

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

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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 Here I show that a key indicator of federal research productivity — the number of
30 peer-reviewed journal articles and book chapters by US federal government affiliates — has
31 declined precipitously in the first seven months of 2025 relative to the same time period in
32 any of the preceding six years (Figure 1). This conclusion is based on an analysis of the
33 Scopus bibliographic database (<https://www.scopus.com>), which indexes the content of over
34 200,000 books and 48,000 journals comprising all major fields of scholarship (6). While
35 productivity at twelve of the most productive research universities in the United States has
36 also declined during this time period, the decline in Federal productivity exceeds the
37 collective decline at these universities by ~55% (Table 1, Figure 2).

38

Results

39 I identified $N = 457,421$ research articles (87%), reviews (7.4%), book chapters (3.6%),
40 Notes (1.9%), and Data Papers (0.18%) in Scopus with at least one federally affiliated
41 author and a publication date between January 1, 2019 and July 31, 2025 (hereafter,
42 ‘publications’). The publications in this corpus had a total of $N = 1,207,501$ unique authors,

43 of which $N = 217,569$ (18%) had federal primary affiliations. Federal researchers were highly
44 collaborative: the publications in the data set had on average 9.3 ± 12 SD authors, of which
45 5.9 ± 11 SD had affiliations outside of the US federal government.

46 During the reference time period the focal universities produced $N = 740,800$
47 publications (Figures 2,4) with $N = 6,332,969$ authors. There were $N = 1,734,321$ unique
48 authors in the data set, of which $N = 404,446$ had one of the focal universities as their
49 primary affiliation. Each article had an average of $N = 8.9 \pm 12$ SD authors, of which $2.7 \pm$
50 3.2 SD were affiliated with the focal universities.

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

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

62 I identified $N = 15,589$ publications indexed in Scopus that had a federally affiliated
63 first author and a January 1-July 31, 2025 publication date. This is a 14% decline relative to
64 the same time period in 2024, and a 24% decline relative to the 2019–2024 average (Figure 1).
65 Both this decline, and the 8.9% decline in first author publications observed for the focal
66 universities (Figure 2), were highly significant ($P < 0.0001$, see the *Supporting Information*
67 for a description of the bootstrapping procedure used to asses significance).

68

Discussion

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

83 The proposed reductions to the budgets of federal agencies that support research and
84 education, along with the ongoing efforts to strip universities of previously allocated research
85 funds and limit the enrollment of international students (12), have led a broad array of
86 stakeholders to warn of an imminent and potentially catastrophic decline in the scientific
87 preeminence of the United States (e.g., 13, 14, 15). The results presented here suggest that
88 executive orders dismissing research and support staff, suspending agency funding, and
89 requiring federal scientists to withdraw manuscripts undergoing peer review (16–18) have
90 already set this decline in motion — particularly at agencies conducting research on the
91 economy, environment, public health, and national security. Given the disciplinary breadth
92 and highly collaborative research conducted by the staff of these agencies (19, 20), in concert
93 with their role in training early career scientists (21), it is likely the long-term consequences
94 of these declines have already begun cascading through both public and private-sector

95 research institutes beyond the federal government.

96 **Materials and Methods**

97 Article records are uploaded daily to Scopus from over 25,000 currently active journals,
98 with the metadata for each record including information such as the publication title,
99 abstract, keywords, publication date. An article's record also includes the names and
100 affiliations of all authors, both of which are assigned unique identification numbers. I used
101 the Scopus Affiliation ID numbers assigned to Departments, Agencies, Commissions, and
102 other units of the United States federal government (see *Supporting Information Table S2*)
103 to search Scopus for all peer-reviewed journal articles, book chapters, and other scholarly
104 publications produced between January 2019 and July 2025 by authors using these
105 affiliations. I began by identifying $N = 5,360$ Scopus affiliation ID numbers nested under the
106 Scopus Institution Codes of all US Cabinet-level Departments and independent federal
107 agencies; these affiliation ID numbers included both the primary affiliation codes for the
108 agencies (e.g., 60012471: US Department of Defense; 60000947: US Department of
109 Commerce) and codes for author affiliations nested under them (e.g., 60032984: Naval
110 Dental Center; 60027716: National Oceanic and Atmospheric Administration). I then used
111 the Scopus API to download the metadata for all articles, data papers, reviews, notes, and
112 book chapters published between 2019-2025 by authors using these affiliation IDs. The
113 author lists of the resulting publications were then searched for any federal affiliations not
114 included in the initial query ($N = 7,355$), and the search was repeated using complete list of
115 $N = 12,715$ affiliations.

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 first 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), then any additional codes found
¹³⁶ in the resulting publications. In total searches were conducted with N = 1,698 Scopus
¹³⁷ affiliation IDs (*Supporting Information Table S3*).

¹³⁸ All data were collected from Scopus between September 1-4, 2025. However, the
¹³⁹ analyses are restricted to publications with cover dates from January 2019 through July 2025
¹⁴⁰ to avoid potential underestimates of productivity due to upload lags (*sensu* 26 and
¹⁴¹ *Supporting Information*).

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¹⁴⁶ Data Availability

¹⁴⁷ The data used in this study are archived at Dryad [*url to be added*], while the version
¹⁴⁸ of the R code used for the analyses presented here is archived at Zenodo [*url to be added*].

¹⁴⁹ Post-publication updates to the code or data can be found at Github
¹⁵⁰ (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

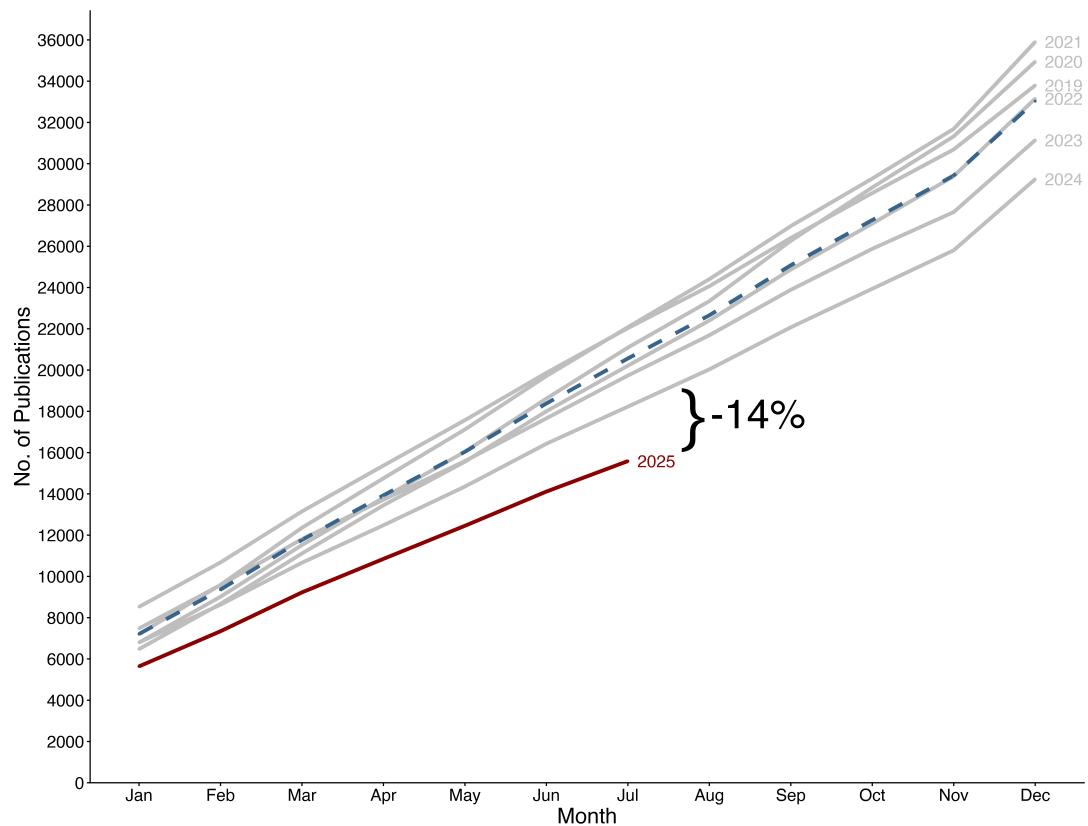


Figure 1. Cumulative number of articles published by researchers at federal agencies between January 1, 2019 - July 31, 2025 and the percent decline in 2025 relative to the same time period in 2024. Red solid line: 2025, Blue dashed line: 2019-2024 average.

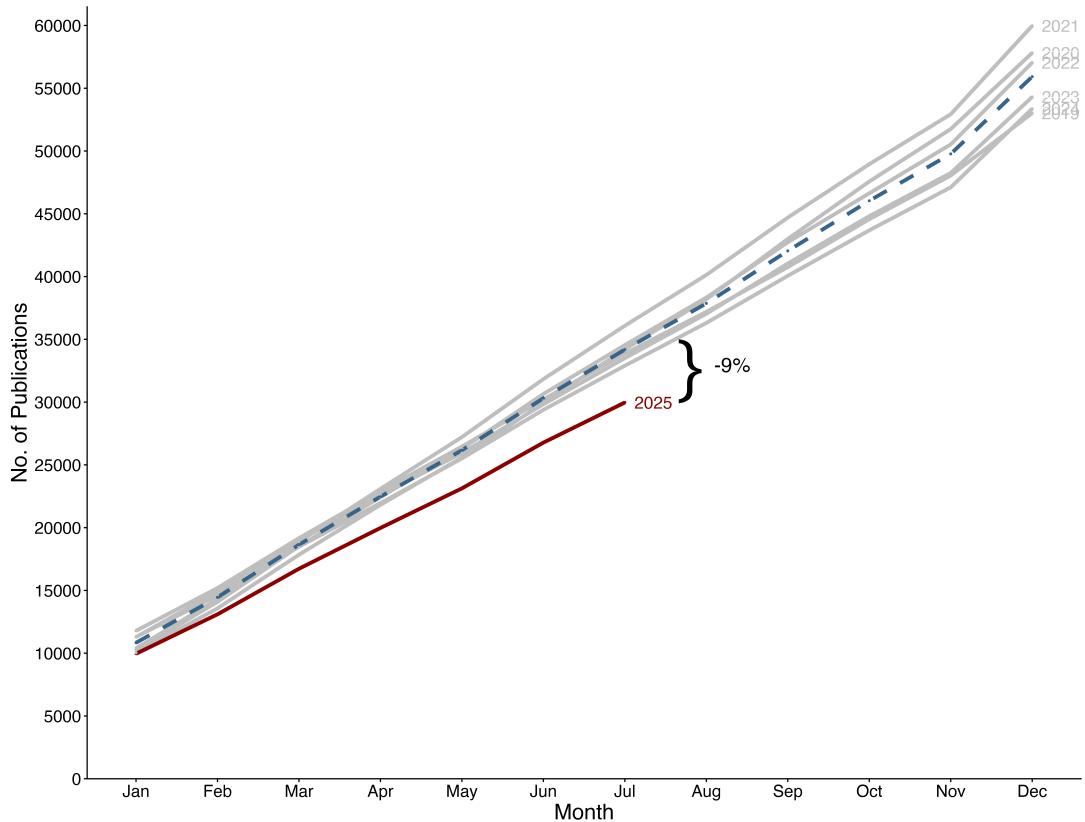


Figure 2. Cumulative number of publications published by researchers at twelve focal universities between January 1, 2019 and July 31, 2025 and the percent decline in 2025 relative to the same time period in 2024. Red solid line: 2025, Blue dashed line: 2019-2024 average.

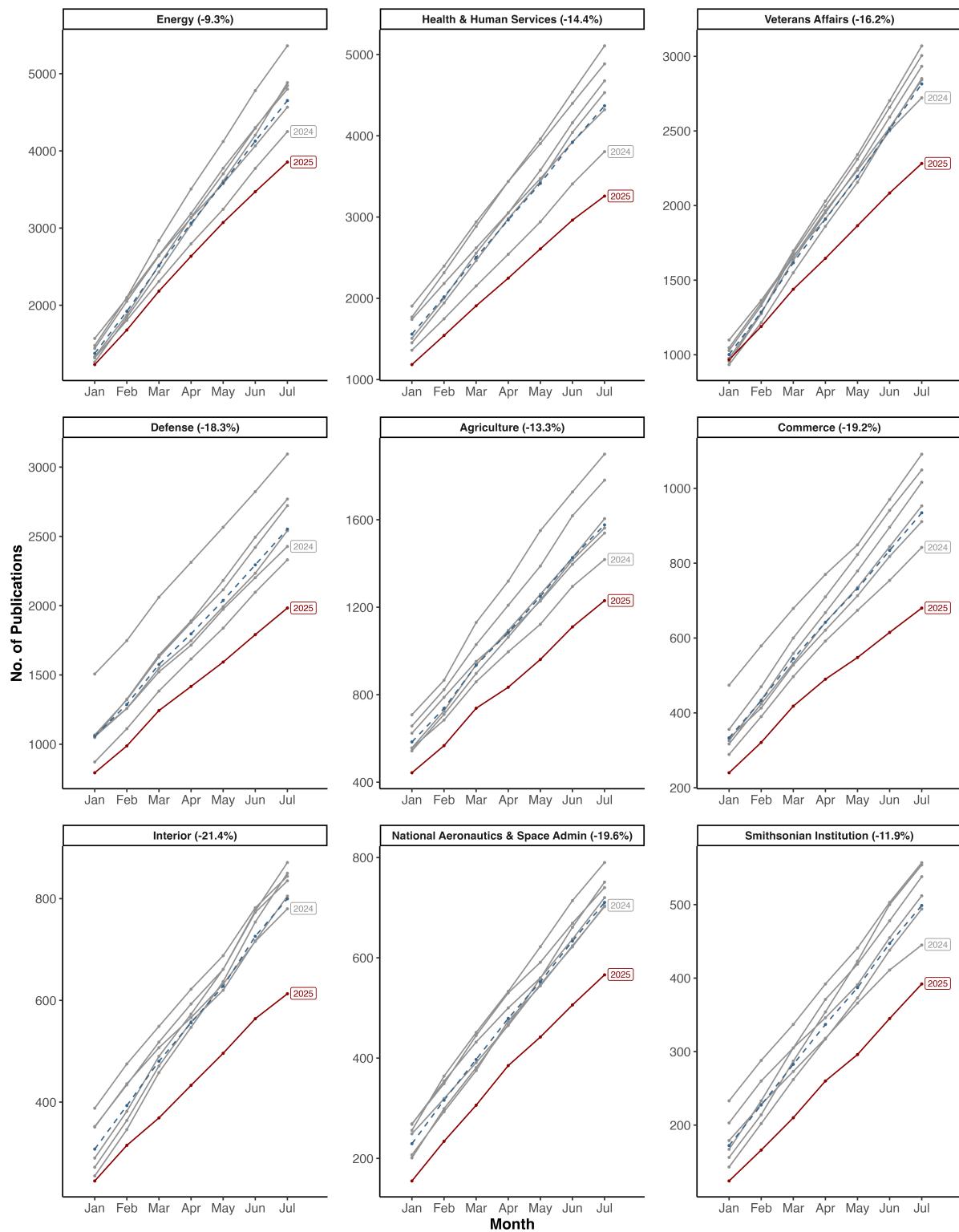


Figure 3. Cumulative number of publications published Jan through July 2019-2025 whose 1st author was affiliated with one of the US federal government's 10 most productive agencies or departments. Red solid line: 2025, Blue dashed line: 2019-2024 average.

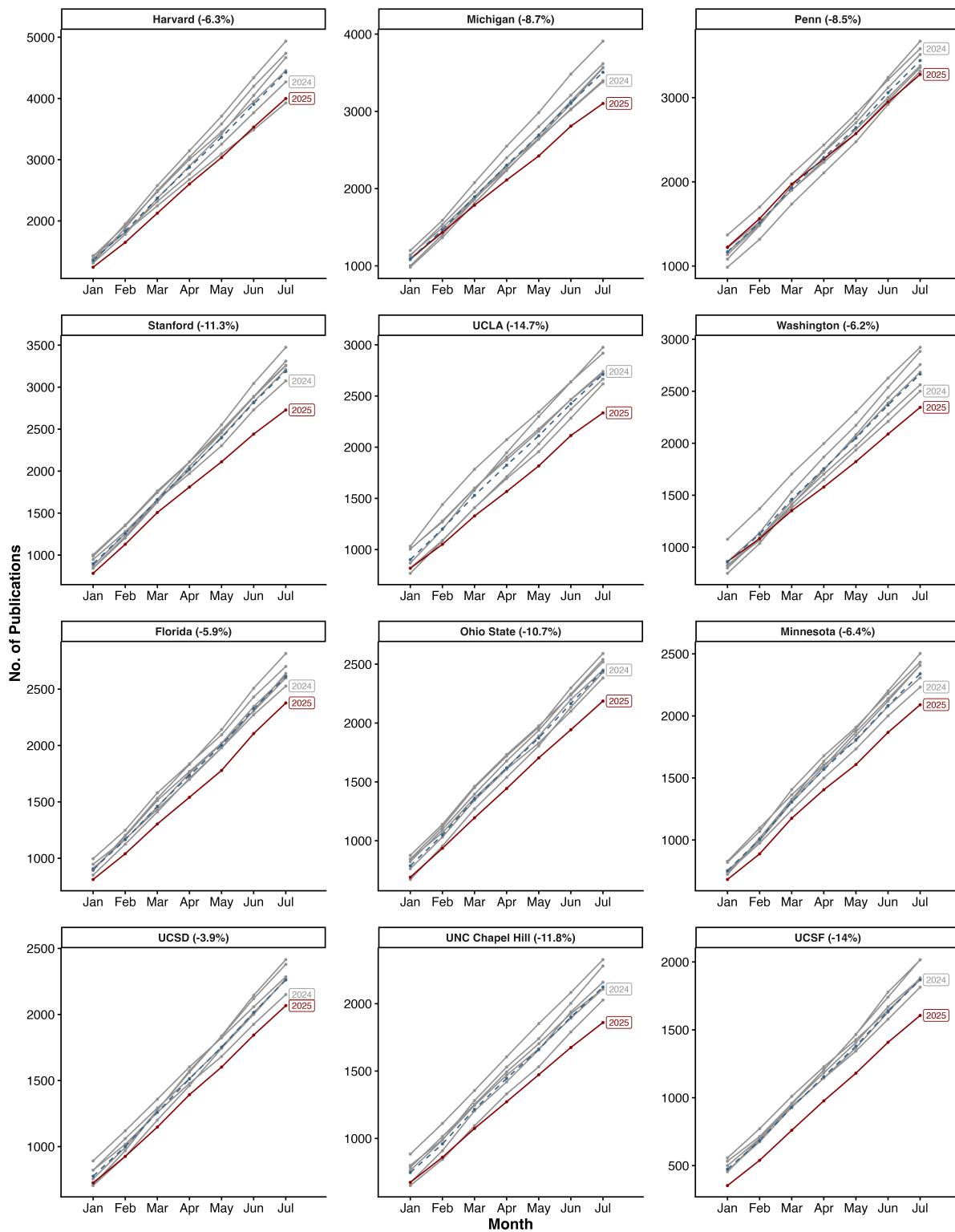


Figure 4. Cumulative number of publications published Jan through July 2019-2025 whose 1st author was affiliated with one of 12 focal universities. Red solid line: 2025, Blue dashed line: 2019-2024 average.