



Advisory Committee for Environmental Research and Education
8-9 May 2024 Meeting - All times Eastern Time

Summary Minutes

Committee members in attendance: Henry Bart Jr., Lora Billings, Vicki Grassian, Rupa Iyer, Kimberly Jones (Chair), Robin Leichenko, Bo Li, Amanda Lynch, Lynda McGilvary, Claire Monteleoni, Diane Pataki, Raina Plowright, Darren Ranco, Rodolfo Torres and Cathy Whitlock

NSF staff: Ashley Pierce (OIA, Executive Secretary for AC-ERE), Alicia Knoedler (OIA, Office Head), Steve Meacham (OIA), Caroline Blanco (OGC), Wendy Graham (GEO/RISE, Division Director), Bruce Hamilton (ENG/CBET), Christopher Lowry (GEO/EAR), Carlos Martinez (GEO/RISE AAAS S&TP Fellow), Benjamin McCall (OIA), Linda Molnar (TIP/ITE), Rebecca Morss (OIA), Brandi Schottel (ENG/OAD), Elaine Shen (GEO/OCE NOAA Knauss Sea Grant Fellow) and Amy Walton (CISE/OAC, Deputy Office Director)

NSF directorate leadership guests: Sylvia Butterfield (EDU DAD), Dean Evasius (MPS/OSI Office Head), Erwin Gianchandani (TIP AD), Kaye Husbands Fealing (SBE AD), Alexandra Isern (GEO AD), Joydip Kundu (CISE DAD), Simon Malcomber (BIO DAD), Susan Margulies (ENG AD), Jessica Robin (OISE Deputy Office Head) and Kendra Sharp (OISE Office Head)

Notetakers: Jennifer Riehl (AAAS S&T Policy Fellow, ENG/CBET) and Sharon Homer-Drummond (AAAS S&T Policy Fellow, EDU/EES)

Wednesday, 8 May 2024

10 – 10:15 a.m. Welcoming remarks

Kimberly Jones welcomed the committee, thanked everyone for attending, mentioned three new advisory committee members, Henry (Hank) Bart Jr., Lynda McGilvary and Darren Ranco, and asked attendees and members to introduce themselves.

10:15 – 10:45 a.m. NSF update

Alicia Knoedler welcomed the committee and thanked and acknowledged the work of several committee members, Ada Monzon and Daniel Wildcat, who have rotated off the committee since the last meeting. Knoedler then welcomed three new Advisory Committee members, Henry (Hank) Bart Jr., Lynda McGilvary and Darren Ranco.

Knoedler then gave an overview of NSF's budget, including the Fiscal Year 2023 actual budget, the FY 2024 request and appropriation and the FY 2025 request and the differences between

them. Knoedler noted that the FY 2025 budget request pillars and themes are identical to the FY 2024 pillars and themes and include accelerating technology and innovation, advancing emerging industries, building a resilient planet, creating opportunities everywhere and strengthening research infrastructure. Knoedler mentioned some recent Dear Colleague Letters (DCLs) and solicitations that have come out under the Build a Resilient Planet crosscutting theme, including NSF Confronting Hazards, Impacts, and Risks for a Resilient Planet (NSF [CHIRRP](#)) program. Knoedler also touched on the different NSF programs that support the Create Opportunities Everywhere budget theme, including Growing Research Access for Nationally Transformative Engagement and Discovery ([GRANTED](#)), the Established Program to Stimulate Competitive Research (NSF [EPSCoR](#)), Advanced Technological Education ([ATE](#)) and Excellence in Research for HBCUs ([HBCU-EiR](#)). Knoedler reminded the committee about the update in the Proposal and Award Policies and Procedure Guide ([PAPPG](#)) that requires investigators to seek and obtain approval from Tribal Nations for proposals that may impact Tribal resources or interests. Knoedler then gave a brief overview of a new NSF Science and Technology Center (NSF [STC](#)), the Center for Braiding Indigenous Knowledges and Science ([CBIKS](#)), noting that one of the senior personnel on the award is one of the new AC-ERE members, Darren Ranco.

Knoedler went over the major themes of the AC-ERE meeting agenda and noted some of the recent impacts of the committee, which include a second round of the NSF Sustainable Regional Systems Research Networks (NSF [SRS RNs](#)) released in January 2024. This program emerged in response to the [AC-ERE's 2018 report on Sustainable Urban Systems](#). Another recent solicitation that was released in March 2024, Focus on Recruiting Emerging Climate and Adaptation Scientists and Transformers ([FORECAST](#)) calls on the research community to adopt the recommendations in the [AC-ERE's 2022 report on Engaged Research for Environmental Grand Challenges](#) to support the building of a robust scientific workforce ready to work with communities to address societal challenges through convergent research approaches. NSF's Environmental Justice Working Group, which will meet with the committee during this meeting, also used the *Engaged Research* report as a resource.

The committee discussed the update from Knoedler, including a discussion on NSF EPSCoR funding.

10:45 – 11 a.m. Break

11 a.m. – 12 p.m. Strategic Roadmap Discussion

Moderator: Kimberly Jones, chair of subcommittee

Subcommittee members: Lora Billings, Kimberly Jones, Rupa Iyer, Robin Leichenko, Bo Li and Diane Pataki

Kimberly Jones introduced the context for the Strategic Roadmap, including the AC-ERE 10-year report that celebrates its ten-year anniversary soon, *America's Future: Environmental Research and Education for a Thriving Century*, and the start of NSF's next round of strategic planning for 2026-2030. Jones then went through the Strategic Roadmap outline, explaining the different

sections, tools to leverage to improve environmental research and education, ways to improve the ecosystem of environmental research and education and the list of research priorities and then invited discussion from the committee.

The committee discussed the long list of research priorities and noted that it might be better to reorganize the outline to focus on the tools and improvements to the research and education ecosystem aspects of the outline. The committee agreed to reorganize the Strategic Roadmap outline and to develop work groups around the different topics for the committee members to join and contribute to writing. The committee took a brief break to grab lunch before returning to discuss the Strategic Roadmap.

12 – 1 p.m. Working lunch

The committee continued the conversation on how to reorganize the Strategic Roadmap. The committee agreed to focus the Strategic Roadmap more on research approaches instead of research areas. The conversation also touched on the need to focus on convergent research and potential gaps in partnership areas.

The committee then spent the rest of the working lunch prepping for the discussion with the NSF Office of the Director and reviewing the guiding questions for the conversations with the directorate leadership.

1 – 2 p.m. Minimizing the Environmental Impacts of Research discussion

Moderator: Vicki Grassian, chair of subcommittee

Subcommittee members: Lora Billings, Vicki Grassian, Kimberly Jones, Rodolfo Torres and Cathy Whitlock

Vicki Grassian gave an overview of the Minimizing the Environmental Impacts of Research Recommendation document and opened the discussion to feedback from the committee. The discussion touched on the challenge of understanding the topic across varied research domains, institutions and industries. There were several suggestions, including looking at what may be common across disciplines, where improvements can be made, collaborating with other agencies or industries that have done work in this area, and considering when travel is necessary. There was also discussion about ensuring that the burden to address environmental impacts is not solely on researchers who may have different resources available to support them across different institutions.

2 – 2:30 p.m. Break

2:30 – 3:15 p.m. Discussion with Dean Evasius, office head, NSF Office of Strategic Initiatives of MPS and Susan Margulies, assistant director of NSF ENG

Moderators: Kimberly Jones, ENG Liaison, AC-ERE chair and Rodolfo Torres, MPS liaison

Susan Margulies thanked the committee for the previous reports they had published and noted that NSF ENG reads them and is interested in the recommendations. Margulies then went through some ENG investments including collaborations with the USDA through the NSF Innovations at the Nexus of Food, Energy, and Water Systems (NSF [INFEWS](#)) and the NSF Signals in the Soil (NSF [SitS](#)), the Net Zero in ENG [DCL](#), and the NSF [SRS RNs](#) programs.

Dean Evasius noted that there were many points of contact in MPS with environmental research, including in the NSF Sustainable Chemistry Basic Research program, Critical Aspects of Sustainability ([CAS](#)), an [environmental chemistry program](#) and the Molecular Foundations for Sustainability: Sustainable Polymers Enabled by Emerging Data Analytics ([MFS-SPEED](#)) solicitation. Evasius also noted that environmental research happens throughout the core programs and the importance of astronomy facilities, particularly in energy usage and international diplomacy.

The discussion with the committee touched on how the two directorates handle interdisciplinary and convergent research. Margulies noted that ENG is inherently multidisciplinary and provided biomanufacturing, the Robotics Program and Clean Energy Technologies as examples. There was discussion on the definitions for transdisciplinary convergent research and the need for this term to be defined in the Strategic Roadmap. There was also discussion on whether there are enough programs to support complex systems research, and that complex research should be funded across NSF. Margulies listed some examples of NSF programs that fund convergent research, including the Engineering Research Centers ([ERCs](#)), Civic Innovation Challenge ([CIVIC](#)) and the [Lemelson Foundation partnership](#). There was also discussion on how to improve the review of convergent and transdisciplinary research through reviewer training and learning from past experiences, engaging with advisory committees, international partnerships and using metaprograms at NSF.

3:15 – 3:30 p.m. Break

3:30 – 4:15 p.m. Engagement of Students and Early Career Researchers discussion
Moderator: Bo Li, chair of the Working Group
Subcommittee members: Kimberly Jones, Bo Li, Lynda McGilvary, Cathy Whitlock

Bo Li gave an overview of what the work group had discussed on how to engage students and early-career researchers in the work of the AC-ERE, which included potentially receiving feedback through a questionnaire or holding a panel discussion. The committee discussed bringing early-career researchers onto the committee, potentially holding a panel discussion

with students and early-career researchers and exploring resources from other associations and professional societies that may have student and early-career groups already established. The discussion also touched on the barriers to working on convergent and interdisciplinary research as an early-career researcher due to the extra time needed to set up complex research projects, the incentives for tenure, and the limits of programs like the Faculty Early Career Development Program ([CAREER](#)) in supporting transdisciplinary research. The committee noted that it may be important to include the early-career researcher perspective in the Strategic Roadmap.

4:15 – 4:30 p.m. Committee business

The fall 2023 meeting minutes were accepted.

4:30 – 5:00 p.m. Briefings from advisory committee liaisons

Kimberly Jones, ENG AC

Kimberly Jones reported on the Engineering Advisory Committee meeting where they discussed the Engineering Strategic Plan, the FY 2025 budget themes and strategic priorities and values for Engineering. Highlights included partnering for a resilient planet, opportunities in clean energy and climate change adaptation and mitigation, broadening participation at scale, Engineering PLUS Alliance, investing in engineering research infrastructure, and revolutionizing engineering departments.

Rupa Iyer, CEOSE

Rupa Iyer reported on the Committee on Equal Opportunities in Science and Engineering (CEOSE) meeting, which highlighted topics such as STEM talent in rural America, EPSCoR 2022 envision the future, a National Academy of Science report on advancing antiracism, diversity, Inclusion, beyond broadening participation and supporting Tribal communities.

Henry Bart, BIO AC

Henry Bart reported on the Biological Sciences Advisory Committee, which was holding a concurrent meeting and had so far discussed use-inspired research opportunities and an interest in engaging with the AC-ERE.

Cathy Whitlock, GEO AC

Cathy Whitlock reported on the Geosciences Advisory Committee, which highlighted new NSF programs such as CHIRRP and EMpowering BRoader Academic Capacity and Education (EMBRACE), an update on the Sexual Assault and Harassment Prevention and Response (SAHPR), and discussions on how to enhance transdisciplinary science and education in the geosciences (from universities to NSF).

Rodolfo Torres, MPS AC

Rodolfo Torres reported on the Mathematical and Physical Sciences Advisory Committee, which included a subcommittee report on facilities, a focus on building bridges between MPS and EDU and a discussion on artificial intelligence investments by NSF and use in NSF research.

5 p.m. Adjourn Day 1

Thursday, 9 May 2024

8:30 – 9 a.m. Committee member arrival

Steve Meacham and Kimberly Jones welcomed everyone to the second day and thanked everyone for the great discussion on the first day. Then, they turn it over to Whitlock to begin the first session of the day.

**9 – 9:45 a.m. Discussion with Alexandra Isern, assistant director of GEO, and
Simon Malcomber, deputy assistant director of BIO
Kendra Sharp (office head, OISE)
Jessica Robin (deputy office head, OISE)
Moderator: Cathy Whitlock, GEO liaison**

Simon Malcomber presented on behalf of BIO and GEO and how the two directorates see environmental research pointing to the NSF National Ecological Observatory Network ([NEON](#)), the Ocean Observatories Initiative ([OOI](#)), and the Long-Term Ecological ([LTER](#)) programs, which span BIO, GEO, and increasingly, SBE. Malcomber noted that BIO and GEO successfully review interdisciplinary research within the directorates and stated that 50% or more of incoming proposals are co-reviewed; panelists are increasingly interdisciplinary and can communicate across disciplines and understand challenges and opportunities for interdisciplinary research. Malcomber advised the broader research community to talk to their program officers, be aware of new and evolving metaprograms, suggest where a proposal could be co-reviewed, trust that program officers are selecting the best reviewers and provide advice through advisory committees.

Alexandra Isern noted that many transformational research areas are cross-directorate efforts and that topics like biocomplexity have impacted how transformative science is supported across NSF.

Kendra Sharp talked about the NSF Global Centers ([GC](#)) program in the Office of Science and Engineering, which has worked to increase NSF's participation and leadership in multilateral approaches to global science with topics such as climate change, clean energy and youth-inspired research.

The discussion touched on where human-environmental interactions and socio-ecological research were funded within NSF and on how co-review occurs across NSF. The discussion also

touched on how to support early-career researchers in interdisciplinary research fields, particularly when programs sunset or evolve.

9:45 – 10:35 a.m. Preparation for discussion with NSF senior leadership

The committee debriefed on the earlier discussions and focused on what recommendations could be made to improve the review process for transdisciplinary and convergent research proposals.

Kimberly Jones then prepared to meet with the NSF Office of the Director and asked the committee to synthesize the main meeting themes and work on summarizing key points for their discussion with the Office of the Director. The committee decided on three main themes: fostering the creation of new research opportunities, reviewing interdisciplinary and convergent research, and strengthening the focus on environmental education.

10:35 – 10:45 a.m. Break

10:45 – 11:30 a.m. Discussion with Joydip Kundu, deputy assistant director of NSF CISE and Erwin Gianchandani, assistant director of NSF TIP
Moderators: Diane Pataki and Claire Monteleoni

Joydip Kundu noted that NSF CISE is thinking a lot about the sustainability of computing as well as innovation from computing and provisioning cyberinfrastructure to advance research on sustainability. Kundu mentioned several examples of CISE's efforts in these areas, including NSF programs Design for Environmental Sustainability in Computing ([DESC](#)), the Civic Innovation Challenge ([CIVIC](#)), and the National Discovery Cloud for Climate ([NDC-C](#)).

Erwin Gianchandani introduced NSF TIP and noted that NSF supports transformative research, researchers and ideas, and TIP tries to push those ideas into the market and society. TIP has three key pillars: innovation ecosystem building, accelerating technology development and technology translation, and workforce development. Gianchandani noted that at least 13% of TIP's portfolio comes up in a search for "environmental research" and that two-thirds of the new NSF Regional Innovation Engines (NSF [Engines](#)) are on topics that intersect with environmental research and sustainability. Gianchandani mentioned other examples of how TIP supports environmental research, including the NSF [Convergence Accelerator](#), the Small Business Innovation Research / Small Business Technology Transfer ([SBIR/STTR](#)) program, workforce programs and entrepreneurial fellowships.

The discussion touched on the difficulties in putting together an interdisciplinary panel to review convergent proposals. Kundu and Gianchandani both noted experience in core NSF programs as well as in the Convergence Accelerator and Engines programs and for TIP, the

necessity to include cross-sector expertise. The discussion also touched on the opportunities available for early-career researchers looking for funding for interdisciplinary research ideas, how new research programs form and how programs that have been around for a long time evolve.

11:30 am–12:15 pm Discussion with Sylvia Butterfield, deputy assistant director of EDU and Kaye Husbands Fealing, assistant director of SBE
Moderator: Robin Leichenko, SBE Liaison

Kaye Husbands Fealing noted several NSF programs in SBE or to which SBE contributes to, such as Human Environmental and Geographical Sciences ([HEGS](#)), [Cultural Anthropology](#), [Archaeology](#), and Dynamics of Integrated Socio-Environmental Systems ([DISES](#)) that fund environmental research. Husbands Fealing noted some challenges in reviewing interdisciplinary research proposals, including recruiting panelists that cover all the disciplinary expertise needed, can work together, are varied and come from a range of institution types. Other challenges include budget constraints and how solicitations and DCLs are constructed. Husbands Fealing noted that it is important to include SBE folks when designing a call for interdisciplinary research proposals.

Sylvia Butterfield reminded the committee that EDU supports projects from pre-K through post-doctoral experiences and workforce development, and any of the programs in EDU could fund projects focused on environmental education. Butterfield listed a couple of examples, including research on extreme climates and blizzards, learning about climate from informal learning activities, and developing a community-based curriculum. Butterfield also noted some challenges in training reviewers and program officers in reviewing interdisciplinary proposals, including using metrics that may differ from the metrics used in a specific research field, which may lead to a lack of support for overall transformative projects, especially when addressing novel, risky and innovative work. Butterfield noted that it is rare for a proposal to be strong in all fields and that it takes skilled panel facilitation and good reviewer orientation as well as varied reviewer expertise to address this issue.

12:15 – 12:30 p.m. Break

12:30 – 1 p.m. Karen Marrongelle, NSF chief operating officer and Brian Stone, chief of staff

Kimberly Jones welcomed Karen Marrongelle and Brian Stone and highlighted the work of the committee, including the Strategic Roadmap and recommendations on Minimizing the Environmental Impacts of Research. The committee then discussed with Marrongelle how the committee could support NSF when fostering the creation of new research disciplines and programs, how to support NSF in reviewing interdisciplinary and convergent research proposals,

and how to increase the focus on environmental education. Marrongelle agreed that supporting interdisciplinary and convergent research and training reviewers can be challenging and noted that she looks forward to hearing recommendations in the Strategic Roadmap.

1 – 2 p.m. Lunch

2 – 3:30 p.m. Meeting with the NSF working group on environmental justice to provide feedback on the agency strategy in response to Executive Order 14096, "Revitalizing Our Nation's Commitment to Environmental Justice for All"

Caroline Blanco, assistant general counsel, Office of the Director

Wendy Graham, division director, RISE/GEO

Carlos Martinez, AAAS S&TP Fellow, RISE/GEO

Elaine Shen, NOAA Knauss Sea Grant Fellow, OCE/GEO

Moderators: Robin Leichenko and Raina Plowright

Caroline Blanco is the NSF tribal liaison and co-chair of the Tribal Consultation Work Group and, as such, gave the committee an overview of NSF's new tribal consultation policies in the [PAPPG](#). The discussion touched on how the policy would be enacted regarding who gives permission and who is responsible for determining impact.

Carlos Martinez then gave an overview of the "Executive Order on Revitalizing Our Nation's Commitment to Environmental Justice for All" and NSF's Strategic Plan outline for feedback from the committee. The discussion touched on the need for metrics, engaging with impacted communities, the challenges in engaging communities in the award funding timeline of a few years, how environmental justice could be addressed in broader impacts, the potential for administrative burden on under-resourced communities, the need for guidance in how to do environmental justice work equitably, and potentially holding a workshop with organizations that are already doing this work to help inform NSF's work in this area.

Blanco then went over the [Environmental Checklist](#) used to gain a better understanding of the potential environmental impacts of proposed projects. This checklist is used as an initial screening tool and gives an idea of what to follow up on. Follow-up may or may not lead to further environmental assessment and possibly reports on environmental impacts.

3:30 – 3:45 p.m. Committee wrap up

Kimberly Jones, Ashley Pierce and Steve Meacham gave closing remarks and thanked the committee and the NSF staff for their time.

3:45 p.m. Adjourn Day 2