



Rocky Mountains

Cooperative Ecosystem Studies Unit

Research, Education & Technical Assistance

NEWSLETTER

Spring 2019

RM-CESU NEWS & EVENTS



RM-CESU Announces the Annual Competition for Student Award: The Rocky Mountains CESU annually recognizes "above and beyond" accomplishments by student(s) involved in Rocky Mountains Cooperative Ecosystem Studies Unit (RM-CESU) projects. Nominations may be submitted by any representative of the federal agency that sponsored the RM-CESU project, or by the student's RM-CESU university.

Nominations for Student Award are due July 17, 2019. The Award winner(s) will receive a citation and give a presentation on their project results at annual RM-CESU Fall Meeting. For nomination instructions, go to the RM-CESU web site at [Student Award](#).

Salish Kootenai College to Host the Whitebark Pine Ecosystem Foundation Annual Science and Management Meeting, September 13-14, 2019: The annual science and management meeting put on by the Whitebark Pine Ecosystem Foundation, and co-sponsors (including the Confederated Salish and Kootenai Tribes and the Northern Rockies Fire Information Network) is scheduled for September 13-14, 2019 at Salish Kootenai College, Pablo, Montana, which is the local host. The meeting venue will be at the Victor Charlo /Johnny Arlee Theater on the Campus of Salish Kootenai College, situated in the Mission Valley surrounded by the Mission Mountains. This region-wide meeting brings together researchers, managers, students and enthusiasts of Whitebark Pine and related high-elevation forested ecosystems of the Northern Rocky Mountains in both the United States and Canada. The program includes a day of science, management, and cultural presentations about Whitebark Pine and an additional day for a field trip visiting high elevation forests and Whitebark Pine on the lands of the Confederated Salish & Kootenai Tribes. Follow whitebarkfound.org for additional information on conference programming and details on presenting papers or posters, attending, vending, volunteering or helping sponsor this event.

New RM-CESU Partner Research Featured in Ecological Applications: Tyler Creech and Matthew Williamson of the **Center for Large Landscape Conservation** in Bozeman have an article published in a recent edition of *Ecological Applications* titled: "Ecological and sociopolitical assessment of congressional and presidential designation of federal protected areas". The article is open-access and can be [downloaded here](#).

In the United States, federal protected areas can be designated through the Congress or by the president. The authors look at the ecological features of such protected areas (in the lower 48 states) and the socio-economic

factors that were in play during these two different types of designations. The authors found minimal differences between these designation modes for both ecological and sociopolitical variables. These results suggest that presidentially-designated protected areas tend to be no more burden-some to local communities and no less valuable for ecological conservation than more widely accepted federal protected areas such as wilderness areas and national parks. Their analysis looked at protected areas designated from 1996 until the present. Since 1996 there has been a significant increase in presidential use of the Antiquities Act to designate national monuments, especially in the western U.S.

Major Forest Ecology Article published in the Proceedings of the National Academy of Sciences on Wildfires and Climate Change and Forest Regeneration, with authors from multiple RM CESU Partners:

Forest ecologists from the USFS-Forest Service, University of Montana, University of Colorado Boulder, and Aldo Leopold Wilderness Research Institute recently published a paper in the prestigious **Proceedings of the National Academy of Sciences**. The citation is: Kimberley T. Davis, Solomon Z. Dobrowski, Philip E. Higuera, Zachary A. Holden, Thomas T. Veblen, Monica T. Rother, Sean A. Parks, Anna Sala, and Marco P. Maneta, **Wildfires and climate change push low-elevation forests across a critical climate threshold for tree regeneration**, PNAS March 26, 2019, 116 (13) 6193-6198.

The **press release** from the College of Forestry and Conservation, University of Montana describes these findings.

Kimberley Davis, a postdoctoral research associate in the College of Forestry and Conservation at UM, and her co-authors examined the relationship between annual climate and post-fire regeneration of ponderosa pine and Douglas fir in low-elevation forests of western North America. The authors used tree rings to determine establishment dates of more than 2,800 trees that regenerated after fires in Arizona, California, Colorado, Idaho, Montana and New Mexico between 1988 and 2015. The authors found that sapling regeneration exhibited a threshold response to annual climate conditions and the forests sampled crossed these climate thresholds in the past 20 years, resulting in fewer recruitment opportunities through time. In areas that have crossed climatic thresholds for regeneration, stand-replacing fires may result in abrupt ecosystem transitions to other non-forested ecosystem types.

NPS Project with Montana State University Library Provides "Sounds of the Wild West"

In 2015 The National Park Service, Office of Education and Outreach, funded an RM-CESU task agreement with the Montana State University Library, PI Kenning Arlitsch, to produce and archive audio productions to illustrate NPS science in parks. Also in that year, Yellowstone NP began collaborating with the MSU Library through an RM-CESU task agreement titled, **Innovations in Communicating Science at Yellowstone National Park**. This agreement allowed MSU to collect, curate and archive natural soundscape recordings of Montana and the Greater Yellowstone Ecosystem, and to connect people with these sounds of regional biodiversity.

These sound libraries have resulted in the creation of a recent podcast, titled "Sounds of the Wild West", produced by the MSU **Acoustic Atlas** and **Esri Story Maps team**. Since 2013, the **Acoustic Atlas** has collected sounds throughout Montana and the West. The archive is based at the **Montana State University Library** and has become one of the premier online collections of natural sounds in the United States.

This new collaboration called "[Sounds of the Wild West](#)" celebrates the Crown of the Continent, Upper Missouri, High Plains and Greater Yellowstone ecosystems through 25 sound recordings, five maps and nearly 30 images. Explore the full [MSU Acoustic Atlas](#).

University of Montana Graduate Student Helps RM-CESU Federal Partners Understand the Relationship of Bison Grazing to Grassland Bird Populations A number of the Rocky Mountains CESU Federal partners have similar ecosystem integrity and species persistence issues. Comparative studies of sites in a National Park (Yellowstone) and a Fish and Wildlife Refuge (National Bison Range) can help managers understand ecological trends that can be extrapolated to other western landscapes. The RM-CESU has been a catalyst for agency managers to use graduate student research to help with on-the-ground management of species and natural resources.



Bison grazing at the National Bison Range, Moise, Montana. D. Fagre

In one such study, Danielle Fagre, an MS student at University of Montana, Avian Science Center, wanted to research the relationship between grassland songbird abundance and the intensity of bison grazing. This is an interesting question since bison are considered to be "ecosystem engineers," meaning they modify habitat to be more or less favorable for other species. They can do this through behaviors like grazing, trampling and wallowing (taking dust baths). She was able to get support from both the US Fish and Wildlife Service to study this issue on the National Bison Range, western Montana and from the National Park Service in Yellowstone National Park. Part of her funding came from the Boyd Evison Student Fellowship, awarded by the Grand Teton Association and the Don Bedunah Memorial Scholarship at the University of Montana.

The work at these two sites resulted in her MS thesis, published in 2018. Fagre, Danielle A., "Avian Community Responses to Bison Grazing in North American Intermountain Grasslands" (2018). [Graduate Student Theses, Dissertations, & Professional Papers. 11213](#). Here is a [report of her work](#) at the National Bison Range.

Grassland and shrubland songbird species are a guild of conservation concern in North America. Many of these species have experienced severe population declines, due to habitat loss and land use change. Bison grazing can affect avian habitat by altering the vegetation structure. As part of her multi-year field investigation, Danielle looked at ten bird species and two ecological processes that affect species richness of grassland and shrubland songbirds: habitat heterogeneity from bison grazing, and productivity, a measure of the resources available to individuals. She concluded that bison grazing has a stronger influence on bird occupancy and species richness than site productivity. Additional analysis of populations of vesper sparrows (*Pooecetes gramineus*) and western meadowlarks (*Sturnella neglecta*) in these two locations showed that bison grazing intensity did not significantly affect the density of populations of these two avian species. Additional research questions regarding grassland bird demography remain for the next graduate student to solve.

RM-CESU Partners Publish a Synthesis Article on Ecosystem Level Effects of Lake Trout Invasion of Yellowstone Lake: After forty years of monitoring various ecosystem compartments and wildlife populations in and around Yellowstone Lake, Yellowstone National Park, there is now a synthesis article that describes the impact of invasion by non-native lake trout: T. M. Koel, L. M. Tronstad, J. L. Arnold, K. A. Gunther, D. W. Smith, J. M. Syslo, P. J. White, *Predatory fish invasion induces within and across ecosystem effects in Yellowstone National Park. Sci. Adv.* 5, eaav1139 (2019).

This article includes contributions from scientists with the National Park Service, University of Wyoming and Montana State University.

This article lists the effects of lake trout on lake zooplankton, cutthroat trout, river otters, osprey, bald eagles, bears and, most likely, elk, which have shown population, behavior and diet responses to this invasion.

Some of these effects include:

- The size of zooplankton in the lake increased, as fewer cutthroat trout were there to consume them. That has brought about an increase in the lake's water clarity, a likely factor in a slight rise in the lake's surface water temperature during summer.
- Fewer spawning cutthroat trout in tributary streams reduced the transport of nutrients such as ammonium into those streams
- The density and success of osprey greatly declined, as they're unable to prey on lake trout, which live at inaccessible depths.
- Bald eagles shifted their diet to compensate for the loss of cutthroat trout. Even with that shift in diet, the average number of bald eagle nests on Yellowstone Lake dropped from 11 in 2004-08 to eight in 2013-17.
- River otters, which relied on cutthroat trout as a primary food source, have shifted their diets to longnose suckers and amphibians. While there are no estimates on otter numbers in Yellowstone Lake and its tributaries before the introduction of lake trout, the estimate in 2008 -- one otter for every eight miles of shoreline -- is among the lowest ever reported for a river otter population.
- Black bears and grizzly bears, for which spawning cutthroat trout had been an important food source, had to seek alternatives. The estimated number of spawning cutthroats consumed annually by grizzlies declined from 20,910 in the late 1980s to 2,266 in the late 1990s to only 302 in the late 2000s.



UW researcher Lusha Tronstad holds a large cutthroat trout captured in Clear Creek, a tributary stream of Yellowstone Lake, when she was a Ph.D. student in spring 2005. The numbers of spawning cutthroats in the lake's tributaries have increased in recent years as a result of efforts to reduce the numbers of lake trout, whose presence has affected a number of other species in the Yellowstone Lake ecosystem since they were illegally introduced in the 1980s.

The authors note that extensive gill-netting of lake trout in Yellowstone Lake over the last 24 years has reduced the lake trout populations, and there is now some recruitment of juvenile cutthroat trout in small tributaries. However, the recovery of lake processes and wildlife populations is uncertain at this time.

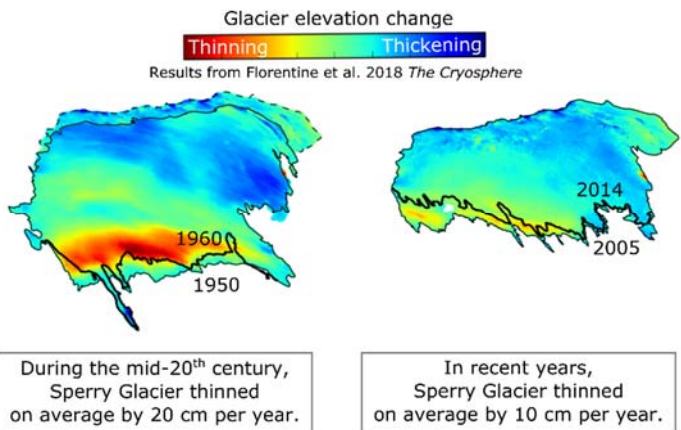
As mountain glaciers retreat, local processes like snow avalanching and solar shading can buffer (but not cease) ice loss

Prepared by 2017 Jerry O'Neal National Park Service Fellow, Caitlyn Florentine

Glaciers are melting worldwide as our planet warms. To mitigate the wide-ranging consequences of land ice loss, scientists aim to understand the precise relationship between glaciers and climate. One recent study in this vein illustrates an important subtlety in the glacier-climate connection.

Recently (from 2005 to 2014) summers have been warmer and winters drier relative to the mid-20th century (from 1950 to 1960) in Glacier National Park (GNP) in the Northern Rocky Mountains, USA. According to the simplest glacier-climate relationship, where hot and dry conditions equate to more ice melt, we would expect that recently GNP glaciers melted faster.

Yet change documented at Sperry Glacier, located in the heart of GNP, shows the opposite. Sperry Glacier thinned less on average during the modern decade, despite warmer summer temperatures and less winter snowfall. Why?



Analysis involving on-ice measurements made by the U.S. Geological Survey show that Sperry Glacier melted less during the warmer, drier period of 2005-2014 because during that decade a greater proportion of the glacier surface was adjacent to a tall headwall that delivers snow avalanches and shading.

Avalanching and shading potentially buffer ice loss and modulate the glacier-climate relationship at other mountain glaciers of GNP as well. However, the buffer provided by local effects is unlikely to prevent mountain glacier disappearance if climate continues to change on its current trajectory.



CALENDAR:

May 6-9, 2019, **2019 National Outdoor Recreation Conference - *Storytelling in Outdoor Recreation: People Places, Landscapes, Cultures***, Rapid City, SD. Showcases innovative and creative approaches to outdoor recreation research, planning and management. [2019 National Outdoor Recreation Conference Website](#).

September 9-12, 2019: **15th Biennial Conference of Science & Management on the Colorado Plateau & Southwest Region**, Flagstaff, AZ. The Colorado Plateau, Desert Southwest and Rocky Mountains will be holding a Joint CESU Meeting - Stay tuned for more details.

September 13-14, 2019: **Whitebark Pine Ecosystem Foundation Annual Science and Management Meeting**, Salish Kootenai College, Montana. This region-wide meeting brings together researchers, managers, students and enthusiasts of Whitebark Pine and related high-elevation forested ecosystems of the Northern Rocky Mountains in both the United States and Canada. The program includes a day of science, management, and cultural presentations about Whitebark Pine and an additional day for a field trip visiting high elevation forests and Whitebark Pine on the lands of the Confederated Salish & Kootenai Tribes.

October 23-26, 2019: **The 2019 National Workshop**, Bend Oregon. The conferences/workshops provide a great way for stewardship groups around the country to connect with each other and with key wilderness specialists in the federal land management agencies.

STUDENT OPPORTUNITIES

Western Colorado University's **Master of Science in Ecology** and **Master in Environmental Management (MEM)** programs are accepting applications for the 2019-2020 school-year (starting summer 2019) for a limited time.

Our MS provides the rigorous scientific training needed to answer pressing questions in the ecology, conservation, and management of the Earth's biota, landscapes, and ecosystems.

We offer two tracks:

- Fisheries and Wildlife Management
- Ecology and Conservation.

Requirements: BA or BS degree in biology or related field with college courses in Statistics and upper-level Ecology with a minimum grade of B completed prior to the student's first fall in the program. GRE scores submitted by the application deadline. Applicants are expected to have been in contact with a faculty advisor prior to submission of application.

Western's MEM offers interdisciplinary training for building environmental and community resilience in three tracks: **Integrative and Public Land Management**, **Sustainable and Resilient Communities**, and **Global Sustainability**. Distance learning or residential programs offered. [See this video for more information](#).

Apply Now, Click **Here!**

For more information contact:

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JOB OPPORTUNITIES

For details, visit [Job Opportunities](#)

2 Postdoctoral Fellow Positions - enhancing research program related to the human dimensions of long-term agro-ecosystems assessment, University of Idaho, Moscow, ID (closes 5/21/2019)

GIS and Sea Level Specialist, Natural Resource Ecology Laboratory, Colorado State University, Fort Collins, CO (closes 5/17/2019)

GIS Technician/Cartographer, Center for Environmental Management on Military Lands, Colorado State University, Camp Roberts, CA (closes 5/13/2019)

Wildland Fire Management Specialist, Center for Environmental Management on Military Lands, Colorado State University, Beale AFB, CA (closes 5/13/2019)

GIS Program Analyst, Center for Environmental Management on Military Lands, Colorado State University, Camp Roberts, CA (closes 5/12/2019)

Managing Director of Development for the College of Natural Resources, Colorado State University, Fort Collins, CO (closes 5/12/2019)

Post-doctoral researcher to study seasonal phenology of migratory birds within an annual cycle framework, Biology Department, Boise State University, Boise, ID (closes 5/3/2019)

Department Head - Animal and Veterinary Science, University of Idaho, Moscow, ID (review of applications begin 5/1/2019)

If you would like to post an announcement in the next RM-CESU Newsletter or on the website, please contact the RM-CESU Coordinator at rmcesu@cfc.umn.edu.