WATER QUALITY

See General Rules, Eye Protection & other Policies on www.soinc.org as they apply to every event.

1. **DESCRIPTION:** Participants will be assessed on their understanding and evaluation of **marine and estuary** 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, **which may be** in a sheet protector **sealed by tape** or laminated, that may contain information on both sides in any form and from any source without any annotations or labels affixed, two stand-alone non-programmable, non-graphing calculators, and one participant-built salinometer/hydrometer for testing.
   b. Participants must wear eye protection during Salinometer Testing (**3.Part IV**.). Teams without proper eye protection must be immediately informed and given a chance to obtain eye protection if time allows.

3. **THE COMPETITION:**

   Scenarios and tasks will be drawn from **marine and estuary locales** (e.g., oceans, coral reefs, Chesapeake Bay) and scenarios 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 to evaluate comparative macroinvertebrates and water quality data.

   Part I: Marine and Estuary Ecology – 30% of the total score
   a. This part will use multiple choice, matching, fill-in-the-blank and/or short answers to assess participants' knowledge in areas such as: aquatic ecology, water cycle, nutrient cycling, aquatic chemistry and its implications for life, potable water treatment, waste water treatment, aquatic food chains/webs, community interactions, population dynamics, watershed resource management issues, sedimentation pollution, harmful species **and recently killed coral.**
   b. **Division C - State and Nationals Only**: life history strategies (e.g., age, structure, survival curves, life tables, succession, R and K strategies).

   Part II: Coral Reef Macroflora and Fauna Identification – 30% of the total score
   a. This part will assess participants' knowledge of coral reefs and the ecological factors that have harmful effects on reef ecosystems. It will also include the identification (common name only) of Coral Reef organisms and their importance as indicators of reef health.
   b. Participants are also expected to know the general ecology, life cycles, and feeding habits of the following organisms (note: spp. is an abbreviation for multiple species):
      i. Organisms found around the globe: Banded coral shrimp (***Stenopus hispidus***), Butterfly fish (***Chaetodon* spp.),** Crown of thorns starfish (***Acanthaster planci***), Fleshy algae, Grouper >30 cm (Serranidae, Epinephelinae), Hard coral, Lobster, Long-spined black sea urchins (***Diadema* spp.),** Moray eel (Muraenidae), Parrotfish (>20 cm) (Scaridae or Scarinae), Pencil urchin, Snapper (Lutjanidae), Sponge, Sweetlips (Haemulidae ***Plectorhinchus* spp.**), and Triton ***(Charonia* spp.)**
      ii. Organisms found in the Indo-Pacific region only: Barramundi cod (***Cromileptes altivelis***), Bumphead parrotfish (***Bolbometopon muricatum***), Giant clams (***Tridacna* spp.),** Humphead wrasse ***(Cheilinus undulatus),*** and Sea Cucumber
      iii. Organisms found in the Atlantic region only: Flamingo Tongue Snail ***(Cyphoma gibbosum***), Gorgonia, and Nassau grouper ***(Epinephelus striatus)***

   Part III: Water Monitoring and Analysis – 30% of the total score
   a. Participants are expected to understand and interpret data related to testing procedures and purposes for collecting data related to salinity, pH, phosphates, turbidity, dissolved oxygen, temperature, nitrates, fecal coliform, total solids, biochemical oxygen demand and **aragonite saturation** and their relationships to one another.
   b. No **physical, laboratory** tests will be performed on these topics **by participants**.

Part IV: Salinometer Testing – 10% of the total score

a. Teams must build, calibrate, bring and demonstrate a salinometer/hydrometer capable of measuring saltwater (most likely NaCl) concentrations between 1-10% (mass/volume).
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 **at least 400 mL of** the saltwater solution.
c. Teams will be expected to estimate the percent salinity measured by their device to the nearest tenth of a percent. Full credit will be given ±1% at Regionals and ±0.5% at State/Nationals. Calibration solutions may or may not be provided by the Event Supervisor.

4. **SCORING:**

a. High score wins.
   i. Points will be assigned to the various questions and problems **for Parts I, II, and III**.
   ii. **Points for bringing a salinometer for testing will be 5% of the total score.**
   iii. **Points for making an accurate salinity measurement per 3.Part IV.c will be 5% of the total score.**
b. Selected questions may be used as tiebreakers.

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