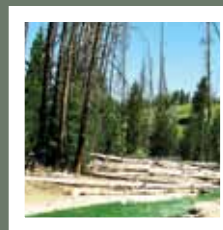


Year 2

Montana NSF EPSCoR

The Montana NSF EPSCoR Program is a partnership between Montana's research universities (Montana State University and The University of Montana) as well as Montana Tech and Montana's seven tribal colleges. Montana EPSCoR is focusing on increasing research competitiveness in two targeted research areas: *Hydrogen and the Environment* and *Large River Ecosystems* and one support area, *Cyberinfrastructure*. *Hydrogen and the Environment* builds on the expertise of researchers in the Montana University System who study hydrogen-metabolizing mechanisms in nature with the mission of applying their understanding to the development of hydrogen as an alternative fuel. *Large River Ecosystems* is building partnerships in the state and region to examine the range of processes affecting large rivers and their ecosystems and restoration techniques and efforts.



annual report
August 1, 2008 – July 31, 2009

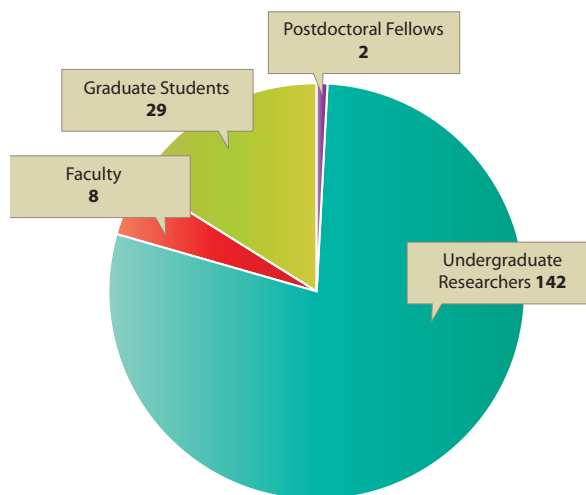
01/HIGHLIGHTS OF THE YEAR INCLUDE:

- Eight new faculty hires
- Increased bandwidth for Flathead Lake Biological Station and UM Fort Missoula
- New outreach programs reaching over 7500 K-12 students across the state
- 80% increase in number of tribal college students involved in research projects
- NSF EPSCoR funds for new faculty hires, equipment, and human resources leveraged by 50% with cost contributions from other sources

02/SCIENTIFIC ACHIEVEMENTS:

SELECTED PUBLICATIONS SUPPORTED IN PART BY EPSCOR DURING THE PAST YEAR

1. Piccardo, P., Amendola, R., Fontana, S., Chevalier, S., Caboches, G., and Gannon, P. (2009) Interconnect materials for next-generation solid oxide fuel cells, *Journal of Applied Electrochemistry* 39(4): 545-551.
2. Lu, C. Kang, J.L. (2008) Generation of transgenic plants of a potential oilseed crop *Camelina sativa* by *Agrobacterium*-mediated transformation, *Plant Cell Reports* 27, 273-278.
3. Jones, K. L.; Poole, G. C.; Woessner, W. W.; Vitale, M. V.; Boer, B. R.; O'Daniel, S. J.; Thomas, S. A.; Geffen, B. A., (2008) Geomorphology, hydrology, and aquatic vegetation drive seasonal hyporheic flow patterns across a gravel-dominated floodplain. *Hydrological Processes* 22(13), 2105-2113.
4. Jones, K. L., G. C. Poole, S. J. O'Daniel, L. A. K. Mertes and J. A. Stanford. (2008). Surface hydrology of low-relief landscapes: assessing surface water flow impedance using LIDAR-derived digital elevation models. *Remote Sensing of Environment* 112:4148-4159
5. Schoenfeld, T.; Patterson, M.; Richardson, P. M.; Wommack, K. E.; Young, M.; Mead, D. (2008), Assembly of viral metagenomes from Yellowstone hot springs. *Applied and Environmental Microbiology*, 74, (13), 4164-4174.
6. Arrigoni, A. S., G. C. Poole, L. A. K. Mertes, S. J. O'Daniel, S. A. Thomas, W. W. Woessner, and B. R. Boer. (2008) Buffered, lagged, or cooled? Disentangling hyporheic influences on temperature cycles in stream channels. *Water Resources Research* 44, W09418.
7. Zhang, K., J.S. Kimball, E.H. Hogg, M. Zhao, W.C. Oechel, J.J. Cassano and S.W. Running, (2008). Satellite-based model detection of recent climate driven changes in northern high latitude vegetation productivity. *J. Geophys. Res.* 113, G03033, doi:10.1029/2007JG000621.
8. McGlynn, S. E.; Shepard, E. M.; Winslow, M. A.; Naumov, A. V.; Duschene, K. S.; Posewitz, M. C.; Broderick, W. E.; Broderick, J. B.; Peters, J. W; HydF as a scaffold protein in [FeFe] hydrogenase H-cluster biosynthesis, (2008) *Febs Letters*, 582, 2183-2187.



EPSCoR Workforce Development

PARTICIPANT GENDER AND ETHNICITY							
YEAR	GENDER			ETHNICITY			
	MALE	FEMALE	TOTAL	AMERICAN INDIAN	AFRICAN AMERICAN	PACIFIC ISLANDER	HISPANIC
07-08	183	122	305	67	0	0	2
08-09	223	143	366	88	2	8	4

Participants in EPSCoR activities by year

Left:

Graduate students Janice Lucon, Kevin Swanson and undergraduate Tara Ness at work in the lab.

03/ PROGRAMMATIC ACHIEVEMENTS:

PROGRAMS / EIGHT NEW FACULTY HIRES:

- 01 Trevor Rainey (Chemistry and Biochemistry, MSU)
- 02 Geoffrey Poole (Land Resources and Environmental Sciences, MSU)
- 03 Chaofu Lu (Plant Sciences and Plant Pathology, MSU)
- 04 Paul Gannon (Chemical and Biological Engineering, MSU)
- 05 Jeffrey Heys (Chemical and Biological Engineering, MSU)
- 06 Anton Vorontsov (Physics, MSU)
- 07 Valeriy Smirnov (Chemistry, UM)
- 08 John Kimball (Flathead Lake Biological Station, UM)



01



02



03



04



05



06

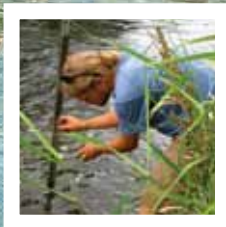


07



08





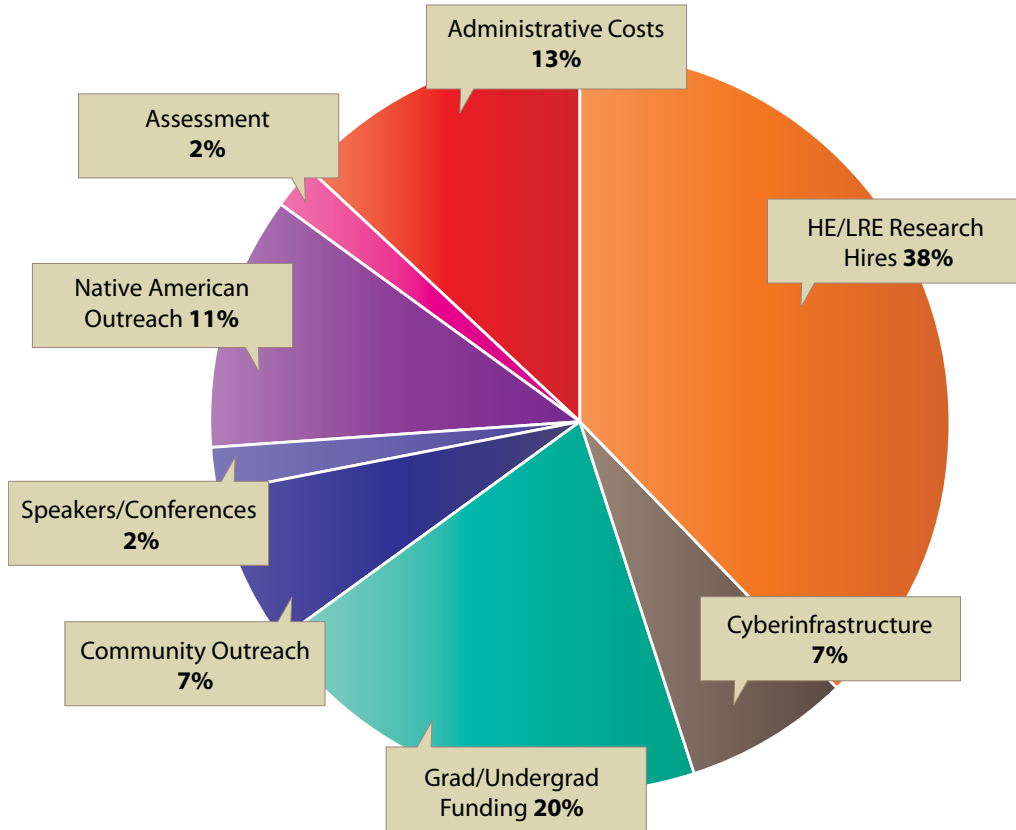
spectrUM
science. try it.



04/ OUTREACH

Reached over 7500 K-12 students with science outreach programs through partners including: spectrUM a hands-on science discovery center, which also brings science to the public through thematic field trip buses, a Super Science Squad, Science Learning Tent, Circus of Science and MosSE (traveling exhibits to the 7 Native American reservations in Montana (www.spectrum.umt.edu). And, MSU Extended University who co-sponsored Expanding Your Horizons, a state wide girls science and math conference, Science Saturdays featuring the science of MSU researchers, and multimedia venues bringing the Hydrogen and the Environment science to the public.

Year 1
Expenditure Distribution



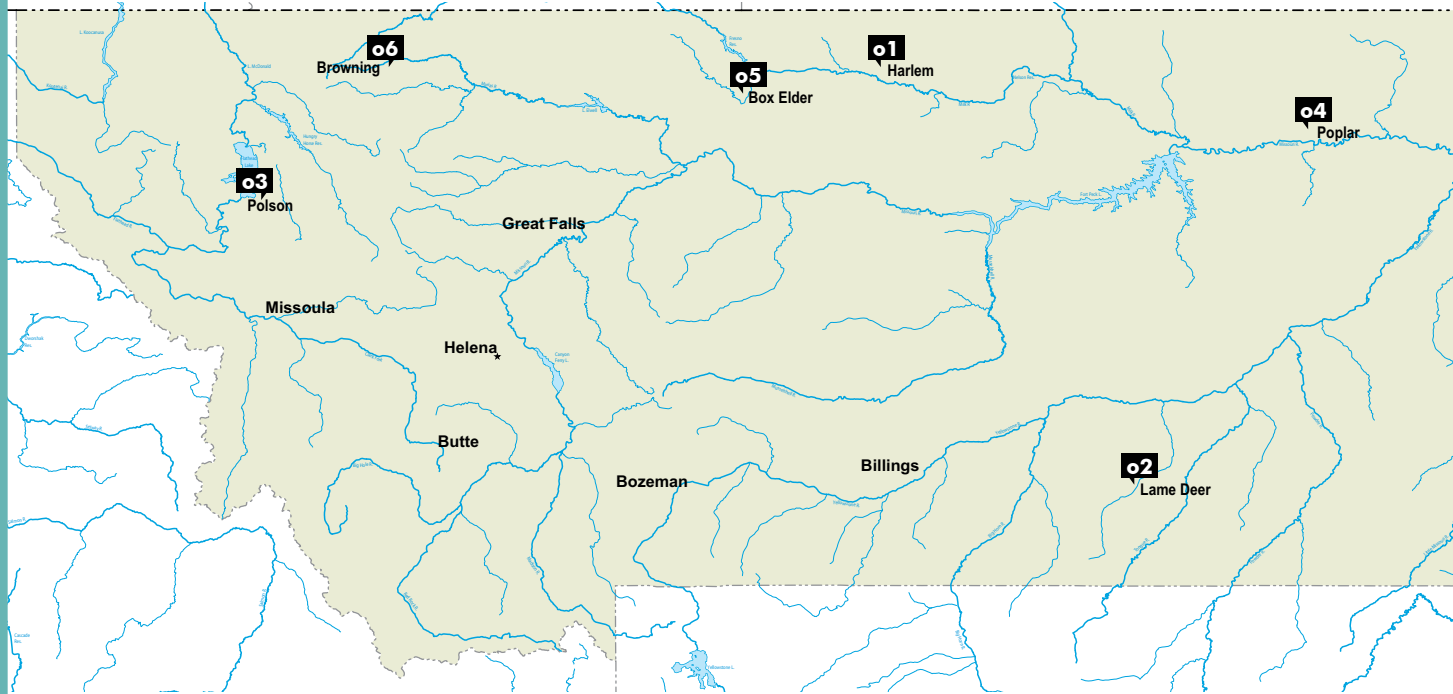
Below:

Girls participating in Expanding Your Horizons study micro-organisms from Yellowstone National Park; Science Saturday participants learn about polymers with green slime; at spectrUM, participants build a temperature-reading circuit as part of the Weather Club



04.1/ TRIBAL COLLEGE COLLABORATIONS

Through Montana EPSCoR, six Montana tribal colleges conduct Large River Ecosystems research projects on water systems relevant to each reservation and community. Undergraduate students participate in the research and the projects are tied to the curriculum.



Fort Belknap Community College

student interns learn techniques and procedures for studying the health of the Milk River including testing and reading fecal/total coliforms in samples and the importance of having access to quality water. They teach TCUP (Tribal College and Universities Program) summer institute high school participants about water quality issues. /o1

At Chief Dull Knife College

students compare bacteria isolated and characterized from the Tongue and Big Horn Rivers to samples previously isolated from the Flathead and Clark Fork Rivers to study species distribution. Students also conduct remote sensing with the use of a tethered blimp. /o2





o3

Students at **Fort Peck Community College** collect water samples monthly and record water flow at 13 designated sites on the Poplar River to monitor brine water. Results are presented to the Fort Peck Tribes Office of Environmental Protection. /o4

At **Salish Kootenai College** students correlate water table elevation of the Jocko River to vegetative cover types and are collaborating with the SKC Native Plant Nursery to propagate material for site restoration. Another project is documenting flowering rush infestation sites on Flathead Lake and developing experimental methods for species control. /o3



o4

Blackfeet Community College students monitor five sites along the Two Medicine River and Cutbank Creek collecting data on phosphate, nitrate, pH, dissolved oxygen, velocity and macro invertebrates. Before committing to their inclusion in the study, students conducted background archeological and cultural significance studies on the sites. /o6



o6



o5

As part of the math and science curriculum, students at **Stone Child College** study the level of pollution tolerant and intolerant macroinvertebrates in the Marias River above and below the Tiber Dam. /o5



o6

The vision of the Montana NSF EPSCoR program is to build sustainable capacity in these areas through direct investments in new tenure track faculty hires, postdoctoral fellows, PhD graduate students, and the involvement of undergraduates in the research endeavor.

Montana NSF EPSCoR

For more information:

<http://www.mtnsfepscor.org>



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