WELCOME TO THE CHAPARRAL TO OCEAN SCIENCE SCHOOL PROGRAM

"When we try to pick out anything by itself, we find it hitched to everything in the universe."

John Muir

You and your students are about to embark on a unique program taking you from the Santa Ana Mountains to the Pacific Ocean. During the three days spent at the Chaparral to Ocean Science School, you and your students will have the opportunity to explore up to five Southern California ecosystems: chaparral, oak woodland, riparian, intertidal, and pelagic.

Students hike along Hot Springs Creek and up the Los Piños trail to explore the biotic and abiotic factors that make each ecosystem a "living system." They identify plants, collect insects, study microhabitats, and determine how each element fits into a working system of living and non-living parts. Students design their own field experiment, learn about nocturnal adaptations as they explore the Lazy W Ranch after dark on a night hike, and participate in a campfire celebration. On the third day, they travel to the Ocean Education Center in Dana Point to investigate the intertidal and pelagic ecosystems found off the coast of California.

The Chaparral to Ocean Science School curriculum is aligned with the Science Content Standards for California Public Schools. Students will develop and exercise the scientific processes, including observing, communicating, inferring, interpreting data, identifying, and classifying.

In order to help you prepare yourself, your class, and your parent chaperones for the upcoming journey, we have provided a teacher materials package. In this package you will find:

- Administrative Preparation Materials
- Administrative Check List
- Program Description
- Links to California Science Content Standards
- Background Resources
- Classroom Activities

Before embarking on your journey, you will also need the Required Forms, which are available on the Ocean Institute website. These forms include the following packets:

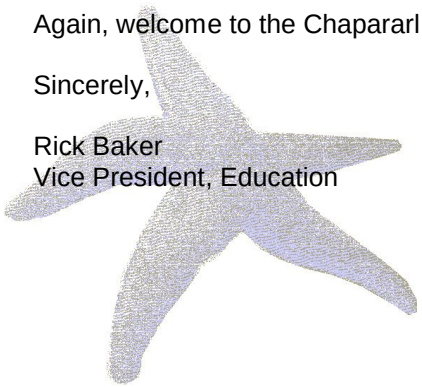
- Teacher Information Packet
- Chaperone Information Packet
- Parent Information Packet

As your program date nears, please review the administrative checklist and program agreement for final preparations before your program. If you have any questions about your visit to the Ocean Institute, please do not hesitate to contact our Outdoor Education Program Director, Sara Ludovise, at 949-496-2274 ext. 344.

Again, welcome to the Chapararl to Ocean Science School program. We are looking forward to your visit.

Sincerely,

Rick Baker
Vice President, Education



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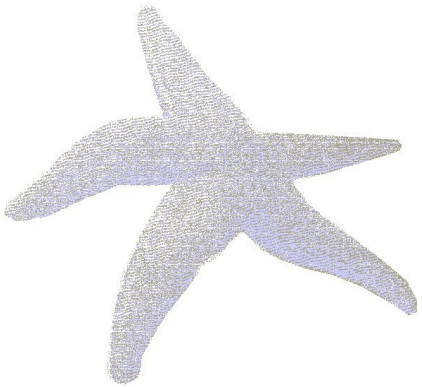


A. ADMINISTRATIVE INFORMATION AND PREPARATION

ADMINISTRATIVE CONTACT

For questions regarding the Chaparral to Ocean Science School, please contact:

Sara Ludovise, Outdoor Education Director
Address: 24200 Dana Point Harbor Drive, Dana Point, CA 92629
Telephone Number: (949) 496-2274, extension 344
Fax Number: (949) 248-5557
E-mail: sludovise@ocean-institute.org

INTRODUCTION

Thank you for choosing the Ocean Institute as your field trip destination. We appreciate the time and effort it takes to prepare your students for their program, and we will do everything we can to make their experience as rewarding as possible.

Please make sure that all of the participating teachers have a copy of these teacher materials. The information contained here can help you find answers to your questions, develop your preparation timeline, and prepare both your students and chaperones. This package also contains directions to the Ocean Institute and the Lazy W Ranch as well as contact telephone numbers — please call us at any time with any questions you may have about your field trip!

TEACHER INFORMATION: BEFORE YOUR PROGRAM

There are several things that you can do prior to your arrival at camp that will help your program run as smoothly as possible:

- Review the program goals and expected behaviors with the students before you arrive. Complete the classroom activities with your students, and make sure they have a clear understanding of the educational concepts they will explore during the program
- Spend some time choosing and preparing your chaperones. It is vital that the chaperones are prepared for the program. Review the program goals, station activities, and expected student behaviors with them before you arrive. Make sure that they have a clear understanding of their role as a chaperone.
- Fax the **"Program Information Sheet"** to the Ocean Institute (949-248-5557) at least one month ahead of time, with all necessary dietary and health information.
- Have a signed Acknowledgement of Risk and Waiver and a signed Medical Form for each student and chaperone before boarding the bus.
- Send program payment to the Ocean Institute at least 10 days before the scheduled date of your field trip. Please mail a single check for the total amount of the program minus the deposit you have already paid. **Please make checks payable to Ocean Institute.**

TEACHER INFORMATION: DURING YOUR PROGRAM

Ocean Institute instructors are all well trained to work with students of different ages and abilities. Both you and the adult chaperones can help the instructors monitor student behavior and safety. There are several things that you can do to help facilitate the smooth running of your educational program:

- Work cooperatively with Ocean Institute instructors and your parent chaperones to manage students during the program.
- Work cooperatively with Ocean Institute instructors and your parent chaperones to solve student and chaperone management problems.
- Report any problems (including facilities and management) to the Ocean Institute staff as soon as possible.

PAYMENT

Payment must be received 10 days before your program date. Please mail a **single check** for the total amount of the program (minus the deposit that you have already paid) to:

Ocean Institute
24200 Dana Point Harbor Drive
Dana Point, CA 92629

Please make the check payable to **Ocean Institute.** If your school cannot meet the Ocean Institute's payment policy, please contact your Reservation Coordinator at (949) 496-2274, extension 211.

FINAL COUNT

Call the Ocean Institute at (949) 496-2274, extension 211 before your program if the number of students or adults changes. When you arrive at the Lazy W Ranch for your program, you must have an accurate count of students and adults participating in the program. If the number of participants listed on your Confirmation Form is not accurate, call the Ocean Institute immediately.

STUDENT AID

The Ocean Institute maintains a student aid fund for students who are unable to obtain sufficient funding to attend the program. Please call (949) 496-2274, extension 211 for more information and to receive the necessary forms for student aid.

CAMPER INSURANCE

All campers visiting the Lazy W Ranch are covered by camper day insurance through Cal-Pac Camps. For more information regarding this policy, please contact the Outdoor Education program director at (949) 496-2274 ext. 344.

INFORMATION PACKETS

We have posted separate packets for the teachers, chaperones, and parents on our website (http://www.ocean-institute.org/teacher/fieldtrips/chaparral_ocean_sci.html). These packets contain copies of information and forms that must be completed before arriving for the Chaparral to Ocean Science School program. **IT IS IMPORTANT THAT YOU ARE FAMILIAR WITH ALL THE INFORMATION AND FORMS FOUND IN EACH PACKET.** These packets are ready to be copied and distributed to the appropriate participants. Information on each of the forms is in the next section.

Please make sure that you provide chaperones with both the Chaperone Information Packet (for themselves) and the Parent Information Packet (for their child).

MEDICAL ISSUES

The teacher-in-charge keeps all medical forms and is responsible for storing and distributing student medications (both prescription and non-prescription). If your school's policy does not allow teachers to handle medications, please contact the program director **immediately** at (949) 496-2274 ext. 344 so that alternate arrangements can be discussed.

Please notify the Ocean Institute in advance of any participant with special dietary or other needs. Please be aware that we do not have a medical doctor or nurse on site, and we do not have housing for sick students. Parents of ill or injured students will be notified immediately and arrangements made for transportation to the hospital or home.

SEASICKNESS

If you are scheduled for a trip on the *RV Sea Explorer* and are concerned about seasickness on board, there are several things that you and your students can do to avoid seasickness on boat programs:

- Eat a good breakfast or lunch before the cruise.
- Take anti-motion medication at least 2 hours before boarding the vessel. We recommend a **non-drowsy** form of Dramamine or Bonine.

LUNCH ON DAY 1

Please make certain that everyone in your group (including students, chaperones, and yourself) brings lunch for Day 1. Separate out or collect the lunches and make certain that they are readily accessible.

Lunch on the first day will be eaten at the Lazy W Ranch upon arrival. All other meals during the program will be provided. Please let Ocean Institute staff know in advance if your school has any particular dietary needs.

MEALS AT THE LAZY W RANCH

Your group will need to bring lunch for Day 1 of your program. All other meals will be provided at the Lazy W Ranch, where they will be prepared by the kitchen staff and served family style.

Although the Lazy W kitchen can accommodate most dietary restrictions (i.e., vegetarians, food allergies), some specific restrictions (vegans, organic foods, extremely strict kosher, gluten allergies) may require guests to bring supplemental food. If you have a question about whether the Lazy W Ranch kitchen can accommodate a specific dietary restriction, please contact the Program Director in advance at (949) 496-2274 ext. 344.

As the teacher, you may select the meals that you would like served during your program. Please indicate your selection on your Program Information Sheet.

Breakfast: (All breakfasts served with cold cereal, milk, juice, and coffee)

- Breakfast Burrito, Salsa & Cheese, Fresh Fruit
- Scrambled Eggs, Bagels, Fresh Fruit
- Pancakes, Sausage, Fresh Fruit
- French Toast, Bacon, Fresh Fruit

Lunch: (All lunches served with punch, chips, and a dessert)

- Grilled Cheese Sandwiches
- Turkey Hot Dogs
- Turkey Sandwiches

Dinner: (All dinners served with salad bar, dessert, milk, and water)

- Make-Your-Own Burritos, Beans, Rice, and Chips and Salsa
- Baked or BBQ Chicken, Rice Pilaf, Steamed Vegetables, and Corn Bread
- Spaghetti or Lasagna, Green Beans, and Garlic Bread
- Roasted Turkey, Dressing, Mashed Potatoes, Fresh Vegetables, and Dinner Rolls
- Chicken Enchiladas, Rice, Beans, and Salsa
- Chicken Stir Fry, White Rice

If you would like to select meals for your program, your Program Information Sheet must be received at least *ONE MONTH* before your program date. Please be aware that if meal selections are not received on time, the Lazy W kitchen staff will not be able to prepare the requested meal.

For the CTOSS program, breakfast on Day 3 will be a walking breakfast (Breakfast Sandwiches with egg, cheese, and ham; Fresh Fruit, and Hot Chocolate). Pizza will be served for lunch on Day 3.

PROGRAM FORMS

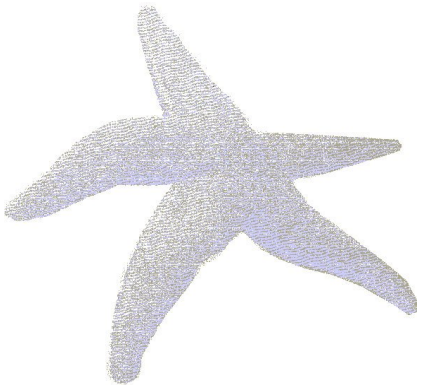
The following forms are included in the Required Forms packet that is available on the Ocean Institute website (http://www.ocean-institute.org/teacher/fieldtrips/chaparral_ocean_sci.html). Please make sure that all of the forms are completed before you arrive for the Chaparral to Ocean Science School Program. Make sure that you use the forms from the packet posted on the website — they are the most updated forms.

- **Program Information Sheet**
  The Program Information Sheet should be completed and faxed to the Ocean Institute **at least one month** before your program date. This information will help us prepare for your program. Use this form to request your explorations and inform us of any special needs.

- **Hiking and Cabin Group Forms**
  Once you have a final roster of participating students, divide them into hiking and cabin groups. During the Chaparral to Ocean Science School Program, each hiking group will be assigned to an Ocean Institute instructor who will guide them through their instructional activities. A hiking group consists of 12 – 16 students (mixed genders, please) and one or two adult chaperones. Choose an identifying name for each of the hiking groups (for example: coyotes or dragonflies). A cabin group consists of nine students of the same gender and one adult chaperone. Please be prepared to present the Science School on-site administrator with a copy of the Activity and Cabin Group lists upon arrival.

- **Medical Forms**
  You will find **medical forms** in the packets. You must have a completed and signed medical form for each student and adult participating in the Chaparral to Ocean Science School Program. In order for a child to receive any prescription or non-prescription medication during the Science School Program, the Administration of Medication form must be completed and signed by the parent or guardian and the child's physician.

- **Acknowledgement of Risk and Waiver**
  Each student must have this form signed by a parent or guardian to participate in the Chaparral to Ocean Science School Program. Please make sure that you have one signed form for each student, adult chaperone, and teacher when you check in with the Ocean Institute staff. **Participants without a signed form will not be permitted to participate.**



TRANSPORTATION

Student transportation should be arranged well in advance. Please make sure that your bus can drive over the 1½-mile dirt road to the Lazy W Ranch. If your bus cannot do this, call the Ocean Institute as soon as possible to make arrangements for luggage transport. The students must walk the 1½ miles into camp.

The Ocean Institute will schedule transport between the Lazy W Ranch and the Ocean Institute. If you would like to arrange your own transportation, please let us know. We highly encourage schools to bring a U-Haul to transport luggage in order to minimize the amount of times that luggage needs to be loaded or unloaded. Please let us know ahead of time if you will be bringing a U-Haul.

Transportation Schedule for the Chaparral to Ocean Science School Program

First Day of Program:

10:30 AM Arrive at the Lazy W Ranch and drop off students

Third Day of Program:

1:30 PM Arrive at the Ocean Institute to pick up students and luggage (without boat program or with an early morning boat program),

OR

3:30 PM Arrive at the Ocean Institute to pick up students and luggage (with boat program)

Please check your PROGRAM AGREEMENT for your scheduled departure time.

DIRECTIONS TO THE LAZY W RANCH

Address: 25832 Hot Springs Canyon, San Juan Capistrano, CA 92623.
Phone Number: (949) 728-0758

- Take Interstate 5 toward San Juan Capistrano.
- Exit the freeway at the Ortega Highway (74) exit and turn left (from north) or right (from south).
- Follow the Ortega highway east for approximately 12 miles.
- Turn left off the Ortega Highway at San Juan Hot Springs Road (just before the San Juan Fire Station).
- Follow the road 1.5 miles until you reach the Lazy W Ranch parking lot (the road dead-ends in the parking lot). Please park on the left against the logs.

Note: You will cross the stream four times as you drive down San Juan Hot Springs Road. The crossings all have concrete bottoms.

DIRECTIONS TO THE OCEAN INSTITUTE

Address: 24200 Dana Point Harbor Drive, Dana Point, CA 92629.
Phone number: (949) 496-2274

Directions from Los Angeles:

- Travel south on Interstate 5.
- Exit on the Pacific Coast Highway Exit.
- Stay in the right lane of the exit ramp and go north on P.C.H.
- Turn left onto Dana Point Harbor Drive.
- The road ends in the Ocean Institute parking lot.

Directions from San Diego:

- Travel north on Interstate 5.
- Exit on the Beach Cities Exit.
- Stay in the left lane of the ramp and go north on P.C.H.
- Turn left onto Dana Point Harbor Drive.
- The road ends in the Ocean Institute parking lot.

PARENT CHAPERONE RECRUITMENT

Your recruitment of chaperones is very important. Their support and enthusiasm are vital to a successful adventure. Chaperones may be teachers, parents, grandparents, college students, or older brothers or sisters of students. They must be at least 18 years old, in good physical condition, and supportive of the Chaparral to Ocean Science School Program goals.

Each chaperone will be assigned to both a cabin group and a hiking group. You will need at least one chaperone per cabin (each cabin can sleep ten people total), which means that you will need to bring at least one adult for every nine children.

Please meet with your chaperones before your trip to make sure they have a complete understanding of their responsibilities, and distribute the Chaperone Information Packet. The onsite administrator will meet with all of the chaperones at the beginning of the program to address any questions or concerns.

Please remember that the Chaparral to Ocean Science School experience is designed for the students and that, while parent participation is important, too many parent chaperones can shift the focus of the information away from the students.

PRE-TRIP PARENT MEETING

The Ocean Institute staff is excited to help with your trip preparation in any way that we can. If you would like, we are happy to visit your school to present information to parents about the Chaparral to Ocean Science School Program and to answer any questions. If you are interested in arranging a presentation, please contact the Ocean Institute at (949) 496-2274, ext. 211.

STUDENT PREPARATION

We have found that the more familiar the students are with program concepts and content before they arrive, the more they will benefit from and enjoy their experience. We have included background information to introduce important concepts to your students before they arrive for their program.

STUDENT BEHAVIORAL EXPECTATIONS

Please take time to discuss the academic nature of their field experience with your students before arriving for your program. During the program, we expect your students to follow the same behavioral rules you have in your classroom.

WILDLIFE AND SAFETY PRECAUTIONS

The Lazy W Ranch is located in the Cleveland National Forest, which is a designated wilderness area. Animal residents of the area that make precautions necessary include mountain lions, bobcats, coyotes, rattlesnakes, scorpions, and bees. While encounters with these animals are rare, both adults and students must be aware of camp policies and procedures. Close supervision of students by the accompanying adults is essential, and strict adherence to the camp rules is necessary.

All teachers, chaperones, and students attending the Chaparral to Ocean Science School Program must read and understand the following wildlife and safety rules prior to their visit

- All students must remain in close proximity of an instructor or chaperone. Close proximity shall be strictly defined as "visual contact." Students are never to go anywhere alone. Students will be advised of the "visual contact" rule and the seriousness of compliance.
- Two adults will accompany each activity group. An Ocean Institute instructor will lead the group and a designated chaperone will follow.
- Students and chaperones must stay with their instructor on established trails. On winding and narrow trails the instructor will stop regularly to allow students to catch up. The distance between the instructor and the adult at the end shall not exceed 30 yards.
- At least one chaperone will oversee the recreation area during the recreation periods. At least one chaperone will oversee the cabin and shower areas before and after dinner.
- Food (including gum and candy) is not allowed in the cabins or on the trails.
- Closed-toed shoes must be worn at all times (except for sleeping and showering). Students are required to wear long pants on trails.
- Littering is not tolerated.
- Students may not touch any of the camp animals or pets, including the cats and dogs.
- The stream area is off limits unless accompanied by an instructor during an organized activity.
- Students must remain in their cabins from "lights out" until 7:00 AM, except for bathroom visits. Chaperones must accompany students on night bathroom visits.
- Instructors will carry walking sticks, air horns, and emergency first aid kits on hiking trails. In addition, all instructors are First Aid and CPR certified.
- Cabin raiding is not allowed.
- Students will report any injury or illness to an instructor or chaperone immediately.
- Students are expected to follow established classroom guidelines.

Upon arrival at the program, the on-site administrator will review these rules and guidelines with the students and chaperones. If there are discipline or safety concerns during the program, the on-site administrator will work with the teachers to resolve issues appropriately following the school's normal procedures.

STUDENT SAFETY RULES ON THE *R/V SEA EXPLORER*

The boat portion of the Chaparral to Ocean Science School takes place on the ***R/V Sea Explorer***. An Ocean Institute Floating Laboratory Specialist will review the following safety rules with you and your students.

- Everyone must walk at all times while onboard the ***R/V Sea Explorer*** — running and horseplay are not permitted.
- Passengers must keep both feet on the deck at all times, and remember to keep one hand on the rail whenever possible.
- Passengers must keep off the upper deck and access ladder, off of the anchor chain, and stay behind the painted yellow lines unless permitted by Ocean Institute instructors.
- Passengers must keep hands off the equipment until instructed to do otherwise.

***LAURENA G. CHAMBERS GALLERY* BOOK AND GIFT STORE**

Chambers Gallery Book and Gift Store is a fun and unique non-profit museum store open daily from 9:00 AM to 5:00 PM that is definitely worth the visit. The revenue is directed toward lowering tuition for schools that participate in Ocean Institute programs.

To help accommodate all of the schools that would like to shop each day, please have one teacher from your school check-in with a store staff member before your students begin shopping.

There will be a limit on the number of students allowed to shop at one time and we encourage you to organize them so that they all have time to enjoy the shop. Please have one or two adults in the store to help supervise your students. We ask that all food, drink, and backpacks be left outside while they are shopping. Teachers receive a 15% discount in the shop if members of the Teachers Club and 10% normally.

Please remind your students that sales tax will be added to their items.

In order to ensure a positive experience, we recommend the following:

1. Let the program administrator know if you would like time in the Gift Store so that they can schedule it into your program time on the last day.
2. All purchases should be stowed safely away and out of sight during the program.
3. Please allow only one hiking group in *Chambers Gallery* Book and Gift Store at a time. Remaining students should remain outside in a manner that does not interfere with traffic in and out of the building.

CHAPARRAL TO OCEAN SCIENCE SCHOOL SOUVENIR T-SHIRT

Your students can take home more than just knowledge and memories from their Ocean Institute adventure! Chaparral to Ocean Science School t-shirts are available for both students and adults. This comfortable t-shirt features the Science School logo and is *only* available to participants who have completed the program.

Group and individual order forms are included in the Required Forms packet, available on the Ocean Institute website. If you would like to place an order for your school, please combine all individual orders onto one Group Order Form (individual checks are okay!) and fax it to (949) 496-4296. All orders must be received at least six weeks in advance of your program date.

If you have any questions, please contact the *Laurena G. Chambers Gallery* Book and Gift store at (949) 496-2274.

B. ADMINISTRATIVE CHECKLIST

Immediately upon receiving this package…

- ❑ Carefully review the Teacher Preparation Package (this document!).
- ❑ Mail an information letter to parents to arrange a parent orientation, and make sure to ask for parent chaperones. **If you would like Ocean Institute staff to make a presentation at your parent orientation, please contact us at least 1 month in advance at (949) 496-2274 ext. 211.**
- ❑ Arrange your transportation
- ❑ Distribute T-shirt information to students and adults

Two months prior to your trip…

- ❑ Eighty percent of your funding should be secured.
- ❑ Confirm student and adult numbers with the Ocean Institute.
- ❑ Arrange for parent chaperones—we require one adult per nine students. See the confirmation form for the cost of each chaperone.
- ❑ Fax your T-shirt order 6 weeks before your program to guarantee the requested sizes and a complete order.

One month prior to your trip…

- ❑ Distribute Chaperone Information Packets and Parent Information Packets. **KEEP THE MEDICAL FORMS AND THE ACKNOWLEDGEMENT OF RISK FORMS SEPARATE.**
- ❑ Begin student preparation.
- ❑ Confirm the final number of students and chaperones, as well as any dietary or medical needs, and select your main explorations by filling out the Program Information Sheet. Mail or fax your Program Information Sheet to the Ocean Institute at (949) 248-5557.

Two weeks prior to your trip…

- ❑ Mail program payment to the Ocean Institute **— full payment must be received a minimum of 10 days before your program.**
- ❑ Collect signed Acknowledgement of Risk and Waiver and signed Medical Forms from each student and chaperone.
- ❑ Fill out and sign the Acknowledgement of Risk and Waiver and Adult Medical Form for yourself and any other teachers attending.
- ❑ Meet with chaperones to communicate expectations and go over the details of the program.

One week prior to your trip…

- ❑ Review behavioral expectations with students.
- ❑ Divide students into activity and cabin groups, and complete the activity and cabin group forms.
- ❑ Contact the Ocean Institute with any last minute questions or changes.

24 hours to go!!!…

- ❑ If inclement weather is expected, contact the Ocean Institute for status of the program. The Chaparral to Ocean Science School is a rain-or-shine program, but we may make minor adjustments in case of inclement weather.
- ❑ Be sure all forms have been collected. Please keep the Acknowledgement of Risk and Waiver separate from the Medical Forms.
- ❑ Gather boxes to separate sack lunches for Day One.
- ❑ Prepare nametags for students and adults.

When you arrive at the Lazy W Ranch…

- ❑ Pass out nametags to the students and adults.
- ❑ Check in with the Ocean Institute on-site administrator to give him or her a final count of students and adults. The on-site administrator will collect the Acknowledgement of Risk and Waiver forms from you. You will hold on to the Medical Forms.

C. DESCRIPTION OF THE CHAPARRAL TO OCEAN SCIENCE SCHOOL PROGRAM

During the Chaparral to Ocean Science School Program, students spend three days in a wilderness setting exploring five different ecosystems.

Over the course of their three-day exploration, students will measure the abiotic (non-living) characteristics of different ecosystems. They will identify biotic (living) components of different ecosystems, investigate their interactions with abiotic components (i.e., organism adaptations), and explore the relationships between biotic components (i.e., food webs, symbiosis). Each hiking group will also work together to design their own field investigation to help them explore different aspects of ecology in depth.

EXAMPLE PROGRAM SCHEDULE

Day One

10:30 AM	Students arrive at Lazy W Ranch
10:30 AM – 11:30 AM	Student and Chaperone Introduction
11:30 AM – 12:30 PM	Lunch, Cabins, Hike Preparation
12:30 PM – 2:30 PM	*Ecosystem Investigation #1*
2:30 PM – 4:30 PM	*Ecosystem Investigation #2*
4:30 PM – 5:30 PM	Supervised Recreation / Showers
5:30 PM – 6:30 PM	Dinner
6:30 PM – 7:30 PM	Supervised Recreation / Showers
7:30 PM – 9:00 PM	*Nocturnal Investigation*
9:30 PM	Lights Out

Day Two

7:00 AM	Good Morning!
7:30 AM – 8:15 AM	Breakfast
8:15 AM – 9:00 AM	Hike Preparation / Recreation
9:00 AM – 11:00 AM	*Ecosystem Investigation #3*
11:00 AM – 11:30 AM	Field Notebook
11:30 AM – 12:15 PM	Lunch
12:15 PM – 1:30 PM	Rest and Relaxation
1:30 PM – 4:00 PM	*Field Investigations*
4:00 PM – 4:30 PM	*Field Investigation Symposium*
4:30 PM – 5:30 PM	Supervised Recreation / Showers
5:30 PM – 6:30 PM	Dinner
6:30 PM – 7:30 PM	Supervised Recreation / Showers
7:30 PM – 9:00 PM	*Camp Fire Program*
9:30 PM	Lights Out

Day Three

6:45 AM	Good Morning!
7:00 AM – 7:30 AM	Clean Cabins and Pack
7:30 AM – 8:15 AM	Breakfast
8:15 AM – 9:00 AM	Clean Camp and Load Buses
9:00 AM – 9:45 AM	Transport to Ocean Institute
9:45 AM – 11:15 AM	*Ecosystem investigation #4: Intertidal Ecosystem*
11:15 AM – 12:00 PM	Lunch
12:00 PM – 4:00 PM	*Ecosystem Investigation #5: Living Systems Lab / Cruise*
4:00 PM	Load Bus and Head Home

Please note that this is a sample schedule. Please check your PROGRAM AGREEMENT for your departure time.

ECOSYSTEM EXPLORATIONS

During the Chaparral to Ocean Science School Program, your students complete three "Ecosystem Explorations." Please read the descriptions and select the **three** explorations best suited for your group. Once you have made your selections, enter your three explorations on the **Program Information Sheet** in the Teacher Information Packet, and return the form to the Ocean Institute.

- ***Chaparral***
  Students examine the adaptations of the plants and animals living in the chaparral ecosystem, measure the abiotic factors of the chaparral using a Physical Factor Test Kit, search for evidence of animals, identify plant and animal species, construct a food web to study energy transfer, investigate the concepts behind fire ecology, and study the impact of humans on the chaparral ecosystem.

- ***Riparian***
  Students identify and examine the adaptations of plants and animals living in the riparian ecosystem, collect and identify insects living in the stream microhabitats, test the water quality using scientific equipment, measure the abiotic factors of the riparian ecosystem using a Physical Factors Test Kit, discover interactions between organisms, and study the impact of humans on the riparian ecosystem.

- ***Oak Woodland***
  Students examine the adaptations of the plants and animals living in the oak woodland ecosystem, identify plants using a dichotomous key, interact with animals in our Nature Center, measure the abiotic factors of the oak woodland using a Physical Factors Test Kit, study food and water transport inside vascular plants, and study the impact of humans on the oak woodland ecosystem.

- ***Riparian / Oak Woodland***
  Students combine the riparian and the oak woodland explorations described above, including stream collection and a visit to the Nature Center.

- ***Earth Science***
  Students search for evidence of tectonic activity while examining the geologic history and makeup of the Santa Ana Mountains. Students will rotate through activities designed to illustrate how plate tectonics have shaped the Santa Ana Mountains in the distant past, and how erosion forces continue to shape the landscape in present day as they identify the geological composition of the Lazy W Ranch.

ADDITIONAL EXPLORATIONS

During the program, your students will also participate in these additional explorations:

- ***Field Investigations***
  After exploring all of the different ecosystems at the Lazy W Ranch, students step into the shoes of field biologists to design their own research project. Students will work together in their hiking groups to come up with a testable question, identify variables, use real research equipment to collect and analyze data, and then present their findings to a "symposium" of their peers.

- ***Night Hike***
  On the first night at camp, students explore the Lazy W Ranch after dark to learn about nocturnal adaptations. Students will make connections to the ecosystems that they explored during the day as they discover how the five senses of nocturnal animals are adapted to help them survive in a vastly different environment.

- ***Campfire Program***
  On the second night at the Lazy W Ranch, the entire group will participate in a campfire-side celebration of their time at Chaparral to Ocean Science School. Songs and stories from Ocean

Institute instructors, as well as skits written and performed by the different cabin groups, make this an experience that students will never forget.

- ***Marine Life Refuge Investigation***
  After arriving at the Ocean Institute on the third day, students will discover the intertidal ecosystem as they venture into Dana Point's Marine Life Refuge. They will analyze the abiotic factors present in the tidepools as they encounter the plants and animals that have adapted to survive in this harsh environment.

- ***Living Systems Lab***
  At the Ocean Institute, students begin an exploration of the pelagic ecosystem. They discover how aquarists put together an aquarium and test the water to see if it is healthy, dissect a fish to explore its digestive system, and use microscopes to construct an ocean food chain.

- ***Living Systems Boat Program*** (optional)
  In this extension of the basic Chaparral to Ocean Science School program, students set out to sea on board the *RV Sea Explorer*. There, they study plankton, analyze a mud sample, and search for other ocean life as they explore the pelagic and benthic ecosystems. **If you would like to add the Living Systems Boat Program to your Chaparral to Ocean Science School, please check your PROGRAM AGREEMENT. Please contact the Ocean Institute at (949) 496-2274 ext. 211 with any questions.**

D. LINKS TO CALIFORNIA SCIENCE CONCENT STANDARDS

All Ocean Institute programs are based around California Content Standards. The activities and investigations that your students participate in during the Chaparral to Ocean Science School Program coincide with the concepts being taught back in your classroom.

Here is a list of the general California Science Content Standards that are included in the Chaparral to Ocean Science School Program. If there are specific concepts that you would like to see focused on during the program, please contact us in advance. We are happy to adjust the program to meet your needs.

Grade Four

Life Sciences

2.a. Students know plants are the primary source of matter and energy entering most food chains.
2.b. Students know producers and consumers (herbivores, carnivores, omnivores, and decomposers) are related in food chains and food webs and may compete with each other for resources in an ecosystem.
2.c. Students know decomposers recycle matter from dead plants and animals.
3.a Students know ecosystems can be characterized by their living and nonliving components.
3.b. Students know that in any particular environment, some kinds of plants and animals survive well, some survive less well, and some cannot survive at all.
3.c Students know many plants depend on animals for pollination and seed dispersal, and animals depend on plants for food and shelter.

Investigation and Experimentation

6.a. Students will differentiate observation from inference (interpretation) and know scientists' explanations come partly from what they observe and partly from how they interpret their observations.
6.b. Students will measure and estimate the weight, length, or volume of objects.
6.c. Students will formulate and justify predictions based on cause-and-effect relationships.
6.d. Students will conduct multiple trials to test a prediction and draw conclusions about the relationships between predictions and results.
6.e. Students will construct and interpret graphs from measurements.
6.f Students will follow a set of written instructions for a scientific investigation.

Grade Five

Life Sciences

2.a. Students know many multicellular organisms have specialized structures to support the transport of materials.
2.c. Students know the sequential steps of digestion and the roles of teeth and the mouth, esophagus, stomach, small intestine, large intestine, and colon in the function of the digestive system.
2.e. Students know how sugar, water, and minerals are transported in a vascular plant.
2.f. Students know plants use carbon dioxide and energy from sunlight to build molecules of sugar and release oxygen.
2.g. Students know plant and animal cells break down sugar to obtain energy, a process resulting in carbon dioxide (CO_2) and water (respiration).

Investigation and Experimentation

6.a. Students will classify objects in accordance with appropriate criteria.
6.b. Students will develop a testable question.
6.c. Students will plan and conduct a simple investigation based on a student-developed question and write instructions others can follow to carry out the procedure.
6.f. Students will select appropriate tools and make quantitative observations.
6.g. Students will record data by using appropriate graphic representations and make inferences based on those data.

6.h. Students will draw conclusions from scientific evidence and indicate whether further information is needed to support a specific conclusion.

Grade Six

Plate Tectonics and Earth's Structure

1.a. Students know evidence of plate tectonics is derived from the fit of the continents; the location of earthquakes, volcanoes, and midocean ridges; the distribution of fossils, rock types, and ancient climate zones.
1.c. Students know lithospheric plates the size of continents and oceans move at rates of centimeters per year in response to movements in the mantle.
1.d. Students know that earthquakes are sudden motions along breaks in the crust called faults and that volcanoes and fissures are locations where magma reaches the surface.
1.e. Students know major geologic events, such as earthquakes, volcanic eruptions, and mountain building, result from plate motions.
1.f. Students know how to explain major features of California geology (including mountains, faults, volcanoes) in terms of plate tectonics.

Shaping Earth's Surface

2.a. Students know water running downhill is the dominant process in shaping the landscape, including California's landscape.
2.b. Students know rivers and streams are dynamic systems that erode, transport sediment, change course, and flood their banks in natural and recurring patterns.
2.c. Students know beaches are dynamic systems in which the sand is supplied by rivers and moved along the coast by the action of waves.
2.d. Students know earthquakes, volcanic eruptions, landslides, and floods change human and wildlife habitats.

Ecology (Life Sciences)

5.a. Student know energy entering ecosystems as sunlight is transferred by producers into chemical energy through photosynthesis and then from organism to organism through food webs.
5.b. Students know matter is transferred over time from one organism to others in the food web and between organisms and the physical environment.
5.c. Students know populations of organisms can be characterized by the functions they serve in an ecosystem.
5.d. Students know different kinds of organisms may play similar ecological roles in similar biomes.
5.e. Students know the number and types of organisms an ecosystem can support depends on the resources available and on abiotic factors, such as quantities of light and water, a range of temperatures, and soil composition.

Investigation and Experimentation

7.a. Students will develop a hypothesis.
7.b. Students will select and use appropriate tools and technology to perform tests, collect data, and display data.
7.c. Students will construct appropriate graphs from data and develop qualitative statements about the relationships between variables.
7.e. Students will recognize whether evidence is consistent with a proposed explanation.
7.f. Students will read a topographic map and a geologic map for evidence provided on maps and construct and interpret a simple scale map.
7.g. Students will interpret events by sequence and time from natural phenomena.
7.h. Students will identify changes in natural phenomena over time without manipulating the phenomena.

E. RESOURCE MATERIALS

The Chaparral Ecosystem
The plants and animals of the chaparral ecosystem thrive in the hot dry climate of Southern California. This ecosystem is found on the sunny side of mountains and hills. The soil is rocky and lacks abundant nutrients. The plants in the chaparral remain small, requiring less water than larger plants. Many plants, like chamise, have small leaves to reduce water loss. The leaves of white sage are light colored and reflect strong sunlight. The shrub called toyon has hard waxy leaves that seal in precious water.

Animals that live in the chaparral, like coyotes, mountain lions, and woodrats, survive the hot climate by hunting at night. Some small mammals can get the water they need from their food, rather than drinking. The large ears of rabbits have evolved to dissipate heat (rather than to increase hearing abilities.)

Common Animals	Common Plants
scrub jay	*scrub oak*
woodrat	*toyon*
red-tailed hawk	*yucca*
wrentit	*chamise*
yucca moth	*laurel sumac*
anna's hummingbird	*white sage*
western rattlesnake	*dodder*

The Riparian Ecosystem
Large trees, moist cool air, and sandy soil characterize the riparian (streamside) ecosystem. These trees, such as the white alder and western sycamore, require a great deal of water to survive. The sycamore has deep roots and can drink 400 gallons of water a day! The roots of the white alder must always be in contact with water for the tree to survive. Many riparian plants, such as blackberry and arroyo willow, have large leaves to help collect sunlight in this shady environment. Mule deer and rabbits will not eat plants like wild rose because of the thorns on the stems.

Animals depend on the stream for many reasons. Raccoons, opossums, and garter snakes are among the animals that search for food and water along the stream. Birds, like the black phoebe and hummingbirds, feed on the plentiful flying insects found around the stream. The young of many of these insects (like dragonflies and caddisflies) develop in the stream and spend their adult lives on land. Other insects, such as the giant water bug and the diving beetle, spend their entire lives in the stream.

Common Animals	Common Plants
pacific tree frog	*white alder*
California newt	*blackberry*
black phoebe	*wild mint*
raccoon	*western sycamore*
dragonfly	*arroyo willow*
diving beetle	*mule fat*
giant water bug	*fern*

The Oak Woodland Ecosystem
The oak woodland ecosystem is found on the shady side of mountains and hills. The most outstanding feature of this environment is the large coast live oak trees. These enormous trees shade the ground below with a wide canopy of branches. Many of the plants in the oak woodland have adapted to living in the shade of the oak trees. These plants usually have larger leaves than chaparral plants. The large leaves are an adaptation to the lower amounts of sunlight.

Many animals make their home in the oak woodland. A common reptile is the fence lizard. The sandy color and blotchy pattern help this lizard blend into its environment and avoid predators, like the gopher snake. Red-shouldered hawks hunt for ground squirrels and other small mammals. A ground squirrel can warn other squirrels of a hawk's presence by sending out a high-pitched single note call. Skunks defend themselves by spraying predators with bad smelling oil. Great horned owls, however, can swoop noiselessly down to catch a skunk without being sprayed.

Common Animals	**Common Plants**
western fence lizard	*coast live oak*
red-tailed hawk	*lichen*
ground squirrel	*poison oak*
raccoon	*coffeeberry*
great horned owl	*milkmaids*
gall wasp	*horehound*
acorn woodpecker	*alder*

The Intertidal Ecosystem

The intertidal ecosystem is found along the seashore between the highest and lowest of tides. Plants and animals living in this region must survive the force of waves, exposure to air and heat during low tides, and competition for space to live.

Plants of the intertidal are different from terrestrial plants. Most intertidal plants (for example, sea palms, feather boa kelp, and codium) have a rubbery texture well suited to moving with the waves. Plants in the intertidal have no roots. Instead, nutrients are absorbed throughout the entire pant. Many plants in this ecosystem remain extremely small and may appear as "fur" on the rocks.

Animals, like barnacles and mussels actually glue themselves to rocks to survive the force of large waves. These animals, while attached, filter the seawater for microscopic organisms. Crabs are scavengers and eat anything they can find. They avoid waves by hiding in the cracks in rocks. Many clams burrow deep into the sand to avoid being washed away. Like plants, most intertidal animals remain small.

Common Animals	**Common Plants**
limpet	*feather boa kelp*
sea urchin	*codium*
bat star	*sea palm*
chiton	*rock weed*
mussel	*coralline algae*
striped shore crab	*sea grass*

The Pelagic Ecosystem

The pelagic ecosystem describes the plants and animals that live in the open ocean. The most outstanding physical feature of this environment is the water itself. Plants and animals that live in this environment must adapt to strong currents, sunlight penetration of less than 300 meters, and vast amounts of space.

Most plants in this pelagic ecosystem are microscopic and drift freely with the ocean currents. These plants, called phytoplankton, float near the surface of the water where sunlight is plentiful.

There are a variety of animals found in the pelagic ecosystem. Microscopic animals called zooplankton float in large numbers with the currents. Some animals, like crabs, and barnacles, spend a part of their lives as zooplankton. Jellyfish drift around the ocean capturing small fish in their tentacles. Whales, sea lions, fish, and squid have streamlined bodies to swim against of the ocean currents. Sea lions and mackerel can swim swiftly after their prey.

Common Animals

copepod
jellies
mackerel
common dolphin
sea lion
squid

Common Plants

diatoms
dinoflagellates

Biotic vs. Abiotic

Group Size: Teams of 3-4, plus individual homework extension
Time: 60 minutes in class, with a homework extension activity

BIG IDEA
Ecosystems are made up of **biotic** (living) and **abiotic** (nonliving) factors. Changes in the abiotic factors in an ecosystem affect whether or not the biotic factors can successfully survive there.

ACTIVITY OVERVIEW

1. Students discover the difference between **biotic** and **abiotic** factors by making observations about mystery objects and classifying them as biotic or abiotic based upon their observations. Using their observations, they then define the terms **biotic** and **abiotic**.
2. For homework, students analyze the **ecosystem** of a room at their house, coming up with a list of biotic and abiotic factors. They predict how changes in an abiotic factor might affect the biotic factors that live in that room.

SCIENCE STANDARDS

Grade 4

3.a Students know ecosystems can be characterized by their living and nonliving components.

Grade 6

5.e Students know the number and types of organisms an ecosystem can support depends on the resources available and on abiotic factors, such as quantities of light and water, a range of temperatures, and soil composition.

LEARNING OBJECTIVES

Students will be able to:

1. define the terms *biotic* and *abiotic*.
2. identify different abiotic factors that are present in an ecosystem.
3. predict how changes in abiotic factors affect the biotic plants and animals that live in an ecosystem.

MATERIALS

Classroom Investigation

- ☐ KWL Chart
- ☐ (10) Small boxes
- ☐ (10) Mystery objects
- ☐ (1) Observation sheet per group

Homework

- ☐ (1) *Home Ecosystem* worksheet per student

ADVANCED PREPARATION

1. Prepare a KWL chart for the classroom.
2. Select 10 mystery objects in advance. They should be a mix of biotic and abiotic factors. It is recommended that they be analogous to biotic and abiotic factors found within a real

ecosystem. Some items to use include a bowl of soil, a bowl of water, ice, a high-powered fan, a heating pad, a flashlight, a living plant, live insects (worms or crickets work well), an acorn or seed, a piece of wood, and an animal skin or rabbit foot.

3. Put each "Mystery Object" inside a box. (Shoeboxes work well.) Cut a hole in the box so that students can reach inside without seeing the object. Black cloth can be stapled over the opening to further obscure vision. Label the containers 1-10.
4. Place boxes around classroom on the day of the lesson.
5. Make enough copies of the observation sheet (1 per group) and the *Home Ecosystem* worksheet (1 per student).

PROCEDURE

1. When students arrive, begin by starting the KWL chart. Ask students what they know about ecosystems. What are some examples of different ecosystems? What is found within them? What would they like to know about ecosystems?
2. If it does not come up during the KWL chart, bring up the idea of *biotic* (anything that is living or was once alive) and *abiotic* (anything that is nonliving and has never been alive) factors. Ask students to individually write down a definition of each word, and share these to come up with a class definition. (Some students may still be confused on the definition of biotic and abiotic. Do not worry about getting a precise definition yet – that will come at the end of the lesson!)
3. Give students their challenge: "We are now going to study biotic and abiotic factors in depth, to see if we can come up with a better definition. You will be divided into research teams. Scattered around the room are ten mystery boxes. Each box has a mystery object inside that you will not be able to see. Your research team will be given an observation sheet to complete as you visit each of the ten mystery boxes. When you visit each box, please make two observations about the object inside, guess what it is, and predict whether it is *biotic* or *abiotic*. Do not look inside the box – you must only use your sense of touch to make your observations!"
4. Allow students time to complete the observation. Each group should follow the directions on their observation sheet.
5. At the end of the lesson, bring students back together. Pair up two research teams to compare their observations and share how they classified the biotic and abiotic objects.
6. When the teams have had time to discuss their findings and debate any inconsistencies, go over the classifications of the mystery objects as one entire class. Point out how some (for instance, the flashlight) might represent something different in an ecosystem (sunlight).
7. Tell students that they are now experts in biotic and abiotic factors. Give them the chance to refine or amend the definition of biotic and abiotic that they came up with earlier.

   *Biotic***:** Any living or once-living organism or object found within an ecosystem.

   *Abiotic***:** Anything found within an ecosystem that is not and never has been alive. This includes wind, sunlight, temperature, etc.
8. Have students apply what they have just experienced by asking them to think of an ecosystem.
   - What are some examples of biotic factors that they might find in an ecosystem? *(Plants, animals, fungi, bacteria, algae, etc.)*

- What are some examples of abiotic factors that they might find in an ecosystem? *(Sunlight, temperature, water, wind, humidity, soil, rocks.)*
- How could some of these abiotic factors affect the biotic factors? What happens if they are taken away? *(Sunlight provides energy for plants to grow and perform photosynthesis, and soil gives them needed nutrients. Plants get water from rain, groundwater, and fog; animals get necessary water from streams. Plants and animals alike have to deal with varying temperatures; ecosystems that are too hot or too cold present challenges that they must adapt to. If necessary abiotic factors vanish or change, it can be devastating to all of the biotic plants and animals that live there.)*

HOMEWORK EXTENSION

Give students a copy of the "Home Ecosystem" worksheet.

For homework, they will be analyzing the "ecosystem" of one of the rooms at their house. They must select a room to analyze and draw a picture illustrating that room. Within the picture, students must then identify biotic and abiotic factors present in the "ecosystem," and analyze how that ecosystem would change if some of the abiotic factors were altered.

Team Members: _____ Date: _____

_____

_____

Mystery Object Classification: Biotic or Abiotic?

Procedure:

1. Visit each of the mystery boxes around the room.
2. At each box, choose a team member to reach inside and feel the mystery object inside. **Do not look into the box! You may only use your sense of touch.**
3. Make two observations about the mystery object based on what you can feel. Decide if you think that it is *biotic* or *abiotic*. Complete the chart below.

#	Observation 1	Observation 2	Biotic or Abiotic?	What is it?
1				
2				
3				
4				
5				
6				

#	Observation 1	Observation 2	Biotic or Abiotic?	What is it?
7				
8				
9				
10				

Analysis and Conclusions

- What are some examples of *biotic* objects that your team found inside the Mystery Boxes?

- What are some examples of *abiotic* objects that your team found inside the Mystery Boxes?

- What does the word *biotic* mean? What makes something biotic?

- What does the word *abiotic* mean? What makes something abiotic?

Name:_____ Date: _____

Home Ecosystem

Believe it or not, ecosystems are not just found in the great outdoors! Even the places we visit every day can have their own ecosystem.

Directions: Choose a room in your house to analyze as an "ecosystem." Draw a picture in the box below showing how it looks. Make sure to show any **abiotic** or **biotic** factors that might be present!

Abiotic Factors:

1.
2.
3.
4.
5.
6.
7.
8.

Biotic Factors:

1.
2.
3.
4.
5.
6.
7.
8.

Extension Questions

- What is the *temperature* in this ecosystem usually like?

- If the average temperature dropped to 30 degrees Fahrenheit, how would that affect the biotic factors that live in the ecosystem? Predict how they might adapt.

- If the average temperature increased to 115 degrees Fahrenheit, how would that affect the biotic factors that live in the ecosystem? Predict how they might adapt.

- Where is *water* present in the ecosystem?

- If there were a drought and all the water evaporated, what would happen to the biotic factors that live in the ecosystem? Predict how they might adapt.

- Choose another *abiotic factor* that you identified in the ecosystem. Describe a way that it might change. How would that affect the biotic factors that live there? Predict how they might adapt.

Ecosystem Vacation Destination

Group Size: Individual or Teams
Time: Varies; can be done as a homework assignment or during class

BIG IDEA
The most common ecosystems in southern California are the chaparral, the oak woodland, and the riparian. Off the shore lie the intertidal, pelagic, and benthic ecosystems. Each of these ecosystems has distinct abiotic characteristics and different organisms that have best adapted to survive there.

ACTIVITY OVERVIEW

1. Students research one of the ecosystems that they will encounter on their fieldtrip.
2. After completing their research, students design a travel brochure or poster advertising their ecosystem as a vacation destination.

SCIENCE STANDARDS

Grade 4

3.b Students know that in any particular environment, some kinds of plants and animals survive well, some survive less well, and some cannot survive at all.

Grade 6

5.e Students know the number and types of organisms an ecosystem can support depends on the resources available and on abiotic factors, such as quantities of light and water, a range of temperatures, and soil composition.

LEARNING OBJECTIVES

Students will be able to:

1. describe the basic characteristics of one of the six ecosystems that they will visit on their Chaparral-to-Ocean Science School.
2. explain how the abiotic factors in that ecosystem affect the plants and animals that live there.
3. list specific ways that the native plants and animals have adapted to survive.
4. create a travel brochure or poster that includes accurate information about their ecosystem.

MATERIALS

- □ (1) *Ecosystem Research Project* worksheet per student
- □ (1) *Ecosystem Vacation Destination* worksheet per student
- □ Research materials (library, field guides, internet, background articles, etc.)
- □ White paper or poster board
- □ Colored pencils, crayons, etc.

ADVANCED PREPARATION

1. Prepare enough copies of the *Ecosystem Research Project* and *Ecosystem Vacation Destination* worksheets.

2. Gather any background materials that are available for research or make arrangements for students to use computer lab. This assignment can also be started as homework, allowing students to find research materials on their own.
3. Gather any additional supplies for the travel brochure portion of the activity.

PROCEDURE

1. Return to the KWL chart started in the last lesson. Ask students what they have learned about ecosystems so far. What do they still want to know?
2. Tell students that they will now be given the opportunity to begin investigating one of the ecosystems that they will visit on their trip to the Lazy W Ranch (Chaparral, Riparian, Oak Woodland, Intertidal, Pelagic, and Benthic). You may divide them into teams or ask them to research their ecosystem individually.
3. Pass out the *Ecosystem Research Project* worksheets. Give students time to complete their research in the library, at the computer lab, or at home.
4. Once the research has been completed, give students the second part of their challenge: "Now that you have researched an ecosystem, you have been contacted by a company called California Dreamin', a travel company that wants to encourage people to take unique vacations in California. California Dreamin' has asked you to design a travel brochure (or poster) that advertises your ecosystem as a unique travel destination. You must highlight the unique attractions in your ecosystem and create testimonials to convince your classmates to travel there!"
5. Pass out the *Ecosystem Vacation Destination* worksheet to help prompt students. They can work on their project individually or in groups. This can also be assigned for homework.
6. After students have completed the worksheet, give them time to create either a tri-folded brochure or a poster "advertising" their ecosystem to vacationers. Students can also write and perform a commercial to present their work to the class.

Name:_____ Date: _____

Ecosystem Research Project

Ecosystem Name:

Where is the ecosystem located?

Circle all of the words that describe the ecosystem:

Hot air	Dry	Rocky	Strong currents	Windy
Cool air	Moist	Muddy soil	Waves	Sheltered
Shady	Wet	Sandy soil	Riverbed	Salty
Add three words of your own:		_____	_____	_____

List five abiotic factors found in the ecosystem. Explain in a sentence how each abiotic factor affects the biotic factors (plants and animals) that live there.

	Abiotic Factor	Effect on Biotic Factors
1.		
2.		
3.		
4.		
5.		

List four plants that are commonly found in the ecosystem. Describe one way that each plant has adapted to survive in the ecosystem. (Example: Cactus – has thick stems to hold water to help it survive in the dry desert.)

Plant Name	Adaptation
1.	
2.	
3.	
4.	

List three animals, insects, or birds that are commonly found in the ecosystem. Describe what their role is in the ecosystem (Primary Consumer, Secondary Consumer, Scavenger, Decomposer), and one way that each animal has adapted to survive in that ecosystem.

Animal Name	Role in Ecosystem	Adaptation
1.		
2.		
3.		

How have humans affected your ecosystem? Describe any threats to it, and predict what we can do to protect it in the future.

Name:_____ Date: _____

Ecosystem Vacation Destination

You and your ecosystem research team have been contacted by a company called California Dreamin'. California Dreamin' is a travel group that encourages people from around the world to take vacations in California. They have asked you to design a travel brochure to convince vacationers to visit that ecosystem.

Answer the follow questions, and use them to help you put together your brochure. Remember to make everything sound exciting so that people will want to visit!

Choose a title for your brochure:

Write a paragraph describing your ecosystem for vacationers. Describe where it is located, what it looks like, and what the abiotic conditions are like. (Is it hot and sunny so that visitors can get a great tan, or cool and shady so that they can relax by the riverbed?)

Describe the top attraction in the ecosystem. What is the one thing that visitors will want to be sure not to miss?

Describe the plant and animal life in the ecosystem. What exciting biotic factors might visitors see if they come to visit?

Choose an animal that lives in the ecosystem, and write a testimonial from its point of view. Have it explain why that ecosystem is the only place it would want to live. (Example: “Some forest creatures might say the Chaparral is too hot, but I love it here! My nice big ears keep me happy and cool on a scorching summer’s day.” -- Jackie Jackrabbit)

List 3 “Smart Visitor” tips that vacationers should follow if they visit the ecosystem. What can visitors do to protect the ecosystem and keep it safe?

1.

2.

3.

Vascular and Nonvascular Plants

Group Size: Research Teams
Time: 45 minutes on Day 1, 30 minutes on Day 2

BIG IDEA
Plants can be classified as **nonvascular** or **vascular**, depending on whether or not they have specialized structures to help transport nutrients. Nonvascular plants, like moss, have no specialized structures and instead rely upon osmosis and diffusion to transport materials. Vascular plants have specialized structures (such as xylem and phloem) that aid in transport, allowing them to grow much larger in size.

ACTIVITY OVERVIEW

1. Students experiment with *vascular* and *nonvascular* forms of transportation to investigate how easily the different methods move liquid from one place to another.
2. Students use colored water and plant stems to observe vascular transportation in action and to determine what other factors aid in vascular transportation.

SCIENCE STANDARDS

Grade 5

2.a Students know many multicellular organisms have specialized structures to support the transport of materials.

2.e Students know how sugar, water, and minerals are transported in a vascular plant.

LEARNING OBJECTIVES

Students will be able to:

1. define the terms *vascular* and *nonvascular*.
2. explain how water and nutrients are transported in a vascular plant, and compare this to the process that occurs in a nonvascular plant.

MATERIALS

Vascular / Nonvascular Race

- ☐ (10) Yellow sponges per two teams
- ☐ (10) Straws per two teams
- ☐ (1) Bowl of water or colored punch per research team
- ☐ Masking tape
- ☐ Scotch tape or other method of attachment

Vascular Transportation Experiment

- ☐ (1) *Vascular Transportation Experiment* sheet per research team
- ☐ (2) Plastic cups per research team
- ☐ (2) Stem cuttings per research team
- ☐ Water
- ☐ Blue or red food coloring
- ☐ (1) Mixing spoon per group
- ☐ (1) Metric ruler per group
- ☐ (1) X-ACTO ® knife or utility blade (optional)
- ☐ Hand lenses or microscopes (optional)

ADVANCED PREPARATION

1. Set out all materials for the Vascular / Nonvascular Race. Each team will get a bowl of water. (If possible, colored punch may work better than water because it is easier to see it travel, but this can get messy and sticky.) Each team will either be given material representing nonvascular transportation (yellow sponges) or vascular transportation (straws and tape).
2. Set up the race course. Two desks pushed together form the "track." Use the masking tape to mark a starting line on one end, and place the bowl of water behind it. Tape a finish line on the other end of the desk. Students will need to transport the water from the bowl to the finish line without moving the bowl past the starting line. **Make sure not to put too much water in the bowl**. It should be just enough to be siphoned across the finish line using a long straw, but not enough that it will spread to the finish line in a puddle if poured on the table.
3. Prepare stems for the Vascular Transportation experiment. Each group should get two similar stems, one with leaves and one without leaves. Make sure to test the stem types in advance to make sure that they will be effective in the experiment – celery or herbaceous stems often work best!
4. Cut across the stems at a diagonal to ensure a clean opening in the xylem. Do not do this too far in advance, or the stem will start to die and will close up.
5. Set out all of the other necessary equipment for the Vascular Transportation experiment.

PROCEDURE: Introduction and Vascular / Nonvascular Race

1. Tell students that they will soon be visiting the Lazy W Ranch to participate in the Chaparral-to-Ocean Science School. While there, they will learn all about different ecosystems. What are some of the biotic factors that they expect to encounter in the ecosystems? *(Plants and animals.)*
2. Inform the group that at the Lazy W Ranch, they will encounter many different types of plants. Ask them to name the two main categories of plants. *(Vascular and nonvascular.)* Show them the picture of the stream.
    - Which plants in the picture are nonvascular? *(The mosses.)*
    - Which are vascular? *(Everything else – the trees, the grasses, the shrubs, etc.)*
    - What is different between the two different types of plants? *(The vascular plants are much bigger. They have defined parts, like stems, branches, roots, and leaves. Nonvascular plants are much smaller and much more homogenous, like moss. They do not appear to have any specialized parts or structures.)*
3. Tell students that there are more differences between vascular and nonvascular plants than just what they can see. Vascular plants have specialized structures inside their stems to help them transport water, sugar, and nutrients. Nonvascular plants, however, do not have specialized structures. They must rely on the process of diffusion to transport water, sugar, and nutrients throughout the plant.
4. Ask students to predict which method can more easily transport water over long distances: vascular transportation (with specialized structures) or nonvascular transportation (with no specialized structures? *(Answers will vary.)* Tell students that they will be able to test their predictions by doing an activity.
5. Divide students into their research teams. Pair each team with another. Assign one team to be the "Vascular" team and give them the straws and tape. Assign the other team to be the "Nonvascular" team and give them the sponges.

6. Give them the challenge for the **Vascular / Nonvascular Race: "**Each research team will be given one bowl of water (or punch), set up behind a starting line. You may not move the bowl past the starting line, although you can pick it up. Your challenge is to use your method of transportation to move the water past the finish line. The first team to successfully move the water past the finish line using either Vascular or Nonvascular Transportation wins!"
7. Allow the teams 5-10 minutes to "compete." The Vascular teams should be able to tape the straws together, and then suck on one end of a giant straw to siphon the water past the finish line. The Nonvascular teams should have trouble getting the water to diffuse very far, even when it is poured on their sponges.
8. After the Vascular teams have won, gather the class back together.
    - Which method of transportation was more effective for transporting water over long distances, vascular or nonvascular? *(Vascular.)*
    - Why can vascular plants like trees can grow so tall, while nonvascular plants like mosses stay fairly small? *(The specialized structures in vascular plants can transport water, nutrients, and sugar over longer distances. The process of diffusion that occurs in nonvascular plants can only transport materials so far!)*

PROCEDURE: Vascular Transportation Experiment

1. Ask students the following question: "You have seen why vascular transportation is so effective, but we have only looked at half the story. In our race, vascular transportation worked better because someone was sucking on the straw at the end. Why does it work in plants?" *(Answers will vary.)*
2. Tell students that we will be investigating vascular transportation in plant stems. Divide them back into the research teams and give them the new challenge: "Your challenge is to follow the experiment procedure to determine what factors affect vascular transportation in plants."
3. Pass out the necessary materials for the experiment, including the Investigation Worksheet, 2 plant stems, 2 cups, and food coloring. **They should be given one stem without leaves, and one stem with leaves.** Encourage students to follow directions to set up their cups and begin their experiments.
4. At the very end of the day or the next morning, have students measure how far up the stem the colored water has traveled. (They may need to hold it up to the light or slice it open to see. Be prepared to assist with an Exact-o knife.) Let them complete the rest of the Investigation Worksheet.
5. Bring the class back together and lead a discussion to help them apply what they just observed.
    - What is a vascular plant? *(A vascular plant has specialized structures inside of it to help transport sugar, water, and nutrients.)* What is a nonvascular plant? *(A nonvascular plant, like moss, has no specialized structures and relies upon diffusion to help it transport materials.)*
    - Why do vascular plants grow taller than nonvascular plants? *(Vascular systems are more effective at transporting materials over long distances. This allows vascular plants to grow taller, because they can transport water, sugar, and nutrients even in a large plant.)*
    - What did you observe in your experiment? *(The colored water traveled farther up the stem with leaves than it did the stem without leaves.)*
    - Why did the water travel farther in the stem with leaves? *(The leaves have tiny openings called stomata, which connect to the plant's vascular system. Water evaporates out of the*

*stomata, creating a vacuum pull much like sucking on a straw. This vacuum draws water up the stem more quickly than would occur in a stem without leaves. This process is called **transpiration.**)*

6. **EXTENSION:** If you have extra time, or would like to extend the activity, have the students use Exact-o knives to cut small slivers of their dyed stems. They can use hand lenses or microscopes to observe these slivers up close. The food coloring from the water will clearly show a cutaway of the plant's vascular system.

Vascular and Nonvascular Plants

Which of the plants in this photograph are vascular, and which are nonvascular?

Team Members: _____ Date: _____

_____

_____

Vascular Transportation Experiment

Directions: You will be conducting an experiment to further explore how transportation works in a vascular plant. Observe each plant stem that you have been given for your experiment. When you start your experiment, you will place each stem in a cup of colored water and leaving it there for a fixed period of time. Use your knowledge of vascular plants to make a **prediction** about which stem the water will travel up the farthest in that fixed amount of time.

Testable Question: If each plant stem is put in colored water for a set amount of time, which stem will water travel farther up?

Prediction: I predict that _____

_____

_____

Materials:

- ☐ (2) Plastic cups
- ☐ (2) stems – one with leaves, one without leaves
- ☐ Water
- ☐ Mixing spoon
- ☐ Food coloring (red or blue)
- ☐ Ruler

Procedure:

1. Fill each cup halfway with water. Make sure that the levels are even. There should be the same amount of water in each cup.
2. Add three drops of food coloring to each cup. Mix it carefully with the spoon until it is spread evenly throughout the water.
3. Look at the two stems. Use the ruler to measure their length in centimeters. Record this number below.

   Length of Stem with Leaves: _____ cm

   Length of Stem without Leaves: _____ cm

4. Observe the physical appearance of the two stems. On the next page, write a physical description of the two stems. If you can, identify the plant species.

Stem	Physical Description
With Leaves	
Without Leaves	

5. Put each stem in a cup of water.
6. After putting each stem in a cup of water, immediately use a clock or wristwatch to check the time. Record this as the "Starting Time" in the Data Chart. Make sure to record whether it is AM or PM.
7. Let one minute pass.
8. Look at the stem, and use the ruler to measure how far the water has traveled up the stem in centimeters. Record this number in your data chart.
9. Wait at least three hours. (Your teacher will tell you how long to wait.)
10. When your teacher tells you that it is time to check your stems again, look at the clock. Record this time as the "Ending Time" in the Data Chart.
11. Take your stems out of the water. Use the ruler to measure how far the water has traveled up the stem in centimeters. (If you cannot see it through the stem, you may need to use a knife to carefully split the stem open to observe the vascular system.) Record this number in the Data Chart.

Data Chart

Stem	Starting Time	Distance Traveled Up Stem	Ending Time	Distance Traveled Up Stem
With Leaves				
Without Leaves				

How many hours did you leave the stems in the water? _____

12. Use subtraction to calculate how far the water traveled up the stem with leaves and the stem without leaves. Subtract the Starting Distance from the Final Distance. Record this number for each stem below.

How far did the water travel up the stem with leaves? _____ cm

How far did the water travel up the stem without leaves? _____ cm

Which stem did the water travel farther up? Was your prediction correct?

_____

_____

_____

_____

13. Share your data with the rest of your class. Take a tally of how many groups saw more water movement in the stem with leaves, and how many saw more water movement in the stem without leaves. Record this overall data in the chart below.

Stem	# of Groups
With Leaves	
Without Leaves	

CONCLUSION

1. For the majority of the class, did the water travel further up the stem with leaves or the stem without leaves?

_____

_____

_____

2. Did your stem come from a vascular plant or a nonvascular plant? How does that particular type of plant transport water?

_____

_____

_____

_____

_____

_____

3. When you observed how far the colored water had traveled up the stems, did you see any evidence of a vascular system? If yes, describe what it looked like.

_____

_____

_____

_____

_____

4. When you participated in the **Vascular / Nonvascular Race** with the straws and sponges, which material represented the vascular plants? Which material represented the nonvascular plants?

_____

_____

_____

_____

_____

5. During the race, what did the vascular plant teams have to do to move the water, aside from just putting the building material together?

_____

_____

_____

_____

_____

6. Based on your observations in this experiment, and the observations of the rest of the class, does the presence of leaves help move water through a plant's vascular system? Why or why not? Why do you think this happens?

_____

_____

_____

_____

_____

_____

_____

Rules to Live By

Group Size: Individual
Time: 30 minutes; can be assigned as homework

BIG IDEA
To keep everyone safe while visiting the Lazy W Ranch, there are specific safety rules that students will need to follow while at camp.

OVERVIEW OF ACTIVITY

1. Students complete a worksheet to familiarize themselves with the safety rules that they will need to follow at the Lazy W Ranch.

LEARNING OBJECTIVES

Students will be able to:

1. Describe the most important Wilderness Safety Rules that they must follow at the Lazy W Ranch.
2. Explain why each rule is necessary to keep them safe.

MATERIALS

□ (1) Worksheet per student

ADVANCED PREPARATION

1. Prepare enough copies of the "Safety Rules at the Lazy W Ranch" worksheet.
2. Take time to familiarize yourself with the Safety Rules that must be followed at the Lazy W Ranch so that you can answer any questions that the students might have. If necessary, please feel free to contact the Outdoor Education Program Director with questions!

PROCEDURE

1. Tell students that they will soon be departing on an exciting field trip to the Lazy W Ranch. While at the Lazy W, there are some important safety rules that they must follow.
2. Go over the list of safety rules with them. Talk through each and ask students what they think the reason for each rule is. Emphasize that these rules must be followed to keep them safe while at camp and to ensure that everyone has fun!
3. Pass out the "Safety Rules at the Lazy W Ranch" worksheet. Ask students to fill it out to reinforce the Safety Rules that they must follow while at camp!

Wilderness Safety Rules at the Lazy W Ranch

Visual Contact Rule: All students must remain in sight of an instructor or chaperone at all times.

Buddy Rule: Students must always have another student with them as a "buddy" while at camp. Students may never go anywhere alone.

Sandwich Rule: While hiking on the trail, two adults will accompany each activity group. An Ocean Institute instructor will lead the group (forming the first piece of bread in the "sandwich") and a designated chaperone will follow at the end of the group (forming the last piece of bread in the "sandwich"). All students must stay between them.

Respect Rule: While visiting the Lazy W Ranch, please remember to be respectful of your fellow students, chaperones, teachers, Ocean Institute instructors, and the Lazy W Ranch itself!

- Students and chaperones must stay with their instructor on established trails.
- Closed-toed shoes must be worn at all times (except for sleeping and showering). Students are required to wear long pants on trails.
- Littering is not tolerated.
- Students may not touch any of the camp animals or pets, including the cats and dogs.
- The stream area is off limits unless accompanied by an instructor during an organized activity.
- Students are expected to follow all established classroom rules while at camp.
- Students must report any injury or illness to an instructor or chaperone immediately.

Cabin Rules at the Lazy W Ranch

- Cabin raiding is not allowed.
- Food (including gum and candy) is not allowed in the cabins or on the trails.
- Only students from the cabin group are allowed in the cabin. Students may not visit cabins other than their own.
- Doors should be kept shut and lights turned off when no one is in the cabin.
- Only the chaperone may operate the heater in the cabin. Please do not set anything on the heater!
- Students must remain in their cabins from "lights out" until 7:00 AM, except for bathroom visits. Chaperones will accompany students on night bathroom visits.

Name:_____ Date: _____

Rules to Live By at the Lazy W Ranch

The Sandwich Rule, the Buddy Rule, and the Visual Contact Rule are the three most important safety rules at the Lazy W Ranch! Match each rule to its definition.

Sandwich Rule	Students visiting the Lazy W must never go anywhere alone. Always make sure that you have a buddy with you!
Buddy Rule	While at the Lazy W Ranch, students must always stay within sight of an adult chaperone or teacher.
Visual Contact Rule	When hiking on the trails, students will be part of a "sandwich." The instructor will be at the front of the line, forming the first piece of "bread." Adult chaperones form the second piece of "bread" at the end of the line. Students must stay behind their instructor and in front of the chaperones.

At the Lazy W Ranch, you must wear closed-toed shoes and long pants at all times. How does this keep you safe?

While at camp, all of the rules from your classroom at school must still be followed. One rule that you will especially want to follow is the **Respect** Rule. Please list five different people, places, or things that you should show respect for while at camp!

1.

2.

3.

4.

5.