Greenway Ecological Standing Committee
Grantee Status Report

Status Report Date: 1 Feb 2016	
Project Title: Quantifying Relationships between Fish Assemblages and Nearshore Habitat Characteristics of the Niagara River	
Organization: Lake Superior State University	
Report Prepared By: Drs. Kevin Kapuscinski & Derek Crane	
Contact Information: 906-635-2093 (Kapuscinski)	
Project Start Date: 1 Apr 2013	Project Anticipated Completion Date: 31 Dec 2016

1. Describe what progress you have made toward each of your grant objectives since your last status report. Did you meet your goals for this period? Please be specific.

Yes, we met most of our goals for this period. General administrative progress included (1) hiring and supervising one long-term and four seasonal technicians, (2) purchasing and maintaining equipment, (3) boat maintenance, (4) vehicle rentals, and (5) terminating rental agreements and vacating housing and storage facilities. The following progress was made toward achieving our project objectives:

<u>Objective #1: Predicting occurrences of Niagara River fishes from habitat characteristics</u>

- 101 sites were surveyed during July-Sept 2015. Each site survey included a 50' seine haul to count and identify all fishes captured, and 12 habitat survey plots per site. Habitat surveys included measurements or visual estimation of submersed aquatic vegetation (SAV) species richness, areal SAV cover, SAV height, 3D SAV cover, substrate class, water depth, velocity, GPS point collection, distance from tributary, and shoreline armoring
- 20,465 (30 species) native and 3,695 (6 species) non-native fishes were sampled
- Most fishes were identified and counted in the field, but others required the use of a microscope. Identification of preserved specimens was completed in late 2015
- Fish and habitat data entry was completed in 2015
- Sample locations were entered into a geographic information system
- Crane created an ArcGIS data layer for docks in the upper Niagara River using 2014 high resolution orthoimages for Erie and Niagara counties. Data from this layer will be included in analysis
- An additional project was completed to determine how seining capture efficiency changes based on the type of fish sampled (e.g., bottom-oriented vs. surface oriented). Twenty-one sites were blocked off with a rectangular net, seined multiple times, and then the block net was hauled in and examined for any remaining fishes. These data will allow us to calculate what percent of all individuals of a given species are sampled during the first seine haul. Once analyzed, the acquired data will allow us to adjust the catch rates observed at the 297 sites sampled during 2013-2015 to reflect how many fish were actually present at each site. For example, if this side-project shows that only 50% of round goby were captured during the first seine haul, then we would multiply our round goby captures by 2 in the master dataset for Objective 1
- Objective 1, Application 1 (*Develop a model that predicts the occurrence of age-0*

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muskellunge from physical habitat characteristics) was completed. A logistic regression model of age-0 muskellunge habitat associations was developed. A total of 15 age-0 muskellunge were collected at 11 of 297 sites sampled during 2013-2015. Wild celery (*Vallisneria americana*) was the dominant aquatic vegetation, and sand and mud were the dominant substrate sizes at locations were age-0 muskellunge were collected. The probability of age-0 muskellunge presence was positively related to the proportion of the water column occupied by aquatic vegetation. Results from this study will be presented at the 2016 Hugh C. Becker Muskie Symposium and published by the American Fisheries Society in a book based on the symposium proceedings

<u>Objective #2: Quantify prey selection by age-0 muskellunge and the caloric content of different prey types</u>

- Energy density of 11 fish species from Buffalo Harbor, the Niagara River, and the St. Lawrence River was quantified by our seasonal technicians and collaborators at SUNY Buffalo State College during 2013. Under the supervision of Crane, an undergraduate student at Coastal Carolina University is analyzing the energy density data and developing a manuscript for publication in the *Journal of Great Lakes Research*
- An investigation of methods used to preserve fishes for calorimetry with collaborators from SUNY Buffalo State College was completed in 2015 and published *Fisheries Research*
    - Crane, D. P., C. C. Killourhy, and M. D. Clapsadl. 2016. Effects of three frozen storage methods on wet weight of fish. Fisheries Research 175:142-147
- We plan to quantify prey selection by age-0 muskellunge during summer 2016

<u>Objective #3: Monitor nearshore fish assemblages at muskellunge nursery sites</u>

- Four 100' seine hauls were conducted at eight index sites and two hauls were conducted at one site (38 total hauls; 2 hauls abandoned due to high water) during 2015, and all fishes were identified and counted or preserved and identified in the lab
- All preserved fishes were identified an counted in 2015
- This marks the ninth consecutive year that this standardized survey has been completed
- NYSDEC staff (primarily Chris Legard) and a volunteer from the Niagara Musky Association assisted with field work during 2015. Chris Legard was shown our standardized protocol, so the NYSDEC could continue the survey in the future

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2. How did you measure your progress since your last status report? What kind of data have been collected to determine whether progress is being made or not being made? What results have been obtained since your last status report?

This is our third status report. The following data and results have been obtained:

<u>Objective #1: Predicting occurrences of Niagara River fishes from habitat characteristics</u>

- Data on fishes and habitat at sites surveyed in 2014 and 2015 have been entered into an Excel database
- Additional data from 21 sites were collected and entered as part of the side project described above
- A model of age-0 muskellunge habitat use was developed

<u>Objective #2: Quantify prey selection by age-0 muskellunge and the caloric content of different prey types</u>

- Little progress was made toward achieving this objective, primarily due to lack of access to an appropriate laboratory facility and time constraints associated with Kapuscinski's relocation to Lake Superior State University
- Kapuscinski has been working toward securing an appropriate experimental system for achieving this objective, and expects to conduct the experiment during summer 2016

<u>Objective #3: Monitor nearshore fish assemblages at muskellunge nursery sites</u>

- The figure below shows the relative abundance of age-0 muskellunge sampled during our index seining survey of Buffalo Harbor and the upper Niagara River

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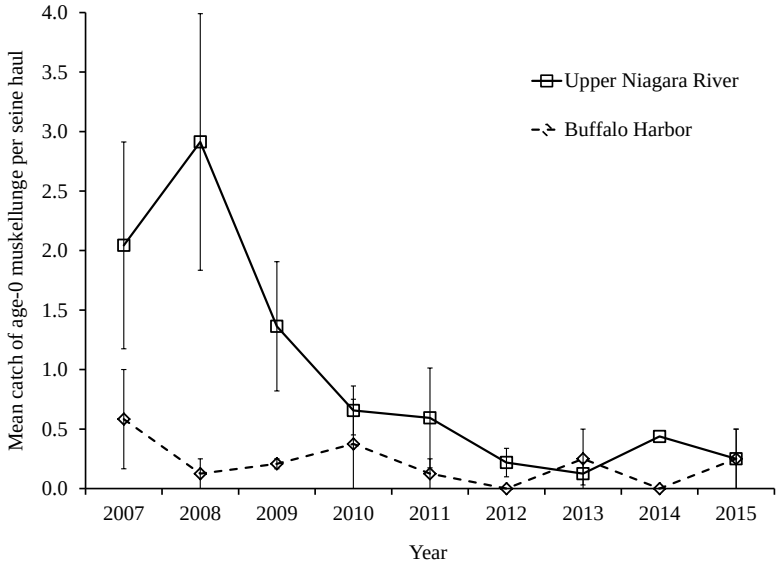

Similar results will be available for all fish species once the data on preserved specimens have been analyzed

<u>Products</u>

Publications completed in 2015 related to our research on Buffalo Harbor and the Niagara River are enclosed. In addition to these products, Crane had another paper accepted for publication pending revision, which focused on evaluating visual assessment methods for aquatic habitat

For additional information on our research, please visit:
https://masquinongy.wordpress.com/
https://cranefishecology.wordpress.com/

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3. What challenges have you encountered since your last status report? How are you addressing these challenges?

Primary challenges included lack of access to an appropriate experimental facility to achieve Objective 2, and time constraints associated with Kapuscinski's relocation to Lake Superior State University and Crane's relocation to Coastal Carolina University. We have identified an adequate experimental system to achieve Objective 2, and requested a no-cost extension of our grant award, which will allow us to complete the scope of work at no additional cost to the GESC

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4. Are you on schedule to complete your project in the proposed timeline? If not, please explain why you are ahead or behind schedule.

All field work and data entry are complete for Objective 1, Application 1 (*Develop a model that predicts the occurrence of age-0 muskellunge from physical habitat characteristics*). Work on Objective 1, Application 2 (*Develop a model that predicts the occurrence of native and non-native fishes from physical habitat characteristics*) continues. Crane is presently extracting spatial data related to the linear meters of docks and distance to the nearest wetland or tributary for each sample point. Kapuscinski is estimating seining efficiency for each species to be used as correction factors in the model. Fish-habitat association modeling (Objective 1, Application 2) will commence when these tasks are complete and model development will occur in summer 2016. Delay in the model development is due to Crane's relocation to Coastal Carolina University and addition of extra assumption tests (e.g., seining efficiency study) and spatial variables to be included in the model (e.g., creation of a GIS docks layer for the upper Niagara River). Although these additions have delayed progress on model development, they will increase the quality and scientific soundness of the final product. Additionally, products such as a GIS docks layer will be beneficial to the Niagara River Greenway, NYSDEC, USFWS, and Buffalo Niagara Riverkeeper. We are behind schedule on Objective 2 for the reasons stated above. Objective 3 is complete. We anticipate all objectives will be achieved by 31 December 2016 if our request for a no-cost extension is granted

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5. Please use the table below to report your expenditures since your last status report. Include in-kind support from other resources have you used since your last report below the table. Please explain any differences between anticipated and actual expenditures. Attach copies of any relevant receipts or invoices to this report.

Budget Categories	GESC-approved budget	Funds or in-kind support from other resources	Total expenses to date	Remaining balance
Salaries and Benefits	165,529		133,648	
Travel	24,500		13,012	
Equipment				
Supplies	2,000		5,020	
Meetings			1,195	
Printed Material				
Consultants			30.00	
Other	2,000		19,415*	
Indirect costs	44,627		39,634	
Total Funds	238,656		211,954	26,702

*Other category includes postage, housing, cable internet service, and insurance costs.

We were under budget in 2015, primarily due to staff turnover (we lost two field crew leaders in 2015) and Crane's relocation to Coastal Carolina University. We plan to use the remaining balance to pay for staff time and any necessary supplies or travel required to complete Objective 1, Application 2 and Objective 2.

Substantial in-kind support (in the form of personnel time, vehicles, and laboratory space) was provided by the NYSDEC and SUNY-Buffalo State; however, we do not have cost estimates for these.

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6. What progress toward your objectives do you expect to make before your next status report? Please be specific.

<u>Objective #1: Predicting occurrences of Niagara River fishes from habitat characteristics</u>

- The fish community-habitat associations model (Objective 1, Application 2) will be completed

<u>Objective #2: Quantify prey selection by age-0 muskellunge and the caloric content of different prey types</u>

- Feeding trials to determine selective predation will be conducted in 2016
- We anticipate that analysis of data on caloric content of prey fishes will be complete by April 2016 and a manuscript will be submitted to the *Journal of Great Lakes Research* by May 2016

<u>Objective #3: Monitor nearshore fish assemblages at muskellunge nursery sites</u>

- We will analyze the capture data for all fishes (other than muskellunge) to update our monitoring index through 2015

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7. Please include 1 to 2 photographs with dates and short descriptions taken since your last project report.

Seining within a block net to determine the efficiency of seining to capture different types of fishes (e.g., bottom-oriented vs. surface-oriented species). Photo credit: Derek Crane

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