

**ENVIRONMENTAL SCIENCE PROGRAM
PROGRAM REVIEW REPORT**

2014 - 2019

Compiled by:

Dr. Francis N. Onduso

The Environmental Science Department

Sitting Bull College

Draft Submitted: April 4, 2019

External Reviewer Advised Revisions back to Environmental Program: April 23, 2019

TABLE OF CONTENTS

| | |
|--|----|
| ABSTRACT (EXECUTIVE SUMMARY) | 3 |
| Program Description, Self-Evaluation, and Planning | 3 |
| PART I PROGRAM DESCRIPTION | 4 |
| 1. ROLE OF PROGRAM WITHIN SITTING BULL COLLEGE..... | 4 |
| Environmental Science Degrees Offered..... | 6 |
| 2. PROGRAM STAFF..... | 8 |
| 3. PROGRAM PRODUCTIVITY (2014-2018) | 9 |
| Program Enrolment..... | 9 |
| Environmental Science Program Enrollment, Graduation, Transition, and Employment | 14 |
| 4. PROGRAM REVENUE (2014 - 2019) | 18 |
| Tuition and ISC (Indian Student Count)..... | 18 |
| Major grant funding | 20 |
| 5. PROGRAM BUDGET..... | 24 |
| 6. ADVISORY COMMITTEE | 24 |
| II. PROGRAM SELF-EVALUATION..... | 26 |
| A. Faculty..... | 26 |
| B. Student Relations | 28 |
| C. Curriculum Content, Design, and Delivery | 29 |
| D. Assessment Findings and Analysis | 31 |
| E. Institutional Support..... | 31 |
| F. Obstacles/Previous Findings | 31 |
| G. Others..... | 33 |
| III. PROGRAM PLANNING | 37 |
| A. Trends | 37 |
| B. Articulation of Issues | 38 |
| C. Revised Goals and Objectives Due to Program Review | 38 |
| D. Additional Resources Needed..... | 39 |
| Appendix A – 1 to A - 4 | 46 |
| Appendix B | 58 |
| Appendix C. | 62 |
| References..... | 70 |

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 in Standing Rock Sioux Reservation. Our graduates are employed with tribal, state, federal, and private entities. These agencies and our graduates work together to improve the environment of Standing Rock Sioux Reservation.

SBC hired one additional full-time faculty member in 2015, and currently has five full-time environmental science faculty and four faculty from the departments of mathematics, engineering, general science, and education who teach part-time within the environmental science department.

Grant funding is the major financial source for the program, providing salary and fringe benefits for science faculty, auxiliary science staff, and science faculty in the education and nursing departments. Grants also allow students and faculty to travel to conferences, international research sites, and field labs, and help fund SBC Extension 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 department, five have Ph.D. degrees and four have M.S. degrees. Two are completing work for a Ph.D., and one is A.B.D. 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 resulted in changes within the department. Additional evening courses have been added, for instance. Additional on-line and hybrid courses were tried, as well, but low passing rates (i.e. below C grade) and a reevaluation of students' desires indicates that in-person education is needed and preferred for 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. and B.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. However, office and research space is needed for graduate students at the main campus. A new building is planned, but ground breaking has not yet taken place.

No major departmental changes resulted from this program review. The review will be used by the department to study trends in enrollment and 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 put pressure on the unique ecology of 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 programs follow the Mission Statement of the department, 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”.

Currently, there are three degree programs within the Department of Environmental Science at SBC. The department offers students an A.S. degree, a B.S. degree, and an M.S. degree. All three of these degree programs 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 his or her education. Nearly all courses within the programs are transferable to other institutions of higher education that offer similar degrees in environmental science.

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 in 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 in 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.

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 OF 3-4 CREDIT HOURS)

| | |
|----------|------------------------------------|
| 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)

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)

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 students' respective degree
- iii. ENS 545 (Applying Dakota/Ochethi Sakowin Culture to Environmental Science) is offered at MS level to enhance understanding of Native Science as it relates to the Lakota/ Dakota culture.

2. PROGRAM STAFF

The primary faculty members who 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):

Dan Buresh, Ph. D., Environmental Science Instructor – Full time 15 credits/semester

Francis N. Onduso, Ph.D. Ecology Instructor- Full time 15 credits/semester

Gary Halvorson, Ph.D., Chemistry Instructor – Full time 15 credits/semester

Mafany Mongoh, Ph.D., Agriculture and Science Instructor – Full time 15 credits/semester

Rena Schmitt, M.S., Environmental Science Instructor – Full Time 15 credits/semester

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

Joshua Mattes, Ph.D., Statistics Instructor – Full time 3 credits/semester

Tim Kraher, M.S., Mathematics and Statistics Instructor – Full time 3 – 6 credits/semester

Linda Black Elk, M.S., Ethnobotany Instructor – Full time 4 credits/semester

Anjanette Parisian, M.S., Biological Science Instructor – Full time 4 – 6 credits/semester

Graduate Students who served on teaching assistantship:

- Clayton Lupe, Graduate Teaching assistant – Part time 2 Credits/semester (Graduated- Fall 2018)
- Louis Walking Elk, Graduate Teaching Assistant – Part time 2 Credits/semester (Graduated- Fall 2016)

- Bruz Van Dusen, Graduate Teaching Assistant – Part time 2 Credits/semester (Graduated- Fall 2016)

Faculty members who resigned during the report period are:

- Linda Black Elk, M.S., Ethnobotany Instructor – Full time 4 credits/semester (Spring 2018).
- Anjanette Parisian, M.S., Biological Science Instructor – Full time 4 – 6 credits/semester (Summer 2015).

The program non-faculty personnel:

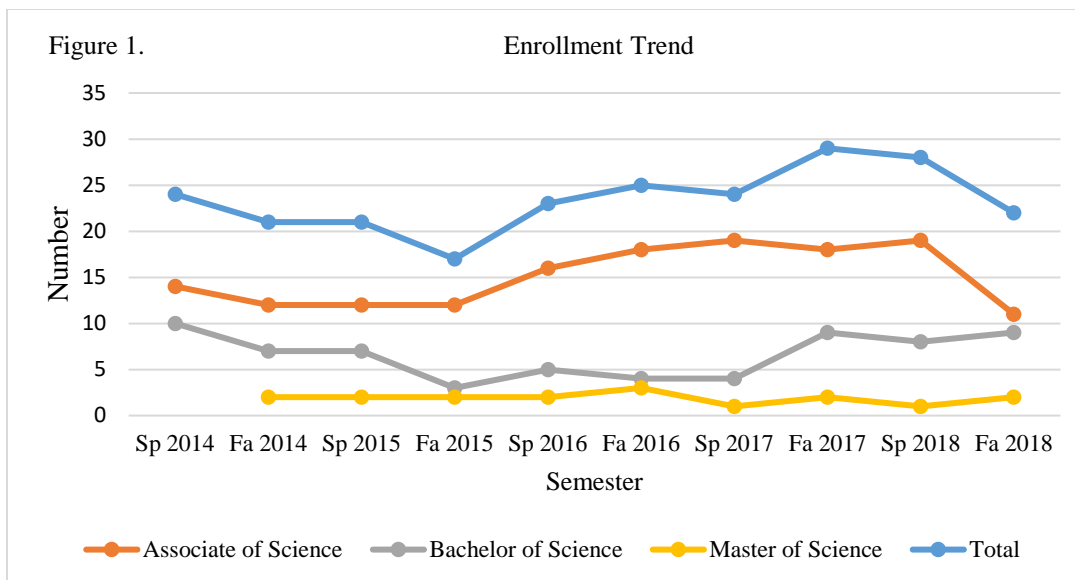
The program uses students especially graduates to assist in the laboratories. There is a need for at least one permanent laboratory technician to help manage and set up both research and teaching labs.

3. PROGRAM PRODUCTIVITY (2014-2018)

Program

Table 1. 2014-2018 Enrollment Data

| Degree Program | Sp 14 | Fa 14 | Sp 15 | Fa 15 | Sp 16 | Fa 16 | Sp 17 | Fa 17 | Sp 18 | Fa 18 |
|--------------------------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| Associate of Science | 14 | 12 | 12 | 12 | 16 | 18 | 19 | 18 | 19 | 11 |
| Bachelor of Science | 10 | 7 | 7 | 3 | 5 | 4 | 4 | 9 | 8 | 9 |
| Master of Science | N/A | 2 | 2 | 2 | 2 | 3 | 1 | 2 | 1 | 2 |
| Total (ENS) | 24 | 21 | 21 | 17 | 23 | 25 | 24 | 29 | 28 | 22 |
| Percent to SBC enrollment | 8% | 7% | 8% | 6% | 9% | 9% | 9% | 9% | 8% | 8% |
| Total (College) | 306 | 304 | 278 | 270 | 247 | 291 | 268 | 316 | 349 | 284 |



Analysis

There was a general stable trend in enrollment. AS enrollment remains the highest followed by BS. However, a sharp downward trend in AS enrollment was registered in spring 2018 (Table 1 and Fig. 1). The decline is most likely be due to the number of students who had already earned an A.S. degree before spring 2018 and then enrolled in the new B.S. degree program. In fact, there was a high A.S. graduation number in spring 2018.

The number of environmental science students enrolled in the B.S. degree program was generally on the decline but started picking up in fall 2017. The decline was due to students on academic suspension.

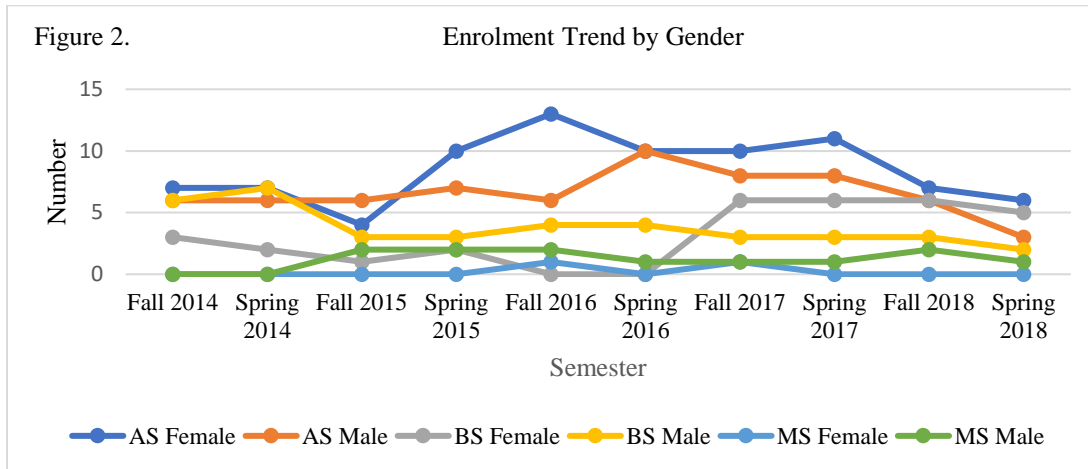
The first cohort began the degree program in Environmental Science in fall 2014. The enrollment remained low but stable.

In the last five years about 70% of environmental science students have moved from the A.S. to the B.S. degree program, and about 30% 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 a direct admission were still admitted but with conditions. The Graduate Record Examination (GRE) score, Grade Point Averagae(GPA), and three letters of recommendation are the main considerations during the M.S. admission process.

The recuitment 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 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.

Figure 2. 2014-2018 enrollment by gender and semester data

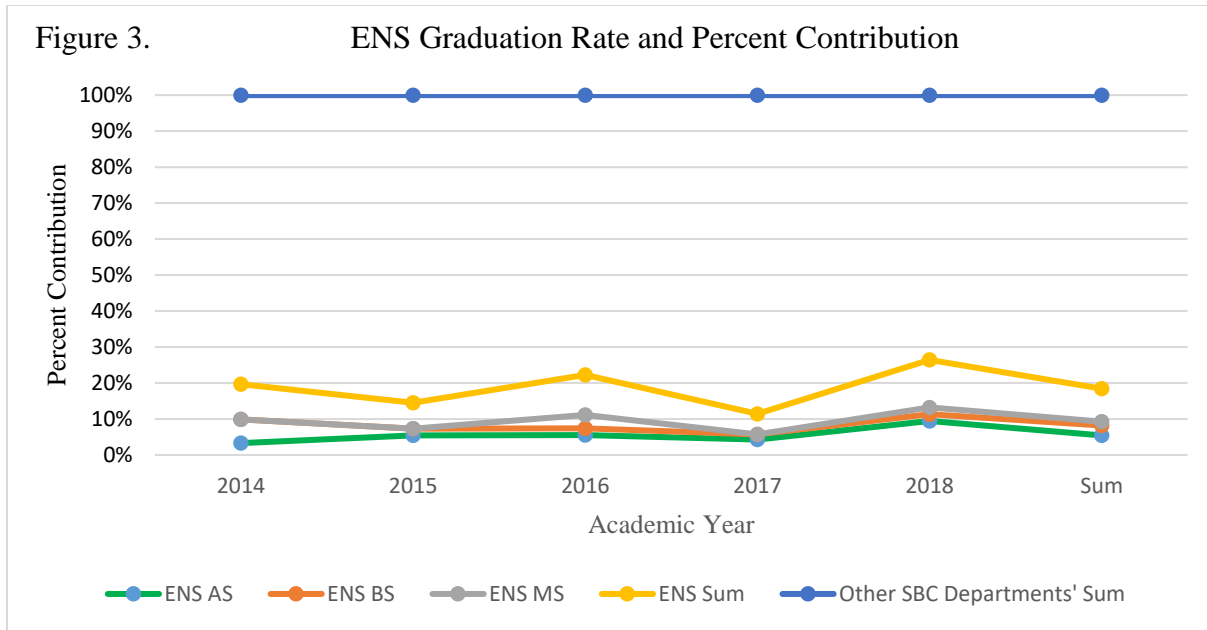


Analysis

At the A.S. level, female enrollment has remained higher than male except in fall 2015. This trend is different at the B.S. level (Fig. 2). Female enrollment passed male in spring 2017 and maintains the lead to date. Male enrollment remains higher at the M.S. level. The department has not yet established the cause of the above trends.

Table 3. 2014-2018 ENS and Other SBC Departments Graduation Data

| Year | ENS | | | | Other SBC Departments |
|-----------------------------|--------------|--------------|--------------|-------------|-----------------------|
| | AS | BS | MS | Sum | Sum |
| 2014 | 2 | 4 | 0 | 6 | 49 |
| 2015 | 3 | 1 | 0 | 4 | 47 |
| 2016 | 3 | 1 | 2 | 6 | 42 |
| 2017 | 3 | 1 | 0 | 4 | 62 |
| 2018 | 5 | 1 | 1 | 7 | 39 |
| Sum | 16 | 8 | 3 | 27 | 239 |
| Departmental percent | 59.3% | 29.6% | 11.1% | 100% | |



Analysis

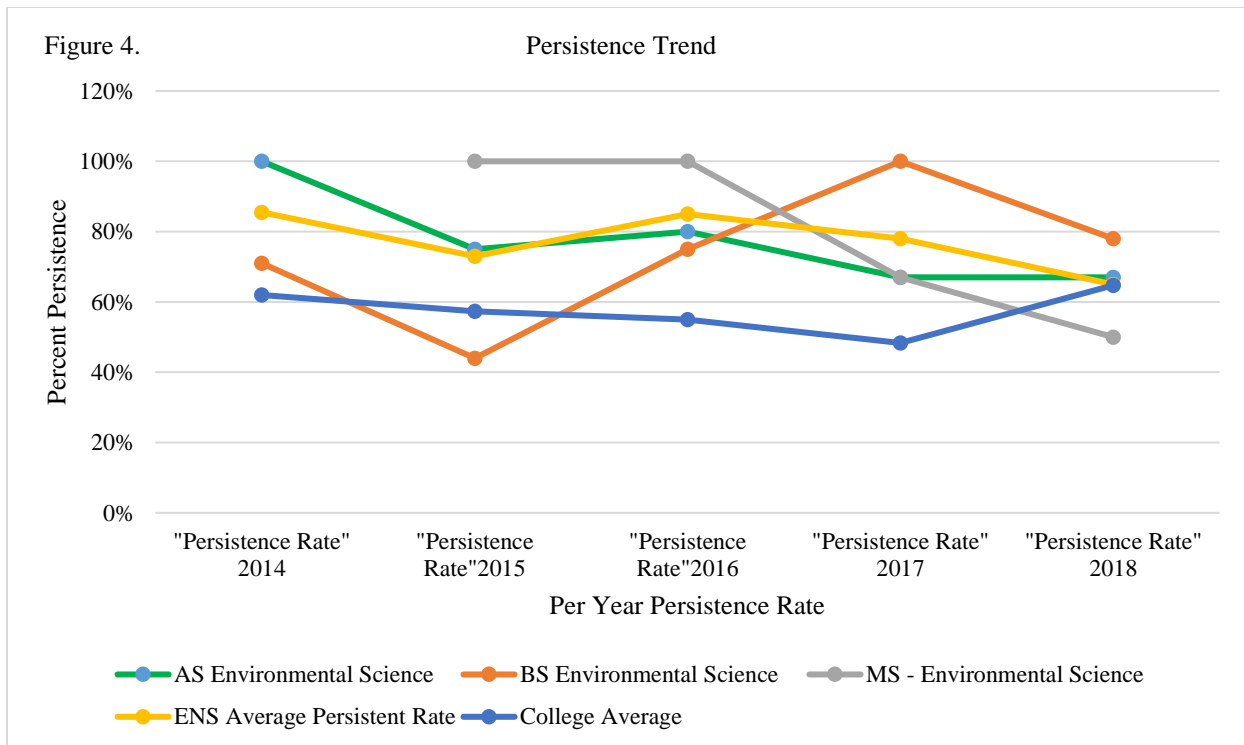
The graduation trend was generally stable for all the Environmental Science degrees. Environmental Science graduation rate contribution to the SBC's is about 20% and 2018 value indicates that it's on the rise (Table 3 and Figure 3).

A total of 27 students graduated with various degrees in environmental science. Fifteen (16) 59% of the total, received their A.S. degree, seven (8) 30 % graduated with B.S. degrees and three (3) 11% with M.S. degrees.

The environmental science department is looking into ways to increase these numbers to 20, 15 and 8 for AS, BS and MS respectively. These ways include, but are not limited to, promoting student tailored research projects and internships.

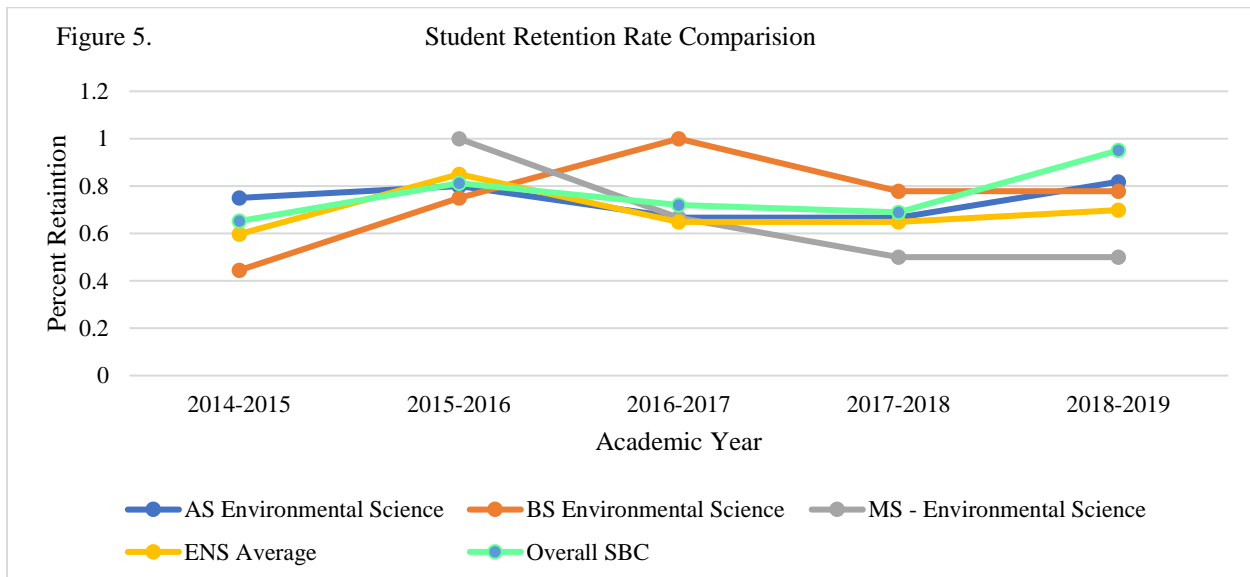
Table 4. Environmental Science Department Student Retention (Percent)

| | 2014-2015 | 2015-2016 | 2016-2017 | 2017-2018 | 2018-2019 |
|---------------------|------------|------------|------------|------------|------------|
| AS | 75% | 80% | 67% | 67% | 82% |
| BS | 44% | 75% | 100% | 78% | 78% |
| MS | 100% | 100% | 67% | 50% | 50% |
| ENS- Average | 73% | 85% | 78% | 65% | 70% |
| Overall -SBC | 65% | 81% | 72% | 69% | 95% |



Analysis

The general persistence was stable, though there was a downward trend in the A.S. and M.S. programs, which calls for a vigorous recruitment and retention effort. However, the overall program's persistence rate is higher than the SBC average persistence (Fig. 4).



Analysis

There is a general increase in retention rates for A.S. and B.S. degree seeking students, but not for M.S. students. However, when examining the retention rates, following students from one academic year to the next, the Environmental Science Department has almost always exceeded the retention rate of SBC as a whole (Figure 5), despite the fact that M.S. degree-seeking student retention currently remains the lowest. The B.S. degree-seeking student retention rates rose steadily from 2014, reaching the peak in 2016, after which a slight decline was experienced. This was due to students who were on academic probation and suspension.

A.S. degree-seeking student retention rate was highest in 2015-2016, and has remained relatively stable, taking the lead in the 2018-2019 period (Fig. 5). The Environmental Science Department is concerned with the decreasing retention rates of the M.S. degree-seeking students, and will try to determine the cause of this decline. The department would like to see at least 12 students in both the A.S. and B.S. degree programs and at least 6 in the M.S. program after the addition of lab spaces for both faculty and teaching labs.

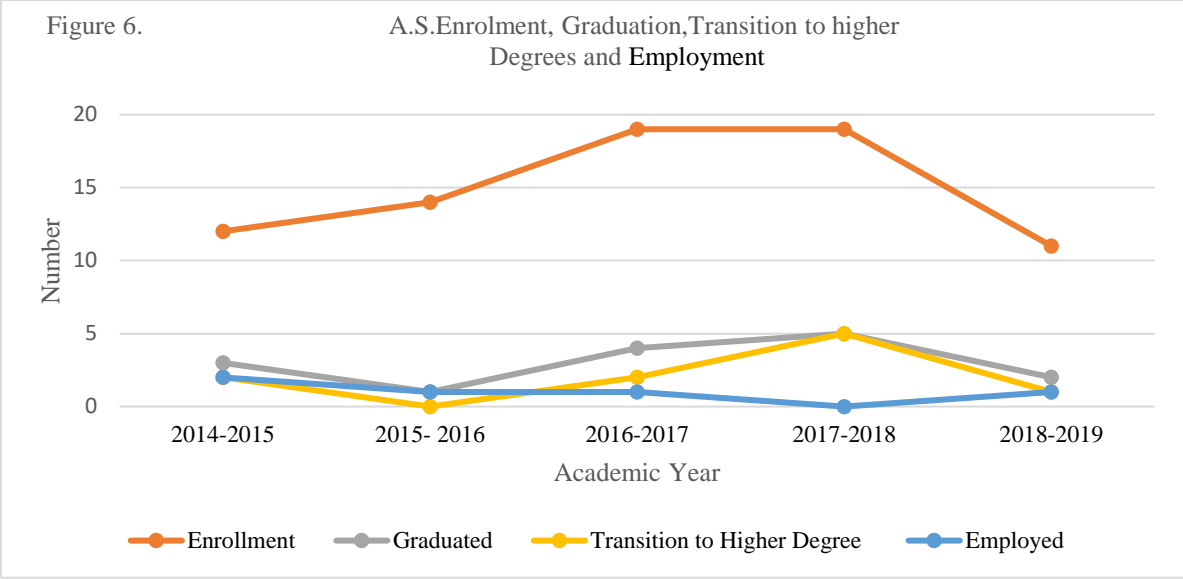
Environmental Science Program Enrollment, Graduation, Transition, and Employment

1. A.S. Degree.

The enrollment for the A.S. degree has fluctuated during the past 5 years, and the graduation rates reflect that fluctuation. Considering yearly enrollment and graduation, the average graduation rate is about 16.2%. However, of those that graduate, an average of 53% have gone to seek a higher degree, and only 16.6% have opted to go to the workforce instead (Table 5).

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

| A.S. Degree | 2014-2015 | 2015-2016 | 2016-2017 | 2017-2018 | 2018-2019 |
|-----------------------------|------------------|------------------|------------------|------------------|------------------|
| Enrollment | 12 | 14 | 19 | 19 | 11 |
| Graduated | 3 (25%) | 1 (7%) | 4 (21%) | 5 (26%) | 2 (2%) |
| Transition to Higher Degree | 2 (67%) | 0 (0%) | 2 (50%) | 5 (100%) | 1 (50%) |
| Employed | 1 (33%) | 1 100% | 2 (50%) | 0 (0%) | 1 (50%) |



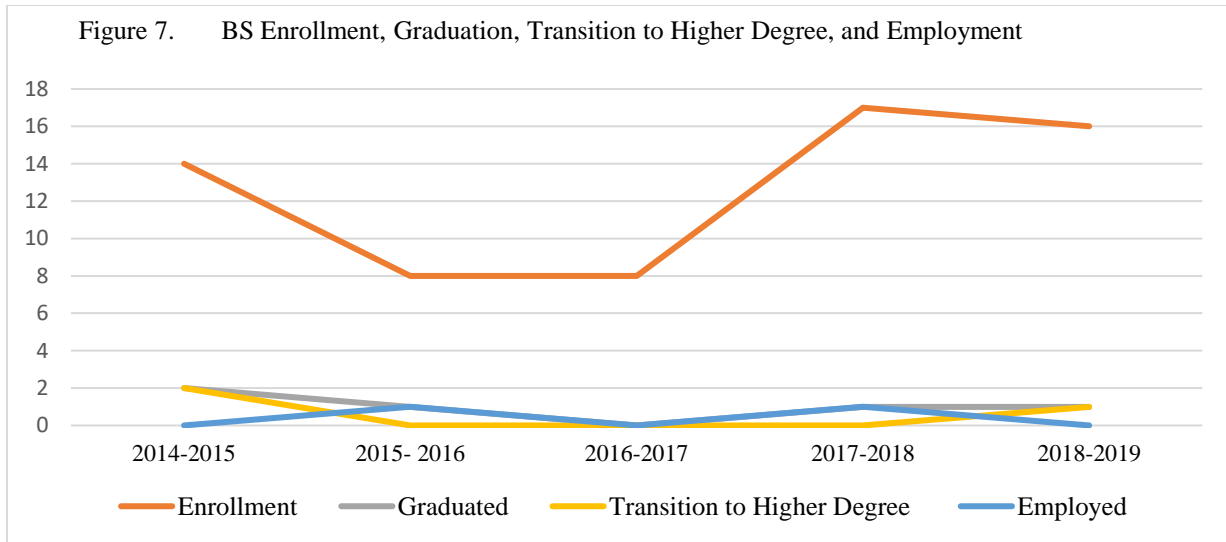
Analysis

Student enrollment in the A.S. degree program remained on the rise, peaked in AY2016 and 2017 (Table 5 and Fig.6). The decline registered in AY2018 may be due to the high number that graduated in AY 2017. The number of A.S. degree graduates transferring to higher degrees was higher than the number employed. This is good for academic advancement within the area that the college serves.

2. B.S. Degree

Table 6. Environmental Science Program enrollment, Graduation, Transition, and Employment (B.S. Degree).

| B.S. Degree | 2014-2015 | 2015- 2016 | 2016-2017 | 2017-2018 | 2018-2019 |
|-------------------------------|------------|--------------|-----------|-------------|-------------|
| Enrollment | 14 | 8 | 8 | 17 | 16 |
| Graduated | 2 (14%) | 1 (12.5%) | 0 (0%) | 1 (0.1%) | 1 (0.1%) |
| Transitioned to Higher Degree | 2 100% | 0 (0%) | 0 (0%) | 0 (0%) | 1 (100%) |
| Employed | 0 (0%) | 1 100% | 0 (0%) | 1 100% | 0 (0%) |



Analysis

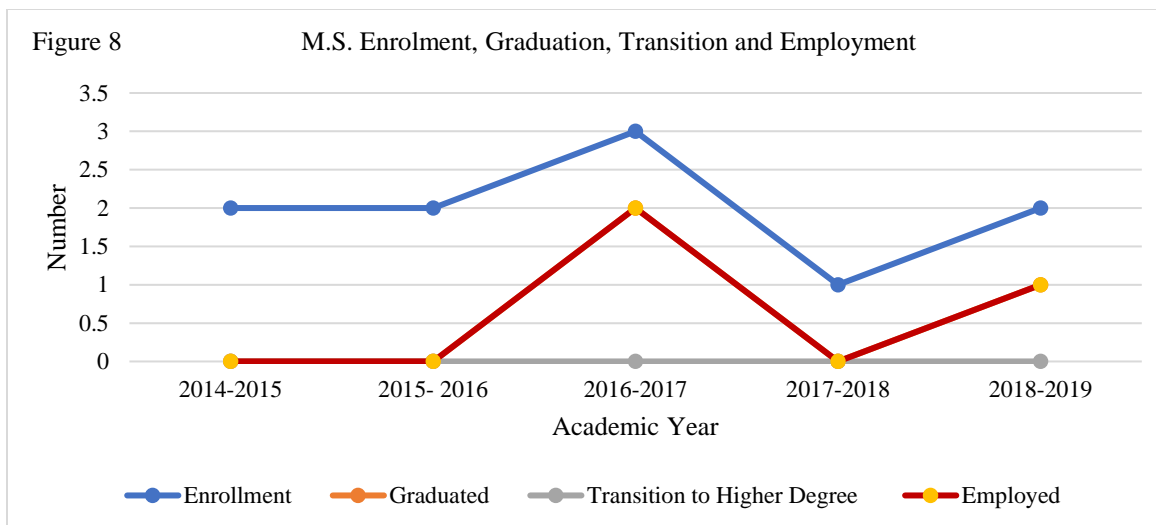
Initially, enrollment in the environmental science B.S. degree plan was on the decline, hitting the nadir in AY2015 (Table 6 and Fig. 7). However, a steady increase has registered since then.

The graduation, transition to higher degree, and employment rates generally remained stable through the review period with the exception of some “noise” during AY 2014 and AY2018 (Fig. 7).

3. M.S. Degree

Table 7. Environmental Science Program Enrollment, Graduation, Transition, and Employment (M.S. Degree).

| M.S. Degree | 2014-2015 | 2015-2016 | 2016-2017 | 2017-2018 | 2018-2019 |
|-------------------------------|-----------|-----------|-------------|-----------|-------------|
| Enrollment | 2 | 2 | 3 | 1 | 1 |
| Graduated | 0 (0%) | 0 (0%) | 2 (67%) | 0 (0%) | 1 (100%) |
| Transitioned to Higher Degree | 0 | 0 | 0 | 0 | 0 |
| Employed | 0 (0%) | 0 (0%) | 2 (100%) | 0 (0%) | 1 (100%) |



Analysis

The first cohort was enrolled in AY 2014. Enrollment in the M.S. degree program in Environmental Science at SBC remained low, but the graduation rate remained high at an average of 75% for the first two cohorts. The employment rate for the M.S. graduates was 100%, while transition to higher degree (Ph.D.) remained 0% (Table 7 and Fig. 8). All that graduated were employed hence the same line graph for the two. Environmental science faculty members will continue encouraging the M.S. graduates to pursue higher degrees.

Courses Environmental Science Department Offered

The department offered several courses to both environmental science majors and others. BIOL 111 and BIOL 150 are offered for both environmental science majors and general education majors, while BIOL 202 and BIOL 230 are for nursing students. PHYS 102 is offered to education students.

Each course in the students' core was examined for completion rates for the whole review period. The Environmental Science Department considers a student completing a course if they receive 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.

Table 14 shows the number of students completing and attempting each course. This 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 in parentheses. Any course that has a 50% or less satisfactory completion rate was examined in depth, as it may be a "gate-keeper" course that is impeding students from graduating. However, it is noted that some low percentages are due to students no longer attending the course but failing to drop, thus getting an F-grade.

Another attribute to low percentages in courses like BIOL 150 were the extraordinary high numbers of students enrolled who are non-science majors, and whose dedication to the course might not be as high as it would be if it was a course directly related to their major. The department feels that the non-science majors should enroll in BIOL 111 (Concepts of Biology) instead of 150 (Introduction to Biology I) which has proved to be more challenging to non-science majors. Both BIOL 111 and 150 may be taught every semester. The two courses have not been taught each semester, but given the data, the department will discuss plans to better accommodate both majors and non-majors who need a laboratory course for their general education requirements.

The BIOL 455 course and the ENS 311 course were designated to accommodate non-science majors who may need additional upper division courses (300- and 400-level). So, these two courses generally have many upper division General Studies majors (non-science majors) enrolled in them, which may be leading to unusually low satisfactory completion rates, as the interest level or educational background may not be in place to set students up for success in the courses.

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 report period, but laboratory space remained a big issue. The department bought a PCR set in AY 2017 but it remained unutilized because of the lack of space to set it up.

Environmental science faculty members offered courses 116 times within the review period and the mean score in all courses ENS faculty offered was about 80% (Table 14). Our classes are small with less than 10 students except some introductory courses such as BIOL 150 (General Biology I) and ENS 113 (Introduction to Environmental Science). 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 lab settings when there is a need .

4. PROGRAM REVENUE (2014 - 2019)

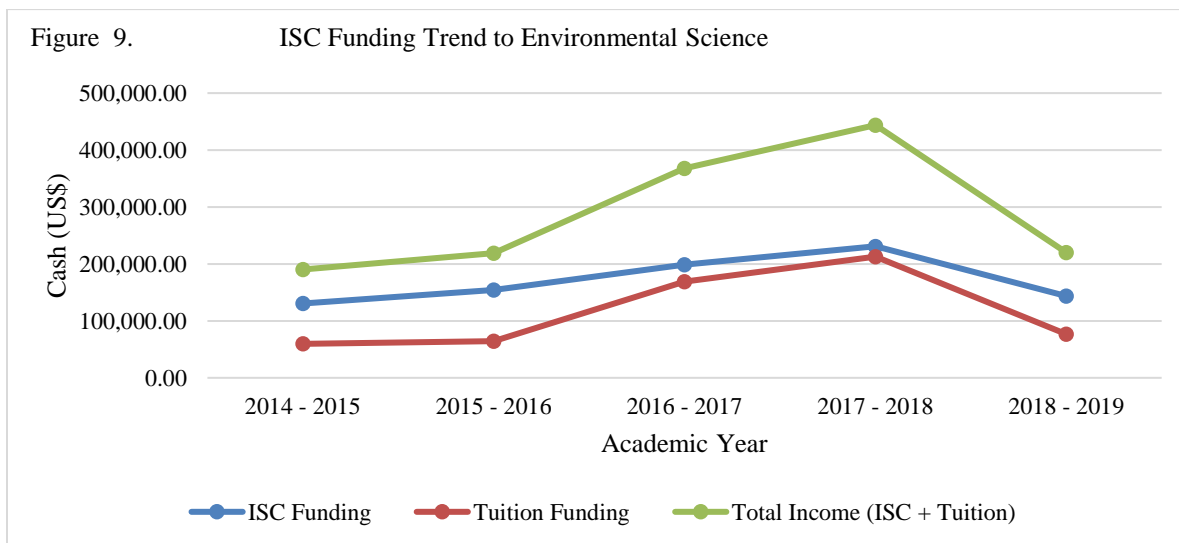
Tuition and ISC (Indian Student Count)

Data related to revenue from Indian Student Count (ISC) and tuition were collected from the SBC Shared File and compiled (Table 8 and Fig. 9). The Environmental Science Department consistently brings the third highest income, behind only the Business program and the General Studies program. Given that Native American populations are grossly underrepresented in the

STEM fields (Smith et. al., 2012), it is quite a favorable statement about the program that it is the third largest program on the SBC campus. The data indicates that the Environmental Science Department has had a total income of \$1,251,029.06 gained from ISC and tuition dollars over the past five years. The lowest income came in academic year (AY) 2014-2015 with an income of \$190,217.29, and the highest income year was AY 2017 - 2018 with an income of \$ 443,795.00 from ISC and tuition. ISC funds are dependent on federal funding for any given fiscal year, thus it is difficult to predict by what amount the ISC funds will change from year to year.

Table 8. Income Derived from ISC and Tuition for the Environmental Science Department (20014 – 2019).

| Academic Year | ISC Funding | Tuition Funding | Total Income (ISC + Tuition) |
|---------------|-------------------|-------------------|------------------------------|
| 2014 - 2015 | 130,542.29 | 59,675.00 | 190,217.29 |
| 2015 - 2016 | 154,541.99 | 64,625.00 | 219,166.99 |
| 2016 - 2017 | 198,600.00 | 169,150.00 | 367,750.00 |
| 2017 - 2018 | 231,000.00 | 212,795.00 | 443,795.00 |
| 2018 - 2019 | 143,517.07 | 76,800.00 | 220,317.07 |
| Total | 858,201.35 | 583,045.00 | 1,251,029.06 |



Analysis

Funding from ISC continued to rise except the year 2018 – 2019 but this may just be noise (Table 8 and Fig.9). The environmental science faculty members are actively writing grant proposals for research and tuition to balance the “noise” incase its real.

Major grant funding

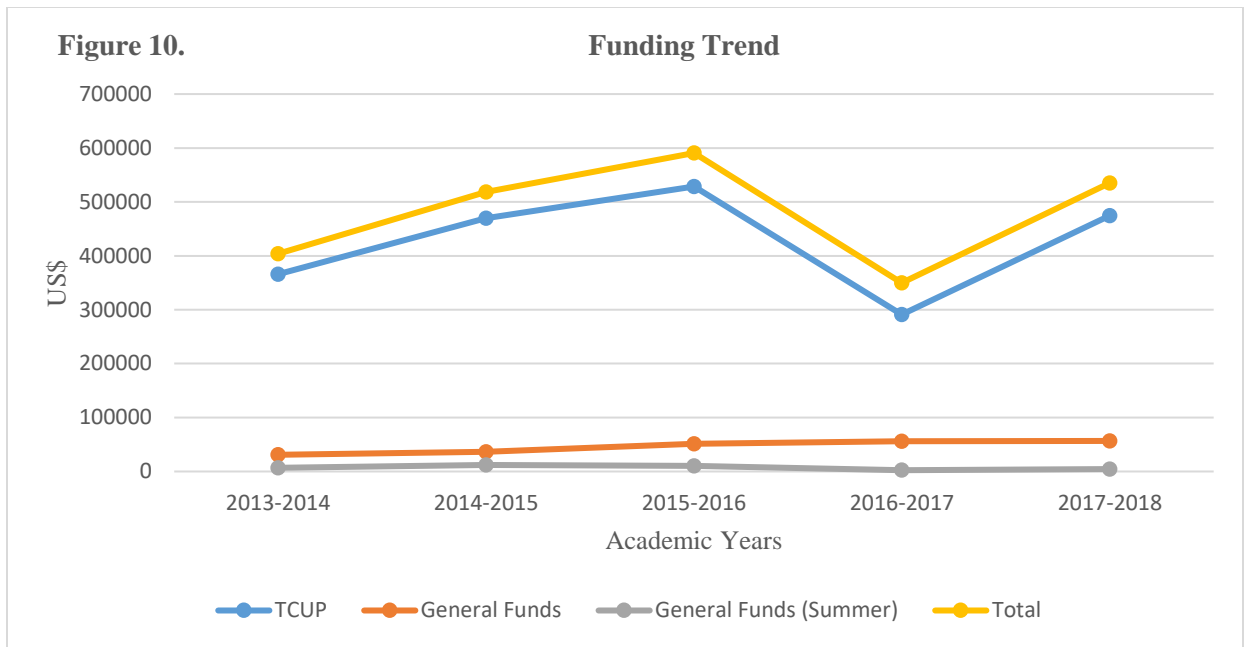
The National Science Foundation (NSF) Tribal Colleges and University (TCUP) grant has been the major funding source for the environmental science program during the review period. In that time, SBC has benefitted from over \$2,000,000.00 dollars from the NSF TCUP grant funds (Table 9). This total includes over one million dollars of salary for faculty and other personnel. In addition, the college has benefitted from indirect dollars in the amount of over \$380,000.00 over the past five years.

TCUP Expenditures

| Table 9. NSF TCUP Funding for the Environmental Science Department (2014 – 2018) | | | | | | | |
|---|-----------------------|-----------------------|-----------------------|---------------------------------|---------------------------------|-----------------------|---------------------|
| | 2013- 2014 | 2014- 2015 | 2015- 2016 | 2016- 2017 TCUP1 | 2016- 2017 TCUP2 | 2017- 2018 | Total |
| Salary Exempt Staff | 204,395.17 | 200,711.77 | 226,746.94 | 101,790.16 | 154,134.52 | 219,843.72 | 145867.10 |
| Salary Hourly | 0.00 | 24,433.49 | 30,335.62 | 23,493.43 | 16,543.92 | 51,060.60 | 29606.07 |
| SALARY-PART-TIME | 1,700.00 | 10,270.00 | 25.00 | 7,367.07 | 3,100.00 | 7,144.00 | 6716.85 |
| Group Life & Disability | 1,157.11 | 1,361.24 | 1,282.43 | 593.18 | 767.77 | 1,555.12 | 54377.77 |
| Retirement Contribution | 7,081.26 | 9,503.84 | 11,586.91 | 4,939.60 | 8,081.93 | 13,184.23 | 149196.70 |
| Group Health Insurance | 22,441.97 | 30,638.34 | 30,680.62 | 15,141.14 | 16,963.10 | 33,331.53 | 4088.51 |
| Suta Taxes Expense | 221.72 | 198.92 | 1,320.80 | 829.40 | 852.77 | 664.90 | 2445.98 |
| Workmens Comp | 725.40 | 430.93 | 1,026.60 | 187.01 | 76.04 | 0.00 | 96889.12 |
| FICA Taxes | 15,342.04 | 17,818.21 | 19,565.89 | 10,115.72 | 12,866.22 | 21,181.04 | 113370.00 |
| General College Business Trav. | 17,402.98 | 42,183.74 | 3,658.00 | 10,781.83 | 17,505.05 | 21,838.42 | 25256.68 |
| Sublet Consultants | 8,004.53 | 17,222.15 | 30.00 | 0.00 | 0.00 | 0.00 | 16278.45 |
| Office Supplies | 2,722.52 | 8,984.12 | 123.27 | 2,326.19 | 888.61 | 1,480.28 | 63551.87 |
| Educational Supplies | 3,921.63 | 19,579.46 | 17,283.45 | 12,241.85 | 1,892.23 | 8,633.25 | 552.78 |
| Research | 0.00 | 0.00 | 552.78 | 0.00 | 0.00 | 0.00 | 387977.6 |
| Indirect Cost Expense | 64,091.05 | 71,837.34 | 79,442.72 | 39,457.63 | 50,706.85 | 82,442.01 | 58324.23 |
| Maintenance and Training costs | 16,846.45 | 14,570.00 | 0.00 | 8,187.78 | 6,654.00 | 12,066.00 | 2262122 |
| Total | 366,053.83 | 469,743.55 | 423,414.49 | 237,451.99 | 291,033.01 | 474,425.10 | 2,262,121.97 |

| Table 10. General Funds for the Environmental Science Department (2014 – 2018) | | | | | | |
|---|------------------|------------------|------------------|------------------|------------------|-------------------|
| General Fund | 2013-2014 | 2014-2015 | 2015-2016 | 2016-2017 | 2017-2018 | Total |
| Salary Exempt Staff | 24,050.74 | 28,802.54 | 41,492.89 | 44,163.16 | 44,214.91 | 182,724.24 |
| Group Life & Disability | 229.55 | 193.20 | 245.71 | 296.54 | 301.62 | 1,266.62 |
| Retirement Contribution | 848.45 | 1,302.47 | 949.19 | 2,147.83 | 2,210.72 | 7,458.66 |
| Group Health Insurance | 3,784.94 | 4,345.70 | 5,658.12 | 6,470.77 | 6,419.13 | 26,678.66 |
| Suta Taxes Expense | 35.10 | 30.93 | 208.23 | 182.10 | 106.15 | 562.51 |
| Workmens Comp | 238.32 | 29.57 | 221.58 | 21.01 | 0.00 | 510.48 |
| FICA Taxes | 1,768.87 | 1,915.04 | 2,831.48 | 3,064.54 | 3,368.62 | 12,948.55 |
| Total | 30,955.97 | 36,619.45 | 51,607.20 | 56,345.95 | 56,621.15 | 232,149.72 |
| General Fund - Summer | | | | | | |
| Salary | 6,000.00 | 10,700.00 | 9,350.00 | 2,100.00 | 3,750.00 | 31,900.00 |
| Fringe Benefits | 750.00 | 1,337.50 | 1,168.75 | 262.50 | 468.75 | 3987.50 |
| Total Summer | 6,750.00 | 12,037.50 | 10,518.75 | 2,362.50 | 4,218.75 | 35,887.50 |

| Table 11. Summary of TCUP, General Funds and General Funds (Summer) | | | | | | |
|--|-------------------|-------------------|-------------------|-------------------|-------------------|---------------------|
| Fund | 2013-2014 | 2014-2015 | 2015-2016 | 2016-2017 | 2017-2018 | Total |
| TCUP | 366,053.83 | 469,743.55 | 528,485.00 | 291,033.01 | 474,425.10 | 2,262,121.97 |
| General Funds | 30,955.97 | 36,619.45 | 51,607.20 | 56,345.95 | 56,621.15 | 232,149.72 |
| General Funds (Summer) | 6,750.00 | 12,037.50 | 10,518.75 | 2,362.50 | 4,218.75 | 35,887.50 |
| Total | 366,053.83 | 469,743.55 | 528,485.00 | 291,033.01 | 474,425.10 | 2,530,159.19 |



Analysis

Support from general fund steadily increased though the dollar amount remained lower than TCUP funds (Table 9. 10, 11 and Fig.10).

Other Grants

There were many other grants that 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 US\$ 4,295,970.97 and it had a great impact on departmental activities as indicated on table 12.

| Table 12. Grants to Environmental Science | | | | | |
|--|------------------------------|---------------------|------------------|---------------|--|
| # | Grant | Amount (\$) | PD | Period | Impact / Supported |
| 1 | USDA- AFRI | 450,748.00 | Dr. G. Halvorson | 2015 - 2017 | <ul style="list-style-type: none"> • Faculty salary, and • Student research |
| 2 | American Indian College Fund | 5,000.00 | Dr. F. Onduso | 2016 | <ul style="list-style-type: none"> • Two undergraduate students during their Building Sustainable Pathway Internships |
| 3 | NSF-EAGER | 304,815.00 | Dr. F. Onduso | 2018 - 2019 | <ul style="list-style-type: none"> • Research funds, faculty and students salaries (Health status of the Missouri River Ecosystem along the Dakota Access Oil Pipeline) |
| 4 | NSF-EPSCoR | 580,000.00 | Dr. M. Mongoh | 2014 - 2019 | <ul style="list-style-type: none"> • Faculty research and summer salary, • K12 STEM outreach components of the ENS program, and Student research |
| 5 | AIHEC-BIE Student Enrichment | 54,000.00 | Dr. M. Mongoh | 2015 - 2017 | <ul style="list-style-type: none"> • The K-12 STEM outreach components of the ENS program |
| 6 | NIH-NARCH | 440,000.00 | Dr. M. Mongoh | 2015 - 2019 | <ul style="list-style-type: none"> • Faculty research and summer salary, and • Student research and tuition funding of the ENS program |
| 7 | NSF-TCUP | 2,262,121.97 | Dr. D. Buresh | 2014 - 2018 | <ul style="list-style-type: none"> • Salaries for four ENS faculty members, and • The departmental academic activities |
| 8 | NSF | 199,286.00 | Ms R. Schmitt | 2018 - 2021 | <ul style="list-style-type: none"> • A four year's grant to increase Native American women in STEM in higher education. |
| | Total | 4,295,970.97 | | | |

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 except one were supported entirely by grant funding. The NSF (Tribal College and University Program) TCUP grant provides the majority of the faculty salary and fringe benefits for the department. In addition, some auxilliary staff are supported either entirely, or in part by the NSF TCUP grant funds . The total expenditure was \$6,826,130.16 (Table 11 and 12).

6. ADVISORY COMMITTEE

The Environmental Science Department has an advisory committee of interested community members, as required by the Higher Learning Commission (HLC), and holds joint advisory committee meetings with the Agricultural Sciences Department and the Agricultural Extension Department. The advisory committee meetings are held twice each year, in the fall semester and in the spring semester. The committee members bring unique knowledge and skills, and make recommendations that effectively guide the program. The committee plays an important public relations role and provides program staff with fresh perspectives on programmatic issues. In general, the roles of the committee include, but are not limited to:

- Offering advice and support to the program
- serving as an advocate for the program to the community and as a liaison with relevant stakeholders, and providing feedback
- assisting staff in determining important activities and
- enhancing the program's public standing.

The current members of the Environmental Science Department's advisory committee are listed on table 13 below:

Table 13. Committee Members and Title and/or Occupation.

| Member | Title/Occupation |
|-----------------------|--|
| Margaret Knox | <i>SBC-Agricultural Director</i> |
| Bruz Van Dusen | <i>E.S. Alumus and NRCS Conservationist</i> |
| Palani Luger | <i>Standing Rock Seoux Tribe (SRST) EPA</i> |
| Harriet Black Hoop | <i>E.S. Program Alumus, and SRST EPA Staff</i> |
| Dylan Jones | <i>Director</i> |
| Jade Ducheneaux | <i>Biologist</i> |
| Mike Eagle | <i>Paleontologist</i> |
| Ed Bahm | <i>District Conservationist</i> |
| Robert Gipp | <i>Area Rancher</i> |
| Bill Chase | <i>USDA Farm Services McIntosh, SD</i> |
| Bruce Greig | <i>Sayler Electric</i> |
| Kerry Libby | <i>SRST Institute of Natural History</i> |
| Lisa Yellow Luger | <i>USDA 1994 Liaison</i> |
| Doug Crow Ghost | <i>SRST Water Resources</i> |
| Sheila White Mountain | <i>Bureau of Indian Affairs (BIA)</i> |
| Sue Isbell | <i>Sioux County Extension.</i> |
| Everette Iron Eyes | <i>SRST Water Resources</i> |
| Delano LeCompte | <i>SRST Land Management</i> |
| Earl Silk | <i>BIA</i> |
| Joe Smith | <i>SRST Land Management</i> |
| Angie McAllister | <i>SRST Farms</i> |
| Jeff Kelly | <i>SRST Game and Fish,</i> |
| Austin Lang | <i>USDA NRCS</i> |
| Jorey Dahners | <i>NDSU Extension</i> |
| Bob Demery | <i>BIA Land Operations</i> |
| Jack Ward | <i>HCR Timber Lake, SD</i> |
| Jane Laintz | <i>Farm Service Agency</i> |

For the review period, the committee members agreed that the program's activities were rigorous and promoted students learning. However, members suggested intensification of research, especially on water resources management, ecology, and on ways to control prairie dogs on private farms. 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 our students, and suggestions for extension workshop topics.

The Environmental Science Department worked to implement the ideas brought forth by the advisory committee by writing several grant proposals and successfully getting funds. One of the grants received was used to study and document species diversity, soil, and water quality along the Dakota Access Oil Pipeline.

Meals were offered in all the meetings. Attendance was high (above 85%). Each SBC employee presented an update of activities and delineated needs of the program. Then each member of the committee was given a chance to discuss areas of their concern and contribute on how they can be of assistance to the Environmental Science Department.

II. PROGRAM SELF-EVALUATION

A. Faculty

Communication within the department needs to be enhanced through frequent formal departmental meetings. In addition to the formal meetings within the department, the five full time environmental science department faculty members had some informal meetings throughout the report period. The faculty members who teach on a part-time basis within the department were often included in management decisions within the department. Each semester except the last one (Fall 2018), the full time Environmental Science faculty met at least twice to discuss issues within the department such as: student research, graduate program changes, curricular changes, program review, recruitment of new students and faculty, retention of students and faculty, grant funding, needs of the department, and how better to meet the needs of the students and faculty in the environmental science department.

The rapport that the faculty members have with each other is good but could be improved through frequent inclusive in-house meetings. Activities occurring within the Environmental Science Department are open knowledge to all, and opportunities for advanced training and continuing education among faculty favors the faculty who have not yet attained their terminal doctorate degrees. There is need for post doctorate opportunities for the faculty. The openness of faculty to each other has fostered an environment of teamwork, rather than competitiveness, among faculty members during most of the review period.

Instructors within the department generally work well with administration, and meet informally with the administration, more with the then Vice-President of Operations (Dr. Ressler) and the current Dean of Academics (Shawn Holz, Ph.D. Candidate), on a regular basis. All faculty members are evaluated by their supervisors, as well as through student evaluations at the midterm and end of each course. Changes are made within a course when it is deemed necessary by the faculty of record, the faculty member's supervisor, and the Environmental Science Department.

The workload for faculty members in the Environmental Science Department exceeds that of faculty members outside the sciences. The Environmental Science Department is the only department on campus that requires students to complete research projects. Students complete research projects at the A.S., B.S., and M.S. levels. The amount of time needed to assist and advise students on research projects can be daunting at times, and this amount of time is not adequately

compensated. Each Environmental Science faculty member is required to teach 15 credits each semester, as are all faculty members in the institution, in addition to advising student research.

The educational and experiential backgrounds of the science faculty member in the Environmental Science Department is more than adequate to meet the needs of the three degrees that are offered within the department. The field of environmental science is very broad, and needs a faculty with varied backgrounds in order to adequately teach the courses within the degree programs, as well as to advise students with research projects. Dr. Gary Halvorson has been in the Environmental Science Department at SBC for over 21 years, and has a background in chemistry, soil science, and mathematics. Dr. Mafany Mongoh has taught at SBC for over ten years. His background is in agricultural science, microbiology, and epidemiology. Dr. Dan Buresh has been a faculty member at SBC for over 20 years, and has a background in wetland ecology, tropical ecology, and environmental health and science. Renae Schmitt has been employed at SBC for six years, and has expertise in grassland ecology, wildlife biology, and field research. Dr. Francis Onduso is completing his fourth year as a full time Environmental Science faculty member. His specialties include, but are not limited to, general biology, forest ecology, fire ecology, biostatistics, mycology, range and wildlife management, agroforestry, and health and safety management.

These five full-time faculty members cover most of the disciplines necessary for a college to have a quality Environmental Science program. Adjunct faculty assist in strengthening the program by offering courses to Environmental Science students that the five full-time faculty members may not be able to teach due to high work load. Mr. John Buresh occasionally filled in for Dr. Dan Buresh in air quality class, Dr. Josh Mattes teaches courses in statistics, and Mr. Tim Krahler teaches courses in mathematics and statistics. Overall, the faculty backgrounds in the Environmental Science Department are strong, and students are afforded the opportunity to learn from very well educated and experienced faculty with degrees from highly ranked institutions. The students have the opportunity to learn from the faculty's diverse cultural, educational and international background. This is one of the department's strengths.

Faculty Satisfaction

The faculty members completed the faculty satisfaction survey . The survey consisted of 25 questions in the following areas: 1) Curriculum and Programmatic Issues, 2) Program Review Processes, 3) Educational Infrastructure, 4) Perceived Commitment of Faculty, 5) Communication, and 6) 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 category of Curriculum and Programmatic Issues had a mean of 4.6 showing that faculty were overall satisfied with the curriculum and program of the Environmental Science Department.

The category of Program Review Process had an average satisfactory rate of 4.8 that was very high though there were questions on the actual implementation of the program review results.

In the third category, Educational Infrastructure, highest satisfactory ratings, above 4, were questions related to faculty expertise and effectiveness. Tutoring scored the lowest rating, 3.2, in this category. Though Environmental Science faculty are satisfied with the overall educational infrastructure, there is concern that tutoring services are inadequate and do not meet the needs of the environmental science students. Tutoring and writing center had a mean satisfactory rating of 3.2.

The fourth category, Perceived Commitment of Faculty, had a satisfactory mean of 4.2. Environmental Science Department faculty feel that there is an insufficient number of faculty members in the program to be effective. Teaching 15 credit units and at the same time doing and mentoring both graduate and undergraduate students in research is overwhelming.

The fifth category related to Communication within the Department had the lowest average satisfaction. The mean in this category was 3.0. It is noted that the communication among the faculty members in the program decreased from 4.6 to 3.0 compared to the 2015 review.

In conclusion, as was in the 2015 program review, the Environmental Science faculty members still have positive views regarding the curriculum and programmatic processes within the department. However, the faculty still have concerns regarding the educational infrastructure that is in place, the effectiveness and implementation of the program review results, and the communication within the faculty in the department. Appendix A shows the average 2019 faculty satisfaction survey results.

B. Student Relations

Faculty put in a minimum of seven office hours per week, and have at least one office hour per day available to meet with students. Faculty post office hours by their doors so students know when they can meet with a faculty member when necessary. The SBC open door policy allow students to visit a faculty member's office at any time that the faculty member is in his or her office. Students can also leave phone messages and email messages for faculty members if they are unable to meet in person with that faculty member. The Environmental Science Department works hard to meet the needs of the students, and it is very rare for a student to have difficulty meeting with a faculty member in the Environmental Science Department if needed. Since students must pass an administrative assistant prior to reaching the office of each science faculty member, the administrative assistant is aware when students cannot find a faculty member, and passes information to the faculty members when they return to their offices. At that point, faculty members attempt to reach the student to meet the need of the student as soon as possible.

The Environmental Science Department teaches many of its lower and upper courses in the evening hours to accommodate persons who work full-time, but are trying to better themselves through education by taking classes at SBC. These evening classes are offered for master's program as well. The upper divisional courses taught are to meet the needs of those students trying

to obtain a B.S. and a M.S. degree in Environmental Science, while lower division laboratory courses are offered to meet the needs of non-science majors who need a lab science for their general education degree requirements. For the last four AYs, Dr. Onduso has taught Physical Science and/or Introduction to Biology during summer break to non-science majors who need a science course to graduate. The summer classes are also open to science majors. This reinforces the fact that the ENS faculty are dedicated to the general education of students at SBC, regardless of major.

Environmental Science faculty members believe in the “hands-on” approach to education especially in science courses. Many of the courses are taught in a laboratory, and in the field when weather permits.

Students in the Environmental Science Department often express their desire to learn in the field through this experiential approach, so this technique of presenting material has been very positive for the recruitment and retention of the students. Many non-science major students who enroll in a lower division laboratory science for fulfillment of curricular requirement have changed majors and become Environmental Science majors at the end of the semester. Some introductory courses that were best in recruitment of students into the program were BIOL 150, Introduction to Biology I, and ENS 113 Introduction to Environmental Science. The 1-credit Science Special Topics courses, both with heavy field learning components, have also been one of the best recruitment tools for the Environmental Science Department. In addition, many of the program’s graduates who have gone out to the workforce upon completion of their degrees have indicated that the field techniques learned while in the program were beneficial to them in their workplaces.

Environmental Science faculty members carried out both national and international research, in most cases incorporating both graduate and undergraduate students. The faculty members in the department took both undergraduate and graduate students to several professional science conferences during the reporting period. The knowledge gained about research and scientific professions, in addition to professional contacts, made these professional conferences great instruments of education to the Environmental Science students. Environmental Science students also used these conferences as platforms to present their own research findings, and the feedback provided by professionals in the field of Environmental Science was extremely valuable to the education of our students.

C. Curriculum Content, Design, and Delivery

Curriculum content, design, and delivery are reviewed annually by the Environmental Science Department. Not only do the faculty members within the department assess each other’s student learning outcomes, but external review is conducted as well by use of the SBC Assessment Committee. Learning outcomes have been delineated for the A.S., B.S., and M.S. degree programs within the department. An end of program assessment is completed on each student at the completion of his/her degree, in the form of a capstone project. Five faculty members, including

the student's research advisor, and three faculty members chosen by the student, assess areas of learning within the entire curriculum of the student. Areas that are assessed in the final capstone project are included in Appendix B. In addition, the program assessment plan and program outcomes were revised in the spring semester of 2018 and are shown in Appendix C.

In addition to the capstone project assessment, students are assessed at milestones throughout the program in order to determine if appropriate learning has taken place in each semester of the degree program. By assessing throughout a student's degree plan, faculty members are able to determine if students are ready to move to the next set of courses, and to the next milestone. All milestone and capstone assessments made in the department are presented to the SBC Assessment Committee in the spring of each year for feedback and ideas for improving the assessment process within the Environmental Science Department.

Course content improvement occurs through faculty self-evaluation and student evaluations at both midterm and end of the semester. The faculty can modify courses based on midterm and end of semester evaluations. Faculty also take into consideration course evaluation by students before making major modifications to their course content for future teaching of the course. The self-evaluation allows a faculty member to reflect on his/her work completed during the academic year. Faculty members meet with the Dean of Academics at the end of the academic year to go over the self-evaluation, and later receive an appraisal of their work from the Dean.

Textbook selections are made by the faculty of record for each course. Textbooks for courses taught by adjunct faculty members are chosen by the Environmental Science Department, or by the adjunct instructor with permission of the department. Textbooks are often changed at the end of each year in order to improve the courses. The change in textbook may be a major change, like changing publishing companies and/or authors, or simply changing the textbook to the new edition in order to keep current with the dynamic nature of environmental science.

During class registration, Environmental Science faculty try to place first-time students in cohorts, since this promotes networking among students within the same discipline. Araujo et al. (2014) demonstrated that it is essential for first-time students to be placed in cohorts within their own academic discipline in order to form a network among themselves before being exposed to the interdisciplinary networking within college. The available data is not yet enough to statistically prove if this cohort placement has positive impact on retention of the Environmental Science students.

The Environmental Science Department incorporates Native American cultures in all courses. ENS 545 (Applying Dakota/Lakota Culture to Environmental Science) is a field based special course for Environmental Science graduate students, in which both past and future environmental issues are looked at in cultural perspective.

D. Assessment Findings and Analysis

Three out of six (fifty percent) of the M.S. program's admissions were from the previous B.S. cohort of environmental science students at SBC. Midterm and final exams are also given and a final grade tabulated. See table 8. Continuous assessment remained in place and effective. It played an important role in gauging Environmental Science students' knowledge gain.

The college program assessment committee effectively guided and evaluated environmental science departmental academic assessment plans and procedures.

E. Institutional Support

The Environmental Science Department is housed in the Science and Technology Center (STC). The STC has state-of-the-art laboratories, and lecture rooms. The Environmental Science analytical chemistry lab has modern equipment comparable to that of the major universities in the North Dakota and South Dakota university systems. The existing storage building that houses environmental sampling equipment, and a four-wheeler, are in good shape. The two departmental vehicles (a Suburban and a van) served well, and the Suburban allowed off-road transportation for students and faculty during research and field lab activities. The 15-seater van allowed taking larger general science classes for field trips. The Environmental Science Department also has a pontoon with an outboard motor that enables faculty and students to conduct research related to aquatic ecosystems and limnology.

The library remained functional, and environmental science students received satisfactory assistance throughout the report period. The librarian added new science books and periodicals as requested by both faculty and students, and this was helpful since on-line articles are not free of charge, and students could not access them as readily as needed. Environmental Science students did not effectively utilize the existing tutor room or writing lab.

The Environmental Science Department supported professional development by paying faculty membership fees to professional societies, financed Environmental Science faculty research and attendance at professional conferences and workshops. The college waved tuition for instructors who took on-campus courses related to Native American Studies.

F. Obstacles/Previous Findings

Poor Attendance

Students' poor attendance remains the biggest issue in performance and retention, given that most students drop out due to poor performance.

The major reasons students gave for class absences and dropping ranked for the highest frequency to the lowest were;

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

Some measures to address some of the above student's concerns are already in place such as operational transit buses, students' on campus housing, financial aid and temporary employment as research or laboratory assistant.

Infrastructure

There is a need for an additional building to house some of the Environmental Science Department activities.

The faculty lacks lab space. This is an impediment to faculty research activities and instructions as current labs are also used as classrooms. Graduate students also need office space for their private studies as well as preparation of their teaching materials.

The current two labs (Biology and Chemistry) are not enough given that they are also used for lectures.

The department acquired a PCR set within the reporting period, and has requested a space to set up the machine for the last three years without success. The PCR unit will help in teaching genetics and genomics, as well as research.

Laboratory Technician

The program uses students, especially graduate students, 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.

G. Others.

1. Contribution to Other SBC Programs

The Environmental Science program offers three level of degrees to students and is the only department that has regular research as part of its curriculum. The fact that this department has the M.S. degree program implemented, coupled with the vast amount of both international and national research, ENS is enhancing the school's overall reputation.

Since the Environmental Science program has the infrastructure, faculty, and research processes already in place, it is likely that this department will be leaned on to lead the way to SBC reaching its vision of being more recognized as a legitimate institution of teaching. ~~Of the total Grant funds received by the Environmental Science Department received within the report period, the grants~~ assisted in infrastructural maintenance, faculty and auxiliary personnel salaries, consulting contracts, fuel purchases, and other essential activities.

Environmental Science faculty also offer courses to other departments and majors, such as microbiology to the nursing program, physical science to education majors, and general biology to the general education majors.

2. Successes and Highlights

There were many successes within the Environmental Science Department over the past five years. One new faculty (Dr. Francis Onduso) was hired. He brings to the department expertise in biostatics, forest ecology, agroecology and mycology, among others. In addition, Dr. Joshua Mattes from the Pre-Engineering Department of SBC taught courses in the M.S. degree program.

The hard work by the faculty, the personnel in the department, and the administration led to the completion and graduation of the first and second M.S. degree program cohorts.

Both faculty and student research continued to grow in the Environmental Science program at SBC. Student-led research has been a cornerstone of the department and continued to be an integral part of the student learning process within the department. The following list of some of the research projects that were presented and or published over the past five years is testament to the fact that scientific research is the foundation to the Environmental Science program:

- **Chelsea Chasing Hawk**, *“Macroinvertebrates Species Diversity Upstream and Downstream from a Disturbance Site”*, SBC AS Defense 2018
- **Melanie Howard**, *“Coyote Food Habits in the North Dakota Mixed-Grass Prairie”*, SBC AS Defense 2018
- **Cresencio Lomeli**, *“Risk Assessment of Hantavirus at Sitting Bull College”*, SBC AS Defense 2018

- **Floris White Buffalo**, “*Traditional medicinal and edible plants along the Missouri that will be affected by Dakota access*”, SBC AS Defense 2018
- **Kylee M. Harrison**, “*Bison (Bison bison) Grazing Effect on Plant Diversity*” FALCON Conference (Washington, DC) 2017 (poster). 6th ANNUAL North Dakota Tribal College Research Symposium Disseminating the Future of Tribal College Research, Tuesday, March 27, 2018 (poster).
- **Frankie Johnson**, “*The Great Plains Turnip (Pediomelum esculentum)*” 6th ANNUAL North Dakota Tribal College Research Symposium Disseminating the Future of Tribal College Research, Tuesday, March 27, 2018 (poster).
- **Saul Bobtail Bear and Joshua J.W. Silk**, “*Understanding the Synthesis Procedure for a Model Compound Polymer made from FDCA and a Nitro-Phototrigger.*” 6th ANNUAL North Dakota Tribal College Research Symposium Disseminating the Future of Tribal College Research, Tuesday, March 27, 2018 (poster).
- **Saul Bobtail Bear**, “*Mercury Levels in Bait Fish*”. Poster presented November 3, First American Land Grant Consortium (FALCON) 2018 Annual Conference, Minneapolis MN.
- **Saul Bobtail Bear**, “*Mercury Levels in Bait Fish*”. SBC BS Defense 2018
- **Clayton Lupe**, “*Correlation of Lead Concentration with Clay Content in Alkaline River Sediments*”. MS Thesis defense, 2018. Sitting Bull College, 9299 Hwy 24, Ft. Yates, 58538.
- **Clayton Lupe**, “*Bison Health: Bovine Viral Diarrhea (BVD) in Bison Herds on Standing Rock Sioux Reservation.* Poster Presented at the 6th ANNUAL North Dakota Tribal College Research Symposium Disseminating the Future of Tribal College Research, Tuesday, March 27, 2018. Poster presented at the Annual ND INBRE Research Symposium at UND, Grand forks ND.
- **Clayton Lupe**, “*Bison Health Bovine Viral Diarrhea (BVD) in Bison Herds on Standing Rock Sioux Reservation.* Poster Presented November 4, 2018 First American Land Grant Consortium (FALCON) Annual Conference, Arlington VA.
- **Thomas DeVille, (2018):** *A preliminary study of the ecological distribution and diversity of mushrooms in the Standing Rock Indian Reservation, USA.* Published in the journal, Current Research in Environmental & Applied Mycology 8(3), 306–312, Doi 10.5943/cream/8/3/2
- **Joshua J.W. Silk**, “*Effects of Microbial Biodegradation on Sustainable Bio-based Polymers*”. SBC BS Defense 2017

- **Jaimie Archambault**, “*Effects of Season on Raptor Species, Abundance, and Habitat Use*”, SBC AS Defense 2017
- **Thomas DeVille**, “*The Mushrooms of Standing Rock*”, SBC AS Defense 2017
- **Sheena Gladue**, “*Effects of Temperature and Humidity on Iguana Behavior in Costa Rica*”, SBC AS Defense 2017
- **Kylee Harrison**, “*Effects of selenium on plant growth*”, SBC AS Defense 2017
- **Frankie Johnson**, “*Pediomelum esculentum (Pursh), The Prairie Turnip*”, FALCON Conference (Washington, DC) 2017 (poster), SBC AS Defense 2017
- **Paul Miner**, “*The Effects of Bison Grazing on Soil Properties in a Mixed-Grass Prairie*”, SBC AS Defense 2017
- **Thomas DeVille**, “*Eco-distribution and Diversity of Edible and Medicinal Mushrooms of Standing Rock Sioux Reservation North & South Dakota*”. Poster presentation at NSF 2017/1994 Symposium in VA.
- **Thomas DeVille**, “*Survey of Mushrooms of standing rock*” Power point presentation for the associate degree project and AS thesis defense 2017.
- **Luke Black Elk**, “*Antimicrobial Properties of Artemisia ludoviciana*”, SBC AS Defense 2016
- **Ashley Weasel**, “*Study of the differences in water from entrance and drainage canals in Costa Rica*”, SBC AS Defense 2016
- **Saul Bobtail Bear**, “*Freshwater Fish Diversity and Size in a Canal System in Guanacaste Region, Costa Rica*”. Poster Presented November 5, First American Land Grant Consortium (FALCON) 2016 Annual Conference, Albuquerque, NM.
- **Buz Van Dusen**, “*Cross-sectional Distribution of Lead Along Floodways of Rural Highway Bridge on Standing Rock and Cheyenne River Sioux Reservation*”. MS 2016 Thesis Defense. Sitting Bull College, 9299 Hwy 24, Ft. Yates, 58538.
- **Lous Walking Elk**, “*Describing Spatial Distribution of Total Mercury with the Sediments of the Grand River on the Standing Rock Sioux Reservation*”. MS Thesis 2016 Defense. Sitting Bull College, 9299 Hwy 24, Ft. Yates, 58538.
- **Saul Bobtail Bear**, “*Freshwater Fish Species Diversity and Size in a Canal System in Guanacaste Region, Costa Rica*”, AISES Conference (Phoenix, AZ) 2015(poster), SBC AS Defense 2015, South Dakota Fisheries Conference (Spearfish, SD) 2016 (poster), AIHEC Conference (Minneapolis, MN) 2016 (poster), FALCON Conference (Washington, DC) 2016(poster)

- **Maurianna Loretto**, “*Bison Health, Prevalence of Parasites (Helminthes) in fecal samples on a bison pasture on SRSR*” SBC BS Defense 2015
- **Pizi Lee**, “*Integrated Solid Waste Management - Waste Stream characterization on Standing Rock Sioux Reservation*” SBC BS Defense 2015
- **James T. Unno**, “*Abundance and Size of the Central American bark scorpion (Centruroides margaritatus) in Two Different Habitats*”, AISES National Conference (Phoenix, AZ) 2015 (poster), SBC AS Defense 2015
Adam Baker – *Impacts on Groundwater Resulting from Cattle Inhabitation*
- **Bruz Van Dusen**, “*Indigenous Corn Reintroduction Project: Analysis of Lipid Content and Dietary Health Implications*”. Poster presented at the 3rd ANNUAL North Dakota Tribal College Research Symposium Disseminating the Future of Tribal College Research, Friday, April 10, 2015. Poster presented at the Annual ND INBRE Research Symposium at UND, Grand forks ND, in October 2015
- **Louis Walking Elk**, “*Characterizing water quality parameters in a typical livestock pasture on the Standing Rock Reservation: health and productivity implications*”. Poster presented at the 3rd ANNUAL North Dakota Tribal College Research Symposium Disseminating the Future of Tribal College Research, Friday, April 10, 2015. Poster presented at the Annual ND INBRE Research Symposium at UND, Grand forks ND, in October 2015.
- **Audra Stonefish** – *Using Macroinvertebrates as indicators of Water Quality in Anthropogenic Water Systems of Costa Rica*
- **Bruz Van Dusen** – *Comparing Soil Characteristics Among Rice Fields, Cane Sugar Fields, and Natural Marshes of the Costa Rican Tropical Dry Forest Biome*
- **Bruz Van Dusen** – *Tracking Northern Pike Movement on Froelich Dam Using Radio Telemetry*
- **Erica Loafer** – *Pilot Study Examining the Use of Clove Oil Anesthetic on Northern Pike (Esox lucius)*
- **Jonathan Holmes** -- *Determining Movement Patterns of Tilapia (Oreochromis niloticus) in Rice Field Canals of Costa Rica Using Radio Telemetry*
- **Koby Sommer** – *Mosquito Genera Comparisons Within Various Habitats in a Tropical Dry Forest Biome*
- **LaLynn Antell** – *Nutrient Status of Vegetation around Prairie Dog Infested Rangelands*

- **Maurice Little Bear** – *Occurrence of Escherichia coli 0157:H7 in Watering Points Around Open Pasture Cattle in Ranches on the Standing Rock Sioux Reservation*
- **Maurianna Loretto** – *Understanding Behavior and Ecology of Bison on Standing Rock Sioux Reservation*
- **LaLynn Antell** – *Biosorption of Iron (Fe) and Lead (Pb) in Aqueous Solution Using Banana Peels*
- **Palani Luger** – *Determining Movement Patterns of Guatemalan Catfish (Rhamdia guatemalensis) in Rice Field Canals of Costa Rica Using Radio Telemetry*
- **Sean White Mountain** – *Small Mammal Response to Rangeland Fire*
- **Sunshine Claymore** – *Banded Tetra (Astyanax aeneus) in Anthropogenic Water Systems of Costa Rica: A Study Determining Population Estimates*
- **Sunshine Claymore** – *Effects of Vegetation on the Microclimate of a Mango Tree Stand in Costa Rica*
- **Tonya Tuntland** – *Sediment Properties of Benthic Environments of Lentic System on Standing Rock Sioux Reservation*

3. Cocurricular activities

Students conduct research at the A.S., B.S., and M.S. degree levels. In addition to the list of successful research projects, the Environmental Science Department has recognized a few students that have excelled in each of the cohorts over the past years. Detailed information on some of these particular students are under success and highlights.

III. PROGRAM PLANNING

A. Trends

Most Environmental Science students, including alumni, remained interested in the M.S. program at SBC, even though the enrollment in the program remained low. The Environmental Science faculty is putting plans in place to increase the enrollment. It is anticipated that the enrollment, especially in the B.S. and M.S. degree programs, will increase with awareness when Environmental Science faculty members visit other tribal colleges and give a talk on the B.S. and M.S. degree programs at SBC. 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.

The department feels strongly that high school students need to be allowed to earn credits, especially in the introductory science courses at SBC, and the younger freshmen students should be registered for science courses in their first semester in order to assess the desires of the students. Araujo et. al. (2014) stated that it is dangerous to deny students entrance into courses they desire when they are academically qualified to take the courses with a high likelihood of successfully passing (Araujo et. al., 2014). The Environmental Science faculty at SBC believe that having Environmental Science degree concentrations at both A.S. and B.S. degree levels may help in increasing enrollment in the program and retention.

The department had an increase in the number of students transferring into the Environmental Science B.S. degree program from the closest tribal college, United Tribes Technical College (UTTC), over the past five years. However, the faculty has a perception that UTTC now will offer stiff competition to the Environmental Science programs at SBC, given that they received accreditation in 2017 to offer a B.S. degree in Environmental Science.

There is a general improvement in the quality of student writing. This improved the success of many students that enrolled in Environmental Science.

Jobs and careers in environmental science are still available in North Dakota and other regions. Two thirds of the SBC M.S. graduates got jobs outside the state. There was a 100% employment rate, with graduate students getting appointment letters even before their M.S. thesis defense. This shows that there is still high demand for environmental scientists. So, the faculty has to work on ways to increase the enrollment and retention for all three degree programs (A.S., B.S. and M.S.).

B. Articulation of Issues

- Reduced transfer of students from the closest tribal college, UTTC, now that the college is accredited to offer a B.S. degree in environmental science.
- Constructing an additional building to house graduate offices and individual faculty lab space will improve academic outcomes.

C. Revised Goals and Objectives Due to Program Review

The program review did not provide any changes in the goals and objectives for the Environmental Science programs. It did provide an illustration of where the department is at the current time. This review will provide a template for future review writers to utilize when the next program review is required for the department in five years' time.

D. Additional Resources Needed

The major needs for resources that were identified by the Environmental Science Department are related to the M.S. and B.S. degree students. Additional space (approximately 3000 ft²) will be needed if enrolment in the B.S. and/or M.S. programs increase. Student research space is grossly insufficient at the main campus, and will get worse with the anticipated higher number M.S. degree program students.

Table 14. Courses Offered by ENS Faculty and the Completion Rates with a Pass Grade (Letter Grade of A, B, or C) in AY 2014 – 2018.

| Course/AY & Semesters | | AY 2014 -15 | AY 2015 -16 | AY 2016 -17 | AY 2017-18 | AY 2018 -19 | Average % pass |
|--|----|-------------|-------------|-------------|------------|-------------|----------------|
| ARSC 236 Intro. to Range Management | Fa | 3/5 (60%) | 1/2(50%) | 4/4(100%) | 1/2(50%) | 4/7(57%) | 63.00% |
| | Sp | N/A | N/A | 11/22(50%) | N/A | N/A | 50.00% |
| BIOL 111 Concept of Biology | Sp | N/A | N/A | 6/8(75%) | N/A | N/A | 75.00% |
| | Su | N/A | N/A | 6/8 (75%) | N/A | N/A | 75.00% |
| BIOL 150 General Biology I | Fa | 3/5(60%) | N/A | 6/6(50%) | 7/10(70%) | 7/11(64%) | 61.00% |
| | Sp | 10/18(56%) | 11/20(55%) | 11/22(50%) | 11/25(44%) | N/A | 51.00% |
| BIOL 202 Microbiology | Sp | 9/13(69%) | 10/11(91%) | 12/14(86%) | 6/11(55%) | NA | 75.00% |
| BIOL 220 Anat. & Physiology I | Fa | 13/15(87%) | 8/15(53%) | 6/13(46%) | 4/14(29%) | 5/12(42%) | 51.40% |
| BIOL 224 Gen. Ecology | Sp | 3/5(60%) | 5/8(63%) | 3/5(60%) | 3/6(50%) | N/A | 58.25% |
| BIOL 230 Anat. & Physiology II | Sp | 7/11(64%) | 8/12(67%) | 1/7(14%) | 6/13(46%) | N/A | 47.75% |
| BIOL 240 Ethnobotany | Fa | 6/10(60%) | 2/5 (40%) | 3/8(38%) | N/A | N/A | 46.00% |
| | Sp | 6/10(60%) | 13/19(68%) | 16/19(84%) | 14/17(82%) | N/A | 73.50% |
| | Su | 10/11(91%) | N/A | N/A | N/A | N/A | 91.00% |
| BIOL 299D Biol. Sampling | Fa | 5/6 (83%) | N/A | N/A | N/A | N/A | 83.00% |
| BIOL 299E Field Ethnobotany | Su | N/A | N/A | 9/9 (100%) | N/A | N/A | 100% |

| | | | | | | | |
|---|----|------------|------------|-------------|------------|---------------|--------|
| BIOL 299F Ethbot.Voc. Build & Story Telling | Su | N/A | N/A | 6/6 (100%) | N/A | N/A | 100% |
| BIOL 299G Intr. to Ethbot. & Plant ID. | Su | N/A | N/A | 8/8 (100%) | N/A | N/A | 100% |
| BIOL 299H Ethnobotanical Products | Su | N/A | N/A | 6/6 (100%) | N/A | N/A | 100% |
| BIOL 230 Anatomy & Physiology II | Fa | N/A | N/A | N/A | N/A | N/A | - |
| | Sp | N/A | N/A | 1/7(14.29%) | 6/13 (46%) | N/A | 30.25% |
| BIOL 240 Ethnobotany | Fa | N/A | N/A | N/A | 13/20(65%) | 18/24(75%) | 70.00% |
| | Sp | N/A | N/A | 16/19(84%) | 14/17(82%) | N/A | 83.00% |
| | Su | 10/11(91%) | N/A | N/A | N/A | N/A | 91.00% |
| BIOL 431 Grassland Ecol. | Fa | 1/1 (100%) | 4/6 (67%) | N/A | N/A | 8/8(100%) | 89.00% |
| BIOL 450 Mammology | Fa | 2/3 (67%) | N/A | N/A | 2/3(67%) | N/A | 67.00% |
| BIOL 456 Ornithology | Sp | 2/2(100%) | N/A | 5/6(83%) | N/A | N/A | 91.50% |
| BIOL 499B Entomology | Fa | N/A | 1/2 (50%) | N/A | N/A | N/A | 50.00% |
| CHEM 115 Introduction to Chemistry | Fa | 4/8 (50%) | 3/6 (50%) | 7/10(70%) | 4/9 (44%) | 4/4 (100%) | 62.80% |
| | Su | N/A | 6/7(86%) | N/A | N/A | N/A | 86.00% |
| CHEM 116 Intro. to Organic and Biochemistry | Fa | 7/8 (88%) | 6/7 (86%) | N/A | 3/6(50%) | 3/5(60%) | 71.00% |
| | Sp | N/A | 6/7(86%) | 2/3 (67%) | N/A | N/A | 76.5% |
| CHEM 121 General Chemistry I | Fa | 4/4(100%) | 5/7(71%) | N/A | 3/5(60%) | 1/1(100%) | 82.75% |
| | Sp | N/A | N/A | 5/7(71%) | N/A | N/A | 71.00% |
| CHEM 122 General Chem. II | Sp | 2/2 (100%) | 1/1 (100%) | 2/2 (100%) | N/A | N/A | 100% |
| CHEM 403 Analy Chemistry | Sp | 5/5(100%) | N/A | 2/4(50%) | 4/8(50%) | N/A | 66.67% |

| | | | | | | | |
|--|----|-----------|------------|------------|-----------|-----------|--------|
| CHEM 499A Adv Analy. Chem | Sp | N/A | N/A | N/A | 1/1(100%) | N/A | 100% |
| ENS 113 Intro. Environmental Science | Fa | 6/8(75%) | 7/13(100%) | 10/16(63%) | 6/15(40%) | 7/15(47%) | 62.50% |
| | Sp | N/A | 2/5(40%) | 5/13(38%) | 3/5(60%) | N/A | 46.00% |
| ENS 202 Env. Issues | Sp | 4/7(57%) | 2/8(25%) | 7/10(70%) | 2/8(25%) | N/A | 60.00% |
| ENS 216 Wildlife Mgt & Conserv. | Fa | N/A | 1/1(100%) | N/A | N/A | N/A | 100% |
| ENS 211 Intro. to GIS/GPS | Fa | 1/2(50%) | N/A | 0/3(00%) | 1/3(33%) | 1/1(100%) | 66.67% |
| ENS 225 Environ.. Sampling | Fa | 2/2(100%) | 2/2(100%) | 5/9(56%) | 5/7(71%) | 4/6(67%) | 64.67% |
| ENS 240 Env.Stat | Fa | 2/3(67%) | 2/2(100%) | 5/8(63%) | 2/4(50%) | 0/4(00%) | 71.00% |
| ENS 260 Env. Research Project I | Fa | 1/2(50%) | 2/2(100%) | 2/4(50%) | 2/4(50%) | 1/3(33%) | 77.67% |
| | Sp | 1/2(50%) | 3/6(50%) | 3/6(50%) | 2/5(40%) | N/A | 46.67% |
| ENS 261 Env. Research Project II | Fa | 1/2(50%) | 2/3(67%) | 2/4(50%) | 2/3(67%) | 2/2(100%) | 71.00% |
| | Sp | 1/1(100%) | 1/2(50%) | 2/2(100%) | 3/4(75%) | N/A | 75.00% |
| ENS 297A Env. Science Internship | Fa | 4/5(100%) | 4/5(80%) | 1/2(50%) | 3/4(75%) | 2/3(67%) | 74.40% |
| | Sp | 0/3(00%) | 2/6(33%) | 5/7(71%) | 0/2(00%) | N/A | 52.00% |
| ENS 297B Env. Science Internship | Fa | 6/6(100%) | 3/3(100%) | 2/3(67%) | 4/5(80%) | 2/3(67%) | 82.80% |
| | Sp | 0/1(00%) | 1/4 (25%) | 1/1(100%) | 1/5(20%) | N/A | 81.67% |
| ENS 297C Env. Science Internship | Fa | 6/6(100%) | 2/2(100%) | 3/4(75%) | 4/4(100%) | 0/1(00%) | 93.75% |
| | Sp | N/A | 1/2(50%) | 1/1(100%) | 1/3(33%) | N/A | 61.00% |
| ENS 299N Science History | Sp | N/A | N/A | N/A | 3/5(60%) | N/A | 60.00% |
| ENS 299H Field Botany | Fa | N/A | N/A | 5/6(83%) | 1/4(25%) | 3/4(75%) | 61.00% |
| ENS 299J Intr. to Beekeeping | Fa | N/A | N/A | 5/5(100%) | N/A | N/A | 100% |

| | | | | | | | |
|--|----|-----------|-----------|-----------|-----------|-----------|--------|
| ENS 301 Hydrology | Sp | 2/2(100%) | 3/5(60%) | 1/3(33%) | 3/6(50%) | N/A | 60.75% |
| ENS 311 Intr. to GIS/GPS | Fa | 6/8(75%) | 2/4(50%) | 2/5(40%) | 6/10(60%) | 2/2(100%) | 65.00% |
| ENS 321 Env. Chemistry | Fa | 3/4(75%) | 3/4(75%) | N/A | 3/6(50%) | 3/5(60%) | 65.00% |
| ENS 331 Wildlife Conservation | Fa | 4/6(67%) | N/A | N/A | N/A | N/A | 67.00% |
| | Sp | N/A | 2/4(50%) | N/A | 4/9(44%) | N/A | 47.00% |
| ENS 422 Environmental Toxicology | Fa | N/A | N/A | 3/3(100%) | 4/6(67%) | 2/4(50%) | 72.33% |
| | Sp | 2/5(40%) | N/A | N/A | N/A | N/A | 40.00% |
| ENS 432. Aquatic Ecosystems | Fa | N/A | 3/5(60%) | N/A | 4/5(80%) | 3/6(50%) | 63.33% |
| ENS 433 Solid Waste Mgt | Fa | N/A | N/A | 1/1(100%) | N/A | N/A | 100% |
| ENS 445 Applying Dakota/Lakota Culture to ENS | Fa | N/A | N/A | N/A | N/A | 3/3(100%) | 100% |
| | Sp | N/A | N/A | N/A | N/A | N/A | - |
| ENS 452 Science Literature | Sp | N/A | 0/4 (00%) | 2/2(100%) | 2/5(40%) | N/A | 70.00% |
| ENS 453 Environmental Law and Policy | Fa | N/A | N/A | 1/2(50%) | N/A | N/A | 50% |
| | Sp | 3/8(38%) | N/A | N/A | 4/7(57%) | N/A | 47.50% |
| ENS 493A Senior Research | Fa | 2/2(100%) | 1/1(100%) | 1/1(100%) | 0/1(00%) | 2/2(100%) | 100% |
| | Sp | 1/2(50%) | 1/1(100%) | 1/1(100%) | 2/2(100%) | N/A | 87.50% |
| ENS 493B Senior Research | Fa | 1/1(100%) | N/A | N/A | 1/1(100%) | 2/2(100%) | 100% |
| | Sp | 1/1(100%) | 2/2(100%) | 1/1(100%) | 1/1(100%) | N/A | 100% |
| ENS 493C Senior Research | Fa | 0/1(00%) | N/A | N/A | 0/2(00%) | 1/1(100%) | 100% |
| | Sp | 2/2(100%) | 0/3(00%) | 1/1(100%) | 1/2(50%) | N/A | 83.00% |
| ENS 493D Senior Research | Fa | N/A | N/A | N/A | N/A | N/A | - |

| | | | | | | | |
|--|----|-----------|-----------|-----------|-----------|-----------|--------|
| ENS 499K Soil Morphology & Classification | Fa | N/A | N/A | N/A | N/A | 3/4(75%) | 75.00% |
| ENS 499L Intermediate Stat. | Fa | 1/1(100%) | N/A | 1/3(33%) | 2/2(50%) | 1/2(50%) | 58.25% |
| ENS 499M Agroforestry | Fa | N/A | N/A | 2/2(100%) | N/A | N/A | 100% |
| ENS 499N Field Botany | Fa | N/A | N/A | 2/2(100%) | N/A | N/A | 100% |
| ENS 499O Introduction to Beekeeping | Fa | N/A | N/A | 2/2(100%) | N/A | N/A | 100% |
| ENS 499Q Science History | Sp | N/A | N/A | N/A | 1/1(100%) | N/A | 100% |
| ENS 499P Microb Ecology & Water Quality | Fa | N/A | N/A | 3/3(100%) | N/A | N/A | 100% |
| ENS 500A Grad. Research Seminar | Fa | N/A | 2/2(100%) | N/A | 1/1(100%) | N/A | 100% |
| | Sp | 2/2(100%) | N/A | N/A | N/A | N/A | 100% |
| ENS 500B Grad. Research Seminar | Sp | N/A | N/A | N/A | 1/1(100%) | N/A | 100% |
| ENS 511 Adv. Experimental Design | Fa | 2/2(100%) | N/A | N/A | N/A | 1/1(100%) | 100% |
| | Sp | N/A | N/A | 0/2(00%) | 1/1(100%) | N/A | 100% |
| ENS 515 Advanced Stat. | Sp | N/A | 2/2(100%) | N/A | N/A | N/A | 100% |
| ENS 520 Advanc. Techniq. in GIS | Sp | 2/2(100%) | N/A | 1/1(100%) | N/A | N/A | 100% |
| ENS 522 Adv Remote Sensing & Digital Image Processing | Fa | N/A | N/A | N/A | N/A | N/A | - |
| ENS 530 Limnology | Sp | 2/2(100%) | N/A | 1/1(100%) | N/A | N/A | 100% |
| ENS 532 Watershed Analy. | Sp | N/A | 2/2(100%) | N/A | 1/1(100%) | N/A | 100% |

| | | | | | | | |
|---|----|-----------|-----------|-----------|-----------|-----------|--------|
| ENS 542 Env. Policy & Resource Mgt | Fa | N/A | N/A | 1/2(50%) | N/A | N/A | 50.00% |
| | Sp | 2/2(100%) | N/A | N/A | N/A | N/A | 100% |
| ENS 545 Applying Dakota/Ochethi Sakowin Culture to Env. Science | Fa | N/A | 2/2(100%) | 1/2(50%) | N/A | N/A | 75.00% |
| | Sp | N/A | N/A | N/A | N/A | N/A | - |
| ENS 550 Conserv. Biol | Sp | N/A | 2/2(100%) | N/A | N/A | N/A | 100% |
| ENS 552 Avian Ecology | Fa | N/A | N/A | N/A | N/A | N/A | - |
| ENS 554 Grassland Ecol. | Fa | N/A | N/A | N/A | N/A | N/A | - |
| ENS 556 Ecol. o of Invasive Sp. | Fa | N/A | N/A | N/A | N/A | N/A | - |
| ENS 558 Rest. Ecology | Sp | N/A | N/A | 1/1(100%) | N/A | N/A | 100% |
| ENS 560 Adv. Water & Soil Biogeochemistry | Fa | N/A | 2/2(100%) | N/A | 1/1(100%) | N/A | 100% |
| ENS 562 Microbial Eco. | | N/A | N/A | N/A | N/A | N/A | - |
| ENS 570 Climate Change | | N/A | N/A | N/A | N/A | N/A | - |
| ENS 572 Envl. Water Quality | Fa | 2/2(100%) | N/A | 2/2(100%) | N/A | 1/1(100%) | 100% |
| ENS 580 Adv. Water Sampling Techniques | Fa | N/A | N/A | N/A | N/A | N/A | - |
| | Sp | N/A | N/A | N/A | N/A | N/A | - |
| ENS 600A Grad. Research & Thesis | Fa | 2/2(100%) | N/A | N/A | N/A | N/A | 100% |
| | Sp | N/A | N/A | 1/1(100%) | N/A | N/A | 100% |
| ENS 600B Grad. Research & Thesis | Fa | N/A | N/A | N/A | 1/1(100%) | N/A | 100% |
| | Sp | 2/2(100%) | N/A | N/A | N/A | N/A | 100% |
| | Fa | N/A | 2/2(100%) | N/A | 1/1(100%) | N/A | 100% |

| | | | | | | | | |
|---|-------------------|-----------|-----------|------------|-----------|-----------|--------|----------------------|
| ENS 600C Grad. Research & Thesis | Sp | N/A | N/A | N/A | N/A | N/A | - | |
| ENS 600D Grad. Res. & Thesis | Fa | N/A | 2/2(100%) | N/A | N/A | N/A | 100% | |
| | Sp | N/A | N/A | N/A | 1/1(100%) | N/A | 100% | |
| ENS 600E Res. & Thesis | Sp | N/A | 2/2(100%) | N/A | 1/1(100%) | N/A | 100% | |
| ENS 600F Res. & Thesis | Sp | N/A | 2/2(100%) | N/A | 1/1(100%) | N/A | 100% | |
| ENS 600G Graduate Research & Thesis | Fa | N/A | N/A | N/A | N/A | N/A | - | |
| | Su | N/A | N/A | 2/2 (100%) | N/A | N/A | 100% | |
| ENS 600H Graduate Research & Thesis | Fa | N/A | N/A | 1/1(100%) | N/A | 1/1(100%) | 100% | |
| | Sp | N/A | N/A | N/A | N/A | N/A | - | |
| HPER 116 Archery | Sp | N/A | 7/8(88%) | 8/11(73%) | 6/8(75%) | N/A | 78.67% | |
| PHYS 102 Physical Science | Fa | N/A | 4/4(100%) | N/A | N/A | N/A | 100% | |
| | Su | N/A | N/A | 6/8(75%) | N/A | 4/6(67%) | 67.00% | |
| SOIL 210 Introduction to Soil Science | Fa | N/A | N/A | 3/3(100%) | N/A | N/A | 100% | |
| | Sp | 8/8(100%) | 5/5(100%) | N/A | 5/6(83%) | N/A | 94.33% | |
| SOIL 222 Soil Fertility & Fertilizers | Fa | N/A | N/A | N/A | N/A | N/A | - | |
| | Sp | N/A | 5/6(83%) | 2/5(40%) | 2/2(100%) | N/A | 75.00% | |
| SOIL 431 Soil Conservation & Management | Fa | N/A | N/A | N/A | N/A | N/A | - | |
| | Sp | 5/6(83%) | 2/3(67%) | 2/3(67%) | N/A | N/A | 72.33 | |
| SOIL 499A Soil Morphology | Fa | N/A | N/A | 1/1(100%) | 1/1(100) | N/A | 100% | |
| | Mean Score | | | | | | | <u>79.85%</u> |

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 Environment | The research project's connection to the environment is demonstrated and a description of how the | The research project's connection to the environment is demonstrated and a description of | The research project's connection to the environment is demonstrated , and future research | The research project's connection to the environment is demonstrated , but future use of the | The research project's connection to the environment is not demonstrated , and future use of the |

| | | | | | |
|------------------------------|---|--|---|--|--|
| | research project can be utilized in environmental decision-making is given. | how the research project adds to the knowledge of the environmental science community is included. | expanding on the research project is advised. | research project is not advised. | 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 associated with the media. | Lakota/Dakota names for media sampled are used, and traditional uses included. In addition, students explained kinship responsibilities associated with the media. | 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. |

Appendix A - 2

A.S. PROGRAM ASSESSMENT PLAN 2018-2019

Review Date (Anticipated): May 2019

| <p>Program Outcomes</p> | <p>Measurement Tool (Who will assess, what will be assessed, how will it be assessed, when will it be assessed)</p> | <p>Measurement Goal (Expected results)</p> | <p>Findings (Actual results including number of students, average score, & range of scores)</p> | <p>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?]</p> | <p>Action or Recommendation (include changes and/or instructional strategies to improve next year)</p> |
|--|---|---|--|---|--|
| <p>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 according to accepted</p> | <p>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 Biology I. The student will diagram the scientific method, as well</p> | <p>Expectation: Each student will score a minimum of 3.5 on a five point Likert scale.</p> | <p><u>Assessment A</u></p> | <p><u>Assessment A</u></p> | <p><u>Assessment A 2018</u> <u>BIOL 150</u> Continue:</p> <ul style="list-style-type: none"> • Counselling students on the importance of attending classes • Encouraging students to study outside of class time (time management). <p><u>CHEM 115</u> Reinforce Knowledge of the parts of the SM. Clarify the question to all the students.</p> <p><u>ENS 113</u> Try to conduct more lab activities that incorporate the scientific method.</p> <p><u>Assessment B 2018</u> ENS 225/240</p> |

| | | | | | |
|--|--|---|--|--|---|
| <p>"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.</p> | <p>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)</p> <p>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 capstones their curriculum completion. The two courses identified for</p> | <p>B) Each student will score a minimum of 3.5 on a five point Likert scale.</p> <p>C) Each student will score a minimum of 3.5 on a five point Likert scale.</p> | | | <p>No changes necessary.</p> <p><u>Assessment C 2018</u></p> <p>C) Milestones will be enforced to help students incorporate all parts of their proposals including the Methods section and explanation of hypotheses/prediction, which were missing in the proposals of the 2017-18 students. More formal meeting times and scheduled course</p> |
|--|--|---|--|--|---|

| | | | | | |
|--|--|---|--|--|--|
| | <p>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)</p> | <p>D) Each student will score a minimum of 3.5 on a five point Likert scale.</p> | | | <p>milestones/requirements may help.</p> <p><u>Assessment D 2018</u></p> <p>D) Changes include: continue requiring review/revisions of proposal from ENS 260, literature review assignments, data analysis assignments. We will continue this process as our capstone assessment tool. More formal meeting times and scheduled course milestones/requirements may help.</p> |
| | <p>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 competency will be measured using a five-point Likert scale (1A,</p> | | | | |

| | | | | | |
|--|--|--|--|--|--|
| | <p>1B, 1D, 1E, 1F, 1G, 1H)</p> <p>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)</p> | | | | |
|--|--|--|--|--|--|

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) |
|---|--|--|--|--|---|
| <p>Competency: The student will describe and show competency in the following issues associated with environmental science:</p> <p>1A: The proper use of environmental sampling equipment and current technology in the classroom and in the field according to accepted "Standard Methods";</p> <p>1B: The ability to design and conduct a field or laboratory study using appropriate sampling equipment and techniques according to</p> | <p>Assessment Strategy:</p> <p>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.</p> <p>Outcomes covered: 1A, 1C, 1D, 1F</p> <p>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</p> | <p>Expectation:</p> <hr/> <p>Each student will score a minimum of 3.50.</p> <hr/> <p>Each student will score a minimum of 3.50.</p> | | | |

| | | | | | |
|---|---|---|--|--|--|
| <p>accepted "Standard Methods";</p> <p>1C: The ability to describe the similarities and differences between traditional and modern views of the Earth;</p> <p>1D: The ability to describe biological, chemical, and physical influences on environmental media, including human health effects;</p> <p>1E: The ability to describe transport mechanisms for contaminants as they travel through various environmental media;</p> <p>1F: The ability to develop a professional research proposal and demonstrate the various steps of the scientific method in the design;</p> <p>1G: The ability to develop and present a professional research presentation and answer questions in an appropriate manner;</p> <p>1H: The ability to produce a</p> | <p>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.</p> <p>Outcomes covered: 1B, 1D, 1E, 1H, 1I, 1J</p> <p>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.</p> | <hr/> <p>Each student will score a minimum of 3.50.</p> <hr/> <p>Each student will score a minimum of 3.50.</p> | | | |
|---|---|---|--|--|--|

| | | | | | |
|---|--|--|--|--|--|
| <p>final report of a research project that effectively provides a general narrative of the student's research;</p> <p>1I: The skill to integrate GPS/GIS technology into presentations; and</p> <p>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.</p> | <p>The student's competency will be measured using a five-point Rubric with all committee members' scores averaged.</p> <p>Outcomes covered: 1A, 1B, 1C, 1G, 1I</p> <hr/> <p>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.</p> <p>Outcomes covered: 1A, 1B, 1C, 1H, 1I</p> | | | | |
|---|--|--|--|--|--|

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) |
|---|---|---|--|---|---|
| <p>Competency: The student will show competency and mastery in the following skill sets associated with environmental sciences:</p> <ol style="list-style-type: none"> The student will develop scientific critical thinking skills. The student will demonstrate the ability to articulate knowledge of environmental science, methodologies, | <p>Assessment Strategy:</p> <p>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.</p> <p>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</p> | <p>Expectation:</p> <p>1A - Pre-Evaluation: score a minimum of 3.0 on a 5 scale</p> <p>Post-Evaluation: score a minimum of 3.5 on a 5 scale</p> <p>1B - Each student will score a minimum of 3.5 on a 5 scale</p> <p>2A - Each student will score a minimum of 3.5 on a 5 scale</p> | | | |

| | | | | | |
|--|---|--|--|--|--|
| <p>and policy both verbally and orally.</p> <p>3. The student will synthesize a cogent research thesis inclusive of appropriate statistical analysis.</p> <p>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.</p> | <p>the student’s ability to demonstrate 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.</p> <p>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.</p> <p>2B) The student will present their research proposal to the graduate faculty, college, and community to demonstrate their grasp of the</p> | <p>2B – Each student will score a minimum of 3.5 on a 5 scale</p> <p>3A Each student will score a minimum of 3.5 on a 5 scale</p> <p>4A Each student will score a minimum of 3.5 on a 5 scale</p> | | | |
|--|---|--|--|--|--|

| | | | | | |
|--|---|--|--|--|--|
| | <p>knowledge of environmental 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</p> <p>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</p> <p>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</p> | | | | |
|--|---|--|--|--|--|

| | | | | | |
|--|------------------------------------|--|--|--|--|
| | measured using a five-point Rubric | | | | |
|--|------------------------------------|--|--|--|--|

Appendix B

Faculty Satisfaction Survey Results

The results of the Faculty Satisfaction Survey have been aggregated, and scored using a 1-5 point scale with a score of 5 = Strongly Agree, 4 = Agree, 3 = Neutral, 2 = Disagree, and 1 = Strongly Disagree. In addition, the percent of respondents who answered either Strongly Agree or Agree is shown, as well as the percent of respondents who answered either Disagree or Strongly Disagree. The aggregated scores from survey respondents in 2015 are included in parentheses to see if differences exist with current respondents' aggregated answers.

- 1) All faculty have the opportunity to participate in curriculum development.

Mean score = 4.6(4.4)

Strongly Agree/Agree = 100 %(100%)

Strongly Disagree/Disagree = 0 %(0%)

- 2) All faculty have the opportunity to participate in program planning.

Mean score = 4.8(4.6)

Strongly Agree/Agree = 100 %(100%)

Strongly Disagree/Disagree = 0 %(0%)

- 3) Faculty in this program are concerned with student success.

Mean score = 5.0(4.8)

Strongly Agree/Agree = 100 %(100%)

Strongly Disagree/Disagree = 0 %(0%)

- 4) The variety of faculty expertise is sufficient to provide effective instruction within program.

Mean score = 5.0(4.0)

Strongly Agree/Agree = 90 %(80%)

Strongly Disagree/Disagree = 10 %(20%)

- 5) Faculty in this program are given the opportunity to participate in the program review process.

Mean score = 5.0 (4.6)

Strongly Agree/Agree = 100 %(100%)

Strongly Disagree/Disagree = 0 %(0%)

- 6) The program review process is effective in evaluation of the strengths and weaknesses of the program.

Mean score = 3.5(2.6)

Strongly Agree/Agree = 70% (20 %)

Strongly Disagree/Disagree = 30 % (80%)

- 7) Information gathered during the program review is integrated into the program's planning process.

Mean score = 3.6 (3.0)

Strongly Agree/Agree = 70 % (60%)

Strongly Disagree/Disagree = 30% (40%)

- 8) Communication among faculty in the program is frequent, interactive, and effective.

Mean score = 3.0 (4.6)

Strongly Agree/Agree = 70% (100 %)

Strongly Disagree/Disagree = 30 % (0%)

- 9) I am satisfied with the quality of educational planning in this program.

Mean score = 4.5 (4.0)

Strongly Agree/Agree = 100 % (100%)

Strongly Disagree/Disagree = 0 % (0%)

- 10) The required text(s) are selected by all faculty teaching a particular course.

Mean score = 5.0 (4.0)

Strongly Agree/Agree = 90% (60 %)

Strongly Disagree/Disagree = 10 % (40%)

- 11) The program's courses conform in content, textbooks, and instruction methods to current disciplinary standards.

Mean score = 4.8 (4.8)

Strongly Agree/Agree = 100 % (100%)

Strongly Disagree/Disagree = 0 % (0%)

- 12) Adjunct faculty communicate with the program full-time faculty regarding grading policies.

Mean score = 3.2 (3.5)

Strongly Agree/Agree = 55% (50 %)

Strongly Disagree/Disagree = 45 % (50%)

- 13) Faculty in this program both assess and base grades and course credit on student achievement and learning outcomes.

Mean score = 4.8(4.0)

Strongly Agree/Agree = 100 % (100%)

Strongly Disagree/Disagree = 0 % (0%)

- 14) The faculty in this program are sufficient in number to provide effective instruction within the discipline.

Mean score = 3.4(2.8)

Strongly Agree/Agree = 70% (40 %)

Strongly Disagree/Disagree = 30 % (60%)

- 15) Faculty in this program stay current in their area of expertise.

Mean score = 4.2 (3.6)

Strongly Agree/Agree = 90% (80 %)

Strongly Disagree/Disagree = 10 % (20%)

- 16) The faculty in this program are actively involved in staff development activities.

Mean score = 4.2 (3.2)

Strongly Agree/Agree = 80% (20 %)

Strongly Disagree/Disagree = 20 % (80%)

- 17) The availability of classroom supplies is sufficient to maintain the effectiveness of this program's courses.

Mean score = 3.6 (3.2)

Strongly Agree/Agree = 65% (40 %)

Strongly Disagree/Disagree = 35% (60%)

- 18) Class schedules for this program conform to students' demand and educational needs.

Mean score = 4.8(3.8)

Strongly Agree/Agree =80% (50 %)

Strongly Disagree/Disagree = 20 % (50%)

- 19) Faculty in this program distinguish between personal conviction and professionally accepted views in the discipline.

Mean score = 3.8 (4.0)

Strongly Agree/Agree = 80% (100%)

Strongly Disagree/Disagree =20 % (0%)

20) Faculty in this program are committed to high standards of teaching.

Mean score = 4.8 (4.5)

Strongly Agree/Agree = 100 % (100%)

Strongly Disagree/Disagree = 0 % (0%)

21) Adequate facilities and equipment are available to maintain the effectiveness of this program's courses.

Mean score = 3.2(3.0)

Strongly Agree/Agree = 60% (50 %)

Strongly Disagree/Disagree = 40 % (50%)

22) Library services and collections are adequate to maintain the effectiveness of this program's courses.

Mean score = 3.8(2.3)

Strongly Agree/Agree = 80% (25 %)

Strongly Disagree/Disagree = 20 % (75%)

23) Tutoring and writing center facilities are adequate to maintain the effectiveness of this program's courses.

Mean score = 3.2 (2.8)

Strongly Agree/Agree = 60 % (0 %)

Strongly Disagree/Disagree = 40 % (100 %)

24) Clerical support is available and adequate to maintain the effectiveness of this program's courses.

Mean score = 2.5 (2.3)

Strongly Agree/Agree = 30 % (0%)

Strongly Disagree/Disagree = 70 % (100%)

25) I have been provided a copy of the SBC policies and procedures and the SBC faculty handbook.

Mean score = 5.0(4.3)

Strongly Agree/Agree = 100 % (75 %)

Strongly Disagree/Disagree = 0 % (25%)

Additional Comments from Respondents.

- 1) It will greatly benefit this program if its review and assessment process are aligned with those of other science programs across the nation.

Appendix C. A raising questions and answers on the 2015 Program Review

Program Review Committee Questions and Environmental Science Faculty Answers.

1. Are more students declaring the ENS major after the intro course(s)?

- a) *The variation in the student numbers is minimal hence it cannot be statistically declared that introductory courses have an impact on the enrolment. However, the department recommends the continuation of the introductory courses expanding it to general biology (BIO 111).*

2. Will this/these course(s) (intro course[s]) need to be offered at all sites both semesters to improve recruitment/retention?

- a) *The department recommends having specific introductory courses and at least one need to be offered at each of these sites (Mobridge and McLaughlin) yearly.*

If this is impossible, what other strategies can be offered to recruit freshman?

- a) *Attend ad take fliers to recruitment fairs at the human services in the community*
- b) *Use radios to market science program*
- c) *Showcase, graduated environmental science students work locally in the community*
- d) *Department to engage in volunteer work especially cleaning the city and collecting trash along highways within the community.*
- e) *Host open houses and invite human services students and their families to come visit the program facilities*

3. How can we revise/update the current recruitment efforts to help students move from associates to bachelor's degree and then from BS to masters?

- a) *Organize recruiting events specific to enrolments in these program levels*
- b) *Recruit students from the associate levels with the known interest or getting them to go through all three phases of the program.*

4. What has been working to help motivate students to continue in the bachelor's degree?

- a) *Access to all faculty and facilities to every audience*
- b) *Discuss grants funding so students can conduct research and travel to conferences*

5. Are students still dropping the major after freshman year due to the prescribed cohort model?

- a) *No, the issues seems to be in the current advising model*

If yes or no, suggest possible solution(s):

a) *There is a need for more flexibility in how faculty can effectively advise students*

6. Since Program Reviews are available to the public, do you still want student names/information in the cohort information (pp. 31-35 of 2015 report)?

a) *No. Student's names should be taken out. Otherwise, a consent form must be used to get authorization.*

7. Master's degree specific information needed:

i. Low enrollment:

What are challenges/obstacles to recruitment?

- a) *Unwilling of the program to expand its recruitment model. If faculty go recruiting more often (multiple times per semester), recruitment may arise.*
- b) *Faculty need to develop interest in the recruitment drive.*
- c) *General perception that tribal colleges are inferior academically compared to non-tribal colleges and main stream universities turn away some students.*

Suggested solution:

Change Faculty titles from instructors to professors (Categorize as Assistant Professors, Associate Professors and Professors depending on the qualifications). General perception is that instructors are less scholarly/qualified than assistant professors.

What recruitment efforts in place to encourage bachelor students to continue into the master's program?

- a) *Dr. Mongoh is volunteering to teach graduate preparatory courses for exams such as graduate record examination (GRE) to help students improve on their confidence in exam taking and their grades*
- b) *College need to offer advance math courses to meet the math level needed for the program.*
- c) *Planned and scheduled graduation dates with admission deadlines during advising*

What obstacles have SBC students voiced who have not entered the program (If any)?

- a) *Cost of the GRE exams*
- b) *Conflicting opportunities on what pays better (school or job)?*
- c) *Intense nature of the program*
- d) *Available funding and scholarships to pay for the attendance*
- e) *Cohort model restricts options for research and students have broader interests.*
- f) *Having instructors not assistant professors, associate and professors.*

ii. **GRE requirements:**

Is the GRE a valid instrument for the Environmental Science graduate program (Yes or No)? Support your answer.

- a) *Yes, it's a valid and flexible instrument used by majority of science programs. The GRE standardizes the recruitment platform for all students coming from various backgrounds.*

Do the scores give SBC faculty information that is necessary to teach master level students (Explain)?

- a) *The tool does provide the faculty with an idea on where student stand when it comes to readiness in the program. Student's ability are ranked on a qualitative, quantitative, and analytical scale which defines the strength of the graduates.*

Are current SBC students exceeding the cut scores (Yes or No)?

No

If not, what plans are there to either help current bachelor students or other transfer students meet or exceed the cut scores?

- a) *The key to preparation is practice. Currently our students do not practice hence need encouragement so that they start practicing early but not too much practice. The concepts covered in exams broadly reflect what undergraduate are supposed to know.*

iii. **Master level course delivery:**

Is there a better method of delivery of courses that could increase student enrollment in the master's program if this may be an issue?

- a) *This is not an issue that affect enrolment into the program.*

Hybrid and online courses were evaluated in the 2015 report and suggested that face to face is the preferred delivery. Is this still true?

- a) *Not really. It would be expedient and a good thing to use hybrid for certain courses and classes.*

Would different times/days/structure be better?

- a) *Having classes scheduled at different times for graduate classes may help. Afternoon works best.*

iv. **Master's degree completion:**

Are students completing the master's program in appropriate time frame (Yes

or No)? Explain.

- a) *Yes. Our students thus far have adjusted and usually finished within the average time which is usually an extra semester allocated to finish research work. This is not uncommon in universities around the world.*

Is there enough support for thesis completion?

- a) *No. Graduate students need more support for writing and editing their thesis.*
b) *At times graduate students may hire a thesis editor.*

What challenges are students facing as they move through the program?

- a) *Time management*
b) *Funding sources are not consistent*
c) *Study spaces for graduate students need to be created to help them study*
d) *Just like options created to solve math issues, it will be beneficial to students if they have remedial course in writing and citations styles especially AAA.*

8. Provide your student's research projects titles and their names (published manuscripts, posters and/or defended for their degree work) since 2014 to date. (Include workshops, conferences etc.)

a) *Dr. Mongoh*

- **Saul Bobtail Bear**, "*Mercury Levels in Bait Fish*". Poster presented at the ND EPSCOR state 2019 Annual Conference, NDSU, Fargo ND, March 27, 2019. Poster presented at the 7th ANNUAL North Dakota Tribal College Research Symposium Disseminating the Future of Tribal College Research, Tuesday, April 2, 2019.
- **Kylee M. Harrison**, "*Water Quality in a Typical Bison Pasture*" Poster presented at the 7th ANNUAL North Dakota Tribal College Research Symposium Disseminating the Future of Tribal College Research, Tuesday, April 2, 2019. SBC BS Defense 2019.
- **Moriah J. Thompson**, "*Assessing Arsenic Concentrations Around Devil's Lake Waters: Public Health Implications*" Poster presented at the Dakota Tribal College Research Symposium Disseminating the Future of Tribal College Research, Tuesday, April 2, 2019. SBC BS Defense 2019.
- **Kylee M. Harrison**, "*Bison (Bison bison) Grazing Effect on Plant Diversity*" FALCON Conference (Washington, DC) 2017 (poster). 6th ANNUAL North

Dakota Tribal College Research Symposium Disseminating the Future of Tribal College Research, Tuesday, March 27, 2018 (poster).

- **Frankie Johnson**, “*The Great Plains Turnip (*Pedimelum esculentum*)*” 6th ANNUAL North Dakota Tribal College Research Symposium Disseminating the Future of Tribal College Research, Tuesday, March 27, 2018 (poster).
- **Saul Bobtail Bear and Joshua J.W. Silk**, “*Understanding the Synthesis Procedure for a Model Compound Polymer made from FDCA and a Nitro-Phototrigger.*” 6th ANNUAL North Dakota Tribal College Research Symposium Disseminating the Future of Tribal College Research, Tuesday, March 27, 2018 (poster).
- **Saul Bobtail Bear**, “*Mercury Levels in Bait Fish*”. SBC BS Defense 2018
- **Joshua J.W. Silk**, “*Effects of Microbial Biodegradation on Sustainable Bio-based Polymers*”. SBC BS Defense 2017
- **Clayton Lupe**, “*Bison Health: Bovine Viral Diarrhea (BVD) in Bison Herds on Standing Rock Sioux Reservation.*” Poster Presented at the 6th ANNUAL North Dakota Tribal College Research Symposium Disseminating the Future of Tribal College Research, Tuesday, March 27, 2018. Poster presented at the Annual ND INBRE Research Symposium at UND, Grand forks ND, in November 2017
- **Maurianna Loretto**, “*Bison Health, Prevalence of Parasites (Helminthes) in fecal samples on a bison pasture on SRSR*” SBC BS Defense 2015
- **Pizi Lee**, “*Integrated Solid Waste Management - Waste Stream characterization on Standing Rock Sioux Reservation*” SBC BS Defense 2015
- **Bruz Van Dusen**, “*Indigenous Corn Reintroduction Project: Analysis of Lipid Content and Dietary Health Implications*”. Poster presented at the 3rd ANNUAL North Dakota Tribal College Research Symposium Disseminating the Future of Tribal College Research, Friday, April 10, 2015. Poster presented at the Annual ND INBRE Research Symposium at UND, Grand forks ND, in October 2015
- **Louis Walking Elk**, “*Characterizing water quality parameters in a typical livestock pasture on the Standing Rock Reservation: health and productivity implications*”. Poster presented at the 3rd ANNUAL North Dakota Tribal College Research Symposium Disseminating the Future of Tribal College Research, Friday, April 10, 2015. Poster presented at the Annual ND INBRE Research Symposium at UND, Grand forks ND, in October 2015.

b) *Dr. Buresh*

None

c) *Dr. Harversion*

- **Saul Bobtail Bear**, “*Mercury Levels in Bait Fish*”. Poster presented November 3, First American Land Grant Consortium (FALCON) 2018 Annual Conference, Minneapolis MN.
- **Saul Bobtail Bear**, “*Freshwater Fish Diversity and Size in a Canal System in Guanacaste Region, Costa Rica*”. Poster Presented November 5, First American Land Grant Consortium (FALCON) 2016 Annual Conference, Albuquerque, NM.
- **Clayton Lupe**, “*Correlation of Lead Concentration with Clay Content in Alkaline River Sediments*”. MS Thesis defense. Sitting Bull College, 9299 Hwy 24, Ft. Yates, 58538.
- **Clayton Lupe**, “*Bison Health Bovine Viral Diarrhea (BVD) in Bison Herds on Standing Rock Sioux Reservation*”. Poster Presented November 4, First American Land Grant Consortium (FALCON) Annual Conference, Arlington VA.
- **Buz Van Dusen**, “*Cross-sectional Distribution of Lead Along Floodways of Rural Highway Bridge on Standing Rock and Cheyenne River Sioux Reservation*”. MS 2016 Thesis Defense. Sitting Bull College, 9299 Hwy 24, Ft. Yates, 58538.
- **Lous Walking Elk**, “*Describing Spatial Distribution of Total Mercury with the Sediments of the Grand River on the Standing Rock Sioux Reservation*”. MS Thesis 2016 Defense. Sitting Bull College, 9299 Hwy 24, Ft. Yates, 58538.

d) *Ms Renea*

- **Jaimie Archambault**, “*Effects of Season on Raptor Species, Abundance, and Habitat Use*”, SBC AS Defense 2017
- **Luke Black Elk**, “*Antimicrobial Properties of Artemisia ludoviciana*”, SBC AS Defense 2016
- **Saul Bobtail Bear**, “*Freshwater Fish Species Diversity and Size in a Canal System in Guanacaste Region, Costa Rica*”, AISES Conference (Phoenix, AZ) 2015(poster), SBC AS Defense 2015, South Dakota Fisheries Conference (Spearfish, SD) 2016 (poster), AIHEC Conference (Minneapolis, MN) 2016 (poster), FALCON Conference (Washington, DC) 2016(poster)

- **Chelsea Chasing Hawk**, “*Macroinvertebrates Species Diversity Upstream and Downstream from a Disturbance Site*”, SBC AS Defense 2018
 - **Thomas DeVille**, “*The Mushrooms of Standing Rock*”, SBC AS Defense 2017
 - **Sheena Gladue**, “*Effects of Temperature and Humidity on Iguana Behavior in Costa Rica*”, SBC AS Defense 2017
 - **Kylee Harrison**, “*Effects of selenium on plant growth*”, SBC AS Defense 2017
 - **Melanie Howard**, “*Coyote Food Habits in the North Dakota Mixed-Grass Prairie*”, SBC AS Defense 2018
 - **Frankie Johnson**, “*Pediomelum esculentum (Pursh), The Prairie Turnip*”, FALCON Conference (Washington, DC) 2017 (poster), SBC AS Defense 2017, AIHEC Conference (Bismarck, ND) 2018 (poster)
 - **Cresencio Lomeli**, “*Risk Assessment of Hantavirus at Sitting Bull College*”, SBC AS Defense 2018
 - **Paul Miner**, “*The Effects of Bison Grazing on Soil Properties in a Mixed-Grass Prairie*”, SBC AS Defense 2017
 - **James T. Unno**, “*Abundance and Size of the Central American bark scorpion (Centruroides margaritatus) in Two Different Habitats*”, AISES National Conference (Phoenix, AZ) 2015 (poster), SBC AS Defense 2015
 - **Ashley Weasel**, “*Study of the differences in water from entrance and drainage canals in Costa Rica*”, SBC AS Defense 2016
 - **Floris White Buffalo**, “*Traditional medicinal and edible plants along the Missouri that will be affected by Dakota access*”, SBC AS Defense 2018
- e) *Dr. Onduso*
- **Thomas DeVille**, *A preliminary study of the ecological distribution and diversity of mushrooms in the Standing Rock Indian Reservation, USA*. Published in the journal, Current Research in Environmental & Applied Mycology 8(3), 306–312, Doi 10.5943/cream/8/3/2
 - **Thomas DeVille**, “*Eco-distribution and Diversity of Edible and Medicinal Mushrooms of Standing Rock Sioux Reservation North & South Dakota*”. Poster presentation at NSF 2017/1994 Symposium in VA.

- **Thomas DeVille**, “*Survey of Mushrooms of standing rock*”
Power point presentation for the associate degree project and AS thesis defense 2017.

9. What some of the challenges/concerns.

- The environmental science department is the only department on campus that requires students to complete research projects. Students complete research projects at the A.S., B.S., and M.S. levels. The amount of time needed to assist and advise students on research projects can be daunting at times, and this amount of time is not compensated adequately enough. Faculty need release time for research and student advising.*
- There is a need to emphasize on research and administration need to avail more research hours to faculty.*
- Additional lab space is needed for faculty.*

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>.