast region includes the St. Mary’s and Nassau HUCs, and portions of the Lower St. Johns HUC representing tributaries north of the point on the St. Johns River defined by latitude 29.9466 and longitude -81.5927. The northern extent of the Peninsula region is defined by, and includes, the Waccasassa, Ocklawaha, and Upper East Coast HUCs, and the portion of the Lower St. Johns HUC representing tributaries south of the point on the St. Johns River defined by latitude 29.9466 and longitude -81.5927. The southern extent of the Peninsula region follows the southern boundary of the Peninsular Numeric Nutrient Criteria Peninsula stream region boundary, including the freshwater portions of the Imperial River Basin in the Peninsula region. Note that the SCI has not yet been calibrated for the Everglades Region.

**Table SCI 2100-1**

**SCI metric scoring formulae for converting metric values to a metric score ranging from 0 to 10.** In each equation, ‘X’ stands for the raw metric value; “ln” stands for the natural log.

| **SCI metric** | **Northeast** | **Big Bend** | **Panhandle West** | **Peninsula** |
| --- | --- | --- | --- | --- |
| Total number of taxa | 10 \* (X-15)/27 | 10 \* (X-17)/23 | 10 \* (X-19)/28 | 10 \* (X-15)/24 |
| Number of Ephem. taxa | 10 \* X /5 | 10 \* X /5 | 10 \* X /8 | 10 \* X /5 |
| Number of Trichoptera taxa | 10 \* X /8 | 10 \* X /7 | 10 \* (X-1) /9 | 10 \* X /7 |
| % Filterer individuals | 10 \* (X-0.7)/40.5 | 10 \* (X-1)/53 | 10 \* (X-2.7)/47 | 10 \* (X-0.7)/43 |
| Number of Long-lived taxa | 10 \* X /4 | 10 \* X /3 | 10 \* X /5 | 10 \* X /3 |
| Number of Clinger taxa | 10 \* X /10 | 10 \* X /8 | 10 \* (X-2) /10 | 10 \* X /7 |
| % Dominant taxon individuals | 10 - ( 10 \* [ ( X-11)/48 ] ) | 10 - ( 10 \* [ ( X-12.5)/54 ] ) | 10 - ( 10 \* [ ( X-10.5)/36 ] ) | 10 - ( 10 \* [ ( X-14)/50 ] ) |
| % Tanytarsini individuals | 10 \* [ ln( X + 1) /3.2] | 10 \* [ ln( X + 1) /3.1] | 10 \* [ ln( X + 1) /3.2] | 10 \* [ ln( X + 1) /3.4] |
| Number of Sensitive taxa | 10 \* X /13 | 10 \* X /10 | 10 \* (X-2) /15 | 10 \* X /7 |
| % Very tolerant individuals | 10 - (10 \* [ ln( X + 1)/4.1 ] ) | 10 - (10 \* [ (ln( X + 1)-0.6)/3.6 ] ) | 10 - (10 \* [ ln( X + 1)/3.3 ] ) | 10 - (10 \* [(ln( X + 1)-0.7)/4.0 ] ) |

### Required Documentation for Laboratory Procedures for Stream Condition Index (SCI) Determination

Record the following for all SCI laboratory procedures and index determinations:

###### Laboratory sample receipt or log-in record

###### Site, sample identification number, STORET station number, sample type, replicate number and date collected

###### Identification of sample collectors

###### Number of grids, squares and aliquots selected and sorted (e.g., 8 grids out of 24 total sample grids)

###### Date of sorting completion

###### Total number of mounted microscope slides, mounting date for each slide, unique label identification for each slide and identification of mounter(s) for each slide for all sorted samples

###### Total number of individuals for each taxon for each of the 150-organism aliquots

###### Name of any organism removed from the sorted sample for reference collection

###### Name of each taxon identified for each of the 150-organism aliquots

###### Total number of taxa identified for each of the 150-organism aliquots

###### Total number of individual organisms identified for each of the 150-organism aliquots

###### Reason(s) why specimens are not identified to the lowest practical level per Table SCI 2230-1, as applicable

###### Data entry into the Florida Statewide Biological Database (DEP staff only)

###### Method and notes for counting and collapsing taxonomic data for each of the 150-organism aliquots

###### Collapsed taxa list for each of the 150-organism aliquots

###### Index calculations per SCI 2100, section 5 for each of the 150-organism aliquots:

###### Long-lived taxa

* + Sensitive taxa
  + % Very tolerant taxa
  + Taxa richness (total taxa)
  + Number of Ephemeroptera taxa
  + Number of Trichoptera taxa
  + % Dominant taxa
  + Number of Tanytarsini
  + Number of clinger taxa
  + % Filter feeders

###### SCI metrics as scored per Table SCI 2100-1 for each of the 150-organism aliquots

###### Final SCI score (average of 2 aliquots)

###### Label identification of archived vials of sorted organisms linked to sample identification data required in this section

###### Label identification of archived mounted slides (midges/worms/mites) linked to sample identification data required in this section

## Laboratory Quality Control for Macroinvertebrate Taxonomic Identification (Also included as LQ 7400)

Perform these general quality control procedures, as applicable, when using SCI 2100 and BRN 2100,

##### Establish and maintain a current reference collection with specimens that have been verified by an expert with specific training in macroinvertebrate taxonomy. The reference collection shall contain at least one specimen of all taxa identified.

##### Retain extramural experts with specific training in macroinvertebrate taxonomy to verify identifications.

### Laboratory quality control for macroinvertebrate sorting (Also included in LQ 7410)

##### Perform the following quality control check on all SCI lab replicates sorted in the laboratory for SCI 2100 (Stream Condition Index).

##### After sorting all organisms from aliquots of an original field sample or subsample, separately retain the material remaining from each of the sorted aliquots for quality control (QC) checking (see SCI 2100 Section 3.1.2.10).

##### Have a second analyst randomly select one of the sorted aliquots (see SCI 2100 Section 3.1.2.9) and perform a QC check for sorting efficiency by examining the aliquot and retrieving and counting any organisms found.

##### After all organisms sorted from the replicate have been counted and identified, record the total number of organisms found in the subsample and the total number found in all QC checks. Determine the sorting efficiency according to the formula in section 1.4 below.

##### Calculate the sorting efficiency for the replicate using the following formula:

*Sorting efficiency (%) = [Total organisms − QC organisms] ÷ Total organisms × 100*

Where:

Total organisms≡ Total number of organisms counted (sorted) in the replicate plus QC organisms

QC organisms ≡ Total number of organisms counted (sorted) in the QC check(s) for the aliquot(s)

NOTE: This is not a statistical representation of the *true* proportion of organisms captured or missed during the sorting process. Sorting efficiency must be calculated as described in this section to apply limits in (2) below.

##### Perform the sorting efficiency QC check (sections 1.1 – 1.3 above) for 10% of all aliquots processed for each original SCI lab replicate.

##### Record the sorting efficiency for each analyst.

##### The target control limit for *cumulative* sorting efficiency including all SCI lab replicates over a 12-month period is 95% as calculated in section 1.4 above.

##### Take precautionary measures when single-analyst cumulative sorting efficiency falls below 95%.

##### Take corrective action when single-analyst cumulative sorting efficiency including all replicates over a 12-month period falls below 90% as calculated in section 1.4 above.

#### Required Documentation of Quality Control for Macroinvertebrate Sorting (Also included as LD 7231)

###### Total organisms as defined in SCI 2210, section 1.4

###### QC organisms as defined in SCI 2210, section 1.4

###### Original field sample identification

###### Cumulative sorting efficiency for each analyst

### Laboratory Quality control for Macroinvertebrate Taxonomic Identification (Also included in LQ 7420)

Use the QC procedures in this section for all wet identifications and for all slide-mounted identifications of midges, worms and mites.

##### Quality control frequency: Perform the following quality control procedure for 5% of all SCI laboratory replicates processed and enumerated, or at least one replicate per year.

##### Quality control Acceptance criteria

##### The target single-analyst cumulative correct identification rate is 95% of the total number of individual organisms including all replicates over a 12-month period and 95% of taxa identified in all replicates enumerated by the analyst (5% cumulative error rate) over a 12-month period.

##### Similarly, control performance for analysts enumerating organisms for subgroups of taxonomic specialty according to the same criteria above.

##### Quality control procedure

##### Randomly select 5% of the processed and enumerated replicates for QC checking or at least one replicate per year. *The selected replicates are defined as QC samples.*

##### Have a second taxonomist identify the organisms in the QC samples to the lowest practical taxonomic level (see Table SCI 2230-1, below) using the most appropriate taxonomic key for each taxonomic group.

##### Record the name and number of individual organisms identified for each taxon enumerated in the QC sample.

##### Record the identification of the original field sample or subsample checked, the date of the QC check and the name of the taxonomist performing the QC check.

##### Obtain the original SCI lab replicate enumeration data and compare with the data obtained from the QC check above. If there is a disagreement with an identification, consult with the original taxonomist until a consensus is reached, utilizing additional experts as warranted.

##### Record all taxonomic discrepancies and comments associated with the QC check for the original field sample or subsample.

##### Calculate and retain cumulative performance data for each taxonomist according to each area of taxonomic proficiency, per the criteria in section 2 above.

##### Calculate the cumulative ID rate using the following formula:

Cumulative ID rate = 100 \* 1 – (sum taxonomist total – sum agreed upon total)

sum agreed upon total

#### Required Documentation of Quality Control for Macroinvertebrate Taxonomic Identification and Enumeration (also included as LD 7232)

##### Documentation of Quality Control for Wet and slide-mounted Enumerations

##### Single-analyst cumulative identification error rate for total number of organisms identified

##### Single-analyst cumulative identification error rate for total number of taxa identified

##### Identification of original field sample and SCI lab replicate QC-checked (*QC sample*, as defined in SCI 2220, section 3.1)

##### Results for each original field sample or subsample, including number of organisms identified for each taxon

##### Results for each corresponding QC sample, including number of organisms identified for each taxon

##### Name of taxonomist identifying original sample or subsample

##### Name of taxonomist performing the QC sample analysis

##### Date of each original field sample or subsample analysis

##### Date of each QC sample analysis

##### Additional comments associated with the QC check, including noted discrepancies and resolutions with the original field sample or subsample enumeration

##### Documentation for DEP Taxonomic QC round-robin Samples

Document the following for all data generated under the DEP Taxonomic Round-Robin program (see SCI 2200, section 3).

##### Record relevant information for round-robin sample enumerations per section 1 above.

##### Retain all correspondence, data sheets, resolutions concerning discrepant results and all reports of results associated with round-robin samples.

Document and retain all correspondence and associated records for any corrective actions implemented pursuant to round-robin results

### Taxonomic Effort for Freshwater Macroinvertebrate Identifications (also included as Table LT 7900-1)

The table below (Table SCI 2230-1) is intended to provide guidance on defining the lowest practical taxonomic level for freshwater taxa encountered in SCI and BioRecon samples. Identify organisms at least to this level unless specified by another method (*e.g*., the Biorecon procedure specifies a reduced taxonomic effort for worms, mites and midges). 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 SCI 2230-1**

| **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. | - | Genus |
| 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 |