

# The Federal R&D Budget for FY 2019 and Beyond

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October 26, 2018

For the Council on Government Relations

AAAS R&D Budget and Policy Program

<http://www.aaas.org/rd>



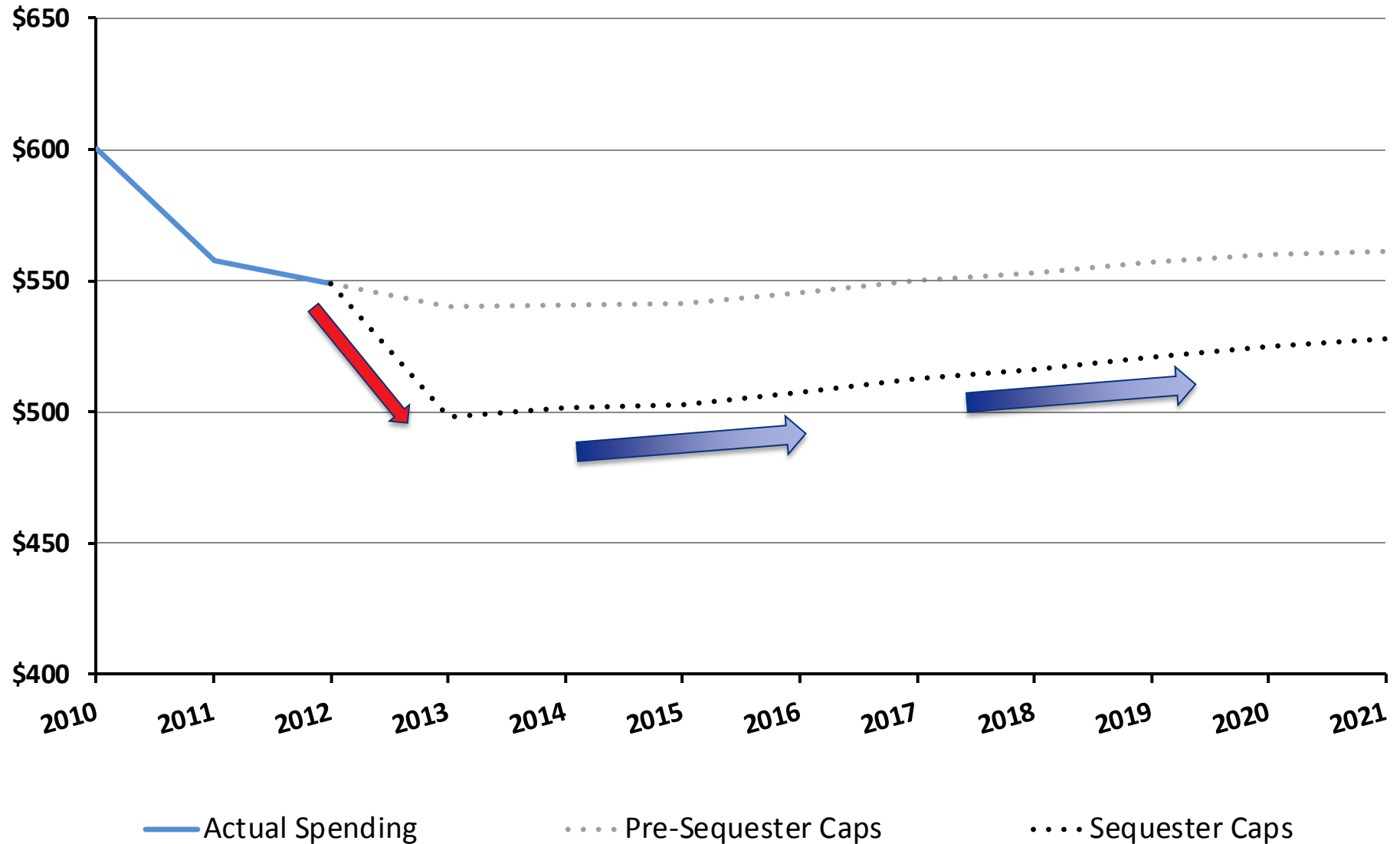
# Game Plan



1. The Story of the Caps
2. The White House Budget for FY 2019
3. FY 2019 Appropriations
  1. Completed...
  2. ...and Pending
4. Where Are We Headed Next Year and Beyond?

# Limits on NONDEFENSE Spending

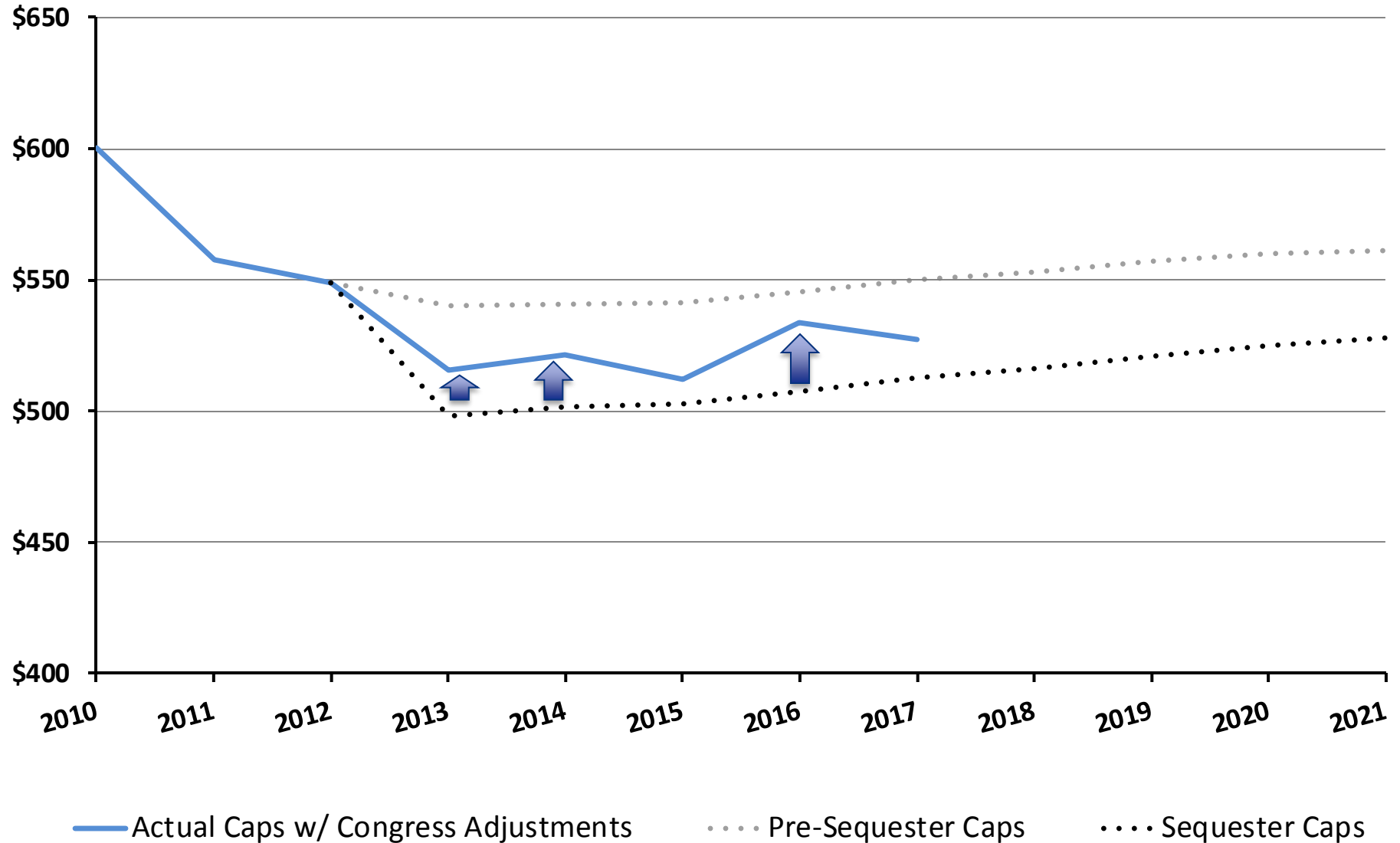
Billions of constant 2018 dollars



\*Current caps last through 2021. Based on past and current budget resolutions, the Budget Control Act and subsequent legislation, and the FY 2019 OMB summary tables. © AAAS 2018

# Limits on NONDEFENSE Spending

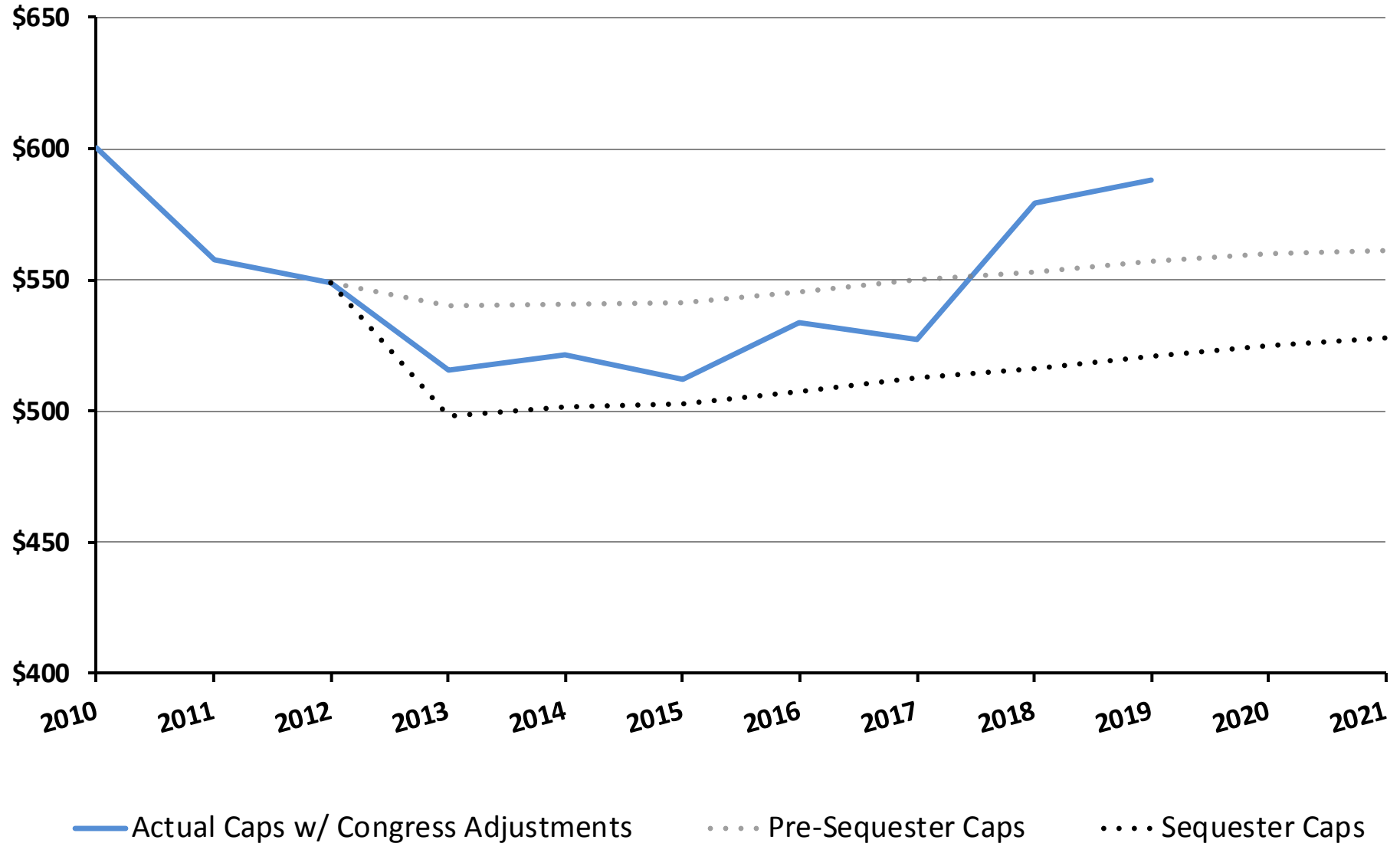
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# Limits on NONDEFENSE Spending

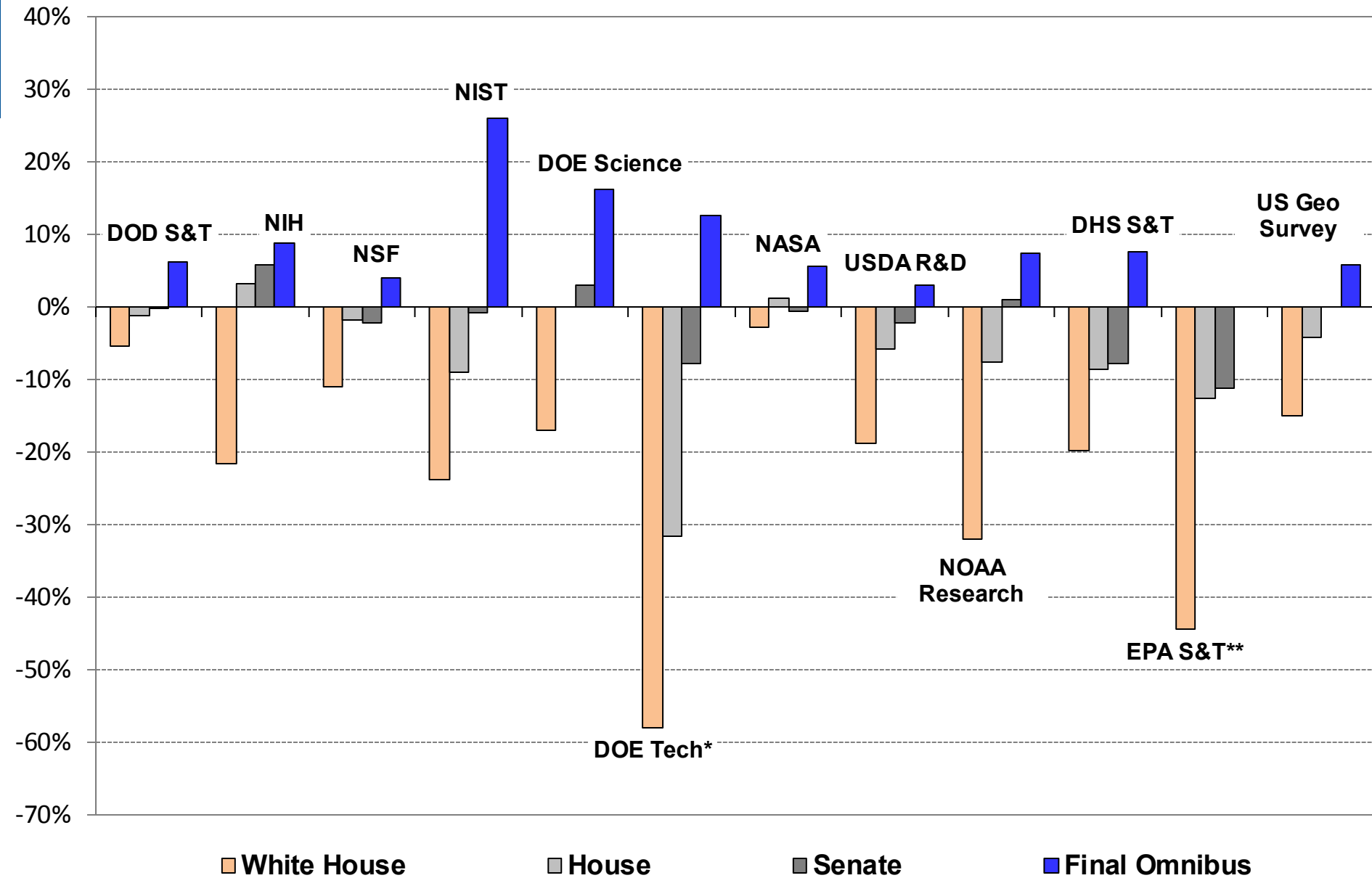
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# Select Science & Tech Agencies/Programs in FY 2018 Appropriations

*Estimated percentage change from FY 2017 enacted levels, nominal dollars*



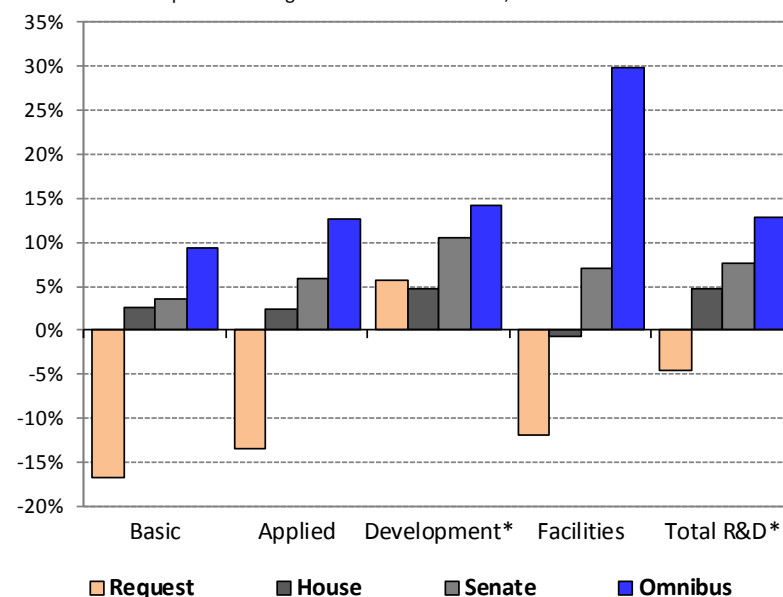
\*Includes renewables and efficiency, nuclear, fossil, grid research, ARPA-E. \*\*Flat in omnibus.  
Based on the FY 2018 budget request, the FY 2017 omnibus, and current appropriations. | AAAS

# FY 2018 Omnibus Notes



- Adopted last March
- ~11% increase for research spending
  - Largest in 15 years (in regular appropriations)
- All-time high for research and total R&D (est.)
- Emergent priorities:
  - Exascale computing; fusion research; user facilities
  - Weather research
  - Defense materials and manufacturing
  - NIH initiatives including opioids
  - NASA: planetary science and exploration
  - Several energy programs saved/boosted
  - Competitive agricultural research grants
  - Natural hazards research and monitoring
- Climate research, manufacturing programs protected
- Gun violence research permitted
- More than \$3 billion for opioids research, surveillance, response (CDC, NIH, SAMHSA, Justice, FDA, etc)
- Also modest increases for NEH, NEA

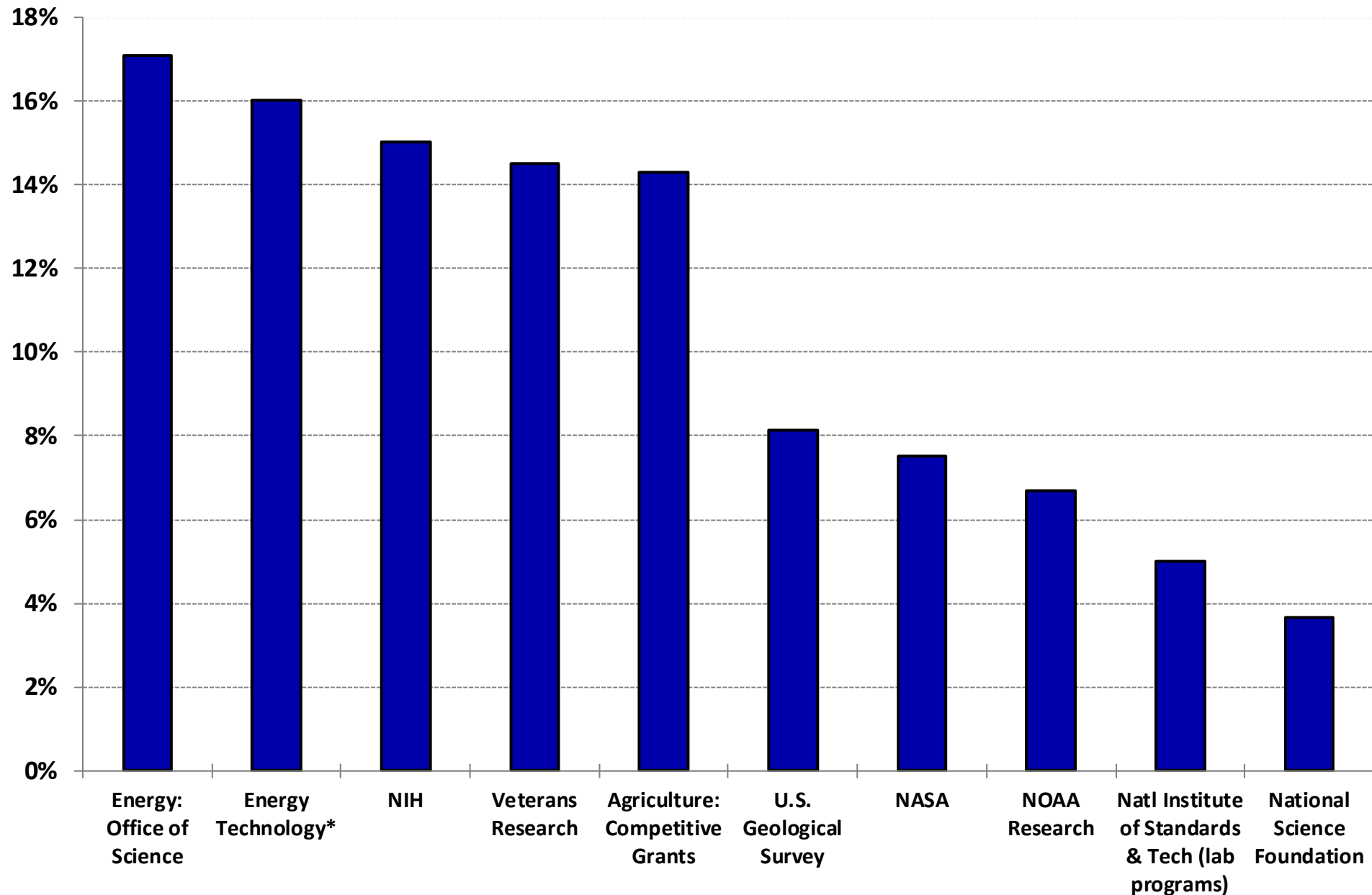
**Estimated R&D by Type in FY 2018 Appropriations**  
percent change from FY 2017 estimates, nominal dollars



\*Using old definition, including DOD 6.7 account as R&D. The new official definition excludes this account from R&D. Based on OMB and agency data, and AAAS estimates from FY 2017 and FY 2018 appropriations. © 2018

# Science Agency Budget Increases Since January 2017

*Percent change from FY 2016 - FY 2018, nominal dollars*

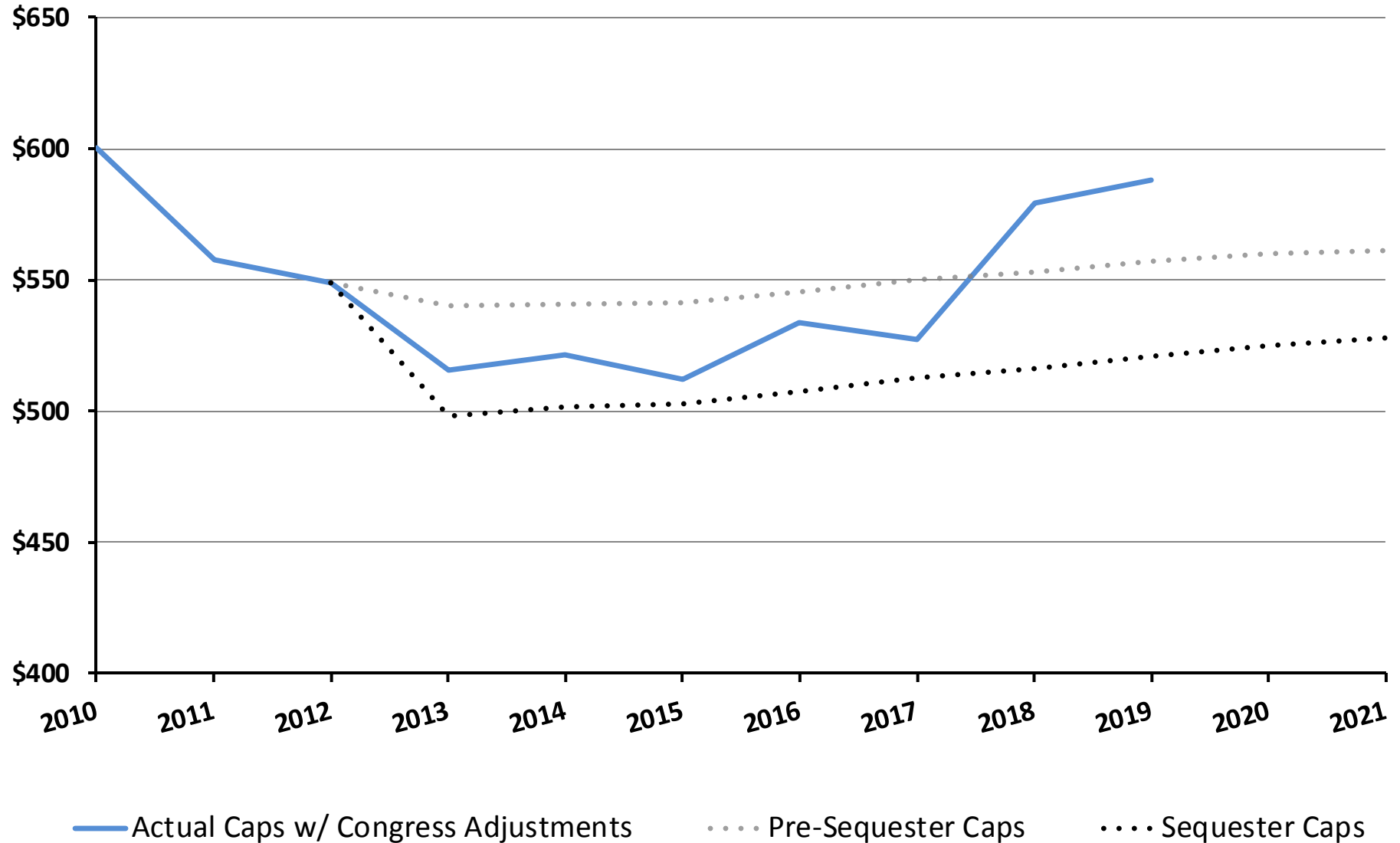


Source: agency budget documents and appropriations. Note: inflation is 3.3% over this time. | AAAS 2018



# Limits on NONDEFENSE Spending

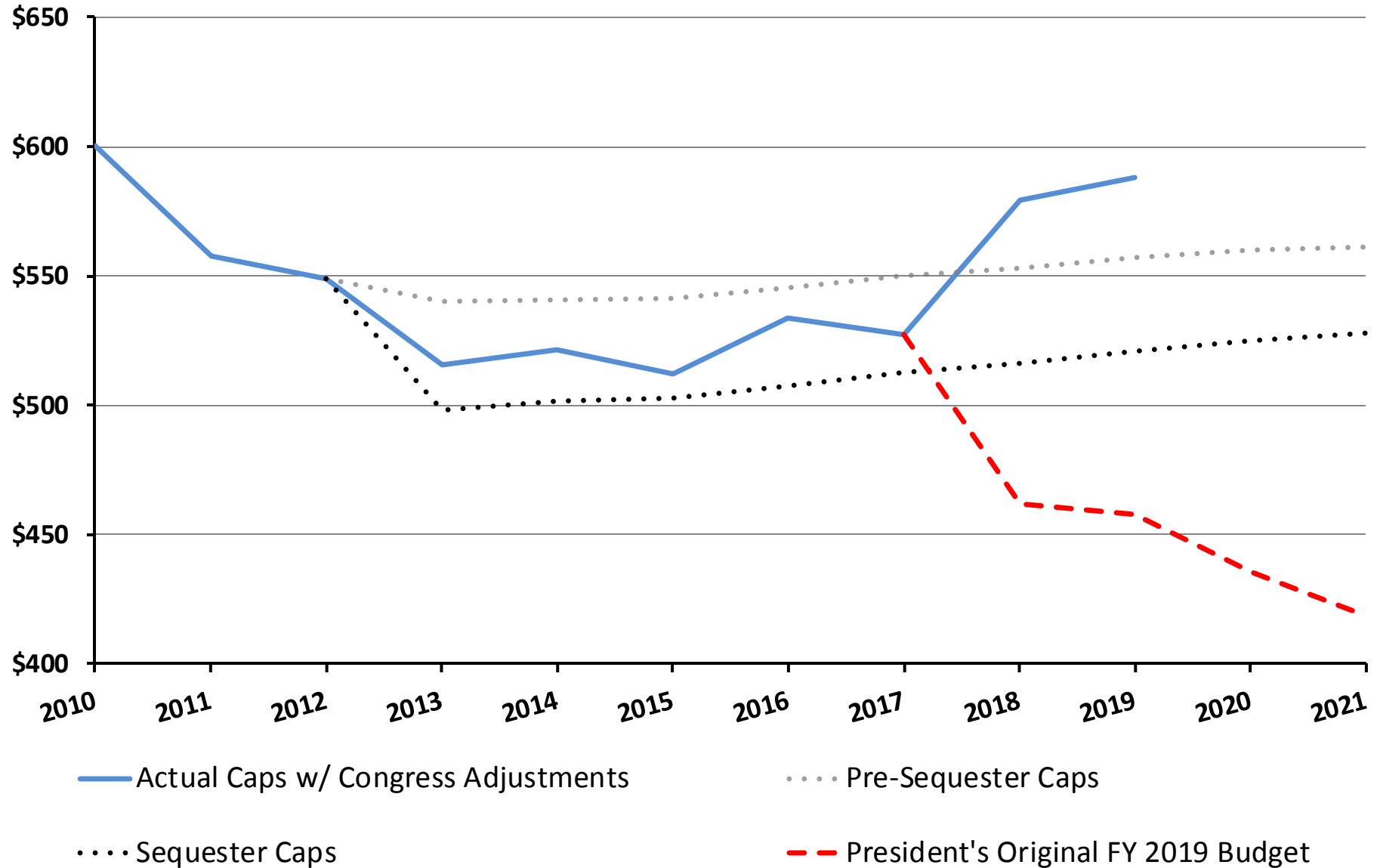
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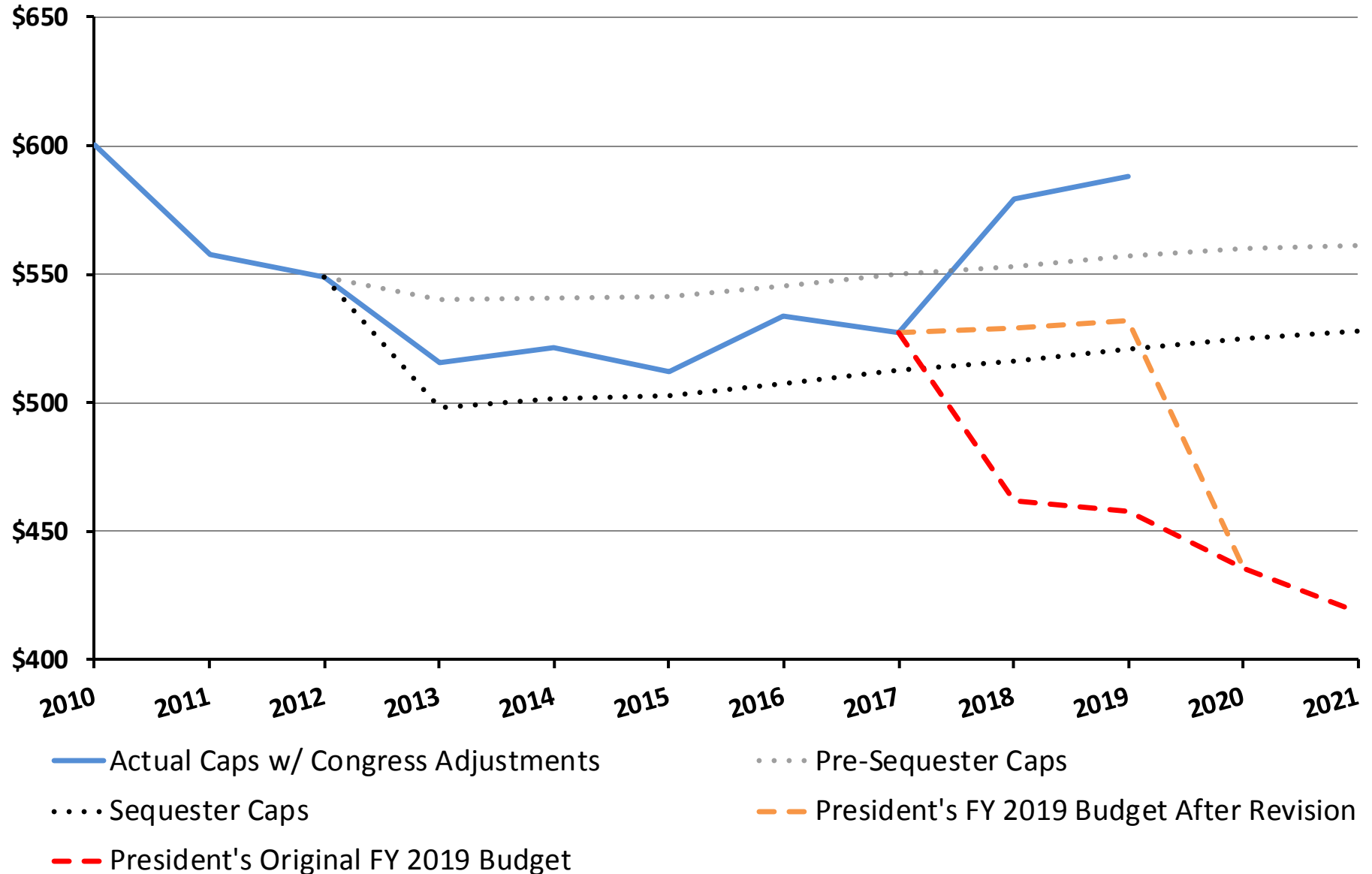
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Billions of constant 2018 dollars

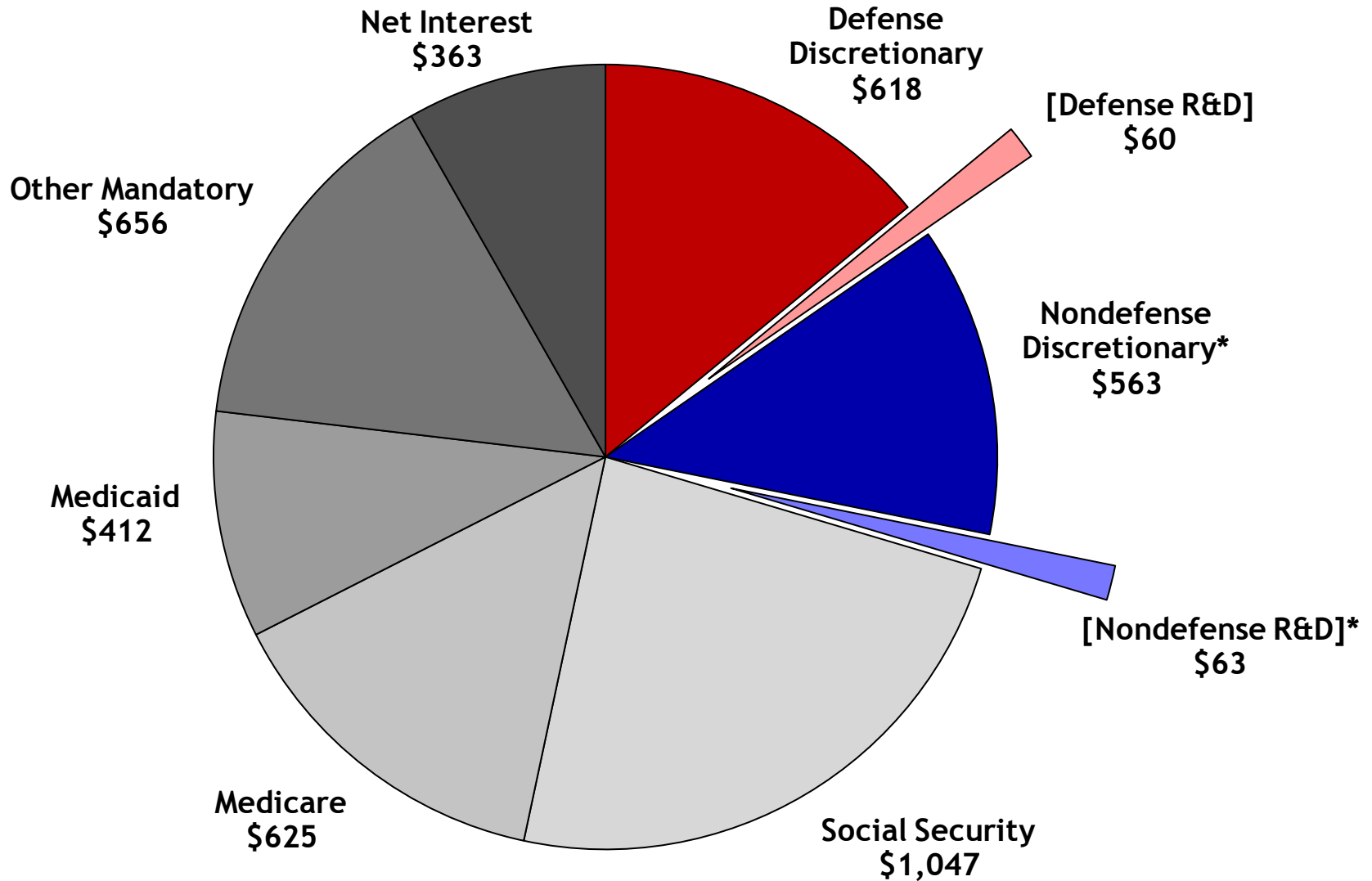


\*Current caps last through 2021. Based on past and current budget resolutions, the Budget Control Act and subsequent legislation, and the FY 2019 OMB summary tables. © AAAS 2018

# Composition of the Proposed FY 2019 Budget

## Total Outlays = \$4.4 trillion

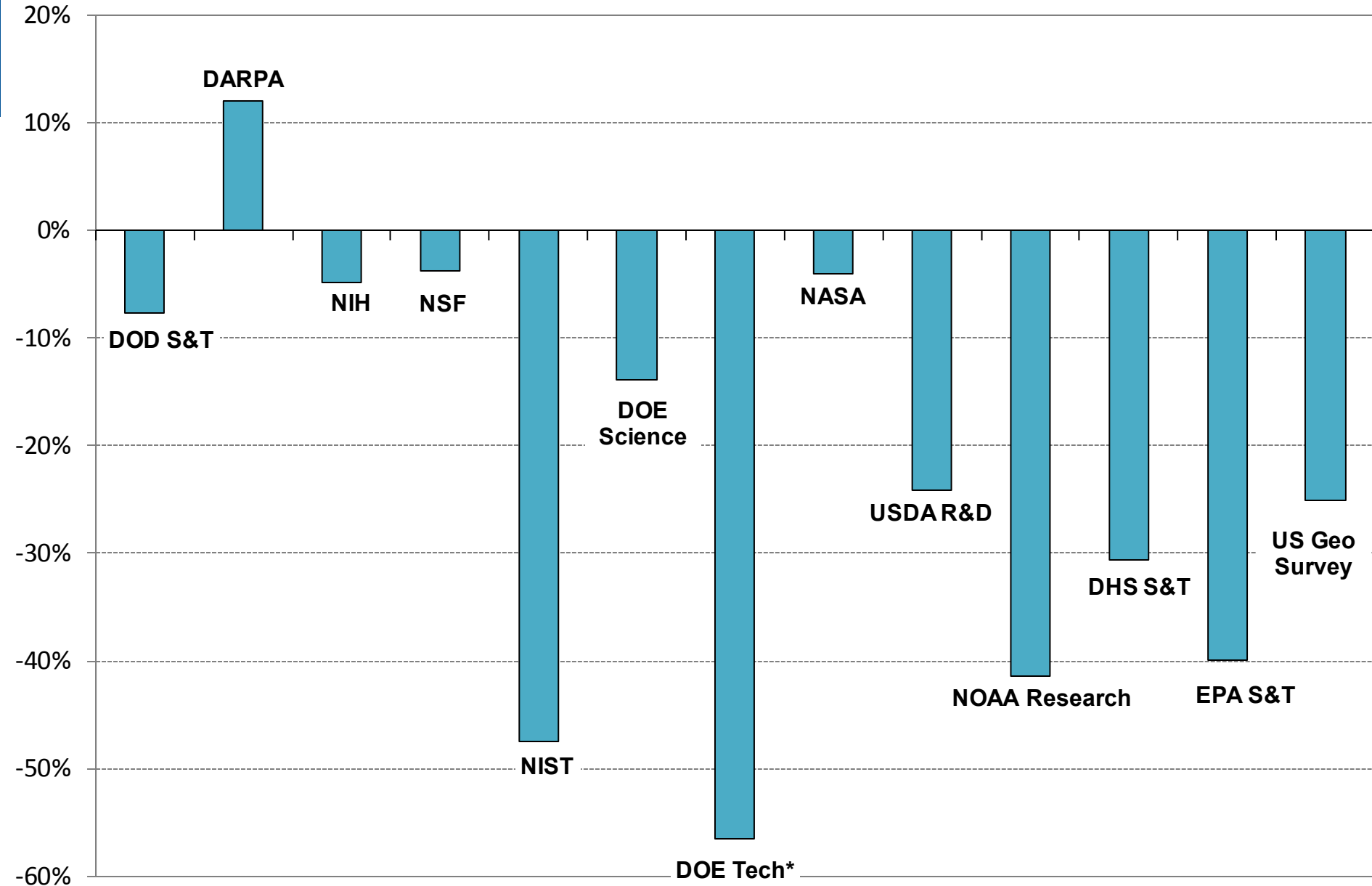
outlays in billions of dollars



\*Totals do not include last-minute additions of several billion dollars in response to passage of the Bipartisan Budget Act of 2018.  
Source: *Budget of the United States Government FY 2019*. Projected deficit is \$984 billion. © AAAS 2018

# Select Science & Tech Agencies and Programs in the FY 2019 Budget

*Estimated percentage change from FY 2018 enacted omnibus, nominal dollars*



\*Includes renewables and efficiency, nuclear, fossil, grid research, cybersecurity, ARPA-E. | AAAS

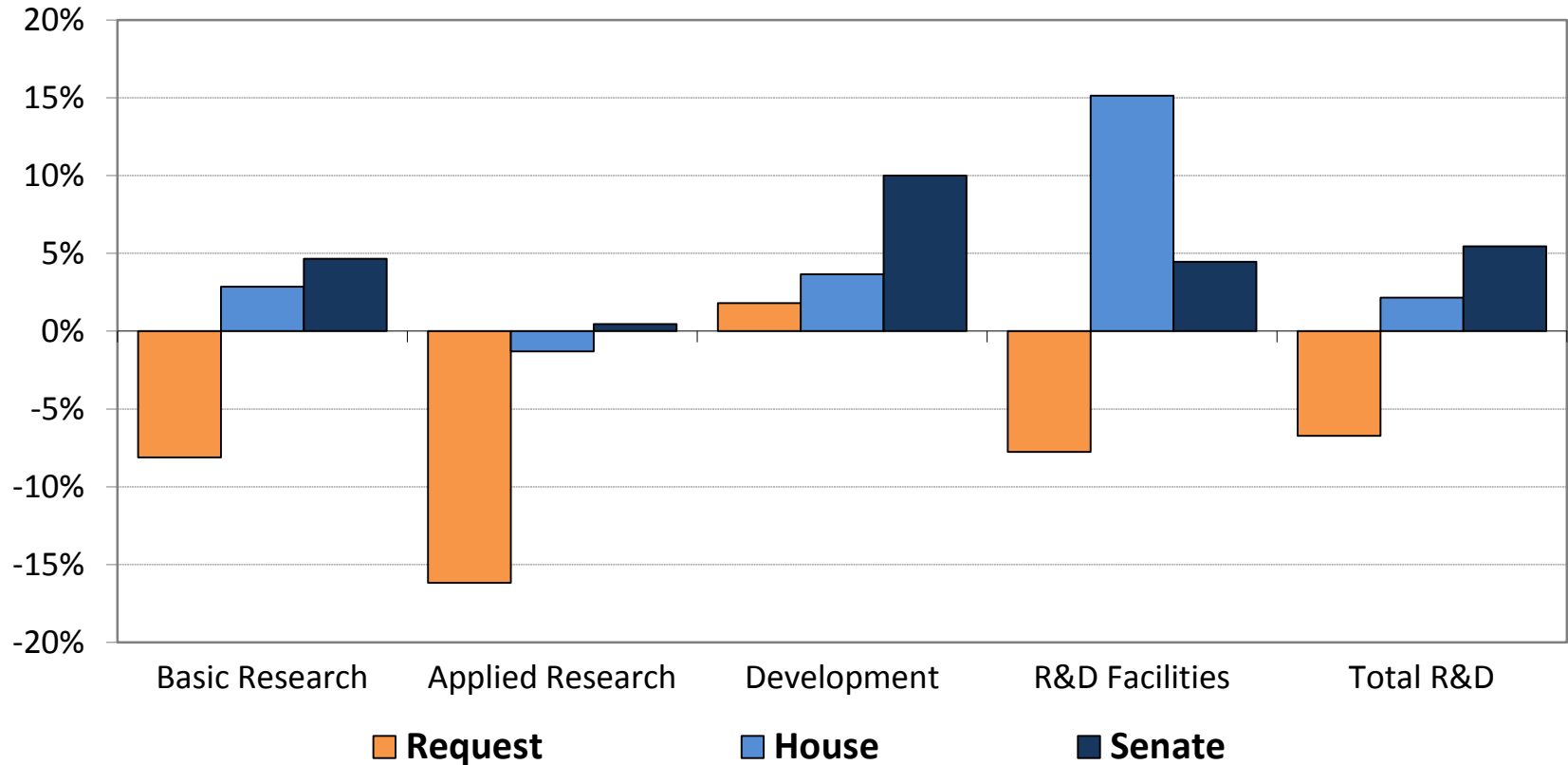
## Spending Bill Progress Check



- **All twelve bills** are through the Appropriations Committees in both chambers
- **Five out of twelve bills** have been fully adopted by Congress and signed into law before the start of the fiscal year October 1
  - Covering Defense, Energy, HHS, Veterans Affairs, Education
  - Fastest pace in 22 years
- **The remaining seven bills** are under a CR until December 7
  - Including NSF, NASA, Agriculture, Commerce, EPA, Interior, Homeland Security

## R&D by Type in FY 2019 Appropriations So Far

Estimated percent change from FY 2018, nominal dollars



AAAS estimates based on OMB, agency, and Congressional data. © 2018 AAAS

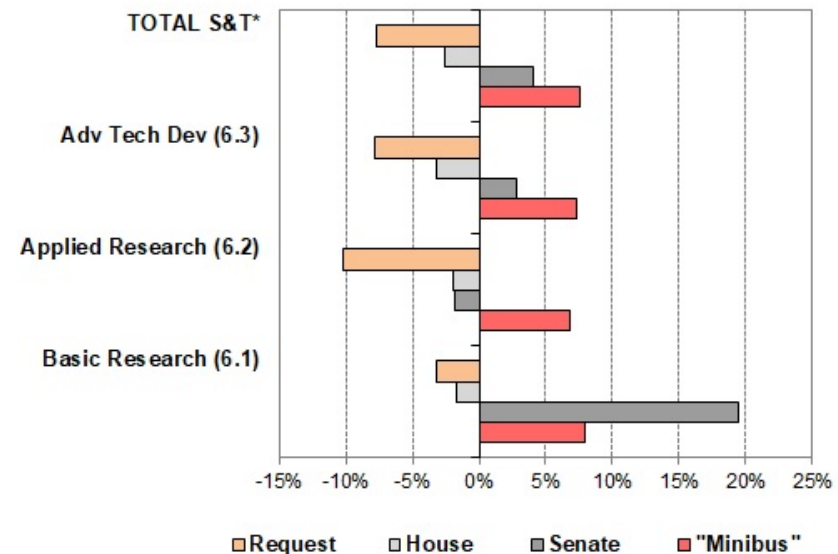
- Our **basic research** estimate: \$39+ billion, increases of 3-5%
- Our **total R&D** estimate: \$145-\$150 billion, increases of 2-6%
- Would push total research spending to all-time high (or close to it), keeping it fairly consistent with historical average as a share of GDP (around 0.40%)

# Department of Defense



- **Basic research: +8% to \$2.5 billion**
  - All-time high, spread across all military branches
  - Splits difference between BIG Senate boost and modest House reduction
  - Primarily for Defense Research Sciences programs
  - National Defense Education Program increased by 31.6%
  - \$10 million added for Navy DURIP
  - 25% increase for Minerva Initiative
- Also increases for applied research and advanced technology development; S&T up 7.6% overall
  - Tens of millions added for AI-related activities
  - Manufacturing tech and related programs OK
- **DARPA** increased by 11.7%, including plus-ups for AI research, hypersonics, other areas
- **Defense medical research** up by 6.9%, including just north of \$1 billion for peer-reviewed medical research

**DOD S&T in FY 2019 Appropriations**  
percent change from FY18 omnibus, nominal dollars



\*Total S&T combines 6.1, 6.2, and 6.3. © 2018 AAAS

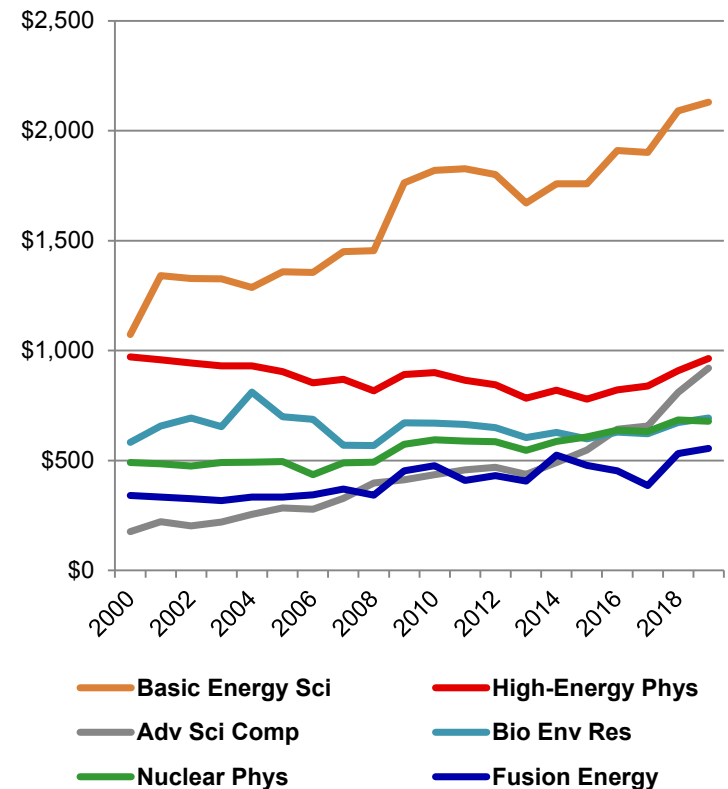


# Department of Energy



- **Office of Science: +5.2%**
  - Advanced computing has become major shared priority
    - +16% for ASCR, +14% for exascale project
  - Flat or moderate increases for most user facilities; also construction plus-ups
  - \$10 million for new microbiome database
  - Fusion research protected: ITER increased by 8%, domestic activities up 5%
  - High Energy Physics and Nuclear Physics: increases of >4% for research accounts; HEP also see construction funding boost
- **Technology programs:**
  - ARPA-E saved again (+4%)
  - Cybersecurity Office established (\$120 million)
  - Efficiency & Renewables: +2.5%
    - Hubs and manufacturing institutes (mostly) preserved
  - Nuclear: +10%, integrated university program preserved plus \$100 million for SMR support
  - Fossil: +2%, limited changes for CCS; funding for coal pilots and natgas retrofit design study

**DOE Office of Science Budgets**  
Budget authority, millions of constant FY 2018 dollars

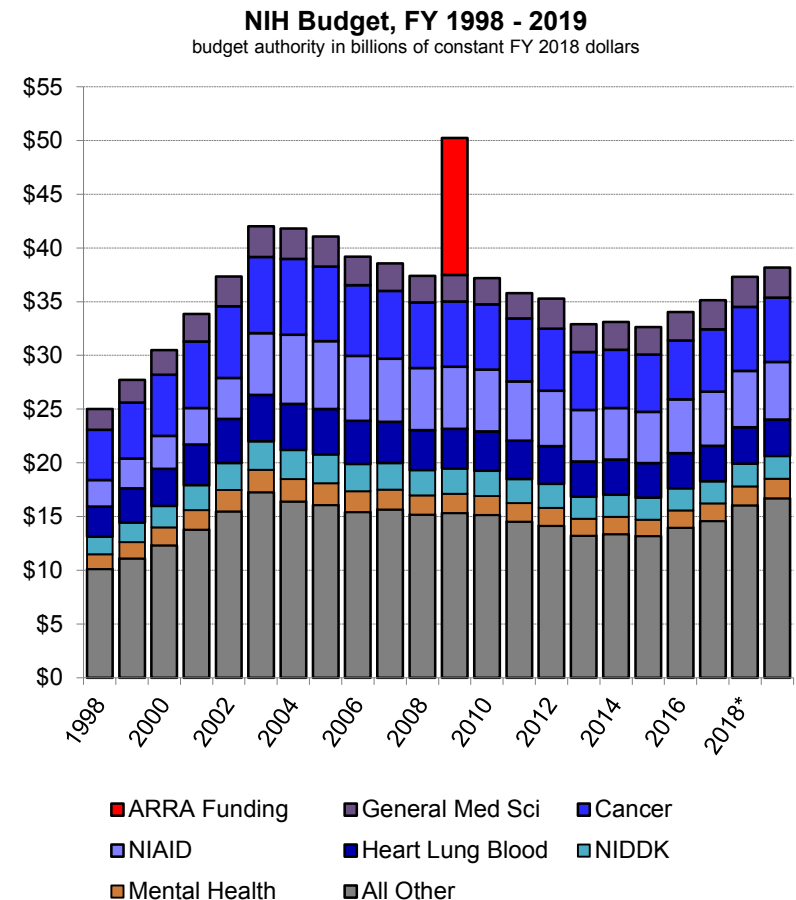


Source: Historical DOE budget data and FY19 appropriations. © 2018 AAAS

# Department of Health and Human Services



- **NIH: +\$2 billion / +5%**
  - Every institute gets at least an increase of ~3%
  - NIA: +20%
    - Alzheimer's research: +\$425 million to \$2.3 billion total
  - Cancer Moonshot up to \$400 million (NCI)
  - Precision Medicine up to \$379 million
  - \$1.3 billion for opioids-related research
  - BRAIN Initiative up to \$429 million
  - Universal flu vaccine research: +\$40 million to \$140 million total funding
  - Antibiotic resistance research: \$550 million total
  - Salary Cap proposals rejected to date
  - No consolidation of AHRQ, NIOSH, or NIDILRR
- **CDC: \$50 million Infectious Disease Rapid Response Reserve Fund**
  - Also \$5 million for National Neurological Conditions Surveillance System
- Other relevant HHS programs with fairly moderate increases



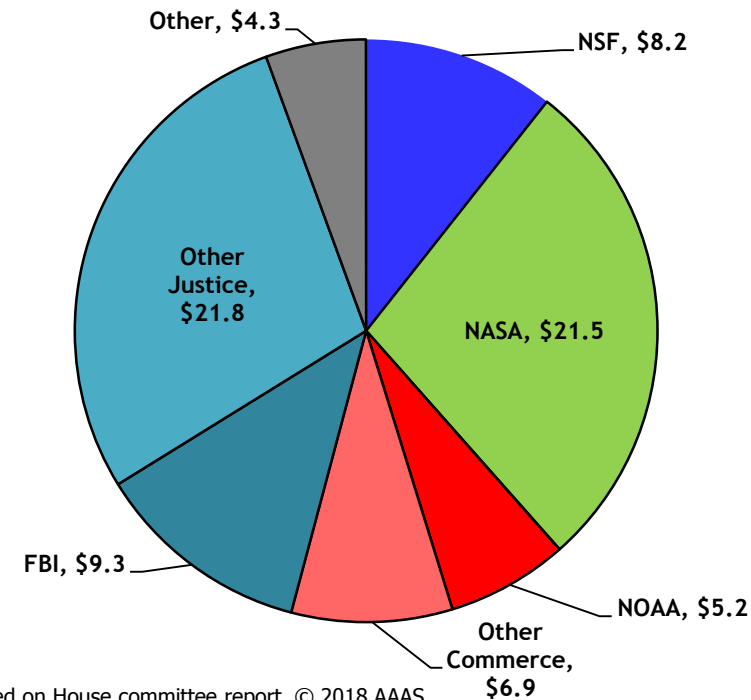
\*Note: FY 2018 figures are omnibus-enacted appropriations. Source: AAAS data, agency budget documents, and appropriations. Adjusted for biomedical R&D inflation rate (BRDPI). Excludes supplemental FY17 Zika proposal and FY15 Ebola funding. © 2018 AAAS

# Commerce, Justice, Science Spending Bill (CR through December 7)



- National Science Foundation
  - **So far:** +5% in House, +4% in Senate; all-time funding highs
  - “Ten Big Ideas” supported, but with eye to preserving other core research programs as well
  - Support for astronomy, plant genomics, EPSCoR, computing, STEM ed, and many other areas
- NASA: recent priority
  - **So far:** +4% in House, +3% in Senate
  - Science Directorate:
    - +7% in House with increases for Europa and Mars missions, plus WFIRST preserved
    - +3% in Senate with doubling of WFIRST, increase for Heliophysics
  - Earth Science, climate programs mostly shielded
  - Space Grant, Education office protected from elimination
  - Appropriators supportive of lunar orbital gateway and other lunar activities, aeronautics, other technology programs
- Department of Commerce:
  - **NOAA so far:** very mixed bag for research programs:
    - Sea Grant protected, ocean research boosted
    - House would eliminate climate research
    - Senate would cut weather and air chemistry research, tech transfer initiative
  - **NIST so far:** protected from cuts, rather limited changes otherwise; \$10 million cut to Manufacturing USA in House

**FY 2019 House CJS Composition**  
budget authority in billions of dollars



Based on House committee report. © 2018 AAAS

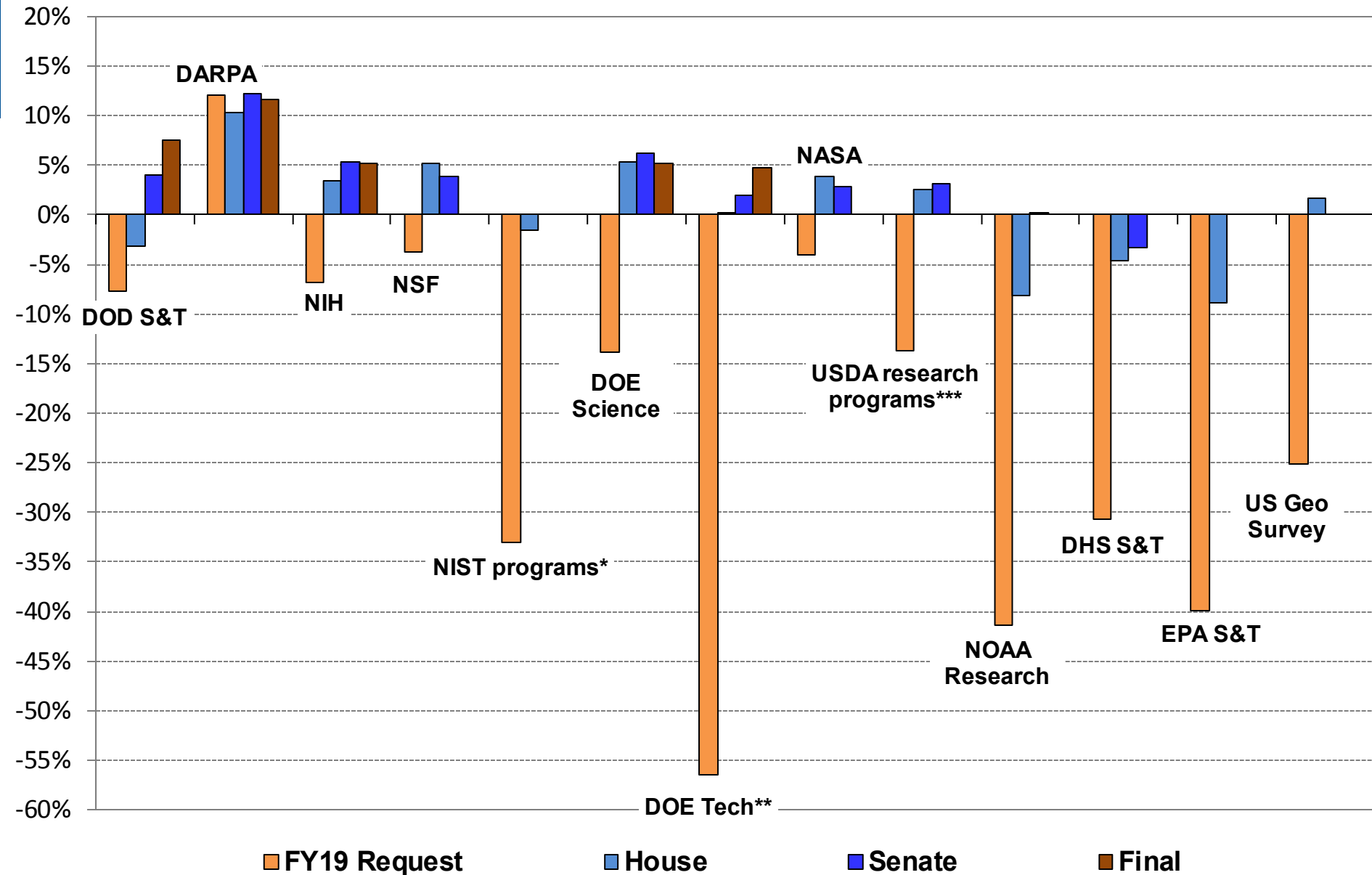
# Other Notes on FY 2019 Appropriations (all under CR through December 7)



- **Department of Agriculture:**
  - Competitive grants: +4% in House, +1% in Senate
  - Intramural research increases of 5-8%
    - Appropriators seem hesitant on proposal to transfer National Bio- and Agro-Defense Facility (NBAF) ownership from DHS to ARS, but may go along with it
    - Lab closures rejected
  - Flat or moderate increases for most formula funds/capacity grant programs, many of which have been protected from elimination
  - ERS and NIFA moves from DC pressing ahead, several dozen expressions of interest from U.S. cities
- **EPA Science & Tech:** 9% cuts in House across most research areas, minimal changes in Senate
- **U.S. Geological Survey:** +2% in House, flat in Senate
- **DHS:** Modest reductions to S&T Directorate but University Programs, Centers of Excellence protected and flat-funded. Split opinion on new Countering WMD Office.

# Select Science & Tech Programs in FY 2019 Appropriations (as of Sept. 17)

*Estimated percentage change from FY 2018 enacted omnibus, nominal dollars*



\*Includes labs and industrial technology, excludes construction; flat in Senate. \*\*Includes renewables and efficiency, nuclear, fossil, grid research, cybersecurity, ARPA-E. \*\*\*Includes ARS, NIFA, ERS, NASS, Rangeland Research, excludes ARS construction. | AAAS

# Where Are We Headed?

- FY 2019 appropriations:
  - Will get negotiations and final decisions after the midterms
- Next year: cap negotiations one more time for FY 2020 and FY 2021
  - Who controls Congress next year?
  - Will widening deficit impact the negotiations?
  - Caps expire beginning in FY 2022 (funding debate will happen in the 2021 calendar year – the first cycle after the next presidential election)
- How likely is it that the discretionary budget – and thus, research spending – keeps growing?

## AGENDA

### To-do list grows as clock ticks toward November

Geof Koss, E&E News reporter  
E&E Daily: Friday, April 27, 2018



Congress has a long to-do list after recess, including spending bills. UpstateNYer/Wikipedia

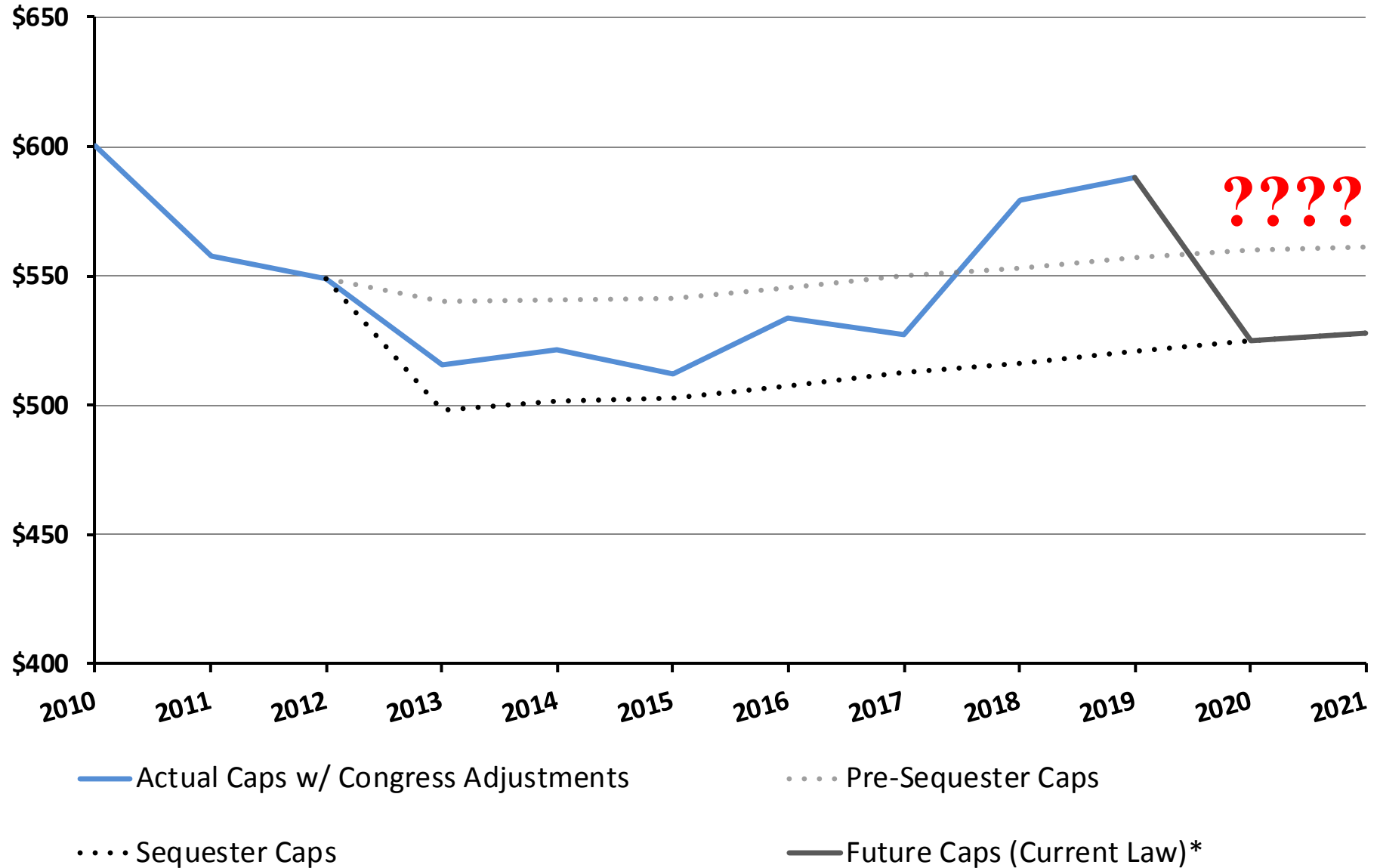
As the clock ticks toward November, Congress' legislative ambition once again finds itself on a crash course with election-year realities.

While the work continues on a number of unfinished big-ticket agenda items, the approach of the Nov. 6 midterm elections means lawmakers will spend more time away from the Capitol — and just as much time protecting themselves from the political perils of legislating when in town.

"If you believe the conventional wisdom around here, it's done," Senate Energy and Natural Resources Chairwoman Lisa Murkowski (R-Alaska) said of the legislative outlook for the rest of the year, shaking her head.

# Limits on NONDEFENSE Spending

Billions of constant 2018 dollars



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# Federal Spending as a Percent of GDP, 1962 - 2023

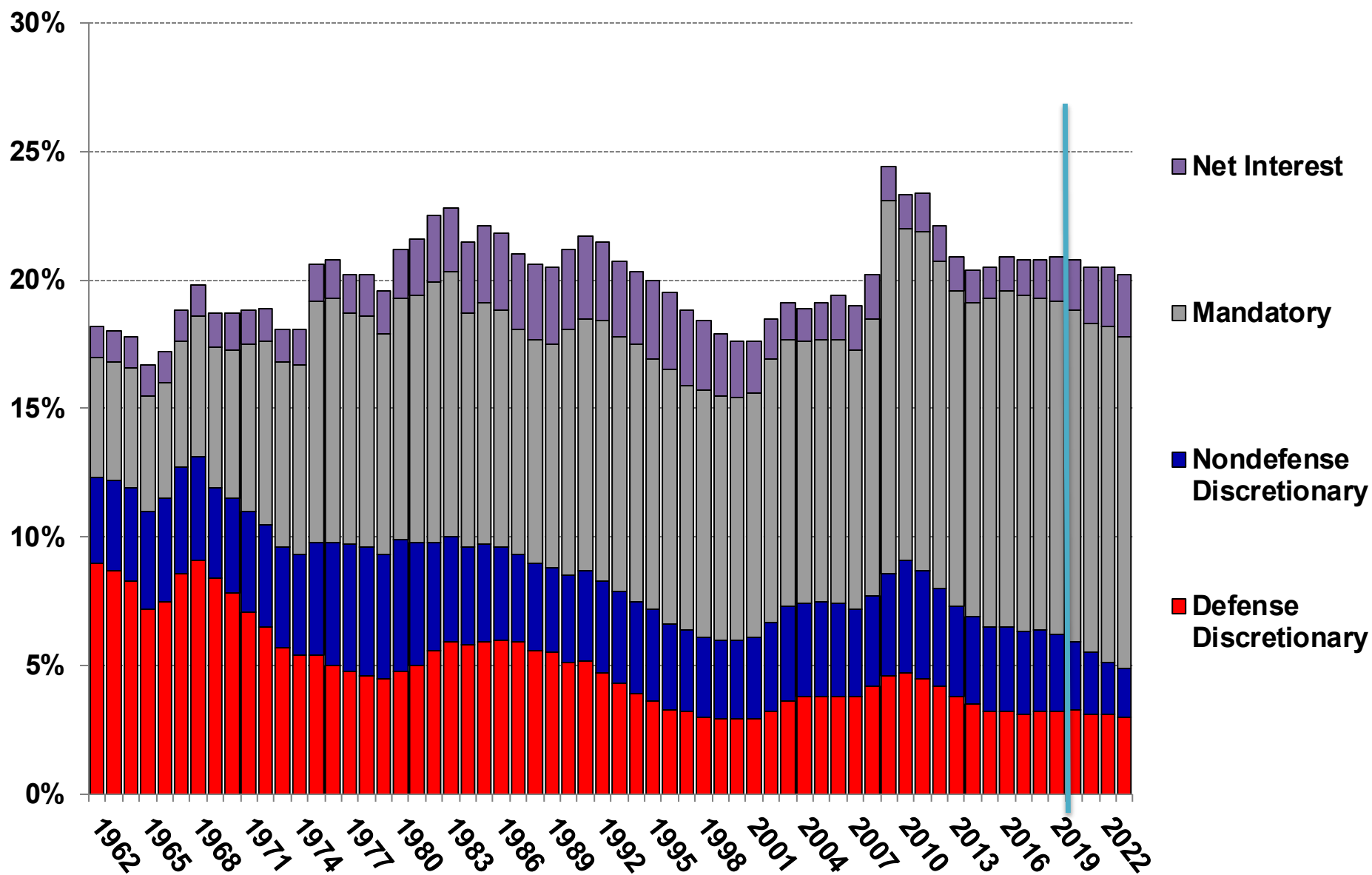
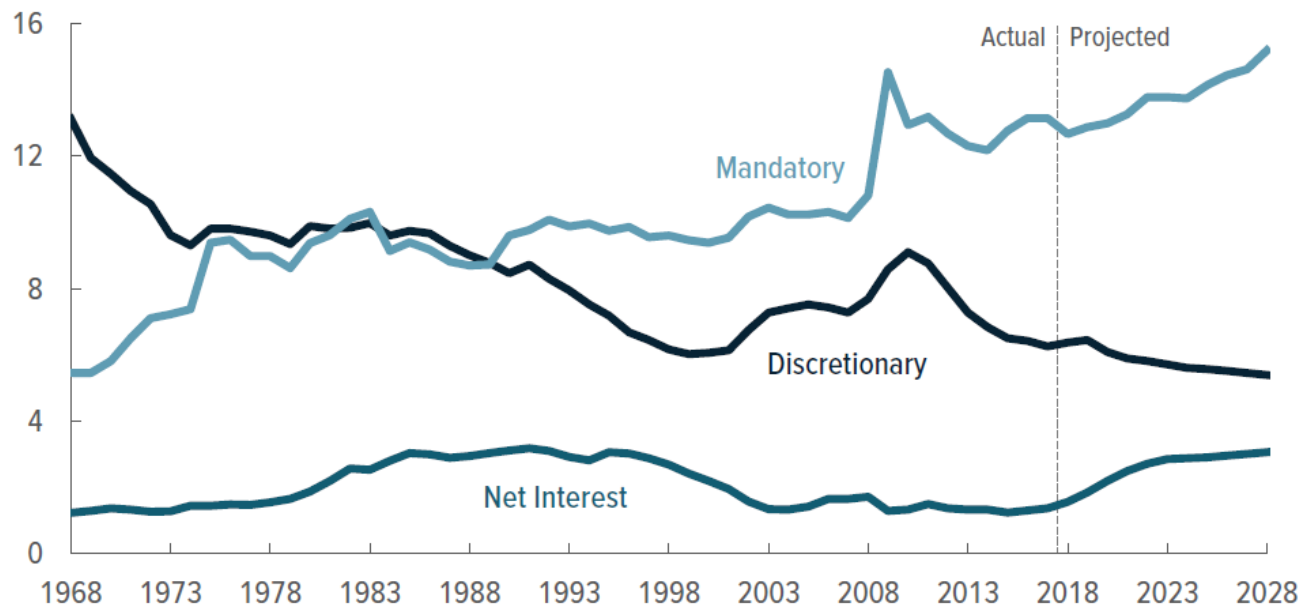




Figure 2-1.

Outlays, by Category

Percentage of Gross Domestic Product



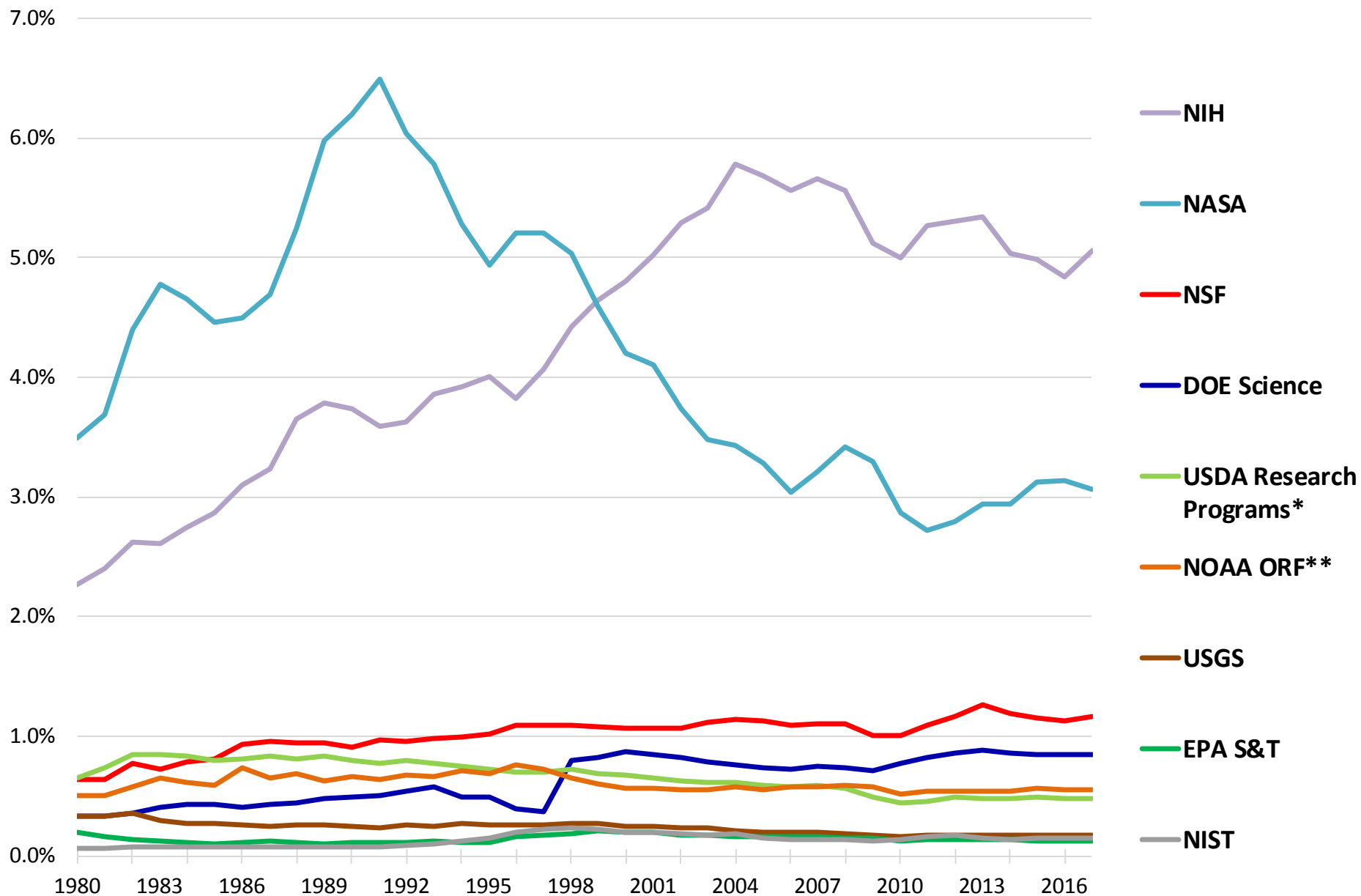
Under current law, rising spending for Social Security and Medicare would boost mandatory outlays.

Total discretionary spending is projected to fall as a share of gross domestic product as outlays grow modestly in nominal terms.

At the same time, growing debt and higher interest rates are projected to push up net interest costs.

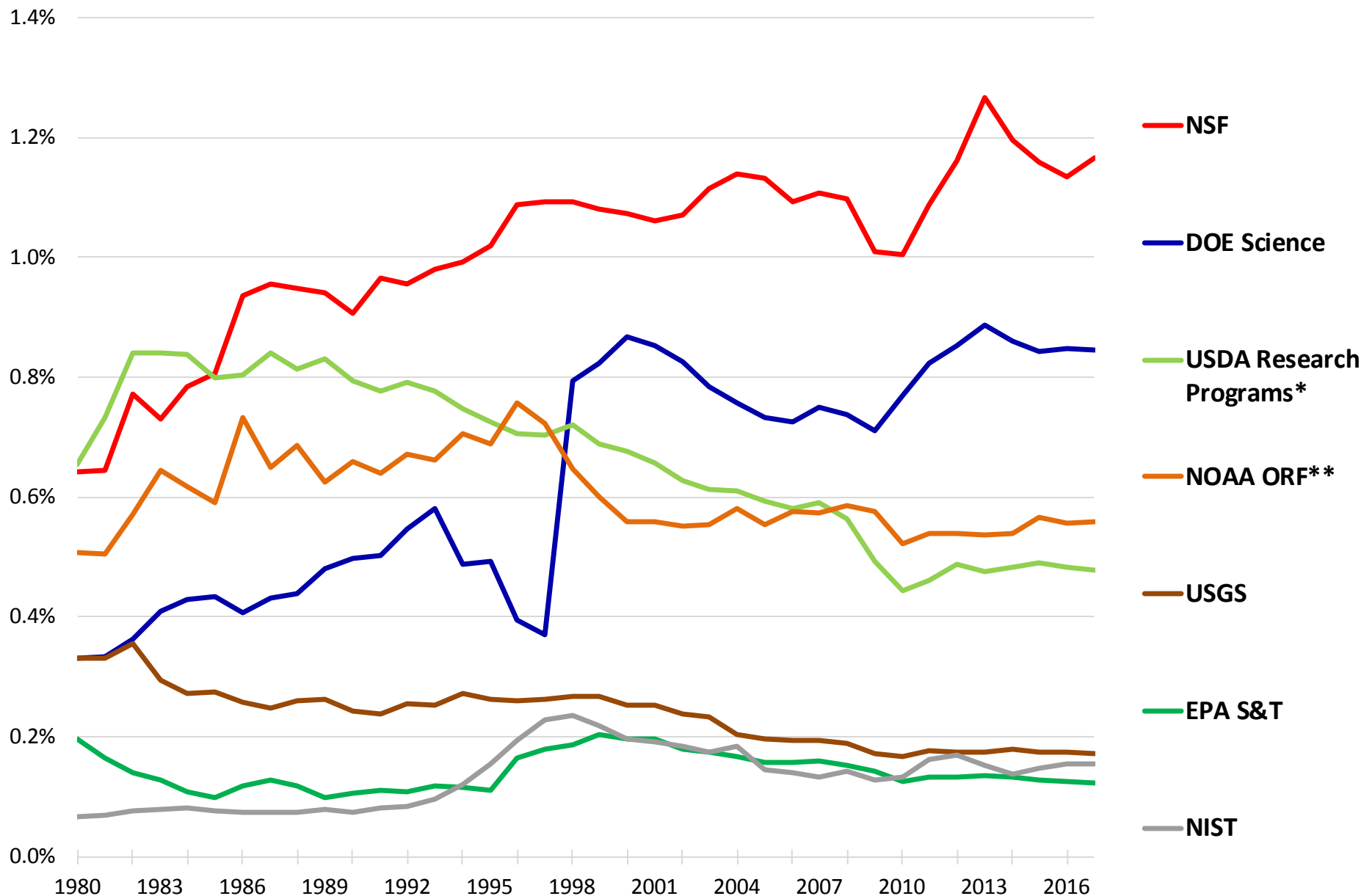
Source: Congressional Budget Office, using data from the Office of Management and Budget.

# S&T Budgets as a Share of Nondefense Discretionary Spending



\*Includes ARS, ERS, NIFA, NASS, Forest and Rangeland Research. \*\*Operations, research, and facilities. Includes 2009 Recovery Act data. Based on historical OMB spending data. | AAAS 2018

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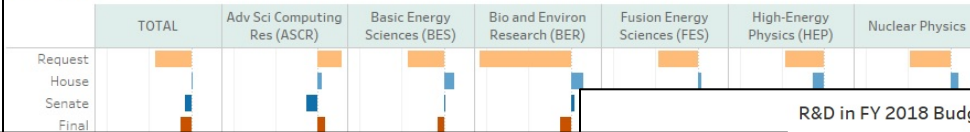


## Department of Energy Appropriations

(recommended percentage change from FY 2017 levels, nominal dollars. Mouse over for more info.)

SPENDING BILL: Energy & Water  
STATUS: Not yet taken up by House or Senate  
Last Update: May XX, 2017

### DOE Office of Science



### R&D in FY 2018 Budget and Appropriations

Federal R&D funding in Congress is allocated via several spending bills, authored by the appropriations subcommittees. Current AAAS estimates of R&D by select spending bill and subcommittee are shown below.

Last Updated: May XX, 2017



### Spending Bill Progress



the President's budget request are displayed below; House and Senate estimates will be added once all... Mouse over for more info, or use the tabs above to view appropriations by agency or by Congressional subcommittee and spending bill.

### Federal R&D Total Estimates\*



For more info...



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