ND EPSCoR
Established Program to Stimulate Competitive Research

July 31, 2019

Chancellor Mark R. Hagerott, Ph.D.
North Dakota University System
10th Floor, State Capitol
600 East Boulevard Ave, Dept. 215
Bismarck, ND 58505-0230

Dear Chancellor Hagerott,

Attached, please find the ND EPSCoR State Office FY19 Annual Report. This report provides an overview of the state office's budget and expenditures and includes separate reports from NDSU and UND on the use of their leveraged funds provided by the state office.

I am pleased to report that the majority of this funding (87.4%) was used to make investments in specific STEM programs at 11 participating EPSCoR institutions [six NDUS and five ND Association of Tribal Colleges] and develop and implement programs by the ND EPSCoR state office staff.

In a continued effort to ***serve the state***, the state office will release an RFP to all 11 EPSCoR participating institutions requesting proposals in the areas of: 1) equipment, 2) seed awards, 3) undergraduate research, and 4) student travel to present at national conferences. The funds for this effort will come from FY19 salary savings and unexpended program funds. A total of $650,000 has been allocated to allow individual institutions/faculty across the state to expand capacity and infrastructure in EPSCoR STEM areas. As a side note, the ND EPSCoR State Steering Committee was in favor of using rollover dollars in this manner (as discussed at the June 5, 2019 meeting).

Once you have had the opportunity to review the report, please let me know if you have any questions. I would also welcome the opportunity to meet with you to discuss the report, should you wish to do so.

Regards,

Kelly A. Rusch Digitally signed by Kelly A. Rusch
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Kelly A. Rusch, Ph.D., P.E., BCEE
Executive Director
ND EPSCoR State Office

ND EPSCoR STATE OFFICE

FY19 ANNUAL REPORT

Prepared by:

ND EPSCoR State Office

(for questions, please contact Dr. Kelly A. Rusch)

Prepared for:

North Dakota University System

July 31, 2019

ND EPSCoR State Office FY19 Budget Overview and Summary

Introduction

The ND EPSCoR state office was created in September 2017. The funding model associated with the State office is significantly different from the historical model used when NDSU and UND had redundant EPSCoR personnel on the two campuses (and the funds were split equally between them with no coordinated/strategic plan to use the funds to enhance the EPSCoR jurisdiction/state beyond those two campuses).

Under the reorganization, programs that were historically jointly funded from the NDSU and UND budgets [Students in Technology Transfer and Research (STTAR), Tribal Colleges Liaison, coalition dues, Nurturing American Tribal Undergraduate Research and Education (NATURE), match on the Track-1 federal award, etc.] have been fully moved into the state office budget for increased efficiency and to provide better oversight of those expenditures. When the two budgets existed, NDSU paid for the joint activities and then had to bill UND for reimbursement, creating additional administrative burden and inefficiencies. Additionally, because the Track-1 match funds were contained in both the NDSU and UND budgets, they were not available to be used at any of the other participating EPSCoR institutions in the state. These things have been remedied by having the NSF Track-1 match funds contained entirely within the State office budget.

The activities and programs of the ND EPSCoR State office are funded by state dollars appropriated to the ND university system and external competitive awards. Currently, the Office budget is comprised of the National Science Foundation (NSF) Track-1 award and the NDUS appropriation. Additionally, an NSF INCLUDES (Inclusion Across the Nation of Communities of Learners of Underrepresented Discoverers in Engineering and Science) proposal was submitted on April 2, 2019. If funded, this proposal (jointly submitted between NDSU – Civil and Environmental Engineering and ND EPSCoR/NDSU campus) would bring an additional ≈$2.2M into the state (over five years) under management in the State office. The NSF INCLUDES proposal was a joint effort of North Dakota, South Dakota, Montana, Wyoming, Idaho, and New Mexico. Under the proposal, ND EPSCoR would serve as the backbone organization for the effort and provide logistics and coordination support. The INCLUDES proposal focuses on the NATIVE STEM research and education and involves two UND faculty members.

Detailed background information on EPSCoR and ND EPSCoR is provided in *Appendix A*. The appendix contains a description of the various programs funded and supported by ND EPSCoR.

ND EPSCoR State Office FY19 Budget and Expenditure Overview

The ND EPSCoR state office uses the NDUS appropriation to:

1) fund programs (**programmatic**) in the STEM areas of research and seed funding; education, outreach, and diversity; communicating science to the public; workforce development; High Performance Computing/ Cyberinfrastructure (HPC/CI), other EPSCoR activities;
2) provide **leveraged** (subset of programmatic dollars) funds for EPSCoR-related investments at NDSU and UND; and,
3) cover **administrative** costs associated with operating the state office and providing oversight of the programs and expenditures.

The budget was allocated to these three pools. A summary of the budget, expenditures, encumbrances, and savings is presented in this section, while details are contained in *Appendix B*.

The FY19 allocation to the ND EPSCoR Office was $3,013,875 (Tables 1 and 2 and Figure 1). Differences in percentages between tables and figures is due to rounding. This entire budget was disbursed through 13 projects:

- one state office general holding project for office administrative functions and programmatic expenses (there was also a pass-through project for travel refundable by other entities, which has no budget);
- six projects under the NSF Track-1 match category (includes one sub-award to UND [and UND established two projects] and one project to NDSU);
- two sub-awards to UND (leveraged from which UND established five sub-projects] and NATURE [from which UND established one NATURE sub-project]);
- one project under STTAR;
- two projects under the NATURE category; and,
- one project to NDSU (leveraged [from which NDSU established 24 sub-projects]).

Table 1. High-level summary of budget, funds allocated to projects, expenditures, encumbrances, and salary savings.

Budget – 07/01/18	Established Projects	Expenditures – 06/30/19	Encumbrances – 06/30/19	Rollover – 06/30/19
$3,013,875	$3,013,875	$1,289,547	$923,397	$800,932
Number of Projects Established (E)/Still Active (A)				
Parent Projects	13 (E)	10 (E)	11(A)	
Sub-Projects	32 (E)	27 (E)	9 (A)	
Total Projects	45	37	20	

Details of the NDSU and UND leveraged funds/projects are provided in *Appendices C and D*.

Table 2. Summary of FY19 budget allocated into administrative and programming funds. The programming pool is further categorized into programming and leveraged pools in the remainder of the report.

Category	Budget	Programmatic	Administrative
Salaries	$907,179	$640,413	$266,766
Operating Services	$279,000	$167,400	$111,600
Programming	$1,063,000	$1,063,000	
NDSU/UND Leveraged funds	$764,696	$764,696	
Total	**$3,013,875**	**$2,635,509**	**$378,366**
Percentage of total	**100.00%**	**87.4%**	**12.6%**

The overall budget includes two pools: 1) administrative and 2) programmatic (Table 2). The majority of this funding was used for investments in specific programs at participating EPSCoR institutions and development/ implementation of programs by the ND EPSCoR office staff. Overall, 87.4% of the budget was allocated to programmatic purposes. The administrative budget included funds to cover salaries and office supplies to operate and manage the state office. From a salary perspective, the Business Manager and Administrative Coordinator were primarily administrative, while the Tribal Colleges Liaison Manager, Project Administrator,

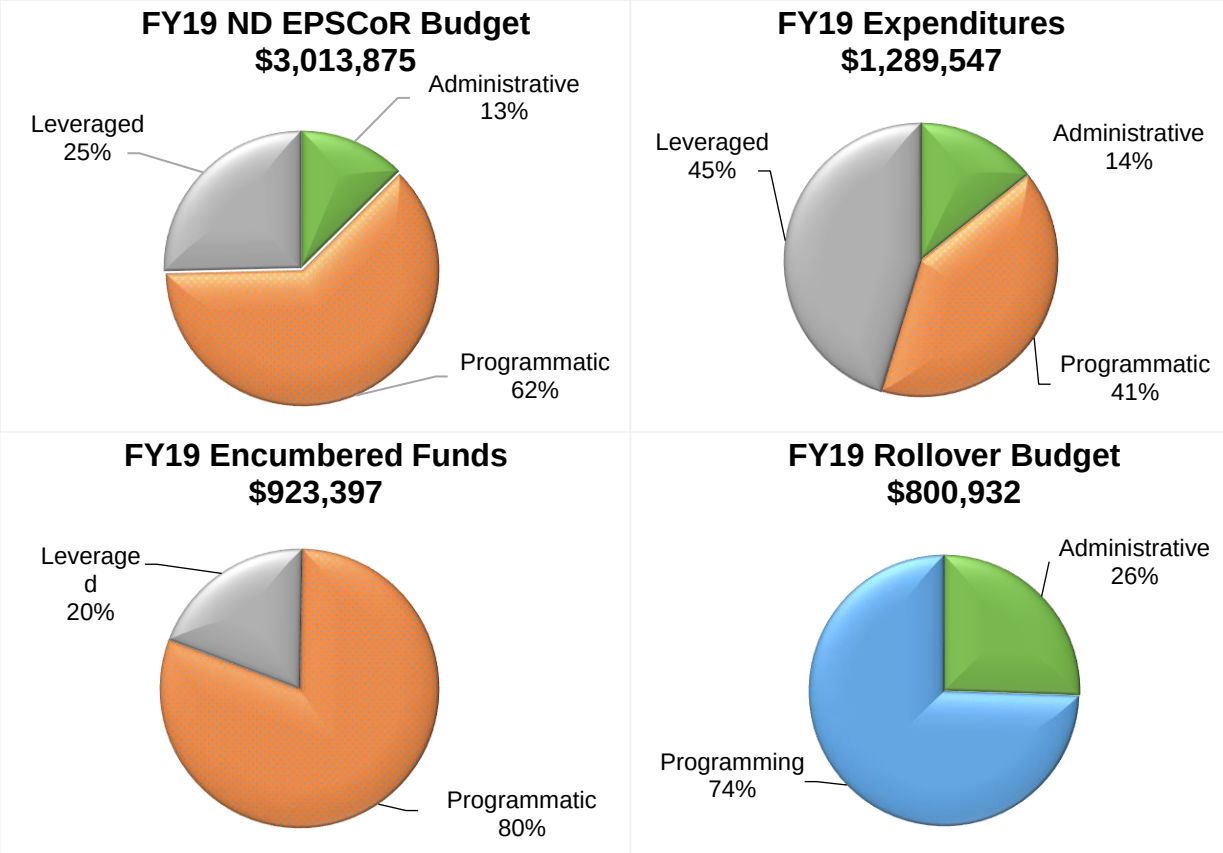


Figure 1*. The revenue and expenditure budgets were allocated to three pools: administrative, programming, and leveraged. Throughout the report, green is used for administrative, gray for leveraged, and orange/blue for programming. The orange refers to the NSF Track-1 match component of programmatic funds, while the blue refers to all other programmatic activities.*

Senior Administrative Assistant, Communications Manager, and STEM Manager were primarily programmatic. The Executive Director was approximately 50%:50% (administrative:programmatic).

The Programmatic pool was further delineated into leveraged funds (NDSU and UND) and overall programmatic funds (Figure 1). The leveraged funds included $171,000 in NASA EPSCoR match dollars split evenly between NDSU and UND. The remaining leveraged dollars were used for EPSCoR-related activities on each of these campuses. *The color scheme of green – administrative; gray – leveraged; and orange/blue – programmatic is used throughout the report for ease of reading and understanding. The orange/blue hatch pattern delineates the two main components of this category: NSF Track-1 match (orange) and other programmatic activities (i.e., NATURE, STTAR, etc.; blue). The percentages in some of the pie charts and tables vary slightly due to rounding.*

As fiscal year's end, $1,289,547 was expended and $923,397 remained encumbered in 10 active parent projects or committed (2 commitments made by NDSU with its leveraged dollars) towards FY20 activities (i.e., faculty start-up funds and support for the NDSU Core Biology Lab

that begin in FY20). The projects with encumbered funds have been extended through FY20 to allow investigators additional time to finish the activities for which the projects were established.

The rollover budget of $800,932 is a combination of salary savings, unexpended funds from projects that were completed but had funds remaining ($111,306), and unused operating funds (both administrative and programmatic - $231,605). Salary savings ($455,021) were generated through two means: 1) vacant staff lines and 2) charging ND EPSCOR salary to other projects (i.e., NSF Track-1) for a portion of his/her time spent working on other projects. Going forward, as positions are filled, the salary savings generated via open lines should be minimal. However, as the ND EPSCoR staff gears up to write additional proposals, there is the potential for increased salary savings if new awards are received.

The rollover budget will be used to invest in EPSCoR participating institutions in FY20. ***An RFP was released on August 1, 2019 to all EPSCoR participating institutions requesting proposals in the areas of: 1) equipment, 2) equipment repair, 3) seed awards, and 4) student and faculty travel to present at national conferences. A total of $650,000 of the $800,932 will be allocated to allow individual institutions/faculty to expand capacity and infrastructure in EPSCoR STEM areas.*** The RFP was discussed with and approved by the EPSCoR State Steering Committee at its June 5, 2019 meeting. The committee agreed that investments across the EPSCoR participating institutions were needed to build STEM capacity and competitiveness (research and education) within the entire state. The remaining $150,932 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. This will be the inaugural RFP-driven distribution of funds to continue to build STEM research and education capacity and competitiveness across the state. It is anticipated this process will implemented each year using prior fiscal year savings.

APPENDIX A

BACKGROUND INFORMATION ON EPSCoR and ND EPSCoR

Background Information

Origin of EPSCoR

The National Science Foundation (NSF) Act of 1950 recognized the value of a broad science and engineering ecosystem across all jurisdictions (states and other U.S. entities). However, over time, the distribution of research funds started to become concentrated in a few geographical areas. Subsequently, the National Science Board created a task force in 1977 to examine the geographical distribution of funds, in response to congressional concerns about geographic imbalance in funding. In FY79, the National Science Board approved a resolution that created the Experimental Program to Stimulate Competitive Research (EPSCoR) at NSF. The success of NSF EPSCoR led to the creation of EPSCoR-like programs at other federal agencies; EPA (1991 and discontinued in FY06), NASA (1992), DOE (1992), DOD (1991 and discontinued in FY10; reauthorized in FY18 and appropriated in FY19), USDA (2007), and NIH (IDeA; 1993).

In January 2017, Congress enacted legislation to change EPSCoR from Experimental Program to Stimulate Competitive Research to Established Program to Stimulate Competitive Research (AICP, P.L. 114-329).

The main NSF EPSCoR award is the Research Infrastructure Improvement (RII) Track-1 cooperative agreement currently funded at $20M over five years. The Track-1 program is a federal-state partnership, which requires a state financial commitment/ match in order to compete for the federal dollars.

The Track-1 is a jurisdictional award meant to build research capacity and competitiveness across the entire state. As such, NSF requires each state to create and sustain an active EPSCoR State Steering Committee[1] (with current by-laws), and an active jurisdictional Science and Technology Plan (S&T Plan)[2]. The State Steering Committee is expected to work closely with academia, industry, government, and other state leaders in identifying R&D improvement strategies that advance the development of nationally competitiveness capabilities in jurisdictional S&T priority areas.

North Dakota (ND) EPSCoR – ND was in the second cohort (1985; Figure A-1) that began participation in the NSF EPSCoR program (receiving its first award in 1986). Currently, eligibility is restricted to those jurisdictions whose research recipients receive 0.75% or less of total NSF research funds, averaged over the preceding three-year period. NSF's FY19 EPSCoR eligibility table shows that North Dakota is at 0.19% (Guam – 0.03%, Virgin Islands – 0.08%, Puerto Rico – 0.19%, South Dakota – 0.19%).[3] ND has fluctuated around this spot for its entire tenure as an EPSCoR jurisdiction. ND has been continually funded by NSF and continuously funded by North Dakota since 1986.

North Dakota's Academic Enterprise - From FY87 to FY17, ND increased its research acumen from $36M to $256M in research expenditures[4,5]. In fact, North Dakota researchers have been

[1] ND EPSCoR State Steering Committee - https://www.ndepscor.ndus.edu/fileadmin/ndus/ndepscor/StateSteering/StateSteeringComm_2019-01-31.pdf
[2] https://www.ndepscor.ndus.edu/fileadmin/ndus/ndepscor/documents/ND_S_T_Plan_Eff_July_1_2018.pdf
[3] NSF's FY19 EPSCoR eligibility table - https://www.nsf.gov/od/oia/programs/epscor/Eligibility_Tables/FY-2019-Eligibility.pdf
[4] National Science Foundation. Academic Science and Engineering: R&D Expenditures, Fiscal Year 1992, Detailed Statistical Tables, NSF 94-324. Arlington, VA, 1994. Retrieved June 12, 2018 from https://wayback.archive-it.org/5902/20150627202643/http%3A//www.nsf.gov/statistics/rdexpenditures/dst/.
[5] NSF. Higher education R&D expenditures, by state: FYs 2008–17. 2018. Retrieved June 6, 2019 from https://ncsesdata.nsf.gov/herd/2017/html/herd2017_dst_20.html.

very successful in leveraging the state's financial investment in EPSCoR (see Figure A-1). From 1985 to year-to-date data, for every $1.00 the state has contributed for EPSCoR support, faculty funded by EPSCoR have competed for $7.72 in external awards. This combined funding has been pivotal in growing the research infrastructure, capacity, and competitiveness at North Dakota State University (NDSU) and the University of North Dakota (UND).

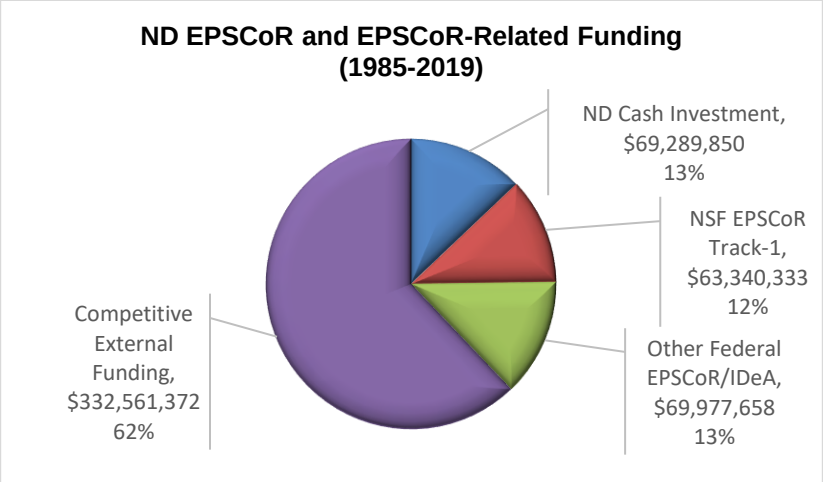


Figure A-1. For every **$1.00** that the State of North Dakota has contributed to EPSCoR, EPSCoR-funded researchers have obtained over **$7.72** dollars in other, external competitive funds.

Although ND's overall research expenditures at the research universities have grown by 22.5% over the past six years (FY11 to FY17), federal expenditures have decreased by 27.3%. ND's growth in NSF dollars during FY11 to FY17 has been sluggish compared to NSF's overall funding pool growth of 12.1%[6]. This reality points to the critical emphasis of building capacity and capabilities in R&D areas in ND that better align with federal priorities while at the same time addressing important growth areas for the state. This also points to the need to continue to invest in building capacity and competitiveness across the state's higher education campuses.

ND EPSCoR

In the early days of EPSCoR, the focus was on research infrastructure and capacity building at the two research universities (RUs) with a diversity outreach component to the five Tribal Colleges (TCs). However, this TC outreach component was not integrated with the research. During this time, NSF EPSCoR did not focus on integration of the research with education outreach, diversity, workforce development, partnerships and collaboration, or communicating science to the public. The focus was on broad infrastructure capacity building. Because of this, a two-location EPSCoR office model (with redundant functionality at NDSU and UND) worked, and each office took care of the activities on its respective campus.

Historically, the vast majority of the funds remained on the NDSU and UND campuses (both federal and state dollars). Over the past 7+ years, NSF has increased the requirements for connecting the research to education outreach, workforce development, diversity, collaborations and partnerships, sustainability, and communicating science to the public and for expanding research partnerships to primarily undergraduate institutions (PUIs), master's colleges and universities (MCUs), and minority serving institutions, such as the TCs.

NSF EPSCoR, like most federal programs, has evolved since its inception. Today, the expectation and requirement for funding of a Track-1 cooperative agreement is that a state/

[6] NSF. Award Summary: by State/Institution FY 2018. Budget Internet Information System from National Science Foundation. 2019. Retrieved June 6, 2019 from https://dellweb.bfa.nsf.gov/AwdLst2/default.asp.

jurisdiction provide a proposal and a plan whereby the research (intellectual merit) is fully integrated with the education outreach, diversity, workforce development, partnerships and collaborations, and communicating science to the public components/broader impacts (often referred to as “other programmatic elements”). All researchers are expected to participate in these integrated efforts. The impetus for this increased integration between research activities and the programmatic elements is to ensure that a fully trained and diversified workforce is also developed such that it positions the state for national competitiveness and broad and sustained economic growth beyond the funding provided by NSF.

Additionally, it is now NSF’s expectation that capacity be built throughout the jurisdiction, not just at the research universities. Thus, while it is accepted (and expected by NSF) that the majority of the research activities will continue to be executed on the campuses of the research universities, it is no longer enough. There is currently an expectation that research bridges be built to other institutions within the state. Subsequently, beginning with the 2014-2019 NSF EPSCoR RII Track-1 cooperative agreement, research partnerships (with research funding provided) have been formed at each of the five Tribal Colleges (Cankdeska Cikana Community College, Nueta Hidatsa Sahnish College, Sitting Bull College, Turtle Mountain Community College, and United Tribes Technical College), the three PUIs (Dickinson, Mayville, and Valley City State Universities), and the MCU (Minot State University). As a result, faculty from these institutions have been integrated into the two currently funded EPSCoR research centers (Center for Sustainable Material Science and Center for Regional Climate Studies).

This evolution in NSF EPSCoR has created an expansion of the activities within North Dakota. ND EPSCoR is now responsible for research capacity building and other integrated activities at both research universities, the three PUIs, the MCU, and the five TCs. There is the potential for expansion to the five technical/community colleges in the future, if resources and staffing are adequate to do so.

This increased level of complexity (and requirements by NSF), the expansion of the number of institutions within North Dakota that are involved in EPSCoR, and the increased importance of the “other programmatic elements” (diversity, education outreach, communication, workforce development, partnerships and collaborations) brought to light the fact that the ND EPSCoR structural model established in 1986 was outdated. Prior to 2017, the ND EPSCoR Office was split between the NDSU and UND campuses. The NDSU Office employed four staff: 1) Project Administrator (a position required by NSF), 2) program coordinator, 3) project assistant, and 4) tribal colleges liaison. Also, NDSU provided a project director (a position also required by NSF) and financial support. The UND Office employed three personnel: 1) Associate Project Director (part-time), 2) Administrative Officer/Program Assistant, and 3) Administrative Secretary. These historical positions were redundant and were not able to meet the functional needs of today’s EPSCoR environment and expectations. This structure prevented expansion of activities and partnerships beyond the research universities due to missing staff functionality

Under this historic model, NDSU and UND each received 50% of the total appropriated funding allocation (via NDUS) each year (and, with the exception of the long-standing NATURE program) made local decisions specific to NDSU and UND and not on behalf of the entire jurisdiction. Similar to the staffing imbalance, this financial model no longer addressed the needs of the current EPSCoR environment within the state or at the national level.

Finally, the competitiveness of obtaining NSF EPSCoR RII Track-1 funding (the $20M cooperative agreement) has dramatically increased. In the past 10 years, over 80% of the EPSCoR jurisdictions have had to resubmit proposals for funding. The successful jurisdictions have an EPSCoR office administrative structure that is more cohesive [centralized] and employs the appropriate personnel [functionality] to meet the growing requirements of the Track-1

cooperative agreement and provide complementary programs (above and beyond) that enhance the reach and impact of overall EPSCoR efforts within the jurisdiction.

Current ND EPSCoR structure – ND EPSCoR was reorganized into a State office in September 2017 to better meet the needs of the state's STEM research, education, and workforce ecosystem (through expanded programming) and address the growing programmatic and administrative requirements of federal funding (specifically NSF, but potentially from other federal agencies as the capacity and capabilities of the state office increase).

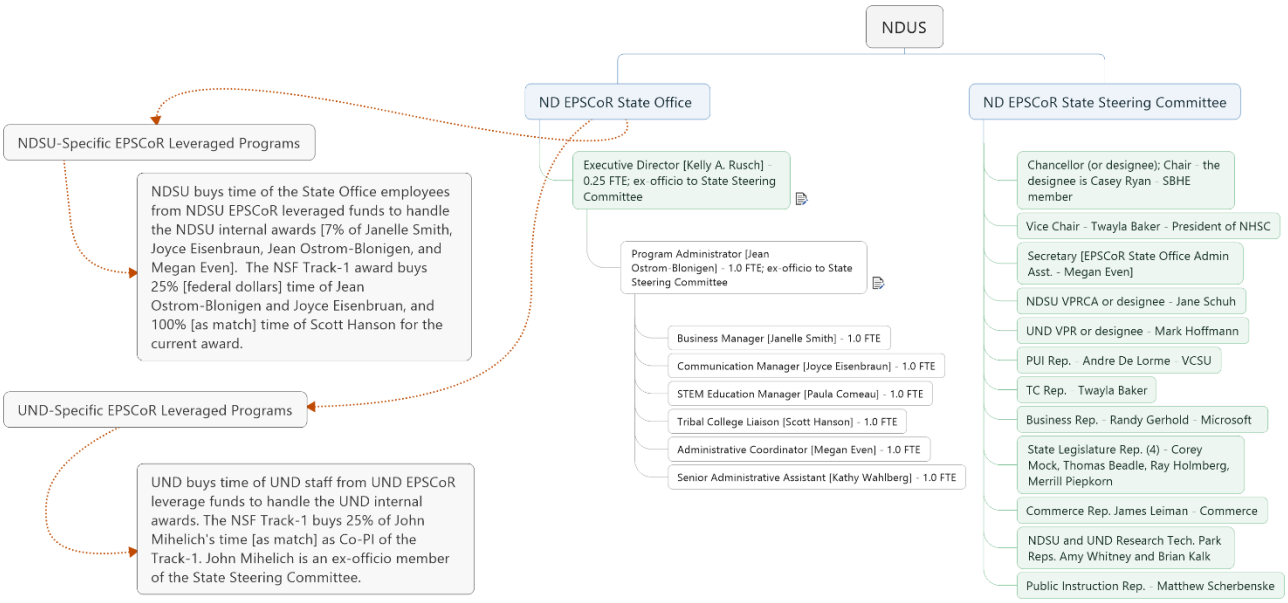


***Figure A-2**. Organizational structure of the ND EPSCoR State office and the North Dakota EPSCoR State Steering Committee.*

The ND EPSCoR State office reports to the NDUS Chancellor (Figure A-2). While there was no growth in the FTEs compared to the old model, this change in structure did involve a reduction in duplicative administrative positions and the creation of essential financial and programmatic positions (business manager, communication manager, and STEM manager) to ensure continued success, growth, and impact. ***All staff positions in the State office provide programming and services to all 11 EPSCoR participating institutions (the 2 RUs, 3 PUIs, 1 MCU, and 5 TCs).*** The staff positions are fully funded by the State office budget (the State office budget proper and/or through the leveraged funds provided to NDUS and UND; if federal dollars are available, a portion of staff time is purchased by the federal award for work performed on that specific grant).

The State office is located at NDSU and is administered via a Memorandum of Understanding between NDUS and NDSU. NDSU is also the prime campus for the NSF Track-1 cooperative agreement.

This re-alignment into a centralized office allows for:

- better oversight and execution of the NSF RII Track-1 cooperative agreement,
- a more coordinated effort for current/future program implementation throughout the state beyond the Track-1,

- a more united and coordinated face to the ND stakeholders,
- staff functionality that lends itself to seeking additional programmatic funding beyond the NSF Track-1, and
- better clarity on "where" the ND EPSCoR office is located.

The addition of the STEM and Communication Managers allows ND EPSCoR to better meet its metrics on the current Track-1, provide for a more defensible and stronger foundation for future Track-1 proposals, and provide functionality to support faculty researchers and to engage in partnerships and build additional STEM programs and services (outside of the NSF Track-1) that reach across the entire state. It is important to note that ND was criticized by NSF during its reverse site visit in 2016 for weaknesses in the areas of communicating science to the public and partnerships and collaborations. Permanent staff in these areas have helped ND EPSCoR address these weaknesses and have created capacity to build and implement programs necessary to enhance the ND STEM research and education ecosystem. The Business Manager is crucial to ensure efficient and appropriate oversight of state and federal expenditures from all participating campuses. This service is of particularly value to the PUIs, MCU, and TCs because they often do not have sufficient infrastructure to administer the federal regulations associated with NSF sub awards.

ND EPSCoR State Office Programs - The ND EPSCoR State office is responsible for developing, implementing, monitoring, and assessing numerous programs related to the STEM ecosystem in the state.

Most associate ND EPSCoR with the NSF EPSCoR RII Track-1. While the Track-1 is critically important to building research capacity and competitiveness within the state (and is the major jurisdictional award), it is just one of the programs managed by personnel in the State office. There are a host of programs funded by state dollars and implemented by EPSCoR State office personnel that are separate (but complementary) to the Track-1 award (Figure A-3).

NSF EPSCoR RII Track-1 cooperative agreement. The current Track-1 (INSPIRE-ND; 2014-2020) focuses on two research centers; Center for Sustainable Material Science and Center for Regional Climate Studies. The award is $18.76M for the first five years. An extension has been approved, and the award will be active through January 31, 2020. A second 6-month extension will be requested in August, 2019, and if approved, will take the award through July 31, 2020. At the same time, the additional $1.2M will be requested to bring to total award to $20M.

To date, the INSPIRE-ND award has included 1,003 participants; 246 faculty, 25 post-docs, 328 graduate students, 20 undergraduate students, 37 non-technical support staff, 28 technical support staff, and 69 other designated persons. More than 120 outreach activities have been conducted and four new NDSU faculty were hired on this award. The Year 4 Annual Report, filed with NSF in May 2018, reported that researchers have published 331 publications, given 251 presentations, submitted 25 invention disclosure forms, received 3 patents, and successfully competed for an additional $20,568,490 in external funding. These numbers are cumulative over the award.

The new proposed Track-1 (ND-ACES; $20M; proposal submitted to NSF on July 29, 2019) focuses on **N**ew **D**iscoveries in the **A**dvanced Interface of **C**omputation, **E**ngineering, and **S**cience. ND-ACES includes the Center for Cellular Biointerfaces in Science and Engineering (CCBSE) focuses on research in the bioscience/biotechnology area as it relates to cancer and the development of advanced knowledge and technologies that can be translated to the private and medical sectors. CCBSE will integrate with Promoting Sustainable Partnerships in

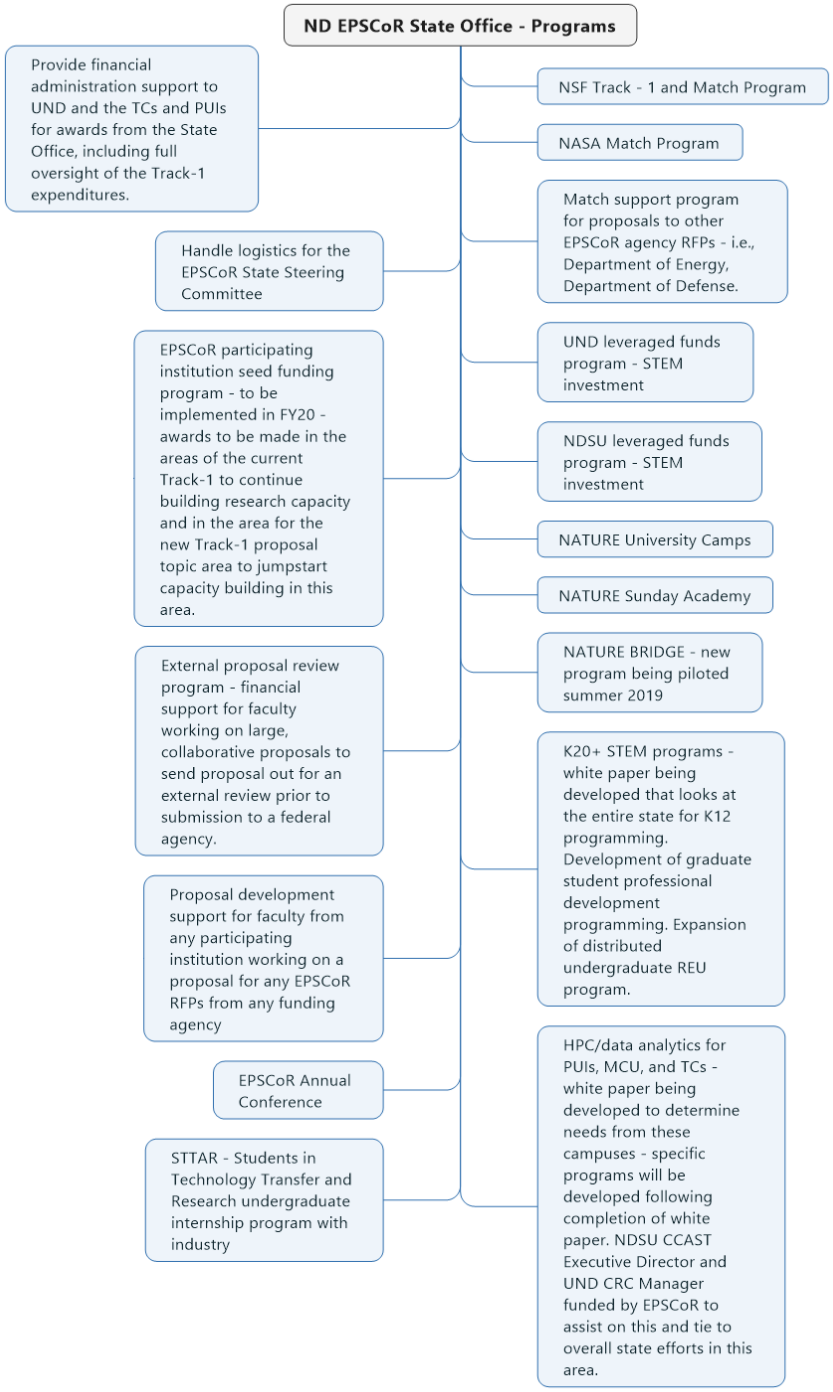


***Figure A-3**. ND EPSCoR State office Programs.*

Education and Research (PROSPER), which is the education, workforce development, partnerships, communication, and broadening participation arm of the ND-ACES effort.

ND-ACES seeks to marry ND's desire to diversify its economy in the biotechnology arena in a manner that complements the Grand Challenges previously identified by the state's research

universities (RUs) in Human Health[7] and Healthy Populations and Vital Communities[8] and capitalizes on the NDSU/UND joint biomedical engineering graduate degree approved in 2016. ND-ACES will help expand ND's economy through pioneering a new interdisciplinary understanding of biointerfaces between biological and engineered materials using innovative computational modeling.

The ND EPSCoR State office provides the $800,000 per year required match for the Track-1 program.

NDSU and UND leveraged funds program (STEM Investment). The ND EPSCoR State office provides NDSU and UND an award each year that allows the two campuses to invest in strategic/priority STEM areas that build capacity and competitiveness (individual annual reports are provided in Appendix C – NDSU and Appendix D – UND).

- NDSU funds are used for: 1) seed awards (mostly directed at junior faculty) that allow faculty to collect preliminary data needed for the submission of competitive proposals to federal agencies; 2) student travel awards to present his/her research at a national conference; 3) faculty travel funds to collaborate with faculty in other states on proposals, visit industrial collaborators and/or national labs with the intent of forming long-term, productive collaborations; 4) equipment that currently does not exist on campus, would elevate research, and can be used across more than one college in a collaborative manner; 5) contributions towards faculty start-up packages (if enough funds are available); and, 6) contributing to the support of CCAST (NDSU's high performance computing center). Funds are also used to help support the NDSU Innovation Challenge, Graduate Student Research Symposium, and NDSU EXPLORE (undergraduate student research showcase) and buy time of some of the State office staff to provide administrative oversight of the awards.

- UND funds are used to: 1) provide administrative oversight of sub-award projects; 2) contribute to the support of the Center for Research Computing; and 3) provide a pool of matching funds.

NASA match program. The ND EPSCoR State office provides NDSU and UND the required match funds each year for NASA EPSCoR. The dollars are contained in the "leveraged funds program" award. Each campus receives $85,500 per year to be used as match towards the NASA Research Infrastructure Development (RID) and Cooperative Agreement Notice (CAN) programs. The original amount was $100,000, but was reduced proportionately (in FY18) the legislative budget cuts in the overall EPSCoR budget. Use of these funds are included in the NDSU and UND annual report appendices.

Broadening Participation programs. The Nurturing American Tribal Undergraduates in Research and Education (NATURE) program is a long-standing signature program for ND EPSCoR and is a means to grow and diversify the STEM pipeline. American Indian students are significantly underrepresented in the STEM ecosystem. As a result, NATURE, which began in 1994 and was initially funded primarily on federal grant dollars, was institutionalized (the UND and NDSU components) and funding is now provided by state dollars. A Tribal Colleges Liaison (the position had been empty for several years) was hired in 2015 to build mutually respectful partnerships between the NDUS institutions and the tribal colleges located in ND.

[7] UND's Human Health Grand Challenge Initiative - https://und.edu/research/grand-challenges/human-health.html
[8] NDSU's Healthy Populations and Vital Communities Grand Challenge Initiative - https://www.ndsu.edu/grandchallenge/

NATURE consists of three existing programs and one new program that is being piloted this summer: University Summer Camp, Tribal College Summer Camps, Sunday Academy, and BRIDGE. NATURE is critical to growing and enhancing diversity in the STEM pipeline (Table A-1).

- The University Summer Camp consists of a two-week (first two full week's in June of each year), residential program for American Indian college students. The purpose of the camp is to expose and engage American Indian students in STEM activities to generate interest in STEM as a career. Bachelors and graduate programs are promoted at NDSU and UND by engaging the students in a research project. Under the annual program, five students from each of the five TCs are selected and financially supported (by the NSF EPSCoR RII Track-1 via sub awards to the TCs) to attend the camp. Students visit both NDSU and UND to learn about STEM research during the first week of the camp. Each student 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 State office budget pays the NDSU and UND faculty and student mentor salaries, as well as the housing, meals, site transportation, and activity costs associated with the program. During those same two weeks, State office staff and coordinating faculty work with the Tribal College faculty and K-12 instructors from the communities surrounding the Tribal Colleges to plan the Tribal College Summer camps and Sunday Academies.

- The Tribal College Summer Camps are held at each of the five TCs following the University Summer Camp. The purpose of these camps is to expose and engage 6-12 tribal students to STEM. The camps average 20 students per camp. Due to high demand, some campuses run more than one summer camp. The funding for these camps comes from the NSF RII Track-1.

- The Sunday Academy program is a series of seven hands-on STEM activities held one Sunday each month during the academic year (September - March) at the five Tribal Colleges. During five of those months, NDSU and UND faculty travel to each of the Tribal Colleges on a scheduled monthly Sunday rotation to deliver STEM modules they created during the University Summer Camp. The faculty mentors work with 7^{th}-12^{th} grade tribal students to generate interest in post-secondary education. During two of those months, Tribal College faculty deliver STEM modules they created during the University Summer Camp, to the same population. The materials, mileage, lodging, and per diem expenses of the NDSU and UND faculty are paid by the ND EPSCoR State office. The salaries of the Tribal College faculty and the student stipends and meals are paid by the NSF RII Track-1.

- The BRIDGE Camp is currently under development and was piloted at Turtle Mountain Community College, May 28 – July 31, 2019. The Camp is targeted at students who are between high school graduation and the start of their first university/college fall semester. The impetus for this camp came from observations, identified in the White Paper outlined in the next section, that the number of American Indian students who stated they were attending college just prior to their high school graduation was significantly higher than those who enrolled in the fall. This pilot camp, paid from NSF RII Track-1 funds, includes a structure that mimics key skills for postsecondary education; however, each section of the camp has been designed to be self-contained to provide important life skills (i.e.: resume building). The pilot program began with seven students; five of which finished the entire program.

***Table A-1**. ND EPSCoR NATURE program summary (Total number of participants*),*

	University Summer Camps	Tribal College Summer Camps	Sunday Academies	Senior Bridge Camp	Totals Since August 1, 2014
# of NDSU/UND faculty (# who are AI/AN)	51 0	2 0	28 1	2 0	83 1
# of NDSU/UND graduate students (# who are AI/AN)	28 9	0 0	15 0	1 1	44 10
# of NDSU/UND undergraduate students (# who are AI/AN)	21 21	0 0	0 0	0 0	21 21
# of TC faculty (# who are AI/AN)	1 1	41 20	23 9	3 3	68 33
# of TC graduate students (# who are AI/AN)	0 0	3 3	3 3	0 0	6 6
# of TC undergraduate students (# who are AI/AN)	0 0	59 56	2 1	0 0	61 57
# of support staff (# who are AI/AN)	15 3	56 28	7 7	5 4	83 42
# of participants (# who are AI/AN)	98 98	640 626	2,017 1,992	7 7	2,762 2,723
AI/AN = American Indian / Alaskan Native *Numbers include multiple touchpoints for single participants					

"A Partnership to Build STEM Research and Education Capacity" white paper[9] was developed by ND EPSCoR in 2016 and is updated every year. The White Paper is a guide to help build STEM research and education partnerships across the state between the two RUs (NDSU and UND); three Primarily Undergraduate Institutions (DSU, Mayville State, and VCSU); one Master's College or University (Minot State); and five Tribal Colleges (CCCC, SBC, NHSC, TMCC, and UTTC). The White Paper, which currently provides up-to-date demographic information at nine of these institutions, along with current STEM capacity and needs, is currently being revised to include NDSU and UND faculty (the updated document will be completed fall 2019). The White Paper is used by the ND EPSCoR State office to guide planning of new program development and is becoming a valuable tool for researchers interested in developing statewide partnerships. The ND EPSCoR State office staff have participated in various workshops and will continue to work to increase awareness of the document throughout the state.

Match support for EPSCoR-like programs. While funds are not specifically set aside each year for this program, the EPSCoR State office provides cash match/commitments for other EPSCoR-like funding programs, if requested. For instance, the Department of Energy EPSCoR program announced a Request for Proposals late last year (the first one since 2014). A match of a cyberinfrastructure graduate assistantship was provided to a faculty member whose project was selected for full proposal development. Unfortunately, the full proposal was not funded by DOE.

The ND EPSCoR State office also provides in-kind match to proposals (i.e., NSF EPSCoR Track-2 proposals, NSF CAREER proposals, etc.) in the form of staff time, inclusion of EPSCoR State office funded programs used by faculty for the Broader Impacts component of his/her

[9] ND EPSCoR's White Paper: A Partnership to Build STEM Research and Education Capacity - https://www.ndepscor.ndus.edu/fileadmin/ndus/ndepscor/EMPOWERED-ND/STEM_capacity_white_paper_-_Oct_15_2018.pdf

proposal, etc. This in-kind match 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 focus to remain on the sustainability of key programs that have been successful.

K-20 STEM programming. Historically, K-20 STEM programming was limited to a small suite of activities associated with and funded by the NSF RII Track-1 awards because of the lack of infrastructure [centralized office and full-time staff] to create programs that would benefit the entire state. A ND EPSCoR STEM Manager was hired in January 2019 and program development has begun. Unfortunately, the incumbent in this position was recruited back to her old job and has since left the ND EPSCoR Office. The position is currently open, and a search is underway. It is anticipated that at least one new program will be launched by the spring 2020 semester. The K-20 STEM programming is considered a continuum of programs across the K-12, undergraduate, and graduate years.

- K-12 programming – it is not the intent of the ND EPSCoR Office to re-create the wheel with respect to outreach activities within the K-12 system. It is ND EPSCoR's intent to better understand what is currently being done within the school districts and at the universities/colleges for the purpose of determining areas of potential partnership and/or need (i.e., professional development opportunities). A survey was developed to capture existing STEM strengths, programs, and needs[10] and has been sent to all members of the North Dakota Regional Education Association and to school districts that participated in STEM events such as Enviro-Thon and C2E2. In addition, the Prairie Waters Education and Research Center has agreed to distribute brochures to their participating teachers and act as a liaison between ND EPSCoR' s STEM Manager and the school districts that take part in the Center's programming. Brochures were also distributed to local educators and administrators at the March 2019 Tribal Nation's Research Group's Data Matters conference. As survey data are acquired, they will be analyzed and used as a foundation for a K-12 STEM programming White Paper (in similar fashion to the STEM Capacity White Paper which focused on higher education). A draft of the white paper is anticipated by May 2020.

- Undergraduate student programming – ND EPSCoR currently administers a distributed undergraduate research experience for students at the three primarily undergraduate institutions, the master's college/university, and the five tribal colleges. This program is funded by the current NSF RII Track-1 and is unique in that it allows the student to remain on his/her home campus while engaging in research with an EPSCoR funded faculty member. The program was formatted in this manner because many of our undergraduate students are place-bound and not able to spend an entire summer on either the NDSU or UND campus. To date, 17 students have participated in the program[11], and over half of those students have gone, or plan to go, to graduate school. The success of the program can be summarized by feedback received from student participants:

    - Breanne Hatfield, 2017 Minot State graduate, currently a Master's degree student at the University of North Carolina at Chapel Hill, said: "It was getting into

[10] Link to ND EPSCoR's March 2019 K-12 STEM survey - https://ndstate.co1.qualtrics.com/jfe/form/SV_8dXbYIwSYIP6pg1
[11] ND EPSCoR's Research Experience for Undergraduates Awardees - https://www.ndepscor.ndus.edu/funding/awardees/reu-awardees/

the lab, doing hands on research, and getting exposed to scientific thinking and experiments that helped me get into grad school."

- Billi Jean Petermann, 2018 Dickinson State graduate, currently a Ph.D. student at Texas Tech University, said her EPSCoR experience "opened the doors to a world I didn't know was possible."

Because of these and other successes, as well as the impact on student achievement, the ND EPSCoR Office is investigating institutionalizing this program through funding from the EPSCoR State office.

- Graduate student programming – Graduate students participating in NSF RII Track-1 research are provided opportunities to gain deep technical, subject matter knowledge. The ability to gain skill set training in STEM practices beyond that learned in research activity remains spotty. Additionally, it has been well established that ND's graduates need additional skills [team-building, communication, critical thinking, presentation, etc.] to be successful in the workforce. The ND EPSCoR State office has developed a survey that was sent to all RII Track-1 graduate student participants the week of April 8, 2019 to receive feedback on areas of professional development need. The survey did not yield meaningful results. Thus, it will be sent out again in fall 2019. It is anticipated that the graduate student programming will include the development of ND EPSCoR specific modules, as well as partnerships with NDUS entities [i.e., graduate schools] that have already created professional development modules and would be willing to share them with other institutions. These partnerships will allow the institution-specific modules to be implemented beyond that institution. The ND EPSCoR State office will provide funding for these partnerships.

Students in Technology Transfer and Research (STTAR) program. The STTAR program is a long-standing and popular program for ND EPSCoR. The program provides salary match for students placed in North Dakota owned STEM businesses. The original program was a 1:1 match program, with ND EPSCoR providing $5/hour. With current wages, the program now has a 2:1 funding requirement (ND EPSCoR still matches at $5/hour, while the ND-based company provides at least $10/hour). This program, which was very popular, particularly with small ND businesses, was put on hiatus for a short time due to budget uncertainties. However, the program has been re-activated for summer 2019 and has funded eight students at five ND companies.

HPC/data analytics/cyberinfrastructure programming. High performance computing (HPC) and cyberinfrastructure (CI) is another priority area for NDUS and the state. CI is also an important component requirement of all NSF RII Track-1 awards.

- HPC/CI White Paper – During FY19, ND EPSCoR provided funding to the Executive Director of NDSU's Center for Computationally Assisted Science and Technology (CCAST) and the Advanced CI Manager of UND's Computation Research Center (CRC) to assess the HPC/CI infrastructure equipment and research needs at the three primarily undergraduate institutions and the master's college/university. The assessment data have being compiled [together with the results of a mirror American Indian Higher Education Commission (AIHEC) NSF-funded study of the five Tribal Colleges] into an HPC/CI White Paper (draft form) that will help drive future projects in this area. Institutions outside of NDSU and UND do not have the infrastructure

necessary for faculty to handle big data; therefore, the final White Paper will address HPC connections to faculty throughout the state regardless of location.

- CI Interns – Identifying and hiring persons knowledgeable in HPC has proven difficult for both NDSU and UND due to a very competitive market. Recently, there has been a lot of discussion around "growing our own" as a means to develop the CI talent needed to continue to build the HPC capabilities of the state. Monies from the NSF Track-1 were used to fund four CI graduate assistantships at NDSU as a pilot program of "growing our own talent" and as a means to develop educational outreach materials for the primarily undergraduate institutions, master's college/university, and tribal colleges. One of the students hired left NDSU for employment after the first semester. The three remaining students developed and presented workshops at several of the institutions within the state, and via the state's interactive video network (IVN). These workshops led faculty and students through big data, HPC, and the software tools available to them at CCAST and CRC. At the same time, the students (all Ph.D. students) gained valuable knowledge of HPC administration (hardware and software), which has enhanced their own computational research work. This program has been a success, and the ND EPSCoR State office is considering institutionalizing it using state office dollars. At first, the program will most likely result in one CI assistantship at both NDSU and UND.

ND EPSCoR Annual Conference. The ND EPSCoR State office coordinates and runs the Annual EPSCoR State Conference. Funding is provided by the State office. This NSF-required annual celebration of research performed across the entire state usually draws over 300 students, faculty, and staff and 140-200 posters. The conference is an important venue to showcase the research efforts of faculty and staff 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.

Communicating science to the public. During its 2016 NSF review, ND EPSCoR was criticized for a weakness in communicating science to the public. The NSF panel asked how ND's citizens have been made aware of, and impacted by, the research being conducted in ND. ND EPSCoR originally tried to address this concern by funding (using NSF dollars) an English professor at UND and a communication professor at NDSU to cover this aspect. While both elevated the level of external communication, their time was limited due to their faculty duties. During the reorganization to a centralized State office, a full-time Communication Manager position was created and filled in February 2018.

The individual in this position is responsible for the ND EPSCoR website, branding of the ND EPSCoR State office (presentation templates, letterhead, etc.), the creation of a monthly newsletter that covers research and education activities occurring on all 11 EPSCoR participating institutions[12], face-to-face interviews with students and faculty on all campuses, distribution of the newsletter to a broad spectrum of stakeholders in the state, one-on-one mentoring sessions on presentation skills for faculty and students, creation of the NSF impact statements, etc. Additional venues and platforms for communicating the science will be developed in FY20. The Communication Manager is also now responsible for the coordination of the Annual Conference each year (independent of its location in Fargo or Grand Forks).

Participating institution seed funding program. This program is new and will be implemented in FY20 using unspent FY19 dollars (unspent dollars consists of funds generated through salary

[12] Link to ND EPSCoR's monthly newsletter - https://www.ndepscor.ndus.edu/news/newsletters/

savings due to open positions and/or charging some staff time to grants, unspent state office operational dollars, and some unused programming dollars remaining after program implementation). This program will allow faculty from across the state to apply for small seed awards that are focused in areas of the current NSF RII Track-1 [to sustain research and dissemination efforts (i.e., continued website hosting fees) beyond the end of that award] or the new proposed Track-1 (to jumpstart this research). Small seed awards go a long way to allow faculty to collect preliminary data that can be used in submitting competitive research proposals to federal agencies.

External proposal review service. Large, collaborative proposals are a norm in today's federal funding landscape. These proposals take a lot of time and effort to compile. To help large research teams be successful, the EPSCoR State office provides financial support to send the proposal out for an external review prior to submission to a federal agency. This service provides ND research teams with valuable feedback from experts in the research area and allows the proposal to be as refined as much as possible prior to submission. During this past year, ND EPSCoR funded external reviews for the NSF RII Track-1 proposal and the joint UND/South Dakota NSF Track-2 proposal.

Proposal development support. The ND EPSCoR State office staff provide internal review services to large initiatives, as well as budgeting assistance; particularly for those faculty at institutions with limited research infrastructure in place.

The creation of a State office with full-time staff has provided the opportunity for leveraging ND EPSCoR in the development of additional proposals [outside of the NSF EPSCoR Track-1] that address the ND STEM ecosystem. As an example, ND EPSCoR is a partner on a collaborative ~$12M NSF Inclusion across the Nation of Communities of Learners of Underrepresented Discoverers in Engineering and Science (INCLUDES) proposal (submitted on April 2, 2019) with ID, MT, NM, SD, and WY. The proposal, focused on Indigenous STEM Research and Education, includes a $2,189,604 five-year ND component. If funded, the ND EPSCoR State office, together with two faculty members from UND, will lead the development of formal STEM modules and associated teacher professional development for 7-12th grade students. Under the proposal, the ND EPSCoR State office will also serve as the backbone organization for the collaborative. Federal funds are included in the budget that would pay a portion (1 month per year) of several staff members' time to participate in this award.

EPSCoR State Steering Committee logistics. The ND EPSCoR State office provides logistical support for the State Steering Committee meetings. Additionally, the State office administrative coordinator serves as the secretary for the committee.

Financial, administrative, and logistical services. 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 ND EPSCoR State office on behalf of the entire jurisdiction.

The Business Manager provides financial oversight of all of the funds housed in the ND EPSCoR State office (state dollars as well as federal funds). The Business Manager is also responsible for all sub-awards to participating institutions. Throughout the past five years, 180 projects (including 24 sub-awards to other institutions) have been funded [128 federally funded projects and 52 projects funded from state dollars]. This number of projects requires a tremendous amount of oversight to ensure funds are spent within federal [NSF EPSCoR oversight is at the line item] and state regulations. The Business Manager works very closely

with the accountants on the sub-awardee campuses as they often have limited research infrastructure support.

The administrative coordinator handles all office logistics as well as the logistics for most of the programs funded by the ND EPSCoR State office (i.e., Annual Conference, data gathering in ERcore database, NATURE planning and events, etc.).

APPENDIX B

ND EPSCoR STATE OFFICE BUDGET AND EXPENDITURE DETAILS

Budget and Projects

The FY19 funding allocation to the ND EPSCoR State office was $3,013,875. The total budget was disbursed through 13 projects:

- one state office general holding project for office administrative functions and programmatic expenses (there was also a pass-through project for travel refundable by other entities – but has no budget);
- six projects under the NSF Track-1 match category (includes one sub-award to UND [and UND established two projects] and one project to NDSU);
- two sub-awards to UND (leveraged [and UND established five sub-projects] and NATURE [and UND established one NATURE sub-projects]);
- one project under STTAR;
- two projects under the NATURE category; and,
- one project to NDSU (leveraged; and NDSU established 24 sub-projects]). Details of the NDSU and UND leveraged funds/projects are provided in *Appendices C and D*.

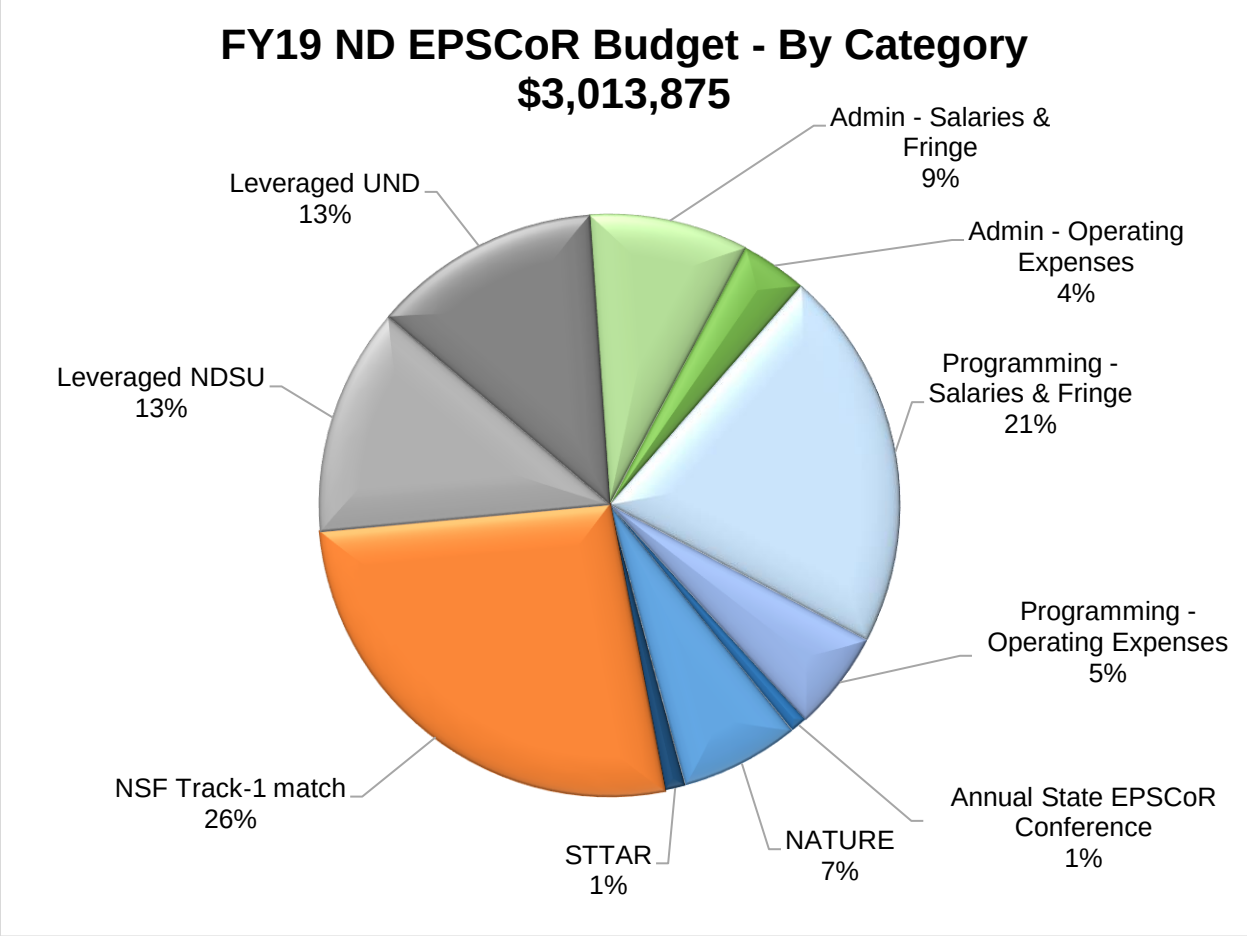


Figure B-1*. FY19 budget allocated to categories within the three base pools of administrative, programmatic, and leveraged.*

The funds in the projects were allocated by categories within the three base pools (administrative, programmatic, leveraged; Figure B-1). *Programmatic* dollars (blue and orange) constituted the vast majority of the budget (61%), with the NSF Track-1 match funds being the

largest traunch (26%) of the programmatic allocation. Programmatic salaries (21%) comprised the second largest component.

The programmatic budget consisted of two main components: $800,000 match (orange) for the NSF RII Track-1 award and all other programming as specified in the original budget request to NDUS (blue). The majority of the implemented programs are personnel intensive (i.e., communicating science to the public, K12 outreach coordination of workshops and the annual conference). The time personnel spend creating, implementing, assessing, and disseminating programs and their results are classified as programmatic salaries (to differentiate from purely administrative responsibilities).

A description of the programs implemented by the state office can be found in Appendix A. With the state office now at full capacity, the number of research, education, and outreach programs will grow. Thus, this category will increase as new programs are developed and brought on line. The majority of these new programs are being driven by the needs: 1) of the K12 community, 2) for graduate student professional development, 3) for undergraduate training (innovation, entrepreneurism, and research), 4) for better communicating the impact of ND EPSCoR research to the public, and 5) to grow and diversity the STEM pipeline and workforce.

The *leveraged* funds (gray; subaward to UND and transfer of funds to a NDSU leveraged project) comprised 26% of the overall budget and provided dollars to NDSU and UND for EPSCoR-related activities on those respective campuses. These funds ($382,348 per campus) included $85,500 for the NASA EPSCoR match program on each campus. Reports on funds usage for NDSU and UND are contained in Appendices C and D, respectively. It should be noted that the ND EPSCoR state office is department 4450 and the NDSU EPSCoR-related activities are contained under department 4200 intentionally so the funds are kept separate for accounting and tracking purposes.

The *administrative* budget comprised 12.6% (shows as 13% in the pie chart due to rounding) of the overall budget and 29.4% of the overall salary budget. The administrative pool was comprised of salaries (9% of total FY19 budget) and operating budget (4% of total FY19 budget). The personnel in the state office are categorized as programmatic, administrative, or a combination of the two. Of the $907,179 salary budget, 60.6% was for programmatic personnel who develop, implement, and assess research, education, outreach, and diversity programs on behalf of ND EPSCoR. Without these personnel, ND EPSCoR would be unable to meet its mission of building the STEM ecosystem in North Dakota. 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/IDEA coalition dues, ERcore (the data reporting and tracking tool for NSF EPSCOR Track-1) fees, ERcore server hosting fees, etc.

Drilling down a bit and allocating the budget by program type within the three base pools provides a better picture of the broader programs that are current priorities for funding (Figure B-2):

- Education, Outreach, and Broadening Participation – includes salary for programmatic staff who develop and implement diversity and STEM outreach programs, NATURE, STEM white paper development and implementation, K12 white paper development, etc.
- Competitiveness and Sustainability – includes efforts focused on building collaborations and partnerships and proposal preparation.
- Communications – includes salary for the Communications Manager, travel to participating campuses, supplies, EPSCoR Annual Conference, EAB travel, branding

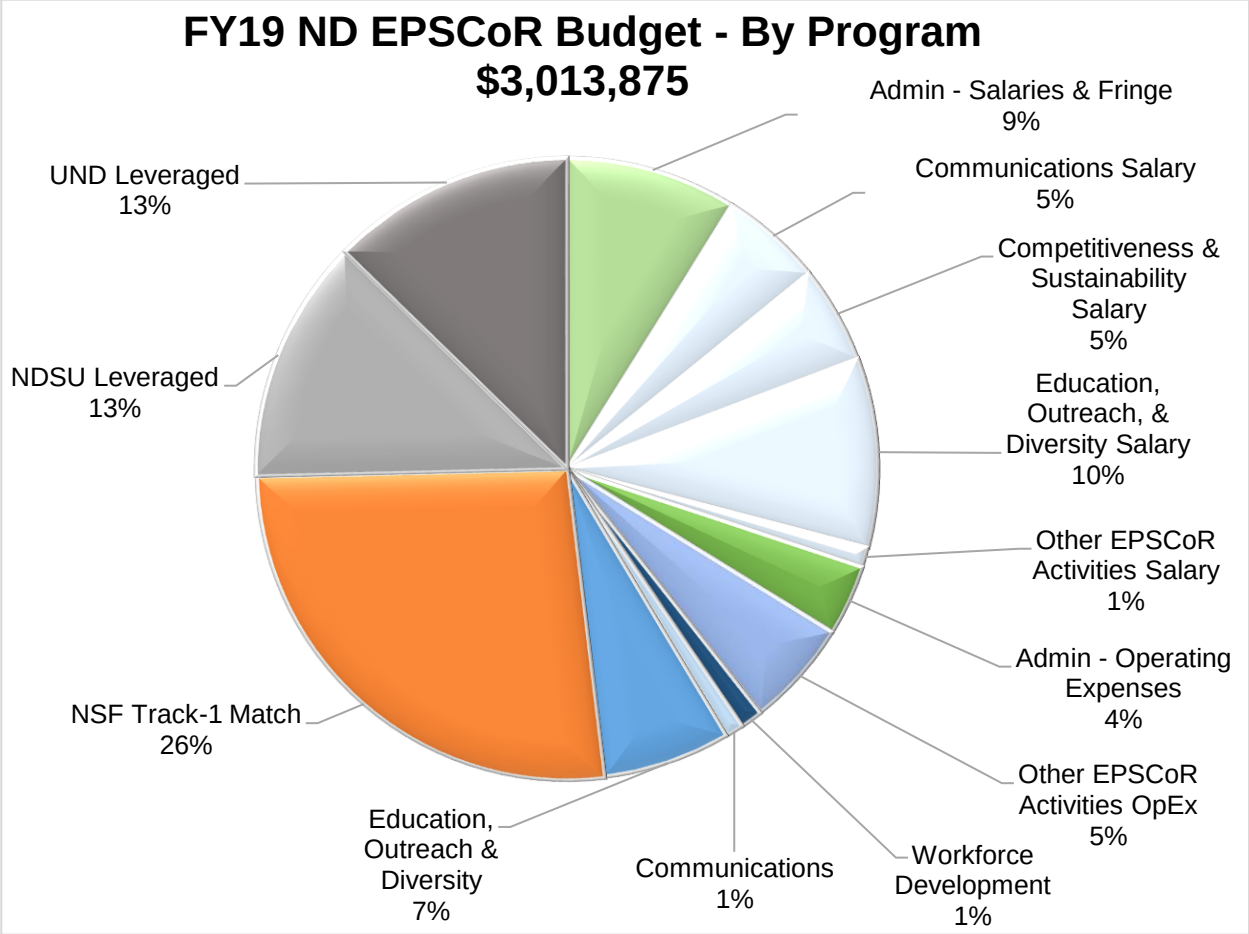


***Figure B-2**. Budget allocated by program type within the three base pools.*

materials, website maintenance, fees for dissemination services, etc. Of particular note, here is the significantly increased effort in communicating science to the public (i.e., monthly newsletter that is distributed throughout the state to a host of constituents and stakeholders).

- Other EPSCoR Activities – includes HPC/CI and other onetime use of funds not captured in another category (i.e., proposal reviews for large collaborative efforts.
- Workforce Development – includes STARR, graduate student research assistantships, undergraduate research funds, etc.

There were four funded projects focused on Education, Outreach, and Broadening Participation; Competitiveness and Sustainability; and, Communications. In addition, five of the NSF Track-1 match projects also fit within these program type pools. Thus, a better illustration of the budget allocation by program type is presented in Figure B-3. The budgets of these nine combined projects are shown by the textured orange/blue pie chart slices.

The five NSF Track-1 match projects (totaling 7% of the overall budget) funded the Tribal Colleges Liaison position, Center for Sustainable Materials Science equipment, State EPSCoR Conference, external advisory board travel, Center for Regional Climate Studies program support at UND. These projects totaled $227,783, the match required for FY19 NSF Track-1 expenditures. This project fund level may seem a bit low, but can be explained by the cumulative NSF Track-1 expenditures from FY15-FY18. The funds spent on match towards the Track-1 during this time period exceeded the actual level (20%) needed by 5%. Thus, during

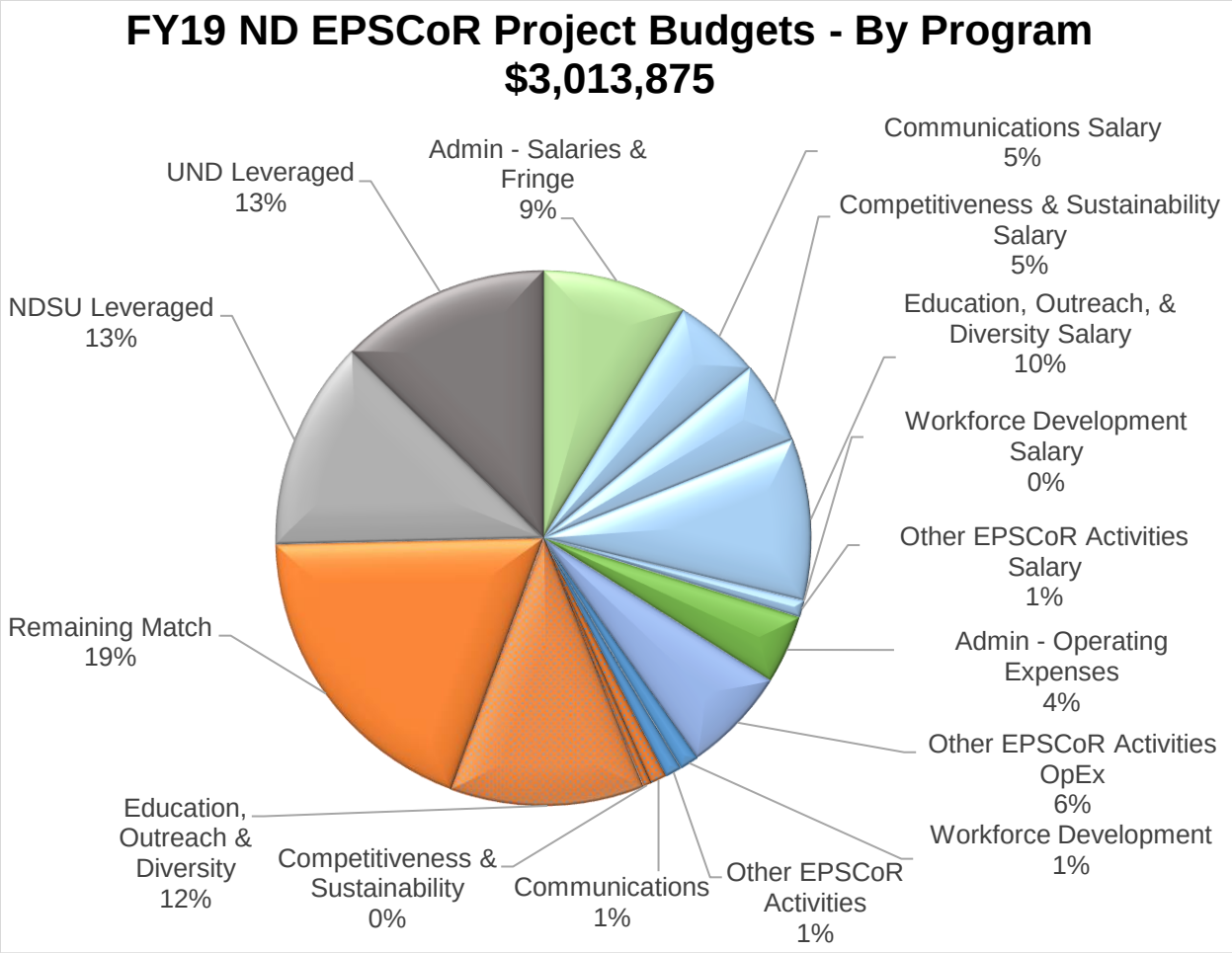


***Figure B-3**. Funded project by program type. The orange/blue hatch slices are a combination of match and other programmatic dollars.*

FY19, the State office was able to reduce the expenditures charged to the match dollars to bring the NSF Track-1 match expenditures into balance. *NSF does not dictate when the match dollars are spent; just that all match is met by the end of the award.*

The remaining NSF Track-1 match ($572,217; 19%) is contained in a match holding project to be spent against future NSF Track-1 expenditures during the last month (July 2019) of the official project, the first 6-month no-cost extension (through January 31, 2020), and the second 6-month no-cost extension (through July 31, 2020; the application for this second extension and the remaining $1.24M in funding held at NSF was made on July 31, 2019.

Expenditures and Encumbrances

By fiscal year-end, $1,289,547 were expended (charges cleared as of the July 16th expense reports) (Figures B-4 and B-5). Based on the initial budget, 76.4% of leveraged funds, 19.9% of the administrative funds, and 49.7% of the programming funds were expended by June 30, 2019. The expenditures must be reviewed in concert with committed/encumbered funds (Figure B-6). Eleven of the 13 projects are still active and have been extended through FY20. These active projects collectively contain $923,397 in encumbered funds.

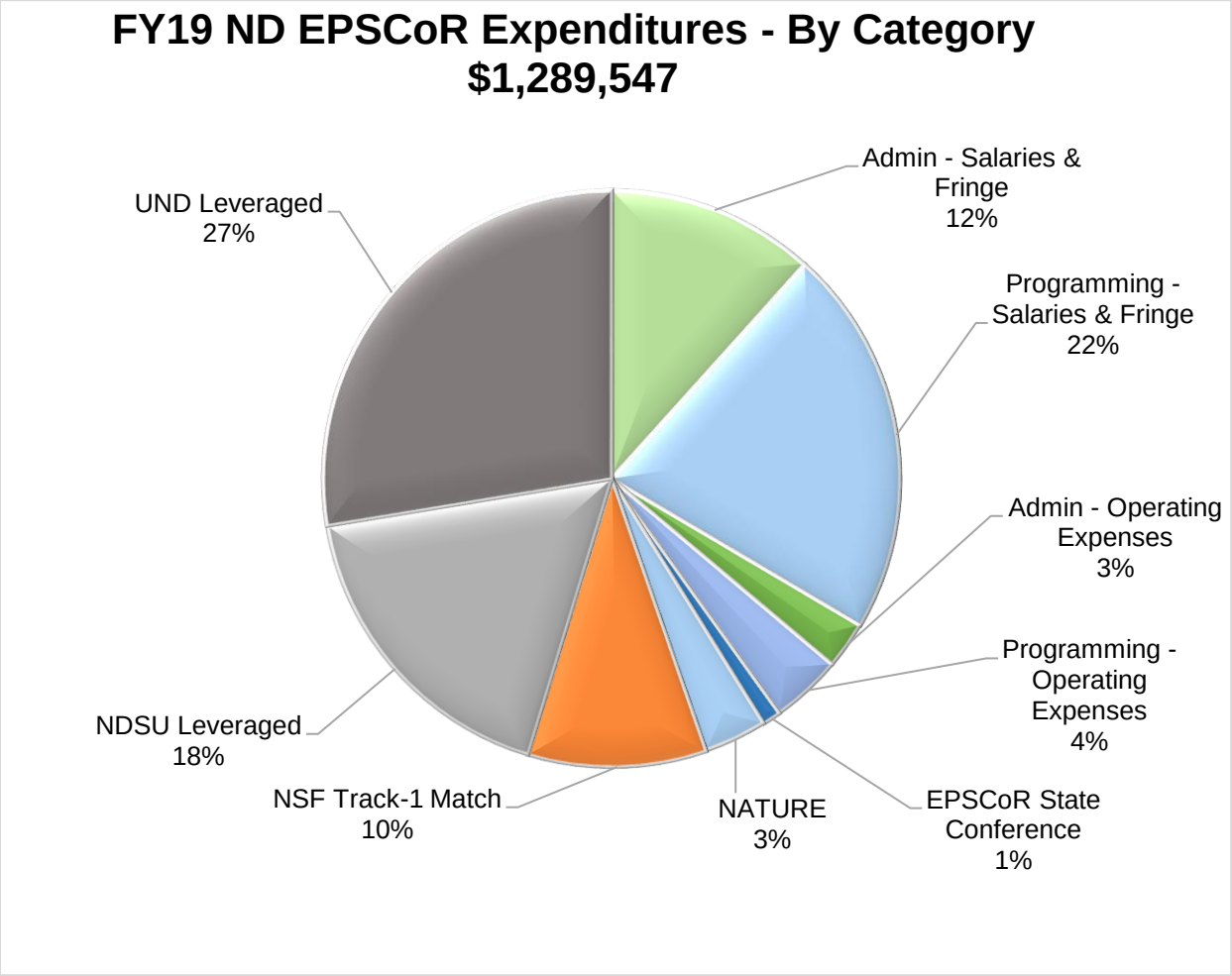


***Figure B-4**. Expenditures by category.*

The majority ($572,277; 62%) of the encumbered funds are within the NSF Track-1 match category.

The encumbered funds in the Workforce Development category will be used to pay the STTAR (Students in Technology Transfer and Research) students working as interns this summer. There are eight students working at five North Dakota companies. ND EPSCoR contributes $5/hour towards each student's salary, while the company must contribute at least $10/hour. This program began in 1994 and is intended to help increase the capacity of our STEM economy.

The majority of funds encumbered within the Education, Outreach, and Diversity are needed to cover expenses of the: 1) NATURE BRIDGE program; being piloted on the Turtle Mountain Community College this summer and 2) graduate student research assistantships of four American Indian students currently attending NDSU and UND.

The BRIDGE program was developed in response to feedback from the Tribal Colleges to help "bridge" or guide recent high school graduates towards enrolling in college the following fall. The pilot program consisted of three 3-day hands-on sessions and one presentation session throughout the summer during which time the students were exposed to and engaged in a series of STEM activities that also work on fundamental math, communication, and English

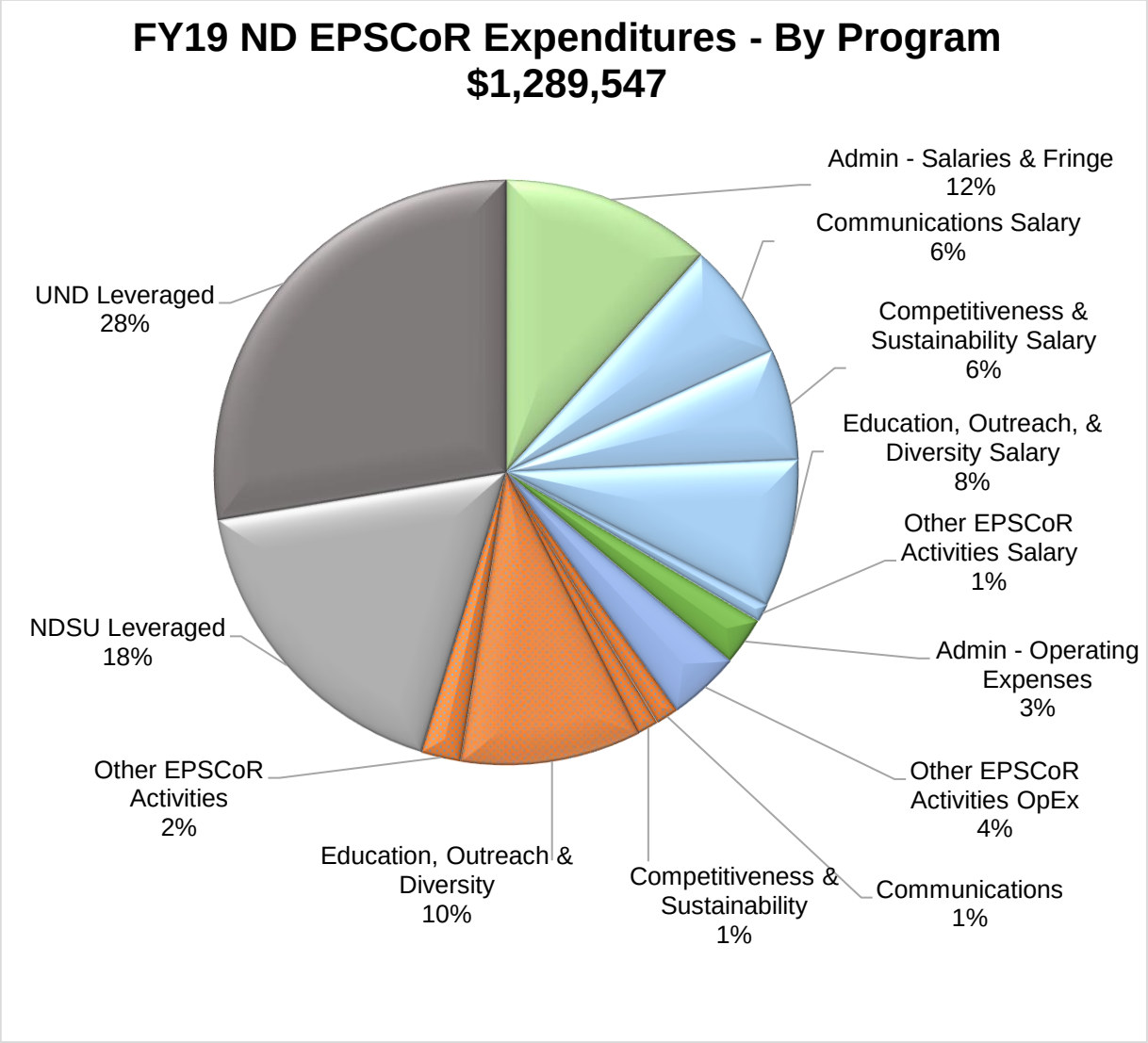


***Figure B-5**. Expenditures by program type.*

skills. In between the hands-on sessions, the students have a set of homework activities that they must complete before the next session. This pilot program had 15 students registered. However, seven actually began the program, and five completed the entire set of activities.

The graduate student research assistantships funds provide for the continuation of four American Indian graduate students (two at NDSU and two at UND) to allow them to finish their degrees. This program is tied to the NSF Track-1, and its intent is to increase the number of American Indian students that complete an advanced degree in a STEM area. During the course of the five-year award, it has been difficult to recruit North Dakota American Indian students into graduate programs at NDSU and UND. The fact that there are currently four students pursuing advanced degrees is a significant accomplishment for these students and will help change the dynamics of how native students view STEM degrees and opportunities.

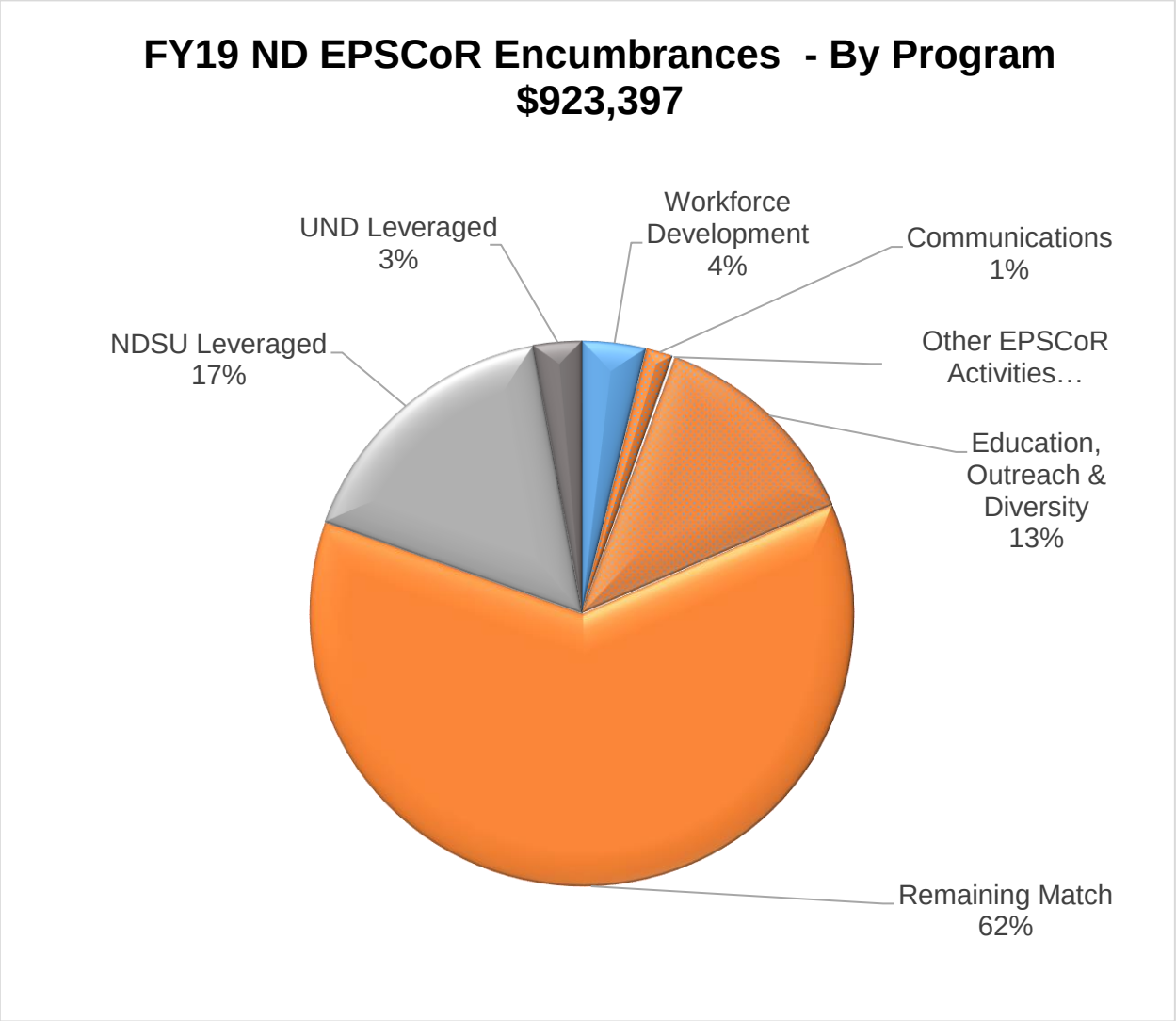


***Figure B-6**. Encumbrances and committed funds.*

Rollover Budget

The rollover budget (Figure B-7) of $800,932 is a combination of salary savings, unexpended funds from projects that were completed but had funds remaining ($111,306), and unused operating funds (both administrative and programmatic - $231,605). Salary savings ($455,021) were generated through two means: 1) vacant staff lines and 2) charging ND EPSCOR salary to other projects (i.e., NSF Track-1) for a portion of his/her time spent working on other projects. Going forward, as positions are filled, the salary savings generated via open lines should be minimal. However, as the ND EPSCoR staff gears up to write additional proposals, there is the potential for increased salary savings if new awards are received.

The rollover budget will be used to invest in EPSCoR participating institutions in FY20. ***An RFP was released on August 1, 2019 to all EPSCoR participating institutions requesting proposals in the areas of: 1) equipment, 2) equipment repair, 3) seed awards, and 4) student and faculty travel to present at national conferences. A total of $650,000 of the $800,932 will be allocated to allow individual institutions/faculty to expand capacity and infrastructure in EPSCoR STEM areas.*** The RFP was discussed with and approved by the

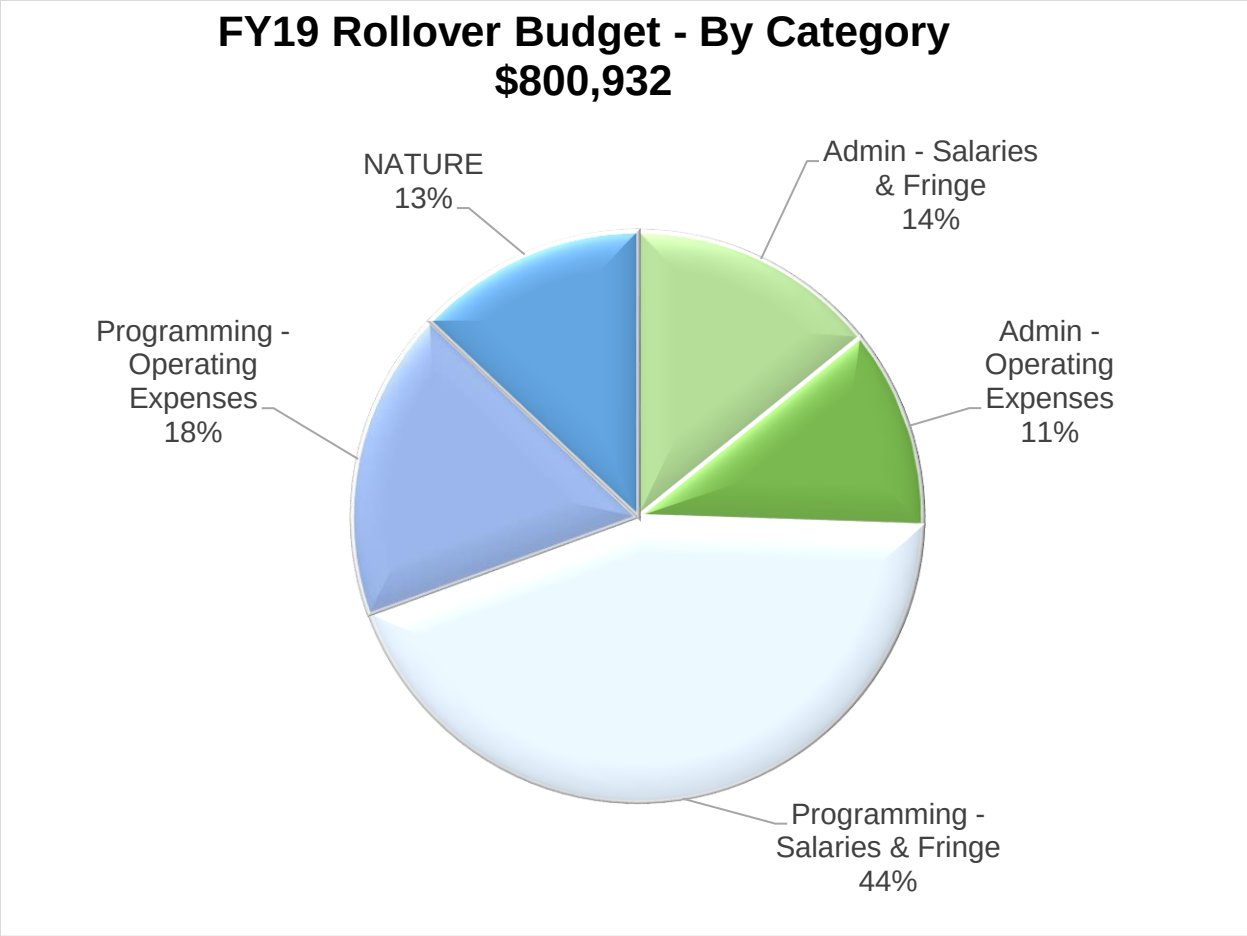


***Figure B-7**. Source of funds by category for rollover budget.*

EPSCoR State Steering Committee at its June 5, 2019 meeting. The committee agreed that investments across the EPSCoR participating institutions were needed to build STEM capacity and competitiveness (research and education) within the entire state. The remaining $150,932 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. This will be the inaugural RFP-driven distribution of funds to continue to build STEM research and education capacity and competitiveness across the state. It is anticipated this process will implemented each year using prior fiscal year savings.

Summary

The initial proposed budget reflects the strategic needs of the ND EPSCoR state office at the time the budget request was submitted to NDUS, events, requests, and opportunities over the course of the year leads to some deviation from the original budget categories. In these cases, ND EPSCoR works with NDSU's Grant and Contract Accounting to re-budget funds from one project to another.

As the State office is less than 2 years old, the overall budget is still undergoing refinement to ensure funds are being used where most needed to support the ND STEM ecosystem. As new programs are developed and implemented by the State office, the "programming" budget will change in quantity and type of programs as new programs are developed and come online. In

fact, the FY20 budget request to NDUS provides more granulation within the programming dollars to better reflect and track actual programs and investment by the State office.

APPENDIX C

NDSU LEVERAGED FUNDS

Budget

NDSU received $382,348 in leveraged funds from ND EPSCoR to cover EPSCoR-related activities on the campus for FY19 (Table C-1). Two of the established (2 of the 24 (E) and 2 of the 7 (A)) projects were commitments made late in FY19 using salary savings and funds remaining from completed projects. The funds were committed in FY, and the projects were established and began on July 1, 2019.

Table C-1. High-level summary of budget, funds allocated to projects, expenditures, and encumbrances and FY20 commitments.

Budget – 07/01/18	Established Projects	Expenditures – 07/31/19	Encumbrances – 07/31/19
$382,348	$382,348	$228,307	$154,041
Number of Projects Established (E)/Still Active (A)			
Projects	24 (E)	24 (E)	7 (A)

The initial budget NDSU submitted to ND EPSCoR was allocated to the three base pools (following ND EPSCoR nomenclature) according to the percentages shown in Figures C-1 and C-2. The administrative budget covered portions of ND EPSCoR 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. The NASA EPSCoR match ($85,500) funds are placed in a separate

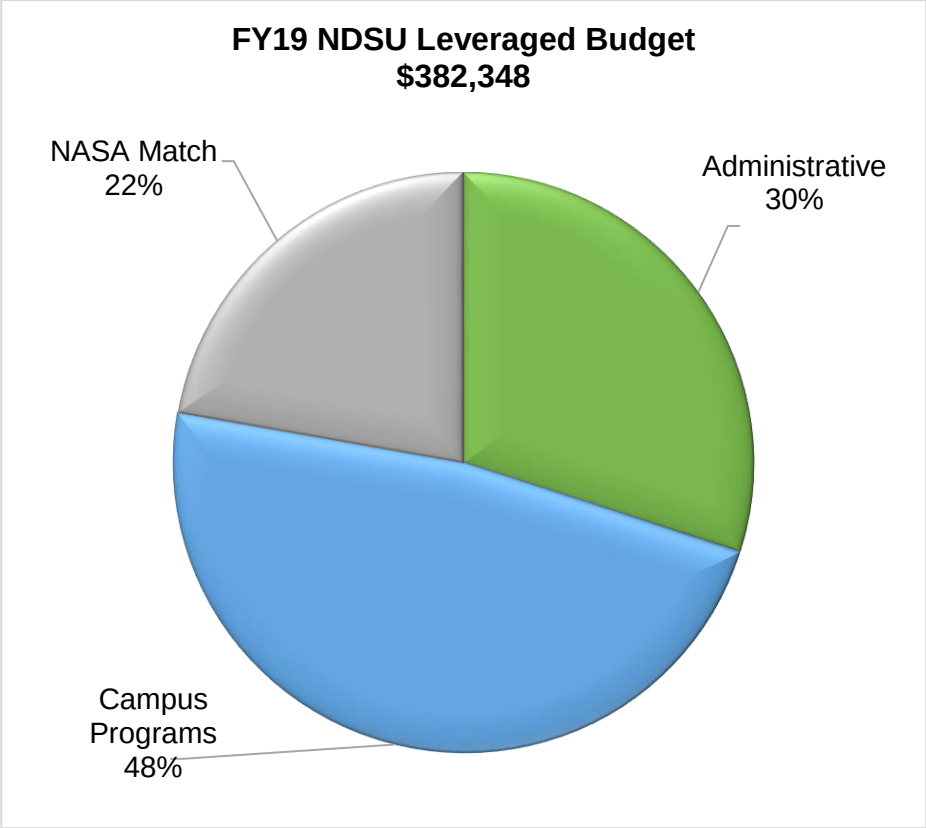


***Figure C-1**. Approved NDSU leveraged budget.*

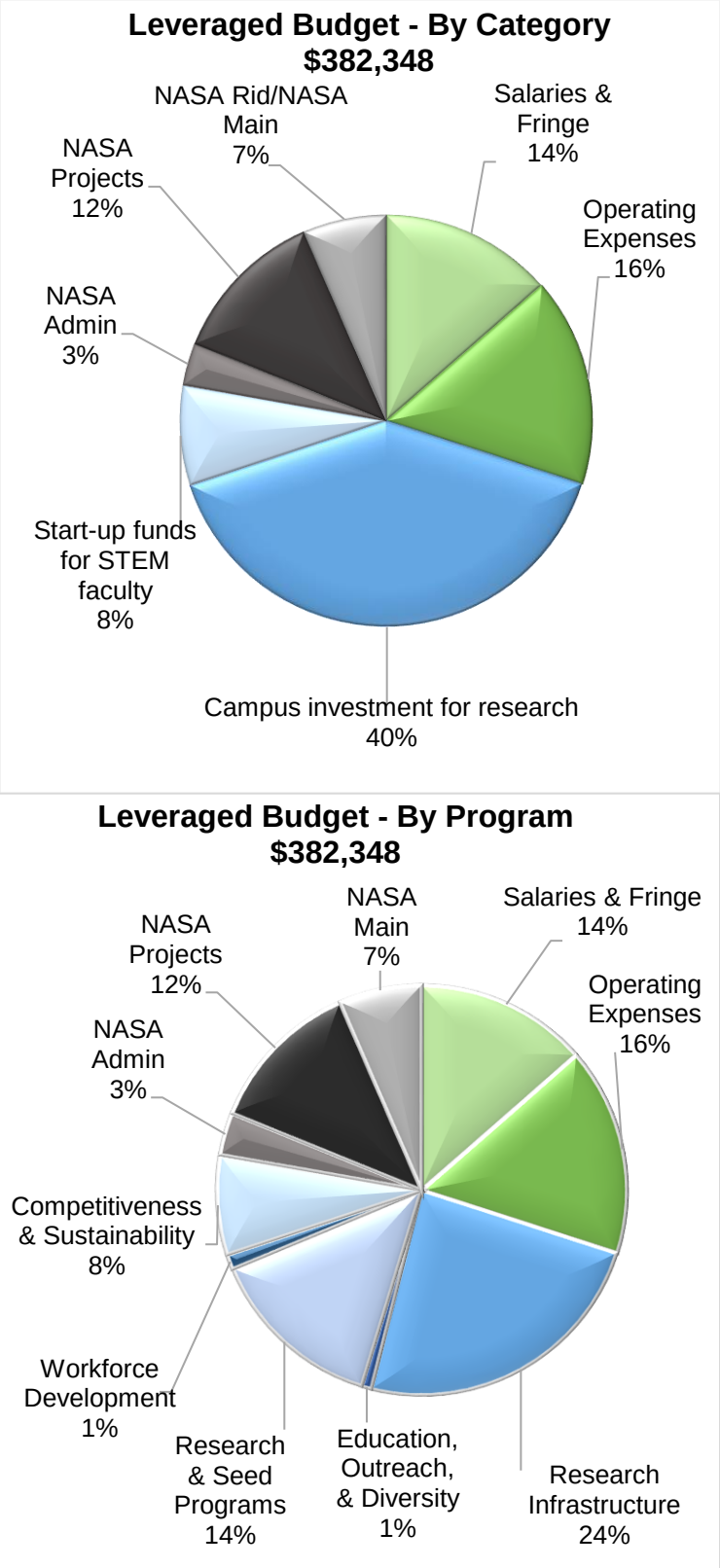


***Figure C-2**. Approved leveraged budget allocated by category and program type - aligns with ND EPSCoR nomenclature.*

NASA project and only used for NASA projects on the NDSU campus related to the RID and CAN programs administered by the ND NASA EPSCoR office located at UND.

The funds in the campus programs category are distributed to NDSU researchers via an annual RFP process to support initial research (data collection needed for proposals submitted to federal agencies), equipment (research infrastructure), student travel (undergraduate and graduate – Education, Outreach, and Diversity) to present research at national conferences, and undergraduate research support (Workforce Development). All disbursed program dollars help expand the STEM research and education ecosystem on the NDSU campus.

Projects

While the approved budget contained administrative funds at 30%, the administrative operating budget was greater than needed. Thus, funds were re-budgeted (request made to the ND EPSCoR Business Manager) to provide more funds to campus programs (Figure C-3). A small percentage (5% of the overall leveraged budget) of the administrative salary budget was also re-budgeted into campus programs. The funds that were moved were associated with a staff line that was vacant for the first seven months of FY19. The campus programs allocation increased from 48% to 67%. A total of 20 (includes the overall holding project) projects were funded under this category.

Expenditures and Encumbrances

Overall, 59.7% of the leveraged funds was spent, including 77% ($175,119) associated with the 20

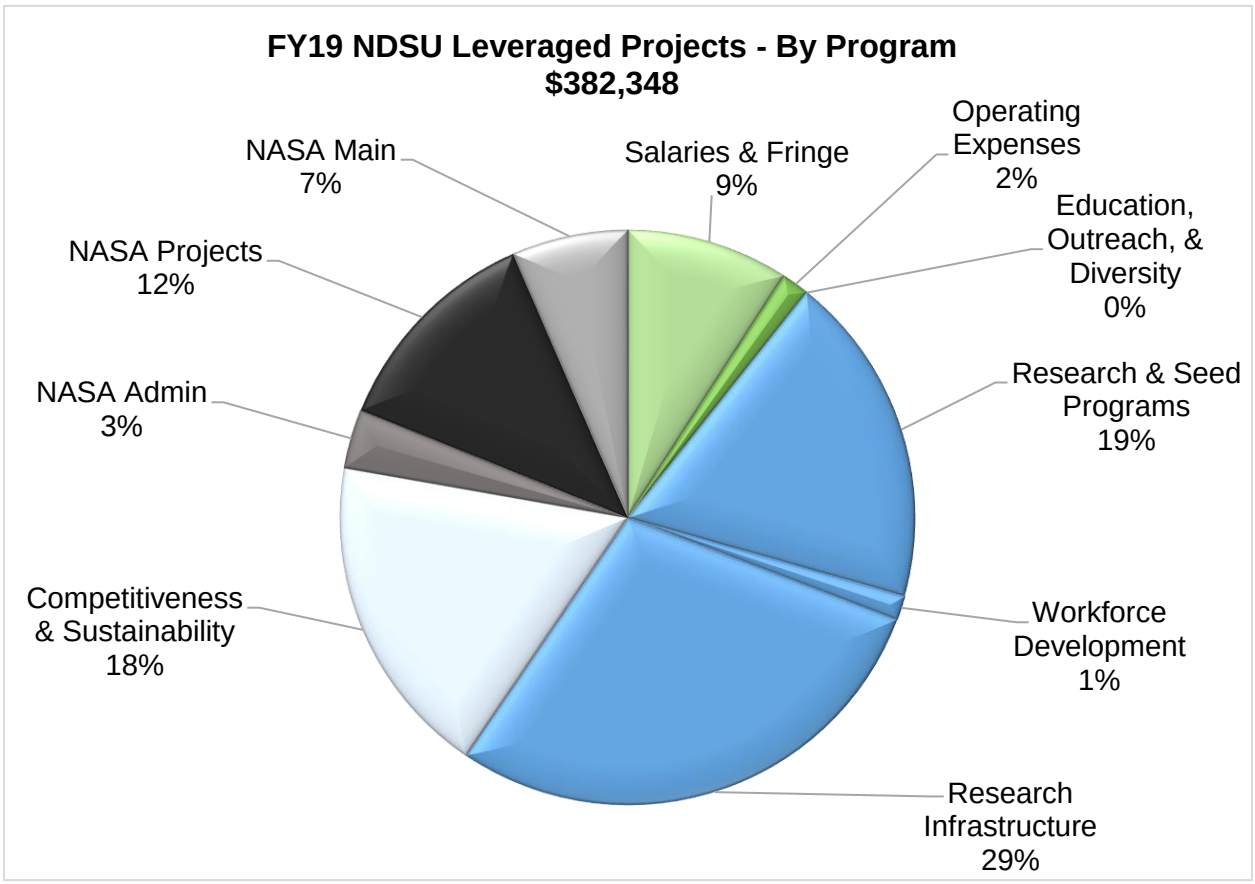


***Figure C-3**. NDSU leveraged projects by program type.*

projects funded under the campus program (Figure C-4). Only $40,738 was spent on administrative salaries and operating expenses, far below the budgeted amount. Administrative time was charged in proportion to the work performed for NDSU EPSCoR-related activities.

Expenditures for the NASA EPSCoR match were minimal. As already stated, these funds are held in a project separate from all other NDSU EPSCoR-related funds. The funds are expended as NASA EPSCoR projects are approved by the ND NASA EPSCoR program located at UND. During FY19, the five projects funded were all supported from federal NASA dollars, and no cash match was requested by the ND NASA EPSCoR Office.

All remaining funds ($154,041) are either encumbered within existing projects (5) that have extended through FY20 or are committed to FY20 projects (2; projects were established and began on July 1, 2019).

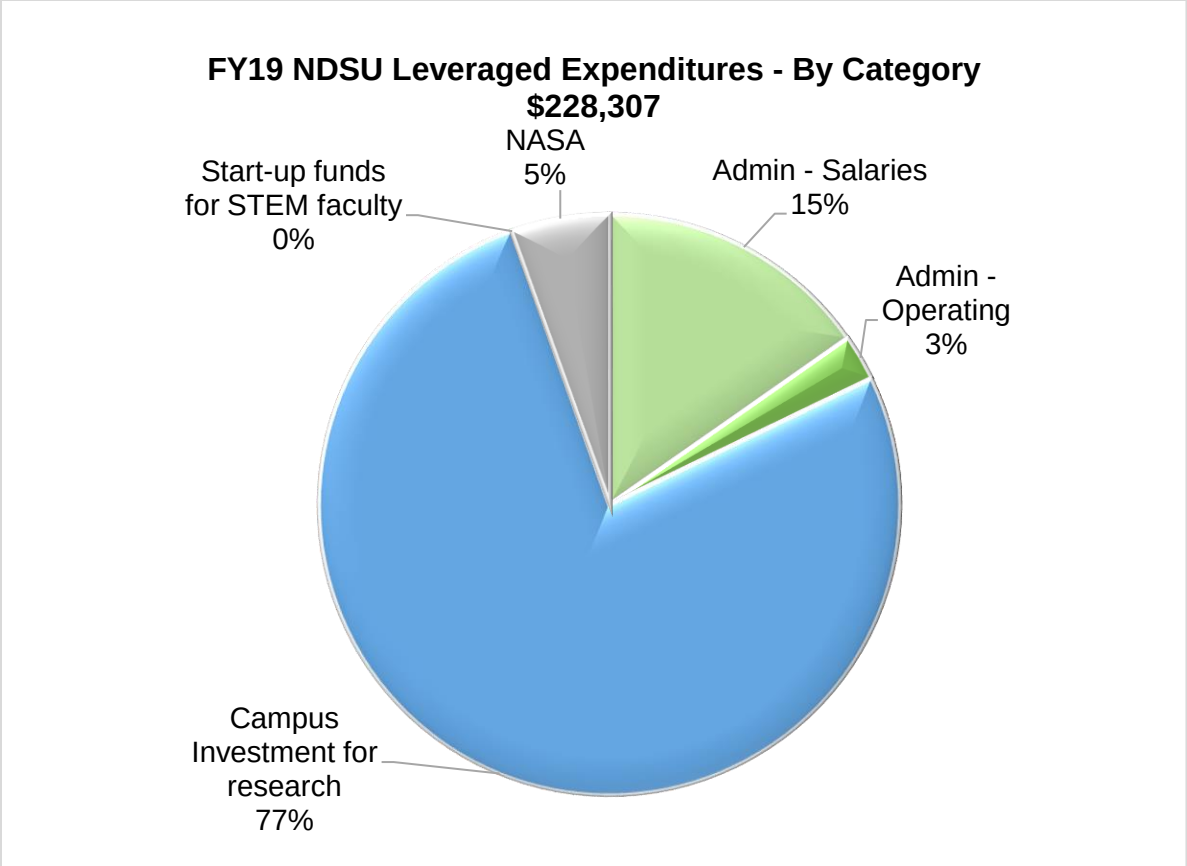


Figure C-4. *NDSU leveraged expenditures by category.*

APPENDIX D

UND LEVERRAGED FUNDS

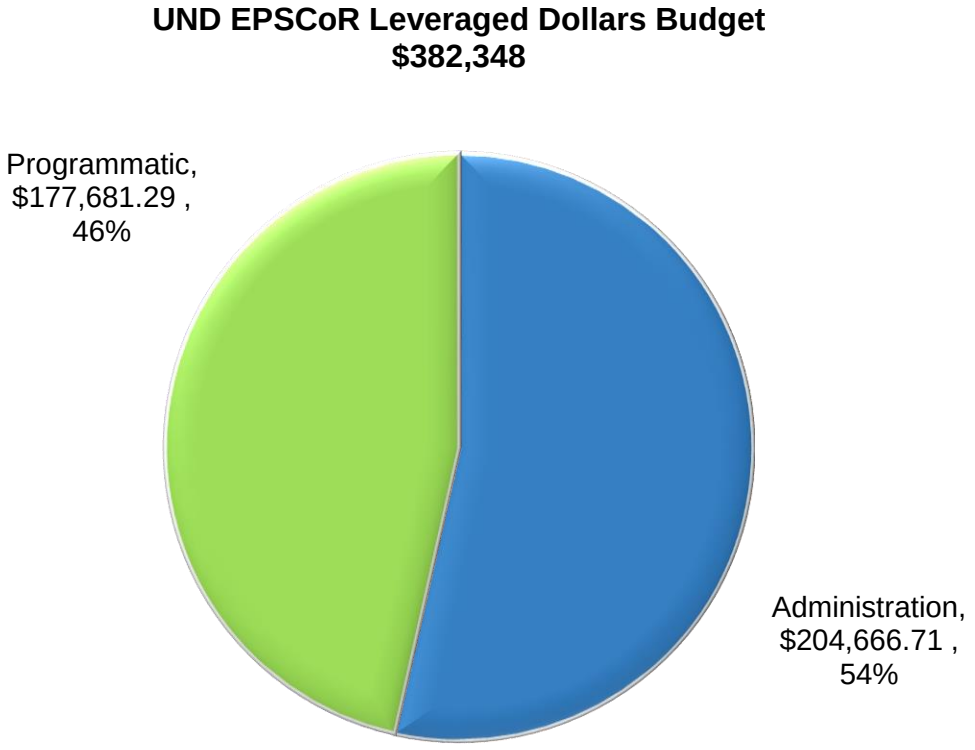
July 1, 2018 – June 30, 2019 UND EPSCoR LEVERAGED SUBAWARD ANNUAL REPORT

The EPSCoR office at UND received a subaward from NDSU for leveraged funds in the amount of $382,348 to be expended during the time period of July 1, 2018 – June 30, 2019. Funds were set up in the following projects: EPSCoR Administration; High Performance Computing; and NASA EPSCoR Match.

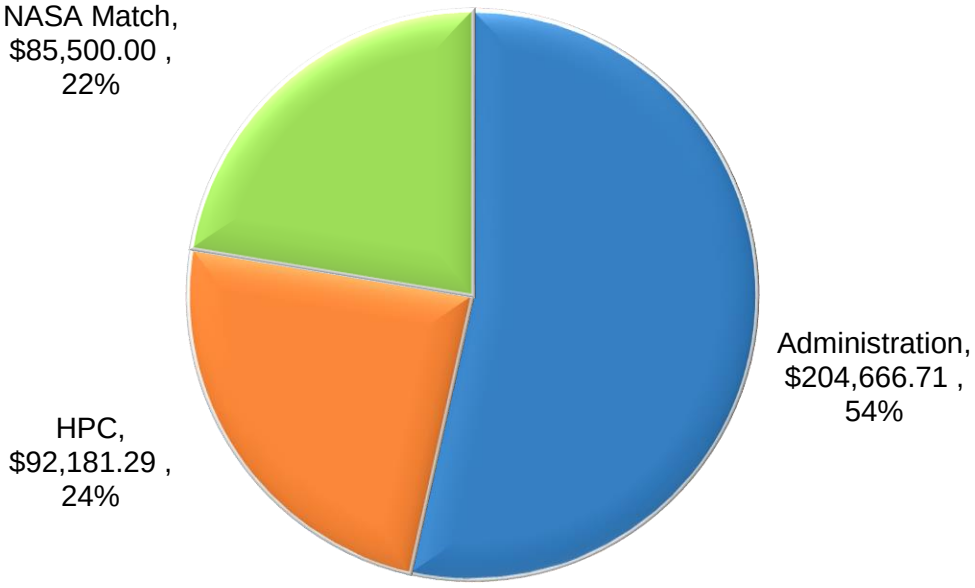
The EPSCoR Administration project provided salary and benefits to UND EPSCoR staff as well as operating funds. Salary and benefits were paid towards the following individuals: Trinity Bohlman, Accountant; Cathy Lerud, Administrative Officer; and Carla Kellner, Administrative Secretary. Operating funds were used for the office phone lines, office supplies, duplicating charges, and travel. The EPSCoR-UND administration provides support to the UND faculty involved with the ND INSPIRE and work towards the ND ACES Track-1 sub-awards. Support includes budget planning and monitoring, ERCore, NATURE Summer Camp (for activities on the UND campus), and other support as needed.

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.

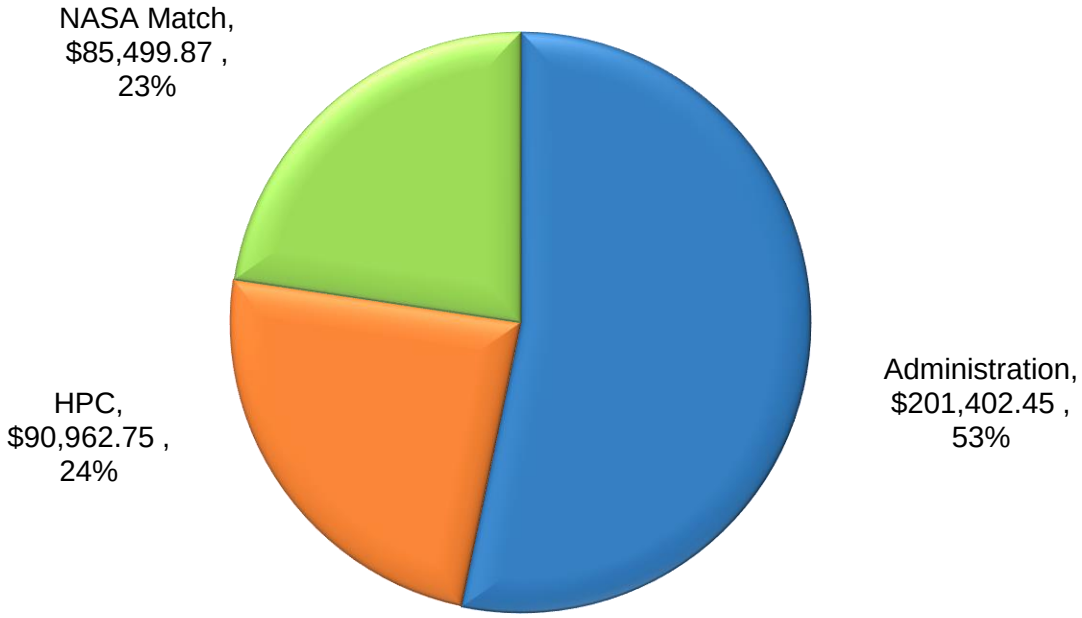
NASA EPSCoR received match dollars of $85,500. These dollars were used for administrative and faculty salaries and fringe, operating costs to include travel and supplies. Match was for the previous NASA Federal RID project UND0020325 and the current NASA Federal RID project UND0023189.



UND EPSCOR Leveraged Dollars Released
$382,348



UND EPSCoR Leveraged Dollars Spent
$377,865.07



Dollars remaining in the current leveraged subaward are: 1) Administration $3,264.26; 2) HPC - $1,218.54; and, 3) NASA Match - $0.13. These dollars remaining are requested to be rebudgeted to the Administration project for salary and fringe. ND EPSCoR has approved this request.