



(Photo credit: Linda Chilton)

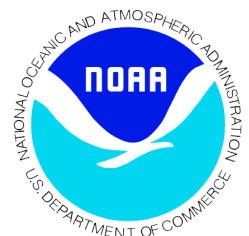
I Know What You Did Last Summer...

USC Sea Grant's Summer Science Program for High School Students

A fog bank hangs thickly across the water. One cannot see more than few yards beyond the bow of the boat, but the captain knows where they're going. A pelican emerges through the gray fog for a moment, circles the boat with hardly a flap of his wings, and then disappears again. Twenty fresh faces scan each other and wonder what lies ahead in the fog. And what lay ahead was a week of summer that they would never forget.

For one week each summer, USC Sea Grant hosts twenty high school students from around the country at the USC Phillip K. Wrigley Marine Science Center on Catalina Island, located 20 miles off the coast of Los Angeles. For many of these students, this is their first time near, on, and in the ocean. Through this weeklong program, students are introduced to the fields of oceanography, marine biology, and island ecology and the short and long-term effects that humans can have on these delicately balanced ecosystems. Through engagement with USC students, faculty and guest scientists, students learn about what it takes pursue a degree and eventually a career in marine science as well as the vast array of applications for such a line of study, including environmental policy, research science, education, illustration, science writing and diving safety.

After leaving Catalina, these high school students know much more than the average high school student about marine ecosystems and ocean science. One 2013 program graduate, Orly Goldberg, recently told USC Sea Grant, "My AP biology class just did a two day unit on marine ecosystems and the ocean, and my teacher was very impressed with my knowledge about the various topics discussed. She even let me present some of the things I learned in Catalina to my class." (Con't on page 3)



At the Helm: From USC Sea Grant

Please welcome USC Sea Grant Education Coordinator Linda Chilton “at the helm” of this twelfth issue of the *Urban Mariner*, USC Sea Grant’s *Urban Ocean Report*!

Education provides both the access and experiences that change lives. As students arrive for the high school marine lab program, we watch them metamorphose into a community of scientists each with their own passion. The process transforms their self-images, views of science, and connection with the ocean. This program and other USC Sea Grant education programs have organically crossed academic disciplines and provided models for integrating science and engineering while also aligning with the new Next Generation Science Standards.

We strive to allow students access to knowledge and tools, so that in a very short window of time, they conduct research projects identifying and answering their own marine related questions using new knowledge and skills. The students deal with the same types of challenges facing any group of scientists: whether it is avoiding procrastination; wanting to push that snooze button at 5 am when they agreed to collect data in an early morning snorkel; looking out for one another; or finding convincing arguments to support one methodological approach over another.

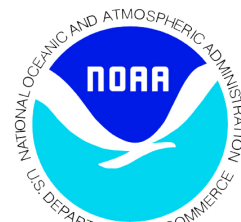
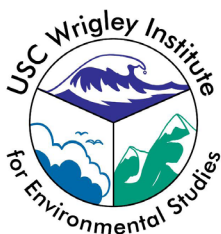
This summer program would not be possible without our partnerships with the Center for Dark Energy Biosphere Investigations (C-DEBI) and Wrigley Institute for Environmental Studies (WEIS). C-DEBI has generously provided funding so the program is available to students at no cost, allowing more access to underrepresented groups in the marine sciences. The collaboration also includes the use of CDEBI’s scientists, support, ROVs, and resources. WEIS provides staffing, an amazing field station on the edge of a marine protected area, university graduate student interns who serve as mentors, and an amazing space for students to delve into science. The extraordinary group of counselors give a week of their time and share their passion for learning.

For the staff involved, spending a week with students who have insatiable curiosity, determination, and a thirst for new experiences is both exhilarating and exhausting. Not only do we get a chance to know the students, but also a chance to be part of their growth process for the week and beyond. Students all contribute to the program, maximizing the prospects for their own achievements and also the success of the program. Some participants served as photographers, others great summarizers or questioners, while developing into promising engineers and scientists. They are all selected for their potential to build on their prior experiences and to take the new knowledge and excitement back to share in their communities. This is a dream job for an educator: having the opportunity to allow students to thrive, to learn what they can’t imagine, and to discover what they love.

Previous issues of the *Urban Mariner* can be found at: urbanmariner.urbanocean.org



“This is a dream job for an educator: having the opportunity to allow students to thrive, to learn what they can’t imagine, and to discover what they love,” says Linda Chilton, Education Coordinator, USC Sea Grant (Photo credit: DJKast)





Students analyze sediments for soil composition and pH.
(Photo credit: LChilton)

(Con't from page 1) Like Orly, many of the summer science program graduates now have their sights set on careers in science that they never knew existed. For USC Sea Grant, which prides itself on its effectiveness in steering and supporting the next generation into careers and research in the marine and environmental sciences, this early ambition in marine science is great news.

More importantly, though, all the graduates of the summer science program gain a love and perspective about the ocean that will stay with them forever, regardless of where their educational or career paths may lead. While interviewing past program graduates about their experience on Catalina, USC Sea Grant staff repeatedly hear the same phrases: I now understand how everything on earth is connected to the ocean...I now understand how my actions on land can affect the ocean...without a healthy ocean, life on earth would not be the same...I can't believe how

diverse and beautiful the ocean is. Books, white boards, and lectures would be hard-pressed to impart these truths with such a degree of success.

Program graduate Victoria Zeleya, who is now a senior at the Animo Leadership High School in Inglewood, CA, says that she felt obliged to share everything she learned on Catalina with others in her community who had never had such educational opportunities and knew very little about the ocean, despite living a couple miles from the beach. "I knew that I wanted to give back to my community and apply everything I had learned from the program to the real world," said Victoria, "whether it was about science, friendship, or the importance of trying different things."

Ultimately, this is the best news for USC Sea Grant and for the ocean. Not everyone will pursue careers in marine science, but everyone is a citizen of the earth and is affected by the health of the ocean. Once someone falls in love with the ocean, that will change the way they behave and the decisions they make for the rest of their lives.

Next Generation Science Standards (NGSS)

The National Research Council, the National Science Teachers Association, the American Association for the Advancement of Science, and Achieve developed the Next Generation Science Standards with focus group input and public input over the last five years. The final public draft was released in April 2013. The goal of NGSS is to prepare students to succeed in the workforce and to be literate citizens. The NGSS practices are:

1. Asking questions (for science) and defining problems (for engineering)
2. Developing and using models
3. Planning and carrying out investigations
4. Analyzing and interpreting data
5. Using mathematics and computational thinking
6. Constructing explanations (for science) and designing solutions (for engineering)
7. Engaging in argument from evidence
8. Obtaining, evaluating, and communicating information



www.nextgenscience.org/

While it will take time to implement NGSS, USC Sea Grant's Summer Science Program imparts experiences that provide students skills and opportunities that align with NGSS. The vision of NGSS is that science and engineering education focuses on "knowledge in use." Our program follows this vision by interweaving science and engineering practices and introducing students to numerous marine science and engineering occupations.

Student Quarters: Let's hear from the students!

Victoria Zeleya, Inglewood, CA
Senior, Animo Leadership High School

Favorite part of the summer science program?

My favorite part was night snorkeling. At first I had my doubts about entering the water in the dark, but soon I realized how beautiful the ocean is at night. The stars provided company as they shined brighter than ever and observed our reluctance to submerge our bodies into the water. As we turned off our flashlights and moved around the water, bioluminescence appeared rapidly. The bioluminescence made me realize that I wasn't so tiny in comparison to the world. I soon realized there was beauty in everything but sometimes we forget to stop and enjoy the smaller things in life. When we moved in the water, we could see life begin all over again as bioluminescent organisms sprang into life. We weren't all individuals but we were united in an intricate way.



Victoria Zeleya explores the mudflats during her stay on Catalina Island, 2013.

Something you learned that you will never forget?

There are several things that I learned and will never forget. Unlike other lessons this experience included teamwork, patience and thinking strategically. Building an ROV was a new experience for me, and learning how to maneuver the motors and balance the weight was important in order for our ROV to work. We had to manipulate the structure and object in order to create positive and negative buoyancy. After several test runs we finally built a successful ROV and it provided insight about careers combining science and technology.

Did your participation in the summer science program change your educational goals or which careers you are interested in?

The summer science program enhanced my educational goals and aspirations. During my stay at the Wrigley Marine Science Center, I reflected on my perception of life and the moral values I had. I was able to leave my comfort zone and explore the possibility that marine biology or environmental science was a career I wanted to pursue. As I apply to college now, I realize what an intricate role the summer program played in my academic success and career choices. I have applied to the California State University system and University of California system as a Marine Biologist major. After the program I made sure to spread the word about the amazing opportunities available to our community. I knew that I wanted to give back to my community and apply everything I had learned from the program to the real world, whether it was about science, friendship or the importance of trying different things. Because of the summer science program, my love for the marine biology club at my school grew stronger, and our club goal to educate our community prevails.



Night snorkeling proved to be a great time to see bioluminescent organisms. (Photo credit: DJKast)

Student Quarters: continued...

Jeremy Bellman, Los Angeles, CA
11th Grade, Port of Los Angeles High School

Favorite part of the summer science program?

My favorite part was getting the chance to snorkel and interact with all the marine life in the water. Being able to snorkel underwater taught me a lot about the diversity of marine life and how we should protect our oceans since there is as much life in the water as there is on land.

Something you learned that you will never forget?

I learned that there is so much more than what is seen by the naked eye underwater. I was astonished at all the microorganisms and plankton that I saw with a microscope and that has made me realize that marine life can come in the smallest sizes possible. These microorganisms not only live in our oceans, but also provide many benefits to other fish in the water.

Did your participation in the summer science program change your educational goals or which careers you are interested in?

Before I participated in the program, I wanted to possibly become an architect but throughout the program, I discovered that I enjoy interacting with marine life and I would like to further my research in either marine or human biology. I also took many pictures while I was in the program and discovered I had a talent for taking photographs that I did not even know I had. I then decided that I would like to pursue a career in photography for newspapers or magazines such as National Geographic. I wish to capture nature's beauty and show it to everyone in the world.



Jeremy Bellman and Linda Chilton from USC Sea Grant, 2013.



Jeremy Bellman and his team display their final ROV model, 2013.

Student Quarters: continued...

Malik Nelson, Detroit, MI
11th Grade, Michigan Virtual Charter Academy

Favorite part of the summer science program?

My favorite scientific activity was snorkeling, seeing the life underwater, looking at the night sky, kayaking, and learning about the importance of plankton. Beyond the science, though, I loved meeting the people there and seeing their many different views.

Something you learned that you will never forget?

I will never forget that plankton sustain one of the most important food chains in the world. I also learned that the most important component of science is communication, even in other languages like Spanish, so I'll never forget the importance of communication. I also will never forget how strange in it to see bison on the island!

Did your participation in the summer science program change your educational goals or which careers you are interested in?

It made me want to become a doctor even more. Science is important, as long as it is understood with wisdom. I'd like to be a cardiologist at the world's largest medical center, the Texas Medical Center in Houston, and be a member of America's largest Church, Lakewood Church.



Malik Nelson works with USC Sea Grant's Linda Chilton and his team to understand how to create changes in buoyancy, 2013.

Examples of Student Research Topics

- Does fish habitat use change with time of day?
- Do people affect the behavior of animals in the touch tank?
- How does time-of-day impact diversity and abundance of plankton?
- What is the impact of salinity and temperature on copepod presence and behavior?
- Can we construct an ROV that will replace a person collecting plankton?
- How does shark activity change with time of day?
- How does the abundance of specific fish vary between an MPA and the adjacent cove?

For more information on the Summer Science Program, including past student research presentations and slideshow:
www.usc.edu/org/seagrants/Education/SummerSciProgram



Fernando watches the camera image carefully as he drives the ROV underwater. (Photo credit: DJKast)

Student Quarters: continued...

David Cararez, San Diego, CA
11th Grade, Hoover High School

Favorite part of the summer science program?

Scientifically, my favorite part was getting to create my own research question and answer it myself. My other favorite part of the program was getting a chance to be out on my own and seeing how it will be for me later on. I enjoyed the beautiful ocean (which I had the chance to swim in every day) and all the great experiences on the island.

Something you learned that you will never forget?

Something I learned that I will never forget is the knowledge I gained about plankton and how many different types there are, just invisible to the naked eye. I know there is much more to discover out in the world, and I am gaining the knowledge to make those discoveries.



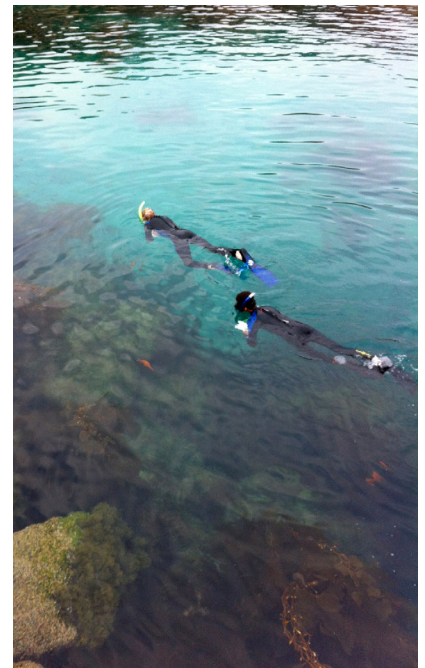
David Cararez investigates plankton under magnification.

Did your participation in the summer science program change your educational goals or which careers you are interested in?

Yes, it did change my educational goals and interests. It showed me the many different opportunities that are out there and ways I can help the ocean. This program opened doors to many new opportunities, and showed us that we can make a difference in the world. It also showed us the importance of taking care of our oceans for future generations.

USC Sea Grant/Wrigley Summer Science Program Highlights

- Tour of the California Science Center and learning about aquarium management
- Visit C-DEBI lab and video conference with scientists on an ocean drilling vessel
- Voyage to Catalina aboard the Miss Christie
- Laboratory and field work: water quality testing; plankton sampling and identification; wave and current simulations
- Engineering the design and testing ROV's; understanding buoyancy and currents
- Tour of the USC Hyperbaric Chamber and human physiology lesson
- Learning from researchers using robots to track leopard sharks
- Explore mudflat ecosystem including vertical abundance and diversity
- Island geology: sediment studies, island isolation and cultural history
- Comparison between non-protected and marine protected area
- Designing, conducting, and presenting small group research projects
- Staying in the dorms at the Wrigley Marine Science Lab
- Star gazing; day and night snorkeling; hiking; kayaking



(Photo credit: L. Chilton)



The final day (which explains a few of the sad faces) on the island for the Summer Science Class of 2013.
(Photo credit: JBellman)

What is Sea Grant?

Sea Grant is a nationwide network--administered through the National Oceanic and Atmospheric Administration (NOAA)--of 33 university-based programs that work with coastal communities. The Sea Grant Program at the University of Southern California has served the Southern California coastal region since 1972, funding research, transferring results to government agencies and user groups, and providing information about marine resources, recreation and education to the public.

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