Montana University System

2019-2020 PROGRAM REVIEW

Institution: **Montana State University**

Program Years: **AY2013-AY2019**

List of the programs reviewed:

Department of Land Resources and Environmental Sciences

- BS Environmental Sciences
- BS Sustainable Food and Bioenergy
- Minor Entomology
- Minor Soil Science
- Minor Water Resources
- MS Entomology
- MS Land Rehabilitation
- MS Land Resources and Environmental Sciences
- PhD Ecology and Environmental Sciences

Department of Ecology

- BS Biological Sciences
- MS Biological Sciences
- PhD Biological Sciences
- PhD Ecology and Environmental Sciences
- PhD Fish and Wildlife Biology

Decision(s) concerning the future of the program(s), based on the program review criteria established at the campus:

See decisions by department/program below.

Rationale or justification for the decision based on the program review process established at the campus. Include graduation numbers and student majors for each of the last seven (7) years for every program under review.

See rationale by department/program below.

Department of Land Resources and Environmental Sciences

- BS Environmental Sciences
- BS Sustainable Food and Bioenergy
- Minor Entomology
- Minor Soil Science
- Minor Water Resources
- MS Entomology
- MS Land Rehabilitation
- MS Land Resources and Environmental Sciences
- PhD Ecology and Environmental Sciences

Decision(s) concerning the future of the program(s), based on the program review criteria established at the campus:

A substantial curricular revision was implemented in 2014-15. These changes have been successful and new changes are not anticipated or recommended at this time. **All the degrees and options will be retained.**

Rationale or justification for the decision based on the program review process established at the campus. Include graduation numbers and student majors for each of the last seven (7) years for every program under review.

The review team included Associate Professor Laura Burkle (Department of Ecology, MSU), Professor Bok Sowell (Department of Animal and Range Sciences, MSU), Professor Otto Stein (Department of Civil Engineering, MSU).

The department of LRES undertook a major restructuring in 2014-15 after their last program review and several degree programs were combined into a single BS in Environmental Sciences with five options. 1) Environmental Sciences (general, no option), 2) Environmental Biology, 3) Geospatial and Environmental Analysis, 4) Land Rehabilitation, and 5) Soil and Water Science. The department also supports the Agroecology option within the interdisciplinary Bachelor of Science in Sustainable Foods and Bioenergy Systems. Degree minors are also available in Soil Science, Entomology and Water Resources. Undergraduate student numbers increased steadily from 2012 to 2019. The increase in student numbers is in the general Environmental Science major with the other options holding steady in terms of enrollments.

The MS program is strong and includes campus and online delivery and the department is part of an interdisciplinary PhD program in Ecology and Environmental Sciences that replaced the prior Land Resources and Environmental Sciences PhD program following the last program review. The interdisciplinary program is shared with Ecology.

The review team indicated that the curricular changes that the department made after the last program review have been successful and continued assessment of the curriculum has resulted in improvements that

support student success. The review team found that the curriculum elements of the department match the mission of a land grant university, the department is experiencing increases in student enrollments and the professional MS program delivered primarily online has been highly successful. They also note that the faculty are productive scientists and teachers, the Extension program is well respected in the state and the PhD program is strong. .

The review team had some recommendations for the department to consider including improving learning outcomes assessment and using it to improve the quality of instruction and exposing undergraduate students to professionals in non-academic positions to help them see clear career paths.

The enrollment and graduation data are included below and includes the interdisciplinary BS in Sustainable Food and Bioenergy and the interdisciplinary PhD in Ecology and Environmental Sciences. The Department of LRES has been a good partner and leader in interdisciplinary programs at MSU.

DEGREE	MAJOR 1,2,2nd DEGREE	CONCENTRATION	CONC	AY2013	AY2014	AY2015	AY2016	AY2017	AY2018	AY2019
BS	Environmental Sciences	Environmental Biology	ENEB	53	56	44	31	41	37	35
BS	Environmental Sciences	Environmental Science	ENES			6	18	43	68	72
BS	Environmental Sciences	Land Rehabilitation	ENLR	39	33	22	23	27	32	24
BS	Environmental Sciences	Soil and Water Science	ENSW	29	22	30	20	20	21	17
BS	Environmental Sciences	Geospatial & Envrnmtl Analysis	ENGS	13	13	14	14	17	17	19
BS	Environmental Sciences	Policy and Management	ENPM	2						
BS	Sustainable Food and Bioenergy	Agroecology	SFLR	9	10	15	19	21	19	19
TOTAL UNDERGRADUATE ENROLLED:				***145***	***134***	***131***	***125***	***169***	***194***	***186***
MS	Entomology	Entomology	ENTO	1	1					
MS	Land Rehabilitation	Land Rehabilitation	LNDA	4	4	2	2	3	4	3
MS	Land Resources Environmntl Sci	Land Resources Environmntl Sci	LRES	32	44	60	73	69	60	63
PHD	Ecology & Environment Sciences	Ecology & Environment Sciences	ESEC	23	27	25	23	24	28	23
PHD	Land Resources Environmntl Sci	Land Resources Environmntl Sci	LRES	1	1					
TOTAL GRADUATE ENROLLED:				***61***	***77***	***87***	***98***	***96***	***92***	***89***
TOTAL ENROLLED				***206***	***211***	***218***	***223***	***265***	***286***	***275***

MINOR	MINOR DESCRIPTION		CONC	AY2013	AY2014	AY2015	AY2016	AY2017	AY2018	AY2019
	Entomology		ENTO	2	1	1	6	7	12	8
	Soil Science		SLSC	2	6	2	3	7	13	5
	Water Resources		WTRR	2	6	13	17	16	20	17
TOTAL MINOR ENROLLED:				***6***	***13***	***16***	***26***	***30***	***45***	***30***

AWARDED DEGREES

DEGRE	MAJOR	CONCENTRATION	CONC	AY13	AY14	AY15	AY16	AY17	AY18	AY19
BS	Environmental Sciences	Environmental Science	ENES			1		1	1	4
BS	Environmental Sciences	Environmental Biology	ENEB	7	10	9	6	3	5	5
BS	Environmental Sciences	Geospatial & Envrnmtl Analysis	ENGS	3		2	3	2	3	4
BS	Environmental Sciences	Land Rehabilitation	ENLR	9	9	7	1	2	10	1
BS	Environmental Sciences	Policy and Managament	ENPM	2						
BS	Environmental Sciences	Soil and Water Science	ENSW	4	1	5	5	3	5	3
BS	Sustainable Food and Bioenergy	Agroecology	SFLR	2		2	2	5	3	3
TOTAL UNDERGRADUATE DEGREES:				***27***	***20***	***26***	***17***	***16***	***27***	***20***
MS	Entomology	Entomology	ENTO	2	1	2	3	1	2	2
MS	Land Rehabilitation	Land Rehabilitation	LNDA	2	1	4	2		1	0
MS	Land Resources Environmntl Sci	Land Resources Environmntl Sci	LRES	8	11	12	25	25	18	20
PHD	Ecology & Environment Sciences	Ecology & Environment Sciences	ESEC	4	3	4	8	1	6	1
TOTAL GRADUATE DEGREES:				***16***	***16***	***22***	***38***	***27***	***27***	***23***
TOTAL DEGREES GRANTED:				***43***	***36***	***48***	***55***	***43***	***54***	***43***

AWARDED MINORS

	MINOR DESCRIPTION		CONC	AY2013	AY2014	AY2015	AY2016	AY2017	AY2018	AY2019
	Entomology		ENTO	0	2	0	1	2	2	1
	Soil Science		SLSC	4	9	2	1	2	11	0
	Water Resources		WTRR	3	4	6	10	8	9	5
TOTAL MINORS AWARDED:				***7***	***15***	***8***	***12***	***12***	***22***	***6***

Department of Ecology

- BS Biological Sciences
- MS Biological Sciences
- PhD Biological Sciences
- PhD Ecology and Environmental Sciences
- PhD Fish and Wildlife Biology

Decision(s) concerning the future of the program(s), based on the program review criteria established at the campus:

The BS in Biological Sciences is the largest undergraduate major in the College of Letters and Sciences and the Masters and PhD programs have healthy enrollments and are producing graduates. **All the degrees and options will be retained.**

Rationale or justification for the decision based on the program review process established at the campus. Include graduation numbers and student majors for each of the last seven (7) years for every program under review.

The review team included Professor Matt Lavin (Department of Plant Sciences and Plant Pathology, MSU), Regents Professor Cathy Whitlock (Department of Earth Sciences, MSU) and Professor Scott Mills (Associate Vice President of Global Change and Sustainability, University of Montana).

Within the Ecology undergraduate degree students specialize in one of four options – Fish and Wildlife Ecology and Management, Conservation Biology, Organismal Biology, and Biology Teaching. The Fish and Wildlife and Management option has been easily the most popular with 63% of Ecology's undergraduate majors in 2018. The Conservation Biology option was launched in 2012 and now has 126 students enrolled. Organismal Biology's enrollment has ranged from roughly 75 to 100 students during the 2012 to 2018 period and has not demonstrated the continuous growth of the first two options. The Biology Teaching option has enrolled under 15 students each year from 2012-2018 and has diminished to 5 students or less in recent years. At the graduate level the department offers MS degrees in Fish and Wildlife Management and Biological Sciences, and doctoral degrees in Biological Sciences, Fish & Wildlife Biology, and Ecology and Environmental Sciences (a program shared the Land Resources department in the College of Agriculture). At the Master's level Fish and Wildlife Management enrolls far more students than Biological Sciences (29 to 7 in 2018). The shared Ecology doctoral degree has been the most popular of the 3 doctoral programs in recent years enrolling and graduating more students than the other two programs combined.

The external evaluators report on the department is generally positive, and they provide several recommendations that are worthy of consideration by departmental, college and university leadership. At the undergraduate level the reviewers recommend reducing the number of learning outcomes to 3-5 per program, creating a more flexible list of undergraduate degree requirements, enhanced research experiences for students, and an increase in faculty to meet increasing instructional and advising demands from growing enrollment. At the graduate level they would like to see a higher ratio of PhD students relative to MS, more competitive stipend levels, additional tenure track faculty hires to enhance capacity in the program and allow TT faculty time to write more grants funding graduate students, possible joint

graduate offerings with the University of Montana, and the establishment of a departmental graduate committee.

Overall, the Ecology department is in fine shape with a large and growing undergraduate major and a research active faculty. The department is unique in that it is one of the few "stand-alone" Ecology departments in the US which capitalizes on MSU's location in the Greater Yellowstone Ecosystem.

DEGREE	MAJOR 1, 2 , 2nd DEGREE	OPTION	CONC	AY2013	AY2014	AY2015	AY2016	AY2017	AY2018	AY2019
BS	Biological Sciences	Conservation Biology & Ecology	BLBE	19	46	52	70	83	101	126
BS	Biological Sciences	Fish & Wildlife Ecology & Mgmt	BLFM	207	202	216	246	285	306	302
BS	Biological Sciences	Organismal Biology	BLOB	78	88	102	102	89	76	76
BS	Biological Sciences	Ecology and Evolution	BLEE	20	11	2	1	1		
BS	Biological Sciences	Teaching	BLTC	13	13	12	5	2	8	4
TOTAL UNDERGRADUATE ENROLLED:				***337***	***360***	***384***	***424***	***460***	***491***	***508***
MS	Biological Sciences	Biological Sciences	BIOL	10	12	6	3	6	11	7
MS	Fish and Wildlife Management	Fish and Wildlife Management	F&WL	21	22	24	23	28	25	29
PHD	Biological Sciences	Biological Sciences	BIOL	3	2	3	2	2	2	3
PHD	Ecology & Environ Sci	Ecology & Environ Sci	ECES	4	6	12	13	15	12	10
PHD	Fish and Wildlife Biology	Fish and Wildlife Biology	F&WB	7	7	7	6	3	3	5
TOTAL GRADUATE ENROLLED:				***45***	***49***	***52***	***47***	***54***	***53***	***54***
TOTAL ENROLLED				***382***	***409***	***436***	***471***	***514***	***544***	***562***

MINOR	MINOR DESCRIPTION		CONC	AY2013	AY2014	AY2015	AY2016	AY2017	AY2018	AY2019
	Genetics		GNTC	5	16	19	17	24	35	42
	Water Resources		WTRR	2	6	13	17	16	20	17
TOTAL MINOR ENROLLED:				***7***	***22***	***32***	***34***	***40***	***55***	***59***

AWARDED DEGREES

DEGREE	MAJOR	OPTION	CONC	AY12	AY13	AY14	AY15	AY16	AY17	AY18
BS	Biological Sciences	Conservation Biology & Ecology	BLBE			2	3	7	12	16
BS	Biological Sciences	Ecology and Evolution	BLEE	6	8	5	2	2	1	
BS	Biological Sciences	Fish & Wildlife Ecology & Mgmt	BLFM	20	26	39	24	30	44	43
BS	Biological Sciences	Organismal Biology	BLOB	11	17	27	20	26	19	19
BS	Biological Sciences	Teaching	BLTC	1		1		2	1	
TOTAL UNDERGRADUATE DEGREES AWARDED:				***38***	***51***	***74***	***49***	***67***	***77***	***78***
MS	Biological Sciences	Biological Sciences	BIOL	4	3	5	4	6	4	1
MS	Fish and Wildlife Management	Fish and Wildlife Management	F&WL	12	3	4	9	8	6	6
PHD	Biological Sciences	Biological Sciences	BIOL	2	4					
PHD	Ecology & Environ Sci	Ecology & Environ Sci	ECES		4	1	1		1	3
PHD	Fish and Wildlife Biology	Fish and Wildlife Biology	F&WB	1	1	2	1	1	2	
TOTAL GRADUATE DEGREES AWARDED:				***19***	***15***	***12***	***15***	***15***	***13***	***10***
TOTAL DEGREES AWARDED:				***57***	***66***	***86***	***64***	***82***	***90***	***88***

AWARDED MINORS

	MINOR DESCRIPTION		CONC	2012	2013	2014	2015	2016	2017	2018
	Genetics		GNTC	1	1	6	4	7	4	11
	Water Resources		WTRR	3	5	4	6	10	11	9
TOTAL MINORS AWARDED:				***4***	***6***	***10***	***10***	***17***	***15***	***20***