The Meadows Center for Water and the Environment

TEKS CURRICULUM GUIDE

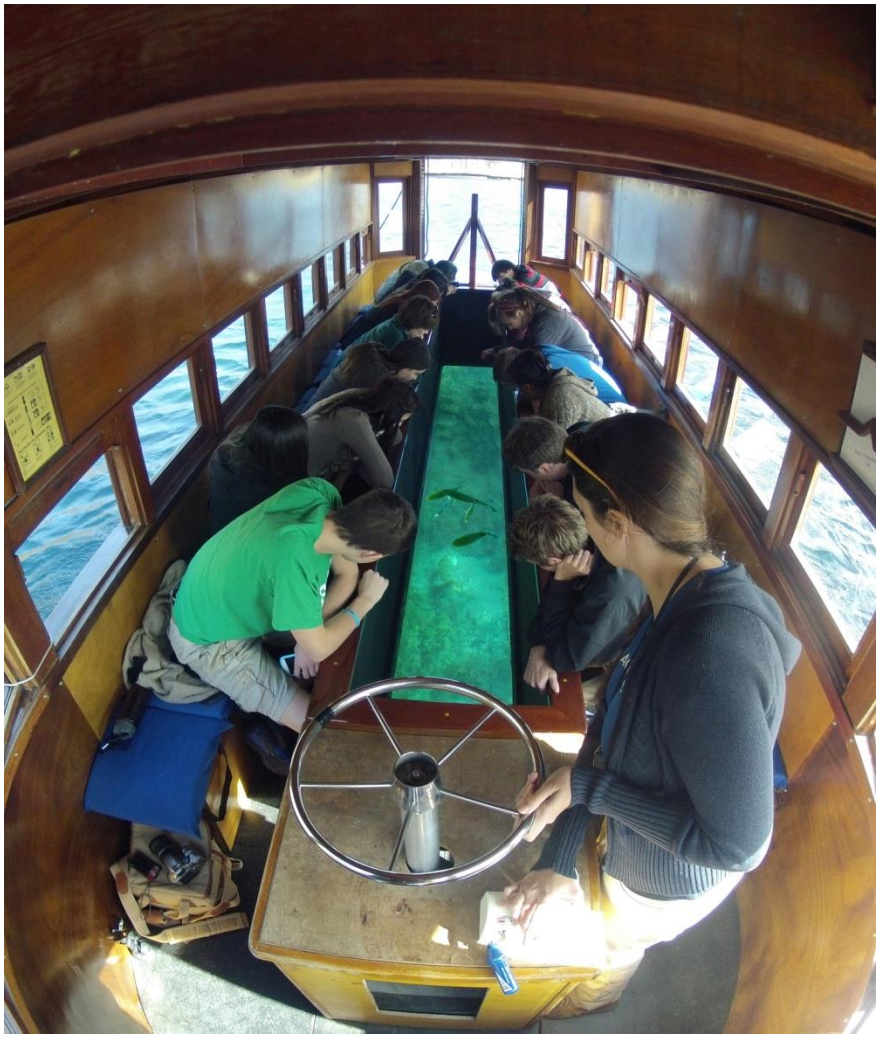
9th-12th Grade

The Meadows Center
for Water and the Environment
Texas State University

The Meadows Center

The Meadows Center Educational Tours mission is to provide people of all ages with the ability to recognize Spring Lake as a unique freshwater ecosystem through interpretative interactive experiences that engages the audience in an exploration of interconnections between all living things and water.

All tours require a two-week advanced reservation. Tour dates are not guaranteed until your confirmation notice from The Meadows Center Education Office has been processed. The listed group rates apply to any group of 15 people or more. Prices subject to change without notice. Listed prices are for school groups and non-profit organizations.



Activities for High School

1. Glass-Bottom Boat Ride

Length: 30 minutes (can be extended to 45 minutes on request during September-February)
As students glide across Spring Lake in glass-bottom boats, they have a rare opportunity to see underwater life from a different perspective. View over 1,000 springs that bubble up 150 million gallons a day of clear water from the Edwards Aquifer to form Spring Lake, the headwaters of the San Marcos River. Declared a critical Habitat by the Federal Government in 1980, Spring Lake is the home of endangered species.

2. Wetlands Boardwalk

Length: 30 minutes
Journey over a 1/10 mile floating boardwalk through our wetlands habitat. Students will learn about what wetlands are and what species live in them. Stroll by "Turtle Island" where turtles often sunbathe and birds migrate through.

3. Aquarium and Discovery Hall Exhibit

Length: 15 minutes
Students will see live endangered species on display in this new aquarium exhibit.

4. Bug Picking

Length: 30 minutes
Participants will conduct an experiment in order to test the quality of the water at Meadows Center based on the bugs they find in their water samples.

5. Wetlands Bug Bingo (Rainy Day Alternative Activity)

Length: 15 minutes
This activity goes hand in hand with Bug Picking. Students will learn what different aquatic bugs look like and how to identify them while playing a fun game of "Wetlands Bug Bingo."

6. All the Water in the World

Length: 15 minutes
During this interactive activity, students learn how little fresh water is available for use by all living things.

7. Frog Food Chain Tag

Length: 15 minutes
During this interactive game, students pretend to be frogs competing with each other for prey while avoiding the predator herons in our wetlands food chain. What our frogs don't know is that there is a twist to this game… this wetland habitat has been polluted! How will the frogs survive?

8. Water Conservation Game

Length: 15 minutes

This trivia game explores the theme of conserving water. Teams compete to see who can successfully save the most water.

9. Nature Orienteering Plant Scavenger Hunt

Length: 2 hours
Grades: 6th-12th
Students will participate in a nature orienteering scavenger hunt during a hike on the beautiful Spring Lake Preserve. Students will use compasses and an iPad to navigate, while identifying plants in the area. Afterwards students will draw a map of their field trip to learn about different parts of a map and build upon foundational spatial thinking skills. Spatial ability is important for success in many fields of study, including mathematics, natural sciences, engineering, economic forecasting, meteorology, and architecture. This activity is part of a study we are conducting to learn about how students understand nature and maps. Teachers have the option to receive a copy of the participating students' maps by email. Parents who do not want their child's map to be involved in the study can sign the opt-out form. (Available for schools with 4 or less classes total study can sign the opt-out form. (Available for schools with 4 or less classes total) Geography TEKS: HS: 29H, 31A

10. Water Quality Presentation

Length: 30 minutes
Water quality is important for human, wildlife, and ecosystem health. Students will explore a basic water quality testing kit and examine what the results of the test mean for the health of the Spring Lake ecosystem. (Available for schools with 4 or less classes total).
*Corresponds with Texas Aquatic Science lesson 1.9 Student Investigation in Water Quality http://texasaquaticscience.org/

11. Mapping the Meadows Center

Length: 30 minutes
Students will delve into mapmaking during this hands-on activity to learn about the importance of maps and map-making, understand the importance of different elements of a map, and build upon foundational spatial thinking skills. Spatial ability is important for success in many fields of study, including mathematics, natural sciences, engineering, economic forecasting, meteorology, and architecture. Mapping at Meadows is part of a study we are conducting to learn about how students understand nature and maps. Teachers have the option to receive a copy of the participating students' maps by email. Parents who do not want their child's map to be involved in the study can sign the opt-out form.

12. Land Use in our Watershed

Length: This is an add on activity that will take place throughout your tour
Hunt for evidence of water. This scavenger hunt activity leads students around the site looking for signs of runoff, erosion, accumulation, or infiltration. This ties into discussions of watersheds, surface water, and aquifer recharge.
*Corresponds with Texas Aquatic Science lesson 3.3 Land Use in Our Watershed http://texasaquaticscience.org/

13. Competition within Spring Lake

Length: 15 minutes

Your environment is crowded! What happens to your resources? Competition for basic survival needs is a part of living in an aquatic habitat. Many factors influence the amount of resources available for species. This engrossing game demonstrates how different limiting factors affect survival rates.
*Corresponds with Texas Aquatic Science lesson 5.2 Competition within Spring Lake
http://texasaquaticscience.org/

14. Food Web Wonders

Length: 15 minutes
Participate in a giant string-web to explore how energy moves in an ecosystem. Species interact through food webs, which require a healthy ecosystem to function. Starting with the sun, energy moves through the natural system from plant to carnivore to decomposer.
*Corresponds with Texas Aquatic Science lesson 8.3 Where do I Live? What do I Eat?
http://texasaquaticscience.org/

15. The Hunt for Biodiversity

Length: 30 minutes
What can we learn from plants? Biodiversity is important to the health of an ecosystem. This activity introduces students to scientific methods (including sampling) and discusses the importance of tall plants growing near a waterbody like Spring Lake. (Available for schools with 4 or less classes total).
*Corresponds with Texas Aquatic Science lesson 6.3 The Hunt for Biodiversity
http://texasaquaticscience.org/

16. Enviroscape 3D Watershed Model Presentation

Length: 30 minutes
Students learn about watersheds, and point and non-point source pollution that affects water quality. Students participate in an activity where they put different types of pollution on the ground of the 3D watershed and see how rainfall creates runoff that carries that pollution into rivers and lakes. (Available for schools with 4 or less classes total)

Activity Connections with Texas Essential Knowledge Standards (TEKS)

Aquatic Science TEKS	**Applicable Activities**
(AS.1) **Scientific processes.** The student, for at least 40% of instructional time, conducts laboratory and field investigations using safe, environmentally appropriate, and ethical practices. The student is expected to:	
(A) demonstrate safe practices during laboratory and field investigations, including chemical, electrical, and fire safety, and safe handling of live and preserved organisms; and	1, 2, 3, 4, 10, 12, 13, 15
(B) demonstrate an understanding of the use and conservation of resources and the proper disposal or recycling of materials.	1, 2, 3, 4, 15
(AS.2) **Scientific processes.** The student uses scientific methods during laboratory and field investigations. The student is expected to:	
(A) know the definition of science and understand that it has limitations, as specified in subsection (b)(2) of this section;	10, 12
(B) know that scientific hypotheses are tentative and testable statements that must be capable of being supported or not supported by observational evidence. Hypotheses of durable explanatory power which have been tested over a wide variety of conditions are incorporated into theories;	4, 10, 12
(C) know that scientific theories are based on natural and physical phenomena and are capable of being tested by multiple independent researchers. Unlike hypothesis, scientific theories are well-established and highly-reliable explanation, but they may be subject to changes as new areas of science and new technologies are developed;	10, 12
(D) distinguish between scientific hypothesis and scientific theories;	10, 12
(E) plan and implement investigative procedures, including asking questions, formulating testable hypotheses, and selecting, handling, and maintaining appropriate equipment and technology;	4, 10, 12, 15
(F) collect data individually or collaboratively, make measurements with precision and accuracy, record values using appropriate units, and calculate statistically relevant quantities to describe data, including mean, median, and range;	4, 10, 12, 15
(G) demonstrate the use of course apparatuses, equipment, techniques, and procedures;	4, 10, 12
(H) organize, analyze, evaluate, build models, make inferences, and predict trends from data;	4, 10, 12, 13, 14
(I) perform calculations using dimensional analysis, significant digits, and scientific notations; and	10, 12
(J) communicate valid conclusions using essential vocabulary and multiple modes of expression such as lab reports, labeling, drawings, graphic organizers, journals, summaries, oral reports, and technology-based reports.	4, 10, 12, 13, 14, 15

(AS.3) **Scientific processes**. The student uses critical thinking, scientific reasoning, and problem solving to make informed decisions within and outside the classroom. The student is expected to:	
(A) in all fields of science, analyze, evaluate, and critique scientific explanations by using empirical evidence, logical reasoning, and experimental and observational testing, including examining all side of scientific evidence of those scientific explanations, so as to encourage critical thinking by the student.	10, 12
(E) describe the connection between aquatic science and future careers	15
(AS.4) **Science concepts.** Students know that aquatic environments are the product of Earth systems interactions. The student is expected to:	
(A) identify key features and characteristics of atmospheric, geological, hydrological, and biological systems as they relate to aquatic environments.	10, 12
(AS.5) **Science concepts.** The student conducts long-term studies on local aquatic environments. Local natural environments are to be preferred over artificial or virtual environments. The student is expected to:	
(B) collect baseline quantitative data, including pH, salinity, temperature, mineral content, nitrogen compounds, and turbidity from an aquatic environment; and,	10, 12
(C) analyze interrelationships among producers, consumers, and decomposers in a local aquatic ecosystem	13, 14
(D) analyze interrelationships among producers, consumers, and decomposers in a local aquatic ecosystem.	10, 12, 13
(AS.6) **Science concepts.** The student knows the role of cycles in an aquatic environment. The student is expected to:	
(A) identify the role of carbon, nitrogen, water, and nutrient cycles in an aquatic environment, including upwellings and turnovers.	10, 12
(AS.9) **Science concepts.** The student knows the types and components of aquatic ecosystems. The student is expected to:	
(A) differentiate among freshwater, brackish, and saltwater ecosystems;	1, 2, 3, 4
(B) identify the major properties and components of different marine and freshwater life zones; and	1, 2, 3, 4
(C) identify biological, chemical, geological, and physical components of an aquatic life zone as they relate to organisms in it.	1, 2, 3, 4, 10, 12
(AS.10) **Science concepts.** The student knows environmental adaptations of aquatic organisms. The student is expected to:	
(A) classify different aquatic organisms using tools such as dichotomous keys;	1, 2, 3, 4, 5
(B) compare and describe how adaptations allow an organism to exist within an aquatic environment; and	1, 2, 3, 4, 5
(C) compare differences in adaptations of aquatic organisms to fresh water and marine environments.	1, 2, 3, 4, 5
(AS.11) **Science concepts.** The student knows about the interdependence and interactions that occur in aquatic environments. The student is expected to:	
(A) identify how energy flows and matter cycles through both fresh water and salt water aquatic systems, including food webs, chains, and pyramids; and	3, 7, 14

(B) evaluate the factors affecting aquatic population cycles.	3, 7, 10, 12, 13
(AS.12) **Science concepts.** The student understands how human activities impact aquatic environments. The student is expected to:	
(A) predict effects of chemical, physical, and thermal changes from humans on the living and nonliving components of an aquatic ecosystem;	10, 12, 13
(B) analyze the cumulative impact of human population growth on an aquatic system;	1, 2, 15
(C) investigate the role of humans in unbalanced systems such as invasive species, fish farming, cultural eutrophication, or red tides;	1, 2, 13
(D) analyze and discuss how human activities such as fishing, transportation, dams, and recreation influence aquatic environments; and	1, 2
(E) understand the impact of various laws and policies such as The Endangered Species Act, right of capture laws, or Clean Water Act on aquatic systems.	1, 2

Biology TEKS	**Applicable Activities**
(B.1) **Scientific processes.** The student, for at least 40% of instructional time, conducts laboratory and field investigations using safe, environmentally appropriate, and ethical practices. The student is expected to:	
(A) demonstrate safe practices during laboratory and field investigations.	9, 10, 12
(B.2) **Scientific processes.** The student uses scientific methods during laboratory and field investigations. The student is expected to:	
(B) know the scientific hypotheses are tentative and testable statements that must be capable of being supported or not supported by observational evidence. Hypotheses of durable explanatory power which have been tested over a wide variety of conditions are incorporated into theories;	4
(E) plan and implement descriptive, comparative, and experimental investigations, including asking questions, formulating testable hypotheses, and selecting equipment and technology;	4, 10, 12
(F) collect and organize qualitative and quantitative data and make measurements with accuracy and precision using tools such as calculators, spreadsheet software, data-collecting probes, computers, standard laboratory glassware, microscopes, various prepared slides, stereoscopes, metric rulers, electronic balances, gel electrophoresis apparatuses, micropipettors, hand lenses, Celsius thermometers, hot plates, lab notebooks or journals, timing devices, cameras, Petri dishes, lab incubators, dissection equipment, meter sticks, and models, diagrams, or samples of biological specimens or structures;	4, 10, 12
(G) analyze, evaluate, make inferences, and predict trends from data; and	4, 10, 12
(H) communicate valid conclusions supported by the data through methods such as lab reports, labeled drawing, graphic organizers, journals, summaries, oral reports, and technology-based reports.	4, 10, 12

(B.3) **Scientific processes.** The student uses critical thinking, scientific reasoning, and problem solving to make informed decisions within and outside the classroom. The student is expected to:	
(A) in all fields of science, analyze, evaluate, and critique scientific explanations by using empirical evidence, logical reasoning, and experimental and observational testing, including examining all sides of scientific evidence of those scientific explanations, so as to encourage critical thinking by the student.	9, 10, 12
(B.8) **Science concepts.** The student knows that taxonomy is a branching classification based on the shared characteristics of organisms and can change as new discoveries are made. The student is expected to:	
(A) define taxonomy and recognize the importance of standardized taxonomic system to the scientific community;	5, 9
(B) categorize organisms using a hierarchical classification systems based on similarities and differences shared among groups; and	5, 9
(C) compare characteristics of taxonomic groups, including archaea, bacteria, protists, fungi, plants, and animals.	5, 9
(B.11) **Science Concepts.** The student knows that biological systems work to achieve and maintain balance. The student is expected to:	
(B) investigate and analyze how organisms, populations, and communities respond to external factors.	10, 12
(B.12) **Science concepts.** The student knows that interdependence and interactions occur within an environmental system. The student is expected to:	
(B) compare variations and adaptations of organisms in different ecosystems;	1, 2, 3, 7, 8
(C) analyze the flow of matter and energy through trophic levels using various models, including food chains, food webs, and ecological pyramids;	1, 2, 3, 7, 8
(D) recognize that long-term survival of species is dependent on changing resource bases that are limited;	1, 2, 3, 7, 8
(E) describe the flow of matter through the carbon and nitrogen cycles and explain the consequences of disrupting these cycles; and	1, 2, 3, 7, 8
(F) describe how environmental change can impact ecosystem stability.	1, 2, 3, 7, 8, 10, 12

Chemistry TEKS	**Applicable Activities**
(C.1) **Scientific processes.** The student, for at least 40% of instructional time, conducts laboratory and field investigations using safe, environmentally appropriate, and ethical practices. The student is expected to:	
(A) demonstrate safe practices during laboratory and field investigations, including the appropriate use of safety showers, eyewash fountains, safety goggles, and fire extinguishers	10, 12
(C.2) **Scientific processes.** The student uses scientific methods to solve investigative questions. The student is expected to:	
(E) plan and implement investigative procedures, including asking questions, formulating testable hypotheses, and selecting equipment and technology, including graphing calculators, computers and probes, sufficient scientific glassware such as	10, 12

beakers, Erlenmeyer flasks, pipettes, graduated cylinders, volumetric flasks, safety goggles, and burettes, electronic balances, and an adequate supply of consumable chemicals;	
(F) collect data and make measurements with accuracy and precision;	10, 12
(G) express and manipulate chemical quantities using scientific conventions and mathematical procedures, including dimensional analysis, scientific notion, and significant figures;	10, 12
(H) organize, analyze, evaluate, make inferences, and predict trends from data; and	10, 12
(I) communicate valid conclusions supported by the data through methods such as lab reports, labeled drawing, graphic organizers, journals, summaries, oral reports, and technology-based reports.	10, 12
(C.3) **Scientific processes.** The student uses critical thinking, scientific reasoning, and problem solving to make informed decisions within and outside the classroom. The student is expected to:	
(A) in all fields of science, analyze, evaluate, and critique scientific explanations by using empirical evidence, logical reasoning, and experimental and observational testing, including examining all sides of scientific evidence of those scientific explanations, so as to encourage critical thinking by the student.	10, 12
(C.10) **Science concepts.** The student understands and can apply the factors that influence the behavior of solutions. The student is expected to:	
(A) describe the unique role of water in chemical and biological systems;	10, 12
(B) develop and use general rules regarding solubility through investigations with aqueous solutions; and	10, 12
(I) define pH and use the hydrogen or hydroxide ion concentrations to calculate the pH of a solution.	10

Earth and Space Science TEKS	**Applicable Activities**
(ESS.1) **Scientific processes.** The student conducts laboratory and field investigations, for at least 40% of instructional time, using safe, environmentally appropriate, and ethical practices. The student is expected to:	
(A) demonstrate safe practices during laboratory and field investigations.	10, 12
(ESS.2) **Scientific processes.** The student uses scientific methods during laboratory and field investigations. The student is expected to:	
(E) demonstrate the use of course equipment, techniques, and procedures, including computers and web-based computer applications;	10, 12
(H) use mathematical procedures such as algebra, statistics, scientific notation, and significant figures to analyze data using the International System (SI) units; and,	10, 12
(I) communicate valid conclusions supported by data using several formats such as technical reports, lab reports, labeled drawings, graphic organizers, journals, presentations, and technical posters.	10, 12

(ESS.3) **Scientific processes.** The student uses critical thinking, scientific reasoning, and problem solving to make informed decisions within and outside the classroom. The student is expected to:	
(A) in all fields of science, analyze, evaluate, and critique scientific explanations by using empirical evidence, logical reasoning, and experimental and observational testing, including examining all sides of scientific evidence of those scientific explanations, so as to encourage critical thinking by the student.	10, 12
(ESS.10) **Solid Earth.** The student knows that plate tectonics is the global mechanism for major geologic processes and that heat transfer, governed by the principles of thermodynamics, is the driving force. The student is expected to:	
(A) investigate how new conceptual interpretations of data and innovative geophysical technologies led to the current theory of plate tectonics;	1
(B) describe how heat and rock composition affect density within Earth's interior and how density influences the development and motion of Earth's tectonic plates;	1
(C) explain how plate tectonics accounts for geologic processes and features, including sea floor spreading, ocean ridges and rift valleys, subduction zones, earthquakes, volcanoes, mountain ranges, hot spots, and hydrothermal vents;	1
(D) calculate the motion history of tectonic plates using equations relating rate, time, and distance to predict future motions, locations, and resulting geologic features;	1
(E) distinguish the location, type, and relative motion of convergent, divergent, and transform plate boundaries using evidence from the distribution of earthquakes and volcanoes; and	1
(F) evaluate the role of plate tectonics with respect to long-term global changes in Earth's subsystems such as continental buildup, glaciation, sea level fluctuations, mass extinctions, and climate change.	1
(ESS.12) **Solid Earth.** The student knows that Earth contains energy, water, mineral, and rock resources and that use of these resources impacts Earth's subsystems. The student is expected to:	
(C) discriminate between renewable and nonrenewable resources based upon rate formation and use.	1, 8
(ESS.13) **Fluid Earth.** The student knows that the fluid Earth is composed of the hydrosphere, cryosphere, and atmosphere subsystems that interact on various time scales with the biosphere and geosphere. The student is expected to:	
(A) quantify the components and fluxes within the hydrosphere such as changes in polar ice caps and glaciers, salt water incursions, and groundwater levels in response to precipitation events or excessive pumping.	1, 6, 8
(ESS.15) **Fluid Earth.** The student knows that interactions among Earth's five subsystems influence climate and resources availability, which affect Earth's habitability. The student is expected to:	
(A) describe how changing surface-ocean conditions, including El Niño-Southern Oscillation, affect global weather and climate patterns;	1, 2, 8

(B) investigate evidence such as ice cores, glacial striations, and fossils for climate variability and its use in developing computer models to explain present and predict future climates;	1, 2, 8
(C) quantify the dynamics of surface and groundwater movement such as recharge, discharge, evapotranspiration, storage, residence time, and sustainability;	1, 2, 8
(D) explain the global carbon cycle, including how carbon exists in different forms within the five subsystems and how these forms affect life; and	1, 2, 8
(E) analyze recent global ocean temperature data to predict the consequences of changing ocean temperature on evaporation, sea level, algal growth, coral bleaching, hurricane intensity, and biodiversity.	1, 2, 8

Environmental Systems TEKS	**Applicable Activities**
(ES.1) **Scientific processes.** The student, for at least 40% of instructional time, conducts hands-on laboratory and field investigations using safe, environmentally appropriate, and ethical practices. The students is expected to:	
(A) demonstrate safe practices during laboratory and field investigations, including appropriate first aid responses to accidents that could occur in the field such as insect stings, animal bites, overheating, sprains, and breaks.	9, 10, 12, 15
(ES.2) **Scientific processes.** The student uses scientific methods during laboratory and field investigations. The student is expected to:	
(E) follow or plan and implement investigative procedures, including making observations, asking questions, formulating testable hypothesis, and selecting equipment and technology;	10, 12, 15
(F) collect data individually or collaboratively, make measurements with precision and accuracy, record values using appropriate units, and calculate statically relevant quantities to describe data, including mean, median, and range;	10, 12, 15
(G) demonstrate the use of course apparatuses, equipment, techniques, and procedures, including meter stick, rulers, pipettes, graduated cylinders, triple beam balances, timing devices, pH meters or probes, thermometers, calculators, computers, Internet access, turbidity testing devices, hand magnifiers, work and disposable gloves, compasses, first aid kits, binoculars, field guides, water quality test kits or probes, soil test kits of probes, 100-foot appraiser's tapes, tarps, shovels, trowel, screens, buckets, and rock and mineral samples;	10, 12, 15
(H) use a wide variety of additional course apparatuses, equipment, techniques, materials, and procedures as appropriate such as air quality testing devices, cameras, flow meters, Global Positioning Systems (GPS) units, Geographic Information System (GIS) software, computer models, densitometers, clinometers, and field journals;	9, 10, 12
(I) organize, analyze, evaluate, build models, make inferences, and predict trends from data;	10, 12, 13, 14

(J) perform calculations using dimensional analysis, significant digits, and scientific notation; and,	10, 12
(K) communicate valid conclusions supported by the data through methods such as lab reports, labeled drawings, graphic organizers, journals, summaries, oral reports, and technology-based reports.	10, 12, 13, 14
(ES.3) **Scientific processes.** The student uses critical thinking, scientific reasoning, and problem solving to make informed decisions within and outside the classroom. The student is expected to:	
(A) in all field of science, analyze, evaluate, and critique scientific explanations by using empirical evidence, logical reasoning, and experimental and observational testing, including examining all sides of scientific evidence of those scientific explanations, so as to encourage critical thinking by the student.	10, 12, 13
(E) describe the connection between environmental science and future careers	15
(ES.4) **Science concepts.** The student knows the relationships of biotic and abiotic factors within habitats, ecosystems, and biomes. The student is expected to:	
(A) identify native plants and animals using a dichotomous key;	4, 5, 9, 15
(B) assess the role of native plants and animals within a local ecosystem and compare them to plants and animals in ecosystems within four other biomes;	4, 5, 9, 14, 15
(E) measure the concentration of solute, solvent, and solubility of dissolved substances such as dissolved oxygen, chlorides, and nitrates and describe their impact on an ecosystem;	10,, 12
(F) predict how the introduction or removal of an invasive species may alter the food chain and affect existing populations in an ecosystem;	1, 2, 3, 7, 13
(G) predict how species extinction may later the food chain and affect existing populations in an ecosystem; and	1, 2, 3, 7
(H) research and explain the causes of species diversity and predict changes that may occur in an ecosystem if species and genetic diversity is increased or reduced.	1, 2, 3, 7
(ES.5) **Science concepts.** The student knows the interrelationships among the resources within the local environmental system. The student is expected to:	
(A) summarize methods of land use and management and describe its effects on land fertility;	1, 8
(B) identify source, use, quality, management, and conservation of water;	1, 8, 10, 12, 13
(C) document the use and conservation of both renewable and non-renewable resources as they pertain to sustainability;	1, 8
(D) identify renewable and non-renewable resources that must come from outside an ecosystem such as food, water, lumber, and energy;	1, 8
(E) analyze and evaluate the economic significance and interdependence of resources within the environmental system; and	1, 8
(F) evaluate the impact of waste management methods such as reduction, reuse, recycling, and composting on resources availability.	1, 8

(ES.6) **Science concepts.** The student knows the sources and flow of energy through an environmental system. The student is expected to:	
(C) explain the flow of energy in an ecosystem, including conduction, convection, and radiation.	7
(ES.7) **Science concepts.** The student knows the relationship between carrying capacity and changes in populations and ecosystems. The student is expected to:	
(A) relate carrying capacity to population dynamics	13
(C) analyze and predict the effects of non-renewable resource depletion; and	8
(D) analyze and make predictions about the impact on populations of geographic locales due to diseases, birth and death rates, urbanization, and natural events such as migration and seasonal changes.	8
(ES.8) **Science concepts.** The students knows that environments change naturally. The student is expected to:	
(A) analyze and describe the effects on areas impacted by natural events such as tectonic movement, volcanic events, fires, tornadoes, hurricanes, flooding, tsunamis, and population growth;	1, 2, 8, 13, 14
(B) explain how regional changes in the environment may have a global effect;	1, 2, 8
(D) describe how temperature inversions impact weather conditions, including El Nino and La Nina oscillations; and	1, 2, 8
(E) analyze the impact of temperature inversions on global warming, ice cap and glacial melting, and changes in ocean currents and surface temperatures.	1, 2, 8
(ES.9) **Science concepts.** The student knows the impact of human activities on the environment. The student is expected to:	
(A) identify causes of air, soil, and water pollution, including point and nonpoint sources;	1, 2, 4, 8, 13
(B) investigate the types of air, soil, and water pollution such as chlorofluorocarbons, carbon dioxide, pH, pesticide runoff, thermal variations, metallic ions, heavy metals, and nuclear waste;	1, 2, 4, 8, 10, 12
(C) examine the concentrations of air, soil, and water pollutants using appropriate units;	10, 12
(D) describe the effect of pollutions on global warming, glacial and ice cap melting, greenhouse effect, ozone layer, and aquatic viability; and,	1, 2, 4, 8
(E) evaluate the effect of human activities, including habitat restoration projects, species preservation efforts, nature conservancy groups, hunting, fishing, ecotourism, all terrain vehicles, and small personal watercraft, on the environment	15
(K) analyze past and present local, state, and national legislation, including Texas automobile emissions regulations, the National Park Service Act, the Clean Air Act, the Clean Water Act, the Soil and Water Resources Conservation.	1

US History since 1877 TEKS	**Applicable Activities**

(USH.14) **Geography.** The student understands the relationship between population growth and modernization on the physical environment. The student is expected to:	
(A) Identify the effects of population growth and distribution on the physical environment;	1, 2, 3
(B) Identify the roles of governmental entities and private citizens in managing the environment such as the establishment of the National Park System, the Environmental Protection Agency (EPA), and the Endangered Species Act; and	1, 2, 3
(C) Understand the effects of governmental actions on individuals, industries, and communities, including the impact on Fifth Amendment property rights.	1, 2, 3

World History TEKS	**Applicable Activities**
(WH.16) **Geography.** The student understands the impact of geographic factors on major historic events and processes. The student is expected to:	
(C) Interpret maps, charts, and graphs to explain how geography has influenced people and events in the past.	1

World Geography Studies TEKS	**Applicable Activities**
(WGS.1) **History.** The student understands how geography and processes of spatial exchange (diffusion) influenced events in the past and helped to shape the present. The student is expected to:	
(A) analyze the effects of physical and human geographic patterns and processes on the past and describe their impact on the present, including significant physical features and environmental conditions that influenced migration patterns and shaped the distribution of culture groups today.	1
(WGS.2) **History.** The student understands how people, places, and environments have changed over time and the effects of these changes. The student is expected to:	
(A) describe the human and physical characteristics of the same regions at different periods of time to evaluate relationships between past events and current conditions.	1
(WGS.3) **Geography.** The student understands how physical processes shape patterns in the physical environment. The student is expected to:	
(B) describe the physical processes that affect the environments of regions, including weather, tectonic forces, erosion, and soil-building processes.	1
(WGS.4) **Geography.** The student understands the patterns and characteristics of major landforms, climates, and ecosystems of Earth and the interrelated processes that produce them. The student is expected to:	
(B) describe different landforms and the physical processes that cause their development; and	1, 2
(C) explain the influence of climate on the distribution of biomes in different regions.	1, 2
(WGS.7) **Geography.** The student understands the growth, distribution, movement, and characteristics of world population. The student is expected to:	

(B) explain how political, economic, social, and environmental push and pull factors and physical geography affect the routes and flows of human migration.	1
(WGS.12) **Economics.** The student understands the economic importance of, and issues related to, the location and management of resources. The student is expected to:	
(B) evaluate the geographic and economic impact of policies related to the development, use, and scarcity of natural resources such as regulation of water.	1, 8
(WGS.19) **Science, technology, and society.** The student understands the impact of technology and human modifications on the physical environment. The student is expected to:	
(A) evaluate the significance of major technological innovations in the areas of transportation and energy that have been used to modify the physical environment.	1, 2

Additional Materials

Additional information on water education can be found on the Texas Aquatic Science website at http://texasaquaticscience.org/. This website provides additional learning opportunities and materials for a variety of subjects concerning water, including "Water is Life", "Water for the people and the Environment", "Bays and Estuaries", and many others.

Frequently Asked Questions

How do I book a group tour?

\You may book a tour online at http://www.aquarena.txstate.edu/Educational-Tours/Tour-Reservation-Form.html. If you have questions please call 512-245-7540. Our office hours will vary depending on park traffic, so please leave a message and we will call you back.

How far in advance should I book my tour?

We require two weeks advance notice for group tours. Please remember the days during March through August can fill up several months in advance, so please book your tour as soon as possible.

Do you have a maximum number of students that can attend the field trip?

There is not a set maximum number of students per field trip. Your tour-booking agent will discuss the best activities for your group's size when you book your tour. We recommend booking your tour early for best choice of dates.

Do you have a minimum number of chaperones required?

One teacher per class is sufficient for our tours. The one required adult should never leave the group alone with the tour guide. You may choose to bring additional teachers and parents if you wish (please check your tour confirmation for fee information). The boats will comfortably seat 25 people each, so additional adults may need to ride on a separate boat than the rest of the group.

What age groups are your programs appropriate for?

All ages. We customize our programs for your group.

I would like to do something different than listed on your website, can you accommodate my group?

We try our best to accommodate special requests.

Do I need to book a specific time for my tour?

Yes, you will book a specific date and time for your tour. Please arrive 15 minutes prior to the start time of your tour. We apologize that we are unable to push back the start times of tours. If your group is late we may need to cut a portion of your tour time. Please call 512-245-7570 and push 0 to notify us that you will be late.

What if it rains?

If it rains on your tour date you will have the option to reschedule. Please call 512-245-7570 and push 0 on the day of your tour and let a staff member know that your group will not be coming. The boats are enclosed and will still run unless there is lightning. We have limited indoor space so please dress for the weather if it is raining on your tour date.

Booking a Tour

Web: http://www.meadowscenter.txstate.edu/Education/EducationalTours.html
Phone: (512) 245-7540