

**NATIONAL SCIENCE FOUNDATION (NSF)  
ESTABLISHED PROGRAM TO STIMULATE COMPETITIVE RESEARCH (EPSCoR)  
CONGRESSIONAL REPORT IN COMPLIANCE WITH PUBLIC LAW 114-329: AMERICAN  
INNOVATION AND COMPETITIVENESS ACT, SEC. 103 (D) (1-3)  
FISCAL YEAR 2018**

This report summarizes fiscal year (FY) 2018 NSF funding to institutions and entities in EPSCoR jurisdictions, as required by the American Innovation and Competitiveness Act Sec. 103(d)(1-3). Specifically, the report itemizes

- (1) a description of the program strategy and objectives;
- (2) a description of the awards made in the previous fiscal year including
  - (A) the total amount made available, by state, under EPSCoR;
  - (B) the total amount of agency funding made available to all institutions and entities within each EPSCoR state;
  - (C) the efforts and accomplishments to more fully integrate the EPSCoR states in major agency activities and initiatives;
  - (D) the percentage of EPSCoR reviewers from EPSCoR states;
  - (E) the number of programs or large collaborator awards involving a partnership of organizations and institutions from EPSCoR and non-EPSCoR states; and
- (3) an analysis of the gains in academic research quality and competitiveness, and in science and technology human resource development, achieved by the program over the last 5 years.

## **Introduction**

EPSCoR utilizes three investment strategies in pursuit of its goal to strengthen research capacity and competitiveness in eligible jurisdictions. These investment strategies are: (1) Research Infrastructure Improvement (RII) awards that support physical, human, and cyberinfrastructure development; (2) Co-Funding in partnership with NSF directorates and offices that support individual investigators and groups within EPSCoR jurisdictions; and (3) Outreach activities and workshops that bring EPSCoR jurisdiction investigators together with program staff from across the Foundation to explore opportunities in emerging areas of science and engineering aligned with NSF strategic priorities and with jurisdictional science and technology goals.

## **EPSCoR Strategies and Objectives (Sec. 103(d)(1)).c**

EPSCoR's strategies and objectives in FY 2018 remain the same as those described in the FY 2017 report. Specifically, the mission of EPSCoR is "to enhance research competitiveness of targeted jurisdictions (states, territories, commonwealths) by strengthening STEM capacity and capability." Thus, EPSCoR's goals are:

- To catalyze the development of research capabilities and the creation of new knowledge that expands jurisdictions' contributions to scientific discovery, innovation, learning, and knowledge-based prosperity.
- To establish sustainable Science, Technology, Engineering and Math (STEM) education, training, and professional development pathways that advance jurisdiction-identified research areas, NSF focus areas, and workforce development.
- To broaden direct participation of diverse individuals, institutions, and organizations in the project's science and engineering research and education initiatives.
- To effect sustainable engagement of project participants and partners, the jurisdiction, the national research community, and the general public through data-sharing, communication, outreach, and dissemination.

*NSF Authorizations*

- To impact research, education, and economic development beyond the project at academic, government, and private sector levels.

**NSF Funding Made Available, by jurisdiction, under EPSCoR (Sec. 103(d)(2)(A)).**

In FY 2018, NSF EPSCoR invested a total of \$170.59 million in support of its programmatic activities. Of this, \$142.21 million (83.4 percent) was directed to RII, \$27.59 million (16.2 percent) to co-funding, and \$790,000 (0.4 percent) to outreach activities and workshops. The table below details the investments from EPSCoR resources and EPSCoR investments in co-funding actions.

**FY 2018 EPSCoR Funding by Jurisdiction**

(Dollars in Millions)

EPSCoR Jurisdiction	RII Program	Outreach & Workshops	EPSCoR Co-funding	EPSCoR Total
AK	\$4.36	-	\$0.68	\$5.04
AL	11.05	-	3.27	14.32
AR	10.72	-	1.42	12.14
DE	4.91	-	1.30	6.21
GU	-	-	-	-
HI	5.37	-	0.42	5.79
ID	6.10	-	1.21	7.31
KS	10.73	-	0.84	11.57
KY	7.22	-	0.56	7.78
LA	4.86	-	0.75	5.61
ME	7.25	-	0.59	7.84
MS	5.36	-	0.38	5.74
MT	4.23	-	1.27	5.50
ND	5.61	-	1.16	6.77
NE	3.13	-	1.08	4.21
NH	6.71	-	1.18	7.89
NM	4.13	-	0.92	5.05
NV	0.19	-	1.01	1.20
OK	0.12	-	1.12	1.24
PR	1.00	-	0.85	1.85
RI	4.18	-	0.19	4.37
SC	4.57	0.74	2.37	7.68
SD	4.66	-	1.33	5.99
VI	4.17	-	-	4.17
VT	10.43	-	0.28	10.71
WV	4.00	-	2.46	6.46
WY	4.75	-	0.56	5.31
Admin	2.40	0.05	0.39	2.84
<b>Total</b>	<b>\$142.21</b>	<b>\$0.79</b>	<b>\$27.59</b>	<b>\$170.59</b>

**Total NSF Funding Made Available in all EPSCoR Jurisdictions (Sec. 103 (d)(2)(B)).**

In FY 2018, NSF invested a total of \$825.80 million in support of EPSCoR jurisdictions. The table below details NSF investments in EPSCoR jurisdictions including research support funding, education and human resources, and major research equipment.

**FY 2018 NSF Funding  
Made Available to All EPSCoR Jurisdictions**

(Dollars in Millions)

EPSCoR Jurisdiction	NSF Funding
AK	\$45.03
AL	60.14
AR	28.98
DE	36.65
GU	-
HI	45.31
ID	24.75
KS	41.17
KY	32.89
LA	42.51
ME	33.44
MS	21.79
MT	30.57
ND	16.05
NE	34.17
NH	38.75
NM	46.03
NV	22.09
OK	24.62
PR	19.49
RI	43.61
SC	64.02
SD	15.02
VI	6.30
VT	19.39
WV	15.96
WY	17.07
<b>Total</b>	<b>\$825.80</b>

**Integration of EPSCoR Jurisdictions in Major Activities and Initiatives of the Foundation (Sec. 103 (d)(2)(C)).**

All EPSCoR programmatic activities target integration and assimilation of EPSCoR jurisdictions into the research and education programs of the Foundation’s disciplinary directorates. RII awards promote the coordination and integration of recipient jurisdictions into major NSF programmatic activities. Additionally, EPSCoR consults and engages NSF disciplinary program officers (POs) in merit review processes and post-award evaluations, such as site visits and reverse site visits (RSVs). Site visits and RSVs are intended to provide additional project oversight by allowing jurisdictions to report on the progress of their RII projects in relation to their stated goals and the programmatic terms and conditions. Disciplinary POs assist in the identification of reviewers, serve as site visit and RSV observers, and provide knowledge about the ongoing activities within the directorate that could be leveraged to sustain RII efforts after the performance period of the EPSCoR award.

National, regional, and jurisdictional meetings of the EPSCoR community facilitate grantee interactions with NSF leadership to learn about the Foundation’s strategic priorities and funding opportunities. Participation by EPSCoR researchers and educators in the merit review process across all disciplinary

domains of the Foundation, in Committees of Visitors (COV) activities, in external advisory (Federal Advisory Committee Act) committees, and in disciplinary workshops that shape new activities is also vital to this integration.

Outreach to EPSCoR jurisdictions by NSF staff promotes integration of the EPSCoR community into mainstream NSF programs, as does co-funding of awards with the disciplinary programs of the Foundation. There is also an effort to promote in-reach, whereby EPSCoR facilitates opportunities for researchers and educators from EPSCoR jurisdictions to meet with NSF staff at the Foundation's headquarters. In these meetings, the EPSCoR participants are provided with information on NSF strategic priorities and funding opportunities.

In FY 2018, EPSCoR staff promoted engagement of the EPSCoR community in NSF and other national activities. Examples are:

- Hosted its annual principal investigator meeting, a two-day event with opportunities for the EPSCoR community and NSF program officers to interact and share best practices in strategic planning, diversity, communication, evaluation, and other areas of importance to EPSCoR jurisdictions and NSF.
- Hosted a half-day session with the EPSCoR Interagency Coordinating Committee at the 7<sup>th</sup> Biennial National IDeA Symposium of Biomedical Research Excellence in Washington, D.C. This event helped to capitalize on federal agency investments in EPSCoR and EPSCoR-like programs and provided opportunities for interactions and possible new collaborations between grantees.
- Encouraged EPSCoR-supported faculty to participate in NSF committee and review panels across NSF (e.g., COVs, site visits, and merit review panels).
- Continued the RII Track-2: Focused EPSCoR Collaborations (RII Track-2 FEC) solicitation. RII Track-2 FEC builds interjurisdictional collaborative teams of EPSCoR investigators in scientific focus areas consistent with NSF priorities. In addition, these awards have a particular focus on the development of early career/junior faculty. In FY 2018, proposals were invited on the topic of understanding the relationship between genome and phenome, aligned with the NSF Big Idea of Understanding the Rules of Life, and nine awards were made.
- Continued the RII Track-4, EPSCoR Research Fellows solicitation, which provides opportunities for early career researchers to further develop their individual research potential through extended collaborative visits to the Nation's premier private, governmental, or academic research centers. Proposals in all areas of science and engineering supported by NSF were invited and 40 awards were made.

#### **EPSCoR Reviewers (Sec. 103(d)(2)(D)).**

Demographics of all reviewers who evaluated EPSCoR proposals or the program in FY 2018 are as follows: of the 138 reviewers, 25 percent were underrepresented minorities, 38 percent were female, 11 percent were from EPSCoR jurisdictions, 65 percent were new reviewers for EPSCoR, and eight percent were new reviewers from EPSCoR jurisdictions.

#### **EPSCoR Collaborations and Partnerships (Sec. 103(d)(2)(E)).**

All RII awards involve collaborations among scientists and engineers in EPSCoR jurisdictions. Additionally, RII awards require institutional collaborations, which are defined as collaborations between researchers at a RII awardee or sub-awardee and those at institutions not receiving any RII funds.

In FY 2018, there were 772 institutional collaborations within EPSCoR jurisdictions; 633 institutional collaborations between EPSCoR jurisdictions and other EPSCoR and non-EPSCoR jurisdictions; and 209 collaborations between institutions in EPSCoR jurisdictions and in foreign countries. These collaborative

efforts highlight the vast network of institutional involvement among EPSCoR jurisdictions and their partners in RII projects.

Among the 143 awards co-funded by EPSCoR in FY 2018, 82 involved collaborative research between multiple institutions. Of those 82 collaborative awards, 56 were collaborations between investigators from institutions in EPSCoR and non-EPSCoR jurisdictions.

**An analysis of the gains in academic research quality and competitiveness, and in science and technology human resource development, achieved by the program over the last 5 fiscal years (Sec. 103(d)(3)).**

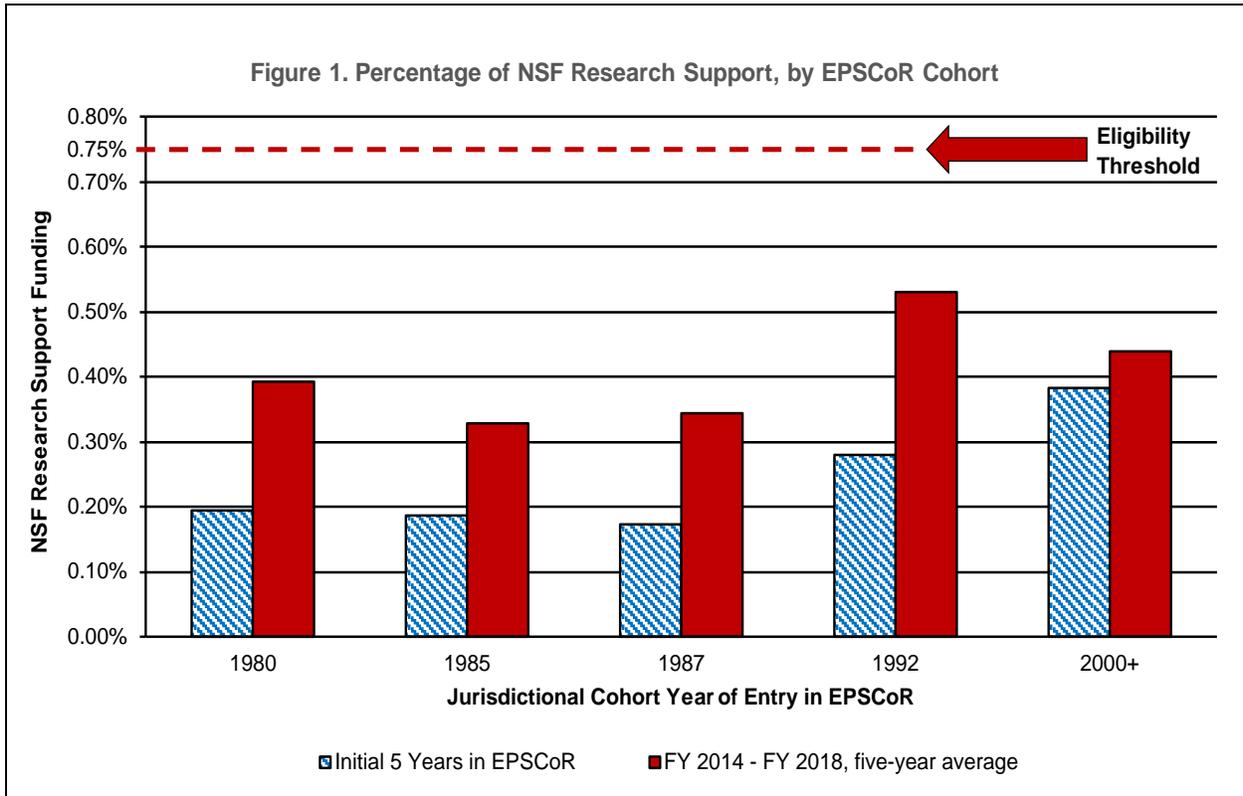
Eligibility to participate in NSF EPSCoR programmatic activities is based upon the jurisdictions' demonstrated ability to obtain NSF research funds. Currently, a jurisdiction is eligible to participate in EPSCoR programs if its level of NSF research support is equal to or less than 0.75 percent of the total NSF research and related activities budget over the most recent three-year period.

Given EPSCoR's aim to stimulate research that is fully competitive in NSF's disciplinary and multidisciplinary research programs, increases in the ability to capture NSF research funds serve as a proxy for gains in research competitiveness. As in FY 2017, Iowa, Missouri, Tennessee, and Utah exceeded the 0.75 percent threshold and these jurisdictions continued to be ineligible to compete in new FY 2018 RII competitions. In FY 2018, New Mexico also rose above the 0.75 percent eligibility threshold for the first time and became ineligible for RII competitions. New Mexico will continue to receive EPSCoR co-funding and outreach for an additional three years; Iowa, Missouri, Tennessee, and Utah have been ineligible for more than three years, so no longer receive any EPSCoR funding.

Figure 1 (below) shows the average amount of NSF research funds by cohort for the initial five years (hatched bars) and the most recent five years (solid bars) of their participation in the NSF EPSCoR Program. A cohort is defined as the group of states or jurisdictions that entered the EPSCoR program within a given fiscal year. For example, the 1980 cohort consists of the initial five states that qualified for EPSCoR: Arkansas, Maine, Montana, South Carolina, and West Virginia. For this summary, the 2000+ cohort consists of jurisdictions that entered EPSCoR in FY 2000 or later and are still EPSCoR-eligible for RII competitions: Alaska, Delaware, Guam, Hawaii, New Hampshire, Rhode Island, and the U.S. Virgin Islands. Former EPSCoR jurisdictions Iowa, Missouri, New Mexico, Tennessee, and Utah are excluded because they were no longer EPSCoR-eligible in FY 2018.

Each cohort shows an increase in competitiveness over the periods of participation. For example, the 1980 cohort shows a 101 percent increase in NSF research funding over the past 38 years of EPSCoR activity. The 1985 cohort (Alabama, Kentucky, Nevada, North Dakota, Oklahoma, Puerto Rico, Vermont, and Wyoming) demonstrates a 76 percent increase during its 33 years of participation in EPSCoR. The 1987 cohort (Idaho, Louisiana, Mississippi, and South Dakota) shows a 101 percent increase over the past 31 years, while the 1992 cohort (Kansas and Nebraska) has an 89 percent increase in competitiveness over its 26 years of EPSCoR involvement. Currently eligible jurisdictions participating in EPSCoR since FY 2000 entered into the program at a higher level of NSF research funding than the previous cohorts. For the 2000+ cohort, there has been a small, yet demonstrable 15 percent increase in research funding. The data for each jurisdiction is provided in the table immediately after the figure.

Figure 1. Percentage of NSF Research Support Funding by EPSCoR Cohort



**Percentage of NSF Research Support Funding,  
by Jurisdiction and EPSCoR Cohort**

	Initial 5 Years in EPSCoR	Most Recent 5 Year Period (FY 2014-2018)
<b>1980 Cohort</b>	<b>0.19%</b>	<b>0.39%</b>
Arkansas	0.10%	0.32%
Maine	0.27%	0.33%
Montana	0.13%	0.38%
South Carolina	0.41%	0.71%
West Virginia	0.07%	0.23%
<b>1985 Cohort</b>	<b>0.19%</b>	<b>0.33%</b>
Alabama	0.33%	0.53%
Kentucky	0.22%	0.46%
Nevada	0.14%	0.31%
North Dakota	0.06%	0.19%
Oklahoma	0.30%	0.51%
Puerto Rico	0.15%	0.17%
Vermont	0.10%	0.21%
Wyoming	0.20%	0.25%
<b>1987 Cohort</b>	<b>0.17%</b>	<b>0.35%</b>
Idaho	0.08%	0.31%
Louisiana	0.36%	0.57%
Mississippi	0.16%	0.28%
South Dakota	0.09%	0.22%
<b>1992 Cohort</b>	<b>0.28%</b>	<b>0.53%</b>
Kansas	0.34%	0.58%
Nebraska	0.22%	0.48%
<b>2000+ Cohort</b>	<b>0.38%</b>	<b>0.44%</b>
Alaska	0.55%	0.54%
Delaware	0.41%	0.54%
Guam	0.02%	0.02%
Hawaii	0.56%	0.56%
New Hampshire	0.44%	0.61%
Rhode Island	0.70%	0.73%
Virgin Islands	-	0.08%

The following table demonstrates the quantifiable outputs of NSF EPSCoR's RII Track-1 program over the last five fiscal years. This information elucidates the gains in academic research quality over time, as defined by publications, leveraged grants, and patents. For publications, primary support is defined as research that is directly funded by EPSCoR and partial support is defined as use of equipment or facilities funded by EPSCoR. The number and valuation of grants awarded encompass all federal, private industry, and private foundation awards across the U.S. in a given fiscal year for all EPSCoR jurisdictions.

**Aggregate of EPSCoR Outputs (n=27\*)**

	<b>FY 2014</b>	<b>FY 2015</b>	<b>FY 2016</b>	<b>FY 2017</b>	<b>FY 2018</b>	<b>Total</b>
Primary Support Publications	591	581	409	293	404	<b>2,278</b>
Partial Support Publications	1,001	1,026	927	692	640	<b>4,286</b>
Grants Awarded	601	563	675	455	505	<b>2,799</b>
Value of Grants Awarded (Dollars in Millions)	\$278.80	\$181.80	\$379.10	\$492.10	\$269.13	<b>\$1,600.93</b>
Patents Awarded	15	13	14	17	8	<b>67</b>
Patents pending	38	44	34	29	15	<b>160</b>

\*The maximum number of jurisdictions with active RII Track-1 awards in FY 2018. Outputs are not comparable from year-to-year due to the influx of new and expiring awards over the time period.

The table below indicates EPSCoR's ongoing support of human resource development over the last five fiscal years in the RII Track-1 program. The number of faculty and students involved in RII Track-1 projects has remained fairly constant over time, signifying a strong commitment by NSF and the jurisdictions in strengthening jurisdictional human capital in science and engineering research and education.

**EPSCoR Human Resource Development**

	<b>FY 2014</b>	<b>FY 2015</b>	<b>FY 2016</b>	<b>FY 2017</b>	<b>FY 2018</b>	<b>Total</b>
Faculty Supported	1,581	1,602	1,552	1,183	1,126	<b>N/A*</b>
Post-Docs Supported	215	231	200	156	179	<b>N/A*</b>
Graduate Students Supported	1,346	1,361	1,332	1,056	1,128	<b>N/A*</b>
Undergraduates Supported	1,867	1,965	1,861	1,220	1,187	<b>N/A*</b>
New Faculty Hired	73	89	84	54	27	<b>327</b>
Graduate Degrees Conferred	326	245	258	254	262	<b>1,345</b>
Undergraduate Degrees Conferred	380	408	404	634	357	<b>2,183</b>

\* The number of faculty and students supported are not summed because many of them remain tied to their respective projects for the duration of the award and would, therefore, be double-counted over time.

NSF EPSCoR is continuing to refine and implement a cohesive Research Competitiveness evaluation framework for the program. This evaluation, once completed in 2020, will address the legislative objective of increasing the research competitiveness of jurisdictions receiving EPSCoR funding by (1) developing a flexible framework to explore, define, and measure research competitiveness in relation to each unique jurisdictional context, and (2) using evidence of jurisdictional progress toward research competitiveness over time for strategic program improvement. The evaluation builds on the findings and recommendations from the EPSCoR retrospective evaluation completed by the Science and Technology Policy Institute (STPI) in 2012. This new, forward looking contract has been underway since 2017. Key activities to date include identification and merging of data sets, cleaning of data sets, preliminary descriptive and correlational analyses, and refinement of the logic model for the research competitiveness framework.