

# EXPLORE

## Independent Review of the Ocean Exploration Program, 2001-2011 May 8, 2012

*Engagement*

# Engagement

- A commitment of service...



...between NOAA and  
the society it serves.






# Point of Entry for America's Public





# Ocean Explorer Website



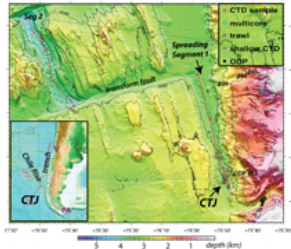
ocean explorer

EXPLORATIONS | GALLERY | TECHNOLOGY | HISTORY | LIBRARY | EDUCATION | FOR FUN | Search

[Explorations](#) | [INSPIRE: Chile Margin 2012](#)

## INSPIRE: Chile Margin 2012

International South-East Pacific Investigation of Reducing Environments



INSPIRE 2012 is a continuation of a multi-disciplinary study begun two years ago. [Click image for larger view and image credit.](#)

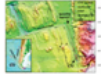
**April 20 - 30, 2012**

Jolted by the planet's biggest earthquakes, sequestering massive reservoirs of methane, while slowly swallowing a mid-ocean ridge, the Chilean margin offers an inspiring natural laboratory for investigating the complex interactions among the solid earth, the deep ocean, and the biosphere. At the Chile Triple Junction (CTJ), where the South Chile rise (a ridge crest) is being forced under the methane-rich South American continent, an international team of scientists will explore for tectonically controlled hydrothermal vents, for seep sites of where methane is released, and for novel "hybrid" systems that may yield hot seeps or cool vents.

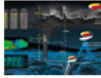
The INSPIRE: Chile Margin 2012 expedition is a follow-up to the [2010 expedition](#). During the 10-day cruise on the R/V *Melville*, we will probe for strange new biological life forms, communities, and ecosystems dependent on as-yet-unknown conditions. Members of the INSPIRE team will use an autonomous underwater vehicle (outfitted with cameras and chemical sensors) called *Sentry* - in combination with instrumentation to measure conductivity, temperature, depth (CTD), a multicorer, and a towed camera system - to locate and characterize heretofore unknown and some barely known ecosystems.

**Updates & Logs**  
[Click images or links below for detailed mission logs and updates.](#)


### Background Essays



[Mission Plan](#)




[How We've Used ABE](#)




[Next Steps - \*Sentry\*](#)

### Mission Logs



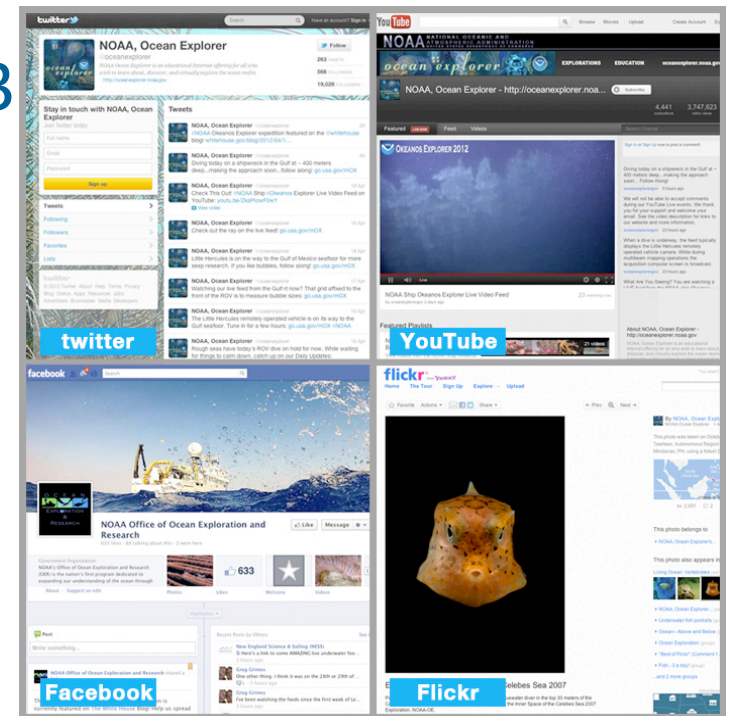
[April 17 Log](#)



[April 18 Log](#)

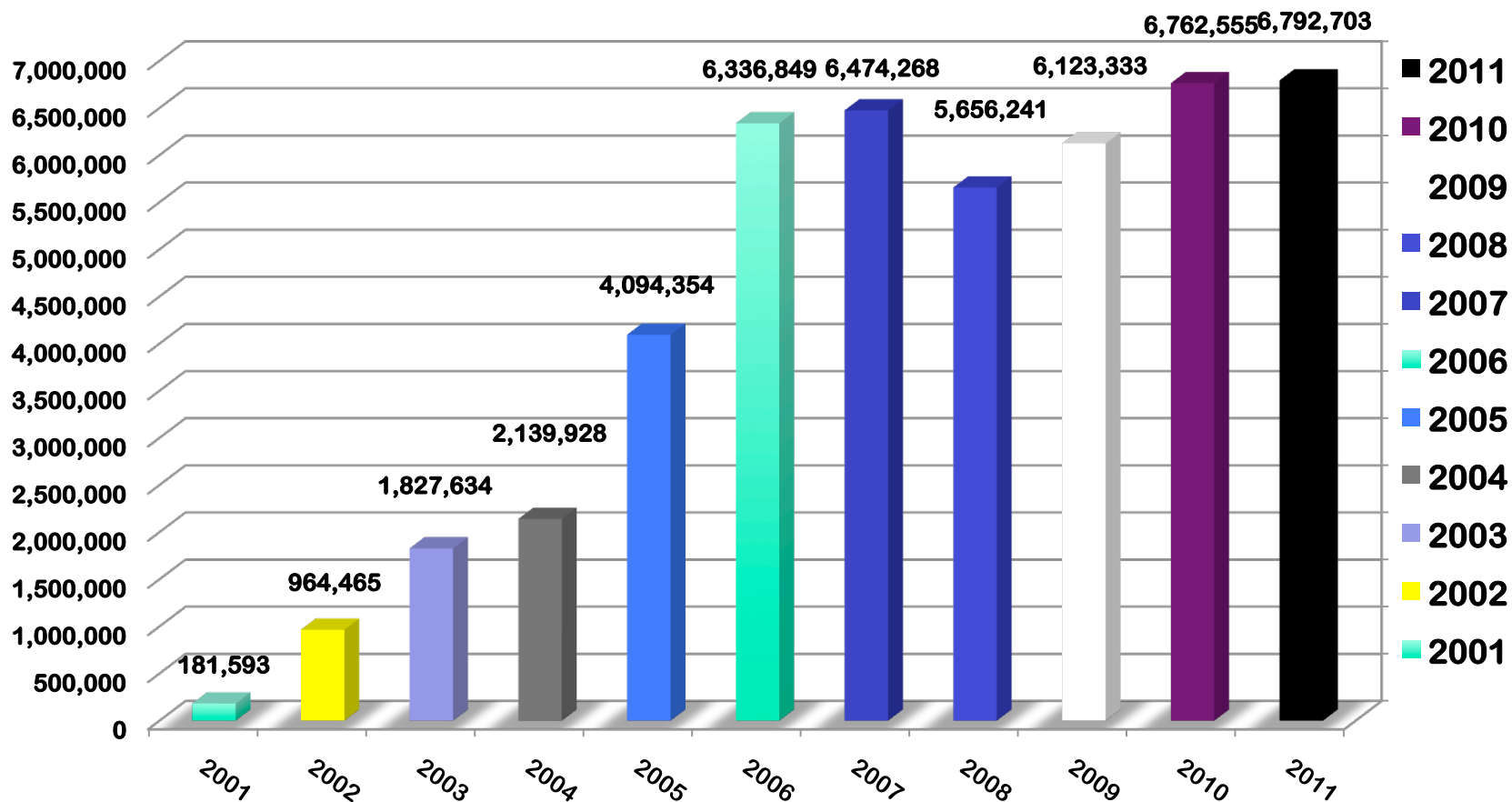
# Ocean Explorer Website and Social Media 2011

- Unique Website visitors: 6,792,703
- Twitter Followers: 18,266
- YouTube subscribers: 4,372
- Facebook fans: 415
- Educators listserv: 5,512
- Lesson downloads: 948,638
- General email listserv: 2,036
- RSS Feeds, News Feeds, and Daily Updates
- NOAA is most popular itunes Channel



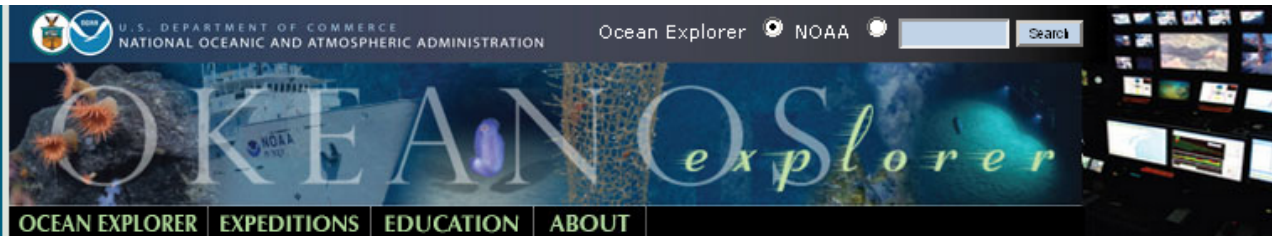
# Oceanexplorer.noaa.gov

## NOAA, Ocean Explorer - User Traffic & Growth



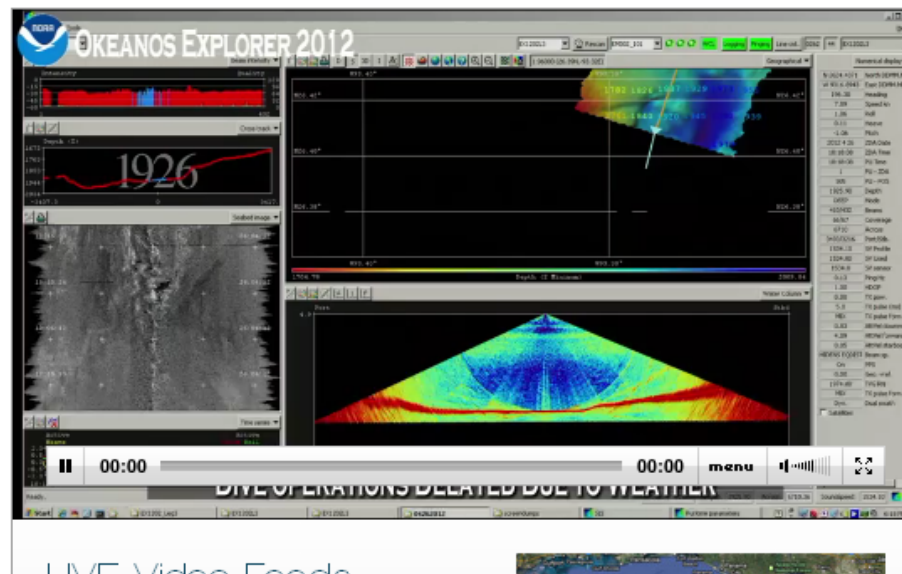


# Okeanos Explorer Website



NOAA Ship Okeanos Explorer, "America's Ship for Ocean Exploration"

Happening NOW: [Gulf of Mexico 2012 Expedition](#)



LIVE Video Feeds



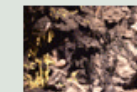
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[Explorations](#)



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# Outreach





# Outreach

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[Michelle Obama's Message to Military Families: You Do Live in a Grateful Nation](#)

### Watch Live: Be a Virtual Ocean Explorer



[Ari Isaacman Astles](#)

April 19, 2012  
10:00 AM EDT

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Have you ever wanted to dive deep beneath the ocean's surface? Discover a sunken shipwreck? Watch sea cucumbers dance and crabs scurry amongst deep corals? Or witness as scientists make new discoveries? Here is your chance.



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#### PHOTOS OF THE DAY

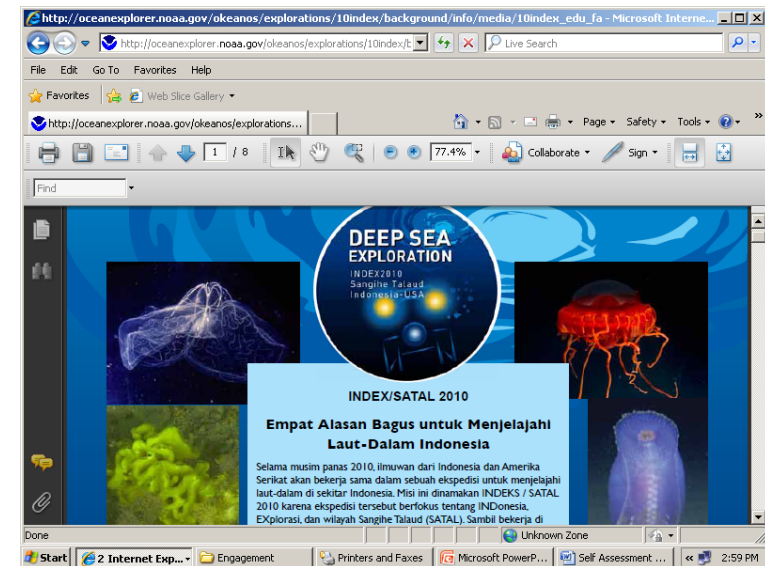




# Education



# Case Study: INDEX/SATAL EXPEDITION COVERAGE



## Four Good Reasons to Explore Indonesia's Deep Sea:

- Biodiversity
- Sources of food in the deep
- Climate change
- Hazards

# Mengapa kita Explore?

## Translated into Bahasa Indonesian

2010: Why Do We Explore? - Bridge Item 1 "Ocean Explorers: Keynote Address" - Windows Internet Explorer

http://coe.coexploration.org/reg/swebsock/0005646/0252303/NOAA2010wdwe/main/viewitem.cml?6156+7+1001+12718


File Edit View Favorites Tools Help

2010: Why Do We Explore? - Bridge Item 1 "Ocean Ex...

### Ocean Explorers: Keynote Address

Combined presentation from these Ocean Explorers  
(transcript of this presentation in next response, below)

- Dr. Charles Fisher
- Dr. Shirley Pomponi
- Dr. Edie Widder



Dr. Edie Widder  
Ocean Research & Conservation Association

rtmp://sas-Flash.OnstreamMedia.com/ondemand/FlashDMSP/webconferences.com/noaa/NOAA\_Why\_Explore.flv

Start National Oceanic and At... Microsoft PowerPoint - [...] 2010: Why Do We Exp...

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### Penjelajah Samudera: Alamat Keynote

Dr. Charles Fisher  
Dr. Shirley Pomponi  
Dr. Edie Widder

#### Penuh Transkrip

**Dr. Edie Widder:** Kami baru saja kembali dari ekspedisi penjelajahan lautan National Oceanographic and Atmospheric Administration di kepulauan Bahama, dan saya diminta untuk menjawab pertanyaan mengapa kami melakukan penjelajahan? Pertama-tama, karena manusia pada dasarnya adalah penjelajah. Pertama kali bayi merangkak dari kenyamanan pangkuan ibunya untuk mengetahui apa yang ada di sekitar ruangan, dunianya menjadi semakin luas. Dan hal itu adalah sifat bawaan yang melekat pada diri kita semua. Kita selalu ingin mengetahui apa lagi yang ada di sekitar kita.

Jadi konsep keinginan untuk selalu menjelajah ini selalu saya miliki. Namun saya selalu membayangkan bahwa penjelajahan yang akan saya lakukan adalah penjelajahan batas-batas dunia intelektual. Saya tidak pernah sama sekali membayangkan bahwa saya akan menjelajahi batas-batas dunia fisik. Tapi itulah yang telah kita lakukan. Kami menjelajahi berbagai daerah di sekitar kepulauan Bahama yang mungkin sebelumnya belum pernah seorang pun melihatnya, menerangi dunia yang belum pernah tersentuh oleh cahaya dan melihat berbagai lansekap yang menakjubkan, tempat-tempat yang mengagumkan.

**Dr. Shirley Pomponi:** Saya benar-benar merasa beruntung dapat menjelajahi berbagai lautan yang kita miliki selama 25 tahun terakhir ini. Dan terlebih lagi saya merasa sangat beruntung karena saya dapat menggunakan beberapa alat unik yang memungkinkan saya untuk tidak hanya dapat menjelajahi lautan namun juga dunia di bawahnya. Dan bagi saya, gairah untuk melakukan penjelajahan tidak hanya untuk mencari petualangan namun benar-benar untuk pengetahuan yang baru, itulah alasan mengapa saya melakukan penjelajahan.

**Dr. Chuck Fisher:** Di bagian planet bumi yang kering, kehidupan mendiami ruang hingga 100 meter di atas permukaan, atau sebesar lapangan sepak bola. Dan bandingkan daerah yang memiliki kehidupan sekecil itu dengan semua volume lautan, dan kita akan mengetahui bahwa 99% dari bagian yang dapat di didiami, tempat di mana terdapat kehidupan, tempat di



# SeaWorld Indonesia - Duta Samudra (Ocean Scout)

A Duta Samudra Makes a Promise to...

- Think about the ocean;
- Learn something new about the ocean; and
- Tell someone about the ocean

....Everyday.





# *University-level Duta Samudra*



# Exploratorium Partnership and Webcasts







## Case Study: The Sant Ocean Hall



# Ocean Hall Portal

Under Arctic Ice | Ocean Portal | Smithsonian Institution - Windows Internet Explorer

http://ocean.si.edu/ocean-stories/under-arctic-ice

File Edit View Favorites Tools Help

Under Arctic Ice | Ocean Portal | Smithsonian Institution

Home RSS Print Page Tools

**Ocean portal** Smithsonian National Museum of Natural History  
You Navigate.

**YOUR BLUE**

Blog For Educators Multimedia

Ocean Life & Ecosystems The Ocean Over Time Ocean Science The Ocean & You

**PHOTO ESSAYS**

Like 299 Tweet 126 74

**Under Arctic Ice**

Intro 1

← PREV NEXT →

Page 1

**Breaking the Ice**

In 2005, 35 researchers from the US, Canada, China, and Russia boarded the US Coast Guard Cutter *Healy* and headed for one of the deepest areas of the Arctic Ocean. Funded and organized by

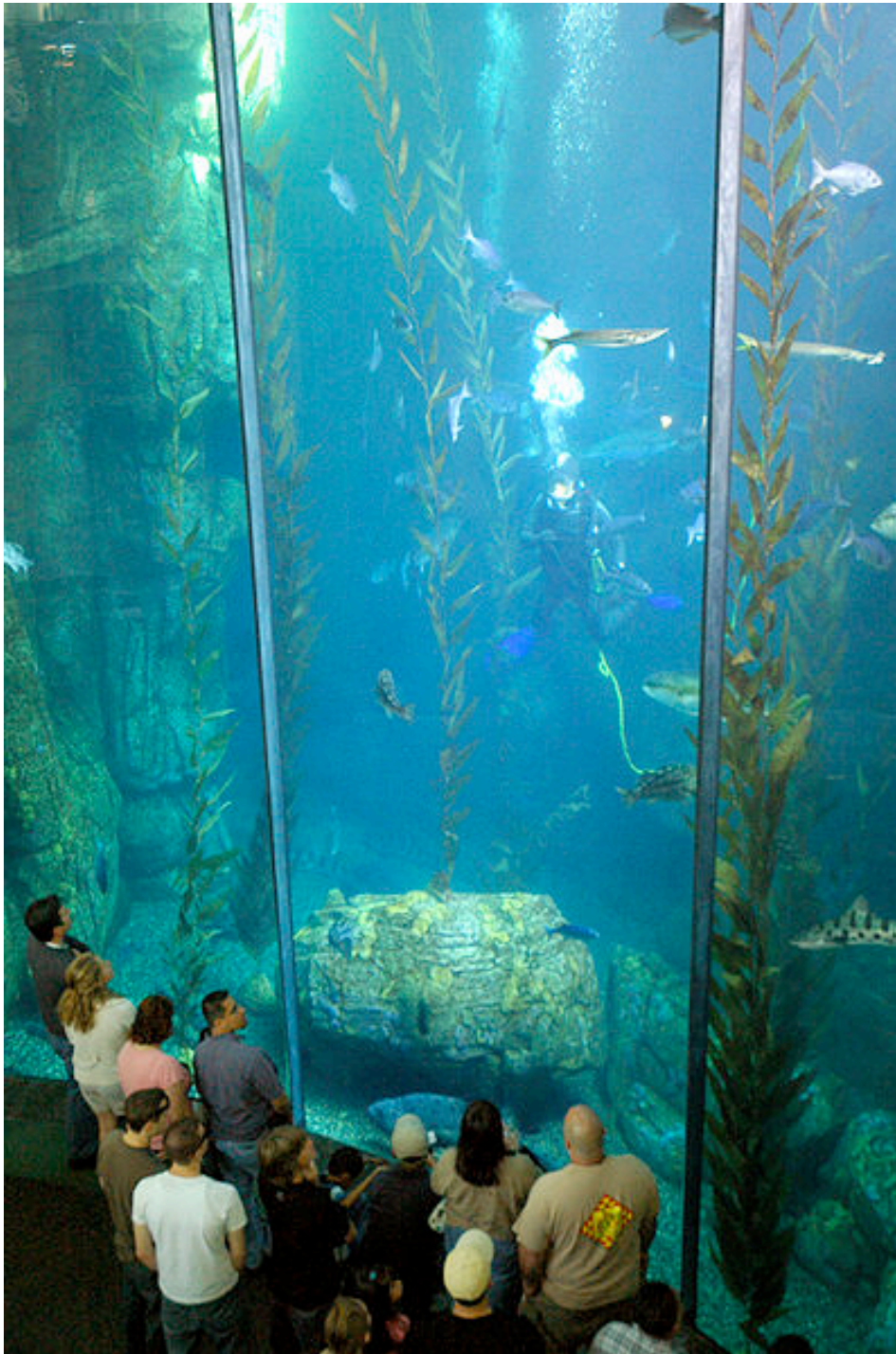
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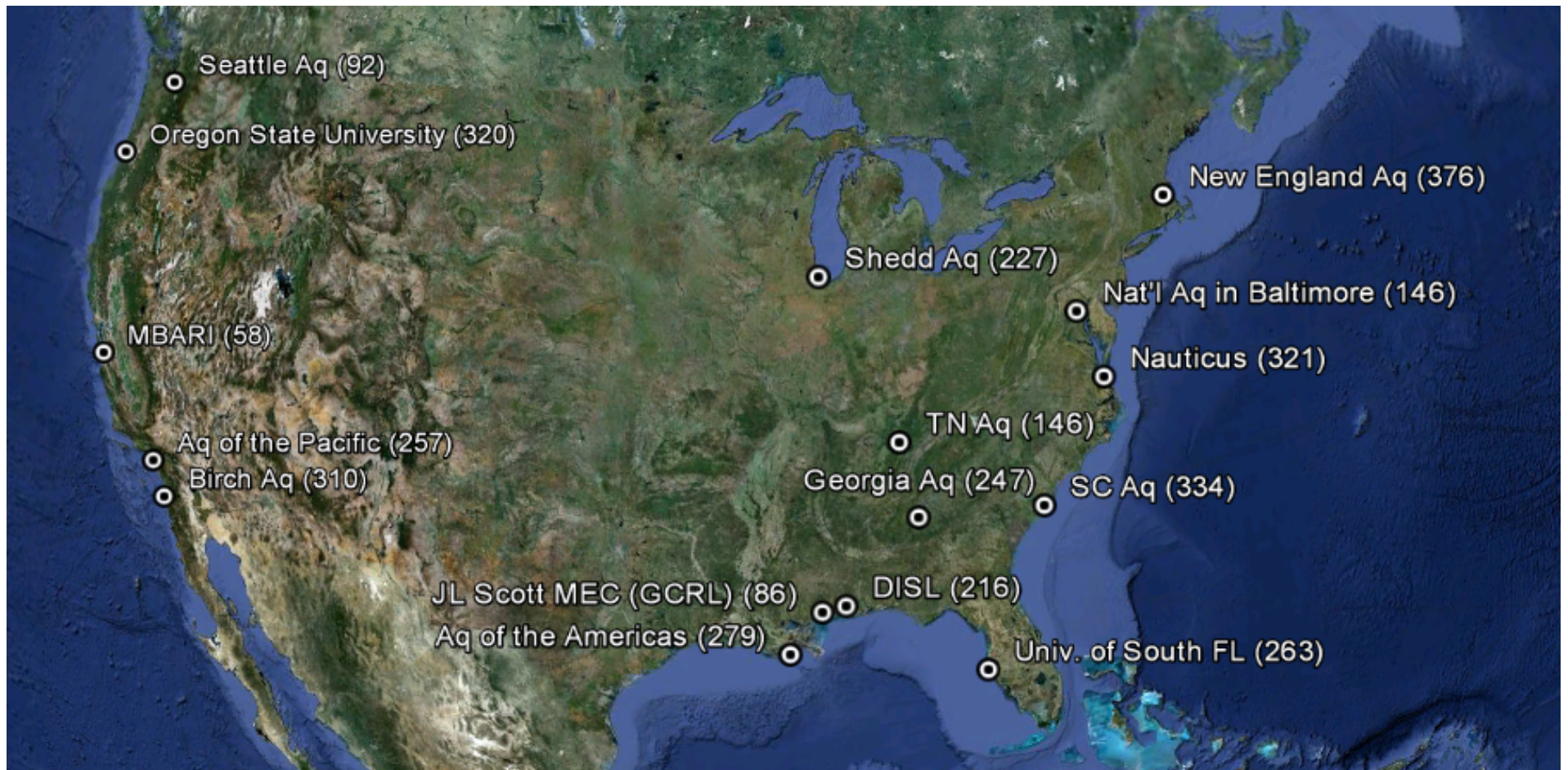
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# Case Study: Ocean Exploration Education Alliance Partnerships



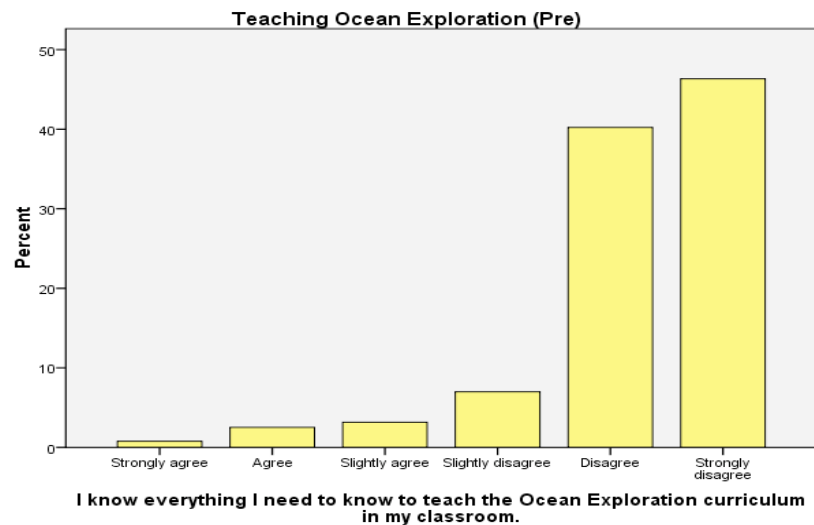


# ***Ocean Exploration Education Alliance Partnerships***

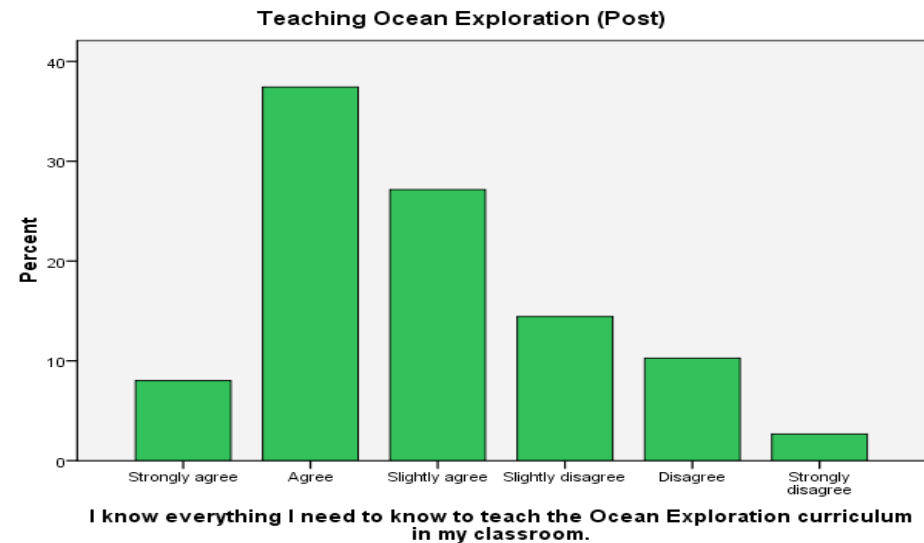


# *I know everything I need to know to teach the OE curriculum in my classroom.*

## Pre-Workshop

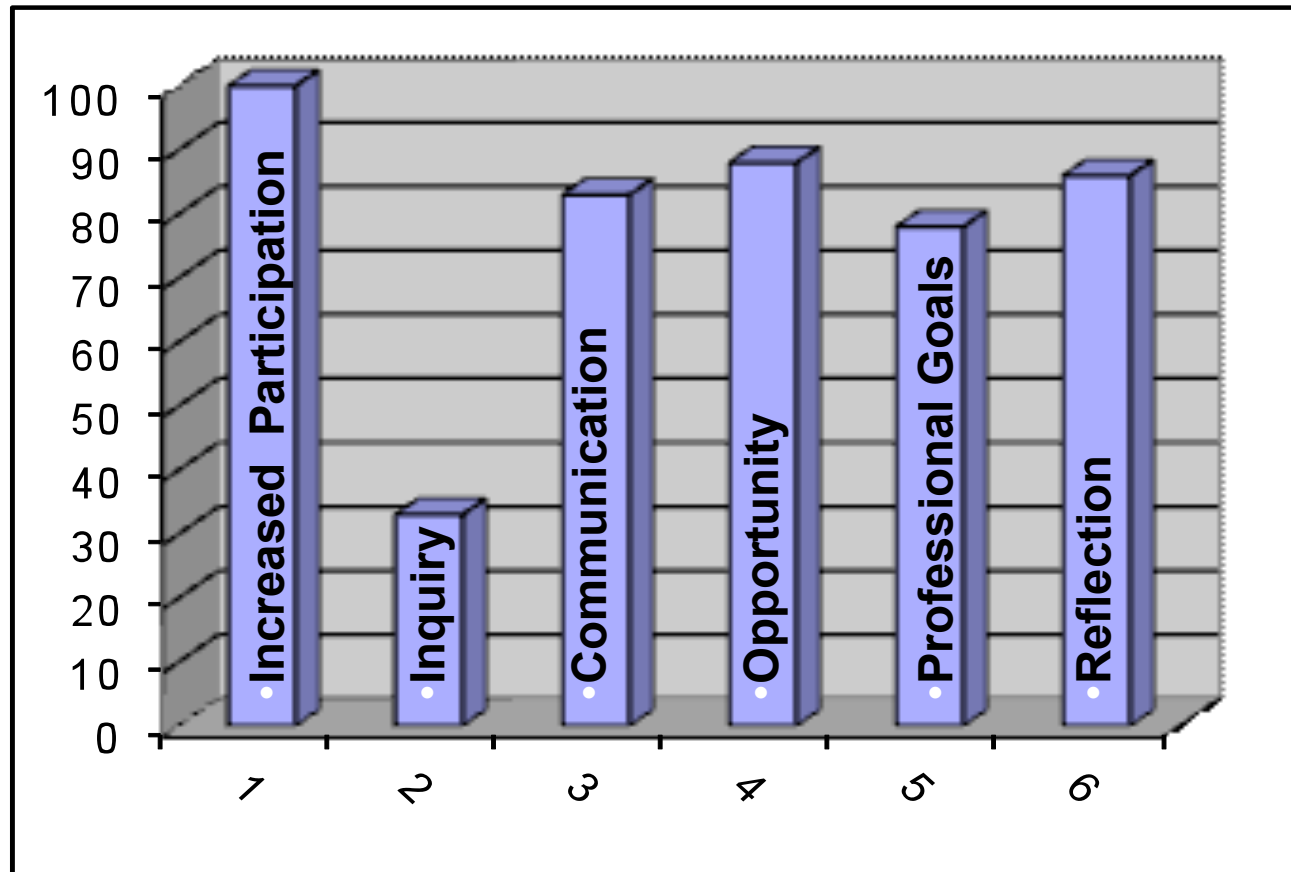


## Post-Workshop



n=970

# Scientists in Ocean Exploration Education



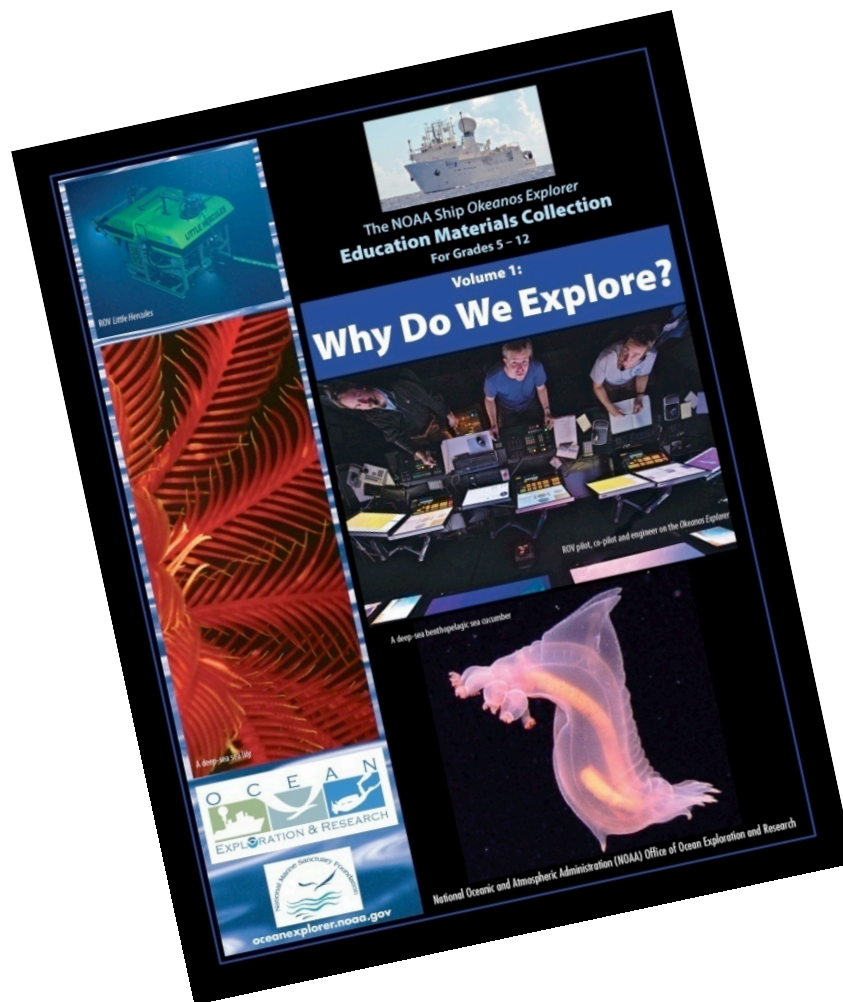
21 PI Surveys, n = 19

97 questions, 5 telephone interviews



A logic model for all of the objectives for the PDOs is quite large so for o

| Inputs   | Outputs  |   |
|--|--|---|
| Resources<br><i>What we invest</i>   | Activities<br><i>What we do</i>  | Participation<br><i>Who we reach</i>  |
| <b>Program Management Staff</b><br><br><b>Onsite:</b><br>Funds to support on-site staff time for workshop preparation, presentation materials, equipment, and to recruit participants, and to pay stipends for workshop facilitators, speakers and teachers<br><br><b>Online:</b><br>Funds to support online host site and management<br><br><b>Ocean Explorers</b> – Scientists engaged in cutting edge exploration activities<br><br><b>Workshop materials and curricula</b><br><br><b>Ocean Explorer Web site</b><br><br><b>Trained Facilitators w/instructional kits</b><br><br><b>Onsite: Workshop presentation (content and lessons)</b><br><br><b>Online: video presentations on key topics and lessons</b> | Host two onsite workshops per year at 15 Alliance sites.<br><br>Host one online PDO/yr<br><br>During onsite and online workshops Facilitators will: <ul style="list-style-type: none"> <li>• Introduce content related to ocean exploration and related discoveries.</li> <li>• Lead participants in trying out framework-referenced activities related to presented content.</li> <li>• Discuss the value of ocean exploration.</li> <li>• Familiarize participants to OLEPs and FCs.</li> <li>• Demonstrate and discuss that the ocean is largely unexplored.</li> <li>• Introduce and discuss the technologies employed to explore the deep ocean.</li> <li>• Introduce and explore ways to follow ocean exploration expeditions and discoveries, and access existing, new, or improved OER resources.</li> <li>• Guide reflections with participants about the ways OER tools, materials and resources can fit their curriculum, national and local standards, and address the needs of their students.</li> </ul> | Onsite: Alliance Partners<br><br>Grade 6-12 teachers<br><br>Informal educators<br><br>Some elementary and pre-service teachers<br><br>Online: TCOE<br><br>Grades 6-12 teachers<br><br>Informal educators<br><br>Some elementary and pre-service teachers<br><br>Some general public |



**“Thank you so much for such an incredible workshop. I learned so much and am so excited to share what I've learned. Thank you for doing what you do and for making the workshop engaging and captivating. It was so especially moving to connect with the team at the end! I left the workshop feeling re-energized and re-inspired, with some really amazing tools in hand, and that's because you created that exciting environment and inspired us to do our work! I'm so excited!”**

**~Julianne Tylko, Lincoln, MA**

http://oceanexplorer.noaa.gov/oceanos/explorations/ex1202/background/edu/media/ex1202\_sdmultibe - Windows Internet Explorer

http://oceanexplorer.noaa.gov/oceanos/explorations/ex1202/background/edu/media/ex1202\_sdmultibe1.pdf

File Edit Go To Favorites Help

http://oceanexplorer.noaa.gov/oceanos/explorations...

Print Save Mail Up Down 1 / 7 Hand Find 50% Sign












Image captions/credits on Page 2.

**supplemental datasheet**

### Okeanos Explorer Multibeam Sonar Supplemental Datasheet #1 for Cruise 12.02

*This Supplement provides data that can be analyzed using techniques developed in the lesson, "Tools for Classroom Explorers - How to Use Multibeam Sonar Data" to investigate discoveries made during the NOAA Ship Okeanos Explorer Gulf of Mexico 2012 Expedition.*

**Focus**  
Multibeam sonar data and exploration activities during the NOAA Ship Okeanos Explorer Gulf of Mexico 2012 Expedition

**Grade Level**  
5-12 (Physical Science/Earth Science)

**Focus Question**  
How are multibeam sonar data used during exploration activities of the NOAA Ship Okeanos Explorer Gulf of Mexico 2012 Expedition?

**Learning Objectives**

- Students explain the role of multibeam sonar data in the exploration strategy used during the NOAA Ship Okeanos Explorer Gulf of Mexico 2012 Expedition.
- Students interpret three-dimensional multibeam sonar data of underwater features mapped by the Okeanos Explorer during the Gulf of Mexico 2012 Expedition.

**Materials**

- Copies of the Multibeam Sonar Student Investigation Guide #1 for Cruise 12.02; one copy for each student group
- Computers with Internet access

**Background for the Gulf of Mexico 2012 Expedition**  
Background information about the mission of the NOAA Ship Okeanos Explorer and its multibeam sonar system is provided in the lesson, Tools for Classroom Explorers - How to Use Multibeam Sonar Data.

The purpose of the Gulf of Mexico 2012 Expedition is to explore unknown and poorly known ocean areas in the Gulf of Mexico. Specifically, the northern West Florida Escarpment, the DeSoto Canyon in the northeastern Gulf, the vicinity of the Deepwater Horizon or Macondo Well, and deepwater shipwrecks (Figures 1 - 5). A major objective of the expedition is to use the Okeanos Explorer's state-of-

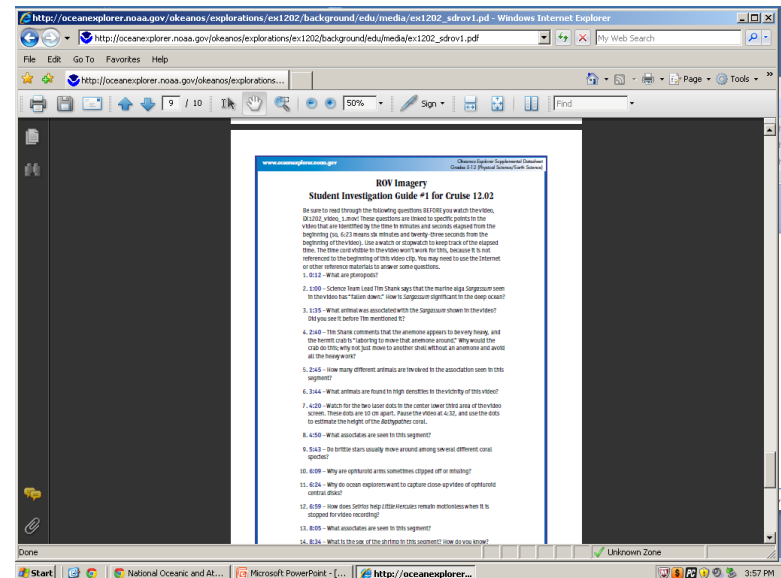
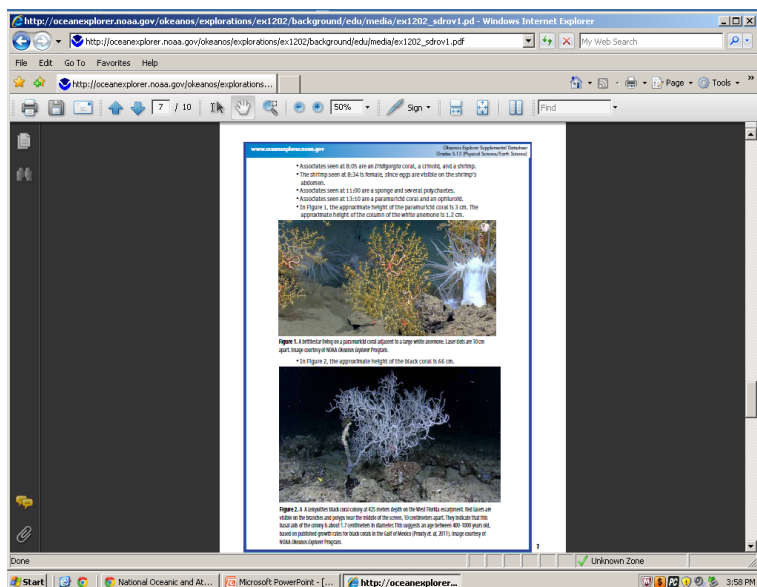
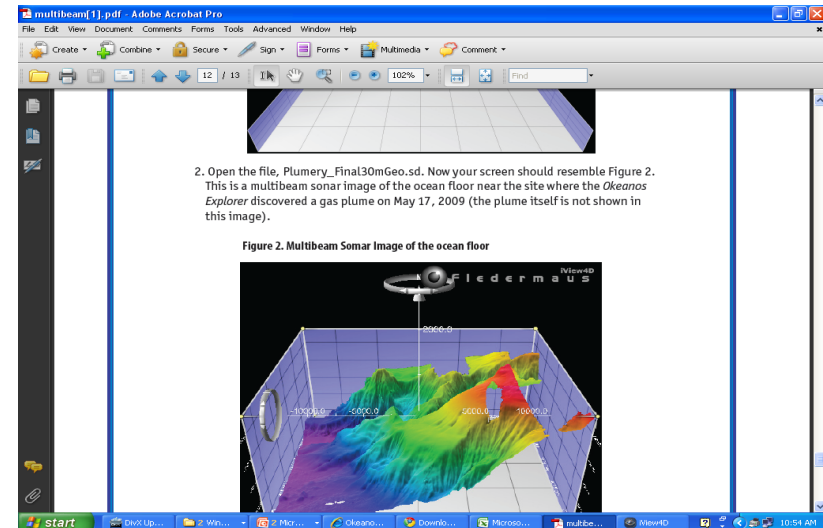
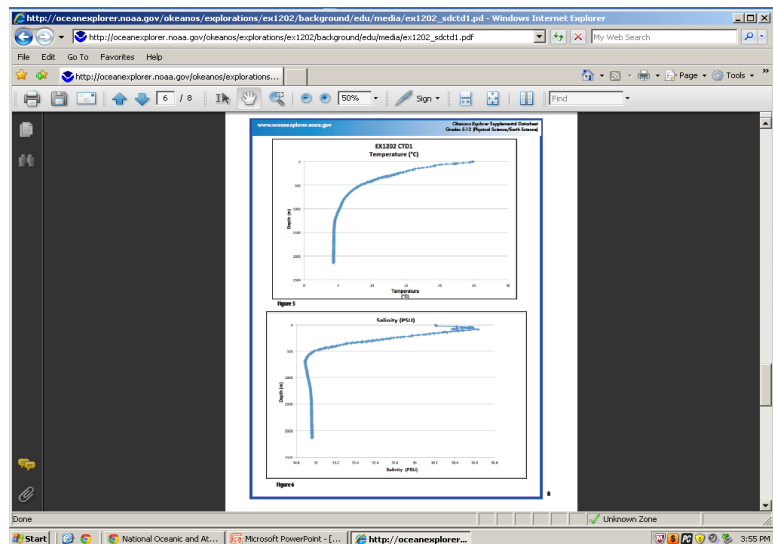
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4:00 PM







COLLEGE OF  
EXPLORATION  
ONLINE CAMPUS



National Oceanic and Atmospheric Administration (NOAA)  
**Office of Ocean Exploration and Research**  
**Online Professional Development**  
*for Educators of All Grade Levels*

## Why Do We Explore?

in partnership with the College of Exploration



NOAA Ship Okeanos Explorer

### Why Explore?

All life on Earth relies on the ocean — yet, the ocean is 95 percent unexplored, unknown and unseen by human eyes.

To understand, manage and protect the ocean and its resources, NOAA believes it is critical to support a systematic program of ocean exploration, using the best of ocean technology to explore, discover, inform, educate, and motivate.

### “Why Do We Explore?”

#### Online Professional Development

*June 21 - July 2, 2010*

*(Same workshop as Oct. 5-16, 2009)*

Join us for the second in a series of educator professional development opportunities focused around NOAA's new ship, the *Okeanos Explorer*.

Ocean explorers and education facilitators will work with participants

**SIGN UP for NOAA OER JUNE 21-JULY 2, 2010**

Online Professional Development Offering

You will need a USER ID and Password for the College of Exploration Online Campus.

1. If you already have one, just log-in below. That will automatically make you a member of the June 21-July 2 event.
2. If you do NOT already have a USER ID [please create one](#). This will automatically make you a member of this



## Why Do We Explore? Oct. 5-16, 2009

This workshop has been completed. But, if you did attend this, we continue to look forward to your follow-up comments in the Control Room, where you can continue to offer feedback regarding the lessons.

[Deck](#) NEW | [Bridge](#) | [Control Room](#) NEW | [Library](#) NEW | [Lounge](#) NEW | [Graduate Credit](#) NEW

NOAA Office of  
Ocean Exploration and Research  
Online Professional Development

## Why Do We Explore? October 5 – 16, 2009



### DECK

Intro and Reception (Begin here)



### BRIDGE

Keynote Address and Leader's Guide



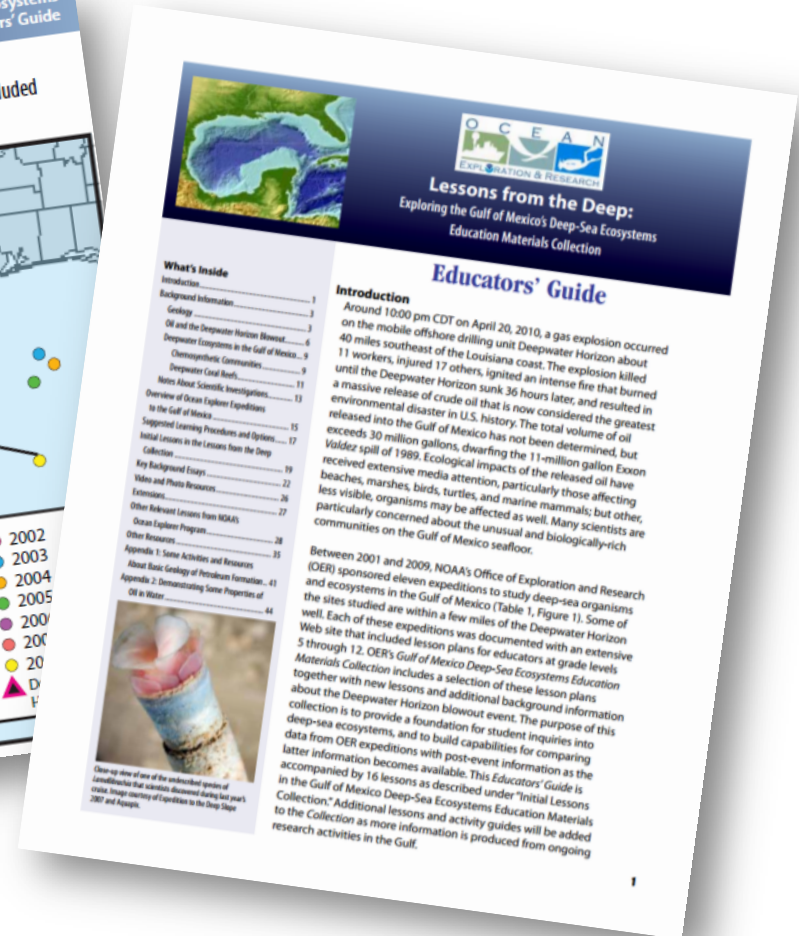
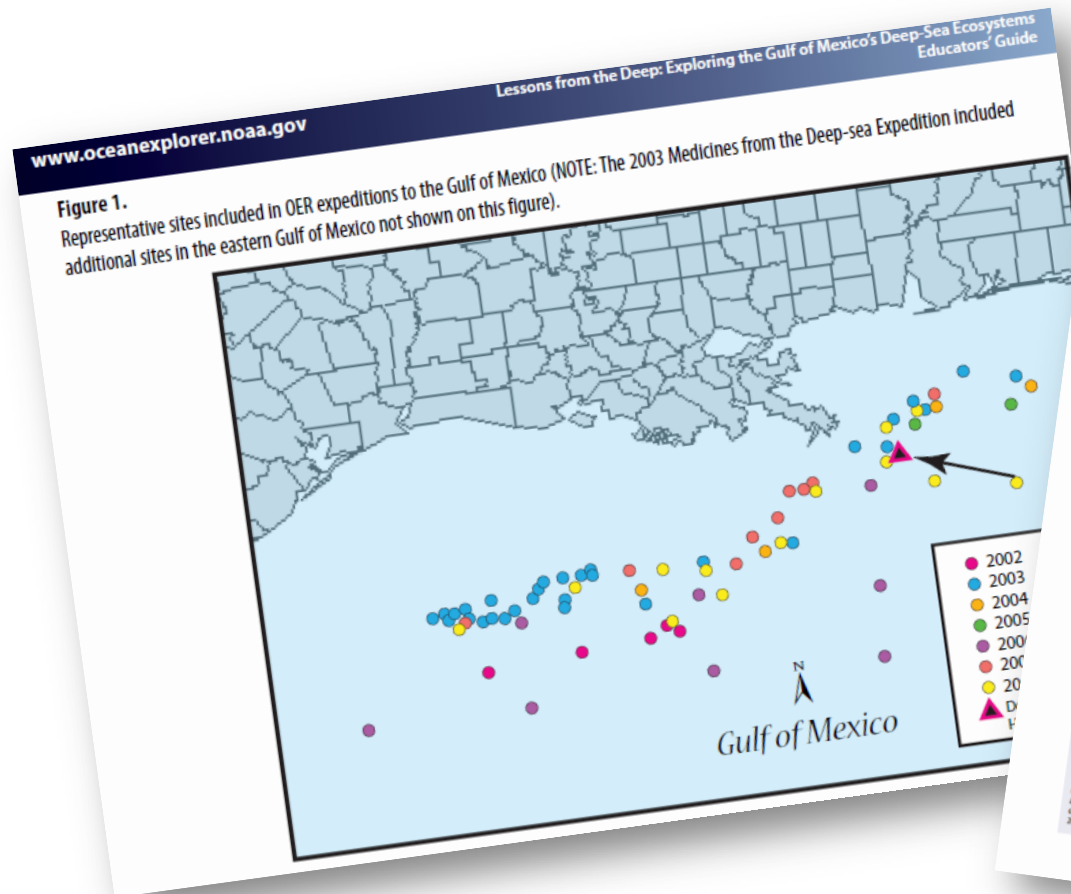
### CONTROL ROOM

Lesson Plans and Discussion



# Case Study 4 – Lessons from the Deep

## Lessons From the Deep: Exploring the Gulf of Mexico's Deep-sea Ecosystems





COLLEGE OF  
EXPLORATION  
ONLINE CAMPUS



National Oceanic and Atmospheric Administration (NOAA)

## Office of Ocean Exploration and Research

### Online Professional Development

*for Educators of All Grade Levels*

## Lessons from the Deep

Exploring the Gulf of Mexico's Deep-Sea Ecosystems

in partnership with the College of Exploration



Two types of ecosystems are typically associated with deepwater hardgrounds in the Gulf of Mexico: chemosynthetic communities and deep-sea coral communities. Hydrocarbon seeps may indicate the presence of undiscovered petroleum deposits, so the presence of these ecosystems may indicate potential sites for exploratory drilling and possible development of offshore oil wells. At the same time, these are unique ecosystems whose importance is largely unknown.

### Lessons from the Deep Exploring the Gulf of Mexico's Deep-Sea Ecosystems

*October 11-29, 2010*

This three-week online professional development offering presents *Lessons from the Deep: Exploring the Gulf of Mexico's Deep-Sea Ecosystems* Education Materials Collection, a selection of lessons about deep-sea ecosystems in the Gulf of Mexico based on ten ocean exploration expeditions sponsored by the National Oceanic and Atmospheric Administration's (NOAA's) Office of Exploration and Research (OER) between 2002 and 2009. Some of these sites are within a few miles of the Deepwater Horizon well. Additional background information will be introduced to participants about the

SIGN UP for this NOAA OER Online Professional Development Offering:

You will need a USER ID and Password for the College of Exploration Online Campus.

- If you already have one, just log-in below. \*
- Don't have a USER ID? [Please create one.](#) \*

\* You will automatically become a member of THIS event, and have access to all past events.

Userid:

Click the image



If you cannot view the streaming flash video above  
or you wish to view the video on a cell phone or iphone/ipod use this link.  
<http://www.coexploration.org/oe-dse/video/FisherOCT6/index.html>

Oct. 21- update:  
Dr. Fisher sends this slightly different version of a talk on Gulf of Mexico...  
<http://www.youtube.com/user/PennState?feature=mhum#p/a/u/1/gE0dJnXiHTo>

#### Discussion below

**Response 5 : 2** [Lori Ryland](#) Oct 16, 2010 08:43

[Mark New](#) | [Select](#) ☐

For the next Lophelia mission that Dr Fisher mentions, is there a map of planned sight dives? Having one I could print out





# GOM DSE 2010 Participants





# Federal STEM Education Inventory and Strategic Plan

Michael Feder

Policy Analyst

White House Office of Science & Technology Policy

# Challenges

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- Program requirements have increased yet staff remained same
- Reaching underserved groups
- Web compliance issues in Federal government
- Unpredictable ship scheduling makes for difficult planning for education activities



# Looking Forward. . . .

- STEM, NGSS
- Social Media – Exploration Learning Community, Underrepresented groups
- *Okeanos Explorer* Education Forum – continue to bring ideas forward
- Citizen Scientists
- ECCs have enormous education and public outreach potential
- Community colleges and higher education institutions
- Broader public engagement in exploration
- International reach – Duta Samudra, Portugal, *ASIAN Geo*, CNMI



- **EXTRA SLIDES**

## ***Looking Forward. . . .***

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- AO
- Sustained contact – listserv subscribers 5,578/  
lesson downloads/BridgeWater intel
- Broader public engagement for NOAA –  
return on investment – extension of PD
- International reach
- Additional Collabs leveraged – MTS/IEEE  
Oceans Conference Professional Development  
Days, NMEA and NSTA Short Courses, NSF  
proposals



# Case Study #3 OceanExplorer.noaa.gov Website

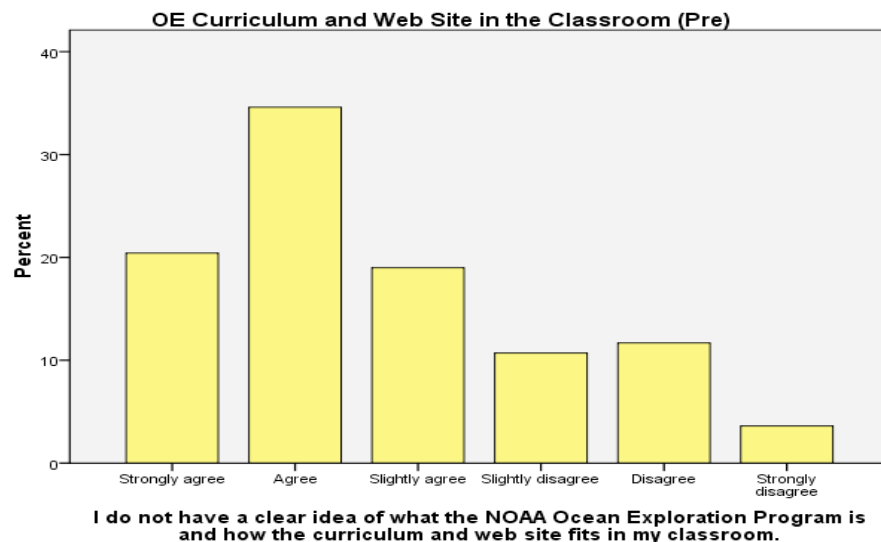


# Okeanos Explorer Website



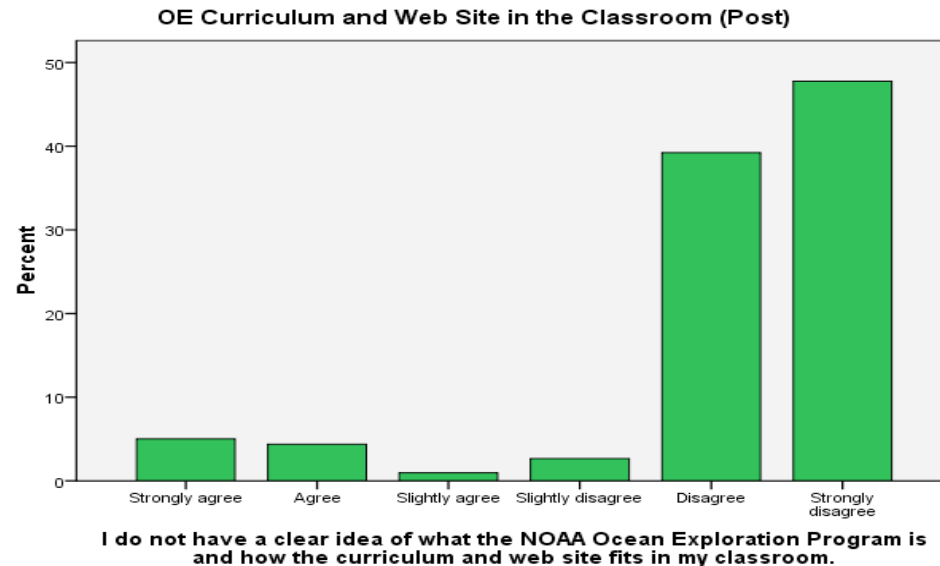
# *I do not have a clear idea of what the NOAA OE Program is and how the curriculum and the website fit into my classroom*

## Pre-Workshop



n=970

## Post-Workshop





# ***Program Drivers***

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- **President's Panel Report and OEAWG**
- **Pew, Ocean Commission, Comm. On Exploration of the Seas, National Ocean Policy**
- **NOAA Next Generation Strategic Plan and Education Strategic Plan, OER Strategic Plan**
- **2002 OE National Education Workshop**
- **2008 Okeanos Explorer Education Forum**
- **Program Evaluation**
- **America Competes Act, Co-STEM**

## ***OER Education Mission: To support OER's vision and***

***mission by reaching out in new ways to stakeholders to improve the literacy of learners of all ages with respect to ocean issues.***

- To enhance ocean science literacy through NOAA OER for K-16/formal and informal; general public and others;
- To enhance education internally within NOAA through serving on the NOAA Education Council, working closely with NOAA Office of Education, and other LOs;
- To foster agency-wide collaborations to leverage funding efforts to enhance ocean science literacy within and outside of the Agency;
- To continually assess program effectiveness/ direction and stay the course on future directions and efforts in ocean science literacy at the national level.

# ***Program Evolution***

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2000 President's Panel Report

2001 Deep East Expedition – First expedition-based lessons for Grades 5-12

2002 OE National Education Workshop, Charleston, SC

2003 *Learning Ocean Science through Ocean Exploration* Curriculum

2004 Two Alliance Partners; 14 in 2008

2008 NOAA Ship *Okeanos Explorer* Commissioned; Education Forum

2010 *Okeanos Explorer* Education Materials Collection – *Why Do We Explore?* and *How Do We Explore?*



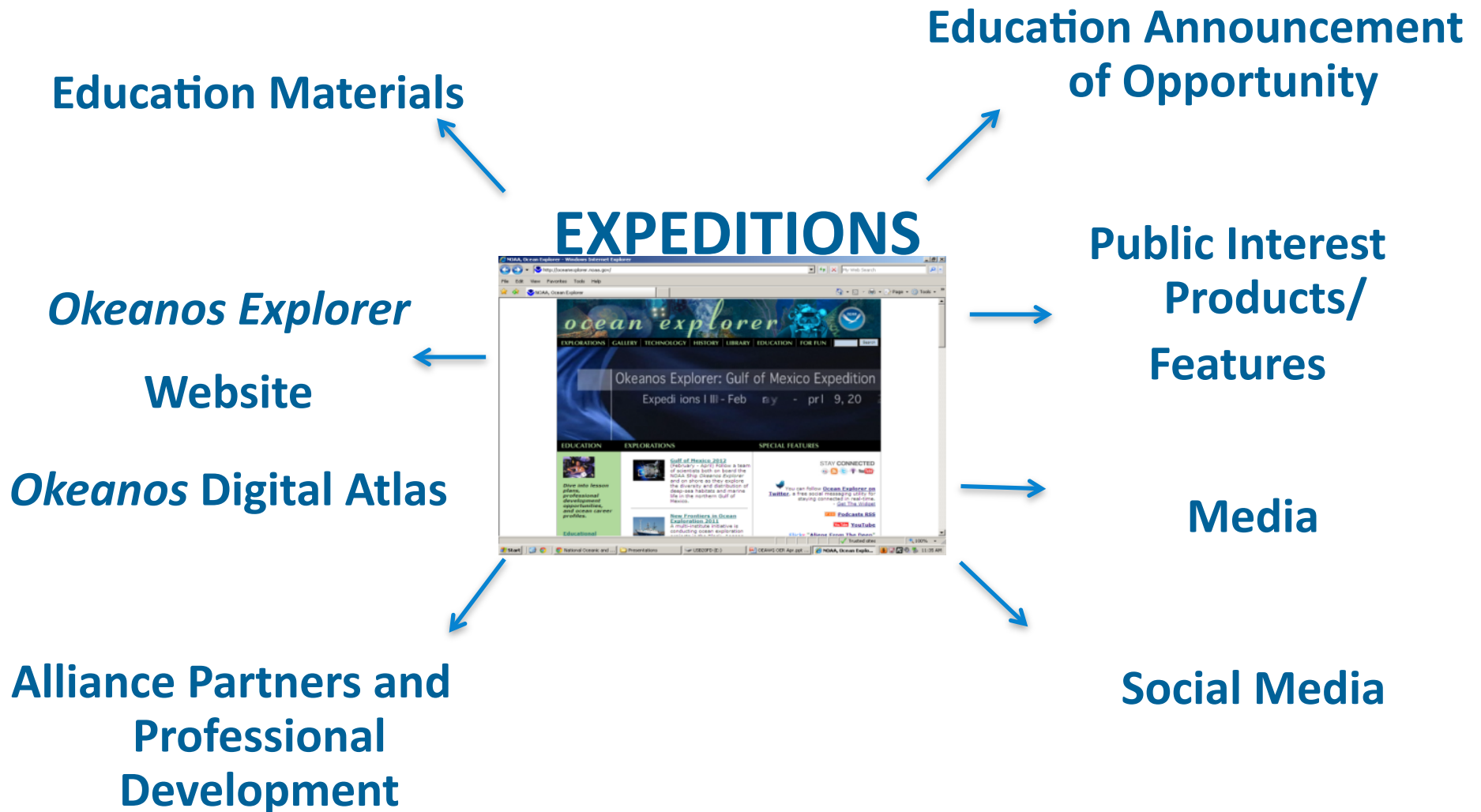
# WDWE 2010 Participants



# HDWE 2011 Participants

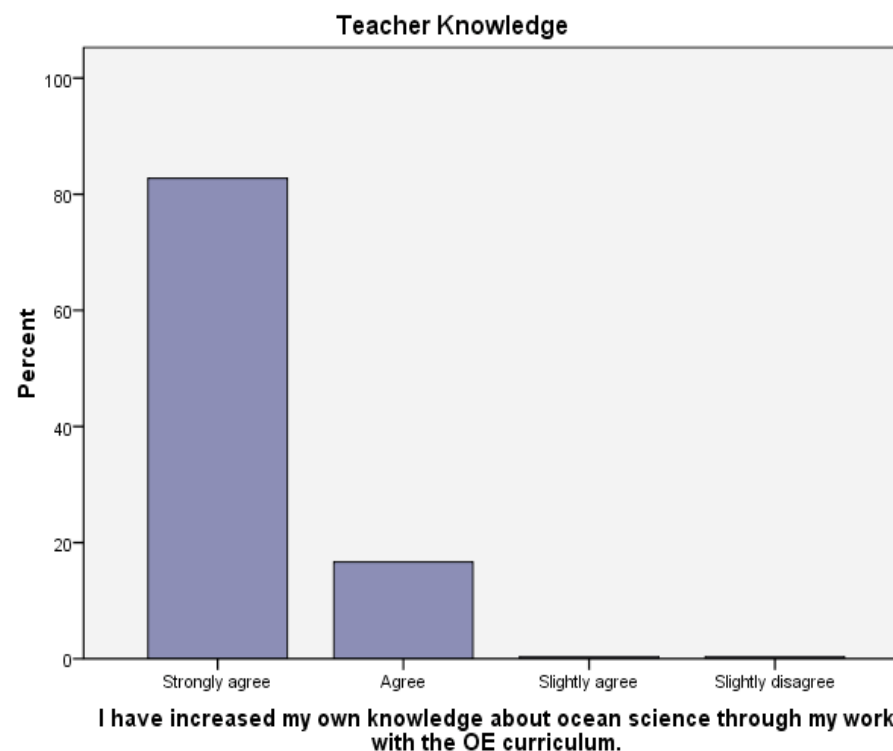
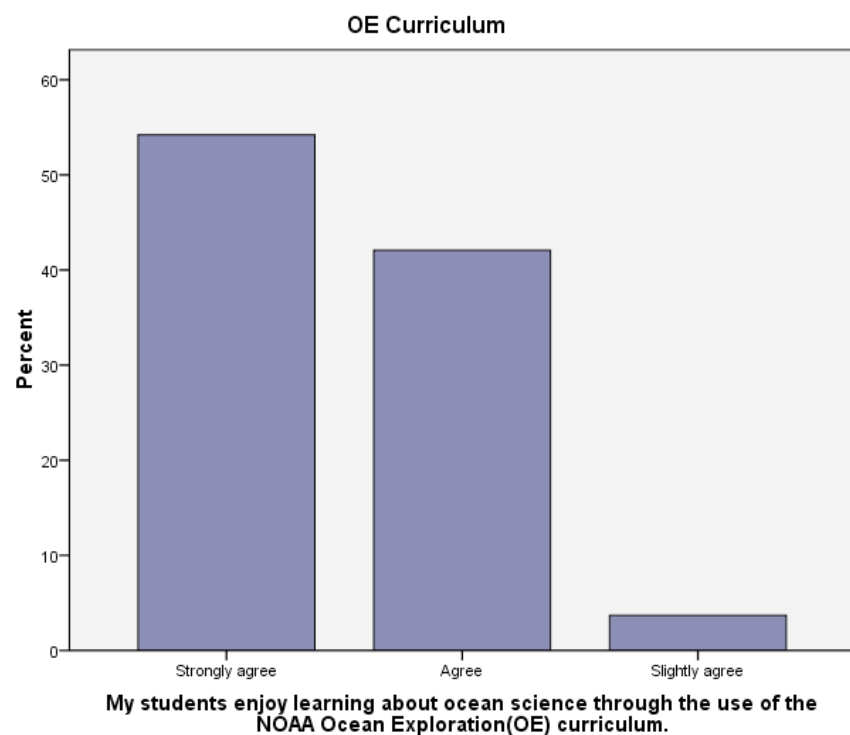


# Point of Entry for America's Public



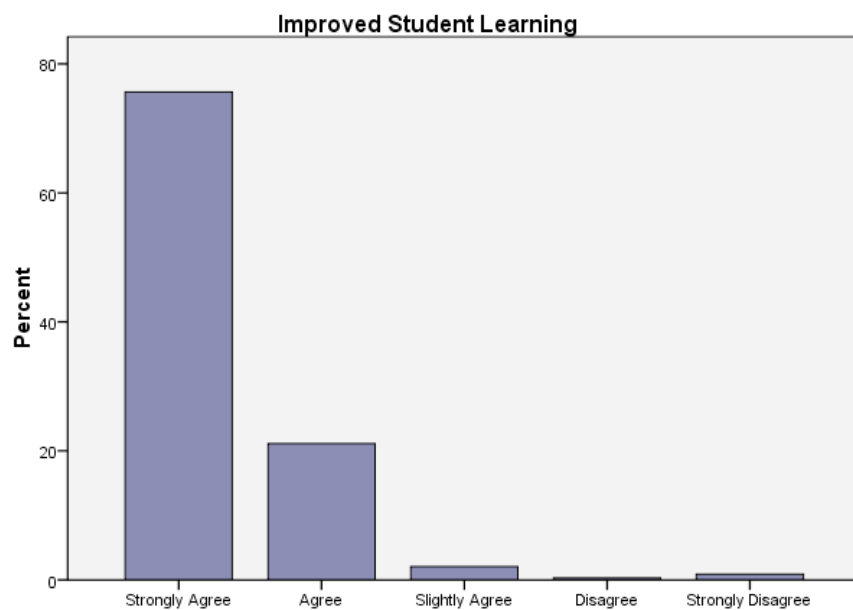


# Follow-up Professional Development

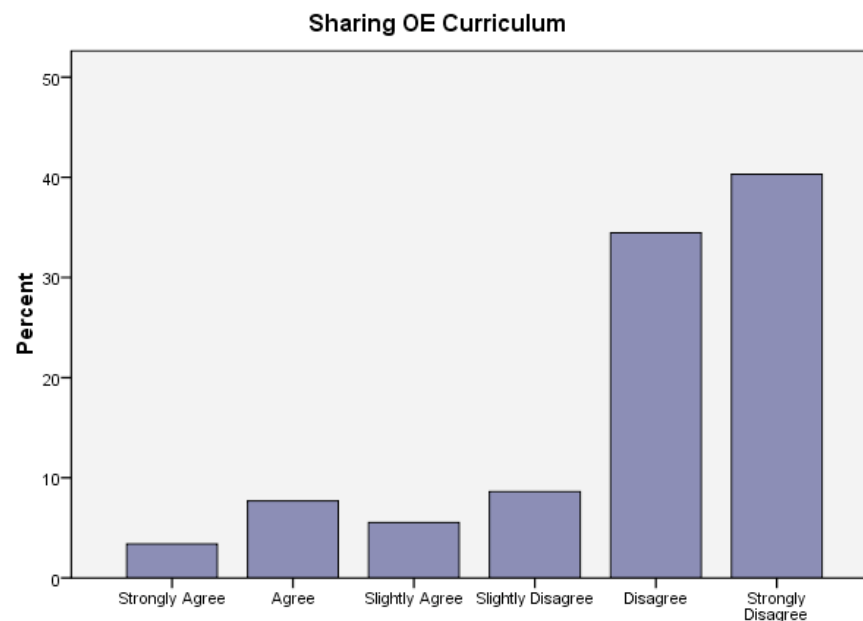


**n=348**

# Follow-up Professional Development (con't.)



I believe that my participation in the OE curriculum professional development has enabled me to improve student learning about the ocean in my classroom.



I have not shared information about the OE curriculum with other teaching professionals.

n=348

# Education Fact Sheets for Students

## Kegiatan Penemuan #3: Memecahkan Teka-Teki Tektonik

Buat salinan Gambar 2 (halaman berikutnya) dengan

- (a) Memfotokopi, ATAU
- (b) Merunut, ATAU
- (c) Menggambar batas-batas lempeng tektonik ke atas peta wilayah Indonesia.

Jika Anda guru, mungkin siswa bisa diminta membuat salinan dengan menggunakan pilihan (b) atau (c).

Gunting setiap lempeng tektonik, lalu campur-baurkan semua guntingan itu. Sekarang, pasang setiap lempeng itu ke tempatnya masing-masing. Jadikan tugas ini menjadi pertandingan dengan menghitung waktu yang diperlukan untuk menempatkan semua lempeng di tempat yang benar.



**Batas lempeng.** Siswa harus menggunting mengikuti garis biru pada Gambar 2 di halaman berikut seperti yang ditunjukkan di atas.



**Response 5 : 54 Dr. Charles Fisher** *Oct 21, 2010 18:57*

[Mark New](#) | [Select](#) ☐

**Cathy (R 5.30)** See my answers to Susan, Cynthia, and Robin above. One other interesting more recent discovery is that the deeper living species (the ones we find below 1000m), grow more slowly and we think can live even longer than the ones we have studied more extensively between 500 and 1000 meters.



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**Response 5 : 55 Dr. Charles Fisher** *Oct 21, 2010 18:58*

[Mark New](#) | [Select](#) ☐

**Chris (5.33)** Actually quite a bit. It has appeared in our publications on the presence of roots and root function, but we have used it mainly for studies of community structure, function, and succession. We also adapted the bushmaster to stain some entire tubeworm aggregations for studies of growth differences within a group. And, some day I'll tell you about the Chimney Master (a melt-proof version we used for hydrothermal chimney communities...).



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**Response 5 : 56 Dr. Charles Fisher** *Oct 21, 2010 18:58*

[Mark New](#) | [Select](#) ☐

**Marian (5.34)** First off thanks!

Although I've some "inside" knowledge, I am not ready to even guess. I know we've got some very sensitive communities down there, but I'm not at all sure about how cohesive any underwater plumes were, how toxic they were when they reached sensitive communities, how long the communities were exposed... etc. I'm also not sure we will ever really know, because we will never be able to look everywhere. It is possible we may miss some key areas where we did not know enough to look. The deep sea is a big place and, as you know, mostly unexplored.



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**Response 5 : 57 Dr. Charles Fisher** *Oct 21, 2010 18:58*

[Mark New](#) | [Select](#) ☐

**Kathleen (5:35).** Kathleen, I'm terrible with names, but weren't you a REVELer a few years back? If so, good to hear from you again! And yes, the seep tubeworms grow much more slowly than hydrothermal vent tubeworms.

I have not studied deep coral growth much (and not much has been published on it), I did summarize some of what we

