

Programs supporting Native American STEM learning created by the National Center for Earth-surface Dynamics

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ABSTRACT: Since 2002, the National Center for Earth-surface Dynamics has collaborated to develop programs aimed at supporting Native American participation in STEM fields, and especially in the Earth and Environmental Sciences. These include math and science camps for K-12, Research Experience for Undergrads program that takes place on two Native reservations, and support for new majors at tribal colleges. All of these programs have a common focus on collaboration with communities, place-based education, community-inspired research projects, a focus on traditional culture and language, and resource management on reservations. This presentation will discuss strategies that have been developed to put theory into practice in different programs and with various age groups



The Research Experience for Undergraduates Site on Sustainable Land and Water Resources (REU SLAWR)

The NSF REU SLAWR incorporates community-inspired research projects in collaboration with two Native reservations, the Confederated Salish and Kootenai Tribes in Montana and the Fond du Lac Band of Lake Superior Chippewa. A major focus of program evaluation is discovering the impact these place-based and participatory research projects have on undergraduate students as they complete their summer research opportunities. Projects are developed in several different ways. At Salish Kootenai College, students work directly with the reservation to explore potential projects, and then students propose and develop their own research questions. On the Fond du Lac reservation, in collaboration with University of Minnesota faculty, students join an ongoing research study of wild rice. The research on this important Ojibwe traditional food was developed in a collaboration between reservation natural resource managers and University of Minnesota, Duluth researchers. A third team conducts research out of the University of Minnesota's St. Anthony Falls Laboratory (SAFL). These students are working on ongoing SAFL projects. We discuss how these teams interact, and how these various approaches are providing students with a solid conceptual understanding of scientist-inspired research, community-inspired research, and co-created science.

The trip to Fond du Lac was a unique and memorable experience for team Zaaga'igan. Our guide Tom H. was very knowledgeable of the history, culture, and ecological significance of wild rice and the Anishinaabe people of the Great Lakes region. Overall we received lots of background information about tribal natural resource management which was a great way to learn more about why it is important to revise the current sulfate water quality standards for the protection of wild rice in Minnesota. Wild rice stands are an excellent habitat for developing juvenile fish, as well as feeding and resting stops for migratory waterfowl. Tribal lands here in Minnesota host an outstanding environmental habitat for the abundance of fish, wildlife, and surface water that is vital to sustaining the cultural resources and recreational activities which we depend on to achieve the mino-bimaahtii - the good life.



Antony Berthelote, an NCED associated PI, began the Hydrology program at SKC--here he is 2016 Faculty of the Year speaking to recent Hydrology A.S. and B.S. graduates



Supporting new STEM majors at TCUs

NCED collaborated with Salish Kootenai College as they developed the Hydrology A.S. and B.S. majors, the first Hydrology program at any tribal college in the country. Currently, under a new award from the NSF, we are collaborating with Leech Lake Tribal College to develop a new major in Earth Systems Science. Both programs incorporate community-based research projects, environmental monitoring activities, and a plan to move students forward on a path to 4-year geoscience degrees and graduate programs.

Our Partners

NCED institutional partners include University of Minnesota Twin Cities and Duluth (including the St. Anthony Falls Laboratory, The National Lacustrine Core Facility--LacCore, and the UMD Dept. of Earth and Environmental Sciences, Fond du Lac Tribal and Community College, Fond du Lac Band of Lake Superior Chippewa, the Leech Lake Tribal College, Salish Kootenai College, and the Confederated Salish and Kootenai Tribes.

Geoscience Alliance

The Geoscience Alliance is a national alliance that supports broadening participation of Native Americans in the Geosciences. We are a community of faculty and students from TCUs and majority institutions, personnel from government agencies and laboratories, elders, K-12 teachers and students and others. We have had 3 national conferences. We facilitate student opportunities, research collaborations, knowledge generation, and collective support for our members.



2015 Geoscience Alliance Meeting: A Changing Climate's Effects on Rivers, Estuaries, Oceans, First Foods and Tribal Health

gidakiimanaaniwigamig

gidakiimanaaniwigamig is a youth science immersion program for Native American K-12 students. For the past 14 years we have provided math and science camps and other STEM and cultural experiences for students from the Fond du Lac Band of Lake Superior Chippewa and surrounding communities. Students in gida have beaten the graduate gap by showing an astonishing 100% high school graduation rate (as compared to ~ 40% for other NA students in Minnesota). The camps focus on themes developed in collaboration with the FDL Resource Management Division.



Our Friday night started with our special guest Marne Kaeske from the 1854 Authority. Marne shared with us what the 1854 Authority does to protect the land and protect tribal rights. Marne shared with us how climate change is affecting moose in our region. We also had the chance to see and touch a moose antler!

On Saturday our camp teachers took the campers out on the Cloquet Forestry trails to talk about phenology, and forestry research being conducted right here where we camp each month. One cool experiment (no pun intended!) we looked at was a series of three greenhouses that are temperature-controlled to see how climate change will affect our subnivian zone. The subnivian zone is the area between the earth and the snowpack where many of our mammals like the red squirrel (ojidamoo) and field mice (wawaaganoojin) use to keep warm and safe from predators in our cold winters.



None of this work could have been accomplished without the ongoing support of our friends and colleagues at NSF! Thank you!