

National Association of Marine Laboratories
Annual Winter Meeting
March 2-3, 2023
1201 New York Ave NW, 4th Floor Conference Room
Washington, DC 20005

Prepared by Allison Hays and Meg Thompson, Federal Science Partners



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Biographical Sketches of Speakers and Potential Questions

Advocacy 101: Who, What, When, Where, and Why

March 2, 2023

Peter Hill

Director, Governmental Relations, Woods Hole Oceanographic Institution

Peter Hill spent 20 years working for the U.S. Department of Commerce, National Oceanographic and Atmospheric Administration (NOAA) before becoming the Director of Government Relations for Woods Hole Oceanographic Institution (WHOI) in 2011. As the Director of Government Relations, Hill is responsible for coordinating WHOI's engagement with federal agencies, Congress and nongovernmental partners in Washington, D.C. and New England states. His work focuses on advancing ocean science and policy through legislation, appropriation, and Administration policy making. He works in collaboration with other academic and nonprofit research entities as well as nongovernmental organizations. During his tenure with NOAA, Hill's work included supporting environmental remediation in the Arabian Gulf, a detail on Capitol Hill, leading the legislative office of the National Marine Fisheries Service, working in the NOAA Chesapeake Bay office, and staffing the U.S. Commission on Ocean Policy.

Lauren Linsmayer, Ph.D.

Ocean Science and Policy Professional, Former Professional Staff, U.S. House of Representatives Committee on Science, Space, and Technology

Dr. Lauren Linsmayer is an ocean scientist and policy expert. She most recently served as the Policy Lead at Urban Ocean Lab, a think tank for the future of coastal cities, where she led the development of policy recommendations to enhance ocean-based climate solutions such as offshore wind and seaweed farming. Previously, she worked for nearly four years to bridge science and policy in the U.S. Congress, first as a Knauss Fellow on the Senate Commerce Committee and then as professional staff on the House Science Committee. There, she worked across the aisle and with a diverse array of stakeholders to develop bipartisan legislation on ocean, climate, and weather research. She holds a Ph.D. in Marine Biology and master's degree in Oceanography from Scripps Institution of Oceanography in San Diego, where she researched coral physiology. She also earned a B.S. and M.S. in Earth Systems at Stanford University.

Potential Questions

- Peter and/or Lauren, how do you adjust your advocacy efforts when there is a change in power in Congress or in the administration?
- Peter, you have worked in ocean advocacy for over a decade. Are there any positive or concerning trends you have seen, and what can the community do to grow/address them?
- Lauren, how did your idea of what advocacy should look like change based on your time with the Science Committee? What are key elements you make sure to incorporate in advocacy now?

Updates from the National Science Foundation Division of Ocean Sciences

March 2, 2023

Jim McManus, Ph.D.

Division Director, Ocean Sciences, National Science Foundation

Dr. Jim McManus has over 30 years of experience in marine and environmental research with a broad portfolio of accomplishments in marine chemistry, geology, biology, and physics. He received his BSc in Chemistry from Stockton State College and his PhD in Oceanography from Oregon State University. He also completed post-doctoral research at the University of Southern California and Oregon State University. Since 2016, McManus has served as the Vice President for Research and Administration at the Bigelow Laboratory for Ocean Sciences. He previously held positions as Chair of the Department of Geosciences at the University of Akron and faculty positions at Oregon State University and the University of Minnesota-Duluth. McManus was an IPA in the Division of Ocean Sciences from 2008-2009.

Potential Questions:

- We're getting close to a year since your appointment to NSF was announced. Do you have any impressions or insights about the agency you can share at this stage? Especially if there is anything that being in the agency has provided new insights on that you couldn't necessarily tell from the outside.
- Can you talk at all about the process of developing NSF's annual budget and your involvement in that?
- What can we do to best support your work at OCE?
- Just before you spoke, we held a session on Mentoring Under-represented Minorities in Marine STEM. Last *year's Chips and Science Act* included language around DEI and workforce development, including language to increase access to mentors and professional development opportunities for graduate students and postdocs. Are you able to talk about specific actions OCE or the agency at large is working on around these topics?

Mentoring Underrepresented Minorities in Marine STEM

March 2, 2023

Aly Busse, Mote Marine Laboratory

Aly Busse currently serves as the Associate Vice President for Education at Mote Marine Laboratory overseeing all education, volunteer and intern programs. She obtained a B.S. in Marine Biology from the University of North Carolina at Wilmington and an M.S. in Secondary Education with a Science concentration from Old Dominion University. She is a Doctoral Candidate in the Educational Measurement and Research program with a concentration in Evaluation at the University of South Florida, with an expected graduation of Fall 2023. She has over 20 years of experience in development, management, and evaluation of science education programs, including as co-PI and Project Director for the LSAMP/MarSci-LACE, which is a project led by Mote to increase diversity in marine sciences.

George I. Matsumoto, Monterey Bay Aquarium Research Institute

Dr. George Matsumoto is a Senior Education and Research Specialist at the Monterey Bay Aquarium Research Institute. He has a BA from UC Berkeley, a PhD from UCLA, and spent three years as a marine biology Lecturer at Flinders University of South Australia before taking up his current position at MBARI. Matsumoto serves on a number of regional and national committees including the National Marine Educators Association Traditional Knowledge Committee, the NAML DEI Committee, and the MBARI DEI Advisory Committee. He is also honored by being selected as one of the inaugural members of the AGU Leadership Academy and Network for Diversity and Inclusion in the Geosciences (LANDInG). He runs an educator professional development workshop in the summer along with the MBARI Summer Internship Program. Most of his research is focused on the deep-sea, and he is also part of a mentoring program for students belonging to the Deep Sea Biology Society.

Lauren Wetzell, Kewalo Marine Laboratory

Lauren Wetzell, M.S., is the Educational Specialist with the Kewalo Marine Laboratory at the University of Hawaii at Manoa (UHM). She has over 15 years of work experience in the Pacific region, with a focus on STEM education, curriculum and material development, and the application of technologies to environmental assessment and monitoring. Wetzell has strong technical skills, having worked as a marine technician for YSI/SonTek and Teledyne RD Instruments. She was a community college instructor at the American Samoa Community College (ASCC). She now supports college instructors and students in the management of a National Science Foundation's Advanced Technological Education (NSF ATE) grant project at ASCC, College of Micronesia-FSM, College of the Marshall Islands, Northern Marianas College, and Palau Community College. She also serves as the NSF ATE program evaluator. Wetzell, a first-generation student and single mom, is pursuing her Ph.D. in the Educational Psychology program at UHM. She is exploring Pacific Island student mentorship experiences for the purpose of improving retention and career attainment in marine/environmental science programs in higher education as part of her dissertation.

ARPA-E and the Ocean: Harnessing U.S. Energy Resources Through Transformational Marine Technologies

March 3, 2023

Dan Rogers

Technology-to-Market Advisor, ARPA-E, Department of Energy

Dan Rogers serves as a Tech-to-Market Advisor at the Advanced Research Projects Agency-Energy (ARPA-E), where he focuses on transformative, high-impact marine technologies to address our society's most pressing ocean-related energy and critical resource needs. Rogers brings an extensive background in underwater technology operation, engineering, business development, and strategic partnership building in the marine science and technology field. Rogers has supported dozens of deep-sea robotic missions across the globe as a remotely operated vehicle (ROV) pilot and mechanical engineer and served as the technical lead for many of these missions. This includes working with 6,000 meter-rated ROV systems aboard NOAA Ship Okeanos Explorer, the premiere platform for federal ocean exploration and technology innovation. In his previous position at the Washington, D.C.-based Consortium for Ocean Leadership, Rogers organized and facilitated workshops and strategic convenings involving dozens of partners from across industry, government, and academic institutions to capitalize on shared priorities and advance community-wide goals for ocean science, data, and technology. This role provided opportunities to support a wide range of industry groups, from nascent start-ups to well-known international companies, who are developing and scaling innovative technologies for marine energy and critical resource applications. Rogers holds a B.S. in Physics from the University of Massachusetts Amherst and an M.S. in Mechanical Engineering from the University of Hawai'i at Mānoa. Additionally, he holds a Master of Business Administration with a concentration in Environmental Policy from the University of Massachusetts Dartmouth.

Potential Questions

- What could NAML do to support your work advancing these critical technologies?
- Where do you see the future of growth in this field? Does it align with the needs you saw in your operational work?

Partnering with the new NSF Directorate for Technology, Innovation and Partnerships

March 3, 2023

Allen Walker

Senior Advisor, Technology, Innovation, and Partnerships (TIP) Directorate, National Science Foundation

Allen Walker is a senior advisor in the U.S. National Science Foundation's newly established Directorate for Technology, Innovation and Partnerships. In this position, Walker focuses on potential partnerships through engagement with stakeholders across government, academia, industry, and nonprofits. He also advises directorate leadership on research and development strategy and policy. Prior to joining the NSF in 2023, Walker was the Special Assistant to the Defense Advanced Research Projects Agency (DARPA) Director, advising on transitioning advanced technologies to the U.S. Army. In 2022, he retired from the U.S. Army after a 26-year distinguished military career, including 10 years in leadership and senior positions. Walker holds a bachelor's degree in computer science from Drew University and a master's degree in operations from the U.S. Air Force Air University.

Potential Questions

- NAML's priorities include supporting federally funded extramural research, education, observations, and infrastructure to support the vital role of marine and Great Lakes laboratories. How do you see opportunities related to these topics in the TIP Directorate?

Key Congressional Committees for NAML in the 118th Congress Information current as of February 22, 2023

Appropriations Committees

The Appropriations Committee decides funding levels for federal departments and agencies. It is also responsible for supplemental spending bills, which are drafted on an as-needed basis to compensate for emergency expenses.

Senate Appropriations Committee Subcommittee on Commerce, Justice, and Science

Website: <https://www.appropriations.senate.gov/>

Majority

Sen. Jeanne Shaheen, Chair (D-NH)
Sen. Dianne Feinstein (D-CA)
Sen. Jack Reed (D-RI)
Sen. Chris Coons (D-DE)
Sen. Brian Schatz (D-HI)
Sen. Joe Manchin (D-WV)
Sen. Chris Van Hollen (D-MD)
Sen. Jeff Merkley (D-OR)
Sen. Gary Peters (D-MI)

Minority

Sen. Jerry Moran (R-KS), Ranking Member
Sen. Lisa Murkowski (R-AK)
Sen. Susan Collins (R-ME)
Sen. Shelley Moore Capito (R-WV)
Sen. John Kennedy (R-LA)
Sen. Bill Hagerty (R-TN)
Sen. Katie Britt (R-AL)
Sen. Deb Fischer (R-NE)

House Appropriations Committee Subcommittee on Commerce, Justice, and Science

Website (majority): <https://appropriations.house.gov/>

Website (minority): <https://democrats-appropriations.house.gov/>

Majority

Rep. Hal Rogers (R-KY-5), Chair
Rep. Robert Aderholt (R-AL-4)
Rep. John Carter (R-TX-31)
Rep. Ben Cline (R-VA-6)
Rep. Mike Garcia (R-CA-27)
Rep. Tony Gonzales (R-TX-23)
Rep. Andrew Clyde (R-GA-9)
Rep. Jake Ellzey (R-TX-6)

Minority

Rep. Matt Cartwright (D-PA-8), Ranking Member
Rep. Grace Meng (D-NY-6)
Rep. C.A. Dutch Ruppersberger (D-MD-2)
Rep. David Trone (D-MD-6)
Rep. Joe Morelle (D-NY-25)
Rep. Rosa DeLauro (D-CT-3), Ex Officio

Authorizing Committees

Senate Committee on Commerce, Science, and Transportation

Website (majority): <https://www.commerce.senate.gov/>
Website (minority): <https://www.commerce.senate.gov/minority>

The Senate Commerce Committee authorizes the programs of NOAA, NSF, NASA, NIST, and OSTP. This includes marine and ocean navigation, safety, and transportation; marine fisheries; non-military aeronautical and space sciences; ocean, weather, and atmospheric activities; science, engineering, and technology research and development and policy; and transportation and commerce aspects of Outer Continental Shelf lands.

Subcommittees:

- Aviation Safety, Operations, and Innovation
- Communications, Media, and Broadband
- Consumer Protection, Product Safety, and Data Security
- Oceans, Fisheries, Climate Change, and Manufacturing
- Space and Science
- Surface Transportation, Maritime, Freight, and Ports

Majority

Sen. Maria Cantwell (D-WA), Chair
Sen. Amy Klobuchar (D-MN)
Sen. Brian Schatz (D-HI)
Sen. Ed Markey (D-MA)
Sen. Gary Peters (D-MI)
Sen. Tammy Baldwin (D-WI)
Sen. Tammy Duckworth (D-IL)
Sen. Jon Tester (D-MT)
Sen. Krysten Sinema (I-AZ)
Sen. Jacky Rosen (D-NV)
Sen. Ben Ray Lujan (D-NM)
Sen. John Hickenlooper (D-CO)
Sen. Ralph Warnock (D-GA)
Sen. Peter Welch (D-VT)

Minority

Sen. Ted Cruz (R-TX), Ranking Member
Sen. John Thune (R-SD)
Sen. Roger Wicker (R-MS)
Sen. Deb Fischer (R-NE)
Sen. Jerry Moran (R-KS)
Sen. Dan Sullivan (R-AK)
Sen. Marsha Blackburn (R-TN)
Sen. Todd Young (R-IN)
Sen. Ted Budd (R-NC)
Sen. Eric Schmitt (R-MO)
Sen. J.D. Vance (R-OH)
Sen. Shelly Moore Capito (R-WV)
Sen. Cynthia Lummis (R-WY)

House Natural Resources Committee

Website (majority): <https://naturalresources.house.gov/>
Website (minority): <https://democrats-naturalresources.house.gov/>

The committee considers legislation about American energy production, mineral lands and mining, fisheries and wildlife, public lands, oceans, Native Americans, irrigation and reclamation.

Subcommittees:

- Energy and Mineral Resources
- Federal Lands
- Indian and Insular Affairs
- Oversight and Investigations
- Water, Wildlife and Fisheries

Majority

Rep. Bruce Westerman (R-AR-4), Chair
Rep. Doug Lamborn (R-CO-5)
Rep. Rob Wittman (R-VA-1)
Rep. Tom McClintock (R-CA-5)
Rep. Paul Gosar (R-AZ-9)
Rep. Garret Graves (R-LA-6)
Rep. Amata Coleman Radewagen (R-AS-1)
Rep. Doug LaMalfa (R-CA-1)
Rep. Daniel Webster (R-FL-11)
Rep. Jenniffer González-Colón (R-PR-1)
Rep. Russ Fulcher (R-ID-1)
Rep. Pete Stauber (R-MN-8)
Rep. John Curtis (R-UT-3)
Rep. Tom Tiffany (R-WI-7)
Rep. Jerry Carl (R-AL-1)
Rep. Matt Rosendale (R-MT-2)
Rep. Lauren Boebert (R-CO-3)
Rep. Cliff Bentz (R-OR-2)
Rep. Jen Kiggans (R-VA-2)
Rep. Jim Moylan (R-GU-1)
Rep. Wesley Hunt (R-TX-38)
Rep. Mike Collins (R-GA-10)
Rep. Anna Paulina Luna (R-FL-13)
Rep. John Duarte (R-CA-13)
Rep. Harriet Hageman (R-WY-1)

Minority

Rep. Raúl M. Grijalva (D-AZ-7), Ranking Member
Rep. Grace F. Napolitano (D-CA-31)
Rep. Jim Costa (D-CA-21)
Rep. Gregorio Kilili Camacho Sablan (D-MP-1)
Rep. Jared Huffman (D-CA-2)
Rep. Ruben Gallego (D-AZ-3)
Rep. Joe Neguse (D-CO-2)
Rep. Mike Levin (D-CA-49)
Rep. Katie Porter (D-CA-47)
Rep. Teresa Leger Fernández (D-NM-3)
Rep. Melanie Stansbury (D-NM-1)
Rep. Mary Sattler Peltola (D-AK-1)
Rep. Alexandria Ocasio-Cortez (D-NY-14)
Rep. Kevin Mullin (D-CA-15)
Rep. Val Hoyle (D-OR-4)
Rep. Sydney Kamlager-Dove (D-CA-37)*
Rep. Seth Magaziner (D-RI-2)
Rep. Nydia M. Velázquez (D-NY-7)
Rep. Ed Case (D-HI-1)
Rep. Debbie Dingell (D-MI-6)

* Vice Ranking Member

Website (majority): <https://science.house.gov/>
Website (minority): <https://democrats-science.house.gov/>

The committee has jurisdiction over much of non-defense federal research and development. This includes exclusive jurisdiction over NASA, NSF, NIST, and OSTP and the research and development activities of agencies including NOAA, DOE, and EPA.

Subcommittees:

- Energy
- Environment
- Investigations and Oversight
- Research and Technology
- Space and Aeronautics

Majority

Rep. Frank Lucas (R-OK-3), Chair
Rep. Bill Posey (R-FL-08)
Rep. Randy Weber (R-TX-14)
Rep. Brian Babin (R-TX-36)
Rep. Jim Baird (R-IN-04)
Rep. Daniel Webster (R-FL-11)
Rep. Mike Garcia (R-CA-27)
Rep. Stephanie Bice (R-OK-05)
Rep. Jay Obernolte (R-CA-23)
Rep. Darrell Issa (R-CA-48)
Rep. Rick Crawford (R-AR-1)
Rep. Claudia Tenney (R-NY-24)
Rep. Scott Franklin (R-FL-18)
Rep. Dale Strong (R-AL-05)
Rep. Max Miller (R-OH-07)
Rep. Rich McCormick (R-GA-06)
Rep. Mike Collins (R-GA-10)
Rep. Brandon Williams (R-NY-22)
Rep. Tom Kean (R-NJ-07)
3 vacancies remain

Minority

Rep. Zoe Lofgren (D-CA-18), Ranking Member
Rep. Suzanne Bonamici (D-OR-1)
Rep. Haley Stevens (D-MI-11)
Rep. Jamaal Bowman (D-NY-16)
Rep. Deborah Ross (D-NC-2)
Rep. Eric Sorensen (D-IL-17)
Rep. Andrea Salinas (D-OR-06)
Rep. Valerie Foushee (D-NC-04)
Rep. Kevin Mullin (D-CA-15)
Rep. Jeff Jackson (D-NC-14)
Rep. Emilia Sykes (D-OH-13)
Rep. Maxwell Frost (D-FL-10)
Rep. Yadira Caraveo (D-CO-08)
Rep. Summer Lee (D-PA)
Rep. Ted Lieu (D-CA-36)
Rep. Sean Casten (D-IL-6)
2 vacancies remain

FY 2023 Omnibus Review

December 20, 2022

Summary of FY 2023 Omnibus Appropriations Bill for National Association of Marine Laboratories: Commerce-Justice-Science (Division B) and Disaster Relief Supplemental (Division N)

In the early hours of December 20, Congress released their omnibus spending bill. This \$1.7 trillion government funding package will fund federal agencies for the remainder of fiscal year (FY) 2023, which began on October 1. Since the start of the fiscal year, agencies have been operating at FY 2022 levels, thanks to a short-term continuing resolution (CR) that ran until December 16. When that expired, Congress passed another week-long stopgap measure to give them time to get the omnibus spending bill over the finish line before the winter holidays.

Congress' ability to finalize FY 2023 spending was not a certainty, particularly as the mid-term elections shifted the House majority to the Republicans for the 118th Congress. Many in the GOP argued that they should wait to finish spending bills in January, when they'd have more input, while others in the party wanted to be able to start the new Congress without having to finish work held over from the 117th Congress. Appropriations Committee Vice Chairman Richard Shelby (R-AL), who is retiring, was a vocal advocate for finishing the appropriations bills before the end of the Congress, as was his Democratic counterpart Appropriations Chairman Patrick Leahy (D-VT), who is also retiring.

The Senate began taking procedural votes on the omnibus on Monday night and are expected to vote on final passage on Thursday, giving the House one day to pass the spending package before the CR expires and they adjourn for the winter recess.

Bill text and the accompanying joint explanatory statements (which provide more detail and indicate congressional intent) can be found [here](#). The following document goes into detail on items of interest found in *Division B, the Commerce, Justice, Science (CJS), and Related Agencies Appropriations Act, 2023*, which funds the National Science Foundation (NSF), the National Oceanic and Atmospheric Administration (NOAA), and the National Aeronautics and Space Administration (NASA).

Congress also included supplemental disaster relief funding in *Division N*; NSF, NOAA, and NASA all received some of this funding, which is also highlighted in the following document.

The joint explanatory statement (also sometimes referred to as "the conference report") for *Division B* states that, unless otherwise noted, language from the House Report carries the same weight as language in the joint explanatory statement and should be complied with unless specifically addressed to the contrary in the explanatory statement. While the explanatory statement repeats some language for emphasis, it is not intended to negate the

language of the House Report unless expressly provided therein. Similar language is customarily included in appropriations explanatory statements to give authority to the underlying House and Senate Reports. This fiscal year the Senate did not pass any appropriations bills and therefore the language only refers to the House reports.

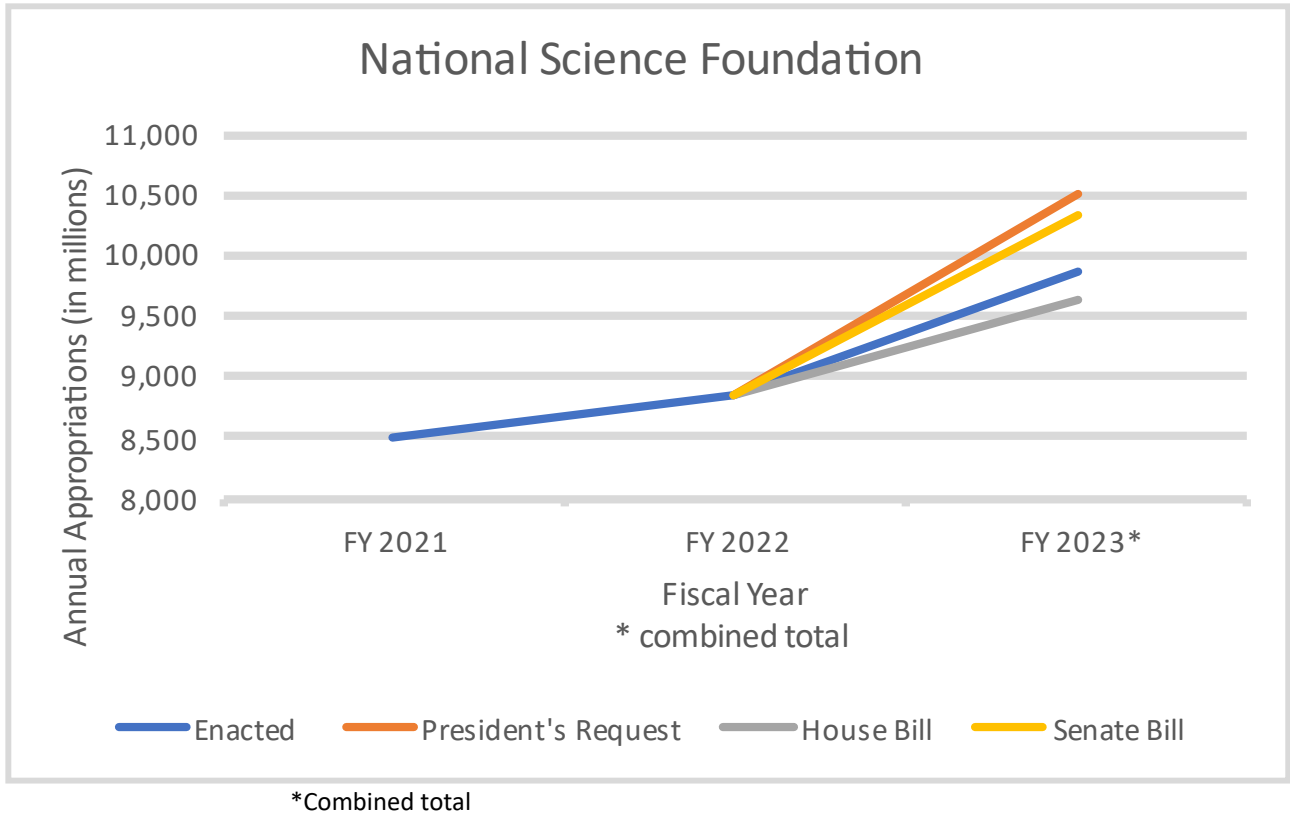
The explanatory statement also notes that spend plans are due to the appropriations committees no later than 45 days after the enactment of this act and that the Government Accountability Office (GAO) will conduct ongoing reviews of large NASA projects and major research equipment and facilities construction at NSF, with reports due to the appropriations committees on a semiannual basis.

National Science Foundation (NSF)

In total, Congress appropriated \$9.9 billion to NSF. On its face, this represents the largest dollar increase NSF has ever gotten and the largest percentage increase in 20 years. This amount includes \$8.8 billion (via the conventional Commerce-Justice-Science appropriations bill, Division B, with the funds split between Research and Related Activities, STEM Education, Major Research Equipment and Facilities Construction, and other operating accounts) and \$1.0 billion that was appropriated to Research and Related Activities and to STEM Education through the supplemental disaster relief funding (Division N). Of that supplemental funding, \$335 million will fund items authorized in the CHIPS and Science Act (PL 117-167), which leaves an additional \$702.7 million in supplemental funds for other NSF activities in those two accounts.

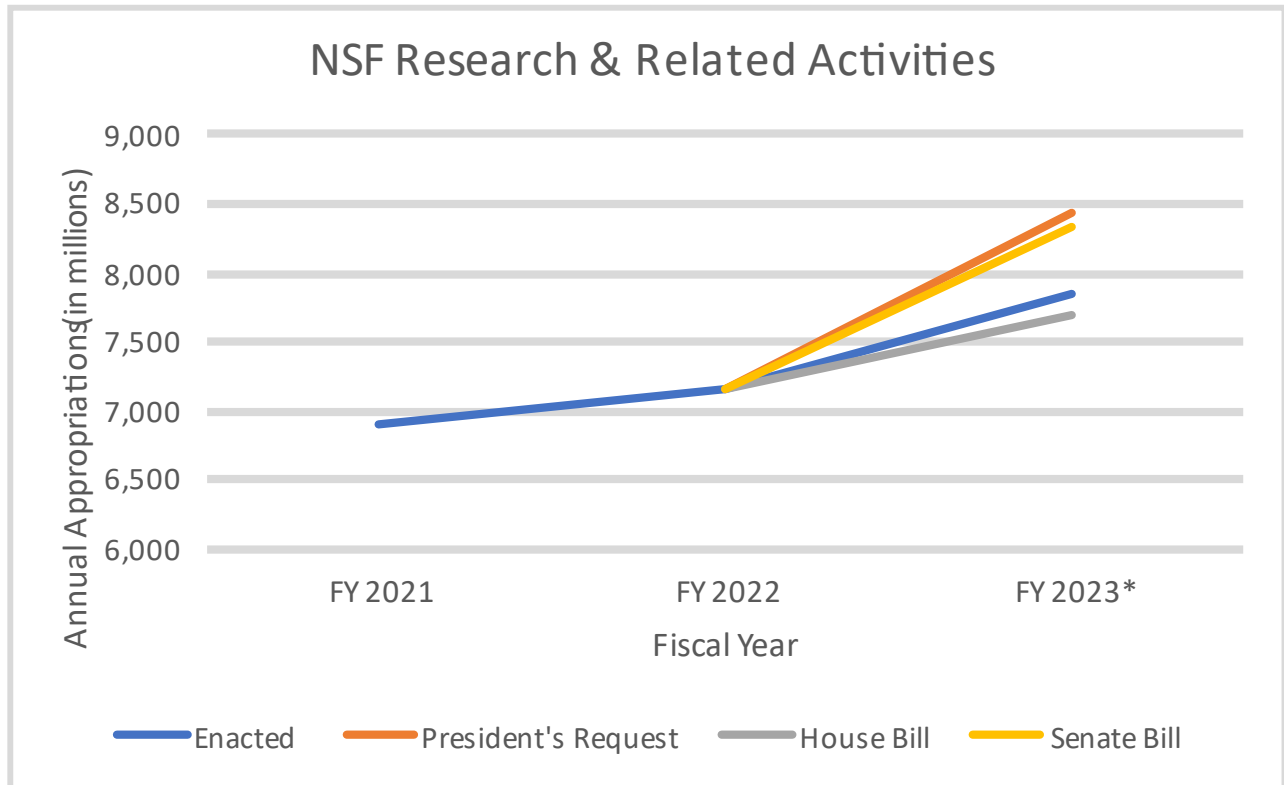
As a result of the appropriations provided by Division B and Division N, Research and Related Activities will see a \$682 million increase over FY 2022 enacted levels (a 10% increase) and STEM Education will see a \$365 million increase over FY 2022 enacted levels (a 36% increase).

While this supplemental funding leads to some impressive numbers for FY 2023, it should be noted that the annual NSF appropriation included in Division B for FY 2023 is only \$849,000 more than in FY 2022. Research and Related Activities would have seen a \$138.3 million decrease (2%) without the emergency funding. While we should celebrate the high overall numbers for FY 2023—thanks to the supplemental funding—NSF supporters should be concerned about whether this supplemental funding will become part of the base budget for NSF or be treated as “one shot” funding and get prepared for an uphill slog when it comes to increasing agency funding through regular appropriations in FY 2024.



The following includes relevant funding decisions for NSF’s accounts.

Research and Related Activities (R&RA):
 Explanatory statement: \$7.8 billion (combined total)
 Senate bill: \$8.3 billion
 House bill: \$7.7 billion
 President's budget request: \$8.4 billion
 FY 2022 enacted: \$7.2 billion



*combined total

Technology, Innovation, and Partnerships

The agreement recognizes NSF's critical role in driving U.S. scientific and technological innovation and supports the Directorate for Technology, Innovation, and Partnerships (TIP) authorized under the Research and Development, Competition, and Innovation Act (division B of Public Law 117-167).

Regional Innovation Engines (NSF Engine)

As part of the TIP Directorate, the agreement supports the Regional Innovation Engines, authorized under section 10388 of Public Law 117-167, to create regional-scale innovation ecosystems throughout the United States and help spur economic growth by bringing together the science and technology research enterprise and regional-level resources to promote long-term national competitiveness. In implementing the NSF Engines, the Foundation is encouraged to coordinate with the EDA Regional Technology Hubs program.

Established Program to Stimulate Competitive Research (EPSCoR)

The agreement reinforces the Research and Development, Competition, and Innovation Act (the NSF part of the CHIPS and Science Act -- Public Law 117-167) requirements that, to the maximum extent practicable, 15.5 percent of NSF research funding and 16 percent of scholarship funding go to EPSCoR States in fiscal year 2023. To help achieve these targets, the agreement provides no less than \$245,000,000 for the EPSCoR program. Within the amount provided, no more than 5 percent shall be used for administration and other overhead costs. NSF is encouraged to support projects in EPSCoR States across all funding initiatives and centers, including Regional Innovation Engines, Mid-Scale Research Infrastructure awards, and Science and Technology Centers.

Growing Research Access for Nationally Transformative Equity and Diversity (GRANTED)

The agreement supports NSF's new GRANTED initiative that will provide assistance to mitigate the barriers to competitiveness at underserved institutions within the Nation's research enterprise. NSF is encouraged to leverage its expertise to ensure institutions participating in GRANTED are able to implement best practices in order to increase the likelihood of award success through increased research capacity.

Infrastructure Investments

Unless otherwise noted, within amounts provided, NSF is directed to allocate no less than the fiscal year 2022 enacted levels to maintain its core research levels, including support for existing scientific research laboratories; observational networks; and other research infrastructure assets, such as the astronomy assets, the current academic research fleet, federally-funded research and development centers, and the national high performance computing centers.

Mid-Scale Research Infrastructure

The agreement provides up to the request level for the Mid-scale Research Infrastructure program.

Academic Research Infrastructure

The agreement recognizes there is considerable support for academic research infrastructure construction and modernization across all directorates. Therefore, NSF is encouraged to evaluate its requirements for facilities programs that provide the academic and research community support for access to critical research facilities and platforms to ensure that the programs benefit broad and diverse segments of the science and technology community.

In particular, NSF is encouraged to support the construction or acquisition of local-class research vessels through the Major Research infrastructure program or Mid-scale Research Infrastructure that will provide outstanding experiential, place-based education and to support innovative research and educational programs focused on understanding and sustaining the near-coastal marine and estuarine environments.

Fairness in Merit Review

NSF shall brief the Committees, no later than 180 days after the enactment of this act, on its actions and findings in understanding and addressing bias in the merit review process. As part of this briefing, NSF shall include a discussion of the option of adopting institution-blind, investigator-blind, and dual-anonymous processes for merit review of proposals, with a focus on the fairness of the process faced by all applicants.

Research Security

The agreement notes the importance placed on research security in Public Law 117-167 and supports the implementation of the various provisions in fiscal year 2023. The agreement further supports NSF's initiative to create clear guidelines that inform researchers and universities on disclosure requirements pertaining to research security. NSF is encouraged to continue to engage university and affinity groups to listen to any community concerns and share information about NSF's policies and processes. NSF is further encouraged to explore ways to assist less-resourced institutions on disclosure requirements and international talent retention.

Not later than 90 days after enactment of this act, NSF shall brief the Committees on its plans for fulfilling the requirements of Public Law 117-167 with regard to research security, including its ongoing plans for community outreach and engagement.

Power Dynamics in the Research Community

House language on "Power Dynamics in the Research Community" is adopted. NSF is encouraged to continue to develop approaches to analyze and study means to address potential bias and develop safe spaces to voice concerns without the fear of repercussion in the research community. NSF shall provide a report to the Committees on these activities no later than 180 days after enactment of this act.

Major Research Equipment and Facilities Construction

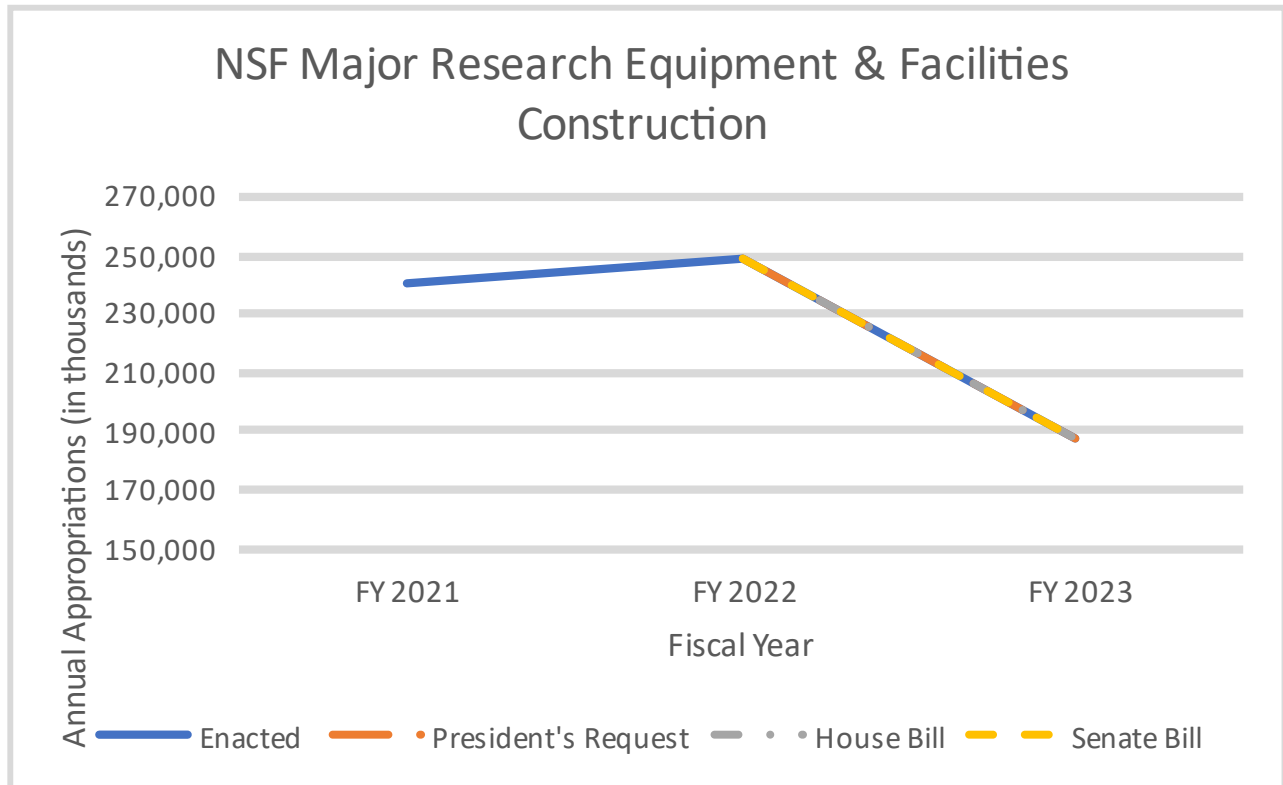
Explanatory statement: \$187.2 million

Senate bill: \$187.2 million

House bill: \$187.2 million

President's budget request: \$187.2 million

FY 2022 enacted: \$249.0 million



The agreement provides \$187,230,000 for Major Research Equipment and Facilities Construction (MREFC), including the requested levels for the continued construction of the Vera C. Rubin Observatory (previously known as the Large Synoptic Survey Telescope), the Antarctic Infrastructure Recapitalization (previously known as the Antarctic Infrastructure Modernization for Science), Regional Class Research Vessels, and the High Luminosity-Large Hadron Collider Upgrade. The Government Accountability Office is directed to continue its annual reviews and semiannual updates of programs funded within MREFC and shall report to Congress on the status of large-scale NSF projects and activities based on its review of this information. NSF shall continue to provide quarterly briefings to the committees on the activities funded in this account, no later than 60 days after the end of each quarter.

Mid-scale Research Infrastructure

The agreement includes \$76,250,000 for Mid-scale Research Infrastructure. This is in addition to Mid-scale Research Infrastructure included in Research and Related Activities. The Foundation is encouraged to award at least one Mid-scale Research Infrastructure project led by an institution in an EPSCoR State.

STEM Education

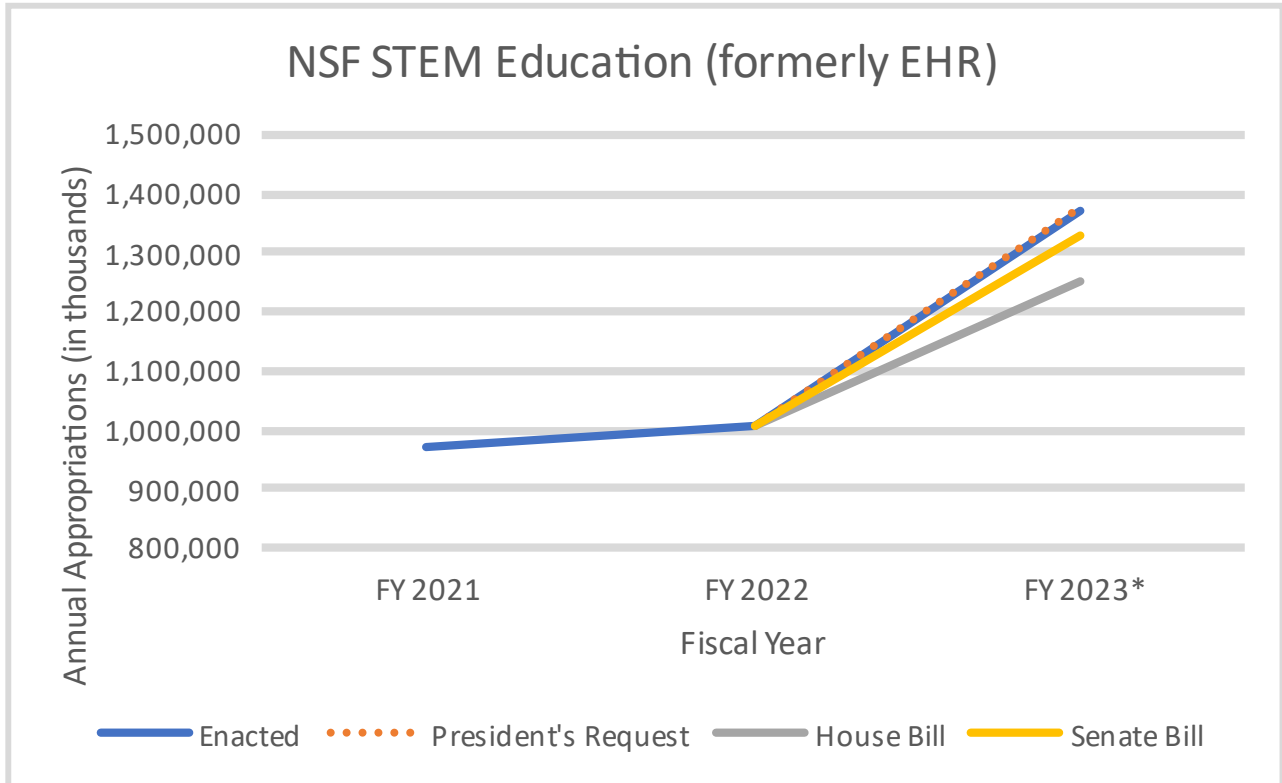
Conference report: \$132 billion

Senate bill: \$1.3 billion

House bill: \$1.3 billion

President's budget request: \$1.4 billion

FY 2022 enacted: \$1.0 billion



*combined total

The agreement accepts NSF's proposal to rename the Directorate for Education and Human Resources as the Directorate for STEM Education (EDU).

Graduate Research Fellowship Program (GRFP)

The agreement accepts NSF's proposal to consolidate GRFP within EDU and provides up to \$325,000,000, an increase of \$29,000,000 above the fiscal year 2022 enacted level, to increase the fellowship stipend, as requested, as well as to increase the number of fellows.

Broadening Participation

The agreement supports the requested increases related to Broadening Participation in STEM programs. NSF is encouraged to ensure the Foundation partners with communities with significant populations of underrepresented groups within STEM research and education as well as the STEM workforce. The agreement provides no less than \$55,500,000 for Louis Stokes Alliances for Minority Participation; \$43,000,000 for the Historically Black Colleges and Universities Undergraduate Program; \$20,000,000 for the Tribal Colleges and Universities

Program; \$70,000,000 for Advancing Informal STEM Learning; \$9,500,000 for the Alliances for Graduate Education and the Professoriate; \$27,000,000 for Centers of Research Excellence in Science and Technology; \$68,000,000 for the Robert Noyce Teacher Scholarship Program; and \$19,000,000 for ADVANCE.

Eddie Bernice Johnson Inclusion Across the Nation of Communities of Learners of Underrepresented Discoverers in Engineering and Science (INCLUDES) Initiative

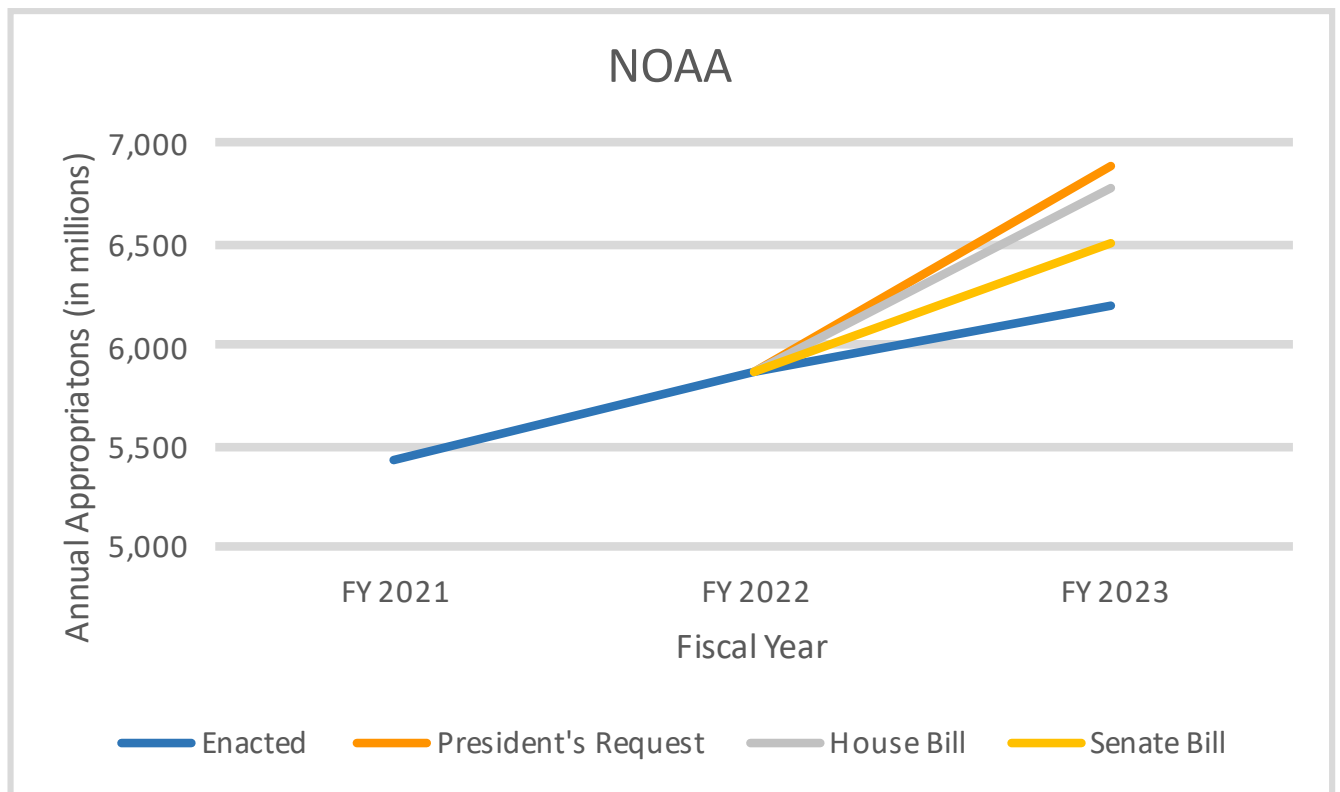
The agreement supports the Big Idea to broaden participation in science and engineering by developing networks and partnerships that involve organizations and consortia from different sectors committed to the common agenda of STEM inclusion as authorized in section 10323 of Public Law 117-167. The agreement provides not less than \$24,000,000 for INCLUDES and encourages NSF to ensure the agency partners with communities with significant populations of underrepresented groups in the STEM workforce.

National Oceanic and Atmospheric Administration (NOAA)

Division B outlines \$6.2 billion for NOAA, an increase of \$324 million over FY 2022 enacted (a 6% increase).

NOAA also receives funding through the disaster relief supplemental (Division N). In the Operations, Research, and Facilities (ORF) account, there is \$29 million for expenses related to the consequences of hurricanes, typhoons, flooding, and wildfire in 2022, for repair and replacement of observing assets, real property, and equipment; for marine debris assessment and removal; and for mapping, charting, and geodesy services. There is also \$62 million to ORF, \$20 million of which is to support the adoption of innovation fishing gear deployment and fishing techniques to reduce entanglement risk to North Atlantic right whales, including through cooperative agreements pursuant to the National Fish and Wildlife Foundation Act.

The disaster relief supplemental also includes funding to Procurement, Acquisition, and Construction (PAC) for a hurricane hunter aircraft (\$327.7 million), an additional \$108.8 million, and \$300.0 million for Fisheries Disaster Assistance.



*from Division B

Climate Ready Nation

The agreement adopts the direction under the heading "Climate Ready Nation" in the House report but provides alternate funding levels along with supplementary direction. The agreement supports the designation of a new position within Mission Support Executive

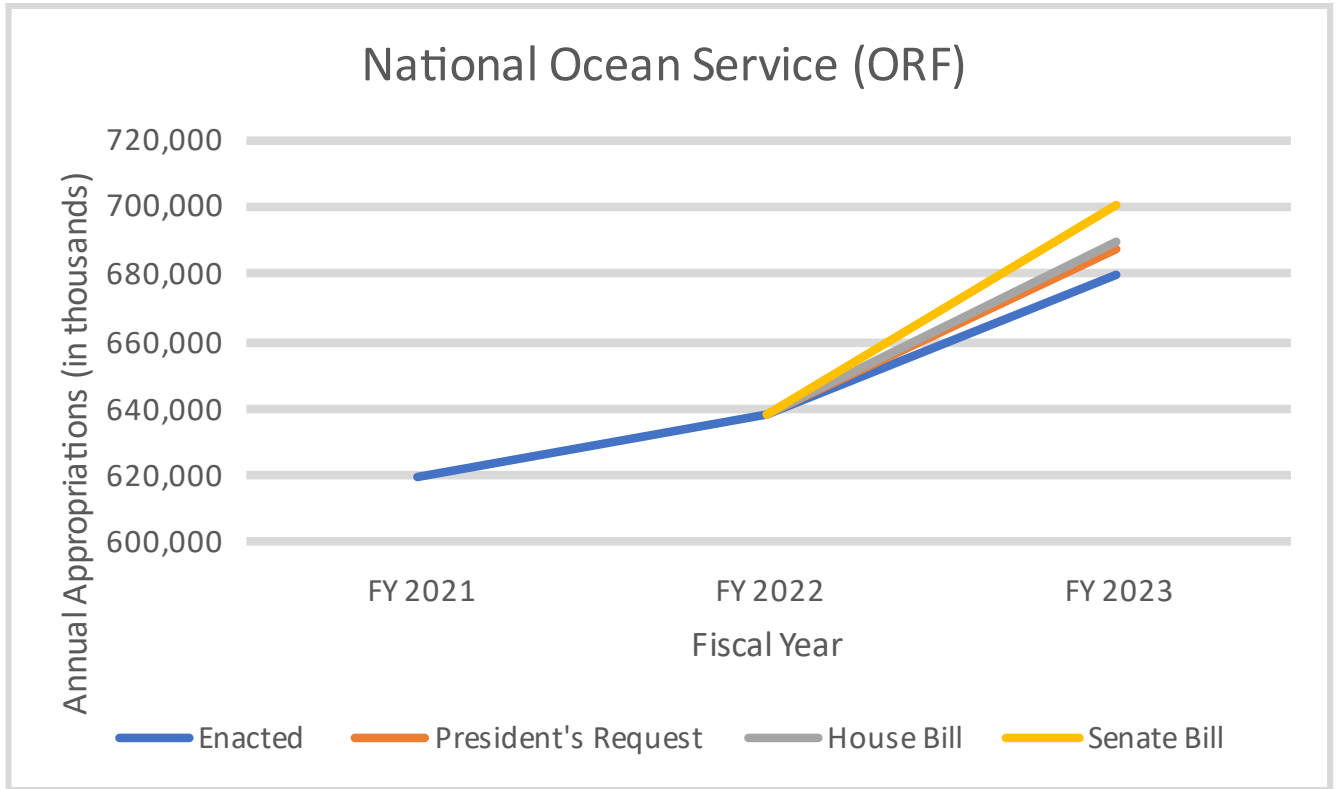
Leadership as directed in the House report and provides an increase of up to \$500,000 above the fiscal year 2022 enacted level. As part of this work, within the Office of Oceanic and Atmospheric Research (OAR) Climate Laboratories and Cooperative Institutes, the agreement provides \$6,500,000 for Climate Change Projections out to 2050 to Inform Risk Management, including \$4,000,000 in support of the Water in the West Initiative.

Healthy Ocean Collaborations

NOAA is encouraged to pursue collaborations with academic institutions located in close proximity to the agency's Disaster Response Center and seafood safety labs to advance education, training, recruitment, and research efforts.

The following includes more detailed information on relevant NOAA line offices in the Operations, Research, and Facilities (ORF) account from funding provided in Division B.

National Ocean Service (ORF)
 Explanatory statement: \$679.4 million
 Senate bill: \$701.0
 House bill: \$689.2 million
 President's budget request: \$686.9 million
 FY 2022 enacted: \$637.7 million



NOAA Center of Excellence for Operational Ocean and Great Lakes Mapping

The agreement provides \$10,000,000 for a NOAA Center of Excellence for Operational Ocean and Great Lakes Mapping. Working in unison with and leveraging existing capabilities, including the Joint Hydrographic Center, the Center shall work across NOAA line offices, including NOS, OAR, and the Office of Marine and Aviation Operations (OMAO), to support and grow the Nation's deep water, shallow water, and coastal mapping capabilities and data holdings, in partnership with industry. In particular, the Center shall serve as: (1) a focal point for activities transitioning developments in mapping platforms, sensors, and concepts of operations into operations; (2) a focal point for applied training for mapping and surveying operations, to grow and diversify the pool of well-qualified talent in this expanding field; (3) an agency-wide capability to provide technical support for ocean mapping technologies to operators in the field on an increasingly diverse set of platforms; and (4) a mechanism to leverage public-private partnerships in advancing the Nation's ocean and Great Lakes mapping goals.

Integrated Ocean Observing System (IOOS)

The agreement provides \$42,500,000 for IOOS to recapitalize and expand observing system infrastructure based upon the highest priority needs of each region to support disaster response, weather forecasting and hurricane prediction, forecasting of freshwater and marine water quality, detection of harmful algal blooms (HABs), and safe maritime operations. This may include buoys, high frequency radar, and underwater profiling gliders. IOOS regional associations are encouraged to consider leveraging existing capabilities of the commercial sector, including uncrewed systems, to meet observational needs through commercial data buys. The agreement provides not less than \$3,000,000 to continue and expand the IOOS HAB pilot programs initiated in fiscal year 2020 and to support the existing HAB monitoring and detection test bed.

Harmful Algal Blooms

The agreement provides \$22,500,000 for Competitive Research, including not less than \$14,000,000 for HABs research, including within the Great Lakes ecosystem, and adopts House direction for these funds. From within this funding, \$2,000,000 is provided to explore innovative methods to increase monitoring and detection of HABs in freshwater systems by partnering with academic institutions with expertise in unmanned aircraft systems. In addition, NOAA is encouraged to fund long-term HAB research in the Gulf of Mexico that further develops ongoing partnerships involving academic institutions, the private sector, and State governments. Further, House language is modified to provide up to \$1,000,000 to expand both existing and new program support for States to assess domoic acid levels of HAB species in the marine environment.

Improving Coastal Resilience

Within the funding for Competitive Research, NOAA is encouraged to provide information and predictive capabilities to coastal communities, especially those with underserved populations, and to encourage natural-based solutions to address coastal hazards like sea level rise, flooding, and inundation.

Sea Level Rise and Coastal Resilience

House language on "Sea Level Rise and Coastal Resilience" is adopted in support of the Climate Ready Nation initiative. For this work, and for Data Development and Products and Services for Coastal Resilience, Coastal Hazards, and Climate Adaptation, the agreement provides an increase of \$2,500,000 above the fiscal year 2022 enacted level, including \$1,500,000 in Coastal Science, Assessment, Response and Restoration and \$1,000,000 in Coastal Zone Management and Services.

Coral Reef Program

The agreement provides \$33,500,000 for the Coral Reef Program, including not less than the fiscal year 2022 enacted level for NOS to work with academic institutions and non-governmental research organizations to carry out innovative restoration projects to restore degraded coral reefs. NOAA is encouraged to expand its collaborative work with external academic partners that conduct scientific research for the conservation of corals and coral reef

ecosystems, including those that are experiencing an increasing prevalence of disease outbreaks. Restoration projects should utilize genetic strains that demonstrate enhanced resiliency to increased water temperatures, decreased pH, and coral disease, and include designs for multiyear monitoring to assess survival and ecosystem health.

In addition, through NOAA Community Project Funding/NOAA Special Projects, the agreement provides \$6,142,000 for coral research and restoration.

Sanctuaries and Marine Protected Areas

The agreement provides \$68,000,000 for Sanctuaries and Marine Protected Areas, which is \$7,000,000 above the fiscal year 2022 enacted level. House language on "Sanctuaries and Marine Protected Areas" is adopted and within the increased funding provided, NOS shall continue to support ongoing sanctuary designation processes and is encouraged to commence designations of new sites, in particular within the Great Lakes ecosystem.

National Marine Fisheries Service (ORF)

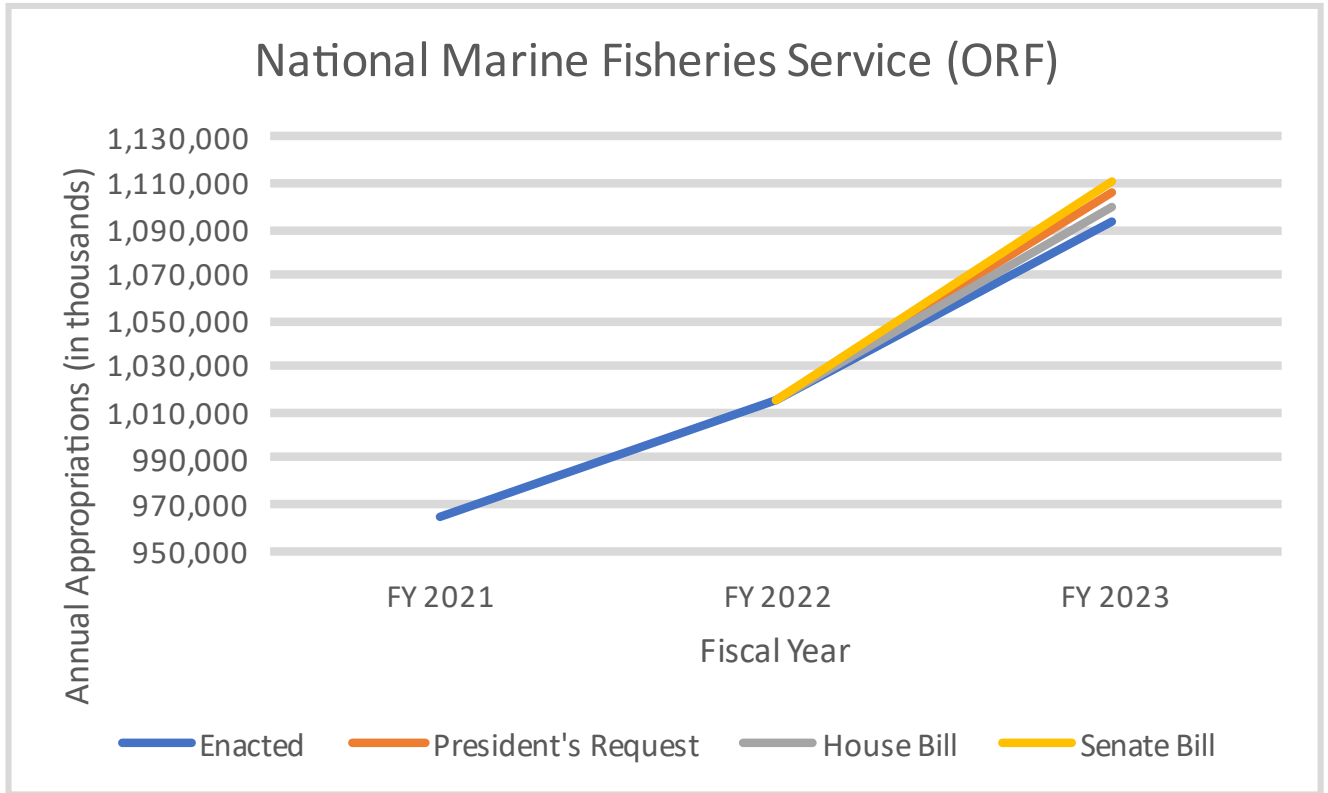
Explanatory statement: \$1.1 billion

Senate bill: \$1.1 billion

House bill: \$1.1 billion

President's budget request: \$1.1 billion

FY 2022 enacted: 1.0 billion



John H. Prescott Marine Mammal Rescue Assistant Grant Program

No less than \$4,500,000

Office of Oceanic and Atmospheric Research (ORF)

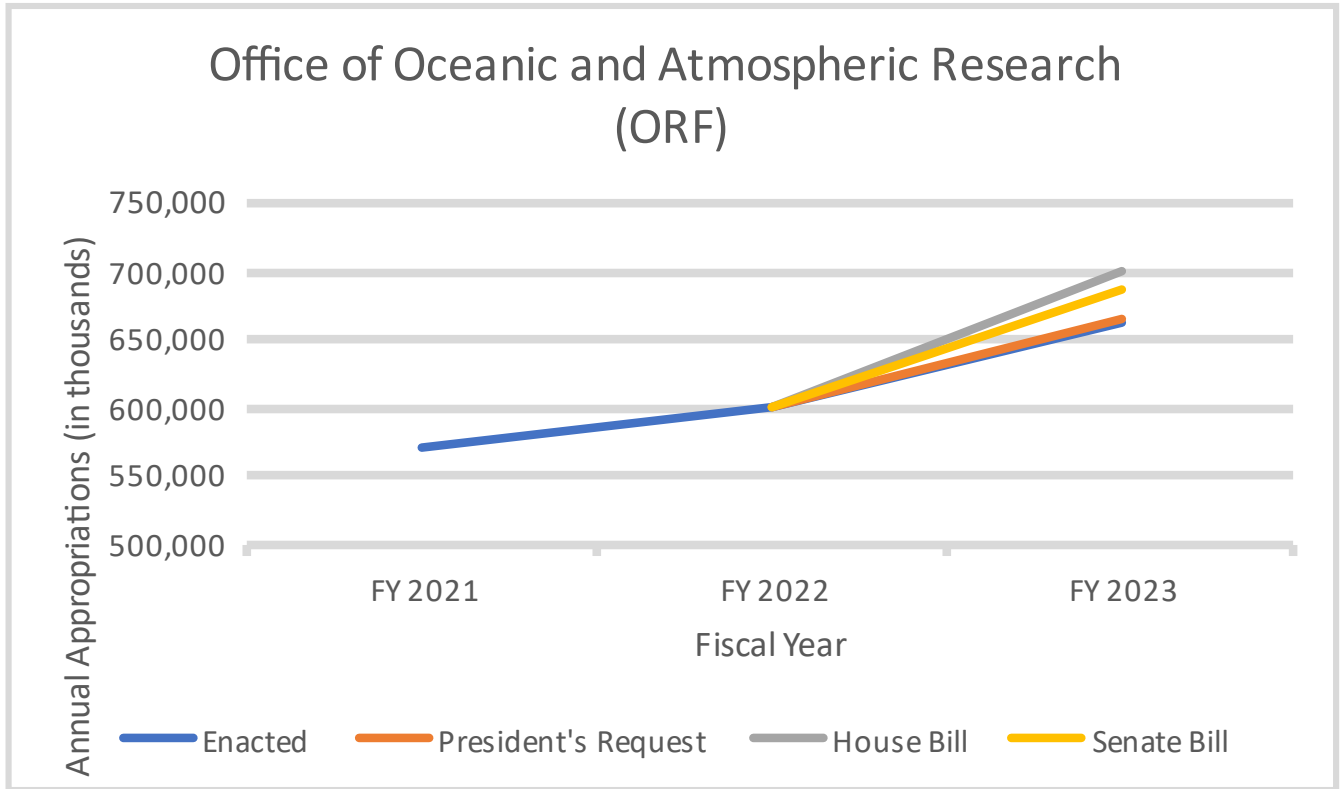
Explanatory statement: \$661.3

Senate bill: \$687.8 million

House bill: \$699.1 million

President's budget request: \$666.3 million

FY 2022 enacted: \$599.4 million



Resilience and Adaptation Cooperative Institute (CI)

The agreement encourages NOAA to consider the establishment of a CI for Coastal Resilience and Adaptation and to include such a proposal as part of its fiscal year 2024 budget request.

National Sea Grant College Program: \$80.0 million

Coastal Resilience—House language under the heading "Sea Grant Coastal Resilience Pilot Project" is modified as follows. Within funding provided for the Sea Grant program, NOAA is encouraged to increase coastal resilience activities across all State programs. This may include recruitment of resilience-focused staff and enhancing research, engagement, decision support, and project implementation. NOAA is encouraged to prioritize work to enhance the coastal resilience of remote communities most at-risk for natural disasters and chronic events, with a priority given to challenges faced by Tribal, indigenous, or economically disadvantaged communities.

American Lobster Research—Within funding for the Sea Grant program, the agreement provides \$2,000,000 for partnerships among State agencies, academia, and industry to address

American lobster applied research priorities in the Gulf of Maine, Georges Bank, and southern New England. Research should focus on informing management actions and explore ecosystem changes that may influence the response of the lobster resource and fishery, particularly in response to recent NARW protection measures or potential fishery response to measures under consideration for inclusion in the Atlantic Large Whale Take Reduction Plan.

Young Fishermen 's Development Act—Within funding for the Sea Grant program, the agreement provides up to \$1,000,000 for training, education, outreach, and technical assistance for young fishermen as authorized under the *Young Fishermen's Development Act* (Public Law 116-289).

Contaminants of Emerging Concern—The agreement provides \$1,000,000 within the Sea Grant program to partner with State agencies and academic institutions to research and monitor contaminants of emerging concern that may cause ecological or human health impacts, including PFAS, in coastal and estuarine waters.

Sea Grant Aquaculture Research: \$14.0 million

Ocean Exploration

The agreement provides \$46,000,000 for Ocean Exploration and Research, an increase of \$2,590,000 above the fiscal year 2022 enacted level. Within the funding provided, OAR is directed to accelerate efforts to map and characterize the oceans, including by maximizing the amount of funding provided for the Ocean Exploration CI and supporting competitive awards for deep ocean research seismic and acoustic methods. NOAA is also encouraged to work with the Department of Education and other relevant agencies to continue fundamental ocean exploration in which open source data are collected for the oceanographic community and private industries in real-time through telepresence technology.

National Oceanographic Partnership Program (NOPP)

Within the funds provided for NOPP, NOAA is encouraged to work with other appropriate Federal agencies and industry partners to develop, test, and evaluate ocean-based carbon dioxide removal technologies.

Ocean Noise

NOAA is encouraged to work through NOPP to expand the deployment of Federal and non-Federal observing and data management systems capable of collecting measurements of underwater sound in high-priority ocean and coastal locations, and to develop and apply standardized forms of measurements to assess sounds.

Mission Support (ORF)

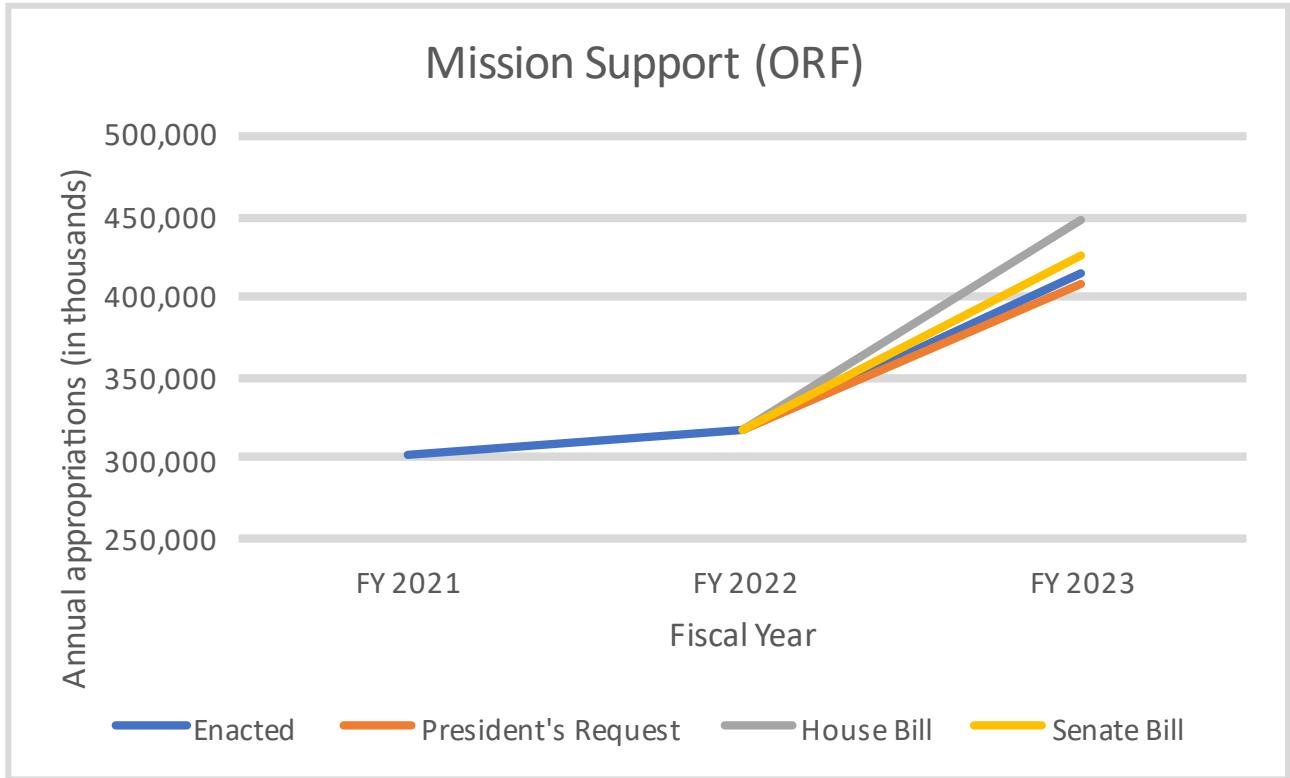
Explanatory statement: \$413.8 million

Senate bill: \$426.6

House bill: \$447.7

President's budget request: \$408.6 million

FY 2022 enacted: \$317.5 million



Office of Education: \$35.5 million

Mission Support Services

The agreement provides not less than \$1,500,000 to accelerate NOAA's Diversity and Inclusion Plan, to expand NOAA's recruiting program, and for equity assessment and implementation support in compliance with Executive Order 13985.

NOAA is directed to immediately provide the Committees with the business case analysis for a new center of excellence, as required in the joint explanatory statement accompanying Public Law 117-103 under the heading "Facilities Maintenance."

Sexual Assault and Sexual Harassment

NOAA is directed to continue implementing NOAA Administrative Order (NAO) 202-1106 on sexual assault and sexual harassment prevention and is provided an increase of \$1,000,000 above the fiscal year 2022 enacted level for these purposes. NOAA shall continue to provide the Committees with a copy of the report required under section 12.02 of NAO 202-1106.

Cooperative Science Center for Ocean Education

NOAA is encouraged to request funding for a cooperative science center for ocean exploration in its fiscal year 2024 budget request.

Providing Opportunities within the Ocean Sciences

NOAA is encouraged to partner with an established consortium of higher education, industry, and non-profit organizations to offer access to a research vessel and to associated programming dedicated to increasing opportunities for underrepresented groups within the ocean sciences.

National Ocean Sciences Bowl (NOSB)

NOAA is directed to meet its obligations to fully fund the NOSB in fiscal year 2023, in partnership with other agencies and non-Federal entities.

National Aeronautics and Space Administration (NASA)

The explanatory statement includes \$25.4 billion for NASA to explore the solar system, understand climate change, promote innovation and sustainability in aeronautics, and protect our planet. This is a \$1.3 billion over FY 2022 enacted levels (a 6% increase) and includes \$7.8 million for Science (a \$180.6 million over FY 2022 enacted, or a 2% increase), \$935.0 million for Aeronautics (\$54.3 million over FY 2022 enacted, or a 6% increase); and \$143.5 million for STEM Engagement (\$6.5 million over FY 2022 enacted, or a 5% increase).

NASA also receives funding through the disaster relief supplemental (Division N), which includes \$189.4 million for Construction and Environmental Compliance and Restoration for repair and replacement of NASA facilities damaged by Hurricanes Ian and Nicole or scheduled for derating due to deterioration, as well as \$367.0 million.



EXECUTIVE OFFICE OF THE PRESIDENT
WASHINGTON, D.C. 20503



July 22, 2022

M-22-15

MEMORANDUM FOR THE HEADS OF EXECUTIVE DEPARTMENTS AND AGENCIES

FROM: SHALANDA D. YOUNG *Shalanda D. Young*
DIRECTOR
OFFICE OF MANAGEMENT AND BUDGET

Alondra Nelson
DR. ALONDRA NELSON
DEPUTY ASSISTANT TO THE PRESIDENT
PERFORMING THE DUTIES OF THE DIRECTOR
OFFICE OF SCIENCE AND TECHNOLOGY POLICY

SUBJECT: Multi-Agency Research and Development Priorities for the FY 2024 Budget

The United States has long enjoyed broad bipartisan support for Federal investment in science and technology. This ongoing support helps to ensure American leadership in discovery, cures, and solutions for decades to come. The Biden-Harris Administration will continue to propose investments that will define America's next generation of global leadership in innovation, while infusing the work of government with greater equity, and the scientific research and technologies being developed with more durable benefit for all.

Federal funding for research and development (R&D) is essential to maximize the benefits of science and technology that advance health, tackle the climate crisis, and bring prosperity, security, environmental quality, and justice for all Americans. In addition to supporting R&D, agencies should make use of research results to carry out their own missions and ensure that the results of Federally funded research are made widely available to the public to facilitate understanding, participation, and inclusive decision-making; to other scientists to promote the exchange of ideas that is key to the advancement of knowledge; and, to innovators and entrepreneurs in every region of the United States, who will translate the research into world-leading businesses employing American workers. Equity should be the touchstone for all of these investments, including a deliberate emphasis on Historically Black Colleges and Universities, Tribal Colleges and Universities, Minority Serving Institutions, rural communities, and other disadvantaged communities that have been historically underserved, marginalized, and adversely affected by persistent poverty and inequality. And, as we seek to make our supply chains more resilient, these R&D investments should protect intellectual property developed in the United States and help create products that are made in the U.S. workers.

This memorandum outlines the Administration's multi-agency R&D priorities for formulating fiscal year (FY) 2024 Budget submissions to the Office of Management and Budget (OMB). The priorities covered in this memo will require Federal investments in R&D; actionable and equitable measurement of program outcomes; science, technology, engineering, and mathematics (STEM) education, engagement, and workforce development; research infrastructure; public access to Federally funded research; and, technology transfer and commercialization. These priorities should be addressed within

the FY 2024 Budget guidance levels provided by OMB. Agency budget submissions should note when they address these priorities. Agencies engaged in complementary activities should consult with one another during the budget planning process to coordinate resources, maximize impact, and avoid unnecessary duplication. Agencies should include summaries of these consultations—including through National Science and Technology Council bodies—in their OMB budget submissions. As in previous years, the investments supported by the Budget for the R&D priorities listed below will be highlighted in the FY 2024 Analytical Perspectives Volume.

Multi-Agency Priority Guidance

FY 2024 Budget submissions should invest in the fundamental infrastructure—the knowledge, institutions, places, networks and people—that makes science possible. There should be a coherent commitment to building a robust and inclusive ecosystem for American science and technology. To do so, agencies must focus on evidence-based, promising practices and mechanisms for fostering, conducting, using, and sharing the fruits of research. Examples of such practices include easy disclosure practices for Federal grants through use of a persistent digital identifier, reducing administrative burdens while improving scientific integrity, evidence-based professional development and mentoring structures, robust anti-harassment and anti-discrimination policies, and full activation of our domestic talent pool, including through more inclusive national engagement. All of these practices are part of reimagining how the Federal science agencies drive equitable innovation. Furthermore, agencies should seek collaborations with private industry, mission-aligned non-profits, and other external stakeholders who can help make these significant investments more sustainable. Towards this end, agencies should prioritize investments that modernize Federal laboratory, testing, and prototyping infrastructure and, where possible, share that infrastructure with universities, non-profits, and the private sector to promote discovery, education, training, and commercialization.

Agencies should balance priorities to ensure that resources are allocated for agency-specific, mission-driven R&D, including discovery-oriented research and use-inspired research, while at the same time focusing resources, where appropriate, on the following multi-agency R&D and STEM education activities that cannot be addressed by a single agency.

- Preparing for and preventing pandemics
- Reducing the death rate from cancer by half
- Tackling climate change
- Advancing national security and technological competitiveness
- Innovating for equity
- Cultivating an equitable STEM education, engagement, and workforce ecosystem
- Promoting open science and community-engaged R&D

The following sections describe in greater detail the motivation and priorities within these seven domains.

Preparing for and preventing pandemics

The COVID-19 pandemic has claimed an unparalleled number of lives and cost the U.S. and global economy trillions of dollars, demonstrating our continued vulnerability to current and future biological threats. As COVID-19 variants and other pathogens like influenza and monkeypox spread globally, we must work with renewed urgency to accelerate development of needed scientific capabilities that can stop outbreaks before they become epidemics or pandemics, regardless of natural, accidental, and deliberate origin. Almost every agency has a role in pandemic preparedness and prevention, and budget submissions should expand upon previous pandemic preparedness and biodefense R&D investments to address priority areas for fundamental science and technological innovation in support of the [*American Pandemic Preparedness: Transforming Our Capabilities*](#) plan (a

core element of the U.S. National Biodefense Strategy). Specific priority areas that require concentrated focus and multi-agency collaboration include pathogen agnostic genomic sequencing for early warning in human, animal, and plant communities; next-generation home, point of care, and host-directed diagnostics; accelerated novel antibody engineering; prototype pathogen research for medical countermeasure (MCM) development; alternative vaccine and therapeutic delivery mechanisms to simplify MCM administration; “universal vaccines” against viral families or subfamilies, including influenza viruses and coronaviruses; broadly-acting antivirals; immune system modulators; innovations to improve vaccine and therapeutic production capacity and flexibility; innovations to improve indoor air quality and to reduce disease transmission in buildings; next-generation personal protective equipment; and applied biosafety and biosecurity innovations. Achieving U.S. and global pandemic preparedness goals will depend on additional S&T efforts to de-risk advanced manufacturing practices, support supply chain resilience, and foster innovative finance mechanisms to support private sector R&D partnerships. Developing these transformative capabilities quickly and at scale, while implementing robust biosafety and biosecurity controls, is vital to ensure our S&T investments reduce biological risks.

Further, G7 leaders committed to support science in the 100 Days Mission to shorten the cycle for the development of safe and effective vaccines, treatments, and tests from 300 to 100 days. International collaboration in support of 100 Days Mission scientific goals will be vital in transforming our capabilities to stop future outbreaks before they become pandemics, including through activities that mobilize the global scientific community, strengthen international early warning systems, harmonize clinical trials approaches, promote development and global distribution of medical countermeasures such as rapid and accurate diagnostics, build local health security capacity, and create sustainable financing for health security S&T capabilities development.

A crucial safeguard against pandemics is a strong, resilient, public health system. To support a rapid, scalable, and equitable public health response, agencies should invest in R&D to develop fundamental public health capabilities such as an integrated data infrastructure, evidence-based health communication strategies, including information integrity where science, data, and evidence related to the human and technological aspects of these issues are both considered, and digital health technologies needed to implement high-quality virtual healthcare. Progress towards our goals in pandemic preparedness and public health should be measured through regular pilot and demonstration projects to assure our efforts to create a world free from catastrophic biological incidents.

Reducing the death rate from cancer by half

To guide the White House Cancer Moonshot, the President has set the ambitious goal of cutting the age-adjusted death rate from cancer by at least 50% over the next 25 years. This includes developing and deploying effective ways to prevent, detect, and treat cancer through new breakthroughs and ensuring existing tools reach more Americans equitably. Agencies should prioritize and collaborate on laboratory, clinical, public health, and environmental health research programs across the following focus areas:

Close the Screening Gap: Americans missed nearly 10M cancer screenings as compared to prior years due to the COVID-19 pandemic. The development of innovative approaches to cancer screening and early detection, including more precise, less invasive, and even at-home methods, should be prioritized to reduce that deficit and expand equitable access to effective cancer early detection going forward.

Understand and Address Environmental and Toxic Exposures: Studies have shown that exposure to environmental contaminants and toxic chemicals can lead to a higher risk of certain types of cancer. A robust scientific research and regulatory agenda should be pursued to enable increased understanding of the impact of environmental exposure in an effort to better prevent and mitigate cancer-related exposures.

Decrease the Impact of Preventable Cancers: Research efforts should focus on fully understanding and developing additional approaches to reach people with cancer prevention tools to include, for example: cancer-related vaccines, effective treatments for cancer-causing infectious agents, techniques to detect and address pre-cancer (like we do with colonoscopies today), and approaches to decrease the impact of nutrition- and tobacco-related cancers. Efforts are also needed to expand access to cancer-prevention approaches through evidence-based public health and community health efforts to ensure these preventative tools are reaching all U.S. populations.

Bring Cutting Edge Research Through the Pipeline to Patients and Communities: The development and deployment of new ways to prevent, detect, and treat cancer will be necessary to increase cancer survival rates. In particular, focus should be given to fundamental research that supports precision medicine, increases understanding of how to target effective treatments to patients, improves cancer survivorship, and speeds progress on some of the deadliest and rare cancers, including childhood cancers. Emphasis should be given to driving innovation, from discovery to patient treatment, by accelerating trial accrual and enrolling populations that reflect the diversity of those diagnosed with cancer in America. Agencies should evaluate ways to use, expand, and share Federal datasets, some already rich with diverse patient populations, to drive investigations.

Support Patients and Caregivers: Cancer can be overwhelming to any person or family and gaps in support can lead to gaps in positive outcomes. In order to make the experience around cancer—from screening, to getting a diagnosis, to treatment, care, and surviving—easier on those living with cancer and their caregivers, evidence-based and scientifically-sound public health approaches should be pursued. That means making it easier for people to access screening and diagnostics, bringing trials and quality care closer to home, including through the use of telehealth, providing patients and caregivers with the data and knowledge they need to make informed care decisions, and giving people with cancer, and the people who care for them, a seat at the table in order to improve our cancer research and development system.

Tackling climate change

The United States and the world face a profound climate crisis with a narrow window to avoid the most catastrophic impacts and to seize the opportunities that tackling climate change presents. Climate change is interacting with and exacerbated by nature loss and community inequities. The President has directed a whole-of-government approach to reduce climate pollution in every sector of the economy, conserve nature, increase resilience to the impacts of climate change, address environmental justice, and protect public health, while creating good-paying jobs that provide a free and fair chance to join a union and collectively bargain. Agencies should identify and prioritize R&D investments that advance the understanding of climate change, its interactions with nature loss and human systems; the innovations in clean energy and climate technology and infrastructure solutions; the ability to evaluate and track the effects of policies, projects, and programs on climate mitigation, resilience, and ecosystem services; and, workforce capacity to develop and effectively implement mitigation and resilience solutions.

Climate science: Advancing climate science—including physical, biological, social, and economic science—improves our understanding of Earth’s climate and the changes that pose the greatest risk to communities and ecosystems. Climate science guides identification and implementation of solutions to address mitigation and adaptation to climate change, and it informs Federal, State, local, Tribal, and territorial governments with capacity building and training to increase access to and use of data, information, and climate services. A critical priority is understanding changes in weather and in climate extremes and tipping points—from temperature and precipitation, to drought and wildfire, to thawing of permafrost, to ice loss, sea-level rise, coastal flooding, and severe storms—that result in actionable information for

communities. Agencies should coordinate research and modeling investments and information dissemination capabilities through the U.S. Global Change Research Program with the goal of producing knowledge and modeling outputs that are needed to address local-scale climate threats. Those modeling outputs should be able to feed directly into derivative risk models and climate information delivery platforms that are made broadly accessible to the public to advance understanding and support adaptation and mitigation decision making.

Innovation in clean energy and climate technology and infrastructure: Spurring innovation, commercialization, and deployment of clean energy and climate technologies, including those to lower costs and decrease emissions in the power, buildings, transportation, industrial, and agricultural sectors is necessary to support achievement of a 50-52 percent reduction from 2005 levels in economy-wide net greenhouse gas pollution in 2030, carbon pollution free electricity by 2035, and net zero economy-wide emissions no later than 2050. Climate innovation investments should include multi-agency support for game-changing clean energy and other emissions mitigation technologies, such as electricity generation from advanced solar, nuclear, fusion, offshore wind, and geothermal; advanced transmission and distribution systems for a net-zero grid and electrification; energy storage; carbon capture (including engineered and natural removal), utilization, and storage; net-zero aviation, shipping, freight, and off-road vehicles; next-generation mobility systems and charging; clean hydrogen, fuels, and feedstocks; net-zero industrial processes; low-cost net-zero buildings and infrastructure; methane and carbon-reducing agricultural practices; and circular economy innovations.

Transforming the energy system also requires coordinated investments in the science and technology ecosystem and infrastructure, including systems science, high-resolution digital modeling and simulation, optimization and controls, supercomputing capabilities, and macro-energy systems. Agencies should support interdisciplinary decarbonization research, including research in the humanities, economics, and behavioral and social sciences on risk assessment, policy, and siting, to ensure that climate innovation efforts are successful and benefit everyone. This research should be informed by the perspectives of and inclusive of solutions by historically marginalized and overburdened communities.

Agencies should also prioritize the use-inspired basic research essential for the development of future generations of climate mitigation technologies, including: electrochemistry, catalysis, fusion and plasmas, photoelectric chemistry, photonics, chemical separations, surface chemistry, and subsurface flow and transport.

Climate change adaptation and resilience: Agencies should increase the understanding of the effectiveness of adaptation and resilience measures, including through integration of physical, natural, and social sciences, and should make science-based information more accessible and decision-ready. Agencies should prioritize efforts to connect science and decision making through meaningful engagement with climate information users, including through the application of user-friendly climate tools and services, evaluation of adaptation and resilience programs and interventions, science-based risk communication, citizen science, and community-engaged research programs. These R&D efforts should focus on more proactive and accessible resilience and adaptation strategies for disadvantaged communities that are historically underserved, marginalized, and adversely affected by persistent poverty and inequality, in order to co-create resilience solutions that are more just, inclusive, and equitable. Because climate risk exacerbates existing environmental and societal inequities and contributes to cumulative burdens on disadvantaged communities, these investments should advance economic and environmental justice, equity, and public health through reduced vulnerability to climate impacts.

Nature-based climate solutions: Agencies should promote R&D programs aimed at understanding and improving the effectiveness of nature-based climate solutions, including protecting and restoring terrestrial, freshwater, coastal, and ocean ecosystems to provide carbon sequestration and storage and to enhance ecosystem and human community resilience, address environmental injustices, create economic opportunities for farmers, ranchers, fishers, and foresters, and improve national security. Agencies should also identify mechanisms to invest in capacity building, training, and technical assistance programs to strengthen the development of the workforce (e.g., scientists, engineers, social scientists, practitioners) with skill sets to design, implement, and manage effective nature-based solutions and hybrid options that integrate traditional and nature-based approaches. Agencies should promote R&D efforts to include ecosystem services in cost-effectiveness and benefit-cost analyses; track natural assets through the emerging national system of natural capital accounts and associated environmental-economic statistics; and synthesize knowledge of these and other connections between nature, climate, economy, and society through the National Nature Assessment.

Greenhouse gas monitoring: Measurement, monitoring, reporting, and verification of greenhouse gas emissions and removals is critical to understanding and enhancing the progress and effectiveness of local to global actions to address the drivers of climate change. Agencies should prioritize investments that enhance the Nation's ability to measure and monitor greenhouse gas flows to and from the atmosphere from human and natural sources, accelerate the transition of relevant research capabilities to operational use, and enable a long-term, cost-effective framework for greenhouse gas monitoring.

Advancing national security and technological competitiveness

Agency investments in science, technology, and innovation should strengthen our long-term global competitiveness while reducing catastrophic risks from current and emerging technologies. Investments should prioritize key, competitive technologies; commercialization and scale-up; international cooperation; and catastrophic risk mitigation.

Critical and emerging technologies: Agencies should collaborate to prioritize world-leading research and innovation in critical and emerging technologies, including: trustworthy artificial intelligence (AI), quantum information science (QIS), advanced communications technologies, microelectronics, nanotechnology, high-performance computing, biotechnology and biomanufacturing, robotics, advanced manufacturing, financial technologies, undersea technologies, and space technologies. In AI, agencies should prioritize fundamental and translational AI research to make AI trustworthy, equitable, robust, safe, secure, and both rights- and privacy-preserving. In QIS, agencies should continue research that addresses the hardest problems impeding progress and accelerate the development of quantum technologies that can have societal impacts in the next five years.

Across all critical and emerging technologies, agencies should work to minimize bias and discrimination, appropriately share and use the Federal government's vast troves of non-sensitive data to conduct large-scale analysis that not only preserves and protects privacy and safety, but also utilizes high-fidelity, high-resolution modeling and simulation tools to address critical challenges, including those in public health, climate science, and disaster resilience. Agencies should also collaborate with one another, and with non-government entities, to invest in research institutes that address crosscutting and multidisciplinary challenges related to critical and emerging technologies. Agencies should actively pursue public-private research collaborations that will expedite American leadership in these technologies and grow our inclusive 21st-century economy. Finally, agencies should support and leverage science and technology intelligence and net assessment techniques to evaluate U.S. competitiveness compared with other global actors in the technologies, policies, and innovation ecosystem elements that underpin national and economic security.

Commercialization and scale-up: For decades, many new products have been invented and innovated in the United States, but ultimately manufactured at scale elsewhere. Federally funded R&D can be an important pillar of rebuilding U.S.-based supply chains per E.O. 14017, seeding the market with cutting-edge new technologies, and providing a comparative advantage to American industries providing quality American jobs. Federally funded R&D investments should strategically target growing U.S.-based domestic manufacturing, job creation, and economic prosperity, including in communities historically underserved, marginalized, and adversely affected by persistent poverty and inequality. Investments in economic resilience should emphasize the scale-up of dual-use, hardware-intensive technologies such as semiconductors, as well as technologies that ensure safe, clean, and reliable access to critical products, materials, and minerals, including new manufacturing and biomanufacturing processes that can cost-effectively produce key goods on demand.

International cooperation: International engagement not only produces better science and technology outcomes, but also improves U.S. standing and maintains the norms and practices that underpin the global scientific commons. Agencies should leverage international datasets and expertise, participate in multinational standards-setting bodies and scientific and technical organizations, and enhance international cooperation, including through joint projects, people exchanges, and co-development and co-production initiatives. When considering international investments or withdrawing from international programs, agencies should evaluate how participation might enhance U.S. competitiveness or create vulnerabilities in our absence, especially if competitors fill the void in U.S. presence in a manner that is detrimental to U.S. national or economic security interests.

Catastrophic risk mitigation: Agency investments should mitigate catastrophic risks, including risks associated with biological, nuclear, and cyber weapons. In particular, investments should emphasize biosecurity and biosafety; system survivability, including modernization efforts that ensure the survivability of our strategic deterrent; and nuclear non-proliferation, integrated arms control, and treaty verification. Investments should reduce the risk of nuclear accidents and miscalculation; enhance strategic stability through improvements in cross-domain crisis communication; and assess the national security risks associated with fusion energy. Investments should prioritize resilient and secure undersea, terrestrial, and space-based communications and should defend critical infrastructure and sensitive networks against cyberattacks and supply chain attacks. This includes funding research in the foundational elements of cybersecurity and in improved authentication mechanisms, zero-trust architectures, security and resilience of embedded systems, anomaly detection for critical infrastructure, software security, and intrusion detection.

Innovating for equity

Agencies should operationalize the Administration's whole-of-government effort to advance equity for all, including at the program level, including the deployment of scientific research and technological advances to drive equitable outcomes for the American public. For example, agencies should develop and implement measurable strategies to promote diversity, inclusion, equity, and accessibility and advance environmental justice, across all R&D focus areas, while building equitable STEM education and workforce ecosystems for all learners and workers. Further, as part of the whole-of-government approach to advance equity across the Federal Government, when possible, program level activities should seek to encourage meaningful engagement with and participation of underserved communities and underrepresented groups, for example, in accordance with the Justice40 Initiative.

Innovative funding mechanisms and programs: Agencies should pursue R&D program structures and policies to equip under-resourced institutions, including some Historically Black Colleges and Universities, Minority Serving Institutions, Tribal colleges, community colleges,

and institutions in underserved geographic regions to successfully compete for R&D funding. Taken together, these institutions educate the majority of the American population, so their success significantly strengthens the Nation's ability to develop a diverse, vibrant, and excellent STEM workforce, and contribute to the STEM innovation ecosystem. Furthermore, agencies should coordinate to assess and ensure that Federal resources are not distributed to any institutions who have been found to violate safe, respectful, and non-discriminatory STEM workplaces.

Equitable data infrastructure: Agencies should develop data infrastructure that facilitates identification of inequities across sectors at scale, especially in underserved communities that have been systematically denied a full opportunity to participate. Agencies should develop policies and protocols to facilitate broader participation, including those that facilitate data linkage across Federal agencies that house the complementary data needed for equity assessment, that create or facilitate interoperable data systems, and that make data available to the public in ways that are useful to them, while protecting privacy and upholding ethical principles. This includes a focus on government-wide collection of robust demographic data, especially the underutilized, inaccessible, or missing data needed to measure and promote equity, including sexual orientation and gender identity; and access to, participation in, and use of Federal research and resources by underserved and marginalized groups and coordinated agency effort to address identified gaps in equitable allocation. Agencies should characterize their Federally owned or funded datasets to help the R&D community more clearly identify any bias in datasets, and support public access policies and data standardization to encourage engagement with, and wider distribution of, Federally funded research, data, and results, which strengthen scientific integrity and restores trust in government.

Actionable and equitable measurements: R&D agencies should employ evidence-based approaches to ensure that Federal investments are assessed and evaluated for effectiveness and impact, and Federal resources are equitably and broadly disseminated. Analyzing data requires building consensus about how to make sense of data, and other forms of evidence, to advance policy goals and assess policy outcomes, while ensuring equity is at the core of what the government delivers. This includes the evaluation of equitable selection and distribution of awards, procurements, and other multi-agency efforts, and the measurement and evaluation of end-user accessibility of Federal grants, opportunities, and research labs. To promote the Administration's commitment to evidence-based policymaking, agencies should develop coordinated investments in personnel within the agency that can increase equitable and evidence-based communication between the Federal Government and the American public. In support of the Administration's Justice40 initiative, research or applied science programs that meet the investment criteria should integrate metrics to track and report benefits that would flow to disadvantaged communities.

Cultivating an equitable STEM education, engagement, and workforce ecosystem

Agencies should develop budget submissions that consider support for our Nation's STEM students; the instructional, institutional, and informal environments for STEM learning; and the training and recruiting of our future STEM workforce. Agencies should consider the following priorities when formulating their budgets: engaging and motivating our Nation's students in STEM pursuits; preparing and supporting our Nation's STEM educators and institutions; increasing opportunity and reducing bias in our learning and working environments; training, reskilling, and upskilling of our STEM workforce; spurring innovation and entrepreneurship in our research communities; fostering international STEM collaborations that significantly increase domestic and global STEM talent; and attracting STEM talent from abroad. Agencies should also prioritize coordinated investments in educational opportunities related to emerging technologies, including instructional materials, at all levels. Agency coordination to reduce fragmentation and duplication while maximizing impact on STEM education, workforce development, and the Federal STEM workforce

should continue to be guided by the Committee on STEM Education under the auspices of the National Science and Technology Council. Furthermore, agencies should coordinate with State, local, Tribal, and territorial governments to ensure the effective deployment of Federal resources in local contexts.

Agencies should take steps to improve diversity, inclusion, equity, and accessibility in the research workforce, which should include: R&D investments in STEM education at all levels, and particularly at under-resourced schools and institutions; ensuring a living wage for our STEM graduate students and postdoctoral fellows; support for STEM educators; and demonstrable steps toward becoming a model employer. This effort will require multi-agency coordination of policies, tools, and personnel to evaluate and increase the flow of talent from early educational opportunities, internships, apprenticeships, and fellowships into persistent employment in the Federal STEM workforce, and broader science and technology ecosystem.

Promoting open science and community-engaged R&D

Science is a tool that should be available to all of America. More inclusive engagement in science benefits the American people, the environment, and the economy. Trust can be fostered when the American public is both knowledgeable about, and has the ability to be involved in, science research and its products. To build a trustworthy, responsive, ethical, and engaged U.S. scientific and technological enterprise, agencies should invest in making Federally funded R&D accessible to the public in accessible, interoperable, reusable, equitable, secure, and trustworthy way. Federally funded R&D should also be reproducible and transparent, as well as non-discriminatory in impacts on people, grounded in sociotechnical assessment of ethical, legal, and societal implications, and free from improper political interference—all while minimizing administrative burden.

Agencies should seek out public participation in R&D programs wherever possible. Community participation in the scientific endeavor enriches and extends the benefits to the Nation, can increase public trust in science, and leads to more innovative research of all kinds, including research that addresses the needs of diverse communities. Examples of public participation in R&D include open science, which broadens public access to scientific data and publications, and participatory modes of research, such as community-based datahubs that give members of the American public access to Federal resources and data, as well as community-engaged research that respectfully provides opportunities for the public, especially those historically excluded from the scientific enterprise, to contribute to the development of research questions.