Teacher Information and Guidelines

Shoreside

Pre-Visit Checklist

- **Please review the invoice**. Note the deposit due date; your deposit must be received by that date in order to hold your reservations. A purchase order will be accepted in lieu of a deposit.
- **Make sure you understand the cancellation policy.**
- **Make sure program balance is paid.**
- **Arrange for chaperones**. MSI requires the assistance of **one adult per ten students.** These adults will assist the students at each station. They do not need to have a science background, but they should be enthusiastic and interested.
- **Complete and return the Student Assessment Sheet.** Fax, email, or mail the Student Assessment Form a few days prior to your voyage.
- **Create list of student groups.** Divide your students into groups. Two groups for 1-30 students, three groups for 31-45 students, four groups for 46-60 students, and five groups for 61-75 students.
- **Notify MSI if there are any special needs** (e.g. students in wheelchairs or crutches).
- **Use pre-activities and background information.** This helps prepare your students for the voyage and can be found on the MSI website: www.sfbaymsi.org.
- **Arrange transportation.** Book buses or arrange for carpools. We recommend booking buses as early as possible to ensure they are available for the times that you need them.

Day-of Visit Checklist

- **Arrive 20 minutes prior to the start of your program.** This allows time to use the restrooms and have a snack before your program begins.
- **Dress in layers.** Students will be using scientific equipment and touching live animals, so their clothes may get wet and dirty. If the forecast calls for rain, please have your students bring rain gear.
- **Make sure driver(s) have directions to the Marine Science Institutes.** You will find directions to the Institute on our website at: www.sfbaymsi.org. If you will be traveling via carpool to Redwood City, please make sure parent drivers know to park in MSI's dirt lot only, and not in Stanford's lot.
- **Bring snacks and lunches if you plan on eating on site.** If you would like a snack break during your program, please notify the instructional staff at the start of the program so that they can add it to the schedule. MSI has multiple grassy and sitting areas that are available for groups to use for lunch if they are on site for a program.
- **Bring a trash bag.** MSI does not have the facilities to accommodate the trash generated by participating groups, and has a "no trash" policy. Please bring a plastic garbage bag

so you can take any garbage back to your school with you, and encourage your students to bring trash-free lunches.

Post-Visit Checklist

- **Send in Thank You to Sponsors to MSI.** If artwork is involved this also enters the students into MSI's Translating the Tides Competition. See below for more details.
- **Use post-activities.** This helps solidify your students' grasp of knowledge they gained on the voyage and can be found on the MSI website www.sfbaymsi.org.
- **Make sure program balance is paid.**
- **Book for next year.** We take bookings a year in advance, so book early if you want specific times of year or dates.

Program Logistics

Location Considerations

The Marine Science Institute is situated on Redwood Creek in Redwood City. With the use of MSI's Discovery Classroom and Lab facilities, as well as scientific equipment such as a beach seine, mud grab, and plankton net, the students can catch a variety of organisms from the San Francisco Bay Estuary for close study and observation. Many of the spaces used for education are outdoors.

Program Length and Student Participation

The Shoreside program can range in duration from a two-hour program to a four-hour program, dependent on the amount of stations chosen. A program includes two to five stations from a choice of six: fish, benthic invertebrates, plankton, hydrology (water chemistry), sharks, and marine mammals. Depending on the number of students and the number of stations chosen, group size can vary. The program allows up to 75 students to participate at one time. The students will be split into two to five smaller learning groups in order to rotate through the stations. Please have your class divided prior to your arrival. Think about cooperative working groups and learning levels when dividing your class. Use the following chart to find information pertaining to your class size:

# of Stations	Program Length	Group Size	Size of Smaller Groups
2	2 hours	Up to 30 students	2 groups of 15 students
3	2.5 hours	Up to 30 students	2 groups of 15 students
		31-45 students	3 groups of 10-15 students
4	3 hours	Up to 30 students	2 groups of 15 students
		31-45 students	3 groups of 10-15 students
		46-60 students	4 groups of 11-15 students
5	4 hours	61-75 students	5 groups of 12-15 students

Please have your students wear name tags for this program.

Weather and Clothing Considerations
Students will be working both indoors and outdoors as scientists in the field. Please have students wear clothing that they do not mind getting a little wet or muddy. Please make sure students dress appropriately for the weather and bring enough layers. They will need warm clothes if it is a cold day, and a rain jacket if it is raining. We conduct programs rain or shine. Hats and sunscreen are recommended for most of the year.

Snack and Lunch
If you would like a snack break either before or during your program, please notify the instructional staff at the start of the program so that they can add it to the schedule. MSI has multiple grassy and sitting areas that are available for groups to use for lunch if they are on site for a program. We do not have the facilities to accommodate the trash generated by participating groups, and have a "no trash" policy. Please bring a plastic garbage bag so you can take any garbage back to your school with you, and encourage your students to bring trash-free lunches.
RESTRICTION: For the animal's safety, no hand sanitizer or food near the animals.

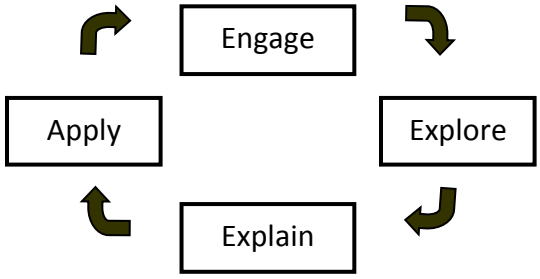
Sponsor Acknowledgement and Translating the Tides
Translating the Tides is a creative contest run by the Marine Science Institute (MSI) for students in grades kindergarten through college who participate in MSI's hands-on marine science education programs. Translating the Tides is a wonderful opportunity for students to express, in their own voices and styles, what they have learned and what they want others to know about our aquatic environments. All submissions count as sponsor acknowledgement. Winning entries are selected and may be published on the MSI web site, in our newsletter BayLines, on our monthly desktop calendar and other promotional materials.

Role of Assisting Adults
For safety reasons, we require the participation of one adult per group of students. At each station, the students may break up into smaller groups to study individual organisms. It is most helpful if the assisting adults/chaperones wander between these small groups of students to help them observe and identify their organisms. Our method of teaching is to ask thought-provoking questions that will lead students to their own answers. We ask that adults do not provide answers to the students, but help them to discover the answers on their own. Adults will also assist with overall group organization and safety. All adults will be briefed by our instructors at the beginning of the program.

Student Assessment and Learning Cycle
Since 1970, MSI has tailored science activities to meet the needs of teachers' curriculum. Students and teachers present themselves to our programs with a wide range of interdisciplinary science understandings and skills. Our marine science educators are specially trained to teach all ages with interesting and innovative methods that encourage interaction and problem solving. We encourage you to tailor your program by telling us about a particular theme that your class has been studying. Please fill out the Student Assessment Sheet you received to let us know.

MSI has modified our working educational philosophy to respond to this broad range and to help teachers and students get the most from our programs. What you do before, during, and after the day of the program will determine to a very large extent how strong a partner MSI will be in helping you meet your learning objectives. As you plan a visit to MSI, please consider how this opportunity fits within your overall instructional objective. What learning outcomes do you desire from this experience? How well is the class positioned to move your desired outcomes toward a reality? Please use the following description of the learning cycle to assess your students.

The Learning Cycle Model



Engage – Students are just beginning to generate interest in marine science.
"The MSI program will be the hook from which I launch my unit and introduce my class to the excitement of marine science. I'm willing to come into this trip a bit cold…my main objective is to generate curiosity and get the students raising questions."

Explore – Students are ready to actively experience, form predictions, and make observations.
"My students are already hooked on marine science. I'm bringing them to the MSI program with basic understandings and tools… They know a bit about the Bay and are ready to actively explore it. My objectives are for my students to make observations and to collect and record data. I'd like to see them make informed predictions and to begin framing their own critical questions."

Explain – Students have been developing understanding for some time, and are now ready to speak the language of marine science.
"By the time we participate in our MSI program my students will have conducted serious investigations of topics related to the San Francisco Bay. My objective is to see them using the language of marine science… I'd like them to begin exploring important concepts and to comprehend and analyze other explanations."

Apply – Students have a mature understanding of marine science, perhaps including aspects that are far afield from the San Francisco Bay area, and now are ready to relate that knowledge to their own backyard.
"My group has a good handle on the major learning objectives I have set for marine science. MSI's program is going to provide new scenarios for them to consider and address. My objective is to see my students using and applying their new knowledge in a different context."

Shoreside Program Description

When you arrive at MSI, you will be greeted by an MSI instructor, who will lead your group to a seated location for an introduction with all students. After the introduction, your group will divide into two to five small groups (depending on the amount of stations chosen) with an instructor and head to their first station. The students will rotate through the chosen stations, using scientific equipment and interacting with animals from the San Francisco Bay Estuary. The six available stations are fish, benthic invertebrates, plankton, hydrology, sharks, and marine mammals. If a fish station is chosen, they will also conduct a beach seine to collect Bay organisms. At the end of the stations, all groups will come back together for a closing activity where they can apply the new information they have learned. Throughout the program MSI instructors and adults will provide guidance and encouragement. Students can expect to handle and touch a variety of organisms as part of their observations.

Program Objectives

1. To provide an exciting educational experience that shows students how marine biologists study in the field; i.e. using oceanographic equipment such as a beach seine and mud grab; identifying and analyzing live specimens.
2. To relate physical and behavioral adaptations of marine invertebrates to the unique environment called an estuary.
3. To emphasize how all the living organisms are interconnected in the marine food web, and also how they relate to the physical environment.
4. To gain an understanding, appreciation, and respect for marine ecosystems, and understand the special responsibilities of humans in the natural world.

Arrival Times

Please arrive 20 minutes prior to the start of your program to allow time to use the restrooms and have a snack before your program begins.

Program Format - Station Overview

Introduction:

Once the group is settled, an instructor will introduce our watery neighbor, the San Francisco Bay Estuary. They will also discuss how the bay is a mixture of fresh and salt water (brackish water), and why the Estuary is so vitally important to the fish and wildlife in the area. Also discussed is information regarding the characteristics of the San Francisco Bay habitat, the program format for the day, and how to handle the animals they will see. During this introduction, a second instructor will brief the adults on their role with a short chaperone talk.

Beach Seine:

If fish is one of your chosen stations, the class will also participate in a beach seine activity. The students will work together to deploy a 50-foot net (beach seine) from our pier and pull it across to our oyster shell beach. Hopefully, a variety of Bay fish and invertebrates will be caught, observed, and discussed.

However, if no organisms are caught, students will have a chance to observe organisms in our holding tanks and at our educational stations.

Bay Fish Station:

Students use their observation skills to study our bay fish in the Discovery Classroom. The instructor introduces concepts to be studied such as adaptations, habitat needs, and diet. The group then breaks into smaller work groups to closely observe study and touch the fish. Younger students will look at physical characteristics to help identify the fish on posters, whereas more advanced students will use dichotomous keys to identify species.

Benthic Invertebrates Station:

The instructor introduces concepts such as adaptations, and predator/prey relationships. The group then breaks into smaller work groups to touch and study the benthic invertebrates. Students will then work together to deploy a Peterson benthic grab to gather a bottom sediment sample. They have an opportunity to touch the "bottom" of the Bay by looking through the sample for organisms. The sediment is then washed away, and the invertebrates are collected and placed into a touch table.

Plankton Station:

Students use a plankton net to gather a concentrated sample of plankton from our dock. The students will then take the sample to our plankton lab where they will discuss what plankton are and their important role in the food web of the San Francisco Bay. Samples of plankton are then placed under a video microscope so students may observe and identify the plankton they collected.

Hydrology Station:

Students use a Van Dorn bottle to collect a sample of Bay water. The students will then use scientific equipment to determine the temperature, density and salinity of the water they collected. The instructor then leads the group in a discussion on how the salinity of the San Francisco Bay can change over the course of a year and how this might affect the animals that live in the Bay.

Shark Station:

Students will take a closer look at our local leopard sharks from the San Francisco Bay. They will observe sharks living in our aquarium and discuss their survival strategies and adaptations. Students will then have an opportunity to touch a live leopard shark under the supervision of our instructors.

Marine Mammal Station:

Students will explore the groups of marine mammals that frequent the San Francisco Bay and local coastal waters. Through games, hands-on activities, and artifacts (including a 45-foot grey whale skeleton), students will learn what types of marine mammals live nearby and how they are different from mammals that live on land.

Closing:

Closing activities are chosen according to the group's grade and the theme chosen for the program. Closing activities tie together the different stations students saw that day, and helps define their role in the ecosystem. Students will brainstorm ideas for how to keep the San Francisco Bay Estuary healthy, clean, and protected.