



Water Quality C

Macomb Science Olympiad Extravaganza
9 January 2020
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The Basics

- ▶ Supervisor introduction
- ▶ Event will focus on the evaluation of aquatic environments
 - Marine and Estuary locales
- ▶ Four segments
 - Marine & Estuary Ecology (30%)
 - Coral Reef Macro-Flora and Fauna Identification (30%)
 - Water Monitoring and Analysis (30%)
 - Salinometer Testing (10%)
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Question Format

- ▶ Inquiry-based competition to emphasize process skills and mental challenges using suggested content.
 - 15 stations; 3 minutes for each station.
 - Multiple-choice, matching, and fill-in answers.
 - Answer sheets will be provided.
 - Essay questions will be used as tie-breakers
- ▶ Data assessments and interpretations
 - Graphs, food webs, ecological pyramids, life patterns, sampling & population densities, etc.
- ▶ Process skills:
 - Defining variables, forming hypotheses, making calculations and predictions, etc.

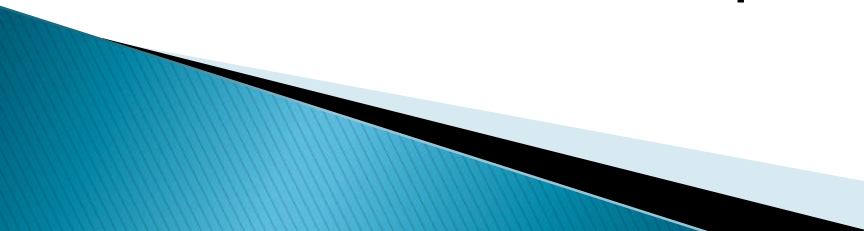
What to bring...

- ▶ Each TEAM may bring only one (1) 8.5 x 11” 2-sided page of notes that contains information in any form from any source.
- ▶ One STUDENT-BUILT salinometer / hydrometer for testing.
- ▶ Up to two (2) non-programmable, non-graphing calculators.
- ▶ **Z87 chemical splash goggles for EACH participant. ANSI/ISEA Z87.1-2015, Cat. C**
- ▶ Pencils and erasers.

Event Sections and Resources

- ▶ Resources for event preparation found at <https://www.soinc.org/water-quality-c>
- ▶ Be sure to read through both the Water Quality C pages from the Rules Manual, and the Training Handout to ensure there are no surprises!

I: WQ Information: Applied Ecological Principles to Estuaries / Marine Ecosystems

- ▶ Aquatic ecology
 - ▶ Water cycle
 - ▶ Nutrient cycling
 - ▶ Aquatic chemistry and its implications
 - ▶ Potable water / wastewater treatment
 - ▶ Aquatic food chains and webs
 - ▶ Community interactions
 - ▶ Population dynamics
 - ▶ Watershed resource management issues
 - ▶ Sedimentation pollution & human impacts
 - ▶ Exotic/harmful species and recently killed coral
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II: Coral Reef Ecology & Macroflora / Macrofauna Identification

- ▶ Assess participants' knowledge of coral reefs and the ecological factors that have a harmful effect on reef ecosystems:
 - Coral reef biology
 - Growth & reproduction
 - Zooanthellae
 - Reef fish communities
 - Reef ecosystems
 - Health indicators
 - The importance of coral reefs
 - Problems associated with pollution
 - Reef systems management

Macro-Flora and Fauna ID

- ▶ Identification of coral reef organisms (common names only), and their importance as indicators of reef health.
- ▶ The general ecology, life cycles, and feeding habits of the following organisms :
 - *Species globally distributed* (Banded coral shrimp, Butterfly fish, Crown of Thorns starfish, Fleshy algae, Hard coral, Lobster, Long-spined black sea urchins, Moray eel, Parrot fish (>20 cm), Pencil urchin, Snapper, Sponge, Sweetlips, and Chiton)
 - *Indo-Pacific species* (Barramundi cod, Bumphead parrotfish, Giant clams, Humphead wrasse, and Sea cucumber)
 - *Atlantic species* (Flamingo Tongue Snail, Gorgonia, and Nassau grouper)

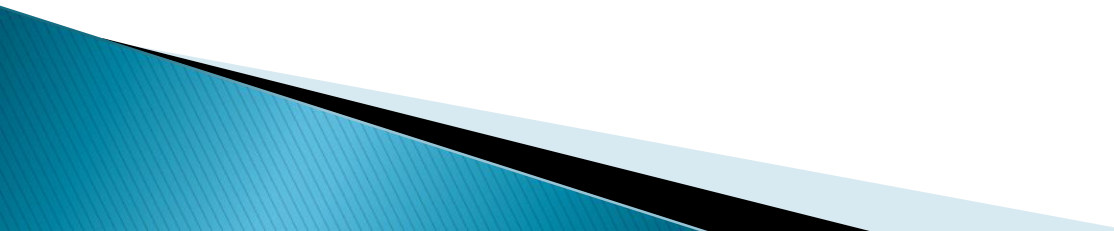
Study Aids for Indicator Species

- ▶ On-line resources
- ▶ Flash cards
- ▶ Collection of actual specimens
- ▶ Create a study binder (segments for each part of the Water Quality competition
 - Copy of the rules
 - Copy of indicator species and groups
 - Developed by students using multiple sources
 - Tabbing and color-coding to organize into related groupings
- ▶ Use of timer to improve efficiency.

III) Water Monitoring & Analysis

- ▶ Understand and interpret data related to test procedures and purposes for each, and how they inter-relate:
 - Salinity (only actual testing with salinometer)
 - pH
 - Phosphates
 - Turbidity
 - Dissolved oxygen (DO)
 - Temperature
 - Nitrates
 - Fecal coliforms
 - Total solids (total residue)
 - Biochemical Oxygen Demand (BOD)
 - Aragonite saturation.

Chemical Analysis (cont'd)

- ▶ Process skills
 - ▶ Equipment use
 - ▶ Collecting/interpreting data
 - ▶ Measurements
 - ▶ Calculations
 - ▶ Classifying
 - ▶ Inferences
 - ▶ Variable analysis
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Salinometer

- ▶ PRIOR TO THE EVENT, Teams must build and calibrate a salinometer/hydrometer capable of measuring saltwater (NaCl) concentrations between 1–10% (mass/volume), to the nearest tenth. This **MUST** be brought to the event! Available points for bringing the hydrometer is approximately 5% of the total score.
- ▶ During the event, this will be used by the team to test 1–3 solutions to determine salinity of each. Points for salinity testing will be approximately 5% of the total score.

Resources!

- ▶ Science Olympiad webpage for Water Quality:
 - http://soinc.org/water_quality_c
 - Water Quality and BioEarth CDs
 - Rules, training handouts for students, etc.
 - Links to websites for EPA, NOAA, etc.
 - Instructions for constructing a simple Salinometer.
- ▶ Scioly wiki for Water Quality Science Olympiad Student Center:
 - <http://scioly.org/wiki/index.php>
 - Forums and examples of past Water Quality tests.

QUESTIONS??

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