Smithsonian Environmental Research Center

March 2017

PlateWatch

"A lifetime can be spent in a Magellanic voyage around the trunk of a single tree."

E.O.Wilson

Inside this issue:

Pilot Project with Monterey Bay Aquarium kicks off this spring

We are working with the Monterey Bay Aquarium to expand the educational and outreach tools of the PlateWatch website and program. The goals are to create a new education program for the Aquarium, while increasing the potential geographic scope of PlateWatch. We are also using the collaboration to develop the abilities of PlateWatch to go beyond tracking target species, to investigate several data streams that the Smithsonian Marine Invasions Lab would like to capture from the citizen science network. The trick is in making the program both accessible to participants without specific taxonomic expertise, and useful to answer large-scale biogeographic questions.

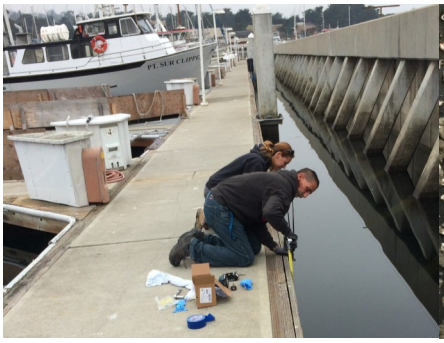
Late in December, two scientists from SERC accompanied two members of the Monterey Bay Aquarium education and learning team as they retrieved their first panels. The aim of the day was to figure out the logistics and timing of retrievals, so the Aquarium staff could work out how to fit it in with several options for education programs. Options the Aquarium team plans to trial for delivery of the programs include:

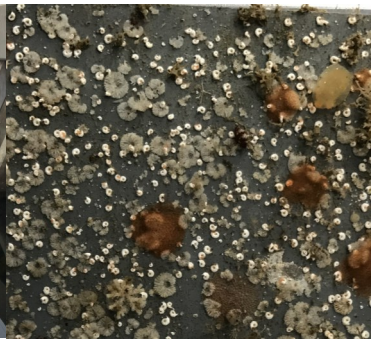
¨ Deliver a multi-day school program of 5-6 sessions, starting with plankton tows as a demonstration of life in the ocean (there's more to seawater than the eye can see), moving through settlement of some of that plankton onto hard substrates, then how we might quantify that life, with one useful tool being settlement plates.

¨ Teach teachers to deliver a similar program– the teachers attend an in-depth training and subsequently lead the syllabus independently with their students.

¨ A combination of the above, where teachers can choose to independently lead several of the more theoretical sessions (following teacher training by the Aquarium), but Aquarium staff lead the sessions in the field.

The curriculum is being designed to align with Next Generation Science Standards for middle-school students, making it appealing to a wide audience. Watch this space as we trial these programs in Monterey, and roll out new tools on the website.at: http://platewatch.nisbase.org/. Article by Gail Ashton





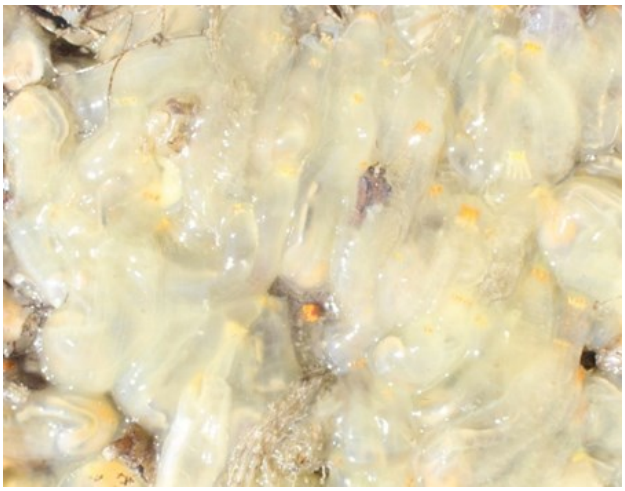
Left: Examining a plate covered with the native *Corella inflata* in Ketchikan. Photo: SERC staff. Right: photo of plate from Monterey Harbor. Aquarium staff pulling up plates. Photos: P. Wade and K. Scott.

Panel Picture Pointers

In the future, we hope to use PlateWatch to ask some broader biogeographic questions about both native and non -native species. To maximize the chances of success, clear in-focus pictures are essential. Though an SLR camera takes very high quality pictures, most cell phone cameras are more than adequate for this task!

- **PLACE THE LABEL NEXT TO THE PLATE. rather than over the plate when you photograph it.**
- **TAKE PICTURES OUTSIDE.** If it is too bright or there is a glare, take pictures in the shade or position your body to cast a shadow over the whole plate. Never take plate pictures under fluorescent lighting and take extra precaution to avoid "glare spots or shadows".
- **TAKE PICTURES IN AND OUT OF WATER AND MULTIPLE PICTURES.**
- **DO NOT RELY ON "IMAGE PREVIEW" on your camera to determine if you took a good picture.** Pictures that appear clear and crisp on the cameras preview setting may not appear the same way once downloaded. To be sure you are taking the best pictures possible, take multiple pictures of the same plate and regularly upload them to a desktop computer.

Examples of BAD plate pictures: glare, overexposed, both in and out of water



Examples of GOOD plate pictures: sharp resolution, no glare

Valdez Marine Bioblitz yields no new species

A BioBlitz for detection of non-native marine species in Prince William Sound, a collaboration of the Smithsonian Environmental Research Center, the Prince William Sound Regional Citizens' Advisory Council and Prince William Sound College was conducted Sept 9 and 10, 2016 in Valdez. Two days of community science activities included (a) hands on training in monitoring procedures and detection of a target list of marine invasive species (b) an overview of biological invasions in coastal marine systems, and (c) a BioBlitz field demonstration and rapid survey to detect non-native marine species at the marina.

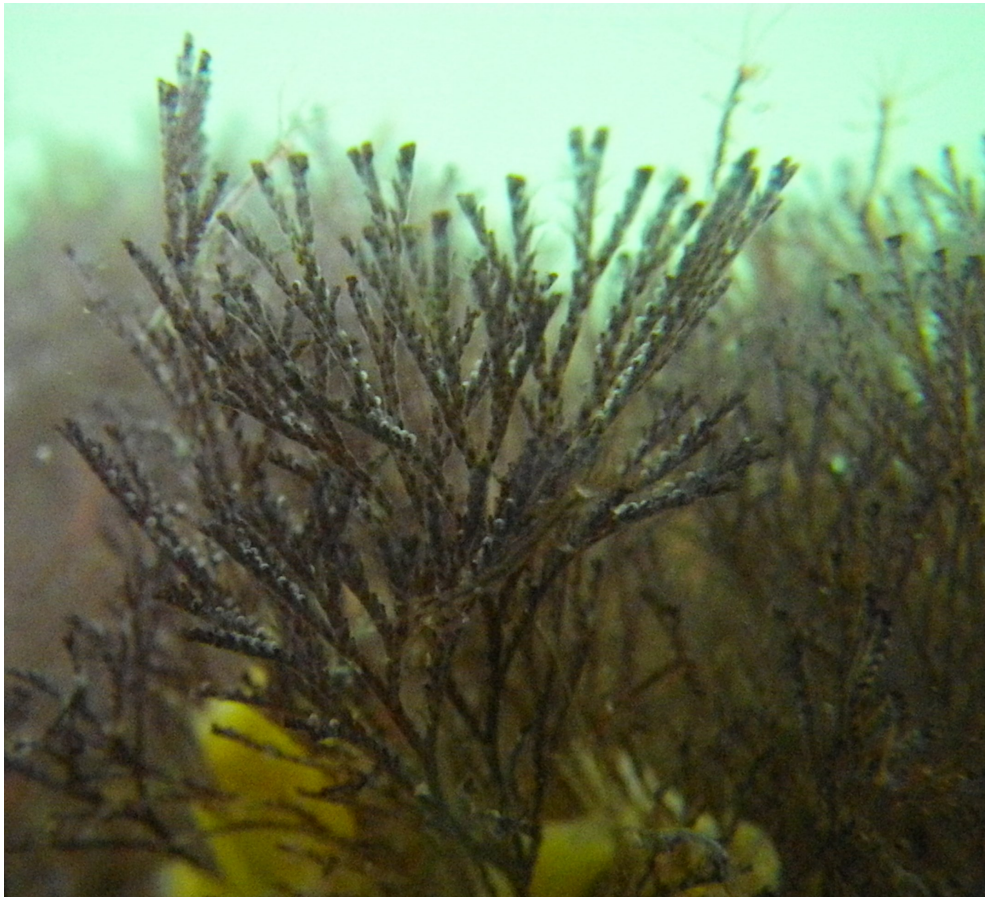
To supplement the public activities, the Smithsonian deployed divers to look at habitats in deeper water, and collected plankton in the surface waters of the Sound, while providing training to RCAC staff to initiate a locally led plankton monitoring program in Prince William Sound to detect non-native marine plankton species. No new invasive species were detected in the blitz and a good time was had by all!

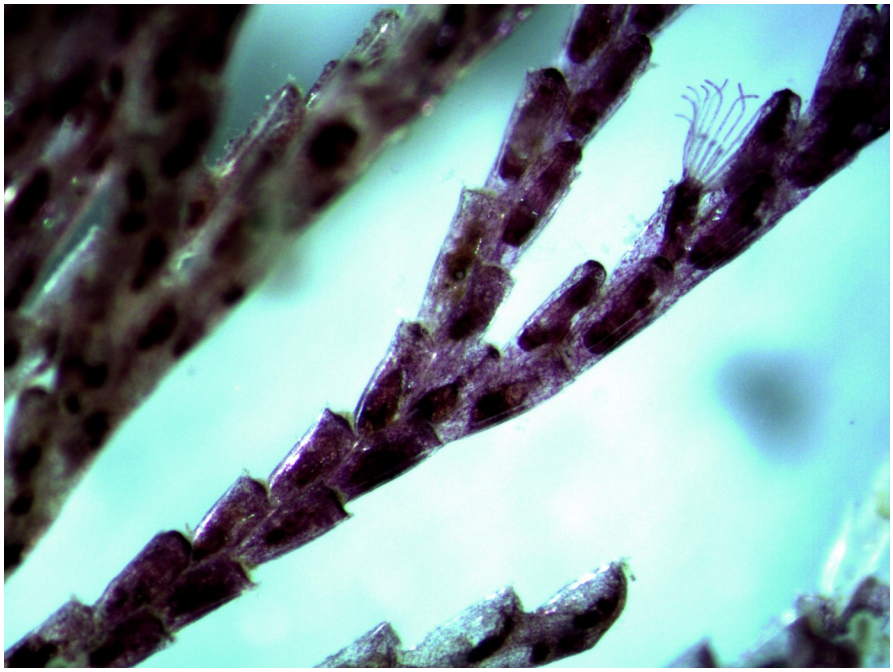
Clockwise from left: 'citizen scientists examining plates and invertebrates under the microscope. Photo: Nellie Vanderburg. Plankton sampling training with RCAC staff Nellie Vanderburg and Austin Love. Photo: Kim Holzer. A rapid survey of dock structure and dangling lines in the harbor yields sometimes surprising results. Photo: Gail Ashton. The non native bryozoan, *Schizoporella japonica* found in Tatitlek during the dive survey. The species is from Japan and has been found at several sites around Alaska previously, including Valdez. Photo: Linda McCann.

New Target Species to look for: Bugula neritina

First reported on the west coast of the US in Baja, California in 1905, it is now abundant up and down the west coast and was recently found on one panel in Ketchikan, Alaska. Found world wide. Tolerant of a wide range of conditions. There are several other 'red' Bugulas, but not that currently occur on the US west coast. All the other Bugulas have avicularia (structures that stick out laterally and that look like birds heads), making this species easy to distinguish.

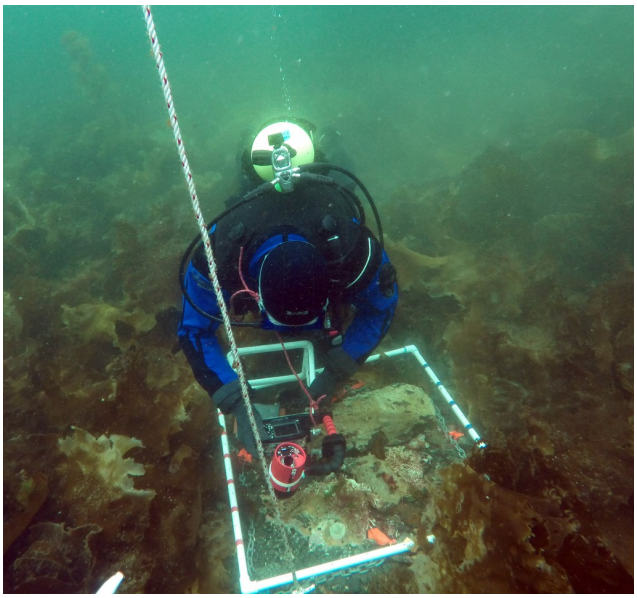
Colonies are dark purple, brown or brick colored. Zooids have pointed corners, but without spines, large globular ovicells and no avicularia (birds heads). Considered cryptogenic (origin unknown).





Top and bottom right *Bugula neritina.* Bottom left is the native *Bugula pacifica* which spirals and is wheat colored. Photos: Melissa Frey.

The next steps for D.vex eradication in Sitka, Alaska



PlateWatch and SERC researchers have played a key role in detecting new introductions of non-native species in Alaska. We hope that through early detection we will be able to inform managers about risks of impact and opportunities for eradication or management. While there are few examples of successful marine eradications, we hope that the removal of the sea squirt *Didemnum vexillum* (D.vex) in Sitka will add to the list. D. vex, the introduced sea squirt, was discovered in 2010 in Whiting Harbor as part of a community BioBlitz. It is a concern because in other parts of its introduced range it has become invasive, covering vast stretches of sea floor and smothering commercially important shellfish and fish spawning grounds. Collaborating with Alaska Department of Fish and Game, SERC scientists and divers have tested small scale removal treatments using high concentrations of salt, chlorine, and lime dust. We determined that while salt and chlorine were extremely effective on the sandy bottom, chlorine worked better along the sloped causeway surrounding the harbor. Given this and logistical concerns (salt required the addition of 150lbs every 2 hours!) chlorine will be used in larger scale tests this coming summer using turbidity curtains to close off parts of the harbor (funded by the North Pacific Research Board http://www.nprb.org/). Closing off sections will allow us to concentrate our efforts only on areas infested with D. vex and minimize the effects on other species. After removing most of the adult D. vex, it should be unable to return to the area. Thanks to community science monitoring and action by managers at ADF, we are hopeful that we can suppress and ultimately remove the only known population of D. vex in Alaska! Stay tuned for the outcome of more research. To follow our progress on this project, check out our new webpage: https://serc.si.edu/research/projects/eradication-introduced-species.

Top Left: SERC diver Ian Davidson photographs the D. vex to look for changes in the amount of area it covers before and after treatments (Photo: M. Marraffini). Top Right: An example of a turbidity curtain enclosing an area, you can see the muddy waters contained on one side while the other is open to the surrounding areas (Photo from Tidal INC http://tidalmarine.net/services/turbidity-curtain/). Bottom Left: D. vex covering an aquaculture net. Photo: NSF. Bottom Right: D. vex living on hard surfaces in Whiting Harbor, while the previous aquaculture infrastructure has been removed from the surface, D. vex has moved to more natural substrates like boulders and shells along the seafloor (Photo by K. Holzer). Article by Michelle Marraffini

Future directions for data collection

Smithsonian researchers have begun to quantify their ability to detect invasive species from analysis of photos of settlement plates in San Francisco Bay. Using two analysis methods, plate photographs and live field analysis of the plates, scientists have been able to compare methods and check the reliability of plate photographs. Species lists and abundance data produced from these two methods have allowed researchers to evaluate the quality of data that photographs can provide to scientists hoping to employ volunteers to collect information on marine invertebrate invaders. Our results suggest that relative abundances of species and morphotype groups are captured fairly well by photographs. Figure 1 below depicts the breakdown of the samples by year in San Francisco Bay, and shows that for multiple groups, the numbers are very similar.

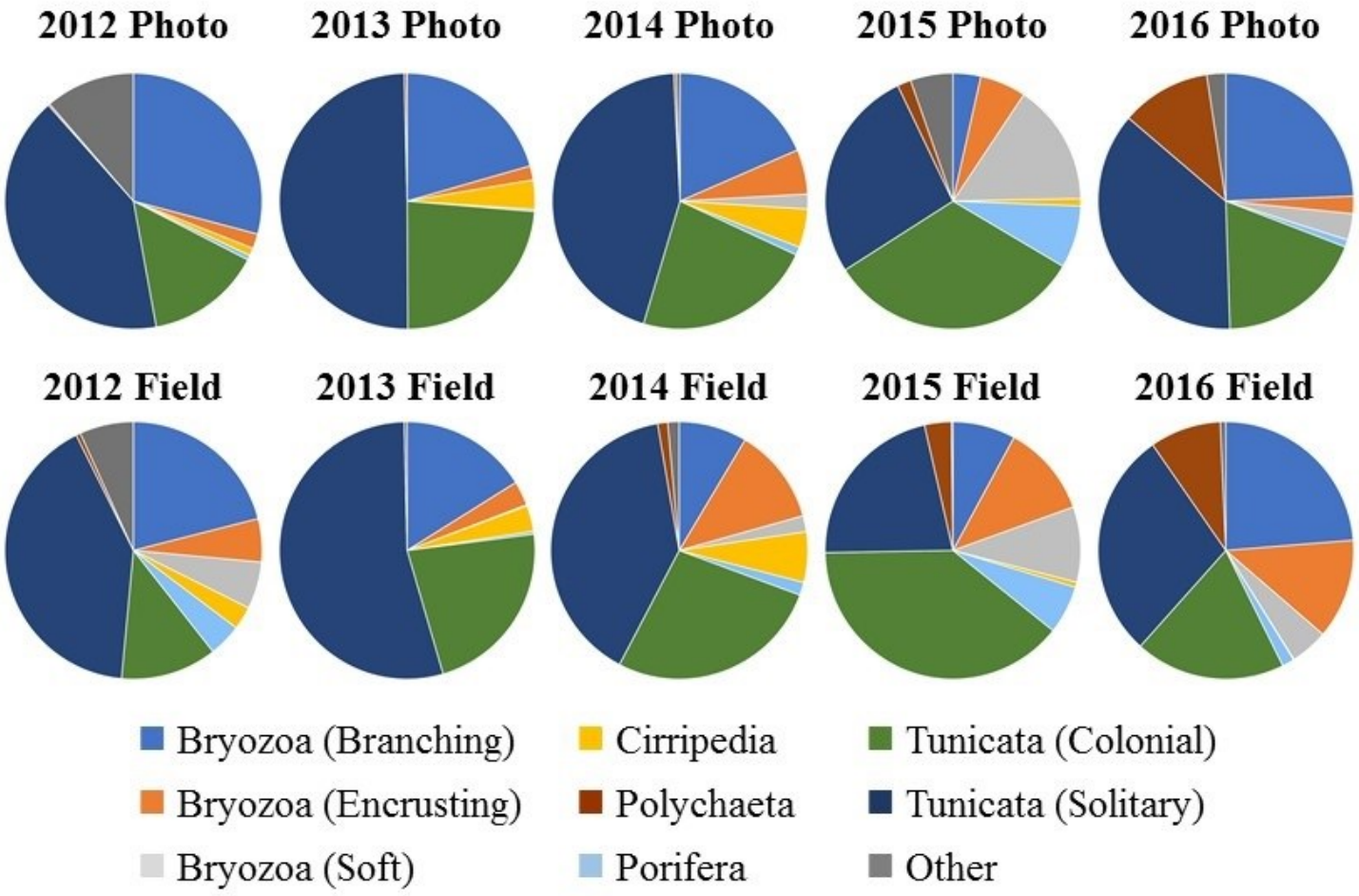


Figure 1. Comparison of taxa abundance for plate photos (top) vs live plate analysis (bottom) for each year from sites in San Francisco Bay. Most groups are represented similarly in both methods, and notably solitary tunicates and soft bryozoans follow close patterns.

One of the most reliable uses for photographs is the identification of "target taxa", both of existing and potential new invaders. We have also found that photographs are also a good tool to capture large shifts in the abundance of different organisms. Through plate photographs, we were able to document a large influx of a solitary tunicate in 2013 in San Francisco Bay, likely in response to drought-like conditions that year.

Some photographic identification methods have become so advanced that computers allow for mass-scale comparisons. A portion of the programs even allow individuals to download web and phone applications that assist citizen scientists in the identification of organisms in real-time (e.g. iNaturalist). Not only do photographic comparisons give scientists the leisure of identifying species or trends without the time constraints of live analysis, but it also allows anyone with a camera and enough interest in the issue to be a 'deputy' scientist.

Looking at photographs from Alaska, below, we can see some interesting trends. Monocultures, or the overwhelming presence of only one species, are common across many sites, with species such as barnacles (Image 1) and tunicates (Image 2), being primary space occupiers. However, some plates can be obscured and misrepresented in photos, where tree-like bryozoans hide the smaller organisms that grow below (Image 3) suggesting that the presence of more upright taxa may result in different assessments between photo and live analysis. These preliminary observations, along with the results of the San Francisco Bay project, tell us that with good citizen science photography work, we can reliably monitor for new invaders. In the face of volatile environmental shifts, long-term monitoring is important to detect, understand, and predict future changes in biological communities and help managers and researchers allocate resources efficiently.

Article by Katy Newcomer and Brianna Tracy

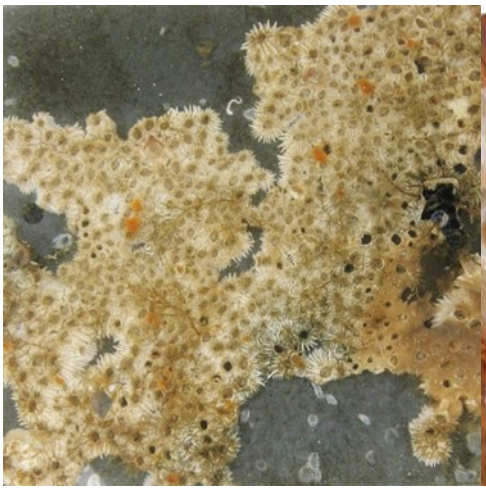


Image 1

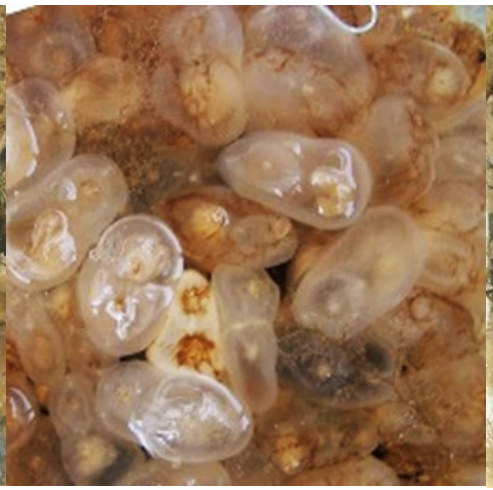


Image 2

Image 3

Monitor Spotlight

High school students in San Francisco are getting to participate in science first hand, thanks to partnerships with the Smithsonian Environmental Research Center's PlateWatch invasive species monitoring program and San Francisco Maritime National Historical Park (SFMNH). Galileo Academy of Science and Technology, affectionately called "Gal" by its students is a big urban high school with roughly 2000 students. There's not a whole lot of what people would call "nature" in the neighborhood. Fortunately the school is just a few short blocks from San Francisco Bay. Gal students are monitoring 20 settlement plates hung off the SFMNH's floating pier. Students are gaining valuable scientific research skills and experience by following PlateWatch protocols. So many high school student labs have a "cookie-cutter" feel to them where very little true investigative learning happens. PlateWatch gives students a unique opportunity to participate in real field research. As one student stated this year "I'm more careful with my observations and measurements than I would be in a regular lab because I know scientists are actually using this data. I feel like we're actually accomplishing something on our field trips and we get to go outside!" One determined student research group last year also learned that science happens rain or shine as they valiantly braved moving docks and pouring rain to collect their final data set. And lastly, a problem faced by field biologists around the world: what do you do when a very large wild animal decides to inhabit your study site? Article by Lisa Franzen

Top: Galileo students checking the plates. Middle: Employing team work to pull up a plate tangled in underwater dock structures. Bottom: students look on as access to panels is made challenging by a snoozing sea lion.

Linda McCann
Smithsonian Environmental Research Center c/o
Romberg Tiburon Center
3152 Paradise Dr.
Tiburon Ca 94920 Phone: 415 435 3528
Email: mccannl@si.edu

Smithsonian Environmental Research Center

ROMBERG TIBURON CENTER FOR ENVIRONMENTAL STUDIES

We're on the web at http://platewatch.nisbase.org