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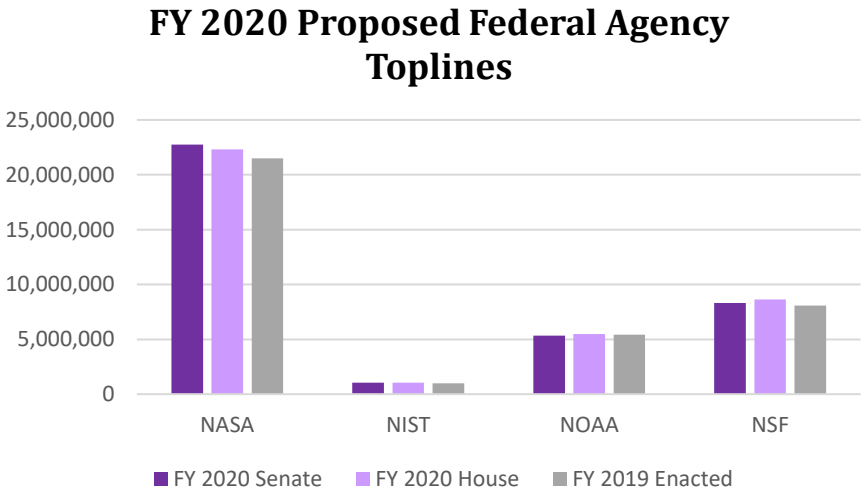
Appropriations Update: Senate Appropriations Committee Approves FY 2020 Commerce, Justice, Science Appropriations Bill

Lewis-Burke Associates LLC – September 30, 2019

On September 26, the Senate Appropriations Committee approved its fiscal year (FY) 2020 Commerce, Justice, Science, and Related Agencies (CJS) appropriations bill by a unanimous vote of 31-0. The bill would provide a total of $70.8 billion in discretionary funding for the National Science Foundation (NSF), National Aeronautics and Space Administration (NASA), National Oceanic and Atmospheric Administration (NOAA), National Institute of Standards and Technology (NIST), Economic Development Administration (EDA), and Department of Justice (DOJ) among other programs. The total amount provided in the Senate CJS bill is $6.7 billion above the FY 2019 enacted amount and $3.1 billion below the House bill. Notably, additional census funding accounts for more than half of the proposed increases to CJS bill.



As part of its consideration of the bill, the Senate Appropriations Committee released its report containing more details and direction to the agencies on CJS programs. As with the House version, the Senate bill would largely ignore many of the spending cuts proposed in the Administration's budget request, including Science, Technology, Engineering, and Mathematics (STEM), minority-serving, and scientific research programs at NSF, NASA, and NOAA. Like the House version, the Senate bill would maintain or increase funding for several agencies and programs that the Administration proposed to terminate entirely including EDA and the Hollings Manufacturing Extension Partnership (MEP) program at NIST. Subcommittee Chairman Jerry Moran (R-KS) expressed excitement that the EDA's Regional Innovation Program would receive its "largest year-over-year increase in the program's history."

Despite these similarities in overall approach, the Senate bill would diverge significantly from its House counterpart in many of the programs and initiatives prioritized for each agency.

As indicated by the vote, support for the bill was broadly bipartisan as Committee members from both parties lauded the increases proposed for scientific research programs as well as funding for continued efforts to combat the opioid crisis. The 13 amendments included in the manager's package enjoyed bipartisan support, including one that would urge the Office of Science and Technology Policy (OSTP) to work with NISF and NIST to "assess the utilization of semiconductor-specific and semiconductor-related fields in both basic and applied research." The bipartisan nature of the proceedings stood in stark contrast to the House bill, which advanced entirely along party lines after a markup that featured protracted debate over the possible inclusion of immigration and gun control policy riders.

The Senate bill would provide the following funding levels:

- **NSF** would be funded at **$8.3 billion** in the Senate CJS bill, $242 million (3.0 percent) above the FY 2019 level and $1.3 billion above the President's requested level, but $319.14 million below the House version. Research and Related Activities, Education and Human Resources, and would grow by 3.8 percent and 3.0 percent, respectively, while Major Research Equipment and Facilities Construction would decrease by 14.4 percent compared to the FY 2019 enacted level.
- **NASA** would be funded at **$22.8 billion**, an increase of $1.3 billion (5.8 percent) above the FY 2019 enacted level, $134 million above the President's request, and $435 million above the House version. Within this amount, the Science Mission Directorate would receive $6.9 billion, flat relative to FY 2019.
- **NOAA** would receive **$5.3 billion**, $87.3 million (1.6 percent) below the FY 2019 enacted level and $141 million below the House mark. Consistent with the House bill, the Senate would reject the budget request's proposed termination of many of NOAA's signature research programs. Additionally, Oceanic and Atmospheric Research would receive $531 million.
- **NIST** would be funded at **$1.04 billion**, an increase of $52.5 million (5.3 percent) compared to the FY 2019 enacted level, but $2.2 million below the House bill. Core research activities would be funded at $753.5 million, $29 million above FY 2019. The Manufacturing Extension Partnership and the Manufacturing USA programs would be funded at $145.5 million and $16 million, respectively, both modest increases from FY 2019.
- **EDA** would receive **$319.5 million**, which is about $15.5 million (5.1 percent) above the FY 2019 enacted level, but $220 million below the House bill. Notably, the bill would provide a robust increase of $7.5 million or 31.9 percent for the popular Regional Innovation Program. For the second consecutive year, the Senate rejected the President's budget proposed elimination of the agency outright.
- **DOJ** would receive **$32.5 billion**, a $1.5 billion (4.9 percent) increase above the FY 2019 enacted level and $446.3 million above the House bill. The bill would prioritize research in the areas of preventing domestic radicalization, school safety, and human trafficking.

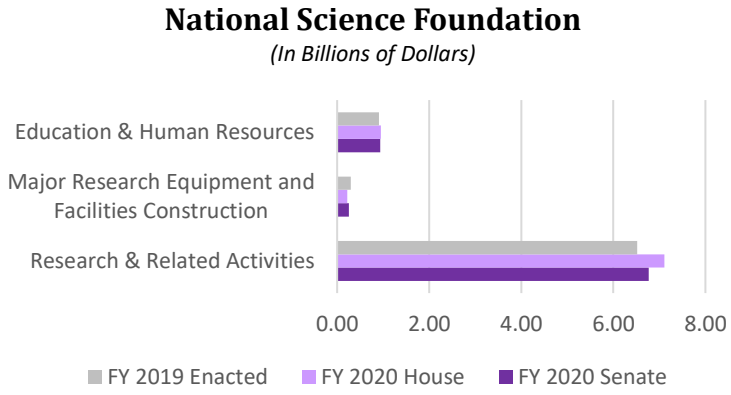
Below are additional details on the House CJS bill and the corresponding Committee report. Specific funding information is available in the charts following the narrative. *(Unless otherwise noted, all graphs are in thousands of dollars.)*

National Science Foundation

The Senate CJS bill would provide NSF with $8.317 billion, which is $242 million or 3.0 percent above the FY 2019 level and $1.25 billion more than the President's budget request. The Senate level would be $319.14 million below what the House version would provide.

The Senate bill would provide $6.77 billion for **Research & Related Activities (R&RA),** 3.8 percent above the FY 2019 level but $336.6 million below what the House Appropriations Committee would provide. The Senate Committee notes the importance of the breadth of NSF research and education to advance "complex problems important to the Nation." The Committee encourages NSF to continue its efforts for increased partnership with industry, foundations, and non-profit organizations.

The Senate Committee is supportive of the NSF **10 Big Ideas** but directs NSF to "maintain its core research at levels not less than those provided in fiscal year 2017." Similar to the House bill, the Senate Committee encourages NSF to fully support U.S. scientific research facilities and instruments engaged in cutting edge research. Like the House bill, The Senate Committee includes new language that would support NSF activities in Quantum and Artificial Intelligence (AI).



While much of the report echoes themes from previous years, below is a summary of additional research areas highlighted under the R&RA account:

Regarding the **Big Ideas**, the Senate Committee:

- Recommends NSF provide at least $106 million to support **quantum information science**, plus $50 million to support up to five research centers to carry out basic quantum research and education activities as set out in the *National Quantum Initiative Act*. The Committee encourages NSF to support centers in locations that enable close collaboration with industry and encourages NSF to "consider Centers that focus on trapped ion quantum computing and/or the optics underlying it, superconducting quantum computing, and other promising technologies."
- Supports NSF ongoing research in **AI**, which is "fundamentally at the core of NSF's **Harnessing the Data Revolution** and the **Future of Work at the Human-Technology Frontier** Big Ideas" and would fully fund all AI activities included in the budget request.
- Encourages NSF to "support both ongoing operations of existing and future NSF funded astronomy and physics facilities within its budget" as part of the **Windows on the Universe** planning.
- Urges NSF to utilize regional expertise in designing new research programs within the **Navigating the New Arctic** Big Idea and to "consider the impact of the opening of the two trans-Arctic sea routes and the proximity to deep U.S. ports."
- Highlights support for the **Rules of Life**, and specifically "NSF's funding for research in plant genomics and directs NSF to continue to advance the ongoing plant genomics research program,

further its work in crop-based genomics research, and to maintain a focus on research related to crops of economic importance."
- Fully funds the **Mid-Scale Research Infrastructure** program, recommending NSF make at least one award in an EPSCoR State.

The Committee would also:
- Encourage NSF to support additional research into **Online Influence** in collaboration with other federal agencies and disparate scientific fields, to help protect against foreign influence from adversaries.
- Direct NSF to "complete a plan to ensure a sufficient number of neutron detectors are deployed to adequately characterize the radiation environment and support a real-time alert and warning system" for the **U.S. Neutron Monitor Network.**
- Encourage NSF to build on existing resources to develop regional approaches to **Earth Systems** science.
- Encourage NSF to continue the **Coastlines and People** theme to study the "impacts of coastal environmental viability and natural hazards on populated coastal regions."
- Provide full support for the "new **Facility Operation Transition pilot** and operation of the **National Ecological Observatory Network** at no less than the fiscal year 2019 level" as included in the budget request.

The report contains several provisions that echo guidance provided in previous years, specifically:
- Expecting NSF to continue to support "world-class scientific research facilities and instrumentation" in **U.S. astronomy** to "maximize its investments in research while preliminarily preparing for facility upgrades and activities associated with supporting the next Astrophysics decadal."
- Underscoring the importance of the **Established Program to Stimulate Competitive Research (EPSCoR)** and funding the program at no less than $190 million, $14.3 million above the FY 2019 level, $12.3 million above the House proposal and $38.5 million above the President's budget request.
- Commending NSF for its continued investment in **high performance computing** and data analysis capabilities, whilst stating the need to invest in additional high-end computational systems. However, the Committee flags concerns that NSF investments in this space do not match science and engineering needs for these facilities in areas such as quantum, artificial intelligence, data analysis and storage. The Senate report also states that "NSF should invest in additional high-end computational systems to fully meet science and engineering needs."
- Recognizing NSF's critical role in technology transfer and innovation through programs such as **Innovation Corps (I-Corps)**. The report would provide no less than the FY 2019 amount for I-Corps and would encourage NSF to, "facilitate greater participation in the program from academic institutions in States that have not previously received awards."
- Recognizing the importance of NSF's **Mathematical Sciences Institutes**.
- Highlighting NSF and NOAA collaborations associated with the **Vortex-SE** program focused on devastating tornadoes in the southeastern U.S.; NSF would be directed to include funding plans for Vortex-SE research and instrumentation in future budget requests and ensure collaboration with the **Prediction of and Resilience against Extreme Events (PREEVENTS)** program.
- Noting the Committee's expectation that NSF will continue supporting research on, "unique mountain temperate woodland ecosystems and ecoregions."
- Maintaining current funding levels for **marine research facilities**. The Committee would direct NSF to accept proposals for new research on the facilities and create a plan to ensure continued access to capabilities comparable to currently provided facilities.

- Encouraging NSF to continue support for research on the **domestic steel manufacturing** industry.
- Providing $15 million for the **Historically Black Colleges and Universities (HBCU) Excellence in Research Program**.

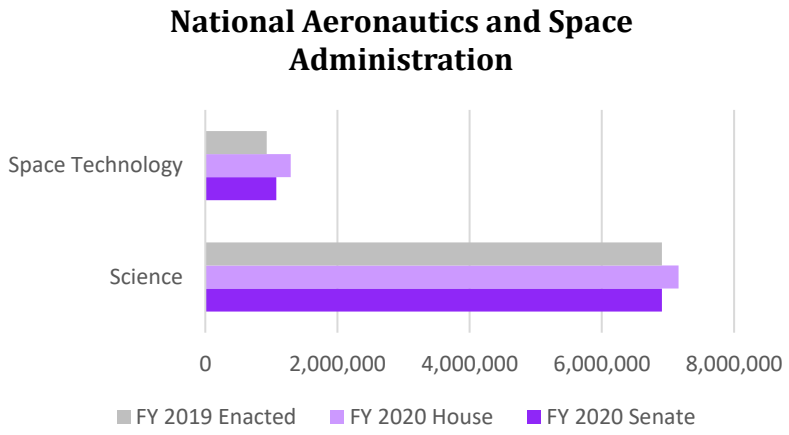
Education and Human Resources (EHR) would be supported at $937 million, $27 million or 3 percent above the FY 2019 levels, but $13 million below the proposed House level. Within the amount that would be provided, the Committee makes a number of recommendations across all levels of education in science, technology, engineering, and mathematics (STEM) at NSF. Guidance would be similar to previous years, as the Committee would provide:

- $75 million for the **Advanced Technological Education** program, equal to the FY 2020 budget request and $9 million above the FY 2018 level.
- The FY 2019 level for the **Robert Noyce Scholarship Program, NSF Scholarships in STEM,** and the **Graduate Research Fellowship Program**, rejecting cuts proposed in the budget request.
- At least $55 million for the **CyberCorps: Scholarships for Service (SFS)** of which, at least $7.5 million would support continued activity with "community colleges that have been designated as a Center of Academic Excellence in Information Assurance 2-Year Education [CAE2Y] by the National Security Agency and the Department of Homeland Security."
- Continued support for informal science education; the Committee would provide $62.5 million to support the **Advancing Informal STEM Learning** (AISL), level with FY 2018 funding.
- Continued support for existing programs to broaden participation in STEM fields supported through the **Division on Human Resource Development**, essentially at FY 2018 levels. The Committee recommends $40 million for the **Hispanic Serving Institutions** program, "to build capacity at institutions of higher education that typically do not receive high levels of NSF funding," this compares to $45 million in the House bill; $15 million for the **Tribal Colleges and Universities Program** (TCUP), same as the House level; $18 million for the **Advancement of Women in Academic Science and Engineering Careers** (ADVANCE) program; $35 million for the **HBCU Undergraduate Program** (HBCU-UP), compared to $38 million in the House bill; $8 million for the **Alliance for Graduate Education and the Professoriate** (AGEP); $46 million for the **Louis Stokes Alliances for Minority Participation** (LSAMP), compared to $48.5 million in the House bill; and $24 million for the **Centers for Research Excellence in Science and Technology** (CREST).
- $20 million as requested for the **Inclusion Across the Nation of Communities of Learners of Underrepresented Discoverers in Engineering and Science** (INCLUDES) big idea.
- As for previous years, the Committee "encourages NSF to include **training in bioprocessing** within appropriate research areas as part of their educational efforts."
- Through the **Division of Research on Learning in Formal and Informal Settings**, NSF would be encouraged to fund out-of-school time STEM engagement program activities, with a particular focus on underrepresented populations.

The **Major Research Equipment and Facilities Construction (MREFC)** account would be funded at $253.23 million, $42.51 million or 14.4 percent below the FY 2019 level but $30 million above both the budget request and the House level. The additional funding would be provided to support **Mid-scale research infrastructure** at $75 million, which is $30 million above the requested level. The Committee would fully fund all requested projects including the **Antarctica Infrastructure Modernization for Science (AIMS)** at $97.89 million, the **Large Synoptic Survey Telescope (LSST)** at $46.34 million, and the **High Luminosity-Large Hadron Collider Upgrade (HL–LHC)** at $33.0 million.

National Aeronautics and Space Administration

NASA would receive $21.3 billion, an increase of $1.25 billion or, 5.8 percent, above the FY 2019 enacted level and $134 million or, .6 percent, above the Administration's FY 2020 request. Nearly all of the proposed increase would be directed to NASA's human exploration activities. The Senate's support is an indicator of congressional attitudes towards the Administration's Artemis program. However, while the amended budget request released in May included an additional $1.6 billion for the mission, the Senate declined to provide the full amount required for several important development milestones despite embracing key elements of the Artemis program.



The **Science Mission Directorate (SMD)** would remain flat at $6.9 billion and reflects the pressure on appropriators to prioritize funding for human exploration activities at NASA while maintaining support for major missions within SMD.

The **Earth Science Division (ESD**) would receive $1.95 billion in FY 2020, a $10 million increase over FY 2019, $165 million above the request, and $78 million below the House mark. The Senate continues its longstanding support for major earth science program: Landsat-9 ($109 million); PACE ($161 million); CLARREO Pathfinder ($18 million); NISAR ($114 million); the Carbon Monitoring System program; Earth-facing instruments on the DSCOVR mission ($1.9 million); the Small Satellite Constellation Initiative ($25 million). The Earth Venture program would receive $205.2 million and allow NASA to move forward with the release of two new competitive mission and flight instrument opportunities in FY 2020.

The Senate maintains direction from prior years urging NASA to compete future missions that address recommendations in the 2017 *Earth Science and Applications from Space* decadal survey. The decadal recommended investments in technology maturation demonstrations as well as new mid-sized "Earth Explorer" and large "Designated" mission classes. However, the FY 2020 request would not implement the Earth Explorer program and articulated a plan develop Designated missions in-house.

The **Astrophysics Division (APD)** would receive $1.17 billion, which is $20 million or 1.7 percent below FY 2019 and $196.1 million below the House mark. Within the Division, $445.7 million – $65 million less than the House – would be provided for the WFIRST mission proposed for cancellation by the Administration. The Senate strongly favors the mission staying under a cost ceiling of $3.2 billion, and this expectation is reiterated in the report. $98.3 million would be provided for Hubble Space Telescope, $15 million above the request. $10 million would also be set aside to leverage and scale technologies developed for the JWST for future missions that search for exoplanets harboring life. Funding is not specified for the Stratospheric Observatory for Infrared Astronomy (SOFIA) mission, however language in the report would encourage NASA to place SOFIA under Senior Review if needed. $250.7 million would be provided for APD's research and analysis program consistent with the budget

request. The James Webb Space Telescope would continue progress on its final development stages, albeit at an increased funding level relative to the request and the House mark.

The bill would provide $2.63 billion for the **Planetary Science Division (PSD)**, $127.4 million or 4.6 percent below FY 2019 enacted, equal to the request, and $82.3 million below the House. The Senate emphasizes the importance of the New Frontiers and Discovery competitive mission programs and would provide $190.4 and 502.7, respectively. Adding to that, explicit direction is provided that cost overruns on other major missions should not impact the recommended cadence of either program. The Senate maintains support for existing and planned missions and programs within NASA's Planetary Defense Coordination Office and provides a record $160 million for activities therein.

The bill would provide $570 million for the **Mars Exploration Program (MEP)**. The amount would provide unspecified levels of funding for development close-out of the Mars 2020 mission and to further develop a Mars sample return mission for launch in 2026. NASA would be required to submit a comprehensive lifecycle profile for the sample return mission (a similar request made by the House). Identical to the House, the Senate also endorses a mid-decadal review of the MEP architecture

The bill would embrace the Administration's prioritization of research and exploration of the lunar environment as part of its **Lunar Discovery and Exploration** program within the Science Mission Directorate. $300 million would be allocated for these activities. This figure represents the original budget request's $210 million plus the $90 million included in the Administration's budget request addendum. The increased request amount was intended to allow procurement of a commercial lander that would deliver science payloads to the lunar surface. In pursuit of future lunar activities, the Committee notes it favors NASA "utilizing public-private partnerships to advance its lunar science and exploration agenda and…to leverage the resources and expertise of both private industry and universities in pursuit of these goals." $18 million would be provided for ongoing operations of the Lunar Reconnaissance Orbiter.

The Senate would provide the **Heliophysics Division (HPD)** with $735 million in FY 2019, an increase of $15 million or 2.1 percent over the FY 2019 enacted level, and $30.5 million or 4.3 percent above both the Administration's request and the House mark. Consistent with the past two years, the bill would offer funding and explicit support for key priorities outlined in the National Academies of Sciences' decadal survey. These include: $182 million to maintain a two-year cadence of alternating Small Explorer (SMEX) and Medium-class Explorer (MIDEX) missions and accompanying Missions of Opportunity (MOs); $183.2 million for Solar Terrestrial Probes to support ongoing missions as well as the continued development of the Interstellar Mapping and Acceleration Probe (IMAP) and associated MOs; and full implementation of the research-focused *Diversity, Realize, Integrate, Venture, Educate (DRIVE)* initiative. The bill would also provide $20 million for the Space Weather Science and Applications program and encourage collaboration with the Department of Defense and NOAA on the translation of NASA's research into operational improvements that enable more accurate space weather forecasting. New in FY 2020, the bill would mandate the creation of a formal Heliophysics Technology Program, similar to those contained within other SMD divisions, to enable "novel and transformative capabilities and mission concepts."

The **Space Technology Mission Directorate (STMD)** would receive $1.08 billion, $149.5 million or 16.1 percent above the FY 2019 enacted level but $216.2 million or 16.7 percent below the House mark. The Senate once again maintains STMD's status as an independent directorate within NASA. This aligns with House appropriators and rejects the Administration's proposal to dismantle STMD and relocate some of

its constituent programs to the proposed human spaceflight-focused Exploration Technology account. The Senate report includes language affirming the Committee's support for STMD's focus on early-stage technologies that "can serve all NASA mission directorates and are not solely focused on enabling human spaceflight." Several technologies including solar electric propulsion, laser communications, ins-space manufacturing, and composite tanks and structural materials are explicitly highlighted as broadly applicable to both robotic and human exploration mission needs. The bill would also provide specific funding directives including: $35 million for additive manufacturing; $20 million for the student-focused Flight Opportunities program; $5 million for research on large-scale fabrication and use of nanomaterials, including carbon nanotubes; $100 million for the development of a nuclear thermal propulsion system, with the goal of a 2024 demonstration mission; and $180 million for continued work on the RESTORE-L satellite servicing project to support a 2020 demonstration mission to refuel Landsat-7.

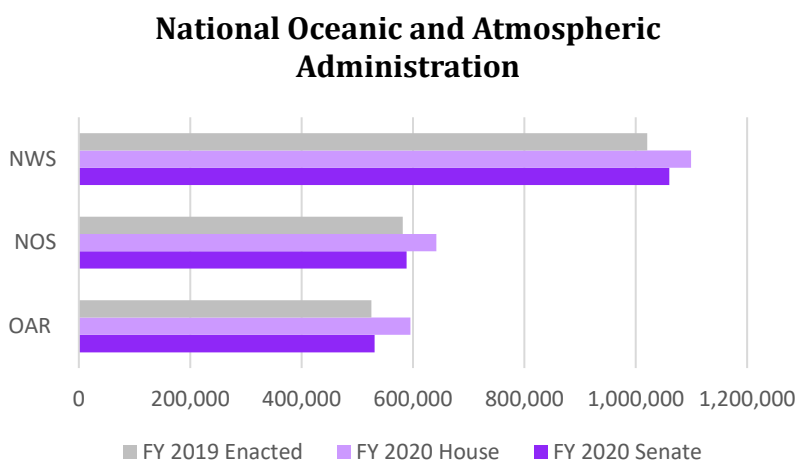
The bill would provide the **Aeronautics Research Mission Directorate (ARMD)** with $783.9 million in FY 2020, which is $58.9 million or 8.1 percent above the FY 2019 enacted level, $117 million or 17.5 percent above the request, and $83.9 million or 12 percent above the House mark. Unlike in prior years, the report offers explicit support for the University Leadership Initiative (ULI) program, which was established in 2015 to support university-led research to overcome specific technical challenges while contributing to the aeronautics workforce development pipeline. Building on the chamber's prior year bills, the Senate report would provide $7 million above the request for university-led research on advanced materials and encourage NASA to continue pursuing partnerships with research institutions that have "strong capabilities in aviation, aerospace structures, and materials testing and evaluation". The bill also expresses support for ARMD's research related to the integration of unmanned aerial systems into the National Air System, especially with regard to unmanned traffic management. These activities will play a major role in the continued implementation of ARMD's Urban Air Mobility Initiative,

The Senate would provide NASA's **Science, Technology, Engineering, and Math Opportunities (STEM Opportunities)** program with $112 million, once again perennially reject the Administration's proposal to eliminate the office entirely. Both Space Grant ($47 million) and EPSCoR ($22 million) would see slight increases. The Minority University Research and Education Program (MUREP) would be held flat at the FY 2019 level.

National Oceanic and Atmospheric Administration

The Senate CJS bill would provide NOAA with $5.3 billion overall, a decrease of $87.35 million or 1.6 percent compared to the FY 2019 enacted level and $141.6 million less than the House bill. Consistent with last year, the **Procurement, Acquisition and Construction (PAC)** account would experience a $215.8 million decrease because of planned operational transitions for weather satellites, while the **Operations, Facilities, and Research (ORF)** would receive a $130.5 million increase compared to the FY 2019 enacted level but $378.4 million than the House mark.

The Senate CJS FY 2020 bill, like the House, rejects the Trump Administration's proposed cuts and eliminations for signature research programs, like **Sea Grant**, **Coastal Zone Management grants**, and the **National Estuarine Research Reserve System (NERRS)**, instead providing flat funding and increases. Overall, the Senate would provide less funding for research than the House CJS bill.



Within the National Ocean Service (NOS), the Senate report prioritizes research on harmful algal blooms, providing $1 million through the **Integrated Ocean Observing System (IOOS)** for pilot programs. The Senate would provide $8 million to support Geospatial Modeling grants of which all funding will be competed externally. The report emphasizes hydrographic research and charting in the Arctic and an additional $2 million is provided to support a new joint ocean and costal mapping center. Flat funding is provided for the **Marine Debris** program and the **National Centers for Coastal Ocean Science (NCCOS)**. The Senate bill would provide $30 million **Title IX Fund grants**, previously known as the Regional Coastal Resilience program, while the House bill proposed doubling the account. Similar to the House bill, the coral reef program would receive $5 million and is directed to work with academic researchers on innovative restoration projects.

The National Marine Fisheries Service (NMFS) would receive $2.5 million directed to support regional pilots in sustainable aquaculture and maintains flat funding for the **Fisheries Science Centers**.

The Senate would provide a slight increase for the **Oceanic and Atmospheric Research (OAR)** compared to the FY 2019 enacted level, but roughly $222 million more than proposed in the President's budget request. The bill rejects proposed eliminations to the **Climate Research** program, instead providing flat funding a $1 million increase topline and flat funding for competitive research. The House proposed a $26.5 million increase overall and $11 million for the extramural climate research arm.

The **National Sea Grant program** would receive a $7 million increase, which is $2 million more than the House proposed. Additionally, the **Marine Aquaculture Program** would receive a $13 million increase, with an emphasis on finfish, shrimp, and oysters. **Ocean Exploration Research program (OER)** would receive flat funding and the report directs NOAA to "maximize" this funding for the newest Ocean Exploration Cooperative Institute that was awarded over the summer and to collaborate with the Department of Defense. In comparison, the House proposed a $2 million increase for OER, with no less than $7 million directed to support collaborations with non-governmental ocean-going ships for additional exploration.

The Senate CJS FY 2020 bill supports the proposed shift of funding from OAR to the Office of Marine and Aviation Operations (OMAO) to support the establishment of a new **Autonomous and Unmanned Technology Operations program (AUTO)**. The Senate would provide $12.6 million to support this, of which $4 million is to support continuing projects from the former office. The interagency **National Oceanographic and Partnership Program (NOPP)** would receive $5 million and directs that no more than 50% of this total can be used for one project. The bill would provide $7 million to support the new **Earth Prediction Innovation Center (EPIC),** that was recently authorized and directs NOAA to submit a five-year strategy for the new Center which is expected to "consist of an extramural center approach

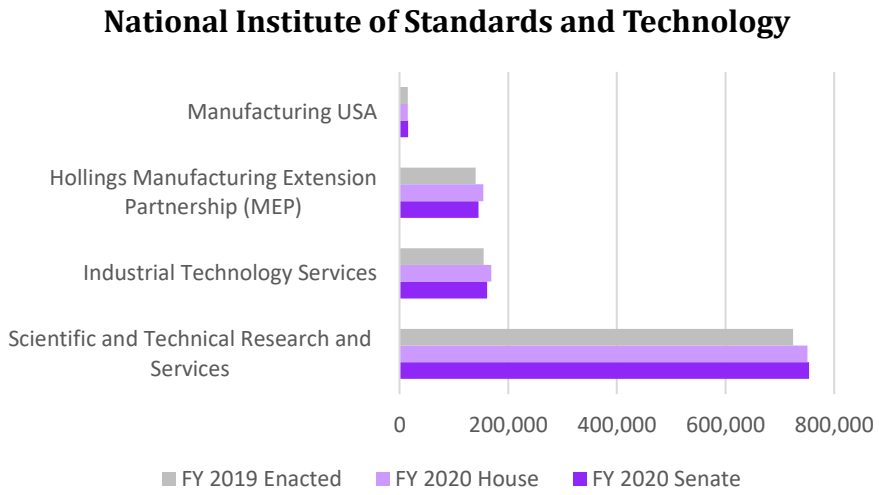
leveraged by intramural investments." The Senate also directs NOAA to submit a progress report on implementation of the **Cooperative Institutes for the 21st Century (CI21)** report recommendations.

Within the National Weather Service, the **National Mesonet Program** would receive an increase of $1 million increase compared to the FY 2019 enacted level and the report directs collaboration with National Science Foundation (NSF) and the US Geological Survey (USGS).

Within the PAC account, the Senate bill would provide $6 million for the **National Estuarine Research Reserve construction**, which is $3 million more than the House bill. The Senate directs $15 million to be dedicated to a **High-Performance Supercomputing** facility and a total of $49 million would support expanded supercomputing efforts at OAR for weather and climate modeling. **Polar Weather Satellites** would receive funding as requested. Similar to the House bill, the Senate would provide flat funding for the **Integrated Water Prediction**. The bill would also support the **Space Weather Follow-On** at $68.6 million, which is almost double than the House mark of $38.6 million. The Senate would reject the proposed reorganization of NESDIS. Additionally, $40 million is provided for NOAA's "highest priority facilities repair and deferred maintenance."

National Institute of Standards and Technology

The **National Institute of Standards and Technology (NIST)** would receive $1.038 billion, which is $52.5 million above the FY 2019 enacted level and $82.4 million above the President's budget request. NIST's research programs would receive $753.5 million, which is $29 million above the FY 2019 enacted level and $2.5 million above the House level. The Senate bill mirrors the House in highlighting numerous research priorities for NIST, including cybersecurity, artificial intelligence (AI), quantum information science (QIS) and additive manufacturing. However, unlike the House bill, the Senate bill also includes language on the Industrial Internet of Things (IIoT) and unmanned aerial vehicles (UAVs) but does not include research for 5G telecommunications systems.



- **Cybersecurity:** The Senate bill focuses on the need to improve the cybersecurity workforce to properly protect the nation's assets and would direct NIST to support cybersecurity activities at no less than the FY 2019 level. Notably, the Committee encourages NIST to "fund additional university system-led state and regional alliances and partnerships to focus on meeting the demand for a trained cybersecurity workforce, with a priority being placed on areas with a high concentration of Department of Defense, automotive and health care related industries."
- **AI:** The Committee would provide $8 million above the FY 2019 level to expand NIST's work in AI to support the Trump Administration's Industries of the Future Initiative. This would include creating resources for government, corporate, and academic use.

- **QIS:** The bill would provide $10 million above the FY 2019 levels to fund NIST's quantum research efforts in support of the *National Quantum Initiative Act*, including the Quantum Economic Development Consortium.
- **IIoT:** The Senate Appropriations Committee would provide at least $2 million to develop an IIoT cybersecurity research initiative and "partner, as appropriate, with academic entities and industry to improve the sustainable security of IIoT devices in industrial settings, including new designs, protocols, algorithms, system architectures, identity and lifecycle strategies, and system hardware features, as well as proposed security standards."
- **UAVs:** The Committee would provide $2.5 million to develop a Public Safety Unmanned Aerial Vehicle Challenge in partnership with academic institutions "that have a strong history of flight operations in both UAV operational training and applied research experiments. NIST is encouraged to run at least three UAV prize-based challenges within one year of the enactment of the bill, with topics of interest that include: extending cellular coverage in rural areas; deploying sensor networks around buildings to better track safety officers in buildings; and providing real-time situational awareness of on-scene response through video and advanced analytics.
- **Additive Manufacturing:** The Committee would provide at least the FY 2019 level to support "competitive external grants for academic institutions to support research, development, and workforce training to overcome barriers to high-volume additive manufacturing of metals."
- **Plastics and Polymeric Materials:** The Committee would provide at least $1 million above the FY 2019 level to support external grants in plastic and polymeric materials, with a focus on new ways to increase the strength of recycled plastics and better understand mechanical properties" with the aim of developing new industry standards for recycled plastics.

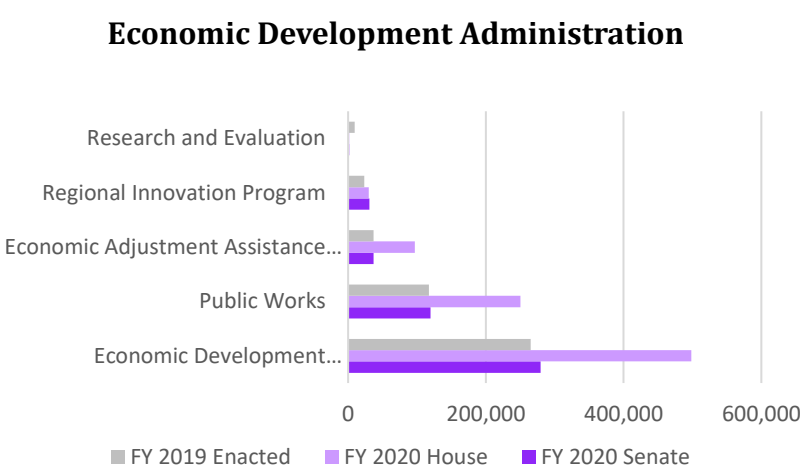
Like the House, the Senate bill would reject the President's proposal to eliminate the **Manufacturing Extension Partnership (MEP)** and would fund the program at $145.5 million, which compares to $154 million as proposed in the House bill. NIST's **Manufacturing USA** program would receive $16 million, an increase of 5.5 percent over the House level and 6.7 percent over FY 2019. Unlike the House bill, the Senate provides $1 million for a "competitive grant program to develop technology roadmaps for promising advanced manufacturing clusters." The technology roadmap grants would strengthen existing industry-led consortia or create new ones that "address high-priority research challenges in order to grow advanced manufacturing in the United States."

Economic Development Administration

Despite repeated attempts by the Trump Administration to eliminate the Economic Development Administration (EDA), the Agency would receive **$319.5 million** in FY 2020 under the Senate's bill, a 5.1 percent increase above the FY 2019 level. However, the proposed increase in the Senate bill would fall significantly short of the House's proposed level of **$540 million**, which would nearly double the amount the agency received in FY 2019. The Senate Committee's recommendations call on EDA to focus on its core mission to aid the most distressed communities. The Committee also directs EDA to consider geographic equity in making funding decisions to ensure that rural communities are adequately supported, a long-standing priority for CJS Subcommittee Chair Jerry Moran (R-KS) and the other Senators in the majority who represent rural states.

The bill would increase funding for many of the agency's key initiatives to advance public works projects and stimulate innovation-based economic growth. Notably, the bill would provide $31 million for the popular **Regional Innovation Program (RIP)**, a 31.9 percent increase over the FY 2019 enacted level and $1 million (3.3 percent) over the House's bill. This is the one program that would receive more funding

than the House's proposal. RIP provides support for universities and research institutes to develop and scale-up commercialization centers through i6 Challenge grants and cultivate funding campaigns for promising startups through Cluster Grants for Seed Capital Funds. In the report accompanying the bill, the Committee directs EDA to ensure that awards go to multiple grantees in diverse geographic areas, including organizations and states that have not yet received RIP funding, and to award at least 40 percent of grants to support rural communities.



In addition, the bill would increase funding for the **Public Works** program by 1.7 percent and the **Economic Adjustment Assistance Program (EAA)** by 5.5 percent; for context, the House bill would increase funding for these programs by 112.8 percent and 162.2 percent, respectively. Public Works and EAA provide competitive funding for projects with potential to expand economic activity through funding for construction, non-construction, technical assistance, and revolving loan fund projects. The Committee directs the increased funding for these programs to go toward assisting distressed communities through collaborations with the Delta Regional Authority, the Appalachian Regional Commission, and the Northern Border Regional Commission.

Other provisions in the bill would:

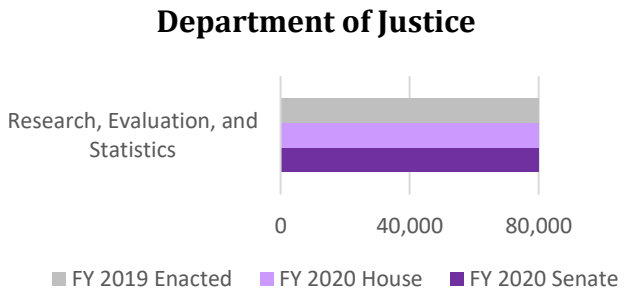
- Direct EDA to invest in university based, high-tech business incubators, including in areas where universities and federal laboratories are collaborating to commercialize discoveries stemming from federally-funded research. This was not listed as a priority in the House's bill.
- Provide $5 million to assist communities impacted by nuclear power plant closures.
- Encourage EDA to consider supporting projects for growing outdoor recreation industries, establishing high-speed broadband in unserved areas, commercializing wood products in communities impacted by changes to the timber industry, and developing or expanding aeronautics related industries.
- Provide grants to communities for STEM apprenticeships and other workforce training models, as authorized under the most recent *American Innovation and Competitiveness Act*. Unlike the House bill, which would allocate $5 million for this effort, the Senate bill does not provide a specific funding amount.

Department of Justice

The Department of Justice (DOJ) would receive approximately $32.5 billion for FY 2020, an increase of about 4.9 percent over the enacted level and 1.4 percent above the House bill. As with the House bill, the Senate bill would reject increased funding for key research accounts proposed in the President's FY 2020 budget request. The bill would maintain flat funding for DOJ's Research, Evaluation, and Statistics

account in the Office of Justice Programs (OJP), including the National Institute of Justice (NIJ), DOJ's primary external research program that leverages university partnerships with the goal of strengthening science and enhancing justice.

Similar to the House bill, the Senate bill would prioritize research in the areas of preventing domestic radicalization, school safety, and human trafficking. Both chambers' bills would also provide set-aside funding for a National Center for Restorative Justice aimed at developing the next generation of justice leaders through enhancing individuals' understanding of the justice system and restorative approaches and a National Center on Forensics to improve forensic science education and training. The Senate bill further encourages a new comprehensive study of law enforcement responses to sex trafficking of minors, as well as support for campus sexual assault prevention research.



Finally, the Senate bill would re-establish the **Science Advisory Board (SAB)**, a panel which allowed the top minds in criminal justice science to provide input on research investments directly to agency leadership. According to the report, the reestablished board should be comprised of "scholars and practitioners in criminology, statistics, sociology, and practitioners in the criminal and juvenile justice fields."

Senate CJS Appropriations Bill, FY 2020

As reported by the Senate Appropriations Committee on September 25, 2019

National Science Foundation

(In millions of $)

	FY 2019 Enacted	FY 2020 House	FY 2020 Senate	Senate vs. FY 2019	Senate vs. Request	Senate vs. House
NSF, total	**8,075.00**	**8,636.14**	**8,317.00**	**242.00 (3.00%)**	**1,251.00 (17.70%)**	**-319.14 (3.7%)**
Research & Related Activities	6,520.00	7,106.30	6,769.67	249.67 (3.83)	1,106.71 (19.54%)	-336.63 (4.7%)
Education & Human Resources	910.00	950.00	937.00	27.00 (2.97%)	113.53 (13.79%)	-13.00 (1.4%)
MREFC	295.74	223.23	253.23	-42.51 (14.37%)	30.00 (13.44%)	30.00 (13.4%)
Agency Operations and Award Management	329.54	336.89	336.90	7.36 (2.23%)	0.01 (--)	0.01 (--)
NSB	4.37	4.37	4.50	0.13 (2.97%)	0.40 (9.76%)	0.13 (3.0%)

Office of Inspector General	15.35	15.35	15.70	0.35 (2.28)	0.35 (2.28%)	0.35 (2.3%)

National Aeronautics and Space Administration

(In thousands of $)

	FY 2019 Enacted	FY 2020 House	FY 2020 Senate	Senate vs. FY 2019 Enacted	Senate vs. Request	Senate vs. House
NASA, total	**21,500,000**	**22,315,000**	**22,750,000**	**1,250,000 (5.8%)**	**134,300 (0.6%)**	**435,000 (1.9%)**
Science	**6,905,700**	**7,161,300**	**6,905,700**	--	**512,000 (8.0%)**	**-255,600 (3.6%)**
Earth Science	1,931,000	2,023,100	1,945,000	14,000 (0.7%)	165,000 (9.3%)	-78,100 (3.9%)
Planetary Science	2,758,500	2,713,400	2,631,100	-127,400 (4.6%)	--	-82,300 (3.0%)
Astrophysics	1,191,600	1,367,700	1,171,600	-20,000 (1.7%)	-25,400 (2.1%)	-196,100 (14.3%)
James Webb Space Telescope	304,600	352,600	423,000	118,400 (38.9%)	70,400 (20.0%)	70,400 (20.0%)
Heliophysics	720,000	704,500	735,000	15,000 (2.1%)	30,500 (4.3%)	30,500 (4.3%)
Education and Public Outreach (EPO)*	45,000	N/A	45,600	600 (1.3%)	N/A	N/A
Aeronautics	**725,000**	**700,000**	**783,900**	**58,900 (8.1%)**	**117,000 (17.5%)**	**83,900 (12.0%)**
Space Technology	**926,900**	**1,291,600**	**1,076,400**	**149,500 (16.1%)**	**-69,900 (6.1%)**	**-215,200 (16.7%)**
Exploration	**5,050,800**	**5,129,900**	**6,222,600**	**1,171,800 (23.2%)**	**-173,800 (2.7%)**	**1,092,700 (21.3%)**
Space Operations	**4,639,100**	**4,285,700**	**4,150,200**	**-488,900 (10.5%)**	**-135,500 (3.2%)**	**-135,500 (3.2%)**
STEM Engagement	**110,000**	**123,000**	**112,000**	**2,000 (1.8%)**	**112,000 (N/A)**	**-11,000 (8.9%)**
Aerospace Research & Career Dev.	65,000	73,000	69,000	4,000 (6.2%)	69,000 (N/A)	-4,000 (5.5%)
Space Grant	44,000	48,000	47,000	3,000 (6.8%)	47,000 (N/A)	-1,000 (2.1%)
EPSCoR	21,000	25,000	22,000	1,000 (4.8%)	22,000 (N/A)	-3,000 (12.0%)
Minority University Research Education Program	33,000	37,000	33,000	--	33,000 (N/A)	-4,000 (10.8%)

(MUREP)						
Safety, Security, & Mission Services	**2,755,000**	**3,084,600**	**2,934,800**	**179,800 (6.5%)**	**-149,800 (4.9%)**	**-149,800 (4.9%)**
Construction and Environmental Compliance and Restoration	**348,200**	**497,200**	**524,400**	**176,200 (50.6%)**	**-76,000 (12.7%)**	**27,200 (5.5%)**
Office of Inspector General	**39,300**	**41,700**	**40,000**	**700 (1.8%)**	**-1,700 (4.1%)**	**-1,700 (4.1%)**

* In the Senate Commerce, Justice, Science appropriations bill for FY 2020, Education and Public Outreach (EPO) is listed as Science Mission Directorate Education.

National Oceanic and Atmospheric Administration

(In thousands of $)

	FY 2019 Enacted	FY 2020 House	FY 2020 Senate	Senate vs. FY 2019 Enacted	Senate vs. Request	Senate vs. House
NOAA, total	**5,424,695**	**5,478,974**	**5,337,343**	**-87,352 (1.6%)**	**870,878 (19.5%)**	**-141,631 (2.6%)**
Operations, Research, and Facilities (ORF)	**3,596,997**	**4,105,907**	**3,727,466**	**130,469 (3.6%)**	**669,083 (21.9%)**	**-378,441 (-9.2%)**
Oceanic and Atmospheric Research (OAR)	525,060	595,393	531,207	6,147 (1.2%)	222,058 (71.9%)	-64,186 (10.8%)
Climate Research	159,000	186,500	160,000	1,000 (0.6%)	72,491 (82.8%)	-26,500 (14.2%)
Competitive Climate Research	60,000	71,000	60,000	11,000 (18.3%)	60,000 (N/A)	-11,000 (15.5%)
Weather and Air Chemistry	135,380	147,313	131,972	-3,408 (2.5%)	21,407 (19.3%)	-15,341 (10.4%)
Ocean, Coastal and Great Lakes Research	218,500	239,345	226,000	7,500 (3.4%)	127,160 (128.7%)	-13,345 (5.6%)
Sea Grant	68,000	73,000	75,000	7,000 (10.3%)	75,000 (N/A)	2,000 (2.7%)
Ocean Exploration Research (OER)	42,000	44,000	42,000	0 (0%)	22,362 (113.9%)	-2,000 (4.5%)
National Weather Service (NWS)	**1,020,719**	**1,099,549**	**1,060,045**	**39,326 (3.9%)**	**70,747 (7.2%)**	**-39,504 (3.6%)**
National Ocean Service (NOS)	**581,567**	**642,000**	**588,806**	**7,239 (1.2%)**	**219,101 (59.3%)**	**-53,194 (8.3%)**
Coastal Science and Assessment:	18,000	20,000	18,000	0 (0%)	18,000 (N/A)	-2,000 (-10%)

Competitive Research						
Ocean and Coastal Management and Services; Coastal Management Grants	75,500	81,000	76,500	**1,000 (1.3%)**	76,500 (N/A)	-4,500 (5.6%)
National Marine Fisheries Service (NMFS)	**908,832**	**944,650**	**944,867**	**36,035 (4.0%)**	**133,199 (16.4%)**	**217.0 (0.1%)**
Procurement, Acquisition, and Construction (PAC)	**1,768,349**	**1,509,000**	**1,552,528**	**-215,821 (12.2%)**	**146,292 (10.4%)**	**43,528 (2.9%)**
National Environmental Satellite, Data, and Information Systems	1,457,181	1,218,237	1,271,583	-185,598 (12.7)	70,464 (5.9%)	53,346 (4.4%)

National Institutes of Standards and Technology

(In thousands of $)

	FY 2019 Enacted	FY 2020 House	FY 2020 Senate	Senate vs. FY 2019 Enacted	Senate vs. Request	Senate vs. House
NIST, total	**985,500**	**1,040,172**	**1,038,000**	**52,500 (5.3%)**	**82,419 (8.6%)**	**-2,172 (0.2%)**
Scientific and Technical Research and Services	**724,500**	**751,000**	**753,500**	**29,000 (4.0%)**	**141,781 (23.2%)**	**2,500 (0.3%)**
Industrial Technology Services	**155,000**	**169,172**	**161,500**	**6,500 (4.2%)**	**146,328 (964.5%)**	**-7,672 (4.5%)**
Hollings Manufacturing Extension Partnership (MEP)	140,000	154,000	145,500	5,500 (3.9%)	145,500 (N/A)	-8,500 (5.5%)
Manufacturing USA	15,000	15,172	16,000	1,000 (6.7%)	1,000 (6.7%)	828 (5.5%)

Economic Development Administration

(In thousands of $)

	FY 2019 Enacted	FY 2020 House	FY 2020 Senate	Senate vs. FY 2019 Enacted	Senate vs. Request	Senate vs. House
EDA, total	**304,000**	540,000	**319,500**	**15,500 (5.1%)**	**319,500 (N/A)**	**-220,500 (40.8%)**
Economic Developmen	**265,000**	**498,350**	**279,500**	**14,500 (5.5%)**	**279,500 (N/A)**	**-218,850 (43.9%)**

t Assistance Programs						
Public Works	117,500	250,000	119,500	2,000 (1.7%)	119,500 **(N/A)**	-130,500 (52.2%)
Economic Adjustment Assistance Program	37,000	97,000	37,000	--	37,000 **(N/A)**	-60,000 (-61.9
Regional Innovation Program	23,500	30,000	31,000	7,500 (31.9%)	31,000 **(N/A)**	1,000 (3.3%)
Research and Evaluation	9,500	1,600	1,500	-8,000 (84.2)	1,500 **(N/A)**	-100 (6.3%)

Department of Justice

(In thousands of $)

	FY 2019 Enacted	FY 2020 House	FY 2020 Senate	Senate vs. FY 2019Enacted	Senate vs. Request	Senate vs. House
DOJ, total	**30,934,388**	**31,999,949**	**32,446,20**	**1,511,815 (4.9%)**	**1,834,177 (6.0%)**	**446,254 (1.4%)**
Research, Evaluation, and Statistics	**80,000**	**80,000**	**80,000**	**--**	**-15,000 (15.3%)**	**--**
National Institute of Justice	37,000	37,000	37,000	--	-9,500 (20.4)	--

Sources and Additional Information:

- The committee report is available at https://www.appropriations.senate.gov/imo/media/doc/FY2020%20CJS%20Appropriations%20Act,%20Report%20116-127.pdf.
- The webcast of the full committee markup is available at https://www.appropriations.senate.gov/hearings/full-committee-markup-of-fy2020-interior-cjs-homeland-and-leg-branch-bills.