THE RESEARCH FOUNDATION
The State University of New York

SUNY COLLEGE OF ENVIRONMENTAL SCIENCE AND FORESTRY

Office of Research Programs
1 Forestry Drive
Syracuse, New York
13210

Phone: 315/470-6606
Fax: 315/470-6779
www.esf.edu

September 20, 2010

Mr. Robert Belue
Executive Director of the Niagara River Greenway Commission
2136 West Oakfield Road
Grand Island, New York 14072

RE: PL-5689/8868

Dear Mr. Belue:

The enclosed proposal entitled, "Evaluation of Nearshore Fish Assemblages, Habitat, and the Effects of Herbivorous Rudd (Scardinius erythrophthalmus): Determining the Efficacy of Fish Habitat Restoration Efforts in the Buffalo Harbor and Niagara River" is being submitted for your consideration by The Research Foundation of SUNY with a place of business at the SUNY College of Environmental Science and Forestry.

Technical responsibility of the project rests with the SUNY College of Environmental Science and Forestry and has been assigned to the technical representative identified below. Questions about the substance of the application should be directed to the technical representative or to the Office of Research Programs. This office will also respond to questions on the budget. Please reference the number assigned to this application in your correspondence or inquiries.

If action on the application is favorable, the award should be made to the Research Foundation of State University of New York which will provide fiscal administration. Negotiations concerning the terms and conditions of the award should be conducted with the administrative representative identified below.

Sincerely,

Dr. Neil H. Ringler
Dean of Research

Administrative Representative
Justine Gordon
The Research Foundation of
State University of New York
PO Box 9
Albany, NY 12201
(518) 434-7105

Technical Representative
Dr. John M. Farrell
State University of New York
College of Environmental Science
and Forestry
Syracuse, New York 13210
(315) 470-6990/4300

cc: Dr. Donald J. Leopold
Mr. William Nicholson

Project Registration Number_____

Niagara River Greenway Commission

Consultation and Review Form

Type of Review Required: Mandatory Consultation

PROJECT SPONSOR INFORMATION

Name: The Research Foundation of State University of New York

Mailing Address: Office of Research Programs, 1 Forestry Drive, Syracuse

State: New York **Zip Code:** 13210

Federal Id#: 14-1368361

PROJECT TYPE

Check all that apply: **_X_** Environmental _____ Cultural/Heritage

_____ Land or Water Public Access _____ Cultural

_____ Trail _____ Educational/Interpretive

_____Waterfront or Land Based Development _____ Signage

_____ Recreational _____ Other

Project Name: Evaluation of Nearshore Fish Assemblages, Habitat, and the Effects of Herbivorous Rudd (*Scardinius erythrophthalmus*): Determining the Efficacy of Fish Habitat Restoration Efforts in the Buffalo Harbor and Niagara River

Location: N/A, research will be conducted on the Buffalo Harbor, Lake Erie, and the Niagara River

Site Address: N/A

State: New York

Minor Civil Division(s): N/A

County: N/A

Project Proponent Property Interest (own, lease, easement or other): N/A

AUTHORIZED OFFICIAL

Name: Dr. Neil H. Ringler **Title:** Dean of Research

Business Address: Office of Research Programs, 1 Forestry Drive, Syracuse

State: New York **Zip Code:** 13210

Telephone Number: 315-470-6606

Fax Number: 315-470-6779

E-Mail Address: neilringler@esf.edu

PROJECT POINT OF CONTACT

Name: Dr. John M. Farrell **Title:** Associate Professor

Business Address: 250 Illick Hall, State University of New York, College of Environmental Science and Forestry, 1 Forestry Drive, Syracuse

State: New York **Zip Code:** 13210

Telephone Number: 315-470-6990 **Cell Number:** 315-243-5978

Fax Number: 315-470-6934

E-Mail Address: jmfarrell@esf.edu

PROJECT NARRATIVE

Description: We seek to acquire information that will promote successful habitat restoration efforts in the Buffalo Harbor and Niagara River. Most of the major habitat improvement projects planned for the upper Niagara River will affect nearshore fish assemblages and aquatic vegetation. In addition, the non-native, herbivorous rudd (*Scardinius erythrophthalmus*) may negatively influence habitat restoration outcomes by consuming aquatic vegetation; rudd was the dominant species in spring trap-net surveys during 2007-2008 (Kapuscinski and Wilkinson 2008; Kapuscinski et al. 2009). Many native species, including the economically important muskellunge (*Esox masquinongy*; Menz 1981; Connelly et al. 1997) rely on nearshore habitats for reproduction and first-year growth (Harrison and Hadley 1978; Kapuscinski et al. 2010). All habitat restoration efforts should include a rigorous evaluation (Society for Ecological

Restoration International Science & Policy Working Group 2004), which typically requires that data be collected before and after habitats are manipulated. Therefore, we are proposing to conduct: 1) surveys of nearshore fish assemblages and aquatic vegetation near restoration sites, 2) an assessment of the seasonal progression of submerged aquatic vegetation (changes in habitat structure and species composition), 3) field surveys and laboratory experiments investigating the influence of herbivory by rudd on nearshore aquatic habitat, and 4) a study determining which aquatic vegetation and physical conditions are associated with muskellunge spawning sites. Various methods will be employed to meet the above four objectives; these methods are described in the proposal that will be submitted to the Greenway Ecological Fund Standing Committee on 24 September 2010 (enclosed). The information acquired from these efforts will help biologists evaluate current nearshore habitats and guide the design of new projects that seek to restore nearshore aquatic vegetation. Additional benefits obtained by achieving each project objective are outlined in the enclosed proposal. This work will continue and expand upon the surveys of nearshore fish assemblages, aquatic habitat, and rudd begun during 2007-2010.

Advancement of the Niagara River Greenway Vision: Our project will advance several principles outlined in the Niagara River Greenway Plan (NRGP), especially *Sustainability*, *Ecological Integrity*, and *Restoration*. The results obtained from our surveys of the nearshore fish assemblage and aquatic vegetation will be used to track changes through time, thereby providing a measure of ecological sustainability and integrity, especially in response to habitat restoration efforts. Understanding how herbivory by non-native rudd affects water quality and aquatic vegetation will help biologists manage for fish populations that sustain the ecological integrity of the Greenway. The results obtained from Objectives 2-4 will be important when assessing changes in aquatic vegetation through time, trying to improve the water quality of still-water habitats (e.g. Strawberry Island Bay), and designing projects that seek to restore nearshore habitat. Our project will also advance the NRGP's principles of *Partnerships* and *Community* by continuing the collaborative effort between the New York State Department of Environmental Conservation, State University of New York-College of Environmental Science and Forestry, Buffalo State-State University of New York, the Ontario Ministry of Natural Resources, and the Niagara Musky Association to gain knowledge about the Greenway's aquatic resources. These

partnerships are critical for conservation of ecological resources such as the muskellunge fishery that are used by the public.

This project will strongly support the NRGP's goals to *Protect and Restore Environmental Systems* and *Promote Long Term Sustainability* by identifying areas in need of protection and habitat restoration, and providing information needed to preserve native fishes and restore aquatic vegetation. As critical habitats are protected and restored, improvements to native sport fish populations (e.g. muskellunge) will attract more anglers, even from out of state, who will spend money locally and help *Spark Revitalization and Renewal*.

Our project proposal is consistent with the criteria Priority Status: *Restoration of Niagara River Ecosystem* because our results can be used to guide preservation and restoration of the native fishes and vegetation that comprise the nearshore aquatic community. Project activities will be conducted almost entirely within the *Focus Area*; assessment of aquatic vegetation in Ontario waters may be conducted. We believe that all aspects of our project are *Implementable*, because they build on existing data and research efforts completed during 2007-2010 such that our prior experience allows us to propose a realistic workload and budget. Several *Matching Funds* totaling at least $247,661.00 will contribute to the implementation of this project, including contributions from the Niagara Musky Association, the New York State Department of Environmental Conservation, the State University of New York-College of Environmental Science and Forestry, and Buffalo State-State University of New York. The results of this project will provide *Clear Benefits* to the Greenway and local community by obtaining information required for proper management and restoration of nearshore fishes and aquatic vegetation.

Project Budget:	Planning	$0
	Construction	$0
	Acquisition	$0
	Administration	$174,030
	Operation and Maintenance / Year	$0
	Total Project Cost	$735,413

Extensive field sampling will be conducted during 2011-2013 to achieve the project objectives. Data entry, analysis, and report writing will be ongoing during the term of the project. Therefore, funding for three years is being requested:

Proposed Budget
NY Power Authority
Greenway Ecological Fund

Title: Evaluation of Nearshore Fish Assemblages, Habitat, and the Effects of Herbivorous Rudd (Scardinius erythrophthalmus): Determining the Efficacy of Fish Habitat Restoration Efforts in the Buffalo Harbor and Niagara River

January 1, 2011 - December 31, 2013

NYPA-Jfarrell-Kkapuscinski:08q3:rbs rev 9-16-10

CATEGORY	**1/1/11 - 12/31/11**	**1/1/12 - 12/31/12**	**1/1/13 - 12/31/13**	**Total**
Senior Personnel:				
PI: John Farrell, 8% CY (NYPA-5%; ESF 3%)	4,710	4,922	5,143	14,775
CoPI: Kevin Kapuscinski, 100% CY (USDA-100%; ESF-0%)	52,000	54,340	56,785	163,125
Total Senior Personnel	56,710	59,262	61,928	177,900
Other Personnel:				
() Other Professionals (Post Doc)	0	0	0	0
(1) Other Professionals - tech - summer	14,400	15,048	7,863	37,311
(2) Graduate Students, 50% CY/pt hourly	28,000	29,260	30,577	87,837
(0) Graduate Students, hourly	0	0	0	0
Total Salaries and Wages	**99,110**	**103,570**	**100,368**	**303,048**
Benefits @ IFR: 48.725%; 56.89%: 62.205%	2,295	2,800	2,212	7,307
Regular @ 40.25% ; 42%; 43%	20,930	22,823	22,856	66,609
Summer Salary @ 17%	2,448	2,558	1,337	6,343
Graduate Students @ 13% ; 13.375% ; 14.375%	3,640	3,914	4,395	11,949
Undergraduate Students @ 5%	0	0	0	0
Total Benefits	**29,313**	**32,095**	**30,800**	**92,208**
Total S, W and B	**128,423**	**135,665**	**131,168**	**395,256**
Permanent Equipment:				
Boat	30,000	0	0	0
	0	0		
Total Equipment	**30,000**	**0**	**0**	**30,000**
Travel:				
1. Domestic US/Canada/Mexico	25,641	25,641	10,895	62,176
2. Foreign Europe/China	0	0	0	0
Participant Support:	0	0	0	0
Other Direct Costs:				
1. Materials and Supplies	17,894	7,673	2,821	28,388
2. Publication Costs/Page Costs	0	0	0	0
3. Consultant Services	5,000	5,000	0	10,000
4. Computer Services	0	0	0	0
5. Subcontracts	0	0	0	0
6. Other:				0
Tuition - 1 AY tuition scholarship	9,951	10,349	10,763	31,063
General services: Boat Maintenance	1,500	1,500	1,500	4,500
Total Other Direct Costs	**34,345**	**24,522**	**15,084**	**73,951**
Total Direct Costs	218,408	185,828	157,147	561,383
Indirect Costs @ 31% TDC (waived from 71%)	67,707	57,607	48,716	174,030
Total Direct and Indirect Costs	286,115	243,435	205,863	735,413
Residual Funds	0	0	0	0
Amount of Request	**286,115**	**243,435**	**205,863**	**735,413**
PI: John Farrell, 8% CY (NYPA-5%; ESF 3%)	2,826	2,826	2,826	8,478
Benefits @ IFR: 48.725%; 56.89%: 62.205%	1,377	1,608	1,758	4,743
Direct Costs	4,203	4,434	4,584	13,221
71% TDC	2,984	3,148	3,255	9,387
Unrecoverable Indirect 71% TDC	87,363	74,331	62,859	224,553
Total ESF Contribution	**94,550**	**81,913**	**70,698**	**247,161**
Total Buffalo State-SUNY Contribution	**3,000**	**0 .**		**3,000**
Total Niagara Musky Association Contribution	**1,500**	**0**	**0**	**1,500**
Total Matching Funds	**99,050**	**81,913**	**70,698**	**251,661**

Matching Funds: Substantial matching funds, totaling $251,661.00, have been pledged toward this project. The Niagara Musky Association has agreed to provide at least $1,500.00. The New York State Department of Environmental Conservation has agreed to provide services (salary, mileage, etc.), but the amount is unknown at this time. The State University of New York-College of Environmental Science and Forestry will provide a cost-share of $247,161.00 in the form of salary, tuition, and indirect costs. Buffalo State-State University of New York has agreed to waive laboratory fees totaling $3,000.00.

Community and Government Support: Kapuscinski has given formal presentations at three Niagara Musky Association meetings and attended a fourth meeting. The Niagara Musky Association fully supports this project, and members will likely be involved in data collection. The New York State Department of Environmental Conservation is a partner on this project, having pledged their support and participation. Buffalo State-State University of New York and the Ontario Ministry of Natural Resources also support this project; letters of support from all groups are enclosed.

Project Site: This project does not require alteration of publicly or privately owned lands. All project activities will be conducted on the Buffalo Harbor, Lake Erie, the Niagara River, and laboratory facilities at State University of New York-College of Environmental Science and Forestry and Buffalo State-State University of New York. All necessary scientific collector's permits will be obtained from the New York State Department of Environmental Conservation and Ontario Ministry of Natural Resources. Maps depicting potential sampling sites are included in the enclosed application document that we submitted to the Greenway Ecological Fund Standing Committee.

References:

Connelly, N. A., T. L. Brown, and Knuth, B. A. 1996. New York statewide angler survey, report 1: angler effort and expenditures. New York State Department of Environmental Conservation, Albany.

Menz, F. C. 1981. An economic study of the New York State muskellunge fishery. New York Sea Grant Institute, Albany.

Harrison, E. J., and Hadley, W. F. 1978. Ecologic separation of sympatric muskellunge and northern pike. American Fisheries Society Special Publication 11: 129-134.

Kapuscinski, K. L., and Wilkinson, M. A. 2008. Adult muskellunge sampling activities in the Buffalo Harbor and upper Niagara River May and June, 2007. Section U *in* D. Einhouse, editor. NYSDEC Lake Erie Unit 2007 annual report. New York State Department of Environmental Conservation, Albany.

Kapuscinski, K. L., Wilkinson, M. A., and Farrell, J. M. 2009. Sampling efforts for young-of-year (2006-2008) and adult muskellunge (2008) in the Buffalo Harbor, Lake Erie, and the upper Niagara River. Section R *in* D. Einhouse, editor. NYSDEC Lake Erie 2008 annual report. New York State Department of Environmental Conservation, Albany.

Kapuscinski, K. L., Wilkinson, M. A., and Farrell, J. M. 2010. Sampling for muskellunge, rudd, and the nearshore fish community of the Buffalo Harbor (Lake Erie) and the upper Niagara River, 2009. Section Q *in* D. Einhouse, editor. NYSDEC Lake Erie 2009 annual report. New York State Department of Environmental Conservation, Albany.

Society for Ecological Restoration International Science & Policy Working Group. 2004. The SER International primer on ecological restoration [online]. Available from www.ser.org & Tucson: Society for Ecological Restoration International [Accessed 3 May 2010].

Evaluation of Nearshore Fish Assemblages, Habitat, and the Effects of Herbivorous Rudd (*Scardinius erythrophthalmus*): Determining the Efficacy of Fish Habitat Restoration Efforts in the Buffalo Harbor and Niagara River

An Application for Funding Through the Greenway Ecological Fund Standing Committee

By

Dr. John M. Farrell and Kevin L. Kapuscinski

State University of New York

College of Environmental Science and Forestry

1 Forestry Drive

Syracuse, NY 13210

Purpose

We seek to acquire information that will promote successful habitat restoration efforts in the Buffalo Harbor and Niagara River. Most of the major habitat improvement projects planned and completed for the upper Niagara River affect nearshore fish assemblages and aquatic vegetation. In addition, the non-native, herbivorous rudd (*Scardinius erythrophthalmus*) may negatively influence habitat restoration outcomes by consuming aquatic vegetation; rudd was the dominant species in spring trap-net surveys during 2007-2008 (Kapuscinski and Wilkinson 2008; Kapuscinski et al. 2009). Many native species, including the economically important muskellunge (*Esox masquinongy*; Menz 1981; Connelly et al. 1997) rely on nearshore habitats for reproduction and first-year growth (Harrison and Hadley 1978; Kapuscinski et al. 2010). All habitat restoration efforts should include a rigorous evaluation (Society for Ecological Restoration International Science & Policy Working Group 2004), which typically requires that data be collected before and after habitats are manipulated. Therefore, we are proposing to conduct: 1) surveys of nearshore fish assemblages and aquatic vegetation near restoration sites, 2) an assessment of the seasonal progression of submerged aquatic vegetation (changes in habitat structure and species composition), 3) field surveys and laboratory experiments investigating the influence of herbivory by rudd on nearshore aquatic habitat, and 4) a study determining which aquatic vegetation and physical conditions are associated with muskellunge spawning sites. The

information acquired from these efforts will help biologists evaluate current nearshore habitats and guide the design of new projects. This work will continue and expand upon the surveys of nearshore fish assemblages, aquatic habitat, and rudd that were conducted during 2007-2010.

Objectives & Justification

Objective 1: Survey nearshore fish assemblages to monitor reproduction, identify priority areas for protection and habitat improvement, and determine if fish assemblages change in response to habitat restoration efforts.

Achieving this objective will provide young-of-the-year (YOY) muskellunge catch rates at individual nursery sites, continuing an effort begun in 2007. These catch rates serve as relative abundance estimates of YOY muskellunge and allow for site-specific comparisons and examination of trends through time. Data collected during previous efforts were used to identify the prey species muskellunge depended upon during their first year of growth (e.g. banded killifish *Fundulus diaphanus*, cyprinids, and darters; Kapuscinski et al. *In prep.*). In the future, these data can be used to determine how habitat restoration efforts affect muskellunge abundance and production, the prey species important to YOY muskellunge, and fish assemblage structure.

Important relations between fish assemblages and local habitat characteristics were determined from data collected during 2008-2009 (Kapuscinski and Farrell *In prep.*). Small-bodied cyprinids, which are important prey for YOY muskellunge, dominated nearshore sites that had measurable flow, abundant aquatic macrophytes, coarse substrates, and little or no macroalgae were typically. Conversely, nearshore sites that lacked flow, had relatively few aquatic macrophytes, fine substrates, and dense beds of macroalgae were dominated by centrarchids and yellow perch (*Perca flavescens*), which are poor prey for YOY muskellunge. Continued annual monitoring will allow us to quantify changes in fish assemblages and physical habitat near restoration sites (e.g. Motor Island, Strawberry Island, etc.); this can serve as an evaluation of these projects and provide guidance for future efforts.

In previous years, we identified four undocumented muskellunge nursery sites (one in 2008 and three in 2009). Densities of YOY muskellunge at these sites ranged from moderate to extremely high. Identification of such sites has provided justification for protection from future disturbances (e.g. at River Lea) and can lead to habitat restoration where necessary.

Important information on species of greatest conservation need in NY State may be collected during this seining effort. For example, we collected a number of rare species in 2008 and 2009, including blackchin shiner *Notropis heterodon*. Blackchin shiner has a NY Natural Heritage Program rank of S1, meaning typically 5 or fewer occurrences (see http://www.dec.ny.gov/animals/9406.html). Information on these rare species is unlikely to be collected in the absence of this survey.

Objective 2: Quantify seasonal changes in the structure and species composition of submerged aquatic vegetation at nearshore sites of the Buffalo Harbor and Niagara River.
Submerged aquatic vegetation (SAV) provides critical habitat for a variety of fishes, birds, and invertebrates. Quantifying how SAV species composition and density changes during the growing season will help biologists better understand how SAV influences the aquatic community. For example, stem density of SAV may be important for retaining and protecting the eggs of broadcast spawners such as muskellunge, whereas vegetation height is important to YOY muskellunge during the nursery period (Werner et al. 1996). Therefore, different vegetation species may be critical for satisfying the life history requirements of fishes during different time periods. Understanding seasonal changes in SAV will also be important for designing projects that seek to restore SAV via planting because it will allow planners to select a suite of species that provide vegetation throughout the season.

Objective 3: Determine the effects of fish herbivory on aquatic vegetation and water quality.
The non-native rudd was the most abundant fish in trap-net catches from the Buffalo Harbor and upper Niagara River during 2007 when they comprised 38% of the total catch (n = 2,066; Kapuscinski and Wilkinson 2008) and 2008 when they comprised 56% of the total catch (n = 4,821; Kapuscinski et al. 2009). Rudd catches during 2008 were about four times greater than catches for the next most abundant species, brown bullhead (*Ameiurus nebulosus*; n = 1,260). The abundant rudd may contribute to poor water quality and impair aquatic vegetation by consuming plants and excreting biologically available nutrients (Lake et al. 2002; Nurminen et al. 2003). We will determine the effects of rudd on nearshore aquatic habitats in the Buffalo Harbor and upper Niagara River by estimating rudd abundance and conducting a series of laboratory experiments to quantify: (1) selection for vegetation species, (2) consumption rates of

aquatic vegetation, and (3) nutrient excretion rates. Determining how rudd affect vegetation and water quality will help us understand the ecological interactions between rudd and nearshore fish assemblages and will be critical for designing successful restoration projects.

Objective 4: Identify and quantify vegetation and physical habitat characteristics at muskellunge spawning sites in the Buffalo Harbor and upper Niagara River.

Previous studies have found that spawning muskellunge select for emergent vegetation and newly emerging SAV (Farrell 2001; Nohner 2009). Emergent vegetation and emerging SAV may play important roles for muskellunge egg incubation by (1) elevating eggs above the zone of low dissolved oxygen concentration that occurs at the substrate-water interface in some habitats, and (2) preventing eggs from being displaced to less desirable habitats by river current and wave action. Aquatic vegetation may be especially important for protecting eggs at higher energy incubating sites (e.g. Buffalo Harbor sites exposed to wave action and Niagara River sites exposed to the main river current). Identifying muskellunge spawning sites and describing associated vegetation and physical habitat at the time of spawning will allow us to assess habitat conditions in this system and provide habitat targets for restoration projects. Additionally, linking spawning habitat characteristics to YOY muskellunge catch data collected during past and proposed seining surveys (Objective 1) may provide insight to the quality of spawning habitat at different sites.

Methods & Expected Results

Objective 1

We will sample fish assemblages at nearshore sites with a fine-mesh bag seine (9.14 m long, 1 mm mesh), using the standardized protocol employed during 2007-2010. Seine hauls will be of equal length (30.5 m) to allow for comparisons of catch rates between sites and among years. Seining will be conducted during 27 July-7 August to be consistent with efforts during previous years. All fish captured will be identified and released, and all northern pike (*Esox lucius*) and muskellunge will be measured for total length (mm). Stomach contents will be flushed out of muskellunge ≥ 80 mm (non-lethal lavage technique, see Farrell 1998) and prey items will be identified and measured for total length when possible. At least 10 sites will be sampled,

including two in the Buffalo Harbor and eight in the upper Niagara River (Figures 1-3). Site-specific catch rates of YOY muskellunge will be calculated, and trends will be examined to identify priority areas for protection and habitat improvement (e.g. see Figure 4).

Objective 2

The density and species composition of SAV will be quantified monthly along geo-referenced, fixed transects at nearshore sites (e.g. those surveyed for Objective 1) of the Buffalo Harbor and Niagara River. All plant species will be identified and quantified within six 1-m^2 quadrats that are evenly spaced along a 30.5 m transect. Additional habitat measurements such as water depth, velocity, and substrate type will also be measured within each quadrat. At least four transects will be included at each site. Surveys will begin in May and be conducted monthly through November. Monthly measurements of SAV density and species composition will be compared to quantify seasonal changes.

Objective 3

We will estimate the abundance of rudd in the Buffalo Harbor and upper Niagara River via mark-recapture surveys. Trap-nets and electrofishing will be used during the spring to mark rudd with a fin clip. Consecutive sampling events (each day trap-nets are checked or electrofishing runs are made) during the spring and a fall electrofishing survey will serve as the recapture periods. Rudd abundance will be estimated with the Schnabel multiple-census mark-recapture method (Van Den Avyle 1993), or a similar, appropriate method.

Laboratory experiments will be conducted with rudd to quantify (1) selection for vegetation species, (2) consumption rates of aquatic vegetation, and (3) nutrient excretion rates. We will determine if rudd feed selectively by offering equal quantities of different vegetation species to captive rudd and quantifying the loss of each over time. Consumption will be determined by offering captive rudd known quantities of the same vegetation species and quantifying loss over time. We will quantify nutrient exertion rates by capturing wild rudd, placing them in aquaria with filtered water, and measuring changes in nutrient concentrations over time. The results of these experiments will be considered in conjunction with the abundance estimates to assess ecosystem-level impacts of rudd herbivory by answering the following questions:

- What aquatic vegetation species do rudd prefer to eat?
- What biomass of aquatic vegetation can the rudd population of the Buffalo Harbor and upper Niagara River consume each year?
- Can the nutrients excreted by rudd degrade water quality, especially in still-water habitats such as Strawberry Island Bay? For example, a low N: P ratio in rudd excreta can promote growth of cyanobacteria (Schaus et al. 1997).
- Can rudd alter aquatic vegetation assemblages, and if so, can we predict how this will influence fish assemblages, based on our previous findings of fish assemblage-habitat relations (Kapuscinski and Farrell *In prep.*)?

Answering these (and potentially other) questions can help us understand how rudd impact existing aquatic habitat and provide guidance for the design of restoration projects that seek to create nearshore habitat. For example, native aquatic vegetation that is resistant to rudd herbivory may be planted at restoration sites.

Objective 4

Visual observation (nighttime spotlighting) following the methods of Zorn et al. (1998), Rust et al. (2002), and Nohner (2009) will be used to identify muskellunge spawning sites in the Buffalo Harbor and upper Niagara River. The location of spawning fish will be recorded using a GPS unit so we can return to sites during daylight hours and conduct habitat surveys. Data describing vegetative coverage, species composition, and physical habitat (e.g. water velocity, depth, substrate type, and temperature) will be collected at each identified spawning site. We will also estimate the percent of vegetation covering the substrate and height of vegetation at each site. The species composition of the vegetation present will be recorded to determine which species are most abundant at sites during the spawning period. Water depth will be measured at the time of spotlighting and during daytime habitat surveys because water levels may fluctuate substantially on a daily basis. Substrate characteristics at spawning sites will be described following the Udden-Wentworth grain size scale (Udden, 1914; Wentworth, 1922). Temperature data will be collected throughout the spawning period using temperature loggers placed at multiple nearshore sites in the Buffalo Harbor and Niagara River. Data from this study will be used to quantitatively describe muskellunge spawning habitat; these descriptions can be used to

develop targets for restoration efforts that seek to improve or create nearshore habitat for spawning muskellunge.

Organization

The Research Foundation for and on behalf of State University of New York, College of Environmental Science and Forestry
P.O. Box 9
Albany, NY 12201
Justine Gordon (Contact)

Federal ID Number

14-1368361

Points of Contact

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Evidence of Consultation with the Niagara River Greenway Commission

A completed *Niagara River Greenway Commission Consultation and Review Form* (enclosed) was submitted to the Commission before 21 September 2010, so a consistency determination is expected on 16 November 2010. Any comments made by the Commission, and our response will be forwarded to the Greenway Ecological Fund Standing Committee.

Evidence of Consultation with Affected Municipalities, Counties, or Indian Nations

N/A – Project activities will not be conducted on municipal, county, or Indian Nation lands.

Evidence of Consultation with State and Federal Agencies

The New York State Department of Environmental Conservation (NYSDEC) is a project cooperator and has reviewed this application in full. NYSDEC project reviewers were Mike Wilkinson and Tim DePriest (Buffalo office, phone: 716-851-7010). We obtained collector's permits from the Ontario Ministry of Natural Resources (OMNR) for work conducted during 2007-2009, and we provided OMNR with a summary report of our activities; we will again obtain all required permits for future work. Our OMNR point of contact was Alistair Mathers (Picton, Ontario office, phone: 613-476-8733). Consultation with U.S. federal agencies was not applicable for this project and therefore not conducted.

Operation and Maintenance Plan

N/A – No permanent physical structures are being built.

Project Consistency with the Niagara River Greenway Plan (NRGP)

Our project will advance several principles outlined in the NRGP, especially *Sustainability*, *Ecological Integrity*, and *Restoration*. The results obtained from our surveys of the nearshore fish assemblage and aquatic vegetation will be used to track changes through time, thereby providing a measure of ecological sustainability and integrity, especially in response to habitat restoration efforts. Understanding how herbivory by non-native rudd affects water quality and aquatic vegetation will help biologists manage for fish populations that sustain the ecological integrity of the Greenway. The results obtained from Objectives 2-4 will be important when assessing changes in aquatic vegetation through time, trying to improve the water quality of still-water habitats (e.g. Strawberry Island Bay), and designing projects that seek to restore nearshore habitat important to spawning fishes. Our project will also advance the NRGP's principles of *Partnerships* and *Community* by continuing the collaborative effort between the NYSDEC, SUNY-ESF, Buffalo State-SUNY, the OMNR, and the Niagara Musky Association to gain knowledge about the Greenway's aquatic resources (letters of support from each organization are enclosed). These partnerships are critical for conservation of ecological resources such as the muskellunge fishery that are used by the public.

This project will strongly support the NRGP's goals to *Protect and Restore Environmental Systems* and *Promote Long Term Sustainability* by identifying areas in need of protection and habitat restoration, and providing information needed to preserve native fishes. As critical habitats are protected and restored, improvements to native sport fish populations (e.g. muskellunge) will attract more anglers, even from out of state, who will spend money locally and help *Spark Revitalization and Renewal*.

Our project proposal is consistent with the criteria *Priority Status: Restoration of Niagara River Ecosystem* because our results can be used to guide preservation and restoration of the native fishes and vegetation that comprise the nearshore aquatic community. Project activities will be conducted almost entirely within the *Focus Area*; assessment of aquatic vegetation in Ontario waters may be conducted. We believe that all aspects of our project are *Implementable*, because they build on existing data and research efforts completed during 2007-2010—our prior experience allows us to propose a realistic workload and budget. Several *Matching Funds* will contribute to this project, including contributions from the Niagara Musky Association, the

NYSDEC, SUNY-ESF, and Buffalo State-SUNY (see budget for dollar amounts). The results of this project will provide *Clear Benefit*s to the Greenway and local community by obtaining information required for proper management and restoration of nearshore fishes and aquatic vegetation.

Project Consistency with State and Federal Laws

NYSDEC collaborators reviewed the project description for consistency with state laws, and NYSDEC staff will be involved with most project activities, providing real-time consultation on any changes to the project. We will obtain a collector's permit from OMNR for any activities in Ontario waters, and therefore be in compliance with all Ontario laws. Our proposed activities do not require exemption from federal laws, so U.S. agencies were not consulted.

Efforts and Opportunities to Obtain Matching Funds

Approximately $251,661.00 in matching funds will support this project. The NYSDEC has agreed to provide services (salary, mileage, etc.), but the amount is unknown at this time. Buffalo State-SUNY will provide a cost-share of $3,000.00 (waived laboratory fees). The SUNY-ESF will provide a cost-share of $247,161.00 in the form of salary, tuition, and indirect costs.

Existing Costs as of 31 August 2007

We will not use any awarded Greenway Funds to defray obligations, operations, or maintenance costs existing prior to 31 August 2007.

Land Ownership Associated with Project

N/A

Project Budget

Field sampling and laboratory experiments will be conducted during 2011-2013 to achieve the project objectives. Data entry, analysis, and report writing will be ongoing during the term of the project. Therefore, funding for three years is being requested at a total of $735,413.00 (see Tables 1-3 for detailed annual budgets).

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Kapuscinski, K. L., Wilkinson, M. A., and Farrell, J. M. 2009. Sampling efforts for young-of-year (2006-2008) and adult muskellunge (2008) in the Buffalo Harbor, Lake Erie, and the

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Table 1. Proposed budget for Year 1 (2011).

Activity	Approximate dates	Item	Cost
Objective 1: seining to assess fish assemblages at nearshore sites	1 - 5 August	Lodging	1,000
		Per diem	300
		Mileage	200
		Supplies	1,000
		Boat fuel	105
Objective 2: density and successional changes in SAV	May-November	Lodging	6,720
		Per diem	1,050
		Mileage	1,925
		Supplies	1,500
		Boat fuel	1,470
Objective 3: estimating rudd abundance	May-June, October	Lodging	4,080
		Per diem	1,140
		Mileage	2,575
		Supplies	1,500
		Boat fuel	798
Objective 3: laboratory experiments	May-November	Lodging	1,200
		Per diem	300
		Mileage	488
		Supplies	1,500
		YSI probe	3,000
		Temp. loggers	1,920
Objective 4: Muskellunge spawning study	April-August	Lodging	3,000
		Per diem	750
		Mileage	913
		Supplies	2,300
		Boat fuel	1,050
		Water level loggers	1,750
Boat purchase			30,000
Boat maintenance			1,500
Consulting services			5,000
Postdoctoral researcher (Kapuscinski)	1 January - 31 December	Salary	52,000
		Benefits	20,930
Graduate Student 1	1 August - 31 December	Salary	18,000
		Benefits	2,340
		Tuition	9,951
Graduate Student 2 (Crane)	1 Jan - 31 December	Salary	10,000
		Benefits	1,300
Technician 1	July 1 - 30 September	Salary	7,200
		Benefits	1,224
Technician 2	July 1 - 30 September	Salary	7,200
		Benefits	1,224
Farrell	1 January - 31 December	Salary	4,710
		Benefits	2,295
Indirect costs			67,707
Year 1 total			286,115

Table 2. Proposed budget for Year 2 (2012).

Activity	Approximate dates	Item	Cost
Objective 1: seining to assess fish assemblages at nearshore sites	1 - 5 August	Lodging	1,000
		Per diem	300
		Mileage	200
		Supplies	250
		Boat fuel	105
Objective 2: density and successional changes in SAV	May-November	Lodging	6,720
		Per diem	1,050
		Mileage	1,925
		Supplies	1,500
		Boat fuel	1,470
Objective 3: estimating rudd abundance	May-June, October	Lodging	4,080
		Per diem	1,140
		Mileage	2,575
		Supplies	1,500
		Boat fuel	798
Objective 3: laboratory experiments	May-November	Lodging	1,200
		Per diem	300
		Mileage	488
		Supplies	500
Objective 4: Muskellunge spawning study	April-August	Lodging	3,000
		Per diem	750
		Mileage	913
		Supplies	500
		Boat fuel	1,050
Boat maintenance			1,500
Consulting services			5,000
Postdoctoral researcher (Kapuscinski)	1 January - 31 December	Salary	54,340
		Benefits	22,823
Graduate Student 1	1 January - 31 December	Salary	18,810
		Benefits	2,516
		Tuition	10,349
Graduate Student 2 (Crane)	1 Jan - 31 December	Salary	10,450
		Benefits	1,398
Technician 1	July 1 - 30 September	Salary (12 weeks)	7,524
		Benefits	1,279
Technician 2	July 1 - 30 September	Salary (12 weeks)	7,524
		Benefits	1,279
Farrell	1 January - 31 December	Salary	4,922
		Benefits	2,800
Indirect costs			57,607
Year 2 total			243,435

Table 3. Proposed budget for Year 3 (2013).

Activity	Approximate dates	Item	Cost
Objective 1: seining to assess fish assemblages at nearshore sites	1 - 5 August	Lodging	1,000
		Per diem	300
		Mileage	200
		Supplies	250
		Boat fuel	105
Objective 3: estimating rudd abundance	May-June, October	Lodging	4,080
		Per diem	1,140
		Mileage	2,575
		Supplies	1,500
		Boat fuel	798
Objective 4: Muskellunge spawning study	April-August	Lodging	960
		Per diem	240
		Mileage	400
		Boat fuel	168
Boat maintenance			1,500
Postdoctoral researcher (Kapuscinski)	1 January - 31 December	Salary	56,785
		Benefits	22,856
Graduate Student 1	1 January - 31 December	Salary	19,656
		Benefits	2,826
		Tuition	10,763
Graduate Student 2 (Crane)	1 Jan - 31 December	Salary	10,920
		Benefits	1,570
Technician	July 1 - 30 September	Salary (12 weeks)	7,863
		Benefits	1,337
Farrell	1 January - 31 December	Salary	5,143
		Benefits	2,212
Indirect costs			48,716
Year 3 total			205,863
Grand total			735,413

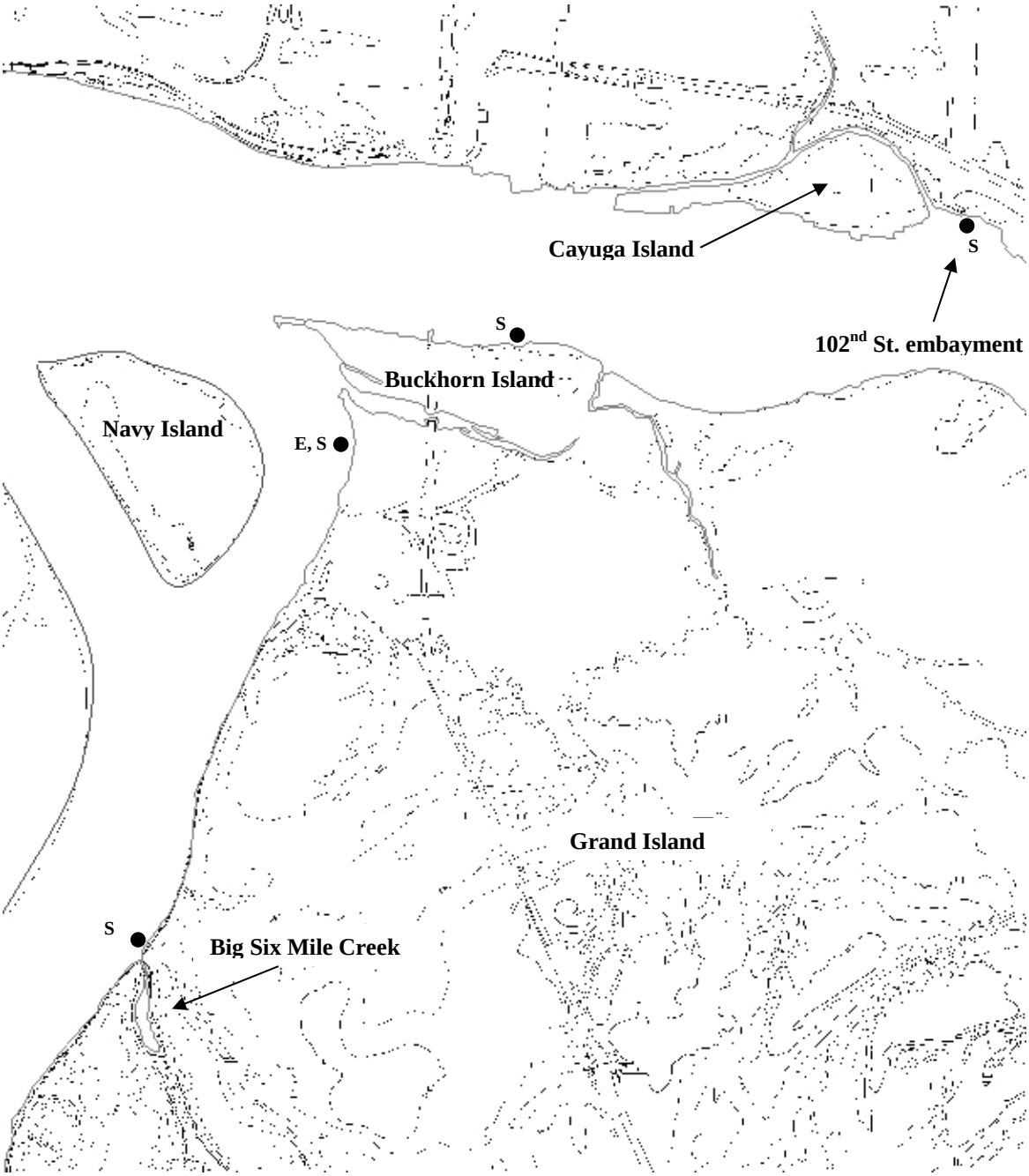

Figure 1. Image of a portion of the upper Niagara River, depicting proposed seining sites (**S**).

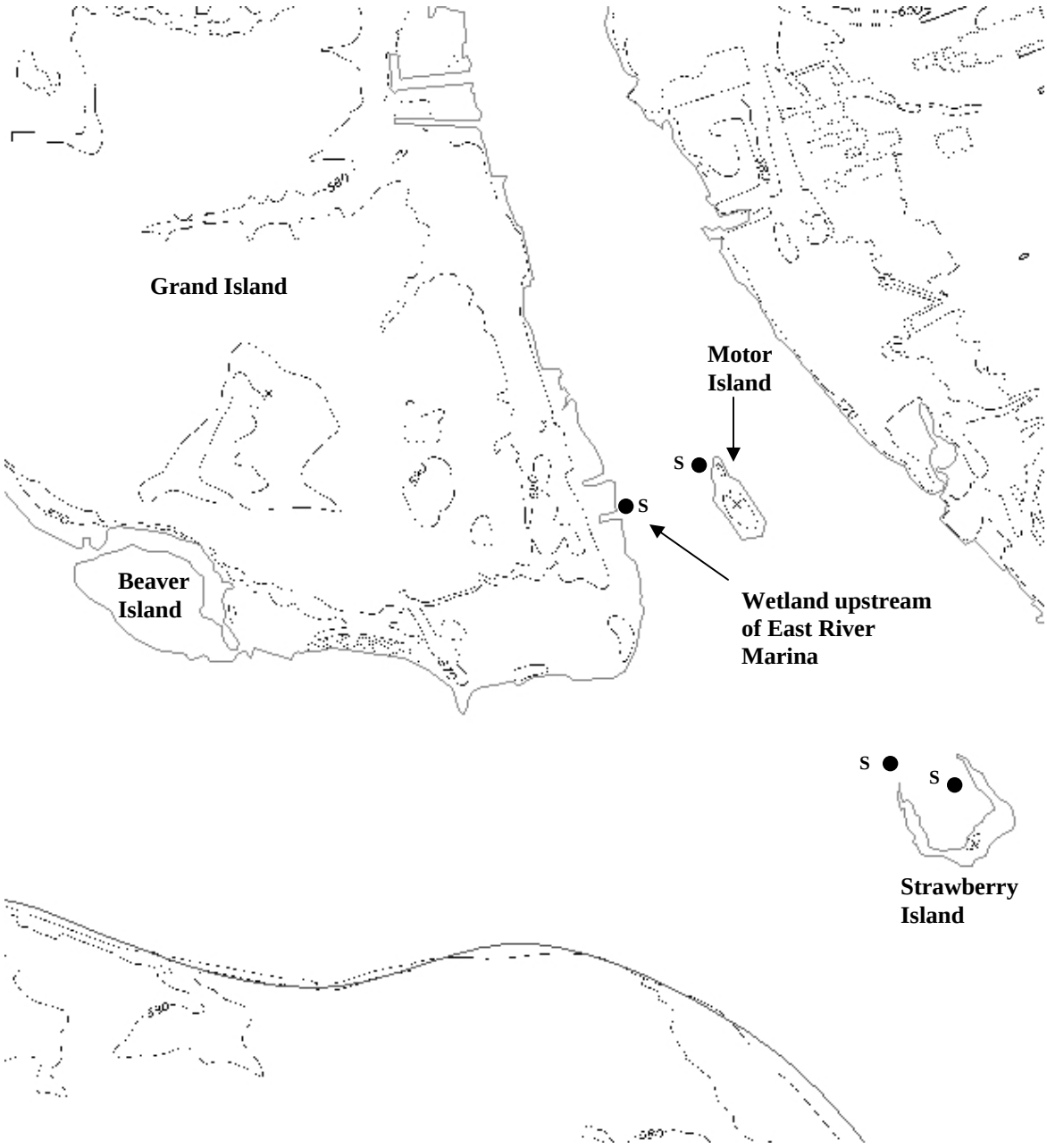

Figure 2. Image of a portion of the upper Niagara River, depicting proposed seining sites (**S**).

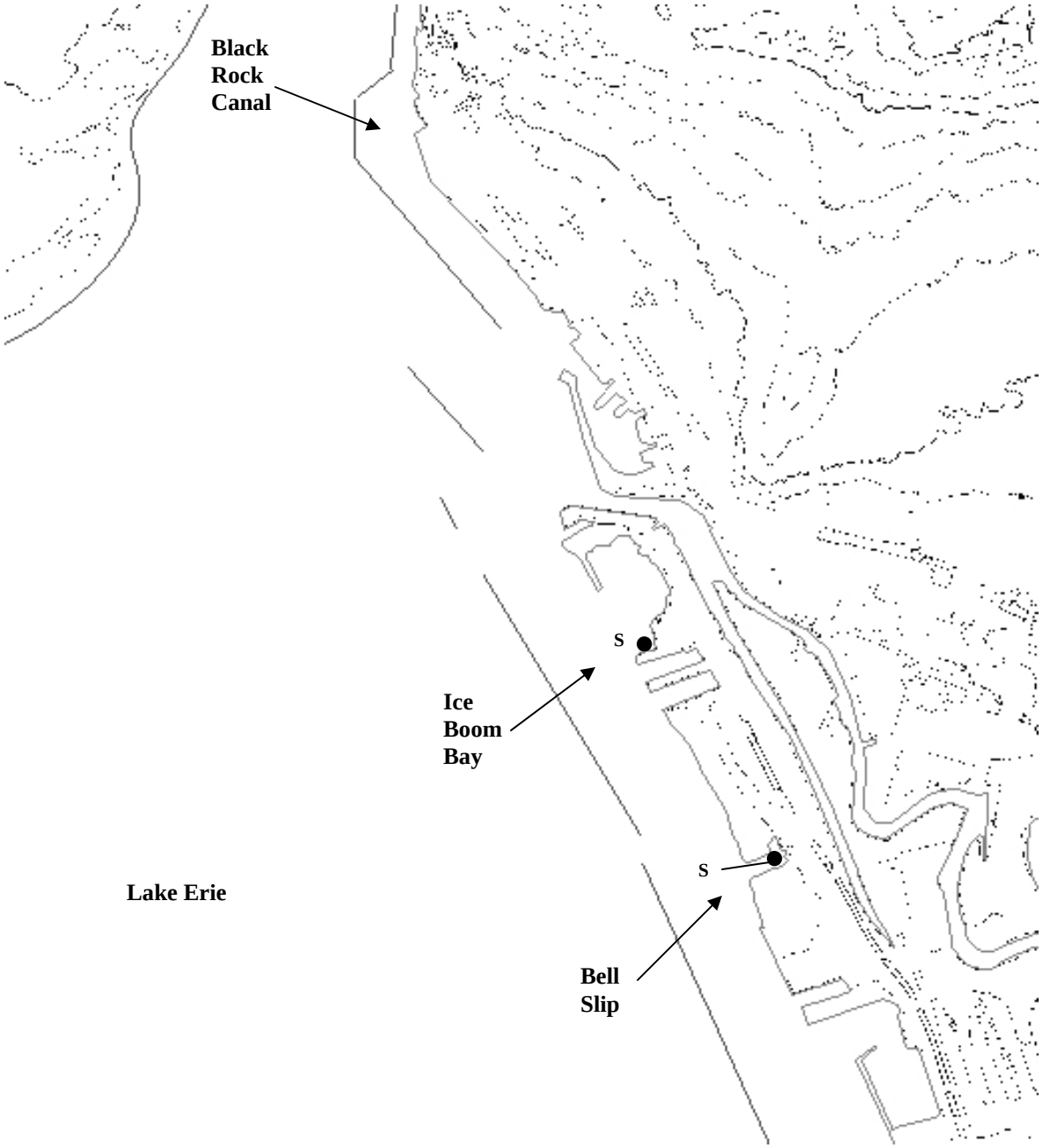

Figure 3. Image of a portion of the Buffalo Harbor, Lake Erie, depicting proposed seining sites (**S**).

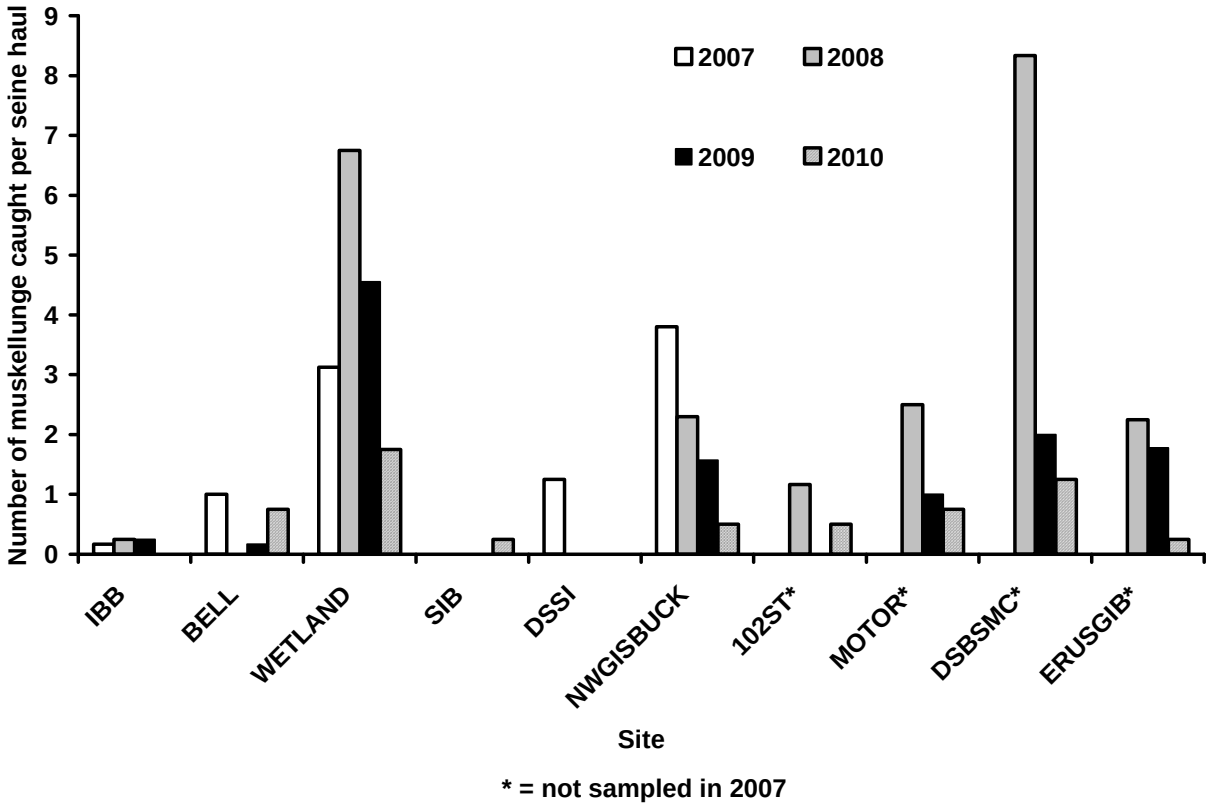

Figure 4. Catch rate (number per seine haul) of young-of-year muskellunge at sites surveyed with a fine-mesh seine each year during 2007-2010. IBB = Ice Boom Bay (Buffalo Harbor), BELL = Bell Slip (Buffalo Harbor), WETLAND = outside of break-walls protecting the wetland on the southeast tip of Grand Island (upper Niagara River; UNR), SIB = Strawberry Island Bay (UNR), DSSI = immediately downstream of Strawberry Island off the western arm (UNR), NWGISBUCK = northwest Grand Island south of Buckhorn Island (UNR), 102ST = 102nd Street Bay (UNR), MOTOR = northwest Motor Island (UNR), DSBSMC = downstream of Big Six Mile Creek, and ERUSGIB = east river upstream of the north Grand Island Bridge (UNR).

New York State Department of Environmental Conservation
Division of Environmental Permits, Region 9
270 Michigan Avenue, Buffalo, New York, 14203-2915
Phone: (716) 851-7165 · **Fax:** (716) 851-7168
Website: www.dec.ny.gov

Alexander B. Grannis
Commissioner

September 14, 2010

New York Power Authority
Mr. Stephen M. Schoenwiesner
Licensing Manager, and Secretary for Greenway
Ecological Fund Standing Committee
123 Main Street
White Plains, New York 10601

Dear Mr. Schoenwiesner:

I am writing to express support for the project proposal **Evaluation of Nearshore Fish Assemblages, Habitat, and the Effects of Herbivorous Rudd (*Scardinius erythrophthalmus*): Determining the Efficacy of Fish Habitat Restoration Efforts in the Buffalo Harbor and Niagara River** *being submitted to you for funding by the Greenway Ecological Fund Standing Committee by* Dr. John Farrell and Kevin Kapuscinski from State University of New York College of Environmental Science and Forestry. As New York State Department Environmental Conservation (NYSDEC) Region 9 Fisheries Unit Manager, with aquatic resource management authority for the Buffalo Harbor and Niagara River, I strongly support this proposal and respectfully urge the Greenway Ecological Fund Standing Committee to provide funding for this work.

We have worked cooperatively with Dr. Farrell and Mr. Kapuscinski from 2007 to 2009 to support their work on the Niagara River by providing considerable NYSDEC staff time and logistical support for field work and subsequent reporting activities. As for the above-mentioned proposal, which includes several tasks to continue previous (2007-2009) studies, we are pledging to provide continued NYSDEC staff labor during the proposed project efforts. However due to reductions in Region 9 Fisheries Unit full-time and seasonal staff, we will not be able to provide a similar level of labor support that we have in the past. We are also pledging an undetermined amount of vehicle mileage and use of NYSDEC trap nets for the proposed work.

As for past research efforts supported by Greenway funds on the Buffalo Harbor and Niagara River, Dr. Farrell and Mr. Kapuscinski have done a very conscientious job of reporting study results, including yearly summaries published in NYSDEC annual reports to Great Lakes Fisheries Commission Committees for both Lakes Erie and Ontario. In addition Mr. Kapuscinski is currently preparing a dissertation as part of requirements for a PhD degree, and much information and data collected on the Niagara River will be further summarized and analyzed in this document, eventually accessible to the public. Dr. Farrell and Mr. Kapuscinski are also preparing several other scientific papers synthesizing and presenting information obtained during Greenway funded work on the Niagara River. This published information greatly helps document the work that has been done and serves to increase our understanding of aquatic resources in the Buffalo Harbor and Niagara River.

Again, I encourage you to provide funding support for this proposal that will yield information to better understand and manage fish resources and aquatic habitats in the Buffalo Harbor and Niagara River corridor. Please let me know if any additional information is required.

Sincerely,

Michael A. Wilkinson for

Paul McKeown
Region 9 Fisheries Manager

PM:sw

cc: Dr. John Farrell, SUNY ESF
Mr. Kevin Kapuscinski, SUNY ESF
Mr. Michael Wilkinson, NYSDEC Region 9 Buffalo

Buffalo State
State University of New York

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TEL: 716-878-4329
FAX: 716-878-6644

September 13, 2010

Mr. Steve Schoenweisner
Licensing Manager, and
Secretary, Greenway Ecological Fund Standing Committee
New York Power Authority
123 Main Street
White Plains, New York 10601

Dear Mr. Schoenweisner,

I am writing to express my support for the project proposal "Evaluation of Nearshore Fish Assemblages, Habitat, and the Effects of Herbivorous Rudd (*Scardinius erythrophthalmus*): Determining the Efficacy of Fish Habitat Restoration Efforts in the Buffalo Harbor and Niagara River"**,** by Dr. John Farrell and Kevin Kapuscinski from State University of New York College of Environmental Science and Forestry. As Director of the Buffalo State College Great Lakes Center I fully support this proposal and would urge you to provide funding for this research.

We have provided assistance to Dr. Farrell and Mr. Kapuscinski in the past and we will support this work by providing 20 days of ecosystem laboratory space ($3,000) as well as vessel storage space, and boat access.

Again, I strongly encourage you to provide funding support for this proposal that will yield information to better understand the role that Rudd are playing in these important nurseries and spawning areas of the Niagara River. Please let me know if any additional information is required.

Sincerely,

Dr. Alexander Karatayev,
Director and Professor
Great Lakes Center
Buffalo State College

cc: Dr. John Farrell, SUNY ESF
Mr. Kevin Kapuscinski, SUNY ESF
Mark Clapsadl, BSC

Niagara Musky Association, Inc.

PMB 383, 735 Delaware Rd., Buffalo,
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Rod Ballard
Gary Melnyk
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Mark Wozniak

New York Power Authority
Stephen M. Schoenwiesner
Licensing Manager
123 Main Street
White Plains, NY 10601

September, 8th 2010

Mr. Schoenwiesner,

I am writing, on behalf of the Niagara Musky Association, to express our unqualified support for the project proposal entitled: *Evaluation of Nearshore Fish Assemblages, Habitat, and the Effects of Herbivorous Rudd (Scardinius erythrophthalmus): Determining the Efficacy of Fish Habitat Restoration Efforts in the Buffalo Harbor and Niagara River*, which was submitted to you by Dr. John M. Farrell and Kevin L. Kapuscinski. Our association believes this work will provide important information that is needed to successfully manage and assess existing Buffalo Harbor and Niagara River aquatic habitat as well as current and future aquatic habitat restoration projects.

The Niagara Musky Association is dedicated to promoting the perpetual survival of the naturally occurring native fish species populations in the Niagara River and Lake Erie, with a specific focus on muskellunge. As all of these species are dependant on appropriate habitat we see this as an important project to support this goal.

Therefore, we support the above-mentioned project and have pledged to provide at least $1,500.00 to support this project. We have financially supported the applicants in the past, and look forward to working with them in the future. We encourage your committee to fund this important project.

Sincerely,

Scott McKee
President
Niagara Musky Association
PMB 383
735 Delaware Road
Buffalo, NY 14223
Email: scotthenrymckee@yahoo.com

Ontario

Steve Schoenweisner
New York Power Authority
Licensing Manager, and
Secretary, Greenway Ecological Fund Standing Committee
123 Main Street
White Plains, NY 10601

14 September 2010

Secretary Schoenweisner,

I am writing today on behalf of the Ontario Ministry of Natural Resources (OMNR) to express support for Dr. John M. Farrell and Kevin L. Kapuscinski's project proposal entitled *Evaluation of Nearshore Fish Assemblages, Habitat, and the Effects of Herbivorous Rudd (*Scardinius erythrophthalmus*): Determining the Efficacy of Fish Habitat Restoration Efforts in the Buffalo Harbor and Niagara River*. The OMNR believes this work will increase our knowledge of the aquatic resources of the Buffalo Harbor and Niagara River, and help guide successful management of this internationally important resource.

I issued permits for Farrell and Kapuscinski's work activities in Ontario waters of the Niagara River during 2007-2009, and will be able to issue permits for similar work in the future. Farrell, Kapuscinski, and their New York State Department of Conservation collaborators adhered to all permit conditions and provided the OMNR with summaries of their work. The OMNR encourages your committee to fund this project based on its merit and the previous works of the proposal authors.

Sincerely,

Alastair Mathers

Alastair Mathers
Lake Ontario Management Unit
Ministry of Natural Resources
R.R. #4
Picton, Ontario K0K 2T0
Phone: 613-476-8733
Email: alastair.mathers@ontario.ca

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250 Illick Hall, Syracuse, NY 13210
(315) 470-6990 jmfarrell@esf.edu; http://www.esf.edu/efb/faculty/farrell.htm

A. PROFESSIONAL PREPARATION:

Cornell University	Natural Resources	B.Sc.	1987
SUNY-ESF	Fisheries	M.S.	1988-1991
SUNY-ESF	Fish Ecology	PhD	1993-1998

B. APPOINTMENTS:

Associate Professor and Director, Thousand Islands Biological Station, Department of Environmental and Forest Biology, SUNY College of Environmental Science and Forestry (current)
Senior Research Associate, Department of Environmental and Forest Biology, SUNY College of Environmental Science and Forestry (2007-2009).

Research Associate, Department of Environmental and Forest Biology, SUNY College of Environmental Science and Forestry (2000-2007)

D. PUBLICATIONS (recent examples)

M. B. Rippke, M. T. Distler, and **J. M. Farrell**. Post-glacial vegetation dynamics of an upper St. Lawrence River coastal wetland: Paleoecological evidence for a recent historic increase in cattail (Typha). Wetlands 30:805-816.

Marty, J.E., M. R. Twiss, J. J. Ridal, Y. de Lafontaine, and **J. M. Farrell**. 2010. From the Great Lakes flows a Great River: Overview of the St. Lawrence River Ecology supplement. Hydrobiologia 647:1-5.

Farrell, J. M., K. T. Holeck, E. L. Mills, C. E. Hoffman, and V. J. Patil. 2010. Recent Ecological Trends in Lower Trophic Levels of the International Section of the St. Lawrence River: A Comparison of the 1970s to the 2000s. Hydrobiologia 647:21–33.

Farrell, J. M., B. A. Murry, D. J. Leopold, A. Halpern, M. Rippke, K. S. Godwin, and S. D. Hafner. Water-level regulation and coastal wetland vegetation in the upper St. Lawrence River: inferences from historical aerial imagery, seed banks, and *Typha* dynamics. Hydrobiologia 647:127–144.

Toner, J., **J. M. Farrell**, and J. V. Mead. 2010. Muskrat abundance responses to water-level regulation within freshwater coastal wetlands. Wetlands 30:211-219.

Kelder, B. F., and **J. M. Farrell**. 2009. A spatially explicit model to predict walleye spawning in an eastern Lake Ontario tributary. North American Journal of Fisheries Management 29:1686–1697.

Murry, B. A., **J. M. Farrell**, M. K. Schulz, and M. Teece. 2008. The effect of egg size and nutrient content on larval performance: implications to protracted spawning in northern pike (*Esox lucius* Linnaeus, 1758). Hydrobiologia 601:71-82.

Farrell, J. M., R. M. Klindt, J. M. Casselman, S. R. LaPan, R. G. Werner, and A. Schiavone. 2007. Development, implementation, and evaluation of an international muskellunge management strategy for the upper St. Lawrence River. Environmental Biology of Fishes 79:111-123.

Murry, B. A., and **J. M. Farrell**. 2007. Quantification of native muskellunge nursery: influence of body size, fish community composition, and vegetation structure. Environmental Biology of Fishes 79:37-47.

Smith, B. V., **J. M. Farrell**, H. B. Underwood, and S. Smith. 2007. Year class strength of St. Lawrence River northern pike. North American Journal of Fisheries Management 27:481-491.

Farrell, J. M., J. V. Mead, and B. A. Murry. 2006. Protracted spawning of St. Lawrence River northern pike (Esox lucius): simulated effects on survival, growth, and production. Ecology of Freshwater Fish 15:169-179.

Murry, B. A., **J. M. Farrell**, P. Smyntek, and M. Teece. 2006. Effect of lipid extraction on the interpretation of fish community trophic relationships determined by stable carbon and nitrogen isotopes. Canadian Journal of Fisheries and Aquatic Sciences 63:2167-2172.

E. SYNERGISTIC ACTIVITITIES: Associate Editor, *Wetlands* 2005-2008; International Joint Commission, Environmental Technical Working Group for the Lake Ontario-St. Lawrence River Water Levels Study, 2002-2005; New York Chapter of the American Fisheries Society President, New York State Fish and Wildlife Management Board 2002-2006; Advisory Board, Central Michigan University Biological Station. Courses taught, SUNY ESF: Aquatic Ecosystem Restoration and Management; Seminars in Aquatic Ecology; Ecology of Adirondack Fishes.

F. COLLABORATORS AND OTHER AFFLIATIONS:

(i) Collaborators

Donald J. Leopold, SUNY-ESF, Distinguished Teaching Professor (Wetlands); Henry Mullins, Syracuse University, Professor, (Geology), Neil Ringler, SUNY-ESF, Distinguished Teaching Professor and Chair EFB (Fisheries), James Gibbs, SUNY-ESF, Associate Professor (Conservation Biology), SUNY-ESF, (Aquatic Ecology), Kimberly L. Schulz , Associate Professor, SUNY-ESF, (Limnology), Mark Teece, Associate Professor, SUNY-ESF (Chemistry), Greg Boyer, Professor, SUNY-ESF (Chemistry), Edward Mills, Professor and Director (retired), Cornell University Biological Station (Limnology), John Casselman, Adjunct Professor Queens University (Fish Ecology), Paul Bowser, Professor, Cornell University (Fish pathology), Jim Johnson, USGS Tunison Laboratory (Fish Ecology)

(ii) Graduate Advisors:

Robert G. Werner (SUNY-ESF)

Don McQueen (York University)

(iii) Thesis Advisees: (all at SUNY ESF)

PhD: Geof Eckerlin, Brent Murry, Kevin Kapuscinski, Derek Crane, Alison Halpern (co-advised with Dr. Donald Leopold), MS: Katherine DeVilBiss, Christina Killourney, Mark Leopold, Brian Henning, Scott Schleuter, Molly A. Connerton, Molly Beland, Jason Toner, Aaron Bosworth, Brian Kelder, Katie Woodside, Geof Eckerlin, MPS; Jarrod Hughes, Emily Cloyd, (co-advised with Dr. Donald Leopold), Thomas Hughes.

Kevin L. Kapuscinski

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EDUCATION

Ph.D., State University of New York, College of Environmental Science and Forestry (Ecology), in progress, GPA = 3.97. Dissertation (working title): *Comparative Ecology of Muskellunge and Littoral Fish Assemblages of the Upper Niagara and St. Lawrence Rivers*.

M.S., University of Wisconsin-Stevens Point, Natural Resources (Fisheries), August 2002, GPA = 3.79. Thesis: *Movements of Lake Trout in U.S. Waters of Lake Superior During 1973-2001.*

B.S., University of Wisconsin-Stevens Point, Water Resources (Fisheries) and Biology, December 1999, GPA = 3.24.

PROFESSIONAL EXPERIENCE

Research Assistant, Ph.D. Student - State University of New York, College of Environmental Science and Forestry (Aug 2006-present)

Developed, conducted, and secured funding ($148,615) for research projects on (1) diets of young-of-year Great Lakes muskellunge, (2) fish assemblages at muskellunge nursery sites, and (3) muskellunge genetic population structure and reproductive ecology

Created and taught a seminar on information-theoretic approaches to model selection (Fall 2008)

Led an annual seining survey and assisted with other research projects conducted at the Thousand Islands Biological Station on the St. Lawrence River (Dr. John M. Farrell, Director)

Fisheries Biologist - Wisconsin Department of Natural Resources (May 2004-Aug 2006)

Developed, implemented, and directed fisheries surveys

Led efforts to reestablish Great Lakes muskellunge in Green Bay, Lake Michigan

Prepared technical reports and peer-reviewed journal articles (see below)

Reviewed plans for construction of culverts, bridges, and storm water containment structures

Participated in statewide fisheries management teams

Pallid Sturgeon Biologist - Montana Department of Fish, Wildlife & Parks (Aug 2002-May 2004)

Coordinated and led recovery efforts for the endangered pallid sturgeon in Montana

Secured funding ($158,000 total) to conduct additional research, tracked budgets, hired personnel, and supervised up to five fisheries technicians

Designed and implemented studies to monitor hatchery-reared pallid sturgeon that were stocked into the Missouri River

Conducted surveys to monitor populations of native and non-native fishes in the Missouri River

Wrote monthly, annual, and project completion reports

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TEACHING EXPERIENCE

The Information-theoretic Approach to Model Selection: A New Paradigm in Ecological Research (EFB 797, Fall 2008 Seminar), State University of New York College of Environmental Science and Forestry.

Ecological Monitoring and Biodiversity Assessment (EFB 202, Summer 2010, Aquatics and Statistics sections), State University of New York College of Environmental Science and Forestry.

PEER-REVIEWED PUBLICATIONS

Kapuscinski, K. L., Zorn, T. G., Schneeberger, P. J., O'Neal, R. P., and B. T. Eggold. 2010. The status of Lake Michigan walleye stocks. *In* Status of walleye in the Great Lakes: proceedings of the 2006 Symposium. Great Lakes Fishery Commission Technical Report 69. pp. 15-70.

Murry, B. A., and eight coauthors. *In Review*. Increasing prevalence of the invasive round goby in coastal wetlands of the Laurentian Great Lakes: implications to native fish refugia. Biological Invasions.

Kapuscinski, K. L., Belonger, B. J., Fajfer, S., and T. J. Lychwick. 2007. Population dynamics of muskellunge in Wisconsin waters of Green Bay, Lake Michigan, 1989–2005. Environmental Biology of Fishes 79:27-36.

Kapuscinski, K. L., Hansen, M. J., and S. T. Schram. 2005. Movements of Lake Trout in U.S. Waters of Lake Superior, 1973-2001. North American Journal of Fisheries Management 25:696-708.

OTHER PUBLICATIONS

Kapuscinski, K. L., Wilkinson, M. A., and J. M. Farrell. 2010. Sampling for muskellunge, rudd, and the nearshore fish community of the Buffalo Harbor (Lake Erie) and the upper Niagara River, 2009. Section Q *in* D. Einhouse, editor. NYSDEC Lake Erie 2009 annual report. New York State Department of Environmental Conservation, Albany.

Kapuscinski, K. L., Wilkinson, M. A., and J. M. Farrell. 2010. Sampling for muskellunge and the nearshore fish community of the lower Niagara River, 2009. Section 19 *in* NYSDEC Annual Report, Bureau of Fisheries, Lake Ontario Unit and St. Lawrence River Unit to the Great Lake Fishery Commission's Lake Ontario Committee.

Kapuscinski, K. L., Wilkinson, M. A., and J. M. Farrell. 2009. Sampling efforts for young-of-year (2006-2008) and adult muskellunge (2008) in the Buffalo Harbor, Lake Erie, and the upper Niagara River. Section R *in* D. Einhouse, editor. NYSDEC Lake Erie 2008 annual report. New York State Department of Environmental Conservation, Albany.

Kapuscinski, K. L., and M. A. Wilkinson. 2008. Adult muskellunge sampling activities in the Buffalo Harbor and upper Niagara River May and June, 2007. Section U *in* D. Einhouse, editor. NYSDEC Lake Erie Unit 2007 annual report. New York State Department of Environmental Conservation, Albany.

Kapuscinski, K. L., and R. Lange. 2005. Status of walleye stocks in lower Green Bay and the lower Fox River. Pages 29-36 *in* B. Horns, editor. Lake Michigan Management Reports. Wisconsin Department of Natural Resources, Madison.

Kapuscinski, K. L. 2004. Evaluation of hatchery-reared pallid sturgeon recaptured in recovery-priority management area #2 during 2003. Montana Department of Fish, Wildlife & Parks, Helena.

Kapuscinski, K. L., and M. W. Baxter. 2004. Lower Missouri and Yellowstone rivers pallid sturgeon study, 2003 report. Montana Department of Fish, Wildlife & Parks, Helena.

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SELECTED PRESENTATIONS

Kevin L. Kapuscinski. How Habitat Influences Young-of-year Muskellunge and the Fishes they Prey Upon. Invited speaker, Homer Dodge Lecture Series, The Antique Boat Museum, Clayton, NY, August 2010.

Kevin L. Kapuscinski and John M. Farrell. Feeding Ecology of Wild-hatched Young-of-year Muskellunge in Lentic and Lotic Nursery Habitats. Invited speaker, EFB 488, Ecology of Adirondack Fishes, Thousand Islands Biological Station, Clayton, NY, August 2010.

Kevin L. Kapuscinski and John M. Farrell. Description and Comparison of Fish Assemblages at Muskellunge Nursery Sites in the Buffalo Harbor (Lake Erie), Upper Niagara River, and St. Lawrence River. 53rd Annual Conference on Great Lakes Research, May 2010.

Kevin L. Kapuscinski and John M. Farrell. A Comparison of diets of young-of-year muskellunge from the St. Lawrence and upper Niagara Rivers. New York Chapter of the American Fisheries Society Annual Meeting, February 2010.

Kevin L. Kapuscinski, Troy G. Zorn, Philip J. Schneeberger, Richard P. O'Neal, and Bradley T. Eggold. The status of Lake Michigan walleye stocks, 1969-2005, American Fisheries Society Annual Meeting, August 2006.

Kevin L. Kapuscinski, Brian J. Belonger, Steven Fajfer, and Terrence J. Lychwick. Reintroduction of Great Lakes muskellunge to Wisconsin waters of Green Bay, Lake Michigan, 1989-2005. Dr. Ed Crossman Muskie Symposium, October, 2005. View at: http://muskie.outdoorsfirst.com/muskievideo.asp

Kevin L. Kapuscinski, Pallid Sturgeon Status and Recovery Efforts in the Missouri and Yellowstone Rivers, Montana, American Fisheries Society Annual Meeting, August, 2004.

Kevin L. Kapuscinski, Status of Pallid Sturgeon in Montana, Montana Chapter of the American Fisheries Society Conference - Pallid Sturgeon Panel Discussion, February, 2003.

Kevin L Kapuscinski and Michael J Hansen, Movements of Lake Trout in U.S. Waters of Lake Superior, Wisconsin Chapter of the American Fisheries Society Conference, January 2002.

CONTINUING EDUCATION

Genetics for Fisheries Professionals: Tools and Decisions, New York Chapter of AFS / Dr. Chris Wilson, OMNR and Dr. Meredith Barton, USFWS (Feb 2009)

No more P-values? A Workshop on Model Based Inference in the Life Sciences, State University of New York, College of Environmental Science and Forestry / Dr. David Anderson (March 2007)

Biostatistics Workshop, Wisconsin Chapter of AFS / Dr. Michael Hansen, UW-SP (Jan 2006)

Perceptive Communications, Wisconsin Department of Natural Resources (Dec 2005)

Basic Principles for a Collaborative Workplace, Wisconsin Department of Natural Resources (Dec 2004)

RESEARCH GRANTS

Greenway Ecological Standing Committee grant award for a project entitled *Muskellunge Genetic Structure, Reproductive Ecology, and Interaction with the Fish Community: Acquiring Information Needed for Successful Management* (2009-2010, $148,615)

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Western Area Power Administration grant for a project entitled *Evaluation of Hatchery-Reared Pallid Sturgeon Stocked in the Missouri River Below Fort Peck Dam* (2004, $94,000)

Western Area Power Administration grant to enhance pallid sturgeon research efforts (2003, $64,000)

ACTIVITIES & AWARDS

IAGLR / OMNR Student Travel Award (2010)

New York's Great Lakes Research Consortium student travel award (2010)

Niagara Musky Association research grant (2009, $600)

Honorary member of the Niagara Musky Association (Nov 2008-present)

Conducted manuscript reviews for The American Midland Naturalist, Environmental Biology of Fishes, Fisheries Management and Ecology, North American Journal of Aquaculture, North American Journal of Fisheries Management, and Wetlands.

American Fisheries Society Hutton Scholar Mentor (two students, May-August 2007)

Active member of the WI DNR Lake Michigan Fisheries Team (May 2004-Aug 2006), Muskellunge Team (Feb 2005- Aug 2006), Non-wadable Streams Team (Nov 2004- Aug 2006), and Monitoring Toxics Team (Nov 2004- Aug 2006)

Chair of the Upper Basin Pallid Sturgeon Workgroup Stocking Plan Committee (Dec 2003-May 2004)

Active member of the UW-SP Chapter of AFS (1996-2001) and the AFS (Feb 1999-present)

REFERENCES

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