



FY2022 Appropriations Priorities

Commerce, Justice, Science, & Related Agencies

Agency	Account	APLU FY2022 Request*
National Science Foundation		\$10.2 billion
National Aeronautics and Space Administration (NASA)	Science Mission Directorate	\$9 billion
NASA	Aeronautics Research Mission Directorate	\$915 million
NASA	Space Technology Directorate	\$1.5 billion
NASA	National Space Grant College and Fellowship Program (Space Grant)	\$60 million
National Oceanic and Atmospheric Administration (NOAA)	Office of Oceanic and Atmospheric Research (OAR)	\$762 million
NOAA	National Sea Grant College Program	\$115.7 million
NOAA	Marine Aquaculture Program	\$15 million
National Institute of Standards and Technology (NIST)	Manufacturing Extension Program (MEP)	\$275 million
NIST	National Network for Manufacturing Innovation (NNMI)	\$167 million
Economic Development Administration	Build to Scale (formerly Regional Innovation Strategies Program)	\$50 million

*APLU advocates for *at least* these sums

NATIONAL SCIENCE FOUNDATION

APLU FY2022 Request: \$10.2 billion

FY2022 PBR = \$10.2 B; FY2021 = \$8.487 B; FY2020 = \$8.280 B

The National Science Foundation (NSF) funds merit-based fundamental research across disciplines and supports science, math, and engineering education at universities throughout the nation. NSF-supported research has yielded groundbreaking discoveries and novel technologies – stimulating new industries and enhancing health and national security. For example, NSF-funded research has supported technological advancements such as artificial intelligence, nanotechnology, 3-D printing, next generation computer chips, MRI scans, and threat detection devices. APLU supports an appropriation of \$10.2 billion for NSF in FY2022.

NSF plays an integral role in our nation’s response to and recovery from the coronavirus pandemic. Agency-funded researchers are improving our understanding of the virus, developing predictions of its spread, and mitigating its impacts on public health, society, and the economy. NSF-supported research has applications across federal agencies. NSF investments in numerous technologies are being deployed now to fight the coronavirus. For example, advances in artificial intelligence and big data allow

researchers to map the spread of the coronavirus and share data with healthcare professionals, state and local leaders, and the public; and advanced manufacturing and cutting-edge engineering put the right tools, such as ventilators and PPE, in the hands of first responders and medical professionals faster than ever. Increased funding to the agency will be used to combat COVID-19 and better equip our country with the research and tools we need for the next major public health crisis.

APLU's request for \$10.2 billion for NSF in FY2022 would also allow the agency to carry out its important mission and provide a vital boost to NSF's core and interdisciplinary programs, further strategic investments in industries of the future such as AI and quantum, enhance critical workforce development programs hosted by NSF, and infuse funds into much-needed midscale and large research infrastructure projects. There is demonstrated need for immediate increased funding at NSF. Every year, NSF must leave numerous excellent proposals on the table due to insufficient grant funds. For example, NSF's resource constraints required it to turn away approximately \$3.4 billion in research proposals deemed "very good or higher" in the merit review process in FY2018 and also leave behind \$2 billion in mid-scale research infrastructure ideas deemed transformational to U.S. science and engineering. A significant funding increase would lead to new knowledge and technologies, igniting the U.S. economy, improving our nation's health and well-being, and better safeguarding our country from national security threats.

Furthermore, strong funding levels for NSF will develop and empower tomorrow's scientific research workforce. We need to ensure a stronger pipeline of Americans studying science, technology, engineering and mathematics (STEM) and ultimately contributing to our STEM workforce. NSF funds critical fellowship and traineeship programs that are our nation's most effective domestic science talent development programs. These programs are essential to countering the dual-pronged concerns that international competitors are enticing U.S. educated talent with foreign resources and that other countries are more effectively developing their own STEM workforces.

The growth of the U.S. economy and our leadership around the world depends on our nation's continued ability to lead in scientific discovery and technological innovation. As the National Science Board's report, "The State of U.S. Science and Engineering 2020"¹ shows, as more countries, particularly China, continue to invest heavily and narrowly in certain areas of R&D, the U.S. "is seen as an important leader rather than the uncontested leader" in the global science and engineering enterprise. If we want to remain at the forefront of scientific discovery and continue leading the world in science and engineering and reclaim our role as the "uncontested leader," we must invest strategically and robustly now.

There is demonstrated bipartisan support for strategically increasing funding for NSF. In the FY21 National Defense Authorization Act, conferees stated in their report that "the National Science Foundation is critical to the expansion of the frontiers of scientific knowledge and advancing American technological leadership in key technologies... to achieve its mission in the face of rising challenges from strategic competitors, the National Science Foundation should receive a significant increase in funding." This Congress, House Science, Space, and Technology Committee leadership introduced the bipartisan NSF for the Future Act which calls for increasing NSF's budget to \$13.3 billion over the next five years, and the Senate recently passed the U.S. Innovation and Competition Act which calls for infusing roughly \$81 billion into NSF over the next five years. House Science, Space, and Technology Committee Minority members also reintroduced the Securing American Leadership in Science and Technology Act which would double NSF's budget over the next 10 years.

¹ *The State of U.S. Science and Engineering*, January 2020 available at <https://ncses.nsf.gov/pubs/nsb20201/executive-summary>

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA)

SCIENCE MISSION DIRECTORATE

APLU FY2022 Request: \$9 billion

FY2022 PBR = \$7.931 B; FY2021 = \$7.301 B; FY2020 = \$7.139 B

The NASA Science Mission Directorate is an essential part of meeting the growing challenges to fully understand global changes to the Earth and answer fundamental questions regarding the universe through space exploration. New knowledge made possible from the Science Mission Directorate inspires future generations to pursue careers in STEM fields, sustaining U.S. leadership in groundbreaking discoveries. NASA Science includes four distinct divisions: Earth Science, Planetary Science, Astrophysics, and Heliophysics.

AERONAUTICS RESEARCH MISSION DIRECTORATE

APLU FY2022 Request: \$915 million

FY2022 PBR = \$915 M; FY2021 = \$828.7 M; FY2020 = \$784 M

The Aeronautics Research Mission Directorate (ARMD) supports cutting-edge aviation research. Continued investment in research such as hypersonics, new methods of propulsion, and material science are crucial to push the envelope of civilian aeronautics. NASA aeronautics has made decades of contributions to aviation. Every U.S. commercial aircraft and U.S. air traffic control tower has NASA-developed technology on board that helps improve efficiency and maintain safety. Research conducted by ARMD directly benefits today's air transportation system, the aviation industry, and the passengers and businesses who rely on aviation every day. Increased funding will help ensure a comprehensive aviation research effort at ARMD and maintenance of the U.S.'s leadership position as the global aeronautics leader.

SPACE TECHNOLOGY DIRECTORATE

APLU FY2022 Request: \$1.5 billion

FY2022 PBR = \$1.425 B; FY2021 = \$1.110 B; FY2020 = \$1.110 B

The Space Technology Directorate supports innovative research and technology development, including through grants to researchers at our nation's research universities, needed for current and future NASA missions. The scientific knowledge gained from the Space Technology Directorate has led to advancements that extend far beyond NASA, improving the lives of all Americans, such as the development of cutting-edge medical devices including pacemakers and Lasik eye surgery, increased agricultural production, and development of improved military protective armor.

NATIONAL SPACE GRANT COLLEGE AND FELLOWSHIP PROGRAM (SPACE GRANT)

APLU FY2022 Request: \$60 million

FY2022 PBR = \$57 M; FY2021 = \$51 M; FY2020 = \$48 M

Space Grant is a national network of colleges and universities that expands opportunities for Americans to understand and participate in NASA's aeronautics and space projects by enhancing science and engineering education, research, and public outreach efforts. The Space Grant national network includes over 850 affiliates from universities, colleges, industry, museums, science centers, and state and local

agencies. These affiliates belong to one of 52 consortia in all 50 states and the District of Columbia. The consortia fund nearly 4,000 fellowships and scholarships for students pursuing careers in STEM, as well as curriculum enhancement and faculty development. Member colleges and universities also administer pre-college and public service education projects in their states.

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA)

OFFICE OF OCEANIC AND ATMOSPHERIC RESEARCH (OAR)

APLU FY2022 Request: \$762 million

FY2022 PBR = \$762 M; FY2021 = \$570.6 M; FY2020 = \$548 M

NOAA OAR supports basic research that improves understanding of ocean and atmospheric processes to advance weather predictions and forecasts, ocean acidification and climate change impacts, and sea level changes/dynamics. The NOAA Research network consists of, among other activities, grants program through the Climate Program Office, external research at Sea Grant universities and programs, and Cooperative Institutes with academia. Recent OAR research forecasts energy demand scenarios, seasonal wildfires, and large storm events; assessing local impacts of projected sea-level rise; improving seasonal precipitation and drought predications; and understanding atmospheric rivers and other causes of extreme flooding. Research is translated into information used by private businesses and public sector managers across all levels of business and government.

The Office of Oceanic and Atmospheric Research (OAR) Cooperative Institutes (CI) and extramural research via Sea Grant universities increase the effectiveness of oceans and climate observations, monitoring, and modeling. Cooperative Institutes, established through an open competition, serve both scientific and educational missions, and represent strong partnerships between NOAA and the 57 CI-affiliated universities and research institutions spread across 23 states and the District of Columbia. Whether co-located within NOAA laboratories or aligned in geographical consortia nationwide, CIs represent collaborations between scientists in a variety of settings. Through NOAA-sponsored fellowships at partner academic institutions, CIs also provide teaching, training, and mentoring to the nation's future scientists and scientific workforce. These long-term, collaborative research partnerships foster and promote NOAA's scientific discovery and educational capabilities now and in the future. CIs also provide the public and government with data to make real-time decisions and to shape long-term policies that enhance public health and protect both commercial and national security interests.

APLU urges support for OAR at \$762 million to ensure that NOAA's predictive capabilities are fulfilled through continuous improvement of analytical capabilities, networks of experts supported by OAR, and facilities that make advancements possible.

NATIONAL SEA GRANT COLLEGE PROGRAM

APLU FY2022 Request: \$115.7 million

FY2022 PBR = 115.7; FY2021 = \$69.5 M; FY2020 = \$67 M

A joint federal, state, and local investment, Sea Grant provides solutions for the issues affecting our nation's coastal communities (including the Great Lakes, Gulf of Mexico and communities on the Atlantic, Caribbean, and Pacific coasts), yielding quantifiable economic, social, and environmental benefits. Sea Grant is a unique university-based program within NOAA that awards over 90% of its appropriated funds to coastal states through a competitive process to address issues identified as critical by coastal communities throughout the United States.

The Sea Grant College Program awards grants and contracts to initiate and support programs at Sea Grant colleges and other institutions for research, education, and advisory services in any field related to the conservation and development of marine resources. In 2019, the Sea Grant Program helped generate an estimated \$412 million in economic benefits; created or supported 10,400 jobs; created or sustained 998 businesses; provided 34 state-level programs with funding that assisted 263 communities improve their resilience; helped nearly 13,000 people adopt safe and sustainable fishing practices; helped restore or protect an estimated 1.8 million acres of habitat; worked with over 1000 industry and private sector, local, state and regional partners; and supported the education and training of nearly 2000 undergraduate and graduate students.² Sea Grant fosters cost-effective partnerships among state universities, state and local governments, NOAA, and coastal communities and businesses, leveraging nearly \$3 for every \$1 appropriated by Congress.

The frequency of “sunny day” flooding alone has doubled since 2000 in the United States. Exacerbated by sea level rise, these events overwhelm sewage treatment plants and public utilities, disrupt transportation corridors, reduce property values of homes and businesses, and threaten public health. Fluctuating water levels in the Great Lakes have resulted in millions of dollars of damages and economic impacts. The program will protect lives, sustain critical infrastructure, protect, and restore critical natural resources, enhance economic opportunity and support more rapid economic recovery after events. APLU requests \$115.7 million for the NOAA Sea Grant Program, consistent with the President’s request.

MARINE AQUACULTURE PROGRAM

APLU FY2022 Request: \$15 million

FY2022 \$13 M = TBD; FY2021 = \$13 M; FY2020 = \$13 M

The marine aquaculture program supports research on breeding, rearing, and harvesting of animals and plants in water environments. Aquaculture supplies more than 50 percent of all the world’s human consumption of seafood. The Sea Grant Marine and Great Lakes Aquaculture program develops innovations in the aquaculture industry, technology transfer, and support America’s expanding aquaculture industry. Pressures from a changing climate, rising sea levels, changes in ocean chemistry, and an ever-dynamic industry places additional demands on an already small program.

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST)

MANUFACTURING EXTENSION PROGRAM (MEP)

APLU FY2022 Request: \$275 million

FY2022 PBR = \$275 M; FY2021 = \$150 M; FY2020 = \$146 M

APLU requests \$275 million for the Manufacturing Extension Program (MEP) for FY2022. This program improves the competitiveness of U.S.-based manufacturing by making manufacturing technologies, processes, and services more accessible to small and medium-sized manufacturers. MEP centers are based at university, non-profit, or state-based organizations throughout the nation providing manufacturers with expertise to help them reduce costs, create new products, develop the next-generation workforce, find new markets, and achieve business success. Universities play critical roles in the MEP program. Some host MEP centers, serving as a front door to university technology assets. Many

² <https://seagrant.noaa.gov/Our-Work>

universities conduct applied research to solve problems, evaluate potential products, perform testing, or provide a critical flow of talent into small and medium sized manufacturers.

The program has grown from a pilot project of just three MEP Centers to one center in every state and Puerto Rico — building a network of organizations to provide manufacturers with a wide array of comprehensive and critical services for their manufacturing business. As a public-private partnership, MEP delivers a high return on investment to taxpayers. For example, according to MEP’s 2018 Annual Report,³ for every one dollar of federal investment in FY2019, the MEP National Network generated \$33.80 in new sales growth for manufacturers and \$32.20 in new client investment. In 2019, MEP centers interacted with 28,213 manufacturers, leading to \$15.7 billion in sales, \$1.5 billion in cost savings, \$4.5 billion in new client investments, and assistance with the creation or retention of 114,650 jobs.

MEP centers have also been crucial in providing services to help manufacturers increase production of products that support the nation’s response to COVID-19,⁴ such as the creation and dissemination of personal protective equipment (PPE), and to reach new suppliers or markets, recover from workforce and supply chain interruptions, and achieve greater resilience.

NATIONAL NETWORK FOR MANUFACTURING INNOVATION (NNMI)

APLU FY2022 Request: \$167 million

FY2022 PBR = \$167 M; FY2021 = \$16.5 M; FY2020 = \$16 M

The NIST National Network for Manufacturing Innovation (NNMI), also known as Manufacturing USA, is a network of 16 manufacturing institutes where universities, industry, and government partners collaborate to develop and accelerate the commercialization of innovative manufacturing technologies and helps fuel our nation’s position as a global leader in advanced manufacturing. Each institute focuses on certain technologies such as 3-D printing, digital manufacturing, smart manufacturing, and advanced robotics manufacturing.

It is estimated that in 2028 manufacturers will need to fill 4.6 million jobs in the U.S. Meeting this demand means recruiting more people into manufacturing by raising awareness of the career possibilities in technology and programming – making workforce training a large component of Manufacturing USA’s mission⁵. Many of the institutes provide workforce training opportunities to new and existing manufacturing workers so that they can develop the skills they will need in the new advanced manufacturing economy. For example, MxD, a NNMI institute, in partnership with University of Maryland–Baltimore County, developed a series of certificate-level cybersecurity courses that integrate instruction about manufacturing-focused job roles, career pathways, and success profiles; and AFFOA, another institute, partnered with the Massachusetts Institute of Technology and the Fashion Institute of Technology to create MITANDFIT (MITxFIT), a two-week workshop in textile technology geared toward undergraduate students.

³ NIST MEP Annual Report, 2018 available at

https://www.nist.gov/system/files/documents/2019/11/21/MEP_Annual_Report_2018_web-508-NEW.pdf

⁴ Gearing Up: MEP Center Response to the COVID-19 Pandemic, University of North Carolina at Chapel Hill Center for Urban and Regional Studies, January 2021 available at https://curs.unc.edu/wp-content/uploads/sites/400/2021/01/Gearing_Up.pdf

⁵ Manufacturing USA, Training the Future Advanced Manufacturing Workforce with Online Learning, available at <https://www.manufacturingusa.com/studies/future-manufacturing-workforce-online-learning>

Realizing that advanced manufacturing could help with our nation's pandemic response strategy, institutes brought together government entities and the private sector to rapidly develop innovative projects that contributed to our nation's COVID-19 response efforts. Thanks to emergency government funding provided to the network, these projects⁶ expanded the production of needed medical countermeasures, provided workforce training that responded to changing conditions, increased testing capacity to track workplace infections, and helped manufacturers prepare for the future in the face of shifting economic realities.

APLU requests \$167 million for NNMI in FY2022 to help support the program's mission and fund an additional two Department of Commerce Manufacturing USA Institutes.

ECONOMIC DEVELOPMENT ADMINISTRATION (EDA)

BUILD TO SCALE (B2S)

APLU FY2022 Request: \$50 million

FY2020 PBR = \$38 M; FY2021 = \$38 M; FY2020 = \$35 M

EDA's Build to Scale program (B2S), formerly the Regional Innovation Strategies Program, provides competitively awarded grants to universities, startups, nonprofits, and entrepreneurship-focused organizations that further technology-based economic development initiatives. B2S supports high quality job growth, improves economic opportunities, and supports the next generation of industries. Through B2S grants, universities and partner organizations leverage federal funds to equip entrepreneurs with the skills to accelerate enterprise growth and access human capital; facilitate connections for startups with new and existing capital providers and enable investors to support regional innovation; and establish replicable and scalable best practices for coordinated public and private economic development initiatives.

There is demonstrated need to increase federal support for this program. In 2020, the EDA received 600 applications for the Build to Scale program but was only able to award 52 grants.⁷ The 52 grants totaled \$35 million, but the awardees leveraged an additional \$44 million in matching funds from a variety of private and public sector sources, making this program a successful partnership between the federal government and grantees. APLU requests at least \$50 million for this program to increase the number of awards the EDA can administer and reach the authorized amount for this program.

About the Association of Public and Land-grant Universities

APLU is a research, policy, and advocacy organization dedicated to strengthening and advancing the work of public universities. With a membership of 201 U.S. public research universities, land-grant institutions, state university systems, and affiliated organizations, APLU's agenda is built on the three pillars of increasing degree completion and academic success, advancing scientific research, and expanding engagement. Annually, its 201 U.S. member campuses enroll 4.2 million undergraduates and 1.2 million graduate students, award 1.2 million degrees, employ 1.1 million faculty and staff, and conduct \$46.8 billion in university-based research.

⁶ Manufacturing USA COVID-19 Response, available at <https://www.manufacturingusa.com/covid-19-response>

⁷ EDA's B2S Program Supports Efforts of 25 Organizations in 36 States, Press Release, available at <https://www.eda.gov/news/press-releases/2020/09/16/buildtoscale-grantees.htm>