

Tijuana Estuary Field Trip Guide

The Tijuana River National Estuarine Research Reserve (TRNERR) is an approximately 2,500-acre Reserve located in Imperial Beach, San Diego County. Habitat areas at the Reserve include salt marsh, riparian, fresh-water marsh, uplands, coastal dunes, and salt panne. A wide variety of plants, birds and animals can be observed at the Reserve.

*The Tijuana Estuary offers activities in the field to support teachers' classroom instruction and current frameworks and standards. There are several activities to choose from as well as two site locations. When designing your field trip, you must first decide which location you want to go to and then choose **three** activities offered at that location.*

Field Trip Locations:

The Tijuana Estuary Visitor Center

The visitor center is located in Imperial Beach and is easily accessible. Public transportation is easily available for this site. The facilities include restrooms, two small picnic tables, and drinking fountains.

Located at: 301 Caspian Way, Imperial Beach, CA 91932 (619) 575-3613x306

Border Field State Park

This site is on the US/Mexico border. There are restrooms, picnic tables, barbeque grills, and a large parking area. Public transportation is not available. Access to the park may be impeded due to rains (typically November to June).

Rain cancels the field trip.

Located at: 1500 Monument Road, San Diego, CA 92154 (619) 575-3613x306

Field Trip Activities: *(A description of each activity can be found beginning on page 4 of this section)*

Tijuana Estuary Visitor Center

- 1) Bird Observation
- 2) Photo-monitoring
- 3) ~~Estuarine Plankton Study~~ *(Currently unavailable)*
- 4) ~~Water Quality Monitoring~~ *(Currently unavailable)*
- 5) Invasive species eradication/weeding
- 6) Plant sampling
- 7) Salt Marsh Plants & Adaptations to Salinity
- 8) Propagation of native species *Fall and Winter - Seed Collection*
- 9) Propagation of native species *Spring - Transplanting*
- 10) Weather Station

Border Field State Park

- 1) Birds
- 2) Invasive species eradication/weeding
- 3) Photo-monitoring
- 4) Plant sampling and mapping
- 5) Sedimentation Basins
- 6) Border Field Naval Air Station
- 7) Cross-Border Cooperation and World War II (tour)

Logistics and Accommodations

Who can go:

Teacher/student groups may include up to 36 students and 4 chaperones. Space is limited, so preference for selection of teachers to attend field trips will depend on pre-activity preparation. Those groups who have studied the Tijuana Estuary High School Teachers' Guide or Estuaries 101 will have first preference. The ratio of students to chaperones should be 1:10

What should you bring:

- Groups are responsible for bringing lunch, drinks, and snacks. All trash must be placed in the appropriate containers.
- Wear closed-toed shoes, hats, and sunscreen.
- Bring plenty of water.
- Pencils and clipboards

What will be provided:

All equipment required for the tour you have chosen will be provided by Reserve staff. This includes binoculars, soil sieves, and tow nets. Those groups doing plant eradication will also be provided with gloves.

Field manners:

Please go over field manners with your students in the classroom and just before the field trip.

- Both sites at the Tijuana Estuary are undergoing restoration and are fragile environments. Groups must stay on designated paths, unless guided by a Reserve educator. Please don't pick any plants including their flowers, or other organisms. You may not take any "souvenirs" home with you except those provided by the Reserve educator.
- Listen carefully to your specialist at all times and follow their directions. They are there to help you learn about the Tijuana Estuary and to make sure your visit is informative, enjoyable, and safe for both you and the organisms that make the estuary their home.
- The only things you should leave at the estuary are your footprints. Take all trash with you when you leave or put it the appropriate receptacles.

Teacher Training:

All teachers are required to attend a teacher training before bringing students for the first time. Trainings are offered annually at the Visitor Center. Please call the visitor center for dates/times. **619-575-3613 x306**

Reservation Procedure:

Reservations may be made by phone or email on a first-come, first-serve basis. A two-week advance notice is required.

Special Visitors:

Special education classes and students with physical disabilities are welcome! Please notify us in advance if special assistance is required. Some field trip activities are not wheelchair accessible.

Your Field Trip

Your field trip will consist of **three** activities that you will choose from the following pages (except for the Cross-Border Cooperation and World War II tour). Classes will be divided into three groups and all students will participate in each activity. Field trips begin with a short introduction and the activities take about 45 minutes. There is brief wrap-up at the end. A typical field trip will look like this:

9:30 -9:45 *Introduction*
9:45 -10:30 *Rotation 1*
10:30 -11:15 *Rotation 2*
11:15 -12:00 *Rotation 3*
12:00 -12:15 *Wrap-up*

Sample Field Trip:

Time	Group 1	Group 2	Group 3
9:30 - 9:45	Introduction	Introduction	Introduction
9:45 - 10:30	Bird Observation	Photo-monitoring	Invasive Plant Species Eradication
10:30 -11:15	Invasive Plant Species Eradication	Bird Observation	Photo-monitoring
11:15 -12:00	Photo-monitoring	Invasive Plant Species Eradication	Bird Observation
12:00 -12:15	Wrap up	Wrap up	Wrap up

Field Trip Activities

Tijuana Estuary Visitor Center

1) Bird Observations

SUMMARY

Students will be able to examine birds, particularly shorebirds, in their natural habitat. Once students have been instructed on how to use the monitoring data sheets, they will be allowed to observe any birds they see on their own. Depending on the season, the number and variety of birds will be different. Although many shorebirds look alike, students should hopefully see that there are differences, even though they are slight. Observing a particular group of animals over time helps to measure how healthy their habitat is.

LEARNING OBJECTIVES: Through observation of behavior and physical characteristics, students should be able to identify at least 3 species of birds. Using data sheets, the students will collect a variety of data which will include species type, count, behavior, and habitat type. An extension to this activity would be to repeat it during a different season.

2) Photo-monitoring

SUMMARY

Students will undertake photo-monitoring in a restoration site near the Visitor Center. Photo-monitoring is a way to monitor the progress of a restoration site or exotic plant eradication project in a quick but revealing way. Ecologists can then do more detailed measurements if the photos reveal a problem that needs to be investigated. They will use a digital camera and compass to find the correct compass bearing for the photos.

LEARNING OBJECTIVES: Students will draw from their geometry skills to find the correct compass bearing for two separate photo-monitoring points. They will also learn why monitoring is done in natural areas.

3) Estuarine Plankton Study (Currently unavailable)

SUMMARY

The plankton comparison study will give students an opportunity to do field and lab work in one activity. Students will collect data and water samples from a nearby channel in the estuary. Using microscopes, they will examine their sample in the classroom laboratory. Using a plankton key, they will be able to identify any organisms in the samples as either phytoplankton or zooplankton.

LEARNING OBJECTIVES: Students will be able to differentiate between phytoplankton and zooplankton and understand the relevance of both. Tide dependent, students will make comparisons between the middle and edge of the estuarine channel with regards to plankton. Students will consider how changes in the environment, naturally or humanly influenced, would impact plankton and the rest of the food chain.

*****This activity is not available on rainy days or within 7 days of rain.***

4) Water Quality Monitoring (Currently unavailable)

SUMMARY

Water Quality testing will give students the opportunity to test the health of the water from a channel within the estuary. Students will test for four parameters: temperature, salinity, dissolved oxygen, and turbidity. Students will use test kits assembled and standardized by the San Diego County Water Authority. They will use data collection sheets to record their results.

LEARNING OBJECTIVES: Students will implement tests for temperature, dissolved oxygen, and nitrates. They will follow protocols for handling chemicals in the field. They will be able to report results of their findings and discuss the possible reasons for them.

5) Invasive Plant Species Eradication

SUMMARY

Students will learn about the importance of native plants and the detrimental impacts of invasive exotics on native habitats through exotic species eradication (weeding out non-natives plant species). Students learn to compare the ecological roles of native and exotic plant species in an ecosystem.

LEARNING OBJECTIVES: Students will understand the ecological importance of native plant species. Students will be able to list negative impacts that non-native plant species can have on local habitats and explain how non-native plants spread. Students will understand how labor intensive it is to remove invasive non-native plants and thus understand the magnitude of this management problem.

6) Plant Sampling

SUMMARY

Students will work in groups to sample plants in the coastal sage scrub or salt marsh transition zone using the percent cover transect method. In recent years the sampling area has been overrun with non-native plants (predominately garland chrysanthemum), therefore; the restoration process for one area began in 2004. Plant sampling is a way to assess which species inhabit any given area without having to count every single plant present. More specifically, the students can monitor the progress of this restoration site using plant sampling.

LEARNING OBJECTIVES: To expose students to an ecology field sampling method using transects. To have students calculate and analyze data collected in the field.

7) Salt Marsh Plants & Adaptations to Salinity

SUMMARY

Students will learn about the two main adaptations that the salt marsh plants of the Tijuana Estuary have that enable them to live in a salty environment. Students will play salt marsh bingo to become familiar with the plant species of the salt marsh and to be able to identify the adaptations that those plants have to the saline environment. Students will choose one plant on which to complete an observation sheet.

LEARNING OBJECTIVES: Students will become familiar with plants found in the salt marsh habitat at the Tijuana Estuary. Students will be able to name and explain the two adaptations that salt marsh plants have to living in a salty environment (excreting and accumulating). Students will be able to name at least three salt marsh plants found at the Tijuana Estuary and identify them as an excreter or an accumulator.

8) Propagation of Native Plants

Fall and Winter - Seed Collection

SUMMARY

Students will work with Reserve nursery staff to collect and plant seeds as a method of propagation. They will gain an understanding of how propagation and nursery work fits into restoration at the Tijuana Estuary. They will complete a worksheet at the end of the rotation.

LEARNING OBJECTIVES: Students will learn how propagation at our on-site nursery fits into the restoration done in the reserve. Students will be able to name various ways seeds can disperse, differentiate between sexual and asexual propagation, explain how to increase genetic diversity when propagating plants, and explain why it is important to maintain genetic diversity in the reserve. Students will be able to name all of the plants they collected seed from and identify how their seeds are dispersed.

9) Propagation of Native Plants

Spring - Transplanting

SUMMARY

Students will work with Reserve nursery staff to transplant a few plant species as a method of propagation. They will gain an understanding of how transplanting fits into restoration at the Tijuana Estuary. They will complete a worksheet at the end of the rotation.

LEARNING OBJECTIVES: Students will learn how transplanting fits into the restoration done in the Reserve. Students will be able to explain how to increase genetic diversity when propagating plants, explain why it is important to maintain genetic diversity in the Reserve, name reasons why we transplant plants, and explain how to increase survival rates of transplanted plants. Students will be able to name one of the plants they transplanted and identify what kind root system it has.

10) Weather Station Ground-Truthing

SUMMARY

Weather data is collected continually by a weather station near the Tijuana Estuary visitor center. The information is displayed in real-time inside the visitor center. On a regular basis, the weather station must be checked for accuracy by auxiliary means (also known as ground truthing) and all of the instruments must go through a visual inspection. Using low-tech weather instruments, students will collect weather data at the site of Tijuana Estuary's weather station and compare this data to the real-time station. The collected data will be inputted into a national database available for access via the web.

LEARNING OBJECTIVES: Students will learn to collect weather data (and its importance) in the field using low-tech instruments. Data will be collected on: air temperature, wind speed and direction, relative humidity, barometric pressure, and rainfall. They will compare this data to the real-time weather station data displayed inside the visitor center. Using their math skills, students will sometimes need to convert measurements from one unit to another i.e. standard to metric.

Field Trip Activities

Border Field State Park

1) Bird Observations

SUMMARY

Students will be able to examine birds, particularly shorebirds, in their natural habitat. Once students have been instructed on how to use the monitoring data sheets, they will be allowed to observe any birds they see on their own. Depending on the season, the number and variety of birds will be different. Although many shorebirds look alike, students should hopefully see that there are differences, even though they are slight. Observing a particular group of animals over time helps to measure how healthy their habitat is.

LEARNING OBJECTIVES: Through observation of behavior and physical characteristics, students should be able to identify at least three species of birds. Using data sheets, the students will collect a variety of data that will include species type, count, behavior, and habitat type. An extension to this activity would be to repeat it during a different season.

2) Invasive Plant Species Eradication

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LEARNING OBJECTIVES: Students will understand the ecological importance of native plant species. Students will be able to list negative impacts that non-native plant species can have on local habitats and explain how non-native plants spread. Students will understand how labor intensive it is to remove invasive non-native plants and thus understand the magnitude of this management problem.

3) Photo-monitoring

SUMMARY

Students will undertake photo-monitoring in a restoration site near Border Field. Photo-monitoring is a way to monitor the progress of a restoration site or exotic plant eradication project in a quick but revealing way. Ecologists can then do more detailed measurements if the photos reveal a problem that needs to be investigated. They will use a digital camera and compass to find the correct compass bearing for the photos.

LEARNING OBJECTIVES: Students will draw from their geometry skills to find the correct compass bearing for two separate photo-monitoring points. They will also learn why monitoring is done in natural areas.

4) Plant Sampling and Mapping

SUMMARY

Students will work in groups to sample plants in the coastal sage scrub / salt marsh transition zone using the line-intercept transect method. In recent years the sampling area has been overrun with non-native plants (predominately garland chrysanthemum), therefore; the restoration process for this area began in 2004. Plant sampling is a way to assess which species inhabit any given area without having to count every single plant present. More specifically, the students can monitor the progress of this restoration site using plant sampling.

LEARNING OBJECTIVES: To expose students to ecology field sampling methods using transects. To have students calculate percent cover and analyze data collected in the field.

5) Sedimentation Basins

HSS Standard

11.9.7 Examine relations between the United States and Mexico in the twentieth century, including key economic, political, immigration, and environmental issues.

SUMMARY

Students visit the sedimentation basins and learn about the bi-directional flow of trash and the inflow of sediment from the Mexican part of the watershed including the living conditions of the residents in Los Laureles Canyon just over the border in Tijuana. Concepts include cross border cooperation and efforts to stem the flow of trash and sediment while helping to make life in Los Laureles a little safer. The 1983 La Paz Agreement (between the Environmental Protection Agency and Secretaría de Medio Ambiente y Recursos Naturales (SEMARNAT)) and the International Boundary and Water Commission Treaty Minute 320 will also be covered.

LEARNING OBJECTIVES: To help students understand the concepts from HSS Standard 11.9.7 in a deeper and more local way including binational government cooperation and solutions and their efficacy.

6) World War II (11th Grade)

Dry months.

HSS Standards

11.7.3 Identify the roles and sacrifices of individual American soldiers, as well as the unique contributions of the special fighting forces (e.g., the Tuskegee Airmen, the 442nd Regimental Combat team, the Navajo Code Talkers).

CCSS Mathematics III G-SRT

Apply trigonometry to general triangles.

11. (+) Understand and apply the Law of Sines and the Law of Cosines to find unknown measurements in right and non-right triangles (e.g., surveying problems, resultant forces).

SUMMARY

Students will go up to the Mexican Border Fire Control Station (base-end station) on Bunker Hill and see the area where Border Field Naval Air Station (BFNAS) was located at the toe of the slope of Monument Mesa. They will learn about the role of BFNAS and the base-end stations during WWII. They will also get an opportunity to hear from a Border Patrol agent.

LEARNING OBJECTIVES: Students will understand the role BFNAS played in the training of sailors during World War II and the roles of sailors while at BFNAS. They will also learn about Army soldiers stationed Mexican Border Fire Control Station (base-end station) and practice trigonometry involved in calculating the distance of Japanese vessels.

7) Cross-Border Cooperation and World War II (tour)

HSS Standards 11.9.7, 11.7.3, 11.7.6

SUMMARY

Students will go on a two-hour walking tour of the sedimentation basins, Border Field Naval Air Station viewshed, and Base-End Stations (bunkers).

LEARNING OBJECTIVES: To help students understand the concepts from HSS Standard 11.9.7 in a deeper and more local way including binational government cooperation and solutions and their efficacy. Students will understand the role Border Field Naval Air Station played in the training of sailors during WWII and the roles of sailors while at BFNAS. They will also learn about the equipment used at the base and the Mexican Border Fire Control Station (base-end station).