Crescent Project (P-4678)
Vischer Ferry Project (P-4679)
Initial Study Report (ISR) Meeting




March 3, 2021

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AGENDA

10:00 AM	Introduction
	Water Quality Study
	Fish Community Study
	Fish Entrainment Study
	Blueback Herring Study
	Aquatic Mesohabitat Study
	Lunch Break (30 min)
	Bald Eagle Study Update
	Recreation Study Update
	American Eel Study Update
	Vischer Ferry Ice Jam Update
1:15 PM	Closing

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Meeting Purpose

Per 18 C.F.R. § 5.15:

To discuss study results, and the applicant's and/or other participant's proposals, if any, to modify the study plan in light of the progress of the study plan and data collected.

Project Relicensing Milestones and Schedule

- NOIs and PAD filed with FERC May 3, 2019
- FERC issued Scoping Document 1 June 10, 2019
- FERC Scoping meetings and project site visits July 10-11, 2019
- PSP filed with FERC September 23, 2019
- PSP Meeting October 23, 2019
- RSP filed with FERC January 21, 2020
- FERC Study Plan Determination February 20, 2020
- 1st Year Studies commence March 2020 (some delays due to Covid-19)
- ISR Study Report filed February 19, 2021
- **ISR Meeting March 3, 2021**
- ISR Meeting Summary filed with FERC March 18, 2021
- Comments on ISR Meeting Summary, disagreements, study requests April 19, 2021
- Response to disagreements May 19, 2021
- FERC issues Determination on Disagreements/Amendments June 18, 2021
- Second Year Studies 2022 (Recreation, American Eel, Bald Eagle)
- Draft License Application (DLA) January 1, 2022
- Updated Study Report February 19, 2022
- Final License Application May 31, 2022

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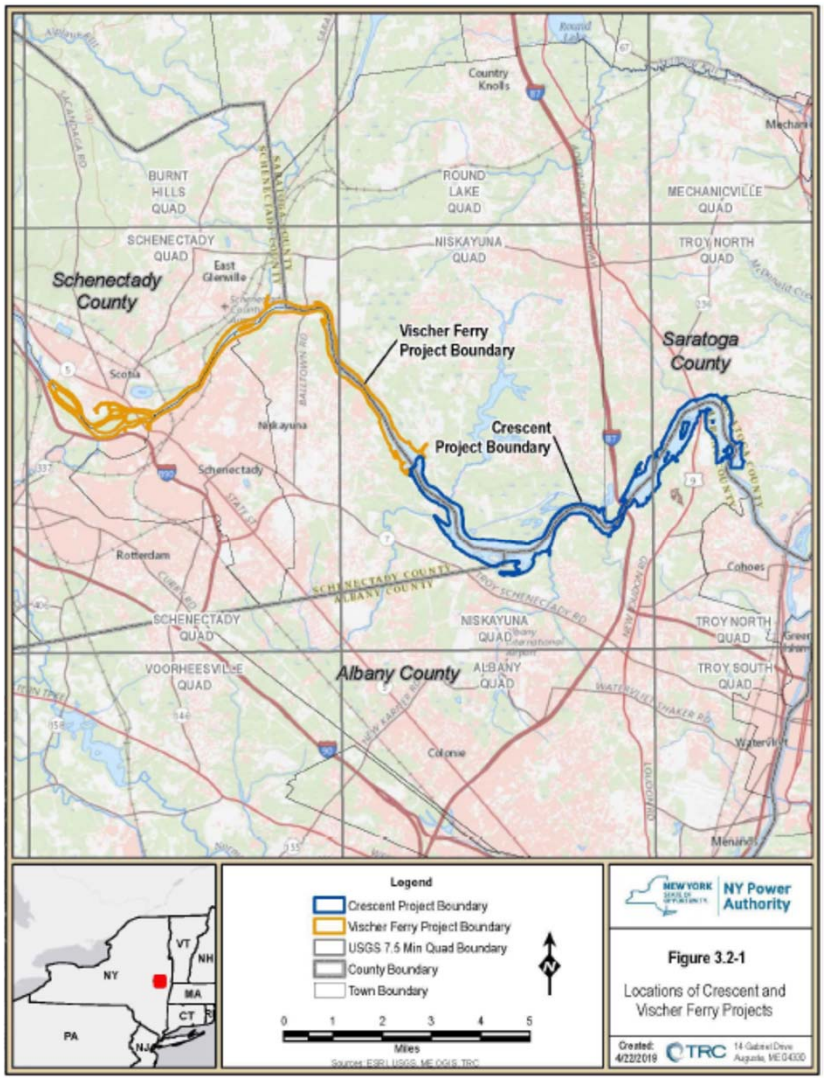
Location of Projects



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Water Quality Study




Study Goals and Objectives

Goals:

- Characterize current water quality conditions at each Project;
- Evaluate the effects, if any, of each Project on water quality; and
- Determine compliance with State of New York water quality standards.

Objectives:

- Collect continuous dissolved oxygen (DO) and temperature data in the Project impoundments and tailwater areas during the summer and early fall months;
- Collect additional water quality data for pH, conductivity, and turbidity in the Project impoundments and tailwater areas.

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Overview of Projects

- Run-of-River Operations
- Flashboards During Navigation Season
- 10+ mile-long Riverine Impoundments
- Minimum Flows During Navigation Season
  - 250 cfs over Crescent Dam A for Fish Passage
  - 200 cfs over Vischer Ferry Dam F for Fish Passage

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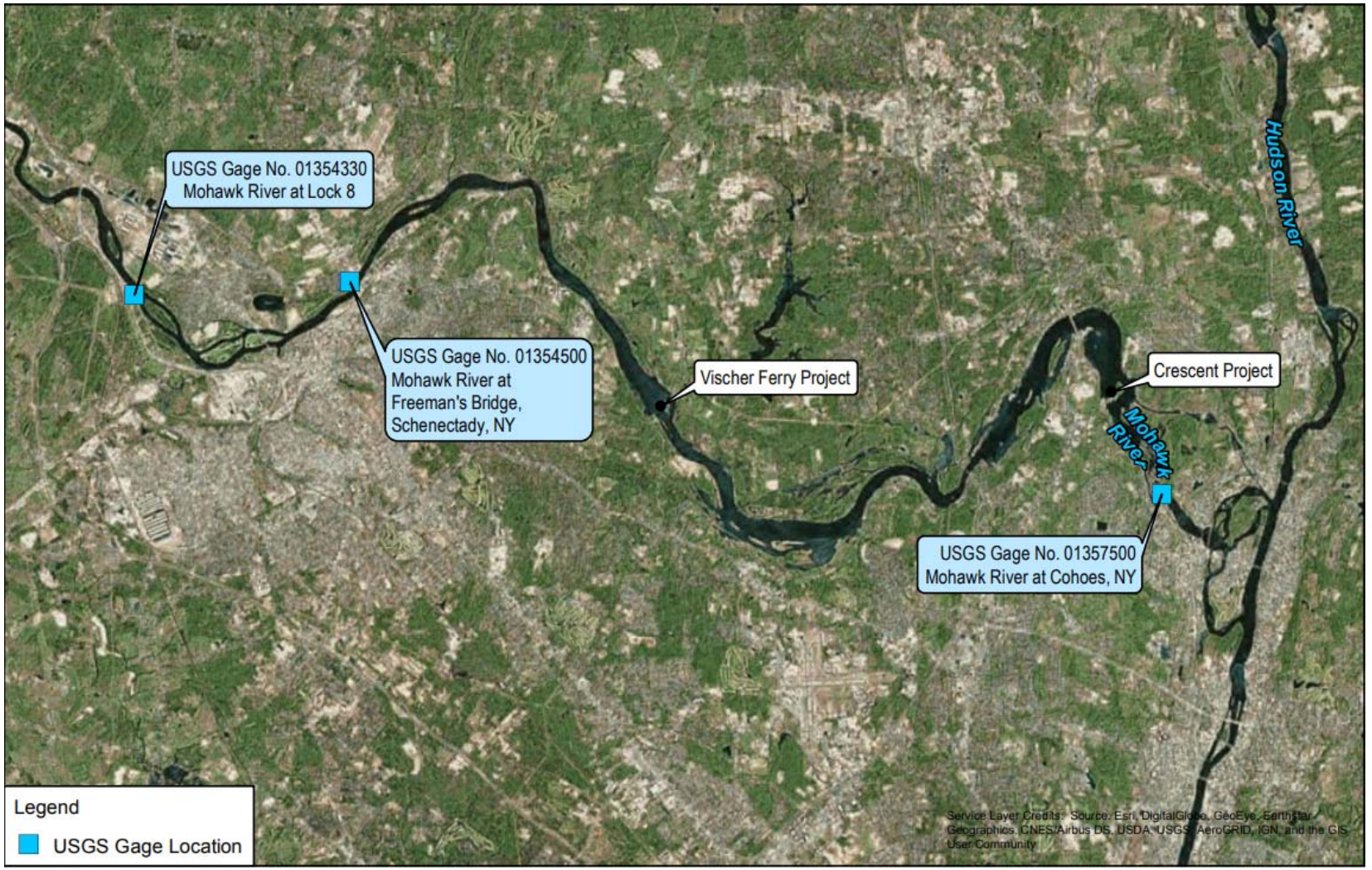

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State Water Quality Standards

- Project waters are Class A waterbodies (non-trout)
- Numerical standards
  - Dissolved oxygen (DO)
    - Minimum daily average shall not be less than 5.0 mg/L,
    - Instantaneous DO concentration shall not be less than 4.0 mg/L.
  - pH - Shall not be less than 6.5 nor more than 8.5
  - No numerical standards for conductivity or turbidity

Study Methods

- Four (4) sampling locations
  - Forebay and Tailwater areas at both Projects
- Sampling from June 12 – November 4, 2020
- Continuous DO and temperature
  - 15-minute time step
  - Weekly service visits
- Bi-weekly vertical profiles at all sites, all parameters

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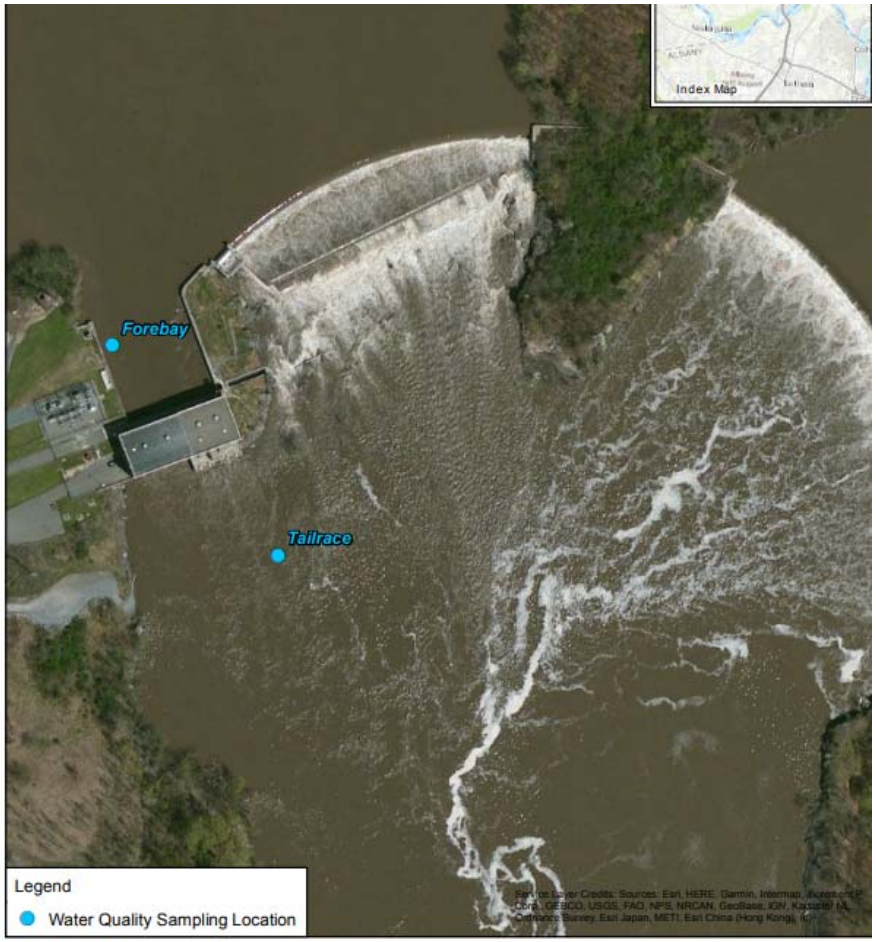

Index Map
Forebay
Tailrace
Legend
Water Quality Sampling Location

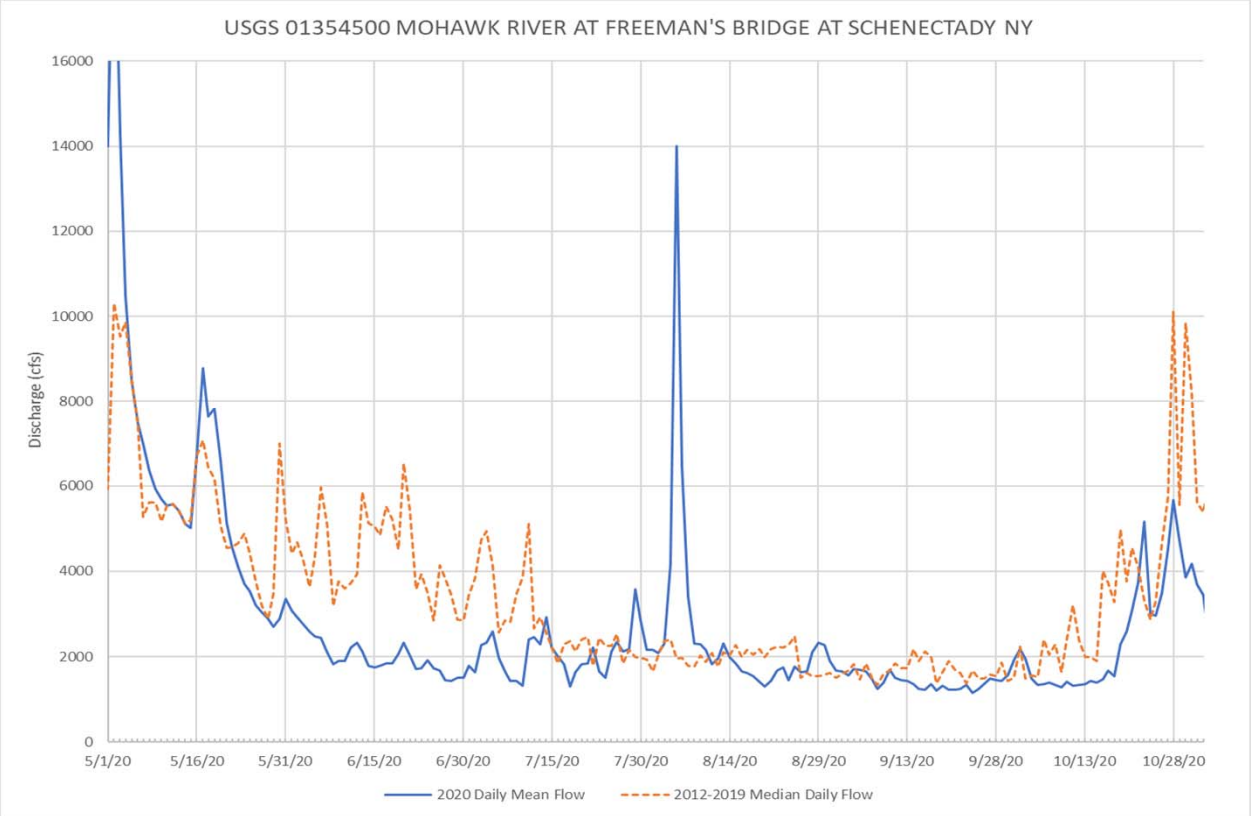

Index Map
Forebay
Tailrace

Study Methods

- Data QA
- Weather and flows
- Operations
  - Turbine operations (hourly)
- Water quality data from Lock 8 USGS gage

Study Results

- Weather and flow conditions
  - Warm and dry
  - Low flows, except early August
- Operations
  - Turbines run at low levels during low flows
  - Periods when flows were too low to run turbines



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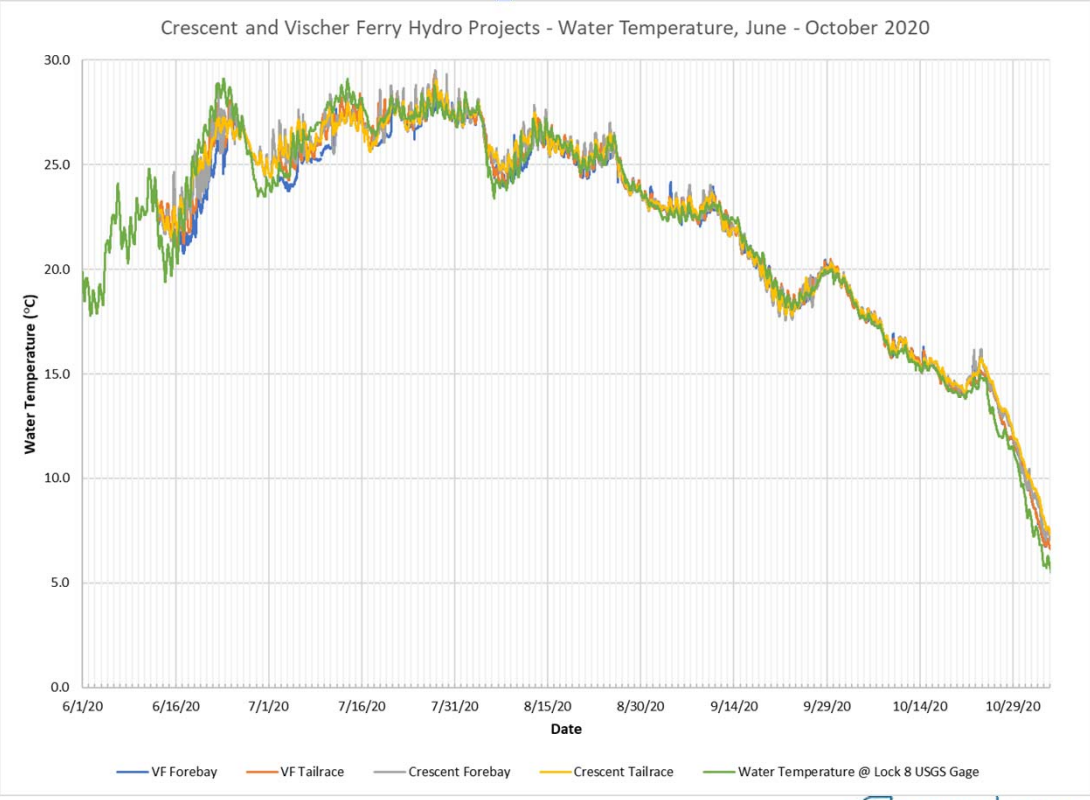
Study Results – Water Temperature

- Water temperature consistent among sites
- VF Forebay slightly cooler due to depth
- Highest measurements in late July
- No thermal stratification observed in Forebays



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Study Results – Water Temperature

Figure 3.4-4a: Vischer Ferry Forebay Vertical Temperature Isopleth

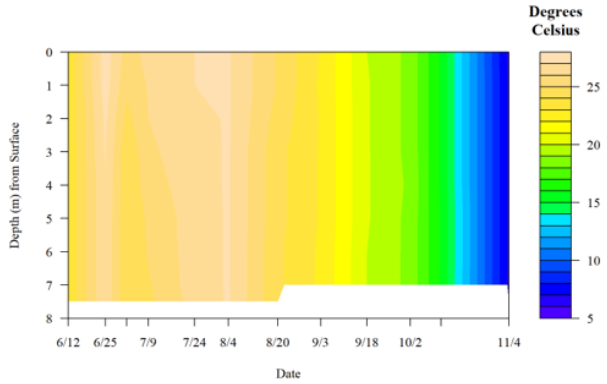


Figure 3.4-5a: Crescent Forebay Vertical Temperature Isopleth

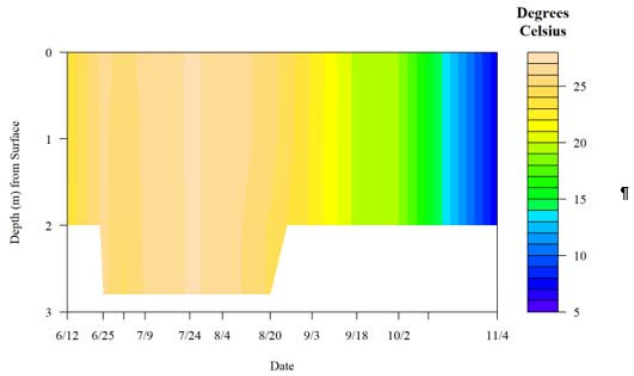


Figure 3.4-4b: Vischer Ferry Tailrace Vertical Temperature Isopleth

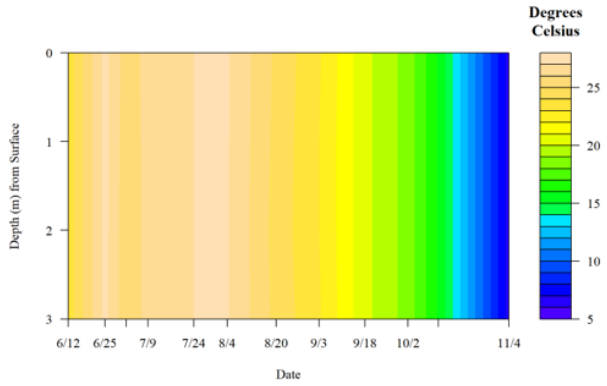
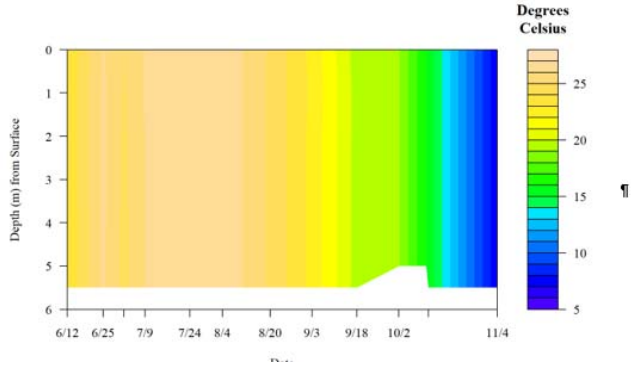


Figure 3.4-5b: Crescent Tailrace Vertical Temperature Isopleth



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Study Results – Dissolved Oxygen

- Dissolved Oxygen
  - Daily fluctuations in Forebays can be atypical and erratic
  - Vischer Ferry Forebay DO stratification (low DO near bottom)
  - Tailraces stay well oxygenated despite Forebay conditions

Study Results – Dissolved Oxygen

Figure 3.4-4c: Vischer Ferry Forebay Vertical Dissolved Oxygen Isopleth

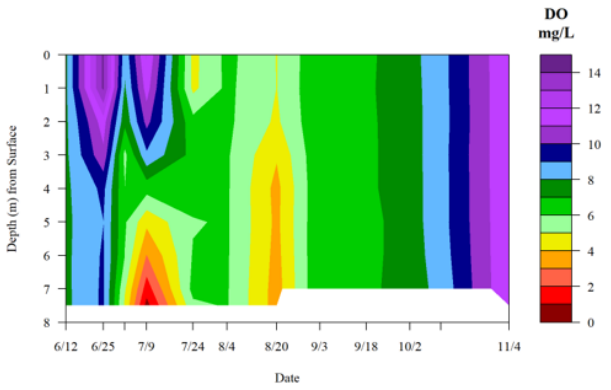


Figure 3.4-5c: Crescent Forebay Vertical Dissolved Oxygen Isopleth

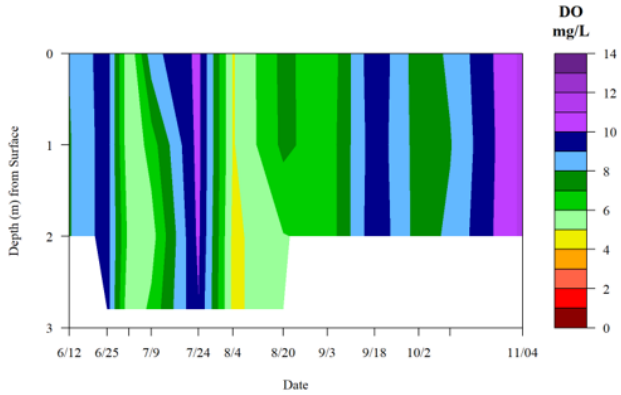


Figure 3.4-4d: Vischer Ferry Tailrace Vertical Dissolved Oxygen Isopleth

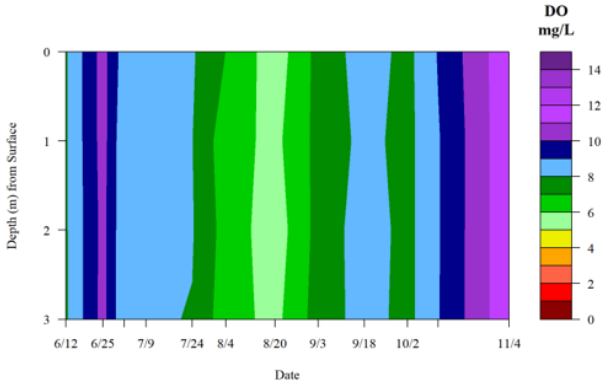
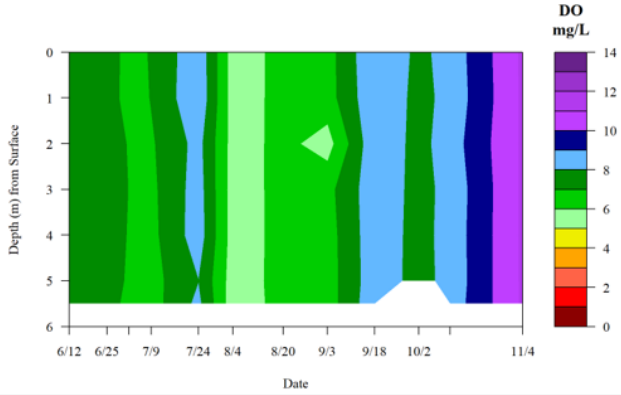


Figure 3.4-5d: Crescent Tailrace Vertical Dissolved Oxygen Isopleth



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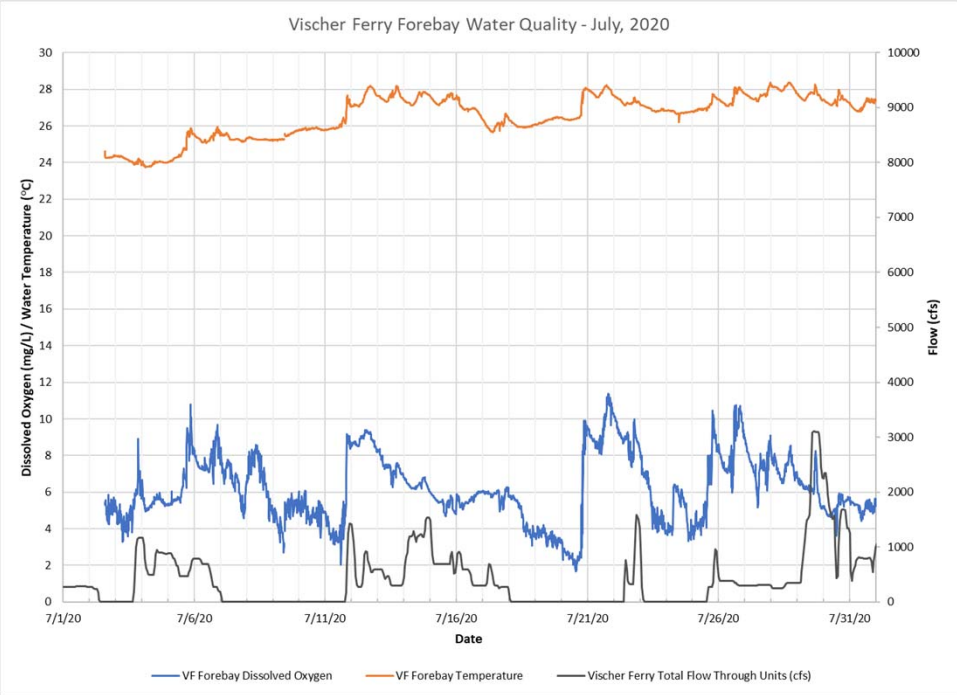
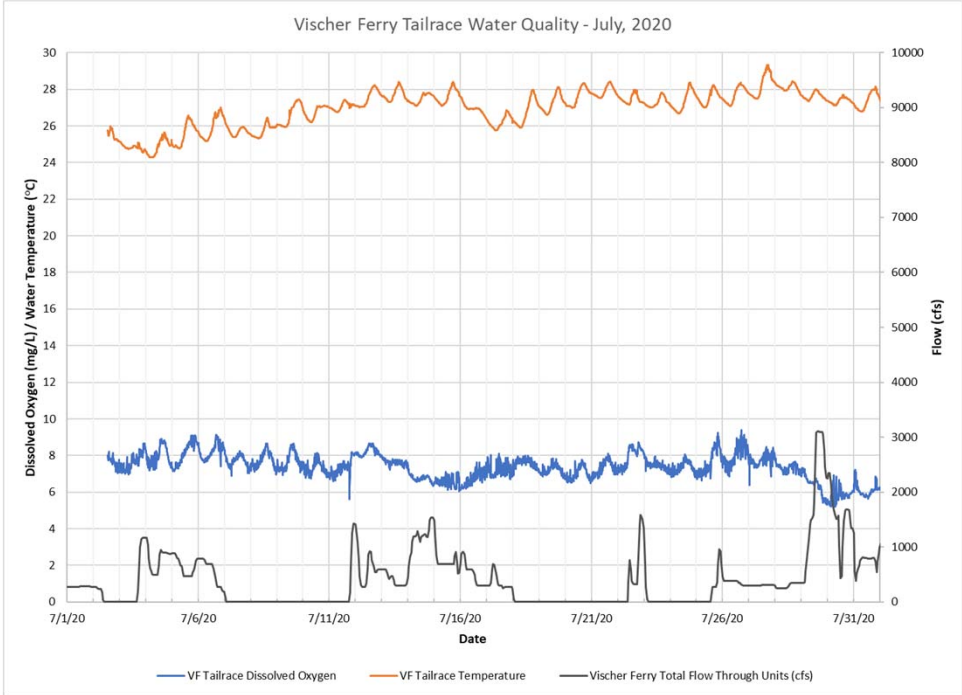
Study Results – Dissolved Oxygen





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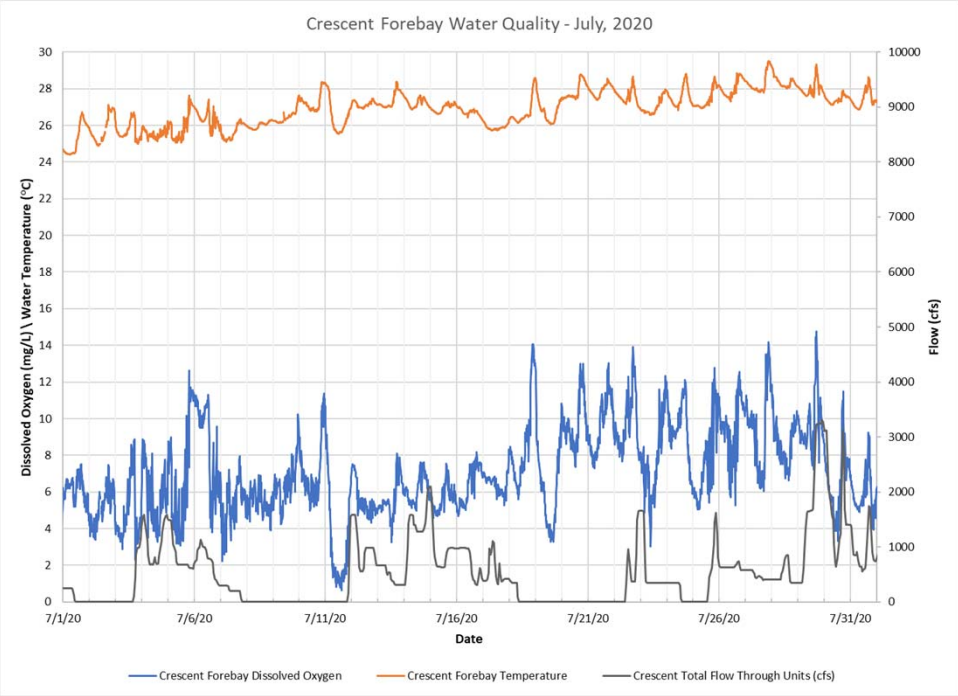
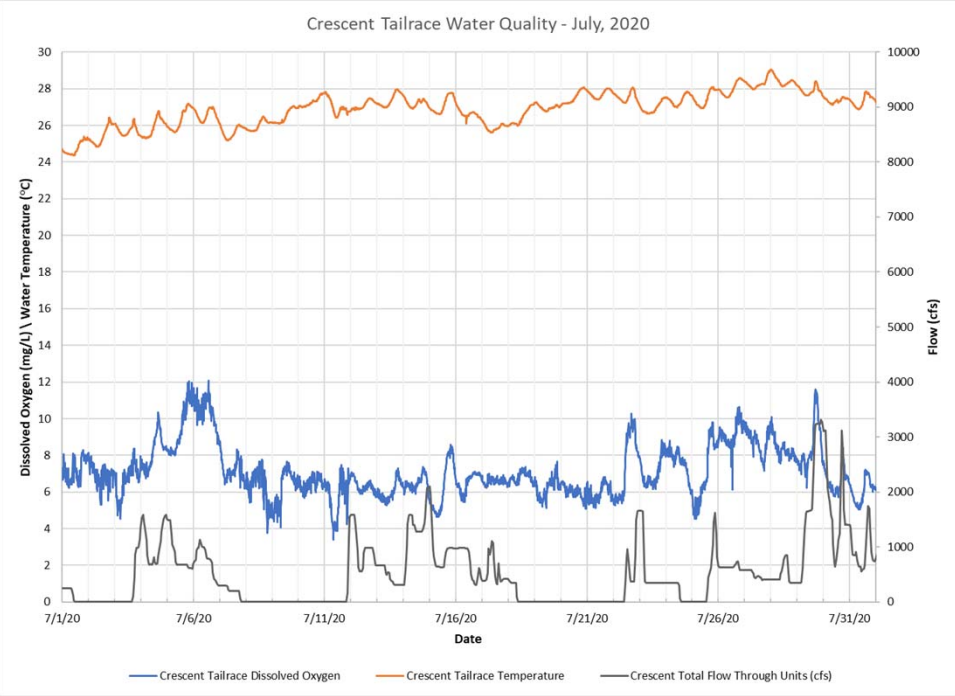
Study Results – Dissolved Oxygen





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Study Results – Dissolved Oxygen

- Forebays can experience low and erratic DO fluctuations
- Project generation does not cause low DO levels in either Tailrace
- Occurrences when average daily DO <5.0 mg/L (continuous data)
  - None in either Tailrace
  - <10% of monitoring days in both Forebays

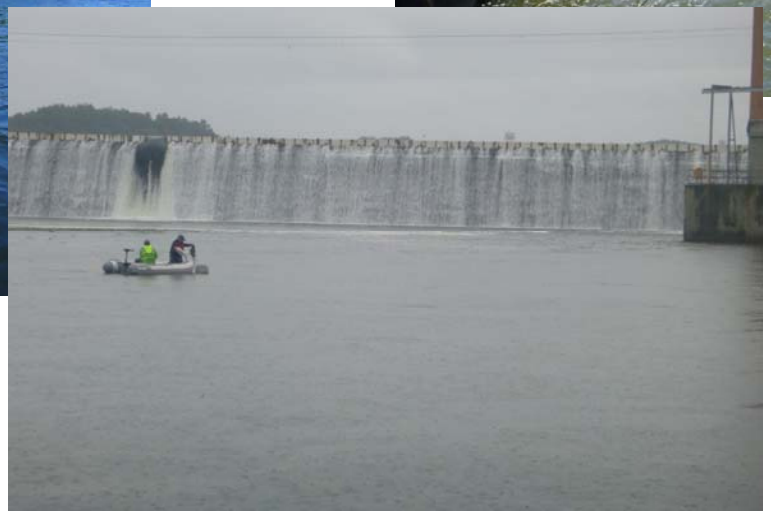
Study Results

- Turbidity levels <10 and consistent among sites
- Conductivity ranged from 335 to 445 µS/cm
- pH ranged from 6.98 to 8.86
  - High surface measurements at Vischer Ferry Forebay tied to high DO

Study Summary

- Study obtained water quality data under a variety of flow and operations
- Low flow, high temperature period captured critical conditions
- Forebay DO levels are driven by highly productive river system
- Project discharges meet water quality standards for DO in both Tailraces
- Minimum flows over Project dams appear to provide downstream aeration

Questions?



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Fish Community Study




Background

- Study covered the lower Mohawk River region, within the vicinity of the Crescent and Vischer Ferry Projects

- Crescent Project
  - Impoundment is ~10 miles long
  - Upstream terminus of impoundment at Vischer Ferry Dam

- Vischer Ferry Project
  - Impoundment is 10.3 miles long
  - Upstream terminus of impoundment at Lock E-8 in Schenectady, NY

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Study Goals and Objectives

Goal:

Using existing fisheries data for the lower Mohawk River, conduct a comprehensive assessment of the fish community at the Projects, including a determination of species composition and relative abundance.

Objectives:

- Characterize the existing fish community.
- Use this information to describe the fishery resources in the vicinity of the Projects in the Exhibit E of the FERC License Applications.

Current Fisheries Management

- Mohawk River provides habitat for an array of native and non-native fish species, including both resident and migratory species
- NYSDEC manages the Mohawk River in the vicinity of the Projects as a mix of warm-water and cool-water species
- Fish community is primarily dominated by warm-water species and is used extensively by recreational anglers (NYSDEC, 2018)
- Common game species:
  - Smallmouth Bass, Walleye, Largemouth Bass, Northern Pike
- Also managed for the anadromous Blueback Herring
- There is a continuous influx of new aquatic species
  - facilitated through the New York State Barge Canal System (Barge Canal)

Methods – Data Collection

- NYSDEC survey data
- USGS survey data
- New York State Library System, professional journals, and the internet were also searched for relative information
- Data and reports were reviewed
- Created an annotated bibliography of all pertinent studies
  - Pertinent data was assembled into an electronic database

Methods – Data Analysis

Variables of Analysis included:

- Species composition
- Relative abundance
- Catch per unit of effort
- Temporal changes

Results – Number of Species and Study Methods

From Reports and studies produced by NYSDEC:

- At least 62 fish species were documented in the Mohawk River and the Barge Canal System from Lock E-6 in Waterford to Lock E-20 in Rome, New York from 1934 through 1983 (McBride, 2009)
- Carlson (2015) reported that as many as 71 fish species may inhabit the greater river-canal system
- Fisheries sampling was conducted multiple times between 1934-2020, using a variety of methods
  - Trap netting, electrofishing, gill netting, seining, and trawling.
- Raw data for many of these studies was not available, but summary data was available

Results – Findings Summarized

- Mohawk River fishery is diverse and consists of warmwater, coolwater, and migratory species.
- Common warmwater and coolwater species are abundant and provide a diverse recreational fishery (including opportunities for anglers)
- Most abundant gamefish species within the vicinity of the Projects are Smallmouth Bass followed by Walleye

Findings – Resident Fish

- Overall, the resident fish community is dominated by species such as Bluegill, Smallmouth Bass, Yellow Perch, White Sucker, Fallfish, and Brown Bullhead

- Walleye and Northern Pike also provide desirable target species for anglers

Findings – Mohawk River, USGS 2014-2015

Date Sampled	River Kilometers	CPUE (fish/h)	SE (fish/h)
May 27, 2014	3.5–7.9	304.0	8.0
May 27, 2014	7.9–12.2	342.0	n/a
May 26, 2015	12.2–16.6	152.6	2.0
May 26, 2015	16.6–21.0	208.0	3.6
May 28, 2014	21.0–25.4	217.3	8.9
May 28, 2014	25.4–29.9	140.0	5.3
May 27, 2015	29.9–34.3	262.5	68.3
May 27, 2015	34.3–38.7	175.5	15.8

Species	Mean (CPUE)	SD
Smallmouth Bass	28.1	10.5
Other centrarchids	41.7	51.1
Yellow Perch	9.3	8.1
Walleye	8.1	11.6
Cyprinids	75.2	36.6
All other species	62.9	32.0
All species	225.2	72.3

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Findings – Crescent Impoundment, NYSDEC 2018

Fish Species	N[2]	Effort[3]	All Sizes	YY/SY	≥Stock	≥Quality	≥Preferred
Brown bullhead	49	2.4	20.7	0.0	20.7	20.7	18.6
Rock bass	95	2.4	40.1	1.3	37.6	7.2	0.0
Pumpkinseed	129	2.4	54.4	0.8	53.6	34.6	3.8
Bluegill	62	2.4	26.6	8.9	16.0	13.1	0.0
Yellow perch	41	2.4	17.3	0.4	16.9	4.2	0.0
Largemouth bass	27	8.9	3.0	0.8	1.8	0.7	0.0
Smallmouth bass	198	8.9	22.3	3.6	18.0	6.8	3.2
Walleye	130	8.9	14.7	1.6	3.6	1.8	0.2

[1] Total length categories for various fish species

	Rock Bass	Yellow Perch / Brown Bullhead	Bluegill / Pumpkinseed	Smallmouth Bass	Largemouth Bass	Walleye / Chain Pickerel
Stock	≥ 4 in	≥ 5 in	≥ 3 in	≥ 7 in	≥ 8 in	≥ 10 in
Quality	≥ 7 in	≥8 in	≥ 6 in	≥11 in	≥12 in	≥ 15 in
Preferred	≥ 9 in	≥10/11 in	≥ 8 in	≥14 in	≥15 in	≥ 20 in

[2] N—numbers captured

[3] Effort—fish per hour

[4] YY—young of year and SY—spring yearling (age 1) fish

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Most Abundant Fishes

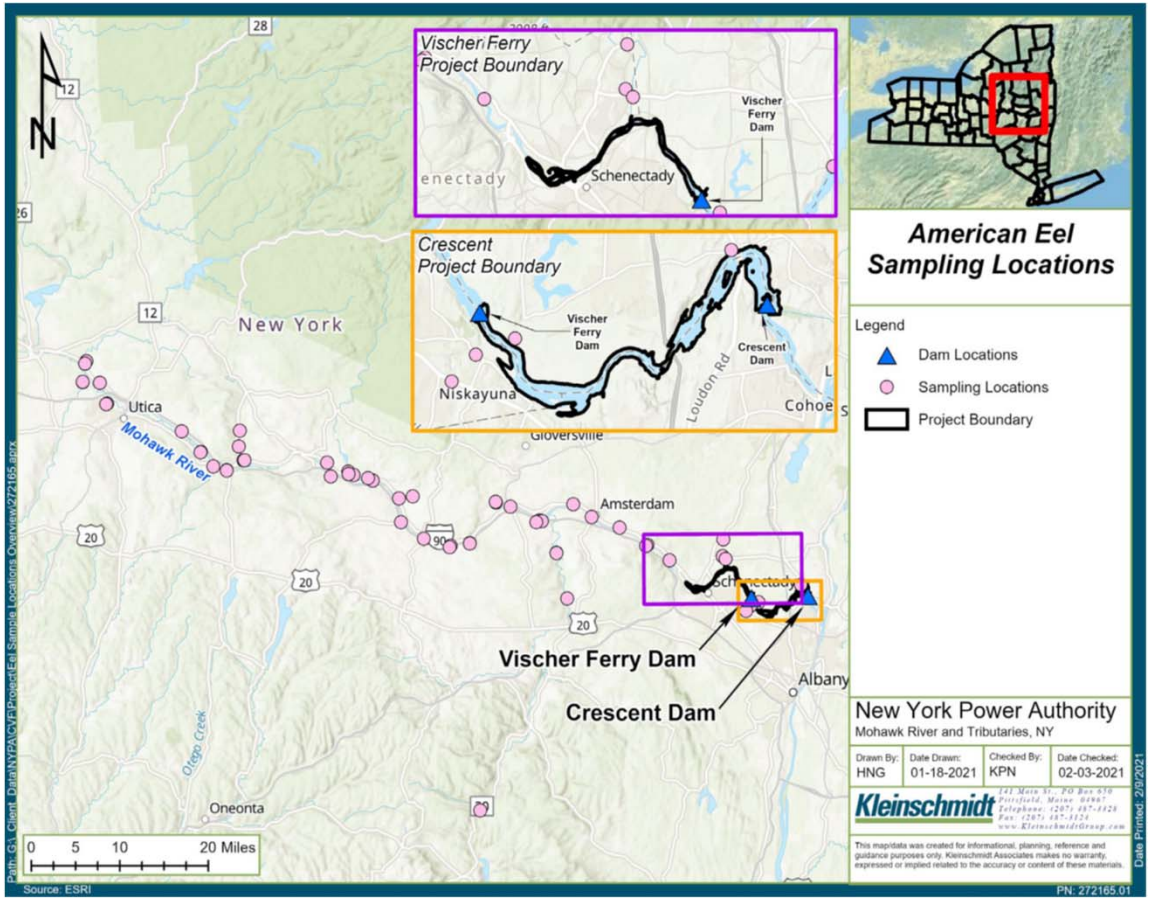
From surveys conducted in 2018:

- Smallmouth Bass have the highest relative abundance (19% of catch) of the resident species collected.
- Relative abundance of Walleye was 12.3% of catch
- Panfish (Yellow perch, Rock Bass, Pumpkinseed, and Bluegill) comprised 31.3% of the catch

Findings – Migratory Fish Species

- Migratory species include the seasonally abundant Blueback Herring and the relatively uncommon American Eel
- The migratory species exist in the vicinity of the Projects due to the Barge Canal, which provides a passage route past Cohoes Falls and the dams present along the lower Mohawk River
- The Barge Canal also provides passage from the Great Lakes drainage into the Mohawk River, and ultimately the Hudson River
  - Allows easier dispersal of non-native fish and other aquatic species

Findings – American Eel and Fish Community Survey Locations, USGS 2015, 2016, & 2019



American Eel Surveys, 2015-2016

- 35 locations in 32 tributary streams
- No Eel collected or observed

Fish Community Survey, 2019

- Intensive, 3-pass depletion surveys
- 20 tributary streams
- 46 species documented
- No Eels collected or observed

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State of Fishery

- NYSDEC has described the Mohawk River Basin fisheries as being in a "**state of transition**"
  - Spreading of non-native species like the zebra mussel
  - Increased abundance of once rare/absent species such as Freshwater Drum and Northern Pike

In Summation

- There have been no issues identified as part of Project scoping that indicate concerns to the general fishery resulting from Project operations.
- Potential fishery issues regarding American Eel and Blueback Herring are being addressed in focused studies.
- Despite the potential influx of new species, the fishery remains productive and provides an abundance of recreational opportunities.

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Thank you

Questions?

Fish Entrainment Study




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Study Goals and Objectives

Goals: Provide a literature-based assessment of the potential for fish entrainment and impingement at the Projects and to use existing databases, tools, and models to evaluate potential turbine survival rates for representative resident and migratory fish species/life stages at the Projects.

Objectives:

- Provide a description of physical characteristics of the Projects, including the intake location and dimensions, trashrack spacing, and depths and velocities near each intake structure;
- Conduct a literature review for species of interest relative to physiology, behavior, life history, and habitat preferences in the context of entrainment, impingement, and survival;
- Assess the potential for entrainment and impingement; and
- Estimate turbine passage survival rates for target gamefish species.

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Study Approach/Methods

- Entrainment Analysis: Qualitative assessment of the probability that fish would encounter the Project intakes based on several factors (e.g., movement patterns and life history of target species, swim speeds, project configuration and operations, fish passage and protection measures in place, EPRI data at other relevant projects)
- Impingement Analysis: Body size and swim speed analysis
- Survival Analysis: Entrainment survival estimates from other Projects and project-specific turbine blade strike analyses (Franke method)

Target Species and Life Stages

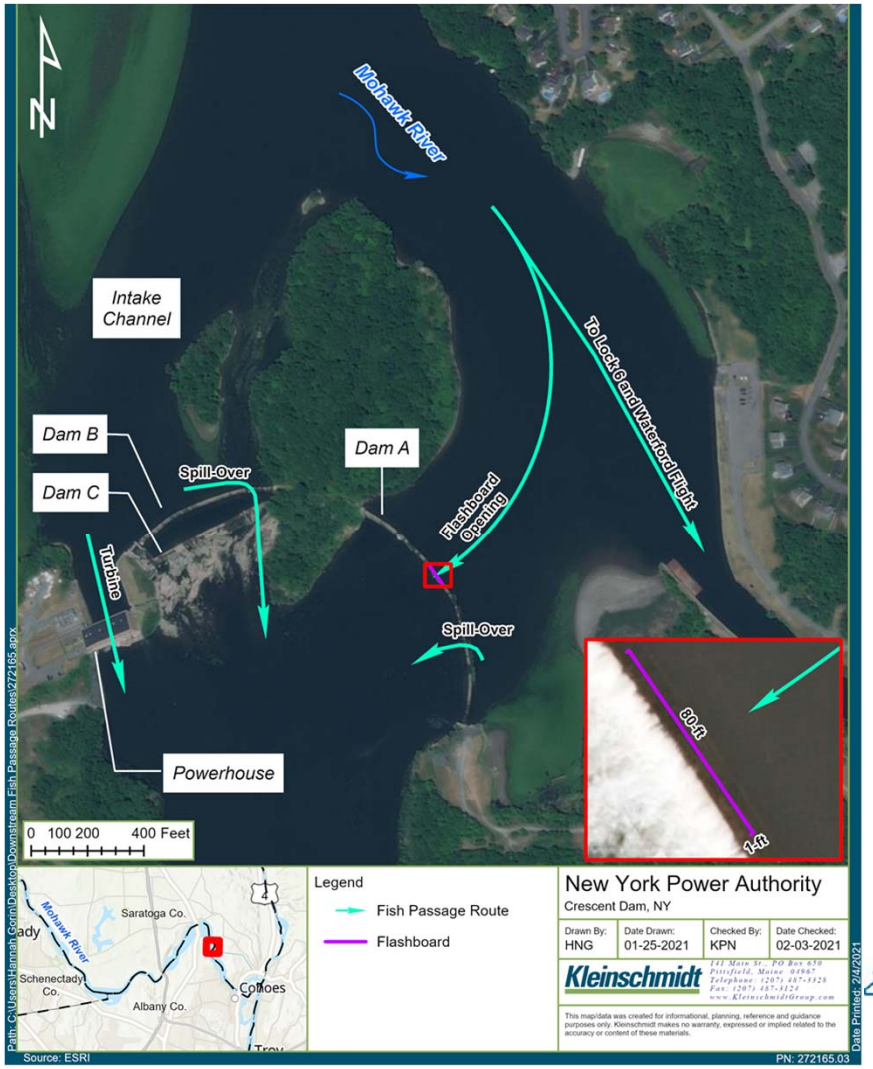
- American Eel (*Anguilla rostrata*)
- Blueback Herring (*Alosa aestivalis*) – evaluated in further detail in Blueback Herring study
- Smallmouth Bass (*Micropterus dolomieu*)
- Walleye (*Sander vitreus*)
- Yellow Perch (*Perca flavescens*)

Project Characteristics

- Trashrack spacing – wider trashracks allow for entrainment, narrower trashracks could result in impingement
- Attractiveness of habitat in intake area relative to other areas of the Project impoundments
- Intake velocities – affected by Project configuration (e.g., intake sections leading to penstocks/turbines) and area relative to amount being generated at the time when fish may encounter the intake area
- Turbine configuration – affects probability of survival for entrained fish
- Fish protection measures are in place for Blueback Herring (e.g., acoustic deterrent systems and flows provide through openings in the flashboards
- Alternative routes of passage are available over spillway and through openings in the flashboards where downstream flow is provided (which could be used by multiple species)

Project Characteristics – Location and Alternative Routes of Passage

- Mohawk River
  - >10-mile-long impoundments
  - Multiple channels at Crescent
  - Lock Systems
  - Acoustic Deterrent System (see Blueback Herring Study)



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Project Characteristics – Location and Alternative Routes of Passage

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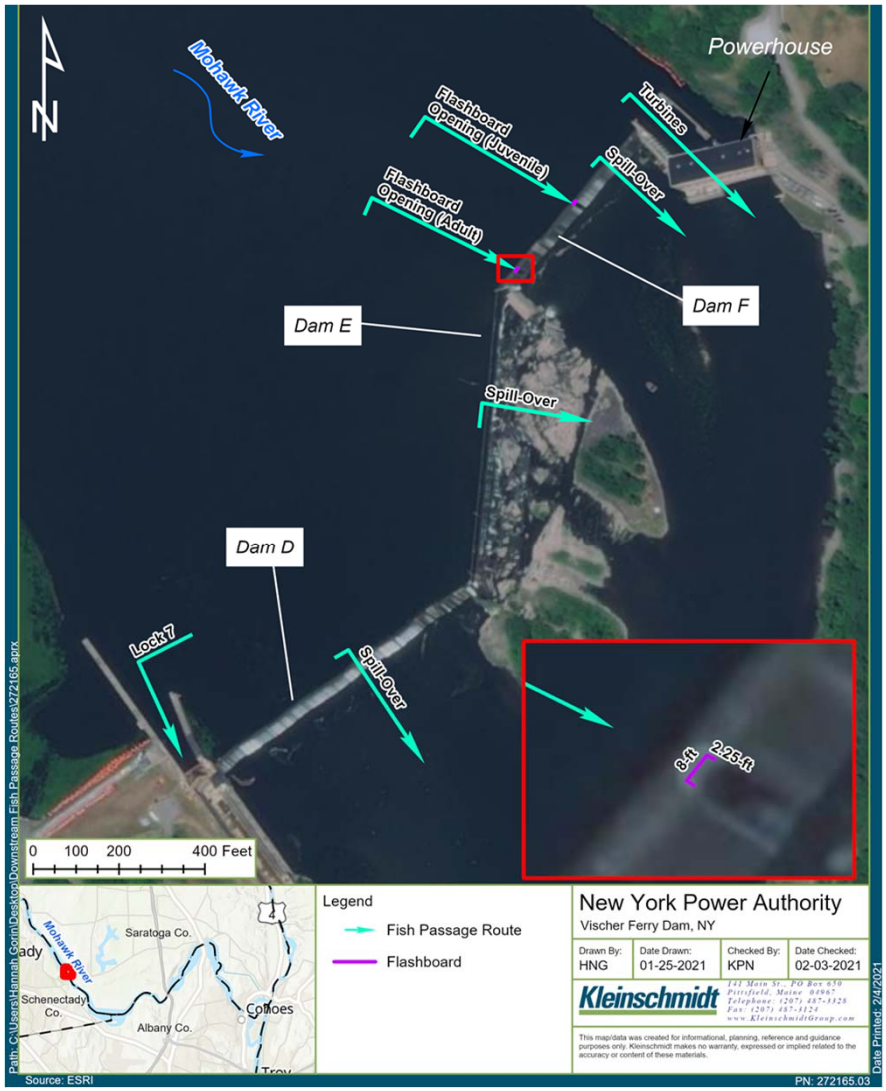

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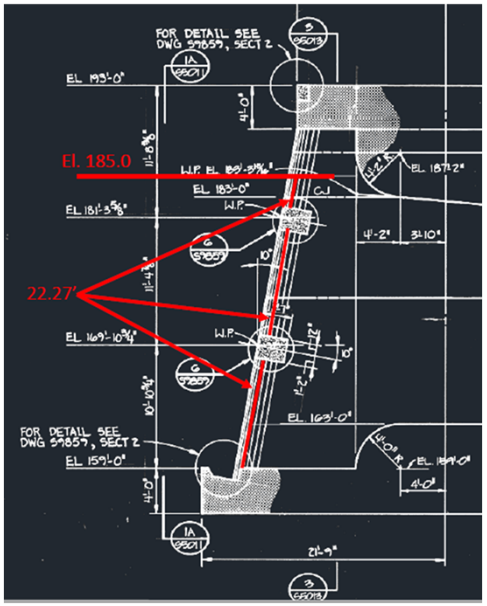
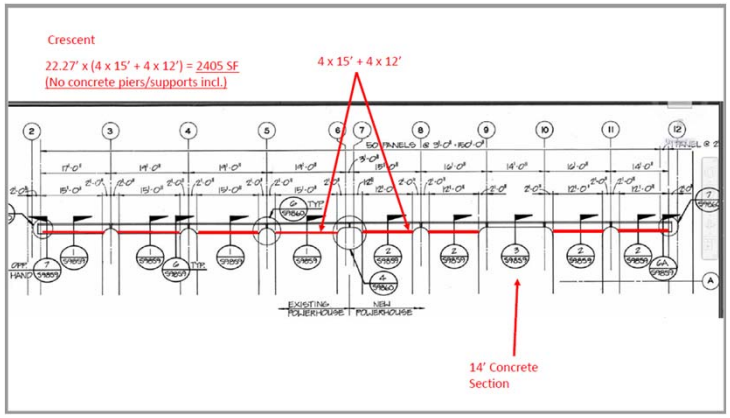
Project Characteristics – Intake Configuration





- Projects have similar (mirror image) intake configurations
- Span entire water column
- Separate Kaplan/Francis sections
- Drawings – calculation of gross trashrack area and calculated velocities

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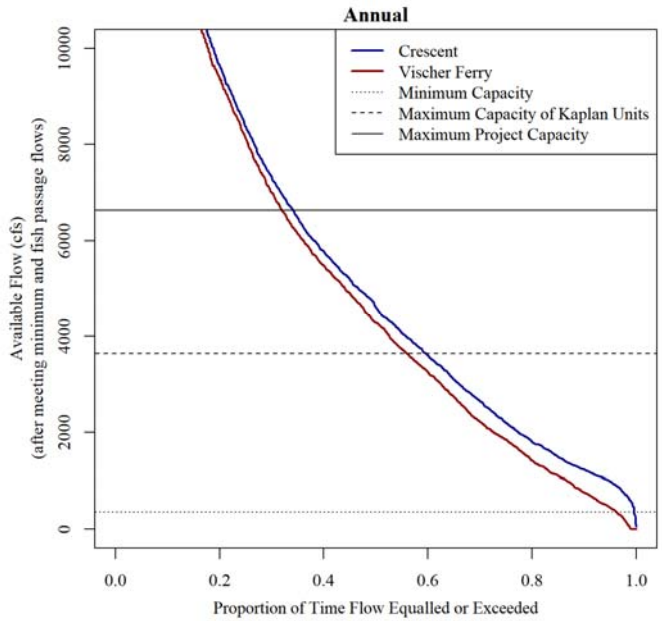
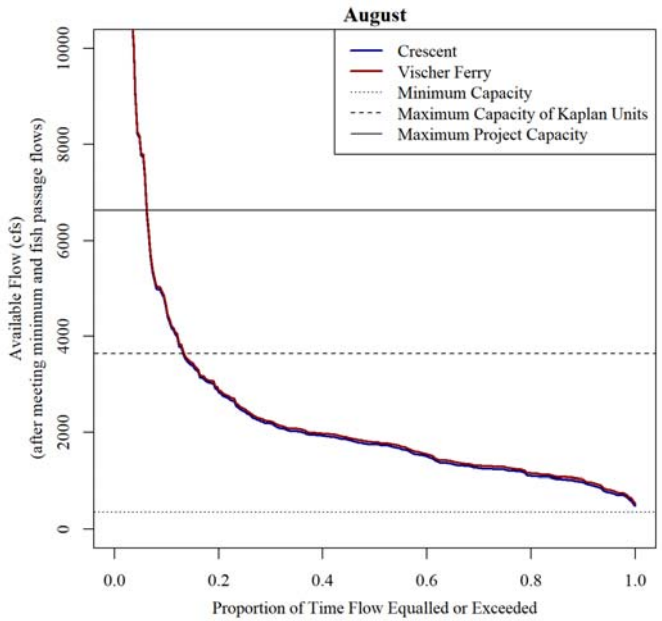
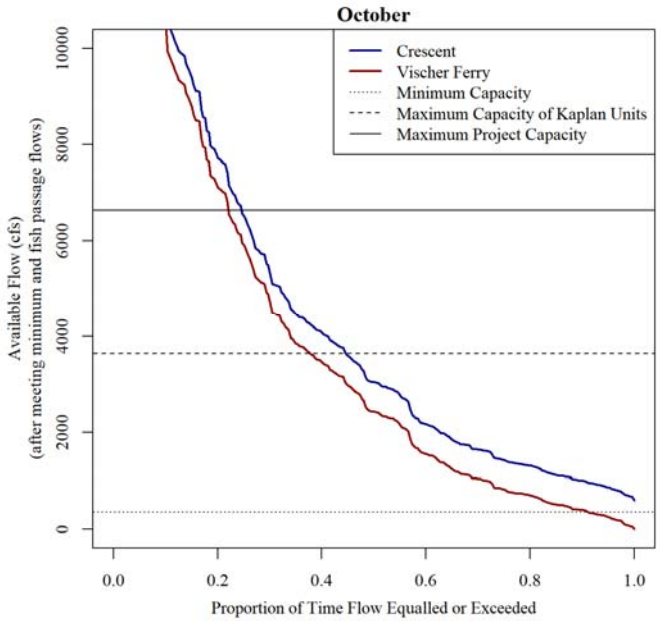
Project Characteristics – Hydrology







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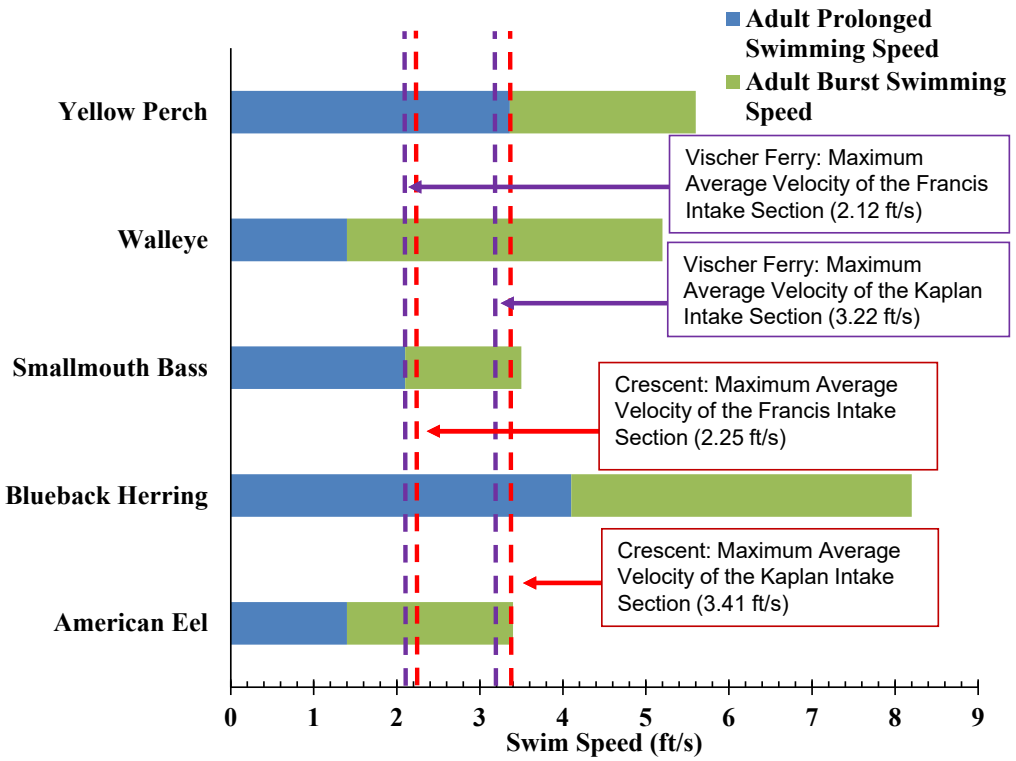
Project Characteristics – Maximum Calculated Intake Velocities



- Adult Fish
  - Swim speeds to avoid involuntary entrainment or impingement most of the time
- Juvenile Fish
  - Lower swim speeds, more likely to become entrained (too small to become impinged), though Project is not always generating at full capacity when they would encounter the intake

Note: Field measurements were collected but eddies and turbulence resulted in lower velocity readings in front of the trashracks. Therefore, the maximum calculated velocities were used to be conservative to the resource

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Project Characteristics – Turbine Characteristics – Survival of Entrainment

Parameter	Crescent/Vischer Ferry Project	
	Units 1 and 2	Units 3 and 4
Turbine Type	Vertical Francis	Vertical Kaplan
Number of blades	15	5
Max turbine discharge (cfs)	1,500	1,820
Efficiency at max discharge	84.7%	90.1%
Min turbine discharge (cfs)	400	350
Runner diameter (ft)	7.18	9.02
RPM	90	144
Maximum head (ft)	27.9/26.5	27.9/27.0
Diameter of Runner at Inlet (ft)	7.18	NA
Diameter of Runner at Discharge (ft)	10.97	NA
Runner height at Inlet (ft)	4.29	NA

Length of Fish (inches)	Crescent		Vischer Ferry	
	Francis	Kaplan	Francis	Kaplan
1	97.81%	99.07%	97.78%	99.07%
2	95.62%	98.13%	95.56%	98.13%
3	93.43%	97.20%	93.34%	97.20%
4	91.24%	96.26%	91.13%	96.26%
5	89.05%	95.33%	88.91%	95.33%
6	86.86%	94.40%	86.69%	94.40%
7	84.68%	93.46%	84.47%	93.46%
8	82.49%	92.53%	82.25%	92.53%
9	80.30%	91.59%	80.03%	91.59%
10	78.11%	90.66%	77.81%	90.66%
11	75.92%	89.72%	75.60%	89.73%
12	73.73%	88.79%	73.38%	88.79%
28	38.70%	73.84%	37.88%	73.85%
29	36.51%	72.91%	35.66%	72.91%
30	34.32%	71.98%	33.44%	71.98%
31	32.13%	71.04%	31.22%	71.04%

- High survival for small fish
- Larger fish have lower probabilities of blade strike if passed through Kaplan turbine
- Patterns are consistent with EPRI survival data published by Winchell et al. (2000).
- Eels/Herring evaluated further based on available studies and literature

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Entrainment

Target Species	Population-Level Entrainment Effects
American Eel	Low - Though individual emigrating adults would be susceptible to entrainment, the population upstream of the Projects is currently believed to be low based on existing information. Therefore, few individuals would be subjected to entrainment.
Blueback Herring	Low - The acoustic array would divert substantial numbers of individuals to alternative routes of passage. Those that become entrained have been documented to exhibit high rates of survival.
Smallmouth Bass	Minimal - Non-migratory resident species with occasional entrainment of individuals on a seasonal basis. Adults and juveniles have swimming capabilities to avoid entrainment during periods when they would be most likely to encounter the intake structure.
Walleye	Minimal - Non-migratory resident species with occasional entrainment of individuals on a seasonal basis. Adults and juveniles have swimming capabilities to avoid entrainment during periods when they would be most likely to encounter the intake structure.
Yellow Perch	Minimal - Non-migratory resident species with occasional entrainment of individuals on a seasonal basis. Adults have swimming capabilities to avoid entrainment and juveniles would be likely to survive entrainment to populate downstream areas.

- Entrainment of individuals of each target species is possible, but would occur at relatively low frequencies which would limit population-level effects

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Impingement

Common Name	Scaling Factor for Body Width	Minimum Length Excluded (inches)	Lengths from Literature (inches)		Size of Fish (total length, inches) excluded by existing trashracks
		3 7/8 inch Clear Spacing	Adult		
			Typical	Maximum	
American Eel	0.040	96.9	Males: 14 – 16.5[6] Females: 17 – 26[6]	59.8[5]	No fish of any size excluded
Blueback Herring	0.130	29.8	7.9 – 11.4[4]	15[1]	No fish of any size excluded
Smallmouth Bass	0.128	30.3	8 - 15[3]	20.5[2]	No fish of any size excluded
Walleye	0.125	31.0	13 – 20[3]	32[2]	Very large individuals (length = 31"+)
Yellow Perch	0.114	34.0	10 - 12[1]	15[2]	No fish of any size excluded

[1] Source: Smith 1985
[2] Source: NYSDEC 2018
[3] Source: Scott and Crossman 1973
[4] Source: LFHA 1992
[5] Source: USFWS 2020
[6] Source: Solomon and Beach 2004

- Impingement is highly unlikely to occur for the target species – most would pass through the racks and very large walleye would have swimming capabilities to escape
- No population-level effects

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Questions?

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Blueback Herring Study




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Study Goal & Objective

To use existing and theoretical data to estimate adult and juvenile Blueback Herring (BBH) downstream passage whole station survival associated with the Crescent and Vischer Ferry Projects.

Background- Project Characteristics

- Both Projects
  - Operate on a run-of-river basis
  - Head pond fluctuations up to six inches
  - Four Turbines
    - 2 Francis Units
    - 2 Kaplan Units
  - Flashboards during the navigation season
    - Crescent; 12 inches
    - Vischer Ferry; 27 inches

Background – Project Characteristics

- Turbine Operations – after meeting minimum flow & Barge Canal requirements
  - Kaplan Units are the priority for operations – 1,820 cfs capacity each
  - Francis Units – 1,500 cfs each
    - Generation flows
    - 350 – 3,640 cfs; Kaplan Units only
    - >3,640 – 5,140 cfs, a Francis Unit begins operation at 1,500 cfs
    - 5,140 – 6,640 cfs, a 2nd Francis Unit operates at 1,500 cfs
    - >6,640 cfs initiates spill

Background – Downstream Fish Passage

- At both projects, fish have multiple downstream passage options, all of which are likely used to some degree
- Options for passage:
  - turbine passage, spillway passage, bypasses, or Barge Canal
- Passage is enhanced through the operation of acoustic guidance systems which divert fish away from the turbine intakes

Background – Downstream Fish Passage

- Minimum flows
  - Crescent: 250 cfs during Barge Canal navigation season
  - Vischer Ferry: 200 cfs

- Downstream Fish Bypasses
  - Crescent – 80 ft wide x 12 inches deep
  - Vischer Ferry – 8 ft wide x 27 inches deep

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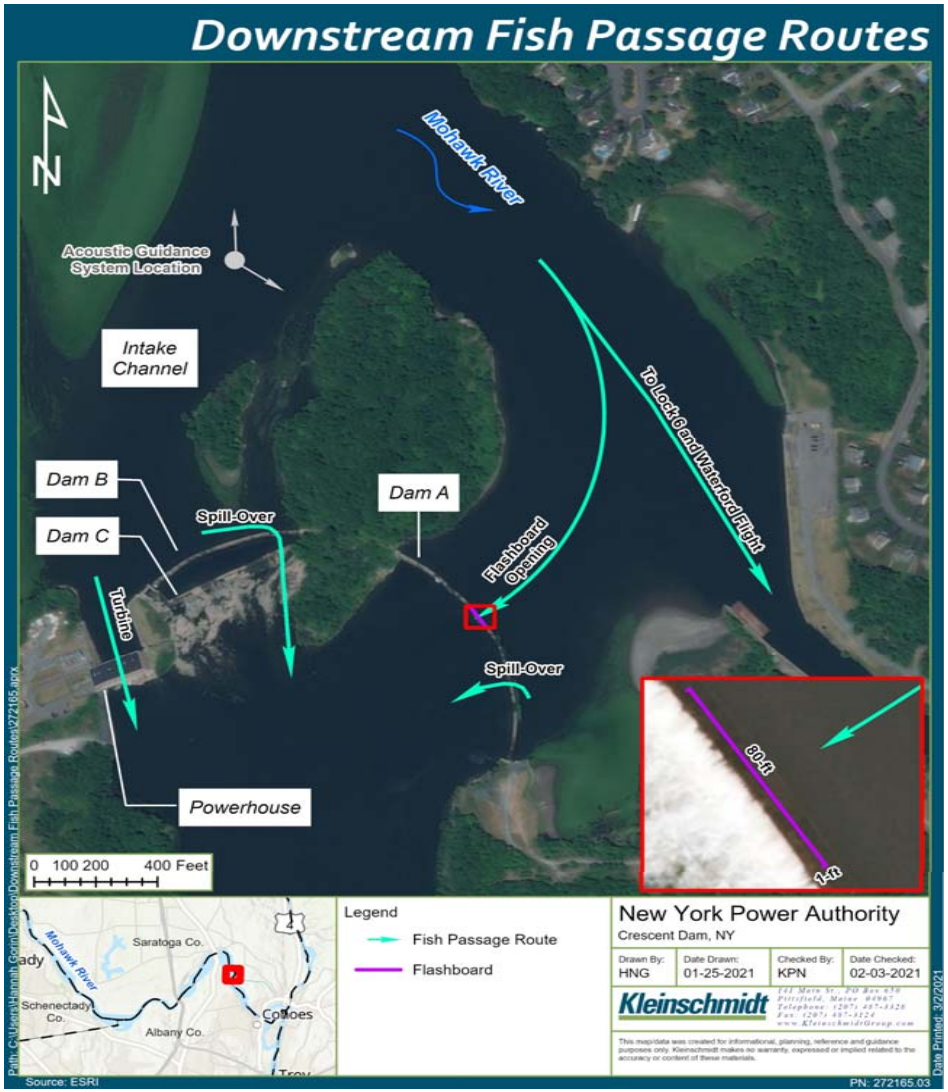
Background – Downstream Fish Passage: Crescent



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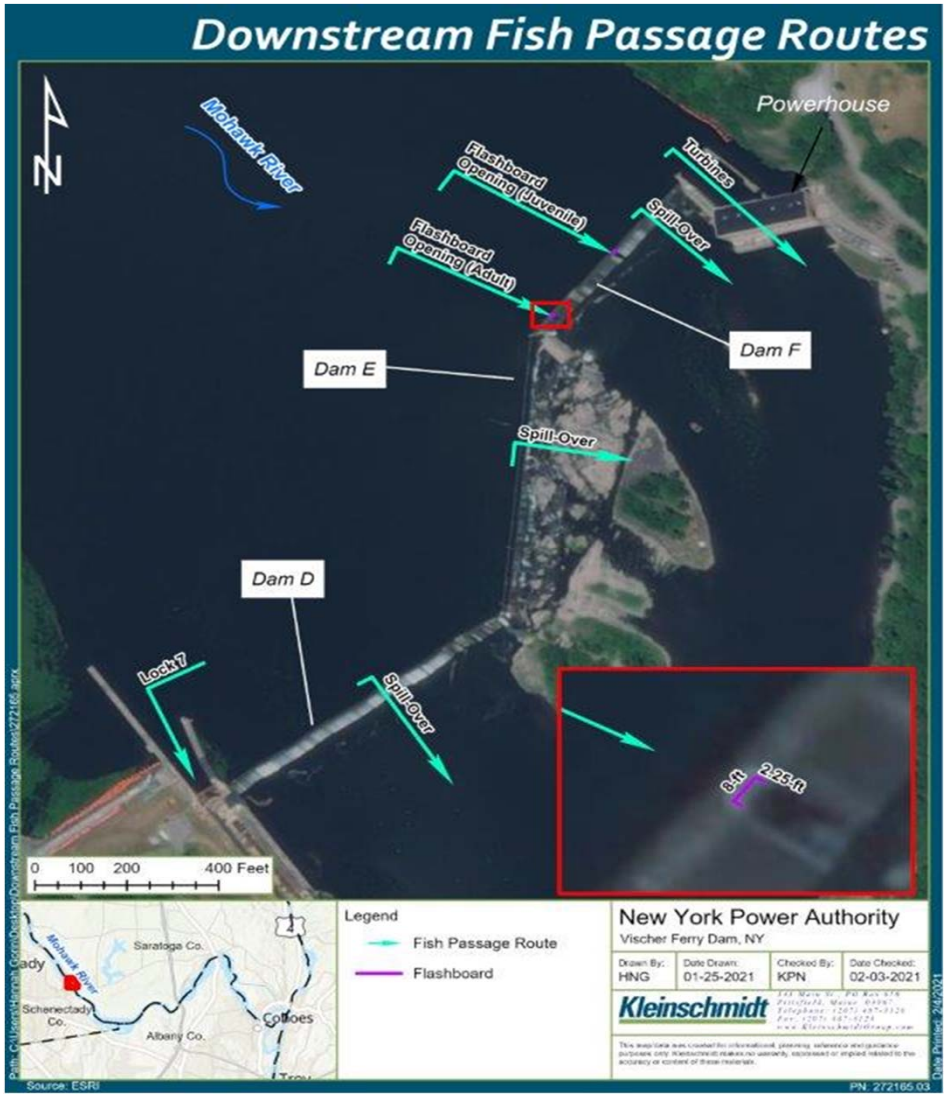
Background – Downstream Fish Passage: Vischer Ferry



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Background – Downstream Fish Passage

- Crescent Project:
  - Downstream passage enhanced by the use of an acoustic guidance system
  - Guides fish away from turbine intake and toward bypass – 76% effective
  - Likely increases the number of fish migrating downstream through the Barge Canal as well

- Vischer Ferry Project:
  - Passage enhanced by acoustic guidance system (bypasses) – 96% effective
  - One opening for adults, one for juveniles
  - Primary river channel and fish movement pattern exposes fish to the bypasses before the Project forebay

Methods – Review of Previous Studies

- Existing studies on downstream passage were reviewed and considered for application to the Projects

- Resources included:
  - EPRI (1997)- a database of turbine passage survival studies for multiple fish species at more than 50 hydropower projects throughout the country
  - Studies conducted after the creation of the EPRI database
  - Studies conducted at the Projects themselves (both turbine and bypass)

Methods – Predictive Models

- Models consider fish size, turbine specifications, and station hydraulics to estimate the blade strike potential
- Model used was the “USFWS Turbine Blade Strike Analysis”
- Model predictions were made for 2 size groups: juvenile and adult BBH
- Flow scenarios evaluated: average, 10% & 90% exceedance flows
- Models were also run with and without the acoustic guidance system operating

Methods – Predictive Models

Bypass Survival

- Empirical tests of juvenile BBH at Crescent: 88.3% survival
  - Enhancements made to the bypass such as plunge pool depth likely increased survival
- Bypass survival is expected to be about 1% for each 10 ft of drop
- Lab testing showed bypass survival for juvenile BBH ranged from 86.0 to 97.5%
  - Except high flow and shallow plunge pool tests, survival ranged from 92.5 to 97.5%
  - Based on these data, all models were run with the low (88.3%) and high (97.0%) bypass survival estimates to bracket potential outcomes

Results of Previous Research (Survival Rates)

- Francis turbine studies conducted elsewhere - turbine passage survival rates from 77.1% to 95.3 %
- Kaplan turbine studies conducted elsewhere - turbine passage survival from 89.1% to 100%
- Empirical tests of juvenile BBH at the Crescent Kaplan Units: 96% survival

Results of Study

Summary of Downstream Passage Survival Estimates by Route of Passage

Range of Downstream Passage Survival Rates (%)				
		Passage Route		
Project	Lifestage	Units 1 & 2 (Francis Units)	Units 3 & 4 (Kaplan Units)	Bypass/Spill
Vischer Ferry	Juvenile	91.2* – 94.2	96.1 – 98.5	88.3 - 97.0
	Adult	77.1* – 85.4	88.3 – 93.9	
Crescent	Juvenile	93.1* – 94.5	95.8 – 97.4	88.3 - 97.0
	Adult	78.3* – 82.7	89.0 – 94.2	

* Represents a worst-case scenario of unit operation at minimum flow. Francis units only operate at maximum discharge.

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Results of Study

- Adult BBH are nearly 3 times as long as Juvenile BBH, thus are expected to experience lower turbine passage survival rates
- Estimates of total station downstream passage survival for adult and juvenile BBH for most months and under most river flow conditions range between 85-98%
- Data supports the conclusion that the acoustic guidance systems at both Projects are effective at directing downstream migrating BBH away from the turbine intakes as intended
- For both lifestages, total station survival estimates are largely driven by bypass/spillway survival rates

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Thank you

Questions?

Aquatic Mesohabitat Study




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Study Goals and Objectives

- Identify and map aquatic habitats at the Projects including:
  - wetlands, riparian, and littoral vegetation communities,
  - submerged aquatic vegetation,
  - and open water habitats.
- Identify and map areas of significant shoreline erosion.

- Evaluates the potential effects, if any, of the Projects' operations on these habitats.
- Considers the differences in water level when the flashboards are both in place and removed.

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Overview of Projects

- Run-of-River operations (allowable fluctuation of 6 inches or less)
- Flashboards during navigation season
  - 12” at Crescent
  - 27” at Vischer Ferry
- 10+ mile-long riverine impoundments

- Study area included Project impoundments and adjacent 50-foot area

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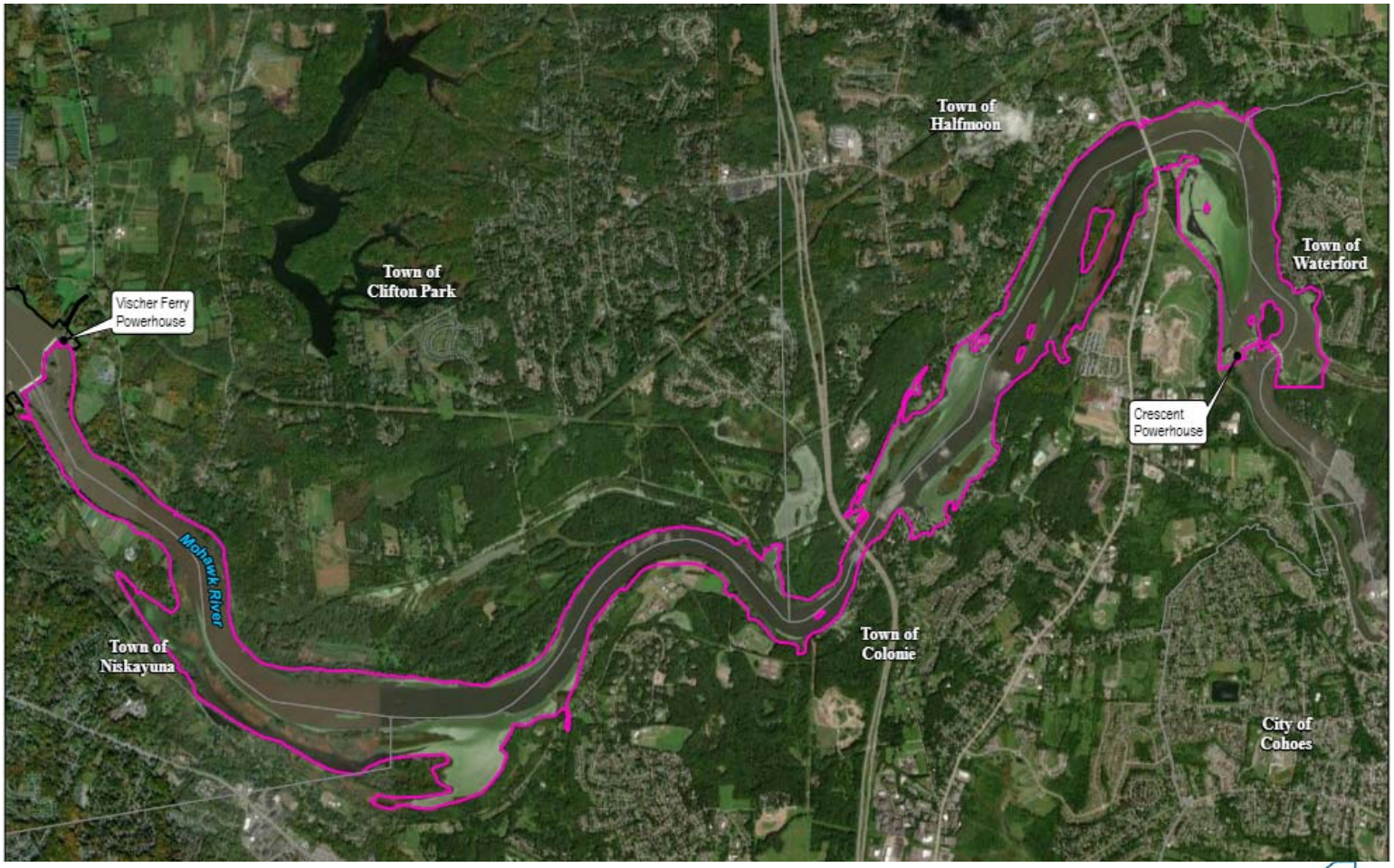

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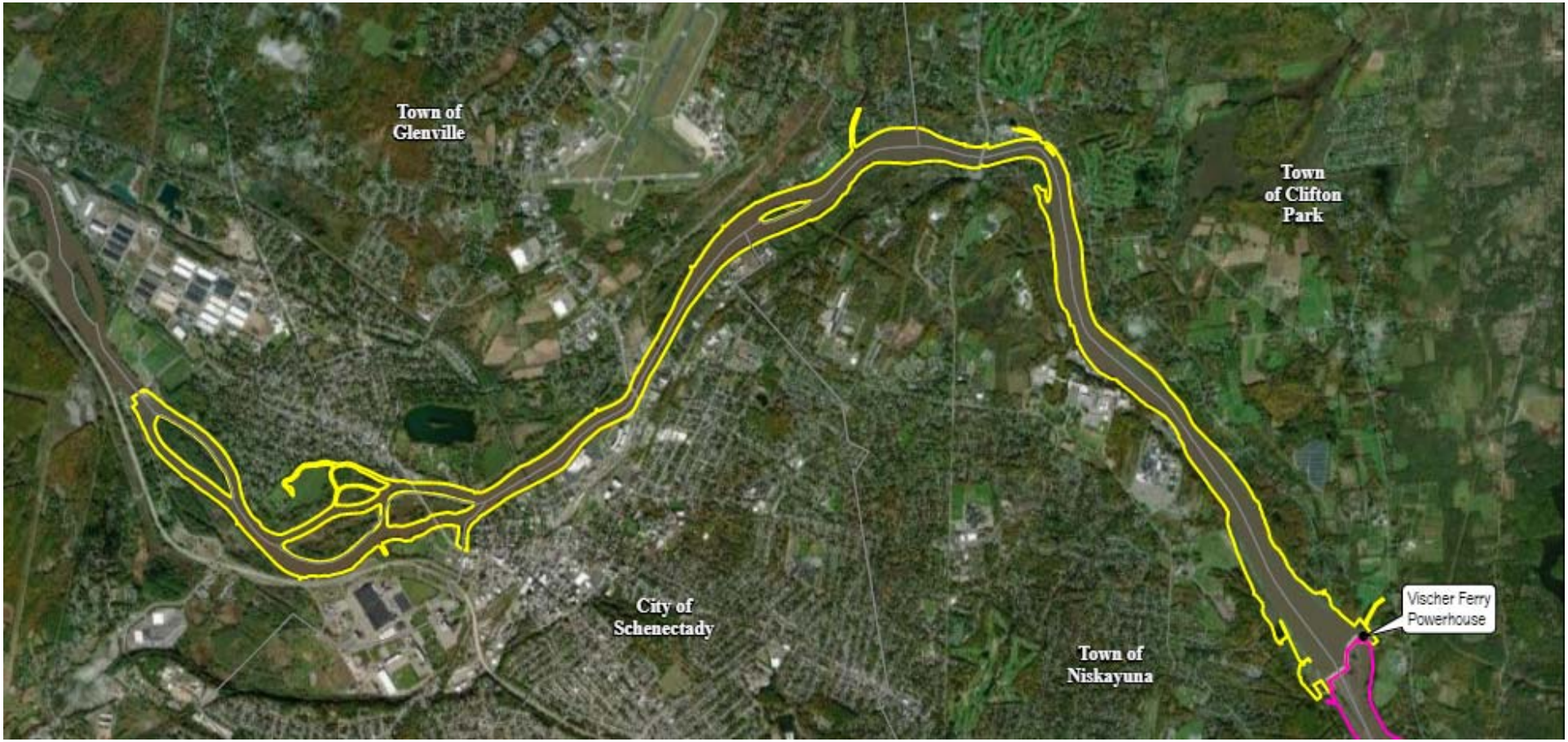

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Study Methods – Desktop

- Base map creation
- Update potential RTE species
- Existing invasive species occurrences
- Preliminary habitat mapping
- Data dictionary for field collection

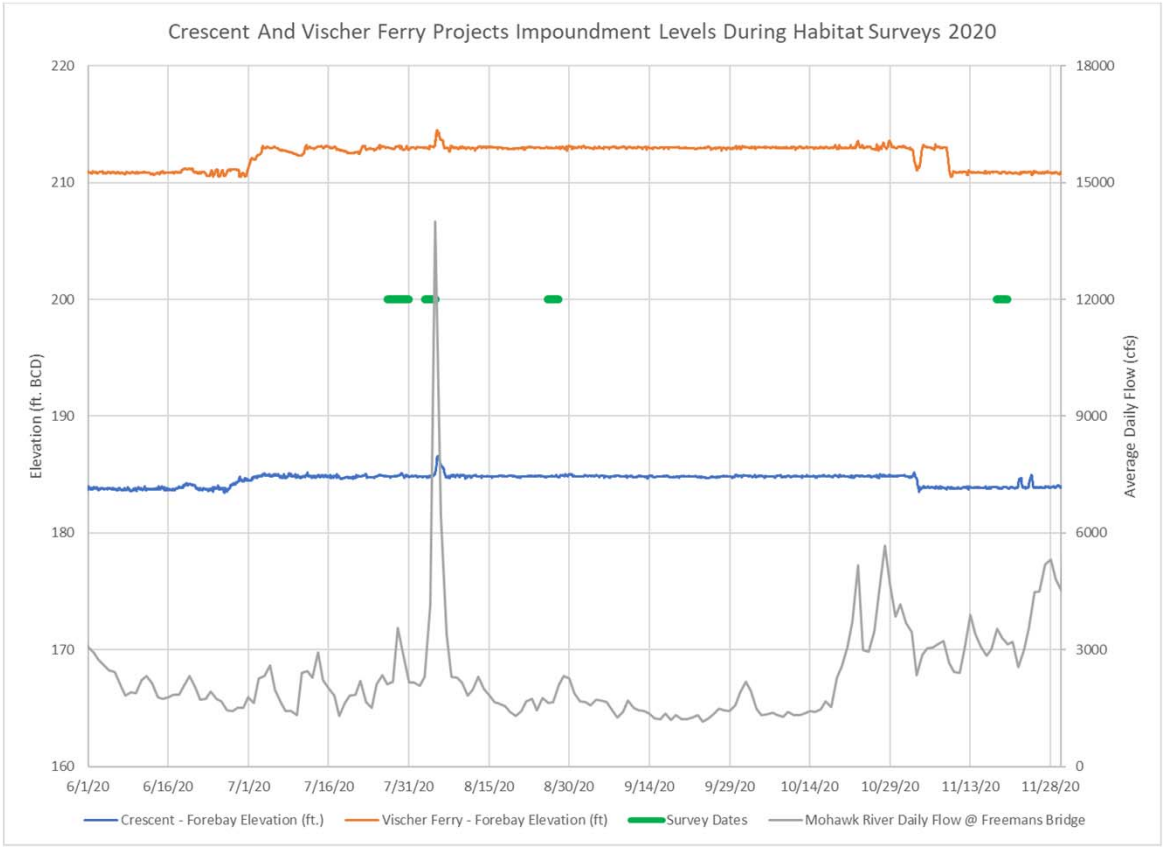
Study Methods – Field

- Summer survey ("Boards Up"): July and August 2020
- Fall survey ("Boards Down"): November 2020

- Riparian land cover and wetland types
- Shoreline erosion observations
- Aquatic habitat mapping
  - Substrate types
  - Vegetation beds
- Observations of mussels and fish spawning
- Wildlife observations

Study Conditions

- Average impoundment elevations during the summer surveys were 184.9’ at Crescent and 213.0‘ at Vischer Ferry.
- The average impoundment elevations during the fall surveys were 183.9’ at Crescent and 210.8’ at Vischer Ferry



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Study Results – Riparian Lands

- Crescent
  - Forested 30%
  - Developed, mostly residential and open space (48%)
  - Wetlands 23%
  - Low gradient slope on shoreline
  - No Bank Erosion
  - Adjacent wetlands prevalent
- Vischer Ferry
  - Forested 44%
  - Developed 34%
  - Wetlands 18%
  - Areas of steeper-sloped shorelines and high banks
  - Very little erosion observed in upper end of impoundment

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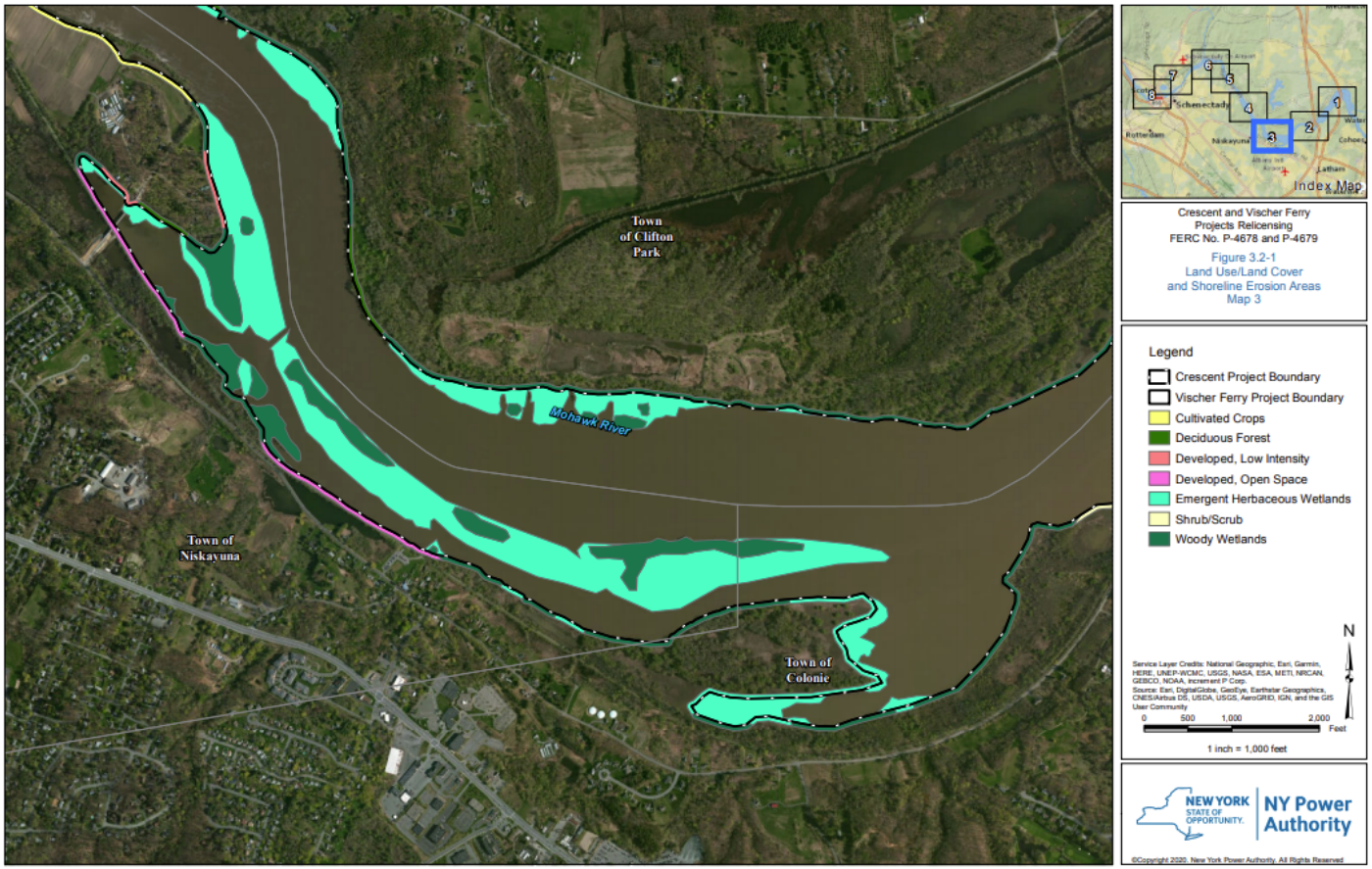
Study Results – Riparian Lands



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Study Results – Wetlands

- Emergent
  - Persistent – most landward (cattail, woolgrass, and sedges and other herbaceous species)
  - Non-Persistent – downslope (arrowhead, smartweed and bur-reed)
  - Phragmites – limited areas of monocultures
- Woody Wetlands
  - PFO1 – Forested Deciduous (cottonwood, silver maple, willow, sycamore)
  - PSS – Scrub/Shrub (willow, dogwood, European alder)
- Aquatic Beds

Study Results – Aquatic Habitat

- Floating aquatic vegetation
  - Water chestnut
  - Monocultures with other species on edges of beds
  - Mostly in silty areas, but can grow over other substrates
- Submerged aquatic vegetation
  - Several native species
- Water depths in the navigation channel are typically at least 10 to 15 feet. Some deeper areas up to 30 feet in the main channel were observed during the field surveys. These deeper areas are generally devoid of vegetation.

Study Results – Wetlands and Aquatic Bed Coverage

Table 3.3-1: Summary of Wetland Area and Coverage within the Crescent Project Boundary

Cover Type	Wetland Classification (NWI)	Area (Acres)	Percent Overall Cover
Emergent Wetland	Palustrine Emergent Persistent (PEM1)	247	12%
	Palustrine Emergent Nonpersistent (PEM2)	3	0.2%
	Palustrine Emergent *Phragmites* (PEM5)	24	1%
	Subtotal	274	13%
Woody Wetland	Palustrine Forested Broad-Leaved Deciduous (PFO1)	53	3%
	Palustrine Scrub-Shrub Broad-Leaved Deciduous (PSS1)	26	1%
	Subtotal	79	4%
Aquatic Bed	Floating	577	27%
	Submerged	36	2%
	Subtotal	613	29%
Total Coverage of all Wetlands		**966**	**46%**
Total Area of Crescent Impoundment (measured in GIS)		**2108**	**-**

Table 3.3-2: Summary of Wetland Area and Coverage within the Vischer Ferry Project Boundary

Cover Type	Wetland Classification (NWI)	Area (Acres)	Percent Overall Cover
Emergent Wetland	Palustrine Emergent Persistent (PEM1)	18.0	1.6%
	Palustrine Emergent Nonpersistent (PEM2)	2.4	0.2%
	Palustrine Emergent *Phragmites* (PEM5)	0.2	0.01%
	Subtotal	20.6	1.8%
Woody Wetland	Palustrine Forested Broad-Leaved Deciduous (PFO1)	6.0	0.5%
	Palustrine Scrub-Shrub Broad-Leaved Deciduous (PSS1)	1.0	0.1%
	Subtotal	7.0	0.6%
Aquatic Bed	Floating	187	16%
	Submerged	74	7%
	Subtotal	261	23%
Total Coverage of all Wetlands		**289**	**25%**
Total Area of Vischer Ferry Impoundment (measured in GIS)		**1137**	**-**

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Study Results – Aquatic Vegetation Species

Table 3.4-1: Summary of Aquatic Vegetation Species Observed in both Crescent and Vischer Ferry Project Boundaries

Common name	Scientific Name	Invasive /PRISM Tier	Notes
Clasping-leaved pondweed	*Potamogeton perfoliatus*	No	Common in both impoundments
Floating pondweed	*Potamogeton natans*	No	Common in both impoundments
Sago pondweed	*Stuckenia pectinata*	No	Common in both impoundments
Water stargrass	*Heteranthera dubia*	No	Very common in both impoundments
Coontail	*Ceratophyllum demersum*	No	Only observed in Crescent impoundment (common)
Tapegrass	*Vallisneria americana*	No	Very common in both impoundments
Bladder wort	*Ultricularia spp.*	No	Very sparse; only observed in Crescent impoundment
Common waterweed	*Elodea canadensis*	No	Very sparse in both impoundments
European water chestnut	*Trapa natans*	Yes/Tier 4	Abundant monocultures in both impoundments
Eurasian milfoil	*Myriophyllum spicatum*	Yes/Tier 4	Common in both impoundments
Curly-leaved pondweed	*Potamogeton crispus*	Yes/Tier 4	Sparse in both impoundments
Brittle naiad	*Najas minor*	Yes/Tier 3	Common in both impoundments

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Study Results – Substrate

Table 3.6-1: Summary of The Crescent Project Shoreline Substrate Type Percent Cover and Total Length in Feet

Substrate	Length (ft)	Length (miles)	Percentage
Boulder	7,827	1.5	5%
Clay	0	0.0	0%
Cobble	37,431	7.1	22%
Gravel	21,255	4.0	12%
Ledge	14,354	2.7	8%
Sand	96	<0.01	<0.01%
Silt	89,222	16.9	52%
Total	170,186	32.2	100%

Percent Cover in respect to the total Project Boundary Perimeter

Table 3.6-2: Summary of The Vischer Ferry Project Shoreline Substrate Type Percent Cover and Total Length in Feet

Substrate	Length (ft)	Length (miles)	Percentage
Boulder	36,522	6.9	23%
Clay	2,250	0.4	1%
Cobble	26,178	5.0	16%
Gravel	22,973	4.4	14%
Ledge	2,885	0.5	2%
Sand	0	0.0	0%
Silt	71,167	13.5	44%
Total	161,975	30.7	100%

Percent Cover in respect to the total Project Boundary Perimeter

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Study Results – Mussels

- Three species found in fall survey
- 2 live mussels found
- Relic shells more abundant at Crescent
- No evidence of fish nests found

Table 3.6-3: Native Freshwater Mussel Species Observed within the Crescent and Vischer Ferry Project Boundary.

Common name	Scientific name	State Conservation Status Rank
Eastern Lampmussel	*Lampsilis radiata*	S4S5
Fragile Papershell	*Leptodea fragilis*	S3
Giant Floater	*Pyganodon grandis*	S4

State Conservation Status Rank:

S3 = Vulnerable in NYS.

S4 = Apparently Secure in NYS.

S5 = Secure in NYS.

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Study Results – Wildlife

- Bald Eagle
  - Adults and juveniles observed
- Wading birds
  - Heron and egret species very common in shallow areas and floating aquatic beds
- Other observations
  - Wetlands and riparian areas used by variety of species

Littoral Zone With Boards Down

- 12 inch difference at Crescent
- ~27 inch difference at Vischer Ferry
- PEM Persistent wetlands intact, adapted to seasonal inundation
- PEM Non-persistent and aquatic beds in boards down zone senesce by early fall
- Width of zone depends on slope
- Littoral substrates exposed but very little erosion

Questions?

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Lunch – 30 minute break

Bald Eagle Study UPDATE




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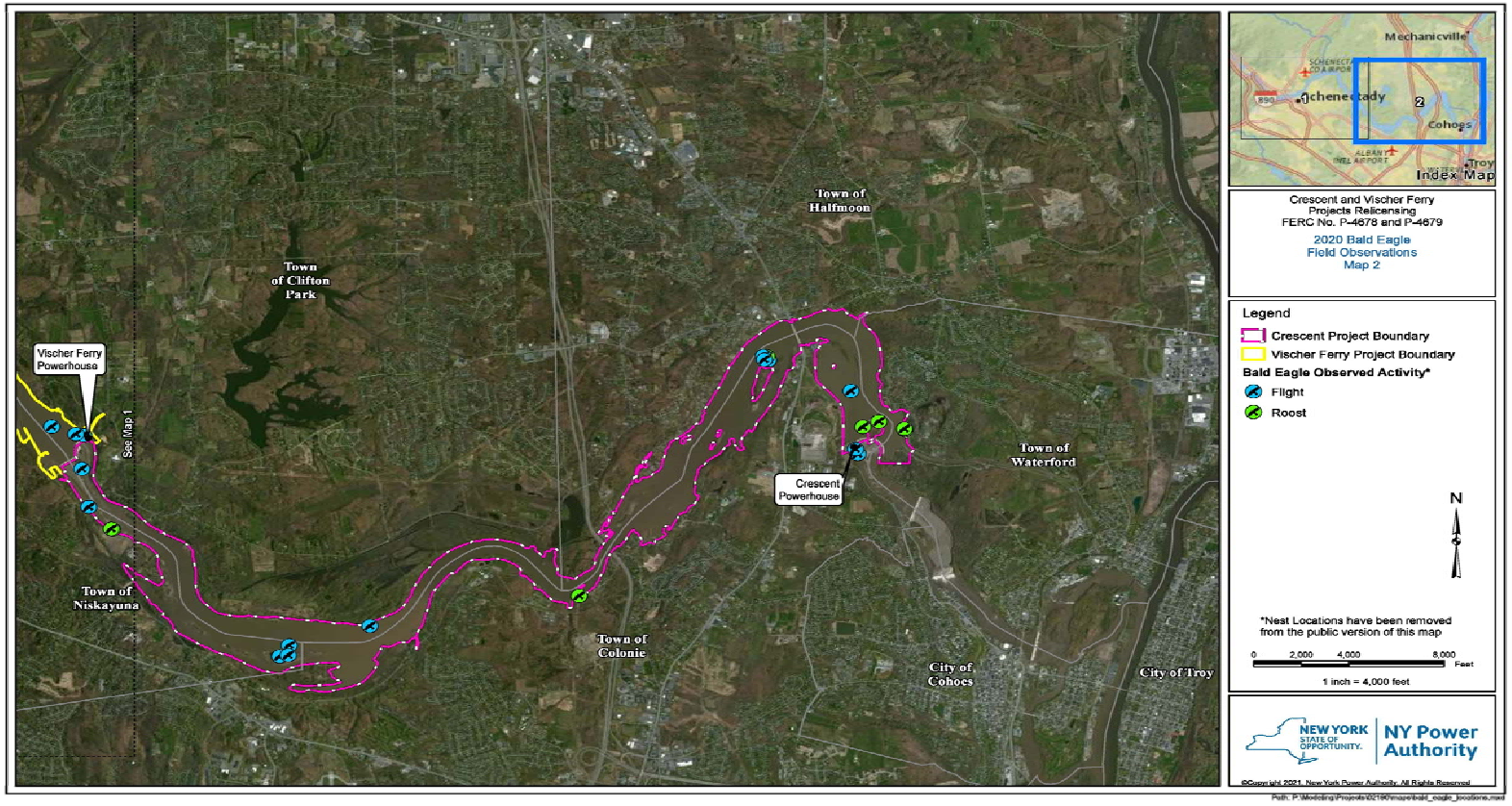
Study Goals and Objectives

- Study Purpose and Goals
  - Identify and map areas of existing and potential bald eagle nesting, roosting, and foraging habitats at the Projects
  - Monitor and record bald eagle activities in those areas

Bald Eagle Study Update

- Bald Eagle Study start delayed due to Covid-19 pandemic
  - General observations of eagle use of Project areas made as part of Aquatic Mesohabitat Study and during water quality monitoring visits in 2020
  - Bald Eagle nesting survey will be conducted in April 2021
- Study update provided in ISR
- Final Bald Eagle Study report will be included in the USR (February 2022)

Crescent Project Eagle Observations



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Vischer Ferry Project Eagle Observations

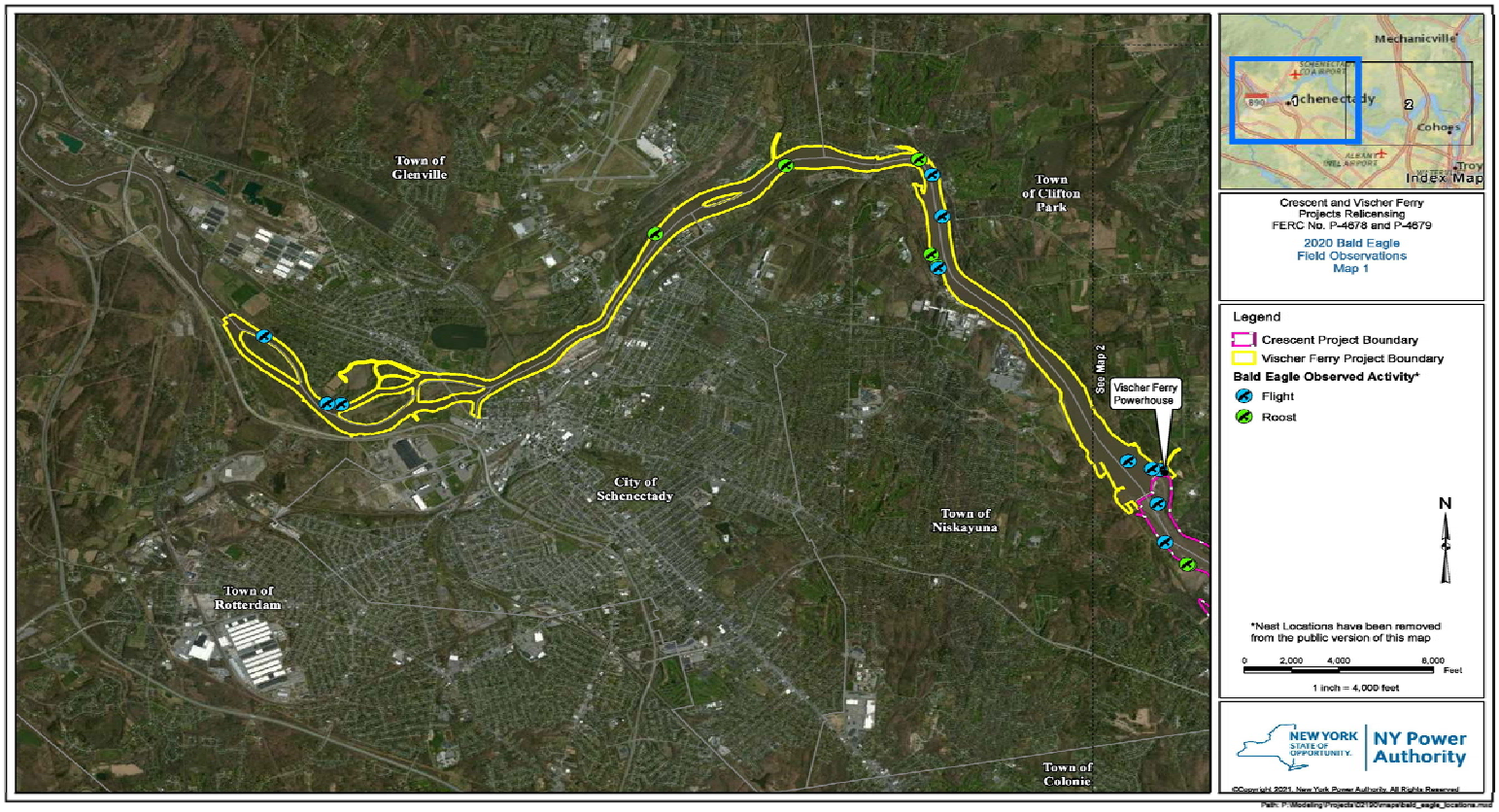

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Table 2.6-1 Bald Eagle Observations at the Crescent and Vischer Ferry Projects, 2020

Date Observed	Bird Observed	Activity Observed	Notes	Project	Lat.	Long.
8/1/2020	Adult	Roost		Vischer Ferry	42.84094	-73.9227
8/1/2020	Adult	Flight		Vischer Ferry	42.81766	-73.9725
8/1/2020	Juvenile	Flight		Vischer Ferry	42.81773	-73.9747
8/1/2020	Juvenile	Roost		Vischer Ferry	42.83785	-73.8792
8/1/2020	Adult	Roost		Vischer Ferry	42.83626	-73.8782
8/1/2020	Adult	Flight		Vischer Ferry	42.83597	-73.8781
8/4/2020	Adult	Roost	2	Vischer Ferry	42.85029	-73.902
8/21/2020	Adult	Flight		Crescent	42.77851	-73.8116
8/21/2020	Adult	Roost		Crescent	42.79479	-73.839
8/21/2020	Adult	Roost		Crescent	42.79487	-73.8392
8/21/2020	Adult	Flight		Crescent	42.77696	-73.8131
8/21/2020	Juvenile	Flight		Crescent	42.77714	-73.8117
8/21/2020	Juvenile	Flight		Vischer Ferry	42.8431	-73.8774
8/21/2020	Adult	Flight		Crescent	42.81769	-73.736
8/21/2020	Adult	Roost		Crescent	42.80903	-73.7188
8/26/2020	Juvenile	Flight		Vischer Ferry	42.80913	-73.8484
8/26/2020	Juvenile	Flight		Crescent	42.804517	-73.7221
8/27/2020	Juvenile	Roost		Crescent	42.80786	-73.7147
8/27/2020	Adult	Roost		Crescent	42.808	-73.7148
8/27/2020	Adult	Roost		Crescent	42.81823	-73.7362
8/27/2020	Juvenile	Flight		Crescent	42.81828	-73.7368
8/27/2020	Adult	Flight		Crescent	42.81774	-73.7366
8/27/2020	Adult	Roost		Crescent	42.78509	-73.766
8/27/2020	Adult	Flight		Crescent	42.80324	-73.8437
9/3/2020	Adult	Flight		Crescent	42.805233	-73.7224
9/3/2020	Adult	Flight		Vischer Ferry	42.807932	-73.8433
9/10/2020	Juvenile	Flight	2	Vischer Ferry	42.80808	-73.8446
10/2/2020	Adult	Flight		Crescent	42.813324	-73.7231
10/7/2020	Undetermined	Roost		Crescent	42.80827	-73.7213
11/19/2020	Adult	Flight		Crescent	42.78114	-73.7988
11/19/2020		Nest	fall	Crescent	*	*
11/19/2020	Adult	Flight	fall	Crescent	42.79792	-73.8427
11/20/2020	Adult	Flight	fall	Vischer Ferry	42.84886	-73.8789
11/20/2020	Adult	Roost	fall	Vischer Ferry	42.851	-73.881
11/20/2020	Adult	Flight	fall	Vischer Ferry	42.82711	-73.9846

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Thank you

Questions?

Recreation Study Update




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Recreation Study Update

- RSP approved by FERC
- Study deferred in 2020 due to Covid-19 pandemic
- The field work for this study will be conducted from May through October 2021
- Study report will be filed with USR in 2022

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American Eel Study Update




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American Eel Study Update

- Feb 2020 FERC issued SPD, recommended additional study: American Eel Study
- NYPA undertook additional informal consultation with USFWS and NYSDEC.
- Nov 19, 2020 NYPA met with agencies at the Projects to scope out potential eel sampling locations.
- NYPA shared draft American Eel Study plan with agencies; consultation held December 17, 2020.
- Comments received; NYPA revised the draft study plan and again shared it with the agencies.
- Jan 2021 USFWS and NYSDEC in agreement with the revised study plan.
- Feb 2021 NYPA submitted the RSP for the American Eel Study to FERC as an RSP addendum.

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American Eel Study Update

- American Eel Study will be undertaken in 2021 to assess presence/abundance of American Eel
    - Three sampling methods:
        1. Spring 2021: Nighttime observations
        2. Beginning in mid-May 2021: Eel ramp traps will be deployed, and
        3. July & Aug 2021: Nighttime boat electrofishing.
- Study Report to be Filed with USR in Feb 2022

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Vischer Ferry Ice Jam Update




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Reimagine the Canals Effort

- Multi-year collaborative effort funded and directed by Canals and NYPA
- Includes scientists and scholars from universities, community stakeholders, municipal representatives, and the NYSDEC, among others
- Focus topics within the vicinity of the C and VF Projects:
  - Flooding
  - Improvements to fish and aquatic environment

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Ice Jam Study

- Led by world renowned ice experts from Clarkson University
- 80% of flooding in Stockade district result from ice jams
- Areas of modeling and further evaluation
  - Use of icebreakers
  - Modification of VF Dam
  - Channel modifications
- Early Warning System

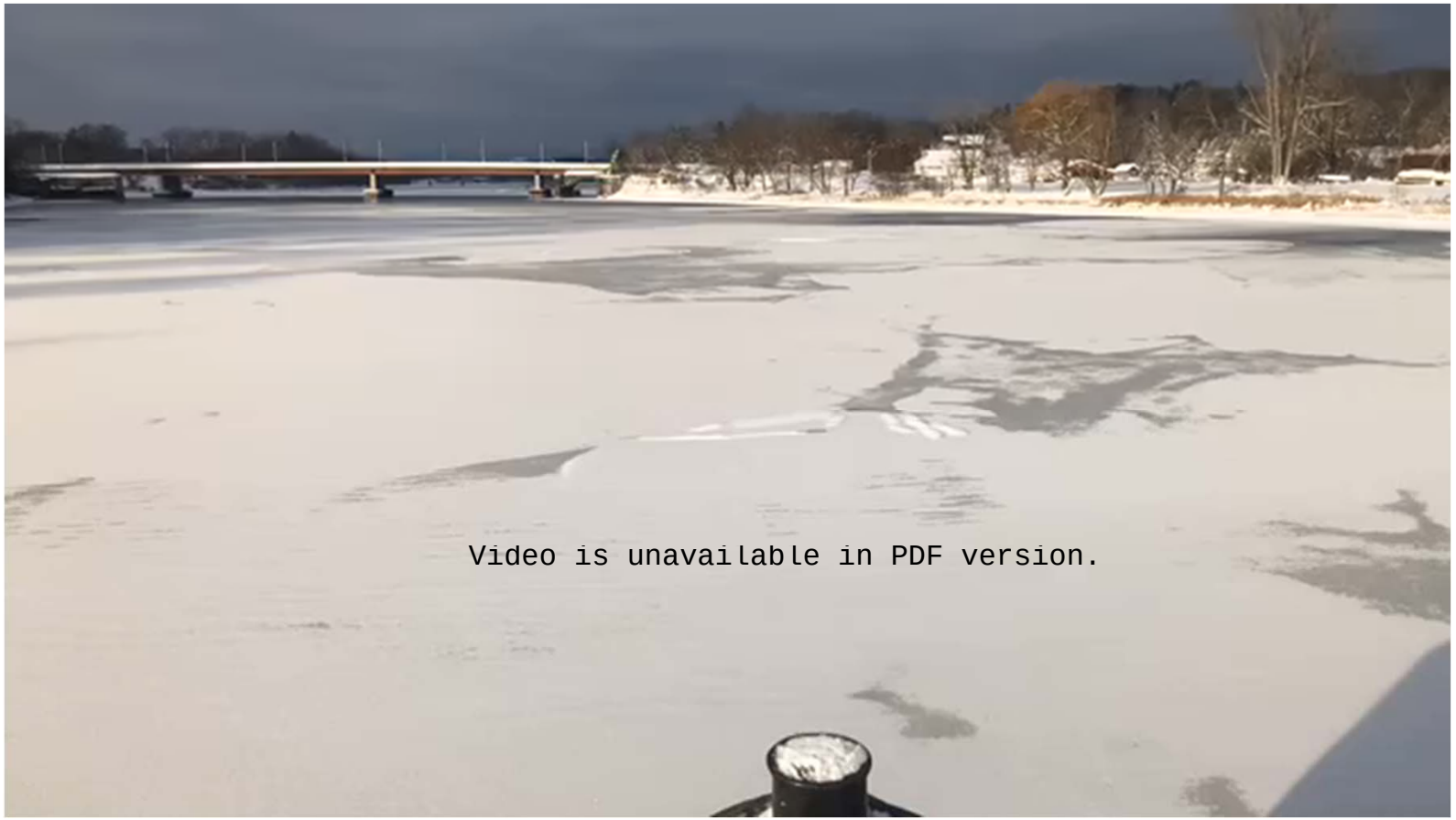
2020 Efforts and Findings

- Pilot program to test ice breaking
- Recommendation to further study VF dam modifications
  - Replace some flashboards with Obermeyer gates
  - Would require improvements to concrete spillway
  - Extensive engineering and dam safety considerations
  - Work within the regulatory process
  - Estimated timeframe: 2025-2026

Ice Jam Warning System

- Begin development in 2021

- Objectives:
  - Tool for early warning and response
  - Include sensors, monitoring equipment and cameras
  - Include inundation mapping to assist responders



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Crescent and Vischer Ferry Projects Relicensing Next Steps

- **March 3, 2021 –Power Authority holds ISR Meeting**
- March 18, 2021 – Power Authority files ISR Meeting Summary with FERC
- April 19, 2021 – Stakeholders file disagreements on ISR; modifications to ongoing studies; requests for new studies
- May 19, 2021 – Stakeholders file responses to disagreements and study modifications with FERC
- June 18, 2021 - FERC issues determination to resolve disagreements and amend Study Plan

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Thank you

Questions?

Contact: Cynthia.Brady@nypa.gov

Project website: http://www.nypa.gov/cvf