

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

2 Emilio M. Bruna^{1,2}

3 ¹ Center for Latin American Studies, University of Florida, PO Box 110530, Gainesville,
4 Florida, 32611-0530 USA

5 ² Department of Wildlife Ecology & Conservation, University of Florida, PO Box 110530,
6 Gainesville, Florida, 32611-0430 USA

7 A preprint of this article has been posted at — Preprints ([link](#)).

8 ORCID:

9 EB: 0000-0003-3381-8477

10

Author Note

11

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

12

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

13

Draft Preparation, Writing - Review & Editing, Project administration, Supervision.

14

Correspondence concerning this article should be addressed to Emilio M. Bruna,

15

University of Florida. E-mail: embruna@ufl.edu

16

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 is thought to directly
19 benefit the nation and its citizens in four ways: by providing the information needed by
20 agencies to advance their missions, via the broad advancement of knowledge, through the
21 application of this knowledge in ways that benefit society, and by developing human capital
22 with education and professional experience (1). Federal research is also a major driver of
23 economic growth — in addition to the direct economic impacts of the research enterprise
24 (e.g., employment, purchasing, tax revenue), the resulting knowledge is also used by the
25 private sector to develop novel technologies and products (2–4). As such the outputs from
26 federal research and development are considered vital not only for addressing domestic needs,
27 but also for enhancing the global competitiveness of US companies, informing international
28 policy, and 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. We identified $N = 7,216$ Scopus affiliation ID
35 numbers assigned to Departments, Agencies, Commissions, and other units United States
36 federal government (*Supplementary Materials*) and used them to quantify the volume
37 research these units produced from January 2019 through August 2025. We found that the
38 number of studies by authors affiliated with the federal government has declined
39 precipitously in the first 8 months of 2025 relative to the same time period in any of the
40 preceding 6 years (Figure 1). This decline is ~60% greater than that observed at the 12
41 leading research universities in the United States (Figure 2).

Results

42 We identified $N = 457,421$ research articles, data papers, reviews, notes, and book
43 chapters (hereafter, ‘articles’) in Scopus with at least one federally affiliated author and a
44 publication date between January 1, 2019 and August 31, 2025. The articles in this corpus
45 had a total of $N = 1,194,360$ unique authors, of which $N = 215,982$ (18%) had federal
46 primary affiliations. Federal researchers were highly collaborative: the articles in our data set
47 had on average 9.5 ± 13 SD authors, of which 6 ± 11 SD affiliations outside of the US
48 federal government.

50 Our analyses focus on the 47% of the articles with a federally affiliated first author.
51 We restricted our analyses to first authors because of the inconsistent use – both within- and
52 across disciplines – of last-author position to indicate the ‘lead’ or ‘corresponding’ author of
53 a study (7–9). Our estimates of changing productivity patterns are may therefore be
54 conservative, particularly for disciplines (e.g., biomedical sciences) where last author position
55 is a signal of research oversight (10).

56 We identified $N = 16,871$ articles published between January 1 and August 31, 2025
57 whose first author had a federal government affiliation. This is a 16% decline relative to the
58 same time period in 2024, and a 26% decline relative to the 2019–2024 average (Figure 1).
59 This decline in productivity is highly significant ($P < 0.0001$, see the *Supporting Information*
60 for a description of the bootstrapping procedure used to asses significance).

61 The search of university productivity was conducted using $N = 487$ Scopus affiliation
62 IDs. It resulted in $N = 688,062$ publications with $N = 6,142,072$ authors. There were $N =$
63 1,702,412 unique authors in the data set, of which $N = 348,688$ had one of the focal
64 universities as their primary affiliation. Each article had an average of $N = 8.9 \pm 12$ SD
65 authors, of which 2.7 ± 3.2 SD were affiliated with the focal universities (Figures 2,4).

Discussion

66 Scholarly publications such as peer-reviewed journal articles are the primary means of
67 documenting, validating, and sharing research results; the results the communicate are used
68

69 to guide public policy and are the foundation on which future discoveries are built (11). We
70 estimate that the US Federal Government — historically a leading global producer of
71 knowledge across a vast array of disciplines — has accumulated a research publication deficit
72 of 3,163-7,534 articles in the first eight months of 2025. This deficit is driven by declining
73 research output at several of the largest and most-research intensive agencies of the federal
74 government — productivity the Departments of Defense, Commerce, Veterans Affairs, and
75 NASA all declined 15-20%, while the number of publications from the Smithsonian
76 Institution and the Departments of Energy, Health & Human Services, and Agriculture
77 decreased 9-15%. The greatest proportional decline was at the Department of the Interior,
78 whose 2025 research output to date has declined 21% relative to the same time period in
79 2024 (Figure 3).

80 The proposed reductions to the budgets of federal agencies that support research and
81 education, along with the ongoing efforts to strip universities of previously allocated research
82 funds and limit the enrollment of international students (12), have led a broad array of
83 stakeholders to warn of an imminent and potentially catastrophic decline in the the scientific
84 preeminence of the United States (e.g., 13, 14, 15). We suggest that these declines have
85 already been set in motion, especially in several fields central to the economic,
86 environmental, and national security interests of the United States. Given the disciplinary
87 breadth and highly collaborative research conducted by the staff of federal agencies (16, 17),
88 it is likely the lasting consequences of these declines have already begun cascading through
89 research institutions beyond the federal government.

90 Materials and Methods

91 We searched the Scopus database for all articles published January 2019-August 2025
92 that included at least one co-author whose primary affiliation was a unit of the US federal
93 government. To do so we first identifying N = 5,360 Scopus ID numbers for federal
94 affiliations; these affiliation ID numbers included both the primary codes for government
95 agencies (e.g., 60012471: US Department of Defense; 60000947: US Department of

96 Commerce) and codes nested under them (e.g., 60032984: Naval Dental Center; 60027716:
97 National Oceanic and Atmospheric Administration). We then used the Scopus API to
98 download the metadata for each Scopus ID's articles, data papers, reviews, notes, and book
99 chapters published between 2019-2025. The author lists of the resulting articles were
100 searched for any other federal affiliations not included in the initial query, and a second
101 search was then conducted using the complete list of initial and subsequently identified
102 affiliations ($N = 7,355$). After final data validation, the data set used for analyses comprised
103 $N = 7,216$ federal affiliations; these affiliations and their Scopus codes can be found in the
104 *Supporting Information*.

105 Queries of the Scopus API were conducted using the `rscopus` library (18) for the R
106 statistical programming language (19). The resulting `.csv` files for each year and affiliation
107 ID were initially processed using the `refsplitr` library (20), after which we combined all
108 data for all years, identified all federal and non-federal author affiliations, and assigned all
109 affiliations to their highest parent agency, department, or organization. We then visualized
110 productivity within and across agencies using the `tidyverse` libraries (21) and used a
111 bootstrapping procedure to assess whether productivity across all federal affiliations was
112 significantly different in 2025.

113 Some US Geological Survey (i.e., USGS) scientists are based at universities under the
114 auspices of the Cooperative Fish and Wildlife Research Units Program. Publications by
115 these researchers are returned in Scopus searches when using the USGS code, but the
116 primary affiliation provided by Scopus for the USGS authors is that of the host university
117 (e.g., USGS Scientists at the Florida Cooperative Fish and Wildlife Research Unit is
118 “University of Florida”). To correct this we downloaded metadata from USGS Publications
119 Warehouse for the $N = 17,445$ articles published between 2019-2025 and used it to correct
120 the affiliation of USGS authors in the Scopus records.

121 We used the same workflow to search for all publications with at least one author
122 whose primary affiliation was one of the USA's twelve most productive non-federal

123 institutions (based on total number of indexed publications 2019-2025). All of these
124 institutions were universities; the sole exception was Massachusetts General Hospital, which
125 as the largest clinical education and research hospital for the the Harvard Medical School
126 was combined with Harvard University for our analyses. As with the searches for federal
127 agency productivity, these searches were conducted with the primary Scopus affiliation codes
128 for institutions (e.g., 60030612 for the University of California, San Diego) and any codes for
129 nested affiliations (e.g., 60121501 for the UCSD School of Biological Sciences). Searches used
130 in all results presented here were conducted on September 1-4, 2025.

131 Additional details on our procedures for data collection, processing, and analysis —
132 including links to the code and data repositories and complete affiliation lists — are provided
133 in the *Supporting Information*.

134 **Acknowledgments and Funding Sources**

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

138 **Data Availability**

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

143

References

- ¹⁴⁴ 1. US National Academy of Sciences (US), National Academy of Engineering (US), Institute of Medicine (US), Committee on Science, US National Academy of Engineering, US Institute of Medicine, Committee on Science, Engineering, and Public Policy, “Research and the Federal Government” in *Evaluating Federal Research Programs: Research and the Government Performance and Results Act*, (National Academies Press (US), 1999).
- ¹⁴⁵ 2. J. A. Cunningham, A. N. Link, The Returns to Publicly Funded R&D: A Study of U.S. Federally Funded Research and Development Centers. *Annals of Science and Technology Policy* **6**, 228–314 (2022).
- ¹⁴⁶ 3. D. P. Leech, J. T. Scott, Foreign patents for the technology transfer from laboratories of U.S. Federal agencies. *The Journal of Technology Transfer* **47**, 937–978 (2022).
- ¹⁴⁷ 4. A. N. Link, Knowledge Transfers from Federally Funded Research and Development Centers. *Science and Public Policy* **48**, 576–581 (2021).
- ¹⁴⁸ 5. R. Mandt, K. Seetharam, C. H. M. Cheng, Federal R&D funding: The bedrock of national innovation. *MIT Science Policy Review* **1** (2020).
- ¹⁴⁹ 6. J. Baas, M. Schotten, A. Plume, G. Côté, R. Karimi, Scopus as a curated, high-quality bibliometric data source for academic research in quantitative science studies. *Quantitative Science Studies* **1**, 377–386 (2020).
- ¹⁵⁰ 7. S. Burrows, M. Moore, Trends in Authorship Order in Biomedical Research Publications. *Journal of Electronic Resources in Medical Libraries* **8**, 155–168 (2011).

- 151 8. M. A. Duffy, Last and corresponding authorship practices in ecology. *Ecology and Evolution* **7**, 8876–8887 (2017).
- 152 9. C. W. Fox, J. P. Ritchey, C. E. T. Paine, Patterns of authorship in ecology and evolution: First, last, and corresponding authorship vary with gender and geography. *Ecology and Evolution* **8**, 11492–11507 (2018).
- 153 10. S. Pichini, M. Pulido, Ó. García-Algar, Authorship in manuscripts submitted to biomedical journals: An author’s position and its value. *Science and Engineering Ethics* **11**, 173–175 (2005).
- 154 11. N. R. C. (US). C. on R. of A. in the B. Sciences, “The Purpose of Publication and Responsibilities for Sharing” in *Sharing Publication-Related Data and Materials: Responsibilities of Authorship in the Life Sciences*, (National Academies Press (US), 2003).
- 155 12. D. Malakoff, How Trump upended science. *Science* **388**, 576–577 (2025).
- 156 13. Federal Research Cuts Threaten U.S. Innovation and Leadership | Association of American Universities (AAU). (2025).
- 157 14. D. Baker, S. Johnson, Will the United States continue to lead in science? *The Economic Consequences of the Second Trump Administration: A Preliminary Assessment* 25.
- 158 15. J. Barocas, E. Choo, Cuts to scientific funding will be detrimental to the US, achieving the opposite to Trump’s stated aims. *BMJ* **388**, r476 (2025).

- ¹⁵⁹ 16. D. P. Leyden, A. N. Link, Federal laboratories as research partners. *International Journal of Industrial Organization* **17**, 575–592 (1999).
- ¹⁶⁰ 17. A. N. Link, J. T. Scott, Scientific publications at U.S. Federal research laboratories. *Scientometrics* **126**, 2227–2248 (2021).
- ¹⁶¹ 18. J. Muschelli, *Rscopus: Scopus database 'API' interface* (2025).
- ¹⁶² 19. R Core Team, *R: A language and environment for statistical computing* (R Foundation for Statistical Computing, 2025).
- ¹⁶³ 20. A. M. V. Fournier, M. E. Boone, F. R. Stevens, E. M. Bruna, Refsplitr: Author name disambiguation, author georeferencing, and mapping of coauthorship networks with Web of Science data. (2025).
- ¹⁶⁴ 21. H. Wickham, *et al.*, Welcome to the tidyverse. *Journal of Open Source Software* **4**, 1686 (2019).

Unit	All Author Positions	Federal 1st Author	
	N Jan 2019-July 2025 (%)	N (Jan-Jul 2025)	2025 vs. 2024 (% change)
DOE	53016 (24.4)	4184	-12.17
HHS	48699 (22.41)	3571	-15.48
VA	30404 (13.99)	2450	-17.76
DOD	26446 (12.17)	2107	-18.99
USDA	16912 (7.78)	1328	-14.21
Commerce	10114 (4.66)	726	-20.31
Interior	8566 (3.94)	666	-21.37
NASA	7732 (3.56)	630	-18.5
Smithsonian	5338 (2.46)	428	-11.57
NSF	2947 (1.36)	219	-7.59
EPA	2540 (1.17)	201	-10.27
Federal Reserve System	1773 (0.82)	160	-6.43
Other	1370 (0.63)	88	-36.69
State	518 (0.24)	36	-7.69
DOT	214 (0.1)	15	-31.82
DOJ	212 (0.1)	15	-25
DHS	176 (0.08)	16	-15.79
Treasury	153 (0.07)	22	69.23
Education	72 (0.03)	6	-50
Labor	45 (0.02)	-	-
HUD	19 (0.01)	3	-25

[†]CBO, CFPB, CIA, Commodity Futures Trading Commission, Congress, CPSC, EOP, Equal Employment Opportunity Commission, FCC, FDIC, Federal Maritime Commission, FHFA, Financial Industry Regulatory Authority, FMC, FTC, GAO, Government Publishing Office, GSA, IMLS, Interagency, Interior, John F Kennedy Center For The Performing Arts, Judiciary, Multiagency, NASEM, National Archives And Records Administration, National Center For Missing & Exploited Children, NEA, NRC, NSC, NTSB, ODNI, OPM, OTHER, Public Company Accounting Oversight Board, SEC, SSA, Susquehanna River Basin Commission, TVA, Uniformed Services University Of The Health Sciences, Us Global Change Research Program, Us Holocaust Memorial Museum, Us Institute Of Peace, USUHS, Woodrow Wilson International Center For Scholars

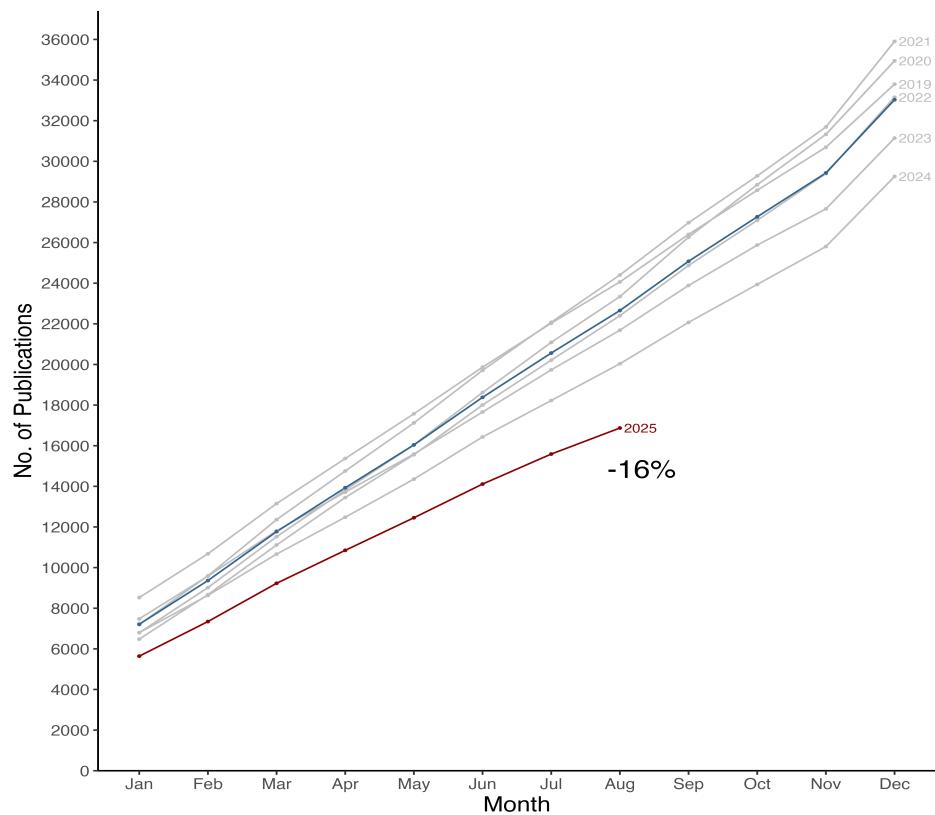


Figure 1. Cumulative number of articles published by researchers at federal agencies between January 1, 2019 - August 31, 2025 and the percent decline in 2025 relative to the same time period in 2024. Red Line: 2025, Blue Line: 2019-2024 average.

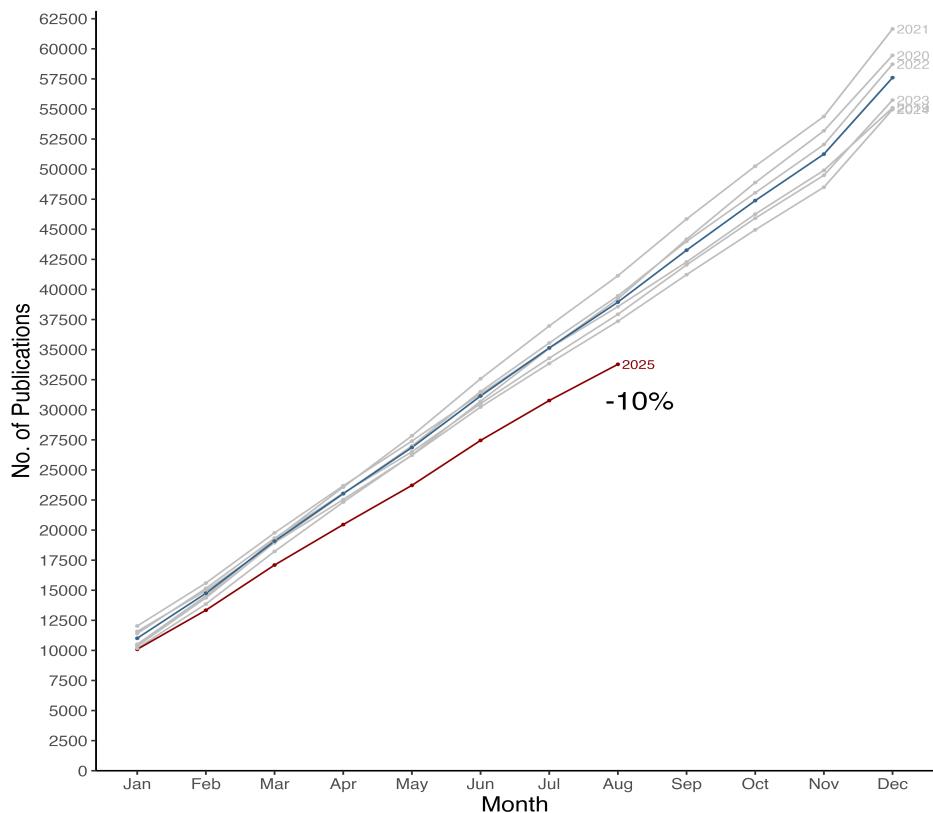


Figure 2. Cumulative number of articles published by researchers at twelve focal universities between January 1, 2019 and August 31, 2025 and the percent decline in 2025 relative to the same time period in 2024. Red Line: 2025, Blue Line: 2019-2024 average.

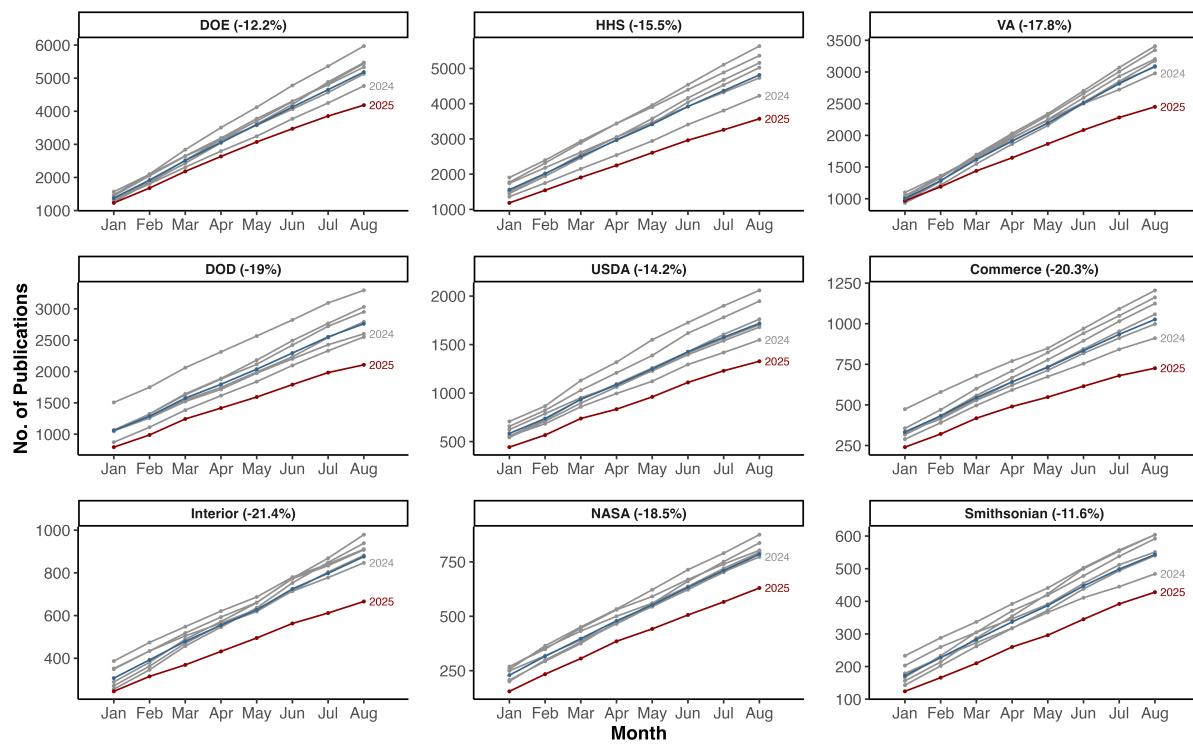


Figure 3. Cumulative number of articles published Jan through July 2019-2025 whose 1st author was affiliated with one of the US federal government's 10 most productive agencies or departments. The 2019-2024 average is shown in blue; 2025 is shown in red.

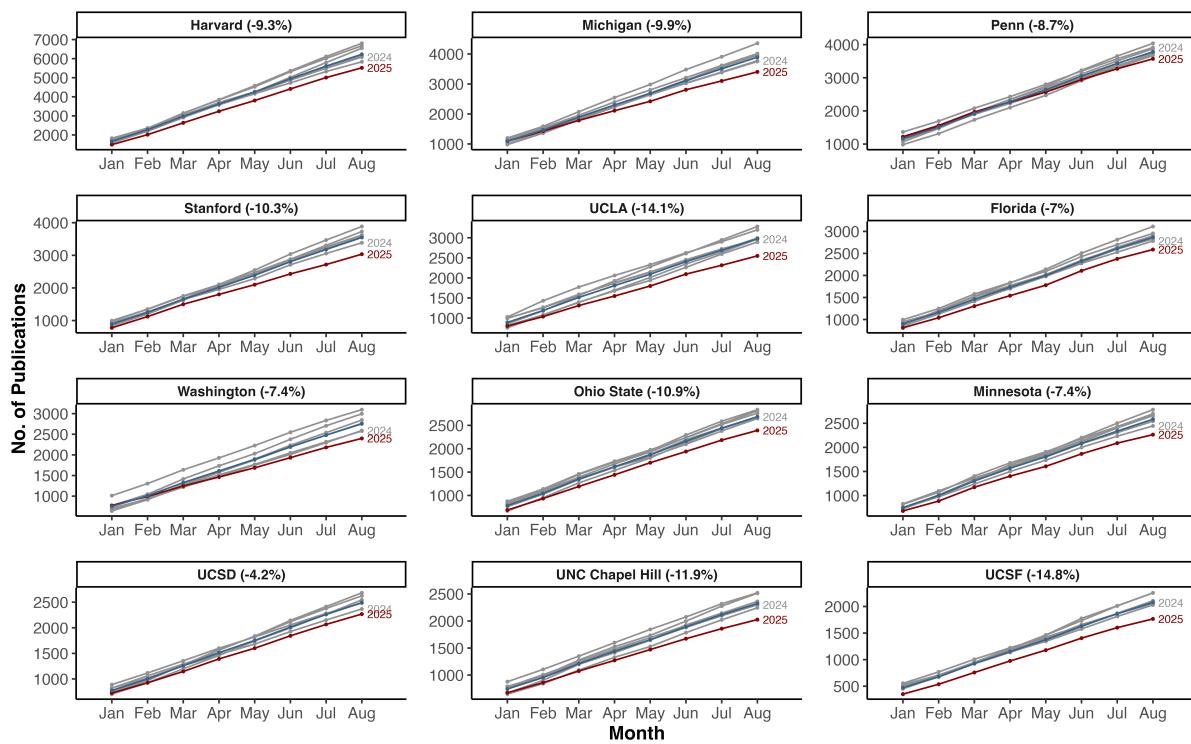


Figure 4. Cumulative number of articles published Jan through July 2019-2025 whose 1st author was affiliated with one of 12 focal universities. The 2019-2024 average is shown in blue; 2025 is shown in red.