

Declining contribution of the United States federal government to global research corpus

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Author Note

Competing Interest Statement: The author declares no competing interests.

This file includes: Main Text, Figures 1-3, Table 1

Preprint Information: A preprint of this article has been posted at — Preprints (link).

The authors made the following contributions. Emilio M. Bruna: Conceptualization, Methodology, Investigation, Formal analysis, Data curation, Visualization, Writing - Original Draft Preparation, Writing - Review & Editing, Project administration, Supervision.

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Abstract

Departments and agencies of the United States federal government conduct research on topics ranging from nuclear technology to economic policy. Using the Scopus bibliographic database, I quantified the number of publications by US federal government authors from January 2019–July 2025. I found that the number of articles and book chapters published from January-July 2025 was 14%-19% lower than during the same time period of 2024, resulting in publication deficit of 2,638-6,489 articles. Changes in executive branch policy related to the funding and staffing of federal agencies have led to warnings of an imminent and potentially catastrophic decline in the scientific preeminence of the United States. The results presented here suggest that this decline has already been set in motion.

Keywords: authorship, bibliometrics, book chapters, federal agencies, articles, research productivity, Scopus, universities

Word count: 1721

Introduction

Departments and agencies of the United States federal government conduct research on topics ranging from nuclear technology to economic policy. This work directly benefits the nation and its citizens in four ways: by providing the information needed by agencies to advance their missions, via the broad advancement of knowledge, through the application of this knowledge in ways that benefit society, and by developing human capital with education and professional experience (1). Federal research is also a major driver of economic growth — in addition to the direct economic impacts of the research enterprise (e.g., employment, purchasing, tax revenue), the resulting knowledge is also used by the private sector to develop novel technologies and products (2). As such the outputs from federal research and development are considered vital not only for addressing domestic needs, but also for informing international policy, strengthening national security, and enhancing global economic competitiveness (3).

Here I show that a key indicator of federal research productivity — the number of peer-reviewed journal articles and book chapters by US federal government affiliates — has declined precipitously in the first seven months of 2025 relative to the same time period in any of the preceding six years (Fig. 1). This conclusion is based on an analysis of ~1.20 million articles in the Scopus bibliographic database (<https://www.scopus.com>), which indexes the content of over 200,000 books and 48,000 journals comprising all major fields of scholarship (4). While the scholarly productivity of twelve major research universities also declined during this time period (Fig. 2), the relative drop in federal productivity was 50% greater.

Materials and Methods

Article records are uploaded daily to Scopus from over 25,000 currently active journals, with the metadata for each record including information such as the publication title, abstract, keywords, publication date. An article's record also includes the names and affiliations of all authors, both of which are assigned unique identification numbers. I used

the Scopus Affiliation ID numbers assigned to Departments, Agencies, Commissions, and other units of the United States federal government (see *Supporting Information Table S2*) to search Scopus for all peer-reviewed journal articles, book chapters, and other scholarly publications produced between January 2019 and July 2025 by authors using these affiliations. I began by identifying $N = 5,360$ Scopus affiliation ID numbers nested under the Scopus Institution Codes of all US Cabinet-level Departments and independent federal agencies; these affiliation ID numbers included both the primary affiliation codes for the agencies (e.g., 60012471: US Department of Defense; 60000947: US Department of Commerce) and codes for author affiliations nested under them (e.g., 60032984: Naval Dental Center; 60027716: National Oceanic and Atmospheric Administration). I then used the Scopus API to download the metadata for all articles, data papers, reviews, notes, and book chapters published between 2019-2025 by authors using these affiliation IDs. The author lists of the resulting publications were then searched for any federal affiliations not included in the initial query ($N = 7,355$), and the search was repeated using complete list of $N = 12,715$ affiliations.

Queries of the Scopus API were conducted using the `rscopus` library (5) for the R statistical programming language (6). The resulting `.csv` files for each year and affiliation ID were initially processed using the `refsplitr` library (7), after which I combined all data for all years, identified all federal and non-federal author affiliations, and assigned all affiliations to their highest parent agency, department, or organization. I then visualized productivity within and across agencies using the `tidyverse` libraries (8) and used a bootstrapping procedure to assess whether productivity across all federal affiliations was significantly different in 2025 (see *Supporting Information: Statistical Analyses*).

It is possible that any changes in productivity at federal agencies reflect a broader national trend in research output. I therefore compared federal publication productivity with that at the $N = 12$ research universities in the United States that were most productive during the focal time period: Harvard University, the University of Michigan, Ann Arbor,

83 The University of Pennsylvania, Stanford University, the University of California, Los
84 Angeles, the University of Washington, the University of Florida, The Ohio State University,
85 the University of Minnesota, Twin Cities, the University of California, San Diego, the
86 University of North Carolina, Chapel Hill, and the University of California, San Francisco.
87 As with the searches for federal agency productivity, the searches for university productivity
88 were first conducted both with the primary Scopus affiliation codes for institutions (e.g.,
89 60030612 for the University of California, San Diego) and any codes for nested affiliations
90 (e.g., 60121501 for the UCSD School of Biological Sciences), then any additional codes found
91 in the resulting publications. In total searches were conducted with $N = 1,698$ Scopus
92 affiliation IDs (*Supporting Information Table S3*).

93 I analyzed productivity in the first seven months of 2025 relative to the same time
94 period in previous years using publications whose first author had a federal or focal
95 university affiliation (49% and 50% of each group's publications, respectively). First-author
96 position is typically interpreted as the person leading the research and the study's primary
97 contributor. It is important to note, however, that authorship norms are used inconsistently
98 within- and across disciplines (9, 10), and in some fields (e.g., the biomedical sciences, 11)
99 the last- or corresponding author position is used to indicate the person with primary project
100 oversight. Moreover, the increasing complexity of research means that many publications
101 written by non-federal first authors describe work that could not have been conducted
102 without the intellectual contributions or other resources provided by their federal coauthors.
103 As such, the estimates of changing productivity based on first-author position described here
104 could be considered conservative. To address this possibility I also quantified changes in 2025
105 productivity relative to previous years using the subset of publications whose authors were
106 exclusively federal affiliates.

107 All data were collected from Scopus between September 1-4, 2025. However, the
108 analyses were restricted to publications with cover dates from January 2019 through July
109 2025 to avoid potential underestimates of productivity due to upload lags (*sensu* 12 and

Supporting Information).

Results

I identified $N = 457,421$ research articles (87%), reviews (7.4%), book chapters (3.6%), Notes (1.9%), and Data Papers (0.18%) in Scopus with at least one federally affiliated author and a publication date between January 1, 2019 and July 31, 2025 (hereafter, ‘*publications*’). The publications in this corpus had a total of $N = 1,207,501$ unique authors, of which $N = 217,570$ (18%) had federal primary affiliations. Federal researchers were highly collaborative: the publications in the data set had on average 9.3 ± 12 SD authors, of which 5.9 ± 11 SD had affiliations outside of the US federal government.

During the reference time period the focal universities produced $N = 740,800$ publications (Fig. 2, Table S1, Fig. S4) with $N = 6,332,969$ authors. There were $N = 1,734,321$ unique authors in the data set, of which $N = 404,446$ had one of the focal universities as their primary affiliation. Each article had an average of $N = 8.9 \pm 12$ SD authors, of which 2.7 ± 3.2 SD were affiliated with the focal universities.

There were $N = 15,589$ publications indexed in Scopus with a federally affiliated first author and a January 1-July 31, 2025 publication date (Table 1). This is a 14% decline relative to the same time period in 2024, and a 24% decline relative to the 2019-2024 average (Fig. 1A). Both this decline, and the 8.9% decline in first author publications observed for the focal universities (Fig. 2), were highly significant ($P < 0.0001$, see the *Supporting Information* for a description of the bootstrapping procedure used to assess significance). Finally, from 2019-2025 there were $N = 100,532$ publications whose authors were exclusively affiliated with the federal government; the number of January-July publications in 2025 was ~18% lower in 2024 (Fig. 1B).

DISCUSSION

Scholarly publications such as peer-reviewed journal articles are the primary means of documenting, validating, and sharing research results; the data and conclusions they communicate are used to guide public policy and are the foundation on which future

discoveries are built (13). I estimate that the US Federal Government — historically a leading global producer of knowledge across a vast array of disciplines — has accumulated a research publication deficit of 2,638-6,489 articles in only the first seven months of 2025. This deficit is primarily driven by declining research output at several of the largest and most-research intensive agencies of the federal government. For example, the number of publications by authors affiliated with the Departments of Defense, Commerce, Veterans Affairs, and NASA all declined 15-20%, while the number of publications from the Smithsonian Institution and the Departments of Energy, Health & Human Services, and Agriculture decreased 9-15% (Table 1). However, the greatest proportional decline was at the Department of the Interior, whose 2025 research output to date has declined 21% relative to the same time period in 2024 (Fig. 3).

The proposed reductions to the budgets of federal agencies that support research and education, along with the ongoing efforts to strip universities of previously allocated research funds and limit the enrollment of international students (14), have led a broad array of stakeholders to warn of an imminent and potentially catastrophic decline in the scientific preeminence of the United States (e.g., 15, 16, 17). The results presented here suggest that executive orders dismissing research and support staff, suspending agency funding, and requiring federal scientists to withdraw manuscripts undergoing peer review (18–20) have already set this decline in motion — particularly at agencies conducting research on the economy, environment, public health, and national security. Given the disciplinary breadth and highly collaborative research conducted by the staff of these agencies (21, 22), in concert with their role in training early career scientists (23), it is likely the long-term consequences of these declines have already begun cascading through public and private-sector research institutions beyond the federal government.

Acknowledgments and Funding Sources

I thank E. White, S. Ryan, and C. Bergstrom for helpful discussions and comments on the manuscript. EMB was supported by the Edward P. Bass Distinguished Visiting

Environmental Scholars Program at Yale University.

Data Availability

The data used in this study are archived at Dryad [*url to be added*], while the version of the R code used for the analyses presented here is archived at Zenodo [*url to be added*]. Post-publication updates to the code or data can be found at Github (https://github.com/BrunaLab/fed_pubs).

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Table 1

The number of publications with at least one federally affiliated author or whose first author is from different units of the US federal government. Also shown is the percentage of 2019-2025 publications whose first author is from each government unit and the percent difference in first author publications (Jan-July 2025 vs. Jan - July 2024).

US federal government unit	2019-2025			Jan-July 2025	
	Any author position*	First author	%	First author	% change vs. 2024
Cabinet Departments					
Energy	435,102	53,824	23.77	3,855	-9.29
Health & Human Services	401,943	51,510	22.75	3,258	-14.38
Veterans Affairs	235,455	33,620	14.85	2,282	-16.16
Defense	144,966	27,669	12.22	1,983	-18.29
Agriculture	102,050	17,209	7.6	1,230	-13.26
Commerce	66,593	10,290	4.54	680	-19.24
Interior	51,733	8,702	3.84	613	-21.41
Environmental Protection Agency	16,054	2,587	1.14	188	-9.18
State	5,050	561	0.25	32	-15.79
Transportation	1,026	222	0.1	14	-33.33
Homeland Security	949	182	0.08	16	-15.79
Justice	889	224	0.1	15	-25
Treasury	383	155	0.07	20	53.85
Education	231	74	0.03	6	-50
Labor	111	48	0.02	0	-
Housing & Urban Development	77	21	0.01	3	-25
Agencies, Boards, & Commissions					
National Aeronautics & Space Administration	75,226	7,865	3.47	566	-19.6
Smithsonian Institution	41,978	5,440	2.4	392	-11.91
National Science Foundation	27,077	3,014	1.33	201	-4.74
Other federal units [†]	5,762	1,415	0.62	82	-36.43
Federal Reserve System	4,258	1,791	0.79	153	-3.16
Total	226,423			15,589	

*The sum of publications in this column is greater than the total number of publications in the dataset because some publications include authors from multiple agencies (i.e., I did not attribute 'fractional authorship').

[†] Other federal author affiliations in the publications data set: Congressional Budget Office, Consumer Financial Protection Bureau, Central Intelligence Agency, Commodity Futures Trading Commission, US Congress, Consumer Product Safety Commission, Executive Office of the President, Equal Employment Opportunity Commission, Federal Communications Commission, Executive Office of the President, Federal Maritime Commission, Federal Housing Finance Agency, Financial Industry Regulatory Authority, Federal Maritime Commission, Federal Trade Commission, General Accounting Office, Government Publishing Office, General Services Administration, Institute of Museum and Library Services, Interagency Task Forces or Commissions, John F Kennedy Center for the Performing Arts, Federal Judiciary, Multiagency Task Forces or Commissions, National Academies of Sciences, Engineering, and Medicine, National Archives and Records Administration, National Center for Missing and Exploited Children, National Endowment for the Arts, Nuclear Regulatory Commission, National Security Council, National Transportation Safety Board, Office of the Director of National Intelligence, Office of Personnel Management, , Securities and Exchange Commission, Social Security Administration, Susquehanna River Basin Commission, Tennessee Valley Authority, US Global Change Research Program, US Holocaust Memorial Museum, US Institute Of Peace, USPS, Woodrow Wilson International Center for Scholars

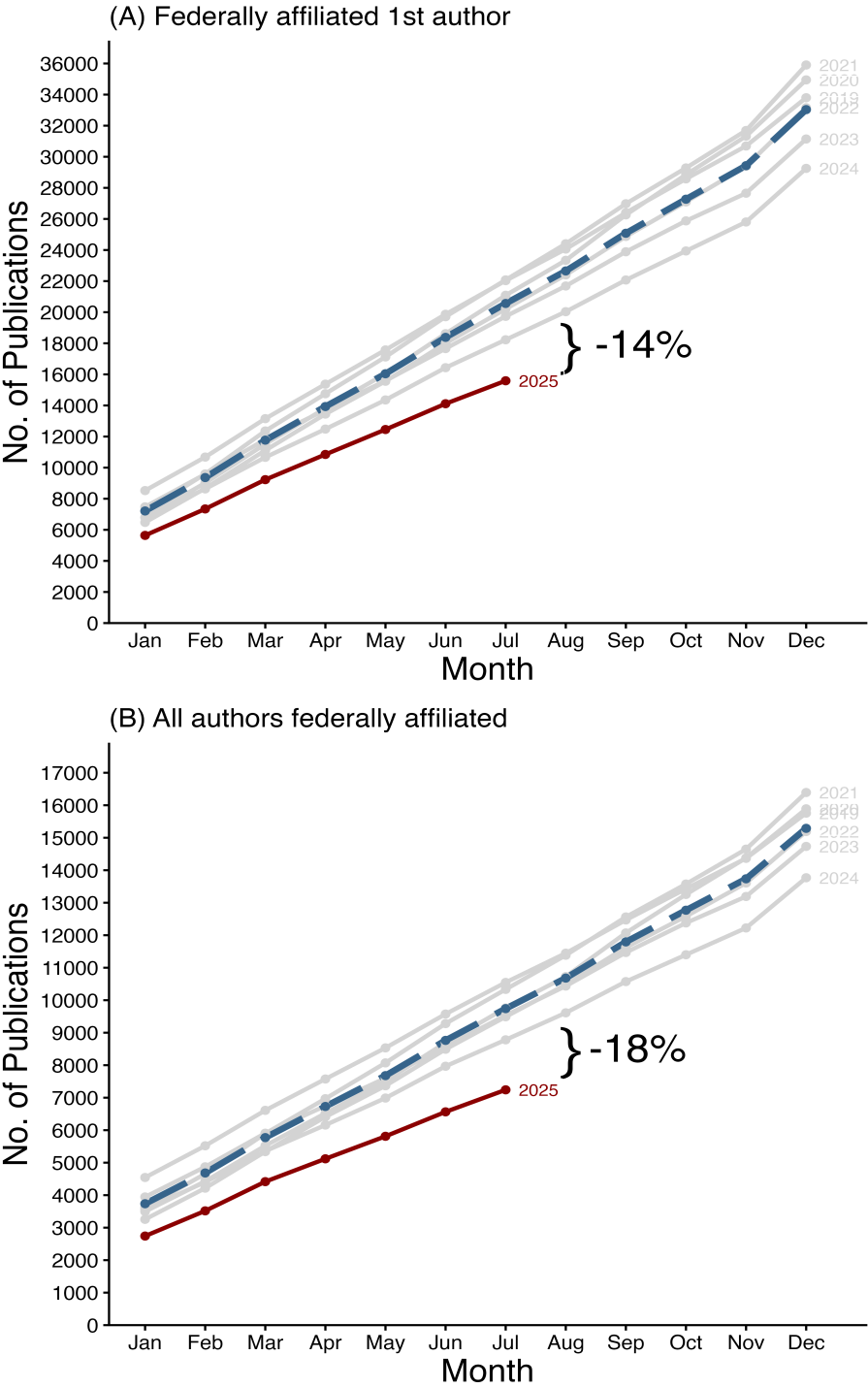


Figure 1. Cumulative number of articles published per month (2019-2025). (A) Articles whose first-authors are affiliated with the US federal government. (B) Articles with all authors having US federal government affiliations. Solid lines represent the cumulative counts for 2019-2025; the dashed line is the 2019-2024 average. Also shown is the percent change in cumulative publications through July 2025 vs. the same period in 2024. Note the different scales of the y-axes in (A) and (B).

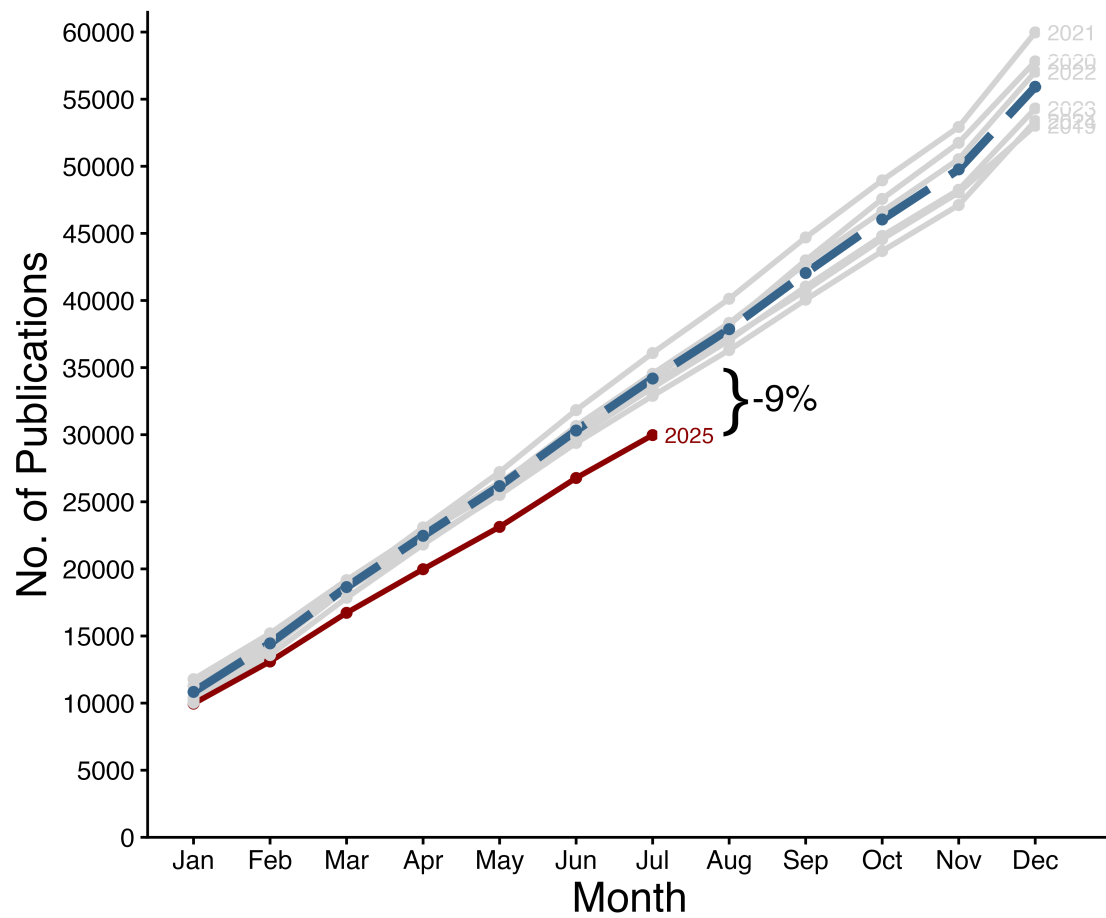


Figure 2. Cumulative number of articles published per month (2019-2025) whose first authors were affiliated with one of twelve focal universities. Solid lines are the annual values for 2019-2025; the dashed line is the 2019-2024 average. The percentage indicates the change in cumulative publications through July 2025 vs. the same time period in 2024.

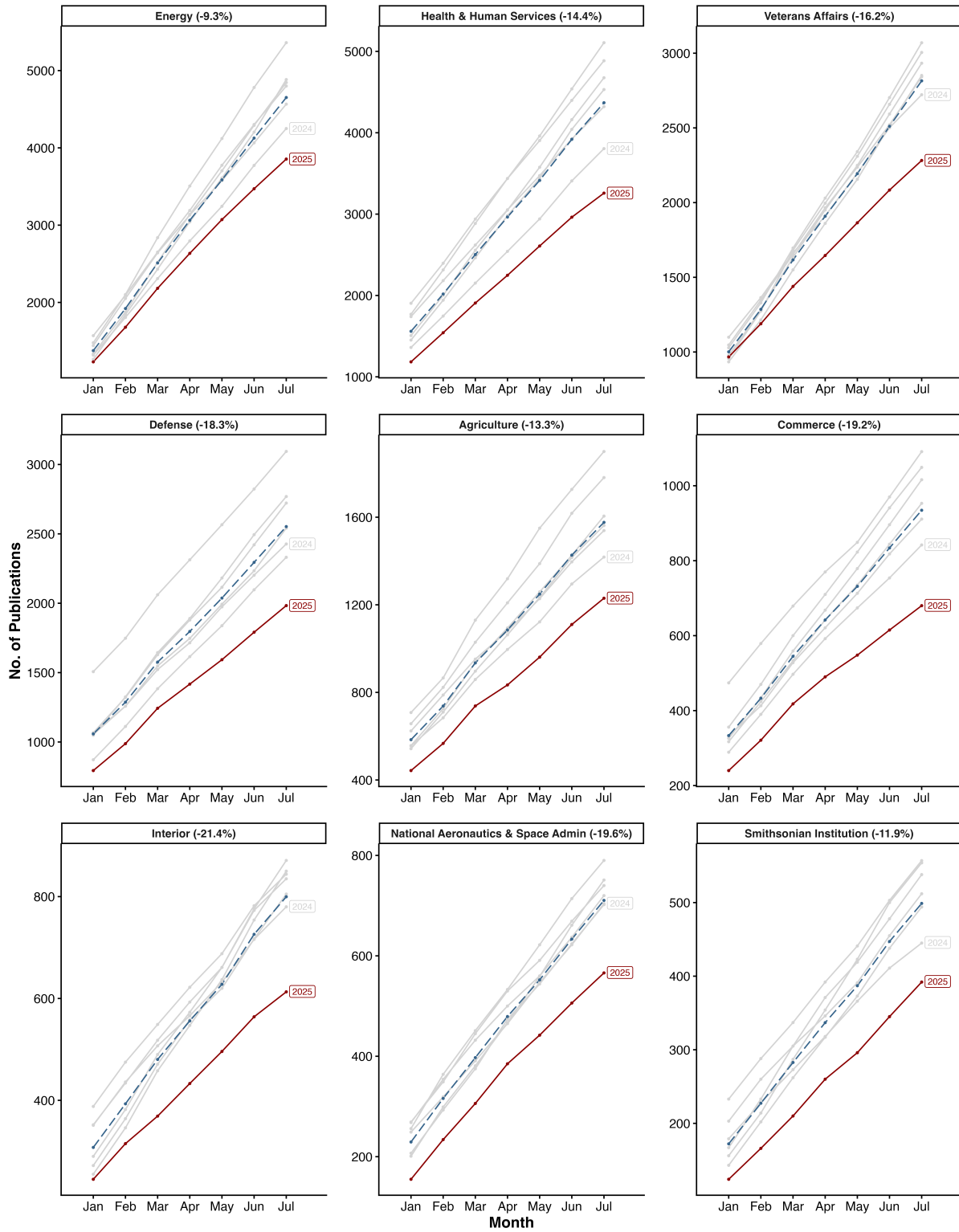


Figure 3. Cumulative number of publications through July (2019-2025) for nine US federal departments or agencies based on first author affiliation. These federal units had the most articles indexed in Scopus from January 2019 through July 2025 (Table 1). The solid lines are each year's cumulative counts; the dashed line is the 2019-2024 average.