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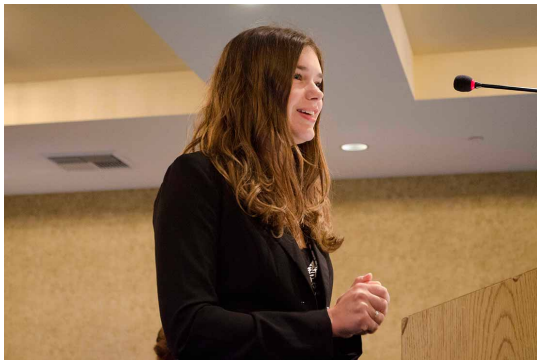
# Scripps Team Makes the Case for a New Era of Science and Education

## Groundbreaking program founded after sardine crash entering new chapter with novel technologies and innovative reach into California's classrooms

A team from Scripps Institution of Oceanography at UC San Diego made a case to the California Fish and Game Commission to support funding for the next generation of science, education, and training through a pioneering ocean monitoring program pushing into the twenty-first century.



*Sarah Lerch, a graduate student at Scripps Institution of Oceanography at UC San Diego discusses the importance of K-12 teaching at the April 16, 2014, California Fish and Game Commission Meeting.*

The Scripps researchers and educators' April 16 presentation was built upon the legacy of the 65-year-old California Cooperative Oceanic Fisheries Investigations (CalCOFI) program. But they also looked forward to augmenting the program with a new era of monitoring and surveying the valuable resources off California's coast with novel technologies and educational goals.

In setting the stage for Fish and Game Commission support, Scripps biological oceanographer David Checkley described CalCOFI's beginning, precipitated by the collapse of the sardine fishery in the 1940s—a byproduct of feeding hungry World War II troops and immortalized in John Steinbeck's gritty novel "Cannery Row"—and the years of priceless data from regular surveys of the biological and hydrographic conditions of the California Current. CalCOFI, led by Scripps Institution of Oceanography at UC San Diego, NOAA's Southwest Fisheries Science Center, and the California Department of Fish and Wildlife, and its data have provided a deeper understanding of the state's resources, which in turn enables well-informed management and policy decisions.

“CalCOFI is one of the world’s premier fisheries observing programs,” said Checkley. “Its long-standing nature and the high quality of its measurements are of great value to the state and the nation. Making the data more useful to non-scientists is one of the more important aspects of what we are trying to do now. CalCOFI has a trove of data for science papers but also information of value to decision makers.”

“The Commission is very supportive of the terrific work underway by CalCOFI scientists,” said Michael Sutton, president of the California Fish and Game Commission. “As we expand our efforts to strengthen the management of California’s marine fisheries, we’re going to need the information generated by CalCOFI more than ever.”

Checkley described how CalCOFI can contribute valuably to state-managed fisheries assessments (including squid, white seabass, nearshore fisheries, spiny lobster, sea urchin, and Dungeness crab), ecosystem-based management of fisheries, and evaluations of Marine Protected Areas, zones where resources are conserved and protected.

He also described how high-tech moorings, positioned to measure a range of specific ocean properties, combined with CalCOFI data are already leading the way into uncharted realms that offer new insights. Autonomous underwater gliders track the waters off California to gauge trends in water temperature, oxygen, and, soon, acidity. The tools of genomics also stand to take CalCOFI to deeper levels of knowledge by measuring microbes and evaluating ocean health. Checkley will collaborate with Andy Allen, a scientist jointly appointed at Scripps and the J. Craig Venter Institute, and NOAA scientists to conduct genomics and transcriptomics (the genetic study of RNA molecules, or “transcripts” in cells) research on CalCOFI samples to assess ecosystem health. Future collaborations for CalCOFI, including genomics measured on moorings and potential autonomous underwater vehicles with the Monterey Bay Aquarium Research Institute, are in development to detect and forecast adverse conditions, including ocean corrosive and oxygen-depleted waters and harmful algal blooms.

Beyond new technologies, CalCOFI is ready to push the frontiers of education by leveraging science to teach students in new and engaging ways.

“CalCOFI has the opportunity to build upon its 65-year success story to help California make science-based policy decisions in the years to come. Its programs can help engage students while allowing them to master the twenty-first century skills they will need to succeed in college or careers,” said State Superintendent of Public Instruction Tom Torlakson. “CalCOFI’s science can also help us accelerate our state’s leadership in STEM education in ways consistent with the findings soon to be released by my STEM Task Force.”

“Today’s students have access to unprecedented amounts of data and information and we are now in a position to teach science in more compelling ways,” Cheryl Peach, director of Scripps Educational Alliances, told the commissioners during the presentation. “The real beauty of CalCOFI is that the rich history and literature that surrounds the program is an excellent vehicle for engaging students in the science. Students can learn about not only physical and biological sciences, but also language arts, history, and social sciences —all in the context of coastal oceanography and fisheries science.”

Peach also described how CalCOFI data could be brought into the classroom to help students work with real oceanographic data, engaging with the information that scientists actually use in their daily research.

Scripps’s third speaker at the Fish and Game meeting talked of her passion in bringing cutting-edge science to the classroom. Marine biology graduate student Sarah Lerch’s testimony to the Fish and Game Commission was built upon her experience teaching and inspiring seventh-grade students through the novel GK-12 program.

“One of the most inspirational things I’ve heard from these students is how incredible they think it is that ‘Ms. Lerch’ gets to go into the laboratory and do science all day,” said Lerch. “That is one of the coolest things I’ve heard. I really believe that the connections I’ve made with my students in the classroom are fostering the next generation of scientists that will solve the world’s problems. That’s why funding for programs with science education outreach is so incredibly important to the future of science.”

Fish and Game Commissioner Richard Rogers praised Lerch’s testimony and outreach emphasis.

“I’m very much in support of this (presentation),” he said. “The point of it is when you touch children’s hearts you create scientists, you create environmentalists, you create people who care about the environment… if you can grasp them, get hold of them, you will have them. I really applaud what you are doing.”

Final comments were contributed by Chris Voss, president of the Commercial Fishermen of Santa Barbara organization, who discussed future collaborations with CalCOFI and its information and educational tools.

“This topic is something that I’m pretty passionate about, and that is the notion that commercial fishermen can group together and start to behave intelligently in relationship to their interaction with the resource they are harvesting,” said Voss. “I hope that in the future CalCOFI

would connect a lot of what they are doing to a lot of what I'm doing in a direct way, and help me understand how what you do is relevant, and then help me make what I do relevant to your inquiries."

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MEDIA CONTACT

**Mario Aguilera**, 858-822-5148, maguilera@ucsd.edu


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