



NOAA's Teacher at Sea Program Southwest Region Alumni Workshop Report: November 2017



(Back Row L-R) Michelle Poquette, Sarah Raskin, Helen Haskell, Marsha Lenz, Anna Levy, Chris Faist, Sian Proctor, Anne Marie Wotkyns, Mary Anne Donnelly, Melissa Barker, Jillian Worssam, DJ Kast, Stephen Bunker, Dana Tomlinson, and Caitlin Fine (Second Row L-R) Kim Pratt, Staci DeSchryver, Deb Brice, Elaine Dolcini, Anne Artz, Dena Deck, Kate Schafer, Maria Madrigal, Cecelia Carroll, Sue Cullumber, Jenny Haritgan, Jackie Hams, Susan Kaiser, Turtle Haste, Jennifer Fry, Lisa Battg, and Michelle Carroll (Front Row L-R) Jenn Annetta, Emily Susko and Jenny Goldner



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Author:

Jennifer Annetta, NOAA's Teacher at Sea Program Alumni Association Coordinator

Contributors:

Jennifer Hammond, NOAA's Teacher at Sea Program, Director

Emily Susko, NOAA's Teacher at Sea Program, Program Specialist

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Contact Information:

Jennifer Annetta

jenn@marinesanctuary.org

National Marine Sanctuary Foundation –

NOAA's Teacher at Sea Program Alumni Association

8601 Georgia Ave. Suite 510

Silver Spring, MD 20910

<https://www.marinesanctuary.org>

Jennifer Hammond

jennifer.hammond@noaa.gov

NOAA's Teacher at Sea Program

1315 East West Highway

Silver Spring, MD 20910

<https://teacheratsea.noaa.gov>



Table of Contents

Workshop Goals and Content	4
Participants	9
Agenda	15
Evaluation Data	17
Appendix: Photos	24

Workshop Goals and Content

NOAA's Southwest Region Teacher at Sea Alumni (SW TASA) Workshop was held on November 17-19, 2017 in La Jolla, CA at NOAA's National Marine Fisheries Service Southwest Fisheries Science Center (SWFSC). 32 Teacher at Sea Alumni (TASA) from the region (AZ, CA, CO, HI, NM, NV, and UT) attended this two and a half day professional development workshop in order to strengthen oceanographic content knowledge, build partnerships with NOAA scientists, gain knowledge about NOAA resources, and build an alumni network in their region.

Workshop Goals:

The goals of the alumni workshop are aligned with selected NOAA Teacher at Sea Program's goals.

- Increase teachers' understanding of earth system science and maritime history.
- Build working relationships among teachers, emphasizing collective participation of groups of teachers.
- Build partnerships between NOAA scientists and teachers in the Southwest region.
- Use NOAA data and resources in classroom activities.
- Use NOAA-related career information in classroom activities, when mentoring students and when working with colleagues.

Workshop Content:

Alumni Poster Presentations – Teachers created and printed presentation slides prior to the workshop. Upon arrival, slides were mounted on tri-fold boards and TASA presented their posters to each other.

Slide content included:

- **Background Information:** name, address, phone number, URL, teaching assignment/experience, reason applied, year sailed, name of ship, where sailed and for how long
- **Ship and Research Goals:** description of ship, the type of research that was being conducted on the mission, and teacher's role
- **At Sea Experience:** description of people met at sea, daily experiences, science content and lessons learned, unique experiences, and pictures of memorable moments
- **Products:** list and description of products created as a result of NOAA's TAS program (lessons, presentations, student projects, curriculum, new courses, community activities, videos, books, etc.)
- **Professional Benefits:** description of how NOAA's TAS program benefitted the educator
- **Highlights:** any additional information regarding the program (Congressional recognition, conferences, improved student test scores, media coverage, etc.)

NOAA's SWFSC Presentations:

Overview of Southwest Fisheries Science Center La Jolla –

Newell (Toby) Garfield – Deputy Science and Research Director, Acting

Roger Hewitt – Assistant Center Director

The SWFSC is the research arm of NOAA's National Marine Fisheries Service in the Southwest Region. Center scientists conduct marine biological, economic and oceanographic research, observations and monitoring of living marine resources and their environment. Center scientists also conduct research on the impacts of environmental variability and climate change on marine ecosystems and on fishery and conservation socio-economics. The ultimate goal of these scientific efforts is to ensure that the region's marine and anadromous fish, marine mammal, marine turtle, seabird, and invertebrate populations remain at sustainable and healthy levels, as functioning parts of their ecosystem and to enhance the quality of life for the public.

Responsibilities include maintaining healthy fish stocks for commercial, recreational and subsistence fishing; conserving and recovering populations of protected species; sustaining ecosystem services; and coordinating with domestic and international organizations to implement and monitor fishery agreements and treaties.

The La Jolla SWFSC contains 38 research laboratories, including an experimental aquarium, a large animal necropsy lab, a specimen processing lab, a photogrammetry lab, an ichthyoplankton lab, genetic labs, physiology labs, oceanographic labs, specimen archives, electronic workshops and a unique large test tank facility for testing new sampling technologies, plus a library, conference rooms and office space for 275 scientists and support staff. The facility allows the SWFSC to continue its legacy surveys and monitoring programs while incorporating new technologies in the provision of advice on the conservation and management of living marine resources in the California Current, Eastern Tropical Pacific and Antarctic ecosystems. (*Information from SWFSC website: <https://swfsc.noaa.gov/>*).

Ichthyoplankton Laboratory – Noelle Bowlin

The Fisheries Resources Division houses one of the foremost ichthyoplankton ID laboratories in the world. Researchers visit from around the globe to look at the collection, to verify or compare their samples with ours, and to receive training on ichthyoplankton identification from our world class experts. Their job is to sort, identify, measure, and count the ichthyoplankton collected during SWFSC's research surveys. They routinely identify eggs and larvae from the eastern, central, and tropical Pacific.

Data produced in the Ichthyoplankton Laboratory, or "Larval Lab," for short, is critical to FRD's mission to conduct stock assessments and monitor the species and health of the California Current ecosystem. Ichthyoplankton data are key contributions to the stock assessments of Pacific sardine and Pacific mackerel. The data have also been used in recent assessments of Bocaccio and Cowcod rockfishes, and can provide fishery-independent time series information for many other fish species as well as market squid. In addition, the data are used to study distribution and abundance changes of many fish species in relation to climate and ecosystem change in the California Current region as well as the eastern tropical

Pacific. (Information from:

<https://swfsc.noaa.gov/textblock.aspx?Division=FRD&id=6208&ParentMenuId=436>)

Large Pelagic Species Laboratory - Antonella Preti

Shark biologists at the SWFSC investigate the feeding habits of various sharks off the US west coast by analyzing stomach contents of samples as they become available from natural mortality or fishery interactions. Species include the shortfin mako shark (*Isurus oxyrinchus*), blue shark (*Prionace glauca*), thresher shark (*Alopias vulpinus*), bigeye thresher shark (*Alopias superciliosus*), white shark (*Carcharodon carcharias*), and others. While sharks are known and feared for their occasional attacks on humans, the majority of species prefer a diet of small fishes and invertebrates. A few (like the adult white shark) appear to prefer larger prey such as marine mammals, large fishes and other species of sharks. Some, like the tiger shark and blue shark, even include seabirds in their diets. (Information from: <https://swfsc.noaa.gov/textblock.aspx?Division=FRD&ParentMenuId=87&id=959>)

Aquarium Facility/ Genetics, Physiology, and Aquaculture - John Hyde and Katherine Swiney

The experimental aquarium occupies the entire basement in one of the four buildings which constitute the SWFSC. Fixed spaces supplied with running sea-water in this area include four completely enclosed and isolated environmental rooms, a small food-preparation room, and an office occupied by the resident aquarium manager.

The Genetics, Physiology, and Aquaculture (GPA) Program of the Fisheries Resources Division (FRD) is unique from many programs at the Southwest Fisheries Science Center (SWFSC) in that it conducts research that addresses questions across multiple focus areas (e.g., groundfish, coastal pelagic species (CPS), highly migratory species (HMS), ichthyoplankton monitoring). The GPA program is composed of researchers with specific expertise in genetics and physiology. As the tools in these disciplines are relatively universal across taxa, the projects are often diverse in taxonomic and ecologic scope. A focus area specific to this program at the SWFSC is the use of the program's unique skillset to provide guidance to the developing marine aquaculture industry in the region, including captive propagation programs aimed to recover threatened or endangered species. The Program serves the public and contributes information to the National Marine Fisheries Service's West Coast Regional Office, the Pacific Fisheries Management Council (PFMC), and the scientific community.

The vision of the GPA Program is the use of both genetic and physiology tools to provide improved management guidance to relevant management bodies and to industry. This guidance follows two separate but intertwined pathways: guidance for management of wild stocks by improving traditional metrics of stock structure, life history information, and performance in respect to change in environmental parameters; guidance for development of a nascent West Coast marine aquaculture industry by identifying best practices in regards to broodstock selection, husbandry practices, and genetic

management. (Information from:

<https://swfsc.noaa.gov/textblock.aspx?Division=FRD&id=1091&ParentMenuId=39>)

Abalone - Seven species of abalone (*Haliotis spp.*) occur off the west coast, including the white (*H. sorenseni*), black (*H. cracherodii*), red (*H. rufescens*), pink (*H. corrugata*), green (*H. fulgens*), pinto (*H. kamtschatkana*), and flat abalone (*H. walallensis*). Abalone belong to a group of herbivorous marine snails in the family Haliotidae. Once being plentiful off the coast of California and supporting a lucrative fishery, intense commercial harvesting starting in the 1960s and 1970s, resulted in a steep decline in the populations. In 1997, California closed all commercial and recreational harvest of abalone except for a highly regulated recreational fishery for red abalone north of San Francisco. Abalone populations are still decreasing in part due to illegal harvesting, disease, and the failure to reproduce in the wild due to their low densities. The white abalone was listed as a federally endangered species in 2001, followed by the black abalone being listed in 2009. In addition, the pink, green, and pinto abalone are all listed as Species of Concern.

The Genetics, Physiology, and Aquaculture (GPA) Program's research focuses on local abalone species to develop methods to support and expand commercial aquaculture in the region as well as aid in restoration programs for the federally endangered white and black abalone. These foci often overlap with research on red abalone, pink and green abalone being used to guide restoration efforts for the two endangered species. (Information from: <https://swfsc.noaa.gov/textblock.aspx?Division=FRD&id=22838>)

California Yellowtail - The Genetics, Physiology, and Aquaculture (GPA) Program conducts research in support of advancing aquaculture techniques and developing best practices for culture facilities. Due to the high value of its meat and fast growth rate, the California Yellowtail, *Seriola dorsalis*, is considered a good species for aquaculture development both locally in California and abroad. However, unlike other fishes that have a long history of culture-based production (e.g., salmon), basic research on optimal rearing practices for yellowtail in captivity is still relatively early in development. Information provided by such research is critical for rearing yellowtail in a healthy, sustainable manner. Among the many important factors that must be established for a cultured organism, the GPA Program seeks to establish basic physiological metrics of health and fitness that can be used to help enhance production efficiency in this newly developing industry. Simultaneously, genetic data is gathered to gain a better understanding of the dynamics of the reproductive potential of members of broodstock populations.

California Yellowtail is native to the waters off the coast of California, ranging from southern Washington to Mazatlán, Mexico. Yellowtail caught in Southern California are mostly from central and northern Baja California, migrating north in early spring as waters warm and heading back south in late summer and fall. *S. dorsalis* are active fish, traveling greater distances earlier in their lives and becoming more geographically constrained as they age. They are opportunistic feeders with a varied diet, eating small fish such as Northern Anchovy, Jack Mackerel, and Pacific Sardine, along with pelagic red crab and market squid. They are the largest fish in the family Carangidae, reaching up to 130 cm fork length and approximately 36 kg. *S. dorsalis* typically reach sexual maturity between 2-3 years old and are generally thought to live a maximum of 12 years. They have a fusiform body shape with a narrow caudal peduncle and deeply forked tail. Their streamlined shape reduces drag and makes them agile, fast swimmers.

(Information from: <https://swfsc.noaa.gov/textblock.aspx?Division=FRD&id=22896>)

Ocean Technology Development Tank –

The SWFSC laboratory in La Jolla incorporates a large sea- and fresh-water Ocean Technology Development Tank. This world-class facility expands NOAA's ability to develop and apply advanced technologies for surveys of fisheries resources and their associated ecosystems and to foster collaborations on fisheries management issues.

The facility enables the SWFSC to continue its pioneering work in the development and use of acoustical and optical technologies for non-lethal surveys of protected and managed species (mammals, fishes and turtles) and for the detection of near-surface fish schools (such as sardine) during ship-based surveys. The tank also supports ecosystem-based fisheries management through new and innovative uses of technologies, including novel platforms for deploying optical and acoustic sensors, such as inexpensive instrumented buoys and small craft, remotely operated vehicles (ROV) and autonomous underwater vehicles (AUV), gliders, untethered profilers, drifters and floats. This unique research facility allows NOAA to create the next generation of technologies essential for achieving its current and future missions. It also enhances collaborations with the community of scientists, both locally, at Scripps Institution of Oceanography, and around the globe, to develop the next generation of fisheries and oceanographic instrumentation. An Ocean Technology Development Tank provides a controlled environment to develop, test, and calibrate these technologies before deploying them on routine surveys or at remote locations at sea. (*Information from:*

<https://swfsc.noaa.gov/textblock.aspx?id=16022&ParentMenuId=630>)

Maritime Museum of San Diego – <https://sdmaritime.org/>

The Maritime Museum of San Diego enjoys a worldwide reputation for excellence in restoring, maintaining and operating historic vessels. The museum has one of the world's finest collections of historic ships, including the world's oldest active ship *Star of India*.

TASA experienced a museum tour where museum staff brought history to life through storytelling and reenactment. They visited a number of ships including *Star of India*, *HMS Surprise*, *B-39* Submarine, the 1898 *Berkeley* and the 1904 *Medea* as well as galleries and exhibits which display a wide variety of maritime topics. TASA also participated in team building activities and sailed on the Tall Ship *Californian*. *Californian* is a replica of the 1847 Revenue Cutter C.W. Lawrence, which patrolled the coast of California enforcing federal law during the gold rush. The Revenue Cutter Service, along with four other federal maritime agencies, was consolidated into the United States Coast Guard in 1915.

Alumni Lesson Share –

Each TASA brought one lesson plan to share with the group related to ocean or atmospheric science, or careers. Next Generation Science Standards were included in the lessons, as well as NOAA data and resources.

Participants		
Teacher at Sea Alumnus	Ship	School/Institution
<u>Susan Brown</u> (AZ)	<i>Oregon II</i>	Northland Preparatory School
<u>Cecelia Carroll</u> (AZ)	<i>Henry B. Bigelow</i>	Pinnacle Peak Preparatory School
<u>Sue Cullumber</u> (AZ)	<i>Gordon Gunter</i>	Howard Gray School
<u>Sian Proctor</u> (AZ)	<i>Oscar Dyson</i>	South Mountain Community College
<u>Jillian Worssam</u> (AZ)	<i>Miller Freeman, US Coast Guard Vessel Healy</i>	Flagstaff Unified School District
<u>Anne Artz</u> (CA)	<i>Delaware II</i>	The Preuss School UCSD
<u>Lisa Battig</u> (CA)	<i>Fairweather</i>	Fountain Valley High School
<u>Deb Brice</u> (CA)	<i>R/V Roger Revelle</i>	San Marcos Middle School
<u>Dena Deck</u> (CA)	<i>Wecoma, Hi'ialakai</i>	Wrigley Environmental Studies USC on Catalina Island
<u>Elaine Dolcini</u> (CA)	<i>R/V Fulmar</i>	Santa Rosa High School
<u>Chris Faist</u> (CA)	<i>Henry B. Bigelow</i>	Carmel Valley Middle School
<u>Jennifer Fry</u> (CA)	<i>Miller Freeman, Oscar Elton Sette</i>	E.A.R.T.H.S. Science Magnet School

Participants		
Teacher at Sea Alumnus	Ship	School/Institution
<u>Jackie Hams</u> (CA)	<i>Rainier, R/V Roger Revelle</i>	Los Angeles Valley College
<u>Jenny Hartigan</u> (CA)	<i>R/V Fulmar</i>	Lincoln Middle School
<u>DJ Kast</u> (CA)	<i>Henry B. Bigelow</i>	USC Joint Educational Project
<u>Marsha Lenz</u> (CA)	<i>Oscar Dyson</i>	South Bay School
<u>Maria Madrigal</u> (CA)	<i>Oscar Elton Sette</i>	The SEA Lab
<u>Mary Anne Pella-Donnelly</u> (CA)	<i>David Starr Jordan</i>	Chico Junior High
<u>Michelle Poquette</u> (CA)	<i>Channel Islands National Marine Sanctuary and DFG Shearwater</i>	Carbrillo High School
<u>Kim Pratt</u> (CA)	<i>McArthur II, Ronald H. Brown, Delaware II</i>	Cesar Chavez Middle School
<u>Sarah Raskin</u> (CA)	<i>Bell M. Shimada</i>	Haycock Academy of Arts and Sciences
<u>Kate Schafer</u> (CA)	<i>Oregon II</i>	The Harker School
<u>Dana Tomlinson</u> (CA)	<i>Ka'imimoana, Teacher in the Air, Teacher in the lab, and Teacher in the Field</i>	Emory Elementary
<u>Anne Marie Wotkyns</u> (CA)	<i>Pisces</i>	Kittridge School for Advanced Studies

Participants		
Teacher at Sea Alumnus	<i>Ship</i>	School/Institution
<u>Melissa Barker</u> (CO)	<i>Oregon II</i>	Dawson School
<u>Staci DeSchryver</u> (CO)	<i>Oscar Dyson, Oscar Elton Sette</i>	Cherokee Trail High School
<u>Caitlin Fine</u> (CO)	<i>R/V Walton Smith</i>	Educational Equity and Cultural Diversity –School of Education, University of Colorado, Boulder
<u>Anna Levy</u> (CO)	<i>Oregon II</i>	Prospect Ridge Academy High School
<u>Helen Haskell</u> (NM)	<i>Faiweather</i>	Sandia Preparatory School
<u>Turtle Haste</u> (NM)	<i>McArthur II</i>	Desert Ridge Middle School
<u>Susan Kaiser</u> (NV)	<i>Nancy Foster</i>	Pine Middle School
<u>Stephen Bunker</u> (UT)	<i>R/V Walton Smith</i>	Northridge Elementary

Participants Invited but Unable to Attend		
Teacher at Sea Alumnus	<i>Ship</i>	School/Institution
<u>Amy Orchard</u> (AZ)	<i>Nancy Foster</i>	Arizona-Sonora Desert Museum
<u>Scott Donnelly</u> (AZ)	<i>McArthur II</i>	Arizona Western College

Participants Invited but Unable to Attend

Teacher at Sea Alumnus	<i>Ship</i>	School/Institution
<u>Sandra Camp</u> (CA)	<i>Hi'ialakai</i>	Robert Lewis Stevenson Elementary
<u>Nichia Huxtable</u> (CA)	<i>Bell M. Shimada</i>	Fillmore High School
<u>Crystal Davis</u> (CA)	<i>Oregon II</i>	Hawthorne Math and Science Academy
<u>Lisa Hjelm</u> (CA)	<i>Rainier</i>	Crossroads Academy
<u>Andrea Schmuttermair</u> (CO)	<i>Oregon II</i>	Colorado STEM Academy
<u>Susy Ellison</u> (CO)	<i>Rainier</i>	Yampah Mountain High School
<u>Laura Brezinsky</u> (HI)	<i>Miller Freeman</i>	Hawaii Community College
<u>Cristina Veresan</u> (HI)	<i>Oscar Dyson</i>	Star of the Sea School
<u>Kazu Fukuda Kauinana</u> (HI)	<i>Oscar Elton Sette</i>	Kapiolani Community College
<u>Patricia Kassis</u> (HI)	<i>R/V Kilo Moana</i>	Parker School
<u>Becky Moylan</u> (HI)	<i>Oscar Elton Sette</i>	Central Middle School
<u>Maggie Prevenas</u> (HI)	<i>US Coast Guard Vessel Healy</i>	Hawaii DOE

Participants Invited but Unable to Attend

Teacher at Sea Alumnus	<i>Ship</i>	School/Institution
<u>Debra Novak</u> (NM)	<i>Oregon II</i>	Manzano Day School
<u>Nathan Pierantoni</u> (NM)	<i>R/V Walton Smith</i>	Heights Middle School
<u>Emilisa Saunders</u> (NV)	<i>Oregon II</i>	Springs Preserve – Las Vegas Valley Water District
<u>Deborah Stringham</u> (UT)	<i>Fairweather</i>	Centerville Junior High School

Alumni Workshop Staff and Support

Jennifer Hammond	NOAA's Teacher at Sea Program
Jennifer Annetta	Teacher at Sea Alumni Association/National Marine Sanctuary Foundation
Emily Susko	NOAA's Teacher at Sea Program
Jenny Goldner	Teacher at Sea Alumni Association/National Marine Sanctuary Foundation
Michelle Carroll	Teacher at Sea Alumni Association/National Marine Sanctuary Foundation
Kristin Koch	NOAA NMFS SWFSC
Toby Garfield	NOAA NMFS SWFSC
Roger Hewitt	NOAA NMFS SWFSC
Sarah Mesnick	NOAA NMFS, SWFSC
Dawn Graham	NOAA NMFS, SWFSC
John Hyde	NOAA NMFS, SWFSC
Katherine Swiney	NOAA NMFS, SWFSC
Noelle Bowlin	NOAA NMFS, SWFSC
Antonella Preti	NOAA NMFS, SWFSC

Agenda



NOAA Southwest Region Teacher at Sea Alumni Workshop

Friday, November 17, 2017

NOAA Southwest Fisheries Science Center
8901 La Jolla Shores Drive, La Jolla, CA 92037

Day 1

- 8:00 – 8:30** Breakfast and Poster Set-Up
- 8:30 – 9:00** Welcome and Introductions – Pacific Room, SWFSC
- 9:00 – 9:30** Overview of NOAA Southwest Fisheries Science Center
Roger Hewitt – SWFSC Assistant Director

9:35 – 10:05 TASA Poster Session: Group 1

10:10 – 10:40 TASA Poster Session: Group 2

Break

11:00 – 11:30 TASA Poster Session: Group 3

11:35 – 12:05 TASA Poster Session: Group 4

12:05 – 1:15 Lunch

Tour of SWFSC and Science Lab Presentations

1:15 – 2:30 Tour 1 and SWFSC science lab presentations
Ichthyoplankton lab – Noelle Bowlin
Aquarium - John Hyde and Katherine Swiney

Break

3:00 – 4:15 Tour 2 and SWFSC science lab presentations
Ichthyoplankton lab – Noelle Bowlin
Aquarium - John Hyde and Katherine Swiney

4:15 – 5:00 Discussion and poster breakdown: Pacific Room

NOAA Southwest Region Teacher at Sea Alumni Workshop
Saturday, November 18, 2017
Maritime Museum of San Diego
<https://sdmaritime.org/education/>
1492 North Harbor Drive, San Diego, CA 92101

Day 2

- 8:30** Arrive at Maritime Museum of San Diego
- 8:45** Introduction and Welcome
- 9:00** Rotation 1 (Rowing, Jibboom, Tour)
- 10:00** Rotation 2 (Rowing, Jibboom, Tour)
- 11:00** Rotation 3 (Rowing, Jibboom, Tour)
- 12:00** Lunch
- 1:00** Sail on San Diego Bay
- 4:00** Return to dock
- 4:15** Wrap-up and discussion

Day 3: San Diego Marriott La Jolla – Salon ABC

- 8:00** Breakfast
- 9:00 – 11:00** Lesson Share with Grade Level Groups
- 11:00 – 12:00** Southwest Regional TASA Discussion and Next Steps; Forms and Evaluation

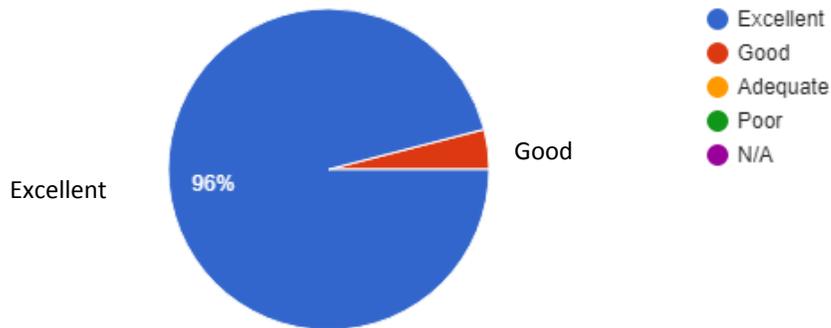
Evaluation Data

Results from NOAA's Southwest Region TASA Workshop Evaluation (n=25)

Participants were asked to select from – excellent, good, adequate, poor or N/A for the following items:

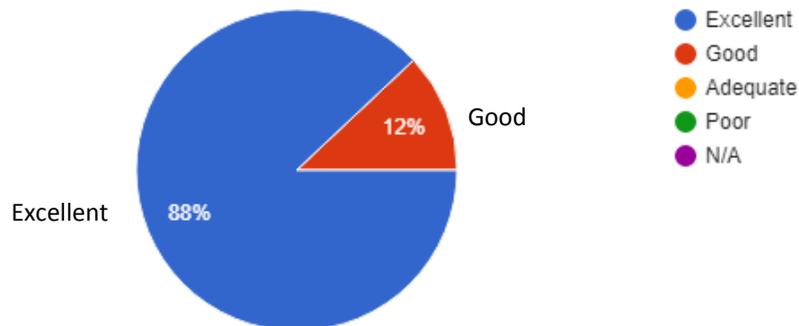
Quality of Workshop Content

25 responses



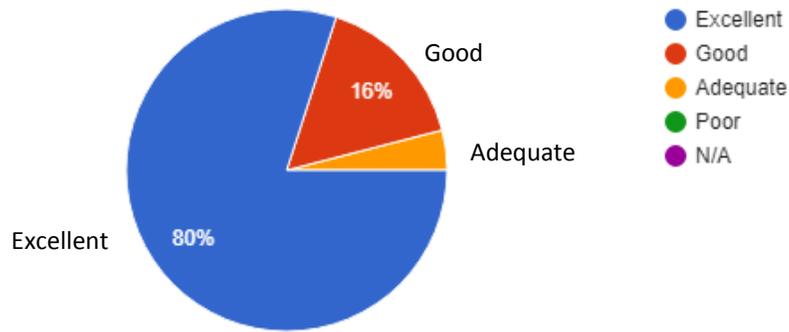
Relevance to your work, professional development

25 responses



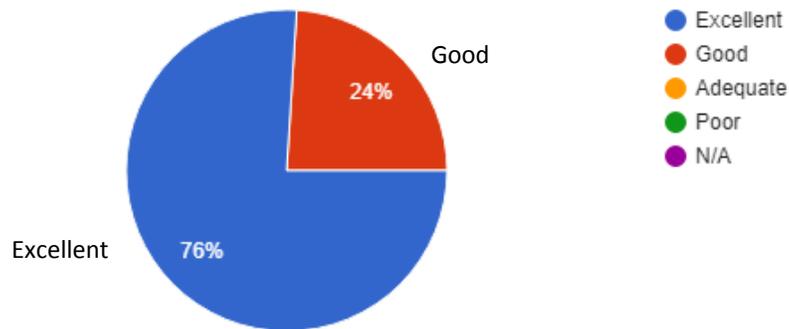
NOAA Southwest Fisheries Science Center - Poster Session

25 responses



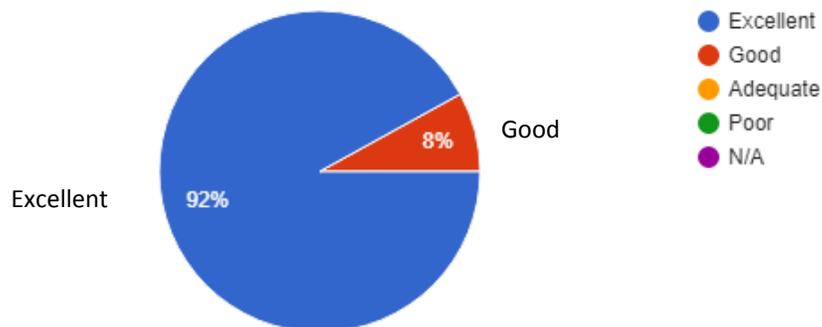
NOAA SWFSC - Tour of the facility (Roger Hewitt)

25 responses



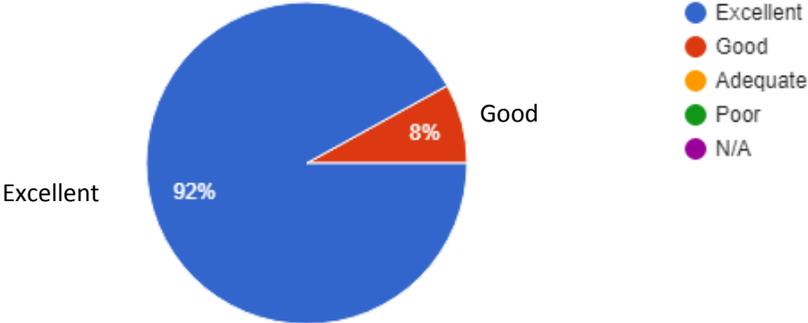
NOAA SWFSC - Ichthyoplankton Lab (Noelle Bowlin)

25 responses



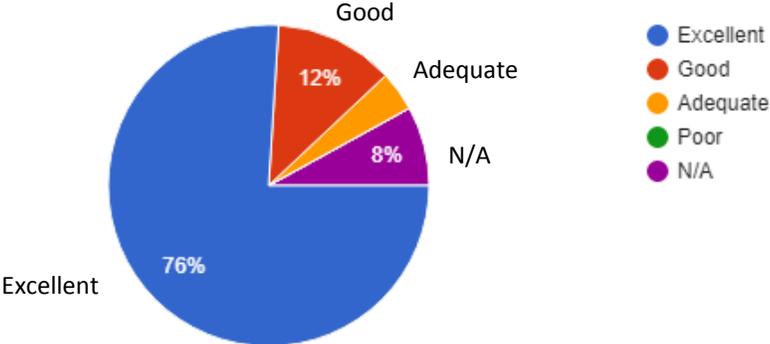
NOAA SWFSC - Large Pelagics Lab (Antonella Preti)

25 responses



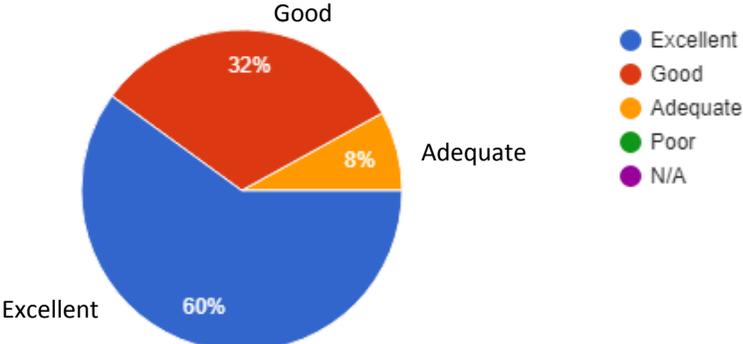
Maritime Museum: Climbing the Jibboom

25 responses



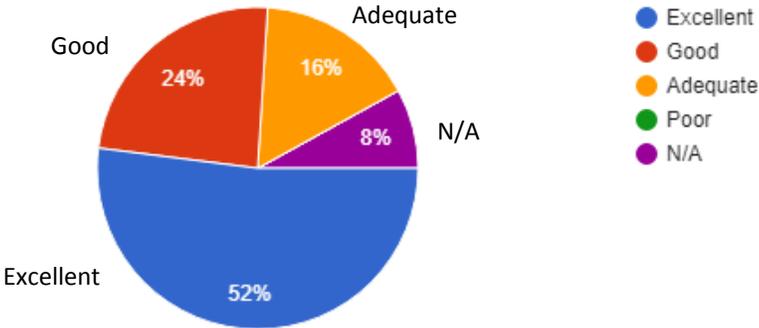
Maritime Museum: Museum Tour/Star of India

25 responses



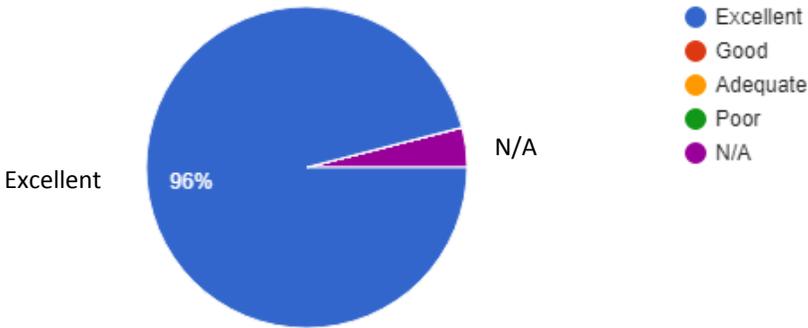
Maritime Museum: Rowing on Longboat

25 responses



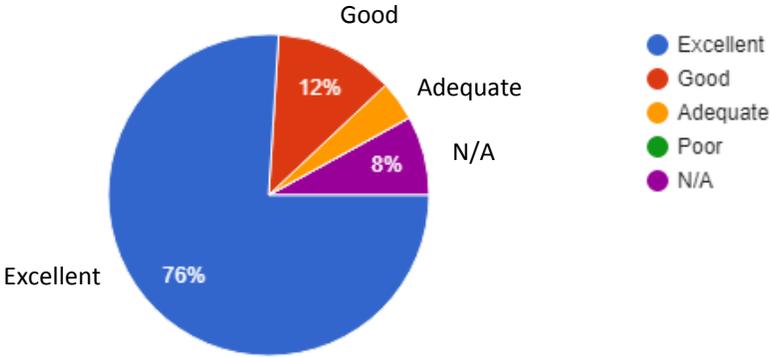
Maritime Museum - Sailing on the Californian

25 responses



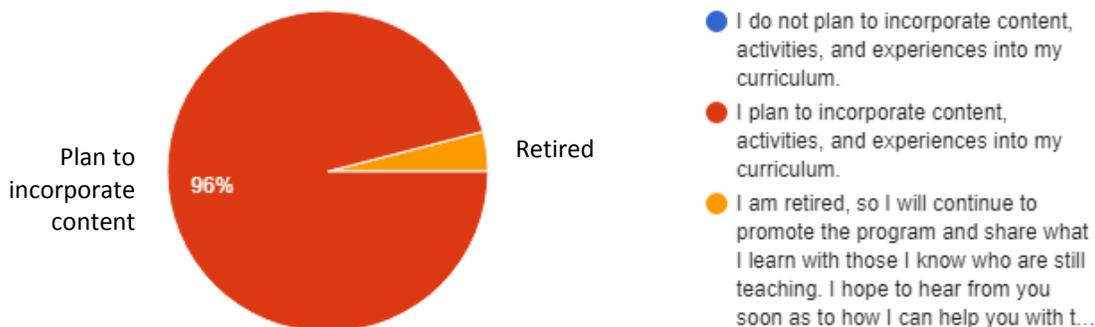
Lesson Share and Collaboration

25 responses



Do you plan to incorporate content, activities, and experiences from this workshop into your curriculum?

25 responses



Those alumni who said that they plan to incorporate workshop content into their curriculum explained that they would do so in the following ways:

- I spent the first day back at school showing my 6th and 9th grade students pictures of all we did and discussing abalone and the different science research and the ships.....
- I want to take some of the lessons shared by high school teachers and adapt them to fit my students. I really want to offer an oceanography course, and this will help me design some of the lessons.
- Incorporate a plankton lab and more ocean-related topics into my curriculum.
- I loved how most people brought "make and take" lessons - lessons already to go. For future sessions, I think it's helpful to remind participants to include references to NGSS standards being used.
- I plan to include them into the marine biology courses I teach coming up this year.
- The other participants were inspiring. They gave me a new vision of how I can engage my students with Ocean and Atmospheric lessons with my students.
- Some participants shared plans where I can use data collected in my math class. I've shared my experience with my students and introduced them to a wide variety of careers in the oceanography/atmospheric field and with NOAA.
- Including an Albatros lesson to my oceanography students, planning of doing some peer collaboration with two other participants. Looking at some of the new resources out of CA to incorporate into my instruction.
- I already shared the experience with my students via a slideshow and discussion. Will also look at the lessons that teachers provided to try to use in class as well.
- I plan to share what I learned with other teachers within my school and the school district.
- Since I got back to school after the TASA workshop, I am meeting up with the local water agency folks to take a look at their educational outreach this Saturday. I want to get my students out in the field again. I applied to receive field to classroom communication with the Arctic NOAA lab.

I have communicated with a program called LIMPETS to see what they are up to in Sonoma County. I've also sent an email to Jenny Stock (Cordell NMS) to inquire about grants that may come her way. I plan to use a lesson on ocean acidification somebody brought. Also one on ice cores for climate change. I'm looking with great interest at polar science after meeting all of my sisters who visited the arctic.

- I've already shown my kids some of the video and photo from the lab visit to discuss some of the researching being done. I also used some of the resources that Emily sent in her follow up email.
- I have already shared 3 lessons with my Science department yesterday at our pull out session to design new curriculum for our next NGSS sequence course for 10th graders. We plan to use them in some way with that class in the ecology and human impact unit.
- I plan to let teachers I work with at the elementary and high school level know about the amazing resources I obtained from the gathering.
- I still need time to work out the details but I see a connection to plastics in the ocean (or that are blown there) and how these items enter the food chain and impact living things. I am interested in making the human impacts connection for my 7th graders next year when we are learning about ecosystems. I will look for other connections to the strands I am teaching in 8th grade this year but haven't seen one yet. I look forward to looking them over more closely over winter break.
- I've already incorporated some of the shark research (in a general sense) through discussion with my classes.

Open-Ended Questions:

What was the most valuable part of the workshop?

- The most valuable part of the workshop was connecting/talking/learning with/from other TASA and meeting the staff who organize this amazing program.
- Tour by real scientists – feeling their enthusiasm is contagious!
- Lesson share and collaboration - would have loved to have more time for this!
- Sharing our experiences with other TAS and meeting some talented educators. I thought the poster share was a great way to learn about others' experiences, and how they have brought that back to their classrooms.
- The tour of NOAA facilities especially the abalone area and watching a student dissect a fish stomach.
- Being able to collaborate with other teachers and share resources. And learning about the NOAA facilities.
- The tour of the two labs.
- Meeting new people, making those educational partnership with other teachers and schools is priceless. SAILING!! I have never done that before and it was a true joy! I have been to many, many professional development conferences, and this was the best one! Well planned, NOAA staff was helpful and supportive! Amazing communication! I miss everyone so much! I learned a lot and have already shared so much with my own peers and students. Keep this rolling!!! It was worth every second and penny!
- Roger Hewitt's personal and historical perspective during the facility tour.
- I felt that anywhere real science was presented and opportunities for involvement with such were definitely my favorite. These are things that I constantly try to impart to my students. These would have included all of the scientists at NOAA, and several of the teacher to teacher presentations both in experiences and curriculum.

How could this workshop have been improved?

- More time on the tour of NOAA although there are only so many hours in the day
- I thought it was wonderful and would definitely make it a priority to come again.
- Nope - it really was excellent!
- I wish the poster session had been a little longer - I didn't get a chance to see everyone's poster.
- Great location, great participants, well organized, engaging and relevant activities. It far surpassed my expectations. Grand Slam and a half!
- It would have been great if we could have participated in a hands-on activity with a NOAA scientist in the ocean environment we were next to. Also having a final dinner all together with all the TAS teachers and staff would have been a great wrap up.
- No suggestions- it was a fantastic workshop!
- Sound system on the first day needed to be trouble shot. It was very well organized, it should be replicated for other groups in the future.
- I would have like to spend more time in the labs and hearing about on- going research at the lab. Maybe have a few scientists actually present to us about their work.
- Nothing – everything was great!
- This was such a fabulous experience. Good balance of work and fun. Don't change a thing!
- I would have like to spend more time with the scientists at the NOAA Fisheries Center. While I enjoyed the sailing history talk and rowing what really gets me excited is the science connections.
- Can't think of a thing - you all did a great job. The location and the field trip were perfect. Thanks so much.

Additional Comments:

- I enjoyed seeing the passion and feeling the positive and creative energy generated by this group.
- Sailing = I never get to go so this was amazing!
- Great weekend! Thanks for organizing this!
- The jibboom was such a huge personal challenge.
- I enjoyed being treated like a professional. This is rare for us. Thank you. It makes me want to return the favor and go above and beyond.
- I feel FULL again as a teacher!
- This weekend was just amazing. Thank you for treating us like professionals, and giving us the opportunity to learn and have a blast. You guys are the best!
- Thank you, thank you, thank you! When I first found out about this weekend, I felt so honored and fortunate to have this opportunity to grow professionally. Now, I see this experience has exceeded my expectations tenfold! I have met so many passionate and committed friends, and I feel we are working as a team to deepen science education. It was great to connect in person with people whose blogs I followed.
- In general this was an inspiring shot-in-the-arm weekend to talk with passionate, dedicated educators who understand the demands of being an educator.

Appendix: Photos



SWFSC La Jolla Lab Pacific Meeting Room



Sarah Raskin (right) shares her TAS experience with Anna Levy (front) and Kate Schafer during a poster session



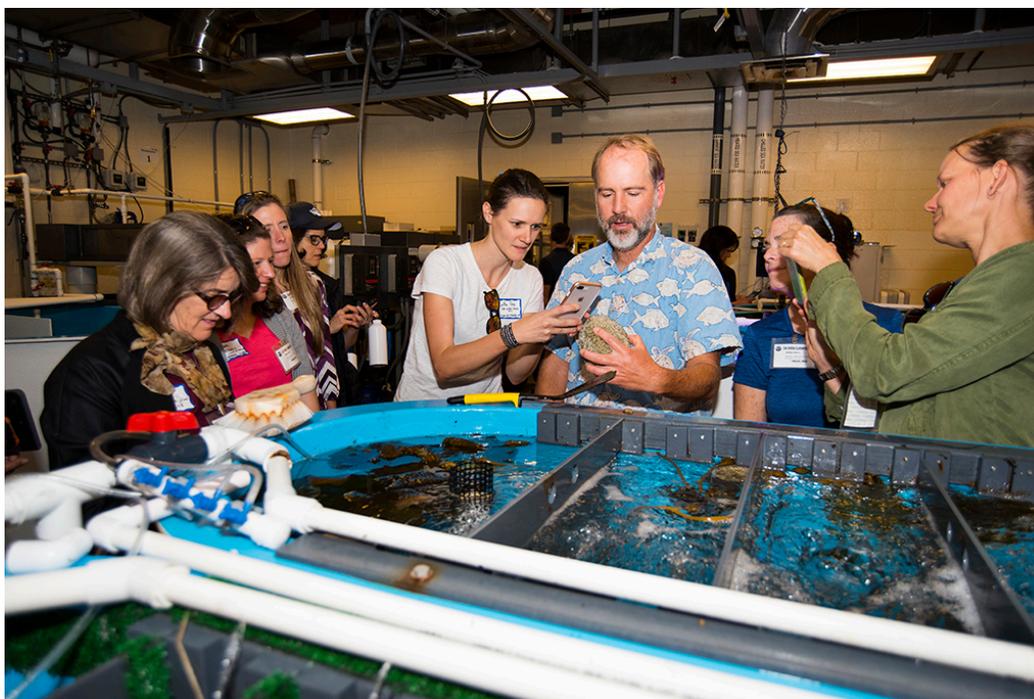
Roger Hewitt leading a tour of SWFSC



Noelle Bowlin with TASA in the Ichthyoplankton lab



Antonella Preti in the Large Pelagic lab with TASA



John Hyde with TASA in the SWFSC Aquarium sharing information about abalone



TASA holding an abalone



Katherine Swiney in the SWFSC sharing information about abalone with TASA



Michelle Poquette at the SWFSC test tank



Noelle Bowlin leading TASA on a tour of the SWFSC



The Maritime Museum of San Diego



Tour of Star of India at the Maritime Museum of San Diego



TASA rowing a long boat in the San Diego Bay



(Front to Back) Jenny Hartigan, Jennifer Fry and Jillian Worssam assist the crew of Californian to hoist the sails



TASA aboard Californian at the Maritime Museum of San Diego



Tall ship Californian



Sian Proctor (L) and Elaine Dolcini learn about a marine science lesson from TASA