A Recent NSF Program Officer's Experience, Tips, and Advice for Preparing Proposals

Bruce J. MacFadden

## Florida Museum of Natural History

Outline

- My background

- Funding and structure of NSF

- Trends and tips

- Broader Impacts

- Discussion of your questions

My background

- STEM --geology, biology, paleontology
- UF faculty since 1977; Curator at FLMNH
- Research: fossil horses, and what they teach us about evolution
- Very interested in education & outreach
- Do PD & teach a course on "Broader Impacts"
- "Rotator" PO at NSF from July 2009-July 2010
- Current PI/PD on recently funded Panama PIRE

FOSSIL HORSES
Systematics, Paleobiology, and Evolution of the Family Equidae

Bruce J. MacFadden
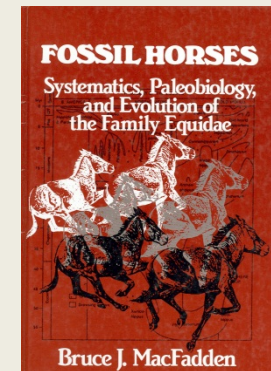
Cambridge U Press
1992

NSF

- 2011 6+ Billion dollar budget; 2,000 staff

- Part of President's Office

- Advised by National Science Board

- ~45,000 proposals, ~10,000 funded

- Adminstrative units (Director, PR, HR, OGC, DGA, etc.)

- ~7 Research & Related Activities Directorates (BIO, CISE, ENG, GEO, MPS, OPP, SBE)

- Cross-cutting Divisions (Integrative, OISE)

EHR (Education and Human Resources) Directorate 4 Divisions

- DUE (Division of Undergraduate Education)--REUs
- DGE (Division of Graduate Education)—IGERTs, GK-12s
- HRD (Human Resource Development), ADVANCE
- DRL (Division of Research on Learning), DRK-12, ITEST

My responsibilities

- Assigned proposals & panels in my "Lifelong Learning" cluster, assisted with other panels (DRK-12, CAREER, SMP, GEOED, 2 off-site STCs)
- Also primary PO for Communicating Research to Public Audiences (CRPAs)
- Primary assignment was to Informal Science Education (Lifelong Learning Cluster)

Informal science education:
Free-choice, Lifelong learning, "K to Gray" (out of school)

- Museums, science centers, nature centers
- Zoos, botanical parks, aquaria
- Community activities (citizen scientists)
- Movies, documentaries
- Gaming, cyberlearning, virtual reality via 2.0
- Radio and TV delivery
- Others, including…

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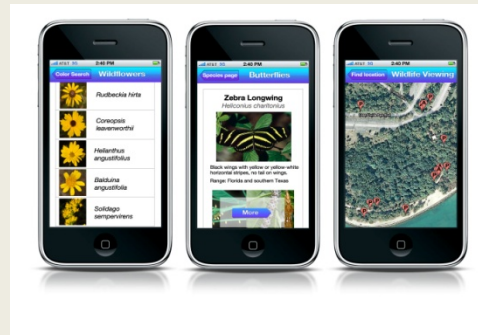
Potential impact of ISE (Informal Science Education)

- Formal and informal education
- What percentage of a person's (US) waking hours during their lifetime is spent in formal education?

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16 hr/ day

Formal

Informal

75 year lifespan
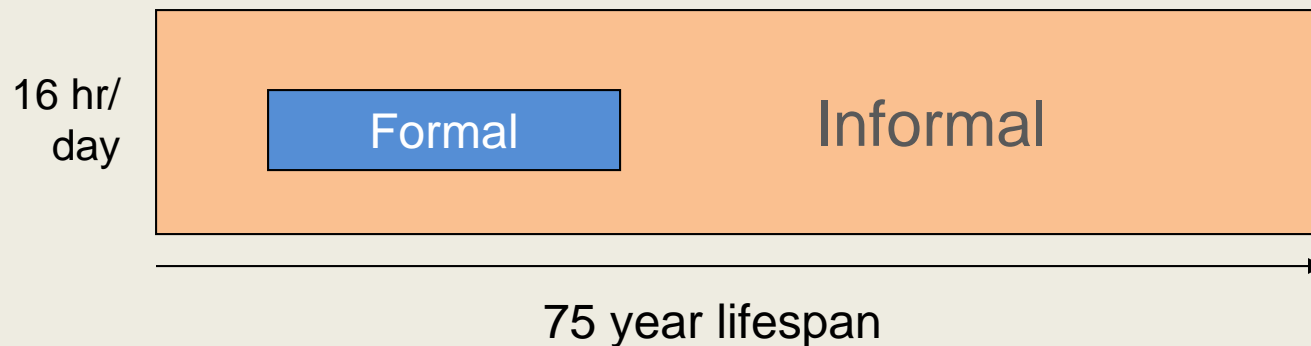
CRPA (Communicating Research to Public Audiences) Specifics

- $150 K "supplements," commensurate with size of active award
- Promote **research** discoveries to public (informal) audiences
- PI on R & RA award is PI on CRPA
- Funding for up to 24 months (some overlap required)
- No deadlines; 6-month turn-around
- 15 page project description, etc.
- Submitted to ISE (10-565)

Selected examples of recent CRPAs (2008)

Aiming High: Probing the Mystery of Ultra-High Energy Cosmic Rays (MPS)   Olinto

Regenerative Technologies in the Future: Tissue Engineering and Organ Printing (BIO)   Forgacs

HAWAII'S Volcanoes: A Media Project (GEO)   DePaolo

Community of Soundscapes - Expanding Environmental Awareness through Capture and
    Sharing of Sonic Experiences (CISE)   Giaccardi

Evolution in a Vortex: Public Outreach on Freshwater Science in the Congo River (BIO)   Stiassny

Genes to Ecosystems (BIO)   Whitham

CRPA Biographical Videos of Black, Hispanic, and Native American Female Faculty: Voices
    of the Few (EHR)   Nelson

ARS Synthetica - A Multimedia Forum Exploring the Artful Design of Living Things (BIO)   Keasling

CRPAs--Recap & Reflections

- CRPAs are "one of the best kept secrets" at NSF
- They can help you do Broader Impacts
- Common pitfalls of CRPAs, STEM scientists don't understand:
    - Target audiences
    - Deliverables
    - Evaluation
    - Education projects (find partners)

NSF Trends (one PO's anecdotal view)

- Little growth in "standard" single-investigator (or collaborative awards)
- No/little growth in across-the-board funding increases
- New monies & increases in large integrated projects
- Integration of technology, internationalization
- President's priorities (e.g., climate change)

"TIPS"

Informal Science Education (ISE)

PROGRAM SOLICITATION
NSF 10-565

REPLACES DOCUMENT(S):
NSF 09-553

National Science Foundation
Directorate for Education & Human Resources
Research on Learning in Formal and Informal Settings

Preliminary Proposal Due Date(s) (required) (due by 5 p.m. proposer's local time):
  July 22, 2010
      except CRPA proposals (which do not require preliminary proposals)
Full Proposal Deadline(s) (due by 5 p.m. proposer's local time):
  December 07, 2010
      except CRPA proposals (which do not have deadlines)

IMPORTANT INFORMATION AND REVISION NOTES

- Read the "solicitation" (e.g., 10-565)
- Make sure your project fits
- Follow the guidelines
- If you have questions, communicate with the PO
- Write to your audience and solicitation
- Compliance—e.g., postdoctoral mentoring, page limits, etc. (no RWR)
- Have your proposal reviewed, if time
- Take Broader Impacts seriously and be innovative
- Sign up a few days early in Fastlane and start uploading as files are ready; don't be late.

What will happen when your proposal is submitted via Fastlane?

- Sent out for review (at least 3)
- Recommendations by ad hocs and/or panel
- All proposals are reviewed based on two criteria
  - Intellectual Merit
  - Broader Impacts
- Within this criteria, some programs will have additional, specific things to address in PD
- You should hear within 6 months; rarely much sooner (unless RWR)

Broader Impacts: Background & perspective

- Since 2002 NSF now evaluates proposals on 2 fundamental criteria
    - Intellectual merit
    - Broader impacts
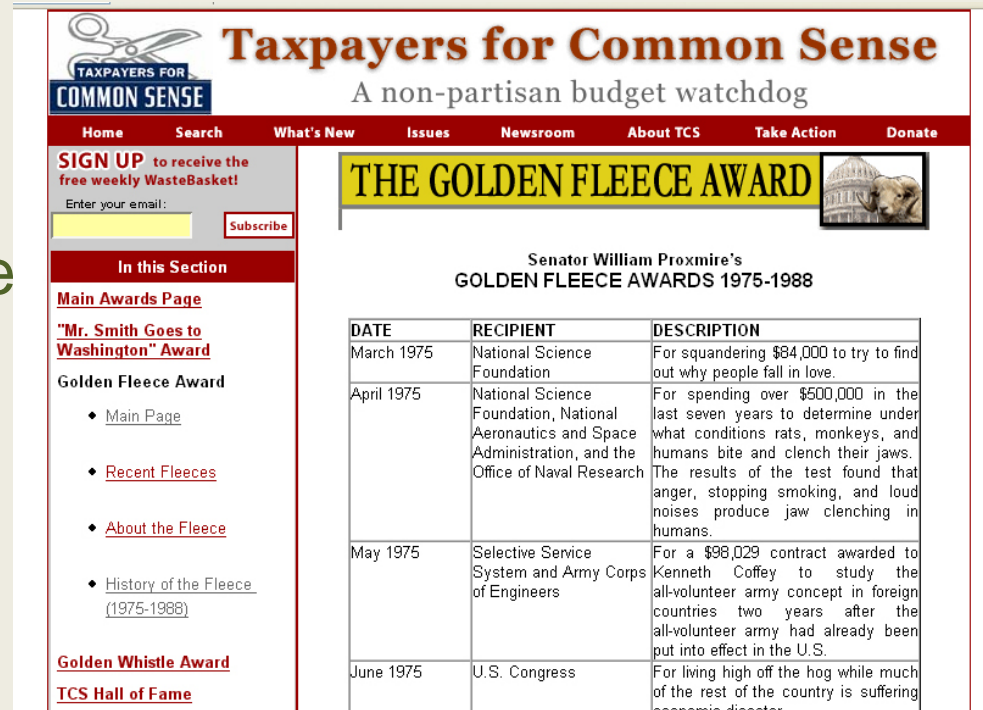
    "...many proposers have difficulty undertaking how to frame the broader impacts of the activities they propose to undertake"

Why is it so difficult?

- Prior to 2002, no expectation of broader impacts in NSF proposals

- No training or experience for proposers

- For "basic sciences" focus has been on "Ivory Tower" research

- No academic culture exsist(ed) for embracing broader impacts

The roots of broader impacts, 1

- Public scrutiny of government-funded research

- "Proxmire Golden Fleece Awards" in 1970s— science taken out of context

The Roots of Broader Impacts, 2

- More recently—Demands by Congress on NSF to make research relevant and/or understood

- We are currently in a culture where "public understanding of science" is critical

- For example, "hot topics" in science currently include evolution, climate change, and stem cell research

- Public misunderstanding of these can result from poor communication of scientists to society.

An anecdote, or two*

- The 11th hour request
- "End of grant and we are out of money" request

*AKA, how not to be like the older generation

More important than writing a paper

It might lead you to new research questions

"Skeletons in Our Closet" exhibit, ca. 2000

EAR 0418042—"Macroevolution and geochemistry of Cenozoic giant sharks"

$2K per year included in budget
For BI activities; plan to submit
A CRPA

CRPA—*Megalodon: Largest shark that ever lived*
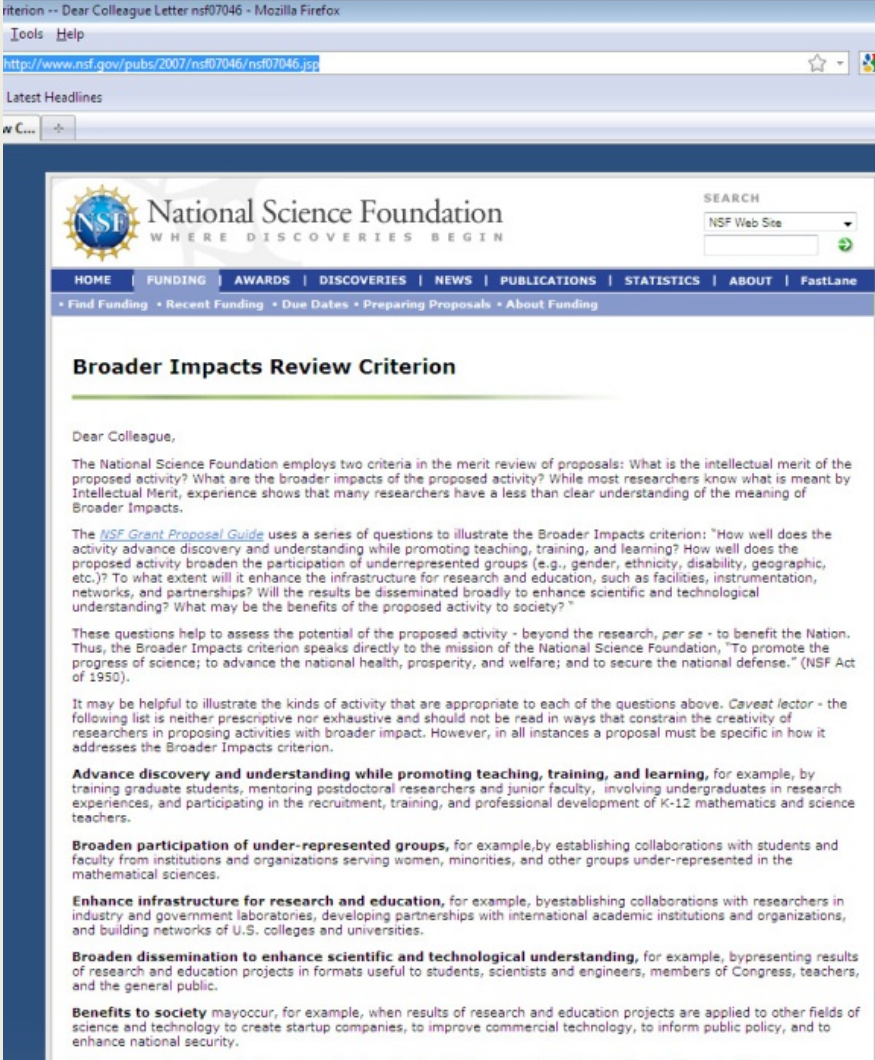
- Opened June 2007; ~100,000 visitors during 6 month venue

- Has been featured at venues in FL, HI, VA, MS: ultimately through 2013

- Projected > 1 million visitors during five-year exhibit life-time; how does this impact compare with your peer-reviewed articles?

NSF BI document
July 2007*

1. Advance discovery and understanding while promoting teaching, training, and learning

2. Broaden participation of underrepresented groups

3. Enhance infrastructure for research and education

4. Broad dissemination to enhance scientific and technological understanding

5. Benefits to Society

*http://www.nsf.gov/pubs/2007/nsf07046/nsf07046.jsp

1. Advance discovery and understanding while promoting teaching, training, and learning

- Integrate research into your teaching

- Include and mentor students

- Recruit and train teachers

- Develop innovative pedagogy

- Promote other researchers and graduate students to do the same

2. Broaden participation of underrepresented groups

- Target audiences

- Promote research and educational collaborations

- Involve other non-Ph.D.-granting institutions

- Conferences and activities where diversity is a priority

- Mentor young faculty

3. Enhance infrastructure for research and education

- Partner with other institutions and organizations, both within US and internationally
- Stimulate, develop, and support next generation research instrumentation and multi-user facilities and platforms
- Upgrade computer infrastructure
- Develop activities that engage large numbers of science students

4. Broad dissemination to enhance scientific and technological understanding

- Partner with museums to develop exhibits
  - Real exhibits
  - cyberexhibits
- Give science presentations to broader community, including public and policy-makers
  - Local interest clubs
  - teachers
- Publish in diverse media to reach broader audiences (e.g., *Natural History* magazine)
- Work on a documentary, You-tube, etc.

5. Benefits to Society

- Demonstrate linkages between discovery and societal benefit (e.g., stem-cell research)
- Partner with government agencies and private sector to integrate research into activities of mutual interest
- Present research and education results in formats understandable to non-scientists
- Provide information for policy formulation by Federal, State, or local agencies

Bottom line recommendations

- Broader impact activities should be integral to project from the beginning

- Can't do them all—do those that make sense to your project

- Enjoy these activities— they will provide "pay back" more than you can realize

Why should we care?--Because

- NSF and Congress care ($)
- No more "Golden Fleece" awards
- Its the right thing to do for society
- It might lead you to new research questions
- It will help you with the current culture of science and society

Take-home messages

- Think outside the box about funding opportunities.
- There are no secrets of how to succeed with a NSF proposal
- Its lots of hard work, mostly objective process
- Don't be afraid of Broader Impacts

Questions and discussion?