



# **Integrating Research & Education in the Ocean Sciences**

## **The NSF Perspective**

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# NSF's perspective

- Foundation-wide, NSF views the integration of research and education as an important outcome of its support for science.
- NSF's merit review criteria now include an assessment of 'broader impacts' (merit review criterion 2) in addition to 'intellectual merit' (criterion 1).
- PIs are now required to address criterion 2 in the body of the proposal and the abstract. Proposals that fail to do this are returned without review.

# Criterion 2: What are the broader impacts of the proposed activity?



- **Community questions**
  - **What counts as “broader impact”?**
    - A variety of approaches: outreach & education, infrastructure development, enhancing diversity, +
  - **How much does NSF weigh C-2?**
    - Necessary but not sufficient; research must be fundable but C-2 can help proposals on the bubble
  - **How can I get help?**

# Action at the Division & Program Level



- In 2000, the Ocean Sciences Division issued a 'white paper' identifying the need for stronger links between ocean research and education and effective national coordination of ocean education efforts.
- 2000 workshop to assess the need for a national Center for Ocean Sciences Education Excellence; 2001 Priorities document; Current volume 17 (2) published by NMEA
- COSEE program announced in 2001 and first cohort of awards made in August – November 2002
- COSEE: a long-term commitment to helping with Crit.-2



# COSEE Goals

- **To develop catalytic partnerships** between ocean scientists & educators
- **To foster communication & coordination** among ocean education programs nationwide
- **To promote ocean education** as an exciting vehicle **to enhance science education** in the 21st century
- **To foster a deeper public understanding of the ocean** and its impact on quality of life and national prosperity



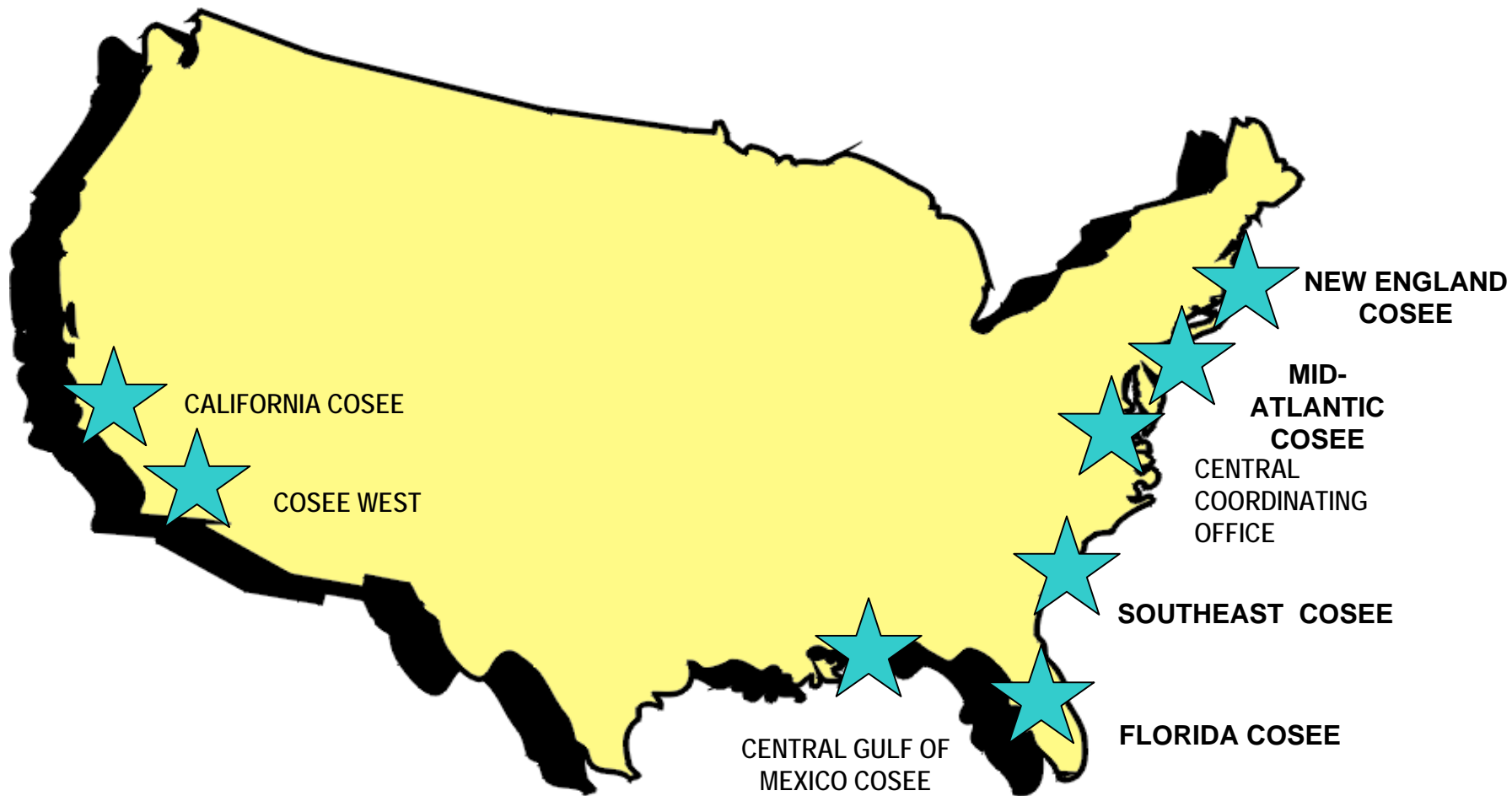
# The COSEE model

- **A distributed network of coordinated regional Centers** providing
  - Grassroots approaches tailored to regional needs &
  - A national perspective on ocean science education
- **A service-oriented Central Coordinating Office**
- **A fundamental cross-cutting theme is helping ocean scientists integrate research and education**
- **Second focus is development and dissemination of 'best practices' and resources.**



# THE CENTERS FOR OCEAN SCIENCES EDUCATION EXCELLENCE (COSEE)

Initial Awards made in Fall, 2002



CALIFORNIA COSEE

COSEE WEST

CENTRAL GULF OF MEXICO COSEE

FLORIDA COSEE

CENTRAL COORDINATING OFFICE

MID-ATLANTIC COSEE

NEW ENGLAND COSEE

SOUTHEAST COSEE



# COSEE & Criterion 2


- **All Centers actively working to increase scientist involvement in education via high quality criterion 2 activities**
  - 'One-on-one extension' model
  - 'Two-way exchange workshops' model
  - Web-portal approach
  - Direct or indirect assistance in proposal writing

# COSEE: a diverse network for catalyzing collaborations & developing 'best practices'



- Technology-rich web portal to provide resources and connect scientists and educators (FL COSEE)
- Master teacher networks (COSEE West; Mid Atlantic)
- Teacher-scientist professional development workshops (New England; Mid-Atlantic; Central Gulf of Mexico)
- Students (HS and UG) via Career website and communicating science course (CA COSEE)
- Students in elementary & middle schools in diverse urban areas (NE, COSEE West, CA COSEE)
- Informal Educators (Southeast; Central Gulf of Mexico)
- Emphasis on links to state educational leadership & colleges of education (FL COSEE)

# Some baseline patterns in the Ocean Sciences



Value to science and society	70%
Post-docs and grad students	69%
Undergraduate research	49%
Infrastructure enhancement	37%
Formal link to K-12 activities	22%
International collaborations	18%
Recruiting minorities	17%
Courses (grad or undergrad)	15%
Increasing repr. of women	11%
Informal education	6%
Other outreach (talks, web)	23%

# What do PIs need to engage in these activities?



- **New England COSEE survey of WHOI PI's**
  - What resources would you need to pursue education/outreach activities?
    - More time (81%)
    - More funding (51%)
    - Consultant to help design activities (23%)
- **Mid-Atlantic COSEE survey of PI's attending the ORION workshop**
  - Time and money

# Other NSF/GEO Programs with a focus on education



- **Opportunities to Enhance Diversity in the Geosciences (OEDG)**
- **Geoscience Education**
- **Digital Library for Earth Science Education (DLESE)**
- **CAREER: Early Faculty Development**
- **REU Sites & Supplements; RET supplements**

# Programs in NSF's Education Directorate



- **Division of Undergraduate Education**
  - CCLI – Course, Curriculum & Laboratory Improvement
  - ATE – Advanced Technology Education
- **Division of Elementary, Secondary and Informal Education**
  - Teacher professional continuum
  - Communicating science to public audiences

# Some 'Best practices' in programs



- Two way communication and common sense of purpose/mission
- Focus on strengths of partners
- 'Real-world' examples of concepts
- Inquiry-based activities
- Vibrant, passionate people as role models



# NSF & Other Agencies

- **Other Federal COSEE partners: ONR, NOAA (Sea Grant; Office of Ocean Exploration; National Ocean Service), US Navy**
- **Different roles/approaches to ocean education**
  - **NSF - Outsourcing approach via rigorous peer review process, Identification of the highest quality proposals based on community evaluation (mail reviews; panel deliberations). Community run projects with little NSF program involvement**
  - **NOAA and other agencies a more 'operational' approach with staff more directly involved in design & implementation**