Learning on the Edge

Nueces Delta Preserve Teacher Workbook

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CAREFULL PLANNING AND PREPARATION CAN ASSURE THE ENVIRONMENTAL FIELDTRIP IS A SUCCESSFUL ONE!

Nueces River Delta

The Nueces River Delta is an estuary. It offers a variety of habitats to many different species. Estuaries can include coastal marshes, natural reefs, open bays, tidal flats, sea grass meadows, gulf beaches and barrier islands. Each provides a unique ecological area for organisms that have adapted to conditions found in these systems.

At the Nueces River Delta, water from four rivers, the East and West Nueces, Frio, and Atascosa, as well as springs, streams, and groundwater contribute to the inflow of fresh water to Nueces Bay. The Nueces Bay watershed includes an area of drains encompassing 16,800 square miles and carries an annual runoff of some 620,000 acre-feet.

The open ocean has an average salinity of 35ppt. The Gulf of Mexico has an average salinity of 32ppt. Due to evaporation, bay systems can have a wide range of salinities (0-100ppt). High salinities occur because salt does not evaporate with water. Low salinities occur when freshwater flows into the system. This can occur via river, creek, stream or rainfall.

The influx of fresh water from the rivers spurs productivity in the bay, bringing fresh water and nutrients to the system. Here, as in other estuaries, the difference in the densities between fresh and salt water cause the heavier salt water to flow upstream and the lighter fresh water to flow downstream producing a layered effect. Some of the saltwater mixes with the freshwater at a point called the interface.

The river carries not only water, but also sediments and nutrients to the delta. As the soil travels downstream, it is tumbled and eroded from large particles into smaller ones. As the water approaches the mouth of the river, the sediments are deposited to create new land masses. This new land is under continual change due to seasonal flooding that causes erosion and re-deposition. This physical weathering produces nutrient-rich habitats for different species of organisms to find a niche.

Estuaries, such as the Nueces River Delta, are unique ecosystems because they provide variety in physical and chemical conditions. Due to the varying degrees of salinity, estuaries provide several diverse habitats for a variety of organisms that have adapted to these unique factors in the ecosystem.

Vocabulary for Delta Trip

ACCRETION – soil and sediment being re-deposited after erosion

ADAPTATION –anything that helps an organism to survive in its environment (a tool)

BRACKISH WATER – an area where fresh and salt water mix together

COASTAL MARSHES – areas that frequently hold water

DEPOSITION – the dumping of a load of soil and sediment by a river

ECOLOGY – the study of plants and animals in relation to their environment

ECOREGION – an area with specific plants and animals unique to the area (ours is Coastal Prairies and Marshes)

ECOTONE – a place where 2 or more ecoregions overlap

ENVIRONMENT – the area where an organism lives (a home)

EROSION – the chemical and physical weathering away of soil and sediment

ESTUARY – a coastal waterbody where fresh water from rivers and runoff mixes with salt water from the ocean

EXOTIC SPECIES - species that are not native to the Nueces Delta

FRESH WATER – water with less than 0.5 parts per thousand dissolved salts

GROUND WATER- water found in the spaces between soil particles and cracks in rocks underground

HABITAT - area where an organism lives that provides for all of its needs - space, water, shelter & food (a neighborhood)

HYDROMETER – instrument used to measure salinity

INVASIVE SPECIES – an opportunistic native species that out competes others in the area

LOMA – Dunes made of loam deposited by accretion on the opposite side of the prevailing wind

NATIVE SPECIES –A species naturally occurring in a given area

NICHE – the ecological role of an organism in a community (a profession)

PRARIES – grasslands

RIPARIAN –relating to or living on the bank of a natural course of water

SAVANNAH – area dominated by grasses with scattered areas of trees

SURFACE WATER –water above the surface of the land, including lakes, rivers, streams, ponds, and runoff

TIDAL FLATS- a broad and flat land caused by the rising tide and exposed at its ebb

TAMAULIPAN – the biotic province for this area

TREE – has a single trunk and is at least 50' tall at maturity

Generalized TEKS Objectives to be aligned:

Elementary

- field investigations
- scientific inquiry
- tools, models, methods
- systems and cycles
- types of change (observe, measure, analyze, record, predict)
- living organisms vs. non-living objects
- species adaptations
- natural world, properties, uses
- past & present, future events – how they're connected
- forms of energy

Middle School

- understanding of nature & science
- field & laboratory investigations
- systems and cycles
- environmental changes
- species adaptation
- structures & properties of matter
- motion, forces, and energy

High School

- understanding of nature & science
- field & laboratory investigations
- organization of living systems
- interdependence of organisms & the environment
- structures & properties of matter
- motion, forces, and energy

**Not all TEKS have to be used – any that tie in to environmental science or can be inter-disciplinary*

Visiting the Nueces Delta Preserve

Considerations for Planning your Trip

1. What is your objective and what is the purpose of the trip? How will you align what you have taught in the classroom to the field trip and match the needs of the lesson?
2. Meet with the CBBEP Educator and prepare an agenda. Together we will work to provide lessons for complimentary instruction at the delta. Before your class travels to the delta, the teacher and an Environmental Educator will meet together to plan the trip, with ideas about topics to be covered in mind. Not only will you be leading activities, but CBBEP educator(s) will have activities for the students as well. As students rotate through the day, we will work together to provide activities that correlate back to TEKS. If needed, CBBEP has provided a list of ideas to help you brainstorm for creating your lesson.
3. CBBEP has limited supplies to assist teachers with the activities listed. If you would like to do additional activities, you must bring your own supplies.
4. Break your students into groups and have an adult assigned to each one. Please wear nametags or provide group lists upon arrival. Grouping the students should be done **before** bringing your students so they will already know exactly what group they are in and who they are supposed to be with. The students get very excited and grouping provides necessary structure and direction for the day.
5. Make sure **all** teachers are comfortable with the activities they will be teaching. Remember it is more about student discovery in the field than teacher lecture. Allow your students to discover new things during your activities.
6. Make sure bus driver understands they are to have a sack lunch and stay at the Delta as we use the buses for transportation on the property.
7. Evaluate the experience. How do you plan to evaluate what the students have learned? Quantitative measures are not necessarily going to weigh the value of the trip, and teachers know students produce amazing products in a qualitative manner to show what they truly learned. CBBEP would love to see what the students come up with so please feel free to share their work! *Also, please take the time to fill out the evaluation form of your fieldtrip to the Delta and return it to CBBEP.*

Recommendations for visiting NDP

1. ***Please address safety issues beforehand***, as the Nueces Delta Preserve is just that – a natural preserve. There are snakes, spiders, javelinas, stinging bugs, cactus, etc. You should bring a prepared folder with emergency phone numbers, the signed permission slips, and any special medical needs.
2. Attire: Visitors should dress appropriately for the field. It is wise to wear long pants and bring a long sleeve shirt. Quick drying, light clothes are advisable since it does become quite warm while outside at the Delta. Closed-toe lace up tennis shoes or hiking boots should be worn for walking through the property which may be muddy at times. Be sure to bring a hat, and water. Ask parents to apply bug spray and sun screen at home before school on fieldtrip day.
3. Supplies: Each student should bring a Field Journal, Pencil, Sack Lunch, & at least 2 Drinks
4. Facilities: A restroom (Port-o-Potty) is available for use, and a pavilion provides shade. Picnic tables are located under the pavilion for student to work & eat their lunch.

Please pack lunches with as little trash as possible

Please make sure you only throw away empty drink containers

Please recycle if possible

Make sure the bus drivers know they must stay the whole time

IN THE CLASSROOM

1. Introduce Delta Terms and Vocabulary to your students.
2. Introduce some of the native Flora and Fauna of the area.
3. Discuss Adaptations, Niche, and Habitat so students have a working knowledge of the 3 terms.
4. Create Field Journals for the trip.
5. Discuss discipline and respect with students and have plan in place if behavior becomes a problem.
6. Remind Students to wear pants and close toed shoes.
7. Discuss packing lunches in a way to REDUCE, REUSE, And RECYCLE. It is windy and they will be eating outside. Please pack things that won't fly everywhere.

TIPS - TEACHER TO TEACHER

- Use paw print stickers in the field journal each time they find a track for track identification – TG Allen1st Grade
- Use HEB green bags for each child to carry for field journals, water, collection, etc. – Kostoryz Kindergarten
- Bring scissors to cut leaves from the shrubs – Kostoryz 2nd Grade
- Take time to train all teachers. Match the activity to the teacher skills. – TG Allen 1st Grade
- Have your students draw what they see in the journals – Kostoryz 2nd Grade
- Make sure the plan to switch groups is smooth and not time consuming – Sanders 5th Grade
- Have your groups already assigned before you get to the delta make sure the students know rotation as well as the teachers– Schanen 5th Grade
- Have teachers run the stations and use parents as group leaders to help rotate the students – San Pedro 1st Grade
- Pack your water separately from lunches so students don't have to dig for drinks – Flour bluff 5th Grade

Field Studies 101

Water Quality Testing

- Students are to collect and observe
- The water is not cleaned or treated in any way
  You will take pH, Temperature, Salinity, Alkalinity, Nitrate and Nitrite readings. It is best that students know what each of these measures before they come to the delta.
- At the pavilion the water is groundwater
  Originally the area was a working gravel pit. Groundwater was accidentally hit and this beautiful water feature became a part of the area. We know it has sailfin molly, perch, sunfish, bass, and alligator gar in it.
- At Rincon the water is a bayou
  This area is the old channel for the Nueces River. It is now a part of the floodplain.

Water Cycle and Weather

- Discuss water cycle
- Prepare Cloud Charts in class and use them at the Delta to describe cloud cover
- Take temperature readings
- Check the barometer in the schoolhouse
- Discuss weather station at Rincon
- Record data on data sheet

Soil, Sieve, and Core Sampling

- Use shovels and sieve areas of the delta to determine particle size of soil
- Use a 7 inch core to sample “layers” in the soil
- Find out if the soil has a clay base to it

Forms of Energy

- Wind – Prepare a pinwheel in class and observe at the Delta
- Water – Discuss water power and show water wheel observation
- Solar – Use weatherstation to discuss solar power

Affects of Pollution

- Find point source pollution
- Find non point source pollution
- Discuss how all the trash ends up in the flood plain (Rincon)

Geo-Caching for 2nd Grade and Up

- Use Garmin eTrex GPS for activities
- Basic GPS is a game called Nailbiter GPS where teams use GPS to mark waypoints and then trade GPS units and try to find waypoints
- Earthcache is a new form of geo-caching where you use the GPS to find geological features. Waypoints are marked on our property for weathering & erosion

Field Investigations

- Walk transects and check traps for small mammals then key out specimen and its habitat
- Use grids for percent coverage of a species
- Catalog and key species using dichotomous keys

Chemical and Physical Weathering

- Look for signs of erosion at Rincon
- Look for signs of accretion at Rincon
- Perform the Mudpile Mountain activity to produce “erosion”
- Use Earthcaching to find Signs of Weathering on the property

Ecological Population Density & Riparian Zones

- Transects for tree & shrub coverage
- Riparian zone identification of flora & fauna
- Small Mammal transect counts
- Insect density by order

Species Identification and Cataloguing

- Transects
- Trail Tours
- Dichotomous Keys
- Flora & Fauna

Species Adaptations

- Discussion of bones
- Mounted Specimen
- Field Observations

Native vs. Exotic Species

- Transects
- Trail Tours
- Discussion

Animal Tracks

Use the Parks and Wildlife handout for track identification
Look for tracks on guided trail tours and at Rincon Bayou
Discuss why animals use our trails
Discuss why tracks are more easily observed at Rincon Bayou
Discuss why a large concentration of tracks are found at Rincon Bayou
Discuss differences in size and shape for identification of tracks

Guided Trail Tours

Look for and identify tracks
Look for and identify animals (primarily birds)
Look for and identify plants
Discuss natural history of the area

Gulf Coast Prairies and Marshes

The Gulf Coast Prairies and Marshes occupy approximately 9,500,000 acres. This ecoregion is a nearly level, slowly drained plain less than 150 feet in elevation, dissected by streams and rivers flowing into the bays. The region includes the barrier islands lining the coast which protect the shoreline from erosion. Rainfall varies from 20 to 50 inches per year distributed fairly uniformly throughout the year.

Surficial and windblown sands and dunes characterize this region's soils. Soils on the Gulf Coast Prairies and Marshes are sandy loams, and clays. Sandy loams predominate, with clays occurring in river bottoms.

Vegetation is primarily grassland with some mottes, salt marshes and areas of thornscrub. The climax vegetation of the Gulf Coast Prairie was once mostly tall & mid grasses, with some savanna.
In the Coastal Bend the important mid grasses are Seacoast Bluestem, Gulf Cordgrass, & several brisslegrass species. On the savannah you would find oaks, legumes, & Prickly Pear, as well as various types of forbes & grasses.

Tamaulipan Biotic Province

South Texas is part of the Tamaulipan biotic province. It extends North from Rio Soto la Marina in Tamaulipas (where it got it's name), includes the Monterrey region of eastern Nuevo Leon and all of South Texas from the mouth of the Guadalupe River to the Balcones Escarpment. This area was historically dominated by grasslands, prairies, & thornscrub. Coastal areas in this province were once dominated by coastal marshes, upland grasslands, and floodplain forest.

INSECT VS SPIDERS

Insects	Spiders
• Usually have 6 legs	• Have 8 legs
• 3 Main Body Parts Head Thorax Abdomen	• Have 2 main body parts Cephalothorax – the head and thorax fused Abdomen
• Found in water and on land	• Usually live on land
• Have antennae	• Have no antennae
• Eat a variety of things from plants to animals to decayed material	• Usually are carnivorous and paralyze their prey with poison
• Most don't spin silk, and those that do usually spin it from glands in their mouth	• Most spin silk from spinnerets on their abdomens
• Usually have 2 compound eyes and several simple eyes	• Usually have 8 simple eyes and no compound eyes
• Usually have 2 pairs of wings	• Have no wings

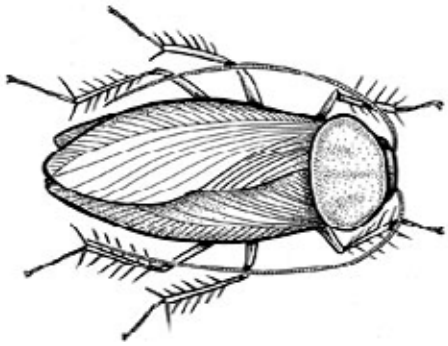
RECOGNITION OF COMMON ORDERS OF INSECTS

Odonata - dragonflies and damselflies

- long slender membranous wings with many cross-veins
- hind wings similar to forewings
- chewing mouthparts
- long, slender abdomen
- larvae are aquatic

Orthoptera - grasshoppers, kaydids, and crickets

- forewings leathery and narrow
- chewing mouthparts
- many have hind legs modified for jumping

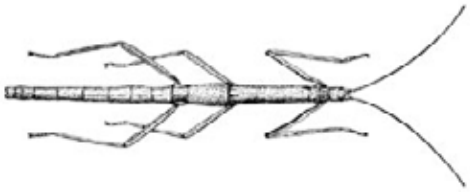


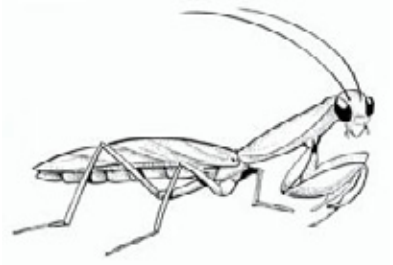
Blattaria - cockroaches

- forewings elongate, often thickened (leathery)
- chewing mouthparts
- running legs
- cerci
- long antennae

Phasmida - walkingsticks

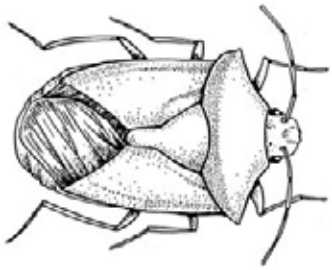
- chewing mouthparts
- looks like a stick





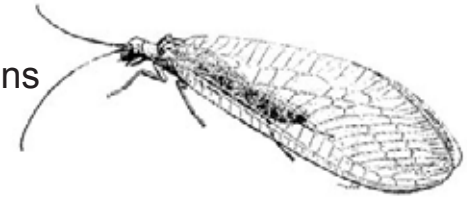
Mantodea - praying mantids

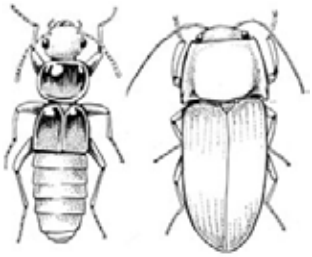
- forewings elongate, often thickened (leathery)
- chewing mouthparts
- enlarge forelegs for grasping prey
- distinctive neck



Hemiptera - true bugs
- forewings thickened at base
- hind wings membranous
- piercing-sucking mouthparts

Neuroptera - lacewings, ant lions
- fore and back wings membranous with many veins
- chewing mouthparts
- antennae long and many segmented





Coleoptera - beetles
- hardened forewing (elytra)
- hind wings membranous
- chewing mouthparts
- elytra meet in straight line down back

Lepidoptera - butterflies and moths
- fore and hind wings with scales
- antennae long and many segmented
- adults - siphoning mouthparts
- larvae - chewing mouthparts

Diptera - flies and mosquitoes
- forewings membranous
- hind wings absent, replaced with balancing organs called halteres
- different types of mouthparts

Hymenoptera - bees, wasps, and ants
- fore and hind wings membranous
- antennae usually threadlike
- chewing mouthparts with modification for sucking