Invertebrate Sorting Quality Control (QC)

1. SCOPE AND APPLICATION

1.1 This Standard Operating Procedure (SOP) details the procedure for determining when an Invertebrate Group analyst is considered proficient at sorting macroinvertebrate samples.

1.2 This SOP details the procedure for assessing continuing proficiency of an Invertebrate Group analyst who has already been deemed proficient in sorting macroinvertebrate samples.

1.3 This SOP applies to any type of macroinvertebrate sample with a Laboratory Information Management System (LIMS) test code beginning with MI-.

2. SUMMARY OF METHOD

2.1 New analysts in the Taxonomy Invertebrate Group of the DEP Laboratory Biology program, who will be performing macroinvertebrate sample preparation begin by training on sorting macroinvertebrate samples. This procedure occurs regardless of prior training, although an employee with prior training and/or experience may proceed through the process faster than one with less training and/or experience.

2.2 During training, all sorting dishes are checked by a proficient analyst. Trainees attaining ≥ 95% picking efficiency for 3 consecutive samples are considered proficient, and an Initial Documentation of Proficiency is generated in LIMS.

2.4 Proficient analysts have 1 out of every 10 dishes checked by another proficient analyst. For a continued demonstration of proficiency, a cumulative average of ≥ 95% picking efficiency must be maintained for each month. The corrective action for dropping below the continued demonstration is to go back onto training status until they can demonstrate the required proficiency.

2.5 All sorting forms are kept in a laboratory notebook and QC results are tracked on a spreadsheet so that initial proficiency and continuing proficiency can be monitored.

3. APPARATUS AND EQUIPMENT

3.1 Dissecting microscope
3.2 Forceps
3.3 100 x 15 mm Petri dish
3.4 20 mL scintillation vial
3.5 Squeeze bottle with 80% Ethanol
3.6 Laboratory counter
3.7 List of random numbers or approved random number generator (such as randomizer.org)

4. REAGENTS AND CHEMICALS

4.1 Ethanol (80%) – prepared following SOP IZ-09

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5. SAMPLE COLLECTION, PRESERVATION, AND HANDLING

5.1 Samples are collected, preserved, and delivered to the lab according to FS 7000: *General Biological Community Sampling*, SCI 1000: *Stream Condition Index Methods*, or BRN 1000: *Biological Reconnaissance Field Methods*.

5.2 Samples are checked into the laboratory per SOP IZ-01.

6. SAMPLE PREPARATION PROCEDURE

6.1 Samples are prepped per one of the following SOP IZ-02, IZ-03, IZ-04, or IZ-39, depending on the type of sample.

7. SAMPLE ANALYSIS PROCEDURE

7.1 Record the information for the sample being processed on the Macroinvertebrate Sample Sorting Form.

7.2 Following SOP IZ-02, IZ-03, IZ-04, or IZ-39, depending on the type of sample, remove all organisms from an aliquot of the sample material contained in a petri dish. Place each organism into a properly labeled 20-mL scintillation vial filled with 80% ethanol.

7.3 After removing all organisms from the dish, place the dish cover over the remaining material.

7.4 Continue steps 7.2 and 7.3 until 10 dishes have accumulated or the sample has been completely picked. Select a dish for QC according to the following:

7.4.1 During training, all sorting petri dishes are checked by a proficient analyst.

Note: New invertebrate lab technicians will be assigned a variety of samples (e.g. wetland, springs, Everglades, etc.) to make certain they have seen most of the organisms likely to be encountered in future samples.

7.4.2 After initial demonstration of proficiency, ask a co-worker to randomly select one of the 10 dishes to be checked for sorting efficiency or use a list of random numbers or approved random number generator to select a dish. Only after the QC dish has been selected and checked, may the material in the remaining 9 dishes be discarded.

Note: Regardless of the number of dishes, a QC check must be performed on every sample even if 10 dishes are not accumulated. For samples with > 10 dishes, a QC check must be performed on 1 of each 10 dishes and on 1 of any remaining dishes.

Examples: 7 dishes = 1 QC = 1 of 7

24 dishes = 3 QCs = 1 of 10 + 1 of 10 + 1 of 4

7.5 When the selected QC dish is returned, enter the number of organisms found in the QC check on the Macroinvertebrate Sample Sorting Form. Repeat steps 7.2–7.4 until the sample is completed.

7.6 After the target number of organisms has been reached as per the SOP for the specific sample type being processed, record the total number of organisms and the total number found by co-workers in the QC check(s) on the Macroinvertebrate Sample Sorting Form. Calculate the percent sorting efficiency and record this value on the Macroinvertebrate Sample Sorting Form.

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Proficiency Calculation:

$$\left(\frac{\text{(Total \# Individuals)} - \text{(\# QC individuals)}}{\text{(Total \# Individuals)}} \right) \times 100 = \text{\% Proficiency}$$

7.7 Proficiency:

7.7.1 For an **initial** demonstration of proficiency, the analyst must maintain an average sorting efficiency of ≥ 95% for a minimum of three consecutive samples.

7.7.2 For a **continued** demonstration of proficiency, a cumulative average of ≥ 95% for each month must be maintained.

Note: Proficiency results are recorded in an Excel workbook located in the Invert Group's Sample Prep Information folder.

The date proficiency was achieved should be recorded in LIMS under Laboratory/Administrative/Training and approved by the Taxonomy Supervisor.

7.8 Corrective Actions:

7.8.1 If it is determined from a QC check that an individual has overlooked more than 5% of the macroinvertebrates in a sample, the individual will be notified and the source of the problem will be assessed. The corrective action for dropping below the continued demonstration is for the individual to be placed in training status until able to demonstrate the required proficiency.

7.8.2 Corrective action for sorting deficiencies is approved by the Taxonomy supervisor. Laboratory personnel are notified of problems and corrective action through discussion with supervisor and in conjunction with performance evaluation procedures.

7.9 When all rows on the Macroinvertebrate Sample Sorting Form are filled, place the form in the Macrobenthos Sample Prep Sorting Efficiency Log notebook located in the Biology Section Wet Lab (B205).

8. QUALITY CONTROL AND DOCUMENTATION

8.1 Macroinvertebrate Sample Sorting Form

8.2 Macrobenthos Sample Prep Sorting Efficiency Log notebook

8.3 Use pen with black ink for all logbook and Bench Sheet entries.

8.4 To correct raw data entries, place a single line through the incorrect entry, write the corrected entry near the error, then initial and date the correction. If the correction requires an explanation, write a comment and reference the error.

8.5 DEP Laboratory Information Management System (LIMS)

8.6 Refer to the Laboratory Quality Manual.

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9. SAFETY

9.1 Squeeze bottles must be labeled with the name and concentration of the reagent.

9.2 Refer to the MSDS for information about reagents and chemicals in this SOP.

9.3 Refer to the Laboratory Health and Safety Plan.

10. POLLUTION PREVENTION AND WASTE MANAGEMENT

10.1 Refer to the Laboratory Health and Safety Plan.

11. REFERENCES

11.1 DEP Laboratory Quality Assurance Manual, https://floridadep.gov/dear/florida-dep-laboratory/content/dep-laboratory-quality-assurance-manual-and-sops

11.2 DEP Laboratory Health and Safety Plan, https://floridadep.sharepoint.com/dear/SitePages/Home.aspx

11.3 SOP FS-7000: *General Biological Community Sampling*

11.4 SOP SCI-1000: *Stream Condition Index Methods*

11.5 SOP BRN-1000: *Biological Reconnaissance Field Methods*

11.6 SOP IZ-01: *Sample Arrival/Log-in Procedures*

11.7 SOP IZ-02: *Stream Condition Index (SCI) Sample Preparation*

11.8 SOP IZ-03: *Invertebrate Hester-Dendy Sample Preparation*

11.9 SOP IZ-04: *Invertebrate Core/Grab/Dredge Sample Preparation*

11.10 SOP IZ-09: *Preparation of 80% Ethanol*

11.11 SOP IZ-39: *Macroinvertebrate Subsampling Sample Preparation*

11.12 SOP IZ-SORT-1.1: *Macroinvertebrate Sample Sorting*

Appendix of Significant Changes

02/28/2009	Reformatted the layout following SOP LB-001.
03/10/2010	Renumbered after Section 8 and updated the Invert Group link
03/07/2011	Renamed the Quality Manual and updated the link
11/01/2012	Included additional corrective action details
01/24/2013	This SOP was renumbered from IZ12-2.12 to IZ-40-3.0 to resolve an issue in the LIMS' SOP Expiration Tracker.
12/29/2014	Formatted for 508 compliance.
01/07/2016	Updated name of the Quality Manual, links and SOP references.
12/20/2016	Standardized SOP formatting

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01/08/2020	Revised syntax in Summary, resolved some grammatical errors.
11/16/2023	Updated link to Health and Safety Plan.
11/13/2024	Added approved random number generators as a source of random numbers and updated the reference list.

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