ASSESSMENT REPORT
2021-22 & 2022-23

Forestry
(Instructional Degree Program)

B.S.
(Degree Level)

Program Mission:
Forestry is the application of scientific principles to the sustainable management of forest resources, including a wide range of ecosystem services (e.g., non-timber forest products, wildlife, medicinal herbs, and craft materials), fresh water, and biodiversity.
The mission of the Department of Forestry is to engage in teaching, research, and service in forestry to promote the sustainable management of forest resources.
The NMHU Forestry program is accredited by the Society of American Foresters and is the only accredited Forestry program in the State of New Mexico.
The primary goal of the forestry program is to train technically competent forest and natural resources managers who understand the ecological notions that underpin human use of forest resources.
The Department promotes the understanding and sustainable management of ecosystems for the benefit of human and non-human communities while seeking to improve equity and diversity within the forestry profession.
The BS in Forestry offers two concentrations of study – Forestry Management and Wildland Fire.
The undergraduate Forestry degree program is designed to educate well-rounded, technologically proficient, and ecologically aware forest managers, providing them with a background sufficient to enable them to support the continued health, integrity, and use of forests for the benefit of society. Being part of a Hispanic Serving Institution (HSI), the Forestry program seeks to address the needs of underrepresented students in the forestry profession.
Graduates of the Forestry Program meet all federal requirements for employment as a professional forester. Students receive training in the various techniques used to determine resource quantities and qualities, economic values, and social constraints in the management of natural resources. Students who major in forestry are not required to take a minor. In this era of rapid environmental change, these forestry fields are in increasing demand.

Student Learning Outcome 1:
Effectively describe and implement the process of scientific inquiry.

NMHU Traits Specifically Linked to Student Learning Outcome 1:
- Mastery of Content Knowledge and Skills
- Critical and Reflective Thinking Skills
- Effective Communication Skills

First Means of Assessment for Outcome 1 (SLO1a):
Design an experiment to examine an ecological question in FORS 2020 (Terrestrial Ecology) and present this proposal to the class. Students must receive a 70% or higher grade to be considered passing in this outcome.

Summary of Data:

Number of Students Meeting Criterion:	18	Number of Students Not Meeting Criterion:	2
Total Number of Students Assessed:	20	Percentage of Students Meeting Criterion:	**90%**

Second Means of Assessment for Outcome 1 (SLO1b):
Successfully design and describe the application of experimental design to a natural resource management problem. This design will be developed and presented in FORS 4920 (Applied Forestry Research). Students must receive a grade of 70% or higher to be considered passing in this outcome.

Summary of Data:

Number of Students Meeting Criterion:	8	Number of Students Not Meeting Criterion:	1
Total Number of Students Assessed:	9	Percentage of Students Meeting Criterion:	**89%**

Third Means of Assessment for Outcome 1 (SLO1c):
Final grade of B or better in FORS 3100 (Mensuration and Biometrics)

Summary of Data:

Number of Students Meeting Criterion:	12	Number of Students Not Meeting Criterion:	12
Total Number of Students Assessed:	24	Percentage of Students Meeting Criterion:	**50%**

Interpretation of Results for Outcome 1:
The program saw large reductions in student performance for SLO1b and SLO1c relative to 2020-2022 outcome assessment. SLO1a is slightly higher than the previous outcome years (80% in 2020-2022 vs 90%). This assessment period reflects a period with continual extraneous challenges as students returned to in-person learning formats and lived with the Hermit Peak/Calf Canyon (HPCC) wildfire that confronted students with direct and indirect challenges. Additionally, FORS 3100 saw changes in instructors teaching the class with variable outcomes each year. These variables confound interpreting student performance from student hardship. The average score across the three outcomes assessments is 76%, suggesting students fail to meet Student Learning Outcome 1 expectations.

Recognizing that Student Learning Outcome 1 pertains to implementing the scientific method is important. Courses like FORS 3100 where only 50% of students received >70% in the course, have numerous other skills, including rigorous mathematical expectations, and it is unclear from these data if students are failing in analytical skills or in metrics specifically related to the scientific process.

To remedy the vague understanding of content mastery in this learning outcome, a viable assessment alternative could be to develop an assignment for each course that reflects mastery of the scientific process and develop a standardized rubric for assessment on this assignment. The assignment could be given in every mandatory class in the program and success would be evaluated on improvement from 1000-level courses to 4000-level courses rather than the binary grade cut-off in specific courses.

Student Learning Outcome 2:
Effectively communicate scientific and resource management ideas, information, and results, as well as standards of professional ethics, both verbally and in writing, in a way that (1) demonstrates consistent logic; (2) is well organized; (3) states and defends a thesis; and (4) demonstrates competent use of language.

NMHU Traits Specifically Linked to Student Learning Outcome 2:

- Mastery of Content Knowledge and Skills
- Critical and Reflective Thinking Skills
- Effective Communication Skills

First Means of Assessment for Outcome 2 (SLO2a):
Present the results of the capstone project to the FORS 4920 Senior Research Project class. A passing grade for this measure is >70%.

Summary of Data:

Number of Students Meeting Criterion:	8	Number of Students Not Meeting Criterion:	1
Total Number of Students Assessed:	9	Percentage of Students Meeting Criterion:	**89%**

Second Means of Assessment for Outcome 2 (SLO2b):
Grade on final exam in Natural Resource Economics (FORS 3050), which requires a comprehensive analysis and presentation of a complicated natural resource valuation and decision problem involving forestry resources. A passing grade for this measure is >70%.

Summary of Data:

Number of Students Meeting Criterion:	22	Number of Students Not Meeting Criterion:	12
Total Number of Students Assessed:	34	Percentage of Students Meeting Criterion:	**65%**

Third Means of Assessment for Outcome 2 (SLO2c):
Final grade of B or better in Professional Ethics (FORS 4260).

Summary of Data:

Number of Students Meeting Criterion:	21	Number of Students Not Meeting Criterion:	3
Total Number of Students Assessed:	24	Percentage of Students Meeting Criterion:	**88%**

Interpretation of Results for Outcome 2:

Most students passed FORS 4920; however, there were fewer students both enrolled in and passing this course compared to the previous report. With only one student not passing this class, it is clear that students generally are competent in using logic and language. The capstone project requires the students to be able to develop a research project during the semester, and the impact of the HPCC wildfire during April 2022 undoubtedly interrupted the regular life of our students during the last month of that semester. FORS 3050 and FORS 4260 had a few to several students who did not pass with a decrease in the rate of passing students in SLO2b and an increase in students passing in SLO2c. It is unclear the reasons for these variable results. The previous report discussed variability in instructor and/or delivery of material, which continues to be a challenge given faculty turnover within the department. The average across all three learning outcomes for SLO2 was 80% of students met this learning outcome. This demonstrates that 1/5 of students in the program are not effectively communicating and/or displaying competency in professional ethics. This could be the result of a particularly challenging assessment approaches within specific courses.

Additional considerations in assessing SLO2 include the vague approach of assessing based on a grade in a class (SLO2a,b) compared to a more focused assessment of a comprehensive project (SLO2b). Further, SLO2 includes ideas regarding effective communication and professional ethics. It is un clear if students not passing SLO2c are failing to effectively communicate or if students are failing to grasp ideas about ethics. These could be subdivided into learning outcomes with specific assessment approaches for each outcome. Similar to previous recommendations, assessing growth in assessment criteria throughout the program could enhance our understanding of the curriculum effectiveness and more guided rubrics can highlight areas of weakness in our program.

We will modify this SLO in two separate learning outcomes, since learning the standards of professional ethics is a pretty unique outcome compared to communicating scientific and resource management ideas. This could also be assessed in many classes by for instance 1) not discrimination, 2) not fabricating data, 3) working as a team among other values. This will also bring the opportunity to assess he human, social, and professional skills across the curriculum in our new Forestry Outcomes Assessment Plan.

Student Learning Outcome 3:

Effective use of technology by competently using appropriate tools from forestry and its various sub-disciplines.

NMHU Traits Specifically Linked to Student Learning Outcome 3:

- Critical and Reflective Thinking Skills
- Effective Use of Technology

First Means of Assessment for Outcome 3 (SLO3a):
Demonstrated competence in using basic measuring instruments in an introductory field-based course (FORS 2010, Forestry Field Practices). Final grade in course of C or better.

Summary of Data:

Number of Students Meeting Criterion:	12	Number of Students Not Meeting Criterion:	0
Total Number of Students Assessed:	12	Percentage of Students Meeting Criterion:	100%

Second Means of Assessment for Outcome 3 (SLO3b):
Demonstrated competence in using forest measuring instruments in an intermediate field-based course (FORS 3100, Mensuration and Biometrics). Grade in a hands-on practicum exercise of B or better and a final grade in the course of C or better.

Summary of Data:

Number of Students Meeting Criterion:	16	Number of Students Not Meeting Criterion:	8
Total Number of Students Assessed:	24	Percentage of Students Meeting Criterion:	**67%**

Interpretation of Results for Outcome 3:
Outcomes for SLO3a was passed by 100% of the students during the academic year 2020-21, which improve our students' performance at respect of the previous OA review period. The course was not assessed during the academic year 2021-22 because there was no faculty available after Dr. Kyle Shaney left during the Summer 2022. This intense two-week field work class is usually taught before the Fall semester starts. August 2022 was a very uncertain period in which our community suffered post-fire flooding impacts after the HPCC fire, so it was impossible to plan that class in the schedule since no faculty was available.
The class also has numerous seniors enrolled in the Fall 2023 section of the course, which challenges the learning outcomes of the course since it is currently designed at the 2000 level. SLO3b was not evaluated during the last OA review period due to the lab being run online and this review period student performance was not excellent at 67%. The average across both these learning outcomes for SLO3 was 83%, as such this was the highest performing SLO in the program. This is still less than 85% and highlights a significant opportunity for improvement given that the connection of this learning outcome with numerous Society of American Forestry disciplinary outcomes.

This learning outcome demonstrates the need for more specific assessments as these courses tend to cover numerous topics beyond just the use of technology. This is a skills-based assessment that reflects many key criteria for SAF accreditation as well. Specific assessments can address the specific technological tools SAF requires.

<u>Student Learning Outcome 4:</u>
Mastery of Forestry knowledge and skills.

<u>NMHU Traits Specifically Linked to Student Learning Outcome 4:</u>

- Mastery of Content Knowledge and Skills
- Critical and Reflective Thinking Skills
- Effective Communication Skills

First Means of Assessment for Outcome 4 (SLO4a):
Take a final comprehensive Forestry Exit Exam that includes questions from the four SAF core competency areas. A passing grade will be 70%. This exam will not impact student graduation but will be used for assessment purposes and will provide students the opportunity to provide feedback on the Forestry Program to Faculty. This Exit Exam will be accompanied by a debriefing with graduating students.

Summary of Data:

Number of Students Meeting Criterion:	8	Number of Students Not Meeting Criterion:	1
Total Number of Students Assessed:	9	Percentage of Students Meeting Criterion:	**89%**

Second Means of Assessment for Outcome 4 (SLO4b):
Final grade of B or better in Forest Management (FORS 4100).
Summary of Data:

Number of Students Meeting Criterion:	10	Number of Students Not Meeting Criterion:	1
Total Number of Students Assessed:	11	Percentage of Students Meeting Criterion:	**91%**

Third Means of Assessment for Outcome 4 (SLO4c):
Final grade of B or better in Applied Forestry Research (FOR 4920).
Summary of Data:

Number of Students Meeting Criterion:	11	Number of Students Not Meeting Criterion:	3
Total Number of Students Assessed:	14	Percentage of Students Meeting Criterion:	**79%**

Fourth Means of Assessment for Outcome 4 (SLO4d):
Final grade of B or better in Natural Resource Law and Policy (FORS 3300) or Geologic Resources, Law, and Environmental Policy (GEOL 4120).

Summary of Data:

Number of Students Meeting Criterion:	10	Number of Students Not Meeting Criterion:	15
Total Number of Students Assessed:	25	Percentage of Students Meeting Criterion:	**40%**

Fifth Means of Assessment for Outcome 4 (SLO4e):
Final grade of B or better in Dendrology (FORS 3130).

Summary of Data:

Number of Students Meeting Criterion:	16	Number of Students Not Meeting Criterion:	9
Total Number of Students Assessed:	25	Percentage of Students Meeting Criterion:	**64%**

Interpretation of Results for Outcome 4:

For all criteria for Outcome 4 of this year compared to the previous (100%, 100%, 100%, 87%, 50% to 89%, 91% 79%, 40% and 64% respectively) suggesting that the program performed worse than in the previous reported year. However,

Outcomes for SLO4a, 4b and 4c have decreased since the last review period, as passing the final comprehensive Forestry Exit Exam, and it has been explained above, it is due to the challenges our students were facing under the post-fire HPCC impact. The SLO4b also showed a slight reduction (91% vs 100%), showing that lower percentage of students passed the Forest Management (FORS 4100) with a letter b or better. Again, the criterial is weak to evaluate how improve the performance in this key class in our curriculum.

A dramatic drop in the SLOd in which only 40% (with a huge variability among the two years reported in this period (20% vs 70% in 2021-22 and 2022-23 respectively) of the students passed the criteria at respect of 87% in the previous reported period. Natural Resources Law & Policy has been taught by Dr. Alan Barton during the last two periods reported at NMHU. After the decrease in the students' performance in this class, a new teacher assistant. Herdhanu Jayanto, was designated to assist on the class in 2022-23. The faculty implemented new updated materials and methodologies, meanwhile the TA facilitated the participation and engagement of the students in this subject. This is a very important class in which the students examine the human and social dimensions of the administration and management of natural resources and the environment, by gathering detailed knowledge and a greater appreciation of the laws governing how land and resources are used and the general policies. We have internally discussed the need to improve the human, social and cultural dimension in our departmental curriculum, and we will address the first steps towards this goal by mapping key concepts and promoting specific attitudes by implementing content and activities within a variety of classes in the Forestry curriculum.

SLOe has slightly improved at respect of the previous report period (50% vs 64%) when the modality of both lecture and lab were switched to remote, which removed hands-on learning of major woody species. Despite showing better results when both the lecture and lab and synchronically taught in the same semester, we expect to improve this SLOe, since this is one of the key forestry classes in the curriculum, by having one of the new tenure-truck faculty teaching this class now in Fall 2023

The average score for SLO4 was a 72. This learning outcome covers numerous broad topics related to mastery of forestry content knowledge and is related to numerous SAF disciplinary outcomes that are more specific. SAF categorizes these based on plant identification, physical environment and ecology, administration and economics and silviculture and management. These reflect the assessment of the final exit exam. Each of these categories is also relevant to numerous, rather than single course topics. For example, FORS 2010 and FORS 3130 have learning outcomes related to plant identification and basic ecology. This creates opportunities to assess students throughout the program to demonstrate measurable growth in content mastery.

Utilization of Results:
In total, 78% of the Forestry students met the SLO criteria, which evidence that the program is meeting the program mission and SAF standards by providing high quality forestry education. Undoubtedly, the implementation of the FORT-CREST project activities in the forestry curriculum, providing academic and professional support to our students and allowing them to have multiple hands-on science based on experiences have improved the program during the reporting period. However, the assessment SLO criteria have proven themselves to be weak since many of the outcomes' criteria are grade-based, and some others are missing the target, so we have found it difficult to interpret many of these outcomes. This was already explained in the last review period, but due to the constant challenge retaining faculty that NMHU and our Forestry department had experienced (we lost two of our four FTE tenure-track faculty during Summer 2022), we were not able to propose a new one. The two-remaining tenure-track faculty took on additional responsibilities to cover core classes, advise additional graduate students who remained at HU, and perform administrative tasks, including performing a search to replace Drs. Klutsch and Shaney. As a result of the lack of human resources, we were unable to make an early review of our outcome assessment plan.
So, the results from these two years' report help us to deeply re-organize and analyze the Forestry curriculum course assessment criteria. In our new plan, we will identify the fundamental concepts, and professional and ethical skills to be mapped in the curriculum, implemented and assessed to improve the SLO assessment plan. Therefore, a revision of the Outcomes Assessment Plan will be proposed this year to better assess the skills of students in the program.

<u>Changes to Program Based on Results:</u>

During the period reported, we continued implementation of the goals of the FORT-CREST project to improve the student outcomes in other areas of assessment, such as use of scientific method, communications, and critical thinking skills, which have been highlighted in this and previous years as areas that need improvement. FORT-CREST project helps the program to overcome previous barriers to increasing hands-on experiences through incorporating research experiences in a cohesive manner into the forestry curriculum.

Ater COVID-19 years and the impact of the HPCC fires in our community, these outcomes reinforce the value of having instructors and students be face-to-face, hands-on laboratory learning and synchronicity of theory and laboratory instruction.

Furthermore, the Hermit's Peak/Calf Canyon fire has had severe impacts on our department's field projects and strategic plan due to the nature of our Natural Resources, Forestry and Wildfire Management programs. Since the fire began in April 2022, we have been called to serve the community in new ways, such as having conversations with journalists, supporting landowner site restoration efforts, informing policies, holding educational workshops, and collaborating with agencies and universities on several grants. We focused FORT CREST efforts and resources to post-fire forest restoration activities to support the community recovery and resiliency. We have been supporting our students to actively participate in the series of Post-Fire Community Recovery workshops organized by the New Mexico Forest and Watershed Restoration Institute (NMFWRI) and the Conservation Management courses' activities and students participated in these activities. Moreover, the new projects and initiative for the creation of the NM Reforestation Center are already bringing training opportunities for our students.

Based on the new initiatives and to improve our Outcomes Assessment Plan during this semester, we will:

- Develop a new OA plan that better aligns with the SAF outcomes assessments criteria and metrics to develop and implement high quality and hands-on forestry education.
- Implement concepts and skills curriculum mapping in our program and identify courses and levels to strengthen and assess them
- Identify, include and transversally reinforce the basic professional and ethic skills through the program and curriculum, and establish the metrics to assess that our students acquire these skills
- Develop standardized rubrics for assessment on specific SLO and evaluate improvement from 1000-level courses to 4000-level courses rather than the binary grade cut-off in specific courses.

Retention Strategies:

The Forestry Program has continued to revisit and revise course scheduling, curriculum changes (e.g., course numbering and offerings) and curriculum advising to create a more efficient and clearer path for new and transfer students to complete the forestry curriculum in a timely manner.

Furthermore, we are integrating a big portion of research and educational HIP and hands-on activities as well as professional training in our curriculum thanks to the implementation of the NSFs FORT-CREST and SomosSTEM projects. These two projects provide activities for students and faculty in the forestry curriculum with the main goal of increasing the retention, success and identity of students in scientific careers. Several forestry faculty contribute as CO-PIs in these two projects focused on education, research and outreach activities based on research and community collaborative projects.

FORT-CREST assist to provide the students with a coherent progression of knowledge and skills as forest managers in assist stakeholders making informed decisions that promote the use of adaptive ecosystem management to reduce the risk of high-severity wildfires and restore the health of fire-adapted forests. Under the post fire environment, FORT-CREST keeps providing and funding opportunities to our students and integrating them in research activities and experiences in a cohesive manner into the forestry curriculum. FORT-CREST approach incorporates field and internship opportunities for undergraduate students, as well as support an integrated case study approach to apply to the core forestry curriculum. FORT-CREST activities in coursework included the following:

- FORS 1010 classes (Ecosystems & Humans) participated in
- Students in FORS 2010
- FORS 4560, Fire and Landscape Ecology students were supported to attend an interact in the 1st Pile Burning Workshop – San Miguel County Fairgrounds held in Las Vegas NM, on April 1st 2022 and Organized by the Fire Adapted Communities in NM. Students had the opportunity to network with agencies and partnerships and increase their understanding of prescribed burning. Thanks to these events, students were exposed to the challenges and constraints that landowners found when it comes to applying fire as management tools.
- Students in FORS 4520 (Prescribed Fire Practices) conducted field sampling of fuel loads prior and posterior to a prescribed burn treatment at Black Lake as part of Subproject 2 Experiment 3- November 2021.
- Students in FORS 3100 (Mensuration and Biometry) and FORS 3130 (Dendrology) were given extra credit to participate in the CREST Subproject 2 Experiment 3 research by planting seedlings and implementing treatments over six days in October 2022.
- FORS 3100 and FORS 3130 students also collected data for CREST Subproject 2 Experiment 1 to evaluate current forest health condition and assesses the shifts in forest structure and composition in New Mexico's Front Range.
- Students in FORS 4920 (Applied Forestry Research) conducted their research projects in the HPCC burnt area in Fall 2021
- Students in FORS 4550 Wildfire Fuels & Modeling used the Hermits Peak burn plan to model different weather and alternative scenarios
- Subproject 2 Experiment 3 was also used as a case study for explaining experimental design in FORS 6250 (Advanced Quantitative Analysis).

Our department keeps following its renovated mission and budget with its Forestry Department Strategic plan 2020-25. Additionally, an abundant number of activities, workshops and training opportunity will be implemented in the next years by FORT-CREST and the NM Reforestation Center, as opportunities to support more frequent communications and consultation between students and academic advisors, as well as to increase the contact with the community, and professional agencies and personnel. Moreover, FORT-CREST is promoting the participation of Forestry students in SAF conferences and professional events organized by the Student Engagement Coordinator of the project.