ENVIRONMENTAL SCIENCE PROGRAM
PROGRAM REVIEW REPORT
AY2019-2020 to AY 2023-2024

Written by:

Dr. Daniel Buresh

Dr. Francis N. Onduso

Dr. Mafany Ndiva Mongoh

The Environmental Science Program

Sitting Bull College

Submitted: March 25, 2025

External Reviewer Advised Revisions back to Environmental Program:

TABLE OF CONTENTS

ABSTRACT (EXECUTIVE SUMMARY)

Program Description, Self-Evaluation, and Planning

The environmental science programs at Sitting Bull College (SBC) were created to support the protection and management of the unique habitats found on the Standing Rock Sioux Reservation. Our graduates are employed with academic, tribal, state, federal, and private entities. These entities and our graduates work together to improve the environment of the Standing Rock Sioux Reservation. The program is approved to offer three-degree levels: an Associate of Science (A.S.) degree, a Bachelor of Science (B.S.) degree, and a Master of Science (M.S.) degree in environmental science. These are designed so that each degree level flows seamlessly into and complements the next degree level.

These levels of study are designed to incorporate an increased understanding of the cultural and traditional framework within which the college, the community, and the Indigenous peoples of North America have interacted with nature and the environment. The environmental Science program therefore infuses cultural connection materials at all programmatic levels. The current review supports a needs to increase this infusion with Traditional Ecological Knowledge and Community Participatory Based learning practices, and specific courses that teach the Lakota/Dakota views of the environment, land, and resources.

SBC hired two full-time faculty members in 2023 and currently has five full-time environmental science faculty including four faculty from the departments of mathematics, general science, nursing, and Native studies, and an adjunct faculty, who teaches part-time within the Environmental Science Department. Three faculty members left the program during this review period: 1 retired and 2 resigned in 2023.

Grant funding is the major financial source for the program, providing salary and fringe benefits for science faculty, auxiliary science staff, and part-time science faculty in the associated programs. Grants also allow students and faculty to conduct active research projects and travel to conferences, international research sites, and field labs. Grant funds help sustain SBC's extension and STEM outreach activities.

The environmental science program has an active Advisory Committee of local stakeholders. Ideas provided by committee members are incorporated into the program whenever possible. Students have also done internships with committee members.

Of the faculty members who teach in the environmental science departmentthree have Ph.D. degrees and six have M.S. degrees. All faculty members in the department work together to ensure that course content meets the needs of the students and to avoid time conflicts among courses within the degree program. A fixed course schedule could be helpful to students in planning and managing their time.

Student evaluations and informal communication with students have prompted the department to make changes. In response to their needs, we have added evening courses and

explored online and hybrid formats. Yet, the low passing rates and a reevaluation of students' preferences reaffirm the importance of in-person science courses.

The faculty collects data each semester to assess the program's learning outcomes. The department also assesses learning outcomes at milestones within a student's degree program, ending with an end-of-program student presentation and evaluation.

The facilities that house the environmental science program are sufficient for the A.S., B.S., and M.S. degree programs. The SBC has classrooms that accommodate all students desiring to enroll in science courses. The laboratories include a GIS/physics lab, a biology lab, a chemistry lab, and an analytical chemistry lab which is state-of-the-art and certified as a water analysis lab by the United States Environmental Protection Agency. SBC recently completed the construction of a new building assigned to the ENS program that is dedicated to research capacity building and graduate work. The Graduate Research Center (GRC) provides more lab space, classroom/conference room space, and office space for research faculty and graduate students in the program.

A significant departmental change recommended by the Advisory Committee of local stakeholders at the fall 2023 advisory meeting was to explore online and hybrid options for the MS. program primarily to expand its students' threshold and increase potential hiring options in the program. The department is currently researching this option, and the SBC administration has recommended that the program conduct a feasibility study to ascertain the benefits and risks of such a move. The department will use the review to study trends in enrollment. It will design quality programs that meet the needs of students and the community and educate our students for jobs on and off the reservation. As environmental impacts continue to pressure the unique ecology of the Standing Rock Sioux Reservation, the faculty is committed to producing graduates who can meet the challenges of preserving and protecting this area.

PART I. PROGRAM DESCRIPTION

1. Role of Program within Sitting Bull College

The environmental science degree programs follow the Mission Statement of the program, which is:

> The environmental science program is designed to prepare students for employment or transfer to institutions of higher learning in such areas as wildlife management, environmental quality, and range and grassland management. Students who complete the program will have a solid, multidisciplinary understanding of environmental problems and solutions, and will be able to integrate the many different aspects of environmental science and relate the underlying scientific theory to how environmental issues affect our everyday lives.

The ENS mission remains in line with the SBC mission that states; "Sitting Bull College is committed to building intellectual capital through academic, career and technical education, and promoting economic and social development".

There are three distinct degrees within the Department of Environmental Science at SBC. The department offers students an A.S. degree, a B.S. degree, and a M.S. degree. Each of these degrees has its unique focus and requirements. The A.S. degree provides a solid foundation in environmental science, preparing students for entry-level positions or further studies. The B.S. degree offers a more comprehensive understanding of the field, suitable for those aiming for mid-level positions or advanced studies. The M.S. degree is a research-focused program, ideal for those seeking leadership roles or pursuing a Ph.D. All three of these degrees are designed to be conclusive by nature in that if a student desires to go to the workplace upon completion of one of the degrees, they will be qualified. In addition, the degrees are all designed to transfer directly into the next sequential advanced degree within the department if a student chooses to continue their education. Nearly all courses within the programs are transferable to other institutions of higher education that offer similar degrees in environmental science.

Throughout the program, students receive a combination of hands-on practical application learning to prepare them for immediate placement into the workforce, as well as a theory-based education that readies the graduates for continuing toward a more advanced degree. Many of those graduates who choose to immediately enter the workforce do continue their education toward a B.S. degree while working full-time on the Standing Rock Sioux Nation.

The uniqueness of the program in the sciences is in its requirement to incorporate cultural and traditional knowledge in all learning and teaching aspects of the program. The program infuses cultural connection pieces, sets, materials, and activities at the course level, student and faculty research level, program advisory level, and every professional and skill building opportunity levels

provided to students enrolled in the program. Emphasis on the views of the Earth and Science from an indigenous perspective through frameworks like the Traditional Ecological Knowledge and Community Participatory Based learning practices, are incorporated in the program. Although the focus is on Lakota/Dakota values, the program explores of equally rich cultures of indigenous communities in the Americas. .

Program outcomes for Associate of Science in Environmental Science:

The student will describe and show competency in the following areas associated with environmental science:

1. The proper use of environmental sampling equipment and current technology in the classroom and the field according to accepted "Standard Methods";
2. The ability to conduct field sampling and monitoring of air, water, soil, and biomass using appropriate sampling equipment according to accepted "Standard Methods";
3. The ability to conduct an environmental site assessment;
4. The ability to describe, orally and in writing, the similarities and differences between traditional and modern views of the Earth;
5. The ability to demonstrate an understanding of methodology in science research;
6. The ability to describe biological, chemical, and physical influences on environmental media;
7. The ability to describe transport mechanisms for contaminants as they travel through various environmental media; and
8. The demonstration of general knowledge of environmental issues and develops an understanding of environmental impacts resulting from human activities

Program Outcomes for Bachelor of Science in Environmental Science:

The student will describe and show competency in the following areas associated with environmental science:

1. The proper use of environmental sampling equipment and current technology in the classroom and the field according to accepted "Standard Methods";
2. The ability to design and conduct a field or laboratory study using appropriate sampling equipment and techniques according to accepted "Standard Methods";
3. The ability to describe the similarities and differences between traditional and modern views of the Earth;
4. The ability to describe biological, chemical, and physical influences on environmental media, including human health effects;
5. The ability to describe transport mechanisms for contaminants as they travel through various environmental media;
6. The ability to develop a professional research proposal and demonstrate the various steps of the scientific method in the design;
7. The ability to develop and present a professional research presentation and answer questions in an appropriate manner;

8. The ability to produce a final report of a research project that effectively provides a general narrative of the student's research;
9. The skill to integrate GPS/GIS technology into presentations; and
10. The competency of developing a wildlife conservation and management plan applicable to the needs of the Standing Rock Sioux Reservation and/or the Cheyenne River Sioux Reservation.

Program Outcomes for Masters of Science in Environmental Science:

The student will describe and show competency in the following issues associated with Environmental science:

1. The student will develop scientific critical thinking skills.
2. The student will demonstrate the ability to articulate knowledge of environmental science, methodologies, and policy both verbally and orally.
3. The student will synthesize a cogent research thesis inclusive of appropriate statistical analysis.
4. The student will demonstrate an understanding of Native Science as it relates to the Lakota/ Dakota culture while maintaining the balance with and the integrity of Western Science.

In addition to being consistent with the mission statement of the College, the Environmental Science degree programs are committed to ensuring that the course content and its delivery are congruent with the institutional outcomes that are as follows:

1. Students will display technical and critical thinking skills through effective oral and written communication.
2. Students will display leadership skills that promote ethical, responsible, dependable, and respectful behavior.
3. Students will develop work ethics and skills to function independently and cooperatively within a diverse work environment.
4. Students will demonstrate knowledge of past, present, and future Native American cultures.

In most of the courses in the Environmental Science program, students learn through multifaceted approaches that include both individualized learning, as well as learning through group participation in laboratory and field activities. This multilayered type of learning allows students to be leaders within the group setting, as well as work cooperatively to achieve the desired outcomes of the program's objectives. Students often present the findings of their activities orally and written through the use of PowerPoint and written documents to effectively demonstrate that they have developed an understanding of the Native American practices both historically as well as contemporarily as changes occur during this very dynamic time in the history for the First Nation's People of North America. All of these efforts instilled by faculty in the Environmental Science program guarantee that the College's institutional outcomes are met when students graduate from the program.

Environmental Science Degrees Offered

Sitting Bull College offers an Associate of Science (A.S.) degree, a Bachelor of Science (B.S.) degree, and a Master of Science (M.S.) degree in environmental science. The courses provided offer students the opportunity to complete any or all of these degrees. They are listed in the SBC Bulletin and include:

Associate of Science Degree

Core Requirements (32-33 credits)

BIOL 150	General Biology I
BIOL 224	General Ecology
CHEM 115/121	Introduction to Chemistry or General Chemistry I
ENS 113	Introduction to Environmental Science
ENS 202	Environmental Issues
ENS 225	Environmental Sampling
ENS 240	Environmental Statistics
ENS 260	Environmental Research Project I
ENS 261	Environmental Research Project II
ENS 297	Environmental Science Internship
ENS 299	Special Topics

Elective - (A total fo 3-4 credits)

ARSC 236	Introduction to Range Management
BIOL 240	Ethnobotany
ENS 216	Wildlife Management & Conservation
SOIL 210	Introduction to Soil Science

Bachelor of Science Degree

Core Requirements (39-40 credits)

ARSC 236	Range Management
BIOL 150	Biology I
BIOL 224	General Ecology
ENS 113	Introduction to Environmental Science
ENS 202	Environmental Issues
ENS 225	Environmental Sampling
ENS 240	Environmental Statistics
ENS 260	Environmental Research Project I
ENS 261	Environmental Research Project II
ENS 297	Environmental Science Internship
CHEM 115/121	Introduction to Chemistry or General Chemistry
CHEM 116	Introduction to Organic and Biochemistry
SOIL 210	Introduction to Soil Science

Electives 100+ Level

Professional Core Requirements (46 credits)

ATSC 110 Meteorology
ATSC 240 Meteorological Instrumentation
CHEM 403 Analytical Chemistry
ENS 301 Hydrology
ENS 311 Introduction to GIS/GPS
ENS 321 Environmental Chemistry
ENS 331 Wildlife Conservation
ENS 422 Environmental Toxicology
ENS 432 Aquatic Ecosystems
ENS 452 Science Literature
ENS 453 Environmental Law and Policy
ENS 493 Senior Research
MATH 314 Applied Statistics
SOIL 431 Soil Conservation and Management
Electives 300+ Level

Master of Science Degree

Core Requirements (26-29 credits)

ENS 500 Graduate Research Seminar
ENS 511 Advanced Experimental Design
ENS 515 Advanced Statistics
ENS 520 Advanced Techniques in GIS
ENS 542 Environmental Policy & Resource Management
ENS 545 Applying Dakota/Ochethi Sakowin Culture to Environmental Science
ENS 550 Conservation Biology
ENS 600 Research and Thesis

Specialization/Emphasis Courses (At least 12 credits)

ATSC 520 Atmospheric Chemistry
ATSC 528 Atmospheric Data Analysis
ATSC 535 Measurement Systems
ATSC 565 Air Quality
ENS 522 Advanced Remote Sensing and Digital Image Processing
ENS 530 Limnology
ENS 532 Watershed Analysis
ENS 552 Avian Ecology
ENS 554 Grassland Ecology
ENS 556 Ecology of Invasive Species
ENS 558 Restoration Ecology
ENS 560 Advanced Water and Soil Biogeochemistry
ENS 562 Microbial Ecology
ENS 570 Climate Change

ENS 572	Environmental Water Quality
ENS 580	Advanced Water Sampling Techniques

It is important to note that:

i. All curricular outcomes are taught to the students during the various courses they take within their degree programs
ii. Each outcome is assessed either at milestone courses or at the completion of the student's respective degree
iii. ENS 545 (Applying Dakota/Ochethi Sakowin Culture to Environmental Science) is offered at the MS level to enhance understanding of Native Science as it relates to the Lakota/ Dakota culture.

The format of the degree curriculum was first developed in 1996 when the A.S. degree was approved and was part of the first major grant that funded program inception. The Model Institutes of Excellence (MIE) National Science Foundation (NSF) grant provided funding that allowed the College to hire one faculty member who was designated as the individual to develop the A.S. degree in Environmental Science. That faculty member is still employed at SBC. There have been minor changes to the program's curriculum over the past 28 years, however, much of the original course listings are still in place. This original approach was translated and enhanced during the development of the B.S. curriculum in 2007, and the development of the M.S. curriculum in 2012. The degree plans are designed to meet the needs of employers on the Standing Rock Sioux Nation by providing graduates with a background in science, technology, engineering, and mathematics (STEM) disciplines, writing proficiency, and cultural literacy. Over the years, the curricular changes have matched not only the College's institutional outcomes but also the needs of the Standing Rock Sioux Nation at specific times.

No changes in the Environmental Science program occurred during the program review reporting period. Beyond adding Atmospheric Science (ATSC) courses to meet the Air Quality specialization requirements, the program has been relatively unchanged. However, anecdotal evidence from students shows that a strong desire to learn Traditional Ecological Knowledge (TEK) about the culture and science of the First Nation's People of the area is present. It is anticipated that a request for curricular changes will occur within the next couple of semesters to meet the needs and desires of the students in the program.

Program Areas of Study Offered

The main areas of study within the program can be divided into Ecology, Environmental Quality and Resource Management. Within these three categories students can focus in the following emphasis areas:

- Air Quality
- Aquatic ecology
- Climate change
- Ethnobotany
- Forest ecology

- Gardening
- Grassland ecology
- Insect ecology
- Microbial ecology
- Natural resources management
- Soil ecology
- Water Quality
- Wetland ecology
- Wildlife ecology

These areas of emphasis in the program are available at all degree levels. The areas are a reflection of the courses offered to students by the program in the last five years. They are also an indication of the areas where students acquired sufficient training and skills to complete research projects as a requirement for their degree. A limited number of these study areas can be offered each year because it is heavily dependent on a number of factors. Availability of qualified faculty to teach and mentor students in that area of emphasis at any given time is a main factor. The development of courses to cover the required skills needed for the area is another factor. Study areas in the program are typically identified by the types of electives offered in the academic year. This in turn has an effect on student selection of research interest areas and the types of research projects completed by students in the program. The availability of resources for teaching and training also contribute to the number of areas that can be taught at any given time

2. Program Staff

The primary faculty members who currently teach courses for the degree programs in environmental science are as follows (curriculum vitae and resumes are on file in the SBC Business Office for additional information regarding each instructor's specific areas of expertise):

- Aimee Sippel, M.S., Biology Instructor – Full Time 15 credits/semester. Undergraduate and graduate degree from South Dakota State University, Brookings, South Dakota. Her areas of study were Biology and Microbiology. She has taught full-time at Sitting Bull College since the 2023-2024 academic year and, before her employment with Sitting Bull College, had a 20-year tenure at Presentation College as an Assistant Professor until the college's closure in 2023. Aimee's academic career has been primarily focused on teaching biological science courses with laboratory components. Aimee's research experience began at the South Dakota Animal Disease Research and Diagnostic Laboratory in the PCR Laboratory. She was employed at Intervet Animal Health in Dallas Center, Iowa, working on swine vaccines and at Benchmark BioLabs in Lincoln, Nebraska. She earned her master's degree from SDSU, with her research focusing on developing a real-time PCR assay to detect and

quantify Porcine Respiratory and Reproduction Syndrome Virus (PRRSV) in tissue, semen, and serum samples. Her research led to a patented assay manufactured and distributed by TetraCore, Inc. This blend of animal study and molecular research has been instrumental in shaping her career and appreciation of the collaborative nature of research. She appreciates the skills and opportunities gained through undergraduate research opportunities, especially in underserved areas where students have limited exposure to a variety of STEM careers. Aimee is currently involved with the North Dakota INBRE Mosquito project where she will be responsible for the work being done around Standing Rock reservation.

- Dan Buresh, Ph.D., Environmental Science Instructor – Full time 15 credits/semester. Dan has a Bachelor of Science (B.S.) degree in Environmental Health, a Bachelor of Arts (B.A.) degree in Native American Studies, and a Doctor of Philosophy (PH.D.) in Public Health (Environmental Science emphasis) with Ph.D. minors in Occupational Safety, as well as in Environmental Engineering. Dan has been a faculty member at Sitting Bull College since 1996. He teaches courses in hydrology, aquatic ecosystems, ecology, and environmental science. In addition, Dan has recently been part of curricular changes that include the addition of courses related to indigenous science into the 2-year and 4-year degree plans in the Department.
- Donna Knutson, M.S., Chemistry Instructor – Full time 15 credits/semester
  Donna has solid academic and teaching credentials at the K12 and college level spanning more than 3 decades. She has an undergraduate degree in Biology (B.S.), and a graduate degree in Teaching Science (M.A. Chemistry emphasis). Donna serves as the chemistry instructor , and the director of the water quality laboratory at SBC. This places her as an important connector between academic, research and business in the community and the college. Prior to joining SBC, Donna worked for many years as a science teacher for multiple K12 districts including Fort Yates (1989=1999), Bismarck public schools (1991-2013), and Century high school (2013-202023). Her deep academic experience allows her to teach all the chemistry courses, and other environmental courses in the program with a strong chemistry requirement. Donna will also be involved with research activities and mentorship activities for students learning how to operate anaylirtcal instruments in the laboratories.
- Francis N. Onduso, Ph.D., Genomics Instructor- Full time 15 credits/semester. Francis joined SBC in 2016 with responsibilities to teach courses in the biological sciences area. He holds undergraduate and graduate degrees in forest ecology , forestry, and plant dynamics. He has taught a many interdisciplinary courses due to his diverse background. Francis has taught the following courses: restoration ecology, conservation biology, experimental design statistics, agroforestry, principle of biology, botany, range management, microbiology, toxicology, genetics. His research interest are in agroforestry, botany, fire ecology, and genetics, mycology, silviculture, and

ecology. Francis is very active in faculty-ld research and has produced over 3 peer-reviewed research papers from the work he has completed on Standing Rock.

- Mafany Ndiva Mongoh, Ph.D., Science Instructor – Full time 15 credits/semester. Mafany holds undergraduate and graduate degrees from the University of Buea, Cameroon (BSc.. Geography/Environmental Science), and North Dakota State University, Fargo (M.S. and Ph.D. in Natural Resources Management), respectively. He also holds a doctoral minor in Statistics from North Dakota State University. He has been with the program since the 2007-2008 academic year when he joined as a postdoctoral teaching fellow. His area of expertise is Natural resources management with a disease management emphasis. His interdisciplinary academic preparation enables him to teach courses in many emphasis areas in the environmental sciences covering the biological, physical and social science focus areas of the program. Mafany has research interests in climate science, indigenous ecology, microbial ecology, animal disease epidemiology, and STEM outreach. He has served as the senior level research advisor for the ENS program, and he is active in building research capacity at SBC. He also coordinates activities of the ENS graduate program. Mafany serves as a research compliance officer for SBC and Standing Rock Sioux Tribe where he is the IRB administrator and chair. He sits on the NDSU IACUC board as the SBC representative.

Additional faculty members who taught courses within the environmental science department include:

- Bruz Van Dusen, M.S., GIS Instructor – Adjunct Full time 3 credits/semester
- Blake Sorenson, M.S., Atmospheric Science Instructor – Adjunct Full time 4 – 3 credits/semester
- Jared Marquis, M.S., Atmospheric Science Instructor – Adjunct Full time 4 – 3 credits/semester
- Michael Moore, M.S., Native American Studies Instructor – Full time 6 credits/semester
- Tim Krahler, M.S., Mathematics and Statistics Instructor – Full time 3 – 6 credits/semester

Graduate Students who served on teaching assistantships:

- Jaimie Archambault, Graduate Teaching assistant – Part time 2 Credits/semester
- Kimberlee Blevins, Graduate Teaching assistant – Part time 2 Credits/semester
- Floris White Bull, Graduate Teaching Assistant – Part-time 2 Credits/semester
- Samantha Borah, Graduate Teaching Assistant – Part-time 2 Credits/semester

Faculty members who retired and resigned during the reporting period are:

- Gary Halvorson, Ph.D., Chemistry Instructor – Full time 15 credits/semester (2001 – 2023) . Gary taught chemistry, agriculture and soil science courses at SBC. He served as the administrator and director of the EPA certified water quality laboratory at SBC. Gary was actively involved in STEM outreach efforts and for many years as the main contact for STEM,K12 contact for SBC. He also served as the main grant writer for the program and was instrumental in bringing major grants to the college from many funding agencies.

- Joshua Mattes, Ph.D., Statistics Instructor – Full time 3 credits/semester (2014-2022). Josh was hired as the pre-engineering instructor at SBC under a PEEK grant. Upon completion of the grant, he shifted his focus to teaching mathematics and statistics courses at SBC. He also maintained a plethora of courses which were still being taught under the pre-engineering consortium formed by the North Dakota Tribal Colleges.

- Renae Schmitt, M.S., Environmental Science Instructor – Full time 15 credits/semester (2013 – 2023). Renae was hired to teach core courses in the program. She served as research advisor for the 2-year program level and was responsible for internship program placement with potential employers for the program. She was the lead faculty tasked with conducting feasibility studies for the program.

The program's non-faculty personnel:

The program uses students especially graduates to assist in the laboratories. There is a need for at least one permanent laboratory technician to help manage and set up both research and teaching labs.

3. Program Productivity (AY2019-2020 to AY 2023-2024)

Program

Table 1. 2019-2023 Enrollment Data

Degree Program	Sp 19	Fa 19	Sp 20	Fa 20	Sp 21	Fa 21	Sp 22	Fall 22	Sp 23	Fa 23
Associate of Science	9	12	6	9	5	12	13	17	11	12
Bachelor of Science	5	10	6	5	4	1	3	3	5	6
Master of Science	1	0	1	3	2	2	2	3	3	2
Total (ENS)	15	22	13	17	11	15	18	23	19	20
Percent to SBC Enrollment	6%	7%	5%	7%	5%	6%	7%	9%	8%	7%
Total (College)	271	300	272	236	210	268	273	265	253	273

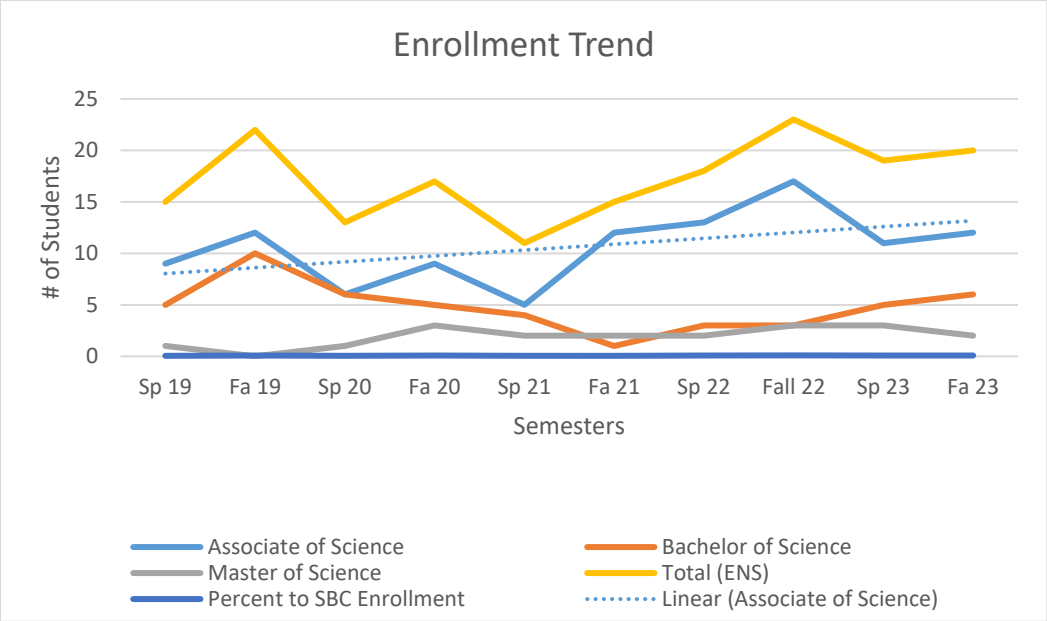

Figure 1. 2020-2023 enrollment trend data

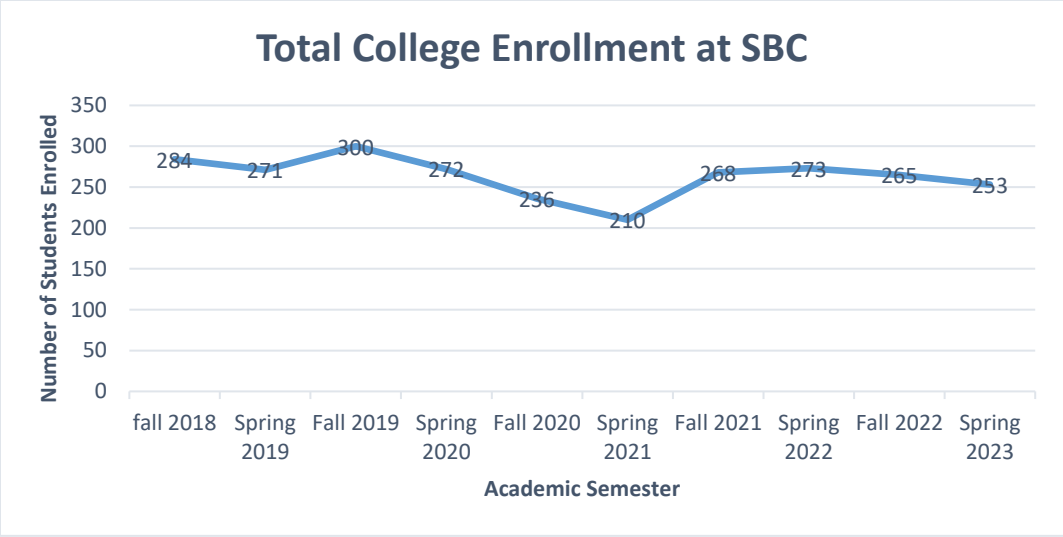

Figure 2. Sitting Bull College Total Enrollment Trends Fall 2018 – Spring 2023.

Analysis

The Environmental Science program has seen a fluctuation in the number of students during the reporting period with a low enrollment number of students in single digits for certain degrees and high numbers for other degrees. Enrollment in some program degrees was stable with

minimal fluctuations. However, during the reporting period, the trend in enrollment for the A.S., B.S., and M.S. degrees continued to skew upwards. The ENS program is not the largest program at SBC. Within the program, the A.S. degree has more than 60% of enrolled students within the program. The B.S. remains the second highest in the program. The B.S. heavily relies on students in the AS program level to transition from the 2-year program to the 4-year program. So enrollment impacts affecting the A.S. program have a direct effect on the B.S. program. Some of the trends observed can be attributed to students being off-cycle to transition smoothly into the program. In fact, there was a high A.S. graduation number in the spring of 2018.

In order to understand enrollment trends in the ENS program, an understanding and assessment of overall enrollment at SBC must be conducted (Figure 2). The overall enrollment at SBC was fairly stable over the reporting period with a high number of enrollees in the Fall of 2019 (300 students) and a low number of students enrolled in the Spring of 2021 at 210 (Range = 90). Figure 2 identifies this trend and the ENS enrollment trend is not far off the college-wide trend for its degrees having more than 10 students.

The Environmental Science A.S. degree has seen a fluctuation in the number of students with a low enrollment number of five students in the Spring of 2021 and a high enrollment number of 17 in the Fall of 2022 (Range = 12). Although the number of students enrolled in the degree are not high, the trend seems to be in the right direction with the four of the five highest enrollment numbers coming in three of the last four years of this reporting period (Figure 1). In addition, the overall enrollment trend for the Environmental Science A.S. degree is in a positive direction with an increasing trend since Fall 2018. This trend is in contrast to the overall SBC total enrollment trend and the associates level enrollment trends for the college, which show a slight downward trend in numbers over the program review period (Figure 3). The total number of students enrolled in all A.S. /A.A. degrees at SBC had a fairly stable enrollment with a high number of enrollees in the Fall of 2019 (204 students) and a low enrollment of 124 students in the Spring of 2021 (Range = 80).

The percentage of Environmental Science A.S. students was very low compared to the overall number of SBC students enrolled from the Fall of 2018 – the Spring of 2023, however, the trend is positive with the four highest percent of overall enrollment being seen in the last four semesters of the program review reporting period (Figure 4). The same trend holds true when the percentage of Environmental Science A.S. enrollees is compared to the overall SBC A.S. /A.A. enrollment with the Environmental Science A.S. student percent makeup.

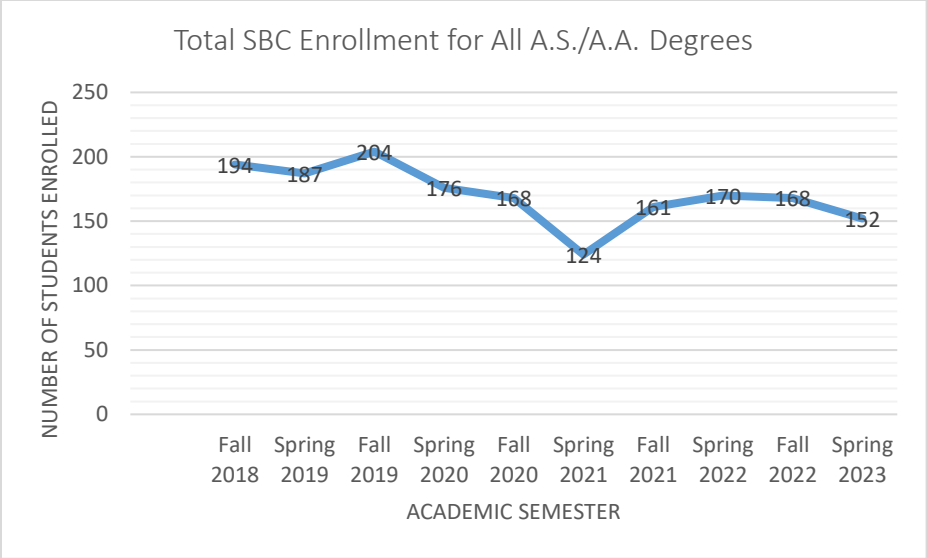

Figure 3. Sitting Bull College A.S. /A.A. Enrollment Trends Fall 2018 – Spring 2023.

The number of environmental science students enrolled in the B.S. degree program was generally on the decline but started picking up in the fall of 2017. The decline was due to students on academic suspension. The percentage of Environmental Science B.S. students was very low compared to the overall number of SBC students enrolled during the reporting period, however, the trend is positive with more enrollment being seen in the last two semesters of the program review reporting period (Figure 1). This is highly correlated with graduation rates at the A.S. level of the program with more and more students opting to continue into the B.S. level of the program.

The first cohort began the degree program in Environmental Science in the fall of 2014. The enrollment remained low but stable.

In the last five years, about 53.8% of environmental science students have moved from the A.S. to the B.S. degree program, and about 10% from the B.S. to the M.S. program. The department would like to see an increase in the number of students transferring in from other colleges to complete their B.S. and M.S. degrees in environmental science at SBC. Within the reporting period, all M.S. program applicants who did qualify for direct admission were still admitted but with conditions. The Graduate Record Examination (GRE) score, Grade Point average (GPA), and three letters of recommendation are the main considerations during the M.S. admission process.

The recruitment plan to entice students from other colleges that have only an A.S. and or B.S. degree in environmental science is being put into place. Dr. Mongo prepared fliers that are being distributed during major events within the Standing Rock Sioux Reservation (SRSR). However, there is a need to continue encouraging student transfers to higher degrees within the

department. The department is planning vigorous recruitment campaigns both within and outside SRSR through actual visits, radios, and advertisements in journals such as the Tribal College Journal and Indian Country Today among others.

Enrollment Trend by Gender

Table 2. ENS 2019-2023. BS and MS Enrollment by Gender and Semester Data

Degree Program		**Sp 19**	**Fa 19**	**Sp 20**	**Fa 20**	**Sp 21**	**Fa 21**	**Sp 22**	**Fa 22**	**Sp 23**	**Fa 23**
Bachelor of Science	**Male**	2	3	1	2	2	0	3	3	5	3
	Female	4	7	4	4	3	1	3	2	5	4
Master of Science	**Male**	1	0	0	1	0	0	0	0	2	0
	Female	0	0	2	2	2	2	3	3	2	2
Total (ENS BS & MS)		7	10	7	9	7	3	9	8	14	9
Percent to SBC enrolment		3.85 %	3.58 %	2.57 %	3.81 %	3.33 %	1.12 %	3.30 %	3.02 %	5.53 %	3.30 %
Total (College)		182	279	272	236	210	268	273	265	253	273

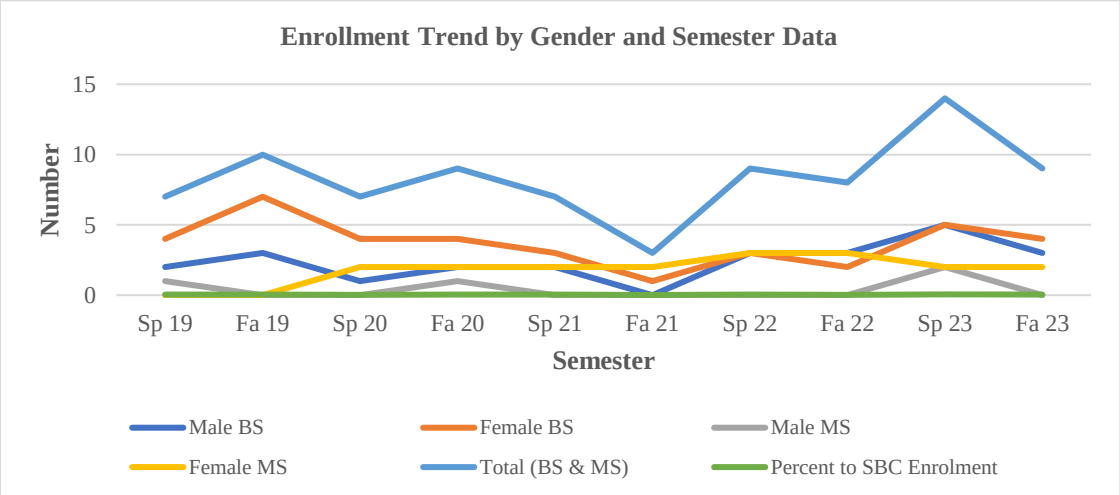

Figure. 4. Enrollment Trend by Gender42

Analysis

At the B.S. level, female enrollment has remained higher than male except in fall 2022. This trend is the same at the M.S. level except in spring 2019 when female enrolment was zero (Fig. 2 and Table 2). Female enrollment is generally doubling male enrollment and generally remained higher than male enrollment at both graduate and undergraduate levels and maintains the lead to date. Female enrollment remains stable at the M.S. level. The department has not yet established the cause of the above trends. In conclusion, there is a general downward trend in enrollment. There is a need to look into ways of increasing enrolment, especially for males**.**

ENS Program Graduation Rates

Although the trends in the number of students enrolling in the Environmental Science program seem to be in a positive direction, the number of students is still low. In addition to the low numbers in the enrollment, the number of students completing the degree requirements and graduating was very low with no year having more than four students graduating at any level during the program review reporting period. The percentage of graduates who earned an A.S. degree in Environmental Science never exceeded six percent during any of the years of this program review period (Table 3a). This also holds true for graduation numbers in the B.S. and M.S. programs (Table 3b)

Table 3a. Environmental Science A.S. Degree Graduation Data.

	Graduation Rates for Human Service Technician Program				
Graduates	**2018-2019**	**2019-2020**	**2020-2021**	**2021-2022**	**2022-2023**
ENS A.S.	3	1	2	3	4
Total SBC	72	70	50	64	67
Percentage	4.17%	1.42%	4.00%	4.69%	5.97%
Number (percent) of Graduates Moving into ENS B.S. at SBC					

	1 (33%)	0 (0%)	1 (50%)	1 (33%)	3 (75%)

Table 3b. ENS 2019-2023. BS, MS, and Other SBC Departments Graduation Data

Year	ENS			Other SBC Departments
	BS	MS	Sum	Sum
2019	5	0	5	67
2020	1	1	2	68
2021	0	0	0	50
2022	0	0	0	64
2023	1	0	1	58
Sum	7	1	8	307
ENS BS and MS proportion to other SBC Departments	2.28	0.33	2.60	

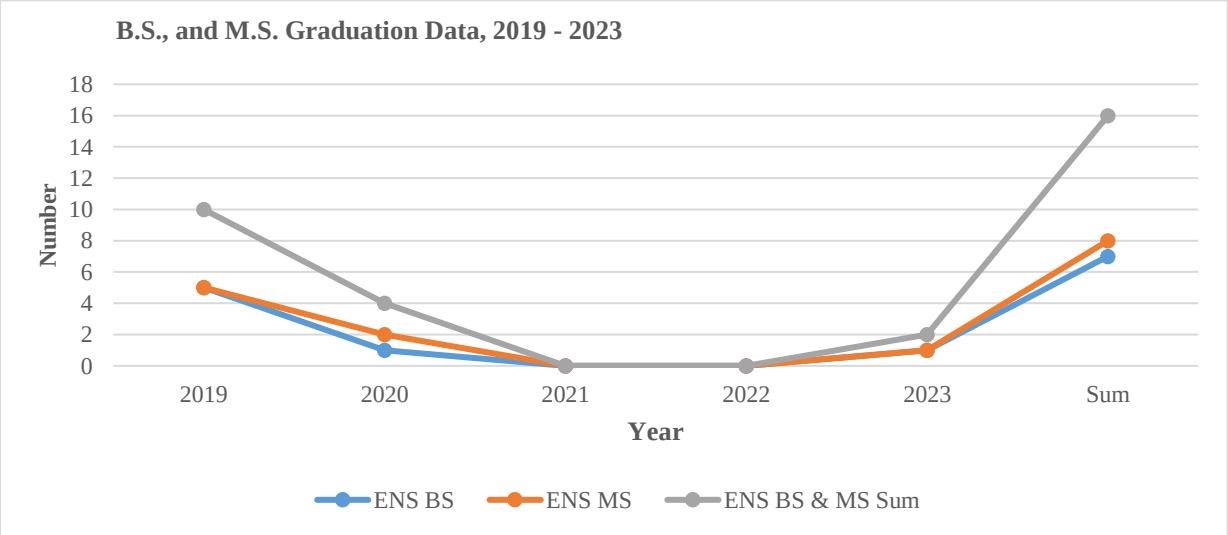

Figure 5. B.S., and M.S. Graduation Data, 2019 - 2023

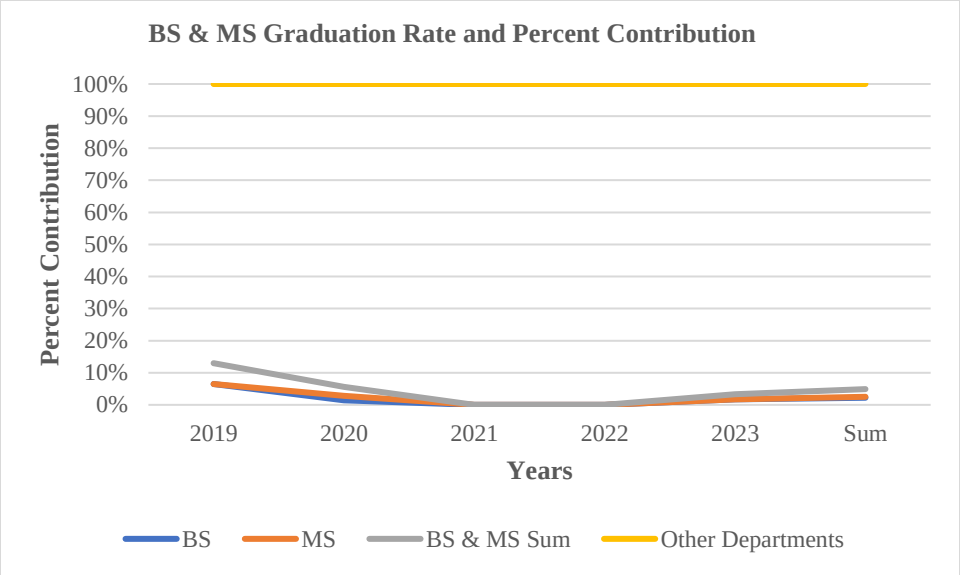

Figure 6. BS & MS Graduation Rate and Percent Contribution

Analysis

The graduation trend was not stable for Environmental Science degrees. Environmental Science graduation rates contribution to the SBC pool is about 5% and the 2023 value indicates that graduation is on the decline (Table 3a and 3b, and Figure 5). A total of 13 students graduated in the A.S. degree level, sevenstudents graduated with B.S. degrees, and one student with an M.S. degree in environmental science during the reporting period. The graduation trend was not stable for all degree levels. Environmental Science B.S. and M.S. graduation rate contribution to the overall rate at SBC was about 14% in 2019 but only 05% in 2023. This indicates that the contribution is in the decline (Table 3b and Figure 6).

What is possibly more disturbing than the low number and percentage of graduates in the Environmental Science program is the strikingly low number of graduates that chose not to continue their education at SBC working toward the B.S. degree or the M.S. degree in Environmental Science. Of the 13 students who finished the requirements for their A.S. degree in Environmental Science, only seven (53.8%) of those students decided to continue working toward their B.S. in Environmental Science at SBC (Table 3a). Of the six that did not continue their education working toward the B.S. degree in Environmental Science at SBC, four chose a different college or different program to complete their B.S. degree, and two chose to finish their education at the two-year level. The data is even more striking at the B.S. to M.S. transition levels. Only five students (2 admitted and 3 not admitted into the M.S. level) chose to pursue a higher degree level at SBC.

There is only anecdotal evidence from the graduates as to why they chose a different college or program for their continued educational needs, as well as for the students who stopped after the A.S. degree or B.S. degree completion, however, a full, scientific study needs to be

conducted to ascertain the causes of such low movement from the A.S. into the B.S. Environmental Science degree program at SBC.

The environmental science program is looking into ways to increase the graduation rates. Some proposed ways are to promote student-tailored research projects, provide diverse internship opportunities, and develop new courses based on the community and job market demands.

Program Student Retention and Persistence

Table 4. Environmental Science Department B.S., and M.S. Programs Student Retention (Percent)

Program	2019-2020	2020-2021	2021-2022	2022-2023	2023-2024	Average
BS	75%	20%	100%	100%	83%	75.6%
MS	100%	67%	100%	100%	100%	93.4%
Average	88%	43%	100%	100%	92%	84.6%
Overall -SBC	65%	61%	66%	79%	76%	69.4%

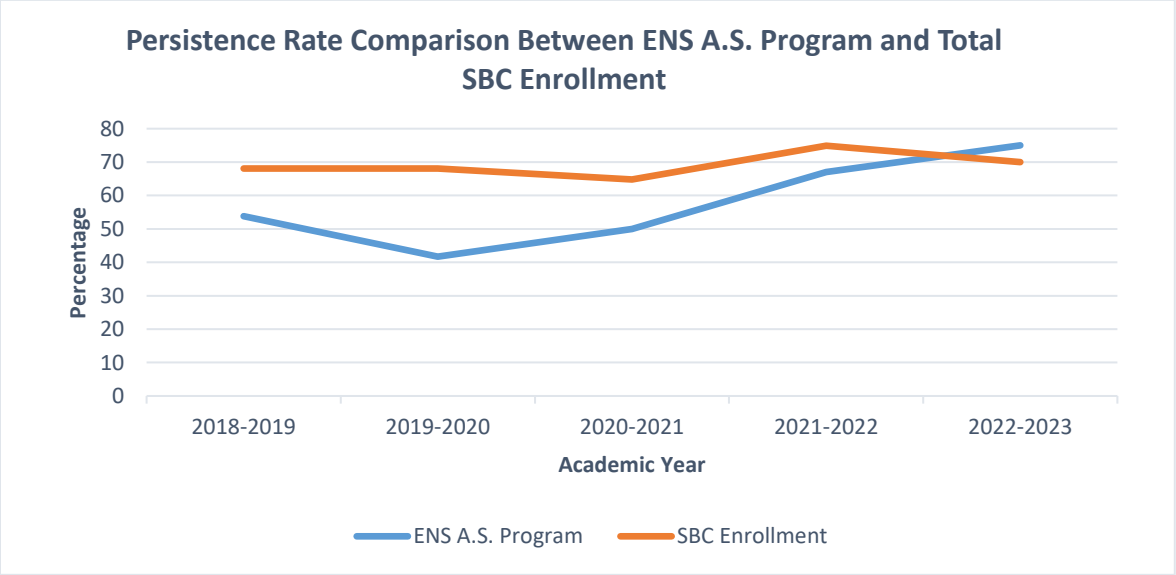

Figure 7a. Environmental Science Persistence Rate Compared to Total SBC Population

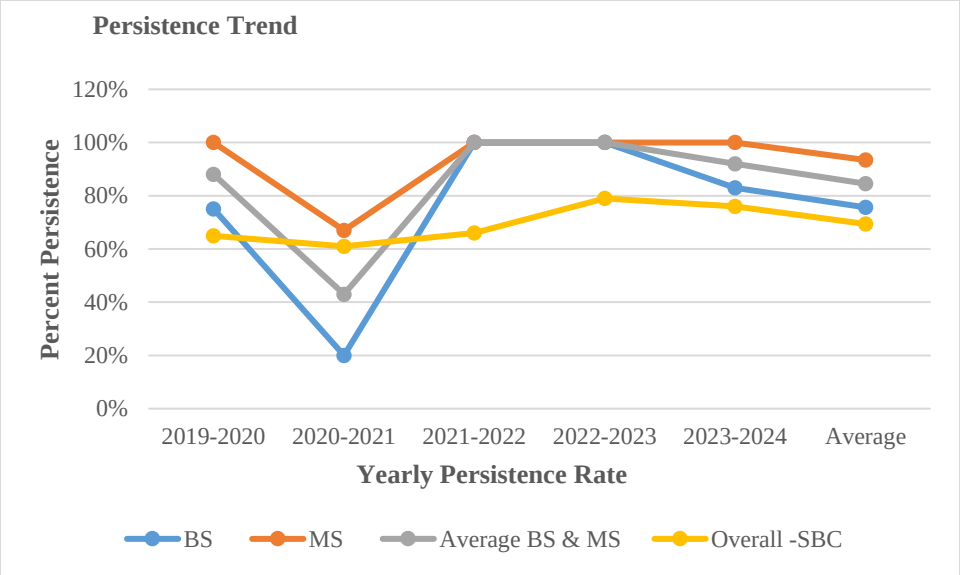

Figure 7b. Environmental Science B.S. and M.S. Persistence Trend Rate Compared to Total SBC Population

Analysis

Drawing the line of best fit, the persistence was on the increase in the program overall. Since the Environmental Science program has a low number of students enrolled in the program, it is of utmost importance to maintain students' enrollment from one semester to the next, as well as from one academic year to the next until the completion of their degree. The persistence rate for the Environmental Science A.S. and B.S. degree levels in the program was slightly worse than the overall persistence rate for SBC (Figure 7a and Figure 7b). The rate for the M.S. degree level was high throughout the reporting period after a dip in the second year of reporting. However, as the persistence rate for the college as a whole is fairly stable, the trend for the Environmental Science program was in a positive direction during the program review reporting period. In fact, for the last semester of the reporting period, the persistence rate exceeded that of SBC's overall persistence rate by a small amount.

M.S. degree level remained above the college's value throughout the review period (Figure 7b). However, the B.S. persistence rate was lower than the SBC average persistence in the year 2020-21 (Figure 7b).

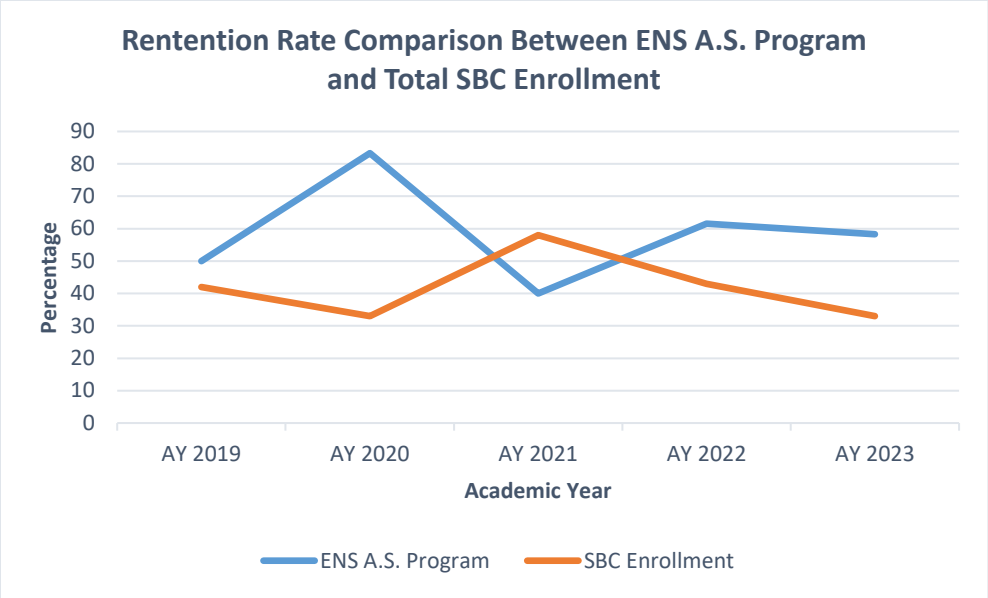

Figure 8a. *Environmental Science A.S. Retention Rate Comparison with SBC Population.*

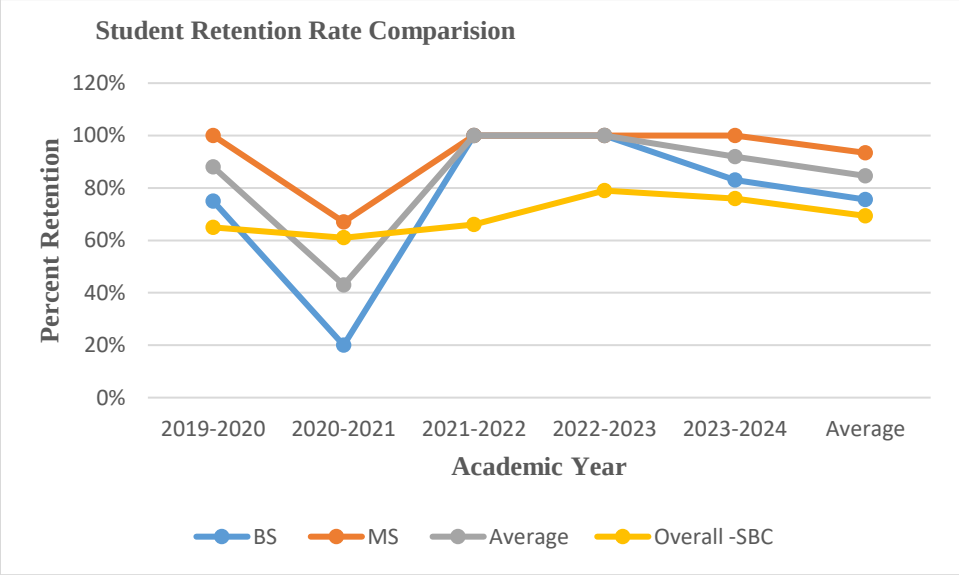

Figure 8b. *Environmental Science B.S. and M.S. Retention Rate Comparison with SBC Population*

Analysis

The retention of students from one year to the next is also critical for maintaining a functional academic program. The Environmental Science A.S. program had a retention rate higher than that of the overall SBC retention rate in all but one of the years during the program review reporting period. Figure 7 shows that only during the COVID year between the Spring Semester of 2020 and the Fall Semester of 2021 was the retention rate lower in the Environmental

Science A.S. program than it was for the college as a whole. While more analysis of the reasons why the irregularity occurred during that time, through anecdotal evidence of student responses, there appears to be a relationship between hands-on learning that normally occurs during the Environmental Science A.S. degree program and the online format that was instituted as a result of the COVID-19 pandemic that resulted in limited contact and limited hands-on opportunities for students to learn.

There is a general increase in retention rates for B.S. and M.S. degree-seeking students, However, when examining the retention rates, following students from one academic year to the next, the M.S. program has always exceeded the retention rate of SBC as a whole (Figure 6). However, B.S. degree-seeking student retention remained the lowest in the 2020/21 academic year. This was due to students who were on academic probation and suspension.

The Environmental Science Department is happy with the retention but concerned with the low number of enrolled students at both the B.S. and the M.S. degree levels. The department would like to see at least 12 students in B.S. degree programs and at least 6 in the M.S. program in the next review period.

Environmental Science Program Enrollment, Graduation, Transition, and Employment

1. A.S. Degree

Table 5a. Environmental Science Program Enrollment, Graduation, Transition, and Employment (A.S. Degree).

A.S. Degree	2019-2020	2020- 2021	2021-2022	2022-2023
Enrollment	18	14	25	28
Graduated	1 (5.5%)	2 (14.2%)	3 (12%)	4 (14.2%)
Transitioned to Higher Degree	0 (0%)	1 (50%)	1 (33.3%)	3 (75%)
Employed	0 (0%)	0 (0%)	1 (33.3%)	0 (0%)

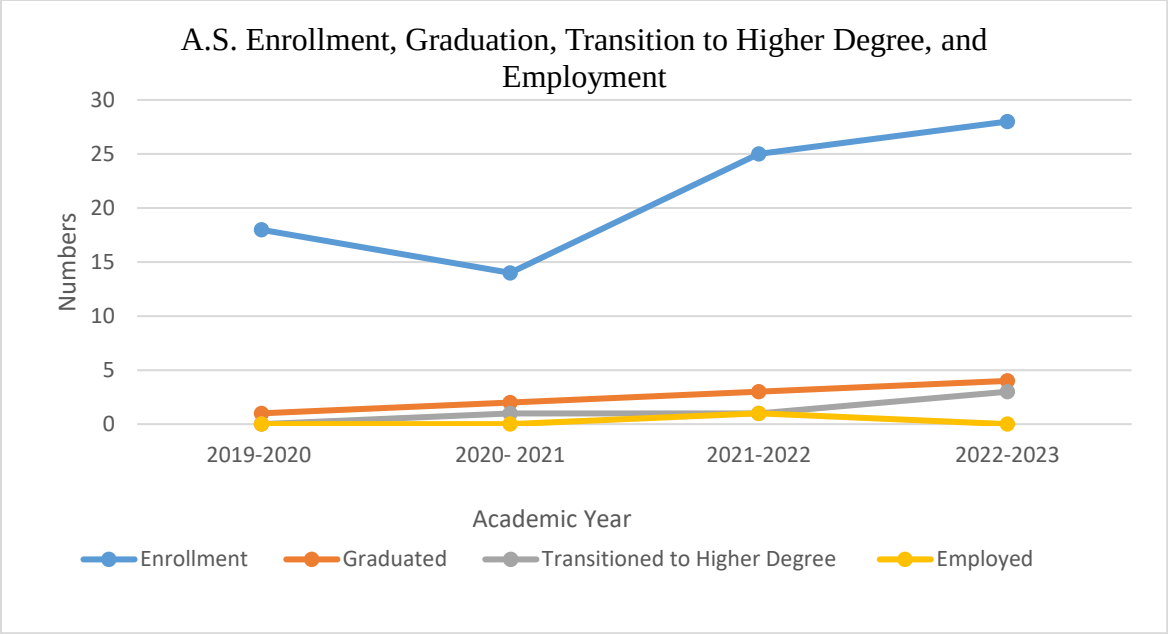

Figure 9a. A.S. Enrollment, Graduation, Transition to Higher Degree, and Employment

Analysis

Enrollment in the environmental science A.S. degree took a slight dip but has steadily been increasing. As explained in previous sections of the review and looking at the data provided, the program has low graduation and transitions to higher degree levels during the reporting period. This is also vied when we look at the extremely low employment rates.

Anecdotal evidence will suggest some level of dissatisfaction with student experience at the A.S. level which may not encourage them to continue beyond that level within the program. There is a need for serious re-evaluation of foundational outcomes of the degree level if students feel they probably are not equipped to continue to higher degree levels. This same reasoning path needs to be applied to finding out why students who graduated from the program and did not opt to continue their education could not find jobs in the community with their degrees.

2. B.S. Degree

Table 5b. Environmental Science Program Enrollment, Graduation, Transition, and Employment (B.S. Degree).

B.S. Degree	2019-2020	2020- 2021	2021-2022	2022-2023	2023-2024
Enrollment	16	11	6	11	17
Graduated	5	1	0	0	1

	(31%)	(09%)	(0%)	(0.1%)	(6%)
Transitioned to a Higher Degree	2 40%	1 (100%)	0 (0%)	0 (0%)	1 (100%)
Employed	0 (0%)	1 100%	0 (0%)	0 0%	0 (0%)

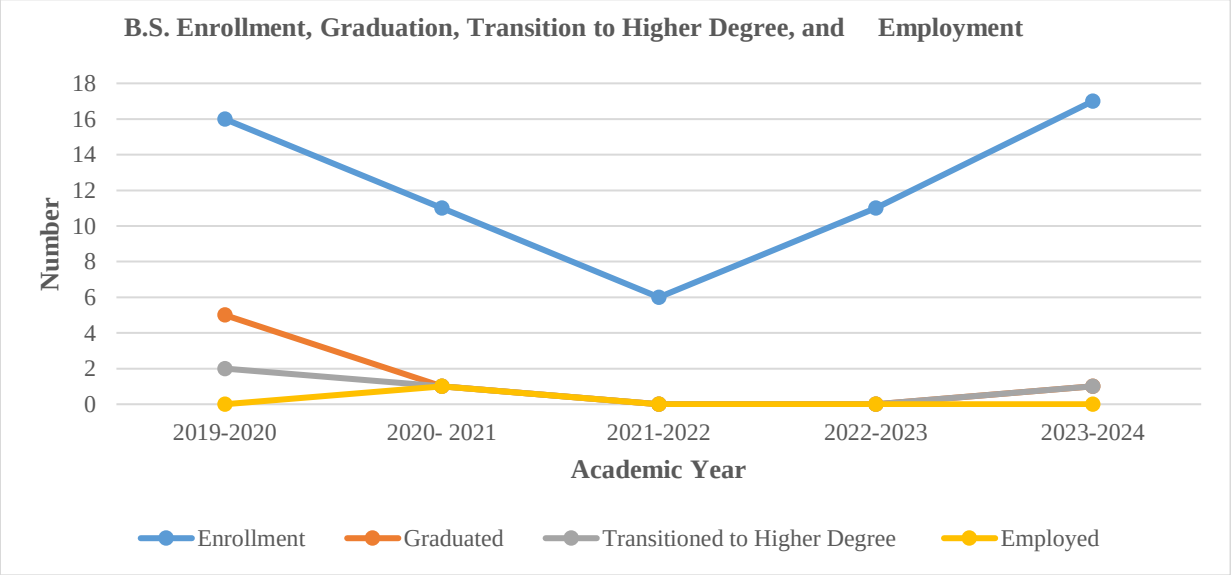

Figure 9b. B.S. Enrollment, Graduation, Transition to Higher Degree, and Employment

Analysis

Initially, enrollment in the environmental science B.S. degree was on the decline, hitting the nadir in AY 2021 (Table 5b and Figure 9b). However, a steady increase has been registered since then. The graduation, transition to a higher degree, and employment rates generally remained stable through the review though at a lower number.

3. M.S. Degree

Table 5c. Environmental Science Program Enrollment, Graduation, Transition, and Employment (M.S. Degree).

M.S. Degree	2019-2020	2020- 2021	2021-2022	2022-2023	2023-2024

Enrollment	**1**	**5**	**4**	**6**	**4**
Graduated	**0 (0%)**	**1 (20%)**	**0 (0%)**	**0 (0%)**	**0 (100%)**
Transitioned to a Higher Degree	**0**	**1**	**0**	**0**	**0**
Employed	**0 (0%)**	**0 (100%)**	**2 (0%)**	**0 (0%)**	**1 (0%)**

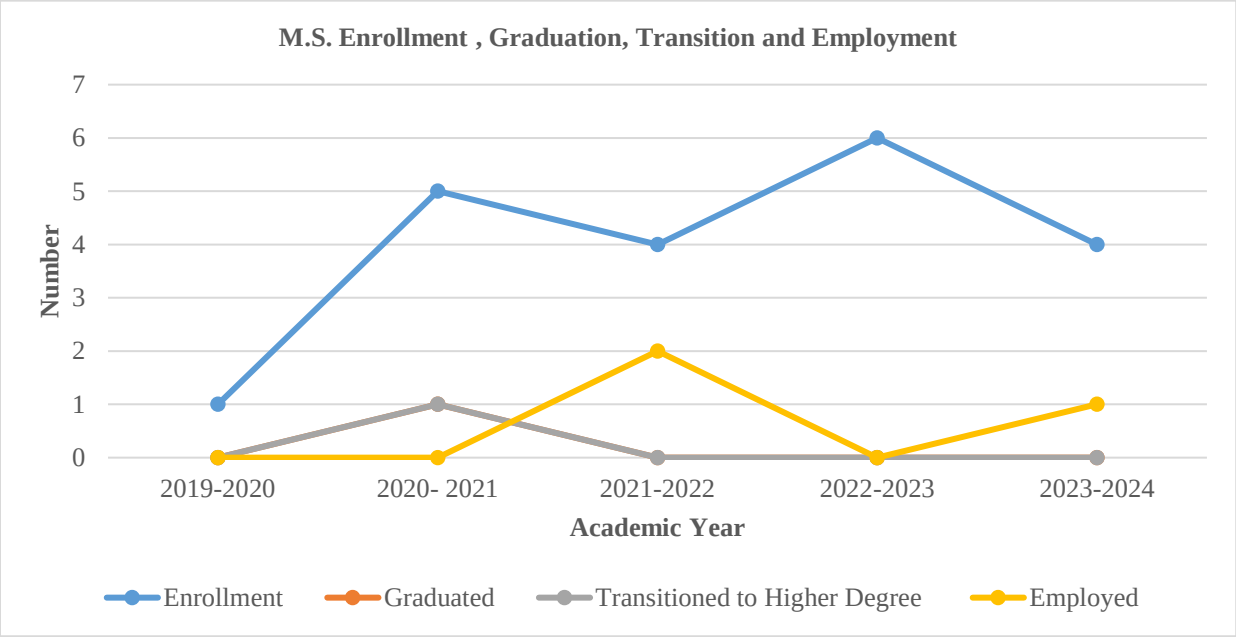

Figure 9c. M.S. Enrollment, Graduation, Transition and Employment

Analysis

The third cohort was enrolled in AY 2019. Enrollment in the M.S. degree program in Environmental Science at SBC remained low but the graduation rate is stable. Enrollment numbers reflect the merit-based approach adopted by the graduate program in its decision to admit students into the program. Given the M.S degree prioritizes the quality of the applicants over the need to have a large pool of students, there is a high number of students who apply and are not admitted into the program due to its selective nature. The employment rate for the M.S. graduates was 100%, while the transition to higher degree (Ph.D.) remained low (Table 5c and Figure 9c). All that graduated plus ungraduated were employed. Environmental science faculty members will continue encouraging the M.S. graduates to pursue higher degrees.

Environmental Science Program Courses Offered

The department is responsible for the majority of STEM courses offered at the college. Several courses are therefore offered to both environmental science majors and students who need a science course. The typical course areas for the program will include Environmental Science (ENS), Biology (BIOL), Chemistry (CHEM), Geology (GEOL), Microbiology (MICR), Physical Science (PHYS), Soil Science (SOIL), and Agriculture (ARSC, AGEC). During this reporting period, the program was approved by the curriculum committee to offer courses in Atmospheric Sciences (ATSC). These course areas are offered at the associate's, bachelor's, and master's level of the program.

The department also offers courses to meet General education science and laboratory requirements at the college. These courses are typically within the Biology (BIOL), Geology (GEOL), Chemistry (CHEM), and Physical Science (PHYS) areas. A few other general courses also exist within the Environmental Sciences (ENS) and Agriculture (AGEC, ARSC , SOIL) areas. Students in other programs can use these courses as electives, general science, or laboratory science requirements. Courses offered during the reporting period are presented in the appendix. The department considers a passed and completed if the student receives a letter grade of A, B, or C. If a student earned a letter grade of D or F, or if they withdrew from the course, the department considers the student not satisfactorily completing the course.

The number of students completing and attempting courses offered by the program provides a good insight into the ability to successfully teach courses and meet program outcomes and the college's outcome. The analysis allows the department to determine if any "gate-keeper" courses exist that are impeding students from reaching the goal of graduation. The percent satisfactorily completed is typically high for students who persist. Any course that has a 50% or less satisfactory completion rate is typically considered a "gate-keeper" course that is impeding students from graduating. This analysis also recognizes that some low percentages are due to students no longer attending the course but failing to drop the course, thus getting an F-grade.

Low percentages in courses like the General Science course can also be attributed to low dedication from non-science majors who take these courses. These have been seen in BIOL 150 which typically has a high number of non-science majors enrolled in the course. The program also identified the fact that students struggle with writing. As a case in point: the ENS 202 course is a writing intensive course for students majoring in Environmental Science, and the low pass rate may be due to the students being unprepared for the amount of writing that occurs.

Generally, the pass rate was not a major issue during the reporting period, but laboratory space remained a big issue. Online and hybrid instruction has been implemented to varying degrees of success within the program and by different faculty. The pandemic mandated long-distance, non-contact teaching to be implemented at the college. The challenges of teaching hands-on science courses were evident during this period. The department bought new instruments and sensors to train students during the laboratory sessions and internships. These are currently housed in the research center. Class sizes are another factor that affects effective course instruction. The

range of number of students enrolled in different courses certainly varies (from 1 to about 19). The faculty members generally feel that 10 students per science class is enough considering other factors such as lab space and the shortage of graduate students and or lab technicians who may help in setting up labs when there is a need.

4. Program Revenue

The Environmental Science Program was funded primarily by the Tribal Colleges and Universities Program (TCUP) NSF grant during the program review period. For all five years of the project reporting period, the program was funded by the TCUP grant. In addition, Indian Student Count (ISC) dollars, tuition money, and indirect from other grants supplemented the program's revenue. The total revenue for the project reporting period was $3,928,209 (Table 3). Some of the revenue generated from tuition, indirect fees, and ISC is garnered from other grants and students who did not work directly with only the program.

Table 6a. Estimated Revenues Generated within the Environmental Science Program.

	NSF TCUP	Tuition	ISC	Indirect From Grants
2018-19	$493,180	$76,800	$71,708	$83,806
2019-20	$639,632	$62,200	$163,508	$111,107
2020-21	$499,776	$55,100	$121,245	$89,128
2021-22	$499,776	$50,400	$116,349	$193,812
2022-23	$254,515	$38,800	$124,800	$182,567
Total Revenue	**$2,386,879**	**$283,300**	**$597,610**	**$660,420**

Program Expenditures

The largest amount of expenditures within the Environmental Science program were related to salaries for faculty and other personnel within the Environmental Science Department (Table 6b). The entire expenditure for the project review reporting period was $2,048,334. Of the $1,816,285 in expenditures, 88.7% of the expenditures were related to salary and fringe benefits. The Environmental Science Department is highly dependent on grant funding in order to maintain the laboratory equipment, have money for research and educational travel, and keep all current faculty onboard.

Table 6b. Environmental Science Program Estimated Expenses.

Academic Year	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023
Salary	$280,013	$365,595	$ 319,315	$ 319,315	$ 89,738
Fringe Benefits	$72,292	$94,237	$ 88,158	$ 88,158	$ 23,366
Supplies	$13,618	$31,071	$ 1,577	$ 1,577	$62,287
Maintenance & Training	$23,168	$16,335	$ 0	$ 0	$36,163
Adjunct Contracts	$1,500	$1,500	$ 1,500	$4,750	$1,500
Fringe & Adjunct Overloads	$8,952	$14,376	$ 18,331	$3,719	$19,970
Travel	$20,281	$20,094	$1,680	$1,680	$2,518
Total Expenditures	**$419,824**	**$543,208**	**$430,561**	**$ 419,199**	**$235,542**

Since the separation of revenues and expenditures among the Environmental A.S., B.S., and M.S. programs is difficult to attain, an analysis of revenues and expenses for the entire Environmental Science Department was conducted as well. Similar to the Environmental Science A.S. program, grant funding makes up the largest part of the revenue for the B.S. and M.S. programs with a total revenue of nearly $4.5 million dollars over the reporting period (Table 5). The NSF TCUP grant was the main revenue for the Environmental Science Department for the first three years of the reporting period. During the final two years of the reporting period, two additional grants were secured by the Department and contributed the majority of the revenue during those two years. The two grants that were added to the Department over that time period were a National Science Foundation (NSF) Tribal Colleges and Universities Enterprise Advancement Centers (TEA Center) grant, and a National Aeronautical and Space Science (NASA) grant (Table 5). As the NSF TCUP grant phased out at the end of the reporting period, these two new grants took over the bulk of the funding.

The vast majority of expenditures for the entire Environmental Science Department were related to salary and fringe benefits. Nearly $3 million of expenditures were related to salary and fringe for employees during the program review period. Another large expenditure during the last two years of the review was related to equipment and supplies, as well as student awards and scholarships with both expenditures at roughly a half million dollars each (Table 6b).

Table 6c. Total Expenses for the Entire Environmental Science Department.

Academic Year	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023
Salary	$332,798	$409,884	$ 375,326	$ 674,864	$ 578,949
Fringe Benefits	$85,487	$105,309	$ 102,161	$ 124,242	$ 95,970
Equipment & Supplies	$13,618	$31,071	$ 1,577	$ 156,346	$312,252
Maintenance & Training	$23,168	$16,335	$ 0	$ 0	$36,163
Adjunct Contracts	$1,500	$1,500	$ 1,500	$4,750	$1,500
Fringe & Adjunct Overloads	$8,952	$14,376	$ 18,331	$3,719	$19,970
Consultants	$0	$500	$0	$53,000	$60,777
Student Awards & Scholarships	$0	$0	$0	$217,109	$283,372
Travel	$20,281	$20,094	$1,680	$5,153	$16,453
Total Expenditures	**$485,804**	**$599,069**	**$500,575**	**$ 1,239,183**	**$1,405406**

Grants

Many other grants were utilized in the science department either directly, through the purchase of equipment and supplies, or indirectly by providing funding for student or faculty travel as well as infrastructural maintenance.

Those grants that impacted the environmental science department over the past five years are listed below (Table 12). The environmental science department received a total of $ 3,830,225.37, and it had a great impact on departmental activities as indicated in *Table 6e*.

Table 6d. Grants to Environmental Science

d	Grant	Amount ($)	PD	Period	Impact / Supported
1	NSF-EPSCoR	580,000.00	Dr. M. Mongoh	2014 - 2019	• Faculty research and summer salary, • K12 STEM outreach components of the ENS program, and Student Research
2	NIH-NARCH	440,000.00	Dr. M. Mongoh	2015 - 2019	• Faculty research and summer salary, and • Student research and tuition funding of the ENS program
3	NSF-EAGER	304,815.00	Dr. F. Onduso	2018 - 2019	• Research funds, faculty and students salaries (Health status of the Missouri River Ecosystem along the Dakota Access Oil Pipeline)
4	NSF	199,286.00	Ms. R. Schmitt	2018 - 2021	• A four year's grant to increase Native American women in STEM in higher education.
5	AICF	99,000.00	Dr. F. Onduso	2022-2024	• A two year grant with a 1 year extension for Agroforestry extension and training
6	NSF RAPID	198,000.00	Dr. M Mongoh	2022-2023	• A one year grant with a 6 months extension to enhance the biology program at SBC
7	AAG	10,000	Dr. M. Mongoh	2021	• Purchase of equipment to support Geoscience instruction affected by the pandemic
8	NSF-EPSCoR	580,000.00	Dr. M. Mongoh	2019 - 2024	• Faculty research and summer salary, • K12 STEM outreach components of the ENS program, and Student Research
9	NASA-MIRO	2,700,000.00	Dr. G. Halvorson / Dr. M. Mongoh	2020 - 2025	• Award to establish a facility for innovative atmospheric research and education (FIARE) • Support for the graduate Air Quality cohort research and NASA's TEMPO mission
10	NSF TCUP	3,500,000.00	Dr. M. Mongoh	2021-2026	• Creation and enhancing research capacity through the creation of the TEA Center: Prairie Ecosystems Research Center (PERC)
11	NSF	287,000.00	Dr. M. Mongoh	2023	• Funding to upgrade the Analytical laboratory at SBC with an ICP-MS
12	NSF	240,000.00	Dr. M. Mongoh	2023-2025	• Faculty support and training for climate change [preparedness
	Total	**9,138,101.00**			

Many faculty in the environmental science department serve as Project Investigators (P.I.s) and Project Directors (P.D.s). These duties are compensated financially by offering extra contracts to faculty who take on the additional tasks. The NSF-EPSCOR and USDA-AFRI grants also have

a requirement to either conduct faculty research and/or advise students on a research project, adding to the work required of faculty members involved in managing one of these grants. These program directors report to the Vice President of Operations.

5. Program Budget

All faculty in the environmental science department were supported entirely by grant funding. The NSF-Tribal College and University Program (TCUP) grant provided the majority of the faculty salary and fringe benefits for the department during the reporting period. Three grants from the program were used to support program activities and personnel. SBC's General fund also contributed support for the program. In addition, some auxiliary staff were supported either entirely, or in part by the NSF TCUP grant funds. Grants from NASA-MIRO, ND-INBRE, and AICF were instrumental in funding program activities.

6. Advisory Committee

The Environmental Science program is supported by an advisory committee comprised of stakeholders who are volunteer members of the community and SBC personnel. Advisory board meetings are organized to cover Higher Learning Commission requirements for the program, and specifically technical education for the North Dakota Career and Technical Education Program. The purpose of the advisory committee is to advise, assist, support, and advocate for the Environmental Science program. Operating in the advisory capacity, the committee functions to suggest improvements with specific content areas of the program. Such suggestions could include industry standards, the updating of the curriculum, the purchase of new instructional materials or equipment to modernize the classroom, and to adopt safety policies. Advisory members can also offer professional advice and support to the program; serve as an advocate for the program to the community and as a liaison with relevant stakeholders, and provide feedback; assist staff in determining important activities; and enhance the program's public standing.

The committee currently is comprised of the following members:

Table 7. Committee Members and Title and/or Occupation.

Member	Title/Occupation
Bruz Van Dusen	*E.S. Alumus and NRCS Conservationist*
Palani Luger	*Standing Rock Sioux Tribe (SRST) EPA*
Harriet Black Hoop	*E.S. Program Alumus, and SRST EPA Staff*
Ed Bahm	*District Conservationist*
Bill Chase	*USDA Farm Services McIntosh, SD*
Bruce Greig	*Sayler Electric*
Lisa Yellow Luger	*USDA 1994 Liaison*
Doug Crow Ghost	*SRST Water Resources*

Sheila White Mountain	*Bureau of Indian Affairs (BIA)*
Jeff Kelly	*SRST Game and Fish,*
Adam Rookey	*SR EPA/DER*
Joe Dunne	*SBC Agriculture Director*
Debbie Vollmuth	*USDA NRCS SCD Selfridge*
Glen Bahm	*USDA NRCS SCD Selfridge*
Glen Philbrick	*SBC Business Faculty*
Justin Mosset	*USDA FSA Carson*
Nathan Grueb	*USDA NRCS Dupree*
Joe McNeil	*SAGE Development Authority*
Shari Evenson	*USDA FSA McIntosh*
Jean Cadotte	*SRST*
John Keller	*USDA FSA Selfridge*
Quita Hines	*SAGE Development Authority*
Susan Koch	*USDA NRCS SCD Selfridge*
Jane Laintz	*Farm Service Agency*

Summary of Advisory Committee

Meetings are held twice a year either within a larger meeting that combines the majority of the college advisory committees at the college or each program can organize their own meetings. Meetings begin with each program personnel providing a short description of the program and the program activities over the course of the previous period and plans for the upcoming year. Planning occurs with members providing recommendations and suggestions for the program. Changes and recommendations proposed by the program are voted upon via motions made by committee members. These are typically presented to SBC administration in the form of meeting minutes an action items. Comments generally are overwhelmingly positive. The department promotes strong relationships with the agencies by encouraging internship programs and placing graduates with agencies. The spring meeting ends with a vote to continue the program. For the review period, the committee members agreed that the program's activities were rigorous and promoted students learning. They approved of the transition some of the courses made to an online and hybrid format. However, members suggested intensification of recruitment, especially in other communities given the online option was available to take courses in the program. The committee members provided the Environmental Science Department with ideas for research projects, ways in which the program can better meet community needs, internship opportunities for students, and suggestions for extension workshop topics.

The committee via a vote recommended that the Master's Program in Environmental Sciences explore an online option after a discussion was held on the issue. They noted the unique advantages of having the program offer its courses online as well given it is one of only two TCUs in the entire country with graduate programs in the sciences.

The Environmental Science Department worked to implement the ideas brought forth by the advisory committee in previous years by writing several grant proposals and successfully getting funds. Meals were offered in all the meetings. Attendance was good (above 50%).

PART II. PROGRAM SELF-EVALUATION

1. Faculty

The Environmental Science program had 5 full-time faculty, 2 part-time faculty, and 2 adjunct faculty during the reporting period of this review. All full-time faculty had advanced degrees, with four of the five possessing a Ph.D., and one having a M.S. degree plus all coursework completed toward the completion of a Ph.D. (ABD). The academic backgrounds of the faculty members in terms of breadth and depth were a significant strength of the program, as the interdisciplinary nature of the field of environmental science requires a high level of diverse backgrounds among the faculty teaching the courses. This strength also was found in the adjunct and part-time faculty who had graduate degrees in their respective fields of study with two completing doctorate degrees (ABD). Two full-time faculty members retired and one resigned from the program during the final year of the reporting period. One part-time faculty resigned and the two adjunct faculty took time off to complete their doctoratal studies. One faculty member was hired full-time to replace the departing faculty, while another faculty was hired in another program with part-time responsibilities in the program.

The expertise lost due to these departures is already difficult to replace. By filling only one of the positions, an increased amount of duties has been placed on the remaining faculty. The current concern in the program is that two of the current faculty members are close to retirement. If the two were to leave within the next reporting period, it may be difficult to find faculty members to replace them. There have been informal discussions of allowing off-site, adjunct faculty to teach in the program, however, it is essential to have some faculty members on-site in order to work on field research projects and the critical hands-on field learning that is necessary in the coursework. The void in the program could result in compromised learning for the students. Therefore SBC administration needs to support the program and its staff to find innovative and competitive ways to recruit new faculty in the program is to survive and function optimally.

A number of strategies have been implemented so far to alleviate the shortage of faculty in the program . During this review period program staff actively recruited adjunct faculty to teach courses in the program. Three adjunct faculty were recruited by faculty to teach courses in the program. Two adjunct faculty were recruited from doctoral graduate programs at the University of North Dakota. The third adjunct was recruited locally and is a graduate of the ENS program.

Another strategy to alleviate faculty shortage issues was to implemet a Graduate Teaching Assistantship model. Graduate students in the program were fully funded with a requirement to teach at least one course at the introductory level under the supervision of a full time faculty. Four graduate students taught courses in the program during this review period. If this model proves sustainable, the program sees it as a very positive solution to the faculty course

overload issue. Increasing the number of graduate students admitted into the program will be beneficial from this perspective.

SBC admisitration authorized online and hybrid instruction as an option to alleviate shortage of instructors at SBC. This approach has recruited one full time online faculty for the program and has vastly expanded the thrshold and opportunity for the program to recruit adjunct faculty to teach in the program.

Faculty Satisfaction

The active faculty members who taught in the program during the reporting period completed the faculty satisfaction survey. The 25-question survey covered the following areas:

- Curriculum and Programmatic Issues,
- Program Review Processes,
- Educational Infrastructure,
- Perceived Commitment of Faculty,
- Communication, and
- Other.

For each question on the survey, faculty members were asked to respond by indicating one of five responses on a five-point Likert scale, which were: 1 = Strongly Disagree; 2 = Disagree; 3 = Neutral; 4 = Agree; and 5 = Strongly Agree. The table in the appendix shows the results of the survey and mean scores for every faculty who completed the survey. The results of the survey are as follows:
Question #1 ~ All faculty have the opportunity to participate in curriculum development and revision for this program. Mean =1.25.
Question #2 ~ All faculty have the opportunity to participate in program planning. Mean = 1.25.
Question #3 ~ Faculty in this program are concerned about student success. Mean = 1.67.
Question #4 ~ The variety of faculty expertise is sufficient to provide effective instruction within this program. Mean = 1.67.
Question #5 ~ Faculty in this program are given the opportunity to participate in the program review process. Mean = 2.50
Question #6 ~ The program review process is effective in evaluation the strengths and weaknesses of this program. Mean = 1.67.
Question #7 ~ Information gathered during program review is integrated into the program's planning process. Mean = 1.67.
Question #8 ~ Communication among faculty in the program is frequent, interactive, and effective. Men = 1.67
Question #9 ~ I am satisfied with the quality of educational planning in this program. Mean = 1.25
Question #10 ~ The required textbook(s) are selected by all faculty teaching a particular course in this program. Mean = 1.67
Question #11 ~ The program's courses conform in content, textbooks, and instruction methods to current disciplinary standards. Mean = 2.50.

Question #12 ~ Adjunct faculty communicate with the program's full-time faculty regarding grading policies. Mean = 1.67
Question #13 ~ Faculty in this program both assess and base grades and course credit on student achievement of learning outcomes. Mean = 2.50.
Question #14 ~ The faculty in this program are sufficient in number to provide effective instruction within the discipline. Mean = 2.50.
Question #15 ~ Faculty in this program stay current in their area of expertise. Mean = 2.50.
Question #16 ~ The faculty in this program are actively involved in staff development activities. Mean = 2.50.
Question #17 ~ The availability of classroom supplies is sufficient to maintain the effectiveness of this program's courses. Mean = 2.50.
Question #18 ~ Class schedules for this program conform to student's demand and educational needs. Mean = 1.67.
Question #19 ~ Faculty in this program distinguish between personal conviction and professionally accepted views in the discipline. Mean = 2.50.
Question #20 ~ Faculty in this program are committed to high standards of teaching. Mean = 1.67.
Question #21 ~ Adequate facilities and equipment are available to maintain the effectiveness of this program's courses. Mean = 2.50.
Question #22 ~ Library services and collections are adequate to maintain the effectiveness of this program's courses. Mean = 5.00.
Question #23 ~ Tutoring and writing center facilities are adequate to maintain the effectiveness of this program's courses. Mean = 5.00.
Question #24 ~ Clerical support is available and adequate to maintain the effectiveness of this program's courses. Mean = 1.25.
Question #25 ~ I have been provided a copy of the SBC Policies and Procedures and the SBC Faculty Handbook. Mean = 1.67.

An analysis of the survey results indicate that the curriculum and programmatic issues were not a major concern., Despite limited faculty and an increased faculty course load, the current faculty has been involved in creating new courses for the program. The program review process was viewed overall as a positive wuth all faculty involved in this process and contributing to the survey data. With the construction of the new Research Center, the program gained significant class room and laboratory space to expand its academic mission at the college. Faculty commitment, espceially in the areas of research growth, and curiculum development has been significant. Emphasis on the hands-on, field-based instructional approach which has been the trademark of the program has increased. The number of courses taught with a field component continues to be the main way instruction is administered in the program.

Communication within the program between its staff, and commubnication with administration and direct supervisors was a concern. The staff in the program noted that some decisions were made in isoloation and not all staff were allowed to take part in the process. Communicvation further impacted the ability of the program to clearly advise students majoring in the ENS program.

The faculty have made significant efforts to stay current in their areas of specialization and through trainings and engagement in activities related to these areas.The faculty has taken advantage of opportunities offered by the college to train staff in alternative modes of instruction that were made necessary sdue to the pandemic. Online, hybrid and innovative face-to-face instructional approaches such as the outdoor classroom, creating laboratory sections with small xclass sizes, and the use of virtual laboratory tools, were implemented in the program

2. Financial

A major concern within the program is how to identify a sustainable and long-lasting funding source. The NSF-TCUP institutional capacity-building grants, which have funded the bulk of the program since 2004, have come to an end. The program was cycled out of these funding opportunities by the NSF given its longevity within the funding source as a program. Although there are currently other grants that are assisting in the funding of the program, they are designed more to assist faculty members with research capacity building and research integration in the curriculum as the main focus, and less focused on student learning and student programming. Since the inception of the Environmental Science program, especially the A.S. program in 1996, it has been paramount that students determine their own research topics and faculty advisors do whatever is feasible to make the students' projects succeed. This model was the initial model of the Model Institutes of Excellence (MIE) grant of the late 1990s and remained intact as the foundational research strategy for over 20 years. The new model advocated by funding agencies, of faculty conducting research and mentoring students and their projects within the faculty-led research group is a deviation from the foundational structure of the program. This model of faculty-led research is more common in large, mainstream universities. It opens up diverse opportunities for funding and learning for the program. This model typically will increase the contribution of the program in impactful development of the community. However, it will remain to be seen if the new model is as effective in retaining students within the program as well as having the students produce the high-quality research that they are expected to produce.

The financial status of the Environmental Science program is in question. Without grant funding, the program would certainly be unsustainable. There has been an enormous amount of investment into the Environmental Science Department as a whole, but with the limited number of students within all levels of the program, maintaining the assets may be in jeopardy if significant grant funding is not secured in the next reporting period.

3. Students

Compounding the financial situation within the program is the low number of students that are choosing to enroll in the program and continue their education from the A.S. to the B.S. degree in the Environmental Science programs at SBC. This lack of interest is also seen in the transition to the M.S. degree level. Although anecdotal evidence as to why many students choose another institution, a different degree, or completely end their educational process and do

not enroll in the B.S. program exists, further analysis of this problematic issue needs to be examined more closely. The current reporting period saw a high dropout rate of students from the program. Although evidence suggests this was a common trend across programs, colleges, and universities in the nation due to the pandemic, there was an expectation that the trend would reverse when the pandemic was put under control. The data shows this has not been the case for the program and recovery from the pandemic may not be a guarantee for the program.

A complete analysis needs to be conducted to assess the situation. Administration needs to prioritize the collection and analysis of data from departing students, as well as current students, to ascertain reasons for departure. If this bleeding of students moving from the A.S. to the B.S. programs is not figured out, the program's continued existence may be in peril. Data from student evaluations for each course offered in the program has historically been used to make this assessment. The anonymous information provided by the evaluations have been used in the past to make changes not only in course instructional methods, but to add or remove programmatic aspects seen as an issue. Unfortunately, the problem with getting this data is that almost all of the classes in the program have fewer than six students, which is the cutoff for us being able to see the student evaluation data for the course. Even if we went with our large courses like biology or introduction to environmental science, we can only pull data from ENS majors because this is a program review for Environmental Science and not General Science.

4. Curriculum, Content, and Delivery

For the 28 years that SBC has had the Environmental Science program, there has been great pride in the efforts faculty members have made in making certain that students receive a high-level education that prepares them for continuing education or for the work place in the environmental science field. One of the cornerstones of this education is the delivery of information to the students through a hands-on, field oriented educational process. From the first introductory course that students take through the A.S. level to the last course offered at the M.S. level, students are allowed to explore environmental science in the field. In fact, many non-science major students that have taken the introductory courses of ENS 113 Introduction to Environmental Science and BIOL 224 General Ecology have stated that they changed majors and became STEM students as a result of the hands-on, field-oriented nature of the courses.

It is critical to continue the type of education that allows students to have experiential education that allows them access to the field setting. Funding must be dedicated to ensure that this educational process continues. In addition, some of the introductory courses need to stay as in-person courses in order to allow for the hands-on learning model. As an increased number of courses become on-line, the Environmental Science program personnel, as well as administration, need to be cognizant of the needs and desires of the many students who enjoy the field-type setting for their education. An analysis should be conducted to determine the needs and desires of the students at the A.S. level, the B.S. level, and the M.S. level.

Another important part of the program's educational process is allowing students to determine their own research projects when completing the requirements for their degrees. The research process is an integral part of the education for students in the at all levels of the program and needs to be continued at any cost financially as well as resourcefully. Faculty members need to be ready to assist student-learning through research projects of the students' choosing. It may

be beneficial for students to choose their own faculty member to advise them through the process in order to maximize student learning and provide each student with a faculty mentor that has expertise in their area of interest, and the faculty member for which they feel most closely understands their educational needs and desires. Students must also be given the opportunity to select projects designed by faculty because of the clear realization that not all of our students have choices and more may need a helping hand to produce something significant.

The program needs a conscious assessment and evaluation of its contribution to the wellbeing and development of Standing Rock Sioux Reservation. We need to assess the real impact we are having on the community with what we teach students. After 28 years, any program should be able to effectively determine whether it has made the local community a better place or if it is contributing to the stagnation of the community in terms of development. This assessment is critical in identifying a new direction if necessary, a need to stay the course.

Although this approach is a departure from the original model of research mentorship adopted 28 years ago, it fits in well with the current direction of research designed in a mentor-mentee model.

5. Assessment Findings and Analysis

Each year data is collected within the Environmental Science program to ensure that learning outcomes are being met by students at all levels in the program. Students are assessed at the introductory level courses to determine if an understanding of the scientific method is learned. In addition, students at the introductory course level are also assessed on their comprehension of the connectedness of the Earth and its various environments and ecosystems. Questions are embedded within the final exam in all introductory courses during this assessment process.

Students are also assessed in the middle and at the completion of their degrees. The assessments after their introductory courses, but prior to the capstone project are termed "milestone courses" and students are assessed for comprehension of materials taught. During the milestone assessments, students will have demonstrated the use of sampling equipment and the processes involved in collecting and analyzing data according to acceptable standards that have been developed. Students demonstrate these learned outcomes through demonstrations with equipment, writing a proposal detailing a testable research idea, as well as through a PowerPoint presentation.

The final semester that students are enrolled in the Environmental Science A.S. program is a critical one in which they complete their final research, capstone project. Students complete the collection, analysis, and statistical methodologies and present their findings in front of a minimum of four faculty members from multi-disciplines. This presentation is assessed by all four faculty members, and data is used during the program assessment process to determine if learning outcomes have been met.

6. Institutional Support

The Environmental Science program is supported by the entire institution at SBC. The first area of support is in the infrastructure that houses the program, as well as all of the auxiliary departments utilized by the program. There are eight buildings on the SBC campus that all house important personnel and equipment necessary for the program to function properly. All of the buildings are less than 20 years old, and all are maintained by a dedicated maintenance staff that keeps them clean, neat, and functional.

The library, counselors, financial aid, registrar, and recruitment/retention personnel are all personnel critical to the existence of the program. All of these personnel have their offices in the Students Support Building, and all personnel are readily available to students and faculty to use and seek advisement.

Administration, two environmental science faculty members, laboratory technicians, and clerical personnel are located in the Science and Technology Center. This building is the "center" of the campus, as most extracurricular activities for students, staff, and personnel tend to occur in this building. In addition, the Science and Technology Center has two teaching laboratories, two classrooms, and an Analytical Laboratory that are used by all Environmental Science students, instructors, and auxiliary personnel.

SBC completed the construction of a new building during the reporting period of this review. The Research Center was designed to focus research capacity in a dedicated area for science. The building houses two environmental science faculty members and a research grants manager. The building also has office space for an engineering faculty, and cubicles for graduate students in the program. The Research Center has a classroom that also serves as a conference room, and it has three dedicated laboratory spaces for research.

The Family Support Center offers daycare for students and employees that are in need of childcare as they attend classes on campus. The Business Center is the financial support apparatus for faculty and staff when financial assistance for activities are needed. In addition, the personnel in the Business Center ensure that payroll is predictable and accurate. These personnel also assist the Environmental Science program during audits and other financial assessments.

The college sites in McLaughlin and Mobridge SD also have dedicated spaces for the program to teach classes and conduct laboratory activities for students who want to take classes at the sites.

Finally, access to tutoring, a well-stocked bookstore, and an abundance of computers all play a role in helping the students succeed. These resources are found primarily in the Science and Technology Center, but some computers and tutoring can be attained in the Students Support Center as well as the Entrepreneur Center. The success of the Environmental Science program lies within all personnel at the College, and not merely within the department itself.

7. Importance to the college and other Programs

The Environmental Science program plays a significant role in many areas at SBC. First, the funding ascertained through grant funding has helped in providing infrastructure that most students who enter SBC use. Maintenance of classrooms, equipment, and entire buildings have been funded through science-related grants. Other buildings not used by students, such as the science garage, is used as storage space for the SBC Maintenance Department.

In addition to infrastructural contributions to the College, the Environmental Science program offers courses in the general education areas that allow non-science majors fulfill their curricular requirements of completion of a laboratory science. Many of the four-credit laboratory sciences that non-science majors take at the college are offered through the Environmental Science program.

Faculty in the Environmental Sciences program have taught courses in other programs due to their specific expertise. Examples include courses taught by the faculty for the Education and IT programs at SBC. Courses have also been cross-taught between programs such as a series of courses taught between the program and the Native American studies program. These reflect the willingness of the program personnel to assist in any way possible in the success of other programs on campus.

Environmental Sciences personnel are very active in other activities on campus. Currently, they serve as advisors to three student clubs, the personnel is active in college standing committees and non-standing committees such as the Institutional Review Board (IRB) and the Institutional Animal Care and Use Committee (IACUC). The program staff represents the college at national and state activities that require their input such as reporting provided every semester to federal agencies on graduate students at SBC (GSS graduate survey).

8. Obstacles and opportunities

All departments have some areas of obstacles that can lead to opportunities for growth within the department. The Environmental Science program is no different in that it has obstacles that need to be addressed for the continued success of the program. The biggest obstacle facing the program is the lack of students majoring in the program. Although the numbers have been increasing over the past two years of the reporting period, they are still low in comparison to the level of expenses that the program requires and relative to other program numbers at the college. If the program cannot receive grant funding, it is hard to see how the program can be sustainable in the long term with the low enrollment.

Enrollment concerns are especially important for the M.S. degree level where admissions are extremely low compared to other graduate programs in the college. Despite an average of six applicants for every cohort in the program, only two have been admitted per cohort thus far. This low number was attributed to the high standards and threshold imposed by the admission process. Even graduates from the B.S. degree level at SBC had a tough time clearing the requirements. In 2022, the admission requirements were significantly relaxed to see if this will improve numbers admitted into the program. This meant the criteria like the Graduate Record Exam (GRE) were no longer required; and students were offered conditional admission if they were found lacking in certain areas of importance (see table 8). Furthermore there was an increased emphasis on professional experience as demonstrated by the letter of intent and the applicants' CV. The program also moved all it courses to the evening and students could take one course a day. This latter measures were instituted to allow for potential students with jobs to apply and take classes in the program. These measures are yet to bear fruits. Anecdotal evidence suggests that though these measures are necessary, more needs to be done to attract qualified graduate students to the program. At the fall 2023 advisory meeting, the advisory board approved the recommendation that the M.S. program explore the option of offering classes and the

program in a hybrid or online format. This opportunity has the potential to reinvigorate the program and increase the threshold population of potential applicants from other reservation communities and mainstream communities who want the quality of education offered at tribal colleges and universities.

Table 8. ENS Graduate program Admission requirements - .

Pre-2022 Admission requirements	Post-2022 Admission requirements
1. Complete an application for enrollment at SBC	Complete an application for enrollment at SBC
2. Official transcripts from all previous colleges and universities	Official transcripts from all previous colleges and universities
3. Three (3) Letters of Recommendation	Three (3) Letters of Recommendation
4. Curriculum Vitae	Curriculum Vitae
5. Letter of Intent – In this letter, the applicant should discuss research interests, academic goals, career goals, and reasons for wanting to attend graduate school. The applicant should discuss how previous work, academic, and personal experiences have prepared them for graduate education and have shaped their research interests	Letter of Intent – In this letter, the applicant should discuss research interests, academic goals, career goals, and reasons for wanting to attend graduate school. The applicant should discuss how previous work, academic, and personal experiences have prepared them for graduate education and have shaped their research interests.
6. GRE scores	

Another obstacle related to student enrollment is that the field of environmental science is currently highly interdisciplinary. The interdisciplinary nature of the current program requires additional faculty that possess various expertise. There is currently a risk of having faculty members teaching outside of their discipline in order to meet the curricular demands of the degree plans. Coupled with this highly interdisciplinary curriculum, the reduced load of faculty assigned to conduct research means more adjunct faculty will need to be added to the department, which will add cost. As stated previously, if grant funding is not secured and the student enrollment is not increased, the revenue will not be there to fund personnel. Even with the understanding that research grants provide salary buyout for faculty engaged in research with funding freed up to hire adjunct at really cheap costs, the funding needs to be available for this to happen.

To address the obstacles mentioned above, faculty within the program will need to attempt to write more grant proposals. Though this seems like an easy solution to the problem, with some faculty teaching a part-time basis within the STEM faculty at the College, more demand has been placed upon other full-time instructors to teach more courses, to teach courses outside of their discipline, and to conduct research and academic advising. Again, this model seems unsustainable as it does not allow the full-time instructors ample time to attempt writing additional grant proposals.

The current administrative structure of the program is an important obstacle to smooth operation and it presents a unique opportunity to increase program efficiency and effectiveness. Currently, the Environmental Sciences program has no department head or chair, unlike the other established programs at the college. The program also has no official assigned responsibilities

put on dedicated faculty and personnel. In the past, the affairs of the program were decided by the collective group involved in the program. Despite the benefits of such a management style, its limitations in the face of recent challenges the program has had to make it necessary to revisit this model. Decisions made at the program level will benefit tremendously if this administrative structure is clarified by the college. It will provide the necessary impetus to solving some of the program bottlenecks currently encountered in the program with communication and assigning responsibilities, course selection, and scheduling planning.

The other area of concern that can provide an opportunity is related to the curriculum in the Environmental Science program. The degree plan that has been active for the past 15 years needs to be analyzed and evaluated for its effectiveness. There needs to be a determination if the current degree plan is meeting the needs and desires of the students and most importantly the community. A review of the curriculum should be completed by the full-time current faculty members in the program to determine if changes should be made that would make the core curriculum less interdisciplinary or more streamlined if necessary, while still meeting community needs and desires. The review should occur soon as two of the faculty members in the program are close to retirement age.

Poor class attendance continues to be a big issue in performance and retention, given that most students drop out due to poor performance. As with previous review periods, the reasons students gave for class absences and dropping ranked for the highest frequency to the lowest were;

- Dissatisfied with their grades
- Employment time conflict with class schedule
- Daycare/babysitter difficulties
- Medical difficulties/issues
- Personal and private issues
- Wants a break from college studies
- Lack of transport and
- Financial difficulties

Measures to address some of these concerns are already in place such as operational transit services, on-campus childcare, student campus housing, financial aid, and temporary employment as research or laboratory assistants.

9. Successes and Highlights

There have been many successes within the Environmental Science program over the past five years. The hard work of the faculty, program personnel, and administration led to the completion and graduation of students despite the pandemic outbreak which lasted throughout the reporting period. Both faculty and student research were completed in the program. Student-led research has been a cornerstone of the program and continues to be an integral part of the student learning process and experience. The following list of some of the research projects that were presented and or published over the past five years is a testament to the fact that research is a foundation pillar of the program:

- **Floris White Buffalo,** *"Traditional medicinal and edible plants along the Missouri that will be affected by Dakota access",* SBC BS Defense 2020

- **Frankie Johnson***, "Vulnerability Analysis on Cannonball River. SBC* BS Defense 2019

- **Thomas DeVille,** *"Coprophilous Myxomycetes Research: Bison, Cow and Horse" ",* SBC BS Defense 2019

- **Kylee Harrison,** *"Water quality in a typical bison pasture",* SBC BS Defense 2019

- **Moriah Thompson***," Assessing Arsenic Concentrations Around Devil's Lake Waters: Public Health Implications,* SBC BS Defense 2019

- **Jonathan Holmes,** *"Solid Phase Extraction of Oil and Grease in Water from Riverine and Lacustrine Systems"* BS thesis defense 2019.

10. **Co-curricular Activities**

The department sent students to the AIHEC (American Indian Higher Education Consortium) NSF-TCUP research conference and FALCON (First American Land Grant Consortium) conferences. Students also presented at local conferences such as the North Dakota Tribal Colleges Research Symposium, the North Dakota INBRE conference, and the North Dakota EPSCOR conference. Student's performance in these annual conferences remained impressive. Interested students also took part in the college clubs. Some of these clubs were ANIME, AISES, Culture, and AIBL clubs. Some students conduct summer research at the A.S., B.S., and M.S. degree levels. In addition to the list of successful research projects, the Environmental Science program has recognized a few students who have excelled in each of the cohorts over the past years. Detailed information on some of these particular students are under success and highlights.

PART III. PROGRAM PLANNING

1. Trends

There are several identified trends in the program. The first is the positive trend that student enrollment has been increasing over the last two years of the program review. It should be noted, however, that increases like this have happened in the past, only to be followed by a reduction in student numbers. It is possible it is just an aberration that the student enrollment trend is increasing as the trend is, in fact, only two years in the positive direction.

The second trend that the program is seeing that is less positive is the high percentage of graduates from within the program not continuing their education into the next level of the program at the College. This trend needs to be addressed in the immediate future, or the fate of the program is not positive. Faculty and administration need to assess and evaluate the reasons for the graduate departure from the College and program.

A third trend is associated with funding opportunities. As funding opportunities have changed over the years, challenges associated with maintaining the original program model and teaching philosophy are being challenged. This can viewed from two perspectives: A shift from the old program model may negatively impact enrollment, but on the other hand, it has the potential to usher the program into new and innovative opportunities to grow as a program. The limited number of funding opportunities that can support the old program model makes a movement toward identifying a new program model inevitable. Therefore program faculty and administration need to consider the role the program will play in the future of the community as a community college program.

Most students in the program, including alumni, remained interested in the program at SBC, even though the enrollment in the program remains low. The faculty put together numerous strategies to increase enrollment, but these were rendered unsuccessful by the pandemic outbreak. It is anticipated that enrollment, especially in the B.S. and M.S. degree programs, will increase with awareness when program faculty visit other tribal colleges and highlight the uniqueness of the programs at SBC. Anecdotal evidence indicates most tribal college students prefer staying within the tribal college system because of one-on-one faculty-student interaction and low student-faculty ratios, as well as other factors. Recruitment personnel for the college also need to still find a way to capitalize on this fact.

2. Revised Goals and Objectives due to the Program Review

At this time, no goals or objectives have been changed as a result of the program review. It is possible that post-review meetings with administration may result in changes. In addition, evaluation of the Environmental Science Department's sustainability may result in changes, but that remains to be seen.

Assessment committee reviews and revisions over the last five years have made changes to program outcomes within the same goals. The number of outcomes for assessment were teased out to improve effective measurement. These has had the unintended effect of creating an imbalance in the flow of outcomes from the A.S. to the B.S. to the M.S. levels of the program. Despite that fact that the stated goals and vision of the program are that each level of the program should build upon the previous level, this is currently difficult to see within the program.

The Higher Learning Commission (HLC) visit of 2023 has recommended that the program outcomes for all three levels need to flow into each other and not be disjointed. The program faculty and administration will be better served to revisit the goals and objectives of the program and use this as an opportunity to formulate outcomes, goals and objectives that are a true reflection of the needs of the students, but most importantly, the needs and future aspirations of the community.

3. Additional Resources Needed

The resource needs identified by the program are related to personnel and faculty positions that need to be filled up. The program needs faculty and affiliated staff recruited to alleviate the work load placed on the current personnel of the program. The program is still seeking to hire new faculty and a postdoctoral fellow. The program is also looking to hire laboratory technicians to work in the labs and assist with research. Another needs area is the pressing requirement to service and update existing instruments and equipment in the laboratories and teaching classrooms.

Appendix A

Appendix A - 1

Assessment Rubric for Final Student Research

	5	4	3	2	1
Use of Technology	Proper use of technology is demonstrated in the following areas: GIS, Power Point, Word, Excel, GPS, and Analytical Laboratory Equipment.	Proper use of technology is demonstrated in the following areas: GIS, Power Point, Word, Excel, GPS, and Field Test Kits.	Proper use of technology is demonstrated in the following areas: GIS, Power Point, Word, Excel, and GPS.	Proper use of technology is demonstrated in the following areas: Power Point, Word, Excel, and GPS.	Proper use of technology is demonstrated in the following areas: Power Point, Word, and Excel.
Sampling Design and Methodology	Sampling design and methodology is consistent with the scientific method, and ensures no biases or confounding factors are introduced into the study. Sampling design is based on techniques found in scientific research literature.	Sampling design and methodology is consistent with the scientific method, but may allow for confounding factors introduced into the study. Sampling design is based on techniques found in scientific research literature.	Sampling design demonstrates acceptable knowledge of the scientific method, but allows for biases to be introduced into the research.	Sampling design demonstrates minimal knowledge of the scientific method, and allows for biases to be introduced into the research.	Sampling design shows no knowledge of the scientific method of conducting research.
Research Purpose, Utility, and Connection to the	The research project's connection to the environment is demonstrated and a	The research project's connection to the environment is demonstrated	The research project's connection to the environment is demonstrated	The research project's connection to the environment is demonstrated	The research project's connection to the environment is not demonstrated

Environment	description of how the research project can be utilized in environmental decision-making is given.	and a description of how the research project adds to the knowledge of the environmental science community is included.	, and future research expanding on the research project is advised.	, but future use of the research project is not advised.	, and future use of the research project is not advised.
Statistical Analysis	Graphs and tables are included. Student interprets graphical data appropriately. Proper statistical tools are demonstrated. Hypothesis testing and accurate explanation of alpha-level and p-value is included.	Graphs and tables are included. Student interprets graphical data appropriately. Proper statistical tools are demonstrated.	Graphs and tables are included. Student interprets graphical data appropriately.	Only frequency data is reported.	No statistical analysis is conducted.
Lakota/Dakota Culture	Lakota/Dakota names for media sampled are used, and traditional uses included. In addition, student explained kinship responsibilities and details any ceremonies that may be	Lakota/Dakota names for media sampled are used, and traditional uses included. In addition, students explained kinship responsibilities associated	Lakota/Dakota names for media sampled are used, and traditional uses included.	Lakota/Dakota names for media sampled are used only.	No Lakota/Dakota cultural inclusion was presented.

	associated with the media.	with the media.			

Appendix A - 2

A.S. PROGRAM ASSESSMENT PLAN 2018-2019

Review Date (Anticipated): May 2019

Program Outcomes	**Measurement Tool** (Who will assess, what will be assessed, how will it be assessed, when will it be assessed)	**Measurement Goal** (Expected results)	**Findings** (Actual results including number of students, average score, & range of scores)	**Analysis of Data** (What students learned and what they didn't learn) [Example: what did students score well in on rubric or assessment and what area needs improvement?]	**Action or Recommendation** (include changes and/or instructional strategies to improve next year)
Competency: The student will describe and show competency in the following issues associated with environmental science: 1A: The proper use of environmental sampling equipment and current technology in the classroom and in the field according to accepted "Standard Methods"; 1 B: The ability to conduct field sampling and monitoring of air, water, soil, and biomass using appropriate sampling equipment	**Assessment Strategy:** **A**) In order to assess student outcomes during the first year of a student's curricular program, the student will demonstrate knowledge of the scientific method in each of the student's introductory (100-level) courses. Three courses have been identified for the assessment process including; CHEM 115 Introduction to Chemistry, ENS 113 Introduction to Environmental Science, and BIOL 150	**Expectation:** Each student will score a minimum of 3.5 on a five point Likert scale.	**Assessment A**	**Assessment A**	

according to accepted "Standard Methods"; 1 C: The ability to conduct an environmental site assessment; 1 D: The ability to describe, orally and in writing, the similarities and differences between traditional and modern views of the Earth; 1 E: The ability to demonstrate an understanding of methodology in science research; 1 F: The ability to describe biological, chemical, and physical influences on environmental media; 1 G: The ability to describe transport mechanisms for contaminants as they travel through various environmental media; and 1 H: The demonstration of general knowledge of environmental issues and develops an understanding of environmental impacts resulting from human activities.	Biology I. The student will diagram the scientific method, as well as provide a detailed description of how the scientific methodology can be used through the use of a hypothetical scenario. The diagram and the detailed description will be assessed using a five point Rubric. (1E, 1F) **B)** Two key courses have been identified within the 200-level courses as being "milestone" courses during a student's sophomore year. In each of the milestone courses, a project will be developed by students, and assessed by faculty teaching the course, to determine if competencies are being met. The assessment will assist in finding problem areas prior to a student's final project assessment that	**B)** Each student will score a minimum of 3.5 on a five point Likert scale. **C)** Each student will score a minimum of 3.5 on a five point Likert scale.			

	capstones their curriculum completion. The two courses identified for milestone assessment include; ENS 225 Environmental Sampling and ENS 240 Environmental Statistics. A five point Rubric will be used to measure student competency. (1A, 1B, 1C) **C)** The student will write a research proposal for ENS 260 that will include a written literature review, explanation of hypothesis, and methods. The students will be evaluated on his/her writing, science, and math/stats skills acquired at that point in their education. The student's	**D)** Each student will score a minimum of 3.5 on a five point Likert scale.			

	competency will be measured using a five-point Likert scale (1A, 1B, 1D, 1E, 1F, 1G, 1H) **D)** The student will take a final oral examination at the end of his/her program. The examination will include the student's completion of a presentation of a research project using Power Point software and an oral examination by 3 faculty members chosen by the student and student's advisor. The student will be asked questions from all coursework taken in his/her program and will be asked to demonstrate knowledge in all program outcome areas. The student's competency will be measured using a five-point Likert scale with all committee members' scores averaged. (1A, 1B, 1D, 1E, 1G, 1H)				

Appendix A - 3

B.S. Environmental Science PROGRAM ASSESSMENT PLAN 2018-2019

Review Date: December 2018

Program Outcomes	**Measurement Tool** (Who will assess, what will be assessed, how will it be assessed, when will it be assessed)	**Measurement Goal** (Expected results)	**Findings** (Actual results including number of students, average score, & range of scores)	**Analysis of Data** (What students learned and what they didn't learn) [Example: what did students score well in on rubric or assessment and what area needs improvement?]	**Action or Recommendation** (include changes and/or instructional strategies to improve next year)
Competency: The student will describe and show competency in the following issues associated with environmental science: 1A: The proper use of environmental sampling equipment and current technology in the classroom and in the field according to accepted "Standard Methods"; 1B: The ability to design and conduct a field or laboratory study using appropriate sampling equipment and techniques according to	**Assessment Strategy:** **A)** The student will write a research proposal which will be used by the student to design a research project. The proposal will be evaluated based on the student's ability to demonstrate knowledge of all steps in the scientific methodology process. The student's competency will be measured using a five-point Rubric. Outcomes covered: 1A, 1C, 1D, 1F B) Four key courses have been identified within the 300-400 level courses as being "milestone" courses. In each of the milestone courses, a project will be developed by students, and assessed	**Expectation:** Each student will score a minimum of 3.50. Each student will score a minimum of 3.50.			

accepted "Standard Methods"; 1C: The ability to describe the similarities and differences between traditional and modern views of the Earth; 1D: The ability to describe biological, chemical, and physical influences on environmental media, including human health effects; 1E: The ability to describe transport mechanisms for contaminants as they travel through various environmental media; 1F: The ability to develop a professional research proposal and demonstrate the various steps of the scientific method in the design; 1G: The ability to develop and present a professional research presentation and answer questions in an appropriate manner; 1H: The ability to produce a	by faculty teaching the course, to determine if competencies are being met. The assessment will assist in finding problem areas prior to a student's final project assessment that capstones their curriculum completion. The four courses identified for milestone assessment include; ENS 311 GIS/GPS, ENS 321 Environmental Chemistry, ENS 331 Wildlife Conservation, and ENS 452 Science Literature. A five point Rubric will be used to measure student competency. Outcomes covered: 1B, 1D, 1E, 1H, 1I, 1J	Each student will score a minimum of 3.50.			
	C) The student will take a final examination at the end of his/her program. The examination will include the student's presentation of a research project in an oral presentation utilizing Power Point software. The examination process will be conducted by three faculty members (or appropriate agency personnel) chosen by the student and the student's advisor. The student may be asked questions from all coursework taken in the program and will be evaluated based on the ability to demonstrate knowledge in all areas of the program.	Each student will score a minimum of 3.50.			

final report of a research project that effectively provides a general narrative of the student's research; 1I: The skill to integrate GPS/GIS technology into presentations; and 1J. The competency of developing a wildlife conservation and management plan applicable to the needs of the Standing Rock Sioux Reservation and/or the Cheyenne River Sioux Reservation.	The student's competency will be measured using a five-point Rubric with all committee members' scores averaged. Outcomes covered: 1A, 1B, 1C, 1G, 1I **D)** The student will submit a final project report at the end of his/her program. The evaluation process will be conducted by the faculty member in charge of senior research. The student's competency will be measured using a five-point Rubric. Outcomes covered: 1A, 1B, 1C, 1H, 1I				

Appendix A – 4

M.S. ENVIRONMENTAL SCIENCES
PROGRAM ASSESSMENT PLAN 2018-2020
Review Date: December, 2018

Program Statement: The Master of Science in Environmental Science program at Sitting Bull College prepares graduates as leaders in environmental, wildlife, and natural resource management fields. Students attain education through research, practical application, and the use of modern technology in order to build intellectual capital and capacity. The educational process is guided by western science methodologies balanced with traditional Lakota/Dakota cultural values that promote harmony with the Earth.

Program Outcomes	**Measurement Tool** (Who will assess, what will be assessed, how will it be assessed, when will it be assessed)	**Measurement Goal** (Expected results)	**Findings** (Actual results including number of students, average score, & range of scores)	**Analysis of Data** (What students learned and what they didn't learn) [Example: what did students score well in on rubric or assessment and what area needs improvement?]	**Action or Recommendation** (include changes and/or instructional strategies to improve next year)
Competency: The student will show competency and mastery in the following skill sets associated with environmental sciences: 1. The student will develop scientific critical thinking skills. 2. The student will demonstrate the ability to articulate knowledge of environmental science, methodologies, and policy both	**Assessment Strategy:** **1A)** A pre and post evaluation will be administered by the instructor through interviews to measure the effectiveness of the program in shaping the student's scientific critical thinking skills before and after the first semester in the program. A five-point Rubric will be administered by the instructor. **1B)** The student will write a research proposal which will be used to evaluate his/her ability to design a scientific research project. The proposal will evaluate the student's ability to demonstrate	**Expectation:** 1A - Pre-Evaluation: score a minimum of 3.0 on a 5 scale Post-Evaluation: score a minimum of 3.5 on a 5 scale 1B - Each student will score a minimum of 3.5 on a 5 scale 2A – Each student will score a minimum of 3.5 on a 5 scale		.	

verbally and orally. 3. The student will synthesize a cogent research thesis inclusive of appropriate statistical analysis. 4. The student will demonstrate an understanding of Native Science as it relates to the Lakota/Dakota culture, while maintaining the balance with and the integrity of Western Science.	knowledge of all the critical steps in the scientific process. The student's competency will be measured using a five-point Rubric by the graduate advisor at the end of his first year in the program. **2A**) Two key seminar courses have been identified as being "milestone" courses. In each of the milestone courses, a seminar presentation will be developed by students, and assessed by faculty and qualified professionals in the discipline, to determine if competencies are being met. The assessment will assist in finding problem areas prior to a student's final project assessment that capstones their curriculum completion. The two 1 credit courses identified for assessment have the course code ENS 500 and will be offered every year. A five point Rubric will be used to measure student competency at the end of the semester the course is taken. **2B)** The student will present their research proposal to the graduate faculty, college, and community to demonstrate their grasp of the knowledge of environmental	2B – Each student will score a minimum of 3.5 on a 5 scale 3A Each student will score a minimum of 3.5 on a 5 scale 4A Each student will score a minimum of 3.5 on a 5 scale			

	science, methodologies, and policy. The presentation will be assessed by faculty and qualified professionals in the discipline, to determine if competencies are being met. A five-point Rubric will be used **3A)** The student will take a final examination at the end of his/her program. The examination will include the student's presentation of a research project both in writing, as well as in an oral presentation utilizing Power Point software. The examination process will be conducted by the student's graduate faculty committee members (or appropriate agency personnel) chosen by the student and the student's advisor. A five-point Rubric will be used as tool to evaluate competency **4A)** The student will be asked questions through a qualifying comprehensive exam at the end of their course work. This exam will evaluate the student's ability to demonstrate knowledge in all areas of the program (Core and Specialization), and how it merges with Lakota/Dakota values. The student's competency will be measured using a five-point Rubric				

Appendix B

Faculty Satisfaction Survey Results

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Not Applicable	Average score
1.All faculty have the opportunity to participate in curriculum development and revision for this program.	1	2	1	1			1.25
2. All faculty have the opportunity to participate in program planning.	1	1	2	1			1.25
3. Faculty in this program are concerned about student success.	1	3	1				1.67
4. The variety of faculty expertise is sufficient to provide effective instruction within this program.	1	3	1				1.67
5. Faculty in this program are given the opportunity to participate in the program review process.		3	2				2.50
6. The program review process is effective in evaluation the strengths and weaknesses of this program.		2	1	2			1.67
7. Information gathered during program review is integrated into the program's planning process.	1	1	3				1.67
8. Communication among faculty in the program is frequent, interactive, and effective.		2		1		2	1.67
9. I am satisfied with the quality of educational planning in this program.	1	1	2			1	1.25
10. The required textbook(s) are selected by all faculty teaching a particular course in this program.	1	3				1	1.67
11. The program's courses conform in content, textbooks, and instruction methods to current disciplinary standards.	2	3					2.50
12. Adjunct faculty communicate with the program full-time faculty regarding grading policies.	2	1	2				1.67
13. Faculty in this program both assess and base grades and course credit on student achievement of learning outcomes.	1	4					2.50
14. The faculty in this program are sufficient in number to provide effective instruction within the discipline.		2	3				2.50
15. Faculty in this program stay current in their area of expertise.	1	4					2.50
16. The faculty in this program are actively involved in staff development activities.	1	4					2.50
17. The availability of classroom supplies is sufficient to maintain the effectiveness of this program's courses.	2	3					2.50
18. Class schedules for this program conform to student's demand and educational needs.		3	1			1	1.67
19. Faculty in this program distinguish between personal conviction and professionally accepted views in the discipline.		2	3				2.50
20. Faculty in this program are committed to high standards of teaching.	2	2	1				1.67
21. Adequate facilities and equipment are available to maintain the effectiveness of this program's courses.	2	3					2.50
22. Library services and collections are adequate to maintain the effectiveness of this program's courses.		5					5.00
23. Tutoring and writing center facilities are adequate to maintain the effectiveness of this program's courses.		5					5.00
24. Clerical support is available and adequate to maintain the effectiveness of this program's courses.		1	2	1		1	1.25
25. I have been provided a copy of the SBC Policies and Procedures and the SBC Faculty Handbook.	1	3				1	1.67

26	At SBC, Are you:	5	Full time Faculty
			Part Time Faculty
		1	Adjunct Faculty
27	How many years have you taught at least one course in this program?		
	Less than 1		4-6 years
2	1-3 years	4	more than 6 years
28	How many different courses per semester are you teaching in this program?		
1	2 courses	4	4 courses
	3 courses	1	I only teach one course per semester
29	How many credits do you teach in this program (per semester)?		
3	5 or less		6-12 credits
	12-15 credits	3	15 or more

Please provide any additional comments (greatly encouraged):

I am not sure what is happening in this M.S. Program right now. - I am not sure if student acceptance into the Program has had policy changes or not. There needs to be a serious overhaul of advising in the program with a separation between the levels of the program in order to better meet other program outcomes for each level. All faculty should be expected and encouraged to take part in every level of the program in full capacity. There is a need to revisit the program mission and the changing realities on SRSR.

Appendix C
Courses Offered by ENS faculty, number of students enrolled, in AY 2019 – 2023.

Year	Term	Course Code	Course Title	Enrollment	Division	Instructor Last Name	Instructor First Name
2019	FA	ENS 113	Introduction to Environmental Scien	21	UG	Buresh	Daniel
2019	FA	ENS 225	Environmental Sampling	5	UG	Buresh	Daniel
2019	FA	ENS 240	Environmental Statistics	3	UG	Buresh	Daniel
2019	FA	ENS 260	Environmental Research Project I	5	UG	Schmitt	Renae
2019	FA	ENS 261	Environmental Research Project II	3	UG	Schmitt	Renae
2019	FA	ENS 297A	Environmental Science Internship	7	UG	Schmitt	Renae
2019	FA	ENS 297B	Environmental Science Internship	3	UG	Schmitt	Renae
2019	FA	ENS 297C	Environmental Science Internship	3	UG	Schmitt	Renae
2019	FA	ENS 299Q	Plant Restoration	10	UG	Schmitt	Renae
2019	FA	ENS 311	Introduction to GIS/GPS	6	UG	Ndiva Mongoh	Mafany
2019	FA	ENS 321	Environmental Chemistry	5	UG	Ndiva Mongoh	Mafany
2019	FA	ENS 331	Wildlife Conservation	9	UG	Schmitt	Renae
2019	FA	ENS 432	Aquatic Ecosystems	6	UG	Buresh	Daniel
2019	FA	ENS 445	Applying Dakota/Lakota Culture to E	2	UG	Buresh	Daniel
2019	FA	ENS 453	Environmental Law & Policy	1	UG	Ndiva Mongoh	Mafany
2019	FA	ENS 493A	Senior Research	1	UG	Ndiva Mongoh	Mafany
2019	FA	ENS 493B	Senior Research	1	UG	Ndiva Mongoh	Mafany
2019	FA	ENS 493C	Senior Research	1	UG	Ndiva Mongoh	Mafany
2019	SP	ENS 202	Environmental Issues*	4	UG	Bobtail Bear	Saul
2019	SP	ENS 260	Environmental Research Project I*	2	UG	Schmitt	Renae
2019	SP	ENS 261	Environmental Research Project II*	3	UG	Schmitt	Renae
2019	SP	ENS 297A	Environmental Science Internship*	3	UG	Schmitt	Renae
2019	SP	ENS 297B	Environmental Science Internship*	2	UG	Schmitt	Renae
2019	SP	ENS 297C	Environmental Science Internship*	3	UG	Schmitt	Renae
2019	SP	ENS 299Q	Plant Restoration*	2	UG	Schmitt	Renae
2019	SP	ENS 301	Hydrology*	3	UG	Ndiva Mongoh	Mafany

2019	SP	ENS 422	Environmental Toxicology*	5	UG	Onduso	Francis
2019	SP	ENS 452	Science Literature*	3	UG	Buresh	Daniel
2019	SP	ENS 453	Environmental Law & Policy*	6	UG	Schmitt	Renae
2019	SP	ENS 493A	Senior Research*	4	UG	Ndiva Mongoh	Mafany
2019	SP	ENS 493B	Senior Research*	1	UG	Ndiva Mongoh	Mafany
2019	SP	ENS 493C	Senior Research*	1	UG	Ndiva Mongoh	Mafany
2019	SP	ENS 499S	Applying Native American Culture to	3	UG	Buresh	Daniel
2020	FA	ENS 113	Introduction to Environmental Scien	10	UG	Buresh	Daniel
2020	FA	ENS 211	Introduction to GIS/GPS	1	UG	Ndiva Mongoh	Mafany
2020	FA	ENS 225	Environmental Sampling	4	UG	Buresh	Daniel
2020	FA	ENS 260	Environmental Research Project I	2	UG	Schmitt	Renae
2020	FA	ENS 261	Environmental Research Project II	4	UG	Schmitt	Renae
2020	FA	ENS 297A	Environmental Science Internship	2	UG	Schmitt	Renae
2020	FA	ENS 297B	Environmental Science Internship	4	UG	Schmitt	Renae
2020	FA	ENS 297C	Environmental Science Internship	3	UG	Schmitt	Renae
2020	FA	ENS 299R	Citizen Science	3	UG	Schmitt	Renae
2020	FA	ENS 311	Introduction to GIS/GPS	4	UG	Ndiva Mongoh	Mafany
2020	FA	ENS 321	Environmental Chemistry	1	UG	Ndiva Mongoh	Mafany
2020	FA	ENS 445	Applying Dakota/Lakota Culture to E	6	UG	Buresh	Daniel
2020	FA	ENS 493B	Senior Research	2	UG	Ndiva Mongoh	Mafany
2020	FA	ENS 493C	Senior Research	2	UG	Ndiva Mongoh	Mafany
2020	FA	ENS 499L	Intermediate Statistics	3	UG	Mattes	Joshua
2020	SP	ENS 113	Introduction to Environmental Scien	11	UG	Buresh	Daniel
2020	SP	ENS 202	Environmental Issues	2	UG	White Bull	Floris
2020	SP	ENS 260	Environmental Research Project I	1	UG	Schmitt	Renae
2020	SP	ENS 261	Environmental Research Project II	2	UG	Schmitt	Renae
2020	SP	ENS 297A	Environmental Science Internship	1	UG	Schmitt	Renae
2020	SP	ENS 297B	Environmental Science Internship	1	UG	Schmitt	Renae

2020	SP	ENS 297C	Environmental Science Internship	1	UG	Schmitt	Renae
2020	SP	ENS 299V	Using Drone Technology in Ecologica	1	UG	Buresh	Daniel
2020	SP	ENS 331	Wildlife Conservation	3	UG	Schmitt	Renae
2020	SP	ENS 422	Environmental Toxicology	2	UG	Onduso	Francis
2020	SP	ENS 452	Science Literature	1	UG	Buresh	Daniel
2020	SP	ENS 493A	Senior Research	1	UG	Ndiva Mongoh	Mafany
2020	SP	ENS 493B	Senior Research	1	UG	Ndiva Mongoh	Mafany
2020	SP	ENS 499X	Applying Native American Culture to	1	UG	Buresh	Daniel
2020	SU	ENS 499U	Introduction to Atmospheric Measure	4	UG	Halvorson	Gary
2021	FA	ENS 113	Introduction to Environmental Scien	15	UG	Buresh	Daniel
2021	FA	ENS 225	Environmental Sampling	5	UG	Buresh	Daniel
2021	FA	ENS 240	Environmental Statistics	5	UG	Buresh	Daniel
2021	FA	ENS 260	Environmental Research Project I	5	UG	Schmitt	Renae
2021	FA	ENS 297A	Environmental Science Internship	4	UG	Schmitt	Renae
2021	FA	ENS 297B	Environmental Science Internship	1	UG	Schmitt	Renae
2021	FA	ENS 297C	Environmental Science Internship	1	UG	Schmitt	Renae
2021	FA	ENS 299Q	Plant Restoration	9	UG	Schmitt	Renae
2021	FA	ENS 432	Aquatic Ecosystems	1	UG	Buresh	Daniel
2021	FA	ENS 445	Applying Dakota/Lakota Culture to E	0	UG	Buresh	Daniel
2021	FA	ENS 493A	Senior Research	1	UG	Ndiva Mongoh	Mafany
2021	SP	ENS 202	Environmental Issues	8	UG	White Bull	Floris
2021	SP	ENS 260	Environmental Research Project I	4	UG	Schmitt	Renae
2021	SP	ENS 261	Environmental Research Project II	4	UG	Schmitt	Renae
2021	SP	ENS 297A	Environmental Science Internship	4	UG	Schmitt	Renae
2021	SP	ENS 297B	Environmental Science Internship	2	UG	Schmitt	Renae
2021	SP	ENS 297C	Environmental Science Internship	2	UG	Schmitt	Renae
2021	SP	ENS 301	Hydrology	1	UG	Ndiva Mongoh	Mafany
2021	SP	ENS 331	Wildlife Conservation	3	UG	Schmitt	Renae
2021	SP	ENS 493A	Senior Research	1	UG	Ndiva Mongoh	Mafany

2021	SP	ENS 493B	Senior Research	1	UG	Ndiva Mongoh	Mafany
2022	FA	ENS 113	Introduction to Environmental Scien	13	UG	Buresh	Daniel
2022	FA	ENS 225	Environmental Sampling	8	UG	Buresh	Daniel
2022	FA	ENS 240	Environmental Statistics	4	UG	Buresh	Daniel
2022	FA	ENS 260	Environmental Research Project I	5	UG	Schmitt	Renae
2022	FA	ENS 261	Environmental Research Project II	3	UG	Schmitt	Renae
2022	FA	ENS 297A	Environmental Science Internship	6	UG	Schmitt	Renae
2022	FA	ENS 297B	Environmental Science Internship	6	UG	Schmitt	Renae
2022	FA	ENS 297C	Environmental Science Internship	5	UG	Schmitt	Renae
2022	FA	ENS 299R	Citizen Science	10	UG	Schmitt	Renae
2022	FA	ENS 311	Introduction to GIS/GPS	4	UG	Ndiva Mongoh	Mafany
2022	FA	ENS 321	Environmental Chemistry	2	UG	Ndiva Mongoh	Mafany
2022	FA	ENS 422	Environmental Toxicology	2	UG	Onduso	Francis
2022	FA	ENS 445	Applying Dakota/Lakota Culture to E	0	UG	Buresh	Daniel
2022	FA	ENS 453	Environmental Law & Policy	4	UG	Schmitt	Renae
2022	FA	ENS 493B	Senior Research	2	UG	Ndiva Mongoh	Mafany
2022	FA	ENS 499L	Intermediate Statistics	2	UG	Mattes	Joshua
2022	SP	ENS 113	Introduction to Environmental Scien	13	UG	Buresh	Daniel
2022	SP	ENS 202	Environmental Issues	10	UG	Borah	Samantha
2022	SP	ENS 260	Environmental Research Project I	6	UG	Schmitt	Renae
2022	SP	ENS 261	Environmental Research Project II	5	UG	Schmitt	Renae
2022	SP	ENS 297A	Environmental Science Internship	5	UG	Schmitt	Renae
2022	SP	ENS 297B	Environmental Science Internship	5	UG	Schmitt	Renae
2022	SP	ENS 297C	Environmental Science Internship	5	UG	Schmitt	Renae
2022	SP	ENS 301	Hydrology	4	UG	Ndiva Mongoh	Mafany
2022	SP	ENS 331	Wildlife Conservation	6	UG	Schmitt	Renae
2022	SP	ENS 493A	Senior Research	2	UG	Ndiva Mongoh	Mafany
2022	SP	ENS 493B	Senior Research	0	UG	Ndiva Mongoh	Mafany

2022	SP	ENS 493C	Senior Research	0	UG	Ndiva Mongoh	Mafany
2022	SP	ENS 499X	Applying Native American Culture to	1	UG	Buresh	Daniel
2023	FA	ENS 225	Environmental Sampling	5	UG	Buresh	Daniel
2023	FA	ENS 240	Environmental Statistics	6	UG	Buresh	Daniel
2023	FA	ENS 260	Environmental Research Project I	4	UG	Ndiva Mongoh	Mafany
2023	FA	ENS 261	Environmental Research Project II	4	UG	Ndiva Mongoh	Mafany
2023	FA	ENS 297A	Environmental Science Internship	5	UG	Ndiva Mongoh	Mafany
2023	FA	ENS 297B	Environmental Science Internship	5	UG	Ndiva Mongoh	Mafany
2023	FA	ENS 297C	Environmental Science Internship	5	UG	Ndiva Mongoh	Mafany
2023	FA	ENS 321	Environmental Chemistry	5	UG	Knutson	Donna
2023	FA	ENS 432	Aquatic Ecosystems	6	UG	Buresh	Daniel
2023	FA	ENS 445	Applying Dakota/Lakota Culture to E	4	UG	Buresh	Daniel
2023	FA	ENS 453	Environmental Law & Policy	5	UG	Onduso	Francis
2023	FA	ENS 493A	Senior Research	2	UG	Ndiva Mongoh	Mafany
2023	FA	ENS 493C	Senior Research	1	UG	Ndiva Mongoh	Mafany
2023	SP	ENS 113	Introduction to Environmental Scien	14	UG	Buresh	Daniel
2023	SP	ENS 202	Environmental Issues	6	UG	Knutson	Donna
2023	SP	ENS 211	Introduction to GIS/GPS	1	UG	Van Dusen	Bruz
2023	SP	ENS 260	Environmental Research Project I	3	UG	Ndiva Mongoh	Mafany
2023	SP	ENS 261	Environmental Research Project II	3	UG	Ndiva Mongoh	Mafany
2023	SP	ENS 297A	Environmental Science Internship	1	UG	Ndiva Mongoh	Mafany
2023	SP	ENS 297B	Environmental Science Internship	4	UG	Ndiva Mongoh	Mafany
2023	SP	ENS 297C	Environmental Science Internship	4	UG	Ndiva Mongoh	Mafany
2023	SP	ENS 299W	Presenting STEM Research	4	UG	Buresh	Daniel
2023	SP	ENS 299X	Plant Science	1	UG	Onduso	Francis
2023	SP	ENS 311	Introduction to GIS/GPS	7	UG	Van Dusen	Bruz
2023	SP	ENS 422	Environmental Toxicology	4	UG	Onduso	Francis
2023	SP	ENS 493A	Senior Research	2	UG	Ndiva Mongoh	Mafany

2023	SP	ENS 493B	Senior Research	4	UG	Ndiva Mongoh	Mafany
2023	SP	ENS 493C	Senior Research	2	UG	Ndiva Mongoh	Mafany
2023	SP	ENS 499X	Applying Native American Culture to	3	UG	Buresh	Daniel
2024	FA	ENS 113	Introduction to Environmental Scien	11	UG	Buresh	Daniel
2024	FA	ENS 225	Environmental Sampling	3	UG	Buresh	Daniel
2024	FA	ENS 240	Environmental Statistics	4	UG	Buresh	Daniel
2024	FA	ENS 260	Environmental Research Project I	2	UG	Buresh	Daniel
2024	FA	ENS 270	Ecology & History of Standing Rock	4	UG	Buresh	Daniel
2024	FA	ENS 297A	Environmental Science Internship	2	UG	Ndiva Mongoh	Mafany
2024	FA	ENS 297B	Environmental Science Internship	1	UG	Ndiva Mongoh	Mafany
2024	FA	ENS 301	Hydrology	4	UG	Buresh	Daniel
2024	FA	ENS 445	Applying Dakota/Lakota Culture to E	5	UG	Buresh	Daniel
2024	FA	ENS 493A	Senior Research	1	UG	Buresh	Daniel
2024	FA	ENS 493B	Senior Research	3	UG	Ndiva Mongoh	Mafany
2024	FA	ENS 493C	Senior Research	1	UG	Ndiva Mongoh	Mafany
2024	FA	ENS 499Z	Advanced Ecology & History of Stand	1	UG	Buresh	Daniel
2024	SP	ENS 260	Environmental Research Project I	1	UG	Knutson	Donna
2024	SP	ENS 261	Environmental Research Project II	3	UG	Buresh	Daniel
2024	SP	ENS 297A	Environmental Science Internship	0	UG	Ndiva Mongoh	Mafany
2024	SP	ENS 297B	Environmental Science Internship	2	UG	Ndiva Mongoh	Mafany
2024	SP	ENS 297C	Environmental Science Internship	3	UG	Ndiva Mongoh	Mafany
2024	SP	ENS 299Y	Oceanography	4	UG	Knutson	Donna
2024	SP	ENS 331	Wildlife Conservation	5	UG	Van Dusen	Bruz
2024	SP	ENS 422	Environmental Toxicology	5	UG	Knutson	Donna
2024	SP	ENS 446	Applying Native American Culture to	2	UG	Buresh	Daniel
2024	SP	ENS 493A	Senior Research	2	UG	Knutson	Donna
2024	SP	ENS 493B	Senior Research	0	UG	Ndiva Mongoh	Mafany

2024	SP	ENS 493C	Senior Research	3	UG	Ndiva Mongoh	Mafany
2024	SP	ENS 499AA	Indigenous Science Physics	3	UG	Knutson	Donna
2024	SP	ENS 499AB	Soil Chemistry	6	UG	Halvorson	Gary
2019	FA	ENS 600A	Graduate Research & Thesis	1	GR	Halvorson	Gary
2019	FA	ENS 545	Applying Dakota/Lakota Culture in E	1	GR	Buresh	Daniel
2019	FA	ENS 560	Advanced Water & Soil Biogeochemist	1	GR	Halvorson	Gary
2019	FA	ENS 500B	Graduate Research Seminar	1	GR	Ndiva Mongoh	Mafany
2019	SP	ENS 599S	Applying Native American Culture to	1	GR	Buresh	Daniel
2019	SP	ENS 600B	Graduate Research & Thesis*	1	GR	Halvorson	Gary
2019	SP	ENS 600C	Graduate Research & Thesis*	1	GR	Halvorson	Gary
2019	SP	ENS 600D	Graduate Research & Thesis*	1	GR	Halvorson	Gary
2019	SP	ENS 600E	Graduate Research & Thesis*	1	GR	Halvorson	Gary
2019	SP	ENS 600F	Graduate Research & Thesis*	1	GR	Halvorson	Gary
2019	SP	ENS 520	Advanced Techniques in GIS*	1	GR	Ndiva Mongoh	Mafany
2019	SP	ENS 530	Limnology*	1	GR	Buresh	Daniel
2019	SP	ENS 532	Watershed Analysis*	1	GR	Halvorson	Gary
2020	FA	ENS 572	Environmental Water Quality	1	GR	Halvorson	Gary
2020	FA	ENS 545	Applying Dakota/Lakota Culture in E	2	GR	Buresh	Daniel
2020	FA	ENS 558	Restoration Ecology	3	GR	Onduso	Francis
2020	SP	ENS 500A	Graduate Research Seminar	2	GR	Ndiva Mongoh	Mafany
2020	SP	ENS 515	Advanced Statistics	2	GR	Mattes	Joshua
2021	FA	ENS 600A	Graduate Research & Thesis	2	GR	Halvorson	Gary
2021	FA	ENS 560	Advanced Water & Soil Biogeochemist	2	GR	Halvorson	Gary
2021	FA	ENS 570	Climate Change	2	GR	Ndiva Mongoh	Mafany
2021	FA	ENS 500B	Graduate Research Seminar	2	GR	Ndiva Mongoh	Mafany
2021	FA	ENS 515	Advanced Statistics	2	GR	Mattes	Joshua
2021	SP	ENS 600B	Graduate Research & Thesis	2	GR	Halvorson	Gary

2021	SP	ENS 600C	Graduate Research & Thesis	2	GR	Halvorson	Gary
2021	SP	ENS 600D	Graduate Research & Thesis	2	GR	Halvorson	Gary
2021	SP	ENS 600E	Graduate Research & Thesis	2	GR	Halvorson	Gary
2021	SP	ENS 600F	Graduate Research & Thesis	2	GR	Halvorson	Gary
2021	SP	ENS 520	Advanced Techniques in GIS	2	GR	Ndiva Mongoh	Mafany
2021	SP	ENS 515	Advanced Statistics	1	GR	Mattes	Joshua
2022	FA	ENS 600A	Graduate Research & Thesis	2	GR	Ndiva Mongoh	Mafany
2022	FA	ENS 600B	Graduate Research & Thesis	2	GR	Ndiva Mongoh	Mafany
2022	FA	ENS 600H	Graduate Research & Thesis	1	GR	Ndiva Mongoh	Mafany
2022	FA	ENS 545	Applying Dakota/Lakota Culture in E	2	GR	Buresh	Daniel
2022	FA	ENS 500A	Graduate Research Seminar	2	GR	Ndiva Mongoh	Mafany
2022	FA	ENS 511	Advanced Experimental Design	2	GR	Onduso	Francis
2022	SP	ENS 600H	Graduate Research & Thesis	1	GR	Ndiva Mongoh	Mafany
2022	SP	ENS 600I	Graduate Research & Thesis	1	GR	Ndiva Mongoh	Mafany
2022	SP	ENS 542	Environmental Policy & Resource Man	1	GR	Ndiva Mongoh	Mafany
2022	SP	ENS 500B	Graduate Research Seminar	1	GR	Ndiva Mongoh	Mafany
2022	SP	ENS 515	Advanced Statistics	2	GR	Mattes	Joshua
2022	SU	ENS 600G	Graduate Research & Thesis	2	GR	Halvorson	Gary
2023	FA	ENS 600H	Graduate Research & Thesis	2	GR	Ndiva Mongoh	Mafany
2023	SP	ENS 600I	Graduate Research & Thesis	2	GR	Ndiva Mongoh	Mafany
2023	SP	ENS 558	Restoration Ecology	2	GR	Onduso	Francis
2023	SU	ENS 600C	Graduate Research & Thesis	1	GR	Ndiva Mongoh	Mafany
2024	FA	ENS 600H	Graduate Research & Thesis	1	GR	Ndiva Mongoh	Mafany
2024	FA	ENS 545	Applying Native American Culture to	3	GR	Buresh	Daniel
2024	FA	ENS 511	Advanced Experimental Design	3	GR	Ndiva Mongoh	Mafany
2024	FA	ENS 515	Advanced Statistics	4	GR	Ndiva Mongoh	Mafany
2024	SP	ENS 600A	Graduate Research & Thesis	3	GR	Ndiva Mongoh	Mafany

2024	SP	ENS 600B	Graduate Research & Thesis	3	GR	Ndiva Mongoh	Mafany
2024	SP	ENS 600I	Graduate Research & Thesis	0	GR	Ndiva Mongoh	Mafany
2024	SP	ENS 542	Environmental Policy & Resource Man	3	GR	Ndiva Mongoh	Mafany
2024	SP	ENS 500A	Graduate Research Seminar	3	GR	Ndiva Mongoh	Mafany

REFERENCES

Araujo, N., Carlin, D., Clarke, B., Morieson, L., Lukas, K., and Wilson, R. (2014). Belonging in the First Year: A creative discipline cohort case study. *The International Journal of the First Year in Higher Education, Volume 5, (Issue 2)* pp. 21-31.

Audubon Society (2014). *Working Lands Grassland Birds*. Retrieved from http://www.audubon.org/conservation/project/grassland-birds.

Buresh, D. (2014). *Environmental Science Program Review Report 2009-2014*.

Brown, J.E. (1953). *The Sacred Pipe: Black Elk's Account of the Seven Rites of the Oglala Sioux*. The University of Oklahoma Press. p.27.

Brush, L.R., (1979). Avoidance of Science and Stereotypes of Scientists. *Journal of Research in Science Teaching, Volume 16, (Issue 3)* pp. 237-241.

Cajette, G. (2000). *Native Science: Natural Laws of Interdependence*. Clear Light Publishers.

Gilmore, M.R. (1977). *Uses of Pants by the Indians of the Missouri River Region*. University of Nebraska Press Publishing.

Grassland Heritage Foundation (2013). *Threats to the Prairie: Habitat destruction*. Retrieved from http://grasslandheritage.org/prairie_threats.html

Quinn, G. P., and Keough M. (2002). *Experimental Design and Data Analysis for Biologists*. ISBN-13: 978-0-521-00976-8.

Guinn, J. and Buresh, D. (2010). *Environmental Science Program Review Report 2009-2010.* p.6.

Marshall, J.M., III (2001). *The Lakota Way*. Penguin Compass Publishing. P. 190.

Smith, B.L., Stumpff, L.M., Cole, R. (2012). Engaging Students from Underrepresented Populations: The enduring legacies Native cases initiative. *Journal of College Science Teaching, Volume 41, (Issue 4).*

Standing Rock Sioux Tribe (No Date). *Standing Rock Sioux Tribe Community Profile*. Retrieved from http://www.standingrock.org/communityProfile/.

United States Department of Labor: Bureau of Labor Statistics. (2013). *North Dakota State Wages and Employment Outlook.* Retrieved from http://www.bls.gov/oes/current/oes_nd.htm.

United States Department of Labor: Bureau of Labor Statistics. (2014). Occupational *Outlook Handbook*. Retrieved from http://www.bls.gov/ooh/a-zindex.html.