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Bishop Hall ~ Room 24
1300 Elmwood Avenue
Buffalo, New York
14222-1095

716 878 3047
Fax: 716 878 4039

www.rf.buffalostate.edu

May 31, 2013

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

Project Title: Investigating Lake Sturgeon habitat use, feeding ecology and benthic resource availability in the lower Niagara River (former 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. Please note that the original proposal has been revised following recommendations from the review committee and has been renamed as indicated above to better reflect the work proposed.

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, JD, CRA, CPRA
Director, Pre Award and Contract Services

enc
CAD/ll

Investigating Lake Sturgeon habitat use, feeding ecology and benthic resource availability in the lower Niagara River

An Application for Funding Through the Ecological Greenway Fund

By

Drs. Alexander Y. Karatayev, and Lyubov Burlakova
Great Lakes Center, SUNY Buffalo State
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 study the distribution, abundance and diversity of benthic forage resources in the lower Niagara River and their relation to lake sturgeon habitat use and feeding ecology. This information is essential for developing management and conservation action plans, 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), are considered currently to only be at 1% of historic abundance (Carlson, 1995; Hay-Chmielewski and Whelan, 1997; COSEWIC, 2006), a level from which populations are likely unable to recover 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 in 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 our understanding of the Niagara River ecosystem, we need to collect data on the current status of its major communities and their interactions. We propose to study the diversity, distribution and density of benthic forage resources and the biology and ecology of lake sturgeon in the lower Niagara River. This information will help researchers and managers develop opportunities to protect and enhance habitat to advance lake sturgeon recovery in the lower Niagara River.

Objectives and Rationale

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

   This objective will provide data on the current status of benthic communities in the lower Niagara River. Benthic habitat maps will link the distribution of physical habitats derived from remote sensing with biological information obtained from direct benthic sampling. Using benthic community biological indices we will prioritize valuable habitats for conservation and identify habitats of importance as feeding grounds for lake sturgeon and other valuable fish species. This study will provide data on the spatial distribution, quality and quantity of benthic resources fundamental to our understanding and management of the Niagara River ecosystem.

2) *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

Benthic mapping of aquatic habitats is one of the eminent goals underlined in the New York Statewide Conservation Strategy. Benthic macroinvertebrates serve as a primary food source for fish, including many recreational, commercially important, and endangered species

such as lake sturgeon. Furthermore, evaluation of the status of benthic communities, sensitive to environmental disturbances, is one of the most reliable and cost-effective approaches for assessing ecosystem health (Barbour et al., 1999; Rosenberg and Resh, 1993; Resh and Jackson, 1993; Uzarski et al, 2004).

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) and historical data (e.g., Veal, 1968; Mudroch and Williams, 1989). This information will be used to define different types of sediments and areas with similar habitats (e.g., macrophyte- or rocks dominated, Figure 1). When the maps of benthic sediments will be produced, we will sample all identified types of habitats using stratified random sampling design to determine their benthic species composition and abundance. The number of samples will be determined by the area of the habitat and variability in samples. 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 kept 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 to determine the 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 1. Examples of macrophyte-dominated (left) and rocky habitats (right) in the lower Niagara River.

We will use the benthic habitat maps to identify and prioritize habitats of importance as feeding grounds for lake sturgeon and other valuable fish species. The data on species composition, density and biomass of macrozoobenthos will be also 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). The 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). We will use these and other multivariate indices (Purcell et al., 2009; Clarke and Warwick, 2001) to assess the current status of benthic community in different habitats and select valuable habitats for conservation.

Objective 2

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.

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.

Figure 1. Lake sturgeon caught on the lower Niagara River during population surveys in 2011.

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

Research Foundation for SUNY/ SUNY Buffalo State
1300 Elmwood Avenue
Buffalo, NY
Carol A. Darstein, J.D., CRA, CPRA (Contact)
Phone: 716-878-3047
Fax: 716-878-4039
carold@rf.buffalostate.edu

Federal ID Number
14-1368361

Points of Contact

Alexander Y. Karatayev, Ph.D., D. Sc.
Director, Professor,
Great Lakes Center, SUNY Buffalo State
1300 Elmwood Ave.
Buffalo, New York 14222
Phone: 716-878-5423
E-mail: karataay@buffalostate.edu

Lyubov Burlakova, Ph.D.
Research Scientist
Great Lakes Center, SUNY Buffalo State
1300 Elmwood Ave. Buffalo
New York 14222
Phone: 716-878-4504
E-mail: burlakle@buffalostate.edu

Dimitry Gorsky, Ph.D.
Fish Biologist
U.S. Fish and Wildlife Service
1101 Casey Road, Basom
New York 14013
Phone: 585-948-5445 ext 2229
E-mail: dimitry_gorsky@fws.gov

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 feedback from Timothy DePriest. We have obtained collector's permits from the Ontario Ministry of Natural Resources (OMNR) for lake sturgeon work conducted during 2010-2013, 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 2013-2014 (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 project 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. 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 improve decision-making and governance, and sustain the natural resources. The study 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. 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 SUNY Buffalo State and the US Fish and Wildlife Service will be **$299,559** (35.8%). The total match from the SUNY Buffalo State will be **$262,959** 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				
PI Karatayev, 2 mo/year match	$0	$0	$0	$0
Co-PI Burlakova, 3 mo /year	$16,218	$16,218	$16,218	$48,653
Post-Doc, 12 mo/year	$50,000	$50,000	$50,000	$150,000
GIS expert Perelli, 2 mo Yrs 1,2, 1 Mo Yr 3	$6,425	$6,425	$3,212	$16,062
Technician, 1 mo/year	$3,667	$3,667	$3,667	$11,000
1 MS Graduate student	$20,000	$20,000	$20,000	$60,000
Total Salaries	***$96,309***	***$96,309***	***$93,097***	***$285,715***
b. Travel				
Mileage	$0	$0	$0	$0
Conferences	$0	$7,000	$7,000	$14,000
Boat time	$0	$0	$0	$0
Total Travel	***$0***	***$7,000***	***$7,000***	***$14,000***
c. Equipment	**$0**	**$0**	**$0**	**$0**
d. Supplies	**$7,500**	**$7,500**	**$7,500**	**$22,500**
e. Contractual:				
Co-PI Gorsky, US FWS	$103,114	$76,274	$76,274	**$255,663**
Total Contractual	***$103,114***	***$76,274***	***$76,274***	**$255,663**
f. Fringe Benefits				
Burlakova @41%, 42.5%, 43%	$6,649	$6,892	$6,974	$20,516
Post-Doc @41%, 42.5%, 43%	$20,500	$21,250	$21,500	$63,251
Perrelli @ 58.75, 55.7, 58.2%	$3,775	$3,579	$1,870	$9,224
Karatayev @ 58.75, 55.7, 58.2%	$0	$0	$0	$0
Technician @ 58.75, 55.7, 58.2%	$11,750	$11,140	$11,640	$34,530
Graduate students @ 15%, 16%, 16%	$3,000	$3,200	$3,200	$9,400
Total Fringe Benefits	***$45,674***	***$46,061***	***$45,183***	**$136,918**
Total Direct Costs	**$252,597**	**$233,144**	**$229,054**	**$714,796**
Total Direct Costs minus equipment and contractuals over $25,000	**$174,483**	**$156,870**	**$152,780**	**$484,132**

g. Indirect Cost: BSC overhead (25% of total direct).	**$43,621**	**$39,218**	**$38,195**	**$121,033**
h. Other	**$0**	**$0**	**$0**	**$0**
i. Total Costs	**$296,218**	**$272,362**	**$267,249**	**$835,829**
Match (includes unrecovered overhead, 47%)	**$103,098**	**$98,304**	**$98,157**	**$299,559**
Match, %	**34.8%**	**36.1%**	**36.7%**	**35.8%**

Cost Sharing
SUNY Buffalo State and US Fish and Wildlife Service

Category	Year 1	Year 2	Year 3	Total Match
a. Personnel				
PI Karatayev, 2 mo/year match	$20,488	$20,488	$20,488	$61,464
Co-PI Burlakova, 3 mo /year	$0	$0	$0	$0
Post-Doc, 12 mo/year	$0	$0	$0	$0
GIS expert Perelli, 2 mo Yrs 1,2, 1 Mo Yr 3	$0	$0	$0	$0
Technician, 1 mo/year	$0	$0	$0	$0
1 MS Graduate student	$0	$0	$0	$0
Total Salaries	***$20,488***	***$20,488***	***$20,488***	***$61,464***
b. Travel	0	0	0	0
Mileage	$0	$0	$0	$0
Conferences	$0	$0	$0	$0
Boat time	$10,000	$10,000	$10,000	$30,000
Total Travel	***$10,000***	***$10,000***	***$10,000***	***$30,000***
c. Equipment	***$0***	***$0***	***$0***	***$0***
d. Supplies	**$0**	**$0**	**$0**	**$0**
e. Contractual:	$0	$0	$0	$0
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	$0	$0	$0	$0
Burlakova @41%, 42.5%, 43%	$0	$0	$0	$0
Post-Doc @41%, 42.5%, 43%	$0	$0	$0	$0
Perrelli @ 58.75, 55.7, 58.2%	$0	$0	$0	$0
Karatayev @ 58.75, 55.7, 58.2%	$12,037	$11,412	$11,924	$35,373
Technician @ 58.75, 55.7, 58.2%	$0	$0	$0	$0
Graduate students @ 15%, 16%, 16%	$0	$0	$0	$0

Total Fringe Benefits	***$12,037***	***$11,412***	***$11,924***	***$35,373***
Total Direct Costs	**$54,725**	**$54,100**	**$54,612**	**$163,437**
g. Indirect Cost: BSC overhead (25% of total direct).	**$58,373**	**$54,204**	**$53,545**	**$166,122**
i. Total Match	**$103,098**	**$98,304**	**$98,157**	**$299,559**

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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, SUNY Buffalo State
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, SUNY Buffalo State, 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.

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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

Great Lakes Center, SUNY Buffalo State
1300 Elmwood Avenue, Buffalo, New York 14222
(P) 716-878-4504; (F) 716-878-6644; burlakle@buffalostate.edu
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, SUNY Buffalo State
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: 62 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., 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, 2009-2013.

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

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

Beaver Island State Park
2136 West Oakfield Road
Grand Island, New York 14072
www.niagaragreenway.org

Rob Belue
Executive Director
(716) 773-5361
Fax:(716) 773-5392
rob.belue@parks.ny.gov

For Immediate Release:
Wednesday, March 21, 2012

Contact: Rob Belue
(716) 773-5361

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.

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

Daniel C. Arcara

Supervisor of Exhibits

cc. Nancy Chapin, Executive Director