RM-CESU NEWS & EVENTS

Glacier National Park Employee Honored for Cultural Resource Work

Lon Johnson at Glacier National Park was one of four NPS employees recognized with the 2011 Appleman-Judd-Lewis Award for excellence in cultural resource stewardship. The other recipients are Russ Smith, superintendent of Fredericksburg and Spotsylvania County Battlefield Memorial National Military Park; the Historic Preservation Program of Yosemite National Park; and Tom Des Jean, Archeologist at Big South Fork National River and Recreation Area. The awards were given by National Park Service Director Jonathan B. Jarvis in a September 19 ceremony at the Department of the Interior headquarters in Washington, D.C.

Lon Johnson - Cultural Resource Specialist/Historical Architect, Glacier National Park

The sub-alpine and alpine areas of Glacier National Park have been used for travel, hunting, and spiritual purposes by ancestors of the Salish, Kootenai, and Blackfeet peoples for thousands of years. These behaviors have very likely deposited artifacts and paleo-biological objects in ice and snow patches, and their exposure by melting related to climate change could lead to damage, loss, or illegal removal. In response to this emerging stewardship challenge, Johnson assembled a team of experts from the tribes, eminent archeologists from the Universities of Wyoming, Arizona, and Colorado (Boulder), and knowledgeable park personnel. The group successfully submitted the Glacier Ice Patch Archeology project and was awarded support under Climate Change Response funds (and distributed through the RM-CESU). The project is designed to recover delicate items from melting ice patches, and contains a unique interpretive component for videos and interactive web design that target tribal youngsters and also be made available to the general public.

The Appleman-Judd-Lewis Awards recognize expertise and outstanding contributions to cultural resource stewardship and management by permanent full-time employees of the National Park Service. Offered annually, the awards were created to encourage creativity in cultural resource stewardship and management practices and projects, particularly those that may serve as examples or models for programs service-wide. Established in 1970, the awards are named for three distinguished former National Park Service employees: historian Roy E. Appleman, historical architect Henry A. Judd, and curator Ralph H. Lewis.
A novel genetic study led by the University of Colorado Boulder has helped to clarify the native diversity and distribution of cutthroat trout in Colorado, including the past and present haunts of the federally endangered greenback cutthroat trout.

The study, led by CU-Boulder postdoctoral researcher Jessica Metcalf, was based largely on DNA samples taken from cutthroat trout specimens preserved in ethanol in several U.S. museums around the country that were collected from around the state as far back as 150 years ago. The new study, in which Metcalf and her colleagues extracted mitochondrial DNA from fish to sequence genes of the individual specimens and compared them with modern-day cutthroat trout strains, produced some startling results.

The biggest surprise, said Metcalf, was that the cutthroat trout native to the South Platte River drainage appears to survive today only in a single population outside of its native range -- in a small stream known as Bear Creek that actually is in the nearby Arkansas River drainage. The strain from Bear Creek is thought to have been collected from the South Platte River drainage in the 1880s by an early hotelier who stocked the fish in a pond at the Bear Creek headwaters to help promote an early tourist route up Pikes Peak.

"We thought one way to get to the question of which cutthroat trout strains are native to particular drainages was to go back to historical samples and use their DNA as a baseline of information," said Metcalf of the chemistry and biochemistry department and a former postdoctoral researcher at the Australian Centre for Ancient DNA. "Our study indicates the descendants of the fish that were stocked into Bear Creek in the late 1800s are the last remaining representatives of the federally protected greenback cutthroat trout."

A second, key set of data was all of the Colorado cutthroat trout stocking records over the past 150 years, a task spearheaded by study co-author and fish biologist Chris Kennedy of the U.S. Fish and Wildlife Service. Between 1889 and 1925, for example, the study showed that more than 50 million cutthroat trout from the Gunnison and Yampa river basins were stocked in tributaries of all major drainages in the state, jumbling the picture of native cutthroat strains in Colorado through time and space.

Originating from the Pacific Ocean, cutthroat trout are considered one of the most diverse fish species in North America and evolved into 14 recognized subspecies in western U.S. drainages over thousands of
years. In Colorado, four lineages of cutthroats were previously identified: the greenback cutthroat, the Colorado River cutthroat, the Rio Grande cutthroat and the extinct yellowfin cutthroat.

The museum specimens used in the study came from the California Academy of Sciences, the Smithsonian Museum of Natural History in Washington, D.C., the Academy of Natural Sciences in Philadelphia and the Harvard University Museum of Comparative Zoology. Colorado cutthroat trout specimens were collected by a number of early naturalists, including Swiss scientist and former Harvard Professor Louis Agassiz and internationally known fish expert and founding Stanford University President David Starr Jordan.

The new study, published online today in Molecular Ecology, follows up on a 2007 study by Metcalf and her team that indicated there were several places on the Front Range where cutthroat populations thought to be greenbacks by fish biologists were actually a strain of cutthroats transplanted from Colorado’s Western Slope in the early 1900s.

Other co-authors on the new study included CU-Boulder Professor Andrew Martin and CU-Boulder graduate students Sierra Stowell, Daniel McDonald and Kyle Keepers; Colorado Parks and Wildlife biologist Kevin Rogers; University of Adelaide scientists Alan Cooper and Jeremy Austin; and Janet Epp of Pisces Molecular LLC of Boulder.

"With the insight afforded by the historical data, we now know with a great deal of certainty what cutthroat trout strains were here in Colorado before greenbacks declined in the early 20th century," said Martin of CU’s ecology and evolutionary biology department. "And we finally know what a greenback cutthroat trout really is."

Metcalf and her colleagues first collected multiple samples of tissue and bone from each of the ethanol-pickled trout specimens, obtaining fragments of DNA that were amplified and then pieced together like a high-tech jigsaw puzzle to reveal two genes of the individual specimens. The tests were conducted on two different continents under highly sterile conditions and each DNA sequencing effort was repeated several times for many specimens to ensure accuracy in the study, Metcalf said.

Roughly half of the study was conducted at CU-Boulder and half at the Australian Center for Ancient DNA at the University of Adelaide, where Metcalf had worked for two years. “By conducting repeatable research at two very different, state-of-the-art laboratories, we were able to show the Bear Creek trout was the same strain as the cutthroats originally occupying the South Platte River drainage.”

The Bear Creek trout strain is now being propagated in the Colorado Parks and Wildlife hatchery system and at the USFWS Leadville National Fish Hatchery.

In addition to identifying the Bear Creek cutthroat trout, Metcalf and her colleagues discovered a previously unknown cutthroat strain native to the San Juan Basin in southwestern Colorado that has since gone extinct. The study also confirmed that the yellowfin cutthroat, a subspecies from the Arkansas River headwaters that grew to prodigious size in Twin Lakes near Leadville, also had gone extinct.

Fortunately, most fish preserved by naturalists before 1900 were “fixed” in ethanol, which makes it easier for researchers to obtain reliable DNA than from fish preserved in a formaldehyde solution, a practice that later became popular. Prior to the new study -- which included DNA from specimens up to about 150
years old -- scientists working in ancient DNA labs had only performed similar research on ethanol-
 preserved museum vertebrate specimens less than 100 years old.

“One of the exciting things to come from this research project is that it opens up the potential for
 scientists to sequence the genes of other fish, reptiles and amphibian specimens preserved in ethanol
 further back in time than ever before to answer ecological questions about past diversity and distribution,”
 said Metcalf, who conducts her research at CU’s BioFrontiers Institute.

Funding for the study was provided by agencies of the Greenback Cutthroat Trout Recovery Team,
 including the USFWS, the U.S. Forest Service, the Bureau of Land Management, the National Park Service
 (through the RM-CESU) and Trout Unlimited.

“I think in many cases success depends less on the application of a new technology and more on the
 convergence of people with shared interest and complementary skills necessary for solving difficult
 problems,” said Martin. “Our greenback story is really one about what can be discovered when dedicated
 and talented people collaborate with a shared purpose.”

“We’ve known for some time that the trout in Bear Creek were unique,” said Doug Krieger, senior aquatic
 we didn’t realize they were the only surviving greenback population.”

The decline of native cutthroats in Colorado occurred because of a combination of pollution, overfishing and
 stocking of native and non-native species of trout, said Metcalf. “It’s ironic that stocking nearly drove the
 greenback cutthroat trout to extinction, and a particularly early stocking event actually saved it from
 extinction,” she said.

PARTNER NEWS & EVENTS

Calendar of Events:
March 11-15, 2013: 2013 George Wright Society Meeting, Denver, CO. Every two years, the George
 Wright Society organizes the USA’s premier interdisciplinary professional meeting on parks, protected

April 18, 2013: 35th Public Land Law Conference and the 41st National Spring Conference on the
 Environment - Balancing Act & Paradigm Shift: The Role of Public Lands in America’s Energy Future,
 University of Montana Law School, Missoula, MT. http://publiclandlawreview.com/public-land-law-
 conference/

TRAINING AND COURSE OPPORTUNITIES
WEBINAR: Small Bugs with Large-scale Impacts: Ecosystem & Watershed-level Responses to the
 Mountain Pine Beetle Outbreak Tuesday, Oct. 30th, 2012 from 10 AM to 11:30 AM Mountain for a webinar
 on ecosystem and watershed-level responses to the mountain pine beetle outbreak. Polly Hays (Region 2
 Water Program Manager), Bruce Sims (Region 1 Regional Hydrologist), and RMRS scientists Rob Hubbard,
 Kelly Elder, and Chuck Rhoades will explore questions such as How might these forested ecosystems change
in the coming decades? and What are potential impacts to water quality and quantity in mountain watersheds? [http://www.fs.fed.us/rmrs/events/#future-forests](http://www.fs.fed.us/rmrs/events/#future-forests)

October 23-25, 2012: Partnering with Beaver in Restoration Design Workshop, Logan, UT. Cost: $1,000. This 3-day workshop is intended for resource managers, restoration practitioners, researchers and others interested in the use of beaver for restoring rivers and/or streams. Participants will come away with a) an appreciation of beaver ecology and the complex feedbacks between beaver activity, hydrogeomorphic responses, riparian vegetation and fish ecology; b) knowledge of past and ongoing restoration projects using beaver; c) a working understanding of considerations in restoration designs using beaver; d) an introduction of how to develop dynamic designs utilizing beaver; and e) how to manage public expectations regarding potential restoration responses involving beaver. The workshop will include field trips to a number of active local beaver colonies, hands-on design exercises, and some interactive lectures and discussions. [https://cnr.usu.edu/streamrestoration/htm/course-information/#beaver](https://cnr.usu.edu/streamrestoration/htm/course-information/#beaver)

**RESEARCH/FUNDING OPPORTUNITIES**

**National Science Foundation-Paleo Perspectives on Climate Change** program [Funding Opportunity Number: 10-574](http://www07.grants.gov/search/search.do;jsessionid=p6nzP5tVyVmyQnLJ76yQ6836FQmVR5c1JkRwvQcHTZ4YM3bgJLL3i712472910?oppId=55215&mode=VIEW)

The National Science Foundation’s Paleo Perspectives on Climate Change program utilizes key geological, chemical, and biological records of climate system variability to provide insight rates of change that characterized the Earth’s historical climate variability, the responses of key Earth system components, and the sensitivity of the Earth’s climate system to forcing changes. The scientific objectives of this program are to 1) provide comprehensive paleoclimate data sets that can serve as model test data sets analogous to instrumental observations; and 2) enable transformative syntheses of paleoclimate data and modeling outcomes to understand the response of the long-term variability of the Earth’s climate system. The NSF is expecting to award 35 grants, ranging between $20K and $1 Million. Eligibility: Unrestricted; Application deadline is 5pm (proposer’s local time) on October 18, 2012

The National Science Foundation’s Hydrologic Sciences [program](http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=13684&org=NSF&from=fund), which focuses on the flow of water and transport processes within streams, soils, and aquifers, has an upcoming proposal acceptance deadlines: December 5, 2012. A description of project priorities is included on the website:

**STUDENT OPPORTUNITIES**

**Fall 2013 EPA STAR Fellowships for Graduate Environmental Study** The EPA is offering fellowships for master’s and doctoral level students in environmental fields of study. Approximately 80 new fellowships will be awarded in the late summer 2013. Master’s level students may receive support for a maximum of two years. Doctoral students may receive support for a maximum of three years, usable over a five year period. The fellowship program provides up to $42,000 per year of support per fellowship. Applications are due November 27, 2012. For more information including eligible research areas and to apply visit the EPA website: [http://epa.gov/ncer/rfa/2013/2013_star_gradfellow.html](http://epa.gov/ncer/rfa/2013/2013_star_gradfellow.html)
**JOB OPPORTUNITIES**

**Rangeland Management Specialist**, Bureau of Land Management, Kingman, AZ (closes 10/26/2012)

**Marketing Director, Museum of the Rockies**, Montana State University, Bozeman, MT (closes 10/26/2012)

**Archeologist**, National Park Service, Fairbanks, AK (closes 10/23/2012)

**Assistant Prof. -- Quantitative Environmental Social Science**, Environmental Studies program (ENVS), University of Colorado, Boulder, CO (Review of applications will begin on 10/21/2012)

**Rangeland Management Specialist**, Bureau of Land Management, Vale, OR (closes 10/19/2012)


**Geologist**, Bureau of Reclamation, Lakewood, CO (closes 10/17/2012)

**Archeologist**, Bureau of Reclamation, Boise, ID (closes 10/16/2012)

**Assistant Professor of Rangeland Ecology & Management**, College of Forestry & Conservation, University of Montana, Missoula, MT (Review of applications will begin on 10/15/2012; the position will begin in August 2013)

**Postdoctoral Research Associate, Yellowstone National Park Social Science**, Mammoth Hot Springs, WY (Screening of applications will begin immediately and continue to be accepted until the position is filled.)

**Assistant/Associate Professor Human Geography**, Department of Geography, Boulder, CO (Review of applications will begin on 10/5/2012; the position will begin in August 2013)

**Two Assistant Professorships in Evolutionary Biology**, University of Colorado Boulder, Boulder, CO (Review of applications will begin on 10/5/2012)

For details on job opportunities visit [http://www.cfc.umt.edu/cesu/Postings/Jobs.php](http://www.cfc.umt.edu/cesu/Postings/Jobs.php)

**MEETINGS OF INTEREST**


November 17-19, 2012: **4th International Conference on Science in Society**, University of California, Berkeley. This conference addresses the social impacts, values, pedagogies, politics and economics of science. It is an inclusive forum that welcomes a breadth of perspectives on science from practitioners, teachers and researchers representing a wide range of academic disciplines. [http://science-society.com/conference-2012/](http://science-society.com/conference-2012/)
http://www.environmentaldisasters.net/


July 21-25, 2013: 26th International Congress for Conservation Biology, Baltimore, MD. The biennial International Congress for Conservation Biology is recognized as the most important global meeting for conservation professionals and students. The theme of the 26th ICCB is "Connecting systems, disciplines and stakeholders" and the meeting will be aptly located along the shores of the Chesapeake Bay in Baltimore’s Inner Harbor. Chesapeake Bay is the world’s most productive estuary and the region is rich in cultural and historical heritage and conservation challenges and success stories.  
http://www.conbio.org/mini-sites/iccb-2013

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.umt.edu.