FishPass Quarterly Update

Dear partners and stakeholders:

On behalf of the FishPass team, I am pleased to provide a project update for the second quarter of 2022. Please distribute the update as you see fit.

Engineering Design / Construction:

- While on-site work remains on hold pending results of the ongoing legal process, the prime contractor, Spence Brothers Construction, has continued to prepare contract submittals for review by the U.S. Army Corps of Engineers (USACE) and AECOM (Designer of Record).

Research:

- 17 March – 2 June – Staff from Cornell University and University of Windsor continued work on the *Energy and Nutrient Dynamics* project. Researchers collected water samples across 34 sites in the Boardman/Ottaway River, its tributaries, and two neighboring streams to create a time-series dataset of nutrient concentrations that will be used to assess stream nutrient availability throughout spring. In addition, the team collected various samples to characterize spatial variation in stable isotopic signatures, assess variation in carbon processing, assess drivers of algal growth, and conducted small-tributary stream fish community assessments for comparison of food webs across streams. Sample processing continues through the summer. The team also collected tissue samples from and implanted acoustic tags in 110 native white sucker *Catostomus commersonii* and longnose sucker *Catostomus Catostomus*. Suckers were caught during weir trapping operations (see assessment section) and released in both Boardman Lake and the river above the lake to monitor fish movements along a network of acoustic receivers and Passive Integrated Transducer arrays in the upper Boardman/Ottaway River. An additional 50 white suckers from Boardman Lake were tagged as part of this effort. These data will be used in combination with run size estimates to predict the location and size of migratory fish subsidies that may be delivered upstream in the future via native lake-run migrants moving through FishPass. Movement and habitat use data will be analyzed when acoustic receivers are recovered and downloaded during early Fall of 2022

- April 2022 – Michigan State University Aquatic Animal Health Laboratory screened a sample of 60 white and longnose suckers for potential presence of fish pathogens in order to understand potential risks of disease transfer via fish passage. **No fish pathogens were detected.**

- April 2022 – GLFC staff installed and recorded video of rainbow trout *Oncorhynchus mykiss* leaping attempts in the auxiliary spillway of the Union Street Dam. In total, 24 hrs of video recordings captured approximately 150 leaping attempts that will be analyzed by researchers at Central Michigan University to estimate swimming speed and leaping angle of each fish.

Additional data will be collected again in Fall 2022 and Spring 2023. These data will be used to validate calculations used to analyze the risk of unintended fish passage at FishPass.

- June 2022 – Staff from Cornell University, USACE, and GLFC conducted field work near the Michigan Department of Natural Resources (MDNR) Boardman River Weir to evaluate three different high-resolution, infrared cameras to measure water velocity at the water surface in real-time. Incredibly small temperature differences between the air and water are detected by the camera. The resulting thermal patterns change over time due to varying levels of turbulence in the water (Figure 1). Water velocities across the entire surface of the water can then be calculated by tracking how the image pixel patterns change over time. In total, over 40 hours of thermal imagery recorded at varying heights and locations (i.e., different scales of spatial coverage) along the river adjacent to the future FishPass project site. Processing of the imagery continues through the summer. If successful, this technology could be used at FishPass to link fish movements to instantaneous water velocities across the entire river thereby providing extremely detailed information about fish movement in relation to water movement.

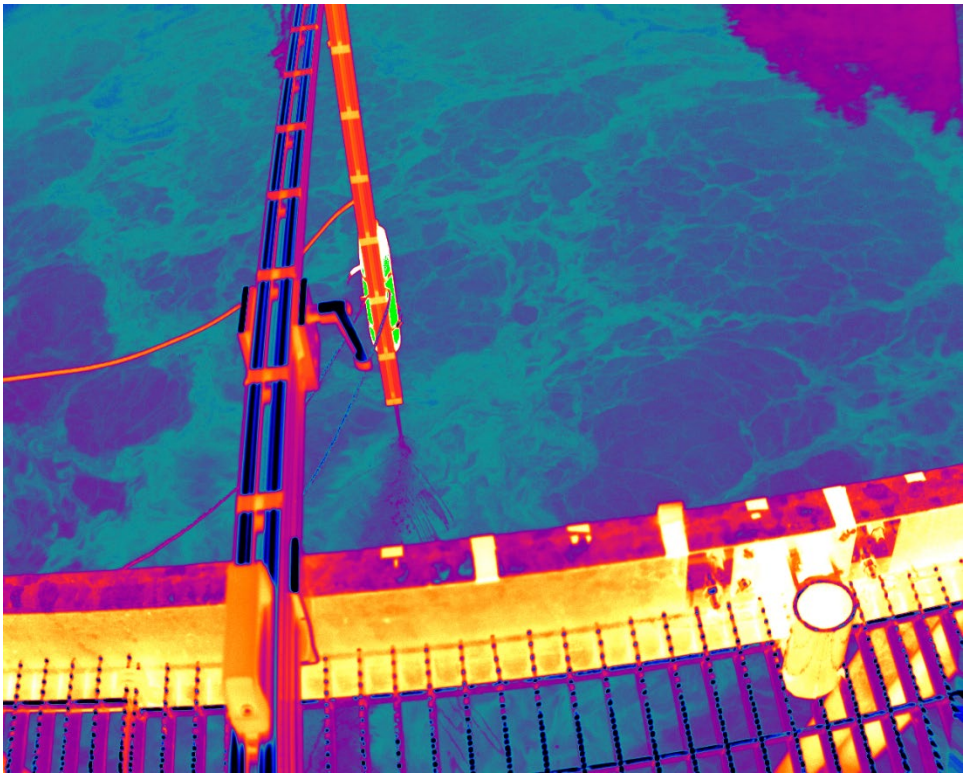

Figure 1. Example of infrared images recorded from the MDNR Boardman River Weir. The blue areas are the Boardman/Ottaway River on the upstream side of the weir, darker colors represent cooler water. In the center of the image is a water velocity probe used to validate camera measurements. Note, cellular shapes are indicative of subsurface turbulence reaching the water surface (i.e., boils erupting on the water surface).

- May 2022 – GLFC staff implemented the last remaining 15 acoustic transmitters and repurposed two additional tags recovered from harvested fish resulting in a total of 205 tags

implanted in support of the *Determining Connectivity Between the Boardman River, Grand Traverse Bay, and Lake Michigan Proper in Support of FishPass* project. Improved understanding of tributary-bay-lake habitat coupling will not only aid in predicting the consequences of selective fish passage on the re-establishment of energy and nutrient pathways, but also provide practical data including a baseline of current movement rates to facilitate future assessment of restoration, and site-specific information on river entry cues and timing that will facilitate sorting of desirable and non-desirable species.

- 15 June 2022 – Northern Michigan University (NMU) Graduate Student Ross Gay successfully defended his M.Sc. thesis entitled "Predicting Contaminant Transfer Following Re-Established Connectivity in the Boardman River." Ross' research in addition to that of former NMU Graduate Student Collin Diedrich and advisor Dr. Brandon Gerig aims to: 1) assess the contaminant burden of Great Lakes spawners to inform future fish passage decisions, 2) evaluate the background contaminant burdens of resident fishes prior to dam removal, 3) measure background contaminant levels of water within the Boardman River watershed, and 4) couple empirically collected diet data to a lifetime bioenergetics-bioaccumulation model to determine the impact of various fish passage scenarios on resident fish growth and bioaccumulation.

- June 2022 - Staff from the U.S. Geological Survey (USGS) and U.S. Fish and Wildlife Service (USFWS) retrieved, downloaded, deployed and re- deployed acoustic fish telemetry receivers in Grand Traverse Bay and Lake Michigan. These receivers are part of the Great Lakes Acoustic Telemetry Observing System (GLATOS; https://glatos.glos.us/) and support numerous ongoing projects including those specific to FishPass described above.

Assessment:

- 23 April – 23 May 2022 – Staff from the GLFC, Cornell University, and the University of Windsor conducted a trapping study at the MDNR Boardman River Weir. The study retrofit the existing weir with large box traps to capture and release large numbers of both white sucker and longnose sucker during their spring migration from Grand Traverse Bay into the lower Boardman River (Figure 2). GLFC and partner staff captured 3,353 total fish in the traps this spring; of which, the vast majority were suckers (479 white and 2,532 longnose; see Table 1). Fish captured during this effort were used to inform research objectives relating to the larger FishPass project including fish health, fish movement, and migratory run size.

Figure 2. Longnose suckers *Catostomus catostomus* that were captured, tagged, and released upstream of the MDNR Boardman River Weir.

Table 1. Number (n) of each fish species caught during the spring sucker trapping at the MDNR Boardman River Weir.

Species	n
common white sucker	479
longnose sucker	2532
northern pike	6
rainbow trout	328
rock bass	1
sea lamprey	1
smallmouth bass	4
walleye	2

- 3 May 2022 – Staff from the Grand Traverse Band of Chippewa and Ottawa Indians (GTB) and GLFC completed an electrofishing survey in the lower Boardman/Ottaway River (below Union St. Dam). The survey was a scheduled "quarterly" index survey to understand the seasonal diversity and abundance of the Boardman/Ottaway River fish community in this section of river (Table 2).

  Table 2. Average length and number of fish (n) sampled during electrofishing in the lower Boardman/Ottaway River on 3 May 2022. Note that all salmon encountered were juvenile and largely ignored during this survey unless captured in a group of other fish as their high abundance was likely a result of recent MDNR stocking activities.

Species	n	Ave. Length (in)
brown trout	7	13.1
Chinook salmon	2	-
common carp	1	26.1*
common white sucker	56	17.9
lake trout	1	25.2*
longnose sucker	51	16.1
rainbow trout	47	22.9
smallmouth bass	1	19.3*
walleye	7	22.4

* Denotes sample size of 1

Outreach:

- 9 May 2022 – GLFC staff presented an update on the FishPass project to the Traverse City Commission at a work session.
- May 2022 – GLFC staff presented multiple talks on the FishPass project virtually and/or in person at the Joint Aquatic Sciences Meeting in Grand Rapids, MI.
- June 2022 – Dr. Dan Zielinski presented "Design and future implementation of selective fish passage research at FishPass" at the International Fish Passage Conference in Richland, WA
- June 2022 – Dr. Karen Murchie, Director of Freshwater Research, Shedd Aquarium and her co-author, Dr. Pete McIntyre, Associate Professor, Cornell University authored a nice article for Michigan Trout magazine that highlights the ecological value of native suckers to river ecosystems (Available here: https://issuu.com/www.michigantu.org/docs/michigan_trout_summer_2022_-_web/24).

Upcoming:

- July - September 2022 – GLFC and partner agency staff will (1) continue to maintain the acoustic fish telemetry receivers in the Boardman/Ottaway River Estuary (July), Boardman/Ottaway River (August), and Boardman Lake (September) in support of both the *Connectivity Between the Boardman River* and *Energy and Nutrient Dynamics* projects, and (2) conduct two additional "quarterly" index electrofishing surveys in the lower river to understand the seasonal diversity and abundance of the fish community.

In the News:

- Rotary Charities of Traverse City Announces "Emerging Needs" Grant Recipients (9&10 News, 28 June 2022): https://www.9and10news.com/2022/06/28/rotary-charities-of-traverse-city-announces-emerging-needs-grant-recipients/
- What's Next for FishPass? (The Ticker, 10 May 2022): https://www.traverseticker.com/news/whats-next-for-fishpass/
- Sucker fish study coming to Boardman/Ottaway River (Record Eagle, 13 April 2022): https://www.record-eagle.com/news/local_news/sucker-fish-study-coming-to-boardman-ottaway-river/article_6474a14e-baac-11ec-aa5c-7355800ed3bd.html

- Boardman River Weir to Start Operation Soon (9&10 News, 11 April 2022): https://www.9and10news.com/2022/04/11/boardman-river-weir-to-start-operating-soon/
- New Project to 'Facilitate the Passage of Fish' in Boardman River (9&10 News, 11 April 2022): https://www.9and10news.com/2022/04/11/new-project-to-facilitate-the-passage-of-fish-in-boardman-river/

Follow FishPass on Facebook to stay up-to-date on the latest news about the project.