

## Graduate Biennial Program Assessment Report

Program Information:	
Degree/s Assessed	Thesis-based LRES MS, Thesis-based Land Rehabilitation MS, Professional Paper-based LRES MS, Entomology MS, ESEC PhD
College or Administrative Division	Agriculture
Department/School	LRES
Report Submitted By	Chair, Graduate Committee
Date Submitted	15-SEP-2018
Assessment Period:	1-JUL-2016 through 30-JUN-2018

Graduate assessment reports are to be submitted biennially. The report deadline is **September 15<sup>th</sup>**. The use of this template is optional, however, any assessment report submitted must contain the required information provided in template.

### Biennial Graduate Assessment Process:

Common Program Learning Outcomes (Where both Masters and Doctoral outcomes are the same).

1. Successful demonstration of disciplinary expertise through completion of coursework appropriate to the individual student's master or doctoral program.
2. Successful completion of the required course, Seminar, LRES 594. The course is taken during the student's first year and is where the student's graduate research proposal is presented. The course addresses competencies such as oral and written communication and presentation skills, problem solving skills, critical thinking, and quantitative reasoning.
3. Successful demonstration of oral and written communication and presentation skills.
4. Successful demonstration of problem solving skills and critical thinking.
5. Successful demonstration of data collection abilities, quantitative reasoning, analytical synthesis, and decision making.
6. Successful demonstration of teaching experience. This addresses competencies such as leadership, conflict resolution, self-confidence, time management, and mentorship.

Unique Masters Learning Outcomes:

A. Thesis option: The student will be trained to be a practicing scientist. On completion of the program, the student will be able to plan, conduct, analyze, and communicate their own scientific studies and will be able to assess the scientific merits of other studies.

B. Non-thesis option: The student will be trained to critically assess and analyze scientific information. On completion of the program, the student will be able to analyze, assess, synthesize, and communicate scientific information in the environmental sciences.

Unique Doctoral Learning Outcomes:

C. Doctoral: The student will develop expertise in a scientific discipline or sub-discipline. On completion of the program, the student will be an expert in their disciplinary topic.

## 1. What Was Done (Assessment Methods)

a. List the courses or instruments used to assess each outcome.

Performance Table	Learning Outcomes							
Masters Students	1	2	3	4	5	6	A	B
LRES 594	X	X	X	X	N/A		X	N/A
Passing grades as indicated on the student's program of study	X	X	X	X	X		X	X
Successful defense and completion of the thesis, as indicated by appropriate signatures	X	N/A	X	X	X		X	N/A
Teaching Experience	N/A	N/A	X	X	X	X	X	N/A
Professional placement as appropriate to the student's disciplinary area	X	N/A	X	X	X		X	X
Doctoral Students	1	2	3	4	5		C	
LRES 594	X	X	X	X	N/A		X	
Passing grades as indicated on the student's program of study	X	X	X	X	X		X	
Successful completion of the written comprehensive exam	N/A	N/A	X	X	X		X	
Successful completion of the oral comprehensive exam	N/A	N/A	X	X	X		X	
Successful defense and completion of the dissertation, as indicated by appropriate signatures	N/A	N/A	X	X	X		X	
Teaching Experience	N/A	N/A	X	X	X	X	X	N/A
Professional placement as appropriate to the student's disciplinary area	X	N/A	X	X	X		X	

b. What benchmark is used to demonstrate whether the outcome has been satisfactorily met?

Describe any changes to the benchmark since last reporting cycle.

Passing grade for Seminar, LRES 594.

Passing grades as indicated on the student's program of study.

Successful completion and appropriate signatures on thesis or dissertation.

Successful completion and appropriate signatures on forms for written and oral comprehensive exams for PhD students.

Average range of start/end date.

Professional placement as appropriate to the student's disciplinary area.

c. What was the process for evaluation (how were data collected and by whom)?

Data were collected by the student coordinators of LRES/LREO and checked for successful completion. The data were then forwarded to the Chair of the LRES Graduate Committee for evaluation and refinement in consultation with the LRES Graduate Curriculum Committee. Data collected were from 1-JUL-2016 to 30-JUN-2018.

d. Has this assessment method changed since the last reporting cycle? Yes or No. Explain any changes.

Yes. LRES has incorporated student placement data and rates of completion as indirect measures since the last reporting cycle.

## **2. What Data Were Collected**

a. What was collected to assess learning outcomes listed above?

Direct measures: Passing grades for coursework; successful completion of master's defense of thesis for LRES, Land Rehabilitation, and Entomology; successful completion of professional paper and presentation of professional paper for LRES MS (LREO); successful completion of written comprehensive exam, oral comprehensive exam, and doctoral defense for ESEC PhD.

Indirect measures: Student placement data and average range of start/end date.

## **3. What Was Learned: Results**

a. What was revealed from analyzing learning outcome data regarding student learning? Describe any result, pattern, or trends that you identify as meaningful.

Student completion rates for all LRES graduate programs in the evaluation period were extremely high.

b. Describe how the above results were communicated to the department and used to develop plans for improvement.

Presented at August/September faculty meeting.

## **4. How We Responded**

a. Based on assessment, describe any changes (content, pedagogical, structural, etc.) that are an outgrowth of the current year's assessment of this outcome. Include timelines.

LRES faculty are discussing annual reviews of graduate student progress separate from major advisor and/or committee progress meetings with the student. The faculty have yet to make a decision about instituting this activity in the future.

b. When will the changes be next assessed?

The next assessment will be July/August 2020 for the period 1-JUL-2018 through 30-JUN-2020.

## **5. Closing the Loop**

a. If there have been changes in program/curriculum to reflect concerns from previous assessments, what impact have the changes had (if any) on achieving the desired level of student learning outcomes?

Not applicable.

**NOTE: Student names must not be included in data collection. Dialog on successful completions, manner of assessment (publications, thesis/dissertation, or qualifying exam) may be presented in table format if they apply to learning outcomes. In programs where numbers are very small and individual identification can be made, focus should be on programmatic improvements rather than student success. Data should be collected through the year on an annual basis.**

Submit report to [programassessment@montana.edu](mailto:programassessment@montana.edu)

7/1/16 - 6/30/18 LREO MS degrees

Last Name	First Name	Sem Enter	Sem Grad	Chair	Professional Paper Instructor	Level	Degree	Thesis Title	Employment
Cimino	Hilary	15 Fall	18 Spring	Powell	Mangold	MS	LREO	RESPONSES OF PLANT COMMUNITIES TO LONG-TERM SHEEP GRAZING NEAR MISSOULA, MONTANA	Pat Emergency Center
Couser	Megan	15 Spring	17 Summer	Powell	Powell	MS	LREO	EFFECTS OF RESIDENTIAL DEVELOPMENT ON WATER QUALITY: A CASE STUDY	Flathead High School
Dalton	Kelly	14 Spring	18 Spring	Powell	Kleindl	MS	LREO	ASSESSING THE INTERACTIONS BETWEEN HUMANS AND WILDFIRES IN CALIFORNIA AND THEIR IMPACTS ON WATER RESOURCES	Diversified Waterscapes, Inc
Darrell	Warren	13 Fall	16 Summer	Powell	Kleindl	MS	LREO	QUESUNGUAL SLASH AND MULCH AGROFORESTRY: A SUSTAINABLE ALTERNATIVE TO SLASH AND BURN AGRICULTURE	Fauquier County Public School
Dauray	James	13 Fall	17 Fall	Powell	Peterson	MS	LREO	RISK ASSESSMENT OF INGESTED ACRYLAMIDE AND POTENTIAL ABATEMENT THROUGH IMPLEMENTATION OF THE SIMPLOT INNATE™ POTATO	Warren Township High School
Hall	Josh	16 Fall	17 Fall	Powell	Powell	MS	LREO	USING TIME SERIES NDVI OBSERVATIONS TO EVALUATE RESTORATION EFFECTIVENESS: AN ASSESSMENT OF RESTORATION PROJECT AREAS IN SOUTH-CENTRAL WASHINGTON STATE	Yakama Nation Forest Management Fisheries Habit
Hammond	Molly	16 Spring	18 Spring	Powell	Ruth O'Neill	MS	LREO	LIFE HISTORY AND MANAGEMENT OF ALFALFA WEEVIL USING DEGREE-DAY MODELING	Montana State University - Extension
Hosley	Rebecca	14 Spring	18 Spring	Powell	Powell	MS	LREO	USING REMOTE SENSING TO ANALYZE POST-FIRE VEGETATION REGENERATION	Discovery Canyon Campus, Academy School District 2
Langston	Carson	15 Fall	18 Spring	Powell	Hook	MS	LREO	DAM-INDUCED HYDROLOGIC ALTERATIONS OF THE WEST FORK RIVER, WEST VIRGINIA AND ENVIRONMENTAL FLOW ANALYSIS	Woolbert
Lankau	Emily	14 Fall	17 Spring	Powell	Powell	MS	LREO	APPLICATION OF REMOTE SENSING TO MONITORING BLACK-TAILED PRAIRIE DOG (CYNOMYS LUDOVICIANUS) COLONIES IN SOUTH DAKOTA	LandCov Consulting
Martin	Cianne	15 Fall	17 Spring	Powell	Stoy	MS	LREO	THE RELATIONSHIP OF PRECIPITATION AND LAND USE ON THE NITROGEN CYCLE IN THE ROANOKE AND TAR RIVER WATERSHEDS OF VIRGINIA AND NORTH CAROLINA	Montana Water Court
Mediak	Robert	14 Spring	16 Fall	Powell	Seipel	MS	LREO	DISTRIBUTION OF <i>BROMUS TECTORUM</i> IN MID-ELEVATION FORESTS OF THE BITTERROOT MOUNTAINS OF MONTANA	Montana Department of Agriculture
Mills	Shelley	14 Fall	16 Fall	Powell	Mangold	MS	LREO	MANAGEMENT OF <i>CREPIS TECTORUM</i> IN CRP	Montana State University - Extension
Molnar	Allison	13 Fall	17 Fall	Powell	Peterson	MS	LREO	PRE- AND POST-REMEDIATION RISK ASSESSMENT FOR A SITE IN NEW JERSEY CONTAMINATED WITH CHLOROBENZENE AND XYLENES	Matrx New World Engineering
Montgomery	Lizzy	14 Fall	16 Fall	Powell	Powell	MS	LREO	FRESHWATER TEMPERATURE RESPONSE TO FIVE YEARS OF CONSECUTIVE DROUGHT IN TWO SOUTHERN CALIFORNIA STREAMS	Resource Conservation District Santa Monica Mountain
Morgan	Elizabeth	14 Fall	16 Summer	Powell	Powell	MS	LREO	THE EFFECT OF SOLAR ENERGY DEVELOPMENT ON AGASSIZ'S DESERT TORTOISE, HABITAT IN THE MOJAVE DESERT, CALIFORNIA	College of the Deser
Price	Emily	15 Spring	17 Summer	Powell	Powell	MS	LREO	EFFECTS OF URBANIZATION ON A COASTAL SOUTHERN CALIFORNIA SAGE SCRUB PRESERVE	San Juan Hills High School
Rothermal	Amanda	14 Fall	16 Fall	Powell	Peterson	MS	LREO	RISK FROM SELENIUM CONTAMINATION IMPACTING THE NORTH AMERICAN RIVER OTTER ( <i>Lontra canadensis</i> ) WITHIN THE UNCOMPAGHRE RIVER BASIN	USGS
Rottinghaus	Dan	16 Fall	18 Spring	Powell	Powell	MS	LREO	REMOTE SENSING OF RUSSIAN OLIVE (ELAEAGNUS ANGUSTIFOLIA) ALONG THE ARKANSAS RIVER, COLORADO	Pueblo School District 6C
Segovia	Ricardo	15 Spring	16 Fall	Powell	Powell	MS	LREO	INCORPORATING INDIGENOUS KNOWLEDGE INTO ENVIRONMENTAL MONITORING OF CONTAMINATED SITES	E-Tech Internationa
Shackford	Blair	15 Fall	18 Spring	Powell	Kleindl	MS	LREO	INTEGRATION OF ECOSYSTEM SERVICE ANALYSIS AS A DECISION-MAKING TOOL FOR REMEDIAL DESIGN AND PRIORITIZATION AT SUPERFUND SITES	StanTech, LLC
Smith	Hayley	15 Fall	17 Spring	Powell	Kleindl	MS	LREO	PRIORITIZING WETLAND RESTORATION FOR WATER QUALITY FUNCTIONS IN WEST TENNESSEE	National Resources Conservation Service
Sukas	Heather	16 Fall	18 Spring	Powell	Rupp	MS	LREO	DOES THE SUSTAINABLE SLOPES CHARTER OF THE NATIONAL SKI AREA ASSOCIATION ADEQUATELY PROTECT WATER QUALITY?	The Nature Conservancy in Maine
Sturm	Erika	14 Fall	16 Fall	Powell	Ewing	MS	LREO	GEOCHEMICAL INDICATORS OF HYDROLOGICAL PROCESS REGIMES NEAR BOZEMAN, MONTANA	Cannix Explorator
Trum	Eric	12 Fall	18 Spring	Powell	Kleindl	MS	LREO	REVIEW OF RIPARIAN MONITORING ASSESSMENTS: AN APPLICATION FOR ADDRESSING MONTANA'S WATER QUALITY	GHK International/ ARCEconomic
Wascom	Marianne	14 Spring	16 Fall	Powell	Powell	MS	LREO	DELTAIC LAND CHANGE: A COMPARISON OF THE ATCHAFALAYA AND MISSISSIPPI RIVER DELTA SYSTEMS	CWConsulting, LLC

7/1/16 - 6/30/18 LRES Thesis/Dissertation degrees								
Last Name	First Name	Sem Enter	Sem Grad	Chair	Level	Degree	Thesis Title	Employment
Adhikari	Subodh	13 Smr	18 Spr	Menalled	PhD	ESEC	Impacts of Dryland Farming Systems on Biodiversity, Plant-Insect Interactions, and Ecosystem Services	Post Doc at Univ. of Idaho and Washington
Baldes	Jason	11 Fall	16 Smr	Lawrence	MS	LRES	Cultural Plant Biodiversity in Relict Wallow-Like Depressions on the Wind River Indian Reservation, Wyoming, and Bison Restoration and Policy	National Wildlife Federation - Tribal Lands Partnerships Program - Ft. Washakie WY
Brown	Christopher	13 Fall	17 Smr	Peterson	PhD	ESEC	Natural Enemy Abundance and Biological Control in Bt Maize Using Simulations of Predator-Prey Interactions	Research Entomologist, Bayer
Fogg	Sarah	15 Spr	17 Fall	Poole	MS	LRES	Thermal Insulation versus Capacitance: A Comparison of Shading and Hypoheic Exchange on Daily and Annual Stream Temperature Patterns	PHD Program w/ Geoff Poole MSU
Larson	Christian	13 Fall	16 Fall	Rew	MS	LRES	An Experimental Approach to Understanding How Global Climate Change Will Effect Bromus tectorum	Research Assoc. LRES MSU
Melzer (Pierson)	Emily	14 Fall	17 Fall	Rew, Rinella	MS	LAND	Evaluating Non-Native Annual Brome Control with Herbicides and Facilitating Wyoming Big Sagebrush Establishment in Degraded Drylands	Research Scientist, ARS, Miles City, MT
Piccolomini	Alyssa	15 Fall	17 Smr	Peterson	MS	ENTO	Toxicity, Exposure, and Risk of Insecticides Used for Mosquito Management on the Alfalfa Leafcutting Bee, Megachile rotundata	Entomologist, Montana Dept. of Agriculture
Pretfakes	Collin	13 Fall	17 Smr	Peterson	PhD	ESEC	Exposure and Risk to Non-Target Receptors for Agricultural Spray Drift of Formulation Types and Adjuvants	Research Entomologist, Bayer
Reis	Dayane	15 Spr	18 Spr	Weaver	MS	ENTO	The Potential of Sugar Resources in the Reproductive Biology of Wheat Stem Sawfly Parasitoids	Clayton, MO
Romero	Carlos	14 Spr	17 Fall	Engel/Cheng	PhD	ESEC	Cycling and Storage of Reactive Soil Carbon and Nitrogen Pools: Management Implications for Semiarid Crop Production	Post Doc (Research Scientist I) at Ag and Agri-Food, Lethbridge Research Center, Canada in Nov.
Saley	Tara	15 Fall	17 Smr	McDermott/Bothner	MS	LRES	Introducing the ArsR Regulated Arsenic Stimulon	PHD Program at Utah State University
Scott-Klingborg	Aaron	14 Spr	16 Smr	Brookshire	MS	LRES	Scaling nitrogen retention from trees to forests through succession	Nursery worker in Oregon
Tang	Angela	14 Spr	17 Fall	Stoy	PhD	ESEC	Land-Atmosphere Exchange of Carbon and Energy at a Tropical Peat Swamp Forest in Sarawak, Malaysia	Research Officer, Sarawak Tropical Peat Research Lab, Kuching, Sarawak, Malaysia
Tittle	Samuel	16 Spr	17 Fall	Lawrence	MS	LRES	Effect of Spectral Band Selection and Bandwidth on Weed Detection in Agricultural Fields Using Hyperspectral Remote Sensing	Firefighter at SGS Northwest Fire
Walker	Robert	15 Spr	17 Fall	Miller/Zabinski	MS	LRES	Potential for and Implications of Cover Cropping and Grazing Cover Crops in Wheat Agroecosystems in Montana	Private Lands Wildlife Biologist, Ephrata, WA
Wood	Jason	10 Fall	18 Spr	Ward	PhD	ESEC	Theory-based Demarcation of Hot Spring Microbial Mat Species from Large DNA Datasets	Post Doc at Calif. Inst of Technology, Biotech and Planetary Protection group at JPL
Ehlert	Krista	13 Smr	17 Spr	Manalled/Mangold	PhD	ESEC	Optimizing Efficacy of Bromus tectorum (Cheatgrass, Downy Brome) Biological Control in Crops and Rangelands	Asst. Professor and Extension State Range Specialist, Natural Resource Mgmt. Dept SDSU
Patriarche	Jeffrey	14 Fall	17 Spr	Priscu	MS	LRES	Long-Term and Overwinter Phytoplankton Community Dynamics in Lake Bonney Antarctica	IT Manager, Under Canvas, Inc. Belgrade, MT
Ranabhat	Nar	13 Smr	17 Spr	Menalled	MS	LRES	Effect of Agronomic Practices on Disease Incidence, Severity, and Impacts in Montana Cropping Systems	PHD Program with Jessica Rupp at Kansas State University
Soderquist	Lora	11 Spr	17 Spr	Sterling	MS	LRES	Understanding the Role of Social Values in Ranchland Management Decision-Making: Collaborative Research with Montana Ranchers	Instructor LRES