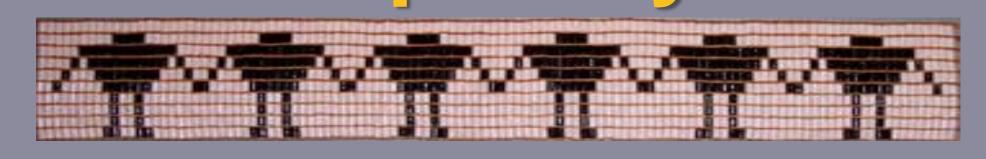
"If You Teach a Man About His Relationship With Fish, You Will Have Fish and Men Until the End of Time" -Dan Longboat-

Interdisciplinary Evaluation of a Wetland Enhancement Project for the Tuscarora Nation

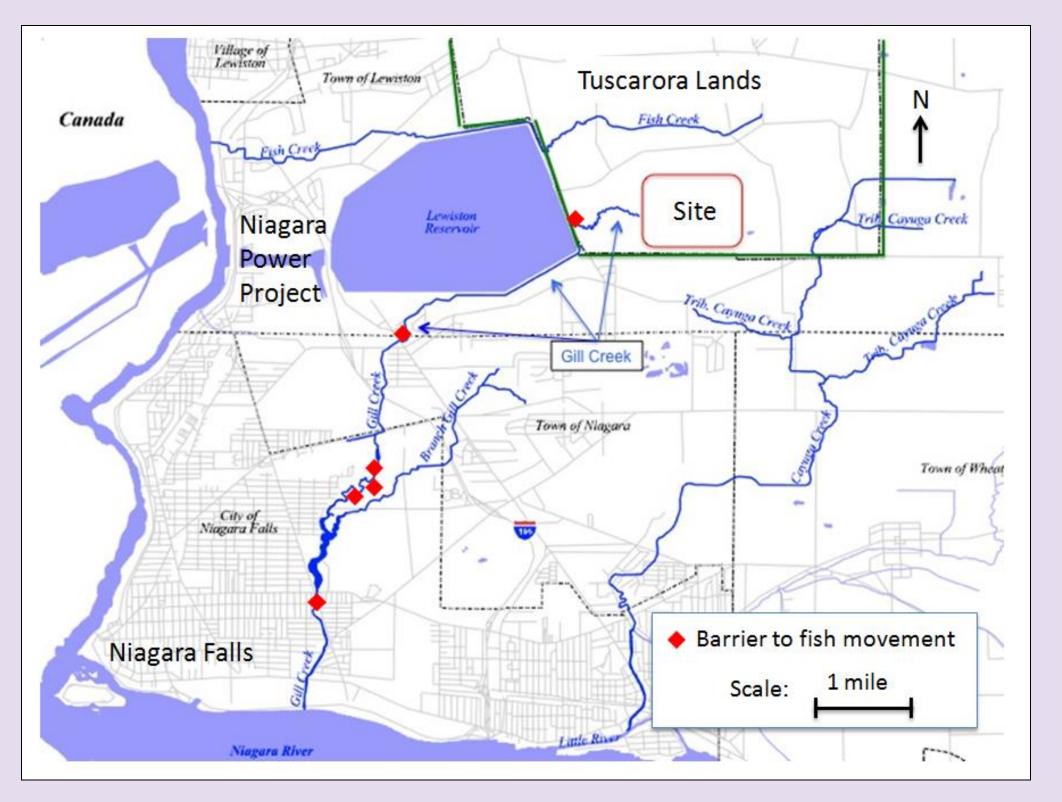


Valerie Goodness, Douglas Lambert, and Sarah Whiteway State University of New York at Buffalo



Čwé:'n (HELLO) Nok-hah: dee-gah-weah-dah-Kyeh (Just a few words)

The ERIE IGERT Practicum Interdisciplinary Team was honored when asked to evaluate the Tuscarora Nation Wetland Enhancement Project. In gratitude and respect to the Tuscarora people, their voice is prominent in this presentation. **NYEAHWEH (THANK YOU)**





Members of the Tuscarora Nation protest the Niagara Power Project.

Figure 1: Location of the Tuscarora Nation, Niagara County, NY. Tuscarora Lands outlined in green; project site outlined in red. Barriers to fish movement noted.

IN PEACE, STRENGTH, and GOOD MIND

- After a legacy of displacement in New York and North Carolina, the Tuscarora people settled at their current location in Niagara County, NY. In the 1950s, associated with the development of the Niagara Power Project, the Federal Power Commission broke treaty and seized 550 acres of Tuscarora land.
- Today, Upper Niagara River water is diverted underground through approximately four miles of conduits into a pump-storage reservoir bordering the reservation. The impacts of the Niagara Power Project on the Tuscarora Nation, while impossible to quantify, were extensive.

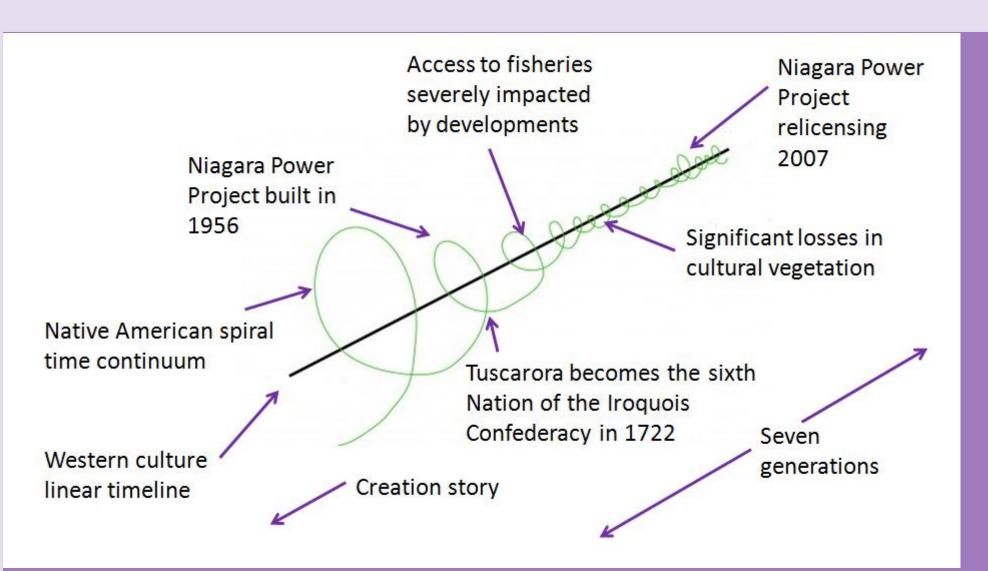


Figure 2. Significant events in the history of the Tuscarora Nation and the area of study, represented in a Native American timeline continuum.

 Due to the diversion of Gill Creek, access to fishing resources were limited. Additionally, traditional spear fishing docks in the Lower Niagara River were relocated and eventually eliminated, discontinuing an important cultural practice and source of sustenance for the Tuscarora people.

 In order to restore the Tuscarora fishing culture, a wetland enhancement was proposed. This project involved the analysis of the proposed enhancement plan.

INTERDISCIPLINARY AND MULTICULTURAL TEAM



Figure 3. A team comprised of geologists, environmental engineers, geographers and First Nation American Studies scholars. Student participants respect Tuscarora sovereignty by completing a standard Non-disclosure Agreement.

The Waters

We give thanks to all the waters of the world for quenching our thirst and providing us with strength. Water is life. We know its power in many forms waterfalls and rain, mists and streams, rivers and oceans. With one mind, we send greetings and thanks to the spirit of water.

Now our minds are one.

ANALYSIS

Water Budget

- Monitoring data from 2009-2011 showed large fluctuations in surface water levels.
- Standing water is present from late fall through spring, but the site is dry in late summer and early fall.

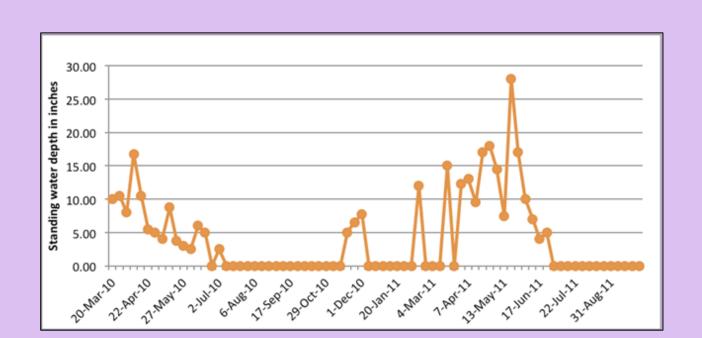


Figure 5. Stage data for Gill Creek 2010-2011.

Geography, Topography

- GIS mapping was used to visualize the relationship between groundwater and site topography.
- These data will be helpful in evaluating the **implications** of introducing surface water features to the site.

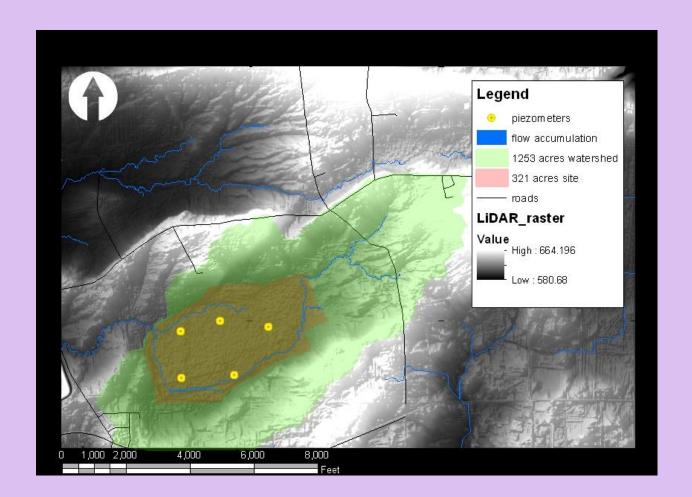


Figure 6. GIS topographic map created using LIDAR. Monitoring well locations and watershed boundary indicated.

The Fish

We turn our minds to all the Fish life in the water. They were instructed to cleanse and purify the water. They also give themselves to us as food. We are grateful that we can still find pure water. So, we turn now to the Fish and send our greetings and thanks. Now our minds are one.

Groundwater Model

- Evaluated the potential of an established regional groundwater model for site analysis, and attempted to establish pumping rates necessary to maintain a fishery.
- Regional GW model does not allow appropriate local analysis due to scaling issues.

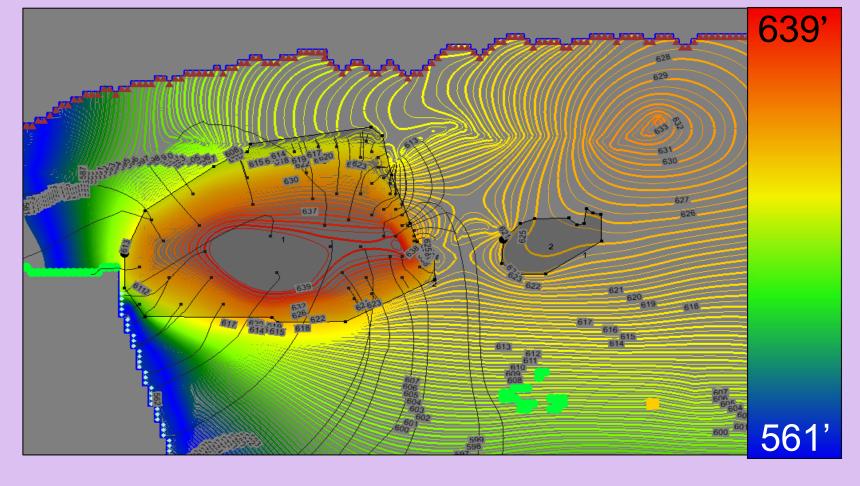


Figure 4. Groundwater Model created in MODFLOW. Colored contours represent water table height and influence of the nearby reservoir.

Keuh-Cheh (Fish)



Figure 7. Yellow Perch (Perca flavescens)



Figure 8. Bullhead (Ameiurus nebulosus)

Ecology

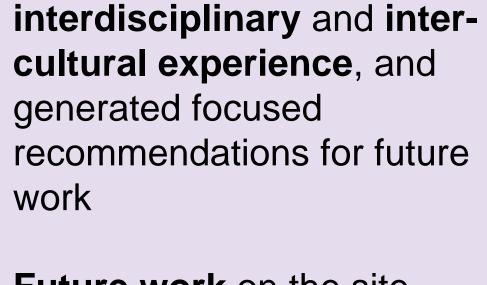
- Investigated the potential of a number of **fish** species for reintroduction.
- Two species recommended, Yellow Perch and Bullhead.
- Qualitatively evaluated the impact of the enhancement plan on **invasive plants**.



Figure 5. Purple loosestrife (Lythrum salicaria)

University at Buffalo The State University of New York





This project provided a unique

CONTINUED

WITH THE

NATION

TUSCARORA

PARTNERSHIP

- Future work on the site should include: gaging the outflow of the wetland, a topographic survey and adaptive invasive plant management.
- Future collaborative work with the Tuscarora is anticipated, **combining** the tools and strengths of western science with Tuscarora values of sustainability and community sovereignty for the next seven generations.

The Mother Earth We are all thankful to our Mother, the Earth, for she gives us all that we need for life. She supports our feet as we walk about upon her. It gives us joy that she continues to care for us as she has from the beginning of time. To our Mother, we send greetings and thanks. Now our minds are one.

U: *n*e čakwa[?]tikéhra: t Now our minds are one

ACKNOWLEDGEMENTS:

The Tuscarora Nation, Neil Patterson, Dr. Alan Rabideau, Ecology and Environment, The Tuscarora Environment Program, The Haudenosaunee Environmental Task Force, **ERIE IGERT Team Members:** Schuyler Chew, Michael Gallisdorfer, Jonathan Malzone, Allison Ribachonck, Matthew Widay, Lou Williams





