

# Stakeholder Engagement in NSF Research

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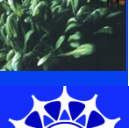
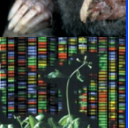
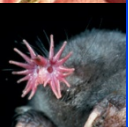
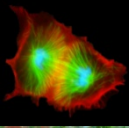
March 27, 2013  
Western States EPSCoR Climate Change Science Meeting  
Las Vegas, NV



# Topics

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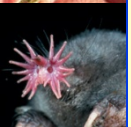
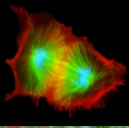
- Context for federal support
- NSF as a research partner
- Opportunities at NSF
- Positioning
- Writing proposals to NSF
- Some recent changes and implications
- Bad news/Good news
- Questions and discussion



# Larger Societal Context

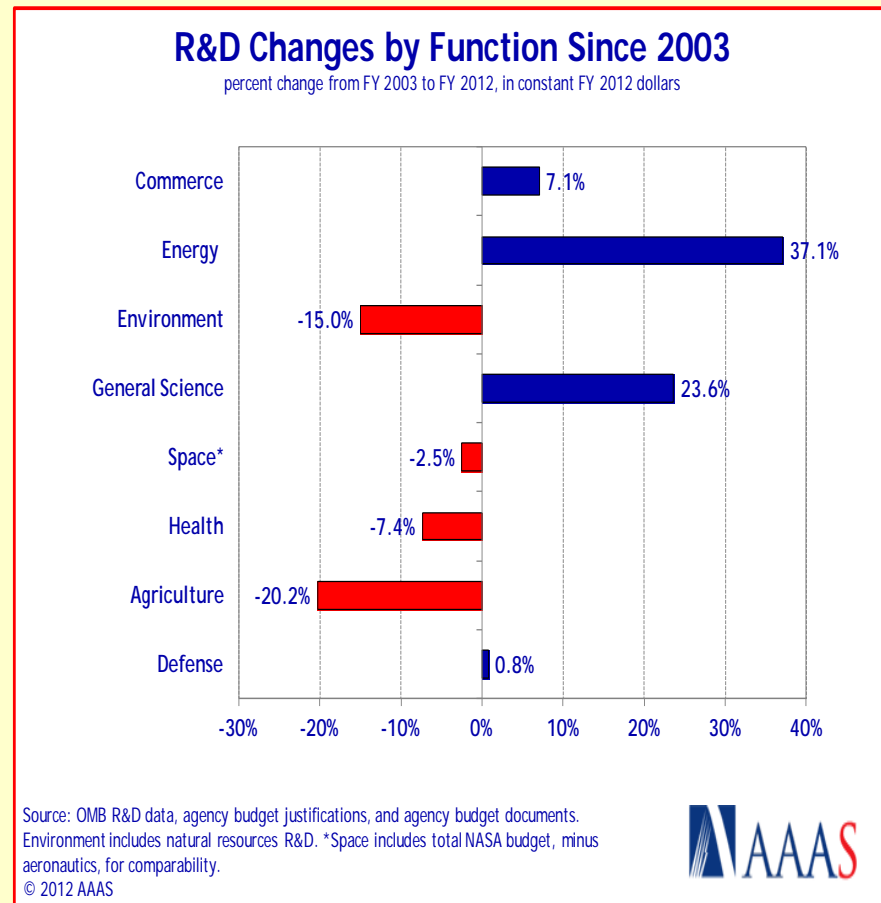
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- The world is unsettled
  - Economies are in crisis
  - Political systems are in gridlock
  - Institutions are dysfunctional
- and*
- The global environment/ecology is out-of-sync



# Funding for “CC” Research

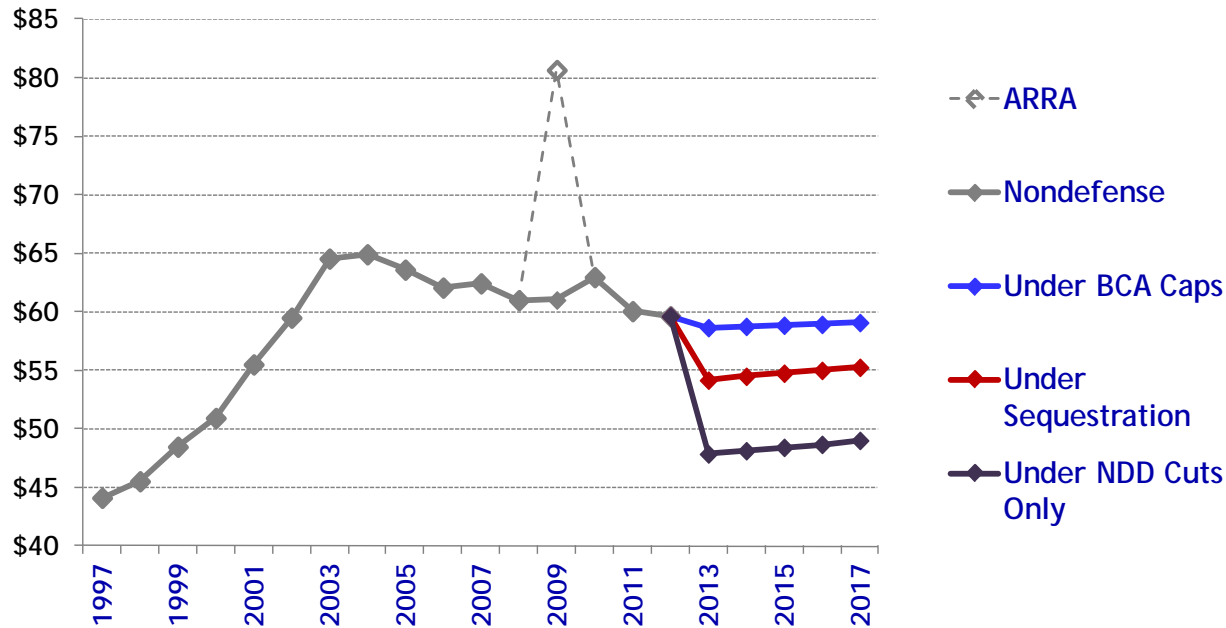
- State support is declining
- Overall federal support is declining:



# The Current Federal Budget Situation\*

## Federal Nondefense R&D Under BCA Caps With and Without Sequestration

in billions of constant FY 2012 dollars

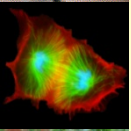


Source: Based on AAAS estimates of R&D funding and the FY 2013 budget, and CBO analyses of the Budget Control Act.  
© 2012 AAAS



*\*subject to change without notice; note HR 933 passed on 3/25/13*

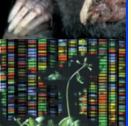
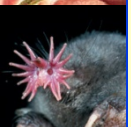
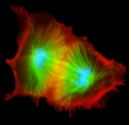
From Matt Hourihan, Dec. 4, 2012 at AAAS (defense R&D = ca \$90M)



# Ironies, Practical Consequences

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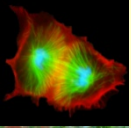
- Highly uncertain times demand solid science (trust in science is high)
- Need more than marginal science and advancements (problems are urgent)
- Must be aggressive and creative (competition is strong)



# CC Science is Relevant and Important

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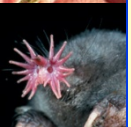
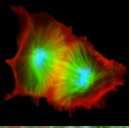
- Fracking and other energy-related research
- Climate change and consequences: regional droughts, wildfires, insect epidemics, agric production, carbon balance, recreation
- Urbanization, land-use change
- Management of public lands





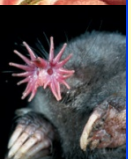
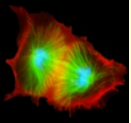
# Importance of NSF

- Only agency whose sole mission is to support basic research (“non-mission”)
- Funding opps are at maximum
  - Programs are evolving
  - Step changes are possible
  - Requires involvement and awareness
  - Competition is high

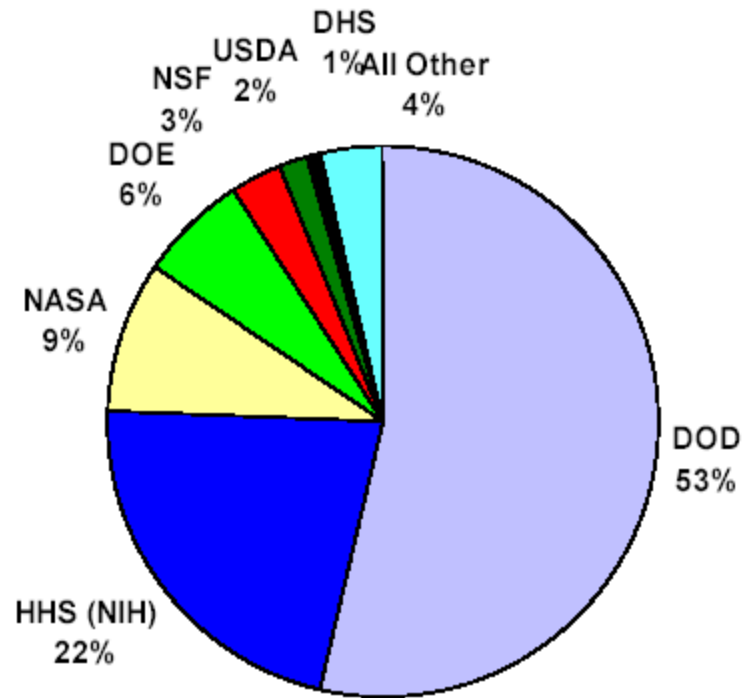




# NSF is a very small agency (\$7B/yr)



Budget Authority as % of total Federal R&D

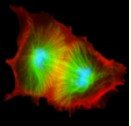
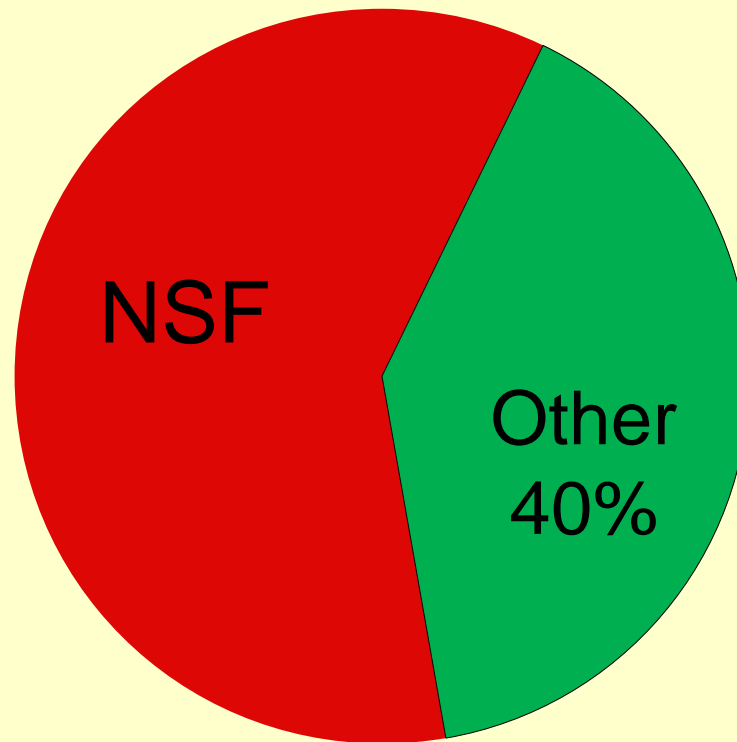


Source: AAAS, based on OMB R&D Budget Data and agency estimates

# NSF supplies most Federal support for basic research

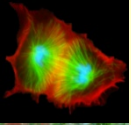
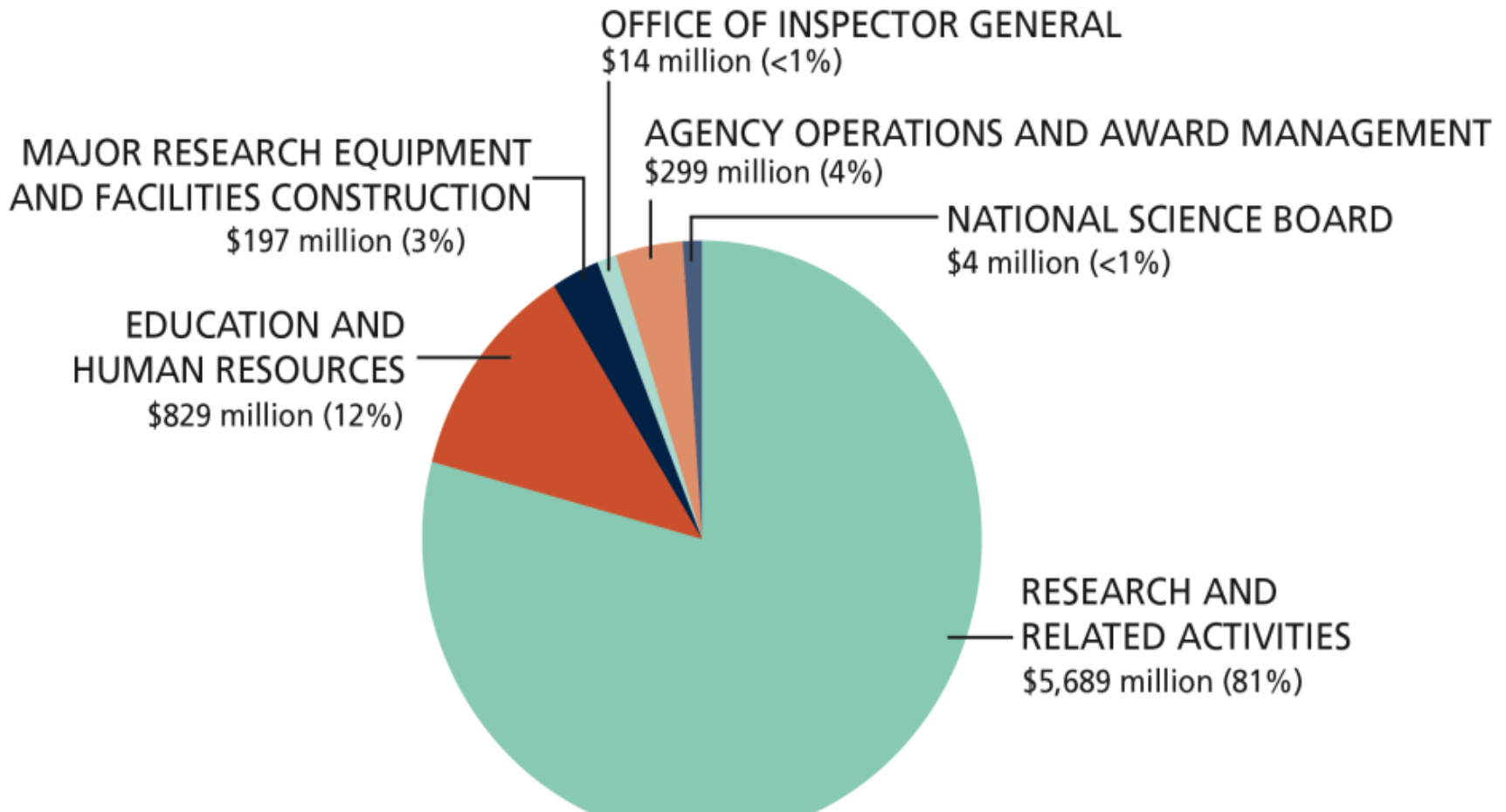
at U.S. academic institutions

in non-medical, non-defense environmental biology



# How? Low overhead...

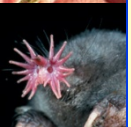
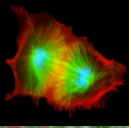
## FY 2012 Appropriations by Account—\$7,033 million



# NSF's Main Stakeholders

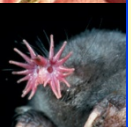
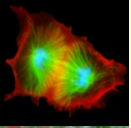
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- Tax payers (appropriations)
- Universities, colleges, non-profit research institutions (grantees)
- Other collaborating Federal agencies (leverage)



# Your Key Stakeholders: Collaborators

- Include only those required to get the job done in the most effective and efficient manner.
- Senior or well-known researchers do NOT have the best chance of getting funded.
- Match collaborators to the solicitation.
- Other agency scientists can be included.
  - Sub-awardees, co-PIs, consultants



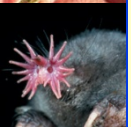
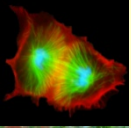
# Anticipate Opportunities

- USGCRP: North American Carbon Program, Decadal Strategic Plan (NASA/ROSES, DOE/NGEE, USDA)\*
- NAS/NRC: Sustainability, urban, other leading reports\*
- NSF-funded workshops, RCNs\*

*\* NSF usually does not respond unless there is new money available*

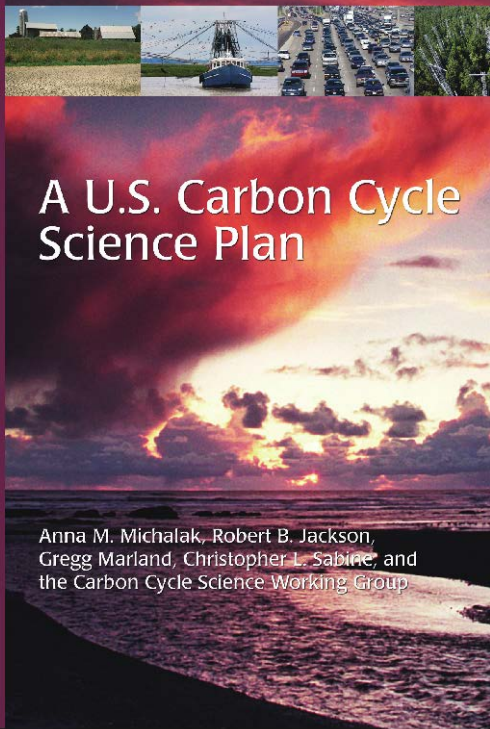
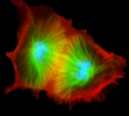
- 
- NSF-chartered reports (Advisory Committees, NSB)

- 
- Letters from the Director (InSpire, Sequester)
  - Dear Colleague Letters
  - New (or revised) solicitations





# Some Influential Reports



## A U.S. Carbon Cycle Science Plan

Anna M. Michalak, Robert B. Jackson, Gregg Marland, Christopher L. Sabine, and the Carbon Cycle Science Working Group

2011 (NACP/CCIWG; follows 1999 plan)

## Accelerate Synthesis In Ecology and Environmental Sciences

STEPHEN R. CARPENTER, E. VIRGINIA ARMBRUST, PETER W. ARZBERGER, F. STUART CHAPIN III, JAMES J. ELSER, EDWARD J. HACKETT, ANTHONY R. IVES, PETER M. KAREIVA, MATHEW A. LEIBOLD, PER LUNDBERG, MARC MANGEL, NIRAV MERCHANT, WILLIAM W. MURDOCH, MARGARET A. PALMER, DEBRA R.C. PETERS, STEWARD T. A. PICKETT, KATHLEEN K. SMITH, DIANA H. WALL, AND ANN S. ZIMMERMAN

*Ecology is a leading discipline in the synthesis of diverse knowledge. Ecologists have had considerable experience in bringing together diverse, multinational data sets, disciplines, and cultural perspectives to address a wide range of issues in basic and applied science. Now is the time to build on this foundation and invest in ecological synthesis through new national or international programs. While synthesis takes place through many mechanisms, including individual efforts, working groups, and research networks, centers are extraordinarily effective institutional settings for advancing synthesis projects.*

*Keywords: synthesis, ecology, environmental sciences, centers, knowledge integration*

**T**he synthesis of diverse knowledge is a central part of all sciences, especially those that draw information from many disciplines, such as ecology and environmental science. Synthesis requires relevant information. To accelerate environmental synthesis and related intense raw data processing, it is possible to:

- analyze disparate data sets and mine them from new perspectives that allow novel analyses;
- develop and use new analytical, computational, visualization, and modeling tools that may lead to greater insights;
- bring theoreticians, empiricists, modelers, and practitioners together to formulate new approaches to existing questions;
- and integrate science with education and real-world problems.

Synthesis occurs when disparate data, concepts, or theories are integrated in ways that yield new knowledge, insights, or

[www.biocomplexity.org](http://www.biocomplexity.org)

explanations (Pickett et al. 2007). Synthesis creates emergent knowledge in which the whole is greater than the sum of the parts. By engaging experts with multiple perspectives, synthesis

## Complex Environmental Systems

connecting the various steps into a common overarching Trends in patents (Jones 2009) demonstrate the value process: In recent years, innovations leading to patent been accomplished by older people who have had more to process knowledge in narrower specialties in which is less interdisciplinary. Innovations or can readily be accelerated by new institutional mechanisms. Synthesis is crucial for solving environmental finding new, sustainable approaches for agricultural infrastructure, transportation, and other sectors that synthesize environmental knowledge employed for policy analysis (Miller 2009)

September 2009 / Vol. 59 No. 8 • 1

## 2009 Workshop report (NCEAS/SESynC)

## Transitions and Tipping Points in Complex Environmental Systems



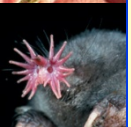
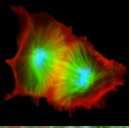
A Report by the NSF Advisory Committee for Environmental Research and Education

NSF AC/ERE - "Biocomplexity and Env." (2003, 2009)



# Examples from NSF/BIO

- **Core programs** (workshops, EAGER, RAPID, CAREER)
  - Ecosystem Studies Program (regular, RCN, OPUS)
  - IOS (Animal Behavior, eco-physiology)
  - DBI (human, cyber, instrumentation)
- **Synthesis centers** (working groups, post-docs, etc.)
  - NCEAS, SESynC, NESCent, NIMBioS, ?





**Airborne  
Platform**

**Relocatable  
Tower**



**Advanced  
Tower**

**Mobile  
Platform**



**Basic  
Tower**

**Aquatic  
Array**

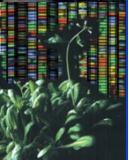
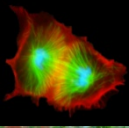
**National Ecological  
Observatory Network  
(NEON) = \$435M**



# BIO/DEF: MacroSystems Biology

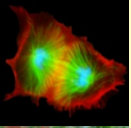
*Quantitative, interdisciplinary, systems oriented projects, focused on biospheric processes and their complex interactions with climate, land use, and/or invasive species at regional-to-continental scales.*

- \$15-20M/yr
- 2010-15
- Exploratory, research, training, workshops
  - Anticipates NEON, builds on other
- 30 awards (up to \$5M/5 yr) from 3 panels




# Other NSF Examples

- GEO
  - workshops, EAGER, RAPID, CAREER
  - Oceans
  - Earth (hydrology, geomorph, geochem, CZO)
  - Atmosphere (surface, paleo, climate models)
- Polar Programs (Arctic, Antarctic)
- SBE: Geography and Spatial Sciences
- ENG: CI, environmental, energy, sustainability



# NSF-wide/SEES: 13 solicitations in '13



National Science Foundation  
WHERE DISCOVERIES BEGIN

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Introduction  
Proposal Preparation and Submission

Email Print Share

Crosscutting/NSF-wide

## Science, Engineering and Education for Sustainability NSF-Wide Investment (SEES) C N

SEES Mission Statement

*To advance science, engineering, and education to inform the societal actions needed for environmental and economic sustainability and sustainable human well-being.*

CONTACTS

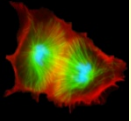
For general inquiries about SEES related activities: [nsf-sees-info@nsf.gov](mailto:nsf-sees-info@nsf.gov).

For program or discipline-specific questions, please see the full list of contacts at: [http://www.nsf.gov/qeo/sees/sees\\_contacts.jsp](http://www.nsf.gov/qeo/sees/sees_contacts.jsp)

SYNOPSIS

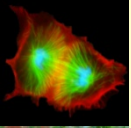
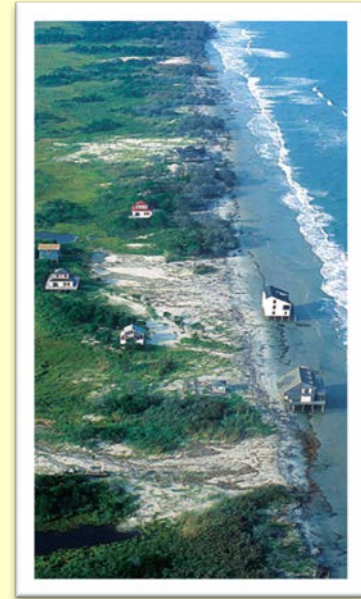
**Science, Engineering, and Education for Sustainability (SEES) is a portfolio of activities that highlights NSF's unique role in helping society address the challenge(s) of achieving sustainability.**

A sustainable world is one in which human needs are met equitably without harm to the environment, and without sacrificing the ability of future generations to meet their needs. Meeting this formidable challenge requires a substantial increase in our understanding of the integrated system of society.



# Recent SEES Solicitations

- Post-Doctoral Fellowships
- Research Networks (SRN)
- Climate Prediction using Earth System Models (EaSM)
- Ocean Acidification
- Dynamics of Coupled Natural and Human Systems (CNH)
- Water Sustainability and Climate
- Arctic
- Coastal
- Hazards and Disasters
- Integrated Sci. & Eng. (energy consumption, clean computing)



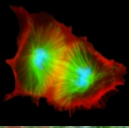


# Writing proposals for NSF

- Lead with best **ideas** for moving forward the frontiers of science.
- Everything else must logically follow.

***This is the greatest contrast with all other agencies.***

*(do not start proposals stating where you would like to work, which species/ecosystem you want to study, the newest techniques you will use, what societal problem you are going to solve, what you can leverage...)*



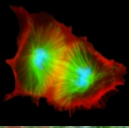


# NSF-EPSCoR Dilemma?

Infrastructure = low risk  
Transformative research = high risk

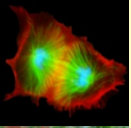
How do you lead with ideas (high risk), when you are trying to leverage and build off previous investments in major infrastructure (low risk)?


(same issue with NEON, other facilities)



# Writing proposals...

- Programs and procedures change; do NOT assume every program is/remains the same.
- Funding is not a lottery: quality **always** trumps quantity.
- Co-review, proposal sharing/swapping is common.
- NSF has strict rules about duplicate submissions.
- Other agency policies may differ.



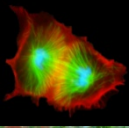


# 2012: DEB (and IOS) Changed Core Programs

- Dropped full proposals (2x/yr)
- Adopted pre-proposals (1x/yr)
- Invited full proposals (1x/yr)
- Considering impacts and future changes.
  - DEB blog: monitor/react
  - NSF/BIO/DEB homepages: DCLs, solicitation changes, etc.

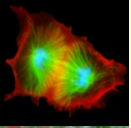
# Pre-proposals are Different

- Excitement: bold and innovative ideas?
- Conceptual framework: sound theory and general results?
- Questions: compelling hypotheses?
- Approach: feasible and testable hypotheses?
- Qualifications: PIs qualified?
- Broader Impacts: convincing and significant?



# Conclusions: Bad News

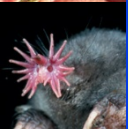
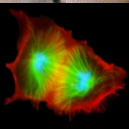
- Pressure to secure NSF funding has increased, while budgets have not.
- Funding is harder to get.
- Success rates of DEB Core Programs declined 50% since 2000.
- Other Federal research support has decreased.
- State support has decreased.



# Conclusions: Good News

*Across NSF, there are more potential sources of funding for “environmental science” than ever before.*

- Core programs in BIO, GEO, OPP, CISE/OCI, SBE, EHR, MPS, ENG...
- Special programs and centers: SEES, MacroSystems, InSpire, SESynC, NCEAS, NEON...
- Programs are adapting – and so must you...



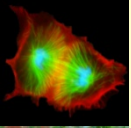
# Questions?

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Henry Gholz

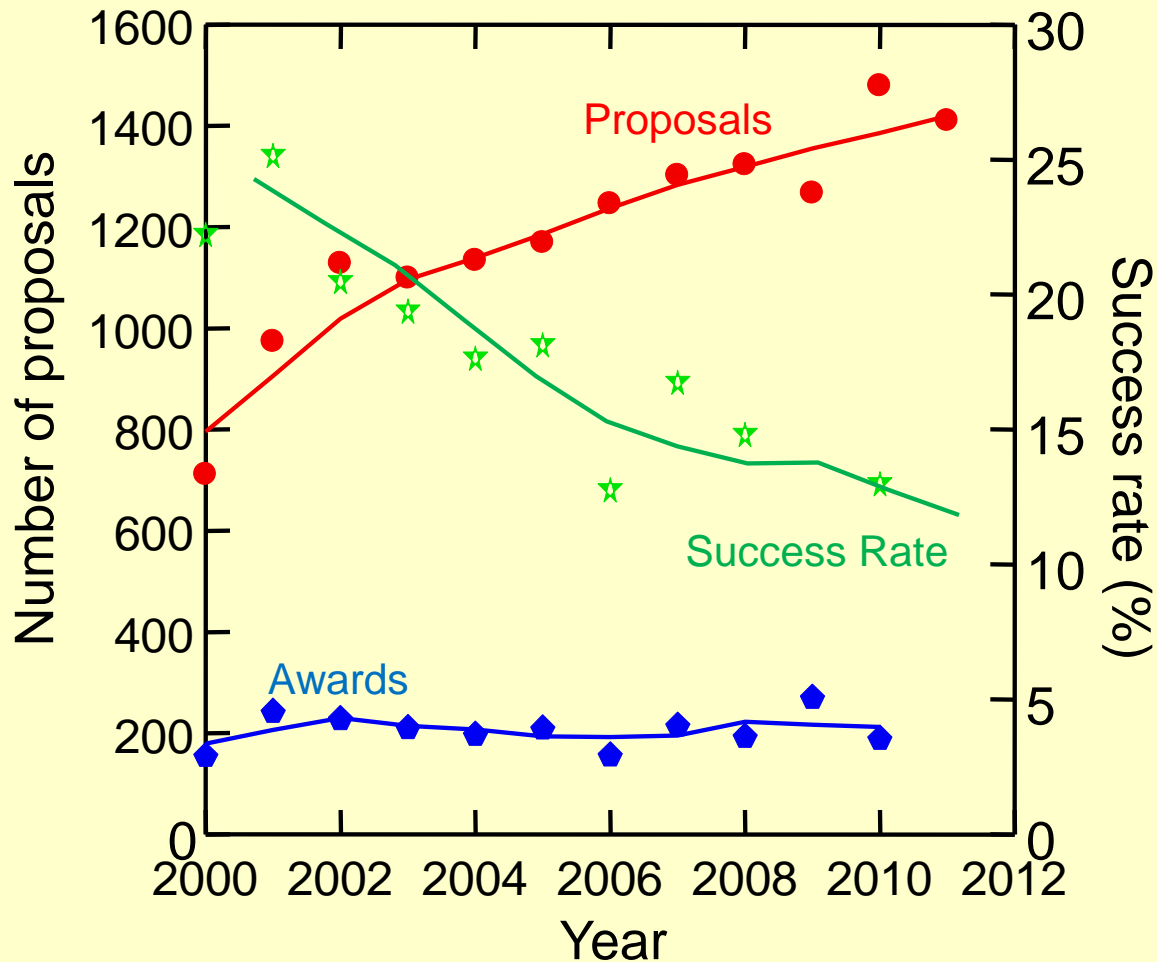
*hgholz@nsf.gov*

[<www.nsf.gov/BIO/DEB>](http://www.nsf.gov/BIO/DEB)





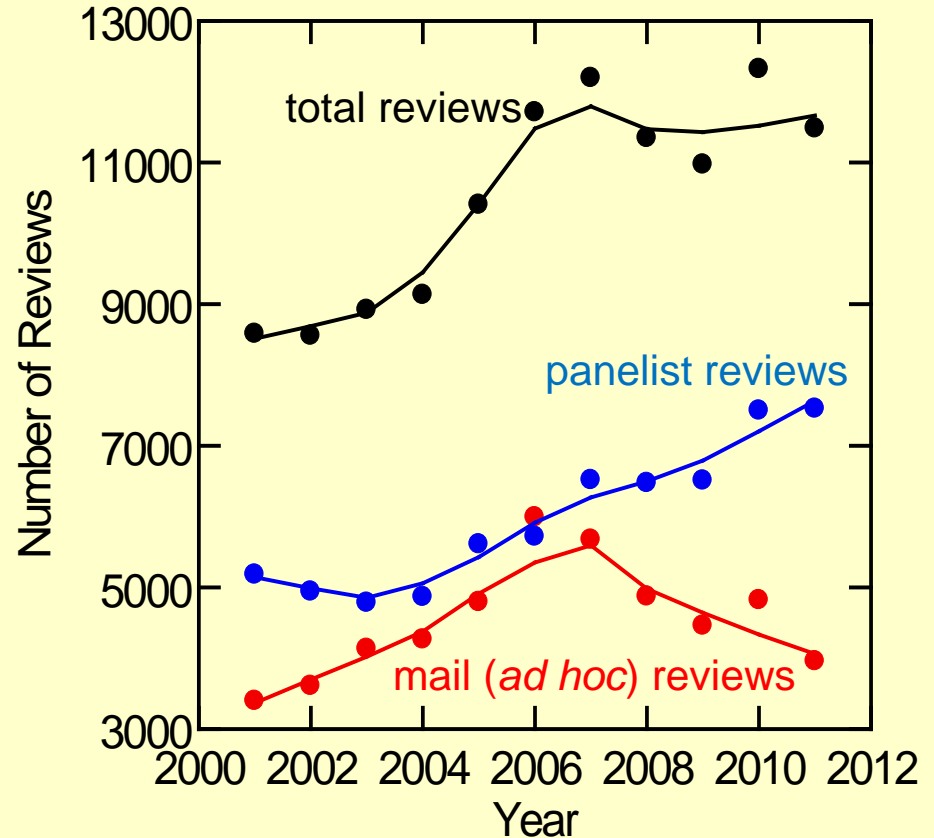
# Funding Trends *not* Sustainable?



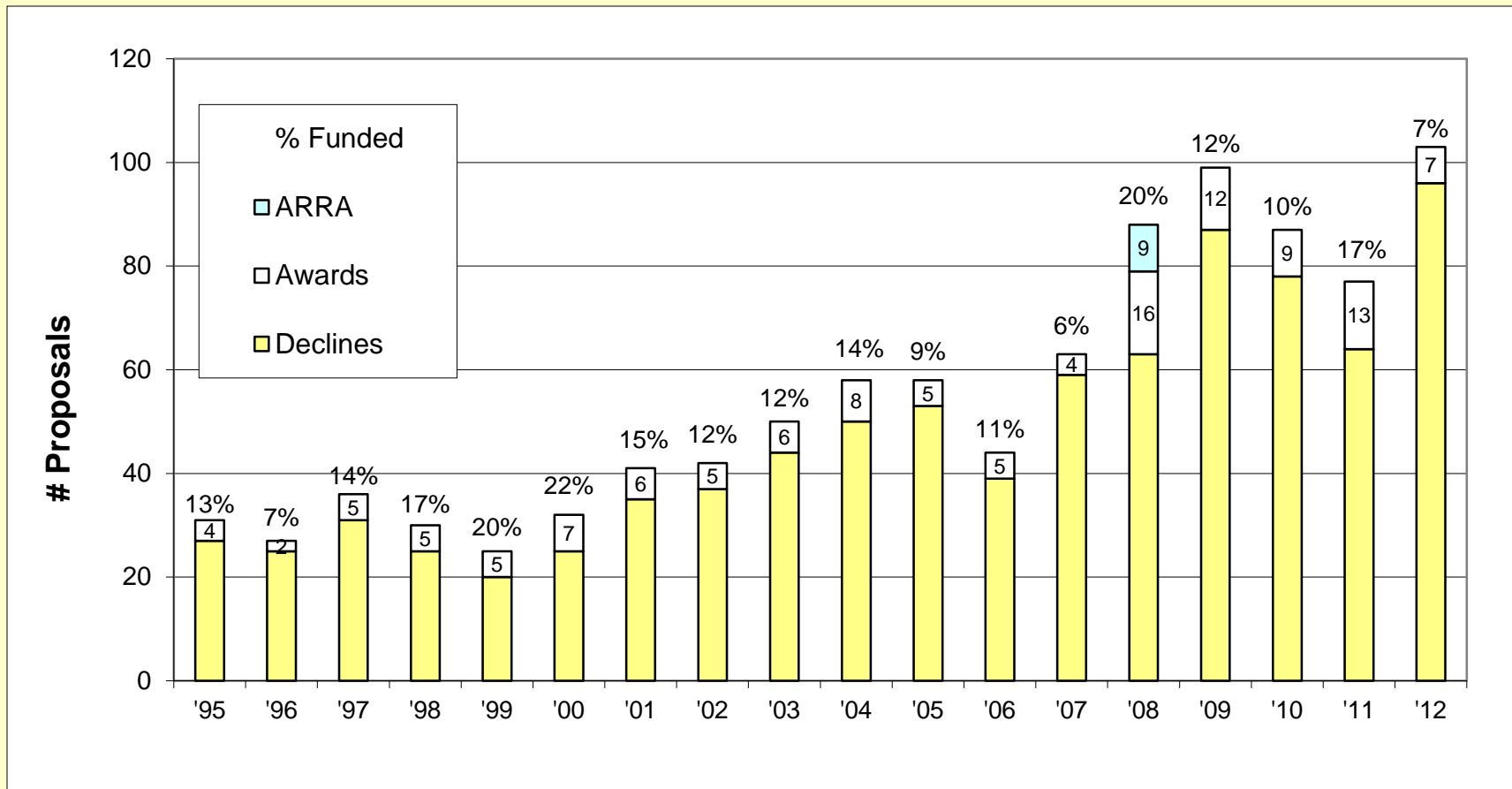
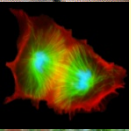
(NSF/BIO/DEB)

# Burdens on Community

- Time: proposal writing
- Time: service as reviewers, panelists, NSF
- Institutional expectations



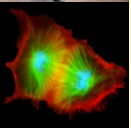
# CAREER Proposals *Not* Affected



# CAREER Proposal Trends (DEB)

	First Submissions			Second Submission			Third Submission		
Years <sup>1</sup>	Award	Decline	Success	Award	Decline	Success	Award	Decline	Success
1-2	19	199	9%	3	12	20%			
3-4	29	289	9%	14	72	16%	4	6	40%
>4	23	158	13%	19	81	19%	13	25	34%

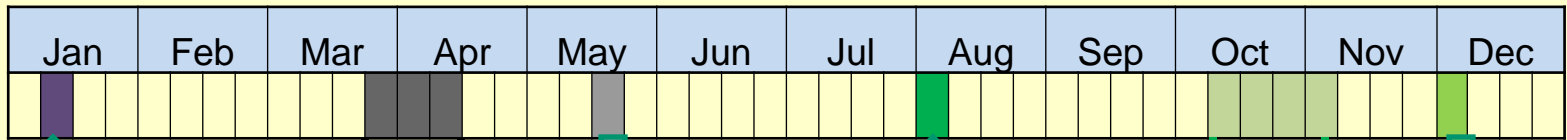
<sup>1</sup> *since first hired in tenure track position*



# The change to preliminary proposals (pre-proposals) in DEB and IOS



Write full proposal



preproposal  
deadline

preproposal  
panels

(no co-review or *ad hoc* reviews)

notification of  
Invite / Not Invite

full proposal  
deadline

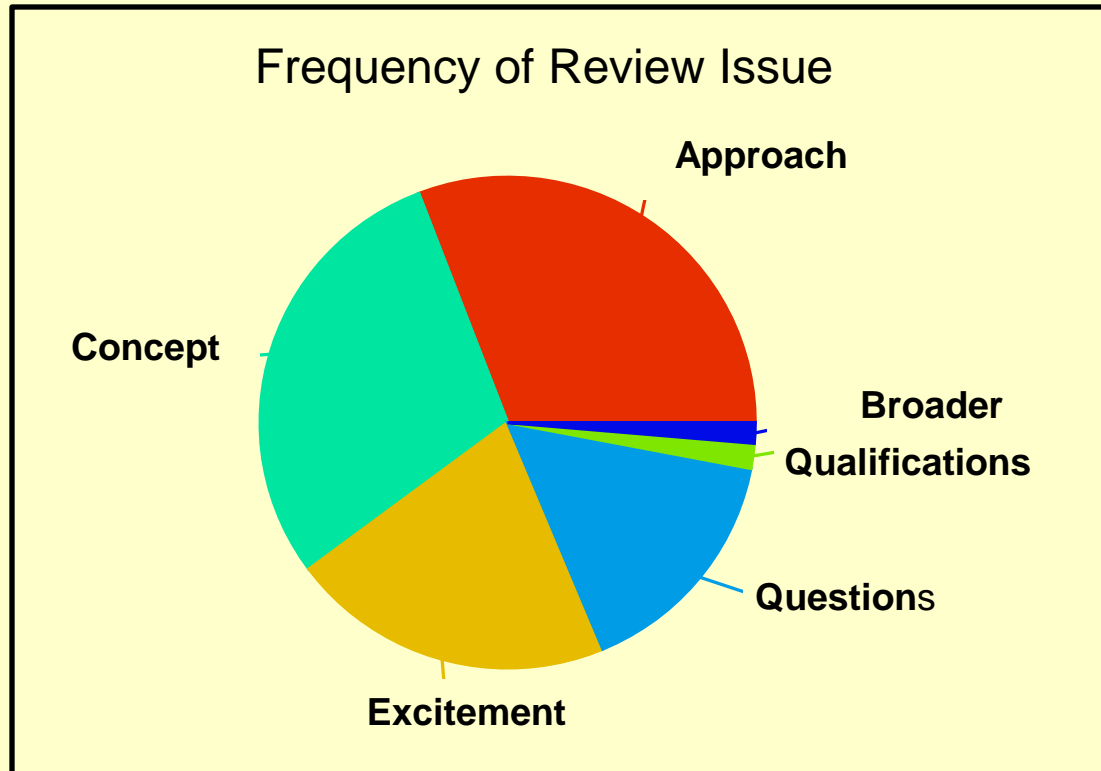
full proposal  
panels

(may have co-review and *ad hoc* reviews)

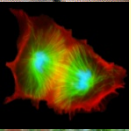
notification of  
Award / Decline



# Issues raised in pre-proposal reviews

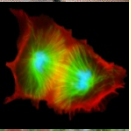
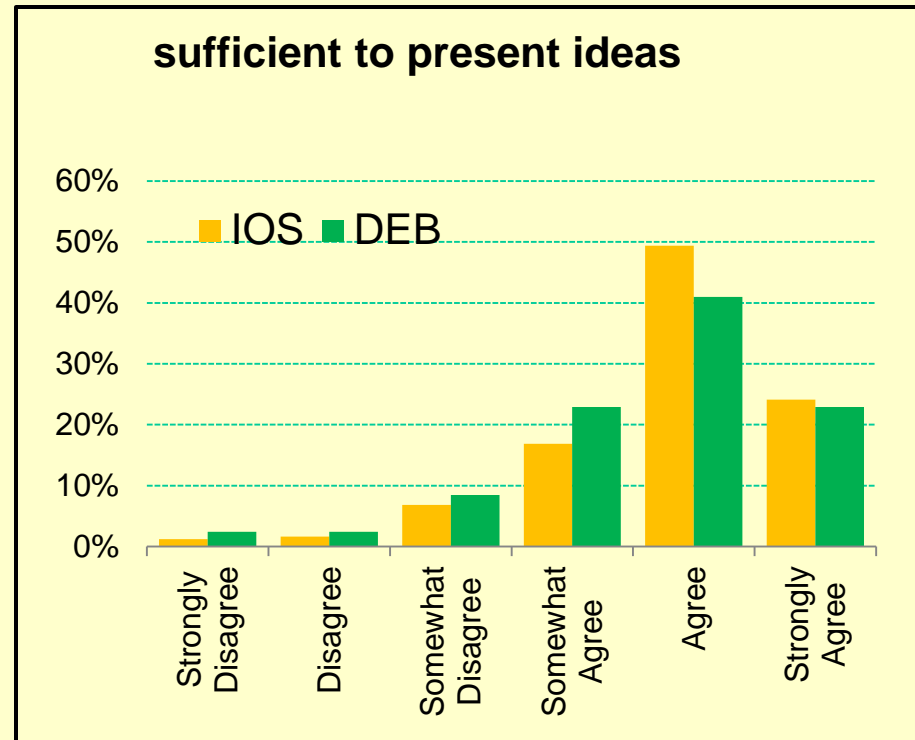
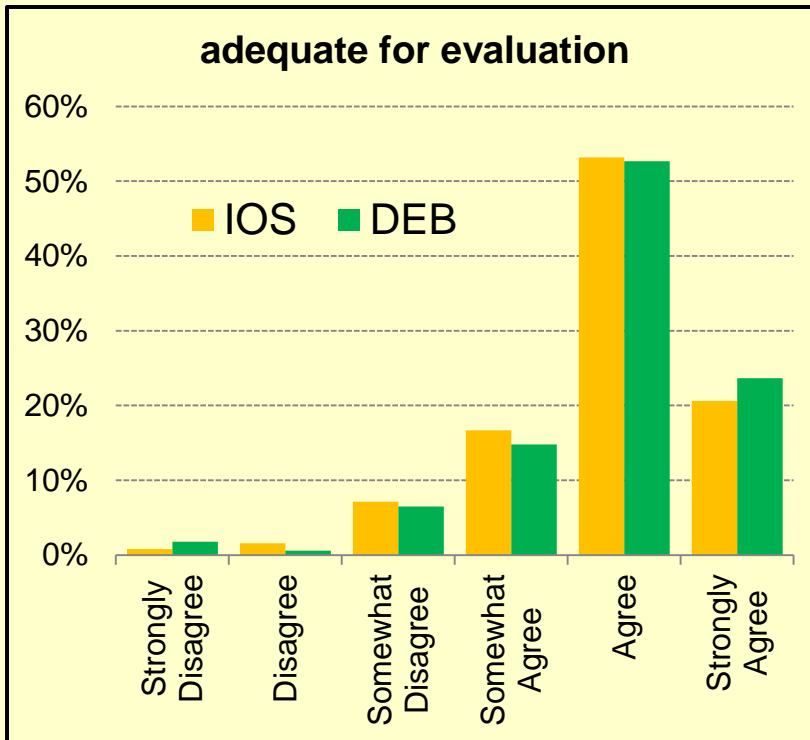


Aspects most often noted as weak were conceptual framework and experimental approach.



# Is four pages too short?

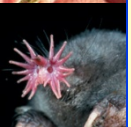
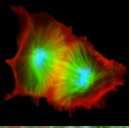
Panelists mostly think it is enough.





# Some Changes in FY 2013

- Doctoral Dissertation Improvement Grant (DDIG): *direct costs* may not exceed \$13,000.
- New international postdoc in biology, deadline in October.
- Most educational activities formerly requested as supplements (REU, RETeachers, RAHighSchoolStudents) should now *normally* be budgeted under participant support costs in the proposal budget. ROAs must still be supplements.

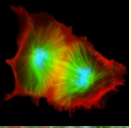


# Will it take longer to get funded?

One analysis indicates, yes, about 3 months on average.

Old system			New system		
If funded:	Percent of the funded	Time to fund (y)	Would be funded:	Time to fund (y)	Difference (y)
First try	33%	0.5	First try	1.0	+ 0.5
Second try, next panel	27%	1.0	First try	1.0	0
Second try, skip a panel	10%	1.5	First try	1.0	- 0.5

Suggestions include two preproposal deadlines per year, with a limit of one per PI per round.



# Will the process discriminate?

Tracking of pre-proposals so far seems to show no large effects on submission.

	<b>Full proposals in 2011 (%)</b>	<b>Pre-proposals (%)</b>	<b>Invited pre-proposals (%)</b>
<b>Beginning investigators</b>	<b>25</b>	<b>25</b>	<b>21</b>
<b>Primarily undergraduate institutions</b>	<b>18</b>	<b>18</b>	<b>13</b>
<b>Women</b>	<b>27</b>	<b>29</b>	<b>25</b>
<b>Other underrepresented groups</b>	<b>2</b>	<b>1</b>	<b>1</b>



This change does not affect other proposals, such as:

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*(reviewed with the invited full proposals)*

- CAREER
- LTREB renewal
- Opportunities for Promoting Understanding through Synthesis (OPUS)
- Research Coordination Network (RCN)

*(reviewed in separate panels)*

- Dynamics of Coupled Natural and Human Systems (CNH)
- Dimensions of Biodiversity
- Ecology and Evolution of Infectious Diseases (EEID)
- Doctoral Dissertation Improvement Grant (DDIG)
- MacroSystems Biology

*(reviewed internally)*

- Conference or workshop
  - EAGER
  - RAPID
  - CREATIV
- 

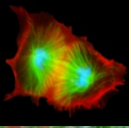
# CAREER Proposals Reviewed in DEB

Three CAREER submissions allowed:

Submission	Award	Decline	Success
1	72	657	10%
2	36	168	18%
3	17	31	35%

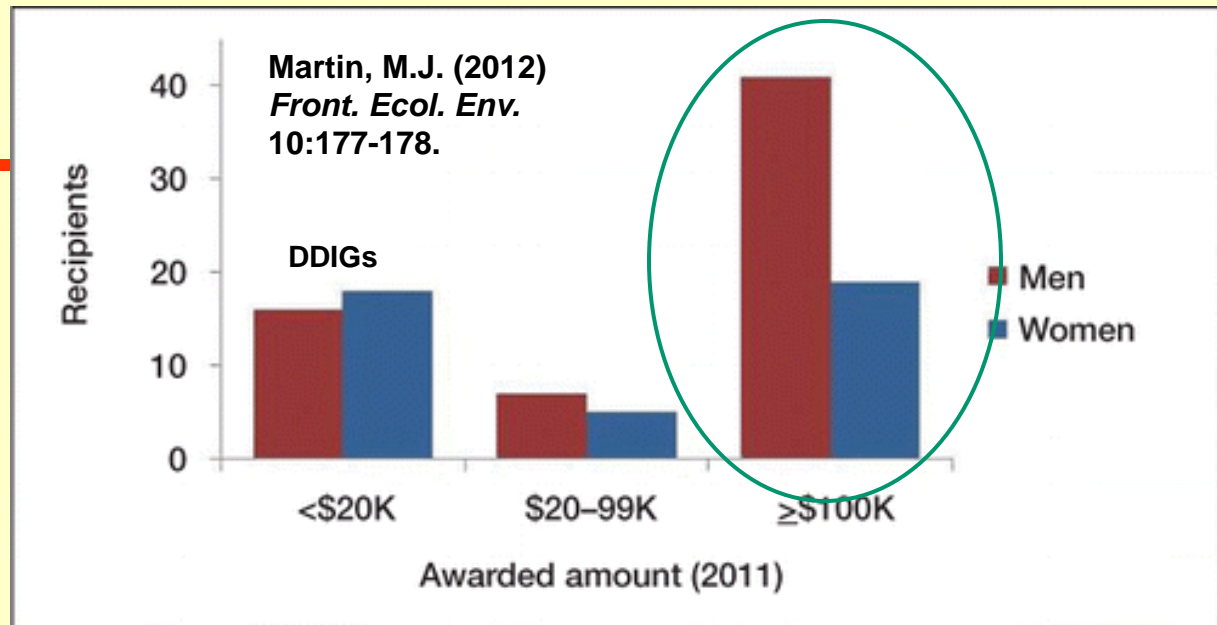
PI must be tenure track, prior to tenure:

Yrs in TT	Award	Decline	Success
1 - 2	22	211	9%
3 - 4	47	367	11%
> 4	55	266	17%



# Is there a gender gap in awards?

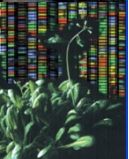
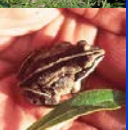
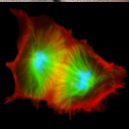
(PCE example)



Population and Community Ecology Fiscal Year 2011		
PI	Proposals	Awards
Female	30.5%	36.1%
Male	62.8%	58.8%
Unreported	6.7%	5.2%

## Conclusions:

- Women submitted fewer proposals
- Women got fewer awards
- Women got smaller awards



# Criterion II – Broader Impacts

- Bls DO count.
- Be realistic; present a solid, convincing plan for Bls, not a laundry list.
- Describe the Bls of your proposed research, not your ongoing or past efforts (but do identify leveraging opportunities and build upon your successes).
- Ask for money if you need it.

