ND EPSCoR State Office
FY21 Annual Report

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Submitted to: Mark Hagerott, Chancellor/NDUS
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Executive Summary (ES)

The North Dakota Established Program to Stimulate Competitive Research (ND EPSCoR State Office [SO; see Appendix A for a full list of acronyms]) operations and programming activities are funded by state appropriated dollars (via the North Dakota University System [NDUS]). Reporting to the NDUS Chancellor, the SO develops, implements, funds, and manages several statewide programs and activities and administers several federal awards in support of its mission to broaden and diversify ND's STEM workforce pathways, support and grow statewide STEM research capacity and competitiveness, and inform and communicate science to ND stakeholders (see Section I for the structure of the SO, Section II for FY21 SO programs and activities, and Section III for FY21 SO budget and expenditure details). During FY21, the ND EPSCoR SO budgeted the $2,842,875 it received from the NDUS into 26 projects across three broad activity pools (Table ES-1):

1. **Programmatic -** funds research, education, outreach, broadening participation, communicating science to the public, and workforce development programs and activities (see Figure ES-1 and Sections II and III for additional details);
2. **Administrative Services** - costs associated with operating the SO, overseeing programmatic programs and activities, and administering competitive federal awards (see Section II for additional details; and
3. **Leveraged** - provides STEM capacity building investments at the two research universities (RUs – NDSU and UND [see Appendices B and C, respectively, for additional details]).

Table ES-1. FY21 ND EPSCoR State Office Budgets, Expenditures, Encumbrances, and Rollover (Remaining) Funds.

Activity Pool	Budget	%	Expenditures	Encumbrances	Rollover
Programmatic	$1,858,363	65.4%	$706,492	$664,937	$486,934
Administrative Services	$384,512	13.5%	$190,520	$7,938	$186,054
Leveraged	$600,000	21.1%	$531,154	$68,846	$0
TOTAL	**$2,842,875**	**100%**	**$1,428,166**	**$741,721**	**$672,988**

The FY21 programmatic budget (the SO's largest activity pool) contained six budget categories of STEM support. Those categories are identified to the right (Figure ES-1) and further detailed in Section II of this annual report.

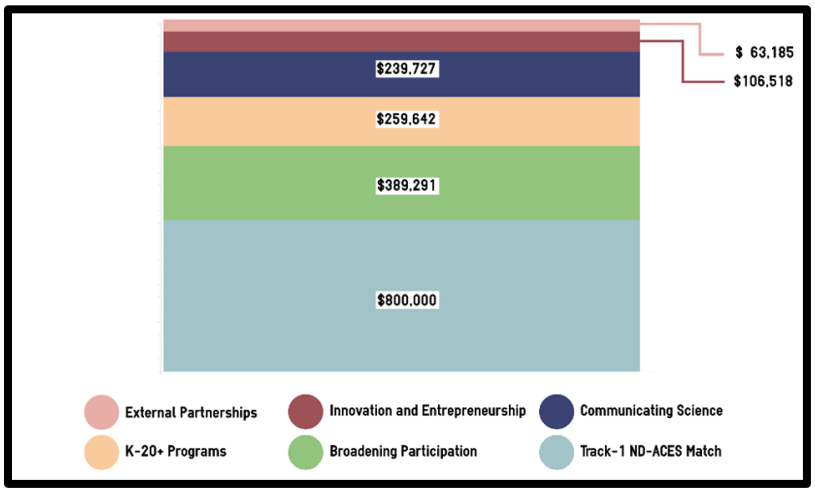


Figure ES-1. FY21 ND EPSCoR State Office budget allocated into the programmatic activity pool by major category.

At the end of each fiscal year (June 30), the SO combines the funds remaining (rollover) in its programmatic and administrative services pools into a competitive statewide request for proposals (RFPs) designed to build STEM research capacity, education

(both formal and informal), and outreach. Personnel at all 11 ND EPSCoR participating institutions (Figure ES-2) (two research universities - RUs [North Dakota St ate University and the University of North Dakota]; one master's college/university - MCU [Minot State University]; three primarily undergraduate institutions - PUIs [Dickinson State University, Mayville State University, and Valley City State University]; and five tribal colleges/universities - TCUs [Cankdeska Cikana Community College, Nueta Hidatsa Sahnish College, Sitting Bull College, Turtle Mountain Community College, and United Tribes Technical College]) are eligible to compete for these funds.

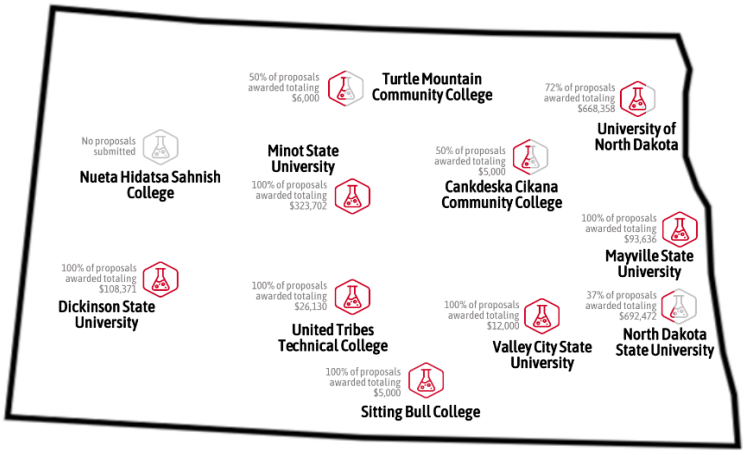


Figure ES-2. ND EPSCoR State Office funded STEM grants by location (FY20-21; fiscal years award were made). *The shading on each beaker represents the percentage of awards funded on each campus.

With the exception of two TCUs, where the same faculty member submitted multiple proposals in a single year, 100% of the proposals from the MCU, PUIs, and TCUs have been funded since this program began in 2020. This amounts to approximately 26.3% of the total available funding, with the remainder split almost equally between the RUs (Figure ES-2).

Section I: FY21 ND EPSCoR State Office (SO) Structure

The SO reports to the NDUS Chancellor and is located at, and administered by, NDSU via a memorandum of understanding (MOU) between the NDUS and NDSU. Thus, NDSU is also the prime campus for competitive external proposals written and awards administered by the SO.
ND EPSCoR's structure allows for partnerships and programming across ND's STEM research, education, outreach, and workforce ecosystem. The SO is a key partner in STEM research capacity building and other integrated activities (education, outreach, workforce development, broadening participation, and communicating science) at 11 participating institutions (two RUs, three PUIs, one MCU, and five TCUs). SO partnerships with statewide STEM stakeholders help to build a high-quality, higher education-based research effort that serves as the backbone of the state's scientific and technological enterprise, ensuring a strong and stable economic base for the future.
The SO develops, implements, funds, administers, and assesses programs focused on broadening and diversifying ND's STEM workforce pathways, supporting and growing statewide STEM research capacity and competitiveness, and communicating science to ND stakeholders. ND EPSCoR also administers several federal awards/cooperative agreements on behalf of the state. A summary of these activities is contained in Table I-1 and discussed in detail in Section II.

Table I-1. FY21 SO Programming, Administrative Services, and External Award Administration.

SO Program and Activity Categories	Budget Structure	FY21 Programs and Activities (further described in the narrative section)
SO Activity – Programmatic (* - SO dollars)		
*External Partnerships	Programmatic (see Figure ES-1 and Section III)	STEM programming partnerships with ND-based entities and organizations
*K-20+ STEM	Programmatic (see Figure ES-1 and Section III)	Activities to build the STEM workforce in ND, including: 1) K-12 programming, 2) K-12 Lesson Plan development, 3) K-12 STEM activity video series for STEM projects at home, 4) Undergraduate and graduate student research, training, programming, and professional development
*Innovation and Entrepreneurship	Programmatic (see Figure ES-1 and Section III)	Students in Technology Transfer And Research (STTAR) student internships with ND-based companies
*Broadening Participation	Programmatic (see Figure ES-1 and Section III)	Nurturing American Tribal Undergraduate Research and Education (NATURE) programming
*Communicating Science to the Public	Programmatic (see Figure ES-1 and Section III)	1) Website, 2) Social media, 3) Monthly newsletter, and 4) Communication workshops, and 5) ND EPSCoR Annual State Conference
*Support for EPSCoR-like Programs	Programmatic (Section III)	1) NSF EPSCoR Track-2 proposals, 2) NSF CAREER proposals, and 3) other EPSCoR-like programs
*Proposal Development Support	Programmatic (Section III)	Internal and external proposal reviews
*Participating Institution STEM Seed Funding	Programmatic/ Administrative (Section III)	Competitive STEM research capacity building, education, outreach, workforce development

		opportunities that are competitively available to all 11 participating campuses (Figure ES-2)
*RII Track-1 match	Programmatic (see Figure ES-1 and Section III)	The National Science Foundation (NSF) requires a 20% state match on each of its 5-year $20M Track-1 cooperative agreements
SO Activity - Administrative Services (* - SO dollars)		
*Financial, Administrative, and Logistical Services	Administrative (Section III)	1) Oversite of financial obligations covered by the State Office on behalf of all participating institutions, 2) financial oversight, 3) administrative support, trainings and guidance to all 11 ND EPSCoR participating campuses, 4) office and program logistics, and 5) campus outreach to ND EPSCoR participating campuses
*ND EPSCoR State Steering Committee	Administrative (Section III)	Logistical and administrative support
SO Activity – Leveraged (*- SO dollars; ** - NASA EPSCoR dollars from UND)		
*STEM Capacity Building at the RUs	Leveraged (Section III)	Investments at NDSU (Appendix B) and UND (Appendix C)
**NASA EPSCoR	Leveraged	NASA investments on the NDSU campus
SO Administration of Externally Funded Awards (* - external dollars)**		
***NSF EPSCoR Research Infrastructure Improvement (RII) Track-1 Cooperative Agreements (2)	NSF	1) New Discoveries in the Advanced Interface of Computation, Engineering and Science (ND-ACES, 2020-2025) and 2) Innovative and Strategic Program Initiatives for Research and Education-North Dakota (INSPIRE-ND, 2014-2021)
***NSF Collaborative Research Grant (2020-2022)	NSF	Cultivating Indigenous Research Communities for Leadership in Education and STEM (CIRCLES) Alliance is a collaboration between six EPSCoR jurisdictions
***NSF Collaborative Research Proposal	NSF	INCLUDES proposal submitted in January 2021

Each SO staff position (with the exception of the Executive Director [who is part-time]) is fully funded by the SO (Figure I-1). Staff members are responsible for building STEM capacity and implementing programs necessary to enhance the ND STEM research, education, and outreach ecosystem. The staff also provides many administrative services to all ND EPSCoR participating institutions. These services are particularly important for the PUIs, MCU, and TCUs, which often lack the complete infrastructure necessary to fully accommodate the financial, oversight, and regulatory components of managing projects. Finally, staff time is oftentimes bought-out via competitive external dollars and leveraged state funds (provided by ND EPSCoR SO to both UND and NDSU), allowing these staff to participate in STEM ecosystem endeavors beyond the SO programming. The salary savings from these buy-outs are used to fund additional SO programming and the annual statewide STEM RFPs.

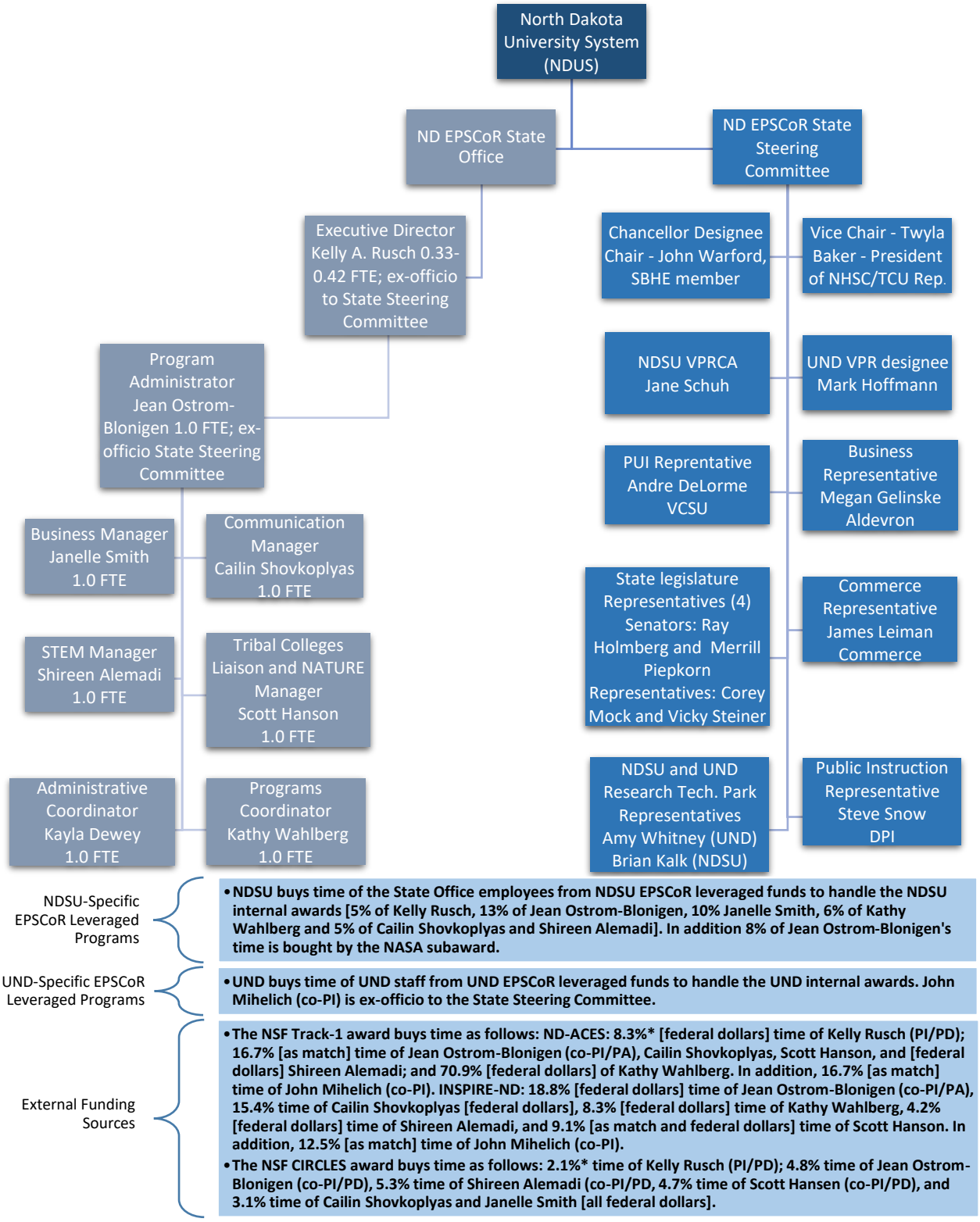


Figure I-1. Organizational structure of ND EPSCoR State Office and ND EPSCoR State Steering Committee. FTE percentages are based on a 12-month appointment.

Section II. ND EPSCoR SO Programs, Services, and External Award Administration

The ND EPSCoR State Office staff has worked to expand its STEM reach within ND since its creation in late 2017. This has been accomplished through increased SO funded programming and expansion of proposal submissions to federal funding agencies (Table II-1).

Table II-1. FY21 ND EPSCoR State Office funds and administered external awards.

Type of funding	Sponsoring Entity/Agency	Amount
State Appropriated Dollars	NDUS	$2,842,875
State Appropriated Dollars	UND via NDUS (ND NASA EPSCoR)	$85,500
Competitive External Award	NSF EPSCoR RII Track-1	$20M (10 institution cooperative agreement [OIA #1946202]: ND-ACES)
Competitive External Award	NSF EPSCoR RII Track-1	$20M (11 institution cooperative agreement [OIA #1355466]: INSPIRE-ND; end date 6/30/21)
Competitive External Award	NSF	$185,330 (collaborative research award [OIA #2038196[: CIRCLES Alliance – part of a $770,143 collaboration between six EPSCoR states)
Competitive External Proposal*	NSF INCLUDES	$10M INCLUDES proposal submitted by the CIRCLES Alliance. ND component is $2.08M*

**This proposal is pending, and NSF is expected to release the results of that proposal in July/August 2021.*

SO Activity - Programmatic

The FY21 SO programs and activities outlined in Section I (see Table I-1) are described in detail below.

External Partnerships. The SO continues to actively extend its reach throughout ND by pursuing partnerships with ND-based groups that are already participating in ND's STEM ecosystem.

Gateway to Science (GTS) STEMzone activities. The SO continued to provide support to this activity under a Master Agreement, first signed in FY20. GTS provides informal K-12 STEM activities to underrepresented and traditionally underserved populations throughout ND (Figure II-1). FY21 activities included in-person activities in every K-5 classroom at Solheim Elementary (Bismarck) and in-person activities in every K-8 classroom at Underwood

Figure II-1. A student participates in an in-person STEMzone chromatography activity.

Public School (Underwood). Due to COVID-19, many K-12 schools were unable to take advantage of most in-person STEM activities; however, GTS was able to convert many of its lessons to a virtual format and provide STEM kits to schools as requested.

K-20+ STEM programming. K-20+ STEM programming is a continuum of programs and activities across a student's K-12, undergraduate, and graduate academic career. These programs and activities are designed to stir student interest in STEM, build STEM efficacy and promote STEM persistence through college or career.

STEM Workforce Paper. The SO continues to keep its K-12 STEM needs survey open to ND teachers. To date there have been 82 responses. Survey responses are outlined in A *Partnerships to Build a STEM Workforce* paper[1], developed by the SO this year, to help build a diverse STEM workforce within ND. The paper provides up-to-date demographic information on all 11 ND EPSCoR participating institutions, the current STEM needs of K-12 teachers throughout ND, and background information about the SO's STEM education portal and external STEM partnerships.

K-12 programming. The SO has made progress in partnering with institutions and organizations across the state to support their K-12 programming. FY21 examples include funding to: 1) DSU for the Discovery Dome (Figure II-2) that travels across the state providing STEM engagement for K-12 students; 2) VCSU for the INSTEM Summer STEM Academy, designed to engage American Indian middle school students within ND to increase their awareness of and interest in STEM careers; and, 3) NDSU for Bats and Stats, a project led by a NDSU faculty member, which combines wildlife ecology research with 6th grade STEM learning objectives.

Figure II-2. FY21 Discovery Dome Feature Board at DSU.

Due to COVID-19 restrictions, the SO granted extensions on several of the FY20 awards to accommodate later engagement dates when classes were back in session. Some examples of projects that extended into FY21 include the Mayville State STEM Carnival that was converted to a virtual format and the UND middle school Unmanned Aircraft Systems (UAS) program, led by a faculty member under a partnership with Northrop Grumman.

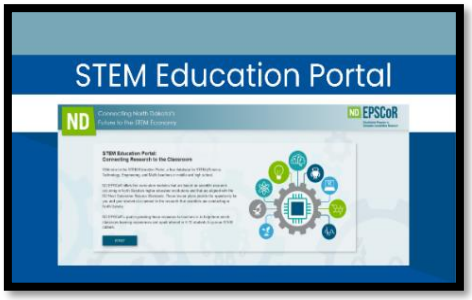


Figure II-3. Click on the thumbnail to view the ND EPSCoR STEM Education Portal.

K-12 STEM Lesson Plan Development. Started in FY20 to better support K-12 teachers, the SO has continued to contract with K-12 teachers to convert ND EPSCoR NATURE Sunday Academy STEM modules into official lesson plans, now available on the STEM Education Portal[2] (Figure II-3). The SO is also contracting with cultural leaders/experts to create indigenous knowledge supplements for each STEM lesson plan. Once developed, these STEM lesson plans are made

[1] *Partnerships to Build a STEM Workforce*: https://www.ndepscor.ndus.edu/serving-our-state/partnershipstobuildstemcapacity/
[2] ND EPSCoR State Office STEM Education Portal: https://www.ndepscor.ndus.edu/stem_education/stem_education_portal/

available on the SO's STEM Education Portal. To date there have been 33 unique lesson plan downloads from the STEM Education Portal. Based on information provided by teachers when they download a lesson plan, over 2,100 students have been impacted from the use of these lesson plans.

STEM at Home Activities Series. During FY21, the SO started bringing fun STEM projects to families at home via our YouTube channel (Figure II-4). Finding engaging STEM projects for elementary students that families can facilitate is not always easy. The STEM at Home Activities Series is a video-based series that makes it easy to find simple and fun projects for young children. These projects help to teach important critical thinking skills and potentially spark a lifetime interest in STEM. The first four activities are shown as thumbnails in Figure II-4. View the entire playlist on the ND EPSCoR YouTube Channel.

Figure II-4. The first four videos in the STEM at Home Activities Series. Click on each thumbnail to view the activity.

***Undergraduate and graduate student research, training, programming, and professional development*.** The SO continues to offer supplemental Responsible Conduct of Research (RCR) training to college students across ND. RCR training is required by most federal agencies and NDUS policy (410.0) for students participating in research. Based on training materials from the Council of Undergraduate Research (CUR) and U.S. Department of Health and Human Services Office of Research Integrity, these materials are available to students at all 11 ND EPSCoR participating institutions. Additionally, the SO offered financial support to undergraduate students to attend academic conferences in FY21; however, COVID-19 restrictions prevented student travel.

Innovation and Entrepreneurism. Support for student innovation and entrepreneurism is an important component of a student's STEM pathway.

Students in Technology Transfer and Research (STTAR) program. This program provides salary match to ND-based companies for student interns from institutions of higher education throughout the state. STTAR program support is not limited to the 11 ND EPSCoR participating institutions. The program has a 2:1 funding requirement (With a required minimum hourly rate of at least $15/hour, the SO matches at $5/hour, while the ND-based company provides the remainder).

In FY21, there were 23 STTAR interns at 12 different ND companies. Five of those companies were new to the STTAR Program (Ellingson Companies [Harwood], F4 Conservation [Manvel], Marvin [Fargo], Mayo Construction [Cavalier], and Mobile Recon Systems [Grand Forks]). The remaining seven companies have had interns in past years (Airtonomy [Grand Forks], ComDel Innovation [Wahpeton], Interstate Engineering, Inc. [Jamestown; Figure II-5], Nodak Electric [Grand Forks], Renuvix [Fargo], Rugby Manufacturing [Rugby]), and WCCO Belting [Wahpeton]).

Figure II-5. STTAR intern, Alexandra Speidel, North Dakota State College of Science, on site with Interstate Engineering.

Broadening Participation. Within the STEM ecosystem, broadening participation is a critical activity for the SO. The success of the country's STEM enterprise relies on full access and participation of persons from broad backgrounds and demographics.

NATURE. Nurturing American Tribal Undergraduate Research and Education (NATURE) is a long-standing SO signature program focused on engaging and encouraging American Indian students in STEM activities. The SO partners with the tribal colleges/universities (TCUs) in ND to provide pathways for American Indian students into the STEM ecosystem (education and career). American Indian students are significantly underrepresented and underserved within the STEM ecosystem throughout the country. NATURE, which began in 1998, was initially funded exclusively on federal grant dollars. The success of 20+ year program has led to the partial institutionalization of this program within the ND EPSCoR SO. The TCU faculty and the TCU Summer Camp continues to be funded via NSF EPSCoR Track-1 RII dollars.

NATURE currently consists of four components: 1) TCU Summer Camps, 2) Sunday Academy, 3) Bridge Camp, and 4) University Summer Camp. With the exception of the Sunday Academy, all of these component activities are held during the summer months; thereby straddling two fiscal years. Across the 2020 and 2021 reporting periods for the four components of this program, there were 1,226 participants (1,155 of whom were AI/AN [Table II-2]).

Figure II-6. A student participates in a TCU Summer Camp.

TCU Summer Camps are held mid-June to late-July at each of the participating TCUs. Planned by TCU faculty during the University Summer Camp, these camps expose and engage middle- and high-school tribal students to STEM (Figure II-6). The TMCC campus typically runs more than one summer camp. The funding for these camps comes from the NSF RII Track-1, while the overall management, planning, and oversight is provided

by the SO Tribal College Liaison and NATURE Manager (funded by the SO). Due to COVID-19, the FY20 planning was held virtually.

The Summer 2020 virtual camps (June 14 – July 24) had a total of 145 participants. The Summer 2021 virtual camps, (June 14 – July 23) had a total of 117 participants (Table II-2). One TCU did not to participate in the 2020 or the 2021 summer virtual camps due to limited bandwidth and other logistical issues.

Sunday Academy is a series of hands-on STEM activities held one Sunday each month (at the TCUs) during the academic year (September – March) for 7th-12th grade tribal students (Figure II-7 shows two siblings working together on an activity). During five of those months, NDSU and UND faculty travel to each of the TCUs on a scheduled monthly Sunday rotation to deliver STEM modules they created during the University Summer Camp. Each TCU hires an elder from their community to present a cultural component at the beginning of each Sunday session. The materials, mileage, lodging, and per diem expenses of NDSU and UND faculty are paid by the SO. The salaries of the TCU faculty and the student participant stipends and meals are paid by the NSF RII Track-1. A total of 455 in FY20 and 429 students in FY21 from 5 TCUs participated in these academies (Table II-2). During FY21, the need for social distancing due to COVID-19 required the SO to conduct Sunday Academy virtually. As a result, the supplies for the modules were packaged into boxes and delivered to each participant so that they could do the activities at home.

Figure II-7. Two Sunday Academy participants working together on the *Candy Engineering* activity.

Bridge Camp focuses on students who are between high school graduation and the start of their first university/college fall semester (Figure II-8). This camp includes a structure that mimics key skills for post-secondary education; however, each section of the camp is designed to be self-contained to provide important life skills (i.e., resume building).

Four of the seven participants, who matriculated into college in 2019, persisted to the 2020-21 academic year. Twenty students participated in the camp in 2020 (June 22 - July 31), and 15 matriculated into college. Three students participated in the 2021 program (June 22 - July 23; Table II-2). Due to COVID-19, this camp was moved to a virtual platform in both 2020 and 2021. Unfortunately, limited bandwidth and other logistical issues prevented three TCUs from participating in the 2021 summer camp.

Figure II-8. A Bridge Camp participant enjoys a virtual conversation with other participants.

Table II-2. ND EPSCoR NATURE Program Summary					
	TCU Summer Camps	Sunday Academy	Bridge Camp	University Summer Camps	Totals
	Summer 2020/2021	FY20/FY21	Summer 2020/2021	Summer 2020/2021	
# of NDSU faculty (# who are AI/AN)	N/A N/A	9/6 0/0	0/0 0/0	32/23 1/1	41/29 1/1
# of NDSU/UND graduate students (# who are AI/AN)	N/A N/A	3/3 3/0	0/0 0/0	0/3 0/0	3/6 3/0
# of NDSU/UND undergraduate students (# who are AI/AN)	N/A N/A	0/0 0/0	N/A N/A	0/0 0/0	0/0 0/0
# of TC faculty (# who are AI/AN)	14/6 12/6	6/5 4/3	3/1 1/1	1/2 1/2	24/14 18/12
# of TC graduate students (# who are AI/AN)	0/0 0/0	0/0 0/0	N/A N/A	N/A N/A	0/0 0/0
# of TC undergraduate students (# who are AI/AN)	6/0 4/0	3/0 2/0	N/A N/A	N/A N/A	9/0 6/0
# of support staff (# who are AI/AN)	22/6 19/6	3/4 3/4	6/4 4/4	5/0 3/0	36/14 29/14
# of participants (# who are AI/AN)	145/117 138/110	455*/429* 431*/397*	20/3 19/3	13/16 13/16	633*/565* 601*/526*
AI/AN = American Indian / Alaskan Native *Numbers include multiple engagements for single participants					

University Summer Camp consists of a two-week, residential program for American Indian college students. Typically held the first two weeks in June, this year's camp was again moved to a virtual platform due to COVID-19. The purpose of the camp is to expose and engage American Indian TCU students in STEM activities that generate interest in a STEM career beyond the TCU. Bachelors and graduate programs are promoted at NDSU and UND by engaging the students in a research project. Under the program, five students from each participating TCUs are selected and financially supported (by the NSF EPSCoR RII Track-1 via subawards to the TCUs) to attend the camp. Students visit both NDSU and UND to learn about STEM programs and research during the first week of the camp. Each student then selects a faculty researcher with whom they will work during the second week of the camp, performing research in a laboratory setting. The students present their work at the end of the camp.

The SO budget pays the NDSU and UND faculty and student mentor salaries, as well as the housing, meals, travel, and activity costs associated with the program. During those same two weeks, SO staff

and coordinating faculty work with the TCU faculty and K-12 instructors from the communities surrounding the TCUs to plan the TCU Summer Camps and Sunday Academy activities. The 2021 virtual University Summer camp, held June 7 - July 14, had 16 students participating from two TCUs (Table II-1). The 2020 virtual University Summer camp, held June 15 – July 10, had 13 students participating from two TCUs. Activities included an opening ceremony, virtual lab tours, meetings with RU faculty, and computer science/HPC (Figure II-9) and engineering discussions. One TCU did not to participate in this summer's virtual camp due to limited bandwidth and other logistical issues.

Figure II-9. Click on the thumbnail to view the "High Performance Computing Made Easy" session presented at the 2021 NATURE University Summer Camp.

STEM Capacity Paper. The SO Tribal College Liaison and NATURE Manager works to build mutually respectful partnerships between the NDUS institutions, and the TCUs located in ND. An example of those efforts is *A Partnership to Build STEM Capacity* paper[3], which was initially developed by the SO in 2016. This recently updated document is a guide to help build STEM research and education partnerships across the state between the two RUs (NDSU and UND); three PUIs (DSU, Mayville State, and VCSU); one MCU (Minot State); and five TCUs (CCCC, SBC, NHSC, TMCC, and UTTC). The paper provides up-to-date demographic information on all 11 ND EPSCoR participating institutions, along with current STEM capacity and needs. The document is also used by the SO to guide new program development and is a valuable tool for researchers interested in developing statewide partnerships.

<u>Communicating Science to the Public</u>. The SO Communication Manager is responsible for the many activities that communicate SO STEM programs and activities to the public.

Communicating Science via Media Outlets. The SO uses numerous outlets to reach ND citizens and stakeholders: 1) SO website that allows ND EPSCoR to build relationships with our stakeholder groups. The website brings stories to public audiences and informs the public about the work of the SO; 2) SO social media platforms (Figure II-10), including Facebook, Instagram, Twitter, and YouTube build an online presence that broadens the reach of the SO and creates deeper connections with our audiences; 3) Cohesive branding of the SO increases audience

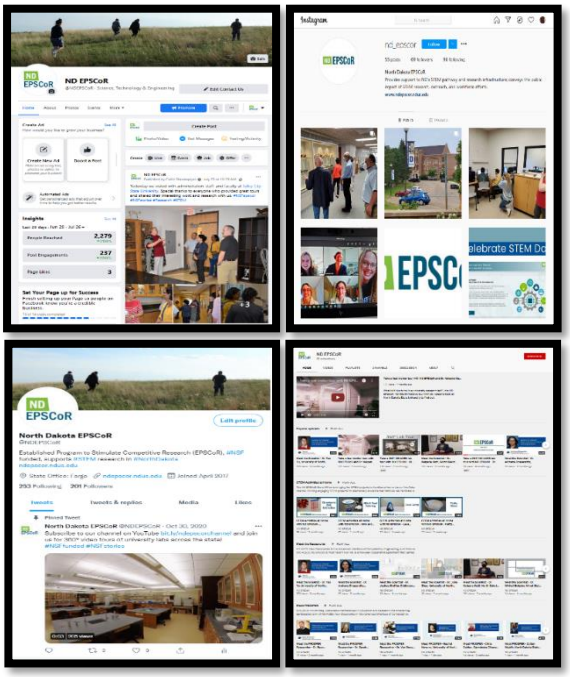


Figure II-10. Landing pages to ND EPSCoR's social media sites. Top left: Facebook. Top right: Instagram. Bottom left: Twitter. Bottom right: YouTube.

[3]*Partnership to Build STEM Research and Education Capacity*: https://www.ndepscor.ndus.edu/serving-our-state/partnershipstobuildstemcapacity/

recognition and furthers ambient awareness of the mission of the SO; 4) Monthly newsletters cover research, education, and outreach activities occurring across all 11 ND EPSCoR participating institutions[4]; 5) Face-to-face interviews with students and faculty on all campuses provides a way to share facts and ideas about our programs and activities by connecting with our audiences to video and written narrative content; 6) Distribution of the newsletter to a broad spectrum of stakeholders; 7) One-on-one mentoring sessions on communication/ presentation skills for faculty and students. The SO mentors faculty and students through the process of building a rapport with stakeholders that allows them to share their work/research in ways that are meaningful to general audience stakeholders; and, 8) Creation of the NSF impact statements allow the SO to demonstrate how our work makes a difference in the lives of people across the state of ND and throughout the nation.

Communicating Science Workshop. In March 2021, the SO hosted a two-hour Alan Alda Center Communicating Science[5] *Creating Connections* online workshop (Figure II-11). The Alda Method is a unique approach to science communication training that combines improvisational theatre-based techniques with message design strategies, including analogies and narrative. This immersive method emphasizes two-way communication that builds trust and invites others (especially lay stakeholders) to share in the science conversation. Twenty individuals, including NDUS faculty, campus communication personnel, and graduate students participated in the event. The SO has scheduled another *Creating Connections* workshop for September 28, 2021, which will be followed by an *Essential Understandings* workshop. The SO is currently working with its 11 ND EPSCoR participating institutions to promote this opportunity to students, faculty, communication personnel, and other stakeholders.

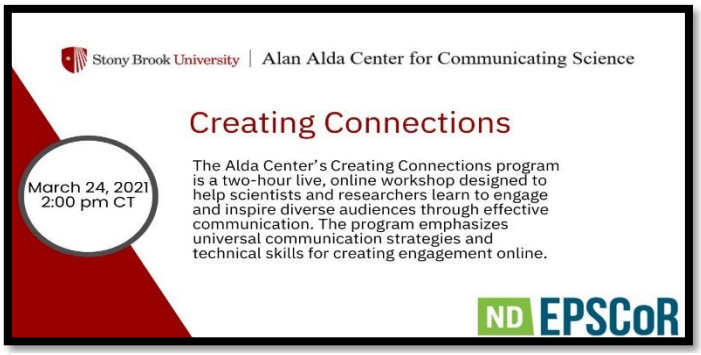


Figure II-11. Statewide solicitation at all participating institutions for the communicating science workshop.

ND EPSCoR Annual Conference. The SO coordinates and runs the Annual ND EPSCoR State Conference. This annual celebration/showcase of research performed across the entire state usually draws over students, faculty, and other stakeholders. The conference is an important venue to showcase the research efforts of faculty and students from the 11 ND EPSCoR participating institutions and provides a valuable opportunity for faculty and students of various campuses to dialogue in ways that may not normally occur due to distances between the institutions. The 2021 Annual ND EPSCoR State Conference, held virtually on April 14, 2021 (Figure II-12), was attended by 250 individuals and involved 120 poster sessions and 14 live sessions. A unique feature to the virtual delivery was that the posters could be viewed

Figure II-12. Click on the thumbnail to view the homepage of the 2021 ND EPSCoR Annual Conference hosted on Symposium by ForagerOne.

[4]Link to ND EPSCoR's monthly newsletter - https://www.ndepscor.ndus.edu/news/news-and-notes-newsletter/
[5] Alan Alda Center Communicating Science: https://www.aldacenter.org/

during the two weeks prior to the conference, giving stakeholders more time to review the research. The posters received 6,257 views, and 331 comments were left for the students and faculty during that timeframe. Registrants spent almost 270 hours engaging in the conference materials.

This year's conference featured an Indigenous Knowledge Panel, a recording of which is linked in Figure II-13. The SO has a particular interst in expanding mutually respctful partnerships with ND's tribal community to expand its learning and understanding of indigenous knowledge and ways/means by which collective efforts can connect western STEM with indigenous knowledge.

Figure II-13. Click on the thumbnail to view the STEM-based Indigenous Knowledge Panel recording, presented at the 2021 ND EPSCoR Annual Conference.

Support for EPSCoR-like programs. The SO provides support/collaboration to faculty proposals (i.e., NSF EPSCoR Track-2 proposals, NSF CAREER proposals, etc.) in the form of support letters, staff time, facilitating collaborations between institutions, and the inclusion of SO funded programs (e.g., NATURE) identified by faculty in the Broader Impacts component of his/her proposal, etc. This support is extremely valuable for faculty to provide them access to well-established and staffed outreach programs versus having to create a new program for each proposal (which is not sustainable). This approach also helps streamline the number of outreach activities to allow the focus to remain on the sustainability of key programs that have been successful.

Proposal Development Support. The SO supports proposal development at and with all 11 ND EPSCoR participating institutions. Included in this support is funding to send large, multi-disciplinary proposals out for eternal review before their submission to federal funding agencies. The SO provided financial support (for external review) to one proposal team in FY21.

Participating Institution STEM Seed Funding. This program, which began in FY20 (year awards were made) uses the SO rollover funding from the prior fiscal year to provide competitive STEM capacity and workforce development awards to faculty across all 11 ND EPSCoR participating institutions (see Figure ES-2 for cumulative totals since program began in FY20). Fifty-two projects across seven of the 11 ND EPSCoR participating institutions were funded in FY21. FY21 projects were funded in the following categories: 1) equipment (24 awards), 2) equipment repairs (2 awards), 3) undergraduate research (3 awards), 4) seed awards for faculty to collect preliminary data for the preparation of federal STEM proposals (18 awards), 5) external proposal review for large collaborative and interdisciplinary STEM efforts (0 awards), 6) seed awards for faculty and students to engage K-12 in STEM outreach activities (1 award), and 7) development of online/virtual modules for STEM courses (4 awards). The FY22 RFP, funded from FY21 rollover (Table III-1), will include two additional categories: 8) Seed awards for community-based STEM research and 9) electronic STEM data sets.

The funding has been critical for increasing STEM capacity and infrastructure throughout the state. For example, Dr. John Webster was able to purchase a Cube II Scanning Electron Microscopy (SEM) system with integrated EDAX Element (EDS) with the corresponding computer systems that run them. This will allow for advanced sample analyses by students and faculty currently not available at Minot State University (Figure II-14). Dr. Sattar Dorafshan (UND) was able to procure and assemble a hyperspectral imagery system (Figure II-15), which allow him and his colleagues to perform non-contract structural condition assessment for concrete infrastructure. Finally, Dr. Gurjot Dhaliwal was able to procure a heat flow meter for use in teaching and research at UTTC (Figure II-16).

Figure II-14. Dr. Webster (MiSU) was able to purchase a Cube II SEM with EDAX Element EDS and computer systems. Click on the thumbnail to view the associated equipment video.

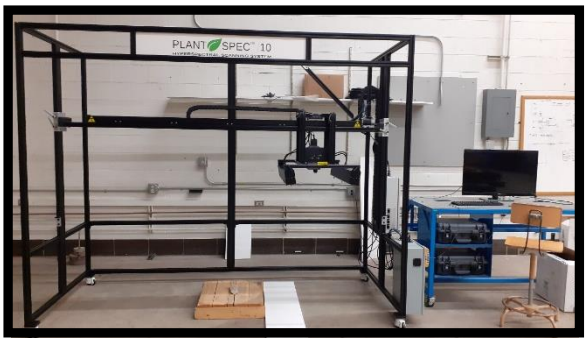


Figure II-15. Dr. Dorafshan (UND) was able to purchase a hyperspectral imagery system using a ND EPSCoR equipment award.

Figure II-16. Dr. Dhaliwal (UTTC) was able to purchase a heat flow meter that will be used for teaching and research.

RII Track-1 Match. In FY21, required state match support for the NSF RII Track-1 cooperative agreement (ND-ACES) of 20% ($800K per year) was provided by the SO. This NSF-required match, totaling $4M, has been pledged to this cooperative agreement through the five-year duration of this cooperative agreement (2020-2025). The FY21 required state match support for the INSPIRE-ND cooperative agreement came from prior year's funds; as due to COVID-19, this cooperative agreement was granted a second no cost extension and finished its seventh year (2014-2021) on June 30.

SO Activity - Administrative Services

Financial, Administrative, and Logistical Services. The SO Business Manager provides financial and compliance oversight of all SO dollars. The Administrative Coordinator handles all office logistics as well as the logistics for most of the programs funded by the SO (i.e., Annual Conference, data gathering in ERcore, NATURE planning and events, etc.). The SO also provides administrative support, trainings, and guidance to all 11 ND EPSCoR participating campuses, including topics of grant finances, technical training, compliance, etc. In addition, the SO does campus visits and outreach to the ND EPSCoR participating campuses.

Since 2017 (the start of the ND EPSCoR State Office), 528 projects (including 90 subawards to other institutions) associated with these three federal awards have been funded (154 federally funded

projects and 374 projects funded from state dollars used as cost-share to the federal awards). The Business Manager's oversight ensures funds are spent within federal and state regulations. The Business Manager also provides guidance to accountants at the other participating institutions.

Additionally, each EPSCoR jurisdiction has several financial and data collection obligations. This includes the annual EPSCoR coalition dues, ERcore (EPSCoR Reporting database) membership fees, ERcore server hosting fees, mandatory travel to NSF and coalition meetings, travel to participating institutions, etc. The costs of these items are covered by the SO on behalf of all participating institutions. The SO also provides training to researchers on grant finances, technical training on ERcore (Track-1 awards) and transcription file setup (CIRCLES), etc.

ND EPSCoR State Steering Committee Logistics. The SO provides logistical support for four ND EPSCoR State Steering Committee meetings each year. Additionally, the SO administrative coordinator serves as the secretary for the committee. During FY21, State Board of Higher Education (SBHE) member Casey Ryan, M.D., chaired this committee and Nueta Hidatsa Sahnish College President Twyla Baker, Ph.D., served as committee vice-chair. Per its bylaws, the committee: 1) leads the effort to develop and compile a state Science and Technology Plan that describes and summarizes the research and education strengths of the jurisdiction and provides a set of means and methods to bring the outcomes of NSF EPSCoR Track-1 projects (and other EPSCoR and EPSCoR-like projects) to a commercially viable end; 2) identifies research and development areas, strategies and actions within the higher education system consistent with the state's Science and Technology Plan; 3) assesses and summarizes the strengths, barriers, and opportunities for continuing to build the capacity of the NDUS and the ND Association of Tribal Colleges (NDATC) institutions, identifying long-term strategies for the growth of research and infrastructure capacity that will lead to prosperity and diversification of the state and its competitiveness, and identify key funding and leveraging sources to support research and education proposals from within the state; 4) evaluates the potential of ongoing efforts as well as establishes the potential new research directions and their alignment with the STEM research priorities identified in the state's Science and Technology Plan; and, 5) functions as a liaison to state stakeholders in communicating the value proposition of research and economic development from the university systems.

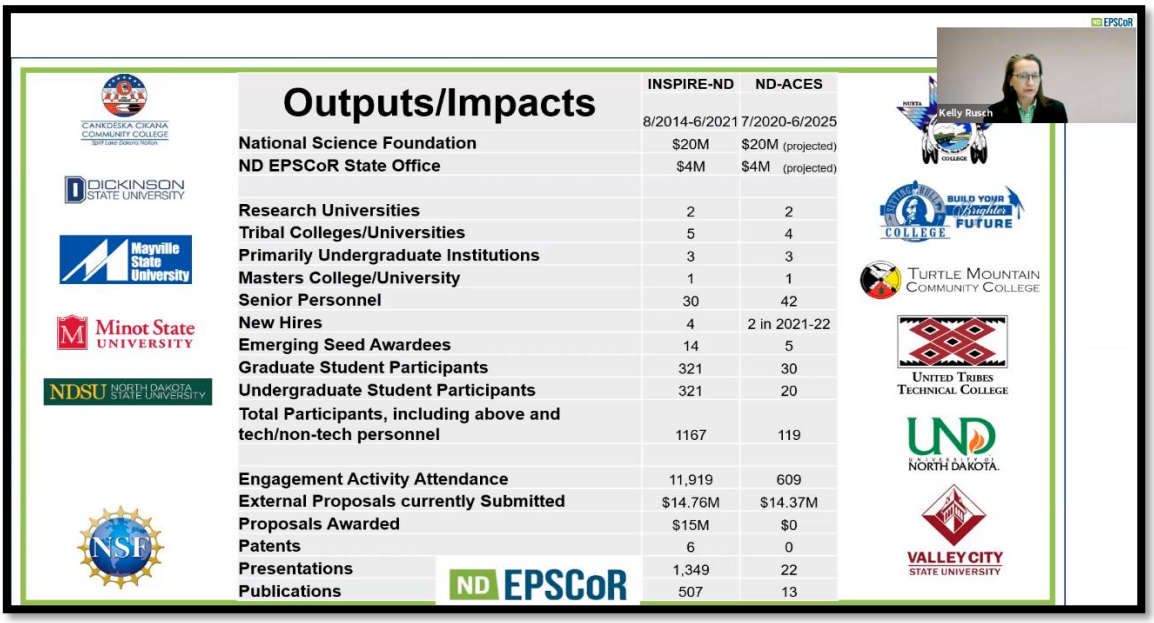
SO Activity - Leveraged

STEM Capacity Building at the Research Universities. The ND EPSCoR SO provides NDSU and UND an award each year that allows these research universities to invest in strategic/priority STEM areas that build capacity and competitiveness (individual annual reports are provided in Appendix B – NDSU and Appendix C – UND).

NASA EPSCoR. During FY21, the NDUS provided $171,000 to UND for ND National Aeronautics and Space Administration (NASA) EPSCoR activities. The SO administers the NDSU NASA EPSCoR activities and received one-half of appropriated dollars ($85,500) via a subaward from UND. These funds are used to provide match funding to NDSU faculty on NASA EPSCoR Cooperative Agreement Notice (CAN, including Rapid Response Research [R3]) and Research Infrastructure Development (RID) awards, which are administered by ND NASA EPSCoR at UND. In the event that these dollars are not used to match NASA EPSCoR CAN or RID awards during a fiscal year, they are made available through supplemental project RFPs to NDSU faculty that provide seed funding for contributing and promoting the development of research infrastructure in support of NASA's mission, improving the state's NASA-related capabilities, developing partnerships with NASA, and contributing to the NASA-related education or economic development of the state.

SO Administration of Externally Funded Awards
During FY21, SO staff were involved in the administration and management of three external competitive awards (federal). The Executive Director and Project Administrator are responsible for the oversight of these awards. The Business Manager is responsible for the financial/compliance monitoring the overall NDSU award (parent award) and all of the subawards to ND EPSCoR participating institutions.

NSF EPSCoR Research Infrastructure Improvement (RII) Track-1 Cooperative Agreements. During FY21, the SO administered two NSF EPSCoR RII Track-1 agreements (Figure II-17 shows Executive Director Kelly A. Rusch presenting statistics about these cooperative agreements at the 2021 ND EPSCoR Annual State Conference).



	INSPIRE-ND	ND-ACES
	8/2014-6/2021	7/2020-6/2025
National Science Foundation	$20M	$20M (projected)
ND EPSCoR State Office	$4M	$4M (projected)
Research Universities	2	2
Tribal Colleges/Universities	5	4
Primarily Undergraduate Institutions	3	3
Masters College/University	1	1
Senior Personnel	30	42
New Hires	4	2 in 2021-22
Emerging Seed Awardees	14	5
Graduate Student Participants	321	30
Undergraduate Student Participants	321	20
Total Participants, including above and tech/non-tech personnel	1167	119
Engagement Activity Attendance	11,919	609
External Proposals currently Submitted	$14.76M	$14.37M
Proposals Awarded	$15M	$0
Patents	6	0
Presentations	1,349	22
Publications	507	13

Figure II-17. ND EPSCoR Executive Director, Kelly A. Rusch, reports on the FY21 research and outreach outputs and impacts of the two NSF RII Track-1 cooperative agreements at the ND EPSCoR Annual State Conference in April 2021.

New Discoveries in the Advanced Interface of Computation, Engineering, and Science (ND-ACES, #1946202, 2020-2025). This $20M award focuses on expanding the state's research capacity by leveraging investments to generate new knowledge and increase North Dakota's competitiveness in biosciences by working collaboratively within the Center for Cellular Biointerfaces in Science and

Engineering (CCBSE)[6]. The CCBSE has three pillars of scientific inquiry: materials design at biointerfaces; cellular systems at materials interface; and computation, machine learning, and predictive modeling.

[6] Center for Cellular Biointerfaces in Science and Engineering (CCBSE) website: https://www.ndepscor.ndus.edu/ndepscorprograms/track_1_nd_aces_prime_institution_ndsu_2020_2025/center_for_cellular_biointerfaces_in_science_and_engineering/

The CCBSE is also linked to the ND-ACES outreach arm, PROmoting Sustainable Partnerships in Education and Research (PROSPER); especially in the development of STEM pathways for students (Figure II-18). This cooperative agreement will be active through June 30, 2025. In its Year 1 Annual Report filed with NSF on April 1, 2020, ND-ACES included 119 participants, 50 of whom were students. Twenty-two external engagements have been conducted involving 609 event attendees, of which 217 were underrepresented K-12 minority students. There were 13 publications and 22 faculty and student presentations. Collaborations within the state totaled 23 at four institutions. Other domestic collaborations totaled 21 at 15 institutions. Twelve external proposals totaling $14,368,361 had been submitted. Two new faculty will be hired during Year 2 of this award (one at UND and one at NDSU).

Figure II-18. Undergraduate students at Mayville State University work in Dr. Khwaja Hossain's lab on ND-ACES research.

Innovative and Strategic Program Initiatives for Research and Education-North Dakota (INSPIRE-ND, #1355466, 2014-2021) focuses on two research centers aligned with agriculture: Center for Regional Climate Studies (CRCS)[7] and Center for Sustainable Materials Science (CSMS)[8]. This $20M award was active through June 30, 2021. To date, the INSPIRE-ND award cumulatively includes 1,134 participants; 634 of whom were students (Figure II-19).

Figure II-19. Graduate students in the Department of Coatings and Polymeric Materials at North Dakota State University work on Center for Sustainable Materials Science research.

More than 400 external engagements have been conducted, reaching over 4,400 underrepresented minorities and 798 rural 4-12th graders. Four new NDSU faculty were hired on this award and have been retained. There are currently 537 publications, CRCS faculty and students made 297 presentations, CSMS students and faculty made 661 presentations, CSMS researchers were awarded three patents, and CRCS and CSMS successfully competed for an additional $21,940,027 in external funding. The SO will file the Final/Year 7 Annual Report with NSF in August 2021.

NSF Collaborative Research Grant. The Cultivating Indigenous Research Communities for Leadership in Education and STEM (CIRCLES [NSF #2038196, 2020-2022]) Alliance is a $770,143 collaboration between six EPSCoR jurisdictions (Idaho [$76,051], Montana [prime institution, $236,250], New Mexico

[7] Center for Regional Climate Studies (CRCS): https://und-crcs.org/
[8] Center for Sustainable Materials Science (CSMS): https://csms-ndsu.org/

[$87,152], North Dakota [$185,330], South Dakota [$87,850], and Wyoming [$97,510]) to address the underrepresentation of American Indian/Alaskan Native (AI/AN) students in the STEM disciplines and within the STEM workforce. The CIRCLES Alliance (Figure II-20) states are home to 19 tribal colleges/universities (TCUs) and span 49 tribes/nations. The shared vision for the Alliance is to increase the number of AI/AN students who enter and persist in STEM-related fields and to become a leader in advancing AI/AN preparation and success. This grant from NSF was recently extended through 2022.

Figure II-20. CIRCLES Alliance logo.

NSF Collaborative Research Proposal. The SO is has partnered with the CIRCLES Alliance on a collaborative NSF Inclusion across the Nation of Communities of Learners of Underrepresented Discoverers in Engineering and Science (INCLUDES [submitted on January 2021]). The total award is approx. $10M, and ND EPSCoR will receive $2.08M, if funded. The proposal focuses on the development of Indigenous STEM K-12 lesson plans. If funded, the SO, together with one faculty member from UND, will participate in a grant to develop formal STEM lessons and associated teacher professional development for grades 7-12. Under the INCLUDES proposal, the SO also serves as the backbone organization for the collaborative. Federal funds are included in the budget that would pay a portion of several staff members' time to participate in this award.

Section III: FY21 ND EPSCoR SO Budget and Expenditure Details

FY21 SO Budgets

During FY21, SO activities fell into one of three activity pools (see Table ES-1 and Table III-1): 1) Programmatic, 2) Administrative Services, and 3) Leveraged.

Programmatic (65.4%) - Within this budget pool, there are six program types (see Section II for a discussion of activities under these program types):

1. Education, Outreach, and Broadening Participation – includes salary for programmatic staff who develop and implement STEM outreach programs that broaden the diversity of the STEM pathway in ND: NATURE, STEM partnership paper implementation, K-12 partnership development, etc.
2. Competitiveness and Sustainability – includes efforts focused on building collaborations and partnerships and proposal preparation.
3. Communication – includes salary for the Communication Manager, travel to participating campuses, supplies, EPSCoR Annual State Conference (held virtually this year due to COVID-19), branding materials, website maintenance, fees for dissemination services, etc. Of note here is the significantly increased effort in communicating science to the public via increased targeted social media presence, which includes the development of a SO YouTube Channel.
4. Workforce Development – includes STTAR, graduate student research assistantships, undergraduate research funds, etc.
5. Track-1 Match – includes the annual $800,000 cash match to the NSF RII Track-1 cooperative agreement
6. Other EPSCoR Activities – includes onetime use of funds not captured in another category (i.e., conference registration fees, travel, and programmatic allocation for expenses not captured elsewhere).

The majority of the implemented FY21 programs are personnel intensive (i.e., communicating science to the public, K-12 outreach, coordination of workshops, and the annual state conference). Of the $918,055 SO salary budget, 65.1% was for programmatic personnel who develop, implement, and assess, and disseminate research, education, outreach, and diversity programs. Without these personnel, the SO would be unable to meet its mission of helping to build the state's STEM ecosystem.

The SO has continued to develop additional state-wide proposals programs and activities for statewide research, education, and outreach. The majority of these programs/activities are driven by: 1) the needs of the K-20 STEM community, 2) the desire to better communicate the impact of ND EPSCoR programming to ND stakeholders, 3) the SO goal to grow and diversify the ND STEM pathway and workforce, and 4) to desire to meet the IT infrastructure needs of the state (especially within tribal and rural communities).

Administrative Services (13.5%) - costs associated with operating the SO, providing oversight for programmatic programs and activities, and expenditures and for servicing competitive federal awards. The FY21 administrative budget included 34.9% of the total SO salary budget. The administrative/service pool was comprised of salaries (11.2% of total FY21 budget) and operating (2.3% of total FY21 budget). The administrative responsibilities included purchasing, billing, managing budgets, financial oversight, scheduling, etc., while the operational expenses included phone lines, copying, mailing, office furniture/computers, travel to EPSCoR meetings and participating institutions, EPSCoR coalition dues, ERcore (the data reporting and tracking tool for the NSF EPSCoR RII Track-1s) fees, ERcore server hosting fees, etc.

Table III-1. FY21 ND EPSCoR SO Project Budgets, Expenditures, Encumbrances, and Rollover.

Budgets	$	%	Expenditures	Encumbrances	Rollover
Programmatic					
Education, Outreach, and Broadening Participation	$512,897	18.00%	$217,485	$75,467	$219,945
Competitiveness and Sustainability	$169,323	6.00%	$81,459	$12,457	$75,407
Communication	$186,543	6.60%	$84,961	$3,425	$98,157
Workforce Development	$93,000	3.30%	$3,186	$54,438	$35,376
Track-1 Match	$800,000	28.10%	$282,392	$517,608	$0
Other Activities	$96,600	3.40%	$37,009	$1,542	$58,049
Total	**$1,858,363**	**65.40%**	**$706,492**	**$664,937**	**$486,934**
Administrative Services					
Other Activities	$384,512	13.5%	$190,520	$7,938	$186,054
Total	**$384,512**	**13.5%**	**$190,520**	**$7,938**	**$186,054**
Leveraged					
Other Activities	$600,000	21.1%	$531,154	$68,846	$0
Total	**$600,000**	**21.1%**	**$531,154**	**$68,846**	**$0**

All Activity Pools					
Education, Outreach, and Broadening Participation	$512,897	18.00%	217,485	75,467	$219,945
Competitiveness and Sustainability	$169,323	6.00%	$81,459	$12,457	$75,407
Communication	$186,543	6.60%	$84,961	$3,425	$98,157
Workforce Development	$93,000	3.30%	$3,186	$54,438	$35,376
Track-1 Match	$800,000	28.10%	$282,392	$517,608	$0
Other Activities	$1,081,112	38.00%	$758,683	$78,326	$244,103
Total	**$2,842,875**	**100%**	**$1,428,166**	**$741,721**	**$672,988**

Leveraged (21.1%) - provides STEM capacity building investments at the two research universities (RUs – NDSU and UND). The FY21 leveraged budget consisted of a subaward to UND and a transfer of funds to a NDSU leveraged project of $300,000 per campus. Reports on NDSU's and UND's FY21 use of Leveraged funds are contained in Appendices B and C, respectively. *NOTE: The SO activities (department 4450) and the NDSU EPSCoR-related activities (department 4200) have been intentionally separated for accounting, tracking, and reporting purposes.*

The total budget of $2,842,875 was disbursed through 26 projects: **ten** ND-ACES match projects (1 parent project, 7 projects at NDSU, 1 subaward at UND [with 3 sub-projects], 1 subaward at MaSU [with 1 sub-project]); **three** K-12 outreach (1 SO project and 2 subawards [both to Gateway to Science]); **five** Nurturing American Tribal Undergraduate Research and Education (NATURE) University Summer Camp projects (1 parent project, 2 projects at NDSU, and 2 UND subawards [one project each]); **one** undergraduate students, innovation, and professional development (1 holding project); **one** STTAR project; **one** faculty and graduate student professional development project; **one** annual conference project; **one** leveraged parent project (from which NDSU established 29 sub-projects [Appendix B]); **one** leveraged subaward to UND (from which UND established 2 sub-projects [Appendix C]); **one** SO administrative parent project; and **one** SO administration project.

FY21 SO Expenditures and Encumbrances

By fiscal year-end (June 30, 2021), $1,428,166 were expended (in charges cleared as of the July 21, 2021 reports; Table III-1). Based on the initial budget, 38.0% of the programming funds, 49.5% of the administrative/service funds, and 88.5% of leveraged funds, and were expended as of June 30, 2021. Nine of the 26 budget projects remain active/encumbered ($741,721) and have been extended through FY22. Seventeen projects have been or will be closed.

The majority of the encumbered funds are within the programmatic pool ($664,936; 89.6%), with $517,608 of these funds related to ND-ACES state match. The funds in the Workforce Development category will be used to pay the STTAR students during the remainder of this summer. There are currently 23 students working within 12 North Dakota companies. Most of funds encumbered within the Education, Outreach, and Diversity will be used to cover Summer 2021 expenses related to NATURE

University Summer Camp and Sunday Academy planning activities, as well as conversion of Sunday Academy modules into lesson plans for K-12 educators.

Rollover

As of July 20, 2021, rollover funds totaled $672,988 (72.4% originated from programmatic funds). Rollover is a combination of salary savings ($378,012), unexpended funds from projects that were completed but had funds remaining ($202,223), and unused operating funds (both programmatic and administrative/service – $92,753). Salary savings were generated through two means: 1) vacant staff lines and 2) charging ND EPSCOR staff time to other projects (i.e., NSF RII Track-1s) while they performed work on those projects. As the SO staff continues to gear up to write additional proposals, there is the potential for increased salary savings if new externally competitive awards are funded.
The rollover budget will be used to invest in ND EPSCoR participating institutions in FY22. An RFP released to all ND EPSCoR participating institutions on July 27th requests proposals in the areas of: 1) equipment, 2) equipment repair, 3) undergraduate research, 4) preliminary data seed awards, 5) external proposal review, 6) seed awards for K-12 outreach 7) development of online/virtual modules for STEM laboratory courses, 8) community-based STEM research, and 9) moving researcher data sets to electronic format. A total of $600,000 of the $672,988 in rollover funding will be allocated to allow individual institutions/faculty to expand capacity and infrastructure in the above listed STEM areas**.** The remaining funds will be held in reserve to cover potential project overruns and address special requests in critical areas that build collaboration between institutions within the state.

Summary

The initial proposed budget reflected the projected strategic needs of the SO at the time the budget request was submitted to NDUS; however, events (particularly COVID-19), requests, and opportunities over the course of the year created some deviation from the original budget categories. In each of these cases, the SO worked with NDSU's Grant and Contract Accounting personnel to re-budget funds from one project to another. Future budgets will continue to be refined to ensure funds are being used where they are most needed to support the ND STEM ecosystem. Additionally, as new SO programs are developed and implemented, the programmatic budget will increase as they come online and the administrative/service budget will decrease.

APPENDIX A: List of Acronyms

Acronym	Meaning
AI/AN	American Indian/Alaska Native
CCCC	Cankdeska Cikana Community College, Fort Totten
CIRCLES	Cultivating Indigenous Research Communities for Leadership in Education and STEM
CRCS	Center for Regional Climate Studies
CSMS	Center of Sustainable Material Science
DPI	Department of Public Instruction
DSU	Dickinson State University, Dickinson
EPSCoR	Established Program to Stimulate Competitive Research
ERcore	EPSCoR Reporting Core (Track-1) Database
FY	Fiscal Year
GTS	Gateway to Science, Bismarck
INCLUDES	Inclusion across the Nation of Communities of Learners of Underrepresented Discoverers in Engineering and Science
INSPIRE-ND	Innovative and Strategic Program Initiatives for Research and Education-North Dakota
MaSU	Mayville State University, Mayville
MCU	Master's College/University. There is 1 participating MCU: MiSU
MiSU	Minot State University, Minot
MOU	Memorandum of Understanding
ND-ACES	New Discoveries in the Advanced Interface of Computation, Engineering, and Science
ND EPSCoR	North Dakota Established Program to Stimulate Competitive Research
NDSU	North Dakota State University, Fargo
NDUS	North Dakota University System, Bismarck
NHSC	Nueta Hidatsa Sahnish College, New Town
NSF	National Science Foundation
PROSPER	PROmoting Sustainable Partnerships in Education and Research
PUI	Primarily Undergraduate Institution. There are 3 participating PUIs: DSU, MaSU, VCSU
RCR	Responsible Conduct of Research
RFP	Request for Proposal
RII	Research Infrastructure Improvement
RU	Research University. There are 2 participating RUs: NDSU and UND
SBC	Sitting Bull College, Fort Yates
SBHE	State Board of Higher Education
SEM	Scanning Electron Microscope
SO	State Office of ND EPSCoR
STEM	Science, Technology, Engineering, and Mathematics
STTAR	Students in Technology Transfer And Research
TCU	Tribal College/University. There are 5 participating TCUs: CCCC, NHSC, SBC, TMCC, and UTTC
TMCC	Turtle Mountain Community College, Belcourt
UAS	Unmanned Aircraft Systems
UND	University of North Dakota, Grand Forks
UTTC	United Tribes Technical College, Bismarck
VCSU	Valley City State University, Valley City
VPRCA	Vice President for Research and Creative Activity

APPENDIX B: FY21 NDSU Leveraged Funds Report

Budget

In FY21, the ND EPSCoR SO provided $300,000 in leveraged funds to invest in STEM capacity building activities on the NDSU campus (Table B-1). The initial budget was allocated to the two base pools: administrative (27%) and programming (73%). The administrative budget covered portions of SO staff salaries for time spent working on "purely" NDSU activities (including associated operating expenses). This is an intentional budgeting strategy to ensure proper allocation of time and resources to the appropriate fund/project.

Most of the funds in the campus programs category were distributed to NDSU researchers via an annual RFP process to support initial research (data collection needed for proposals submitted to federal agencies – Research and Seed Programs), equipment (Research Infrastructure), student travel (undergraduate and graduate – Workforce Development) to present research at national conferences, external proposal reviews (Competitiveness and Sustainability), and undergraduate research support (Workforce Development). Other funded projects Innovation Programs (Education, Outreach and Diversity). All disbursed program dollars help expand the STEM research and education ecosystem on the NDSU campus.

In addition to campus programs, NDSU funds are budgeted for administrative functions through a buy-out of staff time allocated to support ND EPSCoR objectives that are specific to NDSU. These activities include oversight of NDSU Leveraged funds and administrative/operational support of activities aligned with building research capacity on NDSU's campus. While the approved budget contained administrative funds at 27%, the administrative budget was slightly greater than needed due to COVID impacts on operating expenses. Thus, funds were re-budgeted to provide more funds to campus programs. As a result, the Campus Programs allocation increased from 73% to 77%. A total of 30 projects were funded under these combined categories.

Expenditures

Overall, 94% ($281,851) of the leveraged funds were spent during the year (Table B-1). While COVID-19 continued to impact spending, the ND EPSCoR staff worked with NDSU faculty to adjust project budgets and timelines to mitigate COVID impacts to the extent possible. Of the funds spent, 76% ($213,271) were associated with the 28 projects funded under the Campus Program. Expenditures on administrative salaries and operating expenses totaled 24% ($68,580), which was less than the budgeted amount of $81,660. Administrative time was charged in proportion to the work performed for NDSU STEM-related activities.

Encumbrances and FY22 Commitments

All remaining funds ($123,717) are either encumbered within existing projects (19) that have been extended through FY21 due to COVID-19 or are primarily committed to FY22 projects. The funds for FY22 commitments came from finished projects for which funds remained unexpended.

Table B-1. NDSU High level summary of budget, funds allocated to projects, expenditures, and encumbrances and FY22 commitments.					
Budgets	**$**	**%**	**Expenditures**	**Encumbrances**	**FY22 Commitments**
Programmatic					
Education, Outreach, and Broadening Participation	0	0%	$17,142	$265	$0
Competitiveness and Sustainability	$50,000	17%	$51,840	$0	$2
Research and Seed Programs	$168,340	56%	$120,840	$15,321	$1,055
Workforce Development	$0	0%	$23,449	$1,504	$2
Total	**$218,340**	**73%**	**$213,271**	**$17,090**	**$1,059**
Administrative					
Other Activities	$81,660	27%	$68,580	$0	$0
Total	**$81,660**	**27%**	**$68,580**	**$0**	**$0**
All Activity Pools					
Education, Outreach, and Broadening Participation	$0	0%	$17,142	$265	$0
Competitiveness and Sustainability	$50,000	17%	$51,840	$0	$2
Research and Seed Programs	$168,340	56%	$120,840	$15,321	1,055
Workforce Development	0	0%	$23,449	$1,504	$2
Other Activities	$81,660	27%	$68,580	$0	$0
Total	**$300,000**	**100%**	**$281,851**	**$17,090**	**$1,059**

APPENDIX C: FY21 UND Leveraged Funds Subaward Report

UND received a subaward from NDSU for leveraged funds in the amount of $300,000 to be expended on STEM capacity building activities during the time period of July 1, 2020 – June 30, 2021 (Table C-1). Funds were set up in the following projects: EPSCoR Administration and High-Performance Computing.

The EPSCoR Administration project provided salary and benefits to UND EPSCoR staff as well as operating funds. Salary and benefits were paid towards the following individuals: Trinity Bohlman, Director, Strategic Finance, Operations and Reporting; Cathy Lerud, Administrative Officer; and Justin Berg, Associate Professor, Sociology and Faculty Fellow. Operating funds were used for the office phone lines, office supplies, and duplicating charges. The EPSCoR-UND administration provides support to the UND faculty involved with the ND INSPIRE and work towards the ND ACES Track-1 awards. Support includes budget planning and monitoring, ERcore, NATURE Summer Camp, and other support as needed. Justin Berg manages internal seed funds primarily directed toward enhancing research related to UND's Grand Challenges and assisted with sustaining research activity through COVID restrictions. Funds remaining are due to a decrease in operating expenditures, COVID related restrictions and obstacles in obtaining post docs university wide. Rollover funds from FY20 were used as planned for salaries and benefits.

The High-Performance Computing funds provided salary and benefits for Aaron Bergstrom, High Performance Computing Specialist, to assist faculty and student opportunities with their research capabilities and by providing resources and training activities associated with scientific computing software development.

An estimated $50,697 in administration dollars will remain in the UND leveraged subaward. These remaining dollars will be used for administrative salary and benefits in FY22.

Table C-1. UND High level summary of budget, funds allocated to projects, expenditures, and encumbrances and FY22 commitments.

Budgets	$	%	Expenditures	Encumbrances	FY22 Commitments
Programmatic					
Competitiveness and Sustainability	$119,035	39.7%	$119,035	$0	$0
Total	**$119,035**	**39.7%**	**$119,035**	**$0**	**$0**
Administrative					
Other Activities	$180,965	60.3%	$130,268	$50,697	$0
Total	**$180,965**	**60.3%**	**$130,268**	**$50,697**	**$0**
All Activity Pools					
Competitiveness and Sustainability	$119,035	39.7%	$119,035	$0	$0
Other Activities	$180,965	60.3%	$130,268	$50,697	$0
Total	**$300,000**	**100%**	**$249,303**	**$50,697**	**$0**