Self-Study

Natural Resource Conservation and Management Program

and

Geology Program

Department of Geosciences and Natural Resources
College of Arts and Sciences
Western Carolina University

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EXECUTIVE SUMMARY AND CONTENTS

The Department of Geosciences and Natural Resources is home to three degree granting programs: Natural Resource Conservation and Management (NRCM), Geology, and the interdisciplinary Environmental Science. This review is for the NRCM and Geology programs, but references are provided about the Environmental Science program for improved context about our Department. Typically, academic reviews at Western Carolina University are conducted separately for each degree-granting program. We made a special request of administration to conduct a joint review, which obviously was supported. While the Geology and NRCM programs are unique, we share much. We share a vision for education, we embrace the teacher-scholar model to support experiential learning for students, we share faculty, and we share resources. We think we are better together than we would be in isolation.

The primary strength of our programs is our faculty who strongly believe in and practice the teacher-scholar model: we actively pursue research and scholarly activities that benefit students, instruction, and service functions; enhance professional development and intellectual vigor; and enrich our understanding and stewardship of the environment. The quantity and variety of opportunities afforded to students, makes us distinct from many other departments at WCU and many peer institutions. By most measures, our programs and department are healthy—our majors are growing, our alumni are successful, our resources are currently adequate (except for faculty body size), and our quality has been recognized by the University at program and department levels.

There are three broad areas of focus we wish to address through program review. These stem from our strengths, weaknesses, concerns about sustaining quality as we grow, and desire to expand our role on and off-campus.

1) **Experiential Education, Scholarship, and Administrative Structure**. We are at our best in our collective ability to provide students with high quality educational experiences through experiential education. Faculty scholarship, productivity, and the ability to obtain external funding are fundamental to our ability to serve our students, the region, and our professions. Growth in majors and the WCU student body challenge our ability to sustain our impact. Furthermore, we strive to expand our impact. Are there new and/or innovative models for faculty appointments, partnerships, and administrative structures our department should consider to achieve these goals?

2) **Appropriate Curricular Content, Experiences, and Assessment**. Curricular change is commonly slower than change in societal needs. Should we deemphasize some experiences and content to increase emphasis on those that are emerging? Can we better optimize our use of faculty and courses to serve the students who major in our three programs? Additionally, our assessment is a weakness. We seek guidance on assessment approaches that are appropriate for experiential education and can inform needs for curricular change.

3) **Inclusiveness**. Our departmental majors are generally low in numbers from underrepresented groups. We know increasing the number of underrepresented groups in our programs will likely require some fundamental changes within our department, and cooperation and collaboration with others on and off campus. With this review, we have set a goal for the diversity within our department to at least match that of WCU. Is this goal reasonable? We encourage input on what practices, culture, and goals we should put in place to be more inclusive and accessible.

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DEPARTMENT AND PROGRAMS OVERVIEW

The Department of Geosciences and Natural Resources (GNR) is home to three degree granting programs: Natural Resource Conservation and Management (NRCM), Geology, and the interdisciplinary Environmental Science (ES). GNR houses the Geography program (minor) and shares responsibility for the B.S.Ed. in Science Education with the other science departments. In sum, GNR has 14 full-time faculty with primary appointments in the department: 4.5 NRCM, 8 Geology, 0.5 Environmental Science, and 1 Geography. An additional 8 faculty teach in the department; these include full-time faculty with a primary appointment outside of the department and several adjunct faculty. GNR programs have about 200 student majors; by program the major numbers are NRCM: 97, Environmental Science: 58, Geology: 48, and Secondary Science Education-Earth Science: 5.

The Geology degree includes three concentration areas (solid earth, environmental hydrology, and interdisciplinary). Though the concentrations do serve to help recruitment, advising, and clarify career opportunities—the difference in requirements for the concentrations is small. There are similar numbers of students who select the solid earth and environmental hydrology concentrations. Seniors are required to complete a research project, individually or as part of a small group, and most majors have taken part in research—within or outside of class, prior to their senior year. The Geology program has strategically chosen a diversified approach to best serve the University and its students. This has been accomplished by providing a high-quality education in all of our courses and out-of-class engagement opportunities for students via our professional scholarship activities. We offer courses that serve our majors, the liberal studies program, the honors program, requirements for other programs, and a suite of environmental elective courses designed to serve all the sciences.

NRCM offers a BS degree with concentrations in Forest Resources and Soil and Water Conservation, and provides students with an interdisciplinary education focused on the conservation and sustainable use of natural resources. Our curriculum includes traditional classroom and laboratory instruction, seminars, group projects, and experiential learning opportunities designed to prepare students for their chosen discipline. Our location is one of the greatest attributes of our program. The southern Blue Ridge is home to the most biologically diverse, temperate ecoregion in the U.S. and has the greatest concentration of national forest and national park lands east of the Mississippi. This region also faces some compelling natural resource conservation and management challenges due to record levels of residential development, air and water pollution, introduction of exotic species, and global climate change. Western North Carolina provides invaluable opportunities for students and faculty to teach and learn about natural resource management while applying this knowledge to the development of strategies to meet those challenges.

A description of the Environmental Science program is provided to add context for the review of the Geology and NRCM programs. It is an interdisciplinary program created about 10 years ago with a single (1/2 time) appointment to the program. The Environmental Science Executive Committee, an interdisciplinary mix of eight faculty, act as program faculty with responsibilities for curriculum planning, advising, and teaching for the program. Members are from Geology, NRCM, Biology, Chemistry, Environmental Health, Philosophy, and Political Science. The curriculum requires a broad science foundation, directed electives from environmental content/experience categories (e.g. field-based science, quantitative, and policy). A coherent set of additional upper-level electives for the major must be proposed by each student and approved by the committee. The GNR department offers many of the required and elective courses in support of the major. The senior capstone for the degree requires a comprehensive, open-ended investigation of a sustainability problem. Several capstone projects have examined issues at WCU (e.g. transportation), while others have tackled regional issues.

SIGNIFICANCE AND SCOPE OF PROGRAM

Standard 1. The purpose of the program reflects and supports the mission and strategic vision of Western Carolina University and the mission of its School and/or College.

Department

The Department of Geosciences and Natural Resources (GNR) priorities are highly central to and epitomize most aspects of the mission of the University, especially through its creation of an abundance of scholarly-based, experiential learning opportunities: *Western Carolina University creates learning opportunities that incorporate teaching, research, service, and engagement through on campus, off campus, on-line and international experiences* (from WCU mission statement, Appendix 1.1). The priorities of GNR also support the mission of the College of Arts and Sciences: *the College of Arts and Sciences provides students with a liberal arts foundation where they are taught to think critically, grow academically, and communicate effectively* (from A&S mission statement, Appendix 1.2).

Teaching and learning constitute the central mission of the University as well as the NRCM, Geology, and Environmental Science programs. GNR faculty accomplish this through course offerings that serve undergraduate majors, liberal studies students, and majors in associated disciplines, as well as through field and laboratory experiences inside and outside the course structure. Our majors graduate with a unique interdisciplinary perspective that enables them to become leaders in geoscience, conservation, and environmental management issues in their communities. The overall student experience is rich with hands-on and experiential learning; they are introduced to field and laboratory projects throughout their coursework and are highly engaged in undergraduate research and other internship-like experiences. The curriculum of the two programs provide a broad foundation,

emphasizing to our students that a wide range of experiences in different topical areas enables them to better identify problems and find solutions. Our efforts place us firmly in line with the University's Quality Enhancement Plan (QEP)[1]: *"The overarching learning goal of the QEP is one where students will synthesize knowledge and skills from their academic and co-curricular experiences to become intentional participants in their own learning"*. Some ways we contribute to intentional learning are promoting attendance (and presentation) at professional meetings, a 1-credit geology careers course, internships on forest stewardship, and student reflections on significant experiences.

Geology and NRCM play a critical role in the University's Liberal Studies program. On average, over half of the WCU undergraduate student body take a science course in our department, including about 1000 students per year who enroll in a science liberal studies course. Our liberal studies courses are rich with hands-on experiences and investigative projects.

We try to embody the University vision: *to be a national model for student learning and engagement that embraces its responsibilities as a regionally engaged university* (Appendix 1.1). GNR faculty and students provide regional and statewide service to community organizations, local governments, private and governmental agencies, public schools and professional organizations. NRCM and Geology are leaders in the study of the environment, environmental stewardship and enhancing external partnerships. Faculty and students collaborate with most regional science and resource management entities, including the National Park Service, NC Department of Environment and Natural Resources, NC Geological Survey, US Forest Service, NC Forest Service, NC Wildlife Resources Commission, The Nature Conservancy, and others. In 2008, NRCM faculty created Forest Stewards, a 501(c)3 non-profit, associated entity of WCU that provides management assistance to over 200 family and municipal landowners owning more than 50,000 acres (Appendix 6.1). The geology faculty are regional leaders in studying human impacts on the environment, with our regional collaborators, on topics such as groundwater/surface water interaction and resources, water quality, stream restoration, landslides, science education, and regional climate history. With this work, by practice and model, we demonstrate to our students the wide range of research necessary to understand and solve environmental problems and be good stewards of land.

The primary strength of our programs is our faculty who strongly believe in and practice the **teacher-scholar model**: we actively pursue research and scholarly activities that benefit students, instruction, and service functions; enhance professional development and intellectual vigor; and enrich our understanding and stewardship of the environment. Critically, the teacher-scholar model is the engine used to create and engage students in a wide variety of research and experiential opportunities we view

[1] http://www.wcu.edu/about-wcu/leadership/office-of-the-provost/ugstudies/intentional-learning-plan/

fundamental to best educate and serve students. This approach, and the quantity and variety of opportunities afforded to students, makes us distinct from many other departments at WCU and, perhaps, regional peer institutions. As a reflection of this focus, in the 2014-15 academic year, 28 GNR students presented research at one of seven different conferences, 100s of students went on off-campus field trips throughout the southeast, and over a 1000 students participated in on-campus field experiences.

Our sense of mission in our department was reaffirmed during an all-day retreat last year. Independently, faculty listed three traits that best defined the department—the consensus was striking: 1) undergraduate research/experiential education, 2) student-centered, and 3) collaborative, active, and collegial faculty.

There are three broad areas of focus we address through program review. These focus areas stem from our strengths, weaknesses, concerns of sustaining quality as we grow, and goals to expand our role on and off-campus.

1) Experiential Education, Scholarship, and Administrative Structure. We are at our best in our collective ability to provide students with high quality educational experiences though experiential education (undergraduate research, hands-on learning, internships, etc.). Faculty scholarship, productivity, and the ability to obtain external funding are fundamental to our vitality and ability to serve our students, the region, and our professions. Growth in majors and the WCU student body challenges our ability to sustain our impact. Furthermore, our goals are to expand our impact—to better serve our current and future students, to better meet the scientific needs of the state and region, and to better support K-12 education on campus, but also with off-campus communities at the regional to potentially international levels, both to professional and non-professional audiences. Are there new and/or innovative models for faculty appointments, partnerships, and administrative structures our department should consider to achieve these goals?

2) Appropriate Curricular Content, Experiences, and Assessment. Curricular change is commonly slower than change in societal needs. We seek feedback as to whether our curricular content and experiences are consistent with societal and disciplinary needs and trends. Should we deemphasize some experiences and content to increase emphasis on those that are emerging? Are we using the best models to teach given the current mix of pedagogical options? Can we better optimize our use of faculty and courses to serve the students who major in our three programs? Related, we view our assessment as a weakness, and seek guidance on assessment approaches that are efficient, appropriate for experiential education, and can inform needs for curricular change.

3) Inclusiveness. Our department and disciplines are generally low in the number of majors from underrepresented groups (e.g. gender, race/ethnicity, socioeconomic background, urbanites). We know increasing the number of underrepresented groups in our programs will likely require some fundamental

rethinking about how we structure and package our programs, curricula, recruiting, and cooperation and collaboration with others on and off campus. With this review, we have set a goal for balance of majors in our department to at least match the diversity of WCU. Is this goal reasonable? We encourage input on what practices, culture, and goals we should put in place to be more inclusive and accessible.

Standard 2. The program engages in ongoing, systematic planning that is reflective of the University's strategic priorities.

The NRCM and Geology programs frequently engage in both formal and informal planning, program assessment, and mission assessment to assure we remain focused on our mission and aligned with the University. Key events tied to planning and/or implementation are summarized in Table 2.1. Since 2008, the University (Administration and/or Faculty Senate) has been active in establishing directives, which have required programs to continually demonstrate their quality and alignment with the University mission or adapt to support new initiatives. Though time consuming, these activities have highlighted the quality of our programs (ex. program prioritization) while others offered opportunities for us to strengthen our mission in support of broader University goals. Some of these key plans, actions, and goals are described below.

Strategic Planning in response to WCU 2020 Vision: Each department was required to develop a strategic planning document that described their role in contributing to WCU goals as set forth in the 2020 Vision document. GNR identified two areas of focus where it aligns and can contribute to the WCU 2020 plan (Appendix 2.1): (1) contribute to university leadership in the study of the environment, environmental/earth science education, and environmental outreach, and (2) expand experiential and service learning opportunities by increasing the number of internships, research experiences, and interactions between students and professionals. We have contributed in both areas (examples throughout document) and, with this review, seek ways to increase our impact and reach in providing experiential learning and professional service to the region.

Academic Program Prioritization[3]: During 2012-2013, all WCU academic programs (~130) were reviewed by a university-level task force and, ultimately, by the Chancellor. Programs were evaluated based on student numbers, retention, costs, quality, and mission. Programs were then ranked as either Category 1: recommended for investment, Category 2: required no additional study or discussion, or Category 3: require additional study or discussion (some 3's were eliminated). All three GNR programs received very good reviews (Table 2.2). NRCM and Environmental Science were two of only eight Category 1 programs--recommended for additional investment.

Table 2.1: Key Events Related to Strategic Planning, Assessment, and Mission		
Year – Frequency	**Event**	**Description**
2015 5-7 years	Academic Program Review	All academic programs are reviewed by a team of external and internal evaluators. The process includes a self-report, an evaluators report, and a program development (action) plan following the review. Geology and NRCM were last reviewed in 2008. External Review reports are in Appendix 2.2 & 2.3
2015 annual	Annual Program Assessment	Program assessment portfolios: mission statement, learning goals, assessment plan, & annual assessments. (Appendix 2.4 & 2.5)
2015 Ongoing	Program and department meetings	Programs meet every 2 to 3 weeks and the department meets monthly. Meetings are commonly a place for informal assessments and action—some is large-scale, some is small adaptive management.
2013 irregular	GNR Strategic Plan to support WCU 2020	Describe GNR strategic goals tied to WCU 2020 Vision and Strategic Plan[2] and our means to achieve those goals. (Appendix 2.1)
2013 irregular	University-wide Program Prioritization[3]	All WCU programs were evaluated based on mission, enrollment, quality, costs, and areas of distinction. A program prioritization committee ranked all programs, including some which were eliminated; the findings were a recommendation to the Chancellor. Prioritization comments on GNR programs are in Table 2.2
2011 irregular	Program Evaluation completed at College level mandated by University	All WCU programs were evaluated based on traits related to mission, enrollment, quality, and costs. A college committee categorized all programs in the college. Most programs were recommended to continue, including all GNR programs.
2009 irregular	Revision of Department Collegial Review Documents (aka tenure & promotion)	University mandated changes to incorporate four forms of Boyer Scholarship into tenure and promotion guidelines. GNR also updated its faculty mission statement, defined its teacher-scholar model, and required faculty to create out-of-class experiential opportunities for students (ex. undergraduate research) for tenure & promotion. (Appendix 2.6)
2008 10 years	Quality Enhancement Plan, SACS reaffirmation	WCU selected a theme of intentional learning, synthesis, and engagement for its Quality Enhancement Plan (QEP)[4]. A QEP is required as part of the SACS reaffirmation process. NRCM and Geology were early adopters in development of program QEP plans because of similarity of goals. Geology and NRCM QEP Impact Reports are in Appendix 2.7 & 2.8

Quality Enhancement Plan (QEP): WCU selected a theme of intentional learning, synthesis, and engagement for its QEP (QEP is required by our University accrediting body, SACS). The Geology and

[2] http://www.wcu.edu/WebFiles/PDFs/Strategic_Plan_2020.pdf
[3] http://www.wcu.edu/about-wcu/leadership/office-of-the-provost/program-prioritization/index.asp
[4] http://www.wcu.edu/about-wcu/leadership/office-of-the-provost/ugstudies/intentional-learning-plan/

Table 2.2 Statements and category for 3 GNR programs from Program Prioritization final report.

Environmental Science BS: Category 1 The Task Force noted strong metrics in nearly all categories, with clearly articulated and demonstrated linkages to the 2020 Strategic Plan, as well as regional significance and an interdisciplinary curriculum. The Task Force considers this to be a program of great potential and worthy of future investment.
Geology BS: Category 2 The Geology program was praised for strong program metrics and a very strong program narrative, particularly with respect to student engagement and curriculum. The Task Force noted the program's great potential for growth and distinction.
Natural Resource Conservation and Management BS: Category 1 The Task Force noted that the NRCM program is unique and impressive, with growing visibility, productivity, and excellent attention to the needs of its students. The narrative was strongly attached to WCU's regional mission. Metrics were uniformly stable or trending upward. The Task Force believes this program is a strong fit for WCU, shows great potential, and is worthy of future investment.

NRCM programs took advantage of the opportunity afforded by the QEP to strengthen some of the things we do well and to stretch in other areas. To meet the QEP goals, both programs developed an extended field trip for their introductory courses, valued internship-like experiences for mid-level students, and have integrative, challenging senior capstone research or project experiences that are comprehensive and authentic (Appendices 2.7 & 2.8, QEP program impact reports). Challenged by the QEP, we are more intentional in our approach with students about their education and career preparation. We require reflection by our students on key events, such as on capstone, attending/presenting at a conference, and field experiences. These reflections also help faculty assess the value of student experiences. For example, a student reflects on presenting research at a Geological Society of American conference in the quote below (Appendix 2.9 includes all student reflections from this meeting).

> *I believe that the meeting was very beneficial to both my understanding of geoscience and ability to advance in my career…. I also believe that this generally helped me grow as a person. Working and interacting with a large number of highly-educated people as, more or less, an equal has greatly bolstered my confidence and perspective on my future. This experience of working with people has also affected my leadership capabilities…*

Academic Program Review: The Geology and NRCM programs were independently reviewed in 2008. Program strengths identified by the reviewers included the quality of faculty body, grant productivity, faculty-student interactions, our inside and outside facilities, and the broad training and experiences afforded students. Suggested areas for improvement included (1) increase the number of majors, (2) increase budget support, (3) increase ease of transportation for field trips, (4) improve assessment of current students and alumni, and (5) examine parts of the curriculum. Our status on (1) enrollment, (2) budget support, and (3) transportation all have improved significantly due to our actions coupled with administrative support. For example, we developed formal on and off-campus recruiting

plans, which we largely continue with today. On transportation, the number of field trips is higher because of budget increase, though the ability to obtain university vehicles is not consistent and the vehicles are not always reliable. Improving program assessment, (4), is not much improved past tracking several indicators of student experience (ex. professional presentation, field trips, internships, and paid research and teaching assistant positions). We have not made it a top priority and are unsure how to implement an assessment program that includes a large component of experiential learning. Last, (5) our focus on student competencies and experiences is in keeping with national level guidance (ex. NSF sponsored summit, Future of Undergraduate Geoscience Education[5]; LEAP program of Association of American Colleges and Universities[6]). However, as part of this review, we want feedback on our curricular and learning goals for each program.

Standard 3. The program provides and evaluates a high quality curriculum that emphasizes student learning as its primary purpose.

Department

GNR offers diverse curricula that serve several populations of students including, (1) liberal studies students who take courses to understand the nature of scientific inquiry and the key environmental and resource issues, (2) student majors who end up in a range of geologic, natural resource and environmental careers, and (3) pre-service teachers enrolled in secondary science education. Courses for our departmental majors are designed to provide students with the knowledge and skills to become leaders in understanding and solving problems related to our natural resources, energy supplies, environmental management and restoration, land use, and the earth's changing climate. In preparing undergraduate students for their role in the workforce and society, we educate them throughout our curriculum with active learning strategies designed to increase their proficiency in scientific inquiry, data collection, synthesis and interpretation, and communication. These techniques allow students to develop a work ethic and gain the confidence they need to become successful. Program learning goals are listed later in this section.

The teacher-scholar model and hands-on learning permeate our departmental culture. Students complete capstone projects designed to become disciplinary practitioners (Appendix 3.5-recent capstone projects). Further, many courses have inquiry or research-based learning experiences embedded within the semester experience. Two of many examples of course-based, inquiry learning are (1) GIS and Remote Sensing class projects that culminate in poster sessions open to all Department faculty and

[5] www.jsg.utexas.edu/events/files/Future_Undergrad_Geoscience_Summit_report.pdf
[6] https://www.aacu.org/leap

students, and (2) a recent structural geology mapping project in nearby Panthertown Valley. In both the capstone and course-based project experiences, learning is rooted in activities our students will practice throughout their professional lives.

Our curricula are well aligned with the University's mission in key areas, including experiential learning, regional engagement, environmental stewardship, and stewardship of place. A review of courses taught by GNR faculty (Appendices 3.1-Geology & 3.2-NRCM) and course expectations as reflected in syllabi (Appendices 3.3 & 3.4) demonstrate that curricula are designed to meet disciplinary competencies and to provide a breadth of experiential learning opportunities. In addition to serving our majors, we play a major role in the university's Liberal Studies program. Like our upper level courses, our liberal studies classes often take advantage of our location in the Smoky Mountains and an amazing array of on-campus field sites.

The learning approach goes beyond the classroom to provide for extant research and other developmental experiences. We are one of two departments in our college that use undergraduates as Teaching Assistants, a practice that we think helps their learning and interpersonal skill development. GNR has a clear and sustained record of financially and logistically supporting active curricular and co-curricular learning experiences. As a matter of context, many of our students could not work on research projects that are unfunded (particularly during the summer) because of financial need and the loss of a summer income. Below are a few salient examples and evidence of how we have supported learning "outside" of the classroom.

- Faculty members in the Department (including many of our newest hires) have participated in overnight field trips with students that stress field skills, field experience, and professional development opportunities.
- Undergraduate students have 120 authorships or co-authorships on professional presentations since 2008. These are the direct result of faculty creating and directing research projects.
- GNR faculty have received more than $1 million in external funding since 2008 that often directly supports student learning. Grant and contract money not only provides materials and infrastructure for research and applied learning, but it funds student salaries and allows them to integrate their work life and educational life.
- An active National Science Foundation (NSF) grant helped create a hydrologic research station (wchrs.wcu.edu) on campus that is used in several courses, allowed testing of the benefits of undergraduate research with students, and provided over $40,000 in student stipends.
- Forest Stewards, a non-profit organization affiliated with GNR, has provided over 6,500 internship hours and $70,000 in student stipends since 2008.

- An active National Park Service grant provided funds to assess natural resource conditions in the Great Smoky Mountains National Park and pay over $50,000 for intern stipends.

The many professional collaborations faculty have developed and maintain provide students with important job contacts and references, and they offer valuable insights into the integration of science and management. In the next two sections, we present the current program learning goals and general comments on the curricula for Geology and NRCM. These learning goals provide broad objectives for both of the programs and serve as a starting place for program assessment.

Geology Program

The Geology program curriculum consists of a 64-hour B.S. degree (Appendix 3.8-degree check sheet), a senior research capstone requirement (Appendix 3.5), and a wide variety of elective courses (Appendix 3.1-geology course list; 3.3-course syllabi). The general program objective is for students to be able to use the knowledge and skills they have developed, through course requirements and experiences, towards understanding and solving complex geoscience problems. The specific student learning goals are:

1. Students have effective written, oral, and graphic communication skills in general and within geology.
2. Students are able to carry out geological research, including problem definition, study design, analytical procedures, analysis of results, and communication of results.
3. Students have broad understanding of geological knowledge and supporting field, laboratory, data analysis, and computer skills.
4. Students have confidence to solve geoscience problems independently and in teams.

The curriculum includes 30 credits of core geology courses found in many traditional programs. For each concentration (Solid Earth, Environmental Hydrology, and Interdisciplinary), students must take an additional 34 credits, which includes advanced geology course electives and a mix on non-geology math and sciences courses.

NRCM Program

The NRCM program curriculum consists of a 72-hour B.S. degree (Appendix 3.8-degree check sheets). Courses offered by NRCM faculty, which include some required Geography classes, are listed in Appendix 3.2; syllabi are in Appendix 3.4. The specific student learning goals are:

1. Develop an understanding of forest, soil, water, and wildlife systems, as well as, techniques for monitoring and managing their condition.
2. Become effective communicators.

3. Develop critical thinking and problem-solving skills that can be applied to the conservation and management of natural resources, as well as, to broader issues.

The NRCM curriculum focusses on the conservation and management of renewable natural resources. We have a 54-hour core, with a strong geospatial component, and two, 18-hour concentrations: Forest Resources and Soil and Water Conservation. The Forest Resources and the Soil and Water Conservation concentrations are designed so students meet minimum U.S. Civil Service requirements for the GS-460 Professional Forester series and the GS-457 Soil Conservation series, respectively. Curricular content is largely driven by traditional offerings found at larger Schools/Colleges of Natural Resources that are accredited by agencies such as the Society of American Foresters. Natural Resources faculty are intrigued by opportunities to incorporate more holistic and interdisciplinary experience for our students.

Challenges and Opportunities

We have several open challenges related to the curriculum. We recognize that our disciplines are changing, particularly as interdisciplinarity and collaboration are increasingly required in science and society. One area where we might innovate and be more interdisciplinary is in water and soils. We have faculty in both programs that can and do offer coursework in water and soils, and having better planning and coordination courses in this area might improve our ability to offer classes to students.

Many of our curricular challenges relate to increasing enrollment in our majors, and throughout the University, without proportional increases in full time faculty. Key growth challenges are (1) large class sizes sometimes exceed pedagogically-sound limits or laboratory space, particularly for upper-level lab courses (enrollments in both programs have increased by 70% during since 2008 (Appendix 5.1), and (2) having students take courses in sequence when many upper level courses are only offered once every other year (Appendix 3.6-course frequency). Given this growth, we need to consider scheduling courses more often so students can make timely progress to degree completion. Transfer students, over one-quarter of our majors, are especially problematic because they have varied backgrounds and commonly, expect to graduate in two years. Students in this position have to take courses when they are offered, often without regard to sequencing. We do accommodate students where we can, and time to degree does not show any sign of increasing (Appendix 3.7); however, we are concerned student education suffers when upper level courses are taken out of sequence.

While we think our curricula are strong, we recognize both higher education and environmental challenges are changing rapidly. We must be in front of these changes in order to effectively adapt our learning goals, student experiences, and curricula. We do annual assessment on the general program goals presented above, but our assessment is coarse and does not directly inform the need for curricular change (Appendix 2.4 & 2.5--program assessment portfolios). Some of our methods, such as tracking

class GPA's, are superficial. Others, such as qualitative evaluations of capstone course experiences do provide useful information regarding overall program effectiveness, but are too anecdotal to drive curricular change. In addition to current students, integrating robust mechanisms for evaluating alumni success and employer satisfaction would greatly improve our ability to evaluate fundamental aspects of our curriculum.

Standard 4. The program has sufficient faculty resources to meet its mission and goals.

The geology and NRCM faculty (Table 4.1) are innovative and consistently productive in both teaching and research as evident by the scholarship, education practices, and outreach listed in each of their CVs (Appendix 4.1). Our faculty embrace the teacher-scholar model and direct considerable energy creating experiential opportunities for our students. Our faculty are collegial, collaborative, and supportive of each other. Team-teaching is common as is research collaboration. During the 2014-2015 academic year, GNR faculty authored 14 peer-reviewed articles that were either accepted or published, were lead or contributing author of two books, produced dozens of conference presentations, worked on eight active grants totaling over $580,000, and applied for 3 additional external grants totaling over $185,000. Since 2008, faculty have been awarded 52 new grants from 18 different organizations that averaged $180,600 per year (Appendix 4.2). These accomplishments do not include numerous internal submissions and awards.

Faculty scholarship translates well to student experience. Last year, 28 students authored or coauthored 14 presentations at six professional conferences such as the Southeast Division of American Geographers, Geological Society of America, and National Conference on Undergraduate Research (NCUR). One student had their senior thesis accepted in Southeastern Geology. Since 2008, students have authored or coauthored over 120 professional presentations.

A strength of the faculty is also their off-campus collaboration. As described in Standard 1, our faculty work with a wide range of off-campus partners, and GNR faculty have been elected and/or appointed leadership roles with professional organizations including the Society of American Foresters, the Geosciences Division of the Council for Undergraduate Research, the Geological Society of America, and the Southern Blue Ridge Fire Learning Network.

The faculty body (Table 4.1, Appendix 4.1, 4.3) is diverse by educational background and career status, and possesses solid expertise in most key areas of natural resources and geology. We have virtually no racial or ethnic diversity, though we have reasonable gender balance that extends to course offerings and students taught (Table 4.2).

Table 4.1: GNR Faculty 2014-2015				
Faculty	**Program**	**Title**	**Specialty**	**Teaching Load #**
Full-time faculty with primary appointment in GNR				
Bates, Pete, Ph.D.	NRCM	Associate Professor NRCM Program Director	sustainable forestry	~ 2/3 load
Davis, Ron, Ph.D.	NRCM	Associate Professor	wildlife habitat, landscape ecology	full
DeWald, Laura, Ph.D.	Env. Science, NRCM, & biol.	Professor	forestry, conservation biology	~ 2/3 load
Kelly, Charlene, Ph.D.	NRCM	Assistant Professor *(resigned, effect. 5/15)*	soil conservation, watersheds	full
Krenz, Trip, Ph.D.	NRCM	Visiting Assist. Professor *(fills Kelly position, above)*	watershed cons., biol. assessment	full
Styers, Diane, Ph.D.	NRCM	Assistant Professor	remote sensing, landscape ecology	full
Fagan, Amy, Ph.D.	geology	Assistant Professor	petrology, lunar geology	full
Forcino, Frank, Ph.D.	geology	Assistant Professor	paleontology, science education	full
Gannon, JP, Ph.D.	geology	Assistant Professor	watershed hydrology	full
Lord, Mark, Ph.D.	geology	Professor Department Head, GNR	hydrogeomorphology, STEM education	half
Miller, Jerry, Ph.D.	geology	Whitmire Professor of Environmental Science	fluvial geomorphology, water quality	1 course/year
Stafford, Emily, Ph.D.	geology	Instructor	paleontology	full$
Tanner, Ben, Ph.D.	geology	Associate Professor	wetlands, biogeochemistry	full
Waters-Tormey, Cheryl, Ph.D.	geology	Associate Professor	structural geology, plate tectonics history	full
Dobbs, Becky, Ph.D.	geography	Instructor	human geography	full
Part-time faculty with primary appointment in GNR				
Andry, Jenny	NRCM	Adjunct Faculty	*2012 – present*	3 courses/sem.
McCallum, Nell	Geography	Adjunct Faculty	*2014 – present*	3 courses/sem.
Renedo, Roxanne, Ph.D.	Geology	Adjunct Faculty	*Fall 2015*	3 courses/sem.
Full-time faculty or staff at WCU with appointments in GNR, but with primary responsibilities elsewhere				
Kinner, David, Ph.D.	geology	Associate Professor Assoc. Dean Arts & Sci.	hillslope hydrology, STEM education	~1/3 load
Young, Rob, Ph.D.	geology	Professor Dir., Prog. Study of Devel. Shorelines (PSDS)	Coastal geology & management	~ 1 course/year
Peek, Katie	geology	Adjunct Faculty (PSDS)	*~ 2010 - present*	~ 1 course/year
Tormey, Blair	geology	Adjunct Faculty (PSDS)	*2005 - present*	~ 1 course/year
Kloeppel, Brian, Ph.D.	NRCM	Associate Professor Acting Dean, Grad. School	forest & watershed ecology	~ 1 course/year
Schwab, Brandon, Ph.D.	Geology	Professor Associate Provost	petrology	none

Table 4.2: Distribution of courses and students taught in GNR Fall 2014 by gender of faculty. Tables show data for all GNR courses (top) and courses for the majors (bottom).						
	number of courses			number of students		
All GNR Courses	**total**	**female**	**male**	**total**	**female**	**male**
geography	7	100%	0%	54	100%	0%
geology	19	42%	58%	120	41%	59%
NRCM	10	70%	30%	117	72%	28%
Total	36	61%	39%	291	64%	36%
	number of courses			number of students		
Majors Courses#	**total**	**female**	**male**	**total**	**female**	**male**
geography	2	100%	0%	245	100%	0%
geology	7	43%	57%	494	38%	62%
NRCM	6	50%	50%	256	61%	39%
Total	15	53%	47%	995	59%	41%
# all taught by full-time, tenure-line faculty						

Faculty teaching loads are typical for a regional comprehensive, public university (Appendix 4.4). The 'regular' teaching load is the lesser of nine student credit hours or 12 contact hours. Depending on the semester, faculty members may satisfy either requirement; lab courses generally push professors towards the 12 contact hour requirement. A concern with the teaching loads is the lack of recognized release time to supervise student theses and individual research projects.

During the annual review process and to be considered for reappointment, promotion, or tenure, faculty must show productivity in teaching, scholarly activity, and service as per our current Department Collegial Review Document (DCRD) (Appendix 2.6). There is an expectation that faculty will provide students the opportunity for hands-on, experiential learning, such as undergraduate research. Integration of scholarship and undergraduate learning is clearly articulated in our DCRD and job advertisements, which provide a roadmap for our faculty development. This policy allows us to recruit faculty who support this model and rewards them when they succeed.

Support for faculty professional development, office, and laboratory space are generally sufficient. Within the department, our spaces are relatively new (~6 years old). Field research and teaching space on campus and in the region are excellent (see Standard 7).

New faculty members receive $16,000 start-up funds from the college (*unchanged for 10 years*) and have reduced teaching and service expectations during their first year. The department allocates all full-time faculty with $400-$500 annually for professional development. In addition, all faculty can apply for several internal grant programs for professional development or research. Tenure-line faculty can

readily obtain up to $1200 from the Chancellors Travel Fund to present at professional conferences. A new (2014) Provost Research Grant program awards up to $10,000 as seed money; three of these gone to our faculty.

Challenges and Opportunities

The size of our faculty body has not grown in pace with our majors and students. By most any campus measure, we are down two faculty. We have put forth requests for a new position during the annual budget process, but they have not ranked sufficiently high enough at the university level; only a few 'new' faculty positions have been created the past few years. This is disappointing in light of the program prioritization process completed in 2013, where all GNR programs were evaluated as strong and two were ranked category 1—*high quality and worthy of investment*. Our ability to provide students high quality educational experiences will diminish both inside and outside the classroom if we are unable to obtain new faculty in concert with our program growth. Also, it is likely that our collective scholarly productivity and ability to serve the region will not increase without additional faculty.

Our collaborations within GNR continue to increase, which is in large part why we requested a combined program review. Most of our courses that relate to the environmental sciences are populated by students from all of our majors: Environmental Science, Geology, and NRCM. When feasible, we seek new faculty with interdisciplinary backgrounds that can serve these broader departmental needs. We seek guidance and innovative ideas on how to fill future faculty positions. The expertise of our faculty body covers most major areas in our disciplines with a healthy depth in some areas (e.g., watersheds) that foster collaboration. As we get the opportunity for change with new faculty, through growth or replacement, what areas of expertise and experiences should we gain so we and our students stay current? How do we balance program versus department needs? Can we hire regional professionals to teach long-term, but part-time from regional agencies and groups (e.g. from Coweeta Hydrologic Lab, National Park Service, NC Department of Environment and Natural Resources, or NGOs)?

Over time, the gender diversity of the faculty has improved considerably, but our race/ethnic diversity has not. What strategies can be put in place at the department, college, and university levels to improve the diversity of our faculty? This is especially important as we actively seek to improve the diversity of the majors in our programs.

Standard 5. The program attracts, retains, and graduates high quality students.

Enrollment and Recruitment: At the time of our last program review (2008), the Geology and NRCM programs were concerned about low enrollments. Geology was cited by the UNC system as a low-enrolled program, and NRCM was experiencing enrollments down nearly 50% from their peak in the

mid 1990's. Since 2008, the number of geology majors increased by 70% to 48, and the number of NRCM majors increased by 70% to 97 (Appendix 5.1). These increases likely reflect the quality of student experiences, recruiting, a robust job market for some graduates (e.g., energy sector); WCU-wide increases in enrollment and retention, and national trends. The increase in GNR majors has outpaced growth at WCU as indicated by the percent of graduates (Table 5.1). Recent institutional data support this same trend; both programs have higher retention and graduation rates than average for the campus.

Table 5.1. Number of NRCM, Geology, GNR (NRCM plus Geology) and WCU graduates, and the percent of all WCU graduates comprised of GNR students from 2008-09 to 2013-14

Source	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14
Number of graduates						
NRCM	11	14	12	20	16	18
Geology	3	9	7	13	9	15
GNR	**14**	**23**	**19**	**33**	**25**	**33**
WCU	1,547	1,760	1,654	1,783	1,772	1,901
Percent of WCU graduates						
NRCM	0.71%	0.80%	0.73%	1.12%	0.90%	0.95%
Geology	0.19%	0.51%	0.42%	0.73%	0.51%	0.79%
GNR	**0.90%**	**1.31%**	**1.15%**	**1.85%**	**1.41%**	**1.74%**

Our recruiting efforts have focused on (1) updating materials used in university open houses (Appendix 5.2-example materials), (2) emails and letters to interested students, mostly in concert with the admissions office, (3) recruiting from within our liberal studies courses, and (4) interacting more with local high schools and high school science teachers (e.g., though a collaborative hands-on educational program, providing workshops, and giving lectures). Most of our recruiting effort has been aimed at incoming freshman—not transfers (except for a transfer articulation agreement with natural resources programs from a neighboring community college). We recognize the need and desirability to develop and implement a recruitment plan for transfer students, especially with community colleges.

Student diversity: While our overall enrollment patterns are relatively strong, they are not in all demographic groups. We recognize many of the careers associated with our programs have traditionally been dominated by white males, but we are committed to increasing access to underrepresented groups--by gender, race/ethnicity, and background. Given our location and regional demographics, increasing student race/ethnic diversity is a university-wide issue that will require commitments and action at all levels. Table 5.2 illustrates overall student diversity at WCU, and demonstrates that the GNR student body is significantly less diverse than the overall university population. We think it is reasonable for us to set targets so that the diversity of our majors matches that of the campus. We also want to assure our

programs have equitable access to other typically underrepresented groups, such students who are first generation or from low-income families; in this area we have no data to know our current status.

We are aware that there is a body of work available to assist in this area (for example, the InTeGrate program, Increase the Diversity of your Graduates[7]), and we need to commit to adopting some of these strategies if we are to be successful. In recent years we have significantly increased gender diversity within our faculty (Table 4.2), though the gender diversity of our majors did not keep pace. Increasing the number of underrepresented groups in our programs will likely require some fundamental rethinking about how we structure and package our programs, curricula, recruiting, and cooperation and collaboration with others on and off campus. We are eager for guidance on effective strategies to improve diversity.

Table 5.2 Full-time undergraduate student diversity at WCU in fall 2014 and the number of students required for GNR to match the WCU demographics percentages based on GNR's current enrollment of 202 students.

Demographic Group	Number		Percent		Number required for GNR to match WCU percentage	Change needed for GNR to match WCU percent
	WCU	GNR	WCU	GNR		
Female	3846	64	53.4%	31.7%	108	**+44**
Male	3351	138	46.6%	68.3%	94	**-44**
White	5724	178	79.5%	88.1%	161	**-17**
Black	474	2	6.6%	1.0%	13	**+11**
Hispanic	396	2	5.5%	1.0%	11	**+9**
Native American	47	1	0.7%	0.5%	1	**0**
Other	556	19	7.7%	9.4%	16	**+3**
Not known	70	3	1.0%	1.5%	2	**+1**
TOTAL	7197	202	100.0%	100.0%		

Retention: Our retention efforts largely emanate from our student-centered mission: use of engaged student learning strategies, providing students with an education to support their career/life goals, having strong faculty-student relationships with quality advising, and providing non-academic social and service opportunities. The academic quality of GNR majors, as with WCU, is quite variable. The *average* scores for GNR's enrolling classes between 2009 and 2014 were within the following ranges: high school GPA: 3.3-3.5, SAT math: 500-545, SAT verbal 500-520, and ACT: 19-22 (Appendix 5.3). Our faculty and university are challenged with recruiting traditionally strong academic students.

[7] http://serc.carleton.edu/integrate/programs/diversity/index.html

Figure 5.1. Geology Bachelors Degrees as percent of Undergraduate Degrees at UNC Schools.

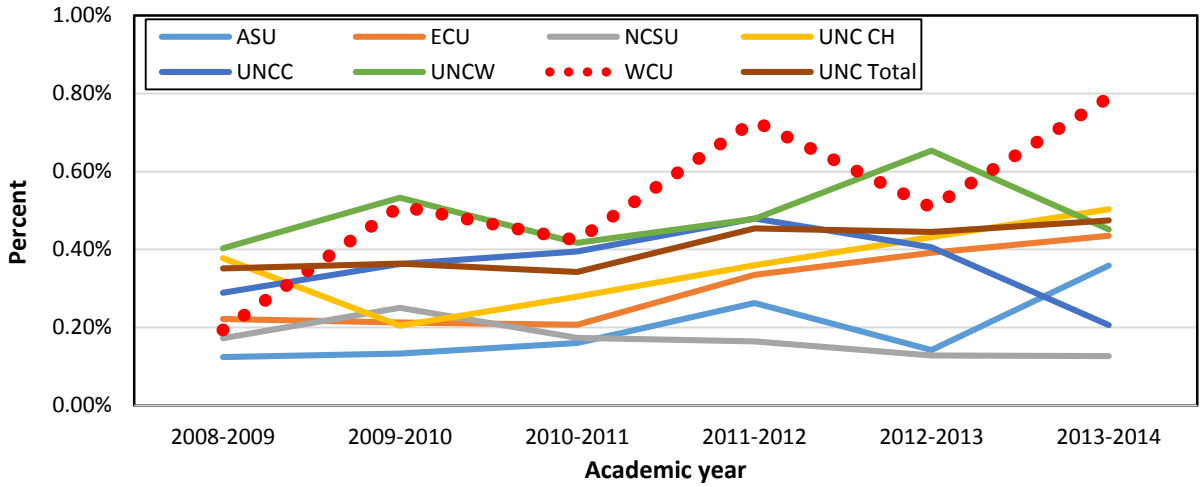
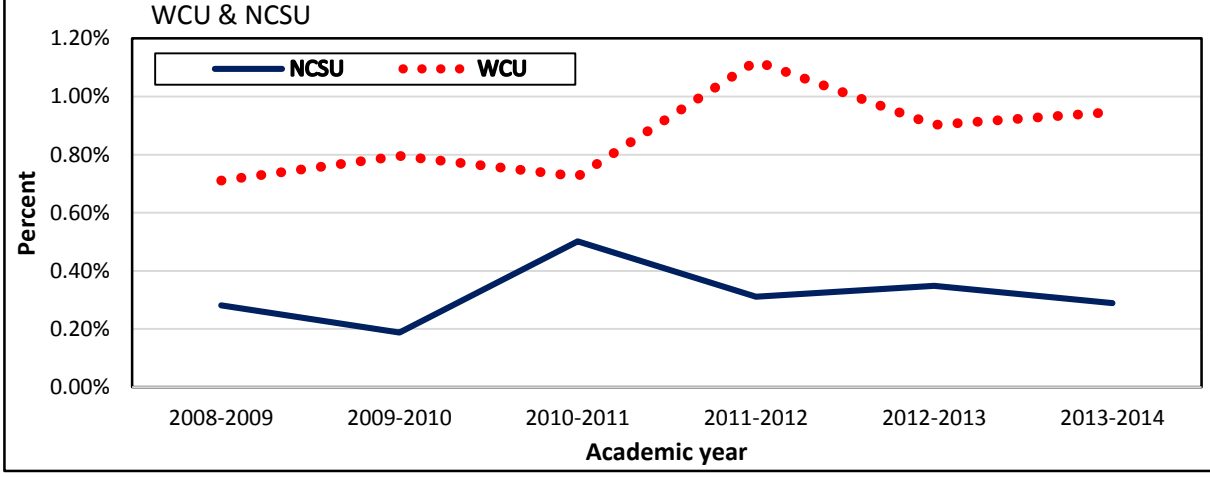


Figure 5.2. NRCM Bachelors Degrees as percent of undergraduate degrees at WCU & NCSU



We think, however, our general approach to serve the educational needs of students is well-suited for students of diverse academic backgrounds and experiences.

We also pursue opportunities to reward students with financial support. Each program has an endowed scholarship that awards $1000 per year to a deserving, upper-level student. In addition, we support many students through wages—through campus sources and external grants. Since 2008, we have paid about $20,000 per year in wages to support our students as undergraduate teaching assistants, research assistants, and student interns (including summer). Our recruitment and retention efforts seem successful: the number of graduates in NRCM and in Geology, proportionally to student body size, equal or exceed those of other UNC system schools with the same degrees (Figure 5.1-Geology, Figure 5.2-NRCM).

Graduates: Students who graduate from our programs have been successful in terms of finding employment or entering graduate school. In 2013 GNR, documented the post-graduation pathways for all

of our alums who had graduated during the previous five years. Of the 75% of the tracked graduates (84 of 112), 64% were either employed in the discipline or in graduate school (Table 5.3).

Table 5.3. Post graduate pathways for 112 GNR graduates (2008-2013).

Program	n	Employed in discipline	Graduate school	Other employed	Unknown
Geology/SEES	44	19 (43%)	4 (9%)	13 (30%)	8 (18%)
NRCM	68	28 (41%)	2 (3%)	18 (26%)	20 (29%)
Total GNR	**112**	**47 (42%)**	**6 (5%)**	**31 (28%)**	**28 (25%)**

ADMINISTRATIVE STRUCTURE AND OPERATIONAL RESOURCES

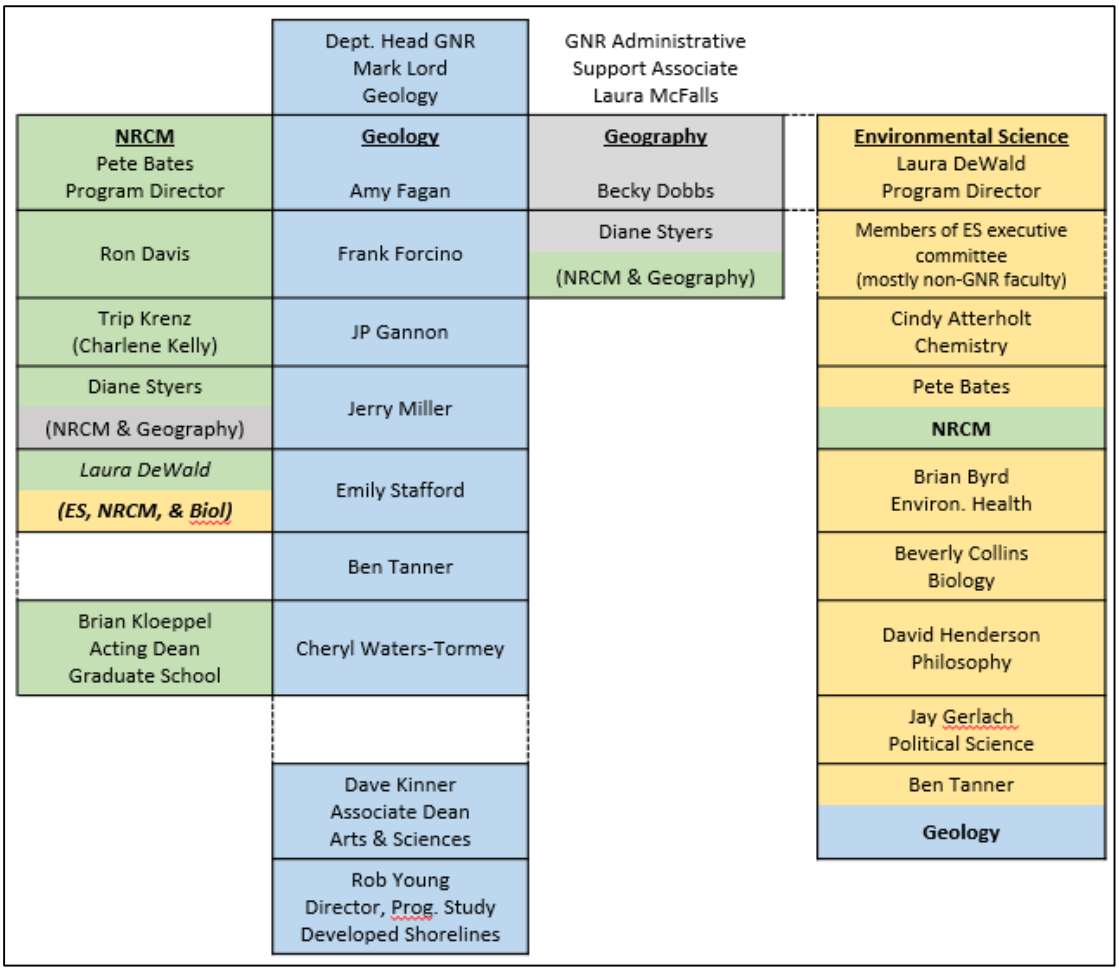
Standard 6. The program has an administrative structure that facilitates achievement of program goals and objectives.

The three degree granting programs in GNR meet separately to discuss program specific issues, including lead on curriculum, though most governance and management is done at the department level. The department addresses issues such as evaluation of faculty (i.e. tenure, reappointment, promotion, and post-tenure review), curriculum approval, personnel requests for new hires, departmental activities, and larger budget requests and planning. Department and program subcommittees are set up to address a specific topic and the recommendations of that committee are brought to the department for discussion. Standing subcommittees in the department include the Collegial Review Committee (acts on tenure, reappointment, promotion, and post-tenure review), Annual Faculty Evaluation (AFE), Faculty Affairs, Student Recruitment and Retention, and Resources. The department also has faculty who are designated for specific duties (i.e. liaison with career services, safety, etc.).

Because there are three degree-granting programs within the GNR Department, we have a Program Director for the programs not represented by the Department Head (Figure 6.1). Since the current Department Head is a geologist, we have an NRCM Program Director, whose primary duties include coordinating class schedules, facilitating program faculty meetings, coordinating recruiting activities, and serving other administrative functions as required. The Program Directors is eligible for a quarter load release from teaching per semester. In addition to faculty involvement in program activities, current students are regularly informed of program activities and are invited to participate in field and classroom special events and socials. Students are also included in the hiring process for new faculty by

attending seminars, meeting with prospective faculty, and providing their input. Efforts to inform and involve alumni in program events are sporadic and have much room for improvement.

Figure 6.1: Faculty members, programs, and administrative structure in GNR. Some faculty directly serve more than one program.



Each department at WCU has a Department Collegial Review Document (Appendix 2.6) that, in accordance with University policies, defines guidelines and expectations for all faculty evaluation actions. Untenured, tenure-track faculty are considered for reappointment annually. After tenure, faculty undergo post-tenure review once every five years. All faculty who teach in the department, regardless of appointment type, also participate in an Annual Faculty Evaluation (AFE) each spring by preparing a file per the departmental document; for full-time faculty, the file is reviewed by the AFE committee and the Department Head. The AFE committee reports are given to the Department Head, who also writes an evaluation. The AFE reports provide annual feedback and must be included in candidate files for reappointment, tenure, promotion, and post-tenure review.

Challenges and Opportunities:

Our department has grown in complexity and students. We are concerned that recent and future growth will decrease our ability to serve our students and the region. Furthermore, we seek to expand and increase our impact, including enhancing the educational experience of our students. We would like reviewer opinion on how to structure our department to achieve two goals: (1) to sustain the opportunities we afford students, our scholarship, and our ability to serve the region concurrent with student growth; and (2) to expand our impact and effectiveness —on campus, but also with off-campus communities at the regional to potentially international levels, both to professional and non-professional audiences. Are there new and/or innovative models our department should consider to achieve these goals?

As of now, our potential is largely capped by our faculty numbers and structure. Collectively, we have had to repeatedly turn down or not pursue opportunities—especially regional, where we could have contributed to the science needs of the region and provided experiential opportunities for our students. This untapped potential stems from our collaboration--which is at an all-time high--with most government agencies and other environmental groups with a responsibility to the state or our region. We seek to (1) strengthen and broaden ties with appropriate agencies/groups/entities to better serve scientific and educational needs, especially of the state and region, (2) better serve K-12 science education through partnership and support; and (3) to offer outreach to the public, NGOs, and local government agencies who need or want the expertise of our faculty and students. With expansion, we would also be in a better position to explore the potential of strengthened international ties or a graduate program to serve the academic areas of our department. We are confident that any expansion would increase educational quality and experiential opportunities for our students—through increased opportunities for undergraduate research, internships, and service learning.

We view our greatest strength as our implementation of the teacher-scholar model with much of our energy directed toward providing students with high-impact opportunities. This requires our collective scholarly activity and off-campus collaborators. We seek models where multiple environmental science programs (i.e. Geology, NRCM, and Environmental Science) can more wisely use campus resources (primarily faculty) and off-campus partners. Elements of potential models for GNR may already exist. GNR is affiliated with Forest Stewards (Appendix 6.1) and the Program for the Study of Developed Shorelines (PSDS; psds.wcu.edu): both provide some opportunity for students and faculty. Forest Stewards is a non-profit associated entity of WCU founded out of the natural resources program. It is mandated by its mission is to provide 'real world' internship experiences to WCU students. Forest Stewards is housed on campus, has contracts to provide management and planning services throughout western North Carolina, including with the town of Waynesville, the Eastern Band of the Cherokee Indians, and the Balsam Mountain Preserve. Forest Stewards has involved many faculty and students

from a variety of programs because of its holistic mission of education and sustainable forestry management. In another example, partnership with the NC Department of Environment and Natural Resources groundwater quality division, an on-campus Western Carolina Hydrological Research Station (wchrs.wcu.edu) was established in 2010 as part of a resource evaluation program. A NSF grant to support small-group, authentic research in regular courses provided funds to build a broad infrastructure of field and monitoring equipment to facilitate a sustainable research program. This site has now provided course-based research experiences to more than 300 students in addition to individual senior theses.

In general, innovative department models appear more common in natural resource programs where the need for off-campus partnerships and/or on-campus centers are likely viewed more central to their mission. As asked in the Standard 5 section on faculty resources, should we seek professionals (e.g. from government, NGOs, private sector) to serve as affiliated faculty in our department? Can this model work at our type of institution? If feasible and appropriate, this may foster development of longer-term relationships important to sustainability of productivity of faculty scholarship and high-quality student experiences.

Standard 7. The program has adequate resources to meet its goals and objectives.

Budget: The Geology and NRCM programs share the department budget with Geography, but at this time, the Environmental Science program maintains a budget separate from GNR (ES is an interdisciplinary program and that joined GNR in 2014). All budget matters are addressed at the departmental level as Geology and NRCM have not operated with separate budgets since 2009. Our budget picture has improved significantly in recent years. During the last fiscal year, our effective annual budget was about $85,000. This includes (1) our guaranteed annual allocation of $44,000 for operating, education, and technology, (2) an additional $16,000 of recurring allocations to support summer school, work study, and QEP initiatives, and (3) internal grant programs, such as, the Chancellor's Travel Fund and Provost's Academic Project Grants (Table 7.1).

Our current budget enables us to support course-related travel and student teaching assistants at an appropriate level given current enrollments. We can afford routine expenses for small equipment and supplies. However, consistent funding is lacking for larger purchases and regular replacement of the computers in our GIS lab (we have been dependent on university end-of-year funds in the past). While, we view our current *effective* annual budget to be adequate for our current needs, we do have two major concerns. First, we rely heavily on the availability of non-department funds, which makes us sensitive to potential changes in university practice. Second, our majors have grown rapidly (Appendix 5.1) and our E&T funds have been flat (These funds are generated from student fees to cover expendable educational

Table 7.1 GNR Annual Budget for 2014-15 academic year		
Budget Area	**Budget**	**Usage notes**
GNR Annual Operating	$ 26,773	Dept. supplies & fees, faculty development, student enrichment fund Annual allocations by department are: 1) Student Enrichment Fund: $2,000 2) Faculty professional Development: ~$6,000 ($400 - $500 per full-time faculty)
E&T (education & technology)	$ 17,189	Expendable equipment & course travel; E&T funds can carry over to next fiscal year.
"Guaranteed" annual budget	**$ 43,962**	
GNR Summer School Fund	$ 3,080	Expenditures must tie to summer teaching. Amount determined by 'profit' from GNR summer courses.
work study	$ 2,000	Federal work study program
QEP Funds	$ 11,000	Annually applied for funds to support QEP plans of NRCM & Geology (ex. intro. course travel, wages for student teaching assistants, & geology research capstone support). Budget is not set, but has been $10-12K per year.
Other recurring allocations	**$ 16,080**	Final budget allocations are general not known until November.
Chancellors Travel Fund	$ 9,600	$1,200 each for 8 GNR faculty who presented at conferences
Academic Project Grants	$ 6,080	9 grants to 22 students in support of undergraduate research
Internal grant programs	**$15,680**	
Total Effective Annual GNR Budget (2014-15)	**$ 84, 742†**	*This amount does not include internal & external research grants. Since, 2008, we have averaged about $180,000 in new grant funds per year.*
† The ES program operates on a separate budget of $9,600 that is not reflected in this total.		

items). As a field, lab, and travel intensive department, our student experience would benefit if our E&T allocation kept pace with departmental increases in enrollments and student credit hours.

Equipment and Facilities In general, our equipment and facilities are good and current. The Stillwell Science building, our home, underwent a complete renovation that was completed in January 2008 (Appendix 7.1). We have an introductory teaching lab, 5 upper level teaching labs (GIS, geochemistry, hydrology, microscope-petrology, & seminar), and a heavily-used student common room. Our research spaces are tied to theme, not individuals, and are widely used by faculty and students. Research spaces are increasingly burdened as they are used to support course-based projects. To this point, we have had adequate space to support faculty research needs. However, we are at full capacity. Any growth will be problematic.

We have most standard field, lab, computing, and instructional equipment associated with natural resource and geology programs (Appendix 7.2). We have three pieces of analytical equipment (CNS Analyzer, X-Ray diffraction Machine, and Particle Size Analyzer). Also, the Chemistry Department is well equipped (Appendix 7.3) and provides our faculty and students with access to instruments provided we pay cost of materials.

Our campus property is an excellent, heavily used resource for student education and research. The main and west campus cover about 350 acres each and include streams, soils, outcrops, wetlands, and varying forest stands. On any given year, over one thousand students who take classes in our department will conduct a field exercise or project on WCU's property. In addition, the Western Carolina Hydrological Research Station (wchrs.wcu.edu), provides students ongoing research opportunities in and out of classes; the site contains about 50 groundwater wells and 6 stream gages in addition to precipitation and soil moisture sensors.

Library resources: We have good resources and access for our type of university. Our access to journals increased significantly as journals shifted to electronic formats. The library is also responsive to specific needs of our programs.

Program staffing: As was discussed in Standard 4: Faculty Resources, the size of our faculty has not kept pace with increases in our majors and the number of student credit hours we teach and we believe we are down two faculty positions. In addition, we have long sought a technician to support our department. This need was affirmed during our last external review. To the best of our knowledge, we have one of the largest science departments in the country without a technician or equivalent. Last year, with the support of our Dean, we implemented a partial solution by upgrading a geology lecturer position to an instructor position. Unlike lecturers, instructors are true full-time positions with service responsibilities (20 to 40%). We utilize the service component of this position to (1) oversee the maintenance of some equipment and facilities, and (2) either supervise or directly train students in the use of specialized equipment, such as the CNS analyzer. To help with facilities and equipment oversight, we support this position with two student workers.

Other University Offices: No department is an island, and ours is no exception. We rely heavily on other university offices, such as, Research and Administration, Motor pool, Information Technology, and Human Resources (hiring). While all these offices are genuinely supportive, there are cases where bureaucratic barriers create roadblocks that negatively impact our department. We cite two examples. First, the Office of Research and Administration is critical for providing grant-related information and for pre- and post-award support. This office is much improved in recent years, particularly in pre-award and they have developed a positive service outlook. However, post-award has not seen similar improvement. Second, we understand that WCU is developing a new plan for Motor pool. However, the present

situation creates challenges for our department. The safety and reliability of the vans is questionable, van reservations are not confirmed far enough in advance, and on several occasions vans were not available even after being confirmed. We are increasingly renting vehicles because of better service; however this is inconvenient, adds costs, and adds hours of time for pick up and return.