1200

ENVIRONMENTAL SCIENCE PROGRAM

PROGRAM REVIEW REPORT

2011-2015

Prepared by:

The Environmental Science Department Faculty

Draft Submitted: March 6, 2015

External Reviewer Advised Revisions back to Environmental Program: March 11, 2015

Table of Contents

Environmental Science Program Review 2015

Executive Summary

Program Description Summary

The protection and management of the unique ecological habitats found in the grasslands of Standing Rock Sioux Reservation provides the foundation for implementing the environmental science programs at Sitting Bull College (SBC). Students who graduate with degrees in environmental science find employment in the areas of water quality management, oil extraction process monitoring, natural resource enhancement, environmental protection and regulation, analytical chemistry, wildlife and fisheries biology, and science education. Agencies in which graduates from the environmental science department have chosen for employment include the following: Standing Rock Sioux Tribe Environmental Protection Agency, Standing Rock Sioux Tribe Water Resources Department, Cheyenne River Sioux Tribe Game and Fish Department, South Dakota Game, Fish, and Parks, the North Dakota Department of Health, Whiting Oil, Sitting Bull College, Standing Rock Sioux Tribal Water Resources Department, Natural Resource Conservation Service, and Standing Rock Schools. All of these employment agencies afford our graduating students an opportunity to use the knowledge gained through their education at SBC to improve the environment of Standing Rock Sioux Reservation.

Currently, there are four full-time faculty teaching courses in the environmental science department, and four full-time faculty from other departments (mathematics, engineering, general science, and teacher education) who teach part-time within the environmental science department. SBC is currently advertising to hire one additional full-time faculty member with expertise in the fields of ecological and statistical modeling. The mean (average) length of time full-time faculty members have been employed at SBC is 11.8 years.

Student enrollment in the environmental science degree programs has been good overall. The number of students in the B.S. degree program was steady over the past five years, whereas the number of students in the A.S. degree was more dynamic. The retention of students in the A.S. degree is high among students that transfer into the program from other disciplines, but has decreased among students enrolling in the program as first-time freshman since the last program review in 2010. The retention of students in the B.S. degree remains steady. There is not enough data to evaluate retention trends for the graduate students as the program just began.

Grant funding is by far the major financial support for the environmental science program at all levels. Salary and fringe benefits are paid to science faculty and auxiliary science staff through grant funds. Travel for students and faculty to conferences, international research sites, and field labs is funded by grants. These funds not only support the environmental science department, but have been utilized to fund science faculty in the teacher education and nursing departments, as well as helping to fund SBC Extension activities.

The environmental science program has an active Advisory Committee made up of local ranchers, farmers, environmental science alumni, natural resources personnel, cultural experts, and environmental scientists. Attendance at the advisory committee meetings has fluctuated over the years, but has been light over the past three years. Ideas provided by advisory committee members are incorporated into the environmental science program whenever possible. In addition, students have completed internships with advisory committee members on occasion.

Program Self-Evaluation

The environmental science department has four full-time and four part-time faculty members who teach courses in the three degree programs within the department. Four of the faculty members have Ph.D. degrees and four have M.S. degrees of which three are completing their work for a Ph.D. with one at the A.B.D. point in the process. All faculty members in the environmental science department communicate with each other to ensure that course content meets the needs of the students, as well as providing students with courses that do not have time conflicts with other courses within their degree program. Better communication needs to take place with faculty outside of the department in order to alleviate the few course time conflicts that do occur for students in the environmental science department.

Student evaluation of courses and informal communication with students has resulted in changes within the department that have been implemented to meet the perceived needs of the students. Additional evening courses have been put into place, which does meet the needs for many of the students who are pursuing a B.S. or M.S. degree. In addition, an increased number of on-line and hybrid courses were added to the schedule based on student input. However, low passing rates in these courses and a reevaluation of students' desires indicate that in-person education is needed and preferred by students.

The environmental science department faculty members collect data each semester for assessing the program's learning outcomes. Once used as a model of program assessment for other programs, the environmental science department continues its assessment by utilizing an end-of-program student presentation and evaluation. Over the past four years, the environmental science department has been developing and implementing other methods to assess learning outcomes during milestones within a student's degree program. These evaluation methods have proven effective, and the incorporation of these milestone evaluations will continue to be part of the program assessment plan. In addition, new milestone measurement tools are being developed each year to meet the always changing assessment requirements put forth by the Higher Learning Commission (HLC).

The facilities that house the environmental science program are sufficient for the A.S. and B.S. degree programs. The STC has rooms that accommodate all students desiring to enroll in science courses. The four laboratories include a GIS/physics lab, a biology lab, a chemistry lab, and an analytical lab. The analytical chemistry lab is state-of-the-art and is certified as a water analysis lab by the United States Environmental Protection Agency (USEPA). Although the four labs and the adjacent classrooms are of high quality and the analytical lab is state-of-the-art, space is desperately needed for the newly

accredited M.S. program so that graduate students can conduct research. It has been said that the Mobridge Site (campus) will have ample office and research space for the graduate students. However, no remodeling has commenced to suggest that the graduate student space expansion will come to fruition.

SBC is part of the Land Grant college system, and as a result, offers free outreach and extension programs to the public and the SBC community. Examples of outreach education that has been offered recently include: a hide tanning workshop, a beekeeping workshop, a winter limnetic analysis workshop, a native corn educational workshop, and a traditional plant utilization workshop.

Program Planning Summary

No major departmental changes resulted from this program review. The program review could be used by department personnel and administration to see trends in student enrollment to determine if a better method of student retention could be implemented that specifically meets the unique needs of science students. The environmental science department will continue striving to provide a quality education that meets the needs of the local community while at the same time educating our students for jobs on and off the Standing Rock Sioux Reservation. As environmental impacts continue to put pressure on the unique grassland environment of Standing Rock Sioux Reservation, the faculty remain committed to producing students who are prepared to meet the challenges that come along with preserving and protecting the ecology of this area.

Program History

Standing Rock Sioux Reservation is a tract of land that encompasses over 2.3 million acres (*Standing Rock Sioux Tribe, n.d*.), and is distributed nearly evenly between the states of North Dakota and South Dakota. This landmass is made up of large parcels of contiguous, undisturbed grasslands. Large tracts of non-fragmented grasslands are critical habitat for many plant and animal species that are dependent upon the grassland biome for their existence. With only four percent of undisturbed tallgrass prairie grasslands remaining in North America (Audubon, 2014), and some of that area located within Reservation boundaries, it is crucial that persons knowledgeable in the various fields of environmental science are in place to manage the delicate ecology of these areas. In addition, only 20 – 25% of mixed grass prairie and short grass prairie habitats remain in the U.S., much of which is in the National Grasslands and Reservations (Grassland Heritage Foundation, 2013). It only makes sense to educate local, Native American populations to manage the lands and water where they live.

It was the understanding of the importance of educating local, Native Americans in the area of environmental science that was the impetus for starting the Environmental Science Department at Sitting Bull College (SBC) in 1996. Sitting Bull College partnered with Oglala Lakota College, Sinte Gleska University, Cheyenne River Community College, and Sisseton Wahpeton College in applying for, and being awarded, the Model Institutes for Excellence (MIE) grant under the Nation Science Foundation

(NSF). Although the initial $68,000 grant was small, it was enough for SBC to hire one faculty member to develop the Associate of Science (A.S.) degree in environmental science, the first science degree to be offered at SBC.

Dr. Dan Buresh was hired to develop a two-year degree plan that would meet the needs of the local community and increase the marketability of graduates for jobs on and off the reservation. Upon completion of the A.S. in environmental science curriculum, the SBC Board of Trustees approved the A.S. degree in the spring of 1997, and classes commenced at that point. In the fall of 1997, Dr. Gary Halvorson was added to the science department to teach courses in soil science, chemistry, agricultural sciences, and mathematics.

The first student-led research project was conducted in the sciences at SBC in 1998. Leah Taken Alive's project examining macroinvertebrate communities on Froelich Dam was the first student research project ever to be conducted at SBC. In addition, she was the first SBC student to present scientific research at a national conference. Dr. Halvorson and Dr. Buresh continued promoting and advising student-led science research in the environmental science department using the curriculum of the A.S. degree as the platform for the research.

The SBC environmental science program soon became a model institute for other tribal colleges in the areas of science education and undergraduate research. This prompted the SBC administration to petition the SBC Board of Trustees in moving the environmental science forward by attempting to garner accreditation for offering a Bachelor of Science (B.S.) in environmental science in 2004. SBC had offered B.S. level courses through an articulation agreement with Oglala Lakota College, but interest in SBC's A.S. program showed that it would be beneficial for SBC to offer its own independent B.S. program. The administrators with the vision for expansion of the environmental science program were Dr. Laurel Vermillion (President of SBC), Dr. Koreen Ressler (Vice President of Academics), and Ms. Leonica Alkire (Vice-President of Finance). The Board of Trustees agreed and supported the program's expansion.

With SBC Board of Trustee and SBC administration support, Dr. Halvorson and Dr. Buresh developed the curriculum for the B.S. degree. Accreditation for the degree was sought through the Higher Learning Commission (HLC) for the first time in the spring of 2004, but was denied. HLC's primary concern was that the science facility (an old, dilapidated trailer converted to a laboratory) was insufficient for housing a B.S. degree program in the sciences. However, SBC was just breaking ground for the new Science and Technology Center (STC), which would serve to house the environmental science department. And in the fall of 2004, the environmental science department hired Dr. Jeremy Guinn to expand the department to three full-time faculty members. Dr. Guinn brought to the program an expertise in wildlife biology and zoology.

STC construction was completed in the spring of 2006. Using the identical curriculum developed by Dr. Halvorson and Dr. Buresh 18 months prior, SBC again attempted to gain accreditation for the B.S. degree in environmental science in the fall of 2006. This time, the accreditation was granted. The B.S. degree

was immediately a magnet for students from other tribal colleges who had obtained an A.S. degree in environmental science, as well as for past SBC environmental science A.S. degree grantees. The program expanded in student enrollment accordingly by tripling in numbers (J. Guinn and D. Buresh, 2010).

In order to accommodate the growing program and increased number students conducting research, an increase in full-time science faculty was needed. Dr. Mafany Mongoh was hired in the fall of 2008, and brought to the department a background in agricultural science, microbiology, and epidemiology. The addition of Dr. Mongoh also alleviated coursework responsibilities for Dr. Guinn, Dr. Halvorson, and Dr. Buresh, who were often teaching over 20 credits per semester prior to his arrival. Dr. Mongoh has served as advisor for B.S. degree-seeking students from 2010 through the current academic year (2010-2015).

Dr. Guinn left the environmental science department in 2010 leaving a void in the area of wildlife biology. In the fall of 2012, Ms. Renae Schmitt was hired to fill the void. Ms. Schmitt brought an expertise in wildlife biology, grassland ecology, and zoology to the environmental science department. Ms. Schmitt also has an extensive background in field research, thus has served as the research advisor to all of the A.S. degree-seeking students from 2013 through the current academic year (2014-2015).

In addition to teaching and advising research in the environmental science department, Ms. Schmitt took on the task of conducting a feasibility study to determine the efficacy of SBC pursuing a quality Master of Science (M.S. degree) in environmental science. Upon the completion of her feasibility study, it was determined by SBC administration and the SBC Board of Trustees that the environmental science department go forward with attempting to acquire accreditation for the M.S. degree. Ms. Schmitt spear-headed the development of the environmental science department's M.S. degree curriculum, budget, and program review that would be required to obtain accreditation. Through the diligence of the environmental science department, and administrative support from the vice president of academics, the environmental science department was granted accreditation by the HLC to begin offering the M.S. degree in the fall of 2014.

During the development of the M.S. degree program, SBC added another science faculty member to assist with teaching science courses and to add insight regarding the M.S. degree program in the weeks leading up to the accreditation visit. Ms. Anjanette Parisian was hired to fill a position vacated by Mr. Gene Lehr, who had taught the general science courses. Ms. Parisian teaches one course, introduction to biology, for undergraduate students in environmental science. In addition, Ms. Parisian teaches seminar courses to the graduate students.

From the initial development of the A.S. degree to the development and implementation of the M.S. degree, the environmental science department has made great strides in a short amount of time. The working relationship built within the department personnel and with administration, coupled with the commitment of the faculty and administration to expand and enhance the program continues to be the strength behind the department's success.

Comprehensive Analysis

Justification for the Environmental Science Programs

The traditional, cultural history of the Lakota/Dakota people of Standing Rock Sioux Reservation is one inclusive of respect for the environment. The respect for water, animals, plants, and the land is ingrained in the traditional culture of the people, thus the environmental science programs at SBC correspond directly to the culture of the Lakota/Dakota people. Traditionally, Native Americans have had a unique participation with nature that is founded on an ancient human covenant with plants, animals, the forces of the Earth, and the universe (Cajette, 2000). This connection with the environment is a fundamental factor contributing to SBC continuing its offering of the environmental programs in the future. In addition, the job outlook for graduates of the program is good throughout the United States, and that is particularly true for North Dakota and South Dakota.

The Standing Rock Sioux Reservation has a large landmass, and is conveniently located along the Missouri River. The dependence on local water sources for agricultural needs, and for personal consumption is illustrated by the fact that Reservation communities obtain their water from locations close to each individual community, respectively. The communities of Wakpala and Fort Yates both obtain their drinking water from the Missouri River, and the majority of the remaining communities on Standing Rock Sioux reservation obtain their water supply from groundwater or a combination of groundwater and stream systems (*Standing Rock Sioux Tribe, n.d*.). In addition, the terrestrial environment of The Standing Rock Sioux Reservation exceeds 2.3 million acres, and is of vital significance for food production and ceremonial activities of the Lakota/Dakota people. Ranching, farming, hunting, and wild plant harvesting are important components to the food production within the Standing Rock Sioux Reservation boundaries. In addition, many plants, such as green ash (*Dakota ~ Psehti*), sage (*Dakota ~ Pezhihota*), and willows (*Dakota ~ Wahpe-popa*) are used for ceremonies across the Reservation. The connection to the land by Lakota/Dakota people is well documented (Marshall, J., 2001; Brown, J.E., 1953) thus the importance of teaching students the methods of preserving and protecting this valuable resource, and to employ Native Americans in the area of Natural Resource Management and Environmental Science (Gilmore, 1977).

The outlook for employment of graduates from the environmental science programs is good overall. The Occupational Outlook Handbook shows that there are over 90,000 environmental scientists in the United States (U.S.), with a projected ten year increase in the number of jobs of 15%, which is considered very good. In addition, there are currently 229,100 jobs in environmental public relations (12% increase predicted), and 20,100 wildlife scientist jobs (5% increase predicted) in the U.S. All of the aforementioned careers are designed for individuals possessing a B.S. or M.S. degree in environmental science or a related field. The outlook for graduates with an A.S. in environmental science looks good as well, as there are currently 63,600 chemistry technicians in the U.S., with a predicted increase of 9% in the next ten years. Additionally, there are currently 19,000 environmental science field technicians (18% predicted increase) and 32,800 environmental science technicians (19% increase predicted).

Graduates earning a two-year degree in environmental science should have opportunities for employment across the U.S. at least through 2025 (U.S. Department of Labor, 2014).

The outlook for SBC environmental science graduates looks bright for those seeking employment on a local basis in North Dakota (ND). There are currently 180 environmental science technicians in ND with a ten-year predicted increase of jobs of 27.9%. The technician jobs are designed for students choosing to finish their education at the A.S. degree level. In addition, there are currently 80 agricultural scientist positions and 260 environmental scientist positions in ND with a projected ten-year increase of 16.6% and 26.6%, respectively (U.S. Department of Labor, 2013). These statistics indicate that the environmental sciences and closely related fields have a positive outlook for graduates earning a degree in the environmental science department at SBC.

It is difficult to determine if the job outlook for natural resource and environmental science jobs will mimic that of North Dakota, since the Standing Rock Sioux Tribe does not currently publish a report related to predicting the future of employment on Standing Rock Sioux Reservation. Anecdotal evidence suggests that there will generally be some job openings in the science fields at public agencies such as SRST Water Resources Department, SRST EPA, and county extension offices.

Role of the Program within Sitting Bull College

Currently, there are three degree plans within the Department of Environmental Science at SBC. The department offers students an A.S. degree, a B.S. degree, and a M.S. degree. All three of these degree programs are designed to be degrees that are conclusive by nature, in that if a student desires to go to the workplace upon completion of one of the degrees they will be able to. 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 transfer to other institutions of higher education that offer similar degrees in environmental science. The environmental science programs follow the Mission Statement of the department which states:

> 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 considerations affect our everyday lives.

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 the students an opportunity to complete any, or all of these degrees are listed in the SBC Bulletin and include:

Associate of Science Degree
ENS 113 Introduction to Environmental Science
ENS 202 Environmental Issues

ENS 216 Wildlife Management
ENS 225 Environmental Sampling
ENS 240 Environmental Issues
ENS 260 Environmental Research Project I
ENS 261 Environmental Research Project II
ENS 297 Environmental Internship
BIOL 110 Biology I
BIOL 224 General Ecology
BIOL 240 Ethnobotany
SOILS 210 Introduction to Soil Science
CHEM 115 Introduction to Chemistry

Bachelor of Science Degree

BIOL 450 Mammology
BIOL 455 Herpetology
BIOL 499 Entomology
BIOL 458 Ornithology
CHEM 116 Introduction to Organic and Biochemistry
CHEM 403 Analytical Chemistry
ENS 301 Hydrology
ENS 311 Introduction to GPS/GIS
ENS 321 Environmental Chemistry
ENS 422 Environmental Toxicology
ENS 432 Aquatic Ecosystems
ENS 433 Solid Waste Management
ENS 452 Science Literature
ENS 453 Environmental Law and Policy
ENS 493 Senior Research
MATH 314 Applied Statistics
ARSC 236 Introduction to Range Management
SOILS 431 Soil Conservation Management

Master of Science Degree

ENS 500 Graduate Seminar
ENS 511 Advanced Experimental Design
ENS 515 Advanced Statistics
ENS 520 Advanced Techniques in GIS
ENS 530 Limnology
ENS 532 Watershed Analysis
ENS 542 Environmental Policy and Resource Management
ENS 545 Applying Lakota/Dakota Culture to Environmental Science
ENS 550 Conservation Biology
ENS 560 Advanced Water and Soil Biogeochemistry
ENS 572 Environmental Water Quality
ENS 580 Advanced Water Sampling Techniques
ENS 600 Research and Thesis

Program Outcomes

PROGRAM OUTCOMES FOR ASSOCIATE OF SCIENCE IN ENVIORNMENTAL SCIENCE:

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

PROGRAM OUTCOMES FOR BACHELOR OF SCIENCE IN ENVIORNMENTAL SCIENCE:

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

Program Personnel

The primary faculty members who teach courses for the aforementioned 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):

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

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

Renae Schmitt, Ph.D./A.B.D., Environmental Science Instructor – Full Time 15 credits/semester

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

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

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

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

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

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

Louis Walking Elk, Graduate Teaching Assistant – Part time 2 Credits/semester

Bruz Van Dusen, Graduate Teaching Assistant – Part time 2 Credits/semester

Program Productivity

The first degree in environmental science, the A.S. degree, was offered in 1997. The first graduate of the A.S. degree was in 1999. Since that time, SBC has had graduates each year in the A.S. degree program. The first environmental science student entering the B.S. degree program offered through SBC was in 2006. The first graduate from the newly accredited B.S. degree was in the spring of 2007, as that student transferred credits to the program from Oglala Lakota College. All but one year since that time, SBC has had graduates in the B.S. degree program.

The number of students enrolled in the A.S. degree program in environmental science was fairly stable from the Fall of 2008 – Spring 2011 with enrollment at 14 or greater each semester. There was a drastic decrease in student enrollment in the Fall of 2011, as enrollment dropped to six students, less than half the enrollment of the previous year (Figure 1). This drop of enrollment is likely caused by the implementation of the Walmart Grant retention strategy. The retention strategy espoused by the Wal-Mart grant, albeit successful in overall retention, has been counterproductive to the recruitment plan of the ENS program. It negates the recruitment strategy used by the program to attract students into the program. This has had negative impacts to the retention of students declaring environmental science as their major during their first semester at college.

Non-science majors tend to avoid sciences, and put them off for as long as possible because of fears of science and having negative stereotypes of scientists, whereas science majors have strong desires to enroll in science courses as a result of having no negative stereotypes of scientists and the fear of

science courses being lifted (Brush, 1979). Therefore, it is the belief of the environmental science department that students declaring environmental science as their major when they enroll as first-time freshmen, should be put into a science course (ideally ENS 113 Introduction to Environmental Science) that first semester. The department believes that science students are unique students, and don't fit the norms of the rest of the college. Since the fall of 2008, there have been 19 students who have declared environmental science as their major as first-time freshmen. Over that time, there have been nine students who were enrolled in introduction to environmental science their first semester, and eight of those students continued on to the next semester by enrolling for classes (88.8% persistence). Over the same time period, there have been 10 students who declared environmental science as their major as first-time freshman, but were not advised by science faculty, and were not placed into the introduction to environmental science course their first semester. Only five of the ten students who were not placed in the introduction to environmental science course came back the following semester to enroll for classes (50% persistence). Although the numbers may be too small to show a statistically significant difference, it certainly is enough to be suggestive that students should be placed in an introductory course in the sciences upon entering as declared science majors in their first semester (Table 1).

Figure 1

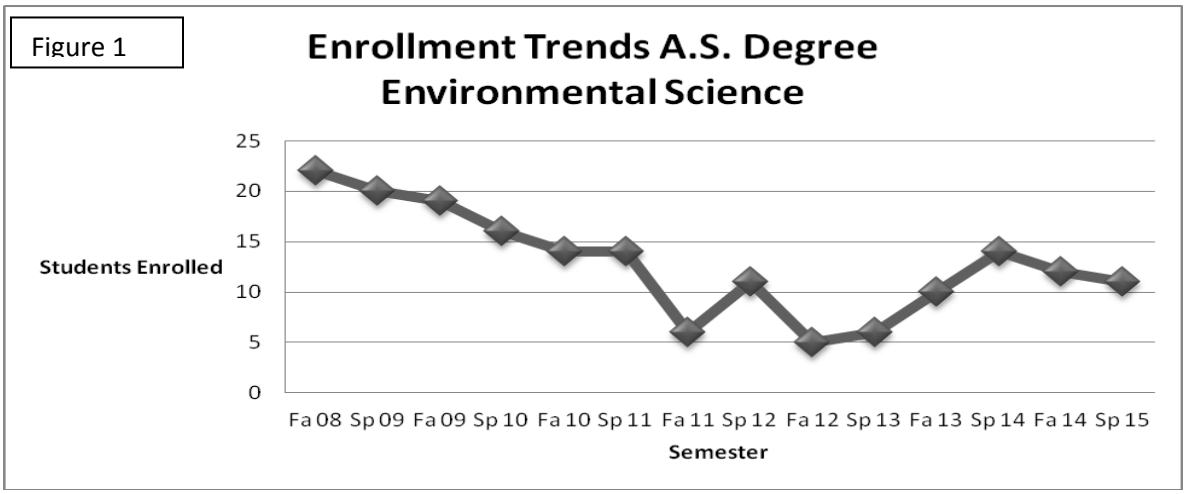
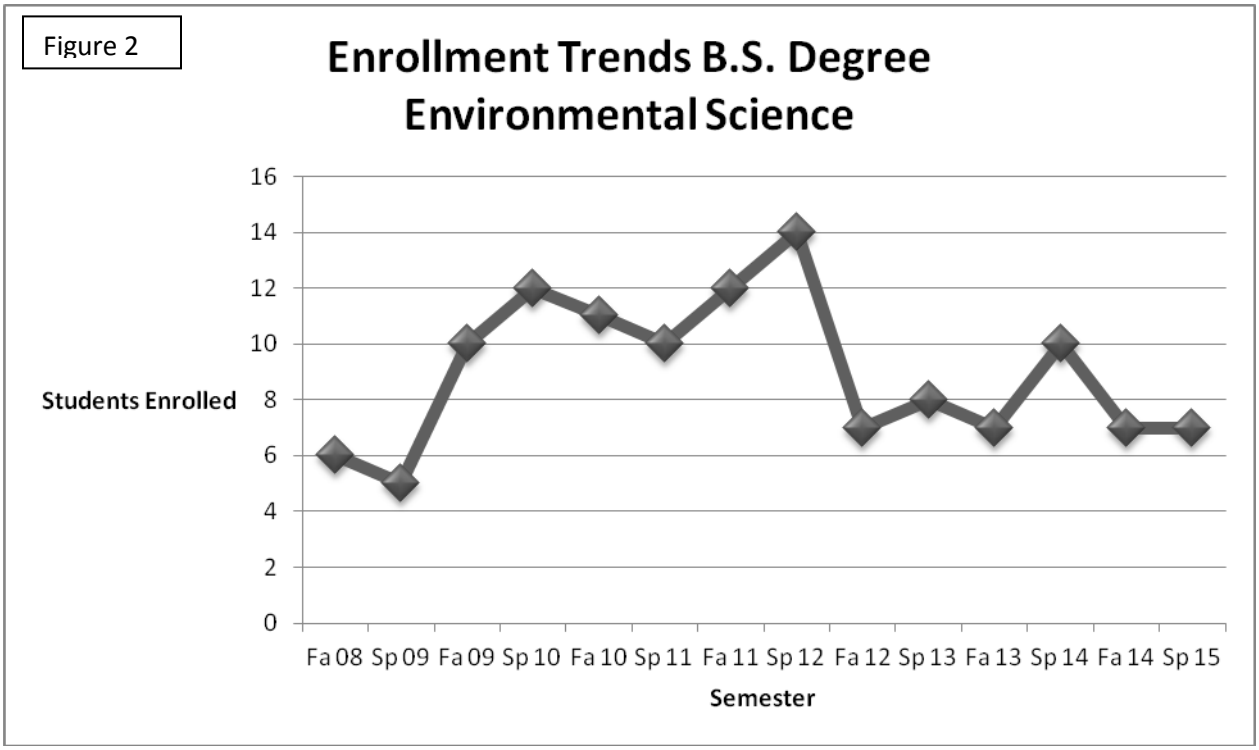


Table 1. Retention Comparison of First-Time Freshman Who Declared Environmental Science Majors.

	Enrolled in Courses at SBC Following Semester	Did not Enroll in Courses at SBC Following Semester
Enrolled in Science Course First Semester	8 (87.5%)	1 (12.5%)
Did Not Enroll in Science Course First Semester	5 (50%)	5 (50%)

The number of environmental science students enrolled in the B.S. degree program was fairly stable from Fall 2009 through the spring semester of 2012, with enrollment in double digits. There was a drop in enrollment between Spring 2012 and Fall 2012 by 50%. Since that time, numbers have been steady (Figure 2). The decline can most likely be attributed to the number of students who had already earned an A.S. degree between 1998 and 2006 that enrolled in the new B.S. degree program. Once those students completed their B.S. degree, a large number of students were removed from the system. The environmental science department is not overly concerned about the drop in numbers between Spring 2012 and Fall 2012 as it is a reflection of those aforementioned students. Although the numbers have stabilized since that time, the department would like to see an increase in the number of students transferring in from other colleges to complete their B.S. degree in environmental science at SBC. An increase of approximately four students per year of transfer students would provide the department with a continued annual enrollment of at least twelve students in the B.S. degree, thus providing a means of ensuring that classes are filled, and that the program existance is founded on solid student numbers instead of projections. A recuitment plan to entice students from other colleges that have only an A.S. degree in environmental science is being put into place.

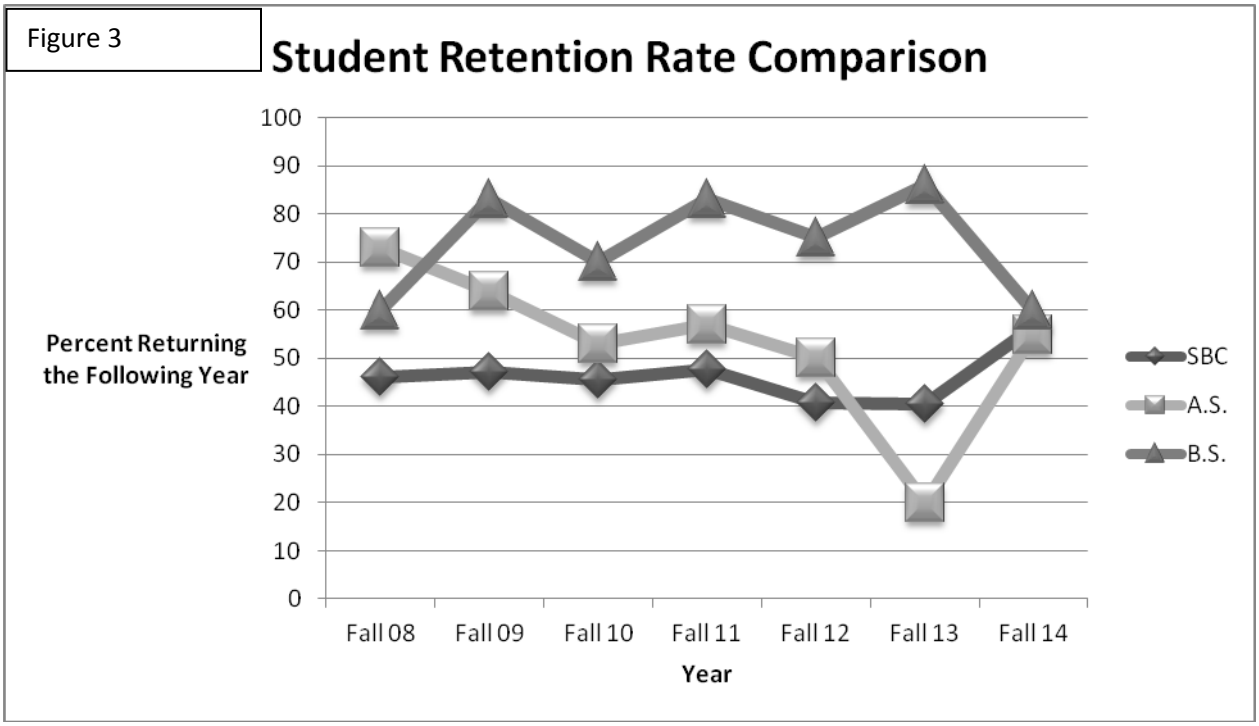
Figure 2



When examining the rention rates, following students from one academic year to the next, the environmental science department has almost always exceeded the overall retention rate of SBC as a whole. The B.S. degree-seeking student retention rates are high, and exceed both the A.S. degree-seeking student retention rates, as well as the overall SBC retention rates each year. The A.S. degree-seeking student retention rates were highest in 2008, and for the most part have decreased each year

since, with an extremely disconcerting low rention rate of 20% in 2013 (Figure 3). The environmental science department is concerned with the decreasing retention rates within the A.S. degree-seeking students, and will try to determine the causation of this decline. The department would like to see at least 12 students in each the A.S. and B.S. degree programs.

Figure 3



The enrollment for the A.S. degree has fluctuated during the past seven years, and the graduation rates reflect that fluctuation. For every group of students enrolled in the A.S. degree program at any given time, we expect about 20% of that number to graduate with an A.S. degree each year. Of those that graduate, nearly all of them (89.5%) have gone to seek a higher degree, and only 10.5% have opted to go to the workforce instead. In addition, 15.7% of those that graduated with their A.S. degree have chosen to go to the workforce, while at the same time seeking a B.S. degree in environmental science (Table 2). Data for the 2014-2015 year are not yet compiled and will be upon the completion of the academic year.

Table 2. Environmental Science Program Enrollment, Graduation, Transition, and Employment (A.S. Degree).

A.S. Degree	2008-2009	2009-2010	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015
Enrollment	25	23	18	10	8	15	12
Graduated	5	4	3	3	1	3	TBA
Transition to Higher Degree	5	4	3	2	1	2	TBA
Employed	1	2	0	1	0	1	TBA

The student to faculty ratio is very low with a ratio of approximately 3:1 in the current academic year (2014-2015). Even when the enrollment was at its highest point in 2008-2009, the ratio was approximately 6:1. The environmental science department at SBC is noted for its low student to faculty ratio in almost all of the courses taught within the department, thus affording students ample opportunity to work one-on-one with the faculty teaching the courses.

The enrollment in the environmental science B.S. degree plan has been fairly stable since 2009, with the total enrollment for both semesters (non-duplicate count) being between nine and seventeen students. Each year, with the exception of 2012-2013, the environmental science department graduated approximately 25% of its total enrollment for that year. Only 20% of the students that graduated with a B.S. degree between 2009 and 2014 have gone on to seek an advanced degree, however, that number may increase in the future with the addition of the M.S. degree program in environmental science at SBC now in place. Eleven out of the 15 graduates (73.3%) were employed on a full-time basis upon completion of their B.S. degree, and one of those students worked full time in the field of environmental science while at the same time pursuing an advanced degree (Table 3).

Table 3. Environmental Science Program enrollment, Graduation, Transition, and Employment (B.S. Degree).

B.S. Degree	2008-2009	2009-2010	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015
Enrollment	8	13	12	17	9	11	9
Graduated	2	0	3	5	1	4	TBA
Transition to Higher Degree	1	0	0	1	0	1	TBA
Employed	2	0	3	3	1	2	TBA

Each course in the students' core were examined for completion rates for the past five years. 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 lette grade of D or F, or if they withdrew from the course, the department considers the student not satisfactorily completing the course. Table 4 shows the number of students completing and attempting each course for the past five years. In addition, the percent satisfactorily completed is in parentheses. This analysis allows the department to determine if any "gate-keeper" courses exist that are impeding a student from reaching the goal of graduation. Any course that has a 55% or less satisfactory completion rate was examined in depth as they may be a "gate-keeper" course that is impeding the student from graduating.

Five courses were identified as having low completion rates. The five courses are as follows: BIOL 150 (Introduction to Biology), ENS 113 (Introduction to Environmental Science), BIOL 455 (Herpetology), ENS 202 (Environmental Issues), and ENS 311 (Introduction to GPS/GIS). Further analysis and discussion among faculty in the department show the most concern with ENS 202. The ENS 113 and BIOL 150 courses have extraordinary numbers of students enrolled who are non-science majors, and whose dedication to the course may not be as high as it would be if it was a course directly related to their major. In addition, students who take one of these two courses are often freshmen students, and it has been shown previously in this document that the retention rate of freshmen as a whole is lower than that of students who are in the second year of their program or beyond. The BIOL 455 course and the ENS 311 course were courses designated by the environmental science department as allowing non-science majors to enroll in order to have additional upper division courses (300-level and 400-level) available for General Studies majors to enroll. These two courses have many upper division General Studies majors (non-science majors) enrolled in them, which may be leading to unusually low satifactory completion rate as their interest level or educational background may not be in place to set them up for success in the courses.

The ENS 202 course, however, should be a course with mainly students majoring in environmental science. It is a writing intensive course. Perhaps the students entering the course are unprepared for the amount of writing that occurs. Anecdotal evidence also shows that students who transfer from other insitutions into the B.S. program enroll in the ENS 202 course and have low pass rates. Perhaps the writing background they received at the previous institution is not preparing them for the course. A final explanation for the low pass rate in the course could be due to faculty delivery of the course not being a right fit for the students' needs. The department has adjunct faculty members teaching the course in AY 2014-15 to see if the problem is alleviated. If the problem continues to exist with the ENS 202 course rate of satisfactory completion, an additional writing lab may be set up in the department related to this course, with the requirement that students in the course have three contact hours per week for the two-credit course.

Table 4. Course Completion Rates with a Letter Grade of A, B, or C (2009 – 2014)

Course/AY	AY09-10	AY10-11	AY11-12	AY12-13	AY13-14	Total
ARSC 236	1/1 (100%)	4/5(80%)	2/2(100%)	5/5(100%)	2/2(100%)	14/15(93%)
BIOL 150	10/14(71%)	14/24(58%)	9/17(52%)	9/23(39%)	3/8(38%)	45/86(52%)
BIOL 224	2/5(40%)	2/2(100%)	3/5(60%)	2/4(50%)	4/6(67%)	13/22(59%)
BIOL 240	10/17(59%)	16/20(80%)	5/7(71%)	10/17(59%)	15/17(88%)	56/78(72%)
BIOL 455 (herp.)	1/5(20%)	XX	3/4(75%)	XX	XX	4/9(44%)
BOIL 450 (mamm.)	XX	3/3(100%)	6/6(100%)	XX	1/1(100%)	10/10(100%)
BIOL 456 (ornith.)	XX	XX	5/6(83%)	XX	XX	5/6(83%)
CHEM 115	7/9(78%)	5/6(83%)	2/4(50%)	5/6(83%)	2/3(67%)	19/26(81%)
CHEM 116	1/4(25%)	5/7(71%)	7/7(100%)	5/5(100%)	4/4(100%)	22/27(81%)
CHEM 403	1/2(50%)	1/1(100%)	3/3(100%)	2/2(100%)	XX	7/8(88%)
ENS 113	8/20(40%)	7/15(47%)	8/10(80%)	8/17(47%)	5/8(63%)	36/70(51%)
ENS 202	2/6(33%)	3/6(50%)	2/5(40%)	2/6(33%)	4/10(40%)	13/33(39%)
ENS 225	2/4(50%)	2/2(100%)	3/5(60%)	1/1(100%)	4/4(100%)	12/16(75%)
ENS 240	2/4(50%)	2/2(100%)	2/4(50%)	0/1(0%)	4/4(100%)	10/15(67%)
ENS 260	3/6(50%)	3/3(100%)	3/4(75%)	1/1(100%)	2/2(100%)	12/16(75%)
ENS 261	1/3(33%)	3/3(100%)	2/2(100%)	4/4(100%)	3/3(100%)	13/15(87%)
ENS 297	5/7(71%)	9/10(90%)	4/6(67%)	5/15(33%)	15/16(93%)	38/54(70%)
ENS 301	3/3(100%)	4/5(80%)	2/3(67%)	3/4(75%)	4/5(80%)	16/20(80%)
ENS 311	3/10(33%)	4/8(50%)	3/5(60%)	5/7(71%)	3/3(100%)	18/33(55%)
ENS 321	0/2(0%)	1/2(50%)	4/5(80%)	2/3(67%)	3/4(75%)	10/16(63%)

ENS 331	1/1(100%)	1/2(50%)	XX	2/4(50%)	1/2(50%)	5/9(56%)
ENS 422	3/4(75%)	XX	4/6(67%)	XX	XX	7/10(70%)
ENS 432	2/5(40%)	XX	4/6(67%)	4/5(80%)	1/2(50%)	11/18(61%)
ENS 452	1/2(50%)	2/2(100%)	3/6(50%)	1/1(100%)	XX	7/11(64%)
ENS 453	3/4(75%)	2/3(67%)	2/3(67%)	4/7(57%)	2/3(67%)	13/20(65%)
ENS 493	4/5(80%)	6/6(100%)	5/10(50%)	3/8(54%)	2/2(100%)	20/31(65%)
SOIL 210	7/10(70%)	4/4(100%)	4/5(80%)	3/4(75%)	4/5(80%)	22/28(79%)
SOIL 431	4/5(80%)	2/2(100%)	1/1(100%)	3/3(100%)	2/2(100%)	12/13(92%)
Total	**87/158(55%)**	**106/144(74%)**	**103/147(70%)**	**91/155(59%)**	**91/117(78%)**	**478/721(66%)**

Program Revenue

Data related to revenue from Indian Student Count (ISC) and tuition were collected from the SBC Shared File and compiled by environmental science department faculty (Table 5). The environmental science department consistently brings in the third most dollars from ISC and tuition at the college 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 $914,738 gained from ISC and tuition dollars of the past five years. The lowest income came in academic year (AY) 2012-13 with an income of $129,450, and the highest income year was AY 2010-11 with an income of $228,445 from ISC and tuition. The nature of ISC funds is one that is 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 5. Income Derived from ISC and Tuition for the Environmental Science Department (2009-2014)

Academic Year	ISC Funding	Tuition Funding	Total Income (ISC + Tuition)
2009 - 2010	106,875	65,625	172,500
2010 - 2011	143,745	84,700	228,445
2011 - 2012	131,003	68,500	199,503
2012 - 2013	82,075	47,375	129,450

2013 - 2014	117,956	66,875	184,831
Total	**581,663**	**333,075**	**914,738**

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 over the past five years. In that time, SBC has benefitted from over $2,000,000 dollars from the NSF TCUP grant funds (Table 6). 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 $395,414 over the past five years.

Table 6. NSF TCUP Funding for the Environmental Science Department (2009 – 2014).

	2009 – 2010	2010 – 2011	2011 – 2012	2012 – 2013	2013 – 2014	Total
Senior Personnel	183,960	183,960	183,960	186,823	195,138	933,841
Other Personnel	32,600	32,600	32,600	21,930	22,928	142,658
Undergraduate Students	17,200	17,200	17,200	18,200	18,200	88,000
Secretarial	9,116	9,116	9,116	10,000	9,961	47,309
Fringe Benefits	57,743	57,743	57,743	55,860	58,400	287,489
Equipment	15,500	15,500	15,500	15,500	15,500	77,500
Travel	28,100	28,100	28,100	31,100	31,100	146,500
Stipends	6,300	6,300	6,300	6,300	6,300	31,500
Materials & Supplies	9,300	9,300	9,300	13,000	13,000	53,900
Publications	500	500	500	1,500	1,500	4,500
Consultants	12,000	12,000	12,000	13,000	13,000	62,000

Computers	3,000	3,000	3,000	3,000	3,000	15,000
Other Direct	30,500	30,500	30,500	29,173	30,500	151,173
Indirect	72,094	72,094	72,094	87,575	91,557	395,414
Total	**477,913**	**477,913**	**477,913**	**492,961**	**510,084**	**2,406,784**

There have been many other grants that have been 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. The grants that have impacted the environmental science department over the past five years are listed below.

USDA-AFRI	$500,000
NSF PEEC	$1,000,000
NSF PETE	$22,800
ANLSAMP	$100,000
USDA-TCU	$175,000
DOD-US Army	$200,127
DOD-US Air Force	$18,270
USDA-Ag Extension	$995,000
USDA-NIFA	$80,000
NSF-EPSCOR	$400,000

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 offereing 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 adivse students on a research project, aadding to the work required of faculty members involved in managing one of these grants.

Personnel Expenditures

All faculty in the environmental science department are supported entirely by grant funding (Table 7). 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. Grants have provided the main support for the environmental science department since the program's inception in 1996.

Table 7. Personnel Expenditures.

Personnel Expenditures	**2009-2010**	**2010-2011**	**2011-2012**	**2012-2013**	**2013-2014**	**2014-2015**
Faculty Salary	247,490	247,490	204,790	254,480	254,180	261,080

Auxiliary Staff Salary	37,625	38,300	56,900	50,275	34,600	24,000
Fringe	70,303	70,355	63,879	73,712	71,050	71,270
Total	**355,418**	**356,145**	**325,569**	**378,467**	**359,830**	**356,350**

Advisory Committee

The environmental science department 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 past four years, the environmental sicence department has held its spring advisory committee meeting in conjunction with the joint adivsory committee meeting of the entire college. Having these joint meetings in the spring alleviates some of the burden placed upon committee members who sit on multiple advisory committees. The current members of the environmental science department's advisory committee are listed below.

Ron Brown Otter, rancher
Mary Louise Defender, cultural expert
Joe Smith, Land Management Director
Bob Demery, BIA operations
Janet Frazier, SRSTEPA Scientist
Everette Iron Eyes, Water Resources
Manaja Hill, rancher
Palani Luger, SRSTEPA Scientist
Miles McAllister, Farm Manager
Austin Lang, District Conservationist
Aubrey Skye, community member
Delano LeCompte, Land Development Coodinator
Bill Sherwood, Tribal Sanitarian
Jackie Bigger, rancher
Robert Gipp, rancher
Hans Bradley, SRSTEPA Scientist
Allyson Two Bears, SRSTEPA Director
Sue Isbell, Extension Agent
Jeff Kelly, Game Warden
Harriet Black Hoop, E.S. program alumus

The Advisory Committee meetings are held twice each year at the end of each semester. The attendance is typically low at these meetings, however, attendance has been increasing slightly over the past three semesters. A meal is provided at each meeting in an attempt to attract a better attendance response from committee members. In addition, if committee members fail to particpate in the committee meetings after three years, they are removed from the committee roster and new members are added to fill their place. This addition of new members has resulted in slightly greater attendance at the meetings.

The meetings are held in a rather informal manner, with each SBC personnel highlighting the area of the environmental science program in which he or she is most actively invovled. After each SBC employee has presented an update of activities and delineated needs of the program, each member of the committee is given a chance to tell what is happening in their area. In addition, this provides an opportunity for the committee members to explain how they can be of assistance to the environmental science department. Often the committee members have 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 on extension workshop topics. Whenever it is possible, the environmental science department tries to implement the ideas brought forth by the advisory committee.

Program Self-Evaluation

Faculty

The four full-time faculty members in the environmental science program communicate very well with each other. In addition, the faculty members who teach on a part-time basis within the department are more often than not included in management decissions within the department. Each semester, the department's faculty meet 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.

In addition to the formal meetings within the department, the faculty members in the environmental science department meet on an informal basis regularly throughout the semester. The rapport that the faculty members have with each other has been greatly improved over the past five years. Activities occurring within the environmental science department are open knowledge to all, and opportunities for advanced training and continuing education among faculty is equally distributed. Prior to the past four or five years, much of what was done within the department was kept in secret, and only a small number of personnel and students benefitted from extra continuing education opportunities. The openness of faculty to communicate with each other has fostered an environment of teamwork, rather than competitiveness among faculty members. Again, during the past program review period, this positive, teamwork mentality did not exist within the department.

All instructors within the department work well with administration, and meet informally with the Vice-President of Academics (Dr. Ressler) 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 compensated adequately enough. Each environmental science faculty member is required to teach 15-credits each sememster, as all faculty members in the institution are, in addition to advising student research. The environmental science faculty feels that release time needs to be implemented if a faculty member is advising student

research. This is especially true with the M.S. degree program now in place and running at the College. The amount of release time required has not yet been determined by the department, as the idea of release time has been stifled by administration each time it has been discussed with them.

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, thus needs a faculty with varied backgrounds in oder to adequately teach the courses within the degree programs, as well as to advise students with research projects. Dr. Mafany Mongoh has taught at SBC for over seven years, and possesses a background in agricultural science, microbiology, and epidemiology. Dr. Dan Buresh has been a faculty member at SBC for 19 years, and has a background in wetland ecology, tropical ecology, and environmental health and science. Renae Schmitt has been employed at SBC for three years, and has expertise in grassland ecology, wildlife biology, and field research. Dr. Gary Halvorson has been in the environmental science department at SBC for 18 years, and has a background in chemistry, soil science, and mathematics. These four full-time faculty members cover most of the disciplines necessary for a college to have a quality envirnmental science program. Adjunct faculty assist in strengthening the program by offering courses to environmental science students that the four full-time faculty members may not be able to teach. John Buresh has taught courses in air quality and environmental law and policy, Anjanette Parisian teaches courses in biology and microbiology, Josh Mattes teaches courses in statistics, and 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.

Faculty Satisfaction.

Five faculty members who regularly teach courses in the environmental science department were identified as individuals who should be included in the faculty satisfaction survey within the department. The survey consisted of 25 questions that could be categorized into five areas, which are: 1) Curriculum and Programmatic Issues (questions number 2, 9, 10, 11, 13, and 18) ; 2) Program Review Processes (questions number 5, 6, and 7); 3) Educational Infrastructure (questions number 4, 17, 21, 22, 23, and 24); 4) Perceived Commitment of Faculty (questions number 3, 14, 15, 16, 19, and 20); and 5) Communication (questions number 8 and 12). Question number 25 did not fit any of the five identified categories. For each question on the survey, faculty members were asked to respond by indicating one of five responses on a five-point likert scale. The five points were as follows: 1 = Strongly Disagree; 2 = Disagree; 3 = Neutral; 4 = Agree; and 5 = Strongly Agree.

The category of Curriculum and Programmatic Issues had all but one of the questions having a mean of 4.0 or over showing that faculty were overall satisfied with curriculum and program of the environmental science department. One question had a mean of less than 4.0, and that was question number 18 which examined if faculty felt the class schedules conform to students' demands, and that question averaged a 3.8. When comparing the results of the survey from the program review that was

completed a little over four years ago, there was an increase in satisfaction in five of the seven questions (71%).

The category of Program Review Process had one of the three questions from the survey having a satisfaction rate of over 4.0, and two of the three questions having a mean of less than 4.0. Question number five, which asked if faculty in the program had input in the program review averaged a 4.6 among faculty in the program, which was an increase from the 2010 survey results (4.2 in 2010). Question six and seven both had low average satisfaction scores of 2.6 and 3.0, respectively. Question number six asked if the program review process was an effective method of evaluating the program, and question seven asked if information from the review would be implemented into the program. Both question number six and seven had a decrease in satisfaction from the 2010 survey with the perceived effectiveness of the program review process having an average satisfaction rate of 4.0 in 2010, and a rate of 2.6 in 2015. Likewise, question number seven had a decrease in belief that the program review results would be implemented into the environmental science program with an average level of agreement at 3.6 in 2010, and an average of 3.0 in 2015.

With respect to the third category, Educational Infrastructure, all five questions related to the category decreased from the 2010 survey results. Only question number four, related to faculty expertise being sufficient and effective, had a mean of 4.0 or higher (4.0), showing that environmental science faculty are not satisfied with the educational infrastructure overall, and have concerns about it meeting the needs of the department. Of particular concern were questions number 22 and 23which are related to library and tutoring services, respectively. Both of these questions had means of less than 3.0, indicating that faculty disagree that the library services and tutoring are adequate to meet the needs of the deparmtent. All five questions in the category showed a decrease from the 2010 survey results.

The fourth category, Perceived Commitment of Faculty, showed three of the six questions having a mean satisfaction of a 4.0 or higher. Question number three, dealing with faculty being concerned about student success had the highest average in this category with a mean of 4.8. Questions number 19 addressing whether faculty distinguish between personal conviction and accepted views in the discipline had an average of 4.0, while question 20 regarding faculty members' commitment to high standards had an average Likert score of 4.5. Although all three of these questions had mean satisfactions of 4.0 or greater, all three questions' results were less than those from the same question in 2010. Questions 15 and 16 had neutral responses overall by faculty in the environmental science program. Question number 15, related to faculty staying current in their area of expertise had a mean of 3.6, while question 16, addressing faculty involvement in staff development activities had a mean agreement level of 3.2. Both of these questions had means less than the 2010 survey for the same questions. Of most concern are the results from question 14 which had a mean satisfaction of only 2.8. Questions 14 addresses whether or not faculty feel there is a sufficient number of faculty members in the program to be effective. In 2010, faculty scored question 14 at an average 4.6, so the drop to 2.8 in 2015 is quite drastic. All six questions in this category had a decrease in average satisfaction from the 2010 survey results.

The fifth category related to Communication within the Department showed increases in the 2015 faculty satisfaction compared to the 2010 survey results for both questions. Question eight, which was directly related to faculty members' feelings about communication among the faculty members in the program increased from an average score of 4.0 in 2010 to an average of 4.6 in 2015. Likewise, question number 12 related to communication with adjunct faculty saw an increase from 2.8 in 2010 to an average Likert score of 3.5 in 2015.

In conclusion, the environmental science faculty members have very positive views regarding the curriculum and programmatic processes within the department, as well as the communication within the department. Conversely, the faculty have concerns regarding the educational infrastructure that is in place, the effectiveness of the program review process, and the perceived commitment among the faculty in the department. Appendix A shows the results from the 2015 survey, with the results from the 2010 survey in parentheses.

Student Relations

All faculty at SBC are required to post office hours by their doors so students know when they can meet with a faculty member when necessary. All faculty are required to have at minimum, seven office hours per week, and one office hour per day available to meet with students. In addition, SBC has an open door policy, meaning that students can come to a faculty member's office at any time that the faculty member is in his or her office. Students can 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. It is a very rare time when a student has difficulty meeting with a faculty member in the environmental sicence department if needed. Since the office of each science faculty is located in an area where students must pass an adminstrative assistant prior to reaching the faculty offices, 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 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. All environmetnal science fauclty member teach evening courses. Some of the courses are upper divisional courses to meet the needs of thos students trying to obtain a B.S. degree in environmetanl science, and others teach lower division laboratory courses in order to meet the needs of non-science majors who need a lab science for their liberal arts degree requirements. The willingness by environmental science faculty to teach evening courses on a regular basis illustrates the commitment that faculty have to the students at SBC.

Environmental science faculty members believe in the "hands-on" approach to education. Many of the courses are taught in a laboratory, or in the field when weather permits. Some courses are taught almost entirely in the field, with instructors bringing white boards in the field to add lecture material

along with experiential learning techniques. 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. The ENS 113 Introduction to Environmental Science course, and the 1-credit science special topics courses, both with heavy field learning components, have 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 students in the program were beneficial to them in their workplace.

Faculty make it a point to take students to professional science conferences whenever possible. Every year, each faculty member in the department takes students to at least one professional conference. The knowledge gained about research and scientific professions, in addition to professional contacts that are made, make these professional conferences great instruments of education for environmental science students. In addition to attending the professional conferences, many of the environmental science students use the conferences as platforms to present their own research findings. The feedback provided by professionals in the field of environmental science is extremely valuable to the education of our students.

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, 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 their degree as a capstone project. Four 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 revises in the spring semester o f2014 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, it allows faculty members an opportunity 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 various processes. Student evaluations are done twice per semester through a formal evaluation form process completed in anonymity on-line. One of the evaluations is done at the midterm, so that instructors can modify the course in midstream if needed. The second evaluation is given at the end of the semester, allowing time for an instructor to make major modifications to course content for future teaching of the course. In addition to student evaluations, self-evaluations are conducted by each faculty member using a form distributed by the Vice-President of Academics. The self-evaluation allows faculty members to reflect on their work completed during the academic year. Faculty members meet with the Vice-President of Academics at the end of the academic year to go over the self-evaluation, and to receive an appraisal of their work from the Vice-President of Academics.

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 is sometimes 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.

Faculty members who are involved in advising students attempt to place students in cohorts whenever possible. Araujo et al. (2014) demonstrate 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 students who have common academic interests. The study goes on to say that once the freshmen experience is complete, the next cohort development should be interdisciplinary by nature, in order to develop a sense of community among students within the rest of the college. SBC currently does not follow this formula for retention set forth by Araujo et al., but rather uses the interdisciplinary method of cohort formation in the first semester in which a student is enrolled. The environmental science department's retention and recruitment strategy is compromised by the current model that SBC is using for its retention plan.

Institutional Support

Nine years ago, most science courses and laboratory activities took place in a double-wide trailer. The facility was shoddy, and not well insulated. There were many occasions when the water pipes would break, and the furnace would fail to work properly. Some class periods were taught in temperature below 50 degrees Fahrenheit, with students wearing gloves during lecture. SBC completed construction of the Science and Technology Center (STC) in 2006. The STC has state-of-the-art laboratories, and spacious lecture rooms. In addition, the analytical lab has equipment that is comparable to that of the major universities in the North Dakota and South Dakota area. A new storage building was constructed in 2014 that houses environmental sampling equipment, the four-wheeler, and one science vehicle. A new Suburban was purchased in 2014 that will allow for off-road transportation for students and faculty to research and field lab activities. The environmental science department also has a pontoon with an outboard motor that enables faculty and students to go onto area lakes to conduct environmental education and research related to aquatic ecosystems and limnology. Finally, the environmental science

department does have a 15-passenger van in order to take larger general science classes to the field for learning activities and field trips.

Student services on campus seem to be adequate to meet the needs of the environmental science department. The library is functional, and the librarian is very knowledgeable and helpful for students conducting literature reviews. However, the library does lack sufficient periodicals in the area of science for graduate and undergraduate students to utilize during their literature review process of their research project. Many on-line articles are not free of charge, and students cannot access them as readily as needed. There is a tutor room, and a writing lab for students to utilize when needed, however, it does not appear that the environmental science students are using that resource consistently.

The environmental science department does support professional development. All faculty members are afforded the finances to maintain memberships in professional societies. In addition, financial resources are in place for all environmental science faculty to attend continuing education courses, professional conferences, and workshops when the desire is there. Instructors are encouraged to pursue additional degrees whether they are advanced degrees leading to a Ph.D., or degrees on campus related to Native American Studies. Currently, all but two of the full-time science faculty members have doctoral degrees, and the other two are working on theirs. There has been no significant release time granted to the two faculty members to assist them in completing their degrees. Only one full-time faculty member has taken advantage of the Native American Studies courses that are being offered free of charge to SBC employees. That faulty member has completed the A.S. degree in Native American Studies, and has taken and passed 21 credits of upper divisional courses in Native American Studies.

Importance to the College and Other Programs

The environmental science program offers three level of degrees to students. This program is the only one in the SBC system that is accredited to do so. In addition, the environmental science department is the only department that has regular research as part of its curriculum, and is the only department that has research being conducted. The fact that this department has the M.S. degree program implemented, coupled with the vast amount of research taking place within the department, make this department a critical entity as SBC moves forward with its recently revised vision that suggests that SBC will move toward more research and become a research I institution within ten years. Although the vision of becoming a research I institution within ten years seems lofty and unrealistic, it still suggests that SBC is planning to transition toward more research in all campus disciplines. Since the environmental science program has the infrastructure, faculty, and research processes in place already, 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 research.

As financial constraints continue to impact governmental agencies, there will undoubtedly be less money available for grant funds to be distributed to colleges. One of the few areas that major cuts have not yet been felt is in the Science, Technology, Engineering, and Mathematics (STEM) disciplines. As a

result, the environmental science department has been fortunate to have grant funding in fairly large sums. The indirect that is garnered from these grants has been utilized institution-wide. In addition, funds from the grants assist in allowing for infrastructural maintenance, auxiliary personnel salaries, consulting contracts, and other essential resources additions for the college as a whole. The grants from the STEM areas (the environmental science and agricultural science departments) regularly exceeds $500,000 annually, which is a large part of the overall budget of SBC. In addition, a large part of that grant money also goes directly to area businesses in the purchasing of fuels, supplies, and other resources.

Successes and Highlights

There are many successes within the environmental science department over the past five years. There has been the addition of two new faculty members, Renae Schmitt and Anjanette Parisian, who bring to the department expertise in grasslands ecology and in biology, respectively. In addition, Dr. Joshua Mattes was added to the STEM area, and has assisted with curriculum changes and has been willing to teach courses in the M.S. degree plan within the department.

In 2014, SBC was granted the authority to offer a Master of Science degree in environmental science by the Higher Learning Commission (HLC). This authority to offer a M.S. degree provides SBC with the honor of being the first tribal college to offer a M.S. degree in a STEM discipline. The hard work by the personnel in the department, the administration, and the auxiliary staff made this accomplishment possible.

Student research continues to grow in the environmental science program at SBC. The student-lead research has been a cornerstone of the department since 1997, and continues to be an integral part of the student learning process. The following list of research projects that were presented over the past five years is testament to the fact that scientific research is the foundation to the environmental science program:

- Adam Baker – *Impacts on Groundwater Resulting from Cattle Inhabitance*
- Audra Stonefish – *Using Macroinvertebrates as indicators of Water Quality in Anthropogenic Water Systems of Costa Rica*
- 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)*
- Harriet Black Hoop – *Analyzing Mercury in Turtle Shells and Claws: A Comparison of Snapping Turtles and Painted Turtles*

- 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*
- Maurice Little Bear – *Occurrence of Escherichia coli 0157:H7 in Watering Points around open Pasture Cattle in Ranches on the Standing Rock Sioux Reservation*
- LaLynn Antell – *Nutrient Status of Vegetation around Prairie Dog Infested Rangelands*
- Bruz Van Dusen – *Indigenous Corn Reintroduction*
- Ann Solano -- *A Comparative and Multi Element Analysis of Water Quality on Lake Sakakawea.*
- Koby Sommer – *Mosquito Genera Comparisons Within Various Habitats in a Tropical Dry Forest Biome*
- Jonathan Holmes -- *Determining Movement Patterns of Tilapia (Oreochromis niloticus) in Rice Field Canals of Costa Rica Using Radio Telemetry*
- Bruz Van Dusen – *Comparing Soil Characteristics Among Rice Fields, Cane Sugar Fields, and Natural Marshes of the Costa Rican Tropical Dry Forest Biome*
- 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*
- 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*

This lengthy list of student research project presentations certainly illustrates how student research has become an important part of the curriculum in the environmental science department. Students conduct research at the A.S., B.S., and most recently the 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. Some of the stories about the students within each cohort are depicted below.

First Cohort Successes

The first cohort of students completing the Bachelor of Science (B.S.) degree in environmental science at SBC included Dereck Stonefish, Allyson Two Bears, and Dylan Jones. All three of these students excelled during their time at SBC and were leaders among all SBC students in academics, as well as in extracurricular activities. Each of the students were recipients of the "Award for Excellence in the Science", the most prestigious award given in the science department. In addition, all three students held officer positions in the SBC Student Government, the Wildlife Society, and the Ecology Club. Allyson, Dylan, and Dereck each received awards for various science research projects that they presented at local, state, and national conferences while students at SBC.

Having graduated from the Environmental Science program at SBC, the three are finding success beyond college. Dereck Stonefish is a graduate student at North Dakota State University where he continues to work toward his doctoral degree in natural resources. Allyson has chosen to work in the field of environmental science, and after working one year as a middle school science teacher on Standing Rock Sioux Reservation, has decided to utilize her skills and knowledge working for the Standing Rock Sioux Tribal Environmental Protection Agency (SRST-EPA) where she holds the position of Director of the SRST-EPA. Dylan decided to continue his education, while working full-time as a fisheries biologist for the South Dakota Game and Fish Department, by completing a Master Certificate in Fisheries Management from Oregon State University.

Second Cohort Successes

The second cohort of science students at SBC completed their B.S. degree in environmental science in May of 2012. Six students completed the curricular requirements for the B.S. degree during the 2011-2012 reporting period. Three of the top students in the class of 2012 were Palani Luger, Audra Stonefish, and Erica Loafer. All three of the students were active in research throughout their years at SBC, and all three students found success in their educational and research-related scientific endeavors.

Palani Luger has been a firefighter for many years with the Standing Rock Sioux Tribe Fire Crew. The crew is one of the top rangeland firefighting crews in the nation, and is often called to fight fires throughout the United States. The fire crew was a good fit for Palani as he has always had affinity for working outside. This attraction to the outdoors is what led him to enroll in the Environmental Science program at SBC. Palani has most recently resigned his position with the fire fighting crew, and has taken a job with the SRST-EPA as an environmental scientist.

When Palani came to SBC, he intended on just taking a few field-related classes that may help him "move up the ladder" with his fire crew. After finding academic success in his first semester, Palani decided to complete an Associate of Science (A.S.) degree in environmental science, and follow that with a B.S. degree in the same field. During his stay at SBC, Palani was the recipient of the American Indian Higher Education Consortium (AIHEC) student of the year because of his academic success, and recipient of the North Dakota Chapter of the Wildlife Society Undergraduate student award for his work with enhancing wildlife. In addition, Palani conducted scientific research on the Standing Rock Sioux

Reservation, as well as in Costa Rica where he was a student in the NUTRO program for three summers. Palani has completed research tracking the movement of Guatemalan catfish using radio telemetry, identifying nightjar daily habits using radio telemetry, and determining impacts of marsh fires on terrestrial turtles of Costa Rican marshes. The latter study being published in the International Reptile Conservation Foundation Retile and Amphibians Journal.

Audra Stonefish followed the footsteps of her older brother, Dereck, by enrolling in the Environmental Science program at SBC. Audra found immediate success academically and was an honor student at SBC during her first years at SBC. Audra was recipient of the "Award for Excellence in Science" in her second year as a student at SBC. In addition to her academic success in the classroom, Audra was the president of the SBC Student Government during her junior year, and was president of the Wildlife Society and Ecology Club for two years.

Audra was immediately drawn to field research, and was involved in conducting summer research in each summer of her schooling while at SBC. Audra completed research projects locally on the Standing Rock Sioux Reservation where she examined factors related to the growth of wild prairie turnips, a food used traditionally by plains Indians. Her research drew attention, and the Bismarck Tribune wrote a newspaper article that featured Audra and her research. Not only was her research with the prairie turnip a topic in the area newspapers, Audra also presented the findings of the research at the AIHEC annual conference and placed first in the Science Poster competition. Audra's love for field research took her to Costa Rica during two summers where she conducted research using macroinvertebrates as water quality indicators in rice field canals as part of the NUTRO program. Audra presented the findings of her NUTRO research at local and national conferences. Continuing to follow her brother's path, she has been accepted to the graduate program at NDSU, and has begun taking classes that will lead to a Master of Science (M.S.) degree in entomology.

Erica Loafer began her educational pursuits at SBC as a student majoring in the elementary teacher education program. After enrolling into the Introduction to Environmental Science course, she decided that environmental science better matched her interests. Erica changed her major and found success in the sciences where she finished her B.S. degree. Erica became involved in the Wildlife Society and Ecology Club, and held officer positions of secretary and treasurer while a student at the college.

Prior to being a student at SBC, Erica had never had the opportunity to conduct formal scientific research. While a student at SBC, she took advantage of the interdisciplinary nature of the field of environmental science, and conducted research in the areas of biochemistry as well as in fisheries management. During her first research experience, Erica examined the use of lead ballistics while hunting of big game animals, and determined if the lead was transferred to individuals consuming animal meat from those animals harvested with lead ballistics. Erica's second research project involved determining optimal concentrations of clove oil as an anesthetic for northern pike in preparing the fish for surgery (radio telemetry implantation). The second research project was presented at the North Dakota Chapter of the Wildlife Society Conference. Erica currently is employed as a development

coordinator with the Upper Missouri Tribal Environmental Restoration and Mitigation (UMTERM) program run out of the United Tribes technical College (UTTC).

Third Cohort Successes

The third cohort of science students are currently enrolled in the environmental science program at SBC. Two of these students, Bruz Van Dusen and Sunshine Claymore, graduated with their A.S. degree in environmental science in May of 2012. Both of these students have been active in conducting science research.

When Bruz Van Dusen graduated from high school, he had no desire to attend college. Through influence from his parents, he decided to enroll in a few classes with no intention of completing a degree. Bruz found that college was an enjoyable experience SBC, and in particular developed an interest in the sciences. Not only did Bruz find an interest in the sciences, he found immediate success as well. Bruz double majored in natural resource management and environmental science, and has earned A.S. degrees in both fields while maintaining a 4.00 grade point average as he finished both degrees in only two years.

Bruz conducted his first scientific research while a sophomore at SBC. Bruz tracked the movement of northern pike in small, ice covered lakes (during winter months) using radio telemetry. Bruz enjoyed scientific research so much that he completed his B.S. degree while completing two additional research projects, one examining Native corn varieties, and the second examining soils in agricultural fields in Costa Rica. Bruz most recently was accepted into the first cohort of students in the M.S. degree at SBC.

When Sunshine Claymore enrolled in the Introduction to Environmental Science course in the fall of 2010, she was doing so only to fulfill the four-credit laboratory science requirements for the A.S. degree in elementary education in which she was majoring. She liked the field of environmental science so much, that she applied for, and was accepted to the NUTRO program in Costa Rica during the summer of 2011. While a student in the NUTRO program, Sunshine conducted the first scientific research project of her life by determining population estimates of banded tetra fish in anthropogenic water systems connected to rice and sugar cane fields. Sunshine presented her research findings at the North Dakota Wildlife Society Conference, and the National Science Foundation's Emerging Researchers National (ERN) conference. During the summer of 2012, Sunshine conducted research in the field of ethnobotany, where she worked with the Missouri Botanical Gardens examining medicinal and food plants used traditionally by the plains Indians. Sunshine continued her educational pursuits by completing one more research project related to the analysis of microclimates in mango forests of Costa Rica, and finished her B.S. degree in environmental science at SBC during the fall of 2012.

Fourth Cohort Successes

Koby Sommer moved from Salt Lake City, Utah to pursue an A.S. degree in environmental science at SBC. While attending college, he completed two research projects in two years. One project took him to Costa Rica, where he evaluated mosquito populations in the various habitats in the tropical dry forest

biome, and the second project brought him to Arizona, where he studied volcano formations. Koby completed his A.S. degree in four semesters, and plans to continue his educational pursuits in Southern Utah.

Jonathan (J.P.) Holmes was an older than average student who came to SBC as a business management major following 12 years in the military service. After enrolling and successfully completing the Introduction to Environmental Science course, he changed majors to environmental science, and jumped into the process of science research right away. J.P. completed two research projects in two years. The first project examined movement patterns of tilapia fish in canal systems of Costa Rica, and the second research project observed movement patterns of coyotes within urban environments. J.P. finished his A.S. degree, and continues his educational endeavors at UTTC where he hopes to obtain two additional A.S. degrees in environmental science before attempting to finish a B.S. degree in a related field.

Maurianna Loretto was a transfer student to the SBC B.S. degree program in environmental science. Maurianna previously attended Fort Berthold College where she had finished her A.S. degree in environmental science. In her academic time at SBC, Maurianna has completed two research projects with one related to the prevalence of parasites in fecal matter of bison, and the second one examining habitat preferences of bison on Standing Rock Sioux Reservation. Maurianna was recently awarded the N.D. Chapter of the Wildlife Society Achievement award for her academic excellence and her research in wildlife.

Program Trends

Trends

As faculty members in the environmental science department talk with students and alumni of the program, there seems to be excitement around the new M.S. degree that is being offered within the department. Most who are enrolling in the B.S. degree plan in the program, have expressed interest in applying for the M.S. degree upon completion of their undergraduate degree. It is hoped, and anticipated, that as word of the M.S. degree spreads across the tribal community nationwide, that the environmental science department will see an increase in its student population along with the increased interest. In addition, a more diverse population may be coming to SBC if this expectation reaches fruition as students from other tribes will likely enroll in the B.S. and M.S. programs to advance their degrees in the sciences while staying within the tribal college system.

Students entering into the environmental science program as first time freshmen are younger than they have been in the past. The environmental science program has seen an increase in freshmen coming to SBC right out of high school. The department feels strongly that these younger students need to be involved in science courses immediately in their first semester in order to meet the desires of the students. It is indeed a dangerous strategy to deny students entrance into courses they desire when

they are academically qualified to take the courses with a high likelihood of successfully passing the courses (Araujo et. al., 2014).

There has been an increase in the number of students transferring into the environmental science B.S. degree program over the past five years. UTTC has three A.S. degree concentrations in environmental science, and they do not offer a B.S. degree. Until UTTC is accredited to teach B.S. level courses, we expect that trend to continue, as we are the closest tribal college to UTTC that offers a B.S. in environmental science. Students coming from other schools and transferring into the B.S. degree in the SBC environmental science department have not succeeded well in courses that have strong writing components to the course, as only two students out of eleven (18.1%) of UTTC transfer students have passed both of the writing courses in the SBC environmental science department. SBC will need to have mechanisms in place to address the transfer students' needs in order to ensure success of those students within the department.

Jobs and careers in environmental science are still present in North Dakota with the addition of oil field jobs related to STEM. Two graduates from the environmental science program have taken jobs in the oil region, but that is not as many as the job market suggests are available. In addition, occasional environmentally-related jobs open on Standing Rock Sioux Reservation with the SRST Water Resources and SRST EPA departments. The job outlook is pretty good for graduates of the program.

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 May of 2020.

Additional Resources Needed

The major need for resources that were identified by the environmental science department is related to the M.S. and B.S. degree students. Additional space (approximately 3000 ft^2) is badly needed if the B.S. and/or M.S. programs expand. Student research space is grossly insufficient, and will likely get worse with the expansion of the M.S. degree. The area previously designated for M.S. degree students to have offices, and to conduct research was identified to be at the Mobridge, SD site (campus), however, that space has been converted to dormitories.

The environmental science department is lacking the number of faculty needed to run three degree plans. If even one faculty member was to leave the college as a result of career change or retirement, the department would likely run into problems providing educators for all three degree plans. This is a critical need identified by the department, and must be addressed immediately.

A release time strategy needs to be developed by administration in conjunction with faculty members to address the desire of the board of trustees to make research an integral part of the college. It needs to

be established in tandem with the M.S. degree program plans of expansion, thus the amount and depth of research advising expanding with it accordingly. If release time is not granted for faculty research advising and independent faculty research, the quality of education provided to students will undoubtedly be compromised. The goals of achieving a reputation as a research institution will also be unrealistic at best.

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.

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

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.

Appendix A
Faculty Satisfaction Survey Results

I. 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 2010 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 = 4.4(3.8)

   Strongly Agree/Agree = 100%(80%)

   Strongly Disagree/Disagree = 0%(20%)

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

   Mean score = 4.6(3.8)

   Strongly Agree/Agree = 100%(80%)

   Strongly Disagree/Disagree = 0%(20%)

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

   Mean score = 4.8(5.0)

   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 = 4.0(5.0)

   Strongly Agree/Agree =80%(100%)

   Strongly Disagree/Disagree = 20%(0%)

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

   Mean score = (4.6)4.2

   Strongly Agree/Agree = 100%(80%)

   Strongly Disagree/Disagree = 0%(20%)

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

Mean score = 2.6(4.0)

Strongly Agree/Agree = 20%(80%)

Strongly Disagree/Disagree = 40%(20%)

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

Mean score = 3.0(3.6)

Strongly Agree/Agree = 60%(60%)

Strongly Disagree/Disagree = 20%(0%)

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

Mean score = 4.6(4.0)

Strongly Agree/Agree = 100%(80%)

Strongly Disagree/Disagree = 0%(0%)

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

Mean score = 4.0(4.2)

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 = 4.0(4.6)

Strongly Agree/Agree = 60%(100%)

Strongly Disagree/Disagree = 0%(0%)

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

Mean score = 4.8(4.2)

Strongly Agree/Agree = 100%(80%)

Strongly Disagree/Disagree = 0%(0%)

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

Mean score = 3.5(2.8)

Strongly Agree/Agree = 50%(20%)

Strongly Disagree/Disagree = 0%(20%)

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

Mean score = 4.0(3.8)

Strongly Agree/Agree = 100%(80%)

Strongly Disagree/Disagree = 0%(20%)

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

Mean score = 2.8(4.6)

Strongly Agree/Agree = 40%(100%)

Strongly Disagree/Disagree = 60%(0%)

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

Mean score = 3.6(4.2)

Strongly Agree/Agree = 80%(100%)

Strongly Disagree/Disagree = 20%(0%)

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

Mean score = 3.2(4.4)

Strongly Agree/Agree = 20%(80%)

Strongly Disagree/Disagree = 0%(0%)

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

Mean score = (3.2)4.0

Strongly Agree/Agree = 40%(100%)

Strongly Disagree/Disagree = 20%(0%)

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

Mean score = 3.8(4.8)

Strongly Agree/Agree =50%(100%)

Strongly Disagree/Disagree = 25%(0%)

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

Mean score = 4.0(4.2)

Strongly Agree/Agree = 100%(100%)

Strongly Disagree/Disagree = 0%(0%)

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

Mean score = 4.5(4.6)

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 = 3.0(3.8)

Strongly Agree/Agree = 50%(80%)

Strongly Disagree/Disagree = 25%(20%)

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

Mean score = 2.3(4.2)

Strongly Agree/Agree = 25%(80%)

Strongly Disagree/Disagree = 75%(0%)

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

Mean score = 2.8(4.2)

Strongly Agree/Agree = 0%(100%)

Strongly Disagree/Disagree = 25%(0%)

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

Mean score = 2.3(4.0)

Strongly Agree/Agree = 0%(80%)

Strongly Disagree/Disagree = 50%(0%)

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

Mean score = 4.3(4.8)

Strongly Agree/Agree = 75%(100%)

Strongly Disagree/Disagree = 0%(0%)

II. 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 B
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 research project can be utilized in environmental decision-making is given.	The research project's connection to the environment is demonstrated and a description of how the research project adds to the knowledge of the environmental science community is included.	The research project's connection to the environment is demonstrated, and future research expanding on the research project is advised.	The research project's connection to the environment is demonstrated, but future use of the research project is not advised.	The research project's connection to the environment is not demonstrated, and future use of the research project is not advised.

Statistical Analysis	Graphs and tables are included. Student interprets graphical data appropriately. Proper statistical tools are demonstrated. Hypothesis testing and accurate explanation of alpha-level and p-value is included.	Graphs and tables are included. Student interprets graphical data appropriately. Proper statistical tools are demonstrated.	Graphs and tables are included. Student interprets graphical data appropriately.	Only frequency data is reported.	No statistical analysis is conducted.
Lakota/Dakota Culture	Lakota/Dakota names for media sampled are used, and traditional uses included. In addition, student explained kinship responsibilities and details any ceremonies that may be 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 C
Program Assessment Plan and Program Outcomes

PROGRAM ASSESSMENT PLAN 2013-2014 ***Review Date: May 2014***					
Program Outcomes	**Measurement Tool and Timeline**	**Measurement Goal**	**Findings**	**Analysis of Data**	**Action or Recommendation**
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 "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	**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 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)	**Expectation:** Each student will score a minimum of 3.5 on a five point Likert scale.			

through various environmental media; and 1 H: The demonstration of general knowledge of environmental issues and develop an understanding of environmental impacts resulting from human activities.	**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 milestone assessment include; ENS 225 Environmental Sampling and ENS 240 Environmental Statistics. A five point Rubric will be used to measure student competency. (1A, 1B, 1C) **C)** The student will 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 three faculty members chosen by the student and the 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)				