

1. **DESCRIPTION:** Participants will be assessed on their understanding and evaluation of aquatic environments.

A TEAM OF UP TO: 2

EYE PROTECTION: C

APPROXIMATE TIME: 50 minutes

2. **EVENT PARAMETERS:**

- a. Each team may bring one 8.5" x 11" sheet of paper that may contain information on both sides in any form and from any source along with two stand-alone non-programmable, non-graphing calculators, and one salinometer/hydrometer. The sheet of paper may be laminated or contained in a sheet protector.
- b. Participants must wear eye protection during Competition Part III: Water Monitoring and Analysis (3.Part III.). Teams without proper eye protection must be immediately informed and given a chance to obtain eye protection if time allows.

3. **THE COMPETITION:**

- a. Each part of the competition will count for approximately 1/3 of the final score.
- b. Scenarios and tasks will be drawn from freshwater locales (e.g., lake, pond, river) and may require analysis, interpretation or use of charts, graphs, and sample data as well as equipment use, collecting and interpreting data, measuring, analyzing data, and making inferences.

Part I: Freshwater Ecology

- a. This part will consist of multiple choice, matching, fill-in-the-blank and/or short answer questions to assess participant knowledge in areas such as: aquatic ecology, water cycle, nutrient cycling, aquatic chemistry and its implications for life, potable water treatment, wastewater treatment, aquatic food chains/webs, community interactions, population dynamics, watershed resource management issues, sedimentation pollution, and harmful species.
- b. **Division C - State and Nationals only** content includes: life history strategies (e.g., age structure, survival curves, life tables, succession, R and K strategies).

Part II: Macroflora and Fauna Identification

- a. Participants should be able to identify the immature & adult macroinvertebrates and aquatic nuisance organisms listed below by common name and know their importance as indicators of water/wetland quality.
 - i. Class 1 – Pollution Sensitive: Caddisfly, Dobsonfly, Gilled Snails, Mayfly, Riffle Beetle, Stonefly, Water Penny, Water Scorpion
 - ii. Class 2 – Moderately Sensitive: Aquatic Sowbug, Crane Fly, Damselfly, Dragonfly, Scuds
 - iii. Class 3 – Moderately Tolerant: Blackfly, Flatworm, Leeches, Midge, Water Mite
 - iv. Class 4 – Pollution Tolerant: Air Breathing Snail, Midge Fly Bloodworm, Deer/Horse Fly, Tubifex
 - v. Class 5 – Air Breathing: Back Swimmer, Giant Water Bug, Mosquito, Predacious Diving Beetle, Water Boatman, Water Strider, Whirligig Beetle
 - vi. Aquatic Nuisance Plants: Purple Loosestrife, Eurasian Water Milfoil, and Water Hyacinth
 - vii. Aquatic Nuisance Animals: Zebra Mussel, Spiny Water Flea, Asian Tiger Mosquito, & Asian Carp
- b. **Division C teams** are expected to know their general ecology, life cycles, and feeding habits of the immature & adult macroinvertebrates and aquatic nuisance organisms listed above.

Part III: Water Monitoring and Analysis

- a. Teams must build, calibrate, bring and demonstrate a salinometer/hydrometer capable of measuring saltwater (most likely NaCl) concentrations between 1-10% (mass/volume). Points for salinity testing will be approximately 5% of the total score.
- b. There are no restrictions on size except that the team must build the device to operate within a standard 400 – 600 mL beaker filled with the saltwater solution.
- c. Teams will be expected to estimate the percent salinity measured by their device to the nearest tenth. Full credit will be given $\pm 1\%$ at Regionals and $\pm 0.5\%$ at State/Nationals. Calibration solutions may or may not be provided by the event supervisor.
- d. Participants should be able to understand and interpret data related to testing procedures as well as reasons for collecting data related to salinity, pH, phosphates, turbidity, dissolved oxygen, temperature, nitrates, fecal coliform, total solids, biochemical oxygen demand, and their relationship to one another. No actual, physical tests will be performed on these topics.

4. **SCORING:**

- a. High score wins. Points will be assigned to the various questions and problems.
- b. Selected questions may be used as tiebreakers.

Recommended Resources: The Science Olympiad Store (store.soinc.org) carries the Water Quality CD and Bio/Earth Science CD; other resources are on the event page at soinc.org.