

Earth Partnership: Indigenous Arts and Sciences

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Partners: Apostle Islands National Lakeshore; Great Lakes Indian Fish and Wildlife Commission; Lac Courte Oreilles Ojibwa Community College; Lac du Flambeau Band of Lake Superior Chippewa; Northern Great Lakes Visitor Center; School Districts of Ashland, Bayfield, and Washburn (WI); UW-Madison Nelson Institute for Environmental Studies; UW-Extension; WI Department of Public Instruction

Overview

Earth Partnership: Indigenous Arts and Sciences (IAS) refines a model for integrating Indigenous and Western STEM education utilizing a 10-step framework for ecological restoration, project-based learning, and professional development. Through community dialogues and a collaborative design process with Native Nations of Wisconsin, Earth Partnership is developing an Indigenous Arts and Sciences approach that has allowed Native participants to voice their insights and aspirations regarding Native excellence in STEM learning. To date, 35 teachers, 20 students, and 50 community members have participated in IAS institutes and programs. Extended application and evaluation with Ojibwe bands in northern Wisconsin and with other tribal communities in the future will allow this approach to serve as an innovative model for addressing the need for increased Native American access to STEM fields and for future managers and stewards of natural and cultural resources.

Project Goals

1. Build capacity of formal and informal educators and citizens to generate enthusiasm among young people and adults for ecological STEM learning imbued with culture and place
2. Integrate culturally accurate and authentic resources, inquiry, and citizen science process skills in multiple formal and informal learning settings
3. Strengthen multicultural intergenerational community partnerships to restore aquatic and terrestrial habitats
4. Encourage Native youth to explore STEM careers to meet future workforce needs for managing tribal resources and to become knowledgeable scientific citizens capable of critical thinking and analysis of STEM related issues in their communities

Achievements

- Community dialogues and advisor meetings in Bad River and Red Cliff communities that engage community members in sharing their experiences and desires for the future and that reflect on project progress
- Seasonal learning events for youth and families including a Bad River watershed tour, wolf tracking, snowshoeing and winter tree identification, and storytelling; plans are in place for additional events of lake coring, harvesting sugar bush and wild rice, and designing a community rain garden
- Two professional development institutes for teachers from schools serving Bad River, Red Cliff, and Lac du Flambeau (LDF) communities (in Red Cliff and LDF, WI)
- Two institutes for youth from Bad River, Red Cliff, and LDF communities (in Ashland and LDF) for which they develop an action plan for an environmental service-learning project and earn elective credit from their school district
- Teacher integration of culturally relevant stewardship projects involving rain gardens, tribal natural resource resources staff, and stewardship
- Presentations at conferences of Native Nations, Wisconsin Indian Education Association, and Midwest Environmental Education Association
- Dissemination of project events through e-newsletters, blogs, and Facebook
- Youth projects of planting a thunderbird garden and pollinator plant trail at the Bad River Tribal Headquarters, digital storytelling on traditional sugar bush harvesting, pine marten monitoring in conjunction with Red Cliff Natural Resources Department and Apostle Islands National Lakeshore, and studying water flow into Lake Superior from Bad River Kakagon Sloughs using NASA imagery

Lessons Learned

Surveys of community partners, advisors, teachers, and students reveal several key formative findings from year one of this project. These pertain to project goals of culturally relevant STEM curriculum development, community engagement, place-based learning experiences, and adult mentors for participating students. Partners will expand the integration of STEM learning with indigenous knowledge in order to affirm the experiences students bring to the classroom and reduce the disconnect between Native and Western science. In the realm of relationship building, community dialogues have been essential to ensuring input from tribal leaders, community members, youth, and educators so that program is relevant to the community. Teachers also found field experiences on tribal land to be extremely important to the success of professional development institutes. Institute activities on reservation land enable educators working with tribal youth to better understand Native students and their communities. In addition, fostering relationships between students and adult mentors in their community ensures the success of IAS youth institutes. Students must have opportunities for relevant and meaningful experiences with elders and natural resource staff monitoring resources and implementing stewardship projects related to cultural and current tribal environmental issues on reservations and in ceded territory.



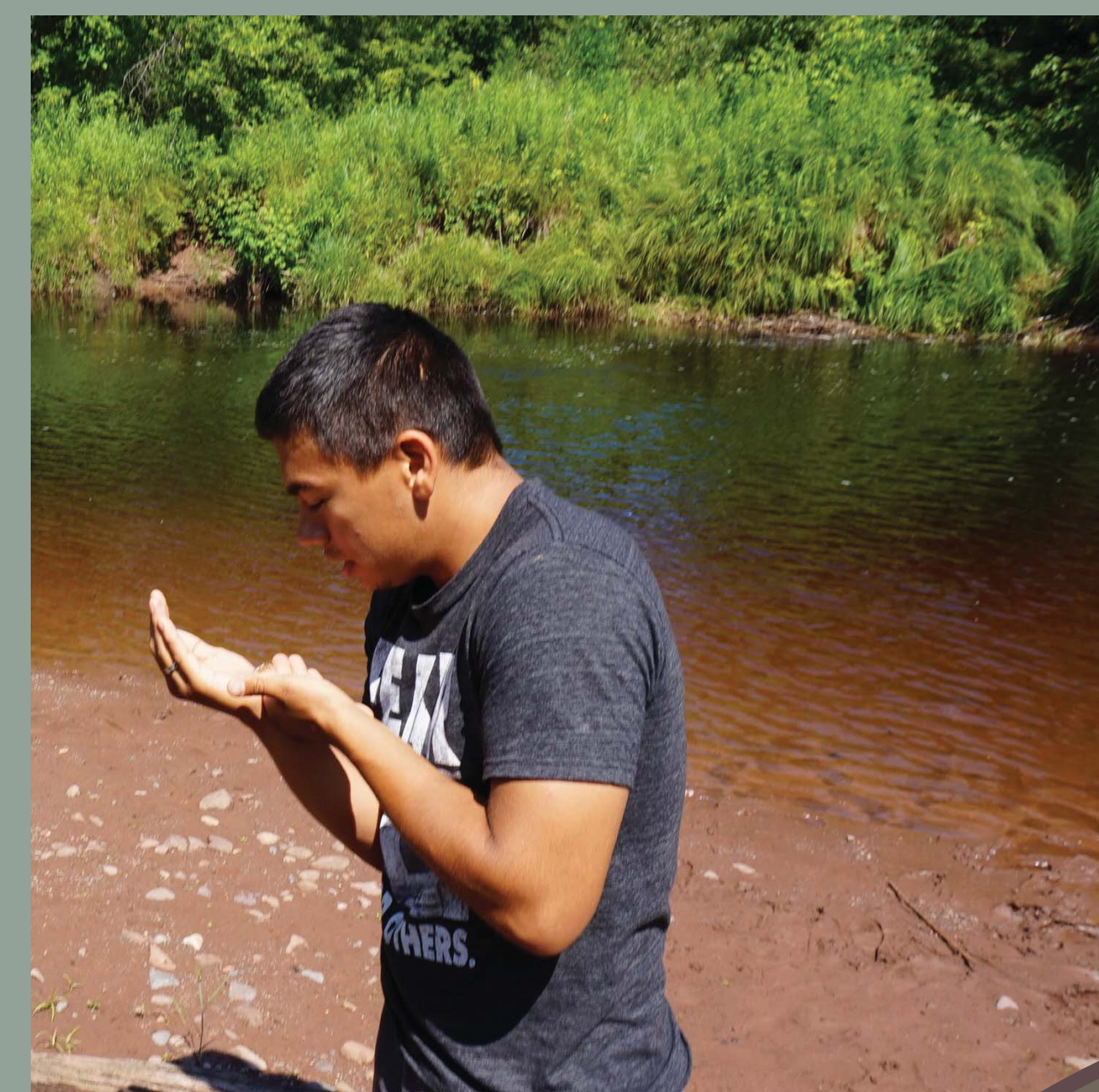
Evaluation

Program evaluation focused on impact on teachers, students, and community members and perceptions of the importance of STEM study and careers, integration of STEM learning with culture, and the degree to which the capacity for teaching and learning about the environment increased. Evaluation instruments include pre/post surveys, follow-up surveys, and interviews.

Teachers reported significant increases in: access to curriculum resources for teaching ecological stewardship and STEM content in a way that is culturally relevant, their beliefs regarding the importance of student learning about STEM topics in ways that are relevant to their cultural heritage, their beliefs regarding the importance of students learning scientific inquiry skills, and their level of environmental science and ecological knowledge

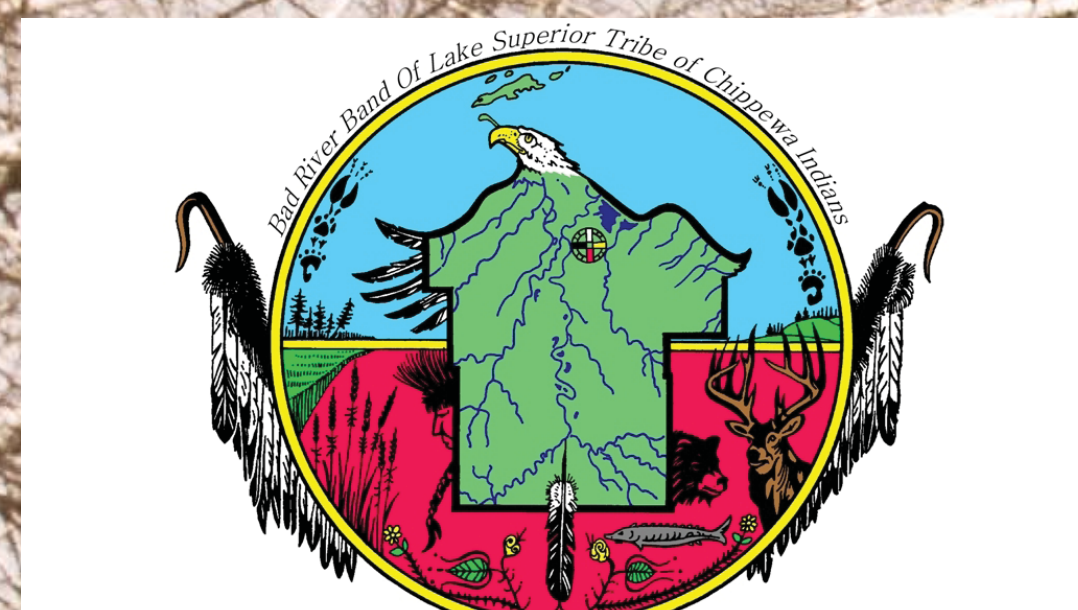
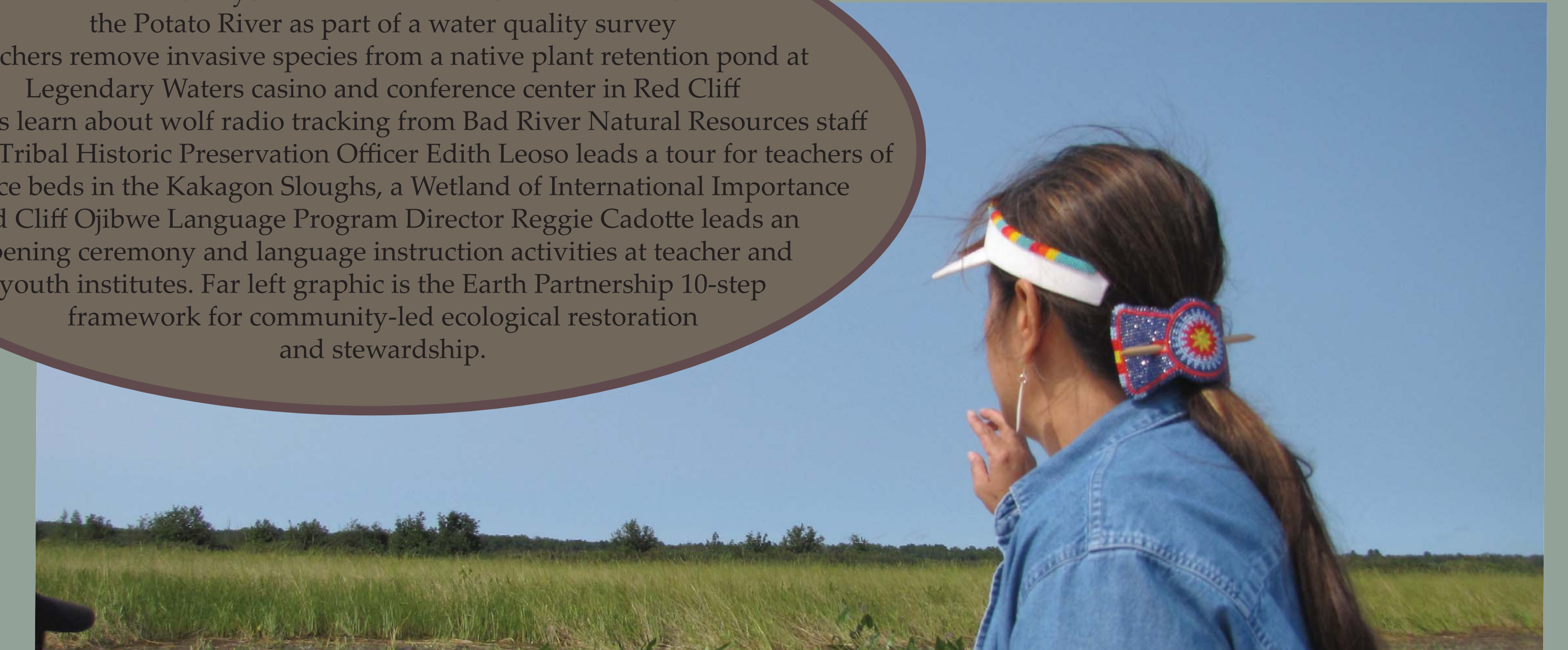
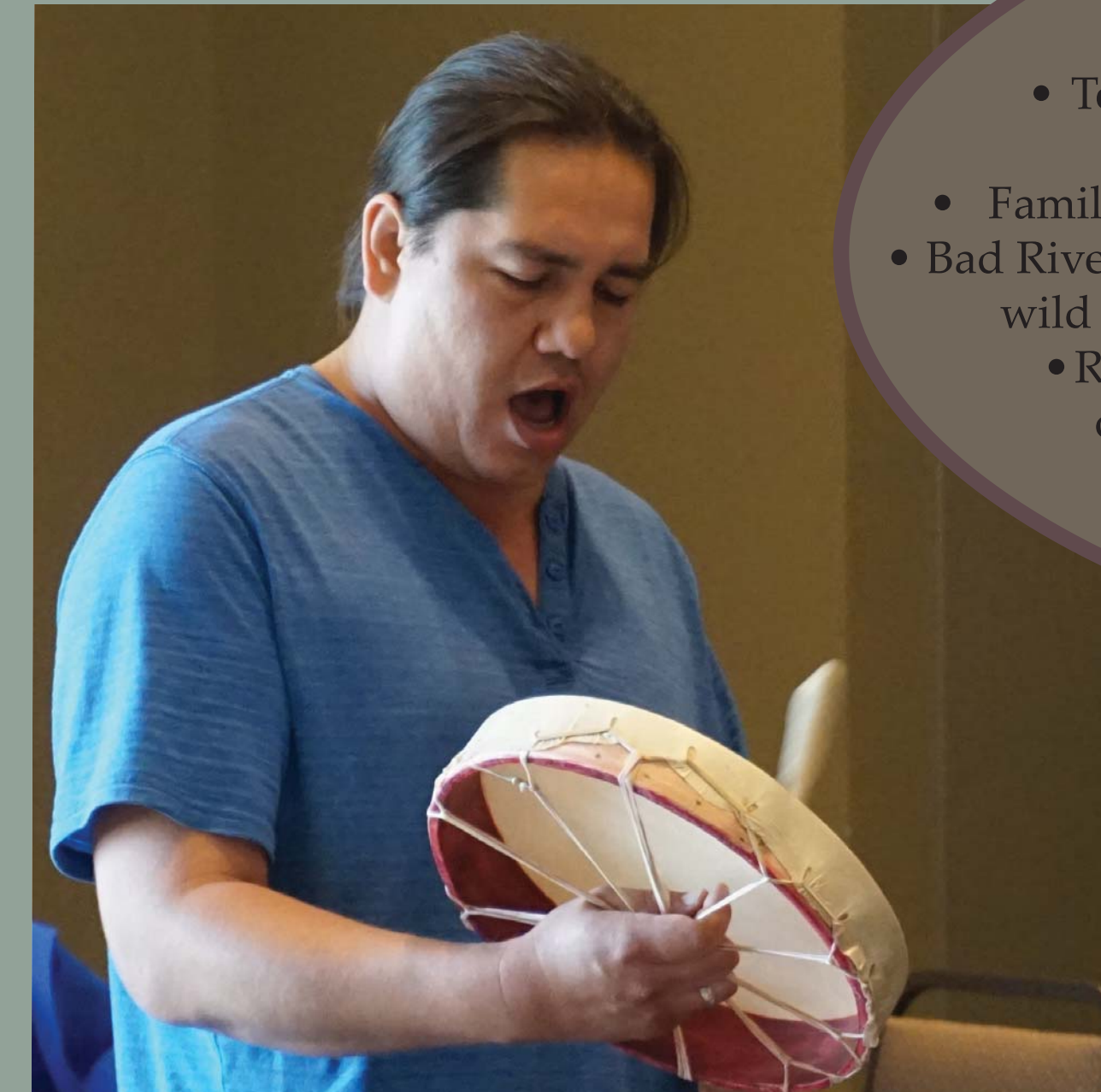
Students reported significant increases in their interest in pursuing a STEM-related college major, skills related to ecological stewardship and scientific inquiry, and perceived competence in communication skills. Youth reported that the IAS summer institute increased awareness of their culture's contribution to understanding science.

Community stakeholders reported agreement that short-term project outcomes have been achieved in the areas of educator access to culturally relevant STEM resources, youth participation in STEM learning experiences and career exploration, and perception among Native youth that STEM fields are relevant to their home community and culture. There was strong agreement that IAS has established robust community partnerships and has raised awareness of STEM issues and their intersection with culture. Stakeholders noted increased STEM awareness and interest in environmental stewardship among Native youth.



Clockwise from upper left:

- A Red Cliff youth examines macroinvertebrates on the Potato River as part of a water quality survey
- Teachers remove invasive species from a native plant retention pond at Legendary Waters casino and conference center in Red Cliff
- Families learn about wolf radio tracking from Bad River Natural Resources staff
- Bad River Tribal Historic Preservation Officer Edith Leoso leads a tour for teachers of wild rice beds in the Kakagon Sloughs, a Wetland of International Importance
- Red Cliff Ojibwe Language Program Director Reggie Cadotte leads an opening ceremony and language instruction activities at teacher and youth institutes. Far left graphic is the Earth Partnership 10-step framework for community-led ecological restoration and stewardship.



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