



# NOAA Education

A Presentation to the  
NOAA Science Advisory Board

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Director of Education

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# Outline



- Purpose
- Issue
- Presentation of Briefing
- NOAA Coordination and Views
- Desired Outcome



# Purpose



- Provide an overview of NOAA's education program
- Get input . . .
  - Where should we be going?
  - What is the best way to get there?



# Issue



- NOAA has limited resources to invest in education, how should we invest them for maximum impact?



# Corporate Guidance



“I want a coherent, authorized education program in NOAA”

VADM Lautenbacher





# Corporate Guidance



## NOAA's Vision

An informed society that uses a comprehensive understanding of the role of the oceans, coasts, and atmosphere in the global ecosystem to make the best social and economic decisions.

What is an informed society?



# Education Goal Themes



## **Ecosystems (Outcome)**

A well informed public that acts as a steward of coastal and marine ecosystems



## **Climate (Outcome)**

Climate-sensitive sectors and the climate-literate public effectively incorporating NOAA's climate products into their plans and decisions



## **Weather & Water (Performance Objective)**

Enhance environmental literacy and improve understanding, value, and use of weather and water information and services



## **Commerce & Transportation (Strategy)**

Build public understanding of the science & technology involved and the role of the environment in commerce and transportation through outreach, education, and industry collaboration





# Overview of NOAA's Education Program



How does NOAA define education?

“A process of engaging audiences to build knowledge on topics relevant to the world's atmosphere, climate, oceans, and coastal ecosystems in order to achieve greater environmental literacy, personal safety, and an improved economy.”<sup>1</sup>

<sup>1</sup> NOAA Education Plan *available at* [http://www.oesd.noaa.gov/NOAA\\_Ed\\_Plan.pdf](http://www.oesd.noaa.gov/NOAA_Ed_Plan.pdf)

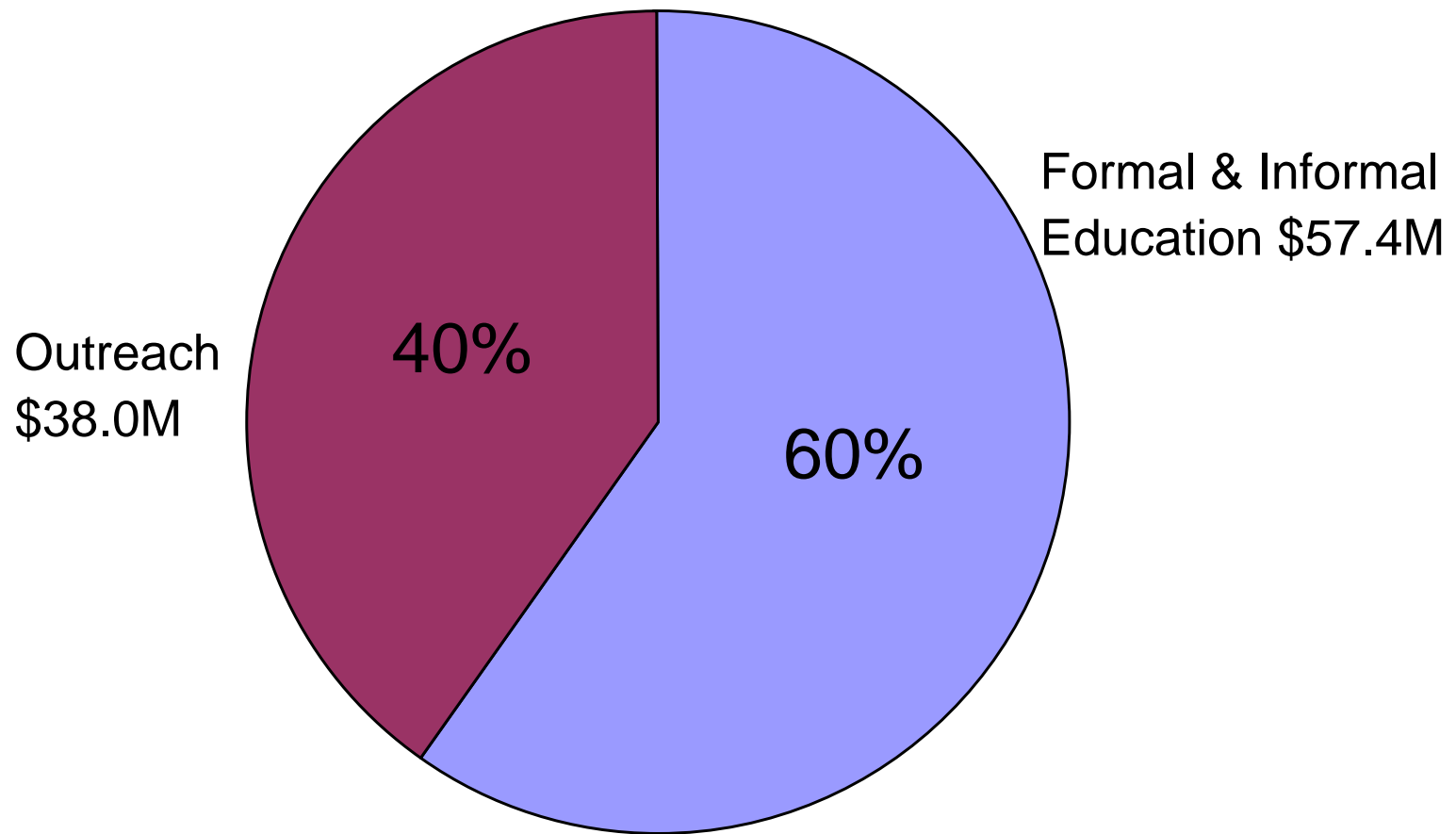




# Major Education Components



FY06 Budget by Type: \$95.4M Total

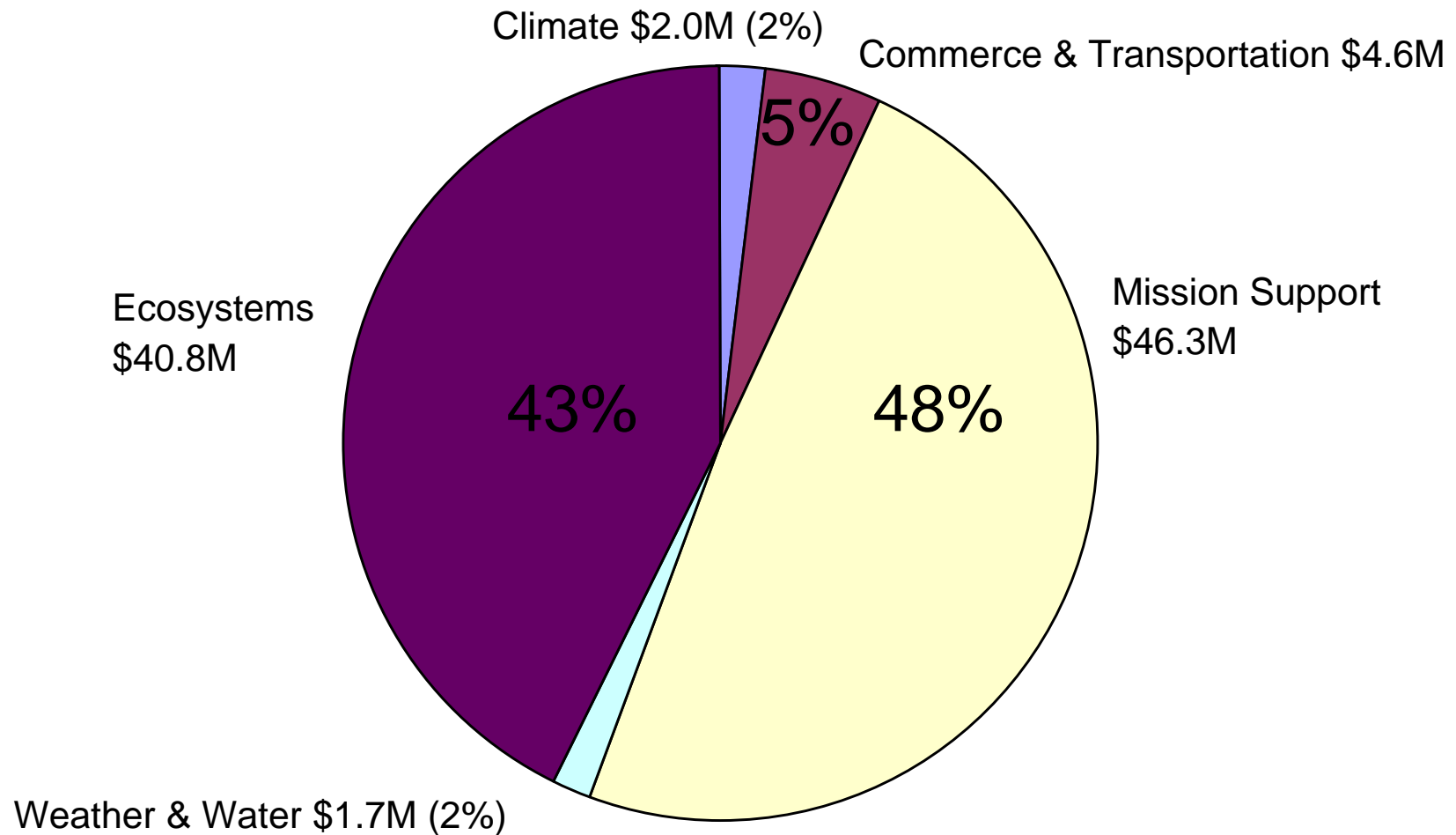




# Major Education Components



FY06 Appropriations by Goal: \$95.4M Total

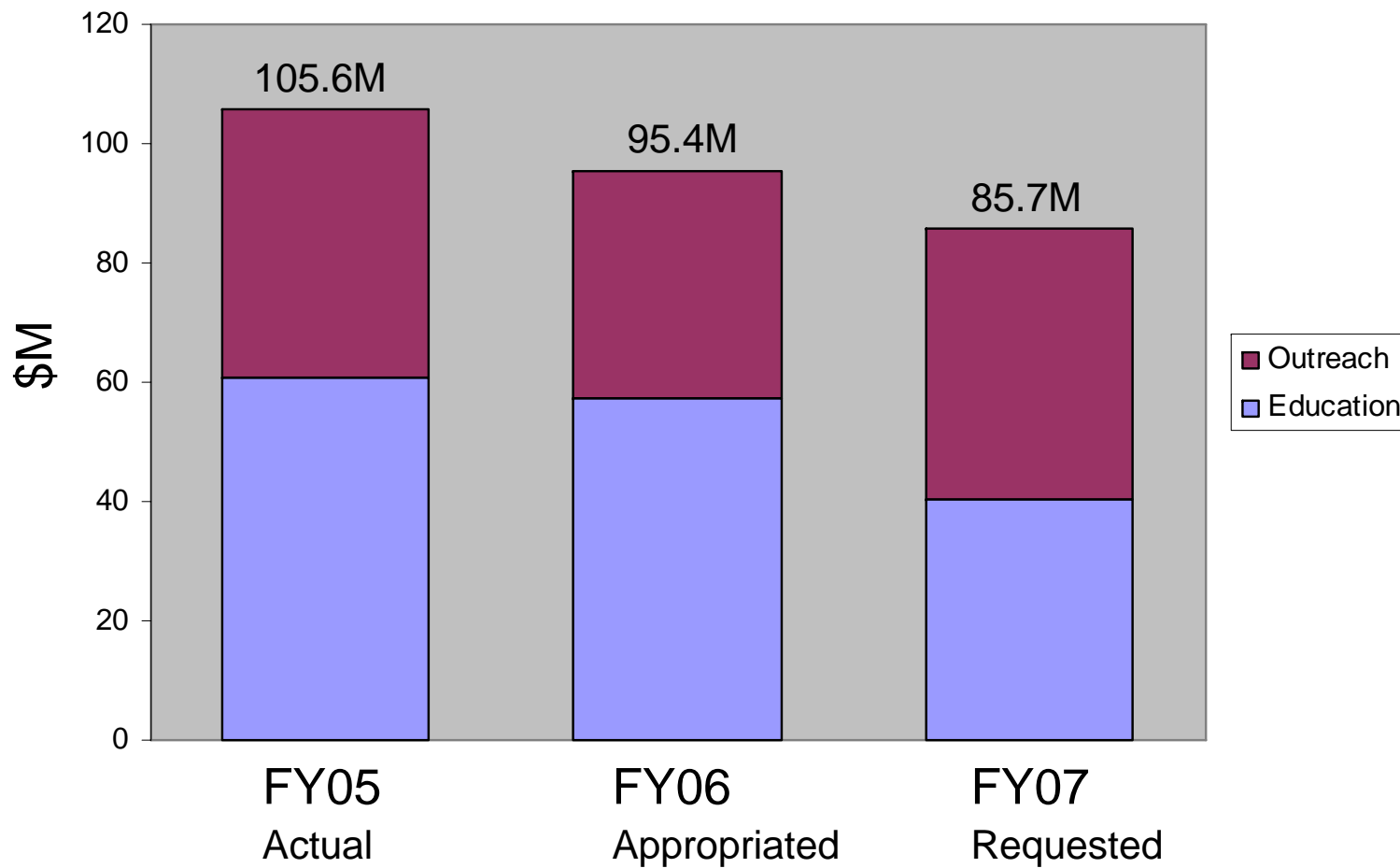




# Major Education Components

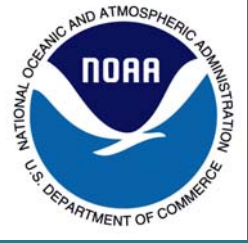


## NOAA Education Totals FY05-07





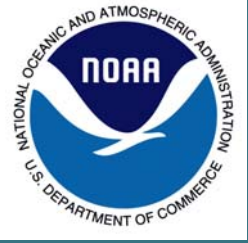
# NOAA's Major Education Programs



- Office of Education (OEd) (\$37.5M)
  - Serves as the primary point of contact for NOAA on education issues
  - Coordinates with NOAA programs for which education is an important element, through the Education Council and other education mechanisms as appropriate
  - Administers programs within NOAA whose primary purpose is education



# NOAA's Major Education Programs (cont.)



- Educational Partnership Program (OEd) (\$14.2M)
  - Provides financial assistance to minority serving institutions to support collaborative research & education.
  - 4 Cooperative Science Centers established at MSIs:
    - Howard University
    - Florida A&M University
    - University of Maryland, Eastern Shore
    - City College of the City University of New York
  - Undergraduate & graduate scholarships fund students from MSIs focused on NOAA related sciences



# NOAA's Major Education Programs (cont.)

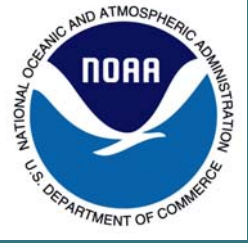


- Environmental Literacy Grants (OEd) (\$4M)
  - Congressional add on allowed awards in 2005 including:
    - Technical Education Research Center – creating a model high-school Earth System Science lab course.
    - National Science Teachers Association – 2 NOAA related Science Objects and SciGuides at the middle-school level.
    - 4 Science on a Spheres
  - FY06 230 letters of intent received





# NOAA's Major Education Programs (cont.)



- Hollings Scholarships (OEd) (\$4M)
  - Funds 100+ students in ocean and atmospheric sciences, math/computer science, social science and education.
  - \$25,000+ undergraduate scholarship package includes:
    - \$8,000 per year for Junior and Senior years.
    - Summer internship after the junior year, including stipend, travel and housing allowance.
    - Professional society membership dues and travel funds for conferences.



# NOAA's Major Education Programs (cont.)



- Bay Watershed Education & Training Programs (OEd – add on) (\$6.9M)
  - 3 B-WETS: Chesapeake Bay, California, & Hawaii
  - Integrates classroom curricular requirements with meaningful first-hand experiences.
  - Emphasizes sustained, hands-on, environmental experiences aligned with academic learning standards
  - Reached over 82,000 students & 10,000 teachers





# NOAA's Major Education Programs (cont.)



- National Marine Sanctuaries (NOS) (\$6.1M)
  - 13 National Marine Sanctuaries & 1 Reserve
  - Promotes public understanding of our national marine sanctuaries and the marine environment
  - Empowers citizens to make informed decisions regarding responsible stewardship of marine natural and cultural resources.
  - Each Sanctuary has an education team that coordinates, conducts, and facilitates marine education and public outreach efforts
  - National coordinator oversees education effort.



# NOAA's Major Education Programs (cont.)



- National Estuarine Research Reserves (NOS) (\$2M)
  - Nationwide network of 26 estuarine areas
    - Full time education & training staff in each reserve
  - Promotes stewardship of estuaries using protected areas
  - Implements a variety of education programs that include 10 years of system wide observing data
  - Education activities include
    - Field-based opportunities & live interactive virtual field experiences
    - Graduate scholarships
    - Teacher development
    - Coastal Training Program for Decision-makers



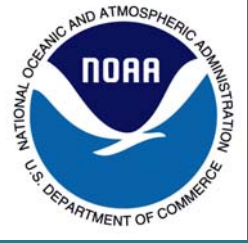
# NOAA's Major Education Programs (cont.)



- Dr. Nancy Foster Scholarship Program (NOS) (\$0.4M)
  - Recognizes outstanding scholarship in oceanography, marine biology, or maritime archeology, particularly by women and members of minority groups
  - Encourages independent graduate level research
  - FY05: 5 scholarships awarded
  - Proposed for transfer to OEd in 2007



# NOAA's Major Education Programs (cont.)



- National Sea Grant Program (OAR) (\$21.1M)
  - Nationwide network of 31 university-based programs that work with coastal communities
  - Involves ~500 outreach professionals who provide science-based information to educators/decision-makers
  - Designs hands-on formal and informal education programs in marine and aquatic science
  - Develops teacher professional training programs
  - Supports ~650 undergraduate & graduate students/yr
  - Fosters increased education of traditionally underrepresented and underserved groups



# NOAA's Major Education Programs (cont.)



- Ocean Exploration (OAR) (\$1.4M)
  - Uses excitement of ocean discovery to enhance America's environmental literacy
  - Developed 165 hands-on and standards-based lesson plans
  - Created "*Learning Ocean Science through Ocean Exploration*" – a curriculum for Grades 6-12 developed from NOAA ocean explorations and the Ocean Explorer website
  - Professional development opportunities introduce teachers to premiere ocean scientists/explorers and their research/explorations



# NOAA's Education Programs



- Teacher at Sea (NMAO) (\$0.2M)
  - Elementary school teachers and college instructors go to sea aboard NOAA research and survey ships to work under the tutelage of scientists and crew.
  - Over the past 14 years, the program has enabled more than 400 teachers to gain first-hand experience of science at sea.
  - Teachers then enrich their classroom curricula with a new depth of understanding of the ocean

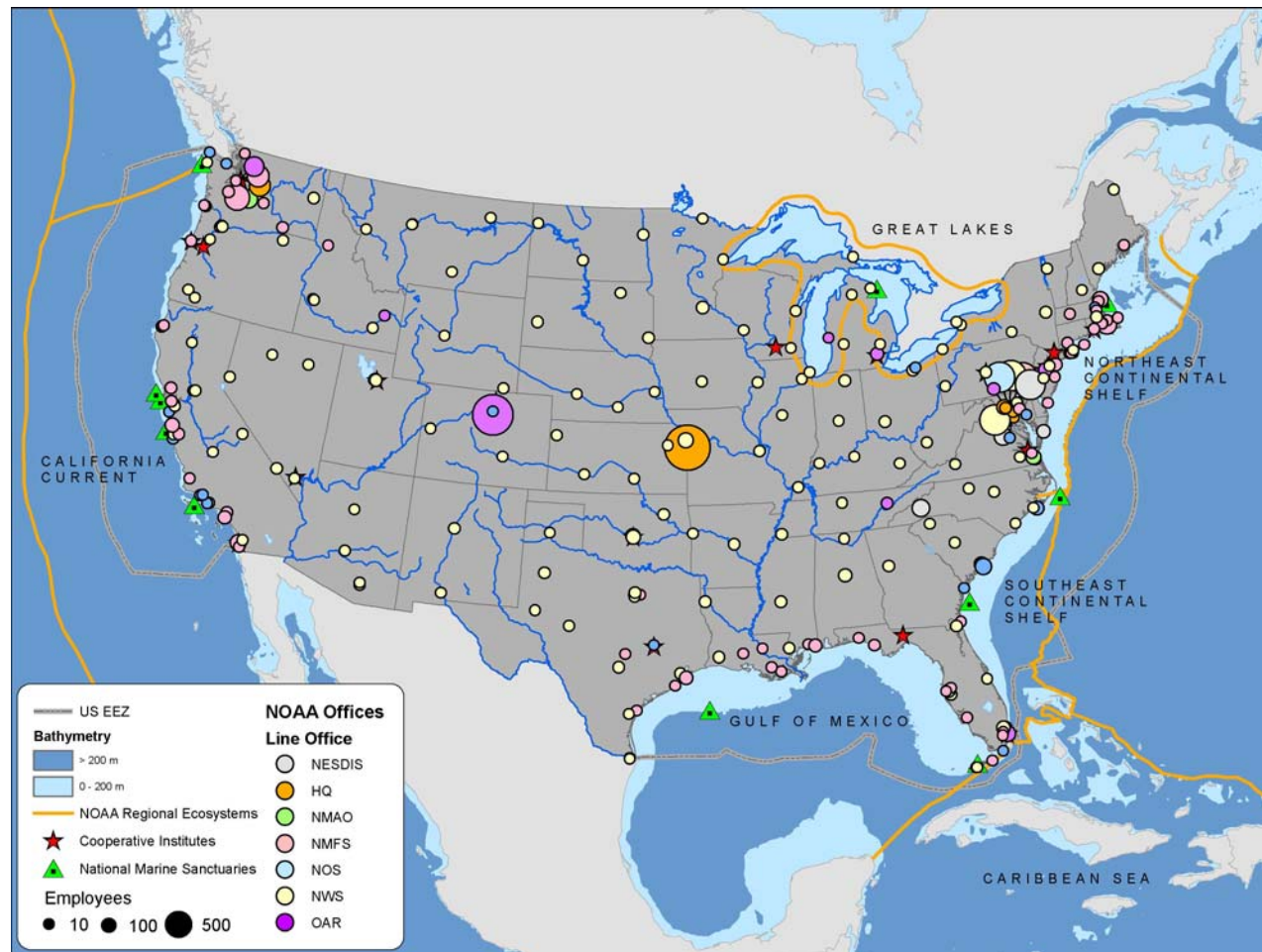




# NOAA's Major Education Programs (cont.)



NOAA resources to support education are extensive and diverse





# NOAA Education Council

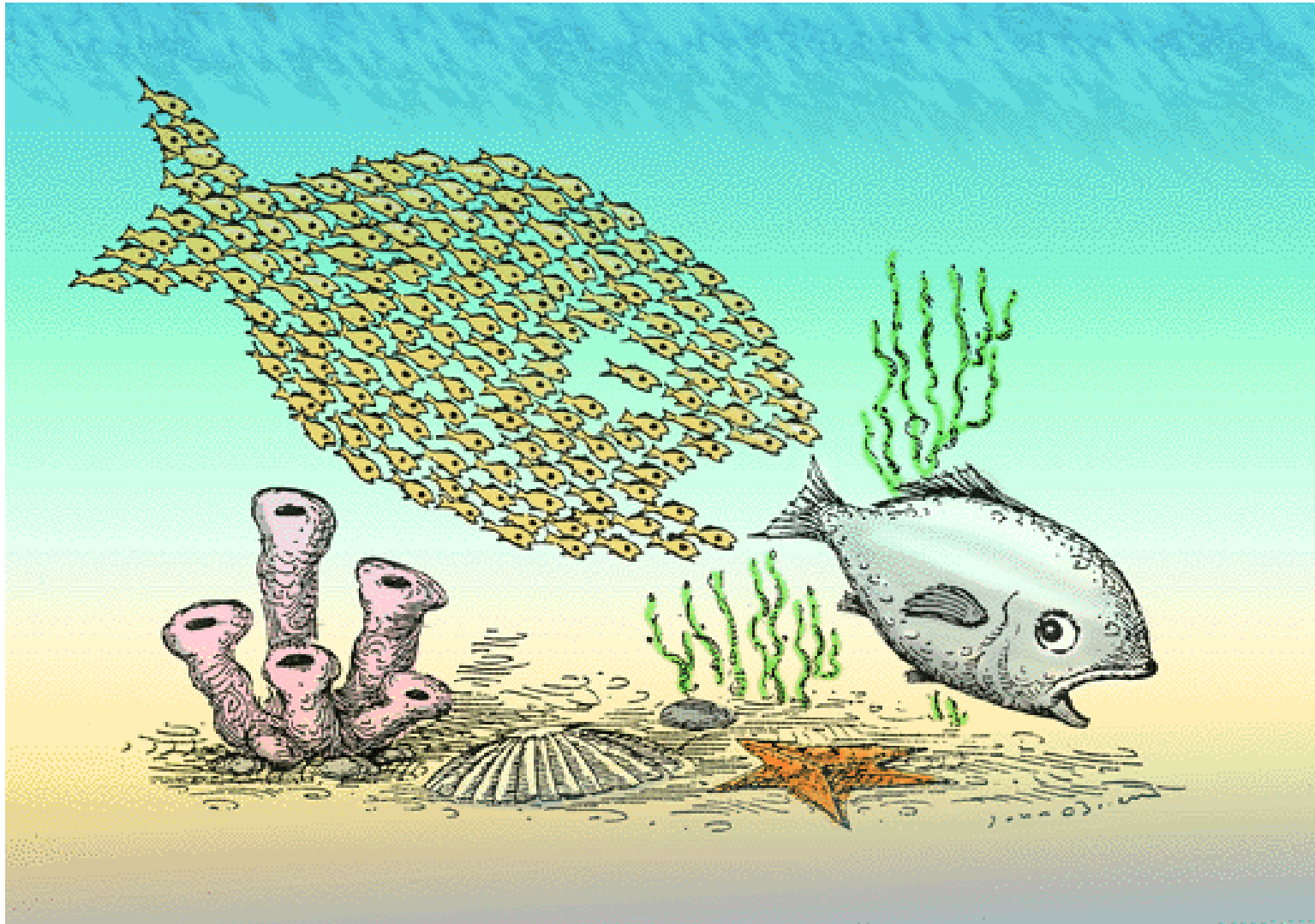


- Includes a representative from each NOAA line office, as well as each major education component
- Serves as the primary internal forum for discussion about NOAA's education efforts
- Sets NOAA's education agenda and policies
- Makes recommendations to NOAA leadership
- Chaired by NOAA's Director of Education





# One NOAA Education Program

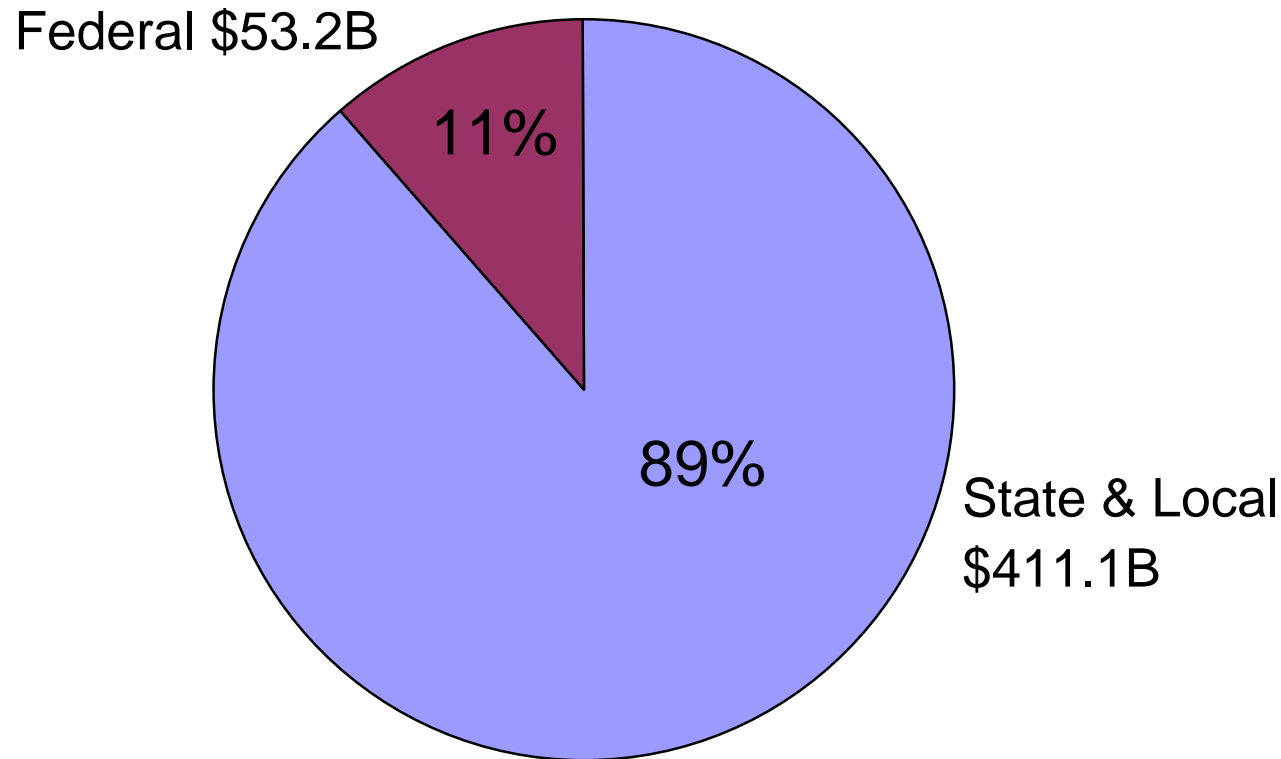




# Important Activity Outside of NOAA



Federal, state, & local spending on K-12 education = \$464B  
NOAA spends \$101m on education & outreach



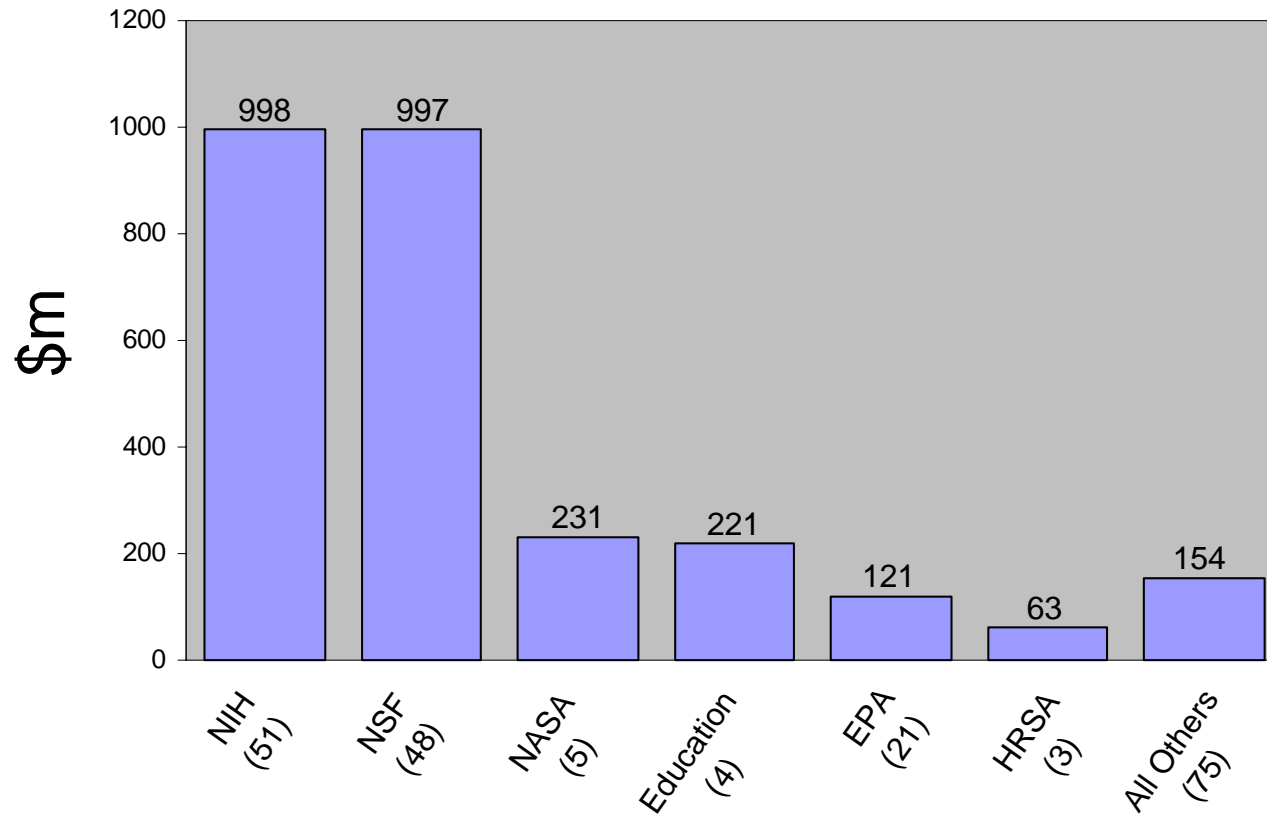
Source: U.S. Census Bureau, 2006 (2002 Spending)



# Important Activity Outside of NOAA (cont.)



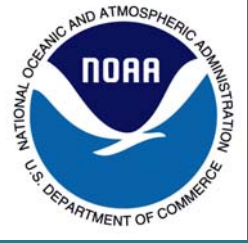
In 2004, Federal agencies spent \$2.8B on STEM education – NOAA spent \$24M



Source: GAO, 2005



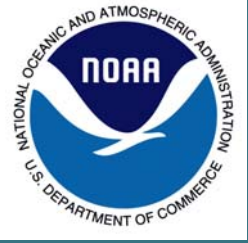
# Important Activity Outside of NOAA (cont.)



- California Education & the Environment Initiative
  - Develops environmental education principles and concepts for elementary and secondary schools
  - Ensures that principles and concepts are aligned to the California academic content standards
  - Incorporates environmental education principles in criteria developed for textbook adoption in science, math, social science, history, & English/language arts
  - Key partners: State of California, EPA



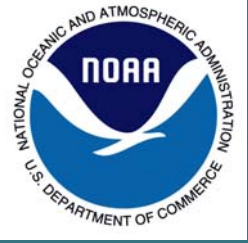
# Important Activity Outside of NOAA (cont.)



- Chesapeake Bay
  - Maryland, Virginia, Washington D.C., Pennsylvania, EPA and the Chesapeake Bay Commission are signatories to the *Chesapeake 2000* agreement
  - Goal: promote better stewardship of the Chesapeake Bay
  - One of the objectives: provide a meaningful bay or stream outdoor experience for every school student in the watershed before graduation from high school.
  - Key partners: States of Maryland, Virginia, Pennsylvania, District of Columbia, EPA



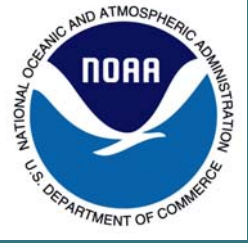
# Important Activity Outside of NOAA (cont.)



- Texas Science, Technology, Engineering, & Math (STEM) Initiative
  - \$80 million initiative to improve math and science achievement in Texas
  - Key goals:
    - Establish 35 STEM Academies to produce 3,500 high school graduates each year
    - Create 5-6 STEM Centers to develop innovative materials that integrate math and science with practical problem-solving elements
  - Key partners: State of Texas, U.S. Dept. of Education



# Environmental Education



- Environmental Education
  - Increases public awareness and knowledge of environmental issues and challenges.
  - Helps people gain an understanding of how their individual actions affect the environment
  - Inspires people to take personal responsibility for the environment's preservation and restoration
  - Key partners: EPA, interested States



# Environmental Education (cont.)



- Earth Sciences
  - Gives students the opportunity to relate to the everyday world
  - Includes fundamentals of geology, oceanography, meteorology, & astronomy
  - Key partners: AAAS, Natl. Academy of Sciences, Dept. of Interior, NASA, NSF, EPA





# Environmental Education (cont.)



- No Child Left Behind
  - Requires the development of science standards by the 2005-06 school year
  - Aimed at strengthening K-12 math & science education
  - Key partners: Dept. of Education, States, other interested agencies
  
- Others?



# Work in Progress





# Work in Progress (cont.)



## 1. Statutory authority

– Programs in NOAA with statutory authority for education:

- Sea Grant
- NERRS Program
- Marine Protected Areas
- B-WET
- Weather Research
- National Oceans Service
- Hollings Scholarship Program
- Nancy Foster Scholarship Program
- Educational Partnership Program

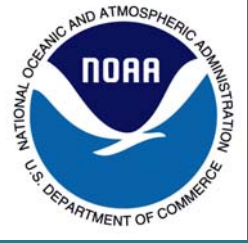
– One year general NOAA authorizing language:

That the Administrator of the National Oceanic and Atmospheric Administration may engage in formal and informal education activities, including primary and secondary education, related to the agency's mission goals.<sup>1</sup>

<sup>1</sup> SCIENCE, STATE, JUSTICE, COMMERCE, AND RELATED AGENCIES APPROPRIATIONS ACT, 2006, Public Law 109-108, 109th Congress, Page 119 STAT. 2312.



# Work in Progress (cont.)



2. Creating a one-NOAA internship program
  - Integrated presentation on web & overview materials
  - Common application where possible
  - Common internship opportunity database
  - Common alumni database
  - Ensure programmatic integrity of individual opportunities

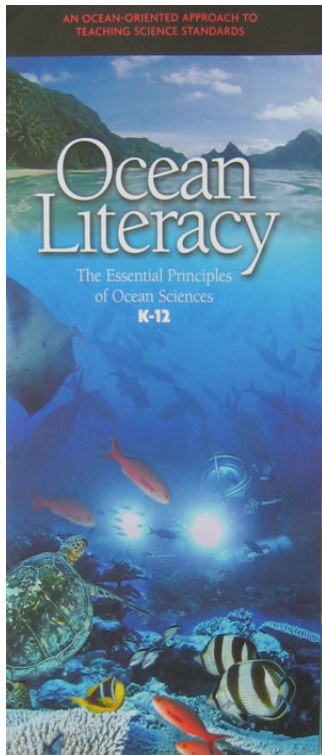


# Work in Progress (cont.)



## 3. Bring together the ocean community

- Ocean Literacy Essential Principles



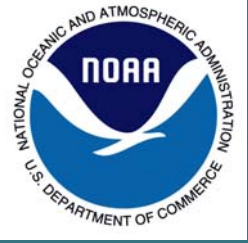
- 7 principles of ocean literacy

- The Earth has one big ocean with many features
- The ocean and life in the ocean shape the features of the Earth
- The ocean is a major influence on weather & climate
- The ocean makes the Earth habitable
- The ocean supports a great diversity of life and ecosystems
- The ocean and humans are inextricably interconnected
- The ocean is largely unexplored

- Key partners: National Geographic Society, Centers for Ocean Sciences Education Excellence, National Marine Educators Association



# Work in Progress (cont.)



- Conference on Ocean Literacy
  - 2 day conference (June 7-8, 2006)
  - Goals include:
    - Highlight exemplary materials/resources/practices in ocean literacy at the national, state and local level
    - Focus on formal education, informal education, underrepresented groups, & regional activity
  - Key partners: Council on Ocean Policy, National Marine Sanctuaries Foundation, Sea Grant, Coastal Environmental Learning Centers, Centers for Ocean Sciences Education Excellence



# Work in Progress (cont.)



- Partnership with Smithsonian on Ocean Hall
  - Ocean Hall is designed to educate the public on the ocean's marine life and its physical characteristics
    - 65% design review complete
    - 95% design review complete summer 2006
    - Oceans Hall opens September 2008
    - Key components: Science on a Sphere; custom animations that use NOAA data; 'Ocean in the News' kiosk
  - Ocean Web Portal
    - Will provide virtual access to the museum's marine collections
  - Key partners: Smithsonian



# Work in Progress (cont.)



- Interagency Working Group on Ocean Education
  - Focus:
    - Improve coordination of Federal programs focused on ocean education and outreach efforts
    - Assess the federal, state, and local relationship to ensure that informal education regarding coasts and oceans is communicated clearly and effectively.
  - Key partners: EPA, NASA, NSF, MARAD, MMS, ONR, USGS, FWS, Dept. of Education



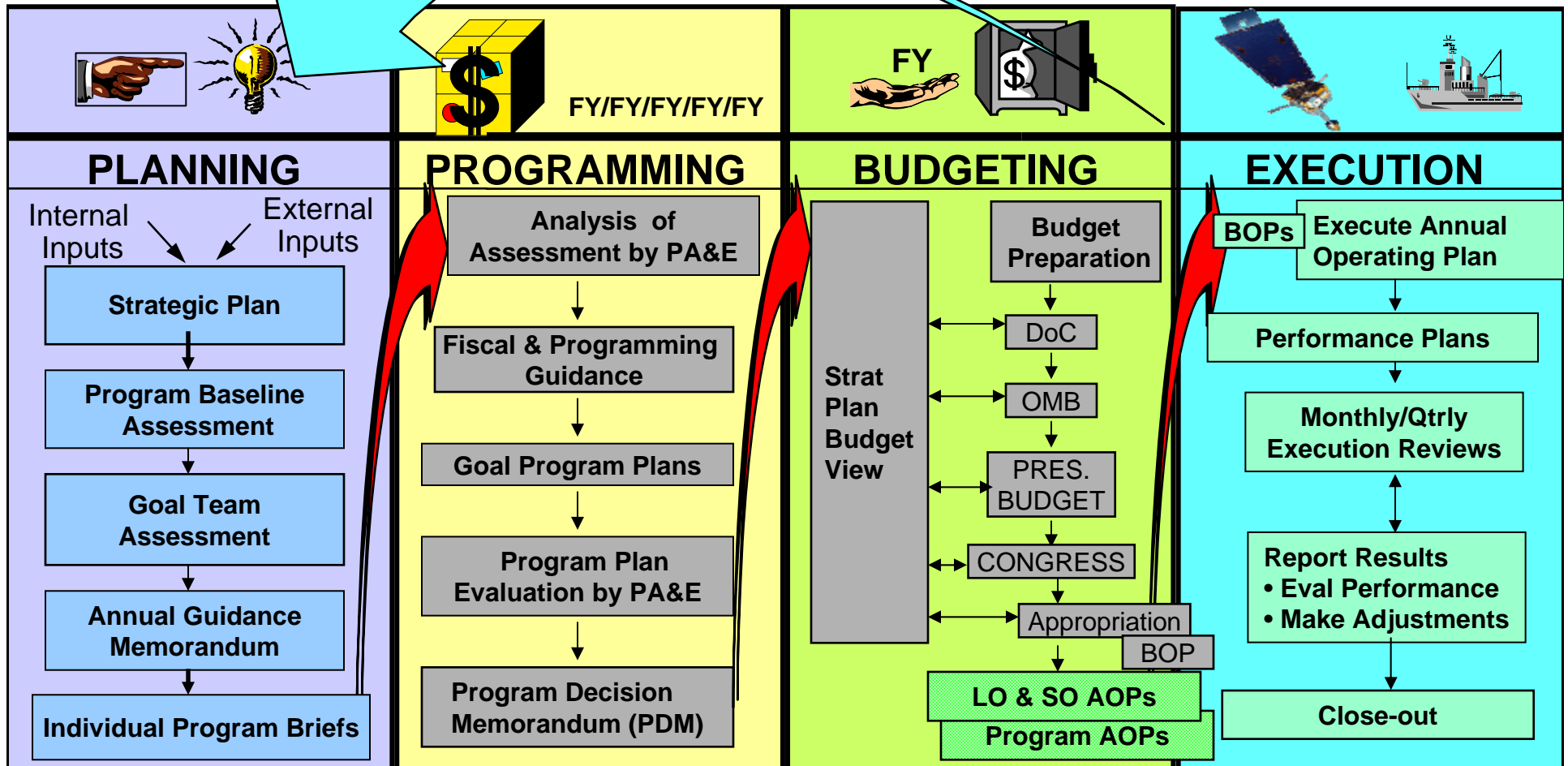


# Work in Progress (cont.)



## 4. Developing a programmatic strategy

### PPBES Process





# Work in Progress (cont.)



- Who is our highest priority audience?
- What level of environmental competency do they need?

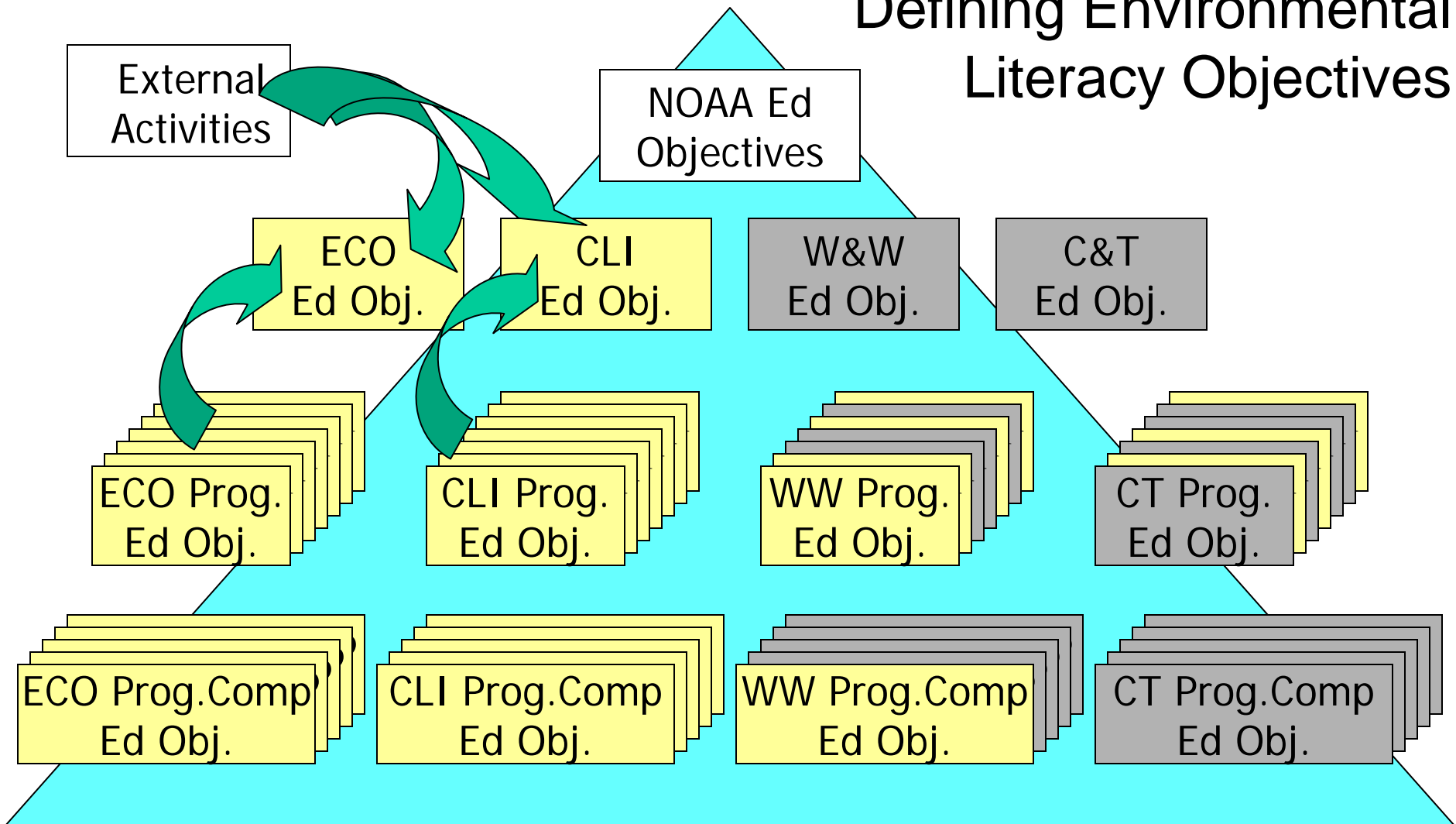
Levels of Competency \ Audience	K-12 General Public	Teachers	Community & Econ Leaders	Policy/ Decision Makers	Resource Managers	Scientists & Tech Experts
1. Environmental Awareness						
2. Environmental Knowledge						
3. Environmental Literacy						



# Work in Progress (cont.)



## Defining Environmental Literacy Objectives

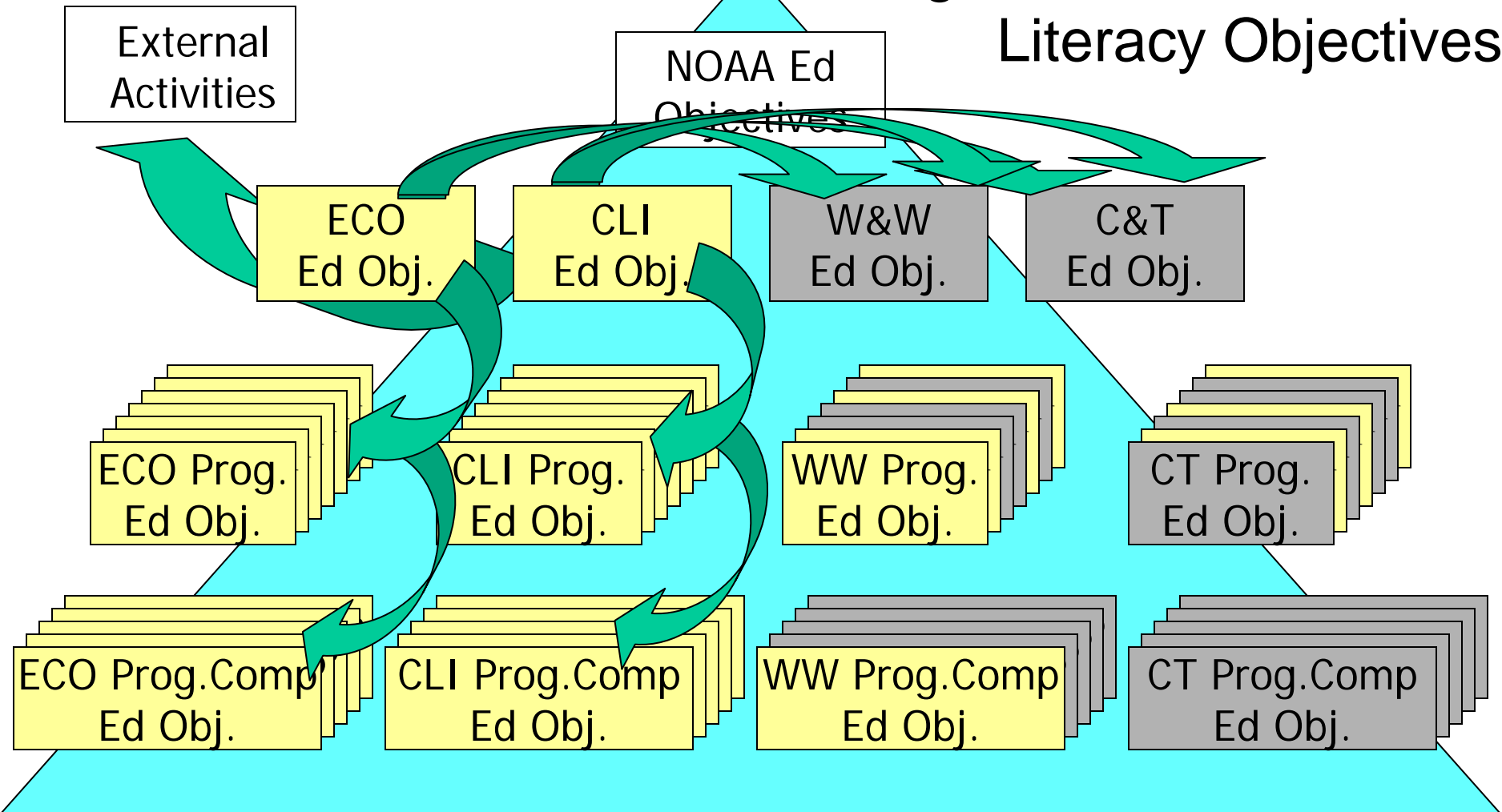




# Work in Progress (cont.)

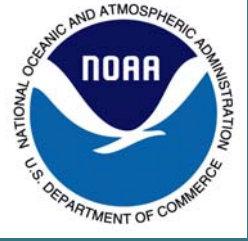


## Vetting Draft Environmental Literacy Objectives





# NOAA Coordination & Views



- Coordination with:
  - Education Council



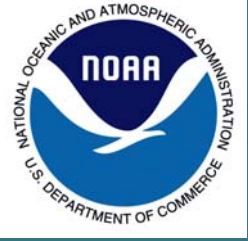
# Desired Outcome



- Assistance in achieving an effective, coherent, authorized Education Program for NOAA
- Is NOAA Education on the right track?



# Background Slides





# Ed Council Representation

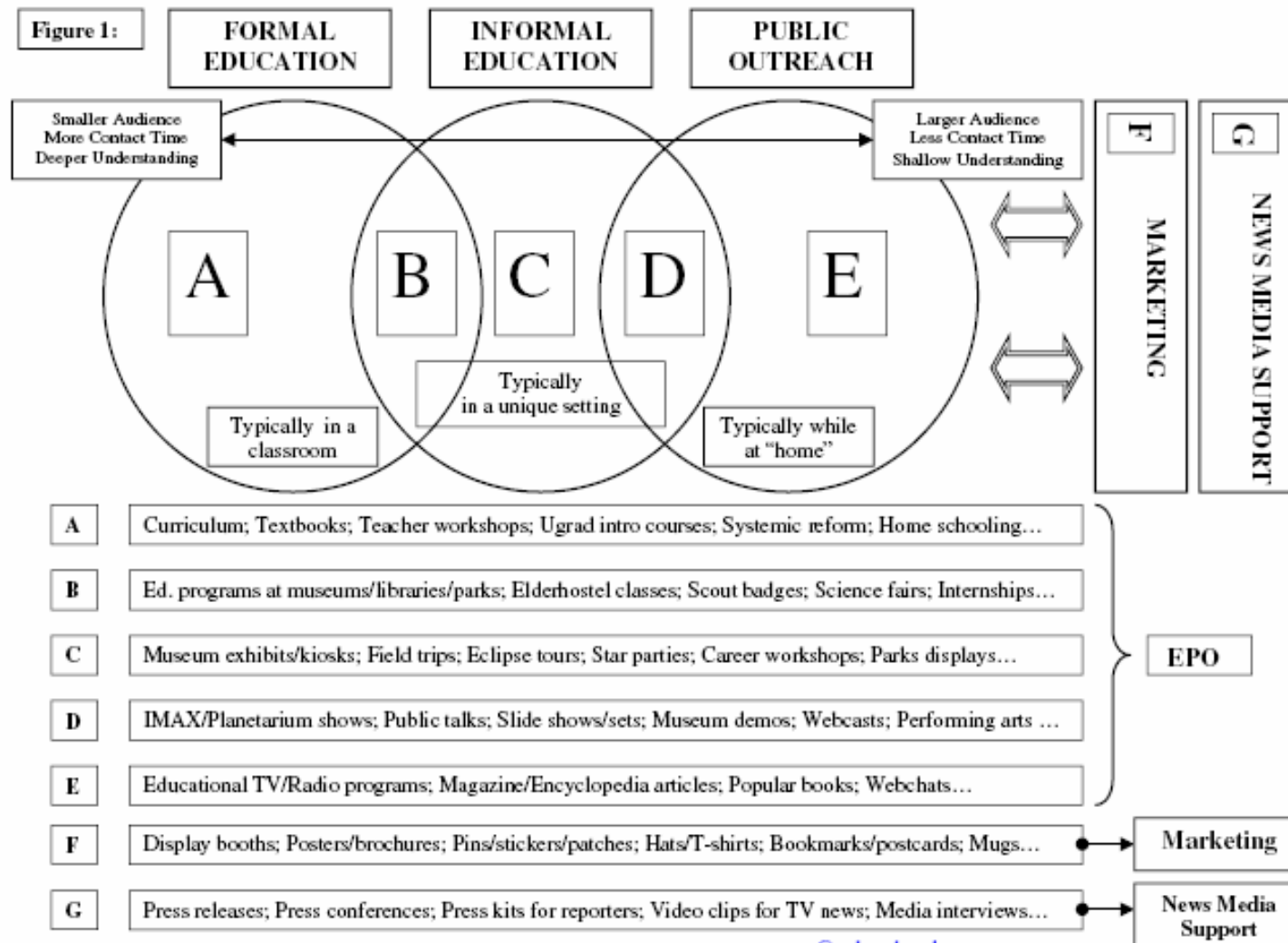


- National Ocean Service
  - At large
  - National Marine Sanctuaries
  - National Estuarine Research Reserves
- National Marine Fisheries Service (at large)
- National Environmental Satellite, Data, and Information Service (at large)
- National Weather Service (at large)
- Oceanic & Atmospheric Research
  - At large
  - National Sea Grant Programs
  - Ocean Exploration
- Office of Education
  - Chair
  - Executive Director
  - Educational Partnership Program
- NOAA Marine and Aviation Operations (Teacher at Sea)
- Public Affairs
- NOAA Library (ex officio)
- Program Analysis & Evaluation (ex officio)
- Programs Planning & Integration (ex officio)





# Education/Outreach Continuum



A Framework for EPO Program Planning Created by C A Morrow Send comments to [camorrow@colorado.edu](mailto:camorrow@colorado.edu) May 2000



# Education Definitions



**Formal Education** directly involves or affects student and teacher learning in the formal education system. Formal education is typically classroom-based, but it can also be homebased via the web, TV, or the post. Teacher workshops are often offered in unique environments such as museums. At its best, formal education addresses multiple intelligences and education standards. It provides a long-term opportunity to acquire basic literacy and deepen understanding of fundamental concepts that are useful in contributing to and interpreting the world.



# Education Definitions



**Informal Education** may be thought of as glue between the realms of Formal Education and Public Outreach, providing strong linkages to both. Products and activities in the informal education realm tend to combine the educational substance of formal education with the excitement and relevance of successful public outreach. Unlike Public Outreach (as defined above), Informal Education typically requires a person to travel to unique settings that are outside both the classroom and the home (e.g. nature centers, museums, aquariums, zoos, national or state parks, club meetings, career fairs, eclipse locales). These are often ideal environments for family-based learning. Informal learning opportunities are active and voluntary and are intended to provide motivation for further formal learning and life-long interest.



# Education Definitions



**Public Outreach** efforts (like educational radio, TV, or periodicals) are outside the classroom and reach a wider public in their homes or cars where they may conveniently tune in. In this framework, Public Outreach means the provider has reached out to where people normally are; a person need not move from their everyday path in order to access it. Compared to formal education, individual public outreach events are generally shorter-term opportunities for providing larger audiences with relatively new information that excites interest and arouses curiosity. Such events are often entertaining, although they tend to retain a more substantive educational value compared to “Marketing” or “News Media” events. In general, there is a trade-off between numbers of people reached and the impact on science understanding.



# NOAA Education Budget



<i>(NOTE: All amounts in \$K)</i>	Education	Outreach	FY05 Total	Education	Outreach	FY06 Total	Education	Outreach	FY07 Total
<b>ECOSYSTEMS GOAL</b>	<b>17,450</b>	<b>35,157</b>	<b>52,608</b>	<b>12,651</b>	<b>28,172</b>	<b>40,823</b>	<b>13,921</b>	<b>35,475</b>	<b>49,363</b>
Aquaculture (EC-AQC) (1)		455	455		455	455		455	455
Coastal and Marine Resources (EC-CMR)									
Office of National Marine Sanctuary (2)	4,890	7,700	12,590	2,224	3,874	6,098	3,422	5,389	8,812
B-WET California (FY06 in OEd)	1,020		1,020						
National Estuarine Research Reserve System (3)	1,732	222	1,955	1,733	223	1,956	1,801	231	2,032
National Marine Protected Areas Center									
Coastal Services Center (3)	1,000	3,865	4,865	870	3,363	4,233	640	2,473	3,113
Corals (EC-COR)	50	488	538	5	660	665	5	693	665
Ecosystem Research (EC-ERP)									
National Sea Grant College Program (4)	6,225	17,770	23,995	5,478	15,638	21,116	5,586	21,533	27,119
National Centers for Coastal Ocean Science		100	100		112	112		100	100
Ecosystems Observations (EC-EOP)									
Ocean Exploration (5)	485	1,782	2,267	292	1,074	1,366	324	1,189	1,513
National Undersea Research Program									
Enforcement (EC-ENF) (1)	534	802	1,336	534	802	1,336	534	802	1,336
Fisheries Management (EC-FMP) (1)		620	620		620	620		620	620
Habitat (EC-HAB) (1)	1,114	753	1,867	1,114	753	1,867	1,114	753	1,867
Protected Species (EC-PSP)	400	600	1,000	400	600	1,000	494	1,236	1,730



# NOAA Education Budget



<i>(NOTE: All amounts in \$K)</i>	Education	Outreach	FY05 Total	Education	Outreach	FY06 Total	Education	Outreach	FY07 Total
<b>MISSION SUPPORT/LEADERSHIP SUB GOAL</b>	<b>39,217</b>	<b>4,775</b>	<b>43,992</b>	<b>40,835</b>	<b>4,797</b>	<b>45,632</b>	<b>22,632</b>	<b>4,797</b>	<b>27,429</b>
Line Office Headquarters (MS-LHQ) (1)	3,320	743	4,063	3,320	743	4,063	3,320	743	4,063
NOAA Headquarters (MS-MGT)									
Public Affairs		4,032	4,032		4,054	4,054		4,054	4,054
Office of Education									
NOAA Education Initiative	6,407		6,407	6,284		6,284			0
National Ocean Sciences Bowl	986		986						
B-WET Chesapeake Bay (FY04 in Habitat)	2,464		2,464	3,452		3,452			0
B-WET California (FY04, FY05 in ONMS)				1,972		1,972			0
B-WET Hawaii (FY04 in CSC)	1,478		1,478	1,480		1,480			0
JASON Education and Outreach (FY04 in ONMS)	2,464		2,464	2,466		2,466	1,000		1,000
Narragansett Bay Marine Education (FY04 in Habitat)	493		493	493		493			0
Ernest F. Hollings Scholarship Program (New in FY05)	3,919		3,919	3,963		3,963	3,700		3,700
American Museum of Natural History	986		986						
HI Humpback Whale Education Prgm (New in FY06)				1,726		1,726			0
Gulf Coast Explorium (New in FY06)				986		986			0
Chesapeake Bay Interpretive Buoys (New in FY06)				493		493			0
Nancy Foster Scholarship Program							400		400
Educational Partnership Program	16,700		16,700	14,200		14,200	14,212		14,212
<b>MISSION SUPPORT/FLEET SERVICES SUB GOAL</b>	<b>179</b>	<b>0</b>	<b>179</b>	<b>179</b>	<b>0</b>	<b>179</b>	<b>179</b>	<b>0</b>	<b>179</b>
Marine Operations & Maintenance (MS-SHP) (1)	179		179	179		179	179		179
<b>MISSION SUPPORT/SATELLITE SUB GOAL</b>	<b>522</b>	<b>0</b>	<b>522</b>	<b>522</b>	<b>0</b>	<b>522</b>	<b>522</b>	<b>0</b>	<b>522</b>
Polar Satellite Acquisition (MS-STP) (1)	522		522	522		522	522		522



# NOAA Education Budget



<i>(NOTE: All amounts in \$K)</i>	Education	Outreach	FY05 Total	Education	Outreach	FY06 Total	Education	Outreach	FY07 Total
<b>CLIMATE GOAL PROGRAMS</b>	<b>1,155</b>	<b>820</b>	<b>1,975</b>	<b>1,155</b>	<b>820</b>	<b>1,975</b>	<b>1,155</b>	<b>820</b>	<b>1,975</b>
Climate Observation & Analysis (CL-COA) (1)	1,155		1,155	1,155		1,155	1,155		1,155
Regional Decision Support (CL-RDS) (1)		820	820		820	820		820	820
<b>WEATHER &amp; WATER GOAL</b>	<b>1,290</b>	<b>375</b>	<b>1,665</b>	<b>1,290</b>	<b>375</b>	<b>1,665</b>	<b>1,290</b>	<b>375</b>	<b>1,665</b>
Science, Technology, and Infusion (WW-WWS) (1)	450	375	825	450	375	825	450	375	825
Local Forecasts and Warnings (WW-LFW) (1)	840		840	840		840	840		840
<b>COMMERCE &amp; TRANSPORTATION GOAL</b>	<b>750</b>	<b>3,850</b>	<b>4,600</b>	<b>750</b>	<b>3,850</b>	<b>4,600</b>	<b>750</b>	<b>3,850</b>	<b>4,600</b>
Geodesy (CT-GEO) (1)	750	2,850	3,600	750	2,850	3,600	750	2,850	3,600
Marine Transportation Systems (CT-MTS) (1)		1,000	1,000		1,000	1,000		1,000	1,000
<b>NOAA ENVIRONMENTAL LITERACY TOTALS</b>	<b>60,563</b>	<b>44,977</b>	<b>105,551</b>	<b>57,382</b>	<b>38,014</b>	<b>95,406</b>	<b>40,449</b>	<b>45,317</b>	<b>85,743</b>

**FOOTNOTES:**

- (1) FY2005-FY2007 figures are based on spending estimates reported for FY2005 during the PPBES FY2008 planning process.
- (2) FY2005 and FY2007 figures for ONMS are estimates based on proportional percentages totaling ~20-25% of total appropriations.
- (3) FY2005-FY2007 figures for NERRS and CSC are estimates based on proportional percentages of total appropriations.
- (4) FY2006 and FY2007 figures for Sea Grant are estimates based on proportional percentages of total appropriations.
- (5) FY2005-FY2007 figures for OE are estimates based on proportional percentages totaling 10% of total appropriations.