Schoenwiesner, Steve

From: Burlakova, Lyubov E. <burlakle@buffalostate.edu>
Sent: Tuesday, January 29, 2013 2:24 PM
To: Schoenwiesner, Steve
Cc: Karatayev, Alexander Y.; Gmail; Dimitry_Gorsky@fws.gov; Carol Darstein (carold@rf.buffalostate.edu); Laura Leone (laura@rf.buffalostate.edu)
Subject: application for funding through the Ecological Greenway Fund
Attachments: Niagara Greenway commission proposal submitted 012913.pdf

Dear Mr. Schoenwiesner:
Please find attached our application for funding through the Ecological Greenway Fund entitled "Niagara River Observatory" by A. Y. Karatayev, L. Burlakova, T. Hahn, and D. Gorsky.
With this application we propose to establish the Niagara River Observatory (NRO), a comprehensive and integrated state of the art observation system for research, education and outreach focusing on the Niagara River ecosystem. The main goal of the NRO will be to enhance scientific understanding of the ecosystem. The NRO will provide current and historical information about this unique connecting channel to the scientific community, local stakeholders and the general public. This information is essential for developing management and conservation action plans, promoting economic development, and supporting the sustainable recreational use of the Niagara River.
A hard copy of the application has been sent to your address today by FedEx.
Please let us know if anything is missing or if you have any questions or comments,
Sincerely,

Lyubov E. Burlakova
Research Scientist
Great Lakes Center
Science and Mathematics Complex SAMC 322
Buffalo State College
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THE RESEARCH FOUNDATION
The State University of New York

Buffalo State College
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January 28, 2013

Steve Schoenwiesner
New York Power Authority
123 Main Street
White Plains, NY 10601

Project Title: **Niagara River Observatory**

Dear Mr. Schoenwiesner:

The enclosed application is being submitted for your consideration by the Research Foundation of the State University of New York for and in conjunction with Buffalo State College.

In the event action on the request is favorable, the Research Foundation of the State University of New York will serve as fiscal administrator of the award and depository for all funds in support of such award.

Therefore, any negotiation concerning this application should be made with the Research Foundation representative indicated below. Accordingly, award notices or contracts resulting from this submission should be sent to the Research Foundation of SUNY, Buffalo State College, 1300 Elmwood Avenue, Bishop Hall B-17, Buffalo, New York 14222-1095.

Sincerely,

Carol A. Darstein

Carol A. Darstein, JD, CRA, CPRA
Director, Pre Award and Contract Services

enc
CAD/ll

Niagara River Observatory

An Application for Funding Through the Ecological Greenway Fund

By

Drs. Alexander Y. Karatayev, Lyubov Burlakova, Thomas Hahn
Great Lakes Center, Buffalo State College
1300 Elmwood Ave. Buffalo, New York, 14222

Dr. Dimitry Gorsky, U.S. Fish and Wildlife Service
1101 Casey Road, Basom, New York 14013

Purpose

We propose to establish the Niagara River Observatory (NRO), a comprehensive and integrated state of the art observation system for research, education and outreach focusing on the Niagara River ecosystem. The main goal of the NRO will be to enhance scientific understanding of the ecosystem. The NRO will provide current and historical information about this unique connecting channel to the scientific community, local stakeholders and the general public. This information is essential for developing management and conservation action plans, promoting economic development, and supporting the sustainable recreational use of the Niagara River.

Background

The Niagara River is an important feature of the Great Lakes Basin. As a connecting channel between Lake Erie and Ontario, the Niagara River drains the combined watersheds of four of the five Great Lakes and supplies 83 % of the tributary flow to Lake Ontario. The Niagara River is an ecologically important corridor for fish and wildlife "where species of plants found and still find protection throughout changes in climate over the past 8,000 years since glaciation" (Eckel, 1986, cited from Wooster and Matthies, 2008). Due to past commercial and industrial activity in the basin, the Niagara River was contaminated, leading to the establishment of the Niagara River Area of Concern (AOC). As part of the AOC process, the Niagara River Remedial Action Plan (NYS DEC, 1994) concluded that the degradation of fish and wildlife populations and the loss of fish and wildlife habitat were "impaired" beneficial uses along the Niagara River corridor.

Although identified as "impaired" the structure and functioning of the Niagara River aquatic ecosystem is currently poorly understood. Referenced survey work is often outdated or not available for many important components of the ecosystem (Wooster and Matthies, 2008). This lack of information can inhibit the ability of managers and stakeholders to make effective management decisions. As evidence of a lack of current status data, recent studies have shown positive signs of recovery in the communities of the Niagara River. Populations of lake sturgeon (*Acipenser fulvescens*), a threatened species in New York State (Carlson, 2000), were said to only be at 1% of historic abundance (Carlson, 1995; Hay-Chmielewski and Whelan, 1997; COSEWIC, 2006), a level from which populations were considered to be unable to recover from in the foreseeable future (Beamesderfer and Farr, 1997; Farrell, 2009). However since 2010,

U.S. Fish and Wildlife Service biologists identified that the population of lake sturgeon in the lower Niagara River is larger than previously suggested and shows signs of recovery (Gorsky et al., unpublished data). Additionally, several refuges of freshwater mussels, of the family Unionidae, were found in the Niagara River during surveys from 2011 (Burlakova, Karatayev et al., unpublished data). As a result of several large remediation programs, NR AOC wetlands now contain amphibian communities that meet or exceed expected non-AOC reference values (Archer and Rankin, 2011). Further studies are needed to understand if these signs of recovery represent the recovery of the whole ecosystem.

In order to advance understanding of the Niagara River, we need an integrated observing system, where ecosystem functions are understood in a comprehensive, holistic process. A scientifically designed observing system will address linkages and feedbacks between different components of the ecosystem, while closing the data gaps in the prediction of the ecosystem functioning. We propose to establish the Niagara River Observatory (NRO) as a multidisciplinary research, education, and service program with a focus on the physical, chemical, biological, and social dimensions of the Niagara and its watershed. The NRO will concentrate scientific expertise and infrastructure sufficient to test fundamental scientific hypotheses and to predict future changes in the structure and function of the ecosystem. We acknowledge that proper stewardship of the Niagara River requires international, trans-disciplinary research approaches to fully understand the complex ecosystem dynamics, community outreach to promote understanding the system, and education of future generations. The NRO will be based in the Great Lakes Center of the Buffalo State College and will be built on the strength of its personnel and state of the art facilities, including research fleet and field and laboratory equipment. The NRO will bring together scientists from multiple institutions, including universities, state and federal agencies, as well as various environmental NGO with particular emphasis on aquatic ecology, fisheries, watershed hydrology, environmental toxicology, and chemistry, urban ecology, and environmental education. The data collected by this system will help in the delisting of the Niagara River Area of Concern by referencing data gaps and research needs identified through the Niagara Remedial Action Plan, the Niagara River Habitat Conservation Strategy, and Lake Ontario and Lake Erie lake-wide action and management plans (LAMP).

Establishment of the NRO will be a large multi-year collaborative project that will require a multi-stage approach. Long-term goals for the NRO are to:

1) Provide historical data, reports, and perspectives to help establish targets for remediation, restoration, and conservation.
2) Monitor and assess the current status of communities and environmental conditions to provide up to date status assessments.
3) Develop an outreach platform that provides functional access to compiled data for use in management, restoration, and conservation.

Objectives and Rationale

1) Create a knowledge database that will incorporate historic and current data on biodiversity and community structure of the major aquatic communities, with the special emphasis on threatened and endangered species as well as exotic species.

This objective helps to address long-term goals number one and three. By compiling historic data and reports into a singular clearinghouse, interested parties can conveniently access a large quantity of valuable information including sometimes difficult to find data sources. This objective includes preliminary development of a web based online archive that can allow access to archives as well as uploading of new information.

2) *Provide real-time environmental data for sites in the lower Niagara River by installing a Great Lakes Observation System (GLOS) buoy and water level loggers in the lower Niagara River.*

This objective helps to address long-term goals number two and three by providing the current status of environmental conditions in the Niagara River. The buoy (Figure 1) will measure air temperature, relative humidity, wind direction and speed, precipitation, barometric pressure, solar radiation, temperature and dissolved oxygen profiles at a specific location. Water level loggers will provide data on water level fluctuations associated with hydropower operations and weather conditions at six specific locations. This data will be accessible through the developed outreach platform in real-time. Once an outreach platform is designed, the data will be usable by the scientific and management community as well as recreational anglers and boaters providing valuable information about the conditions occurring on the river, thereby supporting long-term objective number three

Figure 1. GLOS (Great Lakes Observation System) buoy to be installed in the lower Niagara River.

3) *Estimate presence and biomass of dominant fish species, and temporal/spatial distribution of selected fish species in the lower Niagara River using hydro-acoustic fishery surveys.*

This objective helps to address long-term goal number two of providing the current status of communities in the Niagara River. Understanding of the fish community in terms of what fish species are using the river at what times of the year is currently an important

data gap for the lower Niagara River. This objective provides a high-tech cutting edge method of assessing seasonal distributional patterns of multiple species as well as a focused approach to estimating total biomass of singular species of interest. This data will help frame future investigations of specific species use of the river.

4) *Use bathymetric and habitat data obtained from USFWS's side-scan sonar project on the lower Niagara River to develop habitat maps. Using the habitat maps, assess diversity and community structure of benthic invertebrates in the lower Niagara River.*

This objective contributes to long-term goal number two of providing the current status of communities in the Niagara River. Benthic habitat maps will provide baseline data for the lower Niagara River including characteristics such as depth, substrate type, and benthic and fish community composition. Habitat maps will show the distribution of habitats by interpreting physical data layers derived from remote sensing (side-scan/split-beam sonar), and use biological information about habitats obtained from direct benthic sampling. This approach classifies river bottom by different habitats that are more homogenous internally both by the sediment and the community and allows for rapid sampling to produce sets of permanent data for surveillance and assessment of large areas. Importance of benthic habitat mapping, development of analogous mapping procedures and monitoring programs are eminent goals underlined in the NY Statewide Conservation Strategy. This information is vital for conservation and management, but particularly essential for biological monitoring of the river because traditional chemical water quality monitoring is usually only minimally informative for the overall stress of ecosystems. Benthic macroinvertebrate assemblages are considered to be among the best for environmental monitoring and also serve as a primary food source for fish, including many recreational, commercially important, and endangered species such as lake sturgeon. We will assess and visualize the spatial distribution, quality and quantity of benthic resources fundamental to our understanding of the Niagara River ecosystem and the degree of its impairment. We will further use this data to calculate benthic indices that will provide assessment for stressors such as sediment deposition, habitat alteration, pollution, and storm water runoff point sources that often accompany chemical contamination of the water column in waterways facing multiple anthropogenic impacts. This information will help managers understand processes at work in the Niagara River and what biological impacts they may have.

5) *Document diet, habitat use and behavior (movements and migrations) of lake sturgeon in the lower Niagara River.*

This objective contributes to long-term goal number two of providing the current status of communities in the Niagara River. The lower Niagara River provides habitat to one of the few remnant populations of lake sturgeon in the lower Great Lakes. Evidence shows that this population may be in recovery, but information about diet and habitat use in this unique system is lacking. We propose to determine lake sturgeon movement patterns, habitat use, and diet in the lower Niagara River on an individual basis across multiple years and connect this information with benthic habitat maps provided through objective number 4. This information will help researchers and managers develop opportunities to protect and enhance habitat to advance lake sturgeon recovery in the lower Niagara River.

Methods

Objective 1

To initiate development of knowledge databases on biodiversity and structure of the major aquatic communities, we will select the best data format for future successful data storage and operation in order to provide the best possible science to decision makers. All data obtained in this project will be the foundation of the future knowledge databases on biodiversity and structure of the major aquatic communities in the Lower Niagara River.

Objective 2

The Great Lakes Observation System (GLOS) buoy will be installed at the Yacht Club or the Coast Guard site (approx. 40 ft depth). The buoy will be equipped with a meteorological station encompassing air temperature, relative humidity, wind direction and speed, precipitation, barometric pressure and solar radiation measurements. In addition, the buoy will be equipped with a temperature node comprising temperature sensors placed at 2 meter intervals throughout the water profile, and a dissolved oxygen sensor from YSI. Data will be continuously logged and transmitted via cellular telemetry. The buoy will be a part of the GLOS (Great Lakes Observation System) and will be maintained and run through the Great Lakes Center. Water level loggers will be deployed along the lower Niagara River at 6 strategic locations based on access and site conditions from the mouth of the river upstream into the gorge and past the hydroelectric power facilities, stopping below the Whirlpool. These loggers (Solinst, Model 3001 Levelogger® Edge) will provide data every 15 minutes on water level fluctuations associated with hydropower operations and weather conditions.

Objective 3

We will use two distinct hydro acoustic components: a horizontally looking river sonar system used to detect fish presence and migrations of fish in and out of the lower Niagara River and a downward looking, mobile fisheries sonar system used to assess biomass of a selected species within the observation volume. A combination of these systems is optimally suited to develop techniques that allow automatic and real-time species discrimination.

To detect the presence of fish in the observation volume of the NRO, we will install two split beam sonars at one bank of the river. These beams, each 6 degrees wide, are pointed horizontally towards the center of the river. Funds permitting, these beams will be actuated to allow movement of the beams into various directions, hence, increasing the acoustic observation volume and increasing the precision of the observation. The acoustic frequencies used will be 420 kHz and 120 kHz (or 200 kHz) respectively. The higher frequency will primarily be used to observe migration of smelt, alewife, and lake herring at smaller ranges (up to 50 m). This will avoid any unwanted neurological or behavioral response of the fish to the sound of the sonar. The lower frequency can safely be used to track larger fish at larger ranges (up to 250 m). The acoustic transducers as well as the power and control system of the actuators will be connected to a computer system at the observatory field location. From there, the acoustic data will be collected and archived for further scientific analysis and streaming for real-team Internet presentation will be explored and prepared.

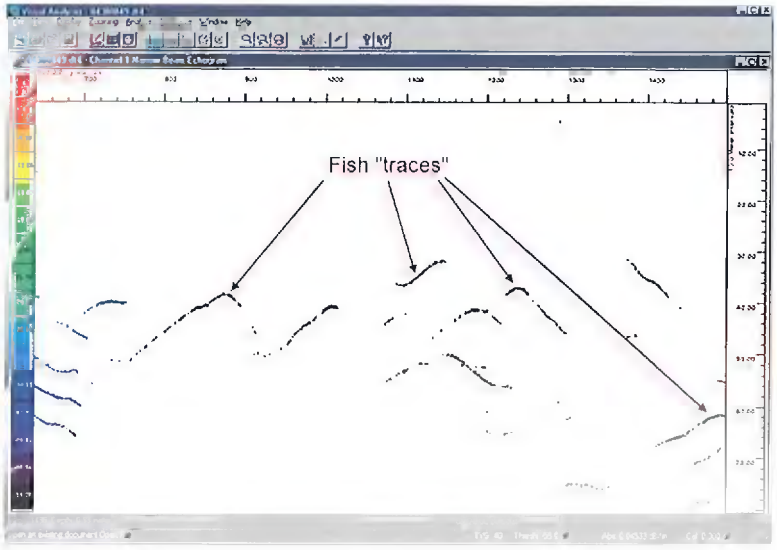

Figure 2. Signature of large fish (Salmon) on a horizontally-pointed river sonar. (The range into the center of the river is drawn downward, time horizontally. Each connected line represents a fish that is moving through the beam.)

To assess the biomass of selected species within the observation volume, we propose to conduct vessel based acoustic fishery surveys. The data will be taken from a downward looking scientific 420 kHz echo sounder, using a mobile data station. Data from a standard transect pattern will be echo integrated to obtain a biomass estimate of a specific species.

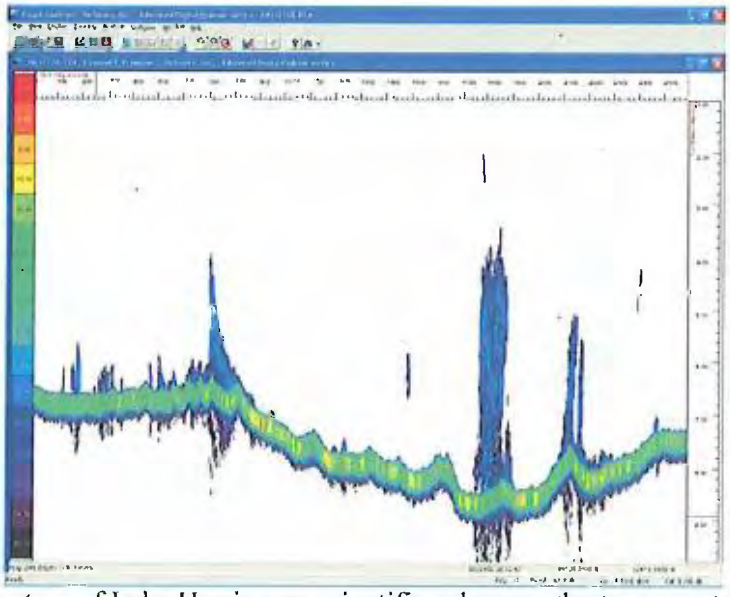

Figure 3. Signature of Lake Herring on scientific echo sounder to assess total biomass. (The fish schools show as blue areas above the river bed.)

Objective 4

Habitat mapping process will involve surveying, collating information, analyzing and modeling data to derive the habitat distribution and then designing the layout of habitat maps. Full coverage maps of physical habitat will be obtained from remote sensing (bathymetry, data from side-scan sonar collected by USFWS in 2011 as well as data collected with a split-beam mobile fisheries sonar). We will use the historical data (e.g., Veal, 1968; Mudroch and Williams, 1989) to develop sampling design and procedures and define different types of sediments and areas with similar habitats (e.g., macrophyte- or rocks dominated, Figure 4). When the maps of benthic sediments will be produced, we will randomly sample all identified types of habitats (proportionally to their area) to determine their benthic species composition and abundance. The number of samples will be determined by the area of the habitat and variability. We will take triplicate samples using benthic grabs (either petite Ponar or Ekman) or quadrats, depending on substrate type. The entire sample will be placed in a plastic bag, labeled, and placed in a cooler until returning to shore. On shore, samples will be washed through a 500 μm mesh, and sorted within 24 hours. All macroinvertebrates collected will be identified to the lowest possible taxonomic level (usually species, genus or family), counted, blotted dry on absorbent paper and weighed to the nearest 0.0001 g (total wet mass). This data will be used to describe species richness, density and biomass in each sample and in the specified habitats. The complete coverage of habitats will be inferred from the association between the physical habitat data and the benthic samples so the final maps will predict the distribution of benthic habitats.

Figure 4. Examples of macrophyte-dominated (left) and rocky habitats (right) in the lower Niagara River.

The data on species composition, density and biomass of macrozoobenthos will be used to employ existing and develop new benthic community biological indices for various types of identified habitats. Benthic indices provide assessment for stressors such as pollution, sediment deposition, habitat alteration and storm water runoff point sources that often accompany chemical contamination of the water column in urban waterways facing multiple anthropogenic impacts (Rosenberg and Resh, 1993; Barbour et al., 1999). Niagara River is affected by all of these stressors and is thus a particularly appropriate candidate for testing benthic bioassessment measures of ecological health. The most effective categories of benthic metrics currently used in indices for waterway bioassessment are the taxa richness, tolerance/ intolerance measures, and feeding measures categories, but they have to be adjusted for geographical variation and

particular anthropogenic impairment (Resh and Jackson, 1993). A multimetric index designed specifically for applicability to urban streams facing multiple stressors was developed utilizing taxa richness, feeding measure, and habit measure in studies conducted in Mid-Atlantic, Midwestern and Pacific Coast United States streams (Purcell et al., 2009), and will be tested on Niagara River benthic data. SPEAR (SPEcies At Risk) is a stressor-specific bioindicator system that combines biological traits responsive to the effects of particular stressors and associated with recovery (Liess and Von der Ohe, 2005; Beketov and Liess, 2008). This bioindicator system has already been successfully validated over different biogeographical regions of Europe using species- and family-level data on stream invertebrates and can be utilized to detect and quantify effects of pesticides and organic pollution in Niagara River. Clarke and Warwick (2001) proposed a set of multivariate methods to detect the effect of pollution on benthic macroinvertebrates, and to discriminate communities with different level of pollution. We will perform these analyses in a PRIMER 6 software (Plymouth Routines in Multivariate Ecological Research, Version 6.1.6, Primer E-Ltd. 2006), specially designed for robust non-parametric analysis of benthic communities.

Objective 5

To determine movement patterns of lake sturgeon in the lower Niagara River, we will use acoustic telemetry technology. Using an array consisting of ~20 passive receivers and active tracking, movements of 15 tagged lake sturgeon from the first study year and 30 tagged sturgeon from the second year will be recorded over a 5 year period. Receivers will be moored to the bottom of the river bed covering as large a spatial scale as possible, including areas located out of the river mouth on the Niagara Bar. Receivers typically have an omnidirectional range with radius of 500 meters. In noisy environments typical of the gorge area, this range may be reduced and receivers will be located closer for detail within high interest areas.

Lake sturgeon will be collected using setlines as described in Thomas and Haas (1999). Biological data will be recorded for each fish such as length (mm), weight (kg), girth (mm), and any observed marks or injuries. A pectoral fin ray sample will be taken for ageing from the base of the leading pectoral ray as described in Rossiter et al. (1995). After capture and processing, fish will be transported to shore, where we will surgically implant the acoustic transmitter. Induction and surgery will take place on a raised sling with recirculating water administered to the fish through a tube. Lake sturgeon will be initially induced using a higher concentration of MS-222, until slowed respiration is observed. Lake sturgeon will then be transferred to a lower maintenance concentration of anesthetic. Tags will be implanted into the body cavity through a ventral incision located three scutes posterior from the pectoral fin. Sexual stage of the fish is sometimes observed during surgery and will be recorded. The incision will be sutured up using size 1 tapered needle and PDS II ethicon monofilament absorbable suture material. Once surgery is completed, lake sturgeon will be returned to a holding pen and allowed to recover for up to 4 hours.

Figure 5. Lake sturgeon caught on the lower Niagara River during population surveys in 2011.

We will document areas of high habitat use and relate it to our benthic habitat analysis to determine substrate and habitat preferences. This objective will take advantage of current research by USFWS that will help provide captured sturgeon and acoustic system components. We propose to characterize the diets of lake sturgeon of various size and age classes. Using gastric lavage, we will analyze the gut contents of captured lake sturgeon throughout the year to determine what foods are being consumed both spatially and temporally. Our hypotheses are that lake sturgeon will select habitats with abundant food items of preferred sources and that preferred food will vary with lake sturgeon size and age. We will also use the abundance of the preferred food source from our benthic community analysis to predict a carrying capacity for lake sturgeon in the lower Niagara River. Combination of this analysis with the previous habitat use analysis and the benthic community assessment will lead to a holistic assessment of food availability and habitat preferences of lake sturgeon in relation to restoration of the local population. Assess the identified feeding grounds for prey composition, and compare data from sturgeon diet with prey composition of habitats of high sturgeon occupancy to determine important prey items and habitats for fish feeding.

Gastric lavage for diet analysis will also be performed while fish are anesthetized. Only 15 lake sturgeon will be tagged in the first year and 30 in the second year, but at least 60 will be sampled for diet analysis each year across multiple seasons. Gastric lavage will be performed as described by Haley (1998). Stomach contents will be removed and fixed in 10% formalin and preserved in 70% alcohol. Prey taxa will be identified to major groups and the importance of each prey type will be determined by percent composition.

Organization

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Evidence of Consultation with the Niagara River Greenway Commission
A completed Niagara River Greenway Commission Consultation and Review Form attached with this project proposal document.

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
We provided the New York State Department of Environmental Conservation (NYSDEC) personnel with this application and received a feedback from Timothy DePriest. We have obtained collector's permits from the Ontario Ministry of Natural Resources (OMNR) for lake sturgeon work conducted during 2010-2012, and we will again obtain all required permits for future work. We already obtained New York State Fish and Wildlife Scientific Licenses to collect or possess aquatic invertebrates and freshwater molluscs for 2012-2013 (Licenses # 1390 and 208 to Lyubov Burlakova, and 1446 to Mark Clapsadl, GLC Field Station Manager). These licenses are issued by NY DEC Division of Fish, Wildlife and Marine Resources, Special Licenses Unit and we renew them annually for our research needs. Our OMNR point of contact was Alistair Mathers (Picton, Ontario office, phone: 613-476-8733). U.S. Fish and Wildlife Service is a collaborator and therefore represent consultation with federal agencies. Additionally, consultation with USGS-BRD out of the Tunison Lab (Dawn Dittman) concerning sturgeon diet studies and practices has occurred and she will be relied upon for further advice and input throughout this investigation.

Operation and Maintenance Plan
N/A – No physical structures are being built.

Project Consistency with the Niagara River Greenway Plan (NRGP)
The Niagara River Observatory will advance the vision and goals of the Niagara River Greenway by providing the best possible science to decision-makers concerned with the health and sustainability of resources of the Niagara River and its watershed. The Observatory will serve as a technical and intellectual resource for resolving environmental issues, and interpret the unique natural, cultural, recreational, scenic and heritage resources of the Niagara River ecosystem. It will provide information and guidance to local and state lawmakers, students, industry, environmental groups, and others with interests in the Niagara River Corridor to foster collaboration, improve decision-making and governance, sustain the natural resources, and promote the economy of the region. The state-of-art Niagara River Observatory will follow the Niagara River Greenway principles of excellence in science, and will potentially serve as a model for other important river corridors in the Great Lakes Region and nationwide. The Observatory will provide essential information for protection and restoration of the Niagara River ecosystem, for the choice of conservation actions, management and recovery plans based on ecological integrity of the system. The knowledge database will make historical and current data available to recognize the short- and long-term changes and trends in the ecosystem. It will improve the knowledge and understanding of biological resources and ecosystem of the Niagara River, which is the critical first step in promoting long-term sustainability of the system.

Project Consistency with State and Federal Laws

We will obtain a collector's permit from NYSDEC and OMNR 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

The total combined match from the Buffalo State College and the US Fish and Wildlife Service will be **$339,842** (26.6%). The total match from the Buffalo State College will be **$303,242** and will include salary, fringe benefits, boat time, and indirect costs. The total match from the US Fish and Wildlife Service will be **$36,600** and will include boat time, volunteer time, and indirect costs.

Existing Costs as of January 1, 2014.

We will not use any awarded Greenway Funds to defray obligations, operations, or maintenance costs existing prior to the beginning of the project, January 1, 2014.

Land Ownership Associated with Project

N/A

Project Budget

Category	Year 1	Year 2	Year 3	Total
a. Personnel				
Co-PI Burlakova, 4 mo /year	$21,623	$21,623	$21,623	$64,870
Co-PI Hahn, 5 mo/year	$33,333	$33,333	$33,333	$100,000
PI Karatayev, 2 mo/year match	$0	$0	$0	$0
GIS expert Perelli, 1 mo Yrs 2,3	$0	$3,212	$3,212	$6,425
Technician, 3 mo/year	$16,500	$16,500	$16,500	$49,500
3 MS Graduate students	$60,000	$60,000	$60,000	$180,000
Total Salaries	***$131,457***	***$134,669***	***$134,669***	***$400,795***
b. Travel				
Mileage	$1,600	$1,600	$1,600	$4,800
Conferences	$0	$7,000	$7,000	$14,000
Boat time	$5,000	$5,000	$5,000	$15,000
Total Travel	***$6,600***	***$13,600***	***$13,600***	***$33,800***
c. Equipment	**$150,000**	**$60,000**	**$0**	**$210,000**
d. Supplies	**$24,800**	**$21,700**	**$21,700**	**$68,200**
e. Contractual:				
Co-PI Gorsky, US FWS	$97,574	$70,734	$70,734	**$239,041**
Engineering	$15,000	$15,000		**$30,000**
Total Contractual	***$112,574***	***$85,734***	***$70,734***	**$269,041**
f. Fringe Benefits				

Category	Year 1	Year 2	Year 3	Total
Burlakova @43%, 43.5%, 44.5%	$9,298	$9,406	$9,622	$28,328
Hahn @43%, 43.5%, 44.5%	$14,333	$14,500	$14,833	$43,668
Perrelli @ 56.52%, 56.52%	$0	$1,816	$1,816	$3,632
Karatayev @ 53.84, 56.52, 56.52%	$0	$0	$0	$0
Technician @43%, 43.5%, 44.5%	$7,095	$7,178	$7,343	$21,615
Graduate students @ 16%, 17.5%, 18.5%	$9,600	$9,600	$9,600	$28,800
Total Fringe Benefits	*$40,326*	*$42,499*	*$43,214*	$126,040
Total Direct Costs	**$465,757**	**$358,202**	**$283,916**	**$1,107,875**
Total Direct Costs minus equipment and contractuals over $25,000	**$243,183**	**$222,468**	**$213,183**	**$678,834**
g. Indirect Cost: BSC overhead (25% of total direct).	**$60,796**	**$55,617**	**$53,296**	**$169,709**
h. Other	**$0**	**$0**	**$0**	**$0**
i. Total Costs	**$526,552**	**$413,819**	**$337,212**	**$1,277,583**
Match	**$115,820**	**$112,401**	**$111,621**	**$339,842**
Match, %	22.0%	27.2%	33.1%	26.6%

Cost Sharing
Buffalo State College and US Fish and Wildlife Service

Category	Match	Match	Match	Total Match
a. Personnel				
PI Karatayev, 2 mo/year match	$20,488	$20,488	$20,488	$61,464
Total Salaries	*$20,488*	*$20,488*	*$20,488*	*$61,464*
b. Travel				
Boat time	$10,000	$10,000	$10,000	$30,000
Total Travel	*$10,000*	*$10,000*	*$10,000*	*$30,000*
c. Contractual:				
Co-PI Gorsky, US FWS	$12,200	$12,200	$12,200	$36,600
Total Contractual	*$12,200*	*$12,200*	*$12,200*	*$36,600*
f. Fringe Benefits				
Karatayev @ 53.84, 56.52, 56.52%	$10,410	$11,184	$12,043	$33,637
Total Fringe Benefits	*$10,410*	*$11,184*	*$12,043*	*$33,637*
Total Direct Costs	**$53,098**	**$53,872**	**$54,731**	**$161,701**
g. Indirect Cost: BSC overhead (25% of total direct plus uncovered indirect).	**$72,722**	**$68,529**	**$66,890**	**$208,141**
i. Total Match	**$115,820**	**$112,401**	**$111,621**	**$339,842**
% Match from Total Costs	**22.0%**	**27.2%**	**33.1%**	**26.6%**

References

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Beamesderfer, R. C. P. and Farr, R. A. 1997. Alternatives for the protection and restoration of sturgeons and their habitat. *Environmental Biology of Fishes*. 48:407-417.

Beketov, M.A., K. Foit, R.B. Schafer, et. al. 2009. SPEAR indicates pesticide effects in streams – Comparative use of species- and family-level biomonitoring data. *Environmental Pollution* 157: 1841-1848.

Carlson, D. M. 2000: A recovery plan for the lake sturgeon (*Acipenser fulvescens*) in New York. N.Y. State Dept. Environ. Cons., Div. Fish and Wildlife, Bureau of Fisheries, Endangered Fish Project, Albany, New York, USA, 16 pp.

Carlson, D.M. 1995. Lake sturgeon waters and fisheries in New York State. *Journal of Great Lakes Research* 21:35-41.

Clarke, K. R., and R. M Warwick. 2001. Change in marine communities: an approach to statistical analysis and interpretation. 2nd Edition. Primer-E Ltd. Plymouth.

COSEWIC 2006. Assessment and update status report on the Lake Sturgeon *Acipenser fulvescens* in Canada. Committee on the Status of Endangered Wildlife in Canada, Ottawa, 106 pp.

Eckel, 1986, from Wooster, M. and Matthies, L. 2008. Buffalo and Niagara Rivers Habitat Assessment and Conservation Framework (Buffalo Niagara Riverkeeper, 2008)

Farrell, J. M. 2009. Lake Sturgeon Population Enhancement as a Strategy for Improvement of Ecosystem Function and Controlling Invasive Species. Final Report Submitted to the Fish Enhancement Mitigation and Research Fund US Fish and Wildlife Service New York Field Office and the Fisheries Advisory Committee, 46 pp.

Haley, N. 1998. A gastric lavage technique for characterizing diets of sturgeons. North American *Journal of Fisheries Management* **18**(4), 978-981.

Hay-Chmielewski, E.M. and Whelan, G.E. (eds). 1997. Lake Sturgeon Rehabilitation Strategy. Michigan Department of Natural Resources. Fisheries Division Special Report 18.

Liess, M. and P. C. Von Der Ohe. 2005. Analyzing effects of pesticides on invertebrate communities in streams. 2005. *Environmental Toxicology and Chemistry* 24: 954-965.

Murdoch, A. and Williams, D. 1989. Suspended sediments and the distribution of bottom sediments in the Niagara River. *Journal of Great Lakes Research* **15**, 427-436.

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Rosenberg, D. M. and Resh, V. H. 1993. In *Freshwater monotoring and benthic macroinvertebrates.* (eds D. M. Rosenberg & V. H. Resh). Chapman and Hall, Inc., London, New York.

Rossiter, A., D. L. G. Noakes, and E. W. H. Beamish. 1995. Validation of age estimation for the lake sturgeon. *Transactions of the American Fisheries Society* 124 (5): 777-781.

Thomas, M. V., & Haas, R. C. 1999. Capture of lake sturgeon with setlines in the St. Clair River, Michigan. *North American Journal of Fisheries Management* 19(2), 610-612.

Veal, D.M. *A Biological Evaluation of the Niagara River*. Ontario Ministry of Environment, 1968.

Wooster, M. and L. Matthies. 2008. Buffalo and Niagara Rivers Habitat Assessment and Conservation Framework. Buffalo Niagara Riverkeeper. Buffalo, NY.

Curriculum Vitae

Alexander Y. Karatayev
Great Lakes Center, Buffalo State College
1300 Elmwood Avenue, Buffalo, New York 14222
(P) 716-878-5423; (F) 716-878-6644; karataay@buffalostate.edu

Overview: I am an aquatic biologist with over 35 years of expertise in invasive biology and benthic ecology, including the ecology, biology, and spread of aquatic invasive species and their role in aquatic ecosystems, as well as the taxonomy, biology, ecology and long-term dynamics of benthic communities, particularly their use as indicators of changes in aquatic ecosystems.

Education:

1992 Doctor of Science, Hydrobiology; Institute of Zoology; Belarusian Academy of Science
1983 Ph.D. Hydrobiology; Institute of Zoology; Belarusian Academy of Science
1976 M.Sc. Biology; Belarusian State University

Employment:

2007- Present	Professor, Director of the Great Lakes Center, Buffalo State College, Buffalo, NY
2006 – 2007	Professor, Biology Department, Stephen F. Austin State University, Nacogdoches, Texas
2001 – 2006	Associate Professor, Biology Department, Stephen F. Austin State University, Nacogdoches, Texas
2000 – 2001	Research Ecologist, University of the State of New York Museum Field Research Lab
1997 – 2000	Chair, General Ecology Department, Belarusian State University
1996 – 1997	Visiting Associate Professor at the University of Wisconsin-Madison, USA
1991 – 1997	Chief, Aquatic Ecology Department, Lakes Research Laboratory, Belarusian State University
1990 – 1991	Senior Scientist, Lakes Research Laboratory, Belarusian State University
1987 – 1990	Scientist, Lakes Research Laboratory, Belarusian State University
1979 – 1987	Junior Scientist, Lakes Research Laboratory, Belarusian State University
1977 – 1979	Assistant, Ecology Department, Belarusian State University

Honors/Awards:

1976 – First Category Award, Republican Competition among undergraduate students from Belarusian Universities, Minsk, Belarus.
1987 – Second Award, Republican Competition for the Best Scientific Paper, Minsk, Belarus.
1987 – First Award, Belarusian State University Competition for the Best Scientific Paper, Belarus.
2005 – Stephen F. Austin State University Faculty Achievement Award in Research.

Grants Received:

Principal Investigator/Co PI of 30 research grants totaling over $3,510,000.

Publications and Presentations:

Publications: 126, Presentations: 107

Recent Relevant Publications:

Kraft, C. E., P. J. Sullivan, A. Y. Karatayev, L. E. Burlakova, J. C. Nekola, L. E. Johnson, and D. K.

Padilla. 2002. Landscape patterns of an aquatic invader: assessing dispersal extent from spatial distributions. *Ecological Applications* – 12(3): 749-759.

Karatayev, A. Y, L. E. Burlakova, and D. K. Padilla. 2002. Impacts of zebra mussels on aquatic communities and their role as ecosystem engineers. In: Leppäkoski, E., S. Gollasch & S. Olenin (eds). Invasive Aquatic Species of Europe - Distribution, Impacts and Management. Kluwer Academic Publishers, Dordrecht, The Netherlands, pp 433-446.

Karatayev, A. Y., L. E. Burlakova, D. K. Padilla, and L. E. Johnson. 2003. Patterns of spread of the zebra mussel (*Dreissena polymorpha* (Pallas)): the continuing invasion of Belarusian lakes. *Biological Invasions* 5(3): 213-221.

Karatayev, A. Y., L. E. Burlakova, and S. I Dodson. 2005. Community analysis of Belarusian lakes: relationship of species diversity to morphology, hydrology, and land use. *Journal of Plankton Research.* 27(10): 1045-1053.

Karatayev, A. Y., D. K. Padilla, D. Minchin, D. Boltovskoy, and L. E. Burlakova. 2007. Changes in global economies and trade: the potential spread of exotic freshwater bivalves. *Biological Invasions*. 9:161-180.

Karatayev, A. Y., D. Boltovskoy, D. K. Padilla, and L. E. Burlakova. 2007. The invasive bivalves *Dreissena polymorpha* and *Limnoperna fortunei*: parallels, contrasts, potential spread and invasion impacts. *Journal of Shellfish Research*. 26:205-213.

Karatayev, A. Y., L. E. Burlakova, S. E. Mastitsky, and S. Olenin. 2008. Past, current, and future of the Central European Corridor for aquatic invasions in Belarus. *Biological Invasions*. 10:215-232.

Karatayev, A. Y., L. E. Burlakova, and S. I. Dodson. 2008. Community analysis of Belarusian lakes: correlations of species diversity with hydrochemistry. *Hydrobiologia*. 605: 99-112.

Karatayev, A. Y., L. E. Burlakova, D. K. Padilla, S. E. Mastitsky, S. Olenin. 2009. Invaders are not a random selection of species. *Biological Invasions*. 11:2009-2019.

Karatayev, A. Y., Burlakova, L. E., Karatayev, V. A., and D. Boltovskoy. 2010. *Limnoperna fortunei* vs. *Dreissena polymorpha*: Population densities and benthic community impacts of two invasive freshwater bivalves. *Journal of Shellfish Research* 29(4): 975-985.

Karatayev, A. Y., L. E. Burlakova, S. E. Mastitsky, D. K. Padilla, and E. L. Mills. 2011. Contrasting rates of spread of two congeners, *Dreissena polymorpha* and *Dreissena rostriformis bugensis*, at different spatial scales. *Journal of Shellfish Research* 30(3): 923-931.

Karatayev, A. Y., T. D. Miller, and L. E. Burlakova. 2012. Long-term changes in unionid assemblages in the Rio Grande, one of the World's top 10 rivers at risk. Aquatic Conservation: *Marine and Freshwater Ecosystems* 22: 206-219.

Karatayev, A. Y., L. E. Burlakova, J. Vander Zanden, R. C. Lathrop, and D. K. Padilla. 2013. Change in a lake benthic community over a century: evidence for alternative community states. *Hydrobiologia* 700:287–300.

Professional Societies

American Society of Limnology and Oceanography, International Association for Great Lakes Research, International Research Consortium on Molluscan Symbionts.

Synergistic Activities:

Organizer, Special session titled, Aquatic invasive Species in the Great Lakes Region, at the Annual Meetings of the International Association of Great Lakes Research, 2009, 2010, 2011, 2012, and 2013.

Reviewer for *Aquatic Invasions, Biological Invasions, Hydrobiologia, Journal of North American Benthological Society, Journal of Applied Ecology, Journal of Great Lakes Research*

Curriculum Vitae

Lyubov E. Burlakova

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http://greatlakescenter.buffalostate.edu/faculty/lyubov-e-burlakova

Overview: I am an aquatic biologist with over 20 years of expertise in invasive biology and benthic ecology. I am interested in in biodiversity and conservation of freshwater ecosystems, as well as in prediction, spread, ecology, and role of aquatic invasive species in community and ecosystems.

Education:

1998 Ph.D. in Hydrobiology; Institute of Zoology, Belarusian Academy of Science, Belarus. Thesis: Ecology of *Dreissena polymorpha* (Pallas) and its role in structure and function of aquatic ecosystems.

1985 B.S. in Biophysics, Belarusian State University, Minsk, Belarus

Employment:

2008–Present	Research Scientist, Adjunct Associate Professor, Great Lakes Center, Research Foundation of SUNY, Buffalo State College
2011–Present	Adjunct Associate Professor, State University of New York at Buffalo
2001–2007	Research Scientist, Stephen F. Austin State University
2001	Research Ecologist, University of the State of New York Museum Field Research Lab
1998–2000	Assistant Professor, Belarusian State University
1996–1997	Visiting Assistant Professor, University of Wisconsin-Madison
1985–1997	Junior Scientist, Scientist, Senior Scientist, Belarusian State University, Minsk, Belarus

Selected Grants and Contracts (last 6 years):

Principal Investigator and Co-PI of 27 research grants from state and federal agencies totaling > $3,075,000.

2012-2016	Great Lakes Long-term Biological Monitoring Program. U.S. EPA. Subcontract for benthic community monitoring from Cornell University. $1,094,726.
2010-2013	Survey of Texas Hornshell Populations in Texas. U.S. FWS and Texas Parks and Wildlife Department (TPWD). $143,000.
2011-2013	Conservation of Native Freshwater Mussel Refuges in Great Lakes Coastal Zones. Great Lakes Fish and Wildlife Restoration Act, U. S. FWS. $366,412 (Co-PI).
2011-2013	The Lake Erie Nearshore and Offshore Nutrient Study (LENONS). U.S. EPA Great Lakes Restoration Initiative. $615,813 (Co-PI).
2010-2011	Evaluating Ponto-Caspian Fishes for Risk of Great Lakes Invasion. U.S. EPA Great Lakes Restoration Initiative. $111,264 (Co-PI).
2009	The Nearshore and Offshore Lake Erie Nutrient Study (NOLENS). U.S. EPA. $150,000.
2004-2012	State-Wide Assessment of Unionid Diversity in Texas. State Wildlife Grant Program, U.S. FWS and TPWD. $326,945.
2004-2007	Assessing potential impacts of Channeled Applesnail to wetlands in the Galveston Bay watershed. U.S. FWS, Texas Commission on Environmental Quality, and USDA $137,544.
2006-2007	Status of Invasive Freshwater Mollusks in Texas. State Wildlife Grants, U.S. FWS and TPWD. $17,795.

Peer-Reviewed Publications:

Publications: 61 Presentations at Scholarly Meetings and Invited Talks: 66

Recent relevant publications:

Karatayev, A. Y., L. E. Burlakova, J. Vander Zanden, R. C. Lathrop, and D. K. Padilla. 2013. Change in a lake benthic community over a century: evidence for alternative community states. *Hydrobiologia* 700:287–300.

Burlakova, L. E., Karatayev, A. Y., and V. A. Karatayev. 2012. Invasive mussels induce community changes by increasing habitat complexity. *Hydrobiologia* 685(1): 121-134.

Karatayev, A. Y., L. E. Burlakova, J. Vander Zanden, R. C. Lathrop, and D. K. Padilla. 2012. Change in a lake benthic community over a century: evidence for alternative community states. *Hydrobiologia* DOI 10.1007/s10750-012-1238-2.

Karatayev, A. Y., Burlakova, L. E., Mastitsky, S. E., Padilla, D. K., and E. L. Mills. 2011. Contrasting rates of spread of two congeners, *Dreissena polymorpha* and *Dreissena rostriformis bugensis*, at different spatial scales. *Journal of Shellfish Research* 30(3): 1–9.

Burlakova, L. E., A. Y. Karatayev, V. A. Karatayev, M. E. May, D. L. Bennett, and M. J. Cook. 2011. Biogeography and conservation of freshwater mussels (Bivalvia: Unionidae) in Texas: Patterns of diversity and threats. *Diversity and Distributions* 17: 393-407.

Burlakova, L. E., Karatayev, A. Y. Karatayev, V. A., M. E. May, Bennett, D. L., and Cook, M. J. 2011. Endemic species: contribution to community uniqueness, effect of habitat alteration, and conservation priorities. *Biological Conservation* 144: 155–165.

Burlakova, L. E., D. K. Padilla, A.Y. Karatayev, D. N. Hollas, L. D. Cartwright, and K. D. Nichol. 2010. Differences in population dynamics and potential impacts of a freshwater invader driven by temporal habitat stability. *Biological Invasions* 12(4): 927-942.

Burlakova, L. E., A. Y. Karatayev, D. K. Padilla, L. D. Cartwright, and D. N. Hollas. 2009. Wetland restoration and invasive species: applesnail (*Pomacea insularum*) feeding on native and invasive aquatic plants. *Restoration Ecology* 17(3): 433-440.

Burlakova, L. E., A. Y. Karatayev, and D. K. Padilla. 2006. Changes in the distribution and abundance of *Dreissena polymorpha* within lakes through time. *Hydrobiologia.* 571:133-146.

Karatayev, A. Y, L. E. Burlakova and D. K. Padilla. 2002. Impacts of Zebra Mussels on aquatic communities and their role as ecosystem engineers. *In*: Leppäkoski, E., S. Gollasch and S. Olenin (eds). Invasive Aquatic Species of Europe - Distribution, Impacts and Management. Kluwer Academic Publishers, Dordrecht, The Netherlands, pp 433-446.

Burlakova, L. E., A. Y. Karatayev, and D. K. Padilla. 2000. The impact of *Dreissena polymorpha* (Pallas) invasion on unionid bivalves. *International Review of Hydrobiology.* 85(5-6). pp. 529-541.

Karatayev, A. Y., L. E. Burlakova, and D. K. Padilla. 1998. Physical factors that limit the distribution and abundance of *Dreissena polymorpha* (Pall.) *Journal of Shellfish Research* 17(4): 1219-1235.

Karatayev, A. Y., L. E. Burlakova, and D. K. Padilla. 1997. The effect of *Dreissena polymorpha* Pallas invasion on aquatic communities in Eastern Europe. *Journal of Shellfish Research* 16(1): 187-203.

Professional Societies: American Society of Limnology and Oceanography, International Association for Great Lakes Research, Freshwater Mollusk Conservation Society.

Synergistic Activities:

Organizer, Special session titled "Aquatic invasive Species in the Great Lakes Region" at the Annual Meetings of the International Association of Great Lakes Research, 2009-2012.

Reviewer for *Applied Ecology, Aquatic Invasions, Biological Invasions, Biota Neotropica, Ecosystems, Estuarine, Coastal and Shelf Science, Journal of North American Benthological Society, Hydrobiologia, Marine and Freshwater Research, The Texas Journal of Science* etc.

Curriculum Vitae

Thomas Robert Hahn

Date: January 28, 2013

PERSONAL

Name: Thomas Robert Hahn
Mobile Phone: +1 (716) 534-2808
Office Phone: +1 (716) 878-6229
Current Academic Rank: Associate Professor
Primary Department: Buffalo State College, Great Lakes Center
Citizenship: Austrian
Visa Type (if non-citizen): Permanent Resident

HIGHER EDUCATION

University of California, San Diego; PhD; 1999
University of Vienna, Austria, Mag. rer. nat. (equivalent MS), Physics; 1992
University of Vienna, Austria, 1st Diploma, Physics, Astronomy, 1988
Several Consulting-, Project Management-, and Leadership-Trainings and Workshops; McKinsey & Company, Inc.; 1999-2003.
Mini-MBA, Alpine University, McKinsey & Company, Inc.; Spring 1999

EXPERIENCE

SUNY, Buffalo State College, Associate Professor, since 2010
UM, RSMAS, AMP; Assistant Professor; 2004-2010
UCSD, Scripps Institution of Oceanography, MPL; Postdoctoral Researcher; summer 2002
UCSD, Scripps Institution of Oceanography, MPL; Research Assistant; 1996-1999
University of Massachusetts, Amherst, Department of Physics; Research Assistant; 1994
Hahn Management Advisors: President, ongoing
McKinsey & Company Inc.; Engagement Manager; 1999-2004
Siemens Austria, System Developer, software development, 1992-1993

RELEVANT PUBLICATIONS AND PRESENTATION

- T. R. Hahn and O. Diachok, "Acoustic Cross Sections and Resonance Frequencies of Large Fish Schools," J. Acoust. Soc. Am., **in preparation**, (2013).
- S. Noleppa, and T. R. Hahn "The value of Neonicotinoid seed treatment in the European Union" Humboldt Forum for Food and Agriculture, 01, (2013).
- T. R. Hahn, "Passive acoustic measurement of herring size," J. Acoust. Soc. Am., **in preparation**, (2012).
- T. R. Hahn and G. L. Thomas, "Passive acoustic detection of schools of herring," J. Acoust. Soc. Am., **125**, 2896, (2009).
- T. R. Hahn and G. L. Thomas, "Modeling the Sound Levels Produced by Bubble Release of Individual Herring," J. Acoust. Soc. Am. **124**, 1489, (2008).

- T. R. Hahn, "Low frequency sound scattering from spherical assemblages of bubbles using effective medium theory", J. Acoust. Soc. Am., **122**, 3252 (2007).
- G. L. Thomas, T. R. Hahn, and R. E. Thorne, "Integrating Passive and Active Acoustics for the Assessment of Fish Stocks," 2007 Oceans **1-5**, 881-885 (2007).
- G. L. Thomas, T. Hahn, and R. E. Thorne, "Combining Passive and Active Underwater Acoustics with Video and Laser Optics to Assess Fish Stocks," Oceans 2006 **1-4**, 1873-1876 (2006).
- T. Elfouhaily, T. Hahn, "Rayleigh's hypothesis and the geometrical optics limit", Phys. Rev. Lett., **97**, 12 (2006).
- T. R. Hahn, "Acoustic Remote Sensing of Fish Schools", IAGLR, Cornwall, (2012)
- T. R. Hahn and X. Chen, "The effects of multiple scattering on bubble cloud and fish school cross sections," J. Acoust. Soc. Am., **128**, 2278, (2010)
- T. Hahn, J. Wylie, and X. Chen, "Passive acoustic determination of herring size," J. Acoust. Soc. Am. **125**, 2488 (2009).
- T. Hahn, "Passive Acoustic Detection and Monitoring of Schools of Herring," J. Acoust. Soc. Am. **123**, 3621 (2008).

PROFESSIONAL

ONR grant number N00014-11-1-0267
The Research Foundation of SUNY, Award Number: 57260
Title: Effects of Multiple Acoustic Scattering from Realistic Oceanic Bubble and Fish Assemblages
Award: $227.000
Funding period: 1/1/11-1/12/13

ONR grant number N00014-07-1-0896
Title: Multiple scattering of underwater sound by clouds of suspended scatterers
P.I.: T. R. Hahn
Award: $200,864
Funding period: 4/16/07 – 4/30/10

ONR grant number N00014-93-1-0054
Title: Acoustics of porous media including marine sediments
P.I.: M. J. Buckingham
Award: $400,000
Funding period: 1/1/99 - 9/30/00

Chevron Research grant number 4511295
Title: Acoustics of two-phase flows in pipelines
P.I.: M. J. Buckingham
Award: $30,000
Funding period: 4/15/99 - 6/30/00

Professional and Honorary Organizations

Member Acoustical Society of America, 1998-2000, 2004-

Curriculum Vitae

Dimitry Gorsky, PhD
U.S. Fish and Wildlife Service
1101 Casey Rd.
Basom, NY 14013

Tel: (585) 948-5445 ext 2229 (Office) E-mail: dimitry_gorsky@fws.gov

Education:

Doctor of Philosophy – 2011 – Department of Wildlife Ecology, University of Maine, Orono, Maine

Advisor: Dr. Joseph Zydlewski
Dissertation Title: Lake Whitefish (*Coregonus clupeaformis*) Habitat Utilization, Early Life History, and Larval Interactions with Rainbow Smelt (*Osmerus mordax*) in Northern Maine

Masters of Science – 2005 – Department of Ecology and Environmental Sciences, University of Maine, Orono, Maine

Advisor: Dr. James McCleave
Thesis Title: Site Fidelity and the Influence of Environmental Variable on Migratory Movements of Adult Atlantic salmon (*Salmo salar*) in the Penobscot River Basin, Maine.

Bachelors of Science – 2000 – Major: Marine Biology
Roger Williams University, Bristol, Rhode Island

Professional Employment:

2010-Present – Fish Biologist
U.S. Fish and Wildlife Service, Amherst, New York

2005-2010 – Research Assistant
Department of Wildlife Ecology, University of Maine, Orono, Maine

2002 – 2005 Research Assistant
Department of Ecology and Environmental Sciences, University of Maine, Orono, Maine

2002 – 2004 Project Biologist
State of Maine Atlantic Salmon Commission, Bangor, Maine.

2001 – 2002 Environmental Consultant
ASA Analysis and Communications, Washingtonville, NY.

2001 Seasonal biologist
Whittemore Salmon Station, Riverton Connecticut.

Professional Memberships:

- American Fisheries Society: Member of the National Society (2002-Present)
- Atlantic International Chapter of the American Fisheries Society: Member (2002-2010)

- New York State Chapter of the American Fisheries Society: Member (2010-Present)
- University of Maine student subunit of the American Fisheries Society: Vice president (2008) Treasurer (2007), and Member (2002-2010)

Manuscripts in Review/Accepted:

Gorsky, D. and J. Zydlewski. Accepted. Experimental evaluation of size-dependent predation by adult post-spawned rainbow smelt (*Osmerus mordax*) on larval lake whitefish (*Coregonus clupeaformis*). North American Journal of Fisheries Management.

Gorsky, D., J. Zydlewski, and L. Kling. Submitted. Effects of competition on Lake whitefish (*Coregonus clupeaformis*) growth in allopatry and sympatry with non-native rainbow smelt (*Osmerus mordax*). Transactions of the American Fisheries Society.

Gorsky, D., J. Zydlewski, and D. Basely. 2012. Characterizing seasonal habitat use and diel vertical activity of lake whitefish in Clear Lake, Maine, as determined with acoustic telemetry. Transactions of the American Fisheries Society. 141 (3): 761-771.

Gorsky, D., J. Trial, J. Zydlewski, and J. McCleave. 2009. The Effects of Smolt Stocking Strategies on Migratory Path Selection of Adult Atlantic Salmon in the Penobscot River, Maine. North American Journal of Fisheries Management. 29 (4): 949-957.

Holbrook, C. M., J. Zydlewski, **D. Gorsky**, S. L. Shepard and M.T. Kinnison. 2009. Movements of Prespawn Adult Atlantic Salmon Near Hydroelectric Dams in the Lower Penobscot River, Maine. North American Journal of Fisheries Management. 29 (2): 495-505.

Invited Presentations:

Gorsky, D., B. Trometer, M. Casto-Yerty. 2012. U.S. Fish and Wildlife Service research activities on the Lower Niagara River from 2010-2011. New York State Department of Environmental Conservation's State of Lake Ontario public forum. Lockport, NY.

Gorsky, D., B. Trometer, M. Casto-Yerty. 2012. U.S. Fish and Wildlife Service research activities on the Lower Niagara River from 2010-2011. Environment Canada's State of Lake Ontario public forum. Burlington, ON, Canada.

Gorsky, D., B. Trometer. 2011. Research activities on the Lower Niagara River from 2000 to 2011. Niagara County Fisheries Board. Business meeting in Lockport, NY.

Gorsky, D., J. Zydlewski, D. Basley. 2011. Lake Whitefish (*Coregonus clupeaformis*) Habitat Utilization, Early Life History, and Larval Interactions with Rainbow Smelt (*Osmerus mordax*) in Northern Maine. Biology Department Seminar. State University of New York in Buffalo.

Niagara River Greenway Commission

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For Immediate Release:
Wednesday, March 21, 2012

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Niagara River Greenway Commission Determines Consistency

The Niagara River Greenway Commission is pleased to announce the vote on project consistency as determined by the Commission for the twenty-sixth round of projects submitted to the Greenway Commission.

Projects were submitted on January 17, 2012 and the votes were taken today during the regularly scheduled meeting of the Commission. The subjective evaluation of projects was based on the principals, goals and criteria that define the Niagara River Greenway Plan. The following project sponsors and respective projects were determined consistent:

- ***WNY Land Conservancy & Ecology & Environment, Inc.****-The Niagara Escarpment Legacy Project*
- ***Great Lakes Center, Buffalo State College****-Niagara River Observatory*

The following project sponsor and respective project was determined not-consistent:

- ***Town of Hartland****-The Hartland Town Park Enhancement Initiative*
- ***Historic Palace Theatre****-Exterior Renovation Project*

Now that the Niagara River Greenway Commission has issued a finding of consistency with the Niagara River Greenway Plan, project sponsors are responsible for funding arrangements. Funding requests can be made through conventional grant and endowment sources as well as the various greenway standing committees.

The twenty-seventh round of project determinations will be made on May 15 2012. Those projects will be on the web-site Tuesday, March27 2012. Public comment on those projects will be accepted until April 30, 2012 and may be submitted at the website, www.niagaragreenway.org or by mail to Niagara River Greenway, 2136 West Oakfield Road, Grand Island, NY 14072. All projects and submission dates for future determinations are also available on the website.

To review the approved Niagara River Greenway Plan and GEIS or to learn more information about the Commission log onto www.niagaragreenway.org. The Niagara River Greenway Commission is a public benefit corporation established by Chapter 460 of the laws of 2004, and charged with the planning and development of a greenway of interconnected parks, river access points and waterfront trails along the Niagara River from Lake Erie to Lake Ontario at the site of the historic Fort Niagara.

BioSonics

22 June 2012

Dr. Thomas Hahn
Buffalo Sate College
Classroom Building C215C
1300 Elmwood Avenue
Buffalo, NY 14222-1095

RE: Niagara River Observatory

Dr. Hahn,

Upon reviewing the pre-proposal you provided, I believe that the observatory for the Niagara River is an exciting and well-founded proposal. For several years both freshwater (lake, river & estuarine) and marine observatories have been recognized as important new tools for the observation, understanding, and management of underwater resources – including restoration of biological resources. These observatories usually include both above and underwater components, fixed and mobile components, and have the benefit of making long-term observations, spanning days, seasons, and years. The underwater components detect, record, and measure values for both physical and biological variables which make up the underwater environment.

Due to the unique nature of the underwater environment, many observational tools that scientists have traditionally employed for longer-term observations are not appropriate for underwater observatories, or have limited application here. Sonar technology (hydroacoustics) has proven to be a versatile and powerful underwater observation tool. Hydroacoustics relies on generated sound and the echoes from "targets" of interest for the detection, classification, and analysis of environmental components. Hydroacoustics do not rely on light, or on individuals that have previously been captured and tagged, but is capable of detecting and measuring the echo characteristics of anything in the water that has different acoustic properties than the surrounding water (e.g. fish).

Not only are hydroacoustic tools capable of detecting fish (e.g. fisheries echosounder), but various forms of scientific echosounders and analysis software can provide information on individual fish size, biomass of fish aggregations, substrate type, and submerged vegetation characteristics. Stationary hydroacoustics can provide measurements and insights into the relationship between physical and biological habitat components. Stationary hydroacoustics employed on an observatory are capable of recording changes over both short (e.g. minute-to-minute or by individuals) to long-term (e.g. seasonal or by changes in

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spatial or size distribution) as well as record and quantify migrations and behavioral response to changes in environmental parameters.

BioSonics has provided scientific echosounders to the scientific and natural resource management community, world-wide, since 1978. Specializing in the manufacture of calibrated, digital, scientific echosounder systems for a variety of applications, BioSonics is a recognized world-leader in this field. BioSonics fixed-location, automated (observatory-type) systems are currently (or have been) used in several riverine, estuarine and ocean observatory applications. BioSonics mobile systems have been deployed in both fresh and marine waters around the world.

BioSonics client list includes the University of Maine, Penobscot River Restoration Trust, US Fish & Wildlife Service, US Park Service, US Army Corps of Engineers, US EPA, US Bureau of Reclamation, Canada Department of Fisheries & Oceans, Canadian, European, and Asian Universities and research institutions, State/Provincial/Regional freshwater resource management agencies, and many private sector environmental professionals. BioSonics scientists and engineers have worked closely with these project teams to deliver and support the technology needed to achieve the project goals.

BioSonics has worked in the marine environment and provided fixed-location observatory systems for US NOAA Fisheries, Ocean Networks Canada (Neptune Observatory), and Memorial University of Newfoundland (Bonne Bay Observatory).

BioSonics is eager to work closely with the Niagara River Observatory team and provide cutting-edge, appropriate mobile and stationary hydroacoustic technology for the observational needs of the scientists involved as well as the link to public outreach in the provision of exciting and captivating real-time observational tools, such as the high-resolution color echograms depicting the acoustic echoes (temporal and spatial information) from fish and other organisms in the underwater environment.

Thank you for the opportunity to discuss and plan the inclusion of cutting-edge hydroacoustic technology in this project.

Sincerely,

Bob McClure
Senior Regional Account Executive / Fisheries Biologist

AQUARIUM
OF NIAGARA

July 13, 2012

Lyubov E. Burlakova, PhD
Research Scientist, Adjunct Associate Professor
Great Lakes Center
Classroom Building C215A
Buffalo State College
1300 Elmwood Ave.
Buffalo, NY 14222

Dear Dr. Burlakova,

Thank you for your interest in including the Aquarium of Niagara to be a part of the proposed Niagara River Observatory. I've looked over the proposal and feel that it is important for us to be involved as we don't have any current information on the health of the Niagara River that is made available to our guests. This would afford us an opportunity to incorporate a new display into our existing one to further educate our guests.

We pledge our support for the proposed Niagara River Observatory and will plan a successful partnership with the Great Lakes Center on this project. We look forward to utilizing the educational aspects that will be produced through this project.

Sincerely,

Daniel C. Arcara

Supervisor of Exhibits

cc. Nancy Chapin, Executive Director