Goals of presentation

I. **Provide an Overview** of NSF’s current context for graduate education and preparation of the future workforce

II. **Highlight** how NSF EHR/DGE Graduate Research Fellowship Program is addressing graduate preparedness through *professional development opportunities*

III. **Gather Your Input:** what should NSF be thinking about as we develop new initiatives to support graduate education?
NSF Investment Focus

- **Training** in national STEM priority areas
- *Innovative models* for graduate education with potential for scalability
- *Research knowledge base* to inform improvements in graduate education
- **Professional development** of graduate students for both academic and non-academic careers
NSF Graduate Education Investments
$985.68 M (FY 2014 Estimate)
Why fellowships?

For undergraduate seniors and beginning graduate students:
• Prestige of the fellowship opens doors to graduate school
• Greater choice of research advisors
• Freedom to do their own research
• More time to do their research
• Establishes connections with federal funding agencies at an early stage, useful for future sponsored research opportunities
• 5 years as Fellow: 3 years of support; additional opportunities

For undergraduate and graduate institutions:
• Prestige – fellowship recipients enhance national image
• High quality graduate students selected by an independent competitive process
• Inclusive of undergraduates, women, minorities, persons with disabilities and veterans we need to recruit!
What is the GRFP? Goals and Key Elements

• To select, recognize, and financially support individuals early in their careers with the demonstrated potential to be high achieving scientists and engineers

• To broaden participation in science and engineering of underrepresented groups, including women, minorities, persons with disabilities, and veterans

Five Year Award to individual students – $138,000

• Three years of financial support
  – $34,000 Stipend per year
  – $12,000 Educational allowance to institution

• 2010 - 2016: 2,000 Fellowships each year
  – 2016: 16,000 Applications - ~12.5% success rate
GRFP Successes

- 50,000 Fellows
- 42 Nobel Laureates
- 450 Members of the National Academy of Sciences

- Higher Ph.D. completion rates
- Greater % of women and URM than national population of PhD completers

The Multiplex Automated Genome Engineering (MAGE) platform.
Credit: Harris Wang, PhD, Harvard University
GRFP Diversity

NSF Graduate Research Fellow

Tonya N. Williams

- NSF Fellow at North Carolina (Fiber and Polymer Science Program)
- Her interest in chemistry, color and their applications, paired with an awareness of the toxicological profile of various colorants, has motivated her to pursue a career in green chemistry.
- To launch a career in this field, she is involved in research that will help change the "face" of hair coloration. Specifically, she is focusing on designing environmentally benign hair colorants.

Demographics of current Fellows

<table>
<thead>
<tr>
<th>URM</th>
<th>25%</th>
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<tbody>
<tr>
<td>Women</td>
<td>53%</td>
</tr>
</tbody>
</table>

Credit: Amanda Padbury, North Carolina State University College of Textiles

Discovery
Celebrating Black History Month with our research fellows

Key enduring program elements

• Awarded to individuals who apply directly to NSF and who are selected through a national competition

• Fellowship provides recognition (prestige) and financial support for high-ability individuals regardless of their financial status

• Fellows have the freedom and flexibility to choose their graduate institutions and to choose to explore their own ideas and research directions
GRFP Solicitation (NSF 16-588)

- Provides the following information:
  - Deadlines
  - Program description
  - Award information
  - Eligibility requirements
  - Application preparation
  - Submission instructions
  - Application review criteria
GRFP Eligibility

• U.S. citizens and permanent residents
• Early-career: undergrad & grad students
• Pursuing research-based MS or PhD
• Science and engineering
• Enrolled in accredited institution in US by Fall

Academic Levels

• 1: Seniors or baccalaureates with no graduate study yet
• 2: First-year graduate students
• 3: Second-year graduate students  
  \( \leq 12 \text{ months of graduate study by August} \)
• 4: >12 months graduate study, with interruption in graduate study of 2+ years (can have MS degree)
Fields of Study of current Fellows

- Life Sciences: 29%
- Engineering: 25%
- Social Sciences: 10%
- Chemistry: 8%
- Psychology: 7%
- Physics and Astronomy: 6%
- Comp/IS/Eng: 5%
- Geosciences: 5%
- Mathematical Sciences: 5%
- Materials Research: 5%
- STEM Education and Learning Research: 1%
GRFP Fields of Study

- Chemistry
- Computer & Information Science/Engineering
- Engineering
- Geosciences
- Life Sciences
- Materials Research
- Mathematical Sciences
- Physics and Astronomy
- Psychology
- Social Sciences
- STEM Education & Learning Research

<table>
<thead>
<tr>
<th>GRFP Field of Study</th>
<th>Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>1958-1993</td>
</tr>
<tr>
<td>Agronomy</td>
<td>1965-1993</td>
</tr>
<tr>
<td>Animal Husbandry</td>
<td>1964 – (1974-84)</td>
</tr>
<tr>
<td>Horticulture</td>
<td>1964-2010</td>
</tr>
<tr>
<td>Plant Pathology</td>
<td>1991-2010</td>
</tr>
<tr>
<td>Phytopathology</td>
<td>1964-1990</td>
</tr>
<tr>
<td>Soil Science</td>
<td>1964-1990</td>
</tr>
<tr>
<td>Veterinary Science</td>
<td>1964-1993</td>
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</tbody>
</table>
# GRFP Research topics of Fellows

<table>
<thead>
<tr>
<th>Area</th>
<th># of NSF Fellows</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>84 Fellows</td>
</tr>
<tr>
<td>Food</td>
<td>233 Fellows</td>
</tr>
<tr>
<td>Natural Resources</td>
<td>89 Fellows</td>
</tr>
<tr>
<td>Animal Science</td>
<td>234 Fellows</td>
</tr>
<tr>
<td>Freshwater</td>
<td>14 Fellows</td>
</tr>
</tbody>
</table>

**Total:** 654 active Fellows (out of 8,500)
Promoting GRFP on Campus

- Establish “GRFP champions” at university admin level
- Publicize GRFP on campus: focus on domestic students, undergrads and beginning grad students
- Identify faculty willing to mentor applicants
  - Encourage faculty to register to serve as reviewers for GRFP
- Establish peer mentoring system
  - Formal courses, informal advisement
- Hold workshops
  - Find faculty advisors and Fellows willing to participate
- Utilize GRFP’s web resources
GRFP on Campus

- Promote benefits of GRFP to undersubscribed departments
  - Juniors (REU), seniors, beginning grad students
- Partner/engage with Honors College and honors programs, REU Site Coordinators
- Reach out to GRFP Resource People on www.nsfgrfp.org
- Engage local/campus GRFP Coordinating Officials (www.fastlane.nsf.gov/grfp/)
- Support courses on science communication and proposal writing, include peer review

Sign up as a REVIEWER/PANELIST at www.nsfgrfp.org
• Outline
  ▪ Program Definition
  ▪ Relationship to NSF Graduate Research Fellows
  ▪ Program Details
  ▪ Current GRIP Highlight
  ▪ Common Questions/Challenges
Graduate Research Internship Program

Definition

To provide professional development experiences to NSF Graduate Research Fellows through research opportunities with Federal Agencies.
Graduate Research Internship Program (GRIP)

Details

• GRIP provides **GRFP Fellows** with opportunities to develop their professional skills and networks

• Fellows conduct mission-related, collaborative research projects at federal facilities and national laboratories

**NSF 16-015 Dear Colleague Letter:** [www.nsf.gov/grip](http://www.nsf.gov/grip)

**Current Partners**

• Office of Naval Research
• Smithsonian Institution
• Department of Homeland Security
• Federal Bureau of Investigation
• Environmental Protection Agency
• National Oceanic & Atmospheric Administration
• U.S. Census Bureau
• U.S. Geological Survey
• **U.S. Dept. of Agriculture**
How Do I Find an Intern Opportunity?

Common Questions/Challenges

• Consult the Agency webpages (links available on NSF GRIP sites).

• Ask your advisor, other faculty, postdocs, graduate students in your lab/department.

• Read the literature in your field.
  – Authors of articles with intriguing or complementary results, methodologies, etc.
Division of Graduate Education

Graduate Research Internship Program (GRIP)

CONTACTS

<table>
<thead>
<tr>
<th>Name</th>
<th>Email</th>
<th>Phone</th>
<th>Room</th>
</tr>
</thead>
<tbody>
<tr>
<td>Erick Jones</td>
<td><a href="mailto:grip@nsf.gov">grip@nsf.gov</a></td>
<td>703-292-8694</td>
<td></td>
</tr>
<tr>
<td>Gisele Muller-Parker</td>
<td><a href="mailto:grip@nsf.gov">grip@nsf.gov</a></td>
<td>703-292-8694</td>
<td></td>
</tr>
</tbody>
</table>

PROGRAM GUIDELINES

Apply to PD 16-7172 in FastLane. (standard NSF Proposal & Award Policies & Procedures Guide proposal preparation guidelines apply.)

SYNOPSIS

The new internship initiative described in the GRIP Dear Colleague Letter 16-015 expands opportunities for NSF Graduate Fellows to enhance their professional development by engaging in mission-related research experiences with partner agencies across the federal government. GRIP is open only to NSF Graduate Fellows, recipients of the Graduate Research Fellowship Program (GRFP) award.

Research internship opportunities are available through the Partner Agencies listed below in the Related URL section of this webpage. More internship opportunities with additional partner agencies are anticipated in the near future. Please see application details in the Dear Colleague Letter 16-015 and via the individual agency links or emails below.
The new internship initiative described in the GRIP Dear Colleague Letter 16-015 expands opportunities for NSF Graduate Fellows to enhance their professional development by engaging in mission related research experiences with partner agencies across the federal government. **GRIP is open only to NSF Graduate Fellows, recipients of the Graduate Research Fellowship Program (GRFP) award.**

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### RELATED PROGRAMS

- NSF Graduate Research Fellowship Program
- Graduate Research Opportunities Worldwide

### RELATED URLS

- Census - U.S. Census Bureau
- DHS - Department of Homeland Security email
- EPA - Environmental Protection Agency
- FBI - Federal Bureau of Investigation
- NOAA - National Oceanic and Atmospheric Administration
- ONR - Office of Naval Research
- SI - Smithsonian Institution
- USDA - Department of Agriculture
- USGS - U.S. Geological Survey
- AOR Certification form for GRIP
<table>
<thead>
<tr>
<th>Program</th>
<th>Project Title</th>
<th>Point of Contact</th>
<th>Location</th>
<th>Duration</th>
<th>Primary Field of Study</th>
<th>Secondary Field of Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>California Water Science Center</td>
<td><strong>A Critical Assessment of Recent Soil Dating Methods in Coastal Wetlands</strong></td>
<td>Judith Drexler</td>
<td>Sacramento, CA</td>
<td>Up to 12 months</td>
<td>EAR Earth Sciences</td>
<td>Geochemistry (soils), Coastal Wetlands</td>
</tr>
<tr>
<td></td>
<td>Are you interested in coastal wetlands and how they form in the landscape? In this internship you will learn about wetland formation and how carbon accumulates in wetland soils over time. In addition, you will learn how to critically evaluate soil dating methods that are currently being used to report carbon accumulation to the US EPA and the Intergovernmental Panel on Climate Change. <a href="#">Read More</a></td>
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</tr>
<tr>
<td>National Research Program</td>
<td><strong>A National-scale River Corridor Model</strong></td>
<td>Jud Harvey</td>
<td>Reston, VA</td>
<td>Up to 12 months</td>
<td>EAR Earth Sciences</td>
<td>Geomorphology (fluvial), Computer Modelling</td>
</tr>
<tr>
<td></td>
<td>The need for better models and more effective use of data to characterize river corridor transport processes is keenly felt, from evaluating the effectiveness of river and watershed management practices all the way to clarifying regulatory authority under the Clean Water Act. <a href="#">Read More</a></td>
<td></td>
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<tr>
<td>Western Ecological Research Center, Patuxent Wildlife Research Center</td>
<td><strong>A tale of two coasts: tidal marsh persistence with changing climate and sea-level rise</strong></td>
<td>Karen Thorne</td>
<td>San Francisco Bay Estuary Field Station – Vallejo CA, Patuxent Wildlife Research Center – Laurel, MD</td>
<td>12 months</td>
<td>DEB Environmental Biology</td>
<td>Ecology (wetlands), Climate Change</td>
</tr>
<tr>
<td></td>
<td>Tidal wetlands are an important management concern because of their ability to attenuate storm surges, sequester carbon, improve water quality, and provide habitat for tidal marsh-dependent species. The overall goal of this project is to improve our understanding of the combined effects of inundation, due to sea-level rise and storm surges, and other climate factor on tidal marsh physical and biological processes to provide guidance to natural resource managers to reduce these threats and increase resilience. <a href="#">Read More</a></td>
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</tr>
<tr>
<td>Crustal Geophysics and Geochemistry</td>
<td><strong>Airborne geophysical imaging of weak zones on Mt. Iliamna, Alaska toward understanding volcanic</strong></td>
<td>Carol Finn</td>
<td>Denver, CO</td>
<td>9 – 12 months</td>
<td>EAR Earth Sciences</td>
<td>Volcanology, Remote Sensing</td>
</tr>
</tbody>
</table>
GRIP Fellow

- NSF Fellow (Engineering – Energy Engineering)
- GRIP Fellow in USDA-ARS Greenhouse Production Research Group
- Optimized control strategies for greenhouse climate control systems

Quote from application:

“Through this internship, the Fellow will learn about greenhouses, plant physiology, and plant production...... Much of the Fellow’s research experience so far has revolved around heat transfer and energy efficiency. Through this internship the Fellow will build skills by applying them to a new domain. In addition, the Fellow will be exposed to a new research perspective through the mentoring of a plant scientist, as opposed to professors trained as engineers. The Fellow believes this type of thinking will help him succeed in future collaborations with biologists.”
What are the qualities of a “great” application?
• **On time:**
  • Dec 4\textsuperscript{th} & May 6\textsuperscript{th} each year

• **Professional Description and Professional Development Plan**
  • Discuss Agency & Lab
  • Discuss Opportunity
  • Discuss Agency Scientist
  • Describe Research Opportunity
  • *Describe Individual Development Plan*

• **Biographical Sketch (Resume)**
  • Use NSF Guidelines *

• **Letter of Endorsement from Advisor**

• **Start early getting an AOR Form (signed)**

* [https://www.nsf.gov/pubs/policydocs/pappguide/nsf15001/gpg_2.jsp#IIC2f](https://www.nsf.gov/pubs/policydocs/pappguide/nsf15001/gpg_2.jsp#IIC2f)
Dear Colleague Letter: Improving Graduate Student Preparedness for Entering the Workforce, Opportunities for Supplemental Support

April 15, 2016

• Encourage enhanced mentoring & skills beyond academia
• Encourage theory and/or evidence-based strategies to enhance and expand training in essential professional skills
• Enhance interdisciplinary training and collaborations through development of activities that encourage graduate student preparedness for entering the workforce

Special Section on non-GRFP GRIPs for Directorate for Geosciences (GEO) with NOAA and USGS

– Summary of Opportunity
  • The Directorate for Geosciences (GEO) invites advisors of PhD students currently supported on active research grants to apply for supplemental funding to enhance the professional development of their students.
  • Funding is available to support professional development experiences through research internships developed in partnership with the U.S. Geological Survey (USGS) and the National Oceanic and Atmospheric Administration (NOAA) as described in the Graduate Research Internship Program (GRIP)