Redevelopment of Lyons Falls Mill
Joint Agency Public Meeting

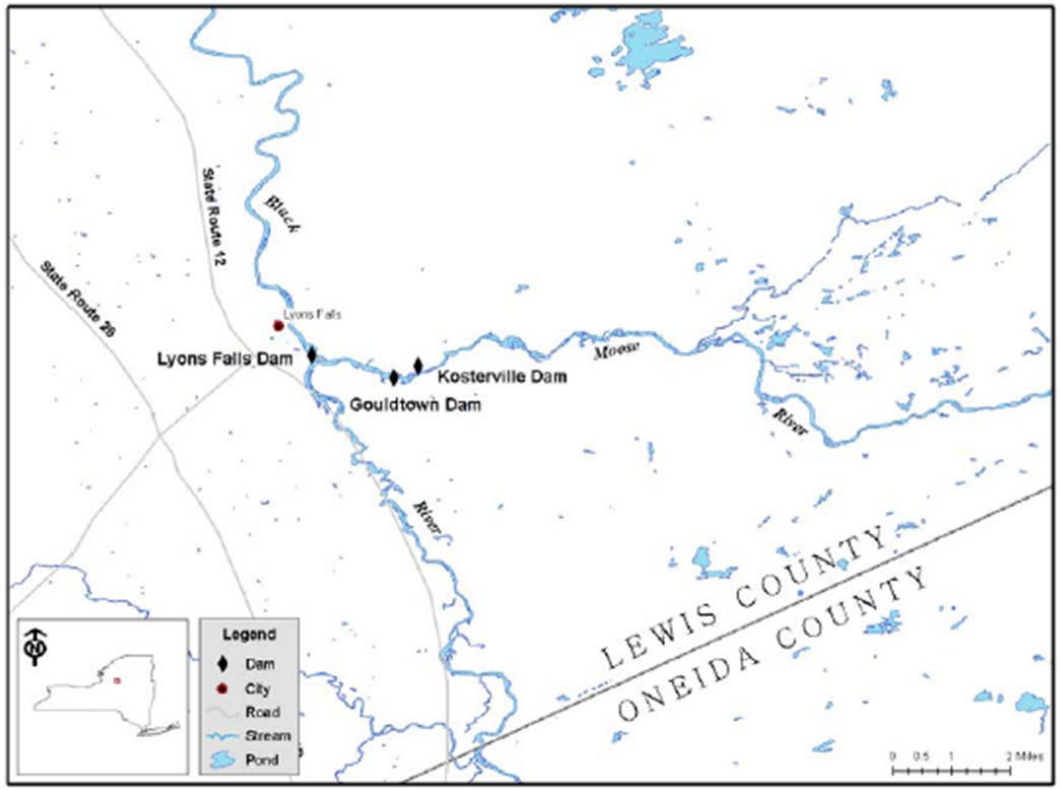
FERC Project No. 2548

March 4, 2015

Lyons Falls Mill

Project Overview

- Northbrook Lyons Falls, LLC (NBLF), an affiliate of Kruger Energy, Inc. (Kruger), is the licensee for the Lyons Falls Project (FERC No. 2548).
- The Project was initially constructed in 1920 and is located along the Moose and Black rivers in Lewis County, New York.
- The Project consists of three separate hydropower developments – Lyons Falls Mill, Kosterville, and Gouldtown.



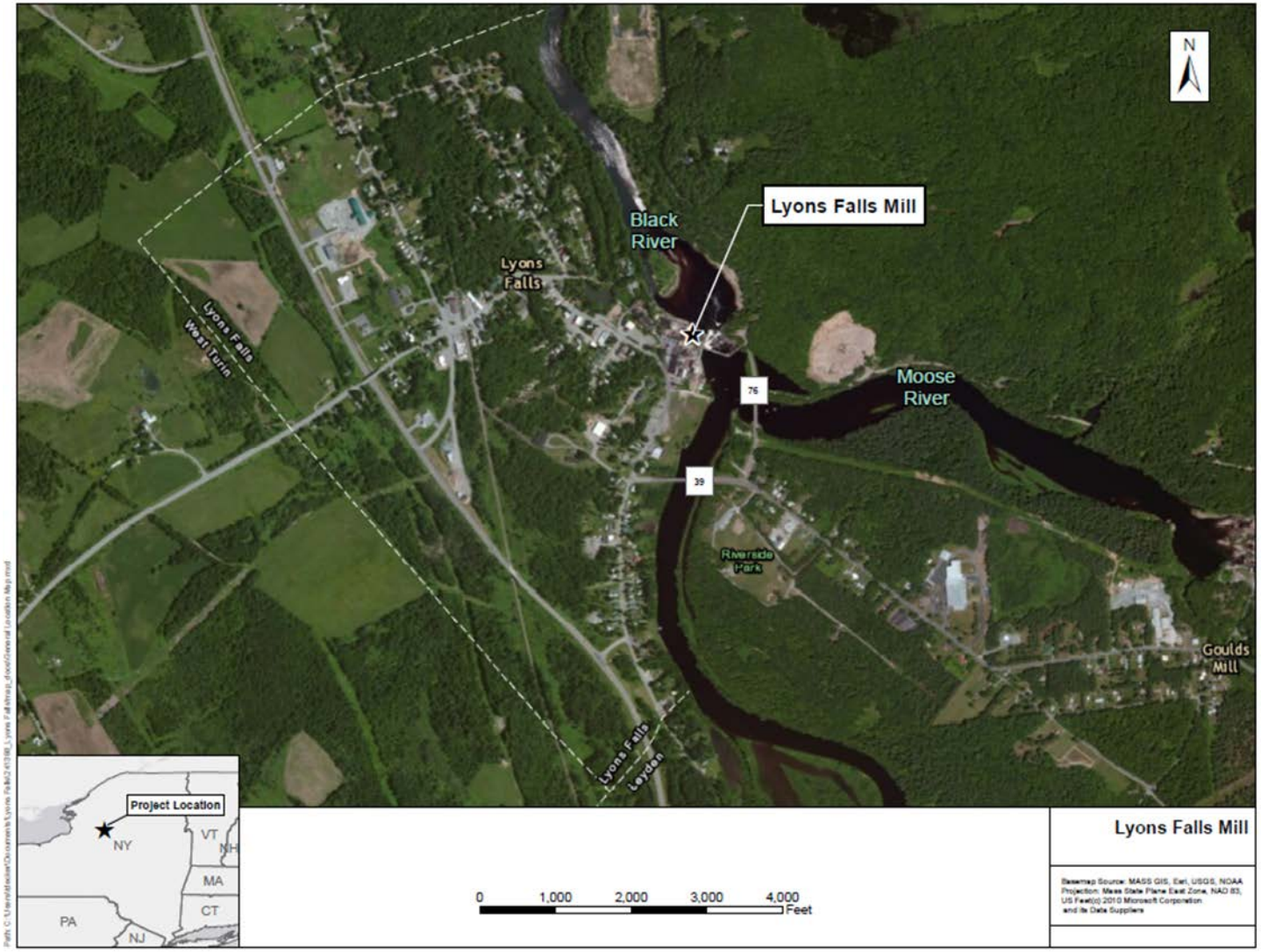
Lyons Falls Mill

Project Overview

- The Project operates under a license issued by the Federal Energy Regulatory Commission (FERC) on May 6, 1986, which expires on May 31, 2026.
  - Originally licensed to include capacity increase to 15.63 megawatts (MW) (for all three developments).
  - Amended in 1987 to current authorized capacity.
- NBLF is proposing to redevelop Lyons Falls Mill to increase its efficiency and the overall energy output of the development.
- Redevelopment of Lyons Falls Mill will increase the capacity of this facility from 5.8 MW to 11.2 MW. The proposed redevelopment of Lyons Falls Mill requires an amendment to the Project's existing FERC license.
- On January 30, 2015, NBLF distributed an Initial Consultation – Amendment Package (ICAP) to stakeholders and resource agencies describing the proposed redevelopment.
  - The ICAP describes current and proposed facilities, operations, and environmental conditions. The ICAP also summarizes proposed protection, mitigation, and enhancement measures associated with redevelopment.

Lyons Falls Mill

Project Overview



Lyons Falls Mill

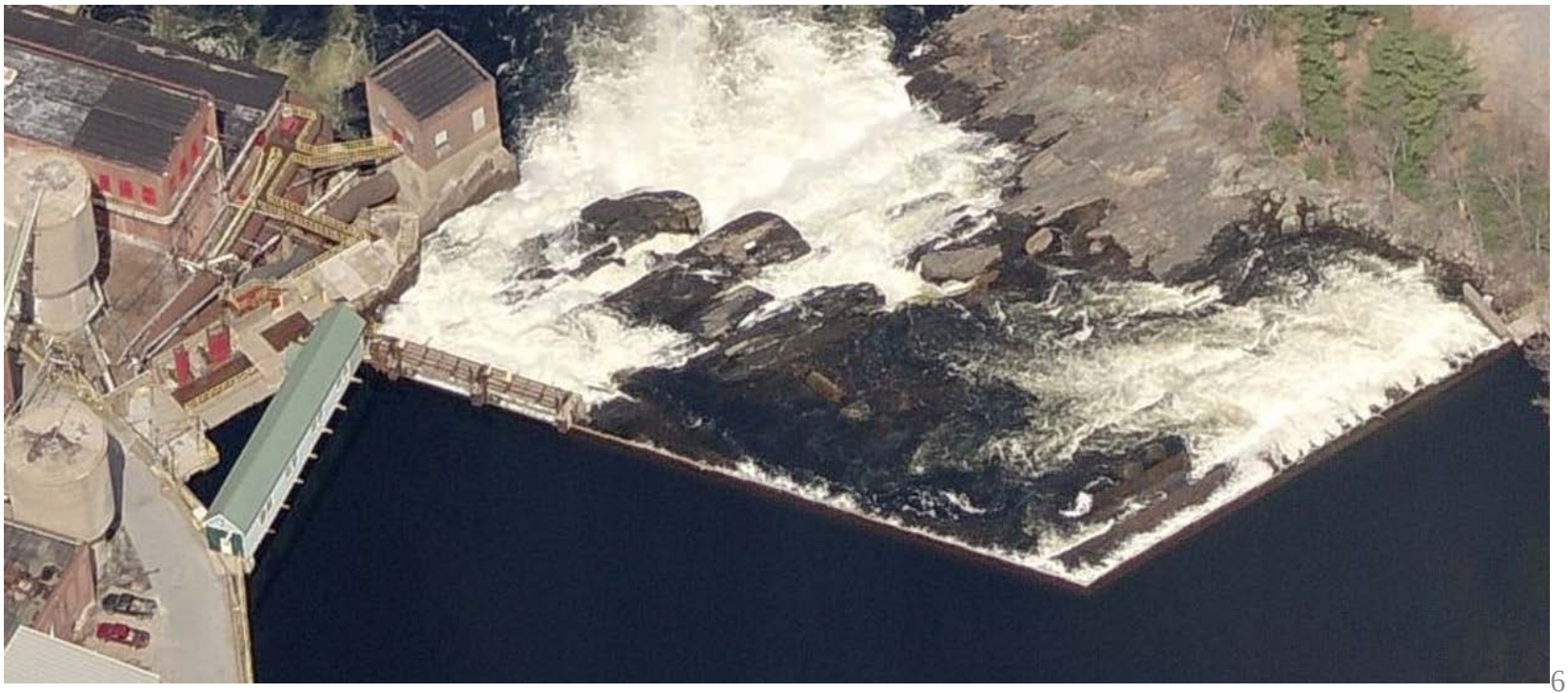
Project Overview

- The existing and proposed powerhouses are located within and adjacent to a former Georgia-Pacific paper mill on river left (looking downstream).

Lyons Falls Mill

Existing Features

- 431.5-foot-long, 10-foot-high, “L-shaped” concrete gravity dam.
  - 362-foot-long spillway section topped with 26-inch wooden flashboards.
  - 69.5-foot-long concrete gate structure adjoining the west (river left) end of the dam.
  - The concrete gate structure contains two 6-foot-high, 25-foot-wide flood control gates and one 6-foot-high, 8-foot-wide sluice gate.



Lyons Falls Mill

Existing Features

- The dam maintains a 130 acre impoundment with a gross storage volume of 730 acre-feet at an elevation of 806.5 above mean sea level (msl) (top of flashboards)
- Normal tailwater elevation of 734.4 msl, results in a gross head of 68.1 feet

Lyons Falls Mill

Existing Features

- The intake structure is located adjacent to the river left dam abutment and is equipped with trashracks measuring 18 feet high and 89 feet wide.
- The trashracks have a clear bar spacing of 1 and 7/8 inches.
- The intake area also includes a 3.75-foot-wide by 6-foot-high manually operated bottom-opening debris gate.

Lyons Falls Mill

Existing Features

- The intake structure feeds three penstocks that lead to two powerhouses.
- Each penstock has an individual, manually operated intake gate.
- Existing generating equipment at Lyons Falls Mill is housed within two powerhouses located on river left.

Lyons Falls Mill

Existing Features

EXISTING TURBINE/GENERATING UNIT CHARACTERISTICS

	Unit 1	Unit 6	Unit 7	Unit 8	Unit 9
Unit Type (propeller)	Vertical	Horizontal	Horizontal	Horizontal	Horizontal
Rated Flow (cfs)	250	250	250	170	70
Rated Head (feet)	67	69	69	69	64
Generator Power Factor	0.8	0.8	0.8	0.8	0.8
Power (kVA)	1,500	1,500	1,500	1,608	1,125
Generating Capacity (kW)	1,040	1,200	1,200	1,286	900

Lyons Falls Mill

Existing Operations

- Lyons Falls Mill operates in a run-of-river mode, with an impoundment elevation generally maintained at 806.5 feet (top of flashboards) and limited fluctuation to account for varying flow conditions, the age of the units, and the limited size of the impoundment.
- All river flows of 70 cfs (minimum operating point for unit 9) to 1,170 cfs (maximum hydraulic capacity of all 5 generating units) are passed through the existing units.
- During periods of high flow, when inflow equals or exceeds hydraulic capacity, Lyons Falls Mill is at the full hydraulic capacity of the five turbines. Flows in excess of the hydraulic capacity are passed over the spillway, through the flood gates, or through the sluice gate.
- During low or mean flow periods, facility operation is scheduled to meet the demands of the local electric grid to the extent possible. Lyons Falls Mill is operated such that current license article requirements are complied with during low or mean flow periods.

Lyons Falls Mill

2006 Proposed Redevelopment

- In 2006, an Initial Consultation Document (ICD) proposing the addition of a new 9 MW powerhouse to Lyons Falls Mill was prepared and distributed.
- The 2006 proposal included the development of the new powerhouse on river right (east side), across from the former paper mill and the existing facility's powerhouses.
- NBLF conducted studies in support of the 2006 redevelopment proposal.
- NBLF did not pursue redevelopment of Lyons Falls Mill as originally presented in 2006.

Lyons Falls Mill

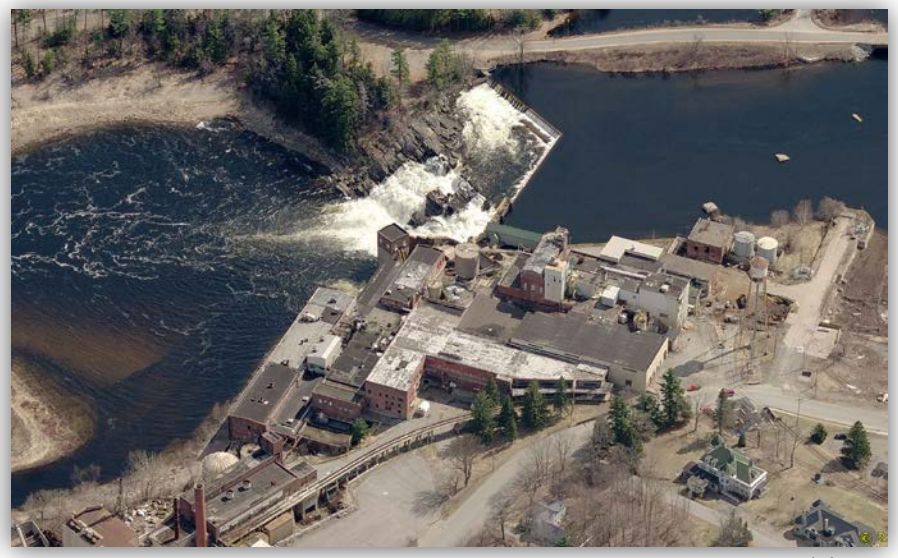
Proposed Redevelopment

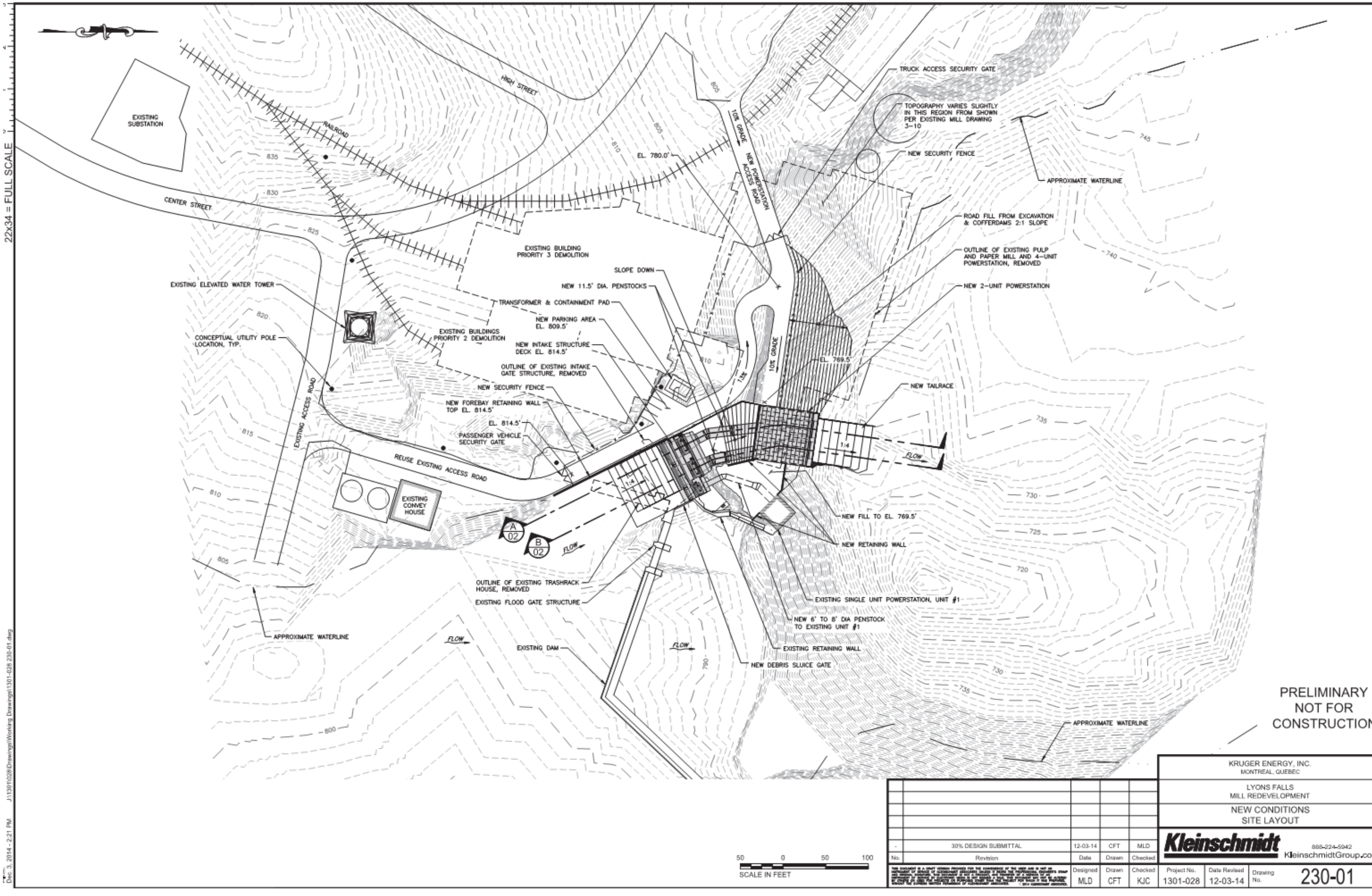
- The ongoing demolition of the adjacent paper mill will now allow for all redevelopment activities associated with Lyons Falls Mill to occur within the footprint of the former paper mill site on the river left shoreline.
- In support of the redevelopment, NBLF proposes to demolish the main powerhouse and mothball the single-unit powerhouse.
- The decommissioned powerhouses will then be replaced by a single powerhouse containing two generating units.

Lyons Falls Mill

Proposed Features

- The proposed Lyons Falls Mill redevelopment would continue to use the existing “L-shaped” concrete gravity dam, including the spillway section, concrete structure adjoining the river left end of the dam, and the 26-inch-high flashboards.
- Under the proposed plan, there would be no modifications to the dam and, thus, no changes to the size or gross storage capacity of the existing impoundment as a result of redevelopment.





22x34 = FULL SCALE
EXISTING SUBSTATION
HIGH STREET
RAILROAD
CENTER STREET
EXISTING BUILDING PRIORITY 3 DEMOLITION
EXISTING ELEVATED WATER TOWER
CONCEPTUAL UTILITY POLE LOCATION, TYP.
EXISTING BUILDINGS PRIORITY 2 DEMOLITION
EXISTING ACCESS ROAD
REUSE EXISTING ACCESS ROAD
EXISTING CONVEY HOUSE
SLOPE DOWN
NEW 11.5' DIA. PENSTOCKS
TRANSFORMER & CONTAINMENT PAD
NEW PARKING AREA EL. 809.5'
NEW INTAKE STRUCTURE DECK EL. 814.5'
OUTLINE OF EXISTING INTAKE GATE STRUCTURE, REMOVED
NEW SECURITY FENCE
NEW FOREBAY RETAINING WALL TOP EL. 814.5'
EL. 814.5'
PASSENGER VEHICLE SECURITY GATE
EL. 780.0'
10% GRADE
NEW POWERSTATION ACCESS ROAD
EL. 769.5'
TRUCK ACCESS SECURITY GATE
TOPOGRAPHY VARIES SLIGHTLY IN THIS REGION FROM SHOWN PER EXISTING MILL DRAWING 3-10
NEW SECURITY FENCE
APPROXIMATE WATERLINE
ROAD FILL FROM EXCAVATION & COFFERDAMS 2:1 SLOPE
OUTLINE OF EXISTING PULP AND PAPER MILL AND 4-UNIT POWERSTATION, REMOVED
NEW 2-UNIT POWERSTATION
NEW TAILRACE
FLOW
NEW FILL TO EL. 769.5'
NEW RETAINING WALL
OUTLINE OF EXISTING TRASHRACK HOUSE, REMOVED
EXISTING FLOOD GATE STRUCTURE
EXISTING SINGLE UNIT POWERSTATION, UNIT #1
NEW 6' TO 8' DIA PENSTOCK TO EXISTING UNIT #1
EXISTING DAM
EXISTING RETAINING WALL
NEW DEBRIS SLUICE GATE
APPROXIMATE WATERLINE
PRELIMINARY NOT FOR CONSTRUCTION
SCALE IN FEET
KRUGER ENERGY, INC.
MONTREAL, QUEBEC
LYONS FALLS MILL REDEVELOPMENT
NEW CONDITIONS SITE LAYOUT
Kleinschmidt
888-224-5942
KleinschmidtGroup.com
30% DESIGN SUBMITTAL 12-03-14 CFT MLD
No. Revision Date Drawn Checked
Designed MLD Drawn CFT Checked KJC
Project No. 1301-028
Date Revised 12-03-14
Drawing No. 230-01
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Lyons Falls Mill

Proposed Features

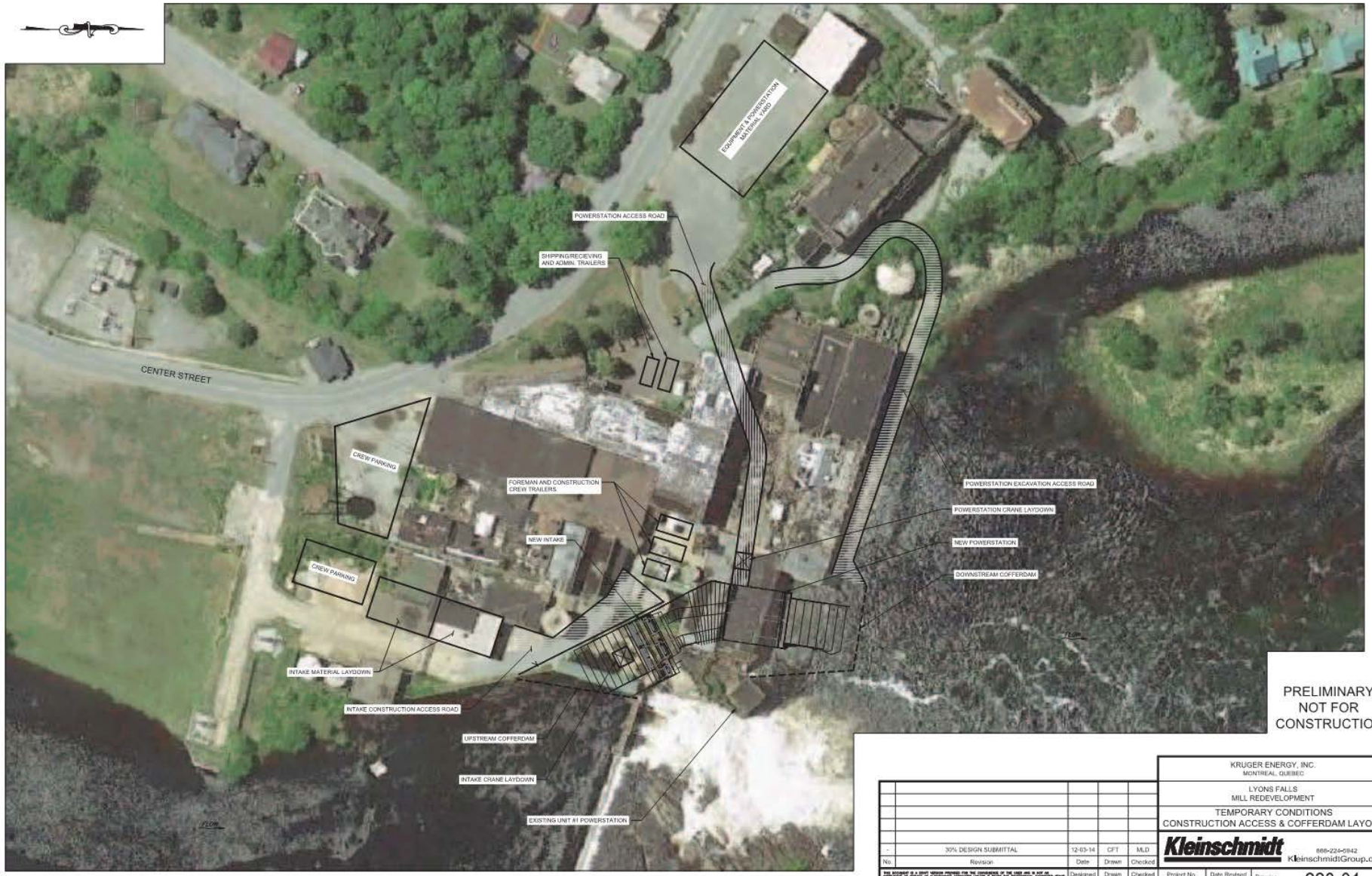
PROPOSED TURBINE/GENERATING UNIT CHARACTERISTICS

TURBINES	
Unit Type	Vertical “Saxo” Kaplan
Number of Units	2
Runner Diameter	2.25 meters
Rated Head	64 feet
Rated Flow	1,236 cfs each
Rated Horsepower (or kW)	5,600 kW
Min. Hydraulic Capacity	237 cfs each
Max. Hydraulic Capacity	1,342 cfs each
Project Min. Hydraulic Cap.	237 cfs
Project Max. Hydraulic Cap.	2,684 cfs
GENERATORS	
Number of Units	2
Voltage	4.16 kV
Nameplate Capacity (kVA)	6,251 kVA
Total Installed Capacity	11.2 MW
Average Annual Generation	63,492 MWh
Monthly Average Generation	5,527 MWh
Power Factor	0.9

Lyons Falls Mill

Proposed Features

- 5 kV generator leads will extend from the new powerhouse to a new 15 MVA generator step-up (GSU) transformer to be located near the new intake structure.
  - The GSU will step-up generation voltage from 4.16 kV to the distribution voltage of 23 kV.
- A new 23 kV aerial transmission line will replace the existing overhead line and will extend 2,640 feet from the GSU transformer to the existing circuit breaker for Lyons Falls Mill.
- The existing overhead conductors will extend form the existing circuit breaker to the utility point of interconnection at the existing National Grid transformer in the Franklin Street Substation.



PRELIMINARY
NOT FOR
CONSTRUCTION

No.	Revision	Date	Drawn	Checked
-	30% DESIGN SUBMITTAL	12-03-14	CFT	MLD

Designed: MLD | Drawn: CFT | Checked: KJC

KRUGER ENERGY, INC.
MONTREAL, QUEBEC

LYONS FALLS
MILL REDEVELOPMENT

TEMPORARY CONDITIONS
CONSTRUCTION ACCESS & COFFERDAM LAYOUT

Kleinschmidt 888-224-5942 KleinschmidtGroup.com

Project No. 1301-028 | Date Revised 12-02-14 | Drawing No. 220-01

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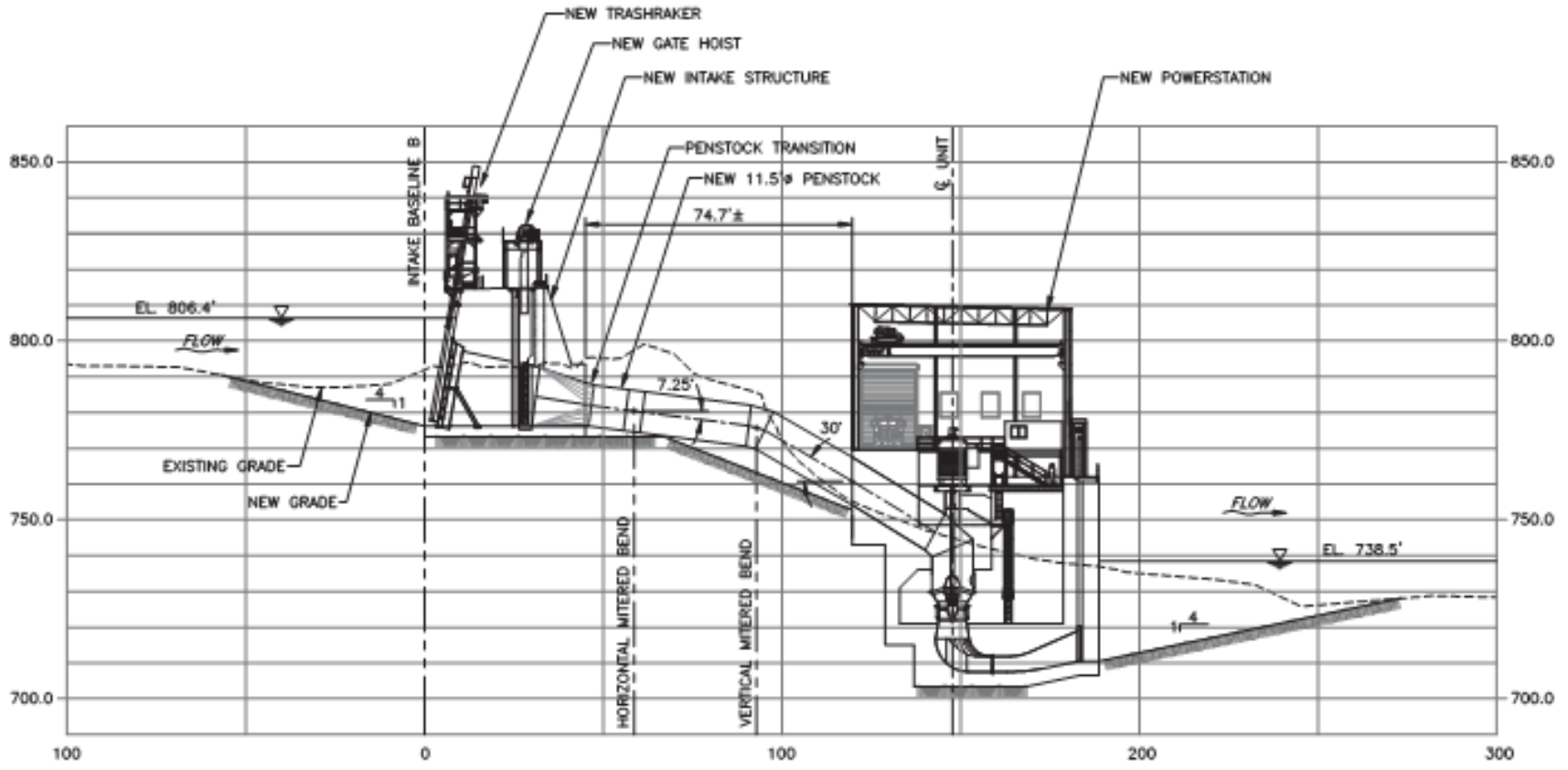
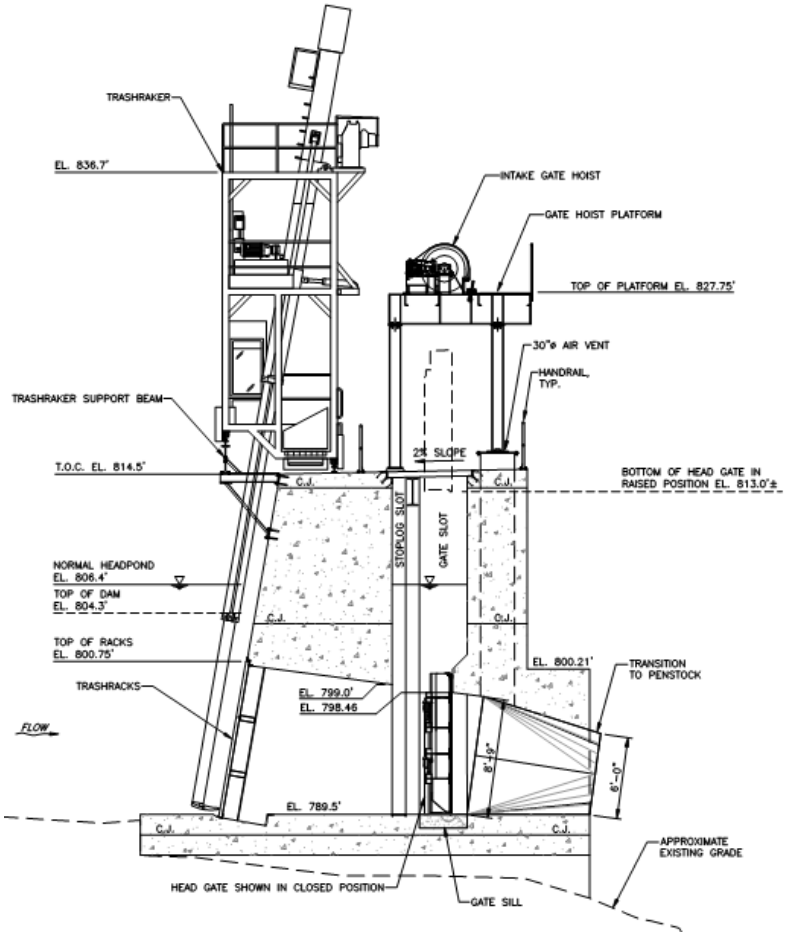
Lyons Falls Mill

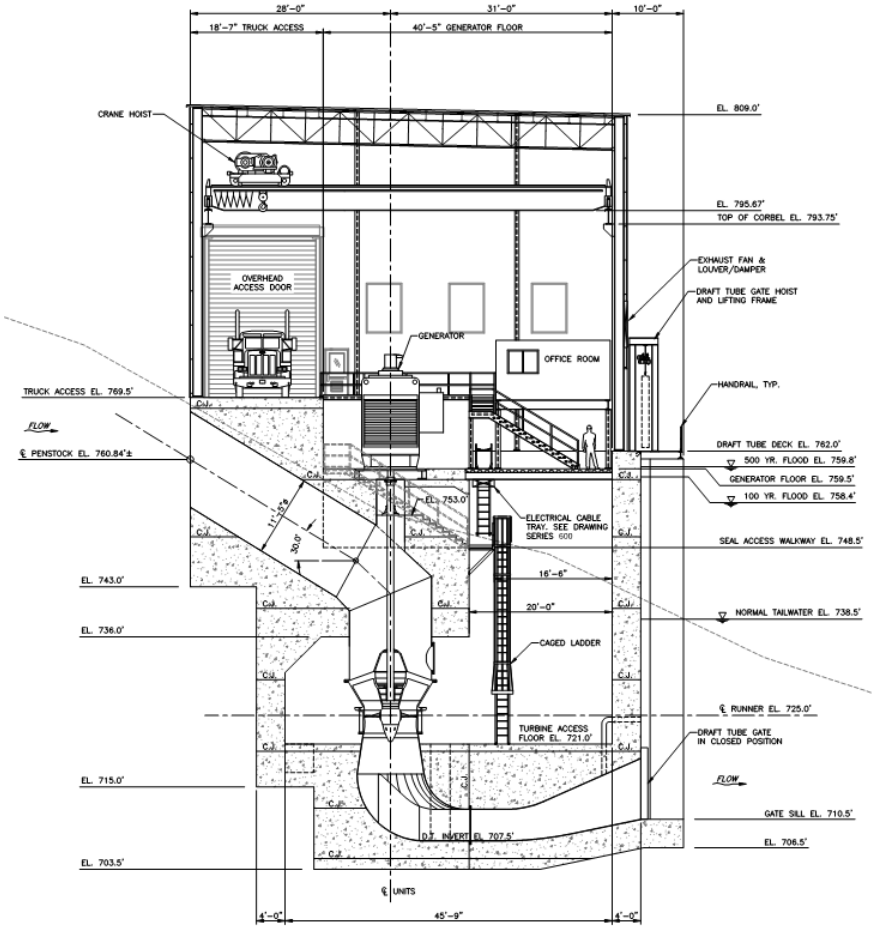
Proposed Features



Lyons Falls Mill

Proposed Features





Lyons Falls Mill

Proposed Operation

- The proposed facilities would continue to be operated automatically in a run-of-river mode and in accordance with the current high- and low-flow operations.
- NBLF will minimize impoundment fluctuation levels by maintaining discharges so that flow in the Black River, as measured immediately downstream from the tailrace, matches inflows to the impoundment.
- The facility's tailrace discharge will continue to backwater up to the bedrock falls upon which the facility's spillway is situated.
- The two new units would operate independently at flows ranging from 237 to 2,684 cfs, which would account for approximately 74 percent of the annual flow regime.

Lyons Falls Mill

Expected Generation

EXPECTED AVERAGE MONTHLY AND ANNUAL GENERATION

Month	Expected Average Generation (MWh)
January	5,138
February	4,586
March	6,576
April	7,965
May	6,442
June	4,638
July	3,459
August	3,052
September	3,357
October	5,610
November	6,570
December	6,099
Annual	***63,492***

Lyons Falls Mill

Proposed Protection, Mitigation, and Enhancement Measures

- Construction is limited to the footprint of the former Georgia-Pacific paper mill located on river left.
- Continue to operate Lyons Falls Mill in a run-of-river mode.
- No changes in or modifications to the existing pond elevation.
- Release seasonal minimum flows totaling 70 cfs downstream from Lyons Falls Dam, or inflow, when flows are below 70 cfs.
  - There are currently no minimum flow requirements at Lyons Falls Mill.
  - Of the 70 cfs, a minimum of 45 cfs would be released continually from March 15 through November 30 to provide downstream movement of fish.
  - A minimum flow of 25 cfs would also be released during the recreation season (May 1 through October 31) to provide a continuous flow over a portion of Lyons Falls for aesthetic purpose. However, flows from ice-out through late spring are likely to exceed plant capacity, and NBLF expects flows over the spillway to begin prior to May 1, annually, as a result of natural hydrologic conditions.
  - NBLF will consult with resource agencies and other stakeholders to define the appropriate location(s) for the seasonal minimum flow releases.

Lyons Falls Mill

Proposed Protection, Mitigation, and Enhancement Measures

- Install seasonal trashrack overlays with1-inch clear-bar spacing.
  - Overlays will be installed annually as soon as possible following ice-out and removed in October.
  - NBLF will consult with the NYSDEC, USFWS, and other parties to determine the specific schedule and notification requirements for the installation and removal of seasonal overlays.
- Develop and implement a Construction Soil Erosion and Sedimentation and a Temporary Emergency Action Plan including standard best-management practices (BMP) to address sediment and erosion control during construction and final stabilization in accordance with NYSDEC technical guidance.
- Develop and implement an Aesthetic Resources Plan to avoid or minimize disturbance of existing visual resources associated with the proposed redevelopment.
- If necessary, develop an avoidance, protection, and/or mitigation plan for historic properties.

Lyons Falls Mill

Questions?

Break

Lyons Falls Mill

Environmental Report – General Setting

- Lyons Falls Mill is located in the Village of Lyons Falls in the Town of West Turin, Lewis County, New York, approximately 42 miles north of Utica and 40 miles south of Watertown, New York.
- The existing dam, powerhouses, and impoundment are located at the confluence of the Black and Moose Rivers, approximately 82 RM upstream of Lake Ontario.
- Currently, there are 39 hydropower developments within the Black River Basin, 21 of which are on the mainstem of the Black River.

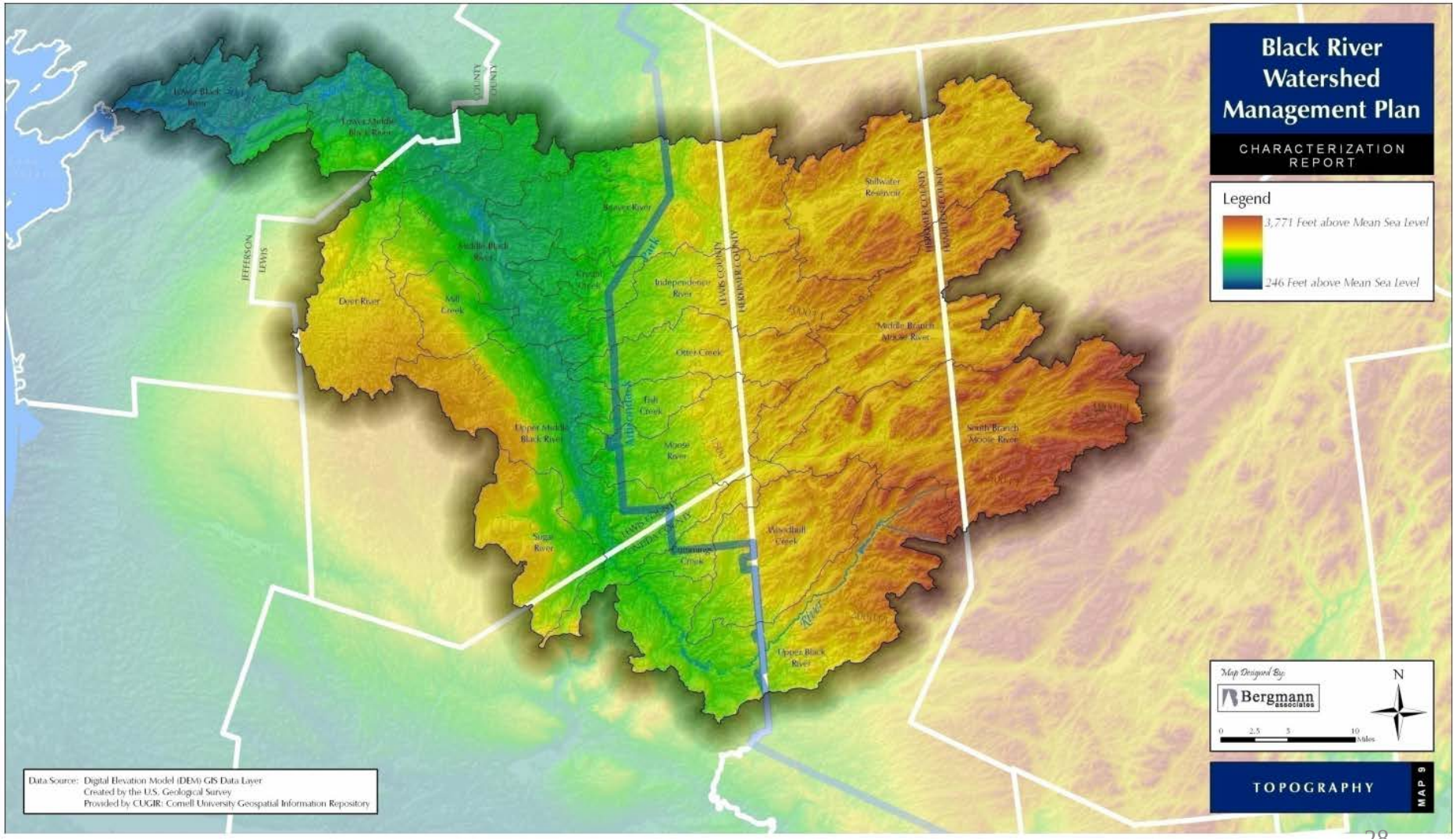
Lyons Falls Mill

Environmental Report – Topography, Geology, and Soils

- The Black River Basin is an extension of the Lake Ontario lowlands.
- The Black River Valley separates the two predominant geologic features in the area, the Tug Hill Plateau to the west and the Adirondack Mountains to the east.
- Unclassified soils are mapped along river left at the location of the former paper mill and the existing Lyons Falls Mill's powerhouses.
  - Characterized as "made land" or similar soils.

Lyons Falls Mill

Environmental Report – Topography, Geology, and Soils



Source: Bergmann Associates. 2010. Black River Management Plan. Prepared for the New York State Department of State, Division of Coastal Resources. Albany, NY

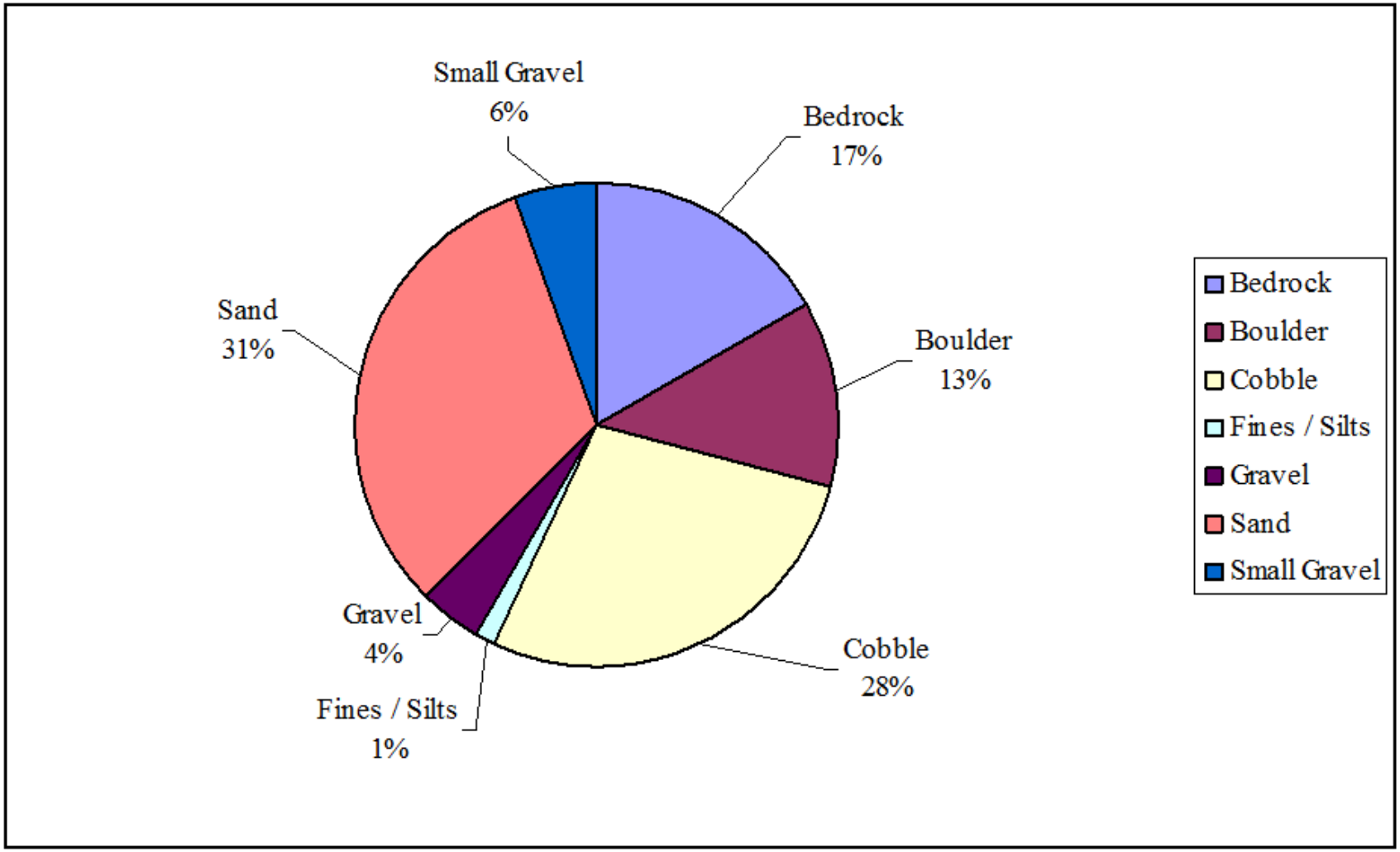
Lyons Falls Mill

Environmental Report – Impoundment Characterization

- In support of the upgrades proposed in 2006, NBLF conducted an evaluation to characterize accumulated sediment within the Lyons Falls Mill impoundment.
- The results indicate that there is relatively little accumulated fine-grained sediment in the impoundment, and that which does exist is dominated by sand.
  - The bulk of this material is located along the right shoreline of the impoundment, opposite of the existing intake structure and the proposed location for construction of the new integrated intake/trashrack.
- Average sediment depth in the impoundment is less than 0.5 foot.
- A small sediment wedge consisting primarily of gravels and sand exists along a portion of the upstream face of the dam.

Lyons Falls Mill

Environmental Report – Impoundment Characterization



Lyons Falls Mill

Geology and Soils Resources PM&E Measures

- PM&E Measures proposed by NBLF for the continued protection of geology and soils include:
  - Construction limited to the footprint of the former Georgia-Pacific paper mill along river left.
  - Continued operation in run-of-river mode.
  - No changes or modifications to the existing pond elevation.
  - Develop and implement a Construction Soil Erosion and Sedimentation and a Temporary Emergency Action Plan including standard BMPs to address sediment and erosion control during construction and final stabilization in accordance with NYSDEC technical guidance.

Lyons Falls Mill

Environmental Report – Water Use and Quality

- There are no other existing or proposed uses of Black River or Moose River water at Lyons Falls Mill other than hydroelectric generation (i.e., for irrigation, domestic water supply, or steam-electric plants). Instream flow uses include hydroelectric flows and recreation.
- The Black River is considered Class C waters from Carthage to upstream to the Moose River confluence (i.e., Lyons Falls Mill impoundment). Class C waters are designated as best suited for fishing and human consumption of fish.
- Above the Moose River confluence, the Black River is classified as Class C(T) water, indicating that water quality standards must be maintained for trout. The lowermost 1.8 RM of the Moose River to its confluence with the Black River are also classified as Class C(T) water.
- Dissolved oxygen (DO) levels of 5.0 mg/L are required for Class C waters whereas a level of 6.0 mg/L or higher must be maintained for Class C(T) waters.
- The standard for pH is between 6.5 and 8.5 for Class C and C(T) waters.

Lyons Falls Mill

Environmental Report – Existing Water Quality

- The majority of water quality issues in the Moose and Black Rivers are associated with atmospheric deposition of contaminants.
  - Other potential sources of water pollution can be associated with agriculture, sediments, chemical spills, and inadequate waste treatment facilities.
- Acidic deposition and the predominance of schists and gneisses in the river basin contribute to lower pH levels.
- The uppermost reach of the Black River (above Kayuta Lake) is also reportedly impacted by lower pH and acid rain/run-off, which has affected aquatic biota.
- There are no specific fish consumption advisories for the Black River or Moose River.
  - However, there are general advisories for sportfish in the Adirondack Region, including the Moose and Black Rivers at Lyons Falls.
- The Black River at Lyons Falls was not listed as impaired by NYSDEC in a recent 303(d) report filed pursuant to the state's Clean Water Act reporting requirements (NYSDEC 2014).

Lyons Falls Mill

Environmental Report – Black River Existing Water Quality

- The NYSDEC conducted Black River water quality monitoring near Lyons Falls Mill as part of the Rotating Intensive Basin Studies (RIBS) monitoring program in 2002 and 2003.
  - RIBS sampling monitoring included the 22.5-mile-long reach of the Black River from Lowville upstream to Lyons Falls.
- NYSDEC RIBS data was reported in 2007, and indicates the water quality in the Black River in the vicinity of Lyons Falls Mill is generally in “very good” to “excellent” condition.
  - Biological (macroinvertebrate) sampling indicated “slightly impacted water quality” in the Black River near Lyons Falls because the invertebrate community was dominated by caddisflies, midges, and mayflies, which was indicative of minor water quality impacts.
  - Additionally, NYSDEC evaluated characteristics of the fish community to assess water quality near Lyons Falls. Results indicate that characteristics of the existing fish community in the Black River from Lowville to Lyons Falls are reflective of “good water quality.”

Lyons Falls Mill

Environmental Report – Black River Existing Water Quality

- The NYSDEC concluded that elevated mercury and aluminum levels in the Black River from Lowville to Lyons Falls were not unusual for areas of the state affected by atmospheric deposition of mercury and subject to acid rain.
- Zinc concentrations were also determined to be elevated, but the NYSDEC found that “overall sediment quality is not likely to cause toxicity to sediment-dwelling organisms.”
- Based on the RIBS data, the NYSDEC concluded that, in the Black River from Lowville to Lyons Falls, there are “no significant water quality impacts and uses of the stream are considered to be fully supported.”

Lyons Falls Mill

Environmental Report – Black River Existing Water Quality

- Based on macroinvertebrate data collected from 1972 – 2002, NYSDEC categorized water quality in the Black River from Dexter to Port Leyden, which includes Lyons Falls, as slightly impacted.
- Upstream from Lyons Falls to Hawkinsville, NYSDEC classified water quality in the Black River as non-impacted.
- In 1996, benthic invertebrate sampling was conducted by NYSDEC upstream and downstream of the former discharge lagoon of Georgia-Pacific's paper mill.
- It was determined that no significant impairments had resulted from the paper mill's discharge.
  - Because the mill has subsequently shut down, it is likely that water quality at Lyons Falls Mill has remained non-impacted or has improved.

Lyons Falls Mill

Environmental Report – Moose River Existing Water Quality

- The NYSDEC conducted RIBS sampling in the lower Moose River in 2003.
  - Results of macroinvertebrate sampling indicated that non-impacted water quality conditions were prevalent in the lower portion of the Moose River from its confluence with the Black River to McKeever.
  - According to NYSDEC, the macroinvertebrate community is “well-balanced, diverse, and dominated by clean-water mayflies.”
- NYSDEC’s sampling in the lower Moose River indicated that mercury and aluminum were parameters of concern.
  - However, according to NYSDEC’s report, the elevated levels of these two variables are not unusual for areas of the state typically affected by atmospheric deposition of mercury and subject to acid rain.
  - The NYSDEC concluded that “sediment chemistry analysis for these and other contaminants show no metals present above established levels of concern, and no compounds present in concentrations likely to cause adverse biological effects to sediment-dwelling organisms”

Lyons Falls Mill

Environmental Report – Moose River Existing Water Quality

- The NYSDEC also collected macroinvertebrate data from the lower Moose River, above Lyons Falls, in 1976, 1982, and 1991.
- All benthic macroinvertebrate monitoring data indicate that the Moose River is non-impacted and reflective of excellent water quality.

Lyons Falls Mill

Environmental Report – Water Quality Studies Conducted by NBLF

- NBLF conducted water quality studies in support of the upgrades to Lyons Falls Mill proposed in 2006.
- NBLF recorded DO, pH, conductivity, and water temperature at Lyons Falls Mill during the summer high-temperature, low-flow period of 2006.
  - As per NYSDEC guidelines, measurements were taken at five intervals throughout a 24-hour period at six sample sites.
  - In the Lyons Falls impoundment, DO and water temperature measurements were taken at 1-foot intervals from the surface to the bottom to create vertical profiles.
  - Data in the riverine sample sites were taken at a depth of 1 foot.
  - At all sites, conductivity and pH were also measured at a depth of 1 foot.
  - Data was collected in the morning, late-morning, early afternoon, early evening, and evening from the afternoon of August 23 to the late-morning of August 24, 2006.

Lyons Falls Mill

Environmental Report – Water Quality Studies Conducted by NBLF

Lyons Falls Mill

Environmental Report – Water Quality Studies Conducted by NBLF

WATER QUALITY MONITORING AT LYONS FALL (2006)

Site ID	Location	Date Sampled	Time Sampled
BR1 (Black River)	Upstream of Moose and Black River confluence.	8/23/2006 & 8/24/2006	0730, 1030, 1800, 2045, 2315
BR2 (Black River)	Downstream of the dam across from the existing canoe launch site.	8/23/2006 & 8/24/2006	0745, 1045, 1830, 2110, 2330
MR1 (Moose River)	Upstream of Moose and Black River confluence.	8/23/2006 & 8/24/2006	0715, 1000, 1800, 2030, 2300
IL (Impoundment Lower)	Upstream of dam face.	8/23/2006 & 8/24/2006	0615, 0900, 1630, 1930, 2200
IM (Impoundment Middle)	Mid-impoundment.	8/23/2006 & 8/24/2006	0630, 0915, 1700, 2000, 2215
IU (Impoundment Upper)	Upper end of impoundment below confluence of Moose River.	8/23/2006 & 8/24/2006	0700, 0930, 1730, 2015, 2230

Lyons Falls Mill

Environmental Report – Water Quality Studies Conducted by NBLF

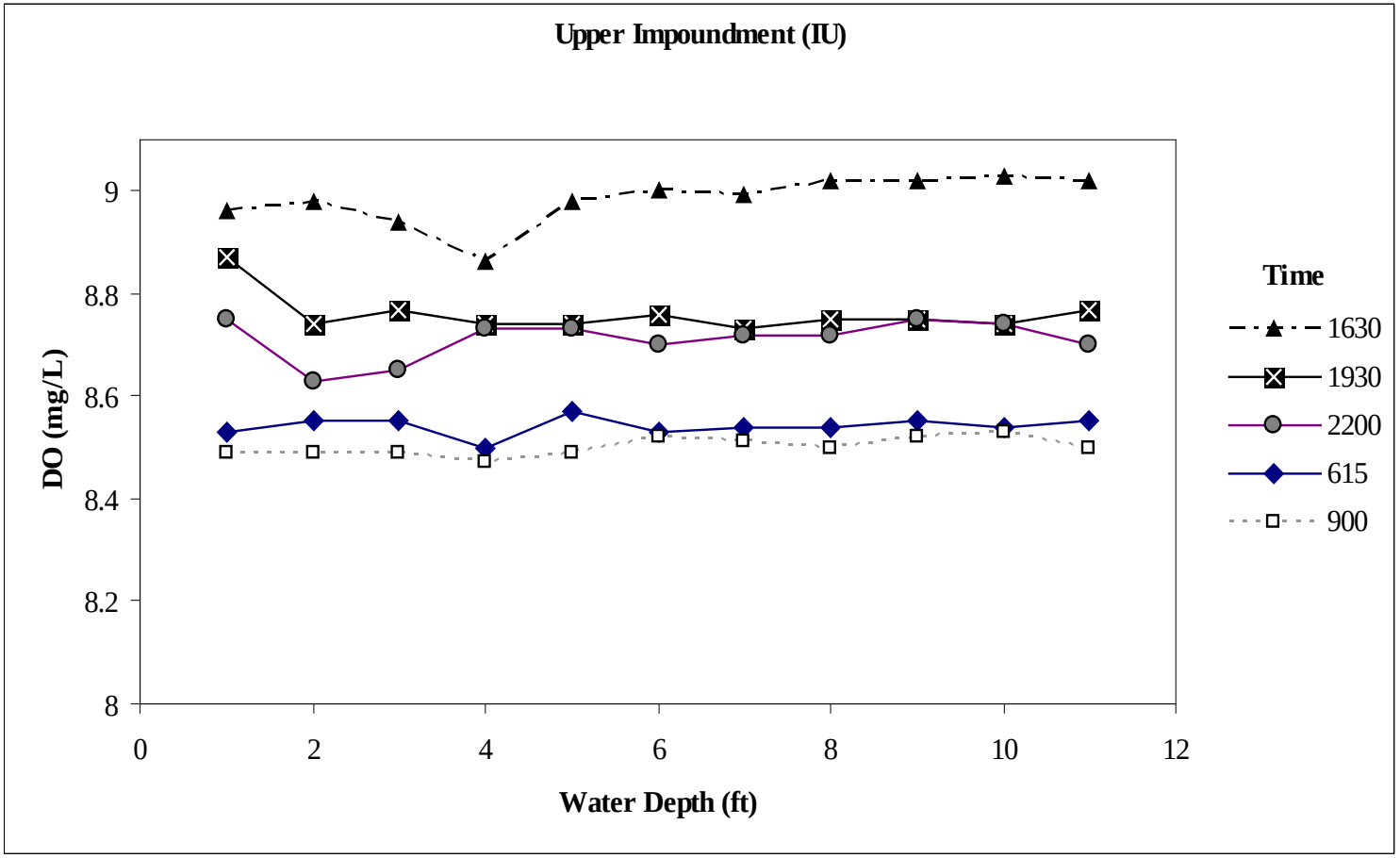
SUMMARY OF MEAN DISSOLVED OXYGEN, PH, CONDUCTIVITY, AND WATER TEMPERATURE

Site ID	DO (%)	DO (mg/L)	Temp. (°C)	Conductivity (uS)	pH
Riverine Sites					
BR1	96.5	8.7	20.5	96.5	7.3
BR2	93.5	8.5	20.0	63.9	7.3
MR1	95.8	8.7	20.0	34.8	7.1
Impoundment Sites					
IU	95.8	8.7	20.0	45.8	7.7
IM	96.1	8.7	20.3	79.9	7.6
IL	95.7	8.7	20.0	35.9	7.5

Lyons Falls Mill

Environmental Report – Water Quality Studies Conducted by NBLF

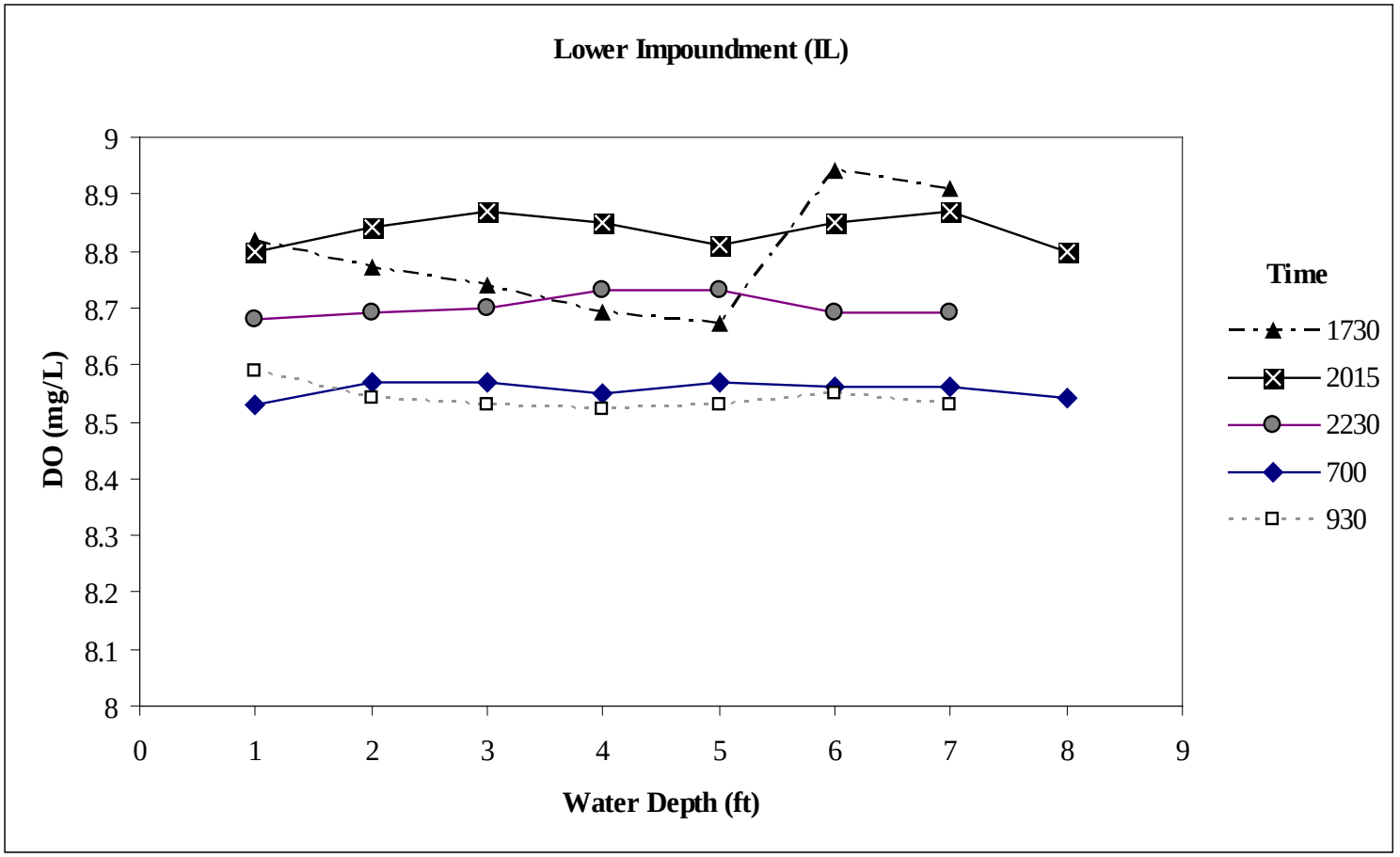
DISSOLVED OXYGEN BY DEPTH AND SAMPLING TIME IN THE UPPER IMPOUNDMENT



Lyons Falls Mill

Environmental Report – Water Quality Studies Conducted by NBLF

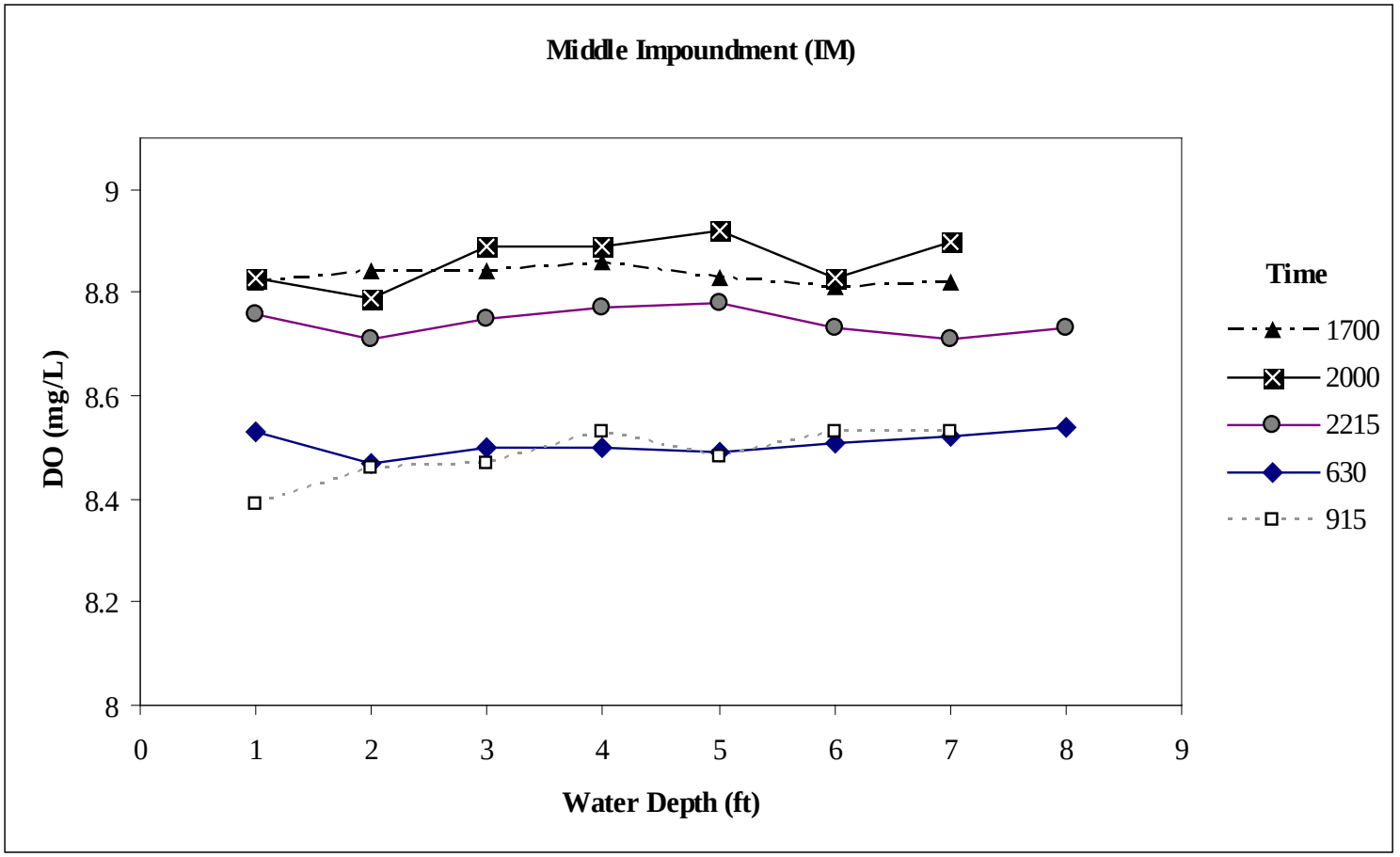
DISSOLVED OXYGEN BY DEPTH AND SAMPLING TIME IN THE LOWER IMPOUNDMENT



Lyons Falls Mill

Environmental Report – Water Quality Studies Conducted by NBLF

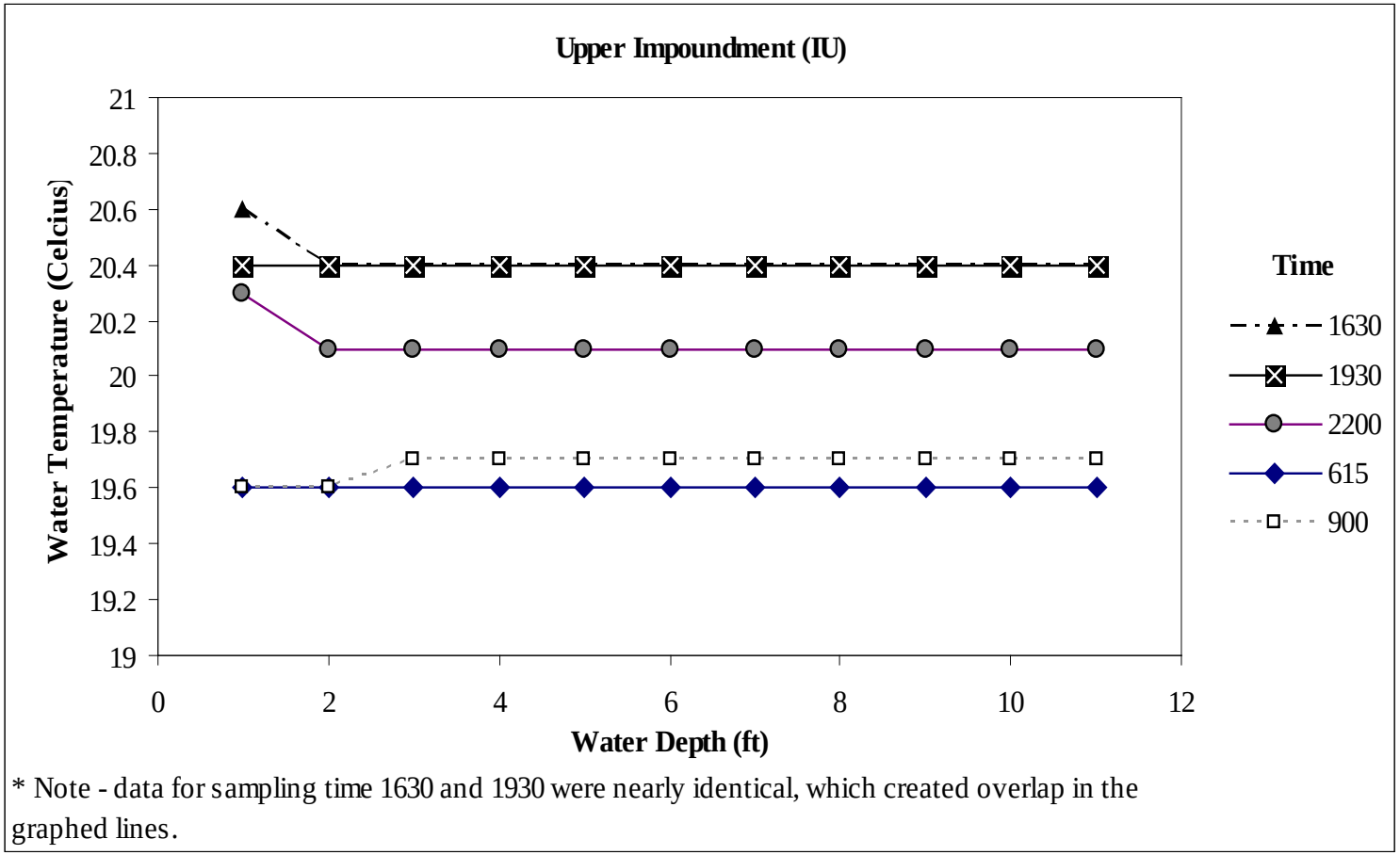
DISSOLVED OXYGEN BY DEPTH AND SAMPLING TIME IN THE MIDDLE IMPOUNDMENT



Lyons Falls Mill

Environmental Report – Water Quality Studies Conducted by NBLF

WATER TEMPERATURE BY DEPTH AND SAMPLING TIME IN THE UPPER IMPOUNDMENT

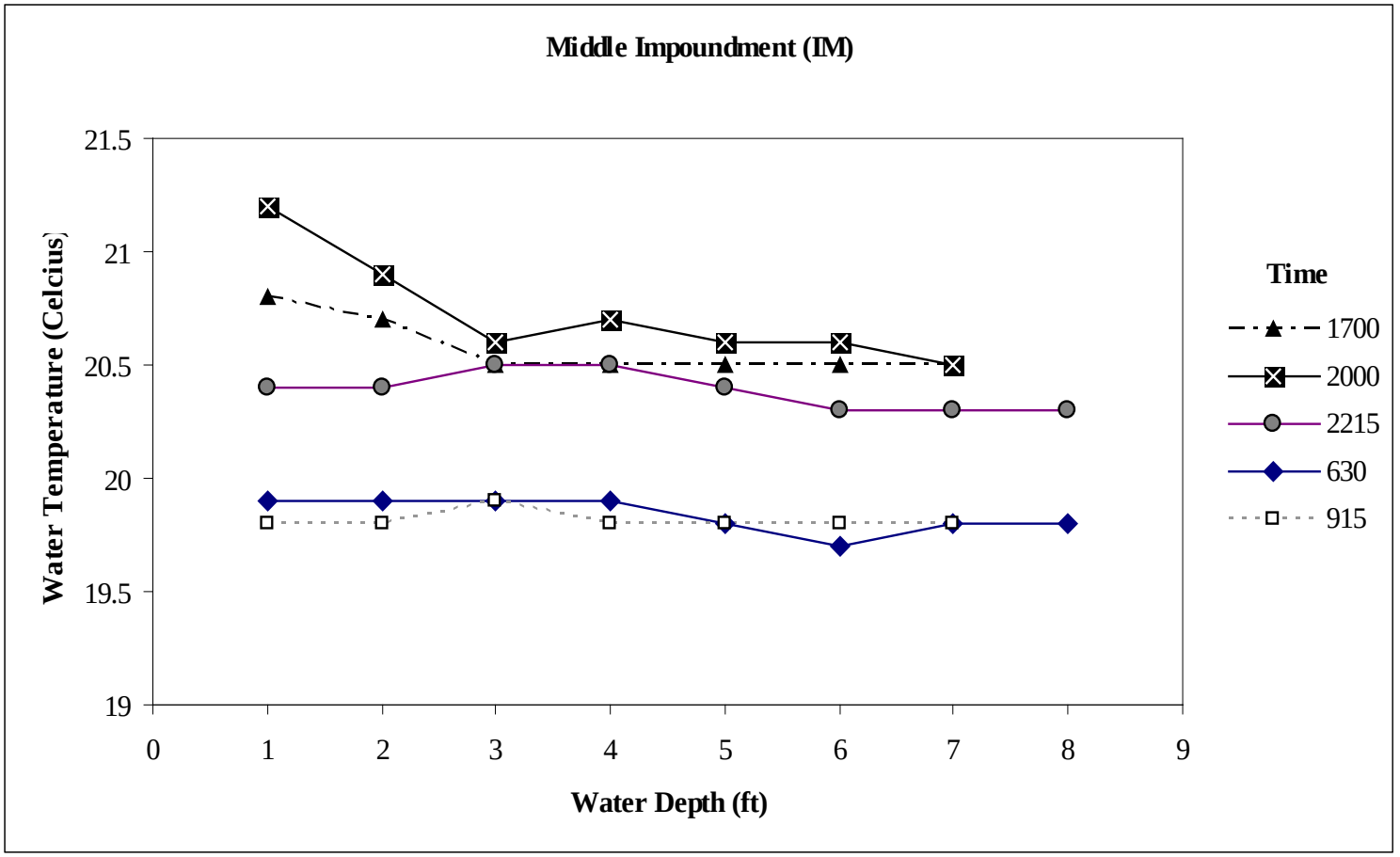


* Note - data for sampling time 1630 and 1930 were nearly identical, which created overlap in the graphed lines.

Lyons Falls Mill

Environmental Report – Water Quality Studies Conducted by NBLF

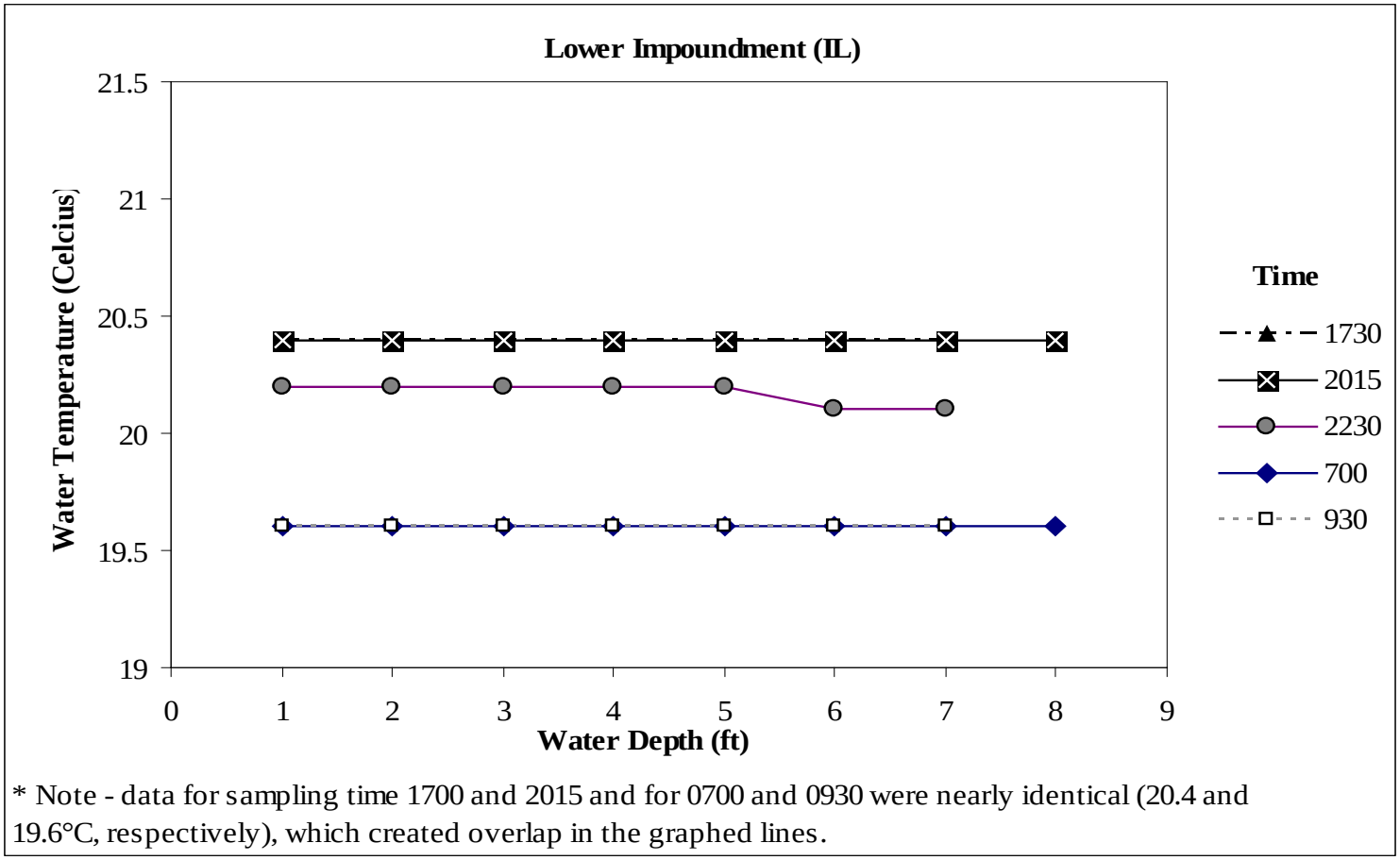
WATER TEMPERATURE BY DEPTH AND SAMPLING TIME IN THE MIDDLE IMPOUNDMENT



Lyons Falls Mill

Environmental Report – Water Quality Studies Conducted by NBLF

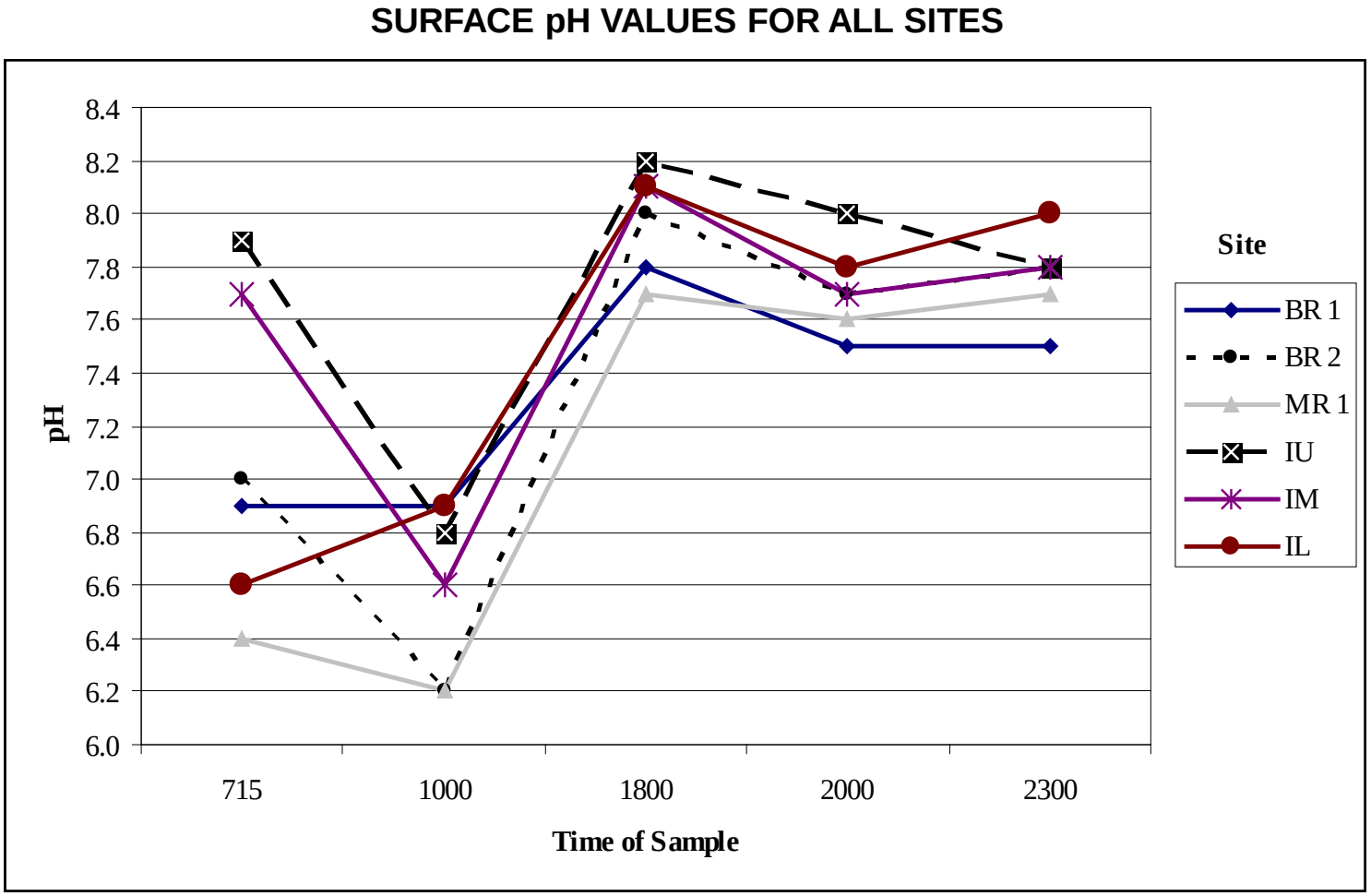
WATER TEMPERATURE BY DEPTH AND SAMPLING TIME IN THE LOWER IMPOUNDMENT



* Note - data for sampling time 1700 and 2015 and for 0700 and 0930 were nearly identical (20.4 and 19.6°C, respectively), which created overlap in the graphed lines.

Lyons Falls Mill

Environmental Report – Water Quality Studies Conducted by NBLF



Lyons Falls Mill

Environmental Report – Water Quality Studies Conducted by NBLF

- With the exception of a few individual pH measurements, all sampling results indicated that DO and pH met or exceeded New York State water quality standards for Class C and Class C(T) waters.
  - Rainfall and associated runoff on the night of August 23 and into the morning of August 24 may have influenced pH levels in Lyons Falls Mill as the upper Moose River watershed is considered as an acidic.
  - Variation in conductivity amongst the sample sites is likely a result of differences in upstream watershed characteristics (e.g., dominant soil types and underlying geologic features).
- The results of monitoring undertaken by NBLF in 2006 indicate that DO, pH, water temperature, and conductivity are not adversely affected by the operation of Lyons Falls Mill.
  - Values observed upstream, downstream, and within the Lyons Falls impoundment showed little variation and were in compliance with New York State standards.
- The DO and temperature profiles in the impoundment indicate that neither thermal nor chemical stratification occurs during the low-flow, high-temperature period of late summer.

Lyons Falls Mill

Environmental Report – Water Quality Studies Conducted by NBLF

- NBLF conducted a baseline survey of benthic macroinvertebrates (BMI) in 2006 to assess species composition and distribution in Lyons Falls Mill tailrace and impoundment.
- A comparison of the two communities (impoundment and tailrace) based on common metrics was completed after collection, sorting, and identification of specimens.
- This information was used to assess differences in the benthic macroinvertebrate assemblages immediately upstream and downstream of the dam and to draw a general understanding of the water quality at Lyons Falls Mill.

Lyons Falls Mill

Environmental Report – Water Quality Studies Conducted by NBLF

- Twelve samples were collected with aquatic kick nets in a 1-meter square sample area. Each kick net station was sampled for 1 minute.
- Once collected, samples were field preserved; raw samples were sorted in the lab; and a subsample of 100 macroinvertebrates was removed from each sample. The 100 macroinvertebrates were then identified to the lowest practicable taxonomic distinction (typically to Family).
- Individual organisms were classified and evaluated according to the U.S. Environmental Protection Agency's Standard Operating Procedures for sampling benthic macroinvertebrates

Lyons Falls Mill

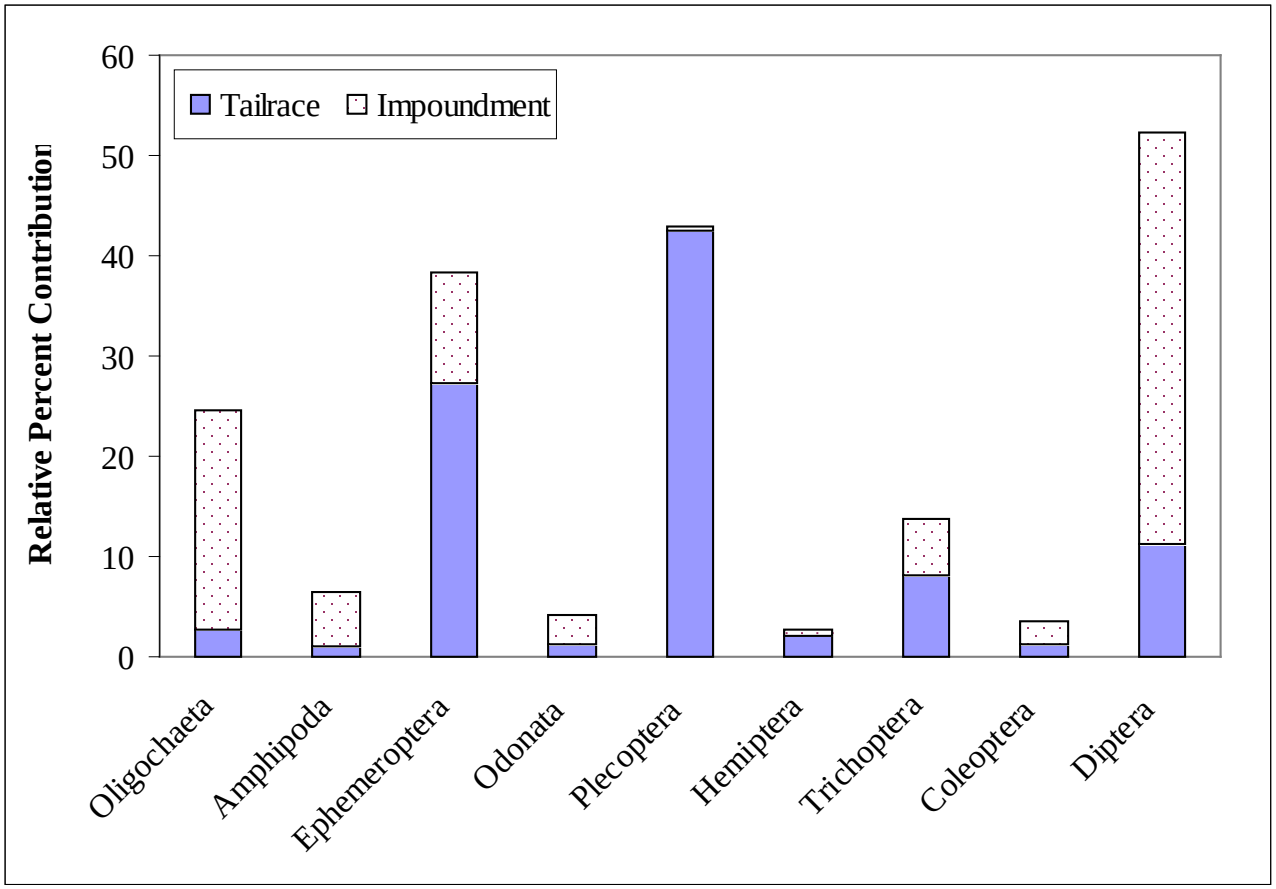
Environmental Report – Water Quality Studies Conducted by NBLF

- Five indices or metrics were applied to the samples:
  - Total taxa richness (R)
  - A Modified Family Biotic Index (FBI)
  - Percent contribution of Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trichoptera (caddisflies) (EPT %)
  - EPT Richness
  - Ratio of EPT to Chironomidae (midge larvae) abundance
- Consistent with other New York rivers and impoundments, community composition appears to mirror flow regime and substrate type.

Lyons Falls Mill

Environmental Report – Water Quality Studies Conducted by NBLF

COMPARISON OF THE RELATIVE PERCENT COMPOSITION OF THE DOMINANT BENTHIC MACROINVERTEBRATE TAXA



Lyons Falls Mill

Environmental Report – Water Quality Studies Conducted by NBLF

- Using the benthic invertebrate assemblages, the tailrace family biotic index (FBI = 3.02) indicates that water quality is excellent.
- The % EPT percentage is much higher in the tailrace than in the impoundment, whereas the % Chironomidae is much higher in the impoundment.
- Taxa richness and EPT richness are approximately equal.

SUMMARY OF MEAN BMI COMMUNITY METRICS

Metric	Tailrace	Impoundment
% EPT	77	17
% Chironomidae	9	37
Ratio EPT:Chironomidae	17	0.7
Taxa Richness	14	14
EPT Richness	6	4

Lyons Falls Mill

Environmental Report – Water Quality Studies Conducted by NBLF

- Many species representative of lentic (ponded or impounded waters) flow regimes and relatively warmer waters with soft substrates dominated the impoundment macroinvertebrate community.
- The tailrace macroinvertebrate community exhibited a rich assemblage of species typical of fast moving (lotic) cold waters that are rich in dissolved oxygen.
  - Significant numbers of invertebrates that are typically associated with non-impacted habitats including members of the Orders Ephemeroptera and Plecoptera were observed in the tailrace.
  - The tailrace invertebrate biota and water quality are in excellent condition, supporting an extremely sensitive benthic assemblage only observed in the cleanest, least degraded of lotic habitats.
  - The high-quality nature of the invertebrate community in the tailrace indicates that the waters being released from the impoundment are fairly well–oxygenated, free from excessive nutrient levels, and other pollutants.

Lyons Falls Mill

Water Quality PM&E Measures

- Baseline water quality results reflect good water quality upstream and downstream from Lyons Falls Mill.
- PM&E Measures proposed by NBLF to maintain water quality include:
  - Construction limited to the footprint of the former Georgia-Pacific paper mill along river left.
  - Continued operation in run-of-river mode.
  - No changes or modifications to the existing pond elevation.
  - Develop and implement a Construction Soil Erosion and Sedimentation and a Temporary Emergency Action Plan including standard BMPs to address sediment and erosion control during construction and final stabilization in accordance with NYSDEC technical guidance.

Lyons Falls Mill

Environmental Report – Fisheries Resources

- Historically, 48 fish species were known to occur in the Black River Basin.
- Prior to anthropogenic activity in the watershed, the 60-foot-high waterfall at Lyons Falls divided the Black River fishery into two distinct assemblages, an upland coldwater fishery and a lowland coolwater fishery.
- More recently, the introduction of nonnative fish species though active fisheries management, or otherwise, has resulted in a more homogenous fish community with approximately 70 species distributed throughout the upper and lower watershed.
- The extent of the natural upstream migration for diadromous species in the Black River is limited by High Falls in Watertown, approximately 60 RM downstream of Lyons Falls.

Lyons Falls Mill

Environmental Report – Fisheries Resources

- In 1992 and 1993, NYSDEC conducted a comprehensive fisheries study of the entire Black River from Dexter to North Lake.
  - Lyons Falls was reported as the dividing point between the middle and upper reaches of the Black River.
  - The NYSDEC reported that the fish community below Lyons Falls is composed of approximately 34 species. The fish community is diverse with few dominant fish species. Common species include rock bass, walleye, yellow perch, tessellated darter, smallmouth bass, rock bass, brown bullhead, pumpkinseed, white sucker, and fallfish.
  - Upstream of Lyons Falls, the fish community consists of approximately 28 species and is dominated by white sucker, rock bass, and smallmouth bass.
- Additional fish surveys conducted by the NYSDEC in the Black River in 1995 and 1998 in the Lyonsdale and Port Leyden area indicate that Northern hog sucker, pumpkinseed, fallfish, chain pickerel, rock bass, and walleye are commonly occurring species in this reach.

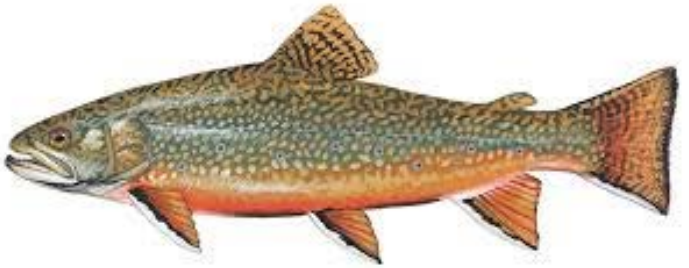
NUMBER AND RELATIVE PERCENT OF FISH CAPTURED IN THE BLACK RIVER BELOW LYONS FALLS MILL (BETWEEN LYONS FALLS AND CARTHAGE) AND ABOVE LYONS FALLS MILL (NYSDEC 1993)

	Lyons Falls downstream to Carthage				Lyons Falls upstream to North Lake		
Species No.	Species	No. Captured	Relative %		Species	No. Captured	Relative %
1	Rock bass	34	11%		White sucker	61	18%
2	Walleye	29	10%		Rock bass	53	16%
3	White sucker	28	9%		Smallmouth bass	45	13%
4	Fallfish	26	9%		Brown trout	24	7%
5	Pumpkinseed	20	7%		Chain pickerel	24	7%
6	Yellow perch	19	6%		Pumpkinseed	16	5%
7	Brown bullhead	17	6%		Rainbow trout	12	4%
8	Smallmouth bass	17	6%		Northern hog sucker	12	4%
9	Tesselated darter	17	6%		Cutlips minnow	10	3%
10	Chain pickerel	16	5%		Common shiner	10	3%
11	Spottail shiner	12	4%		Brown bullhead	10	3%
12	Golden shiner	11	4%		Golden shiner	8	2%
13	Northern pike	8	3%		Margined madtom	8	2%
14	Satinfin shiner	8	3%		Brook trout	6	2%
15	Burboit	8	3%		Spottail shiner	6	2%
16	Northern hog sucker	7	2%		Tessellated darter	6	2%
17	Central mudminnow	6	2%		Yellow perch	6	2%
18	Grass pickerel	3	1%		Common carp	4	1%
19	Common carp	3	1%		Longnose dace	4	1%
20	Brown trout	1	<1%		Fantail darter	4	1%
21	Brook trout	1	<1%		Lake chub	2	1%
22	Common shiner	1	<1%		Fallfish	2	1%
23	E. silvery minnow	1	<1%		Creek chub	2	1%
24	Creek chub	1	<1%		Bluntnose minnow	2	1%
25	Bluntnose minnow	1	<1%		Blacknose dace	2	1%
26	Longnose dace	1	<1%		Slimy sculpin	NG	-
27	Banded killifish	1	<1%		Redside dace	NG	-
28	Largemouth bass	1	<1%		Largemouth bass	NG	-
29	Fantail darter	1	<1%				
30	Hornyhead chub	NG	-				
31	Fathead minnow	NG	-				
32	Redside dace	NG	-				
33	Margined madtom	NG	-				
34	Logperch	NG	-				

Lyons Falls Mill

Environmental Report – Fisheries Resources

- The Moose River is managed by NYSDEC as a coldwater trout fishery.
  - Species typical of the Moose River can include blacknose dace, longnose dace, common shiner, cutlips minnow, brook trout, and white sucker.
- In the 1970s, NYSDEC conducted a trout tagging survey, the results of which indicated a decline in the quality of the trout fishery in the Moose River.
  - NYSDEC concluded that the presence of smallmouth bass, increased water temperatures, and low pH had adversely affected trout populations in the Moose River.



Lyons Falls Mill

Environmental Report – Fisheries Resources

- The trout fishery in the Black River and the Moose River is supplemented through stocking efforts conducted by NYSDEC.
  - Approximately 5,000 brook, brown, and rainbow trout are stocked annually in the Black River and Moose River near Lyonsdale. Stocked fish generally range in size between 7 and 13 inches.
- Riverine habitat in the Black River below the Lyons Falls Dam consists primarily of uniform low-gradient flatwater and tailrace habitat.
- The 130-acre impoundment consists of shallow mixed lacustrine habitat that is primarily composed of a well-defined littoral zone.
  - The maximum depth of the impoundment is approximately 17 feet near the intake. Substrates in the shallow impoundment are composed primarily of cobbles, boulder, bedrock, and sand.

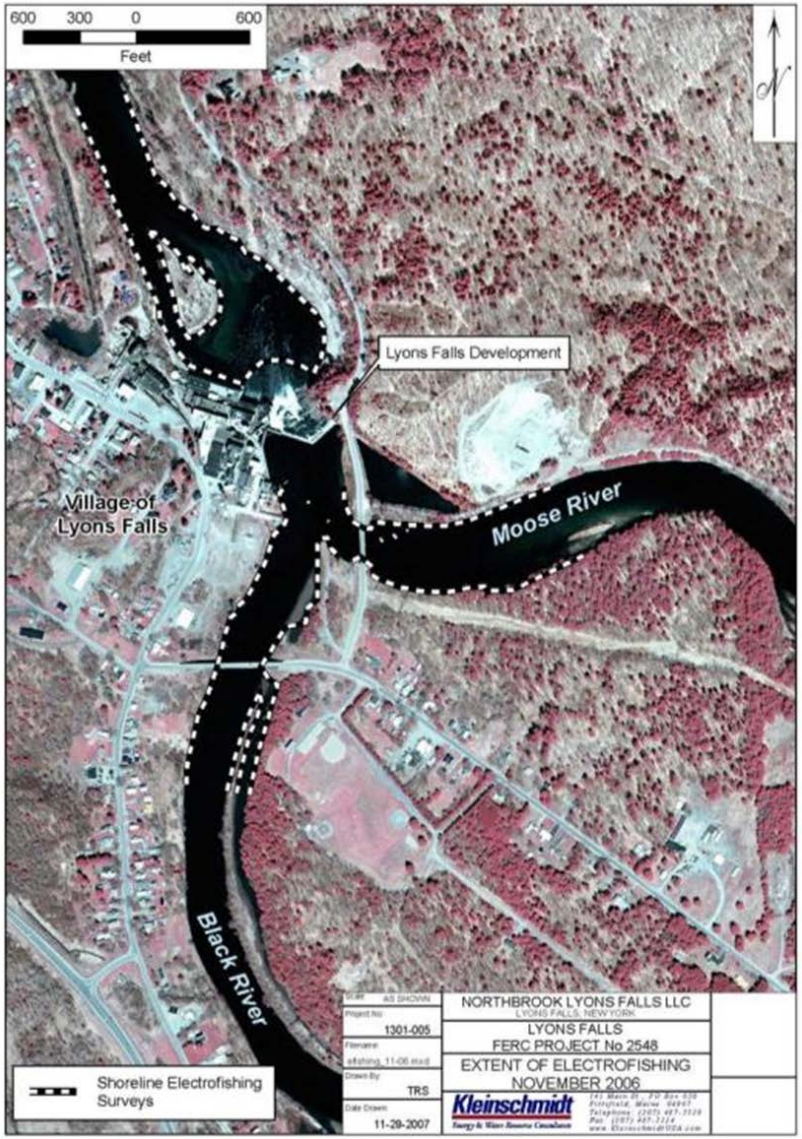
Lyons Falls Mill

Environmental Report – Fisheries Studies Conducted by NBLF

- NBLF conducted a fisheries survey in 2006.
  - Daytime and nighttime boat electrofishing surveys were conducted within the tailrace and impoundment on November 8.
  - To specifically target walleye, a nighttime boat electrofishing survey was conducted during the evening hours of November 9 in the Lyons Falls Mill tailrace.
  - Boat electrofishing surveys were focused on shoreline habitat along both the left and right bank below and above the Lyons Falls Dam, as well as along habitat associated with in-stream islands.
  - Two experimental mesh gill nets (mesh size: 0.5-inch to 2.5-inches) were deployed overnight in the tailrace area and impoundment for a period of 16 hours.
  - Beach seining was also conducted in shallow margins of the impoundment.

Lyons Falls Mill

Environmental Report – Fisheries Studies Conducted by NBLF



Lyons Falls Mill

Environmental Report – Fisheries Studies Conducted by NBLF

FISH CAPTURED DURING DAYTIME AND NIGHTTIME BOAT ELECTROFISHING SURVEYS IN THE LYONS FALLS MILL TAILRACE, NOVEMBER 2006

Species	Abundance	Relative Percent
Chain Pickerel	26	27%
Brown Bullhead	13	13%
Rock Bass	13	13%
Yellow Perch	12	12%
Blacknose Dace	11	11%
White Sucker	5	5%
Pumpkinseed	4	4%
Smallmouth Bass	3	3%
Largemouth Bass	2	2%
Northern Hog Sucker	2	2%
Banded Killifish	1	1.%
Black Crappie	1	1%
Brown Trout	1	1%
Burbot	1	1%
Fallfish	1	1%
Golden Shiner	1	1%
Total	97	-

Lyons Falls Mill

Environmental Report – Fisheries Studies Conducted by NBLF

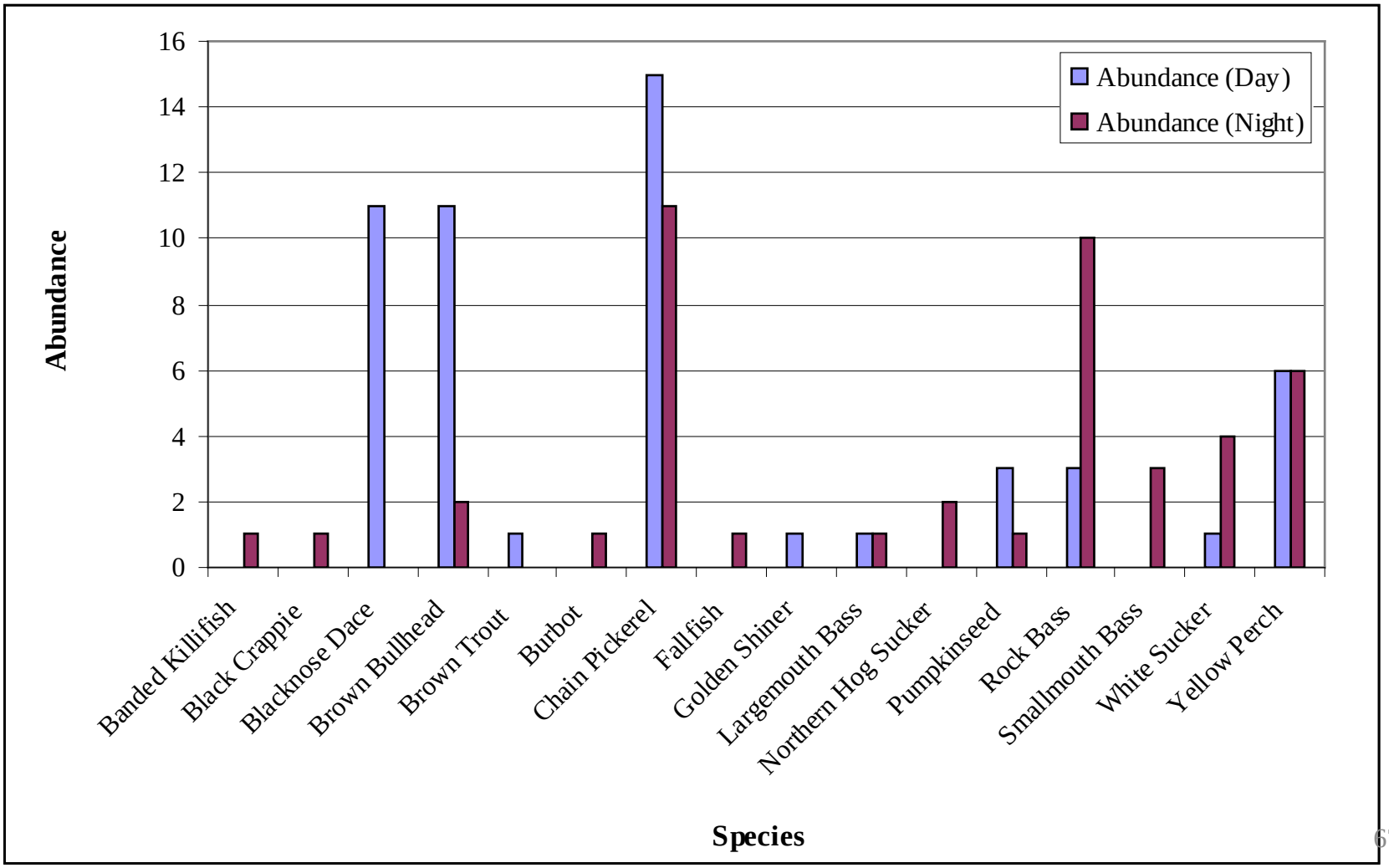
FISH CAPTURED DURING DAYTIME BOAT ELECTROFISHING SURVEYS IN THE LYONS FALLS MILL IMPOUNDMENT, NOVEMBER 2006

Species	Abundance	Relative Percent
Chain Pickerel	21	21%
Golden Shiner	17	17%
Brown Bullhead	15	15%
Pumpkinseed	13	13%
Yellow Perch	10	10%
White Sucker	10	10%
Spottail Shiner	5	5%
Largemouth Bass	3	3%
Log Perch	2	2%
Smallmouth Bass	2	2%
Rock Bass	1	1%
Black Crappie	1	1%
Total	100	-

Lyons Falls Mill

Environmental Report – Fisheries Studies Conducted by NBLF

COMPARISON OF NIGHT VS. DAY ELECTROFISHING SURVEY RESULTS IN THE LYONS FALLS MILL TAILRACE AREA



Lyons Falls Mill

Environmental Report – Fisheries Studies Conducted by NBLF

- The results of the fisheries survey indicate that fish species composition at Lyons Falls Mill is representative of the typical coolwater and coldwater communities known to occur in the Black River.
  - Species composition is similar to that described in earlier studies conducted by NYSDEC and others in and around Lyons Falls.
  - A total of 18 species represented by 197 fish were captured during the electrofishing surveys.
  - The dominant species at Lyons Falls Mill was chain pickerel (24%). Brown bullhead (14%), yellow perch (11%), golden shiner (9%), and pumpkinseed (9%) were also abundant.
  - A single salmonid was observed during the survey: a brown trout captured from within the tailrace.
  - No walleye of any age class were captured during day or nighttime boat electrofishing surveys, indicating limited use of waters associated with Lyons Falls Mill by this species.

Lyons Falls Mill

Environmental Report – Fisheries Studies Conducted by NBLF

- In support of the upgrades to Lyons Falls Mill proposed in 2006, NBLF performed a habitat-based study to assess existing spawning conditions for walleye and smallmouth bass.
  - The goal of this study was to document existing spawning habitat conditions by evaluating depth, velocity, and substrate characteristics in the tailrace and comparing this information to known habitat preferences.
  - Cross-section locations were selected in consultation with the NYSDEC on August 24, 2006 and in areas representative of typical habitat in the tailrace.
  - At each cross-section, information pertaining to the basic habitat requirements for spawning walleye and smallmouth bass (water depth, velocity, and dominant substrate type) were collected to provide an assessment of existing conditions.
  - Velocity, depth, and substrate data were collected along each transect at intervals of 5 to 10 feet.
  - An underwater camera was used to characterize substrate composition.
  - Flows at Lyons Falls Mill during transect sampling were typical for walleye spawning conditions but higher than would be expected during smallmouth bass spawning.

Lyons Falls Mill

Environmental Report – Fisheries Studies Conducted by NBLF

- The tailrace habitat study found that sand is the dominant substrate in the tailrace.
  - A larger depositional area directly in the center of the channel in the middle of the tailrace, which has resulted in the formation of a small sandy island.
  - A larger, low-velocity back eddy also occurs in the middle of the channel upstream of the island.
  - Along the east bank of the tailrace, cobbles and boulders are prominent.
  - Substrates in the small secondary tailrace channel to the west of the island are dominated by cobble and boulders.
  - Substrates are coarser (mixture of boulders and cobbles) towards the upstream portion of the tailrace, while finer sediment (sand) becomes dominant downstream of the falls. Areas of larger woody debris accumulation are also prominent in the main channel.

Lyons Falls Mill

Environmental Report – Fisheries Studies Conducted by NBLF

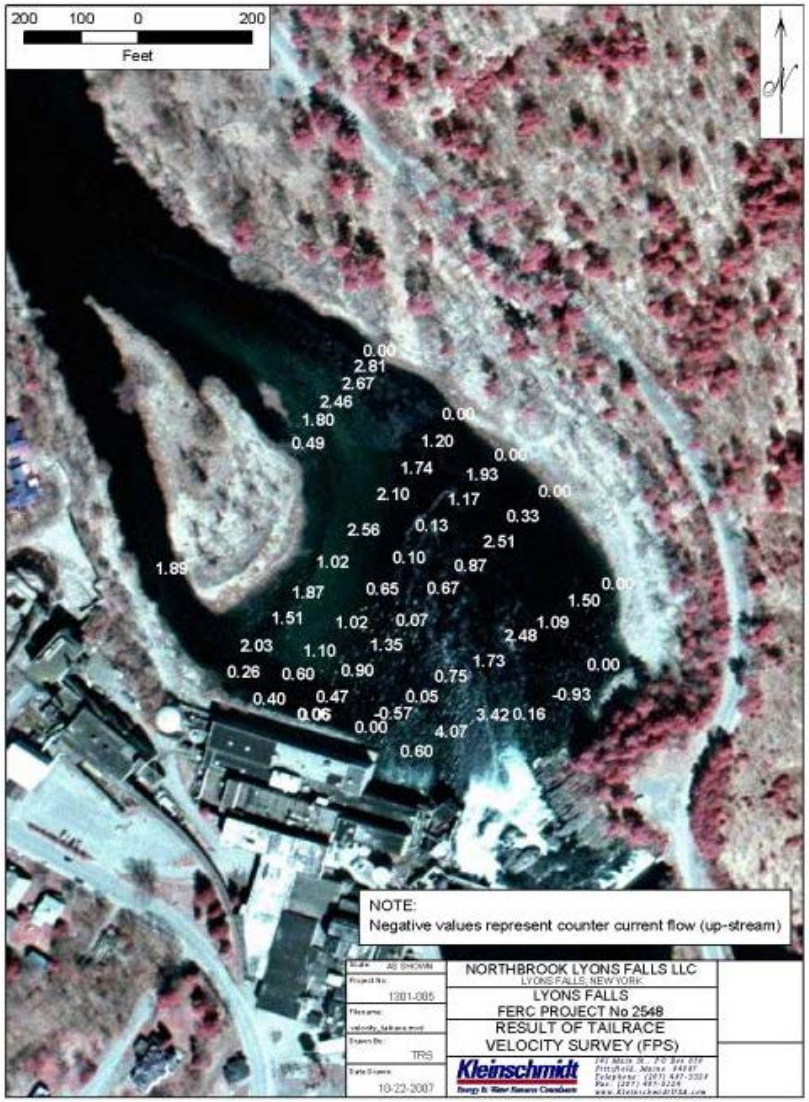
Lyons Falls Mill

Environmental Report – Fisheries Studies Conducted by NBLF

- Velocities were found to be higher along river right.
  - The largest volume of water funnels toward the channel along river right, east of the mid-channel island.
  - A large area of low-velocity water occurs at the head of the mid-channel island.
- Depth in the tailrace was found to be greatest in the plunge pool immediately below the falls.
  - The physical nature of the tailrace is that of an oversized pool and associated pool tail out.
  - The tailrace becomes shallower and more riverine further downstream from the falls.

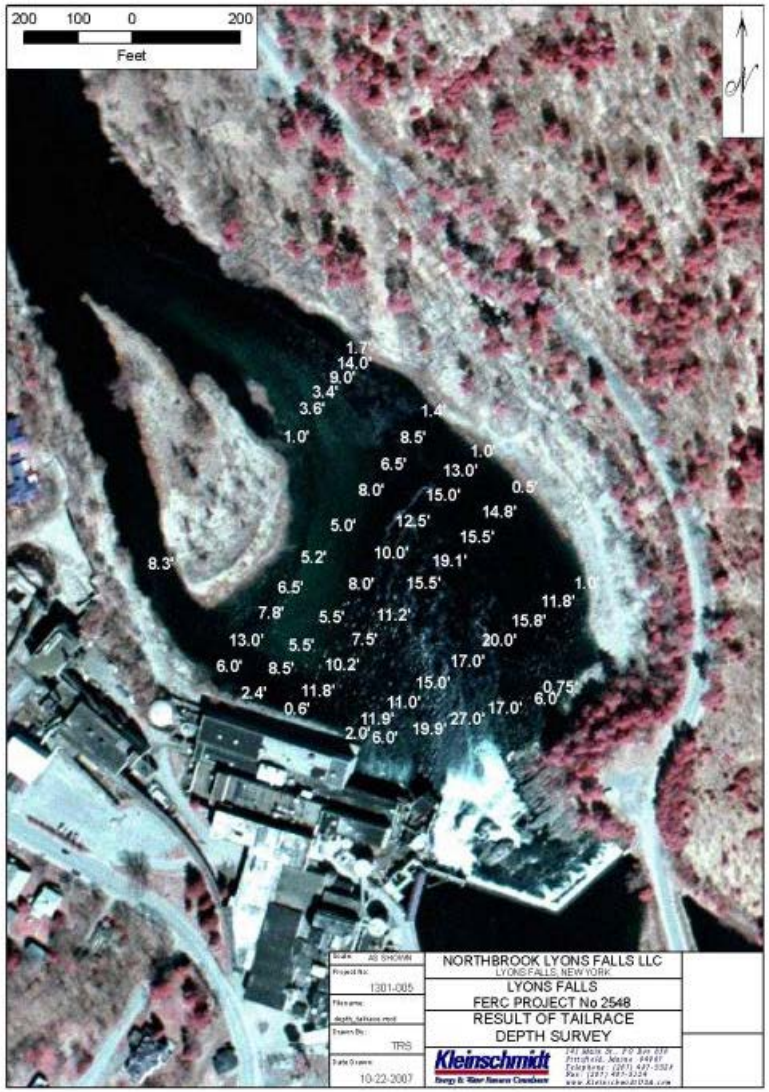
Lyons Falls Mill

Environmental Report – Fisheries Studies Conducted by NBLF



Lyons Falls Mill

Environmental Report – Fisheries Studies Conducted by NBLF



Lyons Falls Mill

Environmental Report – Fisheries Studies Conducted by NBLF

SUMMARY OF DEPTH AND VELOCITY MEASUREMENTS TAKEN IN THE LYONS FALLS MILL TAILRACE, NOVEMBER 2006

Location	Velocity (fps)		Depth (ft)	
-	Average	Maximum	Average	Maximum
XS 1	1.35	3.02	4.9	14.0
XS 2	1.24	2.72	5.9	14.0
XS 3	0.66	2.03	7.4	16.5
XS 4	0.72	2.72	11.6	20.0
XS 5	0.59	2.78	9.5	21.0
XS 6	0.49	4.07	12.2	27.0
Average (all XS's)	0.84	-	8.6	-
Maximum (all XS's)	4.07	-	27.0	-

Lyons Falls Mill

Environmental Report – Fisheries Studies Conducted by NBLF

- Walleye and smallmouth bass spawning habitat appears to exist in the tailrace.
  - The primary section of useable habitat for spawning is likely the large cobble-boulder area on the east bank of the river opposite the area proposed for construction.
  - However, survey data indicates that the water depth over the cobble-boulder substrate during higher flows drops off quickly (as distance from the spillway increases) so that the extent of any usable habitat is likely limited.
  - Further, these two species comprised a relatively small percentage of the overall fish community (smallmouth bass – 2.5%, walleye – 0.5%), indicating that their prevalence in the tailrace is limited.

Lyons Falls Mill

Environmental Report – Fisheries Studies Conducted by NBLF

- NBLF implemented an angler use survey in 2007 to assess fishing pressure and recreational fishing at Lyons Falls Mill.
  - Use data were obtained daily at three sites at Lyons Falls Mill: the canoe launch in the tailrace, the boat launch in the impoundment, and the Lyons Falls Picnic Area located upstream of the impoundment at the Lyons Falls Community Park.
  - Throughout the study period (April 2, 2007 through October 16, 2007), a total of 413 anglers were observed in Lyons Falls Mill, either in the tailrace or in the impoundment.
  - Average angler use at the site was 2.6 anglers per day.
  - Based on the results of the survey, both the tailrace and impoundment are fished regularly during the open water fishing season.

Lyons Falls Mill

Environmental Report – Fisheries Studies Conducted by NBLF

- In 2015, NBLF conducted a fish entrainment and impingement study of the proposed Lyons Falls Mill redevelopment.
  - The study is based on species data from 2006 fisheries sampling, historic data from the NYSDEC, and other available sources of information regarding the fish community in the vicinity of Lyons Falls.
  - A blade-strike analysis was conducted using the Advanced Hydro Turbine model developed by the U.S. Department of Energy.
  - Entrainment risk was evaluated using Electric Power Resource Institute database and location-specific fisheries data and design information.

Lyons Falls Mill

Environmental Report – Entrainment and Impingement Study

TARGET SPECIES

Fish Species	Lyons Falls to North Lake - NYSDEC 1992		Lyons Falls Impoundment - KA 2006		Combined	
	N	RC%	N	RC%	N	RC%
Black Crappie	0	0.00	1	1.00	1	0.23
Brown Bullhead	10	2.95	15	15.00	25	5.83
Brown Trout	24	7.08	0	0.00	24	5.59
Chain Pickerel	24	7.08	21	21.00	45	10.49
Golden Shiner	8	2.36	17	17.00	25	5.83
Largemouth Bass	0	0.00	3	3.00	3	0.70
Log Perch	0	0.00	2	2.00	2	0.47
Longnose dace	4	1.18	0	0.00	4	0.91
Margined madtom	8	2.36	0	0.00	8	1.86
Northern hog sucker	12	3.54	0	0.00	12	2.80
Pumpkinseed	16	4.72	13	13.00	29	6.76
Rock Bass	53	15.63	1	1.00	54	12.59
Smallmouth Bass	45	13.27	2	2.00	47	10.96
Spottail Shiner	6	1.77	5	5.00	11	2.56
Tessellated darter	6	1.77	0	0.00	6	1.40
White Sucker	61	17.99	10	10.00	71	16.55
Yellow Perch	6	1.77	10	10.00	16	3.73

Lyons Falls Mill

Environmental Report – Entrainment and Impingement Study

RACK EXCLUSION

Common Name	Scaling Factor for Body Width1	Maximum Reported Size (in)2	Minimum Size Excluded by a Trash Rack Clear Spacing of 3 in*	Minimum Size Excluded by a Trash Rack Clear Spacing of 1 in*
Black Crappie	0.099	12	NE	10
Brown Bullhead	0.166	14	NE	6
Brown Trout	0.118	20	NE	8
Chain Pickerel	0.088	20	NE	11
Golden Shiner	0.105	10.5	NE	10
Largemouth Bass	0.134	25	22	7
Logperch	0.105	7.5	NE	NE
Longnose Dace	0.139	7	NE	NE
Margined Madtom	0.151	6	NE	7
Northern Hog Sucker	0.146	22.5	21	7
Pumpkinseed	0.124	10	NE	8
Rock Bass	0.156	10	NE	6
Smallmouth Bass	0.128	24	NE	8
Spottail Shiner	0.140	5.8	NE	NE
Tessellated Darter	0.139	3.6	NE	NE
White Sucker	0.146	25	21	7
Yellow Perch	0.114	14	NE	9

[1]scaling factor expresses body width as a proportion of total length (TL) based on proportional measurements for the target/surrogate species in Smith (1985)

[2]maximum size estimated or reported sizes from NYSDEC (2015) and Smith (1985)

*NE = not excluded; all size classes could physically pass through trash racks based on maximum reported sizes

Lyons Falls Mill

Environmental Report – Entrainment and Impingement Study

BLADE STRIKE

Fish Length (in)	Lyons Falls						
	Edge of Hub =	0.44	Mid-Blade =	0.56	Blade Tip =	1	AVG
	0.10	0.20	0.10	0.20	0.10	0.20	
1	99.16%	98.31%	99.21%	98.41%	99.25%	98.50%	98.81%
2	98.31%	96.63%	98.41%	96.82%	98.50%	97.01%	97.61%
3	97.47%	94.94%	97.62%	95.24%	97.75%	95.51%	96.42%
4	96.63%	93.26%	96.82%	93.65%	97.01%	94.01%	95.23%
5	95.79%	91.57%	96.03%	92.06%	96.26%	92.52%	94.04%
6	94.94%	89.89%	95.24%	90.47%	95.51%	91.02%	92.84%
7	94.10%	88.20%	94.44%	88.88%	94.76%	89.52%	91.65%
8	93.26%	86.52%	93.65%	87.29%	94.01%	88.03%	90.46%
9	92.42%	84.83%	92.85%	85.71%	93.26%	86.53%	89.27%
10	91.57%	83.15%	92.06%	84.12%	92.52%	85.03%	88.07%
11	90.73%	81.46%	91.26%	82.53%	91.77%	83.53%	86.88%
12	89.89%	79.78%	90.47%	80.94%	91.02%	82.04%	85.69%
13	89.05%	78.09%	89.68%	79.35%	90.27%	80.54%	84.50%
14	88.20%	76.41%	88.88%	77.76%	89.52%	79.04%	83.30%
15	87.36%	74.72%	88.09%	76.18%	88.77%	77.55%	82.11%
16	86.52%	73.04%	87.29%	74.59%	88.03%	76.05%	80.92%
17	85.68%	71.35%	86.50%	73.00%	87.28%	74.55%	79.73%
18	84.83%	69.67%	85.71%	71.41%	86.53%	73.06%	78.53%
19	83.99%	67.98%	84.91%	69.82%	85.78%	71.56%	77.34%
20	83.15%	66.30%	84.12%	68.23%	85.03%	70.06%	76.15%
21	82.31%	64.61%	83.32%	66.65%	84.28%	68.57%	74.96%
22	81.46%	62.93%	82.53%	65.06%	83.53%	67.07%	73.76%
AVG	90.31%	80.62%	90.87%	81.73%	91.39%	82.79%	**86.29%**

Note: Max size entrained with 3 inch rack is 22 inches, while 11 inches with the 1-inch overlay, which produces an average survival rate of 92.84 for all species 11 inches or less.

Lyons Falls Mill

Environmental Report – Entrainment and Impingement Study

POTENTIAL ENTRAINMENT RISK

Target Species	January	February	March	April	May	June	July	August	September	October	November	December
Black Crappie	Low	Low	Low	Low	Low	Low-Medium	Low-Medium	Low-Medium	Low	Low	Low	Low
Brown Bullhead	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low
Brown Trout	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low
Chain Pickerel	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low
Golden Shiner	Low	Low	Low	Low	Low-Medium	Low-Medium	Low-Medium	Low	Low	Low	Low	Low
Largemouth Bass	Low	Low	Low	Low	Low	Low-Medium	Low-Medium	Low-Medium	Low	Low	Low	Low
Logperch	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low
Longnose Dace	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low
Margined Madtom	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low
Northern Hog Sucker	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low
Pumpkinseed	Low	Low	Low	Low	Low	Low	Low-Medium	Low-Medium	Low-Medium	Low	Low	Low
Rock Bass	Low	Low	Low	Low	Low-Medium	Medium	Medium	Medium	Low-Medium	Low-Medium	Low	Low
Smallmouth Bass	Low	Low	Low	Low	Low	Low-Medium	Low-Medium	Low-Medium	Low	Low	Low	Low
Spottail Shiner	Low	Low	Low	Low	Low-Medium	Low-Medium	Medium	Medium	Medium	Low-Medium	Low	Low
Tessellated Darter	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low
White Sucker	Low	Low	Low	Low-Medium	Medium	Medium	Medium	Low-Medium	Low	Low	Low	Low
Yellow Perch	Low	Low	Low	Low-Medium	Medium	Medium	Medium	Low-Medium	Low	Low	Low	Low

Lyons Falls Mill

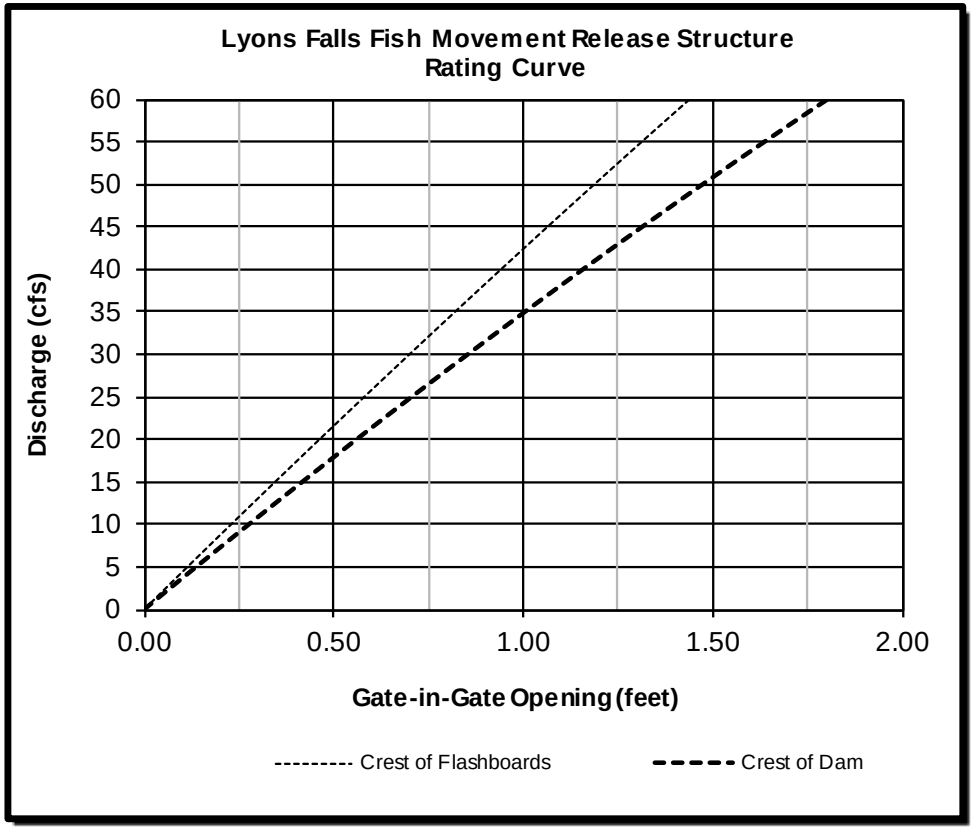
Fisheries Resources PM&E Measures

- Construction will occur within the footprint of the existing paper mill along the river's edge
- NBLF has proposed to provide a seasonal minimum fish movement flow of 45 cfs to be released annually from March 15 through November 30.
  - NBLF conducted an assessment to develop general layout and performance concepts for alternative downstream fish movement.
  - Concept is based on gate-in-gate release utilizing the proposed new trash sluice gate to be located perpendicular to the angled trashracks.
- NBLF has also proposed to install seasonal trashrack overlays with 1-inch clear-bar spacing.
  - Overlays will be installed annually as soon as possible following ice-out and removed in October.
  - NBLF will consult with the NYSDEC, USFWS, and other parties to determine the specific schedule and notification requirements for the installation and removal of seasonal overlays.
- Continued operation in run-of-river mode.
- No changes or modifications to the existing pond elevation.

Lyons Falls Mill

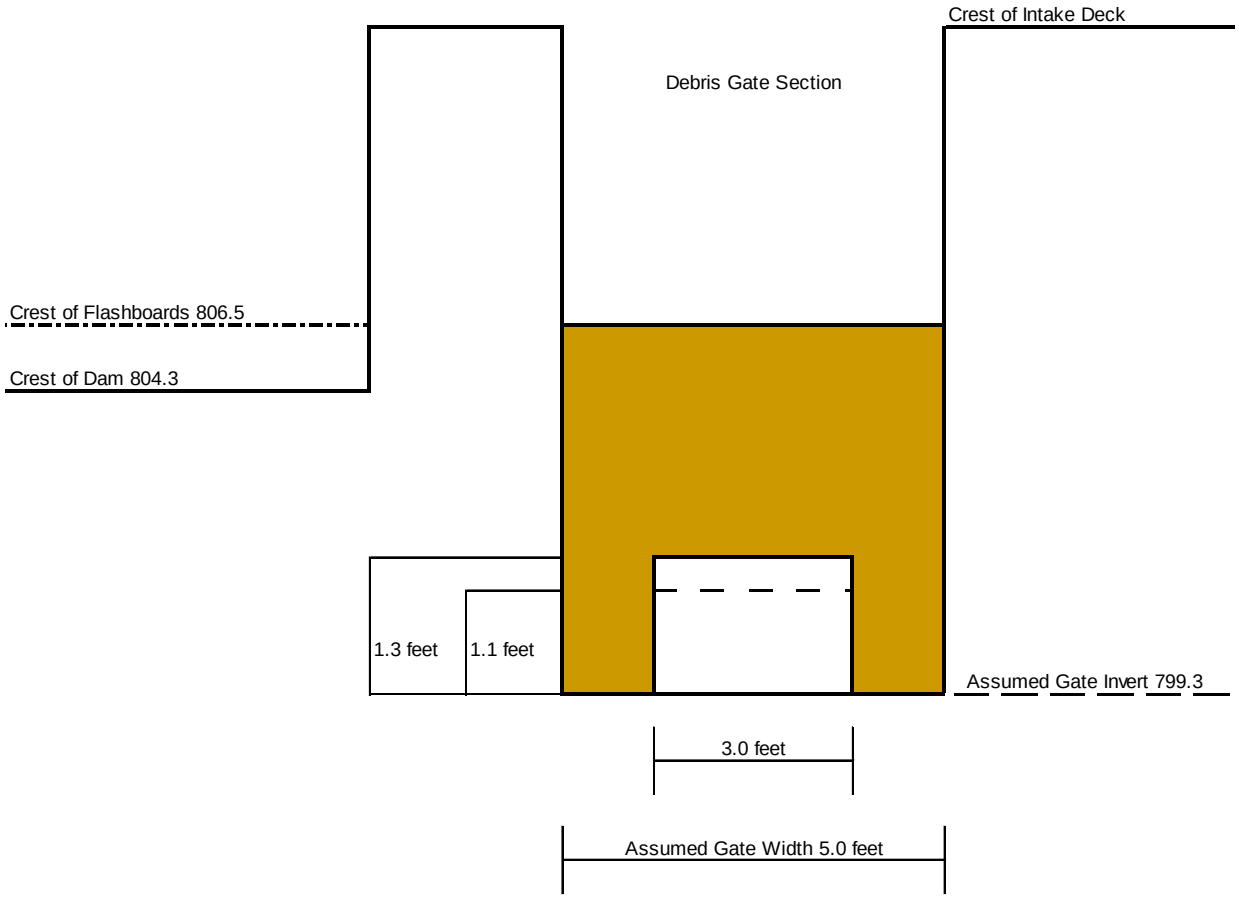
Project:	Lyons Falls Hydroelectric Project (FERC No. 2548)
Development:	**Lyons Falls Development - 45 cfs Release**
Date Created:	2/20/2015
Last Revised:	2/20/2015

Crest of Dam:	804.30 ft USGS
Crest of Boards:	806.50 ft USGS
Height of Boards:	2.17 ft
Range of Interest:	2.17 ft
Elevation Range of Interest Measured From:	806.50 ft USGS
Gate Invert:	799.30 ft USGS
Gate Width:	5.00 ft
Discharge Coefficient:	0.680
Starting Height of Opening:	**0.00 ft**
Width of Modified Opening:	**3.00 ft**
Gate Opening Increment:	0.1 ft



Lyons Falls Mill

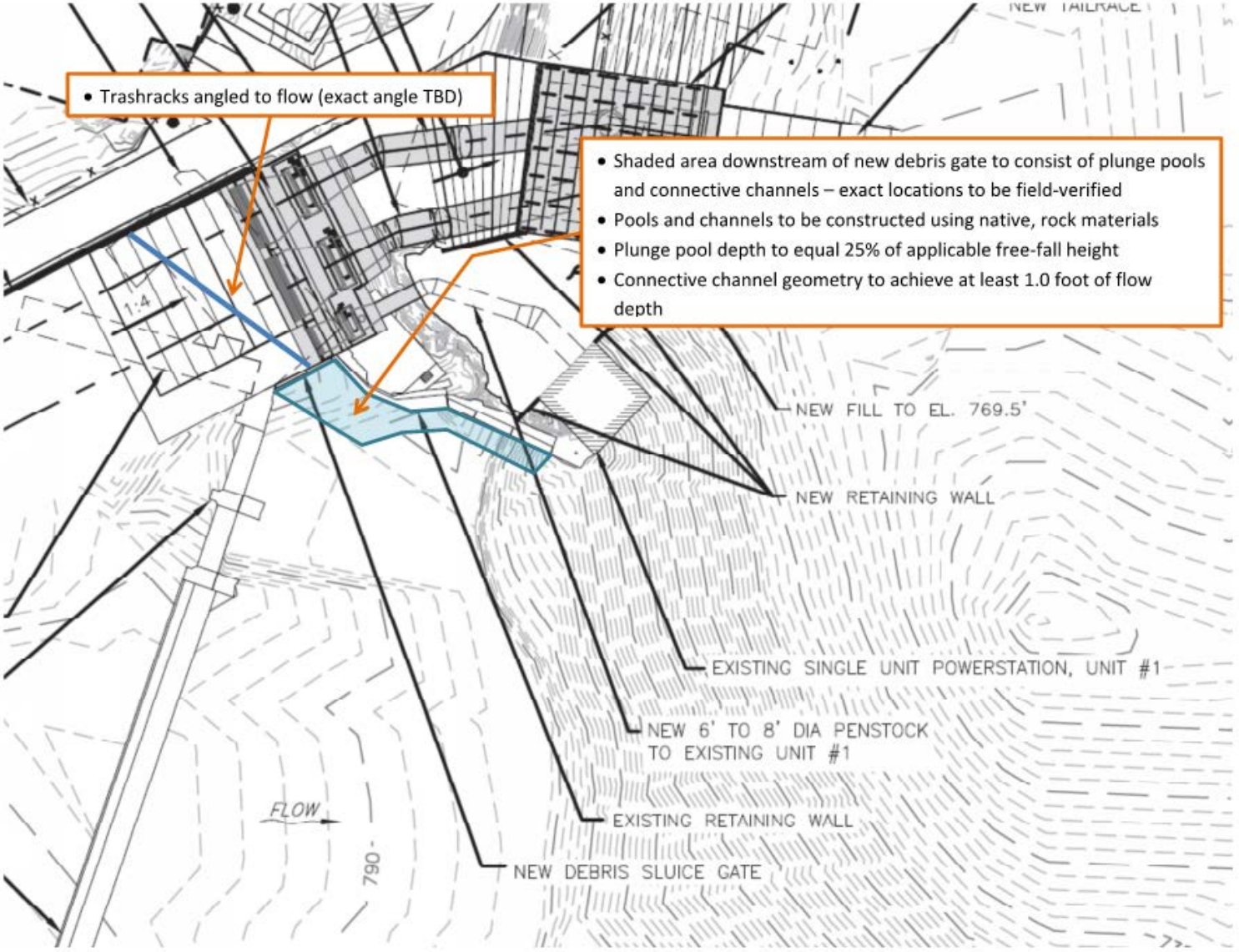
Gate-in-Gate Concept to Pass 45 cfs Fish Movement Flow
(Schematic Drawing - Not to Scale)



(a) A 3.0 foot wide gate-in-gate would pass 45 cfs when open 1.1 feet and WSEL at crest of flashboards (806.5)

(b) A 3.0 foot wide gate-in-gate would pass 45 cfs when open 1.3 feet and WSEL at crest of dam (804.3)

Lyons Falls Mill



Lyons Falls Mill

Environmental Report – Terrestrial Wildlife

- The proposed redevelopment of Lyons Falls Mill would take place entirely within the footprint of the former Georgia-Pacific paper mill located along river left.
  - The grounds of the paper mill are characterized by industrial buildings and structures in various states of disrepair.
  - The remnant facilities associated with the mill do not offer substantive or quality upland terrestrial habitat, and the area is considered an industrial site.
  - Lands surrounding Lyons Falls Mill provide a variety of upland habitats that are utilized by numerous species of mammals, birds, and amphibians typical of the northeastern United States.
  - Wildlife and associated habitat are reported as stable.
  - Wetland and riparian habitat is limited in extent due in part to the geographic nature of area, which consists of exposed bedrock and steep slopes.

Lyons Falls Mill

Terrestrial Wildlife PM&E Measures

- PM&E Measures proposed by NBLF for the continued protection of terrestrial wildlife include:
  - Construction limited to the footprint of the former Georgia-Pacific paper mill along river left.
  - Continued operation in run-of-river mode.
  - No changes or modifications to the existing pond elevation.
  - Develop and implement a Construction Soil Erosion and Sedimentation and a Temporary Emergency Action Plan including standard BMPs to address sediment and erosion control during construction and final stabilization in accordance with NYSDEC technical guidance.

Lyons Falls Mill

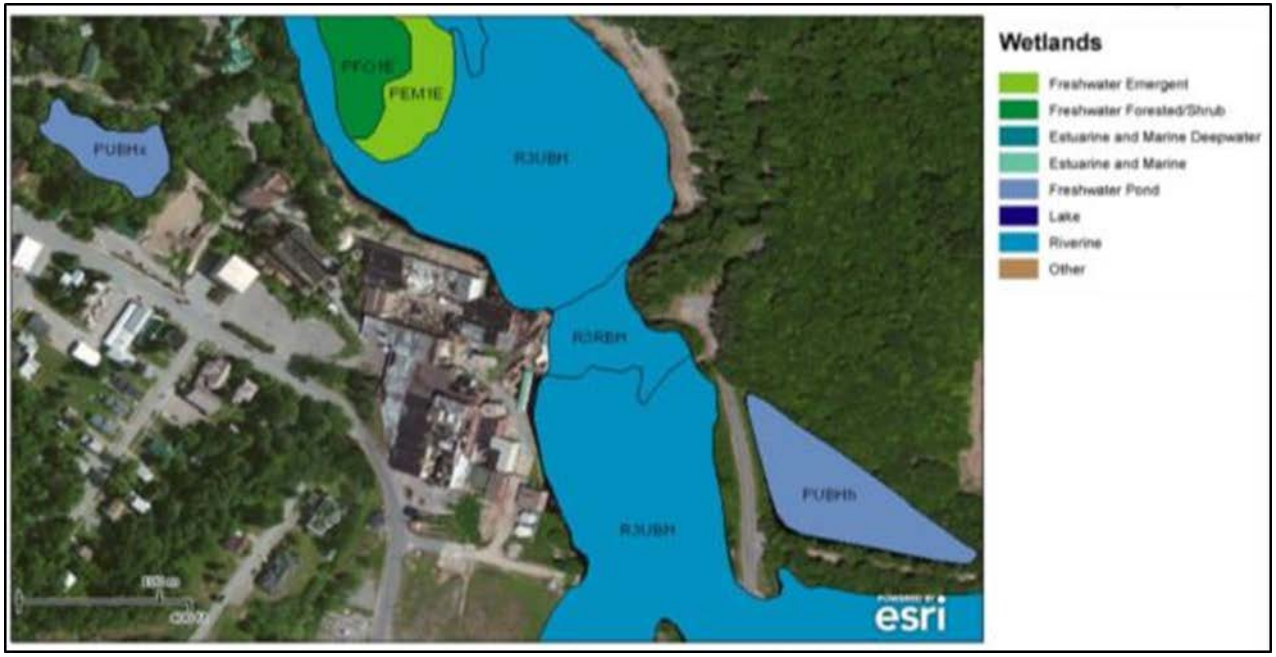
Environmental Report – Botanical Resources

- The former mill site does not support substantive or quality botanical resources.
  - Outside of the industrial mill compound on the west bank of the Black River, the dominant tree species are oak, maple, sumac, and ash.
  - The development of shoreline vegetation is limited near Lyons Falls by shallow bedrock soils, exposed bedrock, boulder, and sandy areas.

Lyons Falls Mill

Environmental Report – Botanical Studies Conducted by NBLF

- In January 2015, NBLF conducted a review of the USFWS's National Wetland Inventory (NWI) and the NYSDEC's GIS wetland maps database.
  - The NYSDEC's GIS database did not identify any wetlands within the vicinity of Lyons Falls Mill.
  - Based on a review of the NWI data, six classes of wetlands have been mapped near Lyons Falls.



Lyons Falls Mill

Environmental Report – Botanical Studies Conducted by NBLF

NWI-MAPPED WETLANDS IN THE VICINITY OF LYONS FALLS MILL

Wetlands Code	System	Class	Wetland Type	Cowardin	General Description
PEM1E	Palustrine	Emergent	Freshwater Emergent wetland	Palustrine emergent	Herbaceous march, fen, swale and wet meadow. Seasonally Flooded / Saturated
PFO1E	Palustrine	Forested	Freshwater-Forested and Shrub wetland	Palustrine forested and/or Palustrine shrub	Forested swamp or wetland shrub bog or wetland. Seasonally Flooded
PUBHh	Palustrine	Unconsolidated Bottom	Freshwater Pond	Palustrine unconsolidated bottom, Palustrine aquatic bed	Pond / Diked or Impounded
PUBHx	Palustrine	Unconsolidated Bottom	Freshwater Pond	Palustrine unconsolidated bottom, Palustrine aquatic bed	Pond / Excavated
R3RBH	Riverine	Rock Bottom	Riverine	Riverine wetland and deep water	River or stream channel / Permanently Flooded
R3UBH	Riverine	Unconsolidated Bottom	Riverine	Riverine wetland and deep water	River or stream channel / Permanently Flooded

Lyons Falls Mill

Botanical Resources PM&E Measures

- PM&E Measures proposed by NBLF for the continued protection of botanical resources include:
  - Construction limited to the footprint of the former Georgia-Pacific paper mill along river left.
  - Continued operation in run-of-river mode.
  - No changes or modifications to the existing pond elevation.
  - Develop and implement a Construction Soil Erosion and Sedimentation and a Temporary Emergency Action Plan including standard BMPs to address sediment and erosion control during construction and final stabilization in accordance with NYSDEC technical guidance.

Lyons Falls Mill

Environmental Report – Threatened and Endangered Species

- In January 2015, NBLF consulted with the USFWS to identify threatened and endangered species or critical habitat that may occur within the vicinity of Lyons Falls Mill.
  - By letter dated January 17, 2015, the USFWS identified one endangered species and one proposed endangered species that may be present.
  - There is no critical habitat within the vicinity of Lyons Falls Mill.

FEDERALLY LISTED THREATENED AND ENDANGERED SPECIES THAT MAY OCCUR WITHIN THE VICINITY OF LYONS FALLS MILL

Species	Status
Indiana bat	Endangered
Northern long-eared bat	Proposed endangered

Lyons Falls Mill

Environmental Report – Threatened and Endangered Species

- By letter dated January 23, 2015, NBLF reinitiated consultation with the NYNHP.
  - The NYNHP indicated in a February 20, 2015 response that “we have no records of rare or state-listed animals or plants, or significant natural communities, at your site or in its immediate vicinity.”

Lyons Falls Mill

Threatened and Endangered Species PM&E Measures

- PM&E Measures proposed by NBLF for the continued protection of threatened and endangered species include:
  - Develop and implement an Indiana Bat and Northern Long-eared Bat Management Plan that includes appropriate conservation measures for the northern long-eared bat as described in Appendix D of the USFWS's January 2014 Northern Long-Eared Bat Interim Conference and Planning Guidance.

Lyons Falls Mill

Environmental Report – Recreation Resources

- The Moose and Black Rivers provide a variety of opportunities for outdoor recreation including canoeing, kayaking, angling, sightseeing, whitewater boating, and picnicking
  - The Black River is primarily flat in the vicinity of Lyons Falls Mill and, therefore, appropriate for both motorized and non-motorized boating.
  - Public boat access is provided at five launch sites along the surrounding reach of the Black River.
  - Due to the hydrologic nature of the Moose River in the vicinity of Lyons Falls Mill, only non-motorized boating, canoeing, and kayaking occur.
  - The “Bottom Moose River” from Fowlersville to Lyons Falls has an average gradient of 72 feet-per-mile with 12 major identified rapids over the course of a 3.6 mile segment.

Lyons Falls Mill

Environmental Report – Recreation Resources

- Angling is also a popular recreational activity along the Black and Moose Rivers.
- Approximately 15 miles of the Moose River and 8 miles of the Black River are designated under the New York State Wild, Scenic, and Recreational Rivers Act.
  - None of these sections are within or adjacent to the Lyons Falls Project boundary.

- The Black River was designated as a Blueway Trail in June 2005.
- Lewis County provides many opportunities for land-based outdoor recreation. Opportunities for hiking, picnicking, sightseeing, biking, and other activities are provided by several state, county, and municipal parks, historic sites, and trails.

Lyons Falls Mill

Environmental Report – Recreation Resources

- Existing recreational facilities at Lyons Falls Mill include boat access and portage opportunities, fishing, picnicking, walking, and sightseeing along the Moose and Black Rivers.
  - An improved canoe/kayak access site downstream of the dam provides parking, a hand-carry boat launch, and angling access to the eastern shoreline of the Black River.
  - NBLF provides access to the impoundment at a gravel vehicle-access boat launch located just upstream of the confluence of the Black and Moose Rivers.
  - A carry-in boat access area provided by NBLF is located on the Black River approximately 1.5 miles upstream of the dam.
  - An informal recreation access point and vehicle pull-out is located on the east side of Black River, just downstream of the Lyons Falls dam.

Lyons Falls Mill

Environmental Report – Recreation Resources

- Upstream of Lyons Falls Dam on the Moose River is a canoe/kayak access site that provides portage opportunities around the Lyons Falls Dam. The upstream canoe access is connected to a downstream canoe/kayak access site via Lyons Falls Road.
- In addition to these recreation sites, public access to Project lands is permitted. As such, informal recreation activities such as hunting, angling, hiking and cross-country skiing occur at Lyons Falls Mill.
- The Lyons Falls Community Park, which was donated by the former licensee, Georgia-Pacific, to the Village of Lyons Falls, is located adjacent to Lyons Falls Mill on the Black River, upstream of the confluence with the Moose River. The Park provides sports fields, a skating rink, and picnic facilities. This site is not within the Project boundary and is managed by the Village of Lyons Falls.

Lyons Falls Mill

Environmental Report – Recreation Resources

Lyons Falls Mill

Environmental Report – Recreation Studies Conducted by NBLF

- In support of the upgrades proposed in 2006, NBLF conducted a recreational use survey throughout the 2007 recreation season to assess overall recreational use, including angler use.
  - Recreational facilities at Lyons Falls Mill were monitored by NBLF staff between May 6, 2007 and October 16, 2007.
  - Monitoring was conducted on 147 of 164 days within the study period (90 percent) and included four peak holidays: Memorial Day, Independence Day, Labor Day, and Columbus Day.
  - For this study, data was collected from the Lyons Falls Boat Access (impoundment), Lyons Falls Canoe Access (downstream), and the Lyons Falls Picnic Area.

ESTIMATED 2007 RECREATION USE BY DAY TYPE AT LYONS FALLS MILL

Day Type	Activity	Days
Weekdays	boating	**51**
	fishing	**227**
	swimming	**105**
	sightseeing	**176**
	picnicking	**18**
	Other	**51**
	Undetermined	**24**
	Subtotal	**652**
Weekends	boating	**16**
	fishing	**188**
	swimming	**41**
	sightseeing	**145**
	picnicking	**12**
	Other	**8**
	Undetermined	**0**
	Subtotal	**410**
Holidays	boating	**12**
	fishing	**32**
	swimming	**8**
	sightseeing	**38**
	picnicking	**5**
	Other	**0**
	Undetermined	**0**
	Subtotal	**95**
Total		**1,157**

Lyons Falls Mill

Recreation Resources PM&E Measures

- A number of PM&E measures proposed by NBLF will support or enhance recreation at Lyons Falls Mill, including recreational fishing, boating, and sightseeing.
  - Seasonal installation of trashrack overlays with 1-inch clear-bar spacings, installed as soon as possible following ice-out and removed in October.
  - A seasonal (March 15 – November 30, annually) minimum fish movement flow of 45 cfs to enhance and protect fish and aquatic resources, including game fish.
  - Continued operation and maintenance of existing recreational facilities at Lyons Falls Mill.
  - A seasonal (May 1 – October 31, annually) 25 cfs minimum aesthetic flow released over Lyons Falls to enhance the aesthetics of the falls during the recreation season.
  - Preparation and implementation of a Construction Soil Erosion and Sedimentation Control Plan and a Temporary Emergency Action Plan to avoid temporary impacts on instream recreation.
  - Continued run-of-river operations.
  - Preparation and implementation of an Aesthetic Resources Plan.

Lyons Falls Mill

Environmental Report – Cultural and Historic Resources

- In support of the previous relicensing, a cultural resources study was conducted in 1983 of the three developments. The study concluded that the hydroelectric facilities were not likely to be eligible for the National Register of Historic Places (NRHP).
- In 2007, the Public Archaeology Facility of the State University of New York at Binghamton (PAF) conducted a Phase IA Cultural Resources Assessment of the upgrades to Lyons Falls proposed in 2006, including construction of a new powerhouse on river right.
  - The study consisted of a pedestrian walkover combined with auger probes.
  - PAF identified one area along river right with the potential to contain archaeological deposits and recommended additional testing at this location if NBLF chose to pursue the upgrades proposed in 2006.
  - NBLF decided not to pursue the proposed upgrades; therefore, additional testing was not conducted along the east shoreline of the Black River.
  - The current redevelopment will not have any impact on the location identified by PAF in 2007.

Lyons Falls Mill

Environmental Report – Cultural and Historic Resources

- In support of the demolition of the former paper mill, the New York State Office of Parks, Recreation and Historic Preservation's (OPRHP) was consulted with regarding the proposed demolition activities.
  - As a result of this consultation, the ORPHP indicated in a June 14, 2013 letter that demolition of the former paper mill "will have No Impact" upon cultural resources in or eligible for inclusion in the State and National Register of Historic Places."
- By letter dated January 29, 2015, NBLF initiated informal consultation with the New York State Historic Preservation Officer (SHPO) to determine if historic properties listed in or eligible for inclusion in the NRHP will be effected by the proposed redevelopment of Lyons Falls Mill.
- If necessary, NBLF will develop an avoidance, protection, and/or mitigation plan for FERC and SHPO approval following FERC's order amending the license and prior to the start of construction activities.

Lyons Falls Mill

Environmental Report – Report on Land Management and Aesthetics

- The Black River Basin, includes both the Black and Moose Rivers and supports a diverse set of land use practices.
- The eastern portions of the basin consist of densely forested woodlands associated with the Adirondack Mountains. Land use and management in this portion of the basin consists mainly of silviculture, recreation, and tourism.
- Lyons Falls Mill lies entirely within Lewis County, New York, which is approximately 1,272 square miles in area. The area surrounding Lyons Falls Mill is mostly rural, heavily forested, and relatively undeveloped.

LEWIS COUNTY LAND USE

Type of Use	Square Miles	Acres	Percent of County Land
Agricultural	244.07	156,205.9	19.2
Residential	177.97	113,900.1	14.0
Vacant (Open Space)	92.79	59,390.8	7.3
Commercial	2.54	1,627.5	0.2
Recreation/Entertainment	3.81	2,440.7	0.3
Community Services	36.86	23,593.0	2.9
Industrial	2.54	1,627.5	0.2
Public	15.25	9,762.8	1.2
Wild/Forested	695.35	445,024.1	54.7
Total	1,271.18	813,572.4	100.0

Lyons Falls Mill

Environmental Report – Report on Land Management and Aesthetics

- Based on 2006 consultation, stakeholders indicated an interest in the aesthetic nature of the falls.
  - The falls can be viewed from numerous locations downstream, including from the canoe access located downstream of the falls.

Lyons Falls Mill

Aesthetic Resources PM&E Measures

- NBLF is proposing to provide a seasonal minimum aesthetic flow of 25 cfs over Lyons Falls to be released annually during the recreation season (May 1 through October 31).
  - NBLF conducted an assessment to develop a conceptual layout for providing the 25 cfs seasonal minimum aesthetic flow.
  - Conceptual approach would modify the 26-inch-high wooden flashboards to provide flow over the falls.
  - NBLF will continue consultation with resource agencies, local officials, and other interested parties to define the location of the 25 cfs seasonal aesthetic flow release.
  - The 25 cfs aesthetic flow will be in addition to the proposed 45 cfs downstream fish movement flow.

- In addition, NBLF proposes to develop an Aesthetic Resources Plan.

Lyons Falls Mill

Aesthetic Resources PM&E Measures

Flashboard Notch Concept to Pass 25 cfs

(Schematic Drawing - Not to Scale)

$Q = C \times L \times H^{(1.5)}$

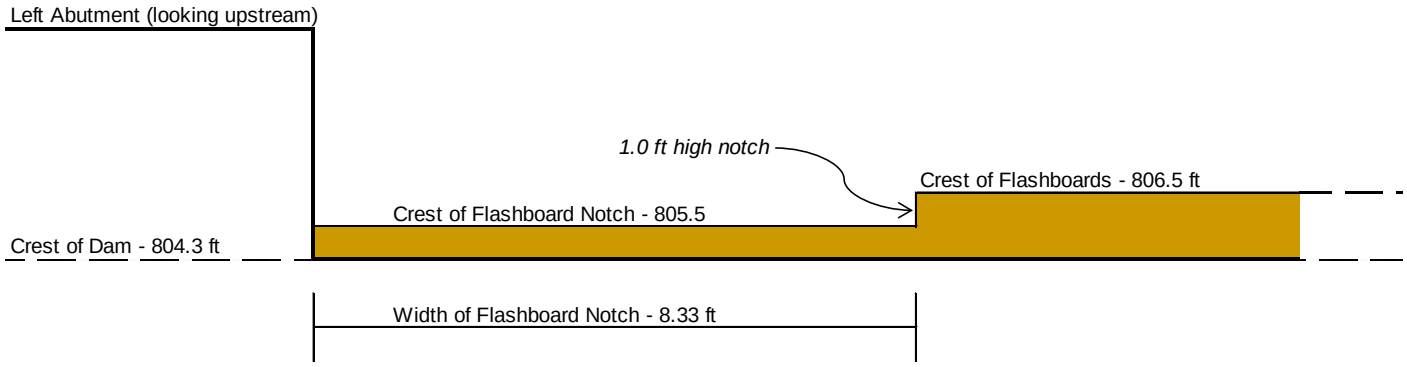
Q = 25 cfs (target flow)

C = 3.0

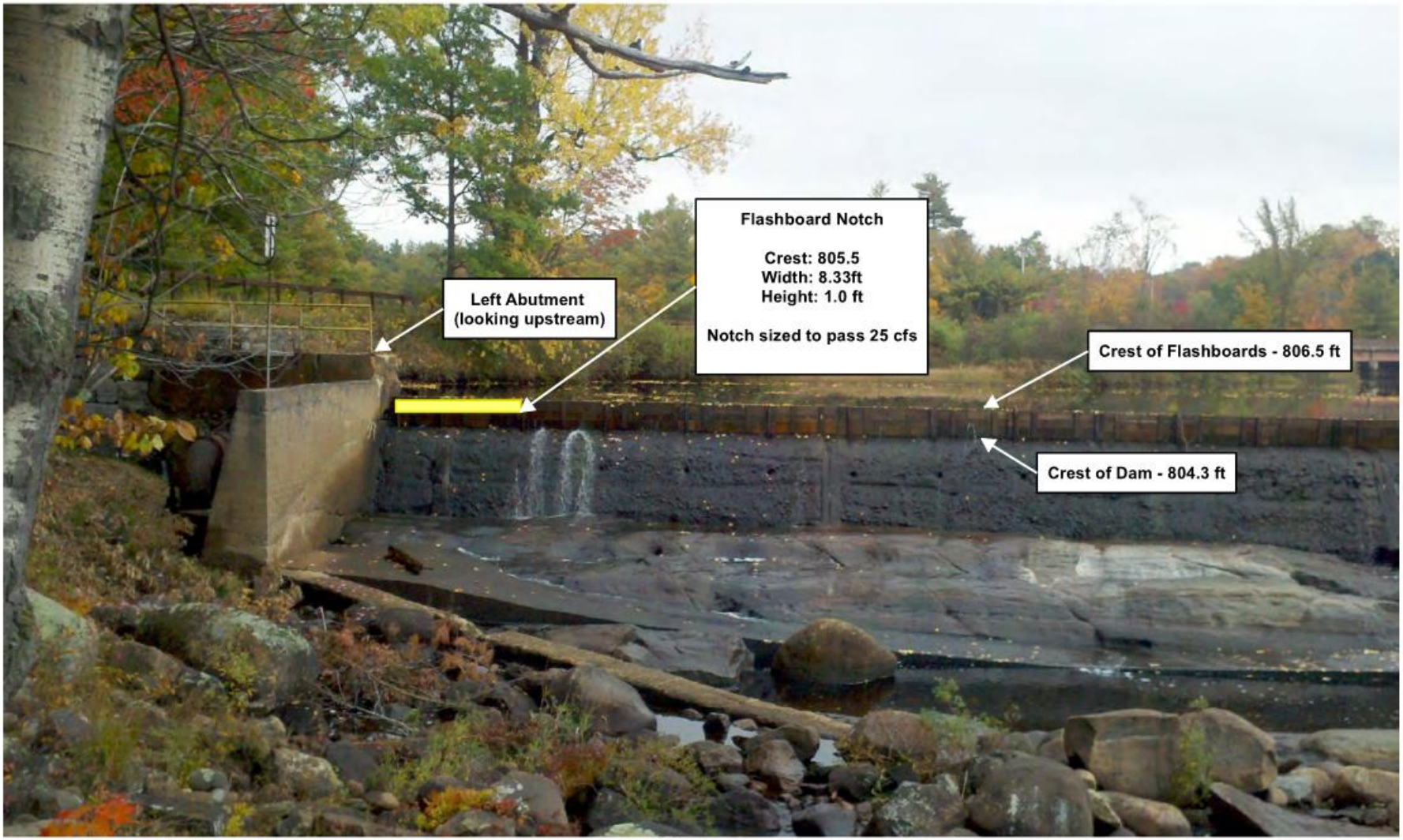
L = 8.33 ft

h = 1.0 ft

Solved Flow = 25 cfs



Elevation View of Flashboard Notch (Looking Upstream)



Lyons Falls Development 25 cfs Aesthetic Release Via Flashboard Notch

NOT TO SCALE

Lyons Falls Mill

Comprehensive Plans

- Interstate Fishery Management Plan for American Eel (Anguilla rostrata) (Atlantic State Marine Fisheries Commission Service [ASMFC] 2000).
- The Nationwide Rivers Inventory.
- North American Waterfowl Management Plan (North American Waterfowl Management Plan, Plan Committee 2004).
- Fisheries USA: The Recreational Fisheries Policy of the U.S. Fisheries and Wildlife Service (USFWS) (1989).
- New York State Statewide Comprehensive Outdoor Recreation Plan (SCORP) (NYSOPRHP 2010).

Lyons Falls Mill

Schedule

Activity	Date
Distribute ICAP	January 30, 2015
Public notice of Joint Agency Public Meeting	February 18, 2015
Joint Agency Public Meeting	March 4, 2015
Stakeholders provide comments on ICAP	March 16, 2015
File final Amendment Application with FERC	April 3, 2015

Lyons Falls Mill

Further Information

Mr. Dan Parker
Project Manager
Kruger Energy, Inc.
330 May Road
Potsdam, NY 13676

dan.parker@kruger.com

Tel: (315) 261-2158

Mr. Jim Gibson
HDR
1304 Buckley Road
Suite 202
Syracuse, NY 13212

jim.gibson@hdrinc.com

Tel: (315) 414-2202