

# *Leadership Lessons In Science, Technology, Engineering and Mathematics Partnerships*

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# *Presentation Overview*

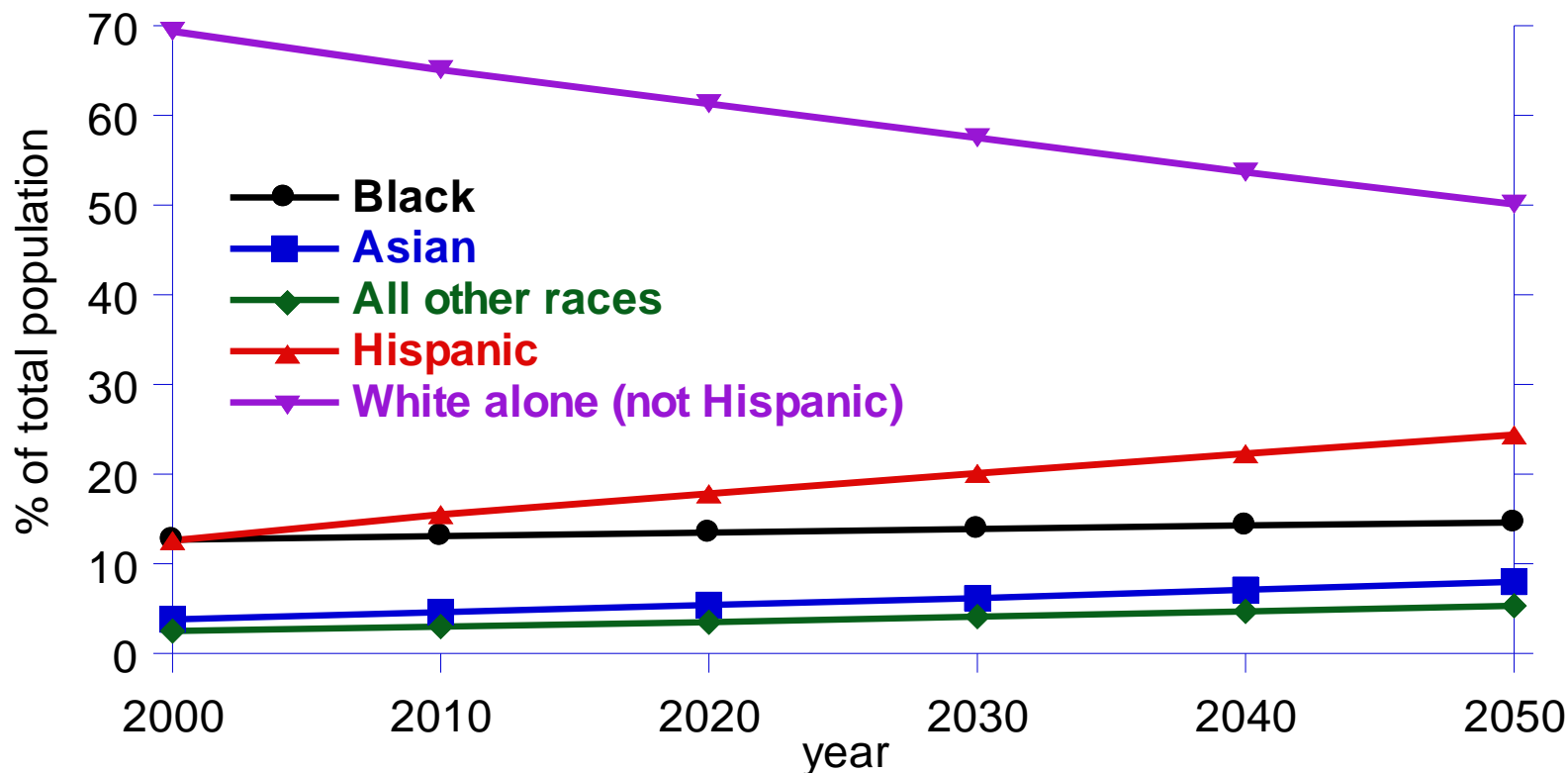
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- The National Context
- Elizabeth City State University and the University of New Hampshire's Institutional Contexts
- Why Did We Partner?
- What Did We Do and How Did We Do It?
- Lessons Learned
- Suggestions for Faculty
- Suggestions for Federal Agencies



# Changing Demographics

## U.S. Demographic Trends 2000 - 2050



# *An Imperfect Storm*

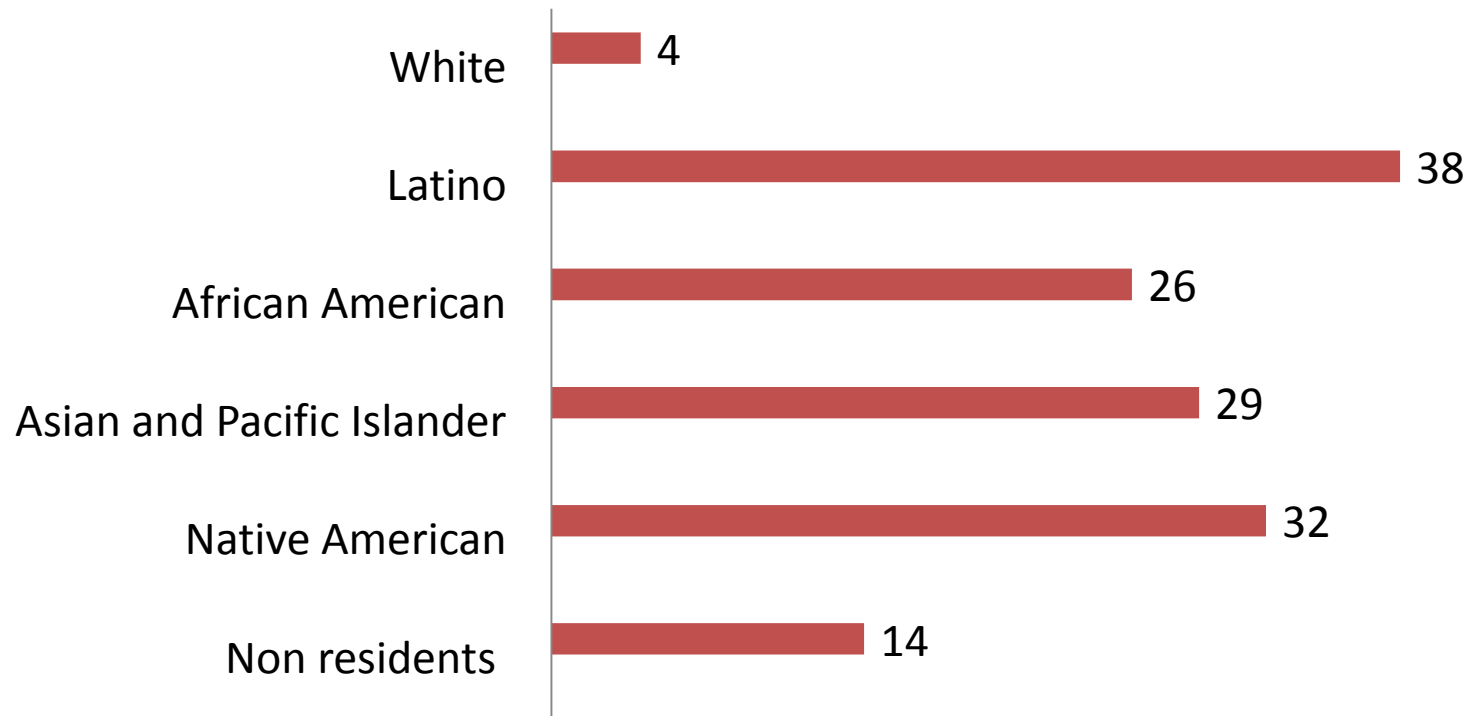
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- Science and Engineering Equal Opportunity Act of 1980
- NSF Broadening Participation and Programs (AGEP, LSAMP; STEP; ADVANCE; GK12)
- AGU Diversity Plan (2002) and Other Plans
- America's Perfect Storm (ETS, 2007)
- National Academy of Sciences (2007)  
“Rising Above the Gathering Storm”



# *College Enrollment Projections*

## ■ Percentage of Increase from 2007 - 2018



# *Federal Dollars Declining Minority Serving Institutions*

<b>MSI's</b> (Colleges & Universities)	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>% of Decline</b>
All HBCUs	404,252	438,301	454,605	472,034	479,205	444,193	406,116	-8.6%
All HHEs	--	--	--	--	--	603,308	593,733	-1.6%
All Tribal Colleges & Universities	30,389	28,325	36,034	23,969	36,125	28,744	24,959	-13.2%



# *Who We Are*

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***Elizabeth City State University***  
***Elizabeth City, North Carolina***

***University of New Hampshire***  
***Durham, New Hampshire***



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A photograph of the Elizabeth City State University entrance. A large brick wall features the university's name in white, three-dimensional letters. In front of the wall is a landscaped garden bed with red mulch, green shrubs, and purple and white flowers. A green lawn is in the foreground. The background shows a line of trees, a parking lot with cars, and a building with a blue roof under a clear sky.

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# *ECSU - Institutional Context*

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- 3260 Students; 160 Faculty
- 78% African American Students
- Primarily Teaching Focused
- Strengths in Remote Sensing;  
Biotechnology; Pharmacy and Aviation



# *ECSU - Institutional Context*

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- Center of Excellence in Remote Sensing Education and Research (CERSER)
- Undergraduate Degree in Marine Science
- Graduate Programs in Biology, Mathematics, Remote Sensing and Mathematics Education
- Rated #2 among public baccalaureate colleges in the South on U.S. News and World Report's "America's Best Colleges" 2009 list.



# *Center of Excellence in Remote Sensing Education & Research*

Develop an innovative and relevant research collaboration focused on coastal, ocean, and polar research.

Center Represents Joint Efforts By:

- **Office of Naval Research**
- **Elizabeth City State University**
- **National Security Agency**
- **NASA**
- **National Science Foundation**



# *ECSU - Institutional Context*

Strong Commitment to both academic year and summer Undergraduate Research Training

The objective is to promote the professional development of minority students through their participation in research.

Each undergraduates is assigned to a specific research team, where he/she works closely with the faculty.



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# *UNH - Institutional Context*

- Land Grant, Sea Grant, Space Grant University
- Carnegie Research High; Community Engaged
- Research Funding: \$100 million/year

Primary Sources: NOAA, NASA, NSF

- Approx. 800 Faculty and 14,500 Students
- 95% White; 1% African American; 2% Latino
- 28 Doctoral & 83 Masters Programs



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# *UNH - Institutional Context*

## ***The Joan and James Leitzel Center for Mathematics, Science and Engineering Education***

- Primary Center Focused on STEM Educational Research
- UNH Faculty Participate From 4 of 6 Colleges
- Regional Partners; K-20
- HBCU Partners
- Home for Partnership with Elizabeth City State University



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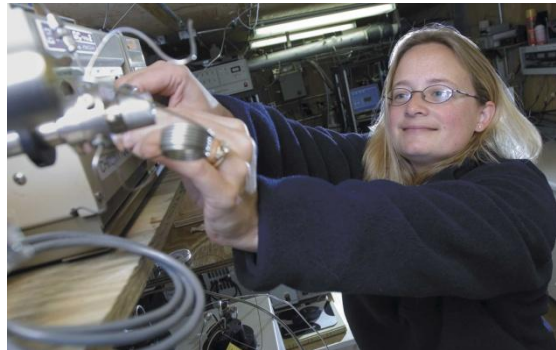
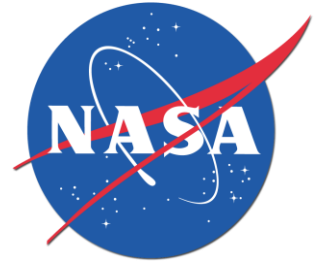


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# *UNH - Institutional Context*

## *Institute for the Study of Earth, Oceans, and Space*

- Largest Research Institute
- \$37 Million
- Faculty From 2 Colleges
- Partnerships with Federal Agencies



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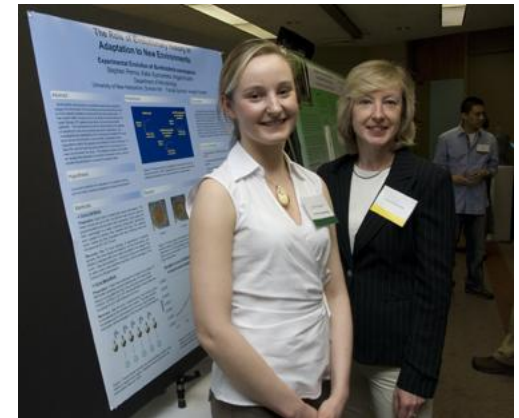


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# *UNH Institutional Context:*

## *Undergraduate Research*

- ***Hamel Center for Undergraduate Research***
  - Endowments to Fund UNH Student Research Nationally and Internationally
- ***UNH Undergraduate Research Conference***
  - In 11<sup>th</sup> Year ; 25 Venues; 10 days; Large External Audience
  - Annually about 1000 Students & 225 Faculty Mentors
  - Partner with Other Universities
  - Expansion in Grant Proposals
  - Papers Presented and Published about the Conference





# *Why Did We Partner?*



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# *Why Did UNH and ECSU Partner?*

- Consistent with the UNH Academic Strategic Plan and Leitzel Center Strategic Plan
- Consistent with ECSU Research and Educational Goals
- Consistent with Federal Agency Imperatives
- Responsive to Urgent National Imperatives
- Consistent with Changing Demographics



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# *UNH – ECSU Partnership Principles*

- Mutual Benefit
- Clearly Articulated Vision
- Shared Responsibility
- Shared Authority
- Shared Financial Resources





# *Partnership: Promising Practices*

- Institutional Commitment and Faculty Engagement
- Establishing Mutual Respect and Shared Time Commitment
- Identifying an Engaged Leader
- Engaging Critical Change Agents
- Initiating Difficult Dialogues
- Preparing for Growth and Evolution



# *Partnership 101:*

## *How To Find and Select Partners*

- Attend Professional Meetings
  - Develop a meeting strategy
- Participate on Review Panels
  - Meet Potential Collaborators
  - Learn While Serving
- Present Papers and Let Others Strengths
- Network with Colleagues you Don't Know
- Don't Hesitate to Venture Out on Your Own



# *Partnership 101:*

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## *How To Find and Select Partners*

- Invite Others to Visit Your Campus
  - Show What You/Your Colleagues Can Contribute
- Pursue Invitations to Other Campuses
  - Learn What Others are Doing in Your Area of Interest
- Learn before You Sign (i.e. Letters of Support)
  - MSI's often get calls
  - Positive and Open; Smart and Strategic
- Do Something!



# *Model of Collaboration: ECSU & UNH*

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## The Model:

Articulates how two demographically diverse institutions in two geographically different coastal regions with specific disciplinary strengths (e.g. earth system science and remote sensing) effectively collaborate to submit research and education grants designed to expand scientific knowledge, enhance educational opportunities and help create a more diverse workforce.

This model's success depends upon partnerships with federal agencies, and private foundations.



# *Building a Model of Collaboration*

## *Activities and Timeline*

- ***Fall 2002***

Two Research Collaborators Meetings with Five Historically Black Universities at UNH

- ***Winter 2003***

Joint NASA MUSPIN Cyber Conference;  
Ongoing meetings with NASA personnel

- ***Winter 2004***

First Visit by UNH Faculty to ECSU



# *Building a Model of Collaboration*

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## *Activities and Timeline*

- ***Winter 2004***  
Submission of NSF STEP1 Proposal;  
Ongoing conversations between UNH and ECSU
- ***Summer 2004***  
Submission of NSF AGEP & NSF CUAHSI; Ongoing conversations
- ***Fall 2004***  
Submission of three proposals: NSF OEDG, NASA Remote Sensing Explorers & NOAA Environmental Literacy Proposals
- ***Fall 2004***  
Reciprocal visits by ECSU & UNH Faculty to work on NSF STEP2 proposal





# *Building a Model of Collaboration*

## *Activities and Timeline*

- **Fall 2004**  
Developed and Finalized MOU Between ECSU & UNH
- **Winter 2005**  
Telephone & Video conferences; E-mail, E-mail, E-mail  
Submission of NSF STEP2 and DHS proposal
- **Summer 2005**  
MOU Signing Ceremony at NASA-GSFC  
Announcement of : NASA  
Remote Sensing Explorer  
Funding



# *Building a Model of Collaboration*

## *Activities and Timeline*

- **Fall 2005**  
Announcement of NSF-STEP Funding
- **Fall 2007**  
Announcement of NSF GEO-Teach Funding
- **Fall 2009** Submission of New NSF PIRE Proposal
- **Fall 2009** Implementation, Evaluation and Planning



# *ECSU - UNH MOU Signing Ceremony*

## *NASA Goddard May 20, 2005*



[http://mums.gsfc.nasa.gov/real/MOU\\_Ceremony.mov](http://mums.gsfc.nasa.gov/real/MOU_Ceremony.mov)



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# *Collaborative Proposals (2004-09)*

- DHS Emergency Preparedness \$25,000,000
- NOAA Environmental Literacy \$500,000
- NSF STEM Talent Expansion Program \$1,000,000 ✓
- NSF Alliance for Grad Ed and the Prof. \$650,000 ✓
- NASA Remote Sensing Explorers \$583,000 ✓
- NSF Nat'l Center Hydrological Synthesis \$183,000
- NSF Geo-Diversity \$85,000
- NSF Geo-Teach \$3,000,000
- NSF PIRE (Submitted Sept 18) \$5,000,000 ✓



# *NSF STEP: Watershed Watch Program*



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# *UNH-ECSU Student Research*

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- Using Digital Images and Spectral Reflectances to Quantify Colored Dissolved Organic Matter (CDOM) Concentrations in Water
- Effect of Oxygen Levels on Survival of Midge Larvae and FishKassim Traore
- Hurricanes and their Effects on Forest Growth in Cypress Swamps
- Human Impacts on Water Quality of the Pasquotank River Watershed





# *Suggestions for Faculty*

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## *“Money Will Follow GREAT IDEAS”*

- Identify Your Strengths and Weaknesses  
(include department, school, university)
  - Scholarships/Fellowships for Students
- Develop a Short Term and Long Term Plan for Outcomes
  - Include curriculum, undergraduate and graduate student outcomes
  - Curriculum modifications should be based on the research strategy
  - Don't Expect to Address all Areas of Need Through One Solicitation



# *Suggestions for Faculty*

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## *“Money Will Follow GREAT IDEAS”*

- Conduct Cutting Edge Research in Areas of Strength for You and Your Partner
- Scale Up Your Ideas With Regional, National and/or International Partners
- Plan to Resubmit Your Proposal
- Serve as a Reviewer
- Set Up an Informal Review Process With Colleagues



# *Suggestions for Faculty*

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*You Have A Successful Partnership... Adding Dimensions*

- Joint Papers and Presentations
- Formal Evaluation of the Partnership
- Learn and Take Suggestions from Program Officers
- Bring Administrators and Other Faculty Members to the Table
- Listen and Learn About the Strengths of Your Partners Before Submitting Proposals or Putting Money on the Table



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# *Suggestions for Faculty*

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*Have A Great Idea... Now What?*

Target an Agency with Programs/Interests in the areas you identified (Repeat as needed)

- How will your plan contribute to the program and mission of the agency?
- Which offices in that agency are most relevant to your plan?
- What are the opportunities for faculty and students within that agency office?
- Which current and or past agency awardees are engaged in research and are implementing relevant programs?



# *Suggestions for Faculty*

*I Have A Great Idea... Now What?*

- Investigate and Learn About What Agencies Fund
- View Websites of Past Awardees; Talk with PI's
- Schedule a Distinguished Lecture/Seminar



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# *Suggestions for Faculty*

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## Join Minority Professional Organizations

- Attend Conferences and Network with New Colleagues
- Pursue Funding to Support Students to Accompany You
- Present Papers and Encourage Student Presentations
- Volunteer





# ***Successful Partnerships: Minority Professional Organizations***

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- National Association of Black Geologists and Geophysicists (NABGG)
- Advancing Hispanic/Chicano and Native Americans in Science (SACNAS)
- The Association of Computer and Information Science/Engineering Departments at Minority Institutions (ADMI)



# ***Successful Partnerships: Minority Professional Organizations***

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- Society of Black Physicists (NSBP)
- National Association of Mathematicians (NAM)
- National Society of Black Engineers (NSBE)
- National Organization for the Professional Advancement of Black Chemists and Chemical Engineers (NOBCCChE )



# *Suggestions for Federal Agencies*

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- Identify Potential Reviewers at This Conference
- Visit MSI's to Determine areas of Strength and Areas for Specific Investments
- Analyze Areas of Need for MSI's
- Cultivate A Cross-Agency Strategy of Co-Investment and Shared Funding in MSI's
- Develop Innovative Strategies to Encourage and Fund Real Partnership that Involve MSI



# *Federal Dollars Declining Minority Serving Institutions*

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# *Suggestions for Federal Agencies*

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- Hold Awardees Accountable for Broader Impact Outcomes
  - Results from Prior Funding: Include Broader Impacts
  - Assure that reviewers hold awardees accountable when proposals are being reviewed
- Make Conferences Available Virtually for those Who Cannot Attend
- Invest in Successful MSI-TWI Partners to Help Them Mentor New Partnerships that Involve MSI's



# Questions & Discussion



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