



Fish Attraction Structure Habitat Improvement Project: 2012 Monitoring Report

Niagara Power Project (FERC No. 2216)

PREPARED BY:

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PREPARED FOR:

NEW YORK POWER AUTHORITY

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1.0 INTRODUCTION

The New York Power Authority's (NYPA) Niagara Power Project (Project) is licensed by the Federal Energy Regulatory Commission (FERC). As part of the relicensing process, NYPA, state and federal resource agencies, local governments, nongovernmental organizations, and other stakeholders signed a Comprehensive Relicensing Settlement Agreement that requires NYPA to develop several Habitat Improvement Projects (HIPs) in the vicinity of Project lands and waters.

One of these HIPs involved the construction and monitoring of fish attraction structures in the Upper Niagara River to provide large-object cover in new areas where fish of various sizes can feed, rest, and seek shelter. In October 2008, NYPA constructed four fish attraction structures in the upper river using a barge. A different design was used at each location. One shallow-water structure used a stone and log groin design while three deep-water structures used boulder field, rock wing “saddleback”, and rock slope designs.

These four structures were monitored in September 2012 for the second time since being constructed. The following sections of this report provide the results of the 2012 fish attraction structure monitoring effort.

2.0 OBJECTIVE

Monitoring requirements for the fish attraction structures were outlined in the HIPs Report (Kleinschmidt Associates and Riveredge Associates, 2005). Specifically, the monitoring objective is to gather and provide data to determine if the fish attraction structures are maintaining their structural integrity. An ancillary objective for NYPA is to qualitatively evaluate structure use by fish. Monitoring is scheduled to be conducted once per year in years 1, 4, 7, and 10, following construction; 2012 represents the second post-construction monitoring event for these structures.

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3.0 METHODS

Monitoring was conducted according to the *Fish Attraction Structure Monitoring Plan* (Kleinschmidt Associates, 2009). Monitoring was performed on September 11-12, 2012 by SCUBA divers from Riveredge Associates.

During each survey, divers visually observed the physical condition of the structures to characterize their structural integrity. Additional ancillary observations included presence or absence of fish, species observed and their relative abundance (*e.g.*, 0, 1-10, 11-20, 21-50, 51-100, >100), how the habitat changes over time (*e.g.*, sedimentation around the structures, zebra mussels clogging the interstitial spaces between the boulders, etc.), and other pertinent observations. Underwater video and still photos were also taken with a GoPro Hero camera contained within a waterproof housing. Divers were interviewed by boat observers immediately following each survey dive in order to complete a data sheet for each monitoring location ([Appendix A](#)).

Monitoring occurred at the four fish attraction structure locations shown in Figure 1 and listed in [Table 1](#).

TABLE 1. FISH ATTRACTION STRUCTURES MONITORED IN 2012

NYPA Fish Attraction Structures		
	Structure Coordinates	
	North American Datum of 1983 (NAD83)	
Shallow Water (Gratwick Park)	Latitude	Longitude
Stone and Log Groin	43° 02' 55.0" N	78° 53' 38.0" W
Deep Water Locations		
Boulder Field	43° 00' 21.6" N	78° 55' 40.9" W
Rock Wing "Saddleback"	42° 59' 24.0" N	78° 56' 30.0" W
Rock Slope	42° 57' 54.0" N	78° 56' 00.0" W

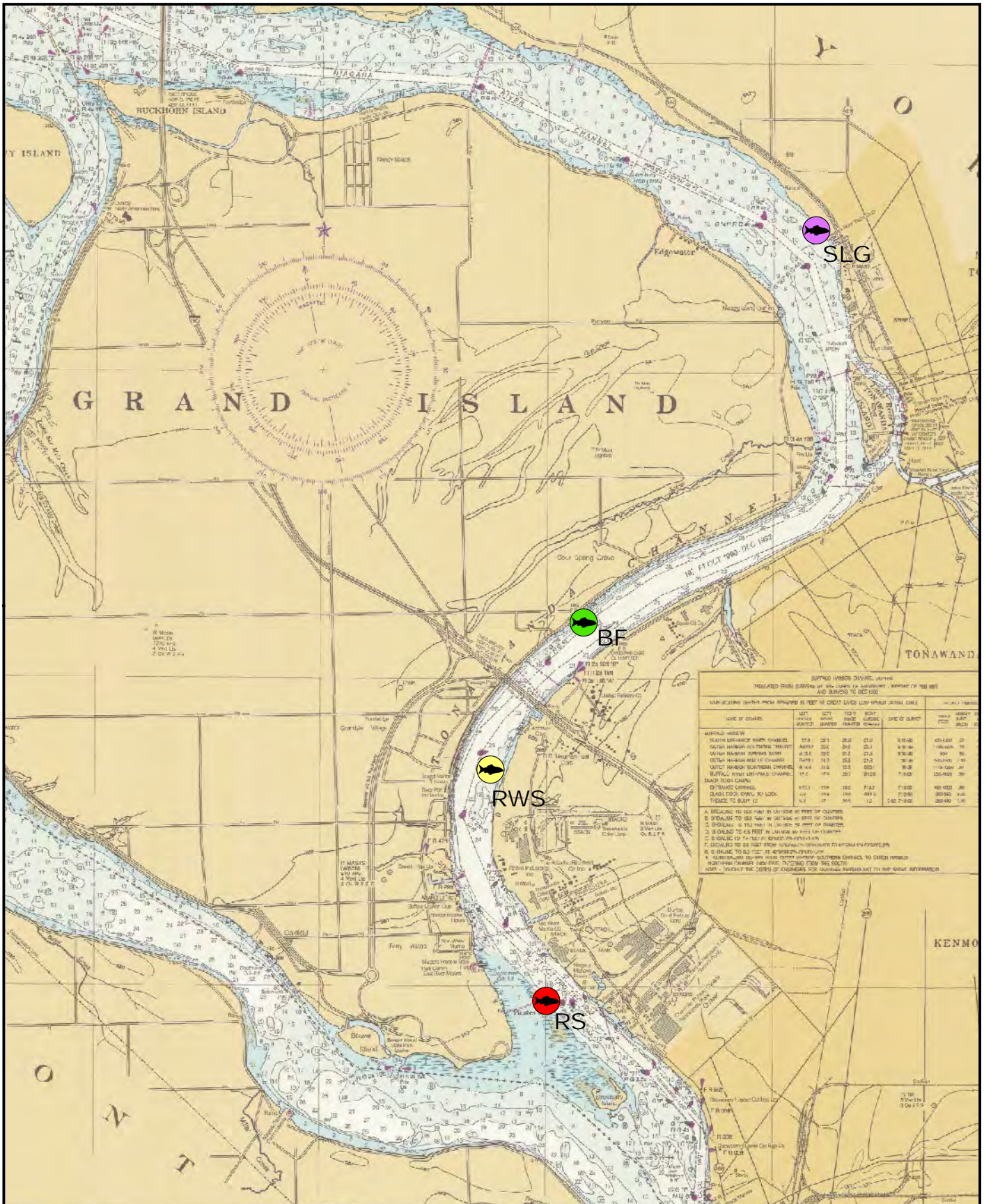


Figure 1. Upper Niagara River Fish Attraction Structures

Legend

- BF Boulder Field
- RWS Rock Wing "Saddleback"
- RS Rock Slope
- SLG Stone and Log Groin

1 inch = 1 mile

4.0 RESULTS

Each fish attraction structure was visited over the course of two days in mid-September 2012. Observations were recorded on the field data sheets included in Appendix A, and are summarized in Table 2. Weather during the monitoring activities was mild (light wind and waves, and ranging from clear to cloudy skies), with an average water temperature of 21.4°C. The average time of observation at each structure location was approximately 30 minutes, with observation times ranging from 11 to 50 minutes. Underwater visibility was consistent both days, allowing divers to see 6 to 10 feet at all four of the fish attraction structures. Because of swift currents, divers descended the anchor line to access the rock wing “saddleback” structure and conducted drift dives at the boulder field site. The remaining structures have slower currents that enabled divers to descend directly to the structures.

4.1 Physical Condition

General condition of the structures, four years after construction, was fair at the stone and log groin and good at the other three locations. The crest of the shallow water stone and log groin structure appeared to have been leveled out and both logs embedded into the structure were absent. Minor cable rusting and one broken cable were noted at the Motor Island rock slope; however, the three logs remained embedded within the structure ([Figure 2](#)). In general, parts of the structures sheltered from the current were coated with silt, contained fine sediment deposits, and supported zebra mussels, while areas exposed to the current were relatively clear ([Figure 3](#)).



FIGURE 2. ANCHORED LOG AT MOTOR ISLAND ROCK SLOPE



FIGURE 3. ROCK WING STRUCTURE UPSTREAM OF THE SOUTH GRAND ISLAND BRIDGE

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Embeddedness, or the degree to which small particles fill in the spaces around larger rocks, describes the amount of habitat space available to benthic macroinvertebrates and small fish in a coarse substrate and can be an indicator of substrate mobility. Embeddedness was highest at the rock wing “saddleback” structure, where sand and zebra mussel shells had accumulated in many of the deeper voids between the individual rocks; however, the ends of the rock wing have many protrusions that are exposed and available for habitat use (Figure 3). The Motor Island rock slope had minimal accumulation of zebra mussel shells and silt. In the boulder field, there is some scour at the base of the rocks, with zebra mussel shells and sand accumulating on the downstream side of the boulders (Figure 4).



FIGURE 4. ACCUMULATED GRAVEL AND SHELLS DOWNSTREAM OF A BOULDER IN THE BOULDER FIELD STRUCTURE

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TABLE 2. SUMMARY OF 2012 MONITORING EVENT RESULTS

Observation	Rock Slope	Rock Wing "Saddleback"	Boulder Field	Stone and Log Groin
Location	Motor Island	Upstream S. Grand Island Bridge	Downstream S. Grand Island Bridge	Gratwick Park
Date	9/12/2012	9/12/12	9/11/12	9/11/12
Time Started	9:30	15:30	13:00	10:00
Length of Observation (min)	11	50	30	20
Weather	Clear	Clear, Windy	Clear, Windy	Cloudy
Water Temp (°C)	21.7	21.7	21.1	21.1
Visibility (Ft)	6 to 10	6 to 10	6 to 10	6 to 10
Method	Divers	Divers	Divers	Divers
Structure Condition	Good	Good	Good	Fair
Embeddedness	25%, silt/clay, zebra mussels	60%, gravel, sand, zebra mussel shells	0%	10%
Boulder Shift	None	Minimal	None	Minimal
Logs	One cable failure; logs present	N/A	N/A	Logs missing
Fouling	Algae, 1 can	Algae, fishing gear, cans, horse toy	None	Zebra mussels, anchor, baseball, cans, woody debris
Flow Through (relative to upstream/ downstream conditions)	Areas of still water	Areas of reverse current; others with still water	Areas with increased velocity; others with decreased velocity	Areas with decreased velocity
Fish Present	Yes	Yes	Yes	Yes
Smallmouth bass (Adult)	1-10	11-20		11-20
Smallmouth bass (Juvenile)	11-20	21-50	21-50, mostly juvenile	21-50
Largemouth bass				2 adult
Round goby	21-50	51-100	1-10	21-50 adult
Muskellunge			1 adult, 1 juvenile	
Carp	1-10	1		
Comments	Cables starting to rust, 1 cable broken, 3 logs present, ¼" sediment and some algae on rocks, SAV around rocks – but not in structure, some flows at base/toe	Zebra mussel shells filled in most spaces of pile, but top layer of rock stuck out, not undermined by scour, milk bottle and rubber boot on structure, no SAV around structure	No trash, no SAV in boulder field, algae mat and zebra mussels on rocks	Logs missing (no cables in orig. design), debris (fish trap, timbers, anchor, cans), Wild Celery nearby, minor zebra mussels present, boulder pile flattened, decreased velocity behind structure, no scour

Fish Attraction Structure HIP: 2012 Monitoring Report

Fouling of the structures was primarily a result of algal build up, debris (small woody debris, aluminum beverage cans, fishing gear, and plastic trash), and zebra mussels. Wild celery (*Vallisneria americana*), a type of submerged aquatic vegetation that provides valuable habitat, was observed growing around the rock slope and the stone and log groin (Figure 5).

The four structures provided beneficial velocity breaks, as indicated by the decreased “flow through” observations, and these areas can be used by fish for resting or ambush feeding behavior. In particular, distinct velocity breaks were observed at the rock wing “saddleback” where currents actually reversed direction and created eddies on the downstream side of the rocks. Flow at the boulder field had areas of both increased and decreased velocity, as the water passed between the boulders. The rock slope had nearly still water, due in part to the uniformly slow current at this location in the river.

4.2 Structure Utilization

Fish, primarily smallmouth bass (*Micropterus dolomieu*) and round goby (*Neogobius melanostomus*), were observed at all four structures at various densities and age classes (Table 2). Gobies were the predominant species present on all the structures other than the boulder field, where juvenile smallmouth were the predominant species and the stone and log groin, where there were about the same number of gobies and juvenile smallmouth. Juvenile smallmouth utilized the spaces between the rocks for cover, as well as the water velocity breaks behind the structures. In addition to smallmouth and gobies, other fishes observed included largemouth bass (*Micropterus salmoides*) at the stone and log groin, muskellunge (*Esox masquinongy*) at the boulder field, and carp (*Cyprinus carpio*) at the rock slope and rock wing “saddleback” structures. The rock wing and the stone and log groin structures appear to have the most fish, perhaps due to the presence of vegetation at these sites. Gobies, an invasive species, were most prevalent among the boulders at the rock wing “saddleback”. Live zebra mussels, another invasive species, are prevalent at most of the sites, with their empty shells making up a large portion of the substrate at the rock wing “saddleback” and boulder field structures.



FIGURE 5. SAV GROWING AMONG THE BOULDERS AT THE STONE AND LOG GROIN

5.0 DISCUSSION

Based on the results of the 2012 monitoring effort, the fish attraction structures generally appear to be in good condition despite the loss of the logs from the stone and log groin and are providing good large-object cover for fish in the Niagara River. Initial year 1 monitoring (2009) indicated that one of the logs on the stone and log groin structure had shifted several yards off of the rock structure. All logs in this structure are now missing after an additional 3 years. Furthermore, this year's inspection indicated that the stone and log groin appeared to be flattened, possibly indicating that thick blocks of lake ice may have impacted the top of the only shallow water (5' deep) feature. If future shallow water projects are considered, preference should be given to slightly deeper sites, and alternative techniques, such as cabling down the logs, may also be needed to avoid the potential damaging effects of ice.

Similar to the 2009 report, there has been deposition of sediment and reduced velocity in sheltered areas of the structures, as expected and desired. The areas of reduced velocity provide ideal cover habitat for predatory fish to wait in while feeding and resting areas for other smaller fish. Minor scouring and undercutting was noted around the upstream and lateral bases of the boulders at the boulder field, as was found in 2009. Fouling of the locations was relatively minor, and was primarily from algae, zebra mussels and debris (aluminum beverage cans, fishing gear, and a boat anchor).

During the monitoring in the fourth year, three additional species of fish were observed using the structures, including muskellunge, largemouth bass, and carp. Both adult and juvenile smallmouth bass were present on the four structures. The overall number of fish using the structures is approximately the same as observed the first year after installation, although the species diversity has increased. There were more gobies at the rock wing and at the stone and log groin than previously observed.

Results from 2012 monitoring indicate that the fish attraction structures are performing well and are highly utilized by fish of multiple species. The next scheduled monitoring event will be conducted in year seven (2015) to provide additional information on the physical condition and utilization of the fish attraction structures in the Niagara River.

6.0 REFERENCES

Kleinschmidt Associates and Riveredge Associates. 2005. Investigation of Habitat Improvement Projects for the Niagara Power Project, Niagara Power Project, FERC No. 2216 – Volume 1: Public. Prepared for New York Power Authority, White Plains, NY. August.

Kleinschmidt Associates. 2009. Fish Attraction Structure Monitoring Plan. Niagara Power Project, FERC No. 2216. Prepared for New York Power Authority, White Plains, NY. June.

Kleinschmidt Associates and Riveredge Associates. 2010. Fish Attraction Structure Habitat Improvement Project: 2009 Monitoring Report. Niagara Power Project, FERC No. 2216. Prepared for New York Power Authority, White Plains, NY. June.

Fish Attraction Structure HIP: 2012 Monitoring Report

APPENDIX A: 2012 FIELD DATA COLLECTION FORMS

Niagara Power Project: Fish Attraction Habitat Improvement Project

Post-construction Monitoring Form

Date: (MM/DD/YY)	09/11/2012	Time Started:	10:00 <input type="checkbox"/> AM / <input type="checkbox"/> PM
Location / Site:	<input checked="" type="checkbox"/> Stone/Log Groin @ Gratwick Park <input type="checkbox"/> Rock Wing upstream SGI Bridge <input type="checkbox"/> Boulder Field downstream SGI Bridge <input type="checkbox"/> Rock Slope @ Motor Island	Weather:	<input type="checkbox"/> Clear <input type="checkbox"/> Rain <input type="checkbox"/> Windy <input checked="" type="checkbox"/> Cloudy <input type="checkbox"/> Snow
Observer(s):	Joseph Bert	Length of Observation:	20 minutes
Observer's Organization:	<input checked="" type="checkbox"/> NYPA/NYPA Contractor <input type="checkbox"/> Other: _____	Water Temperature:	70.0° F
		Underwater Visibility (ft):	<input checked="" type="checkbox"/> ≤5 <input type="checkbox"/> 10-25 <input type="checkbox"/> >50 <input type="checkbox"/> 6-10 <input type="checkbox"/> 25-50
Method of Observation:	<input checked="" type="checkbox"/> Divers <input type="checkbox"/> Underwater Camera <input type="checkbox"/> View Tube <input type="checkbox"/> Other: _____		

Structure Condition:	
Embeddedness:	10% <input type="checkbox"/> Cobble <input type="checkbox"/> Gravel <input type="checkbox"/> Sand <input type="checkbox"/> Silt/Clay <input type="checkbox"/> Zebra Mussels
Boulder Shifting:	<input checked="" type="checkbox"/> None Observed <input checked="" type="checkbox"/> Minimal <input type="checkbox"/> Moderate <input type="checkbox"/> Substantial
Logs:	<input type="checkbox"/> Log decomposition <input checked="" type="checkbox"/> Cable Failure <input type="checkbox"/> Other (describe) <i>no logs present</i>
Fouling Observed:	<input type="checkbox"/> Debris <input type="checkbox"/> Algae <input checked="" type="checkbox"/> Anchor or Lines <input type="checkbox"/> Fishing Gear <input checked="" type="checkbox"/> Zebra Mussels <input checked="" type="checkbox"/> Other (describe) <i>log ball, cans, woody debris</i>
Flow through Structure: (relative to upstream and downstream conditions)	<i>(check all that apply)</i> <input type="checkbox"/> Uniform <input type="checkbox"/> Increased velocity <input checked="" type="checkbox"/> Decreased velocity <input type="checkbox"/> Reverse current/eddies <input type="checkbox"/> Still water

Fish Present at Structure:			
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			
Species Observations	Estimated Abundance	Life Stage	Comments
Smallmouth	<input type="checkbox"/> 1-10 <input checked="" type="checkbox"/> 21-50 <input type="checkbox"/> >100 <input type="checkbox"/> 11-20 <input type="checkbox"/> 51-100	<input checked="" type="checkbox"/> Juvenile <input type="checkbox"/> Adult	3-4"
SMB	<input type="checkbox"/> 1-10 <input type="checkbox"/> 21-50 <input type="checkbox"/> >100 <input checked="" type="checkbox"/> 11-20 <input type="checkbox"/> 51-100	<input type="checkbox"/> Juvenile <input checked="" type="checkbox"/> Adult	6-9"
gobies	<input type="checkbox"/> 1-10 <input checked="" type="checkbox"/> 21-50 <input type="checkbox"/> >100 <input type="checkbox"/> 11-20 <input type="checkbox"/> 51-100	<input type="checkbox"/> Juvenile <input checked="" type="checkbox"/> Adult	in every cracks
LMB	<input type="checkbox"/> 1-10 <input type="checkbox"/> 21-50 <input type="checkbox"/> >100 <input type="checkbox"/> 11-20 <input type="checkbox"/> 51-100	<input type="checkbox"/> Juvenile <input checked="" type="checkbox"/> Adult	12-15" (2)
	<input type="checkbox"/> 1-10 <input type="checkbox"/> 21-50 <input type="checkbox"/> >100 <input type="checkbox"/> 11-20 <input type="checkbox"/> 51-100	<input type="checkbox"/> Juvenile <input type="checkbox"/> Adult	

Photograph/Video File Number(s):	<i>(list individually or the start & end of range)</i>
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Activity Observed Near Structure <i>(Include any activity that may cause disturbance):</i>	
<ul style="list-style-type: none"> - Wild celery around structure ~ 2' tall - logs & cables not present - v. minor zebra mussels not tall - boulder pile <i>flattened out</i> - no SAV on pile - 1g. boulder on W. side of pile - decreased velocity behind structure - no scum - dense SAV 	<p style="font-size: 1.2em;">debris - timbers fish traps cuckoo cans - lots</p> <p style="font-size: 2em;">→</p>

GPS point # 22 on Lee Harper's GPS

Structure located \perp to upstream^{most} poured
concrete slab along gratework shoreline

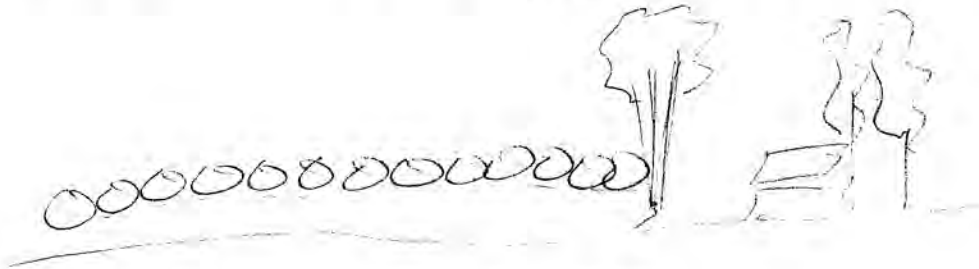


photo 132-2828

Niagara Power Project: Fish Attraction Habitat Improvement Project

Post-construction Monitoring Form

Date: (MM/DD/YY)	09/11/2012	Time Started:	13:00 <input type="checkbox"/> AM/ <input checked="" type="checkbox"/> PM
Location /Site:	<input type="checkbox"/> Stone/Log Groin @ Gratwick Park <input type="checkbox"/> Rock Wing upstream SGI Bridge <input checked="" type="checkbox"/> Boulder Field downstream SGI Bridge <input type="checkbox"/> Rock Slope @ Motor Island	Weather:	<input checked="" type="checkbox"/> Clear <input type="checkbox"/> Rain <input checked="" type="checkbox"/> Windy <input type="checkbox"/> Snow <input type="checkbox"/> Cloudy
Observer(s):	Joseph Bert	Length of Observation:	30 minutes
Observer's Organization:	<input checked="" type="checkbox"/> NYPA/NYPA Contractor <input type="checkbox"/> Other: _____	Water Temperature:	70.0° F
		Underwater Visibility (ft):	<input type="checkbox"/> <5 <input type="checkbox"/> 10-25 <input type="checkbox"/> >50 <input checked="" type="checkbox"/> 6-10 <input type="checkbox"/> 25-50
Method of Observation:	<input checked="" type="checkbox"/> Divers <input type="checkbox"/> Underwater Camera <input type="checkbox"/> View Tube <input type="checkbox"/> Other: _____		

Structure Condition:	
Embeddedness:	0% <input type="checkbox"/> Cobble <input type="checkbox"/> Gravel <input type="checkbox"/> Sand <input type="checkbox"/> Silt/Clay <input type="checkbox"/> Zebra Mussels
Boulder Shifting:	<input checked="" type="checkbox"/> None Observed <input type="checkbox"/> Minimal <input type="checkbox"/> Moderate <input type="checkbox"/> Substantial
Logs:	N/A <input type="checkbox"/> Log decomposition <input type="checkbox"/> Cable Failure <input type="checkbox"/> Other (describe) _____
Fouling Observed:	<input type="checkbox"/> Debris <input type="checkbox"/> Algae <input type="checkbox"/> Anchor or Lines <input type="checkbox"/> Fishing Gear <input type="checkbox"/> Zebra Mussels <input checked="" type="checkbox"/> Other (describe) <u>None</u>
Flow through Structure: (relative to upstream and downstream conditions)	(check all that apply) <input type="checkbox"/> Uniform <input checked="" type="checkbox"/> Increased velocity <input checked="" type="checkbox"/> Decreased velocity <input type="checkbox"/> Reverse current/eddies <input type="checkbox"/> Still water

Fish Present at Structure:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
Species Observations	Estimated Abundance	Life Stage	Comments
Muskie	<input checked="" type="checkbox"/> 1-10 <input type="checkbox"/> 21-50 <input type="checkbox"/> >100 <input type="checkbox"/> 11-20 <input type="checkbox"/> 51-100	<input checked="" type="checkbox"/> Juvenile <input checked="" type="checkbox"/> Adult	2 1-Adult 2-1 Juvenile
SMB	<input type="checkbox"/> 1-10 <input checked="" type="checkbox"/> 21-50 <input type="checkbox"/> >100 <input type="checkbox"/> 11-20 <input type="checkbox"/> 51-100	<input checked="" type="checkbox"/> Juvenile <input checked="" type="checkbox"/> Adult	24 fish holding each rock - more J. than adult
Gobies	<input checked="" type="checkbox"/> 1-10 <input type="checkbox"/> 21-50 <input type="checkbox"/> >100 <input type="checkbox"/> 11-20 <input type="checkbox"/> 51-100	<input checked="" type="checkbox"/> Juvenile <input checked="" type="checkbox"/> Adult	
	<input type="checkbox"/> 1-10 <input type="checkbox"/> 21-50 <input type="checkbox"/> >100 <input type="checkbox"/> 11-20 <input type="checkbox"/> 51-100	<input type="checkbox"/> Juvenile <input type="checkbox"/> Adult	
	<input type="checkbox"/> 1-10 <input type="checkbox"/> 21-50 <input type="checkbox"/> >100 <input type="checkbox"/> 11-20 <input type="checkbox"/> 51-100	<input type="checkbox"/> Juvenile <input type="checkbox"/> Adult	

Photograph/Video File Number(s):	(list individually or the start & end of range) S010 0035 - 92
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Activity Observed Near Structure (Include any activity that may cause disturbance):
NO SAV in field Algae mat on rocks + 3. mussels no trash

Niagara Power Project: Fish Attraction Habitat Improvement Project

Post-construction Monitoring Form

Date: (MM/DD/YY)	09/12/2012	Time Started:	09:30 <input checked="" type="checkbox"/> AM / <input type="checkbox"/> PM
Location /Site:	<input type="checkbox"/> Stone/Log Groin @ Gratwick Park <input type="checkbox"/> Rock Wing upstream SGI Bridge <input type="checkbox"/> Boulder Field downstream SGI Bridge <input checked="" type="checkbox"/> Rock Slope @ Motor Island	Weather:	<input checked="" type="checkbox"/> Clear <input type="checkbox"/> Rain <input type="checkbox"/> Windy <input type="checkbox"/> Cloudy <input type="checkbox"/> Snow
Observer(s):	Joseph Best	Length of Observation:	11 minutes
Observer's Organization:	<input checked="" type="checkbox"/> NYPA/NYPA Contractor <input type="checkbox"/> Other: _____	Water Temperature:	31.8°F
Method of Observation:	<input checked="" type="checkbox"/> Divers <input type="checkbox"/> Underwater Camera <input type="checkbox"/> View Tube <input type="checkbox"/> Other: _____	Underwater Visibility (ft):	<input checked="" type="checkbox"/> <5 <input type="checkbox"/> 10-25 <input type="checkbox"/> >50 <input type="checkbox"/> 6-10 <input type="checkbox"/> 25-50

Structure Condition:	
Embeddedness:	25% <input type="checkbox"/> Cobble <input type="checkbox"/> Gravel <input type="checkbox"/> Sand <input checked="" type="checkbox"/> Silt/Clay <input checked="" type="checkbox"/> Zebra Mussels few
Boulder Shifting:	<input checked="" type="checkbox"/> None Observed <input type="checkbox"/> Minimal <input type="checkbox"/> Moderate <input type="checkbox"/> Substantial
Logs:	<input type="checkbox"/> Log decomposition <input checked="" type="checkbox"/> Cable Failure <input type="checkbox"/> Other (describe) _____
Fouling Observed:	<input type="checkbox"/> Debris <input checked="" type="checkbox"/> Algae <input type="checkbox"/> Anchor or Lines <input type="checkbox"/> Fishing Gear <input type="checkbox"/> Zebra Mussels <input type="checkbox"/> Other (describe) 150k - mostly clean
Flow through Structure: (relative to upstream and downstream conditions)	<i>(check all that apply)</i> <input type="checkbox"/> Uniform <input type="checkbox"/> Increased velocity <input type="checkbox"/> Decreased velocity <input type="checkbox"/> Reverse current/eddies <input checked="" type="checkbox"/> Still water

Fish Present at Structure:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
Species Observations	Estimated Abundance	Life Stage	Comments
Comp	<input checked="" type="checkbox"/> 1-10 <input type="checkbox"/> 11-20 <input type="checkbox"/> 21-50 <input type="checkbox"/> 51-100 <input type="checkbox"/> >100	<input type="checkbox"/> Juvenile <input checked="" type="checkbox"/> Adult	
Smb	<input checked="" type="checkbox"/> 1-10 <input type="checkbox"/> 11-20 <input type="checkbox"/> 21-50 <input type="checkbox"/> 51-100 <input type="checkbox"/> >100	<input type="checkbox"/> Juvenile <input type="checkbox"/> Adult	16"
Smb	<input checked="" type="checkbox"/> 1-10 <input type="checkbox"/> 11-20 <input type="checkbox"/> 21-50 <input type="checkbox"/> 51-100 <input type="checkbox"/> >100	<input checked="" type="checkbox"/> Juvenile <input type="checkbox"/> Adult	
gobies	<input type="checkbox"/> 1-10 <input checked="" type="checkbox"/> 11-20 <input type="checkbox"/> 21-50 <input type="checkbox"/> 51-100 <input type="checkbox"/> >100	<input type="checkbox"/> Juvenile <input checked="" type="checkbox"/> Adult	
	<input type="checkbox"/> 1-10 <input type="checkbox"/> 11-20 <input type="checkbox"/> 21-50 <input type="checkbox"/> 51-100 <input type="checkbox"/> >100	<input type="checkbox"/> Juvenile <input type="checkbox"/> Adult	

Photograph/Video File Number(s):	<i>(list individually or the start & end of range)</i>
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Activity Observed Near Structure <i>(Include any activity that may cause disturbance):</i>
cables starting to rust, 1 broken 3 logs 1/4" sediment out of rocks some algae on rocks - SAV around rocks but not in structure - some flow at base/top @ construction of Motor I's HIP in progress

Niagara Power Project: Fish Attraction Habitat Improvement Project

Post-construction Monitoring Form


Date: (MM/DD/YY)	09/12/2012	Time Started:	15:30 <input type="checkbox"/> AM / <input checked="" type="checkbox"/> PM
Location /Site:	<input type="checkbox"/> Stone/Log Groin @ Gratwick Park <input checked="" type="checkbox"/> Rock Wing upstream SGI Bridge <input type="checkbox"/> Boulder Field downstream SGI Bridge <input type="checkbox"/> Rock Slope @ Motor Island	Weather:	<input checked="" type="checkbox"/> Clear <input type="checkbox"/> Rain <input checked="" type="checkbox"/> Windy <input type="checkbox"/> Cloudy <input type="checkbox"/> Snow
Observer(s):	Bert Joseph	Length of Observation:	50 minutes
Observer's Organization:	<input checked="" type="checkbox"/> NYPA/NYPA Contractor <input type="checkbox"/> Other: _____	Water Temperature:	71.0 °F
Method of Observation:	<input checked="" type="checkbox"/> Divers <input type="checkbox"/> Underwater Camera <input type="checkbox"/> View Tube <input type="checkbox"/> Other: _____	Underwater Visibility (ft):	<input type="checkbox"/> <5 <input type="checkbox"/> 10-25 <input type="checkbox"/> >50 <input checked="" type="checkbox"/> 6-10 <input type="checkbox"/> 25-50

Structure Condition:	
Embeddedness:	60% <input type="checkbox"/> Cobble <input checked="" type="checkbox"/> Gravel <input checked="" type="checkbox"/> Sand <input type="checkbox"/> Silt/Clay <input checked="" type="checkbox"/> Zebra Mussels shells
Boulder Shifting:	<input type="checkbox"/> None Observed <input checked="" type="checkbox"/> Minimal <input type="checkbox"/> Moderate <input type="checkbox"/> Substantial
Logs:	N/A <input type="checkbox"/> Log decomposition <input type="checkbox"/> Cable Failure <input type="checkbox"/> Other (describe) _____
Fouling Observed:	<input type="checkbox"/> Debris <input checked="" type="checkbox"/> Algae <input type="checkbox"/> Anchor or Lines <input checked="" type="checkbox"/> Fishing Gear pale <input type="checkbox"/> Zebra Mussels <input checked="" type="checkbox"/> Other (describe) cans, horse toy
Flow through Structure: (relative to upstream and downstream conditions)	(check all that apply) <input checked="" type="checkbox"/> Uniform <input type="checkbox"/> Increased velocity <input type="checkbox"/> Decreased velocity <input checked="" type="checkbox"/> Reverse current/eddies <input checked="" type="checkbox"/> Still water

Fish Present at Structure:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
Species Observations	Estimated Abundance	Life Stage	Comments
SKP	<input type="checkbox"/> 1-10 <input type="checkbox"/> 21-50 <input type="checkbox"/> >100 <input checked="" type="checkbox"/> 1-20 <input checked="" type="checkbox"/> 51-100	<input checked="" type="checkbox"/> Juvenile <input checked="" type="checkbox"/> Adult	15" - 17"
SKP	<input type="checkbox"/> 1-10 <input checked="" type="checkbox"/> 21-50 <input type="checkbox"/> >100 <input type="checkbox"/> 11-20 <input type="checkbox"/> 51-100	<input checked="" type="checkbox"/> Juvenile <input type="checkbox"/> Adult	
Gobies	<input type="checkbox"/> 1-10 <input type="checkbox"/> 21-50 <input type="checkbox"/> >100 <input checked="" type="checkbox"/> 1-20 <input checked="" type="checkbox"/> 51-100	<input checked="" type="checkbox"/> Juvenile <input type="checkbox"/> Adult	
Corp	<input checked="" type="checkbox"/> 1-10 <input type="checkbox"/> 21-50 <input type="checkbox"/> >100 <input type="checkbox"/> 11-20 <input type="checkbox"/> 51-100	<input type="checkbox"/> Juvenile <input checked="" type="checkbox"/> Adult	1
	<input type="checkbox"/> 1-10 <input type="checkbox"/> 21-50 <input type="checkbox"/> >100 <input type="checkbox"/> 11-20 <input type="checkbox"/> 51-100	<input type="checkbox"/> Juvenile <input type="checkbox"/> Adult	

Photograph/Video File Number(s):	(list individually or the start & end of range)
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Activity Observed Near Structure (Include any activity that may cause disturbance):



Swim clockwise for video
Zebra mussel shells fill in most spaces of pile but top down a little
Not undisturbed by SCORP
- milk bottle, rubber boot - not much
- no BTV around structure