



FY2020 Annual Report

**Rocky Mountains Cooperative
Ecosystem Studies Unit**

Cooperative Ecosystem Studies Units (CESU) Network is a national consortium of federal agencies, academic institutions, and other partners, organized around biogeographic areas. The CESUs were established to provide research, technical assistance, and education to federal resource and environmental managers. The **Rocky Mountains Cooperative Ecosystem Studies Unit (RM-CESU)** is one of 17 units in the CESU National Network. <http://www.cesu.psu.edu/>

The **Rocky Mountains Cooperative Ecosystem Studies Unit** has been operating since 1999 and was one of four original pilot CESUs established through a competitive process. The partnership has grown steadily and is now comprised of 10 Agencies and 25 Non-Federal partners. Members of the RM-CESU are the following:

- | | |
|--|---|
| <ul style="list-style-type: none"> ❖ University of Montana-host 1999 ❖ University of Idaho 1999 ❖ Montana State University 1999 ❖ Salish Kootenai College 1999 ❖ Utah State University 1999 ❖ Washington State University 1999 ❖ University of Wyoming 2002 ❖ Colorado State University 2004 ❖ University of Colorado Boulder 2002 ❖ University of Colorado Denver 2002 ❖ University of Northern Colorado 2006 ❖ University of Calgary 2007 ❖ Metropolitan State University of Denver 2011 ❖ Little Big Horn College 2012 ❖ Northwest College 2013 ❖ University of Utah 2013 ❖ Chief Dull Knife College 2014 ❖ Blackfeet Community College 2014 ❖ University of Waterloo 2014 ❖ Wildlife Conservation Society 2014 | <ul style="list-style-type: none"> ❖ Boise State University 2015 ❖ Western Colorado University 2015 ❖ University of Denver 2017 ❖ Front Range Community College 2017 ❖ Western Association of Fish and Wildlife Agencies 2018 <p>USDI</p> <ul style="list-style-type: none"> ❖ Bureau of Land Management 1999 ❖ Bureau of Reclamation 2004 ❖ Fish and Wildlife Service 2009 ❖ Geological Survey 1999 ❖ National Park Service 1999 ❖ Bureau of Indian Affairs 2017 <p>USDA</p> <ul style="list-style-type: none"> ❖ Forest Service 1999 ❖ Natural Resources Conservation Service 2004 <p>DOD</p> <ul style="list-style-type: none"> ❖ US Army Corps of Engineer- Civil Works 2008 ❖ Office of Deputy Under Secretary of Defense (Installations and Environment) 2009 |
|--|---|

The mission of the Rocky Mountains CESU is to improve and disseminate the knowledge base for managing natural and cultural resources in the rapidly changing social, cultural, and environmental landscape of the Rocky Mountain Region, and to extend its expertise to national issues where appropriate.

RM-CESU PROJECTS ACTIVITY FOR FY2020

This year, the RM-CESU facilitated **104 task agreements (TAs)/modifications (Mods) obligating \$13,717m748 to new projects (\$7,805,878/69 TAs) and adding funds to existing projects (\$7,911,870/35 Mods)**. A complete listing of projects may be found on the RM-CESU Project List for FY2020 on the web site at <http://www.cfc.umt.edu/cesu/projects/default.php> (look under **Annual Reports**).

Table 1: RM-CESU Activity by Agency Partners for FY20

	<u>FY19 # of TA/Mods</u>	<u>FY19 Total Funding</u>	<u>FY20 # of TA/Mods</u>	<u>FY20 Total Funding</u>
RM-CESU	123	\$18,128,357	105	\$15,717,748
BIA	1	\$80,858	0	\$0
BLM	19	\$1,355,371	16	\$2,422,610
BOR	1	\$206,334	0	\$0
DOD	13	\$7,986,453	12	\$5,682,213
NPS	59	\$5,915,192	53	\$5,494,961
NRCS	0	\$0	0	\$0
USFWS	9	\$1,350,780	6	\$774,955
USGS	18	\$1,138,676	16	\$1,203,051
USACE	2	\$73,051	1	\$139,958
USFS	1	\$21,642	0	\$0

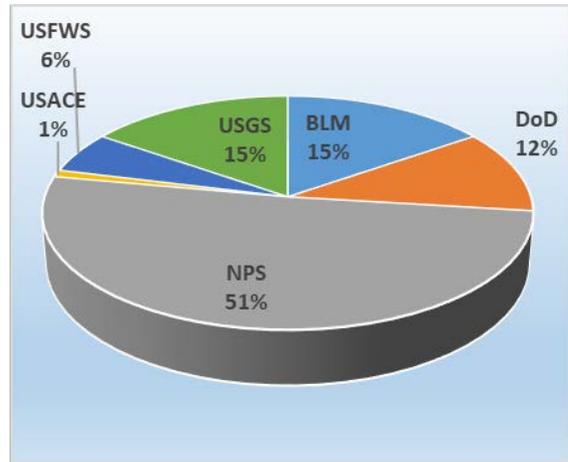


Figure 1. Percentage of TAs/Mods by Agency FY20

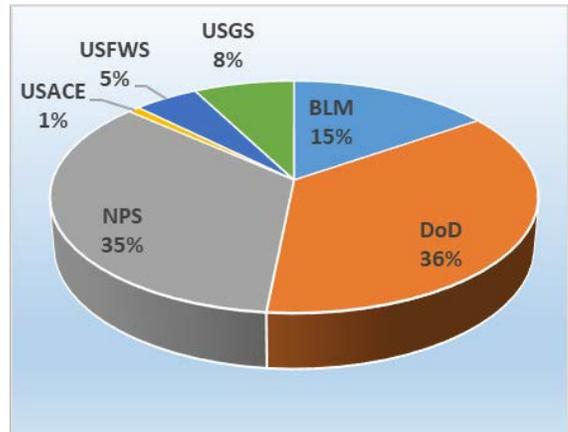


Figure 2. Percentage of Funds by Agency FY20

Observations:

- Six of the ten agencies had activity this fiscal year. Activity in terms of project dollars and number of TAs/mods is down this year, 12 and 13 percent respectively (see Table 1 and Figures 1 and 2).
- Although the number of TAs/mods executed for the DoD remains stable this year, the dollar amount decreased by \$2.3 M.
- After a two year downward trend, NPS numbers stayed flat. NPS remains the biggest user of the RM-CESU in terms of number of TAs per year.
- The BLM continues an upward trend in dollar activity towards projects with a \$1.1 M increase this year on projects partnering with Montana State University, Montana Tech, Salish Kootenai College, Utah State University, University of Montana, University of Waterloo and University of Wyoming.

CESU projects provide needed research, technical assistance, and/or education to our Federal partners and cover the fields of natural resources, cultural resources, social sciences, and interdisciplinary.

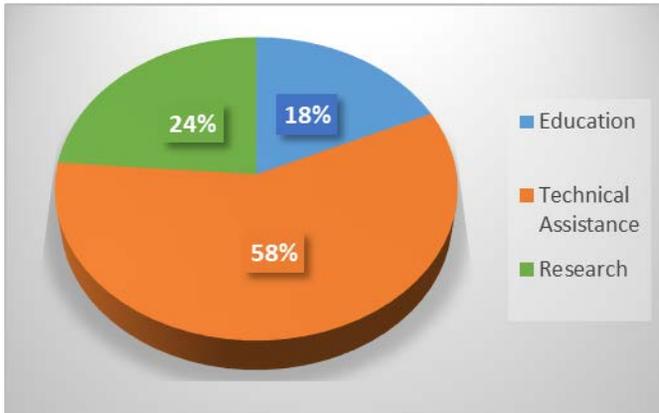


Figure 3. FY2020 Activity by Function

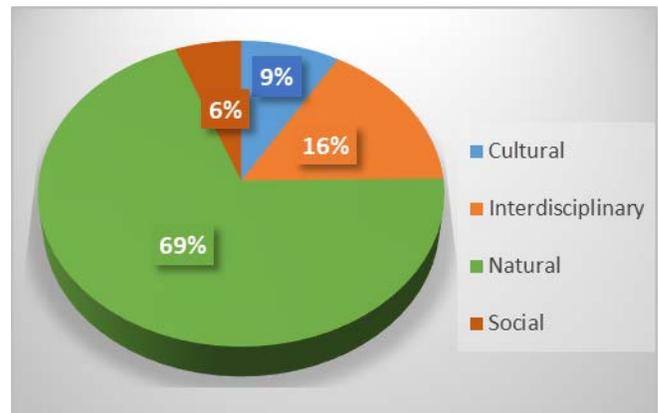


Figure 4. FY2020 Activity by Discipline

- The majority (58%) of RM-CESU projects provide technical assistance to our Federal partners (see Figure 3). These are projects that are solving real time management issues and often engage students in the process. Many of our RM-CESU projects involve multiple functions.
- RM-CESU facilitated \$12,434,353 in natural resource projects, \$854,181 in interdisciplinary projects, \$943,781 in cultural projects and \$1,670,433 in social science projects (see Figure 4).

Smallest Task Agreement: \$4,277 National Park Service/Colorado State University PI: Chris Ray; Establishing capacity for long-term monitoring of the American Pika, a sentinel species, by citizen scientists in Rocky Mountain National Park

Largest Task Agreement (Modification): \$3,027,200 Department of Defense/Colorado State University; PI: David Jones, Natural Resources Management at Pohakuloa Training Area and Keamuku Maneuver Area, HI

Mean: **\$151,544** (Five-year Mean: \$125,699) Median: **\$48,921** (Five-year Median: \$45,971)

Eleven of the twenty-five RM-CESU non-federal members received at least one project this year (see Figures 5 and 6). Montana Tech is being displayed separately, but is part of the University of Montana System.

Colorado State University (CSU) remains the largest recipient of CESU awards. CSU received \$9.6 million in 44 task agreements/modifications with the Department of Defense, National Park Service, and US Geological Survey. Projects range from cultural resources support to bison ecology to pika monitoring by citizen scientists.

The University of Montana (UM)/21 TAs/Mods for \$2.1 M) worked with the most Federal partners (Bureau of Land Management, Department of Defense, National Park Service, US Army Corps of Engineers, and US Fish and Wildlife Service) through the CESU. Projects range from wilderness character monitoring to condition assessments of springs and seeps to analysis of wolverine landscape genetics.

Tribal partner, Salish Kootenai College (SKC), received funding from Bureau of Land Management to develop genetically appropriate native plant material for use in habitat restoration and reclamation. SKC was also the recipient of funds from the National Park Service to inventory archaeological resources in the Gardiner River geothermal area, Yellowstone National Park.

One of RM-CESU’s more recent members, Front Range Community College (FRCC), received its first project through the CESU. The project engages FRCC faculty and students in providing technical geospatial expertise in support of habitat mapping efforts in the Great Lakes and other coastal National Park units.

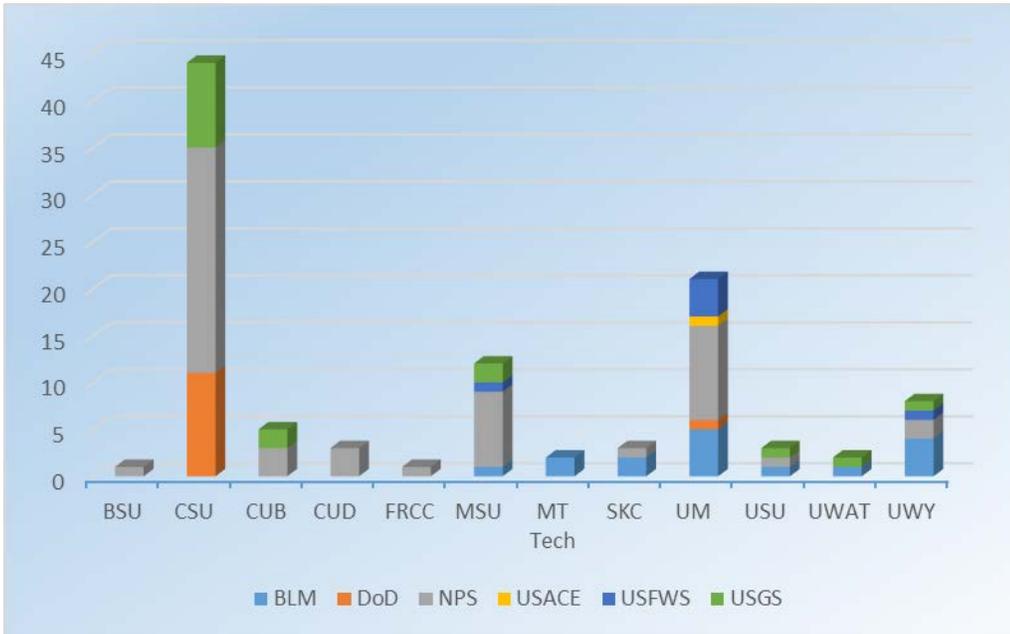


Figure 5. Distribution of TAs/Mods to Non-Federal Partners in FY2020

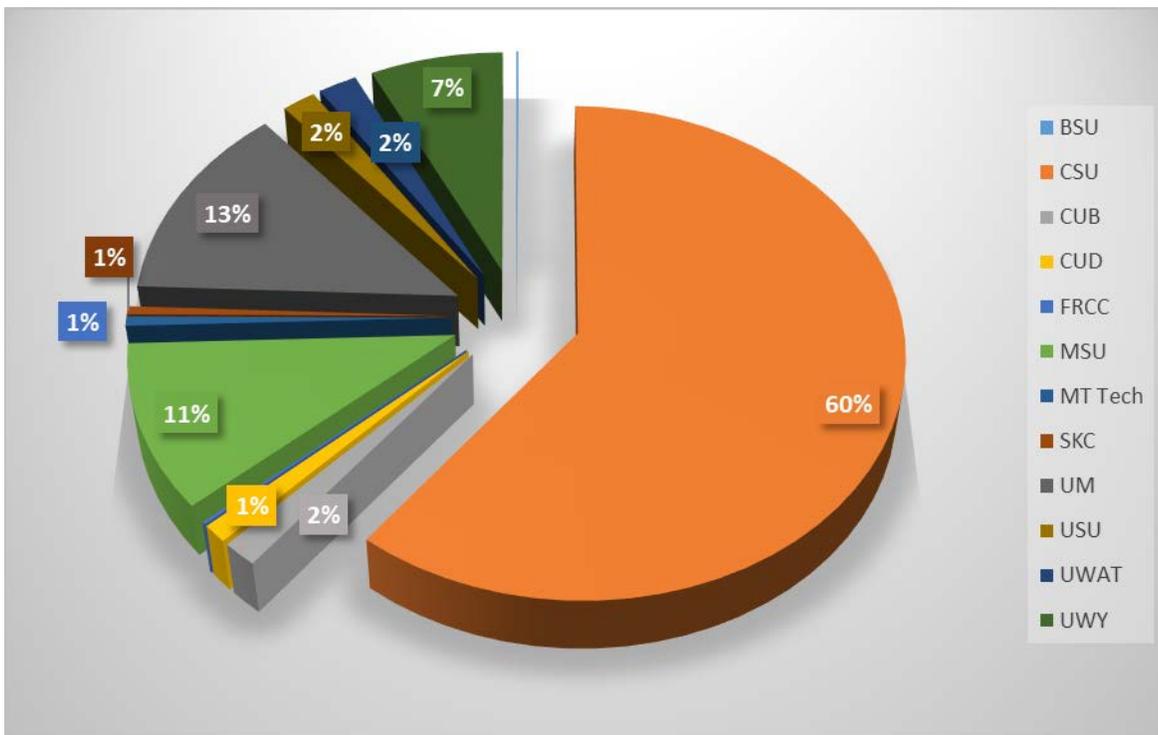


Figure 6. Distribution of funds to Non-Federal Partners in FY2020

Eleven principal investigators receiving project funds in FY2020 were using the RM-CESU agreement for the first time and contributed \$744,317 to the RM-CESU total.

Spotlight: University of Colorado Boulder Researcher Investigates Lakes at Treeline in Rocky Mountain National Park

The Continental Divide Research Learning Center at Rocky Mountain National Park (RMNP) is tasked with getting the “science done” with partners to understand changes in park ecosystems due to climate warming and migration of treeline into the alpine. They worked with Kim Vincent, Ph.D. student at University of Colorado Boulder (and her advisor, Tim Seastedt) to design a study to look at lake productivity (as measured by chlorophyll a) above and below the treeline. This arrangement between agency and university was made possible (and in a timely way) through the Rocky Mountains CESU.

The two types of lakes surveyed during this study can be seen in the photos below: alpine lakes are known for their extreme environments of cold temperatures, intense ultraviolet light, short growing seasons, and low nutrient contents. Lakes located below treeline, but above the montane zone (subalpine lakes), are generally warmer in temperature and have been found to have higher concentrations of dissolved organic carbon than alpine lakes. To make this comparison the researcher made two sampling visits to 16 lakes in drainages within RMNP and the Snowy Range in Wyoming, that spanned the elevation gradient between the alpine and treeline: one in the beginning of the growing season and one at the end.



Photographs of an alpine lake on the left (Cony Lake, RMNP) and subalpine lake (Mills Lake, RMNP) on the right. Both lakes were surveyed in this study. Credit: Kim Vincent

To make this project happen, the investigator, Kim Vincent, recruited undergraduates and graduate students to do the “heavy lifting” and backpacking into remote lakes in the park. This feature of RM-CESU projects – the involvement of many students in field and lab work – is a significant positive outcome of these agreements.

The study did not show large differences in productivity and cyanobacteria abundance between the two classes of lakes. However, there were large differences in lake productivity between the early and late season samplings. The student investigator concluded that increased dissolved organic



Prepping the Alpaca raft for water sampling at Lion Lake II in RMNP with Adalee Darling, undergraduate crew member, Credit: Kim Vincent

carbon (DOC) concentrations in the subalpine lakes were not sufficient to impede photosynthesis. Climate change is likely to affect alpine lakes in the Rocky Mountains, but not via changes in DOC concentrations, and related changes in phototrophy.

For more information on research going on at RMNP, go to <https://www.nps.gov/rlc/continentaldivide/research-highlights.htm> .

Student Participation

Based on project information available, we estimate approximately 65-70% of RM-CESU projects have student participation. Student participation includes research work by graduate and undergraduate students, as well as internships, field schools and class participation in projects.

2020 RM-CESU Student Award

Each year the RM-CESU recognizes the outstanding contribution of student(s) on a RM-CESU project. The recipient of the **2020 Student Award** is **Jennifer Fenwick**, Western Colorado University, for her contributions to the CESU project, ***Digital Junior Ranger Research and Experiential Development (September 2018 to present)***. Jennifer played a key role in developing a digital Junior Ranger prototype that not only benefits National Historic Trails, but all NPS education programs.

Jennifer was nominated by Dr. Melanie Armstrong, Director of the Center for Public Lands at Western Colorado University and supported by Carole Wendler in the National Trails office of the National Park Service.

In her nomination, Armstrong noted that “Though no student was formally assigned the team lead, Fenwick’s mentorship, preparation, focus and communication skills led to her being a de facto leader.” Armstrong went on to report, “Coordinating 19 students, ranging from high school to graduate school, required tremendous capability, responsibility, patience and compassion.

Fenwick has effectively performed traditional research and management roles, such as developing survey instruments and facilitating team meetings, but her leadership shines through in her interactions with other team members.”



Jennifer Fenwick, Western Colorado University, 2020 RM-CESU Student Award Recipient

RM-CESU ACTIVITY FY2016-FY2020

In last five years of operation, the RM-CESU has facilitated **719 task agreements/modifications obligating 93.2 million dollars** to non-federal partners for project work with our Federal partners (see Figure 7).

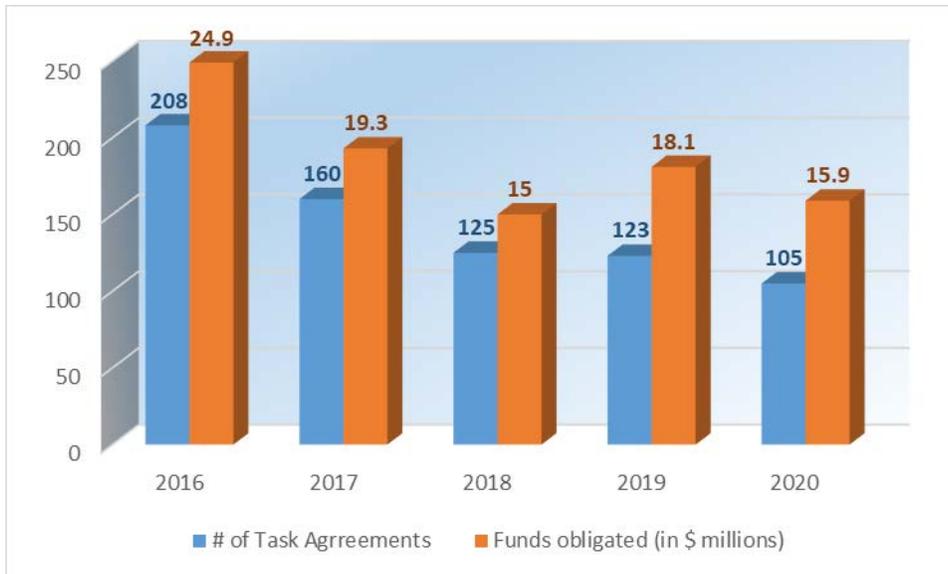


Figure 7. RM-CESU Activity FY2016-FY2020

UNIVERSITY OF MONTANA – HOST ACTIVITY AND ACCOMPLISHMENTS

- Initiated and facilitated a smaller working group of University Authorized Organization Representatives (Sponsored Programs) and CESU directors who are drafting a CESU determination and aspirational document.
- Participated in the 2020 CESU Network National Meeting, July 28-30, 2020.
- Participated in the December 18-19, 2020 Joint CESU Council-Working Group Meeting Directors to discuss the following topics: unconventional uses of the CESU, Host University support, Council composition, and National Office staffing.
- Participated in monthly CESU Directors' calls with Tom Fish, the National Coordinator.
- Maintained RM-CESU web site including posting meetings, project abstracts and reports, and CESU calls for statements of interests.
- Facilitated and completed our 5-year review and renewal.
- Facilitated design of new RM-CESU logo.
- Produced and distributed online RM-CESU Newsletter. The newsletters provide updates on CESU and partner activity, as well as announcements of funding, training, and job opportunities. Kathy Tonnessen, NPS-emeritus, is a regular contributor to the newsletter.
- Produced RM-CESU Annual Report and project lists.
- Facilitated communication and correspondence among existing and potential partners.
- Fielded partner questions in regards to CESU policy and procedures.
- Coordinated RM-CESU Annual Student Award (see page 7 for 2020 awardee).
- Coordinated NPS Jerry O'Neal Student Research Fellowship. This fellowship provides support for graduate students or superior upper division undergraduate students at RM-CESU universities and colleges conducting research in Glacier National Park, Grant-Kohrs Ranch National Historic Site, and Little Bighorn Battlefield National Monument.

New Dean of the University of Montana, College of Forestry and Conservation Will Chair the RM-CESU:

In June 2020 the University of Montana, W.A. Franke College of Forestry and Conservation announced the selection of Dr. Alan Townsend, as the new dean. He took over this responsibility, along with the chairmanship of the Rocky Mountains CESU, in early October 2020.

Alan is an ecosystem ecologist who previously led distinguished programs at Duke University, the University of Colorado Boulder and Colorado College. At CU Boulder he also was a Research Fellow in the Institute of Arctic and Alpine Research and professor of environmental studies. Originally from Missoula, Townsend has studied how ecosystems work, how they change and what those changes might mean for society. His internationally prominent research includes work on nutrient cycling and biogeochemistry in tropical forests, as well as global-scale analyses of human impact on major element cycles.

