

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

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7 Author Note

8 Competing Interest Statement: The author declares no competing interests.

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

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

11 The authors made the following contributions. Emilio M. Bruna: Conceptualization,

12 Methodology, Investigation, Formal analysis, Data curation, Visualization, Writing - Original

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Introduction

17 Departments and agencies of the United States federal government conduct research on
18 topics ranging from nuclear technology to economic policy. This work directly benefits the
19 nation and its citizens in four ways: by providing the information needed by agencies to
20 advance their missions, via the broad advancement of knowledge, through the application of
21 this knowledge in ways that benefit society, and by developing human capital with education
22 and professional experience (1). Federal research is also a major driver of economic growth —
23 in addition to the direct economic impacts of the research enterprise (e.g., employment,
24 purchasing, tax revenue), the resulting knowledge is also used by the private sector to
25 develop novel technologies and products (2–4). As such the outputs from federal research
26 and development are considered vital not only for addressing domestic needs, but also for
27 enhancing the global competitiveness of US companies, informing international policy, and
28 strengthening national security (5).

29 The Scopus bibliographic database indexes the content of over 200,000 books and
30 48,000 journals comprising all major fields of scholarship (6). Article records are uploaded
31 daily from over 25,000 currently active journals, with the metadata for each record including
32 such information such as the publication title, abstract, keywords, publication date. An
33 article's record also includes the names and affiliations of all authors, both of which are
34 assigned unique identification numbers. I identified $N = 7,336$ Scopus Affiliation ID numbers
35 assigned to Departments, Agencies, Commissions, and other units of the United States
36 federal government (*Supporting Information*) and used them to identify peer-reviewed
37 journal articles, book chapters, and other scholarly publications produced by authors at
38 these units between January 2019 and July 2025. I found that the number of studies by
39 authors affiliated with the federal government has declined precipitously in the first seven
40 months of 2025 relative to the same time period in any of the preceding six years (Figure 1).
41 While productivity at the most productive research universities in the United States has also
42 declined during this time period, the decline in Federal productivity exceeds that of

43 universities by ~55% (Table 1, Figure 2).

44 **Results**

45 *Federal affiliations:* I identified $N = 457,421$ research articles (87%), reviews (7.4%),
46 book chapters (3.6%), Notes (1.9%), and Data Papers (0.18%) in Scopus with at least one
47 federally affiliated author and a publication date between January 1, 2019 and July 31, 2025
48 (hereafter, '*publications*'). The publications in this corpus had a total of $N = 1,207,501$
49 unique authors, of which $N = 217,569$ (18%) had federal primary affiliations. Federal
50 researchers were highly collaborative: the publications in the data set had on average $9.3 \pm$
51 12 SD authors, of which 5.9 ± 11 SD had affiliations outside of the US federal government.

52 *Focal university affiliations:* The search of focal university affiliations resulted in $N =$
53 740,800 publications (Figures 2,4) with $N = 6,332,969$ authors. There were $N = 1,734,321$
54 unique authors in the data set, of which $N = 404,446$ had one of the focal universities as
55 their primary affiliation. Each article had an average of $N = 8.9 \pm 12$ SD authors, of which
56 2.7 ± 3.2 SD were affiliated with the focal universities.

57 The analyses presented here focus on publications whose first author had a federal or
58 focal university affiliation (49% and 50% of each group's publications, respectively).

59 First-author position is typically interpreted as the person leading the research and the
60 study's primary contributor. It is important to note, however, that authorship norms are
61 used inconsistently within- and across disciplines (7–9), and in some fields (e.g., the
62 biomedical sciences, 10) the last- or corresponding author position is used to indicate the
63 person with primary project oversight. Moreover, the increasing complexity of research
64 means that many publications written by non-federal first authors describe work that could
65 not have been conducted without the intellectual contributions or other resources provided
66 by their federal coauthors. As such, the estimates of changing productivity based on
67 first-author position described here should therefore be considered conservative.

68 I identified $N = 15,589$ publications indexed in Scopus that had a federally affiliated
69 first author and a January 1-July 31, 2025 publication date. This is a 14% decline relative to

70 the same time period in 2024, and a 24% decline relative to the 2019–2024 average (Figure 1).
71 Both this decline, and the 8.9% decline in first author publications observed for the focal
72 universities (Figure 2), were highly significant ($P < 0.0001$, see the *Supporting Information*
73 for a description of the bootstrapping procedure used to asses significance).

74 **Discussion**

75 Scholarly publications such as peer-reviewed journal articles are the primary means of
76 documenting, validating, and sharing research results; the data and conclusions the
77 communicate are used to guide public policy and are the foundation on which future
78 discoveries are built (11). I estimate that the US Federal Government — historically a
79 leading global producer of knowledge across a vast array of disciplines — has accumulated a
80 research publication deficit of 2,638–6,489 articles in only the first seven months of 2025.
81 This deficit is primarily driven by declining research output at several of the largest and
82 most-research intensive agencies of the federal government. For example, the number of
83 publications by authors affiliated with the Departments of Defense, Commerce, Veterans
84 Affairs, and NASA all declined 15–20%, while the number of publications from the
85 Smithsonian Institution and the Departments of Energy, Health & Human Services, and
86 Agriculture decreased 9–15%. However, the greatest proportional decline was at the
87 Department of the Interior, whose 2025 research output to date has declined 21% relative to
88 the same time period in 2024 (Figure 3).

89 The proposed reductions to the budgets of federal agencies that support research and
90 education, along with the ongoing efforts to strip universities of previously allocated research
91 funds and limit the enrollment of international students (12), have led a broad array of
92 stakeholders to warn of an imminent and potentially catastrophic decline in the the scientific
93 preeminence of the United States (e.g., 13, 14, 15). The results presented here suggest that
94 executive orders dismissing research and support staff, suspending agency funding, and
95 requiring federal scientists to withdraw manuscripts undergoing peer review (16–18) have
96 already set this decline in motion — particularly at agencies conducting research addressing

97 the economic, environmental, and national security interests of the United States. Given the
98 disciplinary breadth and highly collaborative research conducted by the staff of federal
99 agencies (19, 20), and their role in training early career scientists (21), it is likely the lasting
100 consequences of these declines have already begun cascading through research institutions
101 beyond the federal government.

102 Materials and Methods

103 I searched the Scopus database for all publications published January 2019-July 2025
104 that included at least one co-author whose primary affiliation was a unit of the US federal
105 government. To do so I first identifying N = 5,360 Scopus ID numbers for federal affiliations;
106 these affiliation ID numbers included both the primary codes for government agencies (e.g.,
107 60012471: US Department of Defense; 60000947: US Department of Commerce) and codes
108 nested under them (e.g., 60032984: Naval Dental Center; 60027716: National Oceanic and
109 Atmospheric Administration). I then used the Scopus API to download the metadata for
110 each Scopus ID's articles, data papers, reviews, notes, and book chapters published between
111 2019-2025. The author lists of the resulting publications were searched for any other federal
112 affiliations not included in the initial query, and the search was repeated using the complete
113 list of initial and subsequently identified affiliations (N = 7,355). After final data validation,
114 the data set used for analyses comprised N = 7,336 federal affiliations; these affiliations and
115 their Scopus codes are in the *Supporting Information*.

116 Queries of the Scopus API were conducted using the `rscopus` library (22) for the R
117 statistical programming language (23). The resulting `.csv` files for each year and affiliation
118 ID were initially processed using the `refsplitr` library (24), after which I combined all data
119 for all years, identified all federal and non-federal author affiliations, and assigned all
120 affiliations to their highest parent agency, department, or organization. I then visualized
121 productivity within and across agencies using the `tidyverse` libraries (25) and used a
122 bootstrapping procedure to assess whether productivity across all federal affiliations was
123 significantly different in 2025 (see *Supporting Information: Statistical Analyses*).

124 It is possible that declining productivity by federal agencies reflects a broader national
125 trend in research output. I therefore compared federal publication productivity with that at
126 the N = 12 research universities in the United States that were most productive during the
127 focal time period: Harvard University, The University of Michigan, Ann Arbor, The
128 University of Pennsylvania, Stanford University, The University of California, Los Angeles,
129 The University of Washington, The University of Florida, The Ohio State University, The
130 University of Minnesota, Twin Cities, The University of California, San Diego, The
131 University of North Carolina, Chapel Hill, and The University of California, San Francisco.
132 As with the searches for federal agency productivity, the searches for university productivity
133 were conducted both with the primary Scopus affiliation codes for institutions (e.g.,
134 60030612 for the University of California, San Diego) and any codes for nested affiliations
135 (e.g., 60121501 for the UCSD School of Biological Sciences). Searches were conducted with N
136 = 1,240 Scopus affiliation IDs (*Supporting Information*).
137

All data were collected from Scopus between September 1-4, 2025. However, the analyses are restricted to publications with cover dates from January 2019 through July 2025 to avoid potential underestimates of productivity due to upload lags (*sensu* 26 and *Supporting Information*).

141 Acknowledgments and Funding Sources

I thank — for and — for — helpful discussions and comments on the manuscript. EMB was supported by the Edward P. Bass Distinguished Visiting Environmental Scholars Program at Yale University.

145 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 in the data set with at least one author from an agency or department of the US federal government (any author position), the number of publications from 2019-2025 for which the first author's primary address is the federal department or agency, the number of 1st author publications from January-July 2025, and the percent change in productivity relative to the same time period in 2024.

	Federal Author (any position)	Federal 1st Author	
	Jan 2019-July 2025 ¹	Jan 2019-July 2025 (%)	Jan-July 2025 (% 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	144,965	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 ²	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

¹The 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').

² 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

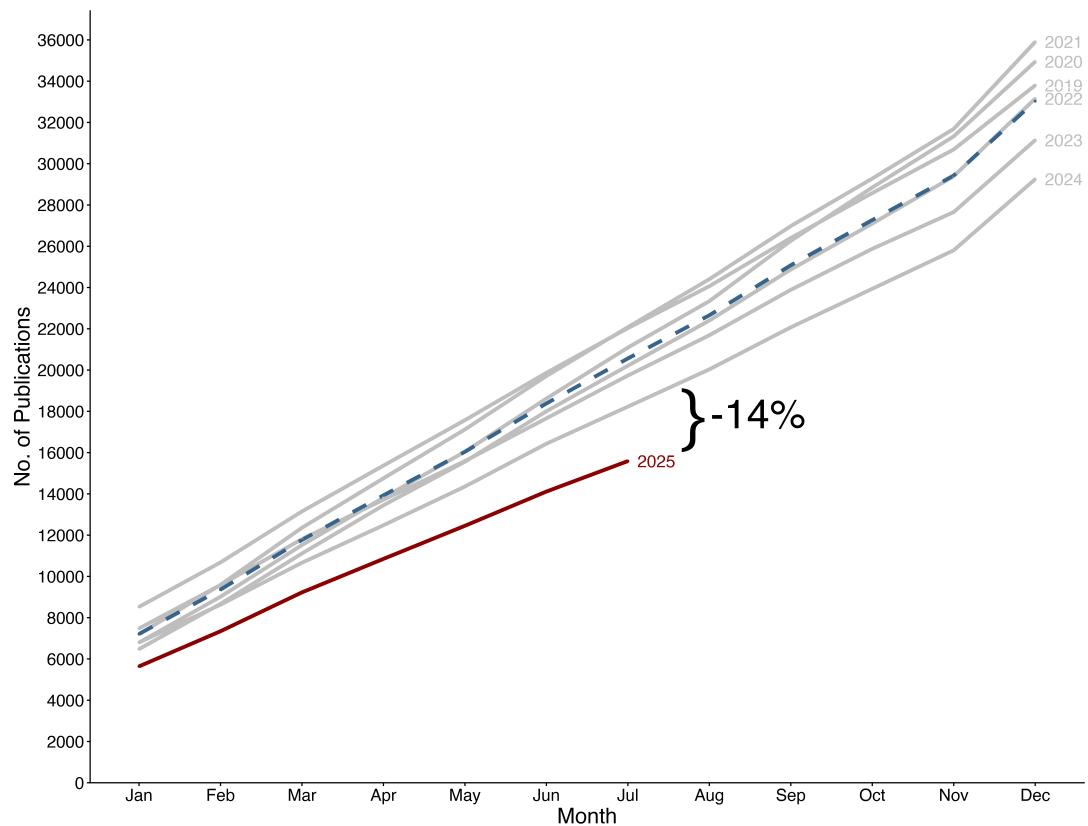


Figure 1. Cumulative number of articles published by researchers at federal agencies between January 1, 2019 - July 31, 2025 and the percent decline in 2025 relative to the same time period in 2024. Red solid line: 2025, Blue dashed line: 2019-2024 average.

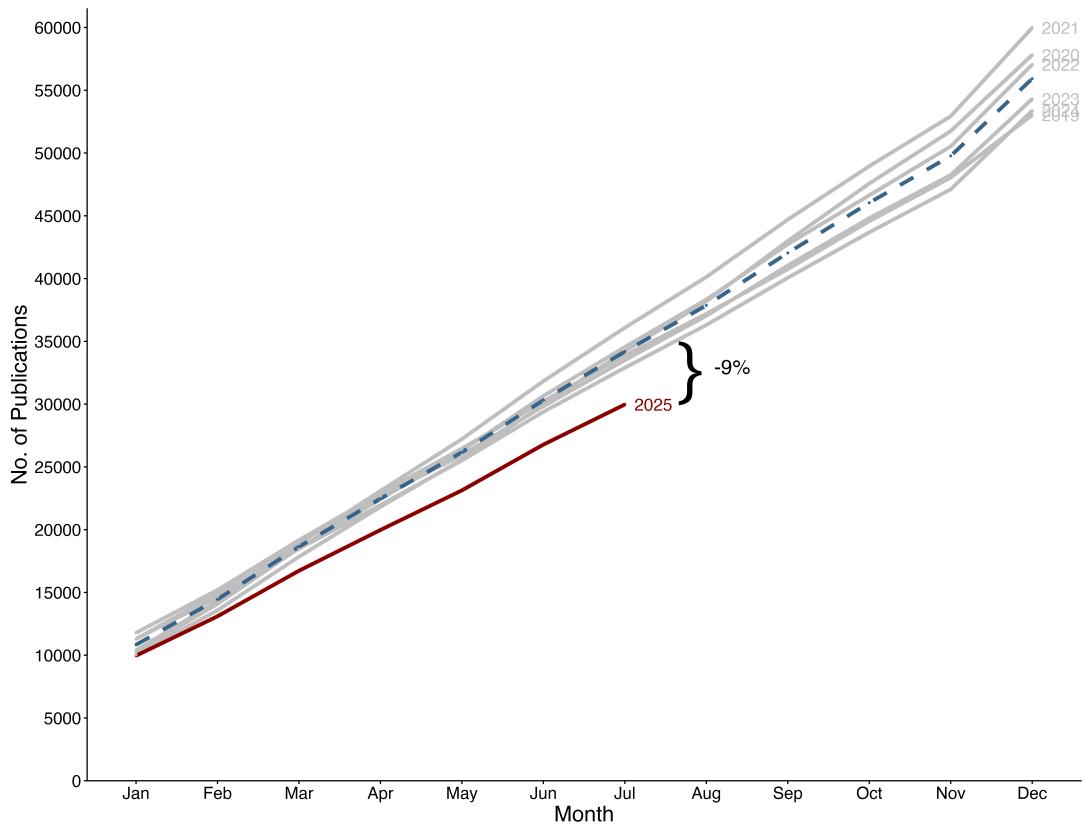


Figure 2. Cumulative number of publications published by researchers at twelve focal universities between January 1, 2019 and July 31, 2025 and the percent decline in 2025 relative to the same time period in 2024. Red solid line: 2025, Blue dashed line: 2019-2024 average.

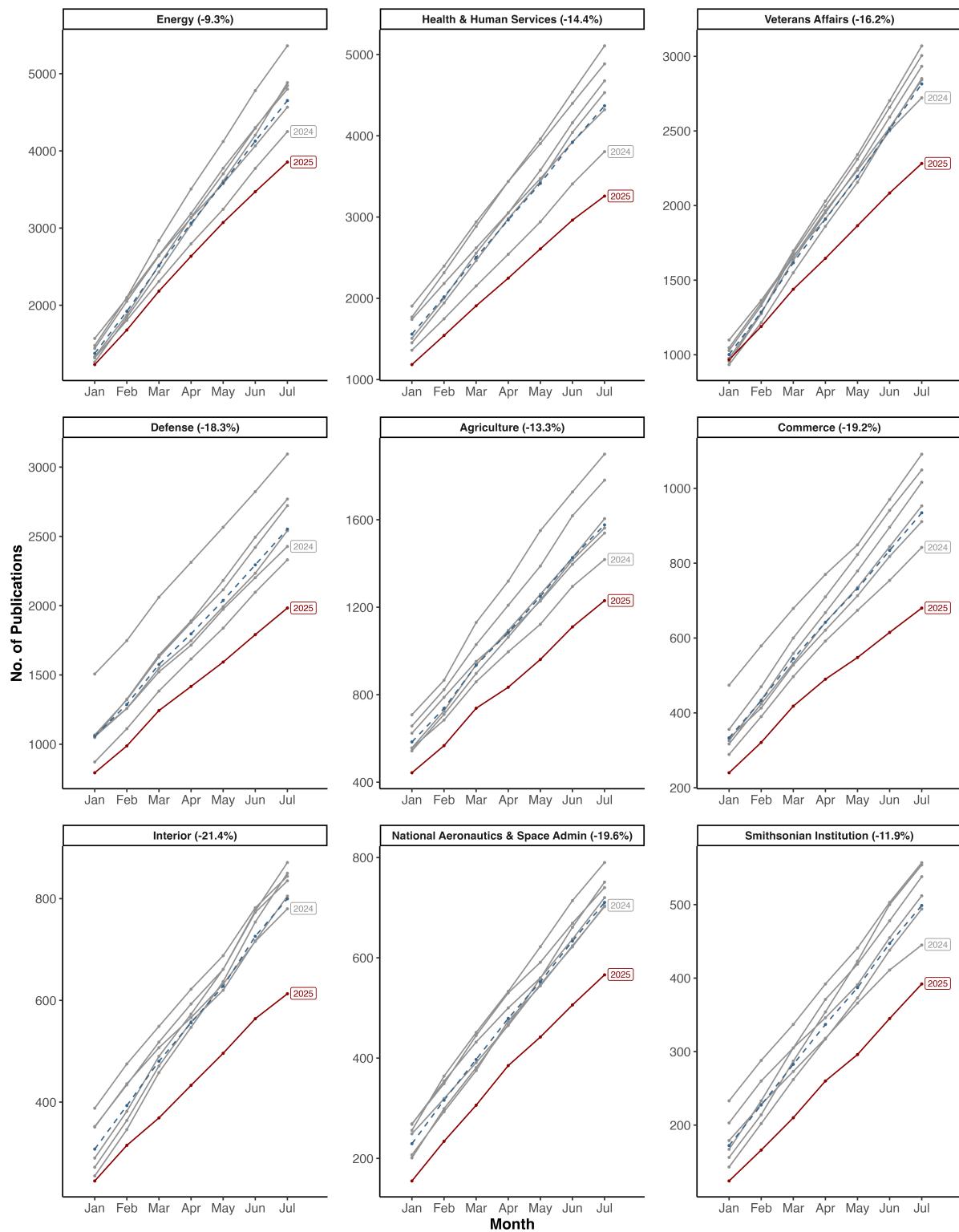


Figure 3. Cumulative number of publications published Jan through July 2019-2025 whose 1st author was affiliated with one of the US federal government's 10 most productive agencies or departments. Red solid line: 2025, Blue dashed line: 2019-2024 average.

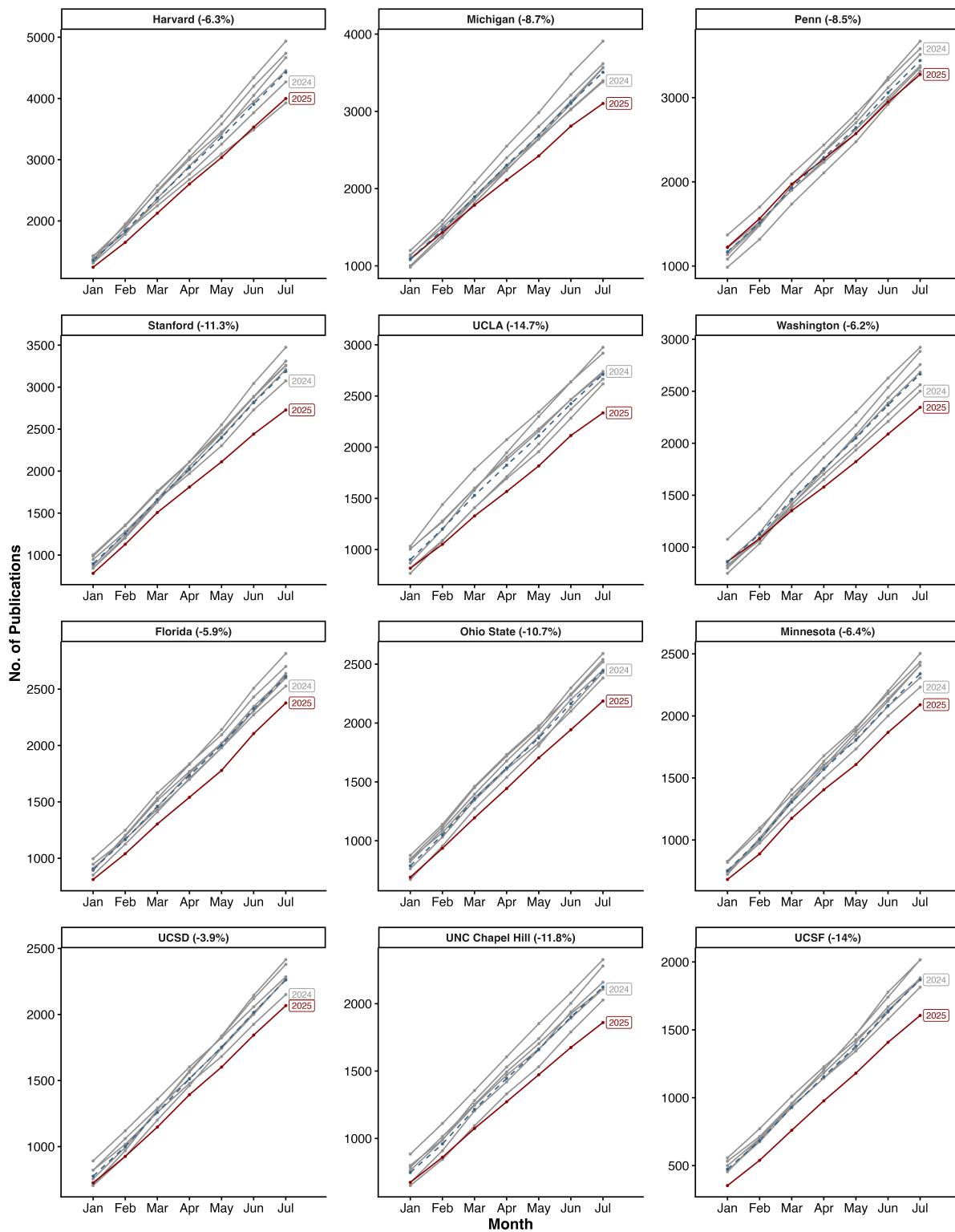


Figure 4. Cumulative number of publications published Jan through July 2019-2025 whose 1st author was affiliated with one of 12 focal universities. Red solid line: 2025, Blue dashed line: 2019-2024 average.