UNITED STATES OF AMERICA

BEFORE THE FEDERAL ENERGY REGULATORY COMMISSION

FINAL APPLICATION FOR NEW LICENSE FOR MAJOR PROJECT – EXISTING DAM

EXHIBIT E – ENVIRONMENTAL REPORT

Prepared by: Gomez and Sullivan Engineers

July 2020

GREGORY B. JARVIS PROJECT RELICENSING FERC NO. 3211

New York State of Opportunity | NY Power Authority

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List of Abbreviations

ACHP	Advisory Council on Historic Preservation
A.D.	Anno Domini (Common Era)
APA	Adirondack Park Agency
APE	Area of Potential Effects
APIPP	Adirondack Park Invasive Plant Program
ATV	All-terrain vehicle
B.C.	Before Common (Era)
BCD	Barge Canal Datum
°C	Degrees centigrade
CaCO3	Calcium carbonate
cfs	cubic feet per second
cm	centimeter
Commission	Federal Energy Regulatory Commission
CRIS	New York State Cultural Resource Information System
CROTS	catch rate oriented trout stocking
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
DHP	Division for Historic Preservation
DLA	Draft License Application
DO	Dissolved oxygen
DOC	Department of Commerce
DOI	Department of Interior
EAV	emergent aquatic vegetation
El.	elevation
EFH	Essential Fish Habitat
EPA	Environmental Protection Agency
EPT	Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trichoptera (caddisflies)
ESA	Federal Endangered Species Act
FERC	Federal Energy Regulatory Commission
FLA	Final License Application
FPA	Federal Power Act

ft	foot/feet
h	height
HOCCP	Herkimer-Oneida Counties Comprehensive Planning Program
HPMP	Historic Properties Management Plan
HRWG	Hinckley Reservoir Working Group
ICAP	installed capacity market value
IGTS	Iroquois Gas Transmission system
IHNv	infectious hematopoietic necrosis
ILP	Integrated Licensing Process
IPaC	Information for Planning and Consultation
IPNv	infectious pancreatic necrosis virus
ISR	Initial Study Report
Kf	erodibility of the whole soil
km	kilometer
Kw	erodibility of the fine-earth fraction
kV	kilovolt
LCI	Lake Classification and Inventory
LMBv	Largemouth Bass virus
m	meter
Magnuson-Stevens Act	Magnuson-Stevens Fishery Conservation and Management Act
MGD	Million Gallons per Day
mg/L	Milligram per Liter
mi	mile
mL	milliliter
m/s	Meters per second
MVWA	Mohawk Valley Water Authority
MW	megawatt
MWh	megawatt hours
NEPA	National Environmental Policy Act
NHL	National Historic Landmark
NMFS	National Marine Fisheries Service

NOI	Notice of Intent
NRHP or National Register	National Register of Historic Places
NRE	properties determined eligible for the NR
NRL	National Register List
NRCS	Natural Resources Conservation Service
NTU	Nephelometric Turbidity Unit
NWI	National Wetland Inventory
NWSRS	National Wild and Scenic River System
NY 365	New York State Route 365
NY or NYS	New York State
NYISO	New York Independent System Operator
NYNHP	New York Natural Heritage Program
NYPA	New York Power Authority
NYSCC	New York State Canal Corporation
NYSDEC	New York State Department of Environmental Conservation
NYSDOS	The New York State Department of State
NYSDOT	New York State Department of Transportation
NYSTA	New York State Thruway Authority
OPRHP	New York State Office of Parks, Recreation, and Historic Preservation
PAD	Pre-Application Document
PM&E or PME	protection, mitigation, and enhancement
PO4	phosphate ion
PRISM	Partnerships for Regional Invasive Species Management
PSP	Proposed Study Plan
REA Notice	Ready for Environmental Analysis
RIBS	rotating integrated basin studies
RSP	Revised Study Plan
RTE	Rare, Threatened and Endangered
s	second
SAV	submerged aquatic vegetation
SCORP	Statewide Comprehensive Outdoor Recreation Plan

SD1	Scoping Document 1
SD2	Scoping Document 2
Section 106	Section 106 of the National Historic Preservation Act
SHPO	State Historic Preservation Officer
SPD	Study Plan Determination
SUNY Poly	State University of New York Polytechnic Institute
SUVA	Specific UV absorbance
SVCv	spring viremia of carp virus
TCPs	traditional cultural properties
The Applicant	The Power Authority of the State of New York/ New York Power Authority
The Power Authority	The Power Authority of the State of New York/ New York Power Authority
The Project	Gregory B. Jarvis Power Project
ug/L	microgram per liter
USACE	U.S. Army Corps of Engineers
uS/cm	microsiemens per centimeter
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Society
USR	Updated Study Report
WI/PWL	Waterbody Inventory/Priority Waterbodies List
WSRRA	Wild, Scenic and Recreational Rivers Act
VHSv	viral hemorrhagic septicemia

1 Introduction

The Power Authority of the State of New York (d/b/a "New York Power Authority" and referred to as "the Power Authority" or "the Applicant") is licensed by the Federal Energy Regulatory Commission (FERC or Commission) to operate the Gregory B. Jarvis Power Project (FERC No. 3211-NY) (the Project). The Project is located on West Canada Creek, a tributary of the Mohawk River, at the Hinckley Reservoir Dam. The Project is approximately 0.5 miles upstream of the Town of Hinckley in the counties of Oneida and Herkimer, NY. The Project does not occupy any federal lands.

1.1 Application

The original license was issued on August 12, 1982, and expires on July 31, 2022 (FERC 1982). As required under the Federal Power Act (FPA), the Power Authority must file its application for a new license for the Project with the Commission on or before July 31, 2020. The Power Authority is preparing its new license application for the Project in accordance with FERC's Integrated Licensing Process (ILP). The Power Authority filed its Draft License Application (DLA) with the Commission on March 3, 2020. Comments on the DLA were received on or before June 1, 2020 from FERC, U.S. Fish and Wildlife Service (USFWS), New York State Department of Environmental Conservation (NYSDEC), Trout Unlimited, and Citizens for Hinckley Lake. A summary of the comments received, as well as the Power Authority's responses, are included in Appendix A.

The Power Authority has prepared this Exhibit E Environmental Exhibit as part of the Final License Application (FLA) and, in accordance with 18 C.F.R. § 5.18(b), following the Commission's Preparing Environmental Assessments: Guidelines for Applicants, Contractors, and Staff. The Power Authority proposes to continue operating the Project as it is currently operated, with no new capacity and no new construction.

1.2 Purpose of Action and Need for Power

FERC must determine whether to issue a license to the Power Authority for the Project and what conditions should be placed in any license issued. In deciding whether to issue a license, FERC must determine that the Project will be best adapted to a comprehensive plan for improving or developing a waterway. In addition to the developmental purposes for which licenses are issued, FERC must give equal consideration to the purposes of energy conservation; the protection, mitigation or damage to, and the enhancement of fish and wildlife (including related spawning grounds and habitat); the protection of recreational opportunities; and the preservation of other aspects of environmental quality.

FERC's issuance of a new license for the continued operation of the Project will allow the Power Authority to continue producing electric power from a renewable resource for the term of the new license, while addressing environmental, land use, public recreation, and cultural resources in accordance with license conditions. Exhibit E was prepared consistent with the ILP requirements as set forth in 18 C.F.R. § 5.18(b) and is designed to support FERC's required analysis under the National Environmental Policy Act (NEPA), as amended. In this Exhibit E, the Applicant assesses the environmental and economic effects of continuing to operate the Project as proposed herein. The Applicant also considers the effects of the no-action alternative.

The Project is a resource used by the Power Authority to meet its statutory and contractual obligations to its customers and provides cost saving benefits to the statewide grid and consumers. The primary purpose of the Project is to supply energy and capacity to the New York Independent System Operator (NYISO), a regional transmission organization that coordinates the generation and transmission of wholesale electricity within the state of New York. The Project plays a role in New York's renewable energy portfolio because it provides low-cost emissions free power during periods of peak demand for energy. The Project is typically operated to serve two purposes: to provide power at times of high consumer use and to provide baseload power during non-peak periods.

1.3 Public Review and Comment

FERC's regulations for the ILP require applicants to consult with appropriate resource agencies, Native American Nations, and other entities before filing an application for a license. This consultation is the first step in complying with the Fish and Wildlife Coordination Act, the Endangered Species Act, the National Historic Preservation Act, and other federal statutes. Pre-filing consultation must be completed and documented according to FERC's regulations.

1.3.1 Scoping

The Power Authority filed a Notice of Intent (NOI) and Pre-Application Document (PAD) for the Project on June 30, 2017, which included preliminary study plans for the Project. The PAD provided summaries of existing, relevant, and reasonably available information related to the Project that was in the Applicant's possession or was obtained with the exercise of due diligence. The purpose of the PAD was to provide participants in the relicensing proceeding with a summary of the information necessary to identify issues and related information needs and develop study requests and study plans.

FERC published Scoping Document 1 (SD1) for the Project on August 29, 2017. Scoping meetings were then held by FERC on September 26 and 27, 2017, at the State University of New York Polytechnic Institute (SUNY Poly) in Utica, NY, at which time potential issues were identified by agencies, stakeholders and the public. Following the scoping meetings, the Commission issued its Scoping Document 2 (SD2) on December 12, 2017.

1.3.2 Studies

The Power Authority received comments on the PAD and the study plans as well as requests for additional studies. The Power Authority reviewed these comments and study requests, and developed a Proposed Study Plan (PSP), which served to address and respond to all comments and requests received. The Power Authority filed the PSP with FERC on December 12, 2017. The Power Authority then held a PSP Meeting on January 11, 2018, at SUNY Poly. Stakeholders provided comments to the Power Authority on the PSP on or before March 12, 2018. The Power Authority filed a Revised Study Plan (RSP) on April 11, 2018. On May 11, 2018, FERC issued its Study Plan Determination (SPD) for the Project approving the following studies:

- Hinckley Reservoir Bathymetric Survey
- Tailwater Water Quality Study
- Assessment of Fish Entrainment and Turbine Survival
- Recreation and Public Access Study
- Desktop Modeling of Peaking Fluctuations
- Reservoir Fluctuation Field Study

The Power Authority filed an Initial Study Report (ISR) on May 8, 2019, and held an ISR Meeting on May 22, 2019. The ISR contained final study reports for five of the FERC-approved studies and a status update report for the remaining study. Studies which are completed and for which final reports were provided are: *Hinckley Reservoir Bathymetric Survey; Recreation and Public Access Study; Desktop Modeling of Peaking Fluctuations; Reservoir Fluctuation Field Study; and Tailwater Water Quality Study*. The *Assessment of Fish Entrainment and Turbine Survival* required additional efforts in 2019. The final study report for the *Assessment of Fish Entrainment and Turbine Survival* was filed with the Commission on October 30, 2019.

On September 6, 2019, the Commission issued its *Determination on Requests for Study Modifications for the Hinckley (Gregory B. Jarvis) Hydroelectric Project*. FERC's Determination included a new study, the *Dissolved Oxygen Enhancement Study*, as well as additional information pertaining to the *Reservoir Fluctuation Field Study*. Following consultation with NYSDEC and USFWS, and after receiving their concurrence, the Power Authority filed its study plan for the *Dissolved Oxygen Enhancement Study* with FERC on January 15, 2020. The Power Authority intends to conduct the *Dissolved Oxygen Enhancement Study* in 2020 and 2021. Additional analysis pertaining to the *Reservoir Fluctuation Field Study* was completed in 2020.

The Power Authority filed an Updated Study Report (USR) on May 4, 2020, and held an USR Meeting on May 18, 2020. The USR contained the final report for the supplemental analysis conducted as part of the *Reservoir Fluctuation Field Study* as well as status updates for the *Assessment of Fish Entrainment and Turbine Survival* and the *Dissolved Oxygen Enhancement Study*. It is anticipated that FERC will issue its determination on requests for study modifications on or before September 1, 2020, if necessary.

2 Statutory and Regulatory Requirements

FERC's issuance of a new license for the Project is subject to numerous requirements under the FPA and other applicable statutes. The major requirements are described below. The actions that the Power Authority has taken to address these requirements are also described below.

2.1 Federal Power Act

2.1.1 Section 18 Fishway Prescriptions

Section 18 of the FPA, 16 U.S.C. § 811, states that FERC shall require construction, maintenance, and operation by a licensee of such fishways as the secretaries of the Department of Commerce (DOC) and the Department of Interior (DOI) may prescribe. Due to the Project's inland location and lack of marine and anadromous species, the National Marine Fisheries Service (NMFS) has not been a participant in the licensing proceeding and, therefore, has not raised any issues pertaining to fish passage. The United States Fish and Wildlife Service (USFWS) requested that the Power Authority examine alternatives to encourage safe downstream fish passage at the Project. In response, the Power Authority conducted the *Assessment of Fish Entrainment and Turbine Survival* study which is discussed in Section 4.5.1.8. Under the Commission's ILP regulations, 18 C.F.R. § 5.23(a), fishway prescriptions, if any, will be filed within 60 days after FERC's Notice for Acceptance and Ready for Environmental Analysis (REA Notice) following the Power Authority's filing of the FLA.

2.1.2 Section 10(j) Recommendations

Under the provisions of Section 10(j) of the FPA, each hydroelectric license issued by FERC is required to include conditions based on recommendations of federal and state fish and wildlife agencies for the protection, mitigation, and enhancement of fish and wildlife resources affected by the Project, unless FERC determines they are inconsistent with the purpose and requirements of the FPA or other applicable laws. During the relicensing, the Power Authority consulted with those agencies with authority to recommend Section 10(j) conditions, including USFWS and the New York State Department of Environmental Conservation (NYSDEC). Under the Commission's ILP regulations, 18 C.F.R. § 5.23(a), federal and state fish and wildlife agencies will have 60 days following the REA Notice to submit Section 10(j) recommendations.

2.2 Clean Water Act

Under Section 401 of the Clean Water Act (CWA), any federal license or permit to conduct any activity that may result in a discharge into navigable waters requires a certification from the state in which the discharge originates that such discharge will comply with the applicable provisions of the CWA, unless such certification is waived. Therefore, a Section 401 Water Quality Certification or waiver is required prior to FERC's issuance of a new license for the Project. The NYSDEC is the state agency designated to carry out the certification requirements prescribed in Section 401 of the CWA. Pursuant to 18 C.F.R. § 5.23(b), the Power Authority will request Section

401 Water Quality Certification from NYSDEC within 60 days of FERC's REA Notice.

2.3 Endangered Species Act

Section 7 of the Endangered Species Act (ESA) requires federal agencies to ensure that any action it authorizes, funds, or carries out is not likely to jeopardize the continued existence of any federally listed endangered or threatened species or result in the destruction or adverse modification of the critical habitat of such species. The Power Authority was granted designation as FERC's non-federal representative for ESA consultation on August 29, 2017.

During development of the PAD, the Power Authority reviewed the USFWS's Information for Planning and Consultation (IPaC) database to identify species that may exist within the Project boundary that are listed as threatened or endangered under the ESA. At that time, the IPaC database indicated that the federally protected northern long-eared bat may be present in the Project area. During development of this final license application, IPaC was again consulted. The results of the updated IPaC inquiry indicate that northern long-eared bat is no longer a species that may occur in the Project vicinity. As such, no federally listed species are known to occur in the Project area. This is discussed further in Section 4.8.

2.4 Coastal Zone Management Act

Under Section 307(c)(3) of the Coastal Zone Management Act (CZMA), the Commission cannot issue a license for a project within or affecting a state's coastal zone unless the state CZMA agency concurs with the license applicant's certification of consistency with the state's CZMA program, or the agency's concurrence is conclusively presumed by its failure to act within 180 days of its receipt of the applicant's certification. The New York State Department of State (NYSDOS) is the agency responsible for implementing New York's coastal management program.

The Project is not located within and does not affect the designated coastal zone or coastal resources of the State of New York. Therefore, the Project is not subject to coastal zone management review and no consistency certification is needed for the Commission's relicensing of the Project. The Applicant discussed the CZMA consistency requirements with NYSDOS on June 25, 2020. The Applicant received an e-mail from the NYSDOS on June 25, 2020 concurring that the Project is not within the designated coastal zone of the State of New York, and affirming that it does not anticipate that relicensing the Project will have any effects on coastal uses or resources within the designated coastal zone of the State of New York (see Initial Statement – Appendix A).

2.5 National Historic Preservation Act

Section 106 of the National Historic Preservation Act (Section 106) requires federal agencies to take into account the effects of their undertakings on historic properties and to afford the Advisory Council on Historic Preservation (ACHP) a reasonable opportunity to comment on such actions.

Historic properties include significant sites, buildings, structures, districts, and individual objects that are listed in or eligible for inclusion in the National Register of Historic Places (NRHP or National Register). FERC's issuance of a new license for the Project is considered an undertaking subject to the regulations and requirements of Section 106 and its implementing regulations at 36 C.F.R. Part 800.

The Power Authority was designated as FERC's non-federal representative for Section 106 consultation on August 29, 2017. As part of its role as FERC's non-federal representative, the Power Authority consulted with the New York State Historic Preservation Officer and Native American Nations. This consultation and analysis is presented in Section 4.12.

2.6 Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) requires federal agencies to consult with NMFS on all actions that may adversely affect Essential Fish Habitat (EFH). No designated species or habitats designated under the Magnuson-Stevens Act occur within the Project boundary; therefore this act is not applicable to the relicensing of the Project.

3 Proposed Actions and Alternatives

This section outlines the No-Action Alternative as defined by the FERC, the Power Authority's Proposed Action and alternatives considered by the Power Authority but eliminated from further analysis.

3.1 No-Action Alternative

The No-Action Alternative would allow the Power Authority to continue Project operations under the terms of the current license, including maintaining the current Project boundary, facilities, and operation and maintenance procedures. No new environmental protection, mitigation, or enhancement measures would be implemented. FERC uses this alternative to establish baseline environmental conditions for comparison with other alternatives.

3.1.1 Existing Project Location and Lands

The Project is located on the West Canada Creek approximately ½ mile upstream of the Hamlet of Hinckley in the Towns of Remsen, Russia, Ohio, and Trenton, in the counties of Oneida and Herkimer, New York. In this area, the West Canada Creek flows south out of the Adirondack Mountains, through the reservoir, and then approximately 35 miles to its confluence with the Mohawk River. When full (Elevation (El.) 1225[1]), the reservoir has a surface area of approximately 4.23 mi^2, a volume of approximately 25.1 billion gallons, and a total drainage area at the Project site of approximately 372 mi^2. Much of the northern and eastern portions of the reservoir are within the Adirondack Park.

The Project Boundary generally follows the shoreline of Hinckley Reservoir at the spillway crest elevation of El. 1225 extending upstream to approximately 0.5 miles downstream of the Harvey Road Bridge. Downstream of the Project, the Project boundary extends approximately 400 feet from Hinckley Dam (Figure 3.1.1-1). The Project boundary encompasses a total of approximately 2,799 acres and has approximately 28.5 miles of shoreline. The lands immediately surrounding Hinckley Reservoir are owned by the People of the State of New York, under the jurisdiction of the New York State Canal Corporation (NYSCC).[2] In 1984, the People of the State of New York granted an easement to these lands to the Power Authority.

3.1.2 Existing Project Facilities

As viewed when looking downstream, Hinckley Dam consists of a north (right) embankment dam, a non-overflow intake structure, a concrete spillway, and a south (left) embankment. The Project

[1] All elevations referenced throughout this report refer to the Barge Canal Datum (BCD). Elevations referenced to the BCD are 1.04 feet higher than elevations referenced to the National Geodetic Vertical Datum of 1929 (NGVD29 or Mean Sea Level (MSL)); thus, El. 1225.0 BCD = 1223.96 NGVD29.

[2] The New York State Legislature transferred control of the NYS Canal System from the New York State Department of Transportation (NYSDOT) to New York State Thruway Authority (NYSTA) in 1992 and then from NYSTA to the Power Authority in 2016. On January 1, 2017, the NYSCC became a subsidiary of the Power Authority.

powerhouse is located approximately 200 feet downstream of the intake structure. Figure 3.1.2-1 denotes the location of the Project facilities discussed below.

3.1.2.1 North and South Embankments

The embankment sections at Hinckley Dam have a maximum height of 53 feet and a crest width of about 11 feet at El. 1242. The north embankment dam is approximately 570 feet long, and the south embankment dam is approximately 2,600 feet long. The upstream slopes, which are covered with riprap, are 1V:2.5H from the dam crest to El. 1227.0, 1V:3H from El. 1227.0 to El. 1210.0, and 1V:3.5H below El. 1210.0. In 1987-1988, a berm was added to portions of the upstream and downstream slopes. The downstream slopes are 1V:2H with two 8-foot wide berms, one at El. 1226 and the other at El. 1213.

The embankment dams contain a concrete core wall, which extends to rock except as noted below. The core walls vary from a width of 2.75 feet at the top (El. 1238.0) to 8.0 feet at the base. Drawings and construction photographs show that the vertical and horizontal joints of the core walls have keys that overlap joints by about 1 foot. The 300 feet of the core wall from Sta. 34+00 to Sta. 37+00 at the south abutment extends 30 feet into overburden and does not reach bedrock. The 350 feet of core wall on the north abutment also does not reach bedrock.

3.1.2.2 Non-Overflow Intake

The non-overflow section is constructed of cyclopean concrete (concrete with boulders embedded during placement). This structure is approximately 65 feet long and 82 feet high, with the top at El. 1240. The intake to the powerhouse is housed in the cyclopean non-overflow section. This structure originally contained four 60-inch diameter cast-iron outlet conduits at centerline El. 1169.5. A 5-foot by 5-foot sluice gate for each conduit was located at the upstream face of the non-overflow section. From 1984 to 1985 the Power Authority substantially modified the non-overflow structure to construct the Project. Three of the 60-inch diameter outlet conduits were eliminated, and a 15-foot diameter penstock and penstock bypass were added. After the addition of the powerhouse, one of the original 60-inch diameter water pipes (sluice gate no. 4) remained. The one remaining water pipe now acts as an outlet for small discharges and is located on the powerhouse side through the non-overflow section.

The calculated water velocity approximately 1-foot in front of the intake trashracks is 2.57 ft./sec. The intake structure trashracks have a rack spacing of 6-inches from centerline to centerline of each bar. Given that each bar is $^{5}/_{8}$-inches thick, the actual space between bars at the intake structure is 5 $^{3}/_{8}$-inches. Trashrack spacing on the remaining sluice gate no. 4 is 4-inches from centerline to centerline of each bar. Given that each bar is ½-inch thick, the resulting sluice gate trashrack spacing is 3 ½-inches between bars.

3.1.2.3 Spillway

The cyclopean concrete spillway is an ungated ogee-type section with its crest at El. 1225.0. The spillway is approximately 400 feet long and has a maximum structural height, measured from crest to foundation, of 83 feet. The base of the section is founded at least 2 feet into bedrock with a 5-foot-deep, 8-foot-wide key at the heel. A 40-foot concrete apron 4 feet thick extends beyond the structural toe of the section, and the downstream edge of the apron is keyed into rock.

3.1.2.4 Conveyance Systems

Water is conveyed to the powerhouse through a 15-foot-diameter penstock, which bifurcates into two 90-foot long, 10.5-foot diameter penstocks. The 10.5-foot diameter penstocks lead to two horizontal Kaplan turbine units. The powerhouse discharges into a short tailrace that meets West Canada Creek approximately 150 feet downstream of the powerhouse. This tailrace is cut into bedrock and has nearly vertical side slopes. There is also a penstock bypass which can act as a low level outlet (in addition to the 60-inch diameter water pipe).

The upstream section of the spillway's south wing-wall contains a gatehouse from which the Mohawk Valley Water Authority (MVWA) withdraws water for water supply. Flow into each of the two 42-inch-diameter water supply conduits is controlled by two 3-foot by 4-foot gate valves located on an outer gate shaft. These valves lead to a 42-inch diameter sluice gate at invert El. 1161.5, located in an inner gate shaft. The water supply conduits pass under the south embankment dam in a trench excavated into rock and backfilled with concrete.

3.1.2.5 Powerhouse

The Project powerhouse is a semi-underground structure located 200 feet downstream of the non-overflow intake. The powerhouse is 120 feet long, 55 feet wide, and 43 feet deep below grade. The powerhouse contains two 4.5-MW horizontal Kaplan turbine/generator units operating under a maximum head of 67.5 feet, plus surcharge, at the spillway crest elevation (El. 1225) with a tailwater level at El. 1157.5.

3.1.2.6 Low Level Outlet

During the 1985 modifications for the Project, three of the four 60-inch diameter outlet conduits through the non-overflow structure were eliminated. The one remaining water pipe is located on the powerhouse side of the non-overflow section, and now acts as a low level outlet for the Project. There is also a penstock bypass which can act as a low level outlet.

3.1.2.7 Hinckley Reservoir

Hinckley Reservoir was constructed by New York State in the early 1900s to serve as a primary water source for the Erie Canal portion of the New York State Barge Canal. The reservoir was constructed on the West Canada Creek, which flows south out of the Adirondack Mountains and through the reservoir on its route to the Mohawk River at Herkimer, NY. The reservoir was commissioned in 1915.

Much of the northern and eastern portions of the reservoir are within the Adirondack Park, and the total drainage area at the Project site is approximately 372 mi^2 (HRWG, 2008). Under existing legal agreements, under certain conditions MVWA may withdraw up to 75 cfs (48.5 million gallons per day (MGD)) from the Hinckley Reservoir for water supply for the greater Utica area (State of New York Supreme Court, 2013); however, on average, withdrawals are typically much less.

The NYSCC maintains Hinckley Reservoir levels within a normal operating range of El. 1195 or above, except during adverse conditions. When full to the spillway crest (El. 1225), the reservoir has a surface area of approximately 4.23 mi^2 (~2,709 acres) and an estimated gross volume of 25.1 billion gallons. The lower limit of storage is at elevation 1173.5 feet, which is the minimum elevation required to pass the 230 cfs flow necessary for canal navigation. The minimum reservoir elevation of 1174.9 feet was observed on November 17, 1964, while the maximum reservoir elevation of 1231.33 feet was observed on November 1, 2019. Based on the results of the 2018 Hinckley Reservoir bathymetric survey, below El. 1173.5 feet the dead storage is approximately 0.52 billion gallons. Therefore, the estimated usable storage capacity of Hinckley Reservoir when full to the spillway crest is 24.6 billion gallons.

3.1.2.8 Project Recreation Facilities

Recreation facilities associated with the Project are described in Section 4.9.

3.1.2.9 Switchyard

Project transmission infrastructure includes:

- 4.16-kV electrical leads from each generator routed through an underground chase approximately 50 feet long to the aboveground Power Authority-owned 46-kV / 4.16-kV step-up transformer located within the powerhouse parking area, and
- A 46-kV underground transmission line, approximately 300 feet long, which runs from the 46-kV / 4.16-kV step-up transformer to a Power Authority-owned switchyard located north of NYS Route 365 at which point Project power interconnects with transmission lines owned by National Grid.

As noted above, voltage values are as follows:

- Generator leads: 4.16-kV
- Underground leads located between the step-up transformer and the switchyard: 46.0-kV
- National Grid transmission line: 46.0-kV

There are no overhead lines between the step-up transformer and the switchyard. The only overhead line serving the Project is a 480-volt overhead line that terminates at the metering pole located just north of the main entrance to the powerhouse. Conduit from the metering pole is routed to the powerhouse running west to east along the soldier pile wall.

3.1.3 Existing Project Operations

Hinckley Reservoir is operated by the NYSCC in accordance with the 2012 Hinckley Reservoir Operating Diagram (Operating Diagram, Figure 3.1.3-1) for which the Project utilizes the reservoir releases to generate power. In addition, the current FERC license for the Project allows for peaking operations and requires a continuous minimum flow in West Canada Creek of 160 cfs as measured at the NYSCC diversion structure at the Nine Mile Creek Feeder Dam, which is located approximately 5.1 miles downstream of the Project. This section provides an overview of relevant background information pertaining to the Operating Diagram as well as a more detailed discussion of the current Project operations.

3.1.3.1 Relevant Background Information

In 1915, the New York State (NYS) Department of Public Works completed the Hinckley Dam and Reservoir for the purpose of supplying water to the NYS canal system. Hinckley Reservoir is owned by the People of the State of New York, under the jurisdiction of the NYSCC. Outflows from the reservoir are governed by the Operating Diagram, a product of legally binding operating agreements between the NYSCC, State of New York, MVWA, New York State Thruway Authority (NYSTA), and Erie Boulevard Hydropower, L.P. (Erie Boulevard).

In 1986, the Power Authority constructed the Gregory B. Jarvis Power Project at the Hinckley Dam to capture hydropower generation from NYSCC's reservoir releases. Construction of the Project entailed reconfiguring discharge outlets at the dam to install turbine generators capable of producing hydropower from the existing releases. After completion of the construction of Hinckley Dam in 1915, various lawsuits and subsequent agreements resulted over water rights. One result of this litigation was the development of the 1920 Operating Diagram to establish the release of water from Hinckley Reservoir based on varying water levels throughout the year. Both the MVWA and Erie Boulevard have water rights based on the 1920 Operating Diagram that was incorporated into two separate settlement agreements: the 1917 Settlement Agreement between New York State and Consolidated Water Company of Utica, and the 1921 Settlement Agreement between New York State and the Utica Gas & Electric Company.[3] The 1920 Operating Diagram was used until it was superseded by the 2012 Operating Diagram[4] (Figure 3.1.3-1).

Today, pursuant to the 2012 Operating Diagram, the NYSCC maintains Hinckley Reservoir water levels within a normal operating range of El. 1195 feet or above, except during adverse conditions. Releases through the powerhouse are determined by the time of year and Hinckley Reservoir elevation, as plotted in the Operating Diagram. Reservoir releases are adjusted on a twice-weekly basis in accordance with the Operating Diagram. The Power Authority does not have the authority

[3] MVWA is the successor in interest to Consolidated Water Company of Utica, while Erie Boulevard is the successor in interest to Utica Gas & Electric Company.

[4] The 2012 Operating Diagram replaced the 1920 Operating Diagram in its entirety in 2013 and was accepted by MVWA and Erie Boulevard pursuant to two agreements: an agreement between NYSCC, NYS and MVWA dated February 1, 2013, and an agreement between NYSCC, NYS, NYSTA, and Erie Boulevard dated January 13, 2015.

or the rights to deviate from these releases and if the Project were not to exist, the same reservoir water levels and discharges would still occur in accordance with the Operating Diagram. In other words, the Project simply redirects reservoir outflow (as determined by the Operating Diagram) through the Project's power generating equipment, which is released by the NYSCC for purposes other than generation at the Project and which would be made even in the absence of the Project. NYSCC does not manage Hinckley Reservoir water levels or releases to promote generation at the Project.

The NYSCC authorizes deviations from the Operating Diagram on a case-by-case basis, taking into consideration a number of different factors, including, but not limited to, the following:

- ensuring public safety;
- in cases of emergency or infrastructure problems (transmission outages, turbine issues, water main breaks, etc.);
- serving canal uses and/or purposes;
- mitigating unusual hydrologic or weather conditions;
- correcting any discrepancies between actual releases and the releases dictated by the 2012 Operating Diagram; and
- providing compensating flow to Erie Boulevard under the terms of a January 13, 2015 Settlement Agreement and Mutual Release.

NYSCC bases the deviation rate(s) and durations on the desired outcome and existing conditions, such as reservoir elevation levels, rate of elevation change, current and forecasted reservoir inflow rates, and the time of year.

In addition to the Operating Diagram, the 2013 Settlement Agreement between NYSCC, NYS and the MVWA allows the MVWA to withdraw up to 75 cfs, although the current monthly average withdrawal amount is 30-35 cfs.

3.1.3.2 Project Operations

As previously noted, the Project utilizes releases determined by NYSCC in accordance with the Operating Diagram to generate power. Releases are determined by the time of year and Hinckley Reservoir elevation (Figure 3.1.3-1). Project operations are adjusted on a twice-weekly basis. Reservoir levels are usually maintained between El. 1195 and El. 1225 (the elevation of the spillway crest); however, reservoir water levels can fall below El. 1195 when prolonged dry conditions occur. The Project does not operate when reservoir levels are below El. 1195. Consistent with the 2012 Operating Diagram, during the winter months, the reservoir is generally drawn down and then allowed to refill during spring melt.

The Project has two horizontal Kaplan units which are each capable of operating between 300 and 900 cfs for a total hydraulic capacity of 1,800 cfs under normal operating conditions. At flows within the operating range of the units (300 to 1,800 cfs), the Project provides outflow via generation. At flows below 300 cfs, or when the reservoir water surface elevation is below El. 1195, the Project does not operate. For these conditions, the low-level sluice gate no. 4 is used to pass the minimum flow when there is no power generation. At flows greater than 1,800 cfs, and when the reservoir water surface elevation is greater than El. 1225, downstream releases are passed via a combination of generation, sluice gate no. 4, the penstock bypass valve, and spillage.

The current FERC license allows for the Project to operate in a peaking generation mode during peak energy demand periods. Peaking also enables the Project to demonstrate to NYISO the ability to generate at its installed capacity (ICAP)[5]. ICAP is a service that the NYISO relies on to help maintain system stability during periods of high demand or fluctuating supply from intermittent energy sources such as wind and solar. When the Power Authority is peaking it will average the outflow required by the Operating Diagram over the course of the day. When operated in this manner, the Project will generate with a lower outflow during non-peak demand periods and then generate with a higher outflow during peak demand periods such that the total daily average flow is equal to the daily outflow prescribed by the Operating Diagram.

The results of the *Desktop Modeling of Peaking Fluctuations Study* demonstrated that the maximum difference in daily water level fluctuations as a result of peaking is 0.32 ft. (3.84 inches) for the scenarios modeled. The maximum modeled daily water level fluctuation of 3.84 inches were only observed to occur during the colder months (i.e., February and March) and are not expected to impact biological resources, which are dormant and less active. Peaking operations which occur during biologically sensitive periods (e.g., late spring, summer, fall) result in even smaller water level differences. The maximum water level differences in Hinckley Reservoir due to theoretical peaking operations between May and November varied between 0.05 ft and 0.21 ft; however, for many of the modeled scenarios during these months the prescribed Operating Diagram release rate is less than 550 cfs, which causes peaking at 1,800 cfs to be infeasible without shutting down one of the turbines. Given this, the results of the peaking study indicate that Project peaking operations have minimal impact on environmental resources in Hinckley Reservoir. Furthermore, as demonstrated in Section 4.5.2, there is ample storage in Prospect Pond such that the West Canada Creek Hydroelectric Project (FERC Project No. 2701) operations are not dictated by outflows from the Jarvis Project.

3.1.3.2.1 Minimum Flow Requirement

In accordance with the current FERC license, a continuous minimum flow of 160 cfs must be maintained in West Canada Creek, as measured downstream of the NYSCC diversion weir at the Nine Mile Creek Feeder Dam. During the Canal's operating season (approximately May 1 through

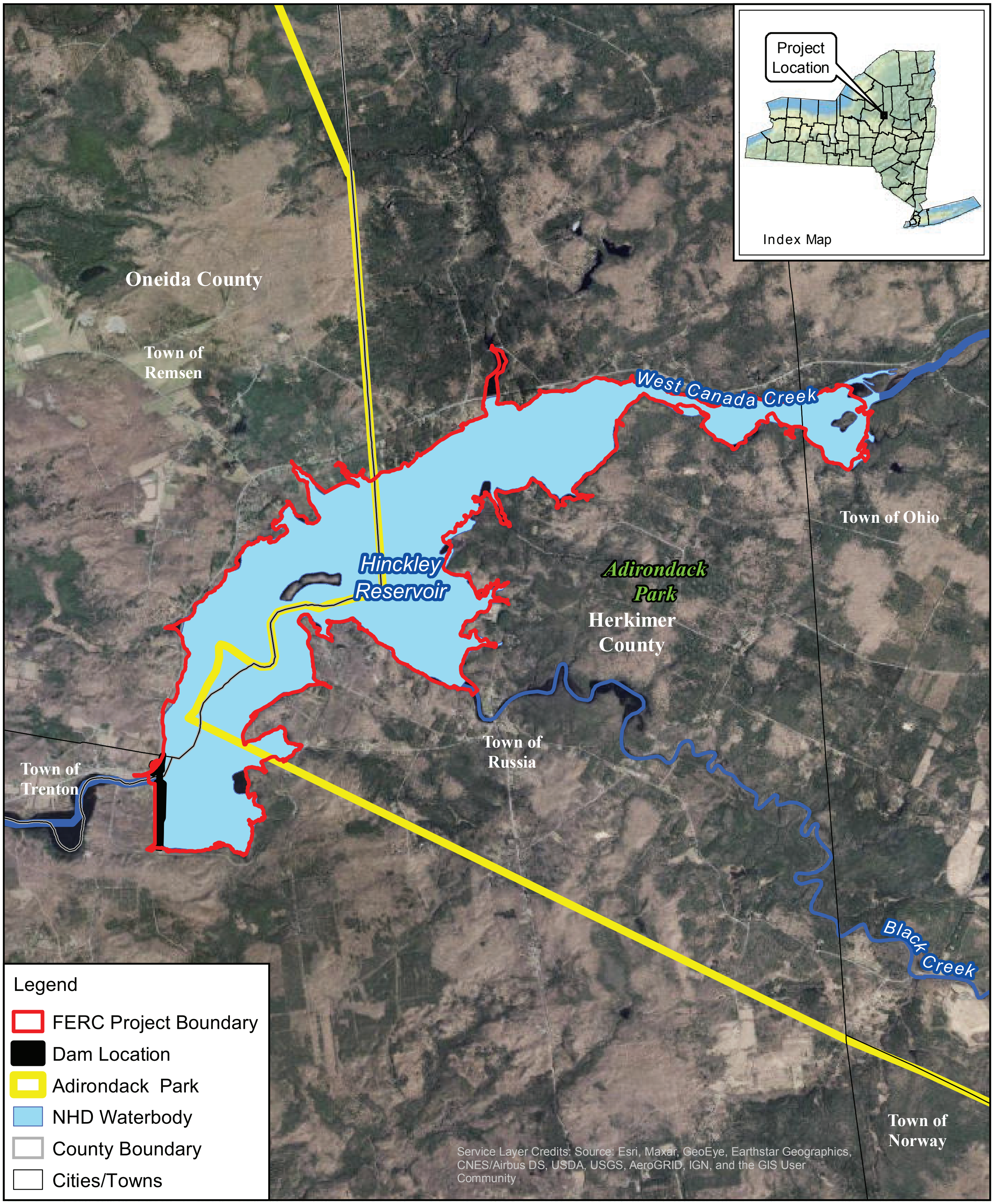
[5] The installed capacity market (ICAP) value of a small hydro project is based on its generation during the 20 peak energy load hours for the NYISO capability period. In general, peaking during higher energy demand periods may coincide with the peak energy load hours that NYISO uses to determine the Project's ICAP value.

November 15), the minimum flow below Trenton Falls must equal the sum of the FERC required minimum flow of 160 cfs, as measured below the Nine Mile Creek Feeder Dam structure, plus the amount diverted into the Nine Mile Feeder Canal by the NYSCC.

3.1.4 Existing Environmental Measures

The Power Authority implements the following environmental measures at the Project:

- Provides public access and use of Project lands and waters; and provides for, and maintains, the existing Project recreation facilities including the Power Authority Boat Launch and Scenic Overlook
- Provides a continuous minimum flow of 160 cfs as measured downstream of the NYSCC diversion weir at the Nine Mile Creek Feeder Dam for the protection of aquatic resources in West Canada Creek



Gregory B. Jarvis Project
(FERC No. P-3211)
Final License Application

0 0.5 1 2 Miles

N

Figure 3.1.1-1:
Project Boundary

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Gregory B. Jarvis Project
(FERC No. P-3211)
Final License Application

NEW YORK STATE OF OPPORTUNITY. | NY Power Authority

0 250 500 1,000 Feet

N

Figure 3.1.2-1:
Project Facilities

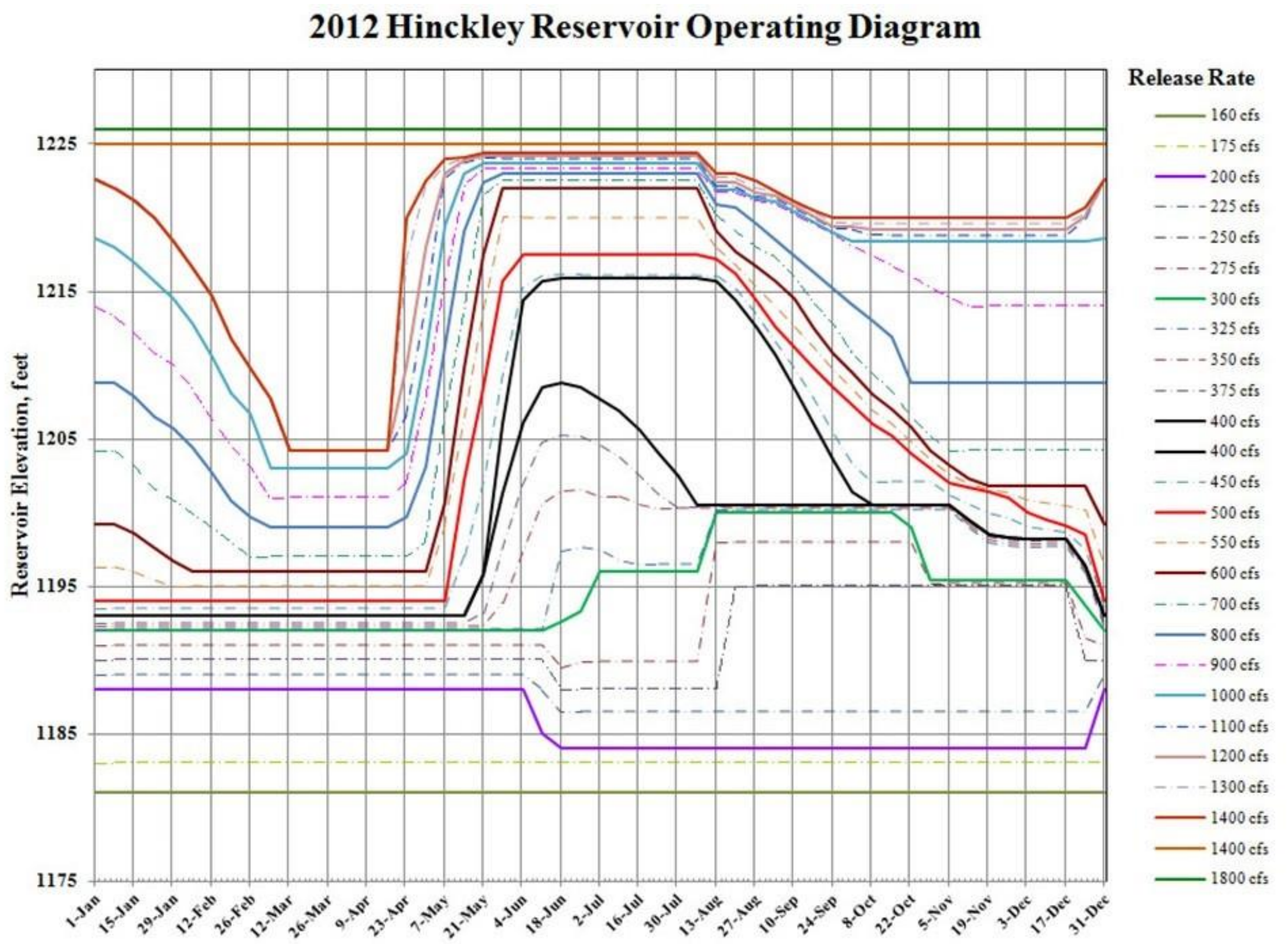


Figure 3.1.3-1: 2012 Hinckley Reservoir Operating Diagram

3.2 Applicant's Proposal

The Power Authority proposes to continue to operate and maintain the Project and continue implementing existing environmental measures with several proposed enhancements. The Power Authority proposes no new development or changes in Project operation; however, the Power Authority proposes the following recreation and public access enhancements:

- Improve directional signage at the Power Authority Boat Launch and Scenic Overlook;
- Replace the informational kiosk at the Power Authority Boat Launch;
- Provide a temporary toilet at the Power Authority Boat Launch during the recreation season; and
- Improve the Power Authority Boat Launch to El. 1205 (operable to El. 1208).

Each of these enhancements is discussed further in Section 4.9.1.3. In addition, the Power Authority is currently evaluating the feasibility, potential effectiveness, and costs of various dissolved oxygen enhancement measures for the Project as part of the *Dissolved Oxygen Enhancement Study*. Upon completion of the study, the Power Authority will propose measure(s) to improve stream dissolved oxygen concentration downstream of the Project tailrace when the Project is operating.

The Power Authority also proposes to modify the Project boundary to include the Power Authority Boat Launch parking lot, switchyard and transmission line, and driveway leading to the powerhouse. The proposed Project boundary is detailed in Exhibit G.

3.2.1 Proposed Project Facilities and Operations

The Power Authority proposes no new or upgraded facilities, structural changes, or operational changes to the Project during the term of the new license.

3.2.2 Proposed Environmental Measures

The Power Authority proposes to continue implementing existing environmental measures as well as the enhancements noted above.

3.3 Alternatives Considered but Eliminated from Further Analysis

3.3.1 Federal Government Takeover of the Project

FERC's statement from SD2 regarding a federal government takeover alternative is as follows:

> *"In accordance with § 16.14 of the Commission's regulations, a federal department or agency may file a recommendation that the United States exercise its right to take over a hydroelectric power project with a license that is subject to sections 14 and 15 of the FPA. We do not consider federal takeover to be a reasonable alternative. Federal takeover of the project would require congressional approval. While that fact alone would*

> *not preclude further consideration of this alternative, there is currently no evidence showing that federal takeover should be recommended to Congress. No party has suggested that federal takeover would be appropriate, and no federal agency has expressed interest in operating the project."*

3.3.2 Issuing a Non-Power License

FERC's Statement from SD2 regarding a non-power license alternative is as follows:

> *"A non-power license is a temporary license the Commission would terminate whenever it determines that another governmental agency is authorized and willing to assume regulatory authority and supervision over the lands and facilities covered by the non-power license. At this time, no governmental agency has suggested a willingness or ability to take over the project. No party has sought a non-power license, and we have no basis for concluding that the Jarvis Project should no longer be used to produce power. Thus, we do not consider a non-power license a reasonable alternative to relicensing the project."*

3.3.3 Retiring the Project

FERC's statement from SD2 regarding the Project decommissioning alternative is as follows:

> *"Decommissioning of the project could be accomplished with or without dam removal. Either alternative would require denying the relicense application and surrender or termination of the existing license with appropriate conditions. There would be significant costs involved with decommissioning the project and/or removing any project facilities. The project provides a viable, safe, and clean renewable source of power to the region. With decommissioning, the project would no longer be authorized to generate power.*
>
> *No party has suggested project decommissioning would be appropriate in this case, and we have no basis for recommending it. Thus, we do not consider project decommissioning a reasonable alternative to relicensing the project with appropriate environmental measures."*

4 Environmental Analysis

4.1 Cumulative Effects

According to the Council on Environmental Quality's regulations implementing NEPA (40 C.F.R. Section 1508.7) in effect until September 14, 2020,[6] a cumulative effect is the impact on the environment which results from the incremental impact of a Proposed Action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or non-federal) or person undertakes such other actions. Under the current definition, cumulative effects can result from individually minor but collectively significant actions taking place over a period of time, including hydroelectric project operations and other land and water development activities.

FERC indicated in SD2 that based upon review of the PAD and preliminary staff analysis, they identified water quantity and water quality (i.e., dissolved oxygen and water temperature) as resources that could be cumulatively affected by the proposed continued operation and maintenance of the Project in combination with other hydroelectric projects and other activities in the West Canada Creek Basin.

4.2 General Description of the River Basin

4.2.1 West Canada Creek Basin

The Project, which includes Hinckley Reservoir, is located at Hinckley Dam on West Canada Creek. West Canada Creek originates in the Adirondack Mountains (approximately El. 2350) from a series of lakes and tributaries and extends approximately 75 miles to its confluence with the Mohawk River (approximately El. 401). The Mohawk River is a tributary to the Hudson River, is approximately 140 miles long, and has a drainage area of approximately 3,460 mi^2. The total drainage area for West Canada Creek, which is the second largest tributary to the Mohawk River, is approximately 561 mi^2.

From its headwaters in the Adirondack Mountains, West Canada Creek flows approximately 35 miles in a south or south-westerly direction into Hinckley Reservoir. The confluence of West Canada Creek and the South Branch of West Canada Creek is located approximately 11 miles upstream of Hinckley Reservoir. The reservoir's primary source of water is stream inflow from the West Canada Creek and Black Creek. Black Creek is estimated to drain 25% of the Hinckley Reservoir watershed (HRWG, 2008). A number of more minor tributaries also drain into the

[6] On July 16, 2020, the Council on Environmental Quality published a comprehensive update to its regulations implementing NEPA to clarify environmental reviews by federal agencies. Among other changes, the final rule eliminated the definition of cumulative impact in 40 C.F.R. § 1508.7 and clarified that federal agency reviews should focus on effects that are reasonably foreseeable and have a reasonably close causal relationship to the proposed action, consistent with the new definition of "effect" set forth therein. The new rule becomes effective on September 14, 2020. *See* Council on Environmental Quality, Update to the Regulations Implementing the Procedural Provisions of the National Environmental Policy Act, 85 Fed. Reg. 43304 (July 16, 2020).

reservoir. Tributaries found in the basin are discussed in greater detail in Section 4.2.5. The total drainage area at Hinckley Dam is approximately 372 mi^2.

Upon its exit from Hinckley Reservoir, West Canada Creek flows in a south or south-easterly direction approximately 35 miles before draining into the Mohawk River. Approximately 4 miles downstream of Hinckley Dam, West Canada Creek flows through Trenton Falls Gorge, which is comprised of a number of waterfalls and unique geomorphic and geologic features. A number of dams are located on West Canada Creek between Hinckley Dam and the Mohawk River. These are described in more detail in Section 4.2.4.

Figure 4.2.1-1 presents a map of the West Canada Creek watershed.

4.2.2 Major Land Uses

The upper watershed of West Canada Creek (upstream of Hinckley Dam) is primarily undeveloped and sparsely populated. Approximately 93% of the Hinckley Reservoir watershed is located within the Adirondack Park (EPA, 2001). Based on review of the available land-use data, approximately 83% of the land in this area is classified as either Deciduous Forest (55%), Evergreen Forest (16%), or Mixed Forest (12%). The remaining 17% is a mix of water, various types of wetlands, or vegetative cover (i.e., shrub/scrub) (Homer *et al.*, 2015). Table 4.2.2-1 provides a breakdown of the various land-use classifications found throughout the West Canada Creek watershed upstream of Hinckley Dam, while Figure 4.2.2-1 depicts the various land-use classifications in this area.

The adjacent land use within 1,000 ft. of the Project boundary is dominated by Hinckley Reservoir. The area surrounding the reservoir is largely undeveloped with approximately 29% classified as forested (Deciduous Forest ~16%, Evergreen Forest ~8%, and Mixed Forest ~6%) and approximately 20% classified as wetlands (Emergent Herbaceous ~12% and Woody ~8%), while 14% is a combination of Barren Land (Rock/Sand/Clay), Shrub/Scrub, or Developed Open Space (Homer *et al*., 2015). Although the majority of the land-use within 1,000 ft. of the Project boundary is undeveloped, there is some limited roadway and residential development scattered throughout this area. Table 4.2.2-2 provides a breakdown of the various land-use classifications found within 1,000 ft. of the Project boundary, while Figure 4.2.2-2 depicts the various land-use classifications in this area.

4.2.3 Major Water Uses

Today, the reservoir continues to serve a variety of purposes including: (1) supplying water to the NYS canal system; (2) serving as the sole source of drinking water for approximately 130,000 people in the greater Utica area; (3) hydropower generation at the Project; (4) supplementing flows for downstream hydropower generation and aquatic resources; (5) flood storage; and (6) recreation. As NYSCC releases flows for these purposes, the Power Authority captures the electric generation potential of these releases at the Project. Section 3.1.3.1 provides relevant background information on the various water uses of the reservoir and the settlement agreements which have been reached over time.

As noted in Section 3.1.3.1, Hinckley Reservoir release rates are determined by the Operating Diagram (Figure 3.1.3-1). Deviations from the Operating Diagram are determined by NYSCC. MVWA and NYSCC can also withdraw additional water from the reservoir per the historic settlement agreements.

Table 4.2.3-1 summarizes monthly average withdrawals by the MVWA and NYSCC from 2009 through December 2019. Historically the monthly average MVWA withdrawals have ranged between a maximum of 39.9 cfs and a minimum of 26.1 cfs. Flows diverted by the NYSCC for the same time period ranged from a maximum of 82 cfs to a minimum of 0 cfs (0 cfs typically occurred during months outside of the Canal navigation season). The 82 cfs maximum daily flow diverted by NYSCC occurred on a daily basis for most readings in July and August 2012. Records of MVWA and NYSCC withdrawals were not always available on a daily basis, therefore monthly averages were determined only from those days that withdrawal flows were available (NYS Canal Corporation, 2016b).

4.2.4 Basin Dams

Downstream of Hinckley Reservoir is the West Canada Creek Hydroelectric Project (FERC No. 2701), which is comprised of the Prospect and Trenton Falls Developments. The Prospect Dam is located approximately 2.5 miles downstream of the Project. The Project discharges directly into the Prospect impoundment. The Trenton Falls Dam is located approximately 1.6 miles below the Prospect Dam. The West Canada Creek Project is owned and operated by Erie Boulevard. Approximately one mile downstream of the Trenton Falls Dam is the Nine Mile Creek Feeder Dam, which is the site of the NYSCC diversion from West Canada Creek into the Nine Mile Feeder Canal. The final two dams on West Canada Creek are those associated with the Newport (FERC No. 5196) and Herkimer (FERC No. 9709) Hydroelectric Projects. The Newport and Herkimer dams are located approximately 13 and 26.5 miles, respectively, downstream of the Nine Mile Creek Feeder Dam. Figure 4.2.4-1 denotes the various hydroelectric projects and dams found on West Canada Creek. There are no dams on West Canada Creek or on the tributaries upstream of Hinckley Reservoir.

4.2.5 Tributary Streams

Few tributaries exist downstream of the Reservoir because the main portion of the Hinckley Reservoir watershed occurs northeast of the Reservoir. The other main tributary which contributes flow to Hinckley Reservoir besides the West Canada Creek is Black Creek, located on the southcentral portion of the Reservoir. Other minor tributaries which drain into the Reservoir include Kreskern Creek, Remus Brook, Taynter Brook, Buttermilk Brook, Beaver Meadow Creek, the Thomas Pond outlet, and a few other unnamed tributaries.

Figure 4.2.1-1 depicts the tributaries found throughout the West Canada Creek watershed.

Table 4.2.2-1: West Canada Creek Watershed Land-use

Land Use Classification	Area (acres)	% Total
Deciduous Forest	135,510	56.7%
Evergreen Forest	38,650	16.2%
Mixed Forest	30,694	12.8%
Woody Wetlands	19,090	8.0%
Water	7,178	3.0%
Developed Open Space	2,802	1.1%
Emergent Herbaceous Wetland	1,791	0.7%
Pasture/Hay	1,279	0.5%
Grasslands/Herbaceous	819	0.3%
Shrub/Scrub	656	0.3%
Cultivated Crops	291	0.1%
Barren	215	<0.1%
Developed, Low Intensity	205	<0.1%
Developed, Medium Intensity	18	<0.1%
Developed, High Intensity	1	<0.1%
TOTAL	239,199	100.0%

Homer *et al.*, 2015

Table 4.2.2-2: Land-use within 1,000 ft. of the Project Boundary

Land Use Classification	Area (acres)	% Total
Water	2,087	38.1%
Deciduous Forest	1,029	18.8%
Evergreen Forest	501	9.0%
Woody Wetlands	483	8.8%
Emergent Herbaceous Wetland	449	8.2%
Mixed Forest	344	6.2%
Developed Open Space	260	4.8%
Barren	213	3.9%
Shrub/Scrub	35	0.6%
Developed, Low Intensity	28	0.5%
Grasslands/Herbaceous	28	0.5%
Pasture/Hay	11	0.2%
Cultivated Crops	4	<0.1%
Developed, Medium Intensity	2	<0.1%
TOTAL	5,474	100.0%

Homer *et al.*, 2015

Table 4.2.3-1: Average Monthly MVWA and NYSCC Reservoir Withdrawals

Date	Hinckley Reservoir Elevation (ft.)	Hinckley Reservoir Discharge (cfs)	MVWA Withdrawal (cfs)	NYSCC Diversion for Barge Canal (cfs)
January 2009	1219.5	1089	39.5	0
February 2009	1203.4	882	40.7	0
March 2009	1214.2	1152	37.2	0
April 2009	1225.6	2052	34.2	1
May 2009	1225.0	1351	34.6	23
June 2009	1224.8	756	35.9	23
July 2009	1223.8	628	33.4	20
August 2009	1223.0	738	36.5	19
September 2009	1216.0	729	35.0	19
October 2009	1220.7	853	33.6	19
November 2009	1222.6	1018	34.1	4
December 2009	1219.6	1001	34.7	0
January 2010	1209.7	874	35.7	0
February 2010	1202.7	857	36.1	0
March 2010	1201.2	784	36.1	0
April 2010	1223.3	1258	34.1	1
May 2010	1215.9	821	34.3	18
June 2010	1218.6	548	35.1	18
July 2010	1222.9	632	38.3	18
August 2010	1222.1	769	34.6	18
September 2010	1218.4	779	35.6	18
October 2010	1225.2	1338	34.4	18
November 2010	1223.4	1005	34.6	5
December 2010	1223.3	1301	34.5	0
January 2011	1209.1	905	36.1	0
February 2011	1192.2	584	37.2	0
March 2011	1208.6	882	37.3	0
April 2011	1223.4	4210	36.5	0
May 2011	1225.3	1546	35.6	2

Date	Hinckley Reservoir Elevation (ft.)	Hinckley Reservoir Discharge (cfs)	MVWA Withdrawal (cfs)	NYSCC Diversion for Barge Canal (cfs)
June 2011	1223.4	866	38.2	10
July 2011	1221.9	663	41.6	10
August 2011	1215.9	547	39.9	1
September 2011	1222.8	1102	40.2	0
October 2011	1223.5	1177	39.0	0
November 2011	1222.8	1002	39.0	0
December 2011	1224.9	1134	39.3	0
January 2012	1220.9	1088	40.8	0
February 2012	1215.3	1102	41.3	0
March 2012	1213.6	1320	40.1	0
April 2012	1221.2	928	37.8	0
May 2012	1224.5	1134	38.9	0
June 2012	1224.4	713	39.5	25
July 2012	1216.6	456	42.5	82
August 2012	1209.9	382	39.4	80
September 2012	1204.3	270	38.5	40
October 2012	1208.6	676	38.4	40
November 2012	1204.1	760	38.9	35
December 2012	1208.1	693	40.3	0
January 2013	1207.1	858	41.4	0
February 2013	1208.4	941	43.6	0
March 2013	1197.7	624	42.2	0
April 2013	1214.4	1526	40.4	0
May 2013	1220.4	972	39.5	8
June 2013	1223.5	1516	38.6	16
July 2013	1222.5	1829	41.3	16
August 2013	1215.4	475	39.4	16
September 2013	1209.8	487	39.0	16
October 2013	1208.1	355	39.4	4
November 2013	1224.2	1196	39.2	0

Date	Hinckley Reservoir Elevation (ft.)	Hinckley Reservoir Discharge (cfs)	MVWA Withdrawal (cfs)	NYSCC Diversion for Barge Canal (cfs)
December 2013	1219.5	1277	41.7	0
January 2014	1218.5	1169	41.5	not available
February 2014	1203.3	891	45.1	not available
March 2014	1192.6	424	43.1	not available
April 2014	1217.7	2012	41.2	not available
May 2014	1224.1	1698	37.4	0
June 2014	1222.1	964	38.7	0
July 2014	1221.1	815	40.9	15
August 2014	1220.1	705	38.8	43
September 2014	1214.3	772	40.0	43
October 2014	1211.9	723	38.5	43
November 2014	1209.4	821	40.0	0
December 2014	1212.8	837	41.4	not available
January 2015	1216.9	1166	42.5	not available
February 2015	1197.0	575	44.0	not available
March 2015	1194.7	226	45.4	not available
April 2015	1213.6	1645	42.3	not available
May 2015	1219.9	970	41.5	45
June 2015	1223.3	987	40.0	53
July 2015	1218.9	1027	41.2	21
August 2015	1209.9	299	38.7	0
September 2015	1204.4	299	38.7	0
October 2015	1208.7	610	38.9	0
November 2015	1213.5	870	38.3	49
December 2016	1213.4	870	38.1	35
January 2016	1218.5	1162	38.9	0
February 2016	1212.6	1061	39.8	0
March 2016	1221.8	1554	37.5	0
April 2016	1222.6	1485	35.7	24
May 2016	1211.6	735	35.6	25

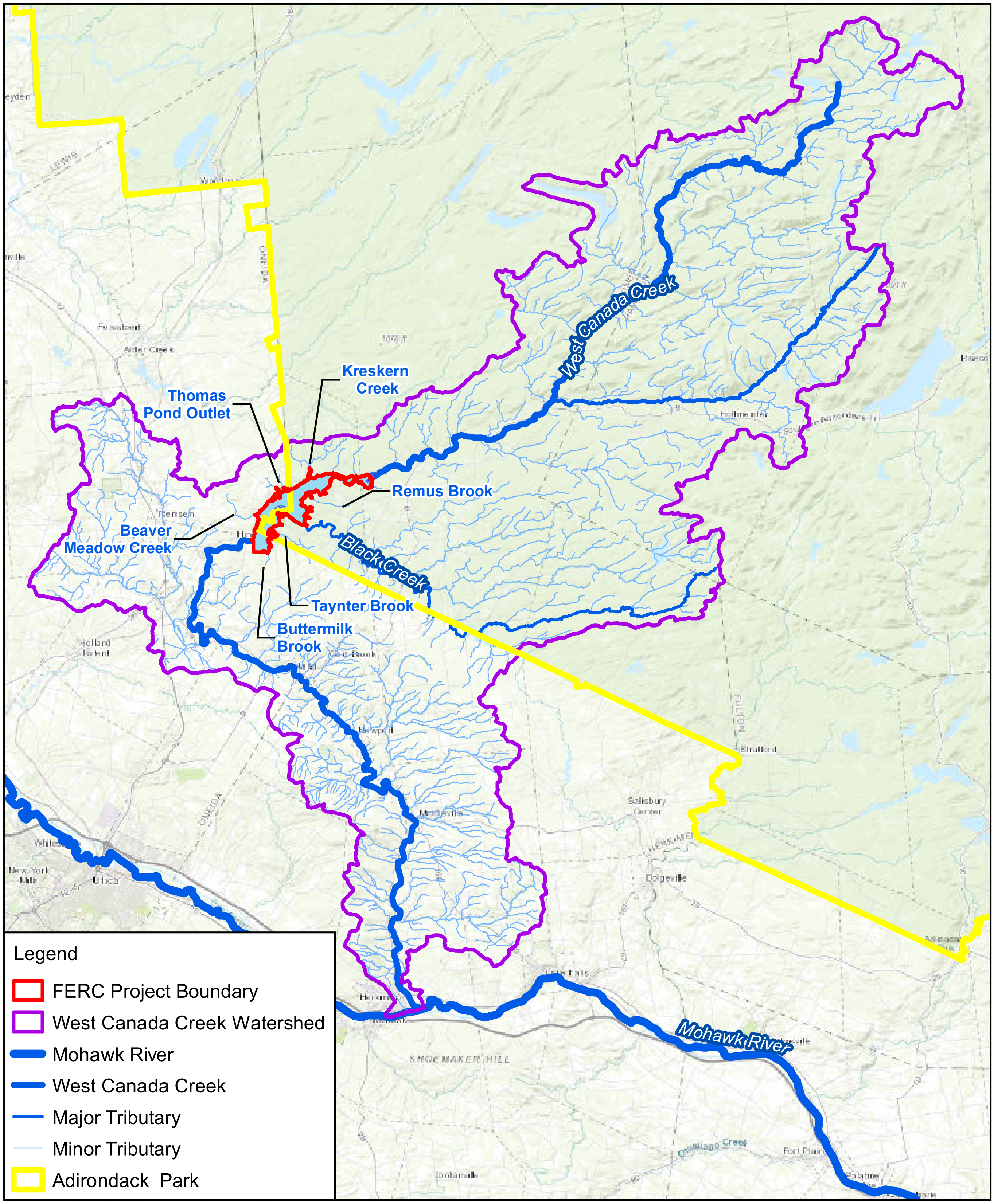
Date	Hinckley Reservoir Elevation (ft.)	Hinckley Reservoir Discharge (cfs)	MVWA Withdrawal (cfs)	NYSCC Diversion for Barge Canal (cfs)
June 2016	1212.1	307	37.3	24
July 2016	1218.0	461	36.2	28
August 2016	1216.9	525	36.1	55
September 2016	1210.9	553	35.1	68
October 2016	1205.0	518	31.3	70
November 2016	1209.0	818	32.3	43
December 2016	1214.0	884	34.5	2
January 2017	1217.0	698	29.7	0
February 2017	1220.7	1403	29.9	0
March 2017	1219.4	1756	30.7	0
April 2017	1223.4	2728	29.8	0
May 2017	1223.3	1294	29.2	0
June 2017	1222.8	1047	29.7	9
July 2017	1222.7	1037	39.9	12
August 2017	1219.7	706	28.6	11
September 2017	1213.0	653	28.5	11
October 2017	1204.6	485	27.1	5
November 2017	1220.7	1513	26.5	0
December 2017	1213.5	918	27.9	0
January 2018	1214.4	973	30.7	0
February 2018	1212.3	1137	30.2	0
March 2018	1209.4	1313	29.4	0
April 2018	1214.1	1454	29.2	0
May 2018	1222.7	1557	29.7	9
June 2018	1218.0	507	29.3	41
July 2018	1213.7	247	30.5	12
August 2018	1212.4	306	28.9	22
September 2018	1211.0	496	29.4	43
October 2018	1216.4	900	30.1	24
November 2018	1219.2	1273	30.7	0

Date	Hinckley Reservoir Elevation (ft.)	Hinckley Reservoir Discharge (cfs)	MVWA Withdrawal (cfs)	NYSCC Diversion for Barge Canal (cfs)
December 2018	1219.7	1122	31.0	0
January 2019	1219.4	1345	30.5	0
February 2019	1217.2	1393	32.0	0
March 2019	1200.3	1031	30.8	0
April 2019	1217.1	2756	27.7	0
May 2019	1224.8	1930	30.0	0
June 2019	1223.9	1210	29.0	21
July 2019	1218.5	571	30.1	23
August 2019	1216.0	475	28.1	36
September 2019	1214.0	702	28.0	52
October 2019	1219.2	1206	29.2	52
November 2019	1220.5	2551	28.5	not available
December 2019	1218.8	1227	30.4	not available

NYS Canals Corporation, 2020

Notes:

1. Data for this table was derived from NYSCC Canal Corporation website http://www.canals.ny.gov/wwwapps/waterlevels/hinckley/hinckleywaterlevels.aspx
2. Records of MVWA and NYSCC withdrawals were not always available on a daily basis, therefore monthly averages were determined only from those days that withdrawal flows were available.



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N

0 3 6 12 Miles

Figure 4.2.1-1:
West Canada Creek Watershed

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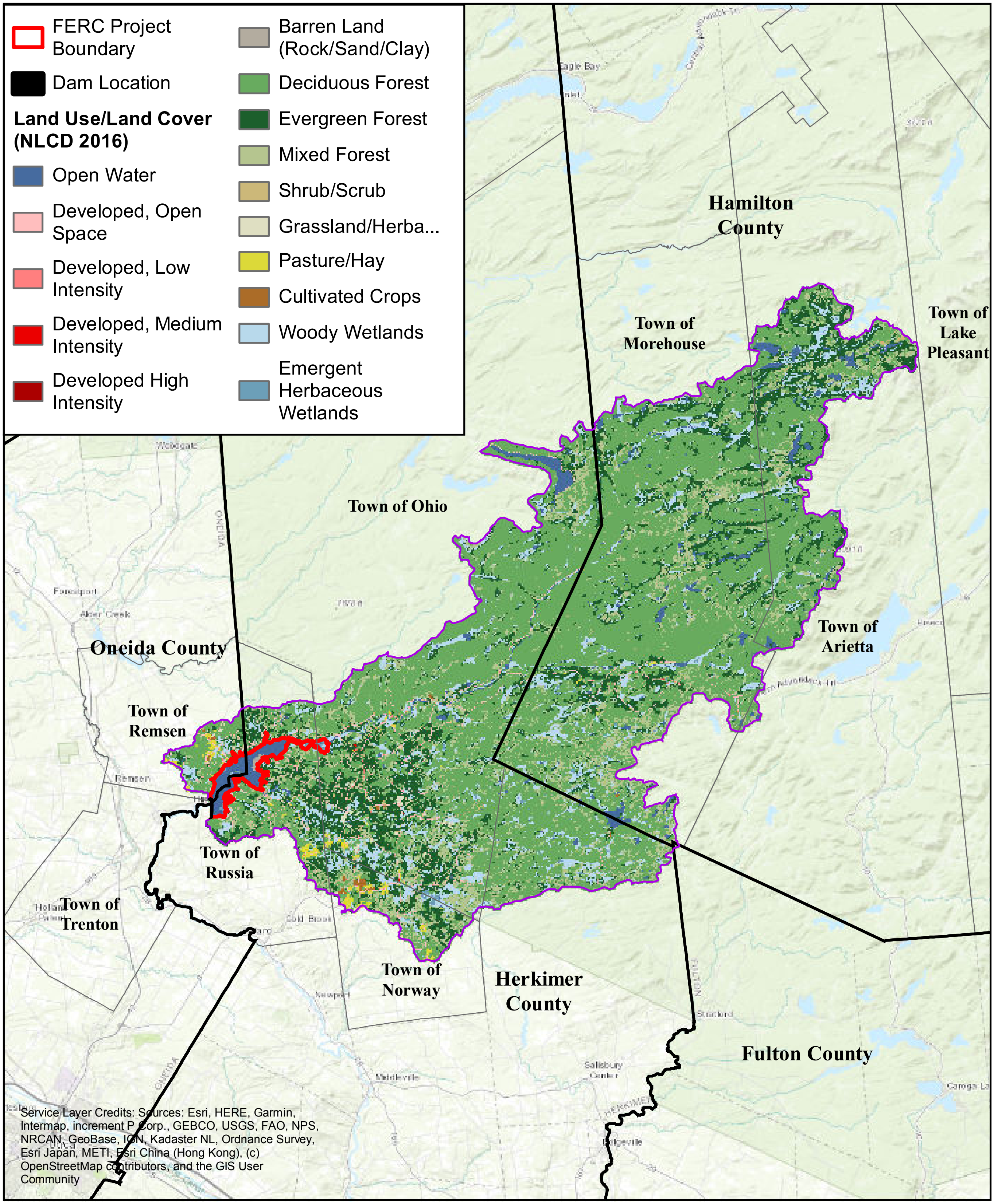

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0 3 6 12 Miles

Figure 4.2.2-1: Watershed Land-use Classifications Upstream of Hinckley Dam

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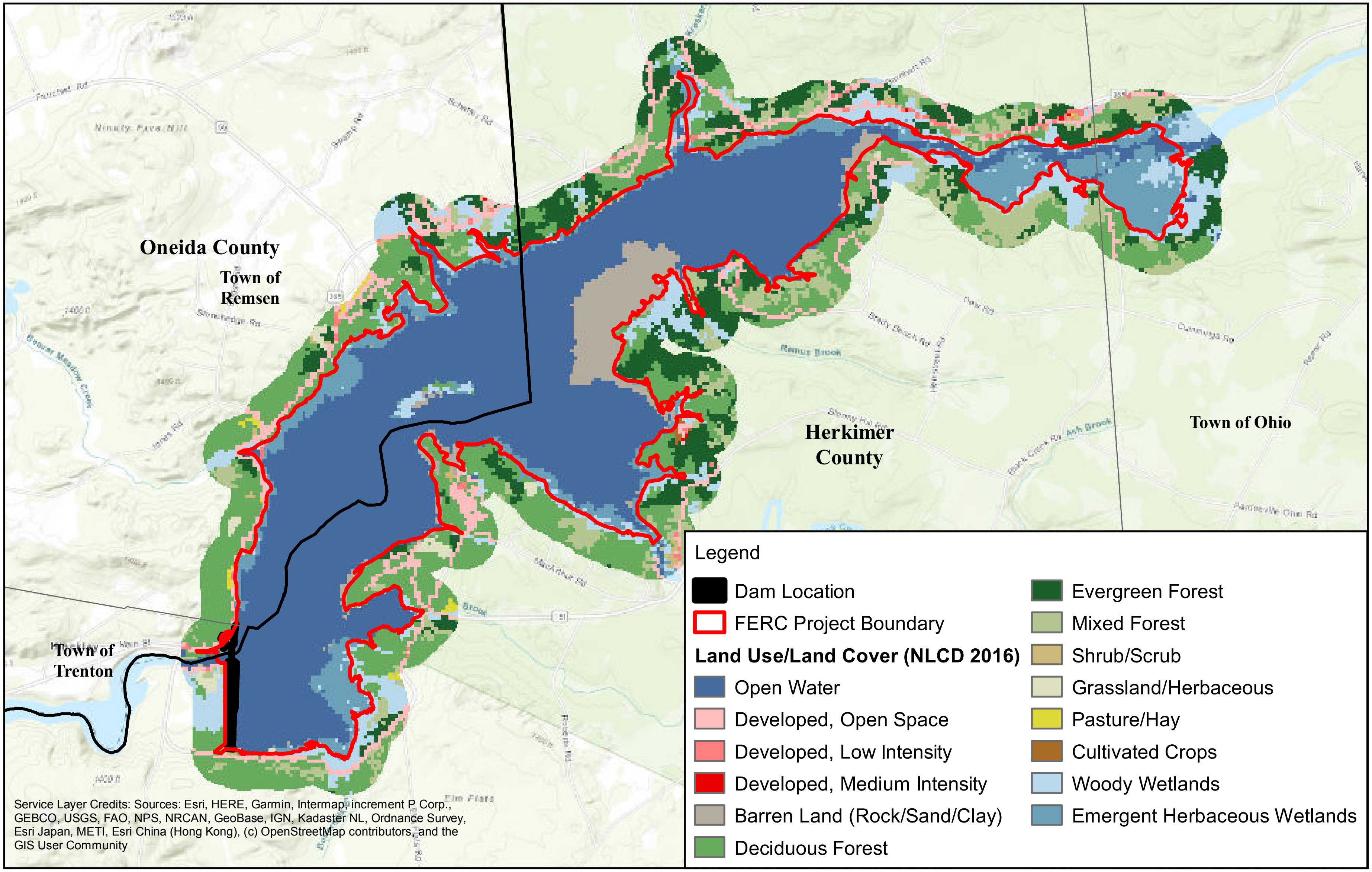

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Figure 4.2.2-2:
Land-use Classifications within 1,000 feet of the Project Boundary

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0 2,000 4,000 8,000 Feet

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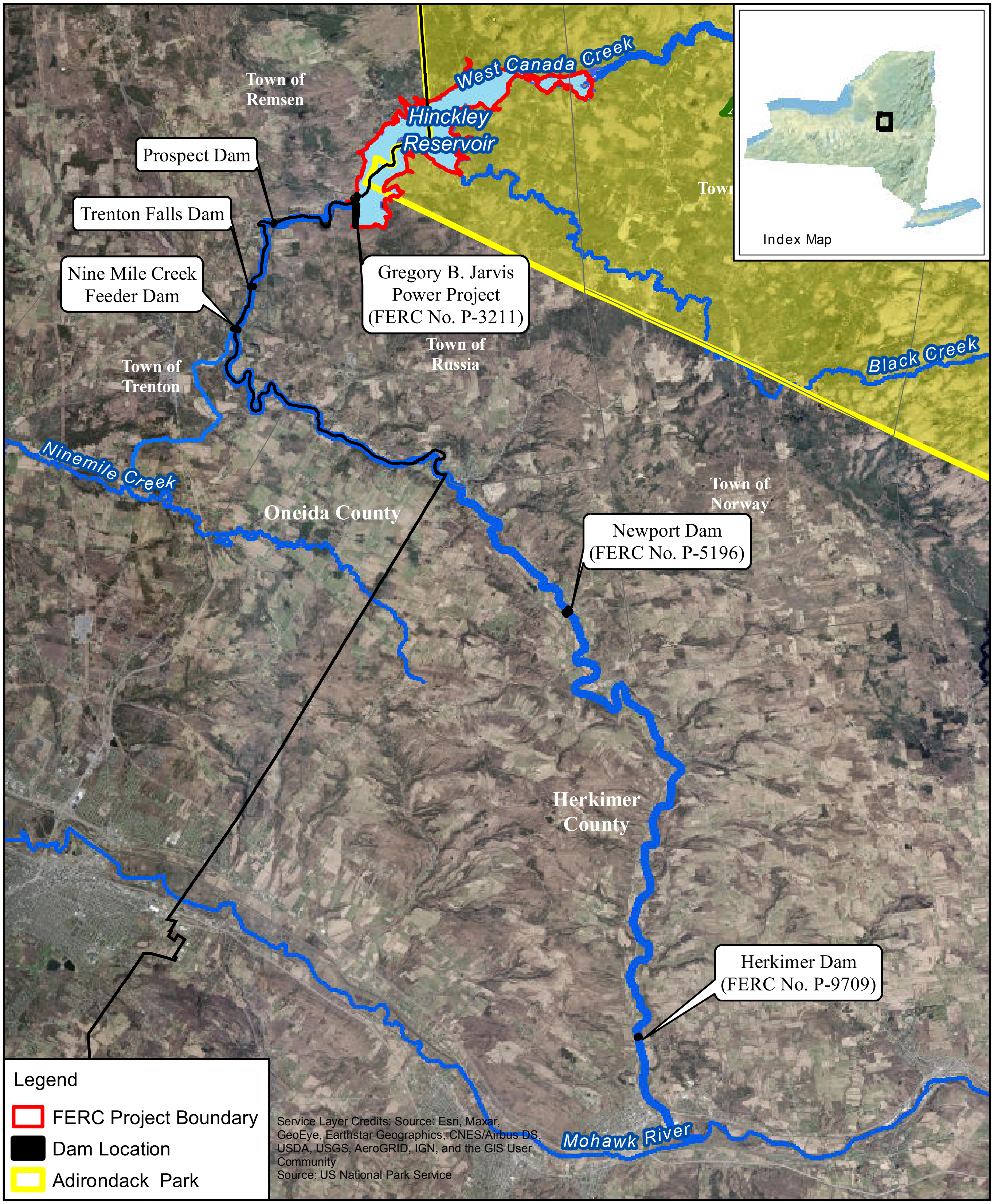

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0 1 2 4 Miles

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Figure 4.2.4-1:
Key Features in the Vicinity of the Project

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4.3 Geological and Soil Resources

4.3.1 Affected Environment

4.3.1.1 Topography

The Project is located within the Appalachian Highlands physiographic division, which extends from Alabama to Maine and includes the Appalachian, Adirondack, and New England provinces. The Appalachian Highlands physiographic division is a region characterized by rugged terrain. In the vicinity of the Project, the physiographic division is split into the Adirondack province and Appalachian Plateaus province; included in the Appalachian Plateaus province is the Tug Hill Plateau. The Project area straddles the border between the Adirondack province and Tug Hill Plateau. The Adirondack province ranges from 600 to 4,000 feet in elevation with a few isolated peaks over 4,300 feet. Less than 20 to 50 percent of this province is covered in gentle slopes (typically defined as being 2 to 5 degrees, Hanson, 2016), with 75 percent of the gentle slopes occurring in the lowlands (USFS, 2016). The Tug Hill Plateau is an asymmetrical dome located in the southwest corner of the Appalachian Plateau, tilting to the southwest. It is separated from the Adirondacks by the Black River Valley (USFS, 2016). The Tug Hill Plateau rises up to 250 feet in elevation along the western ridge and to 2,100 feet along the eastern edge (Tug Hill Commission, 2016).

Most of New York has been glaciated several times. As the ice melted from these glaciers, huge quantities of materials were left behind creating mantles of soil, otherwise known as till. Glacial deposits have left behind minor topographic landforms throughout the Appalachian Highlands area (NYSDOT, 2013).

As previously noted, West Canada Creek originates in the Adirondack Mountains at an approximate elevation of 2,350 ft. As the river flows in a south or south westerly direction, the elevation decreases until it enters Hinckley Reservoir at an approximate elevation of 1225 ft. Elevations within 1,000 feet of the Project boundary get as high as approximately 1,400 feet. Typically, however, elevations remain below 1,300 feet and gradually decrease to approximately 1,225 feet at the reservoir shoreline. The river flows in a south or southeasterly direction after exiting the reservoir (spillway crest El. 1225, riverbed at the site El. 1150), through the Trenton Falls Gorge before eventually draining into the Mohawk River at an approximate elevation of 401 feet. The general topography of the West Canada Creek watershed in the vicinity of the Project is shown in Figure 4.3.1.1-1.

4.3.1.2 Geology

West Canada Creek drains a portion of the southwestern flank of the Adirondacks. Its headwaters lie in the igneous land crystalline metamorphic rocks of the Adirondack Dome. The creek flows in a south or southwesterly direction until it reaches younger sedimentary rocks in the vicinity of Hinckley Reservoir. From this point the river flows southward across the sedimentary rocks to its confluence with the Mohawk River. As West Canada Creek flows downstream of the Project, it develops a moderately deep gorge in the younger, less resistant sedimentary rocks of the Trenton Group. The gorge walls have precipitous, near vertical slopes.

4.3.1.2.1 Bedrock Geology

The Project dam, spillway, and power plant are founded on or in bedrock composed of medium-to-thinly bedded, well-indurated, medium gray, fossiliferous (brachiopodal) limestone which contains thin interbeds of black, limey shale. The New York State Geologic Map includes these limestones and shales within the Trenton Group of Middle Ordovician Age (approximately 450 million years old). The shale limestone beds are generally unweathered, low to moderately hard, irregular (convoluted), calcareous, and contain shell fragments. Shale composes 10% of the bedded sequence near the surface at the Project, increasing to 20% at about 30 feet below the spillway. Shale beds in several places appear weathered to clay, such as a prominent bed that was exposed in the powerhouse cut.

Figure 4.3.1.2.1-1 denotes the bedrock characteristics which exist within 1,000-feet of the Project boundary. The results of this analysis are summarized below:

- Glacial and Alluvial Deposits (Q-underlying bedrock geology unknown): 43%
- Trenton Group (Ot): 41%
- Interlayered metasedimentary rock and granitic, charnockitic, mangeritic, or syenitic gneiss (mug):15%
- Black River Group (Obr): 1%
- Utica Shale (Ou): 0.3%

Descriptions for the top three classifications are included below (USGS, 2016 and NYSDOT, 2013):

Glacial and Alluvial Deposits: Glacial and alluvial deposits originate from the Quaternary period of the Cenozoic era. They are primarily composed of alluvium, which is an unconsolidated detrital material, geologically recent in deposition from a body of running water. The secondary depositional material is glacial drift, a rock material transported and deposited by glaciers. The underlying bedrock geology in these areas is unknown.

Trenton Group: The Trenton Group originates from the Middle Ordovician epoch of the Paleozoic era. It is part of the Black River and Lorraine Groups up to 4,500 feet. The primary rock type of this group is sedimentary carbonate, limestone. The secondary rock type is sedimentary clastic mudstone, shale.

Interlayered metasedimentary rock and granitic, charnockitic, mangeritic, or syenitic gneiss: This metamorphic group originates from the Middle Proterozoic era and is primarily composed of metasedimentary rock. It is secondarily composed of gneiss, a foliated rock that often forms bands or sheet layers.

4.3.1.2.2 Surficial geology

Investigations in the vicinity of the Project have found that overburden in the flatter central portion of the valley consists of organic topsoil, various alluvial or fluvial gravel-silt-sand mixtures with little or no clay, and glacial till. At higher elevations near the north abutment of the dam, borings penetrated a deposit of fine sand to silty fine sand containing occasional lenses of silt and occasional gravel. From the terrace-like appearance of this deposit, these soils have been interpreted to be river terrace or kame deposits that are partially eroded and perhaps subsequently altered by colluvial processes. The till is a dense, silty sand with gravel. These deposits vary in thickness from 2 to 20 feet and are present throughout most of the site. Subsurface profiles drawn in the north-south direction along the embankment axis confirmed this variation.

Figure 4.3.1.2.2-1 denotes the surficial characteristics which exist within 1,000-foot of the Project boundary. Based on the results of the analysis, approximately fifty percent of the area was covered by the reservoir and therefore classified as water. The remaining results of this analysis are summarized below (descriptions from NYSM, 2020):

- Outwash sand and gravel (og): 35.3%
- Lacustrine sand (ls): 6.5%
- Kame moraine (Km): 8.1%

Outwash sand and gravel: Outwash sand and gravel has a thickness variable of approximately 7 to 66 feet. It is stratified coarse to fine gravel with proglacial fluvial deposition and sand. Outwash sand and gravel is stratified and well-rounded and generally finer in texture away from the ice border.

Lacustrine sand: Lacustrine sand is generally permeable, well sorted, stratified quartz sand deposited in proglacial lakes or on remnant ice. It is usually deposited near-shore or near a sand source and has a variable thickness of approximately 7 to 66 feet.

Kame moraine: Kame moraine is a somewhat rounded material with a generally variable texture. Its size ranges from boulders to sand and occurs from the deposition of an active ice margin during retreat. Kame moraine is constructional to kame and kettle topography. It is a calcareous cement with a thickness variable of approximately 33 to 98 feet.

4.3.1.3 Soils

Soil types adjacent to the Project boundary are shown in Figure 4.3.1.3-1. Based on the results of the analysis, approximately fifty-one percent of the area was covered by the reservoir and therefore classified as water. The remaining extent of soil material is summarized below, including descriptions of each series from Natural Resources Conservation Service (NRCS *et al*., 2016) unless stated otherwise. The soil types discussed below represent the dominant soil classifications found in the vicinity of the Project. It should be noted that 15 other soil types were also found in this area; however, those soil classifications are not included in the list below as the percent of total area in which they are present is negligible (i.e., approximately 7%). It should also be noted that the soils data included from North Herkimer County is currently unpublished; however, the unofficial data was obtained from Amy Langner (NRCS, NY) via email on November 4, 2016.

- Adams loamy fine sand, 0 to 60 percent slopes (363A-E): 26.2%
- Searsport-Haplosaprists-Naumburg complex, 0 to 3 percent slopes (367A): 4.6%
- Croghan-Naumburg complex, 0 to 3 percent slopes (364A & 365A): 4.5%
- Monadnock-Adams-Colton complex, 3 to 15 percent slopes, bouldery (650C): 4.1%
- Colton-Adams complex, 3 to 70 percent slopes (375C-F): 2.4%

Adams: Adams loamy fine sand found within the vicinity of the Project has slopes between 0 and 60 percent but can slope up to 70 percent elsewhere. It is formed in glacial-fluvial or glacio-lacustrine sand and can be found within Northern New York and New England. It is an excessively drained soil series present on outwash planes, kames, terraces, eskers and lake planes. The thickness of the upper soil layers ranges from 16 to 35 inches. The depth to bedrock is over 72 inches.

Searsport: The Searsport series slopes between 0 and 3 percent within the vicinity of the Project. It consists of very poorly drained soils formed in thick sandy deposits occurring within pockets and depressions on outwash plains, terraces and deltas. Mineral horizons in this series are estimated to have high or very high saturated hydraulic conductivity.

Haplosaprists: The Haplosaprists series slopes between 0 and 3 percent within the vicinity of the Project. It consists of very poorly drained organic material over sandy glaciofluvial deposits and can be found in bogs and swamps. The depth to bedrock is over 60 inches.

Naumburg: The Naumburg series slopes between 0 and 3 percent within the vicinity of the Project but can slope up to 8 percent elsewhere. It consists of very deep, poorly and somewhat drained soils that formed in sandy deltaic or glaciofluvial deposits found on low-lying sand plains and terraces. It is typically found in forested areas. The thickness of the upper soil layers ranges from 19 to 42 inches. The depth to bedrock is more than 60 inches.

Croghan: The Croghan series slopes between 0 and 3 percent within the vicinity of the Project but can slope up to 15 percent elsewhere. It consists of very deep, moderately drained soils predominantly sandy in texture with some fine sandy loam within a depth of 10 inches from the mineral soil surface. The series is formed in deltaic or glacio-fluvial deposits. The mineral thickness of the upper soil layers ranges from 20 to 50 inches and the depth to bedrock is greater than 60 inches.

Monadnock: The Monadnock series slopes between 3 to 15 percent within the vicinity of the Project but may slope between 0 to 80 percent elsewhere. It consists of very deep, well drained soils that formed in loamy over sandy melt-out tills and mountains in glaciated uplands and are typically found on convex parts of summits, back slopes and shoulders. Its saturated hydraulic conductivity is estimated to be between moderately high or very high. The thickness of mineral upper soil layers ranges from 15 to 36 inches. The depth to bedrock is more than 65 inches.

Colton: The Colton series slopes between 3 to 70 percent within the vicinity of the Project but may slope as little as 0 percent elsewhere. It consists of very deep, excessively drained soils that were formed in glacio-fluvial deposits and can be found on kames, eskers, terraces and outwash plains. Saturated hydraulic conductivity is estimated to be high or very high in the upper soil layers and very high in the substratum. Thickness in the upper soil layers ranges from 18 to 49 inches and depth to bedrock is greater than 60 inches.

Soil Erodibility

Erosion factors for the soil series identified above were gathered from the Essex County Soil Survey developed by the NRCS in cooperation with the Cornell University Agricultural Experiment Station (NRCS *et al*., 2010). The Essex County Soil Survey was referenced for each of the following soil series in the unofficial North Herkimer County GIS layer obtained from Amy Langner (NRCS, NY). As discussed with Ms. Langner, the soils of North Herkimer County are within Major Land Resource Area 143, or the Northeast Mountains, and are similar to the soils in the surrounding counties (such as Oneida County).

The erosion factor, or K factor, indicates the susceptibility of a soil to sheet and rill erosion by water and is one of several factors used in the Universal Soil Loss Equation and the Revised Universal Soil Loss Equation to predict the average annual rate of soil loss. K factor values range from 0.02 to 0.69, with the higher the K factor value typically indicating a higher susceptibility to erosion (NRCS, *et al*., 2010). Table 4.3.1.3-1 shows the Kw (erodibility of the whole soil) and Kf (erodibility of the fine-earth fraction) factors for the soils found in the vicinity of the Project. As shown in the table, these soils are characterized as having low to moderate erodibility.

4.3.1.4 Reservoir Shoreline and Streambanks

Hinckley Reservoir extends approximately 4.5 miles upstream from the dam, has a surface area of approximately 2,709 acres (at El. 1225), and approximately 28.5 miles of shoreline. Shoreline characteristics, including height, slope, vegetative cover, and soil types, vary throughout the reservoir. A pronounced break in topography can be observed at approximately El. 1225 around the entire reservoir.

Based on the results of the 2018 erosion reconnaissance survey conducted as part of the *Reservoir Fluctuation Field Study*, the majority of the reservoir shoreline (approximately 85%)

exhibited little to no erosion and the banks were considered generally stable. Approximately 15% of the shoreline exhibited areas where past, present, or potential future erosion was observed. Figure 4.3.1.4-1 depicts the location of segments exhibiting erosion as observed during the survey.

Approximately 5,890 ft. (1.1 miles) of shoreline was classified as 'Potential Future Erosion'. This equates to approximately 4% of the total study area. Areas classified as 'Potential Future Erosion' were defined as areas where erosion processes had occurred/were occurring but bank failure had yet to occur. Erosion processes could include creep, leaning trees, undercutting, and/or overhanging banks. Segments exhibiting 'Potential Future Erosion' were most common where banks had low heights (i.e., <4 ft.). In many cases, the erosion processes observed at such segments have likely been occurring over many years and bank failure did not appear to be imminent.

Approximately 14,955 ft. (2.8 miles) of shoreline was classified as 'Active or Eroded', indicating that erosion had occurred or is occurring. Of this, approximately 13,759 ft. was considered 'Eroded', while 1,196 ft. was considered 'Active'. In total, this equates to approximately 11% of the total survey area. Areas classified as 'Active or Eroded' were defined as areas where erosion processes have led to a mass wasting event were observed. A mass wasting event is defined as a failure due to gravity (e.g., topple, slides, etc.). 'Active' indicates a segment, or portion of a segment, that exhibits evidence of erosive activity. 'Eroded' indicates a segment, or portion of a segment, where evidence of past erosion is observed but stabilization appears to be occurring and/or there is no evidence of recent erosive activity. Segments classified as 'Active or Eroded' were most common where the bank height was high (i.e., >12 ft.), the slope was vertical or steep (i.e., ~90° or greater than 2:1), and/or vegetation was sparse.

All erosion and potential erosion observed during the survey was observed above El. 1225. Erosion features were not observed within the drawdown zone (i.e., the operating range of the Project units). The geomorphic characteristics of the bank are a dominant factor in the presence or absence of erosion at a given segment. Based on observations made in the field, the typical sequence of erosion throughout the reservoir appears to be:

- When the water surface elevation rests at El. 1225 or above, fluvial erosion (i.e., particle by particle removal of sediment due to water) may occur at the toe of the bank causing the toe to be undercut over time
- In areas where the bank above El. 1225 is vertical or steep, this can eventually lead to a mass wasting event due to the undercut toe and the force of gravity
- Over time this process may repeat itself until the bank eventually naturally stabilizes
- In addition, upland activity (e.g., clearing of vegetation along the face and edge of the bank, presence of stairs leading to the water, retaining walls, etc.) may exacerbate erosion at high and steep banks

Given that the reservoir has been operated in a similar manner for over 100 years, it is not surprising that the vast majority of erosion observed is historic erosion or that banks exhibiting indicators of potential erosion appear to be generally stable, as it is likely that an equilibrium has occurred throughout the reservoir at the majority of these sites. Based on observations made in the field, water level fluctuations do not appear to be impacting erosion processes throughout the reservoir.

The banks along the river downstream of the dam and extending to the end of the Project boundary have a narrow riparian buffer consisting of trees, shrubs, and low-lying vegetation. Banks in this area are moderately steep and are composed of Adams loamy and loamy fine sand (right bank) and cut fill land (left bank). Some limited streambank erosion has been observed in this area, particularly along the left bank. The banks of the tailrace are characterized as having been cut into bedrock with nearly vertical side slopes.

4.3.1.5 Hinckley Reservoir Bathymetry

The Power Authority conducted a bathymetric survey of Hinckley Reservoir in 2018 to obtain the current bathymetric (i.e., bottom surface) contours of the reservoir and update existing elevation-area-volume curves. The results of the survey found that the maximum water depth observed was approximately 73.5 feet below spillway crest (i.e., El. 1225), which equates to a bed elevation of El. 1151.5. Shallow areas along the perimeter of the reservoir were generally observed to have water depths varying from 4-15 feet below spillway crest, depending on location. The West Canada Creek reach of the survey area had a maximum water depth of approximately 32 feet and an average water depth of approximately 12.5 feet (below spillway crest). The average water depth for the entire survey area was observed to be approximately 27 feet below spillway crest, which equates to a bed elevation of El. 1197. In addition, the results of the survey found that the current surface area and gross water volume of the reservoir below spillway crest are 2,709 acres (4.23 mi^2) and 77,014 acre-ft. (25.1 billion gallons), respectively.

Over the past 106 years, two surveys have been conducted to determine the elevation of the reservoir bed. The first was undertaken in 1912 by the New York State Engineer, prior to the reservoir being filled, while the second was conducted in 2018 by the Power Authority as part of licensing. Comparison of elevation-volume curves developed based on these surveys indicates that the storage of Hinckley Reservoir has remained largely unchanged over time. The results of the historic comparison conducted found that the difference in gross storage between these surveys was approximately 2.7%. Such a small difference between the surveys is likely a byproduct of differences in survey methods, the accuracy of the surveys, and the uncertainties associated with the original survey. Table 4.3.1.5-1 provides a side-by-side comparison of key statistics from the historic elevation-volume curve and updated elevation-volume curve.

4.3.1.6 Groundwater and Wells

Some of the residential properties in the vicinity of Hinckley Reservoir utilize wells for daily water supply; however, there are no wells located within the Project boundary. Wells located in the vicinity of Hinckley Reservoir are shown in Figure 4.3.1.6-1. Information depicted in the figure is from NYSDEC's well data GIS layer. Based on review of available NYSDEC well data, a total of six (6) groundwater wells are located within 500 ft. of the Hinckley Reservoir shoreline. Table 4.3.1.6-1 depicts additional information pertaining to each well. In developing the FLA, the Power Authority solicited feedback from each well owner as to whether their wells had ever ceased functioning and, if so, for how long (Appendix B). No responses were received. The Power Authority is not aware of any wells adjacent to Hinckley Reservoir having ever ceased functioning due to the water level management regime of the reservoir.

During periods of prolonged dry weather conditions, some of the wells in the Town of Ohio (southeast of the reservoir) have been reported to run dry. A particularly dry period occurred in November 1998, during which the water level in Hinckley Reservoir fell below El. 1200 for several days. During this time, wells were reported as having extremely low water levels or being completely dry. Over the course of the next several weeks, the water level rose to El. 1210 and yet the wells were still reported dry. This indicates that the water table in the area of the wells southeast of the reservoir is likely controlled more by local recharge due to the infiltration of precipitation than by the water level of Hinckley Reservoir. FERC issued a letter in February 1999 concluding that the cause of the low water levels in the wells was most likely due to below-normal rainfall in 1998[7] which resulted in lower groundwater levels in the region.

4.3.2 Environmental Effects

In SD2, FERC identified the following potential issues pertaining to geology and soils: (1) effects of continued operation on shoreline erosion within the Project boundary and siltation within Hinckley Reservoir, and (2) effects of continued Project operation on groundwater and wells within the Project boundary. Each of these issues is discussed in greater detail below.

Shoreline Erosion and Reservoir Siltation

The majority of the reservoir shoreline (approximately 85%) exhibits none to little erosion with generally stable banks. The remaining 15% of reservoir shoreline exhibits areas where past, present, or potential future erosion is observed. All erosion and potential erosion present in the reservoir is observed above El. 1225 (i.e., above the spillway crest elevation, outside the operational range of the Project). Erosion features were not observed within the drawdown zone during the reconnaissance survey (i.e., the operating range of the units – El. 1195 to 1225). Erosion processes generally occur during periods of high flows and water levels, beyond the control of the Project, when the water surface elevation is greater than El. 1225. During such periods, fluvial erosion occurs at the toe of vertical or steep banks, eventually leading to a mass wasting event due to the undercut toe and the force of gravity. Project operations do not contribute

[7] For the period of September through December 1998, the amount of rainfall in Oneida and Herkimer counties was less than normal by 0.87 inches to 1.62 inches

to erosion processes throughout the reservoir. Given this, the continued operation of the Project is not expected to contribute to erosion within the reservoir over the term of the new license.

The limited erosion observed downstream of the Project is the result of naturally occurring high flows and not Project operations. The observed erosion in this area was the result of the flood of record, which occurred on November 1, 2019 and resulted in a maximum water level in Hinckley Reservoir of approximately El. 1231 (approximately six feet above the spillway crest) and a peak flow of approximately 37,000 cfs as measured at the Wilmurt U.S. Geological Survey (USGS) gage (Gage No. 01343060). Given this history, the continued operation of the Project is not expected to contribute to erosion downstream of the dam over the term of the new license. With that said, the Applicant intends to repair the downstream erosion resulting from the 2019 high flow event in 2020.

Regarding siltation within Hinckley Reservoir, prior to 2018 the only bathymetric data available for Hinckley Reservoir was based on a 1912 survey conducted prior to the reservoir being filled. As a result, it was unknown to what extent, if any, reservoir infilling had occurred over the past 100-plus years. The results of the 2018 survey clearly demonstrate that minimal infilling has occurred during the life of the reservoir. The lack of appreciable change in storage is likely due to the location of the reservoir within the Adirondack Park, the mostly forested land use of the surrounding watershed, and the lack of development in the area. As a result of these factors, the potential for significant sediment inflow and loading to occur is minimal. Therefore, significant deposition of sediment within the reservoir from upstream sources is not expected. In addition, although historic shoreline erosion is observed in several locations around the perimeter of the reservoir, the amount of sediment deposited within the reservoir as a result of such erosion is minimal, resulting in an insignificant loss of storage capacity. The continued operation of the Project is not expected to result in siltation or infilling of the reservoir.

Groundwater and Wells

The Power Authority is not aware of any residential wells adjacent to the reservoir ceasing to operate as a result of the water level management regime of the reservoir. In addition, as discussed in Section 4.3.1.6, FERC found previously that the cause of low water levels in wells in this region is most likely due to below normal rainfall, resulting in lower groundwater levels.

4.3.3 Proposed Environmental Measures

The Power Authority proposes to continue existing operating conditions in the new license and is not proposing any changes with respect to geology and soils resources.

4.3.4 Unavoidable Adverse Impacts

Continued Project operation is not expected to adversely affect geology and soils resources.

Table 4.3.1.3-1: Erodibility of Soils in the Vicinity of the Project

Soil Series	Kw Factor	Kf Factor
Adams	0.05-0.15	0.05-0.15
Searsport	0.10-0.37	0.10-0.37
Haplosaprists	0.20	0.20
Naumburg	0.10-0.20	0.10-0.20
Croghan	0.10-0.15	0.10-0.15
Monadnock	0.02-0.20	0.05-0.24
Colton	0.02-0.05	0.05-0.15

Source: NRCS *et al.*, 2010

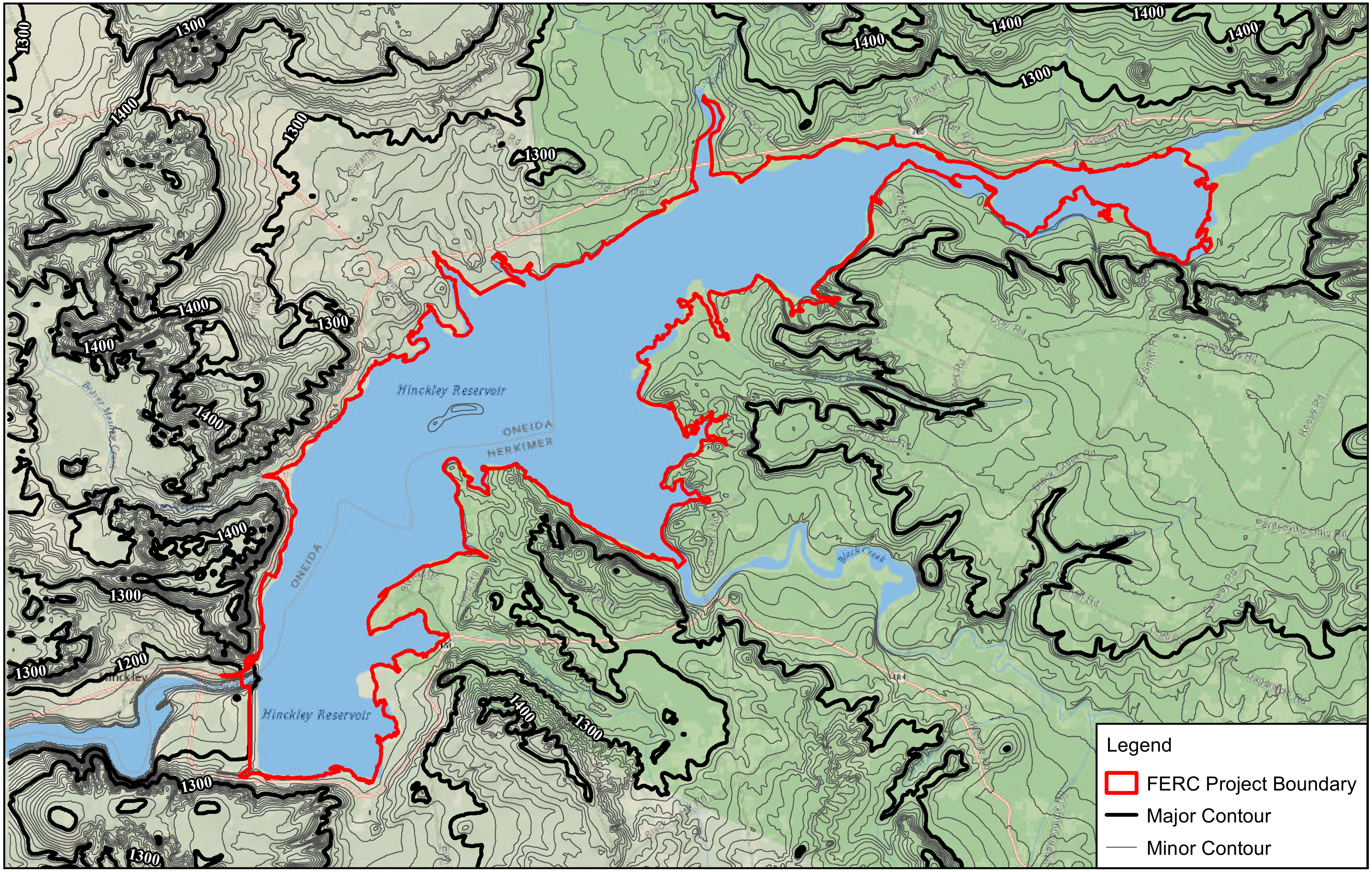
Table 4.3.1.5-1: Comparison of Hinckley Reservoir Bathymetric Datasets

Parameter	Gibson[8] (1921)	Power Authority (2018)
Average water depth (ft.)	28	27
Maximum water depth (ft.)	75	73.5
Gross Storage[9] (billion gallons)	25.8	25.1
Dead Storage[10] (billion gallons)	0.54	0.52
Useable Storage[11] (billion gallons)	25.3	24.6
Surface area (acres)	2,854	2,709

[8] Exact details such as the geographic extent, maximum upper elevation, and accuracy of the original survey are unknown. Differences observed between the 1921 and 2018 datasets may reflect these uncertainties as opposed to actual changes in reservoir conditions.
[9] Storage below El. 1225.0
[10] Storage below El. 1173.5
[11] Gross Storage minus Dead Storage

Table 4.3.1.6-1: Groundwater Wells within 500 ft. of Hinckley Reservoir

NYSDEC Well No.	Latitude	Longitude	Well Depth (ft.)
HE1233	43° 21’ 06.7”	75° 01’ 32.7”	460
HE1252	43° 20’ 27.0”	75° 03’ 18.4”	240
HE1344	43° 20’ 58.8”	75° 02’ 28.2”	520
HE1459	43° 19’ 15.0”	75° 03’ 41.3”	279
HE1644	43° 19’ 39.1”	75° 04’ 58.2”	205
HE855	43° 19’ 03.0”	75° 05’ 37.8”	97



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0 2,000 4,000 8,000
Feet

Figure 4.3.1.1-1:
Topography Surrounding the Project Area

Contour data derived from Digital Elevation Model (DEM) created by NYSDEC and USGS. Data accessed from NYSGIS Clearinghouse on December 1, 2016.

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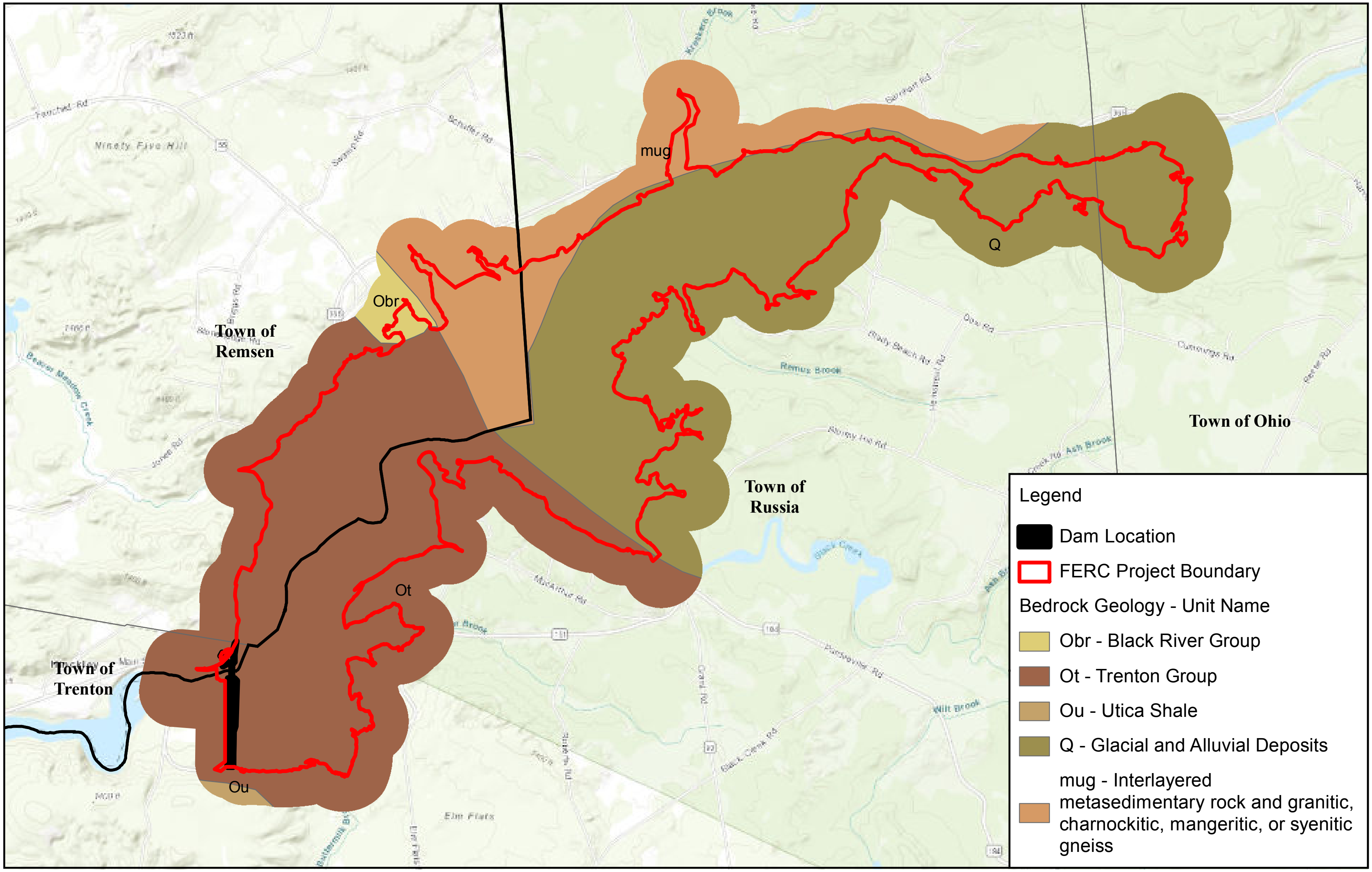

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Figure 4.3.1.2.1-1:
Bedrock Geology in the Vicinity of the Project

N

0 2,000 4,000 8,000 Feet

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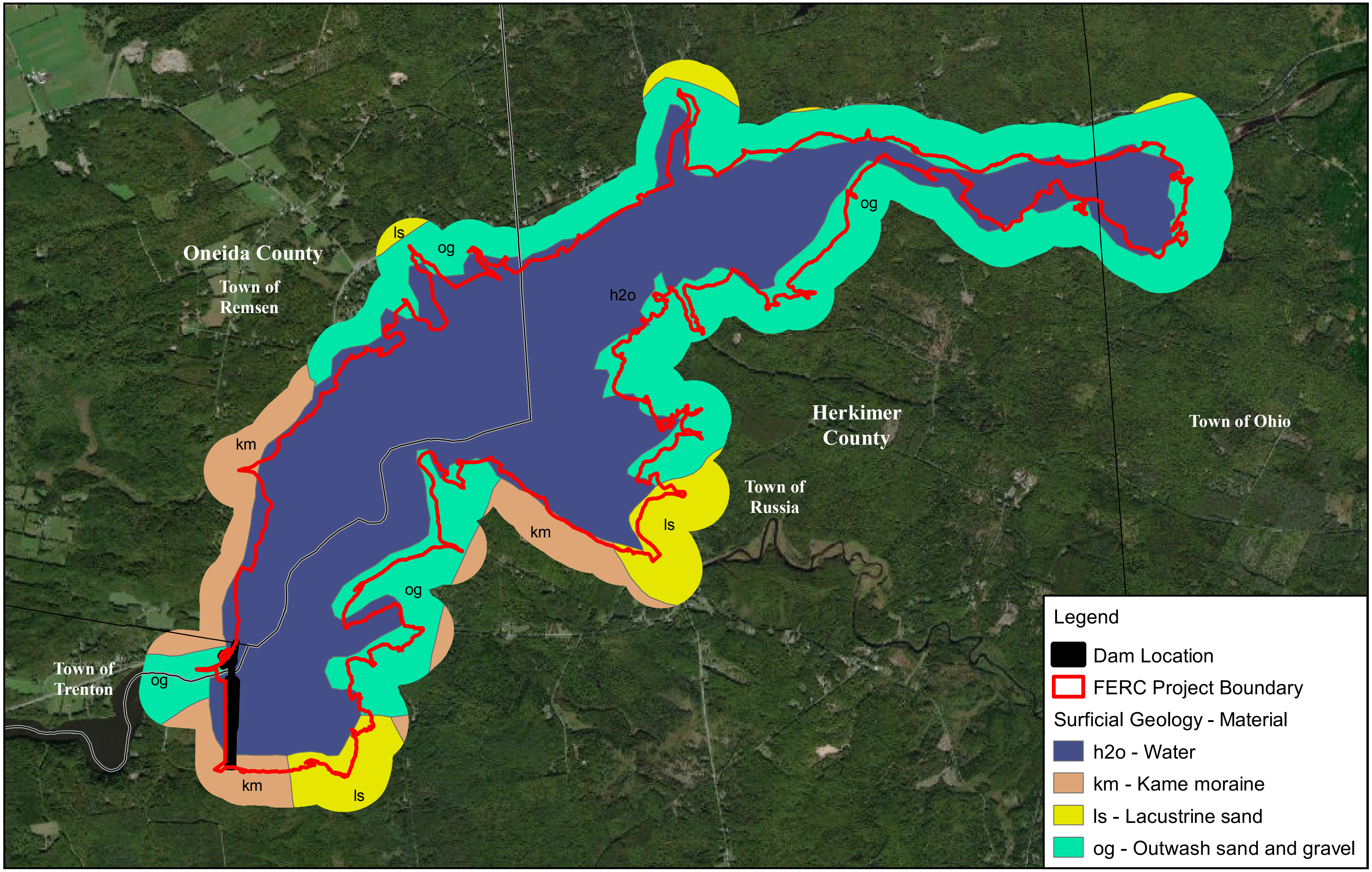

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Figure 4.3.1.2.2-1:
Surficial Geology in the Vicinity of the Project

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N

0 0.5 1 2 Miles

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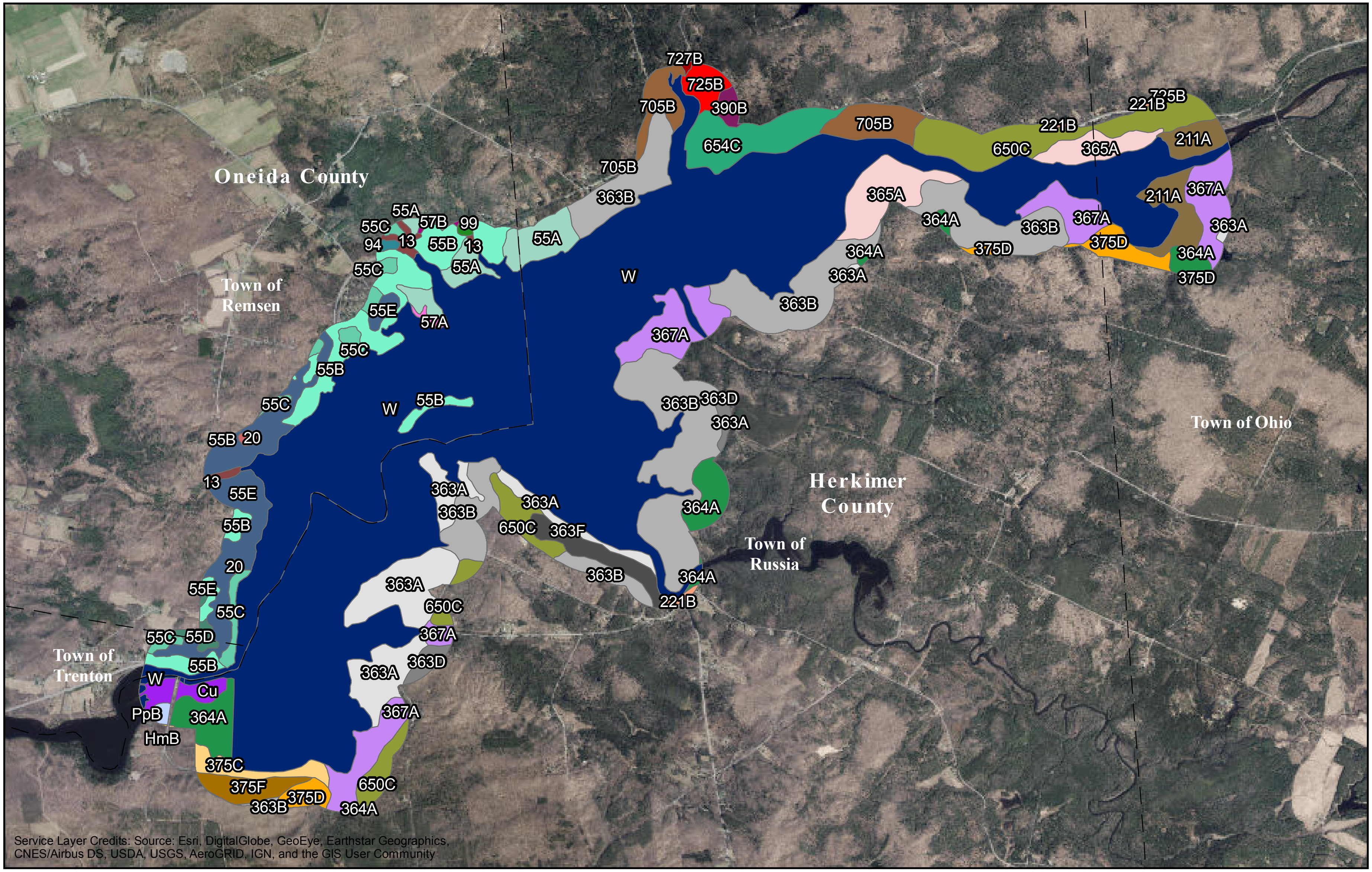

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0 2,000 4,000 8,000
Feet

Figure 4.3.1.3-1:
Soils in the Vicinity of the Project

Path: J:\maps\FLA\exhibit_e\figure_4_3_1_3-1_soils.mxd

Legend

- 13 - Fluvaquents-Borosaprists complex
- 20 - Pits, sand and gravel
- 211A - Burnt Vly-Humaquepts-Pleasant Lake complex, 0 to 2
- 221B - Roundabout-Nicholville complex, 0 to 8 percent slopes
- 363A - Adams loamy fine sand, 0 to 3 percent slopes
- 363B - Adams loamy fine sand, 3 to 15 percent slopes
- 363D - Adams loamy fine sand, 15 to 35 percent slopes
- 363F - Adams loamy fine sand, 35 to 60 percent slopes
- 364A - Croghan-Naumburg complex, 0 to 3 percent slopes
- 365A - Naumburg-Croghan complex, 0 to 3 percent slopes
- 367A - Searsport-Haplosaprists-Naumburg complex, 0 to 3 percent slopes
- 375C - Colton-Adams complex, 3 to 15 percent slopes
- 375D - Colton-Adams complex, 15 to 35 percent slopes
- 375F - Colton-Adams complex, 35 to 70 percent slopes
- 390B - Salmon-Nicholville complex, 0 to 8 percent slopes
- 55A - Adams loamy sand, 0 to 3 percent slopes
- 55B - Adams loamy sand, 3 to 8 percent slopes
- 55C - Adams loamy sand, 8 to 15 percent slopes
- 55D - Adams loamy sand, 15 to 25 percent slopes
- 55E - Adams loamy sand, 25 to 45 percent slopes
- 57A - Croghan loamy fine sand, 0 to 3 percent slopes
- 57B - Croghan loamy fine sand, 3 to 8 percent slopes
- 650C - Monadnock-Adams-Colton complex, 3 to 15 percent slopes, bouldery
- 654C - Monadnock-Sabattis complex, rolling, very bouldery
- 705B - Adirondack-Tahawus complex, 0 to 8 percent slopes, very bouldery
- 725B - Skerry-Becket complex, 3 to 15 percent slopes, very bouldery
- 727B - Skerry-Adirondack complex, 0 to 8 percent slopes, very bouldery
- 94 - Naumburg loamy sand
- 99 - Greenwood peat
- Cu - Cut and fill land
- HmB - Hinckley gravelly loamy sand, 3 to 8 percent slopes
- PpB - Phelps gravelly fine sandy loam, 0 to 4 percent slopes
- W - Water

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Figure 4.3.1.3-1:
Soils in the Vicinity
of the Project Legend

Path: J:\maps\FLA\exhibit_e\figure_4_3_1_3-1_soils_legend.mxd

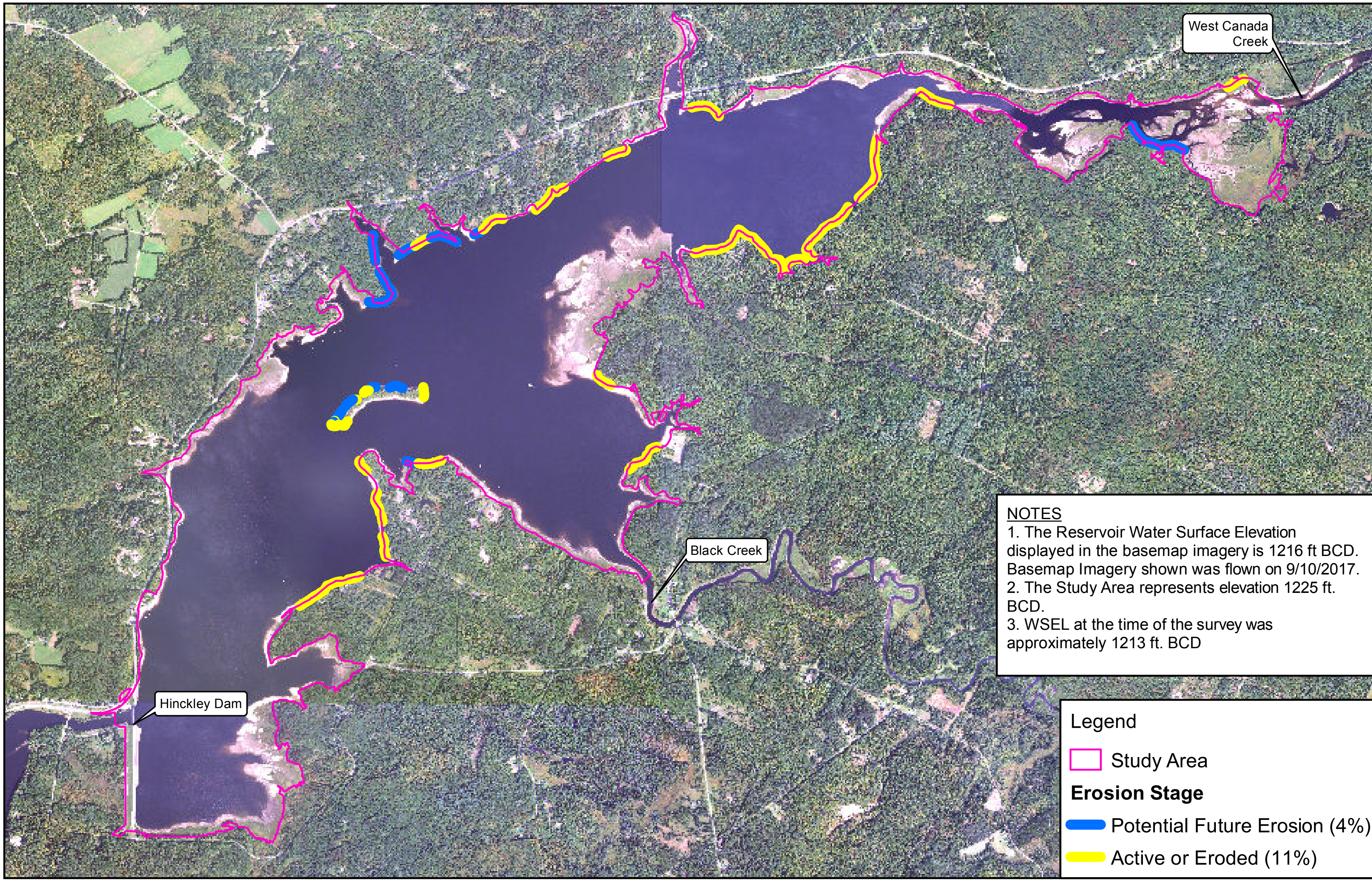

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Figure 4.3.1.4-1:
Hinckley Reservoir Shoreline Erosion

Path: J:\maps\FLA\exhibit_e\figure_4_3_1_4-1_erosion.mxd

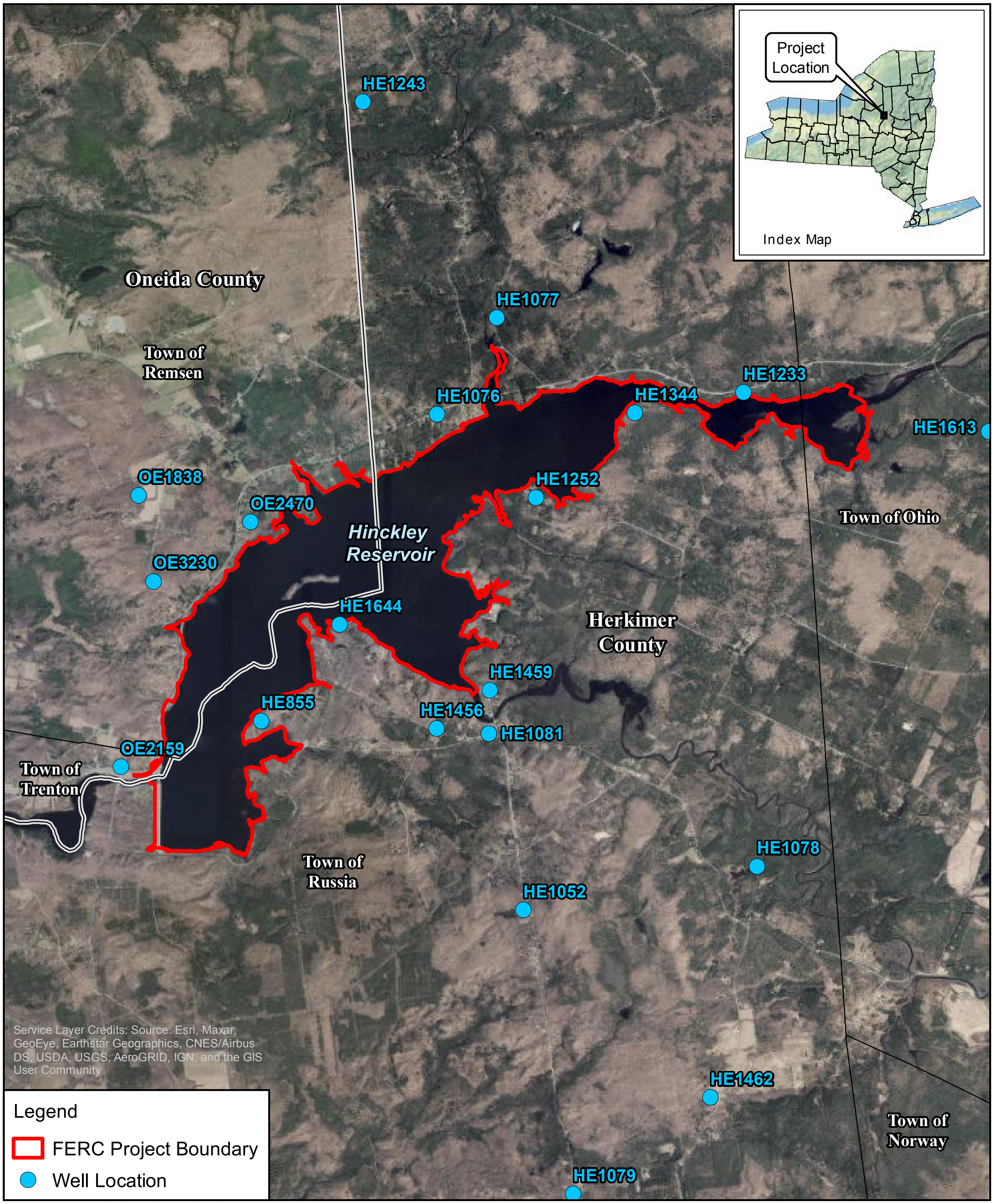

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Figure 4.3.1.6-1:
Wells in the Vicinity
of the Project Boundary

Path: J:\maps\FLA\exhibit_e\figure_4_3_1_6-1_wells.mxd

4.4 Water Resources

4.4.1 Affected Environment

4.4.1.1 Water Quantity

4.4.1.1.1 Overview

Hinckley Reservoir has a surface area of approximately 4.23 mi^2 when full to the spillway crest (El. 1225) and an estimated gross volume of 25.1 billion gallons. The reservoir has an average water depth of about 27 feet and a maximum depth of approximately 73.5 feet from the spillway crest at El. 1225.

Figures 4.4.1.1.1-1 through 4.4.1.1.1-13 illustrate annual and monthly water surface elevation duration curves for Hinckley Reservoir for the period of record from January 1938 to December 2019 (except for the years 1979 to 1986, for which there is no available water surface elevation data). The period from January 2001 to December 2019 is shown on these graphs as well, to show typical recent operations and to represent a similar period of record as the flow duration curves. Table 4.4.1.1.1-1 shows the median water surface elevations for the period from January 1938 to December 2019. Figure 4.3.1.1-14 shows the yearly and annual water surface elevation of the reservoir for recent years (January 2001 to December 2019). As shown in the monthly duration curves and the elevation graph, the reservoir is drawn down in the winter in preparation for greater flows during the spring months.

4.4.1.1.2 Hydrology and Streamflow

Approximately 95% of inflow to Hinckley Reservoir is provided by West Canada Creek and Black Creek. The USGS operates streamflow gaging stations on both of these tributaries. The gaging station on West Canada Creek (No. 01343060) is located in Wilmurt, approximately 3 miles upstream of the reservoir. This gage has a drainage area of 238 mi^2 and has been in operation since 2001. The gaging station on Black Creek (No. 01433403) has a drainage area of 60.9 mi^2, is located about 6 miles southeast of the reservoir, and has only been in operation since 2014. Because of the short period of record at the Black Creek gage, inflows to Hinckley Reservoir are based only on streamflow data from the Wilmurt USGS gage.

The monthly flow statistics for inflow and outflow to the reservoir are presented in Table 4.4.1.1.2-1 and Table 4.4.1.1.2-2, respectively. Flow from the Wilmurt gage[12] was prorated[13] to represent inflow, and the outflow which includes turbine flow, spillway flow, sluice gate no. 4 flow, and penstock bypass flow was calculated by the Power Authority based on reservoir water level,

[12] Flow data from USGS Gage 01343060 is provisional from 10/1/2019 to 12/31/2019, meaning that values are subject to revision until they have been thoroughly reviewed and received final approval.

[13] The proration factor is 1.56 as a result of the drainage area of Hinckley Reservoir (372 mi^2) divided by the drainage area of the gage (238 mi^2). Reservoir inflows calculated by proration of flow data at the gage are higher than those calculated by the Power Authority by balancing the daily change in reservoir storage, the reservoir release, the MVWA withdrawal for public drinking water supply, evaporation, and precipitation (i.e. reverse routing).

power generation, turbine efficiency, and gate openings. A comparison of flows between to the two tables indicates that reservoir operations consistent with the Operating Diagram redistribute high inflows during spring freshet to supplement inflow for the remainder of the year. The inflow to the reservoir must be supplemented by reservoir storage to meet the minimum release of 160 cfs fairly often over the summer months. In July, August, and September flows are supplemented 18%, 29%, and 24% of the time, respectively, to meet the 160 cfs minimum flow requirement. Monthly and annual flow duration curves for the period of record (July 2001 – December 2019) were calculated using daily flows from these same sources, and are presented in Figures 4.4.1.1.2-1 through 4.4.1.1.2-13.

Analysis of the data used to develop the annual flow duration curve (Figure 4.4.1.1.2-1) shows that inflows exceed 300 cfs (the minimum hydraulic capacity of the Project) approximately 80% of the time. Additionally, the data also showed that when inflow is approximately 300 cfs or less, the reservoir outflow exceeds the inflow, indicating that the Project supplements outflow by redistributing high inflows utilizing the reservoir storage. This is the result of Hinckley Reservoir operating as a seasonal storage reservoir (as defined by the Operating Diagram), with water levels at their peak after the spring freshet and then drawn down through the summer and fall months to supplement downstream flows. The reservoir then partially refills during the late fall and winter but is lowered during March and April in anticipation of spring snowmelt.

4.4.1.1.3 Hydraulic Gradient

Approximately 2.5 miles downstream of the Project is the Prospect Development which is owned by Erie Boulevard. The Prospect impoundment backs up to the Project powerhouse, and the Project tailrace is essentially at the same elevation as the maximum operating level of the Prospect Development. Therefore, the downstream reach below the Project powerhouse is not affected by an appreciable gradient.

4.4.1.2 Water Quality

The following sections discuss water quality standards and classifications applicable to waterbodies in the Project vicinity, as well as results from water quality investigations that pertain to Hinckley Reservoir and related waterbodies at the Project.

4.4.1.2.1 Federal Clean Water Act

In 1972, the Federal Water Pollution Control Act Amendments established the Clean Water Act (CWA) as the foundation of modern surface water quality protection in the United States. Sections 303 and 305 of the CWA guide the national program on water quality. Subsections 303(a)-(c) of the CWA are relevant to this water quality discussion, as those subsections discuss the process by which all states are to adopt and periodically review water quality standards. Subsection 305(b) directs states to periodically prepare a report that assesses the quality of waters in the state.

4.4.1.2.2 State Water Quality Standards

In accordance with CWA Section 303(a)-(c), New York State has developed waterbody classifications and water quality standards which apply to all surface water and groundwater throughout the State. All waters in New York State are assigned a letter classification that denotes their best uses. Table 4.4.1.2.2-1 identifies the waterbody classifications of Hinckley Reservoir, the primary tributaries that drain to Hinckley Reservoir, and West Canada Creek downstream of Hinckley Dam. Refer to Figure 4.2.1-1 for a location of the tributaries relative to Hinckley Reservoir.

As noted in the table, Hinckley Reservoir and its primary tributaries are all classified as Class AA or A. NYSDEC defines the best usages of Class AA and A waters as a source of water supply for drinking, culinary or food processing purposes; primary and secondary contact recreation; and fishing. The NYSDEC also notes that the waters shall be suitable for fish, shellfish and wildlife propagation and survival. The area immediately downstream of the Reservoir, from Hinckley Dam to Prospect Dam, is classified as Class B. The NYSDEC defines these waters as best used for primary and secondary contact recreation and fishing. These waters are also suitable for fish, shellfish and wildlife propagation and survival. The symbol (T), appearing in an entry in the "Standards" column in the classification table, means that the classified waters in that specific item are trout waters (State of New York, 2020a). Any water quality standard, guidance value, or thermal criterion that specifically refers to trout or trout waters applies. With the exception of Remus Brook and Black Creek, the remaining tributaries and Hinckley Reservoir are designated as trout waters (State of New York, 2020b).

NYSDEC establishes water quality standards and other criteria for many specific parameters. These standards can be either narrative or numeric. Table 4.4.1.2.2-2 outlines the water quality standards and criteria applicable to the surface waters of the Project.

4.4.1.2.3 Water Quality Assessments

In order to fulfill certain requirements of the Clean Water Act, NYSDEC provides regular, periodic assessments of the quality of the water resources in the State and their ability to support specific uses. This information is compiled by the NYSDEC into an inventory database known as the Waterbody Inventory/Priority Waterbodies List (WI/PWL). WI/PWL includes waterbody Fact Sheets outlining (1) the most recent assessment of use; (2) identification of water quality problems and sources; and (3) a summary of activities to restore and protect each individual waterbody. The Fact Sheets are grouped by the 17 major drainage basins in New York State. WI/PWL is reviewed and updated as sampling results and/or other water quality information becomes available.

The most recent Mohawk River Basin WI/PWL Report was issued in July 2010 and includes an overall evaluation of water quality in the Mohawk River Basin, as well as assessments for specific waterbody segments within the basin. That report also outlines the causes (pollutants) and sources of water quality problems for those waterbodies with known or suspected impacts. Assessed waterbodies are listed as:

- Impaired Waters (Not Supporting Uses);
- Waters with Minor Impacts;
- Threatened Waterbodies;
- Waterbodies with Water Quality Impacts Needing Verification; or
- Waterbodies with No Known Impacts.

Unassessed waterbodies are also included in the Waterbody Inventory. The assessments reflect the best available water quality information at the time of publication of the list (NYSDEC, 2014b). A description of the assessments of the waterbodies in the Project vicinity from the WI/PWL is described briefly below.

Hinckley Reservoir

Hinckley Reservoir is listed in the WI/PWL as “Waters with Minor Impacts” (NYSDEC, 2010). This classification is applied to “waterbodies where less severe water quality impacts are apparent but uses are still considered fully supported. These segments correspond to waters listed as having stressed uses” (NYSDEC, 2014b). Impacted water uses in Hinckley Reservoir include water supply, recreation, and habitat/hydrology. The severity of impact for the three uses is threatened, stressed, and stressed, respectively. The waterbody inventory indicates that the reservoir is stressed due to seasonal water level fluctuations and other impacts resulting from multiple uses of the reservoir, which affect its natural resources, habitat and hydrology. Low nutrient levels and sandy substrate, while not water quality problems, combine with the fluctuating water levels and high flushing rates to limit the fishery resource. Acid rain impacts are also listed as a concern. The described segment includes the entire reservoir from the Hinckley Dam at the mouth of the reservoir upstream to the Harvey Road Bridge (NYSDEC, 2014b).

Tributaries Upstream of Hinckley Reservoir

The West Canada Creek, from Hinckley Reservoir near the McIntosh Bridge (at Harvey Road) upstream to Nobleboro, NY, is classified as an “Impaired Segment” with regard to aquatic life. The impairment is attributed to low pH due to atmospheric deposition (acid rain). A macroinvertebrate survey of West Canada Creek was conducted in 2006; samples taken at the McIntosh Bridge were assessed as having non-impacted water quality. Samples at the Nobleboro site were found to be just into the range of slightly impacted due to nutrient enrichment. This was attributed to elevated nitrate levels from acid rain causing increased algae growth in the stream (NYSDEC, 2010). Black Creek and other minor tributaries to Hinckley Reservoir, including Kreskern Creek, Beaver Meadow Creek, and Taynter Brook, are all listed in the WI/PWL as “Waterbodies with No Known Impacts” (NYSDEC, 2010). NYSDEC defines these waterbodies as “segments where monitoring data and information indicate that there are no restrictions to overall uses, although minor impacts to component indicators (such as biological assessments) may be present" (NYSDEC, 2014b). Biological (macroinvertebrate) assessments performed by NYSDEC of Kreskern Creek in Northwood, NY and Black Creek in Pardee Corners, NY indicated good water quality at both locations. Kreskern Creek sampling results indicated slightly impacted conditions, wherein the community is slightly altered from natural conditions. However, this results in relatively insignificant effects on the fauna, and aquatic life is considered to be fully supported in the stream. The samples taken at Kreskern Creek were considered by NYSDEC to be representative of water quality in Beaver Meadow Creek and Taynter Brook as well. Sampling results at Black Creek indicated non-impacted water quality conditions (NYSDEC, 2010).

West Canada Creek Downstream of Hinckley Dam

The middle mainstem of West Canada Creek (from Hinckley Dam downstream to the Prospect Development) was categorized as an "Impaired Segment" with regard to aquatic life and habitat/hydrology. The source of impairment is attributed to fluctuating stream flow and hydrologic modifications resulting from hydro generation (NYSDEC, 2010). The waters of this portion of the stream are Class B(T).

4.4.1.2.4 Water Quality Studies and Data

Available Water Quality Data

The Power Authority conducted the 2018 *Tailwater Water Quality Study* to gain a better understanding of water quality conditions below Hinckley Dam and to determine compliance with New York State Surface Water Quality Standards. The objective of this study was to collect continuous dissolved oxygen (DO), temperature, and pH data in the Project tailwater downstream of the Project during the warm summer and early fall months. This period was chosen as it represents the period when Hinckley Reservoir is likely to have the most pronounced stratification and when outflows were expected to be the lowest.

The Power Authority conducted additional voluntary water quality monitoring from July 24, 2019 through October 2, 2019 to further inform water quality dynamics in the Project tailwater and to determine if low DO conditions persist during year-to-year variation in flow and weather conditions in the Project area. In addition to the tailwater monitoring, vertical temperature and DO profiles were collected every other week in Hinckley Reservoir to establish stratification trends. The results of voluntary monitoring during the summer and early fall of 2019 are summarized under the *Hinckley Reservoir* and the *Hinckley Dam Tailwater Data* headings below. Full results for the 2019 sampling effort are included in the *Dissolved Oxygen Enhancement Study Plan* dated December 2019.

Hinckley Reservoir

NYPA - 2019

A vertical temperature and DO profile was collected once every other week in Hinckley Reservoir from July 24, 2019 through October 2, 2019 to establish stratification trends. At this site, temperature and DO were measured at 1-meter increments starting from the water's surface and continuing to the bottom. Upon discovery of a thermocline, measurements were collected at 0.5-meter increments.

Figure 4.4.1.2.4-1 presents the vertical temperature profiles in Hinckley Reservoir collected by the Power Authority in 2019. Water temperatures from top to bottom ranged from 12.5 °C to 25.3 °C – both extremes occurred on August 6. All temperatures were relatively constant from near the water surface to the top of the turbine intake except the July 24 sample, where temperatures began to decrease at an elevation about 10 feet above the top of the intake. As the season progressed, there was less change in temperature throughout the water column and the vertical temperature changes started lower in the water column.

Figure 4.4.1.2.4-2 presents the vertical DO profiles in Hinckley Reservoir collected by the Power Authority in 2019. The results show that Hinckley Reservoir was stratified from the onset of 2019 monitoring. Starting at the reservoir surface, DO concentrations began to decrease above or near the top of the intake elevation for all samples. DO ranged from 0.09 to 8.56 mg/L. The first three samples (July 24 through August 23) showed most of the water column between the top and bottom of the intake as having DO concentrations below 5.0 mg/L. The last three samples (September 5 through October 2) showed all or most of the intake water column as having a DO concentration above 6.0 mg/L. Hypoxic conditions (DO less than 3.0 mg/L) typically occurred below the bottom of the intake, except for August 6 when DO levels were below 3.0 mg/L approximately two feet above the bottom intake level.

Data Previously Collected by Others

Water quality data including DO, temperature, turbidity, and pH have been collected in Hinckley Reservoir over the past 30 years by the NYSDEC and the MVWA. These data were described in the PAD (NYPA, 2017) and in the 2018 *Tailwater Water Quality Study* and are briefly summarized here.

Water quality data collected from 2000-2018 by the MVWA is summarized in Table 4.4.1.2.4-1. Data was collected approximately 33 feet and 66 feet below the floor of the MVWA intake tower (elevations of 1199 and 1166, respectively). DO levels measured at each location indicate that lower elevations in the reservoir experience more anoxic conditions. Turbidity values at each location averaged below 2.0 Nephelometric Turbidity Units (NTU).

The NYSDEC has a five-year rotating basin schedule, whereby every five years a different waterbody for a major drainage basin is sampled and a Lake Classification and Inventory (LCI) survey summary is prepared. The most recent LCI Lake Water Quality Summary for Hinckley Reservoir was prepared in 2011. Based on the 2011 sample data, NYSDEC summarized that the reservoir exhibited weak thermal stratification in June with hypoxic (low oxygen) conditions near the bottom of the reservoir. The thermal stratification present in June was lost by July and did not reappear throughout the remainder of the sample period. NYSDEC concluded that, as the majority of water used from the reservoir is removed from the bottom third of the waterbody, the withdrawal of cold water from low depths in the reservoir reduces the reservoir's ability to maintain thermally stratified layers (NYSDEC, 2011a).

pH profiles collected by NYSDEC in 2011 show that pH is decreased slightly from surface to bottom. Discounting the June sample, pH ranged from 7.3 to 5.8 indicating slightly acidic waters. Low pH values are attributed to atmospheric deposition (acid rain). Acid precipitation has historically been problematic for the Adirondack region, with typical pH values for rainfall less than 5.0 (EPA, 2001).

Project Tailwater Data

DO and Temperature

The Power Authority collected data in support of the *Tailwater Water Quality Study* over the summer and early fall of 2018. Monitoring was conducted at one site below the dam and Project tailrace as shown in Figure 4.4.1.2.4-3. Continuous monitoring was conducted using a Hydrolab HL4 Multi-parameter Sonde suspended halfway across the river channel and approximately six feet below the water's surface from a surface buoy anchored to the river bottom. The datasonde recorded water temperature, DO, pH, and conductivity every 15 minutes from June 5 through October 1, 2018. Table 4.4.1.2.4-2 displays the minimum, maximum, and averages for water temperature, DO, pH and specific conductivity each month from June through September. Figure 4.4.1.2.4-4 and Figure 4.4.1.2.4-5 show an overview of the tailwater temperature results for the study period with Hinckley release. Figure 4.4.1.2.4-6 and Figure 4.4.1.2.4-7 show an overview of the tailwater DO results for the 2018 study period with Hinckley release.

There was no spill over the dam at the Project during the 2018 study and the elevation of Hinckley Reservoir was consistently lower than the long-term average during the period June through mid-September. Hinckley Reservoir elevations were over five feet lower than normal for all of July. Reservoir inflows were less than 300 cfs for most of June, July, and through mid-August. Likewise, discharges through the dam during the 2018 monitoring period were well below normal during the entire water quality monitoring period. The average daily Hinckley release was lowest from June 28 to August 21, during which time there was no generation and sluice gate no. 4 was used to pass reservoir outflows. The Project turbines were idle for almost two months of the study when only sluice gate no. 4 was releasing water.

Water temperature followed a typical seasonal trend. The tailwater temperatures during this study increased from June into September and then decreased from mid-September into October. Water temperatures did not appear to be affected by the mode of release through Hinckley Reservoir despite drawing in water from deeper, cooler waters of the reservoir. The deep intake at the Project appears to moderate tailwater temperatures as the maximum temperature observed in 2018 was < 23.0 °C.

The Project was generating for most of June and the tailwater DO concentrations remained above 6.0 mg/L. On June 27 turbine generation ceased due to low reservoir elevations and sluice gate no. 4 was subsequently used to release reservoir outflows. Sluice gate no. 4 draws reservoir water from near the bottom of the reservoir from similar elevations as the intake leading to the turbines. From late June through late August, reservoir releases were provided primarily through sluice gate no. 4, with a few exceptions. During this time, the tailwater DO levels periodically dropped below NYS Surface Water Quality Standards when the Project began generating after a long period of being idle. On August 22, sluice gate no. 4 was closed and the Project began generating on a consistent basis. The DO levels periodically dropped below NYS Water Quality Standard from the period of August 22 to September 8. The daily average DO values were less than 6.0 mg/L for 15 days during this period (minimum daily average DO = 4.82 mg/L).

The lower DO concentrations are attributed to hypoxic conditions in the deeper portions of the Hinckley Reservoir and lack of reaeration through the turbines. Tailwater DO concentrations increased after the first week of September and are likely attributed to the reservoir DO stratification pattern changing in Hinckley Reservoir as tailwater DO levels generally remained >6.0 mg/L throughout the remainder of September while the Project generated.

The Power Authority voluntarily collected additional water quality data at the Project in 2019 to determine if low DO conditions persist during year-to-year variation in flow and weather conditions in the Project area. The 2018 water quality data were collected during a period of moderate drought which resulted in low reservoir inflows and releases and extended periods when the turbines were off-line. The summer of 2019 was not as dry as 2018 and the Project turbines were run more frequently during the summer period.

One continuously recording water quality meter was installed on July 24, 2019 below Hinckley Dam (as depicted in Figure 4.4.1.2.4-3), consistent with the 2018 tailwater monitoring location. A datasonde equipped with sensors to measure DO and water temperature was suspended to mid-depth in the channel from a surface buoy anchored to the river bottom. The datasonde was set to record DO and temperature every 15 minutes.

In general, the daily water temperatures increased from July through the last week in August, and then decreased into October, as depicted in Figure 4.4.1.2.4-8. The maximum instantaneous tailwater temperature of 22.1 °C occurred in early August. The tailwater water temperatures remain moderated and cool due to the deep intake.

The maximum instantaneous DO value during the 2019 study season was 8.13 mg/L (87.9%

saturation), recorded on September 25. The minimum DO value of 3.65 mg/L (41.8% saturation) occurred on August 9. The average DO value for the entire month of August was 4.77 mg/L and was 7.30 mg/L in September.

Tailwater DO values continually decreased from the beginning of the study until, on August 9, the DO values were at their lowest. DO values began to increase after August 9, but were still below the NYS Water Quality Standard instantaneous minimum DO value of 5.0 mg/L and the daily average DO of 6.0 mg/L. On August 23, instantaneous DO measurements were regularly above 5.0 mg/L. On August 26, the average daily DO levels were above 6.0 mg/L and remained there for the rest of the 2019 monitoring period. Average daily DO levels were below 6.0 mg/L from July 24 to August 25, i.e., 33 out of the 71 days of the 2019 study (46%). Biweekly plots of continuous DO and Project discharge data can be found in Appendix A of the *Dissolved Oxygen Enhancement Study Plan.*

pH and Conductivity

Over the course of the 2018 continuous monitoring period, tailwater pH values ranged from 6.55 to 7.67, within the New York State Surface Water Quality Standard of 6.5-8.5. Figure 4.4.1.2.4-9 shows an overview of the tailwater pH values measured over the course of the study, including concurrent pH measurements collected in Hinckley Reservoir by MVWA. The maximum pH value of 7.67 was recorded on September 26, 2018. Table 4.4.1.2.4-2 displays the minimum, maximum, and averages for pH each month from June through September.

Figure 4.4.1.2.4-10 shows tailwater conductivity levels compared to Hinckley average daily release. The specific conductance during the study period ranged 21 to 59 μS/cm, averaging 44 μS/cm (Table 4.4.1.2.4-2). The conductivity gradually increased from the beginning of the study until late August. Thereafter, the conductivity levels generally decreased in response to increased volume of discharges at the Project.

Continuous pH and specific conductance values in relation to Hinckley hourly release data are included in the biweekly plots in Appendix A of the 2018 *Tailwater Water Quality Study* report.

Tributary Data

Water quality data for eight primary tributaries to Hinckley Reservoir were collected by the Environmental Protection Agency (EPA) in 1999 and 2000 and by the MVWA from 2001 through 2016. The data were described in the PAD (NYPA, 2017) and are briefly summarized here.

Overall, there were no significant problems regarding DO levels at any tributary site. The lowest annual average DO concentration measured by the EPA was 7.6 mg/L at Remus Brook in 2000. The lowest annual average DO concentration measured by the MVWA was 5.4 mg/L at Remus Brook in 2001. Since 2001, the annual average DO at Remus Brook has been at 7.8 mg/L or above. Based on this data, the tributaries are generally well-oxygenated and provide habitat to spawning fish moving upstream from Hinckley Reservoir.

4.4.2 Environmental Effects

In SD2, FERC identified the following potential issues related to water resources: (1) effects of continued Project operation on water quantity and water quality. Potential effects on water quality are discussed below.

Effects of Continued Project Operation on Water Quantity

Outflows from Hinckley Reservoir are governed by legally binding agreements between the NYSCC, State of New York, MVWA, NYSTA, and Erie Boulevard. The Power Authority does not have the rights to deviate from these releases and if the Project were not to exist, the same reservoir water levels and discharges would still occur in accordance with the Operating Diagram. The New York State Legislature's recent decision to restructure NYSCC as an entity within the Power Authority does not alter the long-standing contractual obligations associated with the Operating Diagram. Regardless of the current corporate structure of the Power Authority and NYSCC, neither the Power Authority nor NYSCC has the unilateral legal authority to modify the Operating Diagram or the water rights granted to MVWA or Erie Boulevard through past litigation.

Regarding the downstream minimum flow requirement, as discussed in Section 4.4.1.1.2, inflow to the reservoir must be supplemented by reservoir storage to meet the minimum release of 160 cfs fairly often over the summer months. In July, August, and September flows are supplemented 18%, 29%, and 24% of the time, respectively, to meet the 160 cfs minimum flow requirement.

Effects of Continued Project Operation on Water Quality

The Power Authority's 2018 *Tailwater Water Quality Study* and 2019 water quality monitoring revealed that water temperature, DO, pH, and conductivity in Project tailwater is influenced by prevailing water quality conditions in Hinckley Reservoir. Water temperature followed a typical seasonal trend but was moderated by cool water temperature in the deep portion of the reservoir. Surface pH levels were within acceptable limits of the NYS Surface Water Quality Standard and conductivity levels were low. DO concentrations periodically fell below the NYS Surface Water Quality Standards during the 2018 and 2019 study periods, only when turbines were operating. However, lower DO concentrations in the tailwater are likely attributed to hypoxic conditions in the deeper portions of the Hinckley Reservoir, and lack of reaeration through the turbines. These periods of lower DO in the tailwater did not appear to cause any adverse environmental impacts to aquatic biota at the Project.

Vertical temperature and dissolved oxygen profiles collected from Hinckley Reservoir during the summer of 2019 show that the DO concentration in the reservoir began to decrease above or near the top of the intake for all samples. Hypoxic conditions (DO less than 3.0 mg/L) typically occurred below the bottom of the intake.

The Power Authority's 2018 and 2019 water quality monitoring demonstrated that tailwater DO levels remain above state standards when flows are passed through sluice gate no. 4. Preliminary testing in 2019 also demonstrated that DO enhancement is possible when the turbines are operating if concurrent sluice gate no. 4 releases are provided.

4.4.3 Proposed Environmental Measures

Regarding water quantity, the Power Authority proposes to continue existing operating conditions in the new license and is not proposing any changes.

Regarding water quality, the Power Authority developed a *Dissolved Oxygen Enhancement Study Plan* for the Project in response to Commission staff's July 9, 2019 study request. The objective of the requested study is to assess the feasibility, potential effectiveness, and costs of various dissolved oxygen enhancement measures for the Project. The *Dissolved Oxygen Enhancement Study Plan*, filed with the Commission on January 15, 2020, was developed in consultation with the USFWS and NYSDEC. Both agencies concurred with the Study Plan as proposed, and at this time, the study is ongoing. Upon completion of the study, the Power Authority will propose measure(s) to improve stream dissolved oxygen concentration downstream of the Project tailrace when the Project is operating.

4.4.4 Unavoidable Adverse Impacts

Continued Project operation is not expected to adversely affect water quantity.

Table 4.4.1.1.1-1: Median Monthly and Annual Reservoir Water Surface Elevations (1938-2019)

Month	Elevation (ft.)
January	1212.50
February	1203.80
March	1199.00
April	1222.45
May	1224.97
June	1223.60
July	1220.20
August	1215.72
September	1211.41
October	1210.20
November	1214.00
December	1215.80
Annual	1216.10

Table 4.4.1.1.2-1: Daily Inflow (cfs) Statistics for Hinckley Reservoir

Period of Record July 2001 – December 2019

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
min	249	202	219	253	177	96	87	58	55	102	294	256
max	10,332	10,207	10,191	26,884	13,676	23,914	8,800	11,035	12,395	15,943	11,051	7,002
mean	976	760	1,368	3,146	1,382	1,002	573	491	465	1,264	1,264	1,200
median	565	438	781	2,360	1,043	606	322	277	254	780	891	800

Table 4.4.1.1.2-2: Daily Outflow (cfs) Statistics for Hinckley Reservoir

Period of Record July 2001 – December 2019

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
min	298	106	104	246	298	245	178	234	119	120	298	223
max	6,381	2,261	4,449	15,820	7,912	13,062	7,696	2,311	3,744	4,942	16,803	4,156
mean	1,088	944	1,044	2,085	1,251	868	697	569	590	829	1,176	1,068
median	1,025	908	994	1,599	1,080	602	561	495	600	721	976	972

Table 4.4.1.2.2-1: NYSDEC Classifications for Project Waterbodies

Waterbody	Classification	Standards
Hinckley Reservoir	AA	AA(T)
West Canada Creek (Upstream of Hinckley Reservoir: McIntosh Bridge to Nobleboro Dam)	A	A(T)
Kreskern Creek	AA	AA(T)
Thomas Pond Outlet	AA	AA(T)
Beaver Meadow Creek	AA	AA(T)
Buttermilk Brook	AA	AA(T)
Taynter Brook	AA	AA(T)
Remus Brook	A	A
Black Creek	AA	AA
West Canada Creek (Downstream of Hinckley Reservoir: Prospect Dam to Hinckley Dam)	B	B(T)

State of New York, 2020b

Table 4.4.1.2.2-2: NYSDEC Water Quality Standards

Parameter	Standard
Taste-, color-, and odor producing, toxic and other deleterious substances	None in amounts that will adversely affect the taste, color or odor thereof, or impair the waters for their best usages.
Turbidity	No increase that will cause a substantial visible contrast to natural conditions.
Suspended, colloidal and settleable solids	None from sewage, industrial wastes or other wastes that will cause deposition or impair the waters for their best usages.
Oil and floating substances	No residue attributable to sewage, industrial wastes or other wastes, nor visible oil film nor globules of grease.
Phosphorus and nitrogen	None in amounts that will result in growths of algae, weeds and slimes that will impair the waters for their best usages.
Flow	No alteration that will impair the waters for their best usages.
pH	Shall not be less than 6.5 nor more than 8.5.
Dissolved Oxygen	For trout waters (T), the minimum daily average shall not be less than 6.0 mg/L, and at no time shall the concentration be less than 5.0 mg/L. For non-trout waters, the minimum daily average shall not be less than 5.0 mg/L, and at no time shall the DO concentration be less than 4.0 mg/L.
Dissolved Solids	Shall be kept as low as practicable to maintain the best usage of waters but in no case shall it exceed 500 mg/L.

Parameter	Standard
Total Coliform (per 100mL) (Applies to Class AA waterbodies)	The monthly median value and more than 20 percent of the samples, from a minimum of five examinations, shall not exceed 50 and 240, respectively.
Total Coliform (per 100mL) (Applies to Class A and B waterbodies)	The monthly median value and more than 20 percent of the samples, from a minimum of five examinations, shall not exceed 2,400 and 5,000, respectively.
Fecal Coliforms (per 100mL)	The monthly geometric mean, from a minimum of five examinations, shall not exceed 200

*Standards applicable to both Class AA and A, unless otherwise noted.

State of New York, 2020c

Table 4.4.1.2.4-1: Summary of MVWA Water Quality Data Collected Between 2000 and 2018

	Alkalinity (mg CaCO3/L)	Ca-Hardness (mg CaCO3/L)	Tot. Hardness (mg CaCO3/L)	Temperature (C)	DO %	DO (mg/L)	SpC (*u*S/cm)	Turbidity (NTU)	pH
	33 Feet (Elevation of 1,199)								
Avg	14	15	20	17.2	93.3	9.1	43	1.30	7.1
Min	1	2	8	3.7	61.3	5.2	15	0.09	5.7
Max	28	46	110	24.7	124.9	14.6	111	3.20	9.3
	66 Feet (Elevation of 1,166)								
Avg	14	16	20	15.4	86.6	8.9	41	1.75	7.0
Min	1	4	4	4.2	50.6	4.0	12	0.09	6.0
Max	62	141	108	22.8	110.0	15.9	68	6.83	8.8

Table 4.4.1.2.4-2: Project Tailwater Water Quality Results, Monthly Average, Minimum, and Maximum, June – September 2018

	Water Temp (°C)	DO (mg/L)	DO (%SAT)	pH	Specific Conductance (µS/cm)
June					
Average	15.16	7.39	74.8	6.75	27
Minimum	12.35	6.04	62.9	6.54	21
Maximum	17.66	8.44	88.9	6.96	34
July					
Average	18.49	7.80	84.7	6.92	41
Minimum	16.49	5.72	61.3	6.71	34
Maximum	20.65	8.37	90.1	6.98	50
August					
Average	21.40	6.93	79.7	6.99	54
Minimum	20.11	3.64	41.9	6.77	50
Maximum	22.41	8.55	98.9	7.22	59
September					
Average	19.30	6.70	73.6	7.17	51
Minimum	15.49	4.73	54.4	6.84	32
Maximum	22.67	8.20	91.9	7.67	59
Whole Study					
Average	18.74	7.20	78.4	6.96	44
Minimum	12.35	3.64	41.9	6.54	21
Maximum	22.67	8.55	98.9	7.67	59

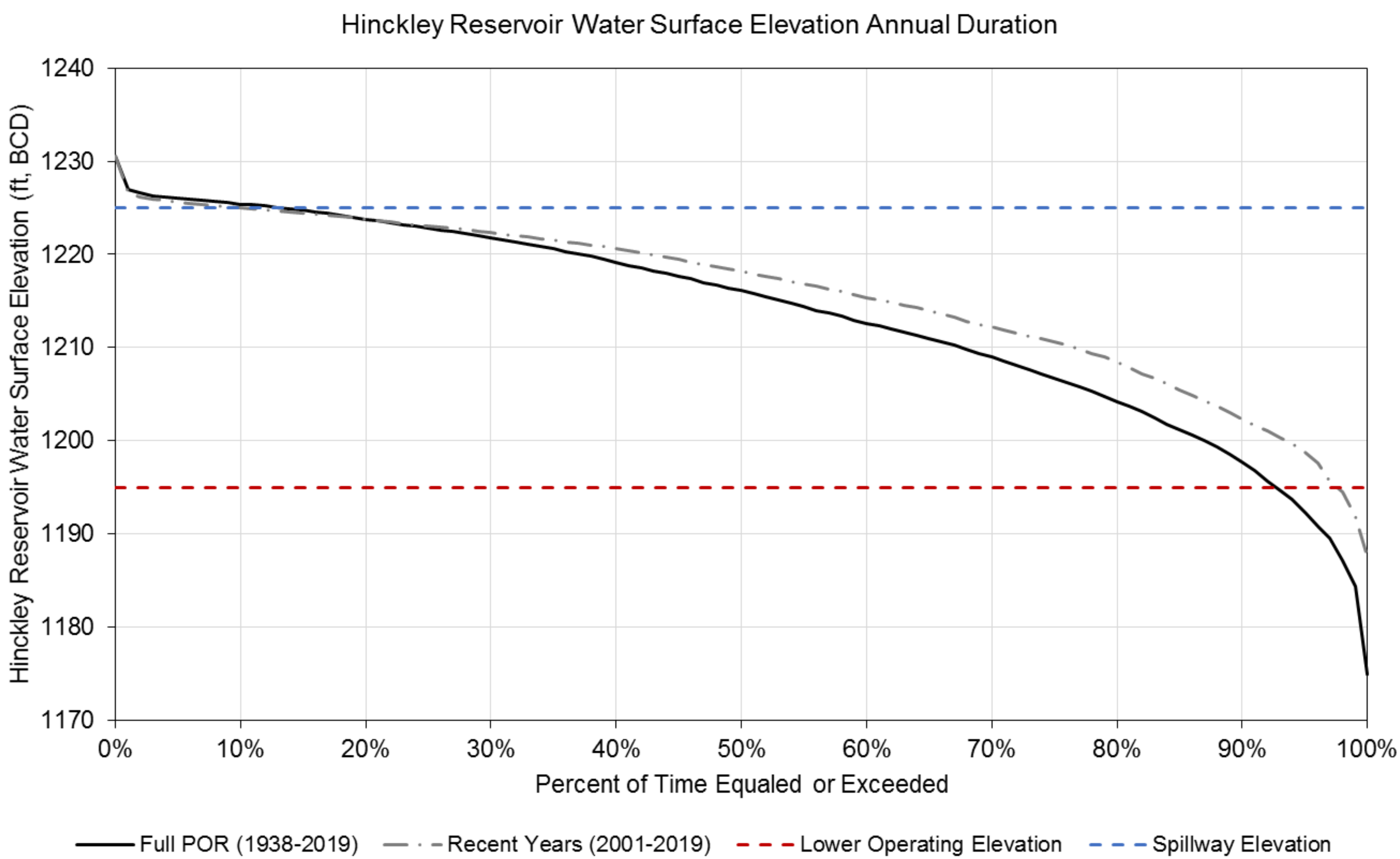

Figure 4.4.1.1.1-1: Hinckley Reservoir Water Surface Elevation Annual Duration Curve

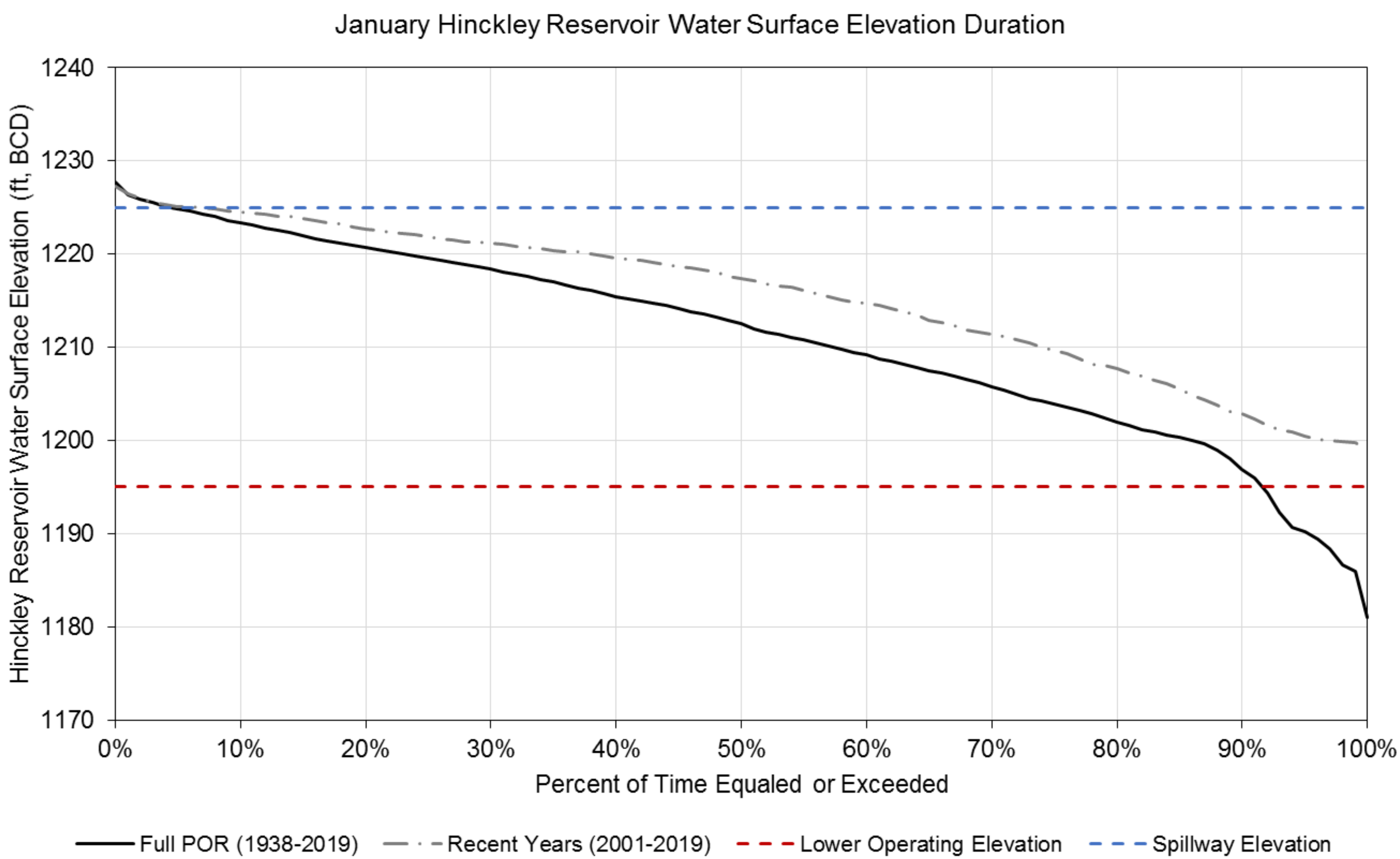

Figure 4.4.1.1.1-2: Hinckley Reservoir Water Surface Elevation Monthly Duration Curve - January

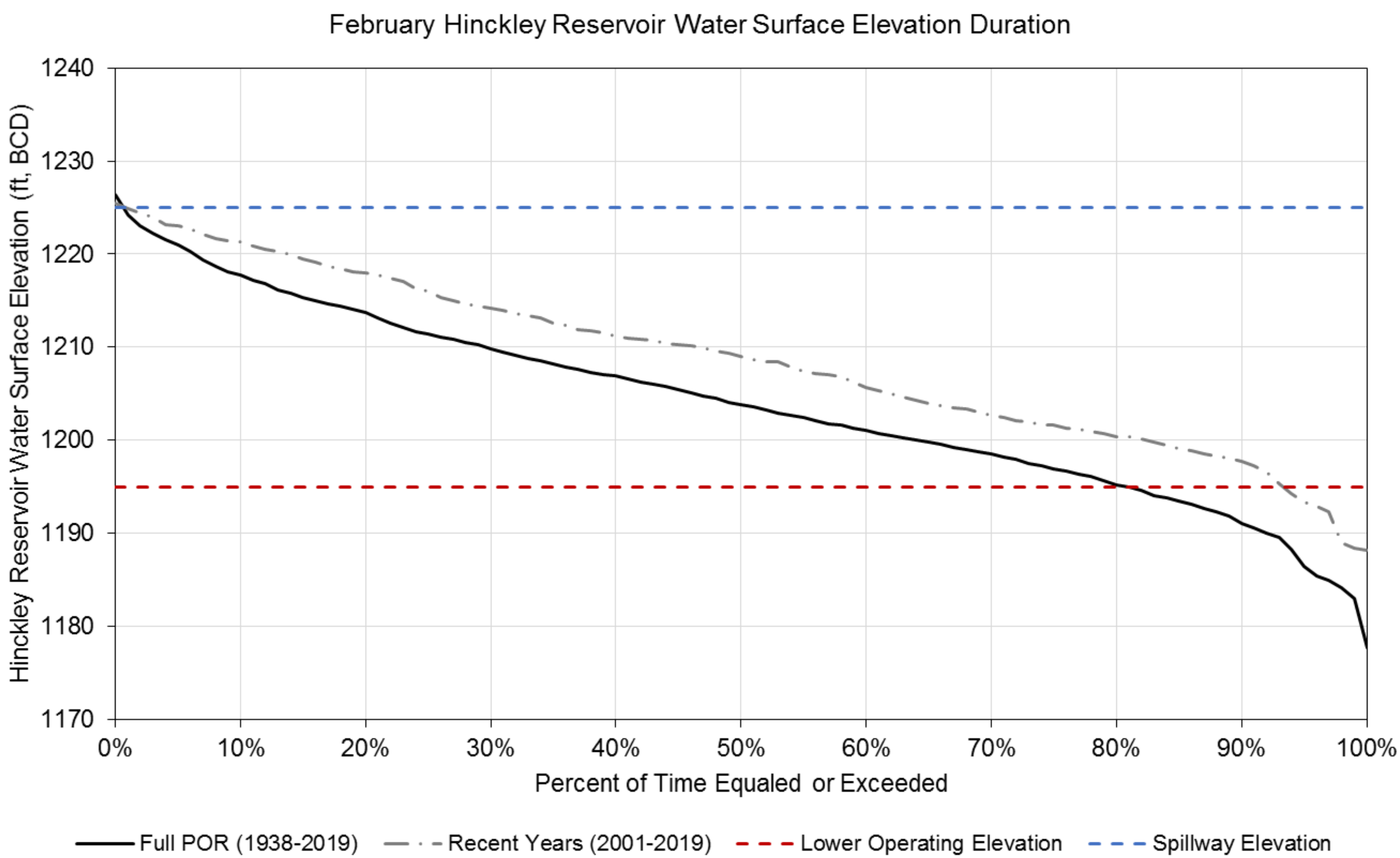

Figure 4.4.1.1.1-3: Hinckley Reservoir Water Surface Elevation Monthly Duration Curve - February

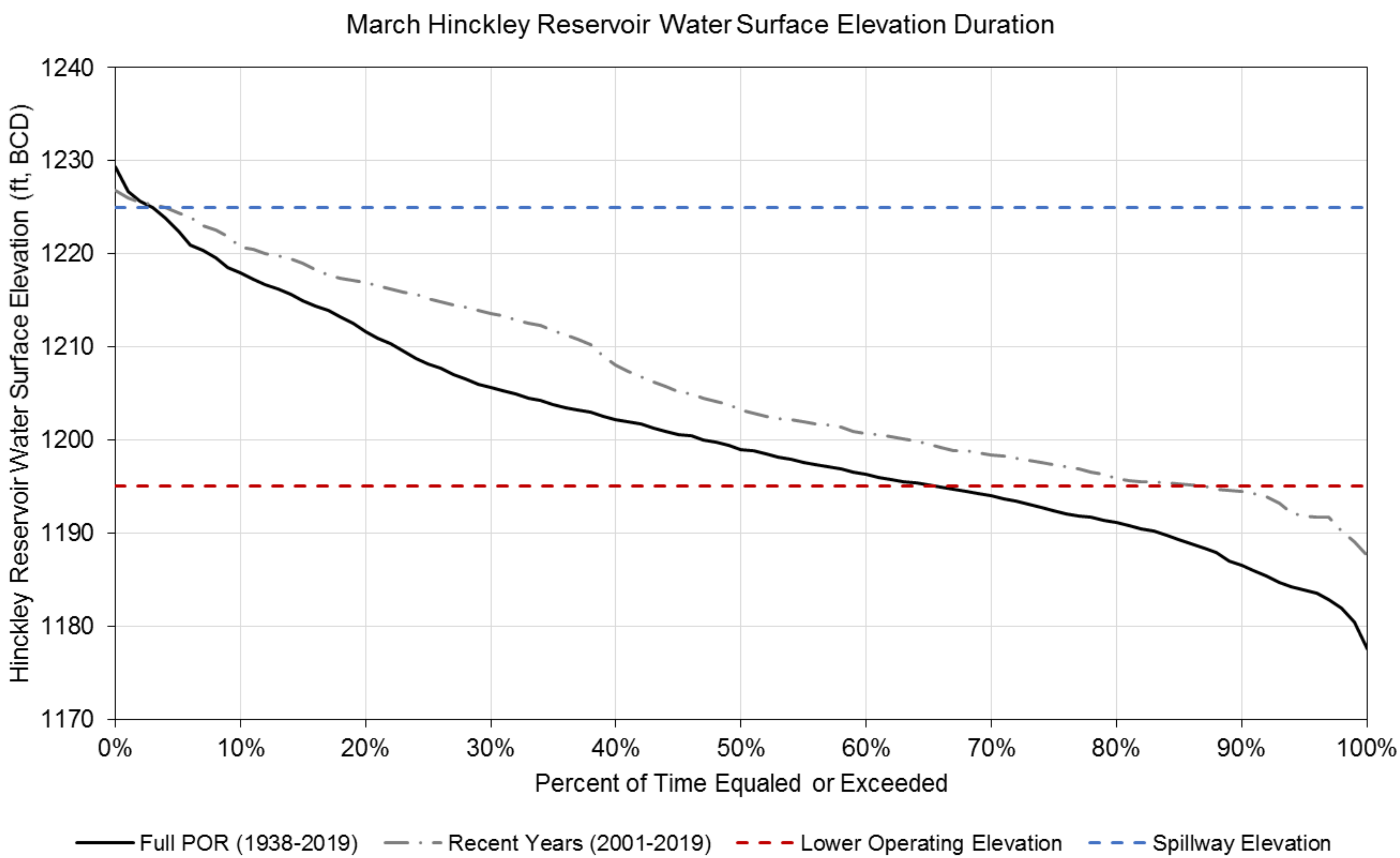

Figure 4.4.1.1.1-4: Hinckley Reservoir Water Surface Elevation Monthly Duration Curve - March

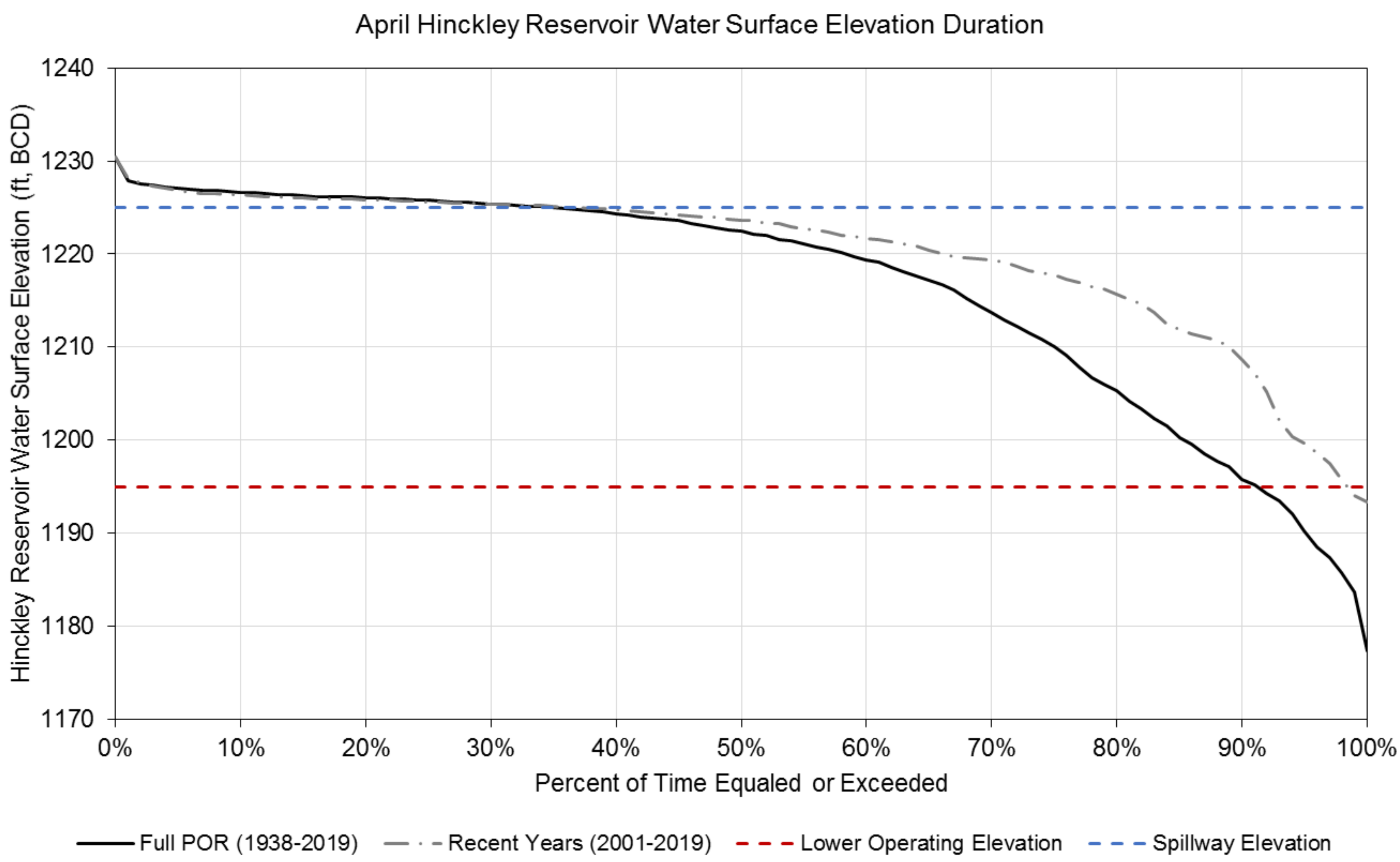

Figure 4.4.1.1.1-5: Hinckley Reservoir Water Surface Elevation Monthly Duration Curve - April

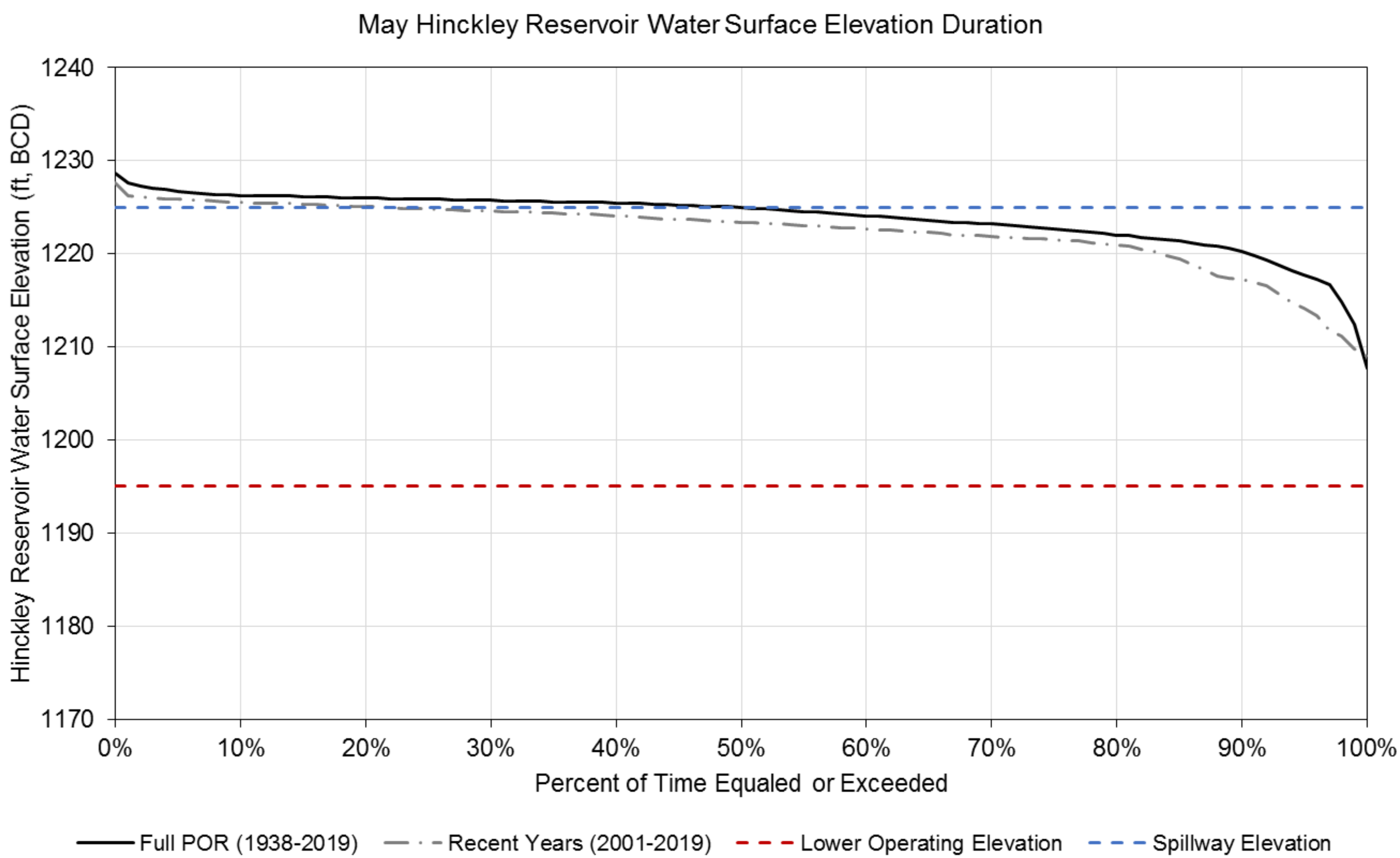

Figure 4.4.1.1.1-6: Hinckley Reservoir Water Surface Elevation Monthly Duration Curve - May

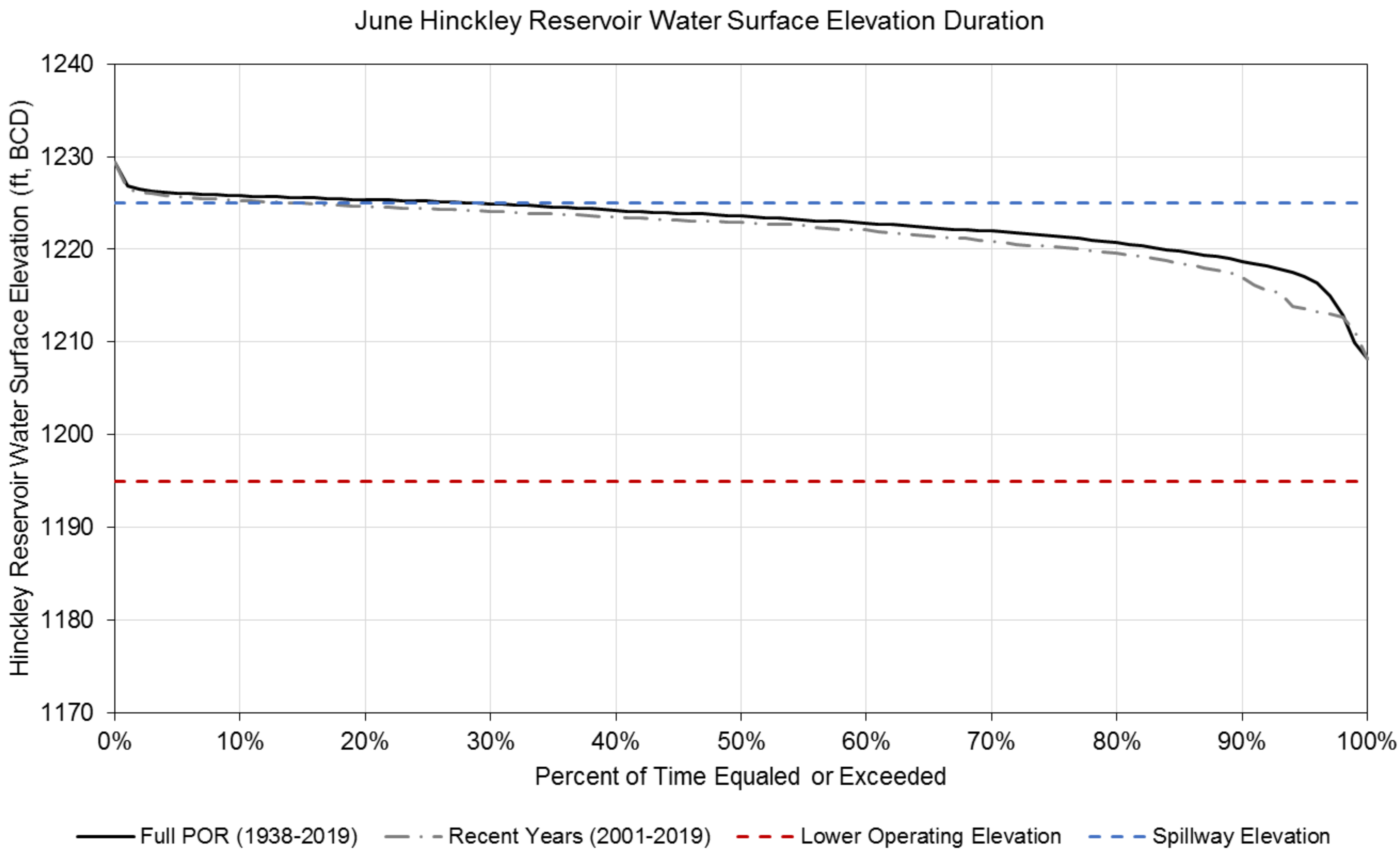

Figure 4.4.1.1.1-7: Hinckley Reservoir Water Surface Elevation Monthly Duration Curve - June

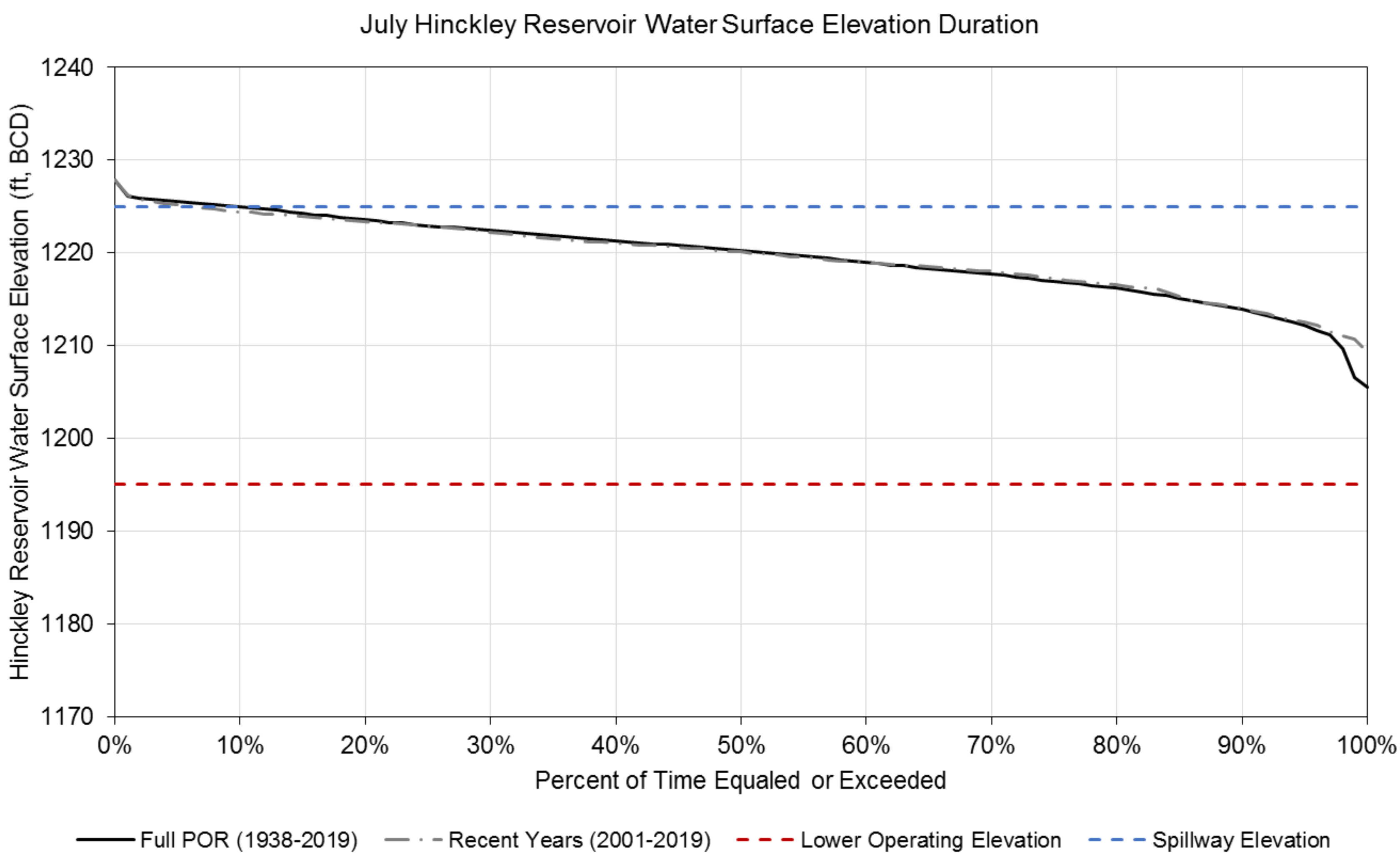

Figure 4.4.1.1.1-8: Hinckley Reservoir Water Surface Elevation Monthly Duration Curve - July

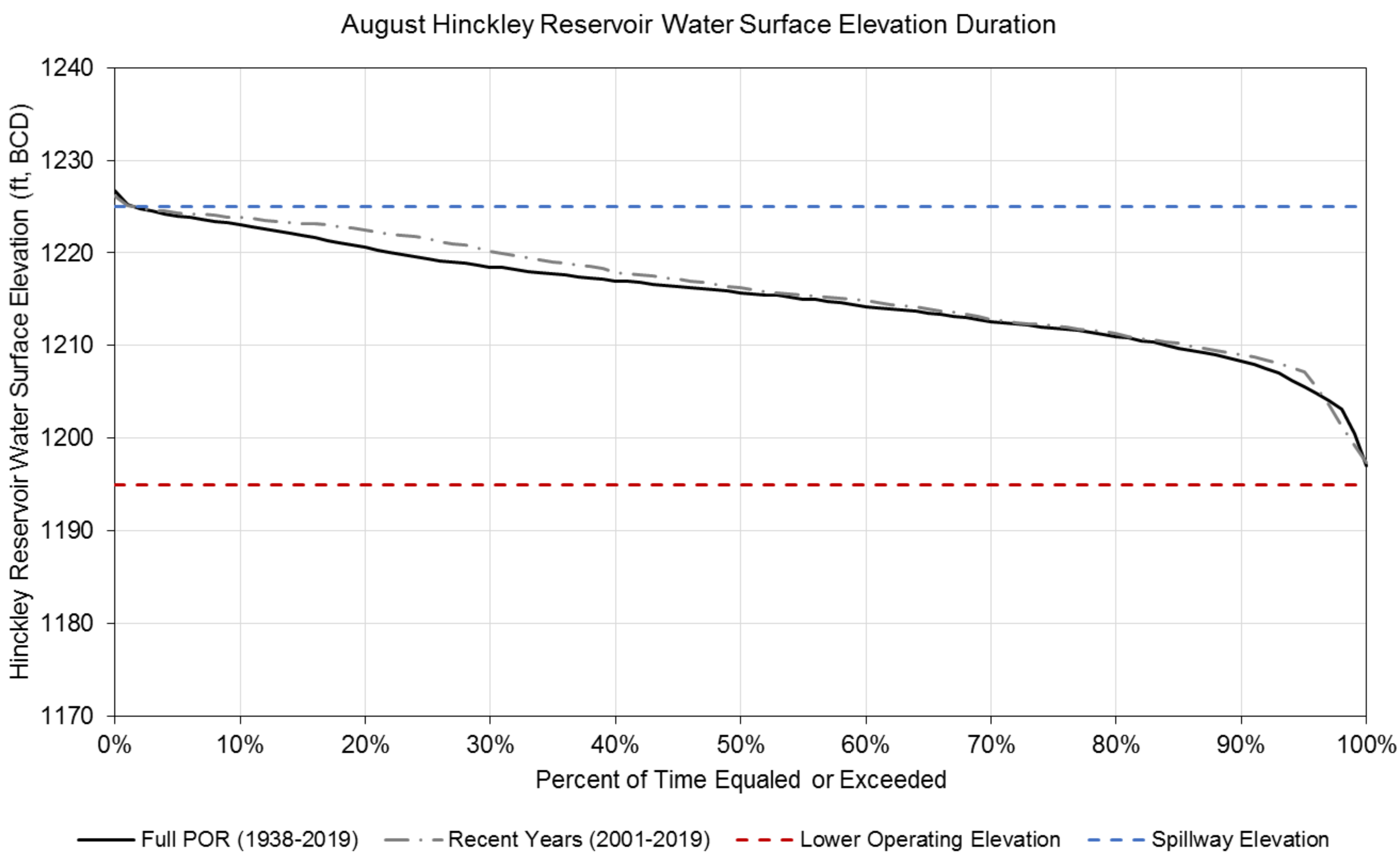

Figure 4.4.1.1.1-9: Hinckley Reservoir Water Surface Elevation Monthly Duration Curve - August

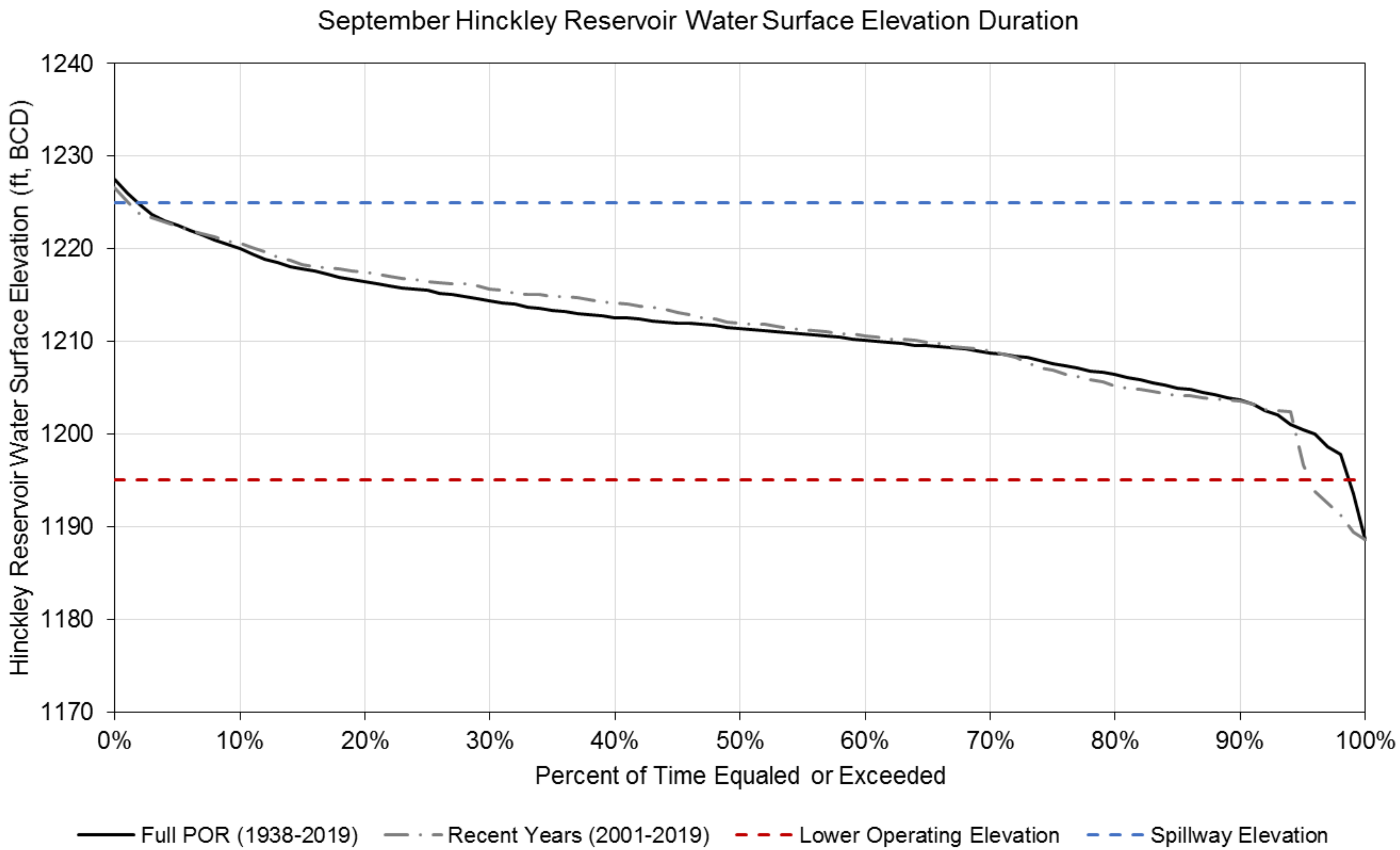

Figure 4.4.1.1.1-10: Hinckley Reservoir Water Surface Elevation Monthly Duration Curve - September

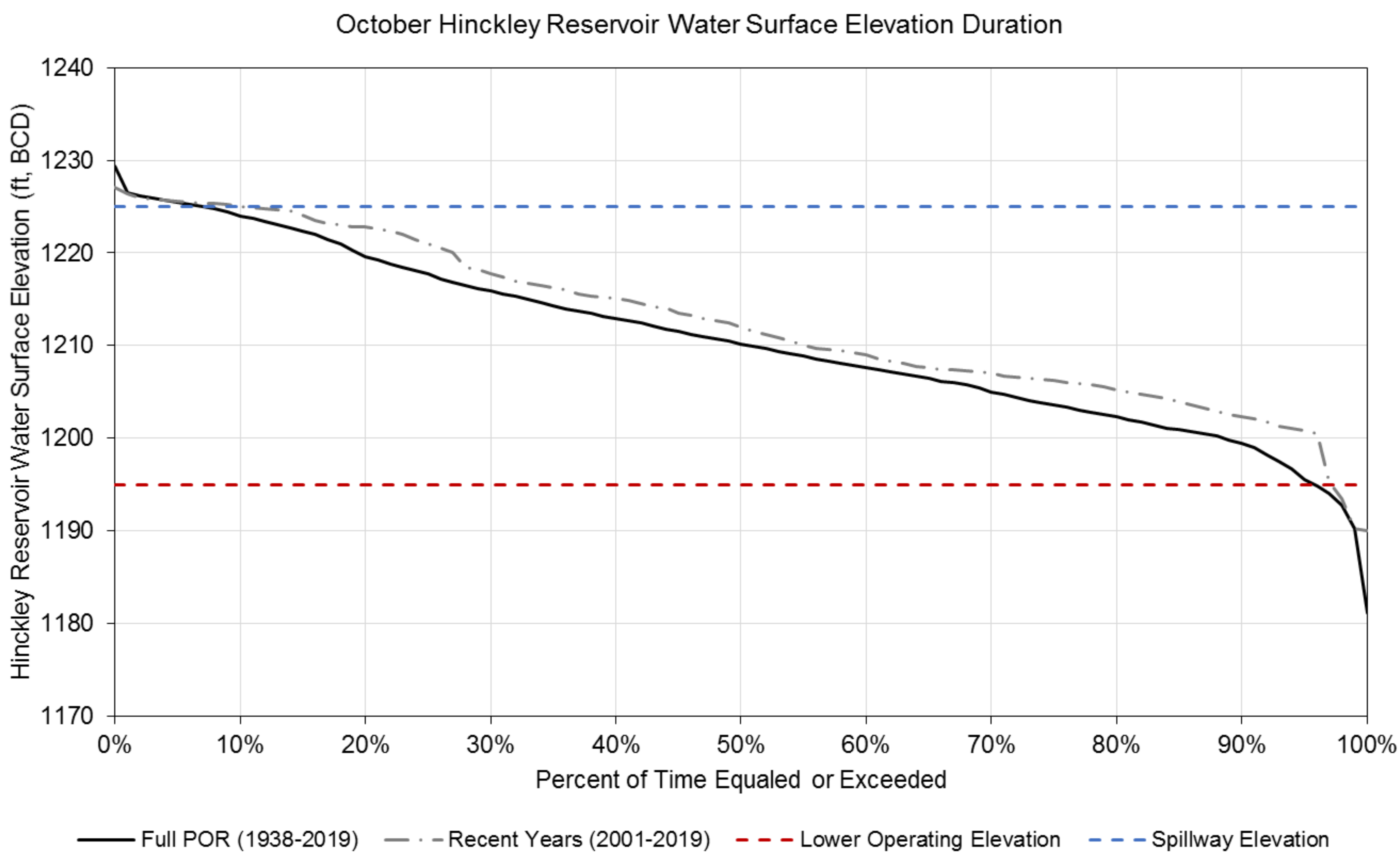

Figure 4.4.1.1.1-11: Hinckley Reservoir Water Surface Elevation Monthly Duration Curve - October

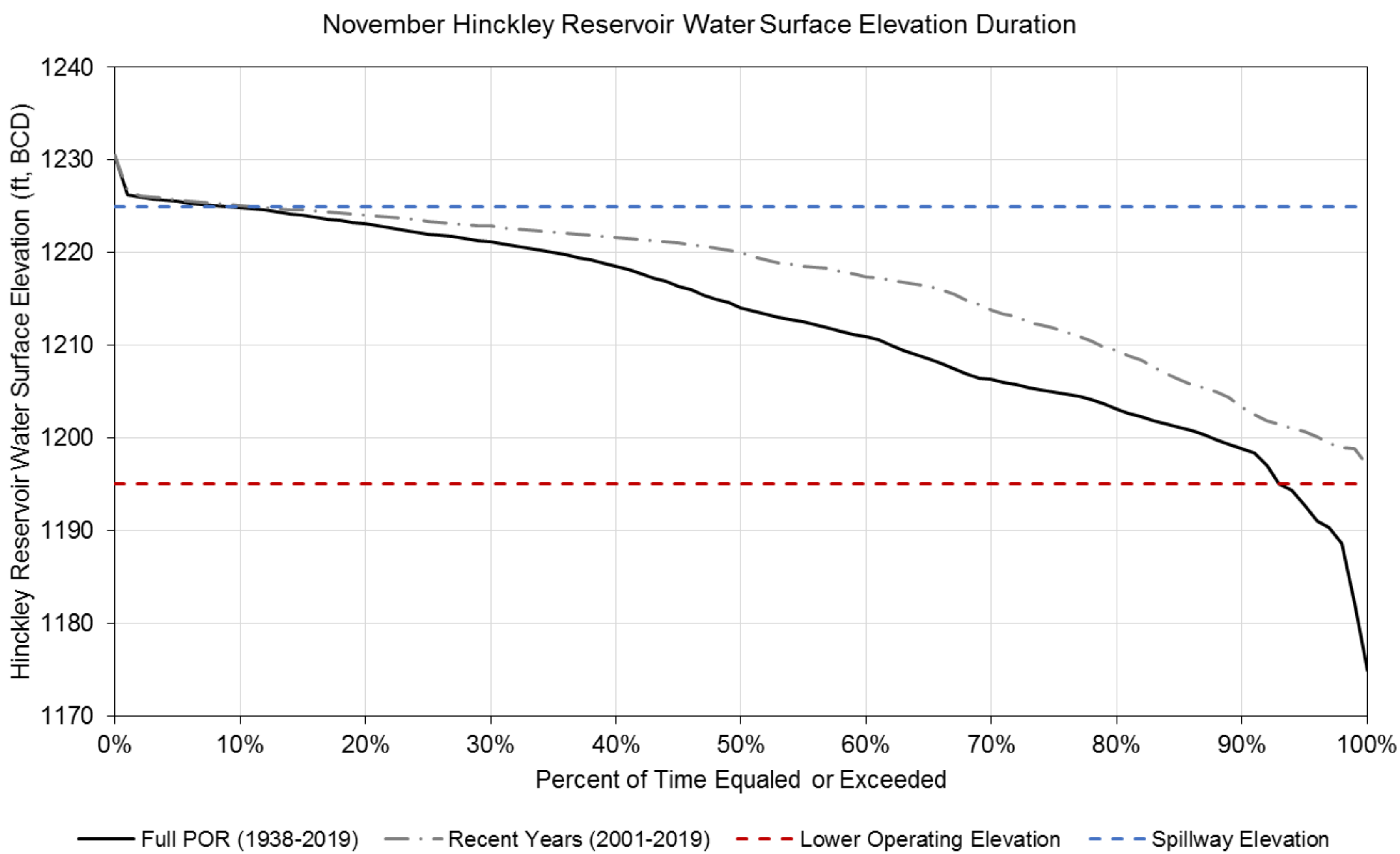

Figure 4.4.1.1.1-12: Hinckley Reservoir Water Surface Elevation Monthly Duration Curve - November

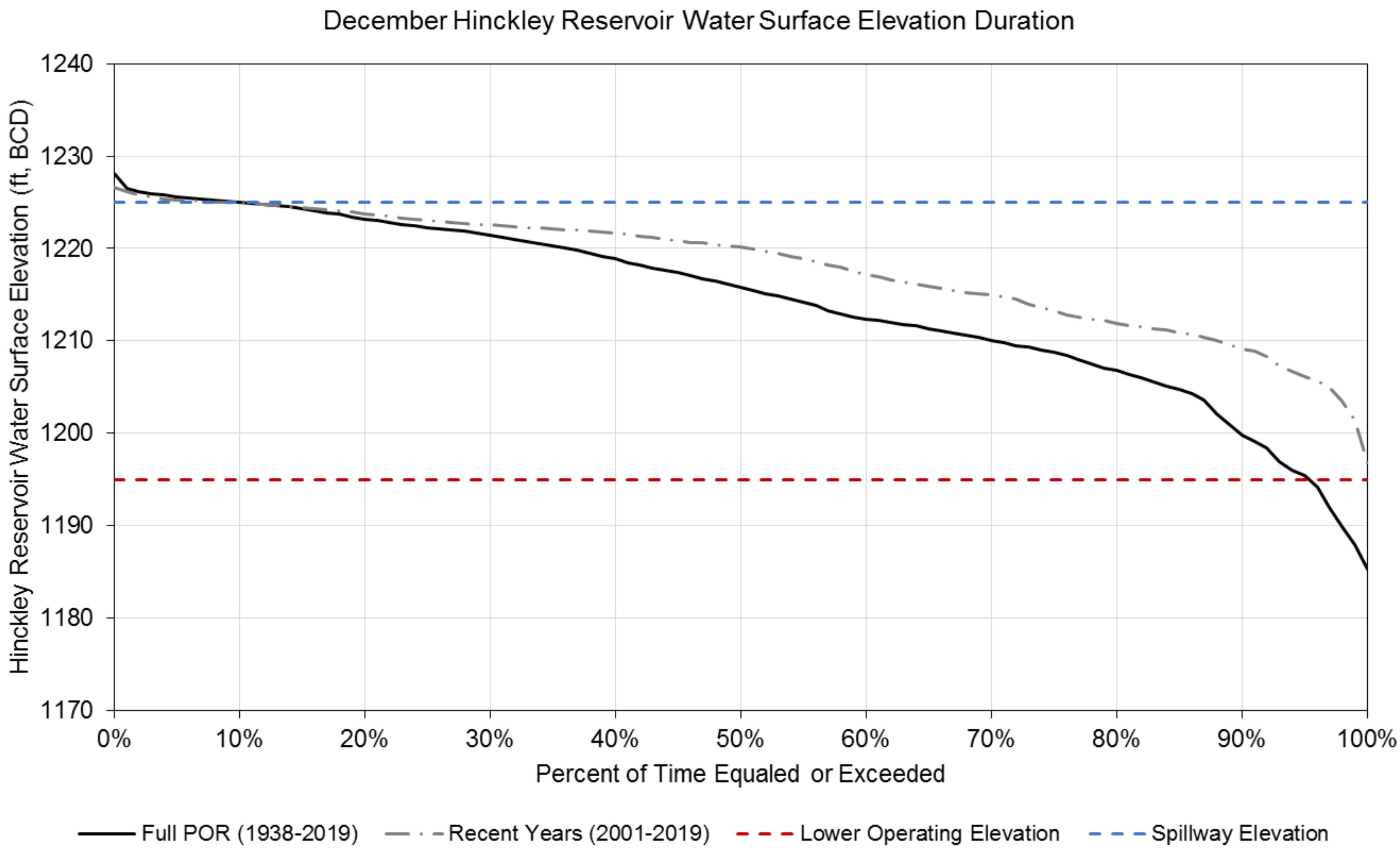

Figure 4.4.1.1.1-13: Hinckley Reservoir Water Surface Elevation Monthly Duration Curve - December

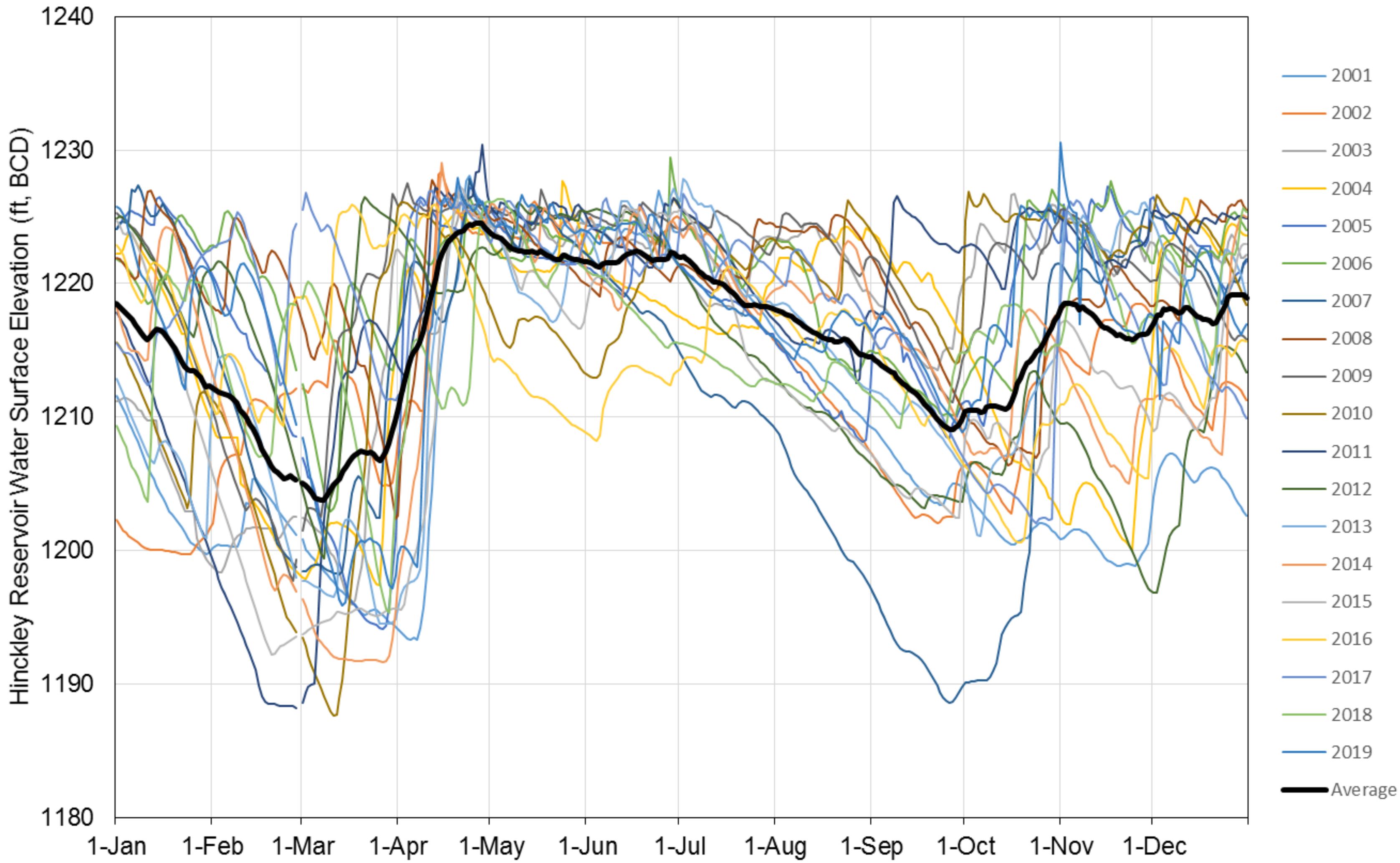

Figure 4.4.1.1.1-14: Hinckley Reservoir Water Surface Elevation 2001-2019

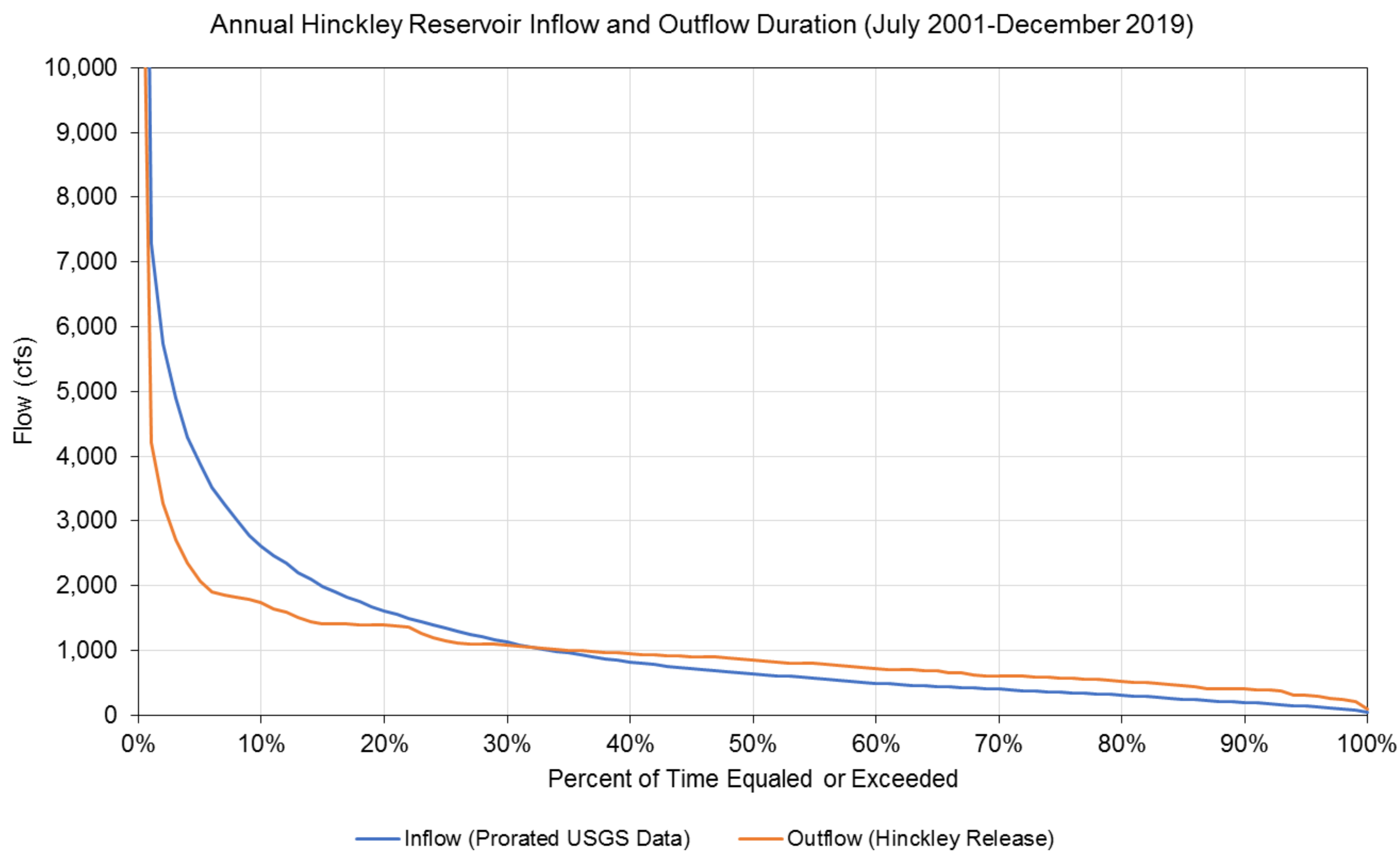

Figure 4.4.1.1.2-1: Annual Inflow and Outflow Duration Curves

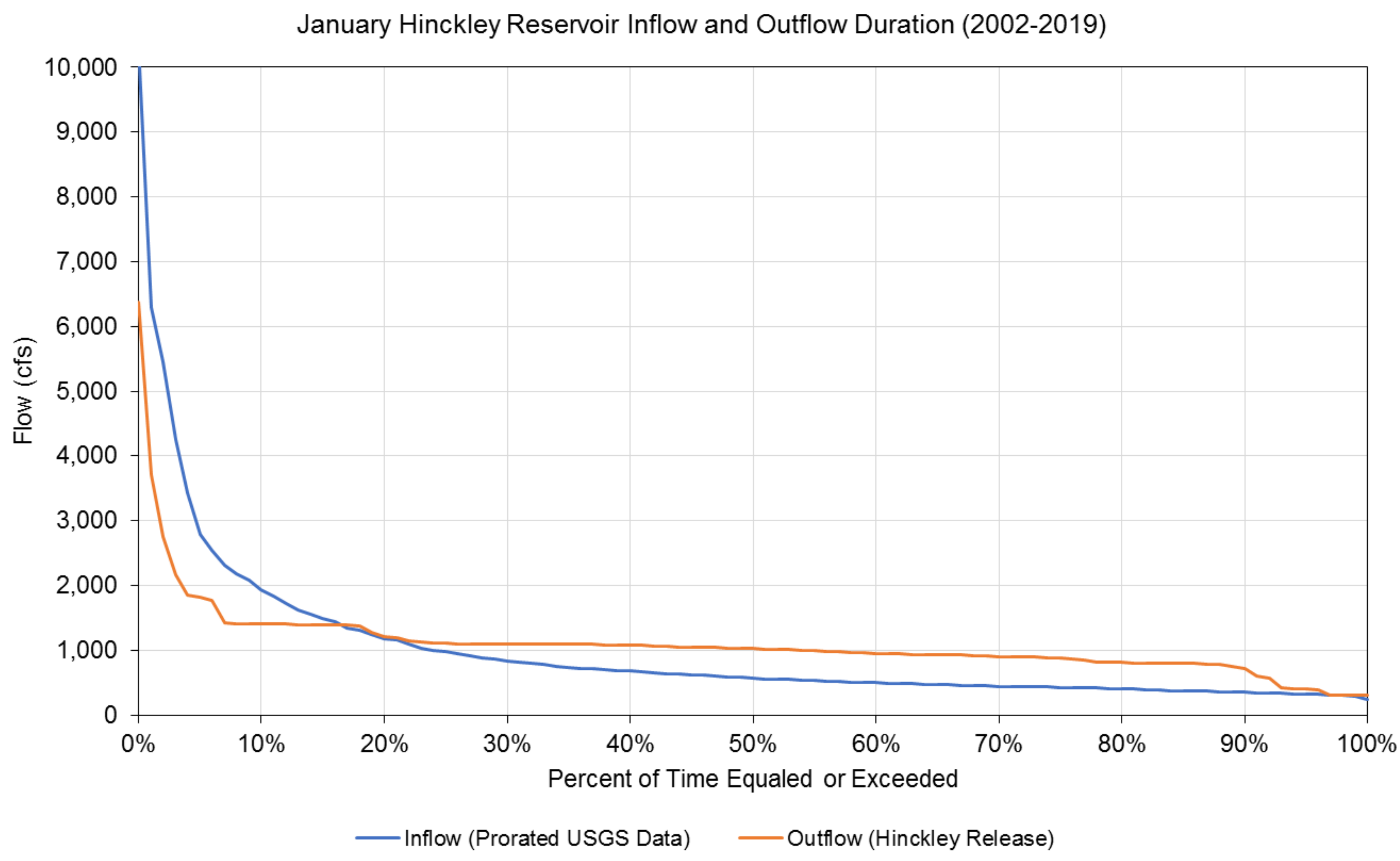

Figure 4.4.1.1.2-2: Monthly Inflow and Outflow Duration Curves - January

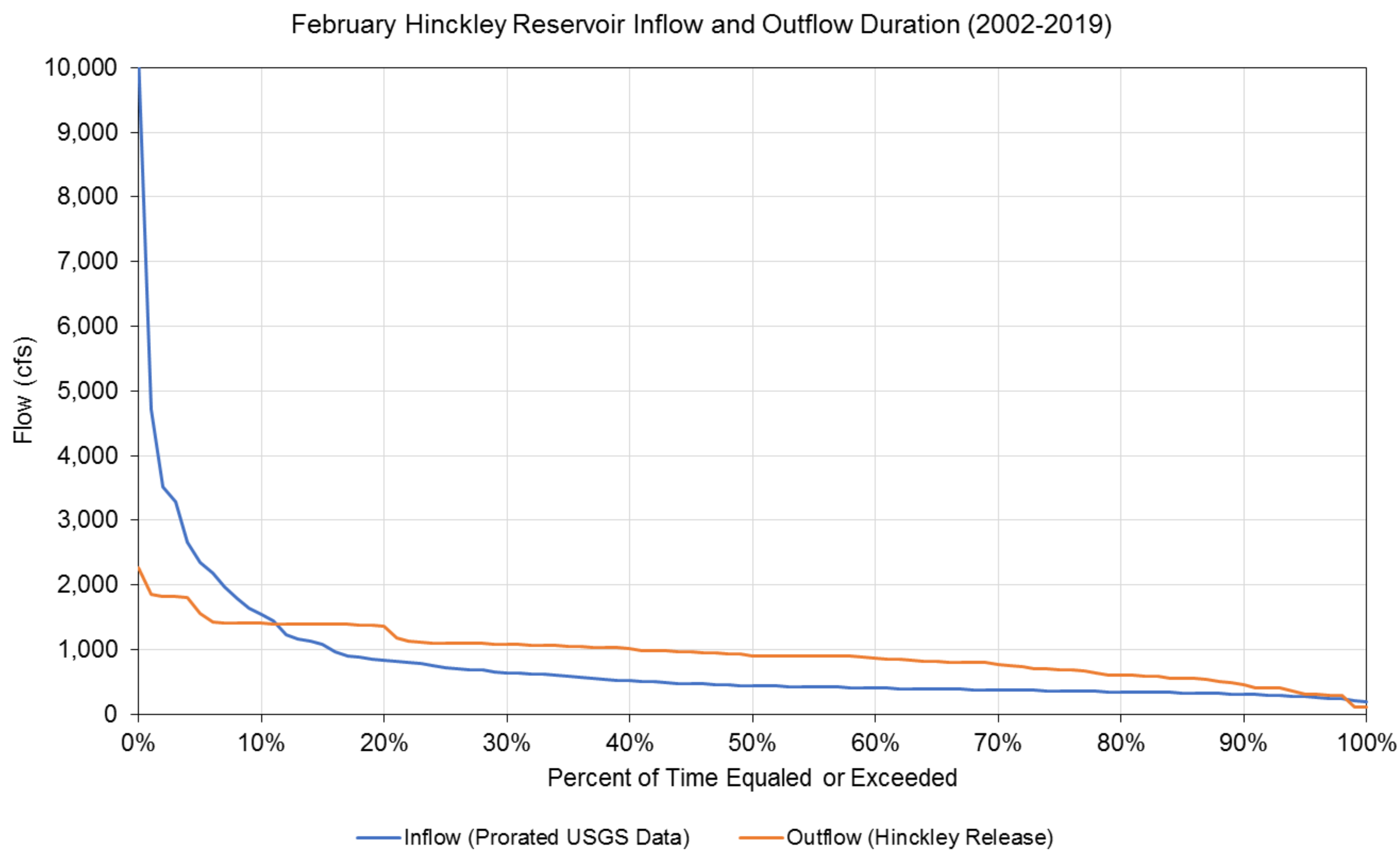

Figure 4.4.1.1.2-3: Monthly Inflow and Outflow Duration Curves - February

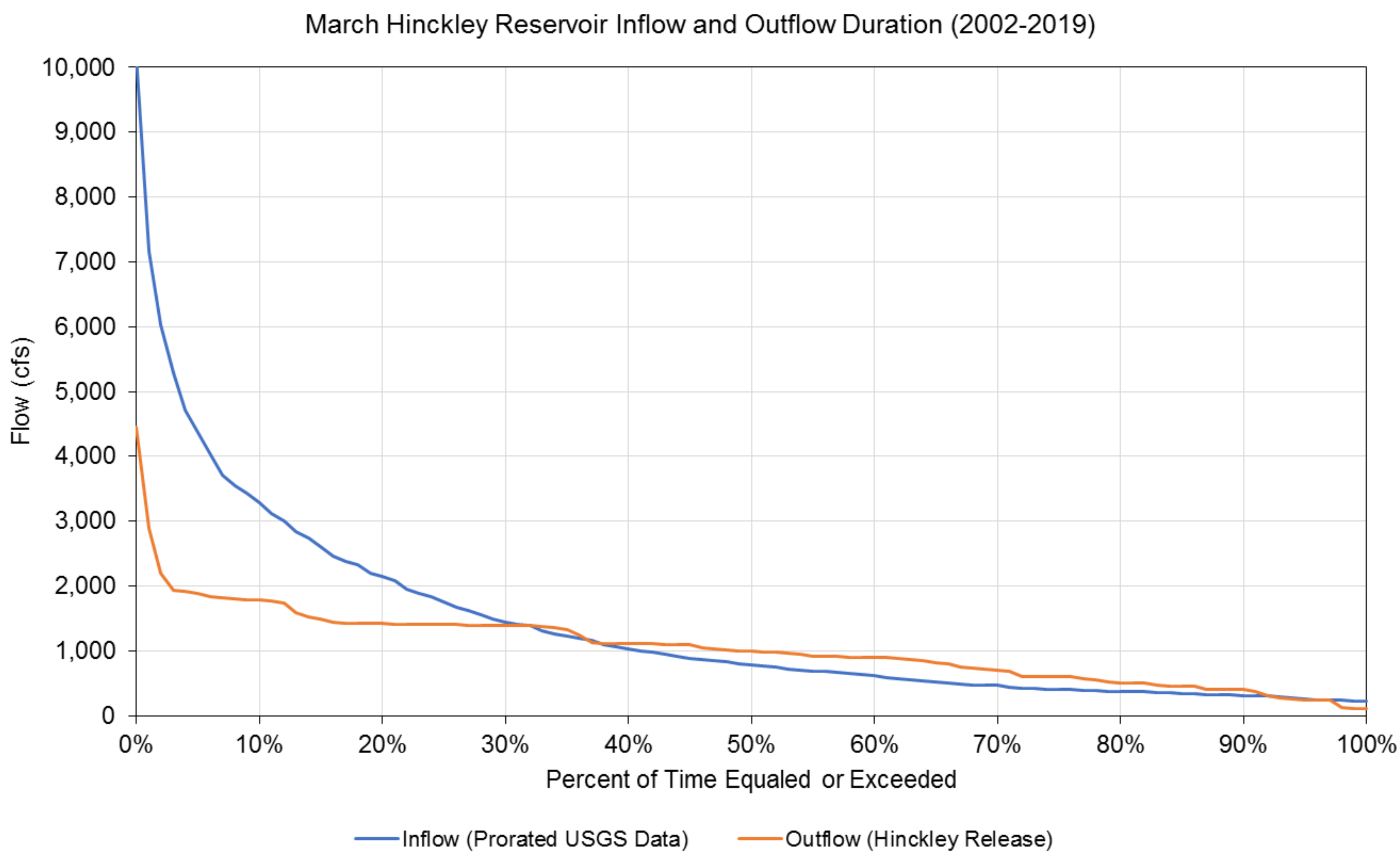

Figure 4.4.1.1.2-4: Monthly Inflow and Outflow Duration Curves - March

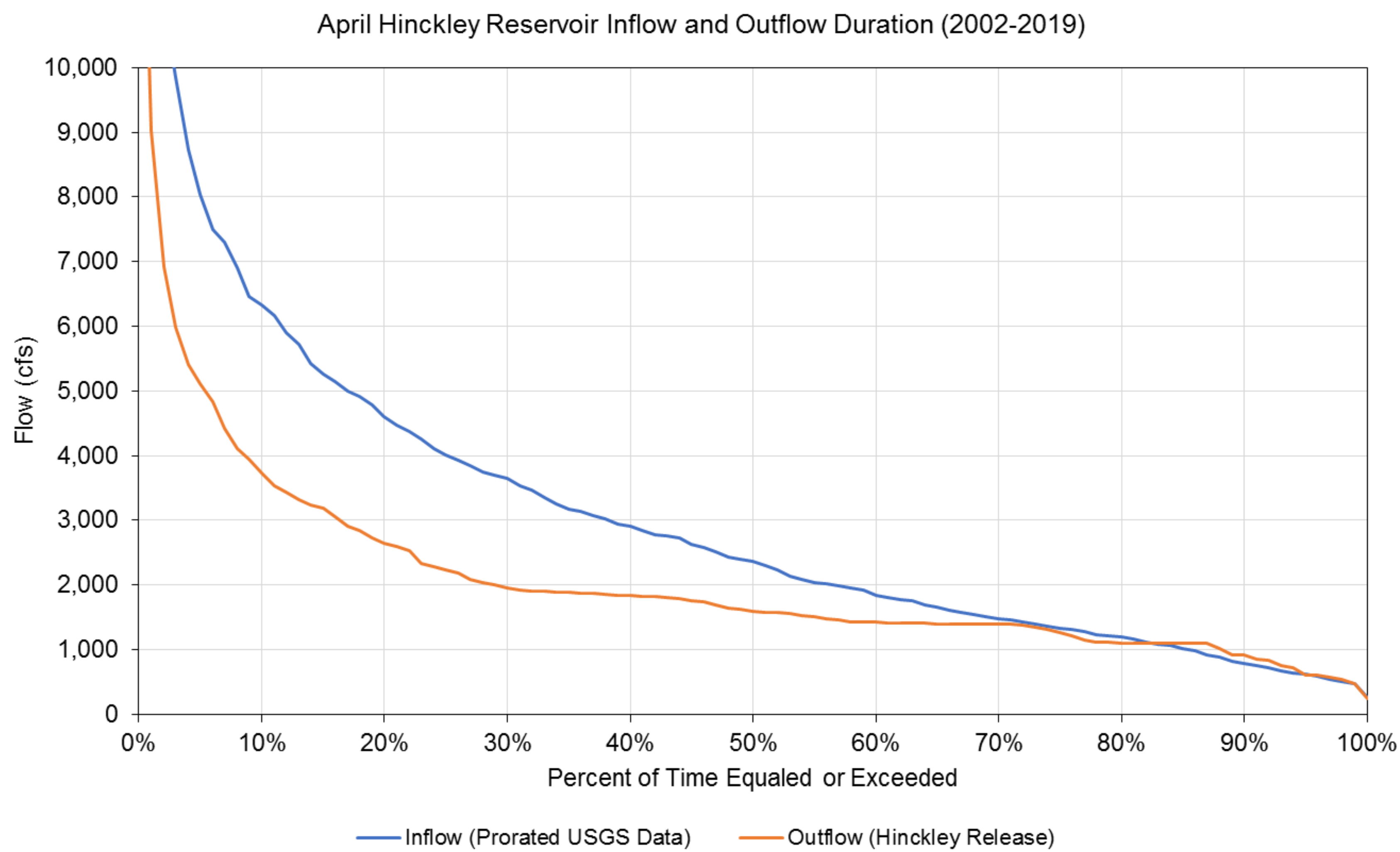

Figure 4.4.1.1.2-5: Monthly Inflow and Outflow Duration Curves - April

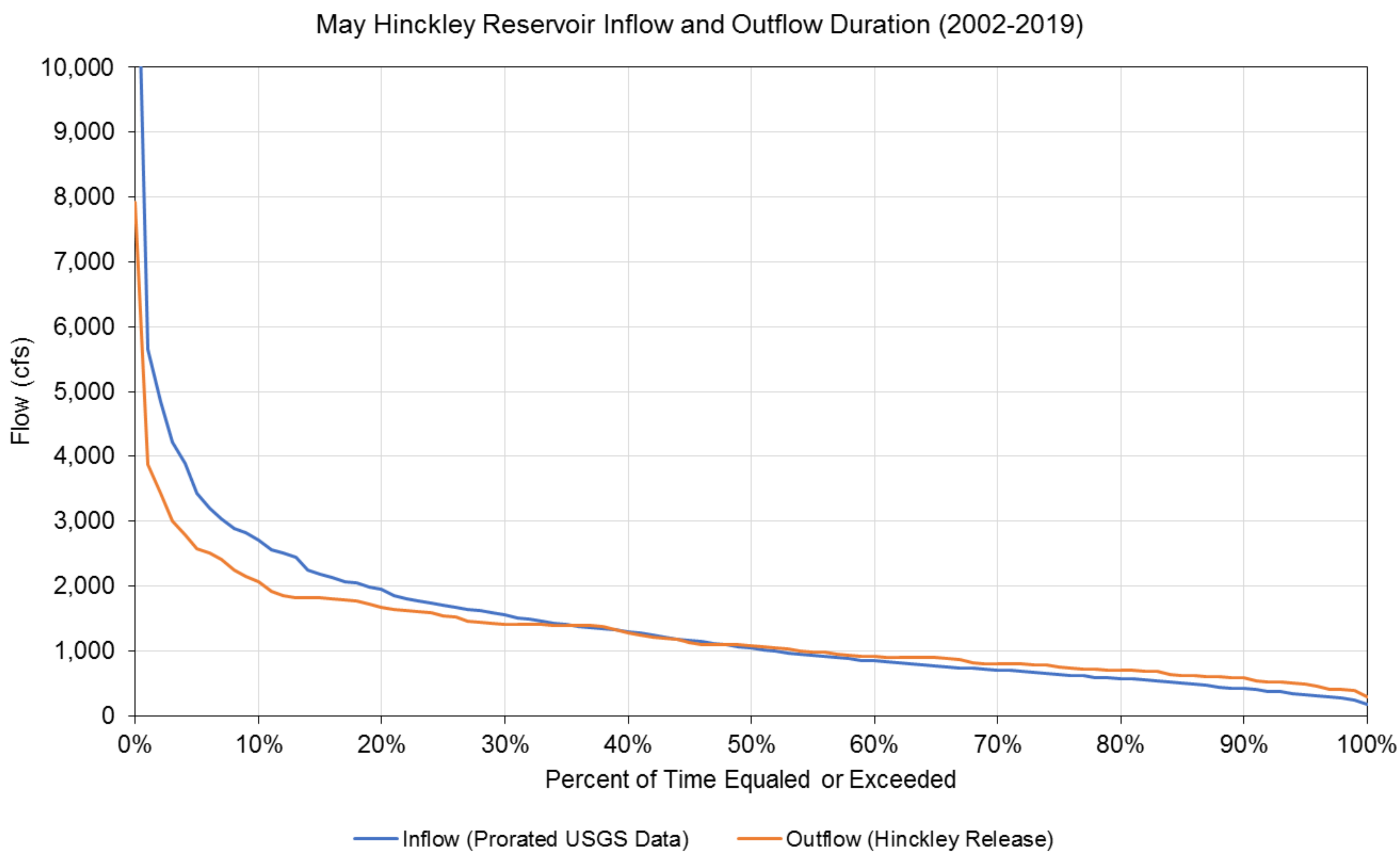

Figure 4.4.1.1.2-6: Monthly Inflow and Outflow Duration Curves - May

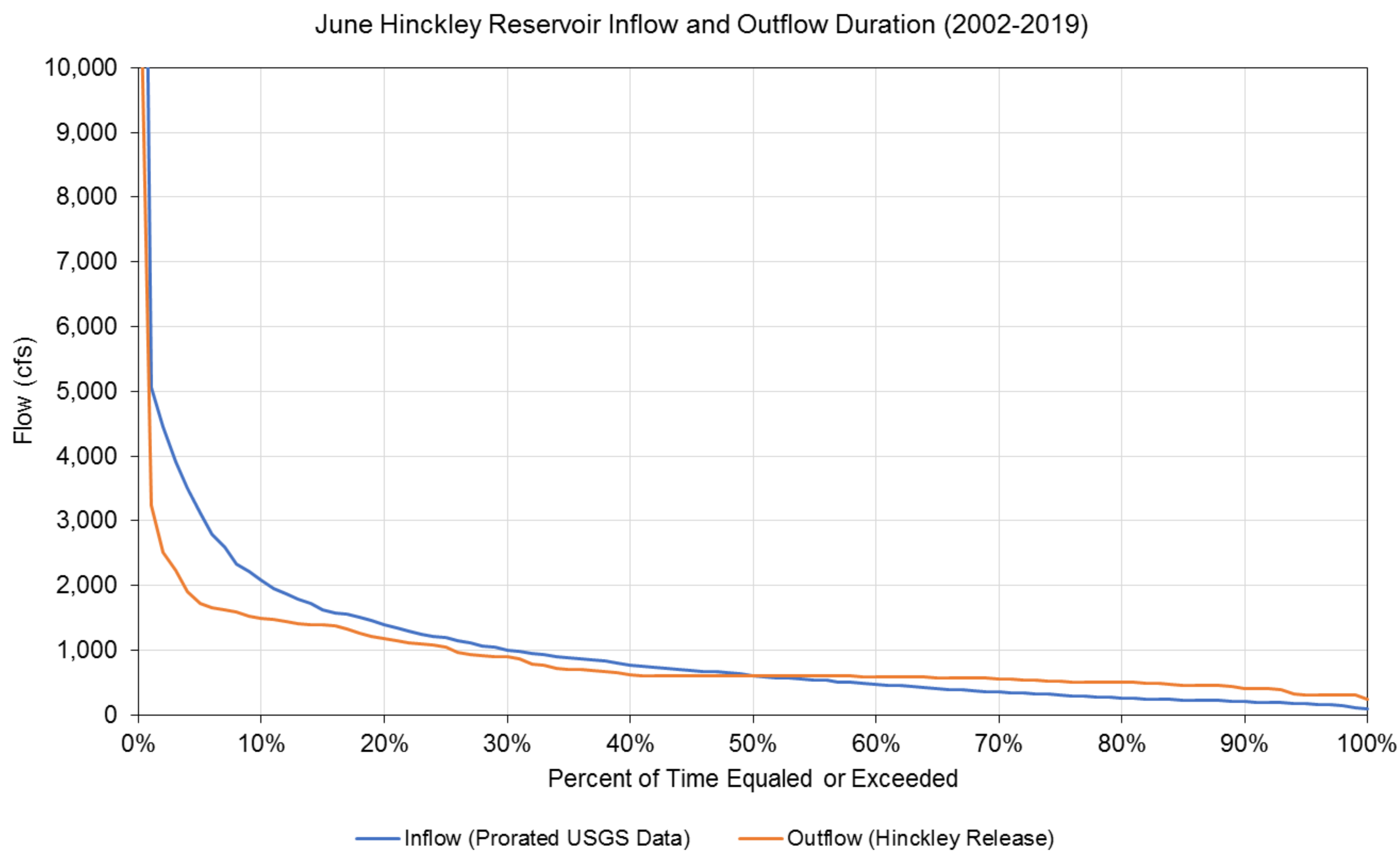

Figure 4.4.1.1.2-7: Monthly Inflow and Outflow Duration Curves - June

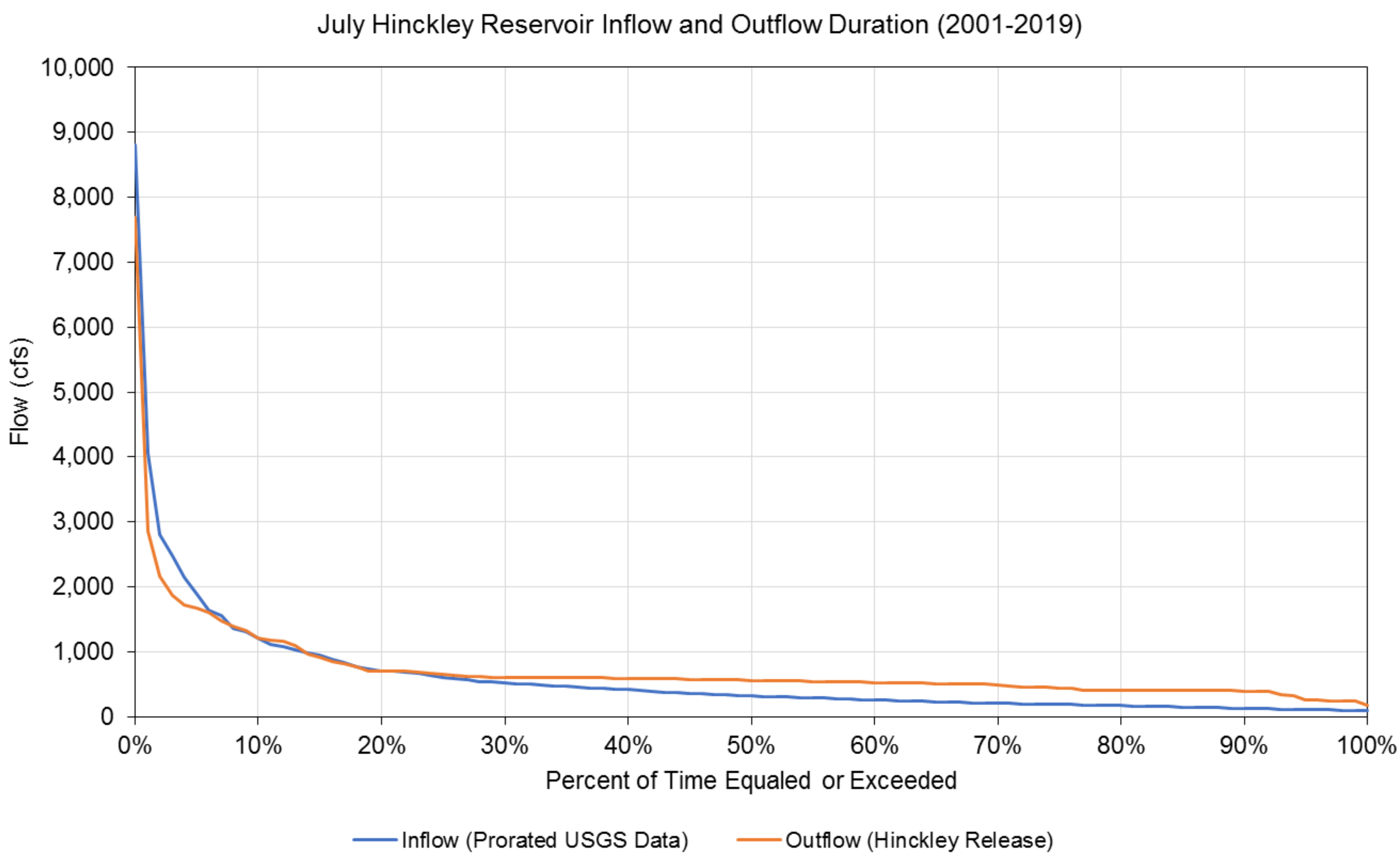

Figure 4.4.1.1.2-8: Monthly Inflow and Outflow Duration Curves - July

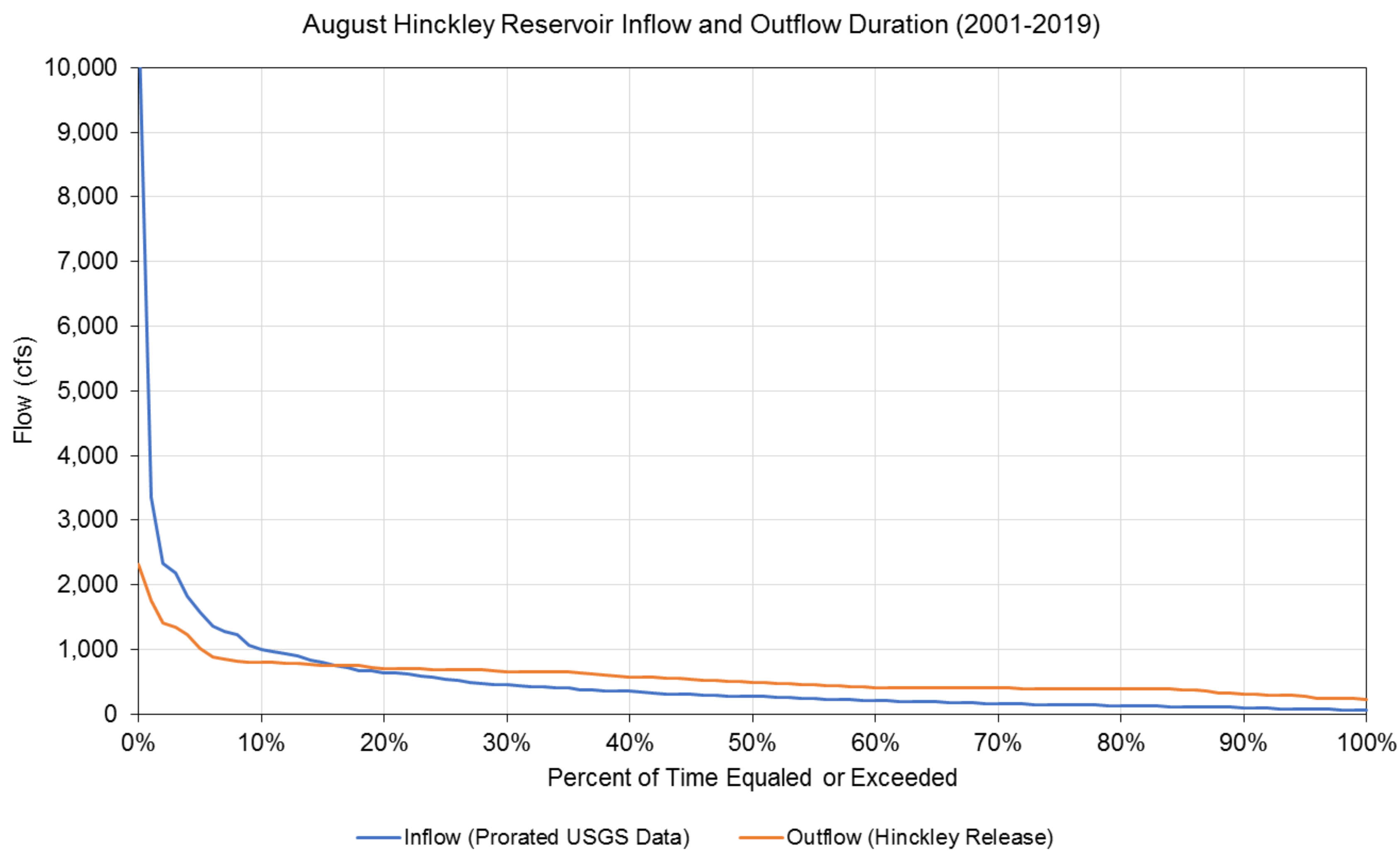

Figure 4.4.1.1.2-9: Monthly Inflow and Outflow Duration Curves – August

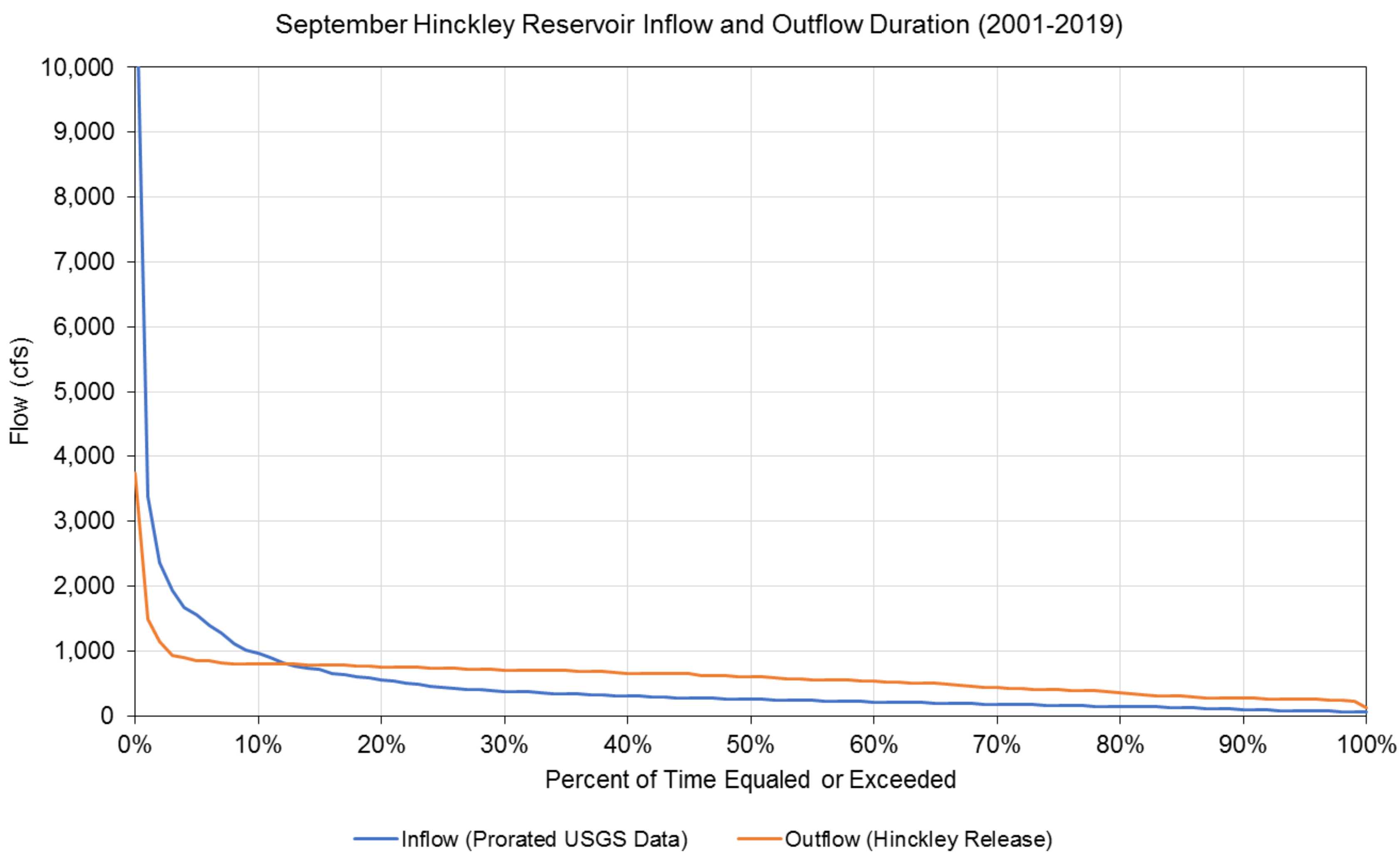

Figure 4.4.1.1.2-10: Monthly Inflow and Outflow Duration Curves - September

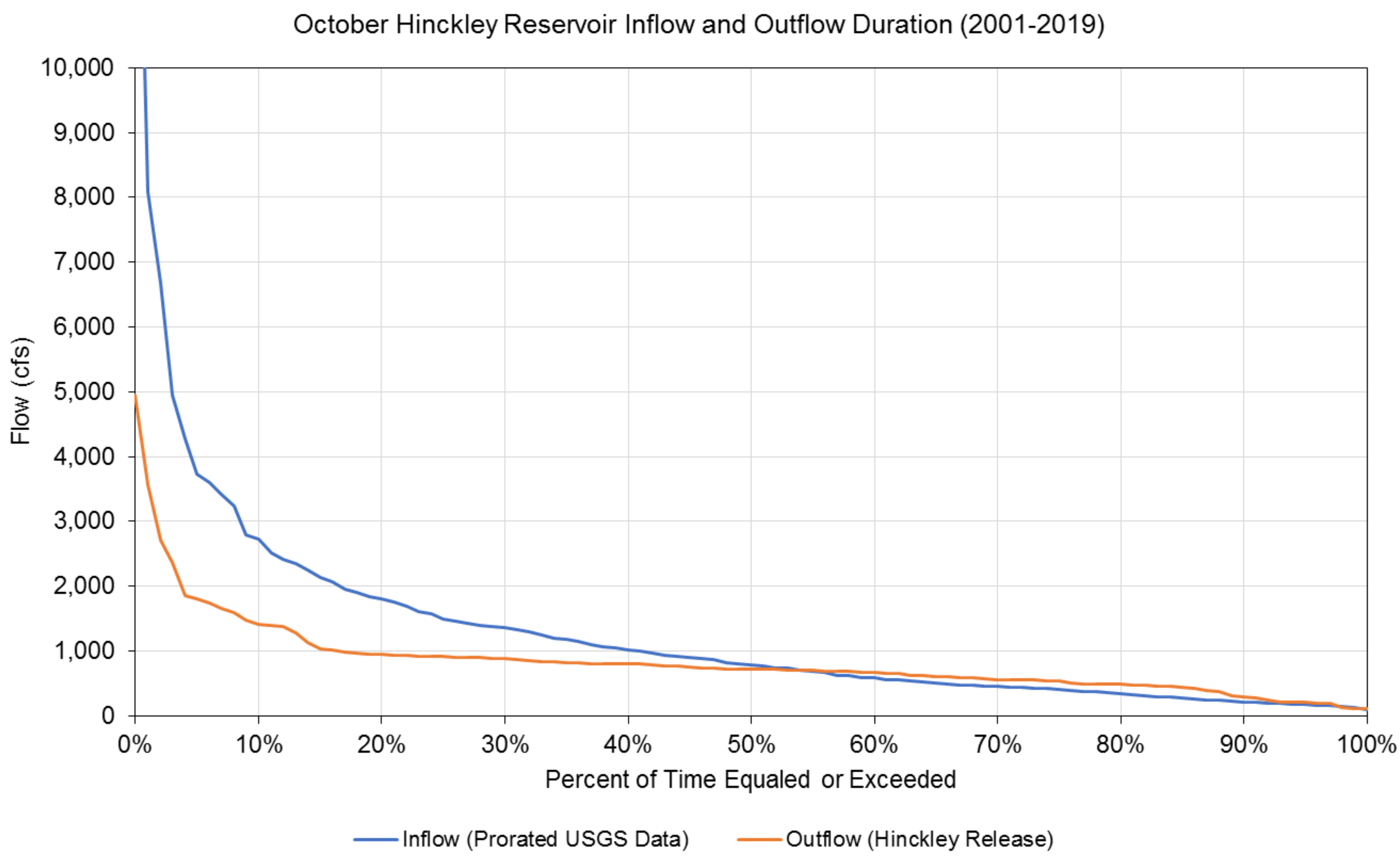

Figure 4.4.1.1.2-11: Monthly Inflow and Outflow Duration Curves - October

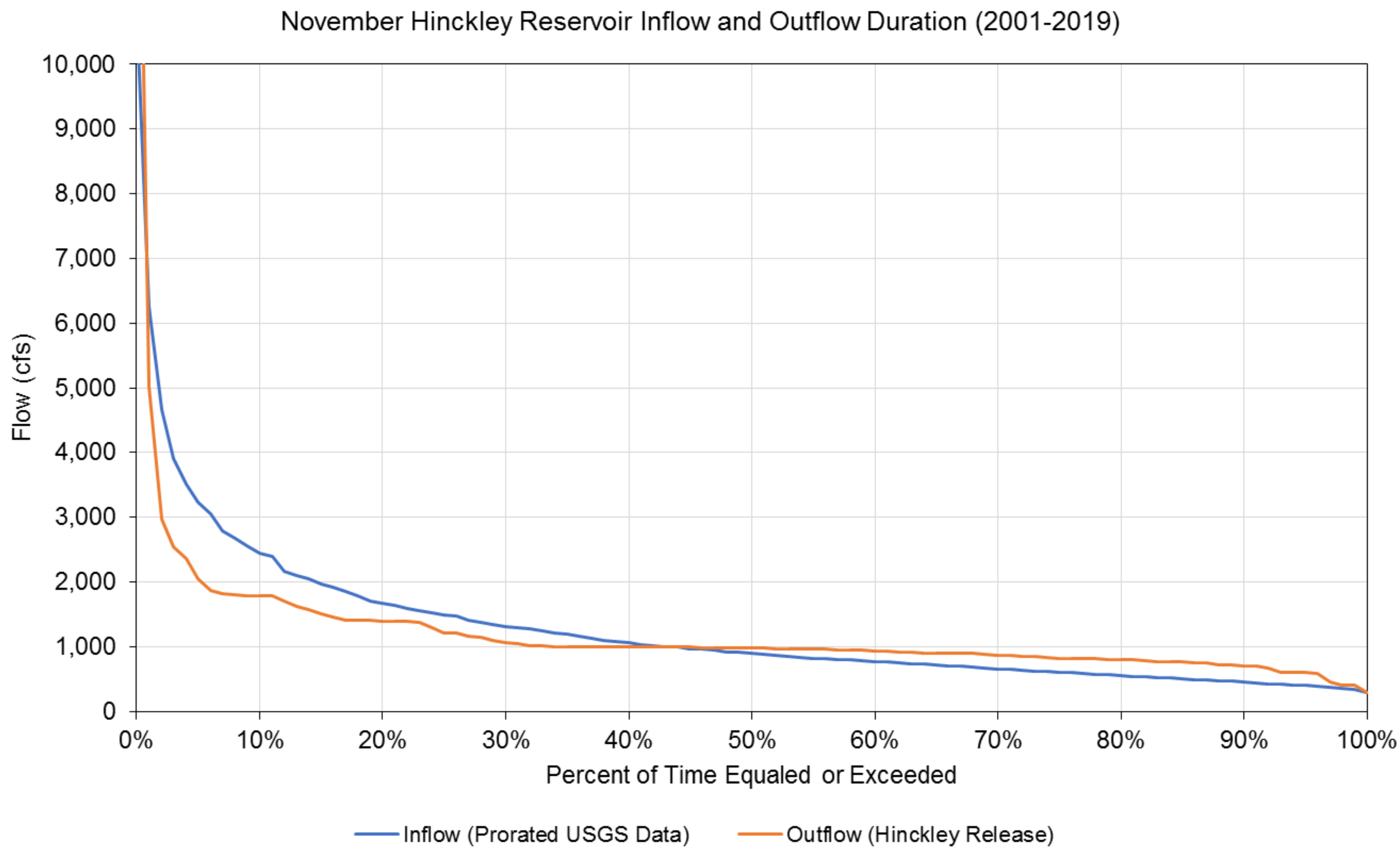

Figure 4.4.1.1.2-12: Monthly Inflow and Outflow Duration Curves – November

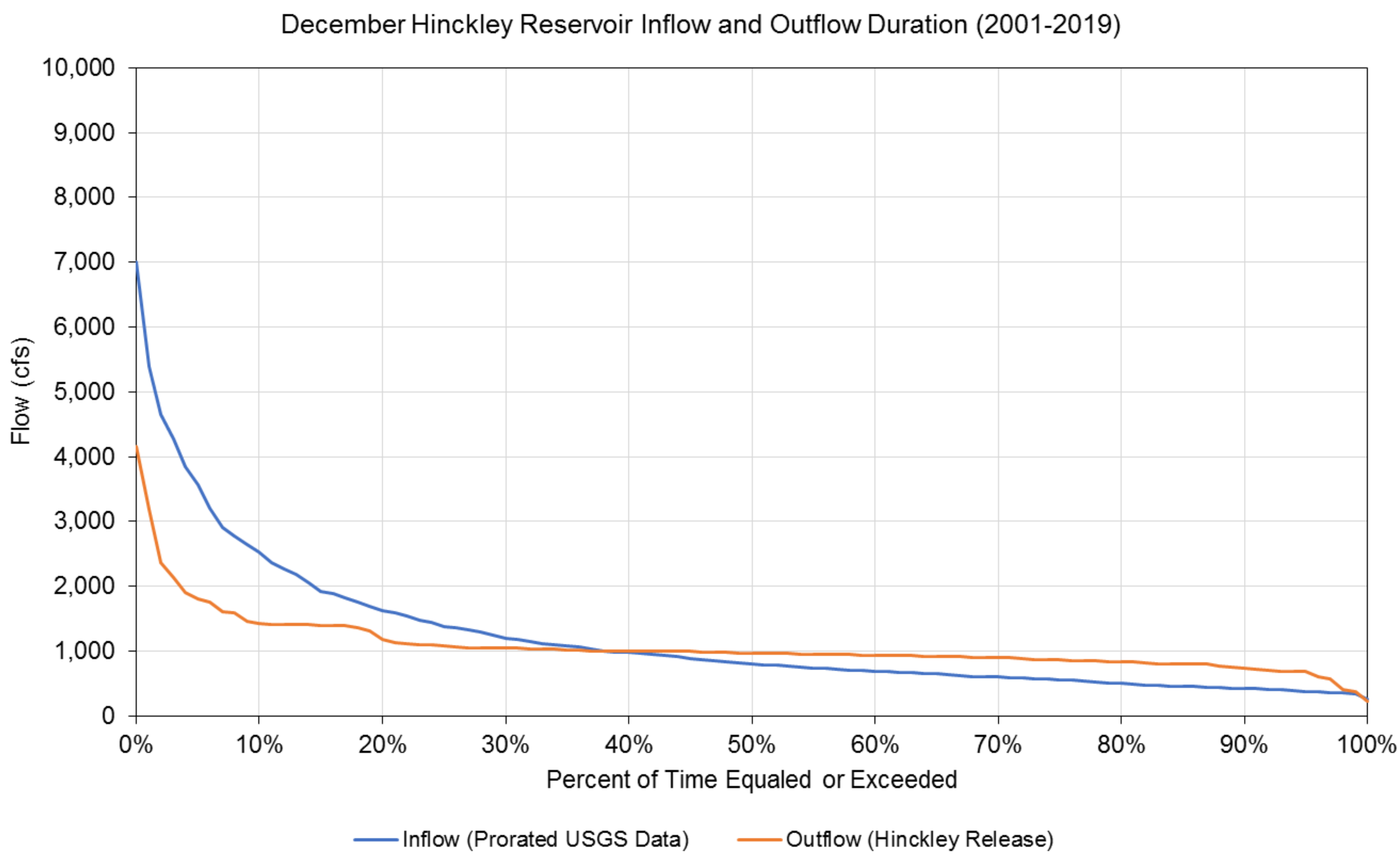

Figure 4.4.1.1.2-13: Monthly Inflow and Outflow Duration Curves – December

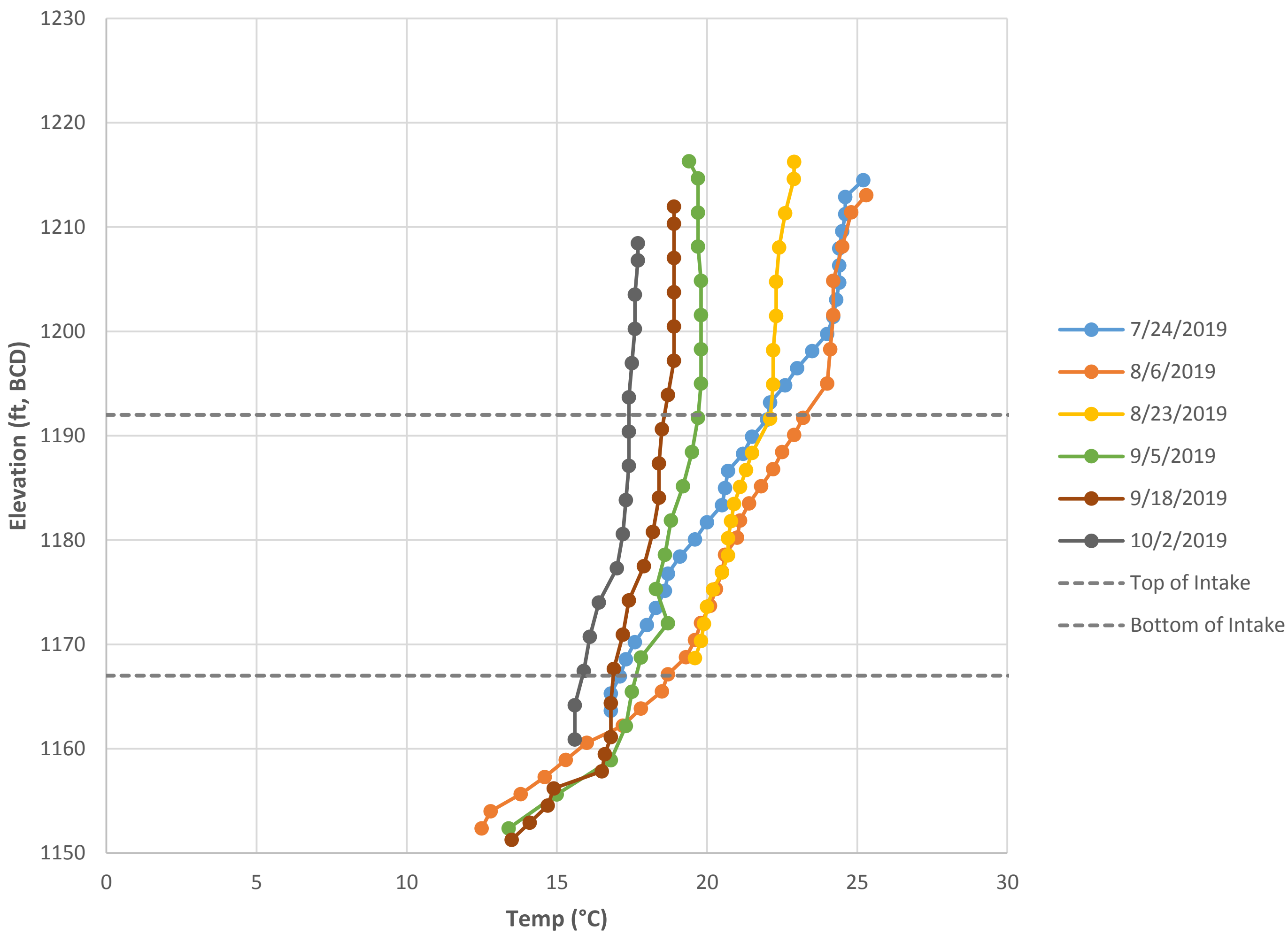

Figure 4.4.1.2.4-1: Hinckley Reservoir Temperature Vertical Profiles 2019

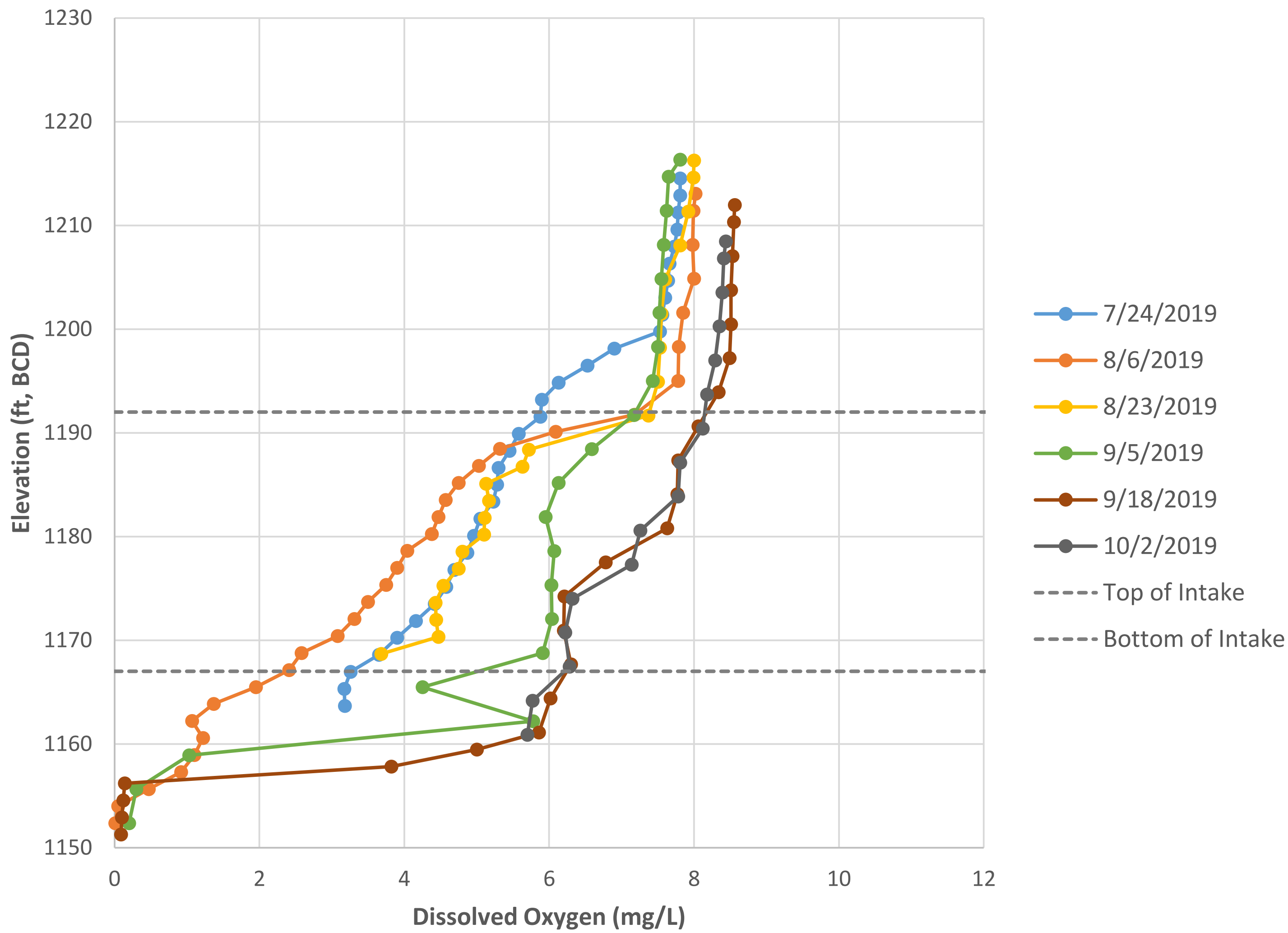

Figure 4.4.1.2.4-2: Hinckley Reservoir Dissolved Oxygen Vertical Profiles 2019

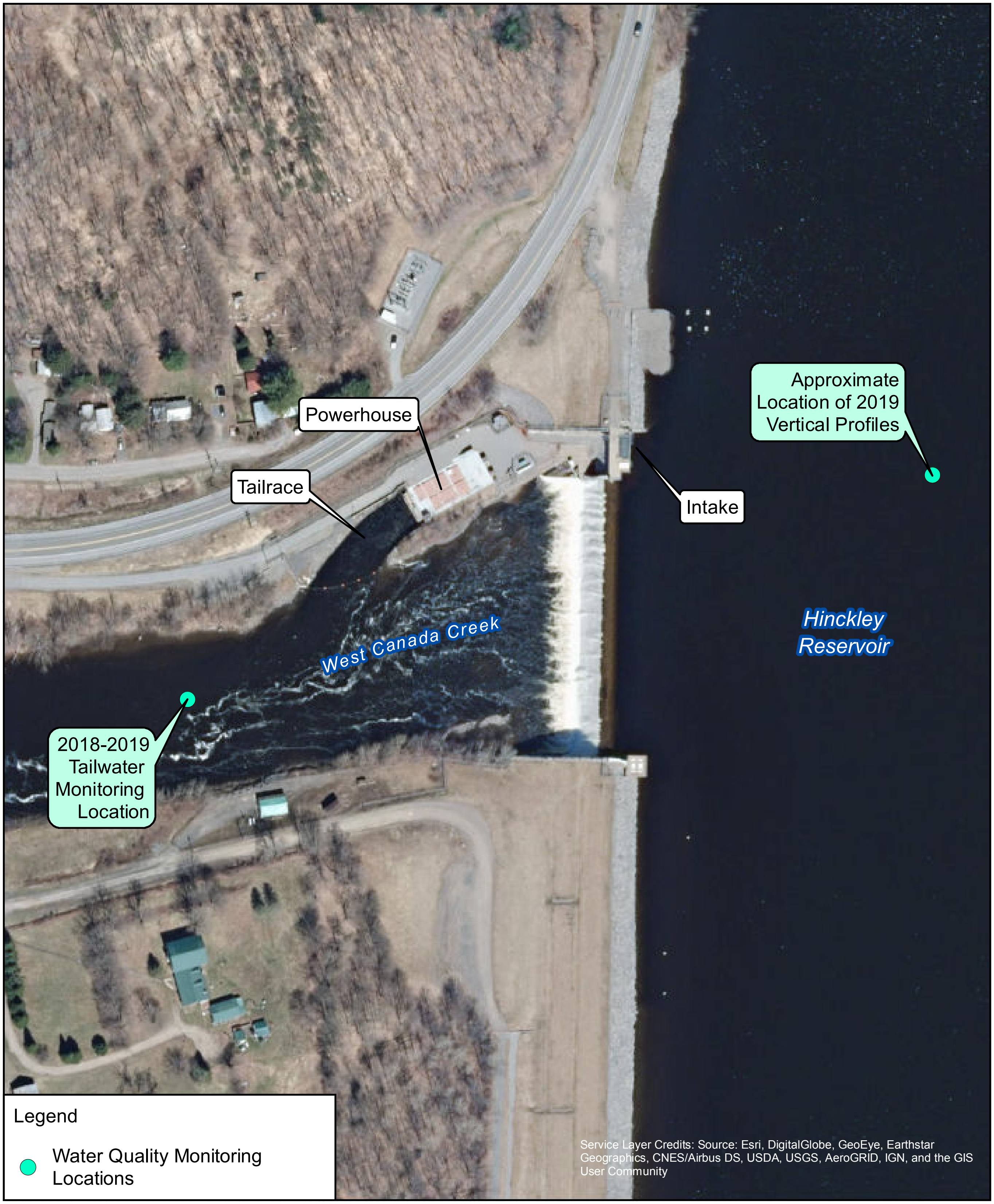

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Figure 4.4.1.2.4-3: 2018-2019 Water Quality Monitoring Locations

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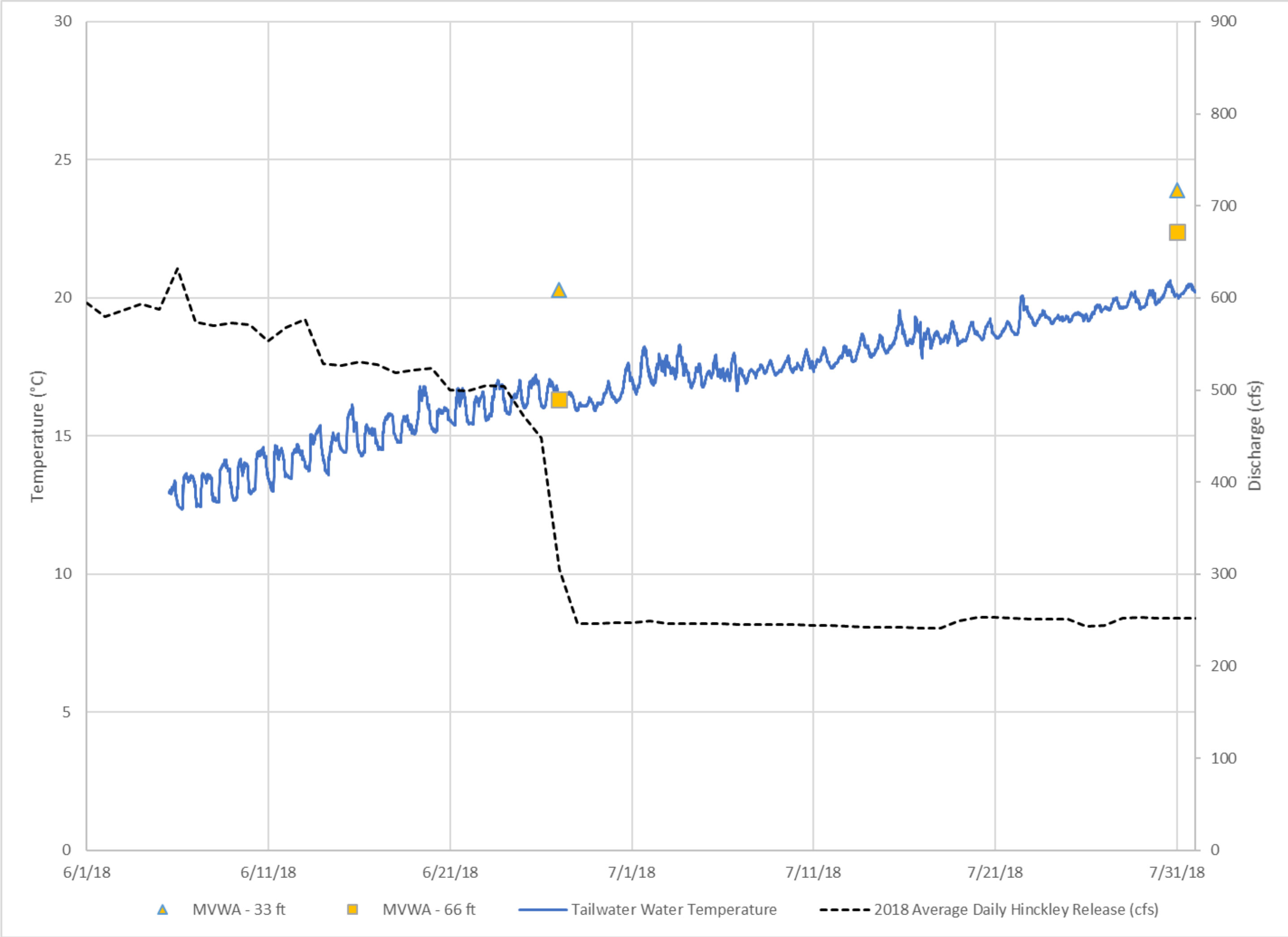


Figure 4.4.1.2.4-4: Tailwater Water Temperature, June – July 2018

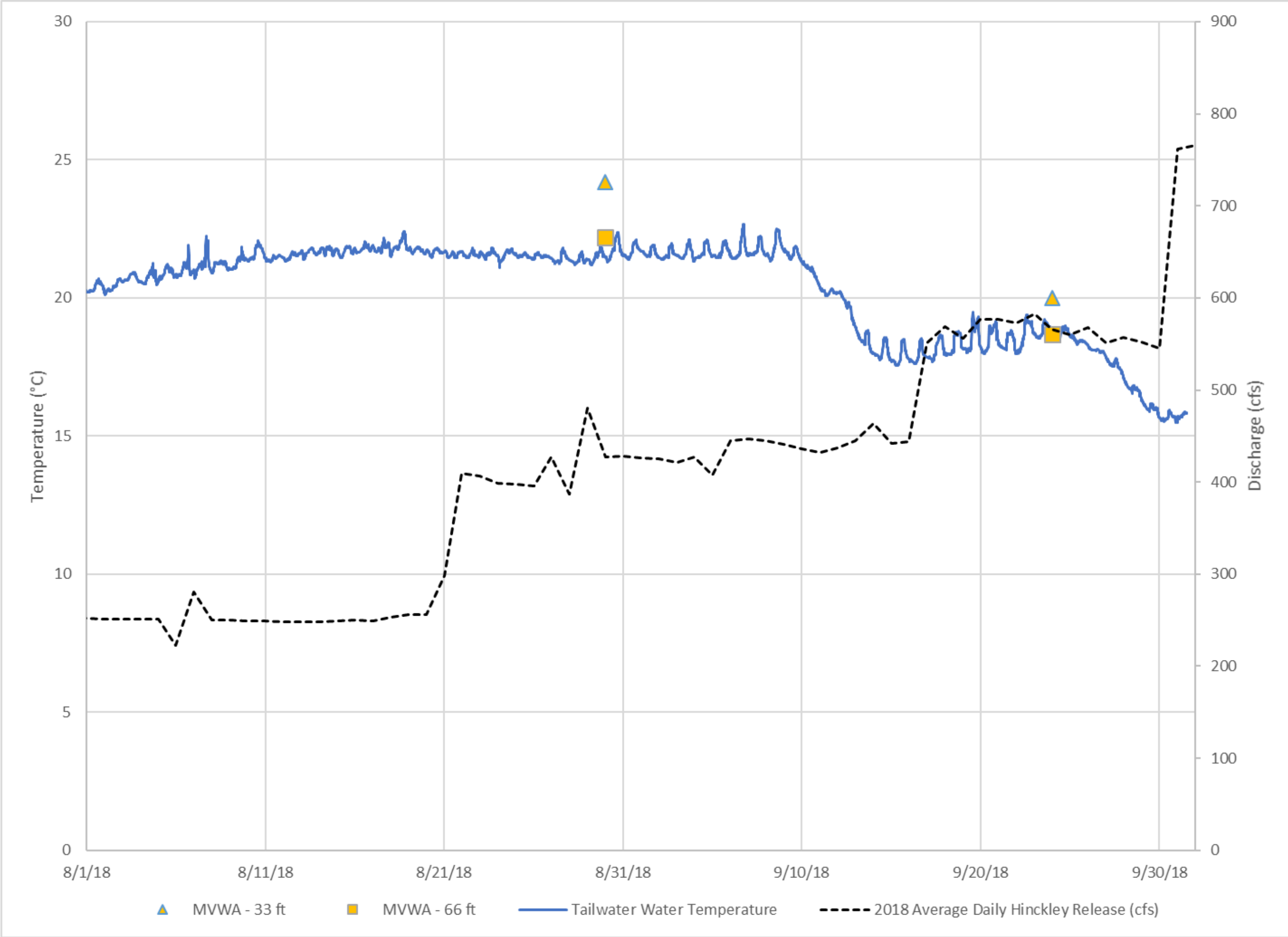


Figure 4.4.1.2.4-5: Tailwater Water Temperature, August – September 2018

Figure 4.4.1.2.4-6: Tailwater Dissolved Oxygen Concentration, June-July 2018

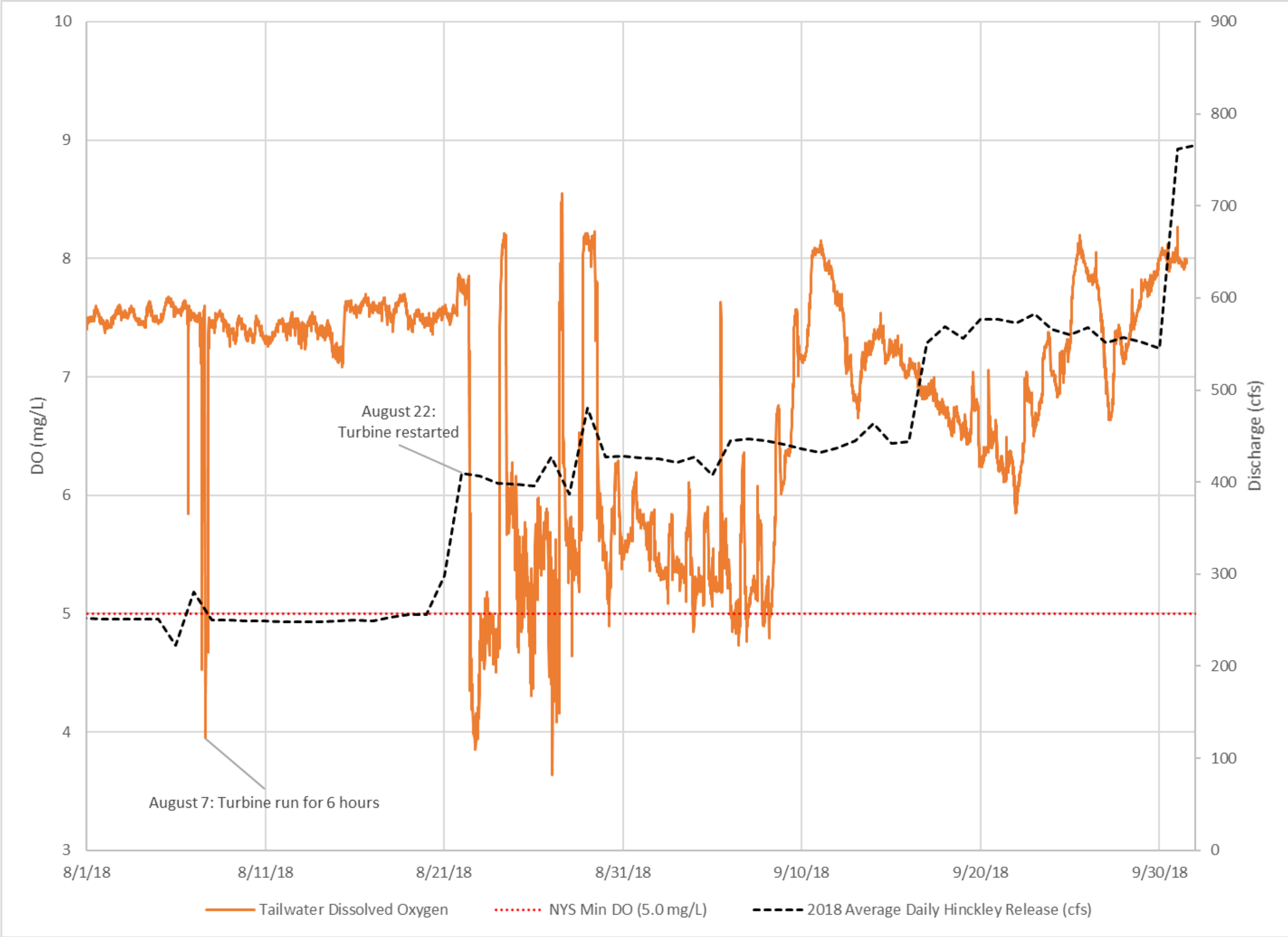


Figure 4.4.1.2.4-7: Tailwater Dissolved Oxygen Concentration, August-September 2018

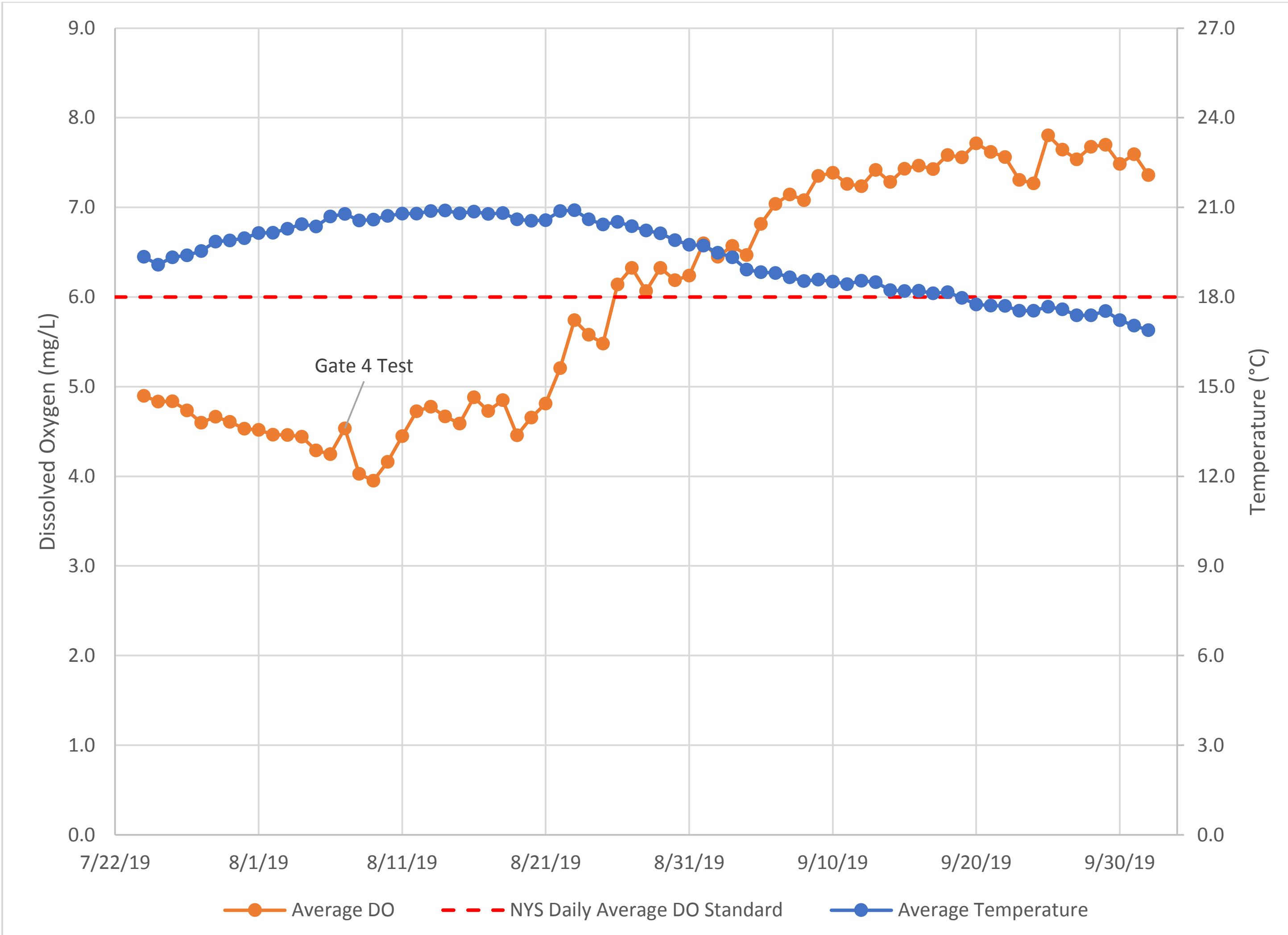


Figure 4.4.1.2.4-8: Average Daily Tailwater DO and Water Temperature, July – September 2019

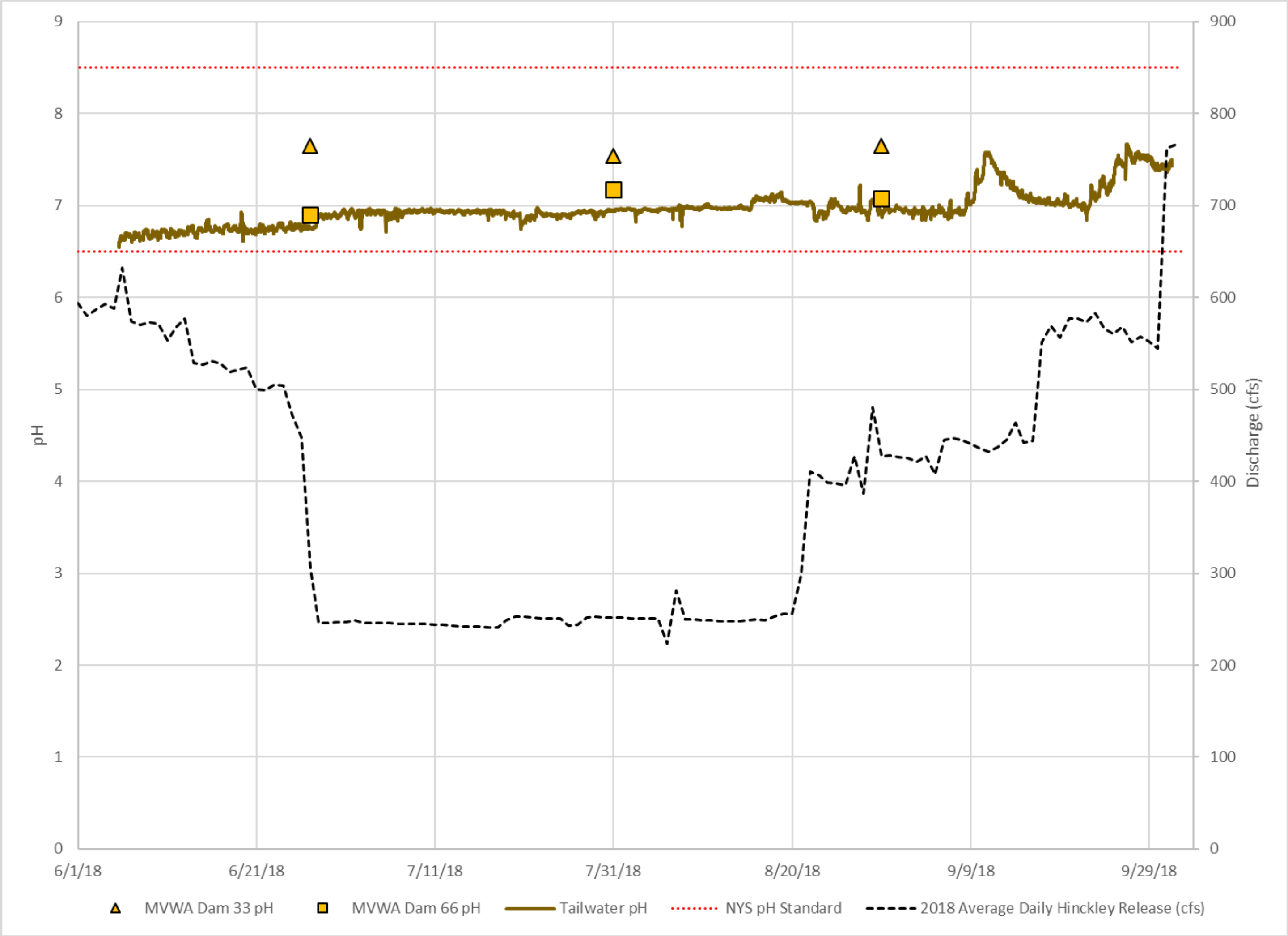


Figure 4.4.1.2.4-9: Tailwater pH, June-September 2018

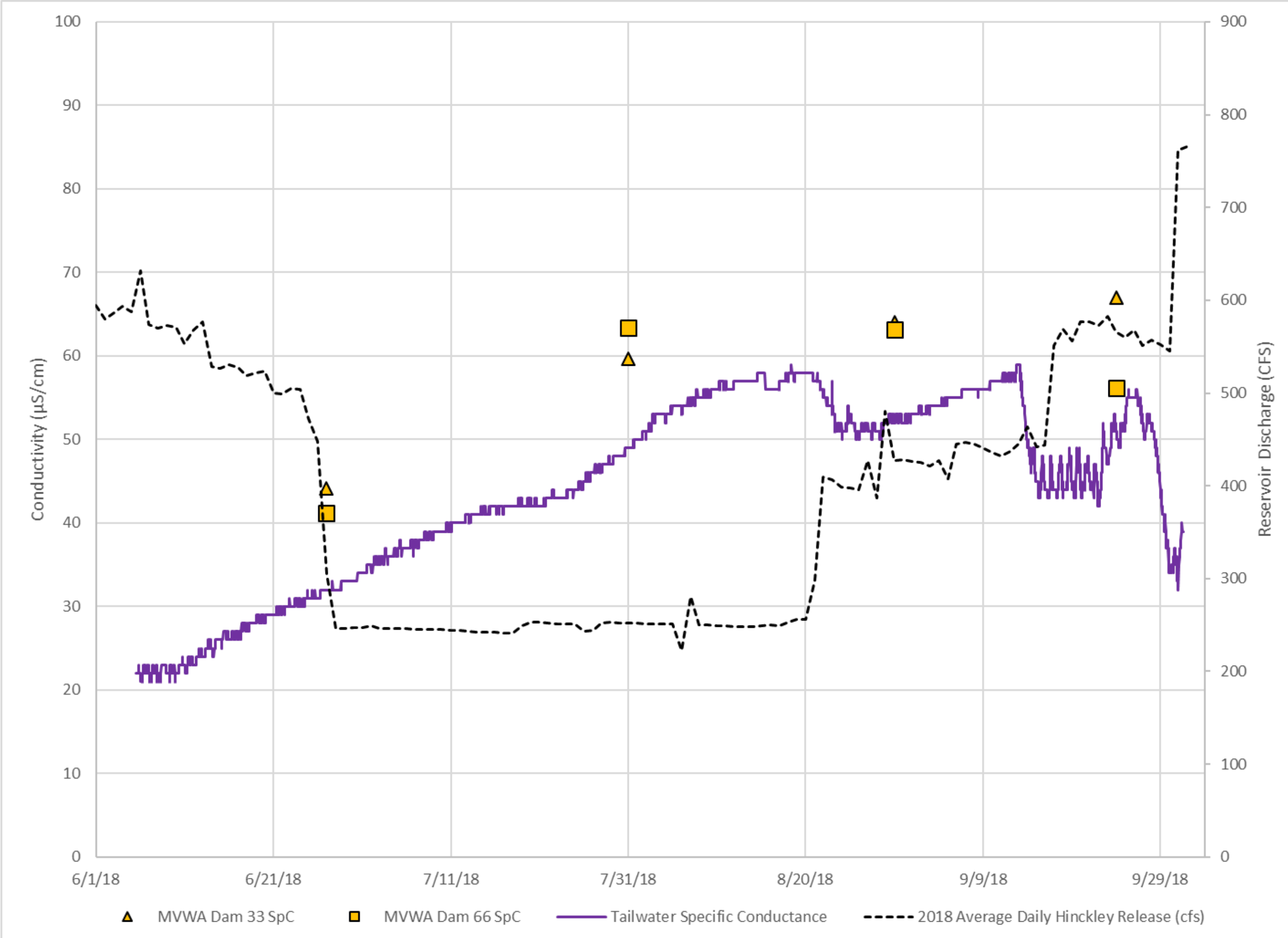


Figure 4.4.1.2.4-10: Tailwater Specific Conductance, June-September 2018

4.5 Fish and Aquatic ResourcesAffected Environment

4.5.1.1 Historic Fish Community Information

The Mohawk River Basin fisheries were described by NYSDEC (2012) as being in a state of transition, with previously absent or rare species, such as Freshwater Drum (*Aplodinotus grunniens*) and Northern Pike (*Esox lucius*), having become common in the Mohawk River, and a shift in the Smallmouth Bass (*Micropterus dolomieu*) population to fewer but larger fish (NYSDEC, 2012). NYSDEC (2016a) considers West Canada Creek one of the most renowned trout streams in central New York. That designation primarily applies to the upper reaches where Brook Trout (*Salvelinus fontinalis*) stocking and natural reproduction occurs, and downstream of the Project area where Brown Trout (*Salmo trutta*) are stocked. Additionally, Smallmouth Bass and Fallfish (*Semotilus corporalis*) recreational catches were noted in the lower reaches of West Canada Creek.

In contrast, the conditions of Hinckley Reservoir have been described as not conducive to a good fishery, citing low catch to stocking ratios and the failure of past stocking of Walleye (*Sander vitreus*), Lake Trout (*Salvelinus namaycush*), Brown Trout, Brook Trout, Rainbow Trout (*Oncorhynchus mykiss*), and Tiger Muskellunge (*Esox lucius* x *Esox masquinongy*) to produce more than occasionally good fishing (HRWG, 2008, HOCCP, 1989). Contributing factors, such as seasonal water level fluctuation, sand as the dominant sediment, and low nutrient levels, hardness and conductivity resulted in fish in poor condition relative to similar northeastern waterbodies (HRWG, 2008). Similarly, the Herkimer-Oneida Counties Comprehensive Planning Program (HOCCP) (1989), citing NYSDEC fisheries surveys and anecdotal information, suggested that the quality of Hinckley Reservoir fisheries resources was poor. Referencing a 1935 study (no citation given), HOCCP (1989) noted that, since its creation, Hinckley Reservoir did not have a reputation as a productive fishery and that fish there were stunted due to a lack of food organisms ("snails, aquatic insects and shore inhabiting crustacea are practically absent"). However, their investigation did suggest that, historically, some Brown Trout and Brook Trout were caught near tributaries to Hinckley Reservoir. Other species caught included Chain Pickerel (*Esox niger*), Brown Bullhead (*Ameiurus nebulosus*), Yellow Perch (*Perca flavescens*), and sunfish (*Lepomis* spp).

Reaches of West Canada Creek downstream of the Project area to its mouth appear to be more productive. Prospect Reservoir, located immediately below the Hinckley Dam, was thought to support a more robust fishery than Hinckley Reservoir, with high quality fishing for Chain Pickerel, Brown Trout, and Rainbow Trout reported (HOCCP, 1989). Additionally, in contrast to Hinckley Reservoir, trout stocking was demonstrated through NYSDEC surveys to be successful there. The reasons cited for the contrast between Hinckley Reservoir and Prospect Reservoir included less dramatic water surface elevation fluctuation and the existence of suitable (cobble and stone) substrate.

Twenty-five fish species were identified in a 1976 NYSDEC survey (Hasse, 1977 as cited in Ichthyological Associates, 1980), supplemented by collections made by Ichthyological Associates (1980) in conjunction with their incremental instream flow study below the Trenton Hydroelectric Station. The species assemblage was similar to that identified by NYSDEC in surveys conducted from 1988-2010 (see Section 4.5.1.3), but with the addition of White Perch (*Morone americana*) and Walleye - species that, along with Common Carp (*Cyprinus carpio*), Logperch (*Percina caprodes*), and Yellow Perch, were attributed to origination in the Mohawk River rather than West Canada Creek.

4.5.1.2 Hinckley Reservoir Fisheries Resources

Over the past 31 years, NYSDEC[14] has conducted six fisheries surveys in Hinckley Reservoir (Table 4.5.1.2-1, Figure 4.5.1.2-1). Mean total length of fish species collected in Hinckley Reservoir by NYSDEC are included in Table 4.5.1.2-2. Those surveys generally targeted game fish species and primarily used gillnet techniques, including experimental gillnets with a wide range of mesh sizes, as appropriate for the habitat and objectives. Although boat electrofishing was conducted at four stations during a 2009 survey, it is not clear whether the fish community was fully represented in those collections. Some of the studies were directed toward specific fisheries management activities but resulted in valuable general fisheries data. For example, the survey conducted in 1994 was reportedly done to document the presence of Tiger Muskellunge, a usually sterile hybrid of Northern Pike and Muskellunge (*Esox masquinongy*) stocked to Hinckley Reservoir during the late 1980's. No Tiger Muskellunge were captured, but species assemblage data was collected that suggested no appreciable change to the fish community relative to previous surveys.

A survey conducted in 2009 was completed to collect fish for the USFWS National Wild Fish Health Survey. From those collections, 60 Yellow Perch and 28 Smallmouth Bass were contributed by NYSDEC to the fish health survey. Pathogens which were tested for included three bacteria: *Aeromonas salmonicida*, the cause of furunculosis; *Edwardsiella ictaluri*, the cause of enteric septicemia; *Yersinia ruckeri*, the cause of enteric redmouth disease; and five viruses: infectious pancreatic necrosis virus (IPNv), infectious hematopoietic necrosis (IHNv), viral hemorrhagic septicemia (VHSv), Largemouth Bass virus (LMBv), and spring viremia of carp virus (SVCv), Largemouth Bass only (Heil, 2009, William Quartz, USFWS, personal communication). A query of the National Wild Fish Health Survey database revealed that none of those samples tested positive for any of the pathogens tested (USFWS, 2009).

In addition to naturally reproducing fish populations, considerable effort has been exerted by NYSDEC to establish and enhance the trout fishery in Hinckley Reservoir. From 2011 through 2019, a reported 53,685 trout were stocked in Hinckley Reservoir, including 51,500 Rainbow Trout, 1,790 Brown Trout, and 395 Brook Trout (Table 4.5.1.2-3). In comparison, 124,600 trout

[14] NYSDEC fisheries survey data provided by Frank Flack, NYSDEC, Region 6.

were stocked during the same period in the upper West Canada Creek watershed upstream of the Project area. NYSDEC also stocks Brown Trout and Rainbow Trout in Prospect Reservoir downstream from the Hinckley Project.

Several fish surveys were conducted in West Canada Creek in reaches immediately upstream of (in the vicinity of the town of Ohio, NY) (Figure 4.5.1.2-2) and downstream of the Project area (to the mouth of West Canada Creek), including one survey conducted in Prospect Reservoir in 2009 (Figure 4.5.1.2-3). Those studies were conducted for various purposes, including general species assemblage data collection, and purposive studies, such as informing the trout stocking program (catch rate oriented trout stocking, CROTS). In contrast to Hinckley Reservoir surveys, studies conducted in other reaches of West Canada Creek used multiple techniques, including electrofishing and seine netting (Table 4.5.1.2-4). As a result, direct comparison between Hinckley Reservoir and other reaches of West Canada Creek would not be valid. However, species occurrences in those surveys are included here to provide background and include the best available data. Within Hinckley Reservoir, 14 species representing 7 families were collected. Upstream of the Project area, 13 species representing 6 families were collected, and downstream of the Project area, 32 species representing 9 families were collected (Table 4.5.1.2-5).

4.5.1.3 Fisheries Resources Downstream of Hinckley Dam

The NYSDEC Division of Water (NYSDEC, 2016f) categorized the middle mainstem of West Canada Creek (from Prospect to Hinckley Reservoir) as an impaired segment with regards to aquatic life and habitat/hydrology. A known source of impairment was identified as hydro modification or alteration to the natural flow regime, and suspected sources were identified from atmospheric deposition. NYSDEC conducted a recent fishery survey within Prospect Reservoir, which was limited to four sites sampled with gillnets (Frank Flack, NYSDEC, personal communication, Table 4.5.1.2-4, Figure 4.5.1.3-1). The NYSDEC survey resulted in only one each of three species being collected - Golden Shiner (*Notemigonus crysoleucas*), White Sucker (*Castostomus commersonii*), and Smallmouth Bass. More recently, Erie Boulevard conducted fish sampling efforts within the Prospect Impoundment as part of the ongoing West Canada Creek relicensing. The Erie Boulevard study was conducted on September 25 and 26, 2019 and consisted of electrofishing in areas where water depth was less than 6 feet and experimental gill netting in deeper areas. The two most abundant species captured were Yellow Perch and Pumpkinseed. The other species collected included: Golden Shiner, Rock Bass, Smallmouth Bass, Chain Pickerel, White Sucker, Spottail Shiner, Brown Bullhead, Tessellated Darter, and Banded Killifish. No trout were captured during the survey.

Prospect Reservoir is stocked with Brown Trout by NYSDEC to sustain the trout fishery there (HRWG, 2008, Table 4.5.1.2-3). In West Canada Creek from Trenton Falls to Herkimer, NYSDEC spends about $75,000 annually to stock 50,520 Brown Trout, providing fishing opportunities for approximately 52,000 anglers (HRWG, 2008). More information is available regarding further downstream reaches, with emphasis on the reaches below Trenton Hydroelectric Station.

Surveys conducted by NYSDEC in downstream reaches (from Prospect Reservoir to the mouth of West Canada Creek) between 1988 and 2009 resulted in collections of 30 species representing 9 families (Table 4.5.1.2-5).

4.5.1.4 Aquatic Habitat

As part of the 2018 *Hinckley Reservoir Fluctuation Field Survey*, the Power Authority conducted reconnaissance-level habitat mapping of the littoral zone habitat and vegetation. Aquatic habitat throughout the littoral zone was characterized according to substrate, cover type, and cover density as observed at the time of the survey.

Substrate

Differences in substrate were noted both above and below the water surface at the time of the survey (i.e., El. 1213), as mobilized fine sediments were observed to recede with the water surface. Fine substrates (i.e., sand and silt) were prevalent in much of the littoral zone in varying proportions and were notably dominant in coves and low slope habitats with dewatered areas along the eastern shore. Coarse substrate (i.e., gravel, cobble, boulder, riprap) dominance occurred around the dam (i.e., riprap and boulder), points of land and higher slope habitats along the western shore, around the island, and tributary mouths along the eastern shore. The West Canada Creek / upper northeastern impoundment was characterized with more coarse substrate dominant areas, fine substrate (floodplain) depositions, gravel-cobble bar, complex channel, and isolated pools.

Table 4.5.1.4-1 and 4.5.1.4-2 present a summary of substrate composition throughout the Project area in acres and as a percentage of the total survey area, respectively. As observed in the tables, the study area is comprised mainly of sand/silt (768 acres or 69% of the total survey area). Figure 4.5.1.4-1 depicts the dominant littoral zone substrate at the time of the survey.

Cover Resources

Cover density (e.g., absent, low, moderate, or high) from macrophytes (e.g., submerged aquatic vegetation (SAV) and emergent aquatic vegetation (EAV)), woody debris, boulder, and detritus varied and included EAV in areas in the littoral zone and above the water surface at the time of observation (i.e., El. 1213). Areas of moderate and high cover density from macrophytes were observed throughout the study area. In these areas, SAV primarily consisted of pondweed (*Potomogeton spp.*), while EAV primarily consisted of rushes (*Juncus spp.*). Three small areas with high cover density from woody debris and low slopes were observed. These three areas were all located near Hinckley Dam in the southeastern section of the reservoir. In the West Canada Creek reach / upper northeastern impoundment, high cover density from EAV, which was generally above the water surface at the time of the survey, was observed. Only one SAV bed (*Potomogeton spp.*) was observed as being dewatered at the time of the survey in a low slope area near a culvert / small tributary.

Table 4.5.1.4-3 and 4.5.1.4-4 present a summary of cover resources in the Project area in acres and as a percentage of the total survey area, respectively. As observed in the tables, the study area is comprised of mostly bare substrate (798 acres or 72% of the total survey area). Figure 4.5.1.4-2 depicts the cover resources in the Project area.

4.5.1.5 Hinckley Reservoir Fish Nests and Isolated Pools

Fish Nests

During the 2018 *Hinckley Reservoir Fluctuation Field Study*, a number of juvenile and adult fish species were observed throughout the study area including Smallmouth Bass, Pumpkinseed, Rock Bass, other unidentified centrarchid spp., Fallfish, Bullhead, Tessellated Darter, Golden Shiner, *Esox* spp., and minnows.

In addition, centrarchid nests were observed at twenty locations throughout the study area. Of these twenty locations, six were observed in the West Canada Creek / upper northeastern impoundment reach, one was observed in the embayment where Kreskern Creek enters the reservoir on the northwestern shore, and the remaining thirteen were observed at various low slope areas along the eastern shore. Figure 4.5.1.5-1 depicts the location of fish nets observed during the survey, while Table 4.5.1.5-1 provides a summary of nest attributes.

Observed nests were classified as active, inactive, unoccupied, or potential nest. For nest sites classified as *unoccupied*, a determination as to whether the nest was active or inactive was not possible. Conversely, sites where it appeared a nest (or nests) likely existed but a definitive determination could not be made were classified as *potential nest*. Of the twenty nest sites observed, five were classified as active, five as inactive, four as occupied, and six as potential nest. Fish observed at active nests included pumpkinseed, rock bass, and unidentified centrarchid spp. Inactive nests observed in the West Canada Creek / upper northeastern impoundment reach were for fallfish and, possible, smallmouth bass.

Nests were observed to either be submerged or dewatered depending on the elevation of the nest. Of the twenty nest sites observed, twelve were found to be submerged, one partially submerged, and seven dewatered. Of the dewatered nests, four were classified as potential nests. More specifically, of the twenty nests observed, twelve were found to occur between El. 1212 and 1209 while the remaining eight were found to occur between El. 1216 and 1213. Water surface elevations between El. 1212 and 1209 were found to be equaled or exceeded 94% and 97% of the time, respectively, from May to August for the period 2001-2018. Water surface elevations between El. 1216 and 1213 were found to be equaled or exceeded 83% and 92% of the time, respectively, for the same period. Dewatered nests were limited to: (1) three locations in the downstream extent of the reservoir immediately east of the non-overflow earthen section of the dam; (2) one location on the eastern shore of the reservoir north of the island; and (3) four locations in the West Canada Creek / upper impoundment reach (Figure 4.5.1.5-1).

Isolated Pools

During periods of low to moderate water levels, the upstream extent of the study area (i.e., the West Canada Creek reach) contains complex and varied habitats characterized to the south by vast emergent wetland complexes with tributary channels running through them and to the north by dynamic, braided riverine channels. The river channel in this area is characterized by gravel-cobble bars, complex channels, and isolated pools. During periods of high flow, it is likely that the gravel-cobble bars found throughout this area may shift, resulting in geomorphic changes to the channel. During periods of low to moderate water levels, the deeper portions of these complex channels and wetland tributaries may become isolated pools as they are temporarily disconnected from the main river channel. During the 2018 survey, eleven such isolated pools were documented in this reach (Figure 4.5.1.5-2).

A summary of each of the mapped pools and their corresponding monthly and annual percentages of inundation is provided in Table 4.5.1.5-2. Each of the observed pools is identified by its location ID, which corresponds to Figure 4.5.1.5-2. The depth of the pool as observed in the field and the maximum bed elevation associated with each pool are also provided. The maximum bed elevation of each pool corresponds with the elevation at which the pool is still connected to the main body of the reservoir. When the water surface elevation is below the maximum pool bed elevation that pool then becomes isolated from the main body of the reservoir.

The percentage of time each pool's maximum bed elevation is equaled or exceeded was calculated based on historical water surface elevation data. For example, Pool A's maximum bed elevation was measured to be El. 1220.9. This corresponds to Pool A being inundated 32% of the time in January, 11% of the time in February, 10% of the time in March, etc. To calculate the percentage of time when the Reservoir's elevation is less than the Pool A maximum elevation, the provided percentages should be subtracted from 100%. Therefore 68% of the time in January the reservoir elevation is less than Pool A's maximum bed elevation, 89% of the time in February, 90% of the time in March, etc. On an annual basis, Pool A is inundated 39% of the time (or, in other words, Pool A is isolated from the main body of the reservoir 61% of the time annually). In general, the pools have a higher likelihood of being inundated by the main reservoir in the months of April, May and June due to the water levels required by the Operating Diagram.

4.5.1.6 Rare, Threatened, and Endangered Fish Species

The list of documented species occurring in the Project area and in West Canada Creek above and below the Project area (Table 4.5.1.2-5) was cross-checked against the list of endangered, threatened and special concern fish and wildlife species of New York State (NYSDEC, 2019), the New York Natural Heritage Program's Rare Animal Status List (NYNHP 2014), the USFWS Information for Planning and Consultation (USFWS, 2019), and NatureServe (2016).

No fish species listed as endangered, threatened, or of special concern are known to occur within the Project area or adjacent reaches.

4.5.1.7 Recreational Fishery

Recreational fisheries within the Project area fall within the jurisdiction of NYSDEC's Region 6. Open water and ice fishing is permitted on Hinckley Reservoir (NYSDEC, 2016c), with a special-regulation trout season that is open all year with a bag limit of three trout that are at least 12 inches long. Section 4.9.1.1 discusses the popularity of, and opportunities for, recreational fishing within the Project area.

Statewide angler surveys conducted during 2007 found that NYSDEC Region 6 received more than 2.6 million angler days overall (Connelly & Brown, 2009a). The estimated number of angler days invested in West Canada Creek was 97,873 (95% confidence interval, CI = ±25,946). Angler at-location expenditures were $3,340,667 (CI = ±1,655,644) in Herkimer County and $5,963,461 (CI = ±1,454,153) in Oneida County. Trout (Brook, Brown, Rainbow trout), black bass (Largemouth, *Micropterus salmoides*, and Smallmouth bass), Lake Trout, Bluegill (*Lepomis macrochirus*), sunfish, Walleye, and Yellow Perch were the most sought-after species by anglers in Herkimer and Oneida Counties, collectively (Connelly & Brown, 2009b). Angler effort and expenditures attributable to the Project area could not be differentiated from West Canada Creek and the counties through which it runs as a whole. However, the presence of black bass, trout, Yellow Perch, and sunfish in Hinckley Reservoir, as evidenced by the NYSDEC survey data, suggests the potential for those fisheries there, and therefore some proportion was presumably attributable to the Project area.

A recreational fishery survey was conducted between April 1 and October 4, 2007 on West Canada Creek between Trenton Falls and Herkimer (Erway, 2012). In it, angler effort was estimated to be 14,942 hours overall, which translated to 20 angler-hours/acre. The reaches from Trenton Falls to Newport were found to experience the greatest angling pressure. Angler perception that more trout are available in and around a catch and release managed section of the stream was presented as a likely contributing factor. Between April 14 and June 6, 2007, 42,770 Brown Trout were stocked in the study area of West Canada Creek. The estimated catch was 7,639 trout with an overall catch rate of 0.47 fish/hour. Estimated overall catch was 17.9% of the number of trout stocked.

4.5.1.8 Fish Entrainment and Turbine Passage Survival

Hinckley Reservoir supports both warm and cool water fish species and is subject to recreational management for cold water salmonid species. Fish species of recreational interest (Brook Trout, Brown Trout, Rainbow Trout, Smallmouth Bass, and Yellow Perch), importance as forage (Golden Shiner) and littoral zone inhabitants (Pumpkinseed) are resident within Hinckley Reservoir. A desktop assessment was conducted to evaluate the potential of entrainment for these seven representative species at the Project. In addition to the likelihood of entrainment, the probability of passage success (i.e., survival) for entrained fish was also evaluated.

The likelihood of entrainment at the Project is influenced by a number of biological (i.e., life history characteristics, habitat in the vicinity of the intake, and species swim speeds) and physical factors (i.e., reservoir water surface elevations, intake rack spacing, intake velocities and seasonal water quality). There is no object cover in the vicinity of the intake that would attract cover-oriented fish to this area, limiting the potential for entrainment. When water surface elevations are relatively low, available wetted habitat becomes reduced and individual fish can venture in proximity to the intake structure. In general, water surface elevations within Hinckley Reservoir are lowest during the late winter, highest during the spring, and mid-range during the summer and fall seasons. The median monthly intake velocities at the Project are lowest during the late spring and summer and highest during the colder water period from late fall through early spring. For fish which do approach the Project intakes and have swim capabilities below the intake velocities at the time of approach, the existing trashrack spacing will allow the target fish species, regardless of length, to pass through the intake structure and be subjected to turbine passage. However, the seasonal patterns in water surface elevation and intake velocities likely serve to lower the overall probability of entrainment at the Project as fish species are typically less active in the colder winter months when the reservoir is typically at its lowest elevation. Similarly, water quality conditions within the Hinckley Reservoir during the summer months may also serve to reduce overall entrainment potential, as low dissolved oxygen levels present in the hypolimnion may form a barrier to fish presence.

The lack of obligatory migrants in Hinckley Reservoir (i.e., those species requiring downstream passage as part of their life history) reduces the overall probability for entrainment. Because there are no outmigrating fish congregating near the intake, predatory fish species are less likely to be present near the intake structure to take advantage of foraging opportunities.

The assessment developed an overall ranking of entrainment potential for each of the seven target fish species, including adult, juvenile and spawning life stages, based on (1) habitat and life history relative to intake characteristics, (2) swim speed relative to approach velocities, and (3) available entrainment results from previously conducted studies at other hydroelectric facilities. The likelihood of entrainment for adult individuals of the seven target species ranged from a rank of Low to Low-Moderate. Adult Brook and Rainbow Trout were the least likely to be entrained (Low) whereas adult Brown Trout, Smallmouth Bass, Pumpkinseed, Yellow Perch and Golden Shiner were all classified as Low-Moderate.

Overall potential of entrainment was greater for juveniles of each species where the two life stages were considered. Juvenile Yellow Perch and Pumpkinseed had the highest risk of entrainment (Moderate-High) with juveniles from other target species ranging from Moderate (Smallmouth Bass and Golden Shiner) to Low-Moderate (Brook Trout). In general, salmonid species have higher burst swim speeds than species such as Pumpkinseed and Golden Shiner, reducing the potential for them to be entrained at the Project.

Available literature related to fish survival following turbine passage suggests that fish size is more important than fish species when assessing survival potential (Winchell *et al*. 2000). Immediate survival rates for fish <8 inches are generally higher through low speed Kaplan units (i.e., <300 rpm), such as those found at the Project (257 rpm). Using empirical data from the EPRI database, for fish less than 8 inches, reported immediate survival rates ranged between 89.8 and 98.0% for low-speed Kaplan turbines, similar to those at the Project. Mean survival for large fish tested at low-speed turbines was 87.2% for fish between 8 and 12 inches and 93.4% for fish greater than 12 inches.

Using the turbine blade strike probability method, mean estimates of turbine passage survival probabilities for fish up to 8 inches in length ranged from 85.4% to 92.7% at the Project with higher rates of mortality for fish passing in proximity to the blade tip as opposed to near the hub. Calculated survival for fish larger than 8 inches ranged from 70.8% to 78.1%. Similar to calculations for smaller sized fish (less than 8 inches), mortality rates were higher nearer to the blade tip than in the vicinity of the hub.

For the reasons discussed above, it is likely that the overall rate of fish entrainment at the Project is very low and survival of any fish passing through the Project turbines is relatively high.

4.5.1.9 Benthic Macroinvertebrates

The Hinckley Reservoir Working Group (HRWG) noted that on September 26, 2007, NYSDEC biologists found thousands of stranded and dehydrated snails that had died in Hinckley Reservoir as the result of low water levels. They concluded that snail mortality may impact the ecosystem by impacting the food source for fish, crayfish, and birds, etc. that may prey upon the snails, and by reducing the snail population's capacity to control algae growth through grazing (HRWG, 2008). During the 2018 *Hinckley Reservoir Fluctuation Field Study*, a minimal amount of snails were observed throughout the study area.

Beginning in 1972, NYSDEC Division of Water has based their statewide water quality analyses on macroinvertebrate community monitoring (Bode *et al.*, 2004). Although their sampling did not include stations within the Project area, they sampled at sites within West Canada Creek, including just upstream of Hinckley Reservoir at Harvey Bridge Road and downstream of Trenton Falls at Poland in 2000. In terms of water quality, those sites were listed as non-impacted based on macroinvertebrate communities, with no prior data for change assessment. The non-impacted designation reflects very good water quality with a diverse macroinvertebrate community and, among other indices, usually at least 27 species in riffle habitats; mayflies, stoneflies, and caddisflies well represented; and EPT[15] (index values greater than 10).

In 2006, a biological (macroinvertebrate) survey of West Canada Creek was conducted at multiple sites from the mouth in Herkimer to Nobleboro as part of the RIBS (rotating integrated basin studies) Intensive Network monitoring. Sampling results indicated non-impacted conditions at all sites in the immediate Project vicinity. Survey sites included Harvey Bridge Road, which, as in 2000, was assessed as having non-impacted water quality (NYSDEC, 2016b).

4.5.1.10 Mussels

As part of the 2018 *Hinckley Reservoir Fluctuation Field Study*, the Power Authority was tasked with recording the location of any observed mussels, mussel beds, or evidence of mussel presence (e.g., shells). No live mussel concentrations or evidence of mussel presence were observed at any location in the study area.

4.5.2 Environmental Effects

In SD2, FERC identified the following potential issues pertaining to aquatic resources: (1) effects of continued Project operation, including reservoir fluctuations and entrainment mortality, on resident fish species, (2) effects of continued Project operation on macroinvertebrates, including freshwater mussels, and (3) adequacy of the 160 cfs minimum flow for aquatic resources (including trout) downstream of the Project (i.e., below the Nine Mile Creek Feeder Dam). Each of the remaining issues identified by FERC are discussed in greater detail below.

Effects associated with Water Level Management

Regarding the potential effect of water level fluctuations on various aquatic resources (e.g., water quantity, macroinvertebrates, aquatic habitat, fish community, etc.), the reservoir has been operated in generally the same manner for over 100 years as prescribed by various existing legal agreements to which the Power Authority was not a signatory party. The Project simply utilizes the NYSCC prescribed flow releases to generate power. The reservoir water level management regime and associated outflows would still exist regardless of the presence of the Project, as they did for almost 70 years prior to Project construction.

Limited aquatic resources or unique habitat were observed throughout the littoral zone during the 2018 reservoir survey due to a lack of desirable substrate, cover resources, or cover density. Large portions of the Project area were found to exhibit bare, sandy substrate with cover densities classified as ‘Absent’ or ‘Low’. Fish nests observed during the field study were primarily in coves or low slope areas with fine substrates. Very few fish nests observed were stranded due to receding water levels. Fish nests that were found to be stranded were due to receding water levels associated with prescribed releases and not Project operations. Given that the centrarchid

[15] EPT stands for Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trichoptera (caddisflies), three taxa of aquatic macroinvertebrates that are intolerant to pollution and poor water quality.

population can spawn multiple times per summer, receding water levels are likely to have minimal impact on fish spawning. As the water levels recede, nesting centrarchids move to more suitable locations deeper in the reservoir. In addition, no mussel concentrations or evidence of mussels within the littoral zone were observed during the 2018 survey.

The current FERC license allows the Project to operate in a peaking mode. The results of the *Desktop Modeling of Peaking Fluctuations Study* demonstrated that the maximum difference in daily water level fluctuations as a result of peaking is 0.32 ft. (3.84 inches) for the scenarios modeled. Differences in daily water level fluctuations of less than 4 inches were only observed to occur during the colder months (i.e., February and March) and are not expected to impact biological resources, which are dormant and less active. Peaking operations which occur during biologically sensitive periods (e.g., late spring, summer, fall) result in even smaller water level differences. Given this, the results of the peaking study indicate that Project peaking operations have minimal impact on environmental resources.

Fish Entrainment and Turbine Passage Survival

It is likely that the overall rate of fish entrainment at the Project is very low and survival of any fish passing through the Project turbines is relatively high due to the following:

- Review of historic fish species assemblages sampled within Hinckley Reservoir indicates an absence of any obligatory migrant fish species; this greatly reduces the probability of entrainment as fish are not compelled to move downstream to complete their life cycle.
- Deep intakes and the lack of littoral zone habitat in their vicinity limits the potential for entrainment of fish species that prefer littoral zone habitat and cover. Also, there is no spawning or nursery habitat in the intake area to attract any of the target species evaluated.
- Adult fish are unlikely to be involuntarily entrained because their burst swimming speeds exceed intake approach velocities so they can swim away.
- Juvenile fish whose burst swimming speeds may be slower than intake velocities are more susceptible to involuntary entrainment but have a high likelihood of survival if they pass through the turbines as the mean turbine passage survival for fish 8 inches or less (i.e., juvenile fish) at the Project is calculated between 85.4-92.7% on average using the turbine blade strike probability method. Using empirical data from the EPRI database, reported immediate survival rates were higher, ranging between 89.8 and 98.0% for low speed Kaplan turbines for fish less than 8 inches.
- Calculated velocities based on recorded turbine flow data exceed 2 fps (USFWS rule of thumb) just 8% of the time and most of these times are during the colder water months from late fall through early spring when resident fish are less active. Mapping of the flow field in the vicinity of the intake (i.e., 25-75 feet away) over a range of turbine outflows from 300 to 1,800 cfs was characterized by relatively low velocities during all conditions.
- Although reductions to the water surface elevation of Hinckley Reservoir will reduce available wetted habitat and may increase the potential for fish to be in the vicinity of the

intakes, the largest drawdowns occur on a seasonal basis at the Project with the lowest water levels during February and March which corresponds to relatively low levels of fish activity due to cold water temperatures.

- Dissolved oxygen stratification has been observed in Hinckley Reservoir during the summer months which may reduce the probability of fish being present within the vicinity of the intakes which are located in the lower portion of the water column.

Downstream Flows

Downstream Effect of Peaking Operations

In comments on the DLA, the USFWS, NYSDEC, and other stakeholders alleged that Jarvis peaking operations are responsible for a downstream peaking flow regime on West Canada Creek extending from the Project's tailrace to the Creek's confluence with the Mohawk River. The DLA comments asserted that water level and flow changes resulting from Jarvis peaking operations could have adverse impacts on downstream aquatic habitat. This is an incorrect assertion and is not an accurate characterization of how the Jarvis and West Canada Creek hydroelectric developments are operated. It is true that when the Jarvis Project peaks, the West Canada Creek Project can use the releases from the Jarvis Project to peak at the Prospect and Trenton Falls Developments. It is also true that the West Canada Creek Project has available storage to flatten the Jarvis Project peaking flows or to peak regardless of whether the Jarvis Project is peaking, and that flow fluctuations downstream of Trenton Falls occur more frequently than those discharges from the Jarvis Project. In response to these comments, the Power Authority compared historic discharges from the Jarvis Project with flows measured at the USGS Kast Bridge Gage (Gage No. 01346000, located approximately 26 miles downstream of the West Canada Creek Project) to assess the effect that the Jarvis and West Canada Creek Projects have on downstream flows. The Power Authority also evaluated whether the West Canada Creek Project could theoretically smooth fluctuating discharges from the Jarvis Project.

This analysis requires an understanding of the usable storage and hydraulic capacities for the West Canada Creek Project as compared to those of the Jarvis Project. Table 4.5.2-1 lists this information as reported by Erie Boulevard (Erie, 2018).The maximum hydraulic capacity of the Prospect impoundment is on the same order as the Jarvis Project, 1,825 cfs and 1,800 cfs respectively, but the maximum hydraulic capacity of the Trenton Falls development is less at 1,425 cfs. The minimum hydraulic capacity at the Prospect development is 525 cfs, which is higher than the 300 cfs for the Jarvis Project. Most of the usable storage of the West Canada Creek Project is present in the Prospect Impoundment (803 ac-ft). This storage can be used to flatten peaking flows from the Jarvis Project downstream of Trenton Falls or for peaking operations at Prospect and Trenton Falls independent of those at the Jarvis Project.

The historic analysis of Jarvis Project discharges and Kast Bridge flows focused on the period since both Jarvis turbines were rebuilt (i.e., 2018 and 2019) and would have been able to peak up to the hydraulic capacity of 1,800 cfs. Monthly graphs for these two years depicting the Jarvis

Project discharges compared to the Kast Bridge flows are in Appendix C. These figures indicate times when flows at Kast Bridge are relatively constant compared to those resulting from peaking operations at the Jarvis Project, times when flows at Kast Bridge fluctuate although flows at the Jarvis Project are constant, times when there seem to be cumulative effects of peaking operations downstream of the three projects, and times when flow fluctuations at Kast Bridge are a different pattern or out of synch with those at the Jarvis Project. Representative examples of these occurrences are discussed below.

An example of times when the Jarvis Project is peaking but the flows at Kast Bridge are more constant is indicated in Figure 4.5.2-1 from June 9th to June 12th and June 20th to June 24th in 2018. Figure 4.5.2-2 for July 2019 shows times when hourly flows are less at Kast Bridge than they are from the Jarvis Project, indicating that storage from the West Canada Creek Project is re-regulating stream flows. For example, on July 5th, the flow at Kast Bridge is approximately 630 cfs but peaking flows at the Jarvis Project vary between 350 cfs and 920 cfs.

Conversely, there are times when flows fluctuate during the day at the Kast Bridge gage even though there is a constant flow being discharged at the Jarvis Project. An example of this is shown in Figure 4.5.2-3 for July 2018, when the Jarvis Project was offline because flows were below its minimum hydraulic capacity (300 cfs). During this month, the Jarvis Project is continuously discharging approximately 250 cfs through sluice gate 4 while the flows at Kast Bridge fluctuate between 300 cfs and 1110 cfs. Some of these peaks may be partially attributed to runoff from storm events that were stored in Hinckley Reservoir but other time periods such as between July 3rd and July 9th are indicative of downstream peaking operations.

There are other instances when flow data from the USGS Gage at Kast Bridge indicate significant flow fluctuations exist in the downstream portions of West Canada Creek. If the Jarvis Project were the only source of flow fluctuations, one would expect the fluctuations at Kast Bridge to be less than the flow fluctuations from the Jarvis Project due to attenuation of peak flows as they travel downstream. However, the difference between the maximum daily flow and the minimum daily flow at Kast Bridge were found to be larger than the difference between the maximum daily flow and the minimum daily flow from the Jarvis Project approximately 75% of the time during 2018 and 2019. Further, Figure 4.5.2-4 for May 24-27, 2018 shows that a double peak is sometimes observed at Kast Bridge while the Jarvis Project only produced a single peak.[16] This indicates that the West Canada Creek Project is likely reshaping flows from the Jarvis Project to a significant degree.

Figure 4.5.2-5 for October 2018 shows the cumulative effect that peaking operations from the Jarvis and West Canada Creek Projects have on downstream flows at the Kast Bridge gage. Between October 18th and 22nd, Jarvis Project flows fluctuate between 630 and 1400 cfs while

[16]The shift in time from the Jarvis peak to the double peaks at Kast Bridge is likely a combination of re-regulation from the West Canada Creek Projects and travel time to Kast Bridge.

flows at Kast Bridge fluctuate between 900 and 1600 cfs.

Another example of cumulative effects is illustrated by Figure 4.5.2-6 for September 2019. On September 5th, the peak flow and low flow at Kast Bridge is 1650 and 713 cfs as compared to the Jarvis Project flows of 926 cfs and 328 cfs. The high and low flows at the two locations seem to be at opposite times which indicates that the West Canada Creek Project may be using storage to re-regulate discharges from the Jarvis Project.

The Power Authority developed a theoretical case to explore whether the West Canada Creek Project has the ability to smooth fluctuating flows in West Canada Creek resulting from Jarvis Project peaking operations. First, the 2018 and 2019 historic data was reviewed to identify the time when the largest degree of peaking occurred, and then similar flows resulting from Jarvis Project peaking operations were routed through the Prospect and Trenton Falls developments to determine whether the usable storage from these developments could be used to re-regulate flows so that they were constant downstream of Trenton Falls. The largest range of peaking flows occurred in November 2018 when the Project generated at 1800 cfs[17] for 15 hours between 0600 and 2100 and 710 cfs for the other hours (NYPA, 2019). To assess whether the West Canada Creek Project could re-regulate Jarvis Project peaking flows, a similar hypothetical scenario was developed. The hourly flows during the day at the three hydroelectric developments are shown on Figure 4.5.2-7. It assumes that the Jarvis Project discharge for the middle fifteen hours of the day is 1,800 cfs and that for the first six hours of the day and the last three hours of the day, it is 680 cfs. Next, the Jarvis Project peaking flows are routed through the Prospect and Trenton Falls developments to see if there is sufficient storage at those two developments to generate within their operating ranges. Because of the storage in the Prospect impoundment, flows can be smoothed out to be a constant discharge of 1,393 cfs at both the Prospect and Trenton Falls developments. Figure 4.5.2-7 shows how the storage in Prospect Pond is utilized, assuming that the impoundment is partially drawn down approximately 50 percent at the beginning of the theoretical example.

The theoretical peaking operations demonstrated in Figure 4.5.2-7 provide just one example of potential re-regulation by the West Canada Creek Project. It is worth noting that in this theoretical analysis, the Prospect development only utilizes approximately 50% of its total storage to re-regulate these flows, indicating that the West Canada Creek Project has considerable flexibility to re-regulate the releases from the Jarvis Project.

Downstream Minimum Flows

The current license requires that a continuous minimum flow of 160 cfs be maintained in West Canada Creek, as measured downstream of the NYSCC diversion weir at the Nine Mile Creek Feeder Dam. The current minimum flow was established based on the results of an instream flow study conducted by Ichthyological Associates, which evaluated weighted useable stream width at

[17] Jarvis Project outflow of 1,820 cfs includes leakage through Gate 4.

three reaches below the Trenton development in response to six levels of discharge. The results of the study indicated that a minimum release of 160 cfs provided optimum flow for juveniles, and near optimum flow for fry and adult Smallmouth Bass.

It should also be noted that the Nine Mile Creek Feeder Dam is located downstream of the West Canada Creek Project. The West Canada Creek Project is owned and operated by Erie Boulevard and consists of the Prospect and Trenton Falls Developments. The Prospect Dam is located approximately 2.5 miles downstream of the Project, the Trenton Falls Dam is located approximately 1.6 miles below the Prospect Dam, and the Nine Mile Creek Feeder Dam is located approximately 1 mile downstream of the Trenton Falls Dam. The Prospect impoundment backwaters to the Hinckley Dam – there is no free-flowing reach downstream of the Jarvis Project.

Based on the absence of a free-flowing reach downstream of Hinckley Dam, the Jarvis Project is required to release adequate water volume to the Prospect impoundment to allow the downstream controlling Projects to meet the current minimum flow requirement. Once released from Hinckley Reservoir, it is the responsibility of the West Canada Creek Project to ensure that minimum flow requirements are met at the Nine Mile Creek Feeder Dam. The Power Authority is not responsible for, nor does it have control over, how the West Canada Creek Project is operated. Potential impacts to fisheries and aquatic resources downstream of the Nine Mile Creek Feeder Dam, if any, are not related to Jarvis Project operations and, as such, are not subject to mitigation as part of the Jarvis relicensing proceeding.

4.5.3 Proposed Environmental Measures

The Power Authority proposes to continue existing operating conditions in the new license and is not proposing any changes with respect to fish and aquatic resources.

4.5.4 Unavoidable Adverse Impacts

While the entrainment risk to fish species at the Project is low, some entrainment of fish is likely to occur at the Project. However, the survival of any fish passing through the Project turbines is relatively high.

Table 4.5.1.2-1: Summary of New York State Department of Environmental Conservation Fisheries Surveys Conducted in Hinckley Reservoir 1989-2014

Survey No.	Date	Purpose	Sites (N)	Gear	Avg. Effort (hr./100 ft.)[18]	Comment
689213	8/24/89	general biological survey	3	gillnet: 150x6 ft., multifilament, experimental, 6 panel (1.0, 1.5, 2.0, 2.5, 3.0, 3.5 in. mesh)	29.21	site coordinates presented as a single point in the approximate centroid of lake
691101	5/16/91	experimental Brown Trout stocking evaluation	5	gillnet: 100 ft., multifilament, (2.0, 2.5, 3.0 in. mesh)	23.17	site coordinates presented as a single point in the approximate centroid of lake
691117	9/10/91	experimental Brown Trout stocking evaluation	5	gillnet: 100 ft., multifilament, (1.5 and 2.0 in. mesh)	21.37	site coordinates presented as a single point in the approximate centroid of lake; reservoir elevation down ~20 ft.
694203	6/20/94-6/23/94	general biological survey	20	gillnet: 150x6 ft., multifilament, experimental, 6 panel (1.0, 1.5, 2.0, 2.5, 3.0, 3.5 in. mesh)	30.76	attempt to document presence of Tiger Muskies from surplus stocking during late 1980's
609001	6/1/09-6/2/09	fish disease sampling	5	gillnet: 150x6 ft., monofilament, 6 panel (1.5, 2.0, 2.5, 3.0, 3.5 in. mesh); 150x6 ft., multifilament, experimental, 6 panel (1.0, 1.5, 2.0, 2.5, 3.0, and 3.5 in. mesh);	22.40	60 Yellow Perch and 28 Smallmouth Bass sent to USFWS Northeast Fish Health Center, Lamar, PA for National Wild Fish Health survey

[18] gillnet lengths were 100 or 150 ft; effort is standardized here to hours of set per 100 ft. of net

Survey No.	Date	Purpose	Sites (N)	Gear	Avg. Effort (hr./100 ft.)[18]	Comment
			4	boat electrofisher	0.25	
614202	6/27/14	TSMP1/Contaminant collection	5	gillnet: 150x6 ft., monofilament, 6 panel (1.5, 2.0, 2.5, 3.0, and 3.5 inch mesh)	29.63	

Table 4.5.1.2-2: Summary of Catch (N) with Mean and Range of Total Length (mm) by Year (Survey) and Species Collected in NYSDEC Fisheries Surveys Conducted in Hinckley Reservoir, 1989-2014

Fish Species	Survey/Year					
	1989	1991, Spring	1991, Summer	1994	2009	2014
Golden Shiner	3 404.7 186-550	0	26 246 (1 measured)	103 170.5 102-296	10 160.3 72-203	0
Fallfish	0	2 255.5 245-266	2 243.5 233-254	17 165.5 120-191	30 219.9 126-414	0
White Sucker	6 254.8 213-305	30 316 280-395	23 295.6 233-380	123 320.3 178-425	43 350.9 163-430	13 305 161-417
Brown Bullhead	0	3 224 219-228	36 181 140-220	28 192.5 146-240	7 275.1 254-312	0
Stonecat	0	0	0	2 131 114-148	0	0
Chain Pickerel	3 404.7 186-550	0	0	1 572 -	3 578 526-612	0
Brown Trout	0	1 360 -	0	0	0	0
Brook Trout	0	0	0	2 519 418-620	0	1 216 -
Rock Bass	0	6 210.5 173-242	14 168 102-245	15 153.9 116-211	7 195 161-221	0
Pumpkinseed	0	0	17 144.7 102-191	10 157 118-196	0	0

Fish Species	Survey/Year					
	1989	1991, Spring	1991, Summer	1994	2009	2014
Smallmouth Bass	0	0	2 195 180-210	0	13 341.7 237-442	4 350.5 272-406
Largemouth Bass	0	0	0	1 362 -	0	0
Black Crappie	0	0	0	0	0	7 156.3 150-166
Yellow Perch	2 130 128-132	5 196.6 174-230	160 205.4 150-230	281 156 95-284	61 132.5 56-204	7 195.1 157-243

Table 4.5.1.2-3: NYSDEC Fish Stocking Summary (including regular and surplus fish stocking) for West Canada Creek above Hinckley Reservoir, Hinckley Reservoir, and Prospect Reservoir, 2011-2019

Reach	Species	2011	2012	2013	2014	2015	2016	2017	2018	2019	Totals
Above Hinckley Reservoir	Brook Trout	9,820	20,180	10,500	10,500	6,900	9,190	10,500	10,500	10,500	98,590
	Brown Trout	2,880	6,040	2,470	2,930	0	2,910	2,810	2,960	3,010	26,010
	Totals	**12,700**	**26,220**	**12,970**	**13,430**	**6,900**	**12,100**	**13,310**	**13,460**	**13,510**	**124,600**
Hinckley Reservoir	Brook Trout	230	0	165	0	0	0	0	0	0	395
	Brown Trout	490	0	300	1,000	0	0	0	0	0	1,790
	Rainbow Trout	14,000	13,500	5,000	4,000	5,000	5,000	5,000	0	0	51,500
	Totals	**14,720**	**13,500**	**5,465**	**5,000**	**5,000**	**5,000**	**5,000**	**0**	**0**	**53,685**
Prospect Reservoir	Brook Trout	0	0	0	0	0	0	0	0	0	0
	Brown Trout	2,870	3,020	2,470	2,930	2,910	2,910	2,800	2,960	3,010	25,880
	Rainbow Trout	0	0	0	0	6,760	3,260	0	0	0	10,020
	Totals	**2,870**	**3,020**	**2,470**	**2,930**	**9,670**	**6,170**	**2,800**	**2,960**	**3,010**	**35,900**

Note: Data obtained from NYSDEC fish stocking database (https://data.ny.gov/Recreation/Fish-Stocking-Lists-Actual-Beginning-2011/e52k-ymww/data) and Spring 2019 Trout Stocking for Herkimer County (https://www.dec.ny.gov/outdoor/23318.html).

Table 4.5.1.2-4: Summary of NYSDEC Fisheries Surveys Conducted in West Canada Creek Upstream and Downstream of the Project Area, 1988-2010

Reach	Survey No.	Date	Purpose	Sites (N)	Location	Gear	Avg. Effort
Upstream of Project Area	606958	7/6/2006	General biological survey	1	Ohio	Electrofish: 2 repetitions	0.40 hr.
	606958	7/6/2006	General biological survey	1	Ohio	Seine: 7 repetitions	0.17 hr.
	608916	7/1/2008	General biological survey	1	Ohio[19]	Electrofish	0.25 hr.
	608932	9/3/2008	General biological survey	1	Ohio	Electrofish: 2 repetitions	0.04 hr.
	608932	9/22/2008	General biological survey	2	Ohio	Electrofish: 3 repetitions (at 1 of 2 sites)	0.33 hr.
	608932	9/22/2008	General biological survey	1	Ohio	Seine: 1 repetition	0.25 hr.
	609207	10/21/2009	General biological survey	4	Prospect Reservoir	Gill Net: 150 ft. x 6 ft.; 5 ft. panels, 1.5, 2.0, 2.5, 3, 3.5, 4.0 in. mesh	25.55 hr./100 ft.
Downstream of Project Area	688202	7/28/1988	Stream protection	1	Newport	Electrofish: 3 repetitions	0.30 hr.
	690212	8/21/1990	Stream protection	1	Newport	Electrofish: 3 repetitions	0.38 hr.
	696511	7/26/1996	CROTS survey	1	Newport	Electrofish:	0.27 hr.
	696510	7/26/1996	CROTS survey	1	Newport	Electrofish: 2 repetitions	0.28 hr.
	604909	5/19/2004	General biological survey	1	Herkimer	Electrofish:	0.29 hr.
	608932	9/25/2008	General biological survey	1	Newport	Electrofish: 2 repetitions	0.25 hr.

[19] survey conducted in Fourmile Brook within 200 m of West Canada Creek

Reach	Survey No.	Date	Purpose	Sites (N)	Location	Gear	Avg. Effort
	610204	6/7/2010	General biological survey	3	Russia[20]	Electrofish	0.50 hr.

[20] survey conducted in Mill Creek within 200 m of West Canada Creek

Table 4.5.1.2-5: Occurrence of fish species in NYSDEC Fisheries Surveys, 1988-2014 in West Canada Creek (including two tributary surveys in close proximity) Upstream of the Project Area, within the Project Area (Hinckley Reservoir), and Downstream of the Project Area

Common Name	Family	Genus and Species	Authority	Upstream of Project Area	In Project Area	Downstream of Project Area
American Eel	Anguillidae	*Anguilla rostrata*	Lesueur, 1817			X
Central Stoneroller	Cyprinidae	*Campostoma anomalum*	Rafinesque, 1820			X
Common Carp	Cyprinidae	*Cyprinus carpio*	Linneaeus, 1758			X
Cutlip Minnow	Cyprinidae	*Exoglossum maxillingua*	Lesueur, 1817	X		X
Common Shiner	Cyprinidae	*Luxilus cornutus*	Mitchill, 1817	X		X
Golden Shiner	Cyprinidae	*Notemigonus crysoleucas*	Mitchill, 1814	X	X	X
Emerald Shiner	Cyprinidae	*Notropis atherinoides*	Rafinesque, 1818			X
Spottail Shiner	Cyprinidae	*Notropis hudsonius*	Clinton, 1824			X
Rosyface Shiner	Cyprinidae	*Notropis rubellus*	Agassiz, 1850			X
Bluntnose Minnow	Cyprinidae	*Pimephales notatus*	Rafinesque, 1820			X
Eastern Blacknose Dace	Cyprinidae	*Rhinichthys atratulus*	Hermann, 1804	X		X
Longnose Dace	Cyprinidae	*Rhinichthys cataractae*	Valenciennes, 1842	X		X
Creek Chub	Cyprinidae	*Semotilus atromaculatus*	Mitchill, 1818	X		X
Fallfish	Cyprinidae	*Semotilus corporalis*	Mitchill, 1817		X	X
Longnose Sucker	Catostomidae	*Catostomus catostomus*	Forster, 1773			X
White Sucker	Catostomidae	*Castostomus commersonii*	Lacepéde, 1803	X	X	X
Northern Hogsucker	Catostomidae	*Hypentelium nigricans*	Lesueur, 1817	X		X
Brown Bullhead	Ictaluridae	*Ameiurus nebulosus*	Lesueur, 1819	X	X	X

Common Name	Family	Genus and Species	Authority	Upstream of Project Area	In Project Area	Downstream of Project Area
Stonecat	Ictaluridae	*Noturus flavus*	Rafinesque, 1818		X	X
Marginated Madtom	Ictaluridae	*Noturus insignis*	Richardson, 1836			X
Chain Pickerel	Esocidae	*Esox niger*	Lesueur, 1818		X	
Brown Trout	Salmonidae	*Salmo trutta*	Linnaeus, 1758	X	X	X
Brook Trout	Salmonidae	*Salvelinus fontinalis*	Mitchill, 1814	X	X	X
Trout-Perch	Percopsidae	*Percopsis omiscomaycus*	Walbaum, 1792			X
Brook Stickleback	Gasterosteidae	*Culaea inconstans*	Kirtland, 1840	X		
Slimy Sculpin	Cottidae	*Cottus cognatus*	Richardson, 1836			X
Rock Bass	Centrarchidae	*Ambloplites rupestris*	Rafinesque, 1817		X	X
Pumpkinseed	Centrarchidae	*Lepomis gibbosus*	Linneaus, 1758		X	X
Bluegill	Centrarchidae	*Lepomis macrochirus*	Rafinesque, 1819			X
Smallmouth Bass	Centrarchidae	*Micropterus dolomieu*	Lacepéde, 1802		X	X
Largemouth Bass	Centrarchidae	*Micropterus salmoides*	Lacepéde, 1802		X	X
Black Crappie	Centrarchidae	*Pomoxis nigromaculatus*	Lesueur, 1829		X	
Yellow Perch	Percidae	*Perca flavescens*	Mitchill, 1814		X	
Fantail Darter	Percidae	*Etheostoma flabellare*	Rafinesque, 1819			X
Tessellated Darter	Percidae	*Etheostoma olmstedi*	Storer, 1842	X		X
Logperch	Percidae	*Percina caprodes*	Rafinesque, 1818			X

Table 4.5.1.4-1: Summary of Substrate Composition Coverage - Area

Elevation Type	Elevation Range (ft.)	Riprap (acres)	Boulder (acres)	Cobble (acres)	Gravel (acres)	Sand (acres)	Silt (acres)	Total Acres
Above Water Surface	1213 – 1225	5	21	100	43	239	232	640
Below Water Surface	1202 – 1213	<1	32	92	53	216	81	474
Total Area	1202 – 1225	5	53	192	96	455	313	1,114

Table 4.5.1.4-2: Summary of Substrate Composition Coverage - Percentage

Elevation Type	Elevation Range (ft.)	Riprap %	Boulder %	Cobble %	Gravel %	Sand %	Silt %
Above Water Surface	1213 – 1225	1%	3%	16%	7%	38%	35%
Below Water Surface	1202 – 1213	<1%	7%	19%	11%	47%	17%
Total Coverage %	1202 – 1225	<1%	5%	17%	9%	42%	27%

Table 4.5.1.4-3: Summary of Cover Resource Coverage – Area

Elevation Type	Elevation Range (ft.)	Boulder (acres)	Woody Debris/Detritus (acres)	EAV (acres)	SAV (acres)	FAV (acres)	Bare Substrate (acres)	Total Acres
Above Water Surface	1213 – 1225	25	14	182	2	27	379	629
Below Water Surface	1202 – 1213	24	19	0	23	<1	419	485
Total Area	1202 – 1225	49	33	182	25	27	798	1,114

Table 4.5.1.4-4: Summary of Cover Resource Coverage – Percentage

Elevation Type	Elevation Range (ft.)	Boulder %	Woody Debris/Detritus %	EAV %	SAV %	FAV %	Bare Substrate %
Above Water Surface	1213 – 1225	4%	2%	29%	<1%	4%	60%
Below Water Surface	1202 – 1213	5%	4%	0%	5%	<1%	86%
Total Coverage %	1202 – 1225	4%	3%	16%	2%	3%	72%

Table 4.5.1.5-1: Summary of Observed Fish Nests (2018)

Nest Site ID	Northing (NAD83 NYSPC East ft.)	Easting (NAD83 NYSPC East ft.)	Elevation (ft.)	Type of Fish	Status	Dewatered (Yes / No)
001	1646062.202	342639.501	1211.5	Centrarchid	Active	No
002	1632796.085	334154.431	1212.0	Unknown	Unoccupied	No
003	1646444.550	356658.997	1213.5	Fallfish	Inactive	Yes (Partial)
004	1646253.148	356748.093	1211.5	Unknown	Potential Nest	No
005	1645786.341	354474.896	1216.0	Unknown	Inactive	Yes
006	1645868.288	354560.451	1216.0	Unknown	Inactive	Yes
007	1645538.705	354482.107	1215.0	Unknown	Inactive	Yes
008	1645780.372	355036.605	1211.5	Unknown	Unoccupied	No
009	1629956.152	333084.551	1215.0	Unknown	Potential Nest	Yes
010	1630255.474	333189.706	1214.0	Unknown	Potential Nest	Yes
011	1630416.072	333187.193	1214.0	Unknown	Potential Nest	Yes
012	1631199.802	332911.948	1212.0	Unknown	Inactive	No
013	1637626.527	336361.834	1211.5	Rock bass	Active	No
014	1637415.181	338688.230	1210.0	Unknown	Unoccupied	No
015	1637286.337	341708.127	1211.0	Unknown	Unoccupied	No
016	1637757.400	341605.388	1211.0	Pumpkinseed	Active	No
017	1639465.460	341720.977	1212.0	Centrarchid	Potential Nest	No
018	1641923.878	339865.099	1214.0	Unknown	Potential Nest	Yes
019	1643582.062	342335.090	1211.5	Pumpkinseed	Active	No
020	1642917.373	343211.821	1209.5	Unknown	Active	No

Table 4.5.1.5-2: Summary of Monthly and Annual Inundation Percentages of Observed Isolated Pools

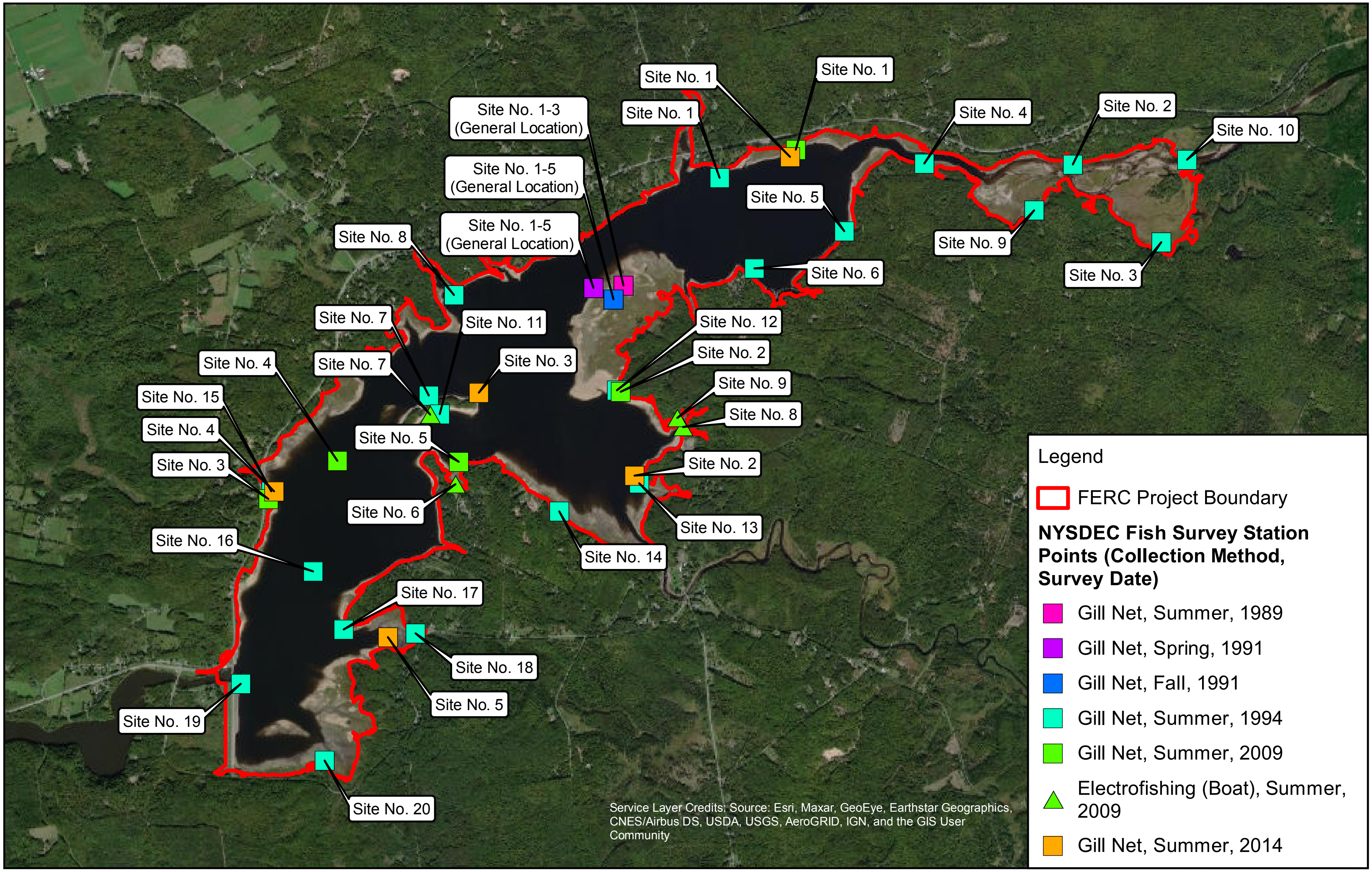
Location ID	Pool Depth (ft.)	Maximum Pool Bed El. (ft.)[21]	Percentage of Time the Maximum Pool El. is Equaled or Exceeded by the Water Surface Elevation of Hinckley Reservoir (2001-2019)												
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Pool A	2.5	1220.9	32%	11%	10%	61%	81%	70%	42%	28%	9%	25%	46%	45%	39%
Pool B	8.0	1223.2	18%	4%	7%	53%	54%	44%	22%	15%	3%	17%	27%	24%	24%
Pool C	2.0	1219.6	40%	15%	14%	68%	85%	80%	54%	33%	12%	27%	51%	53%	45%
Pool D	3.0	1218.0	48%	20%	17%	74%	88%	87%	70%	40%	17%	29%	58%	58%	51%
Pool E	2.5	1217.1	51%	23%	19%	76%	91%	90%	76%	45%	22%	32%	62%	61%	54%
Pool F	2.5	1218.0	48%	20%	17%	74%	88%	87%	70%	40%	17%	29%	58%	58%	51%
Pool G	1.5	1218.0	48%	20%	17%	74%	88%	87%	70%	40%	17%	29%	58%	58%	51%
Pool H	2.5	1218.3	47%	19%	16%	73%	87%	86%	67%	39%	15%	28%	57%	57%	49%
Pool I	1.5	1225.2	5%	1%	3%	34%	18%	12%	5%	1%	1%	9%	9%	6%	9%
Pool J	5.5	1217.5	50%	22%	18%	75%	89%	89%	74%	43%	20%	31%	60%	59%	53%
Pool K	3.0	1215.3	57%	26%	25%	81%	93%	93%	85%	57%	32%	39%	67%	68%	61%

Note: The percentages indicate the frequency that each pool is connected to the main body of the reservoir.

[21] Maximum pool bed elevations were derived from the Hinckley Reservoir bathymetric dataset. Depending on the location of the pool relative to the bathymetric survey transect, elevations shown may be reflective of measured survey data or interpolated data derived from GIS. Interpolated data should be considered approximate (e.g., Pool I).

Table 4.5.2-1: West Canada Creek Project Information

Development	Usable Storage Capacity (ac-ft.)	Minimum Hydraulic Capacity (cfs)	Maximum Hydraulic Capacity (cfs)
Prospect	803	525	1,855
Trenton	155	145	1,425



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N

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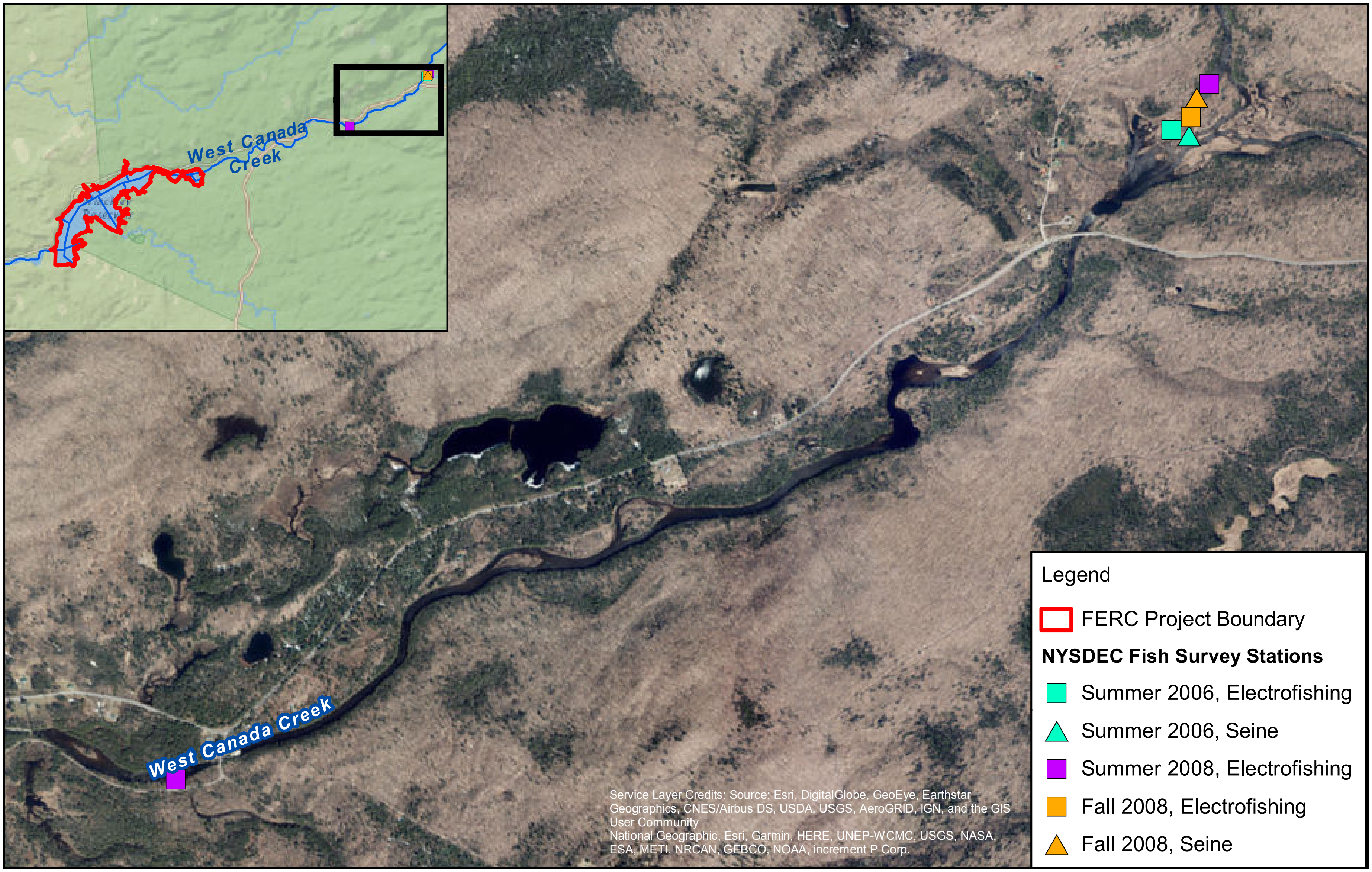
0 0.375 0.75 1.5 Miles

Figure 4.5.1.2-1:
NYSDEC Fishery Survey
Site Locations in
Hinckley Reservoir, 1989-2014

Path: J:\maps\FLA\exhibit_e\figure_4_5_1_2-1_fishery_survey.mxd



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N

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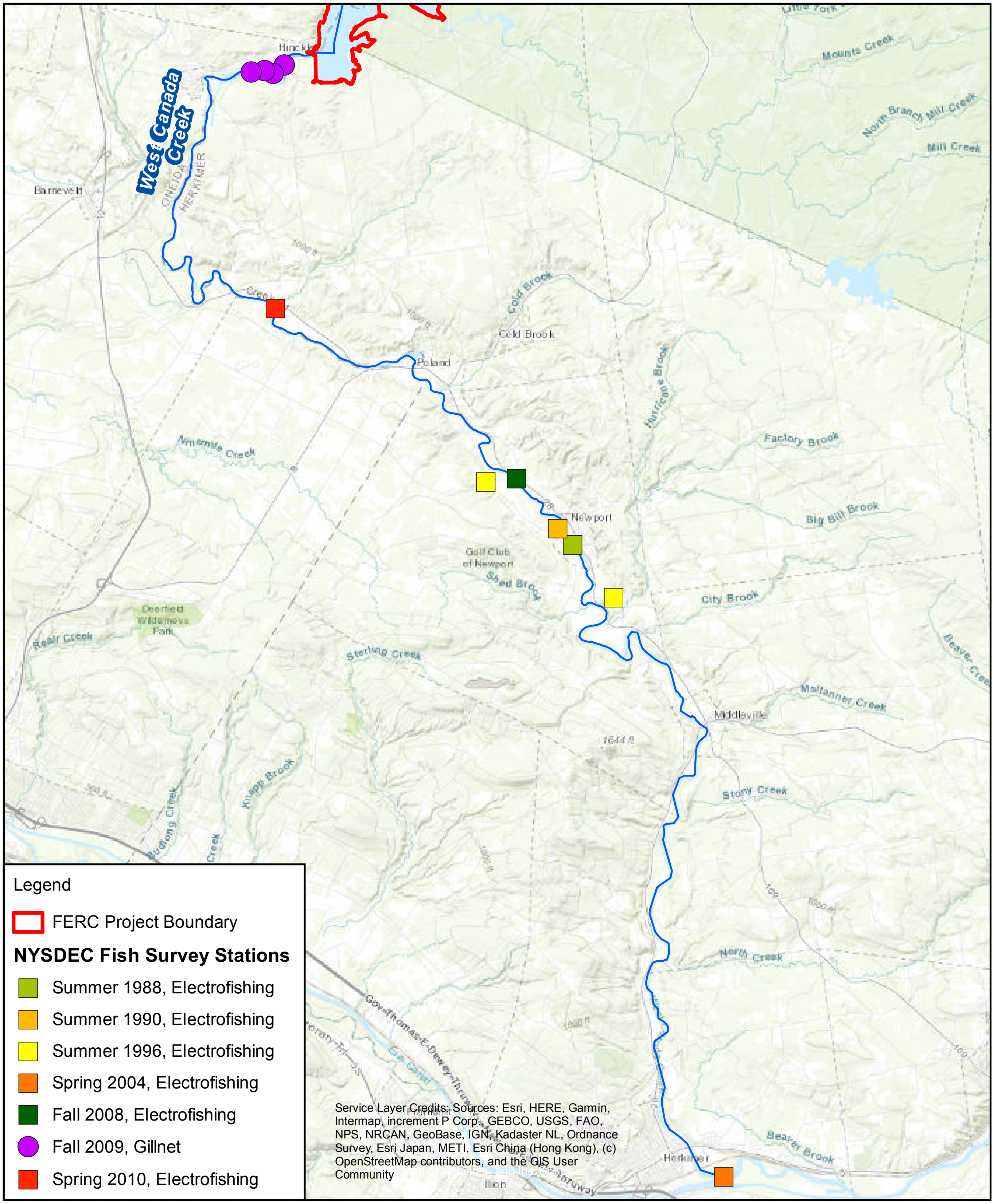
0 1,000 2,000 4,000 Feet

Figure 4.5.1.2-2:
NYSDEC Fishery Survey Site Locations,
West Canada Creek Upstream of the
Jarvis Project area, 1988-2010

Path: J:\maps\FLA\exhibit_e\figure_4_5_1_2-2_upstream_fishery_survey.mxd



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0 1.25 2.5 5 Miles

N

Figure 4.5.1.2-3:
NYSDEC Fishery Survey Site Locations,
West Canada Creek Downstream of the
Jarvis Project area, 1988-2010

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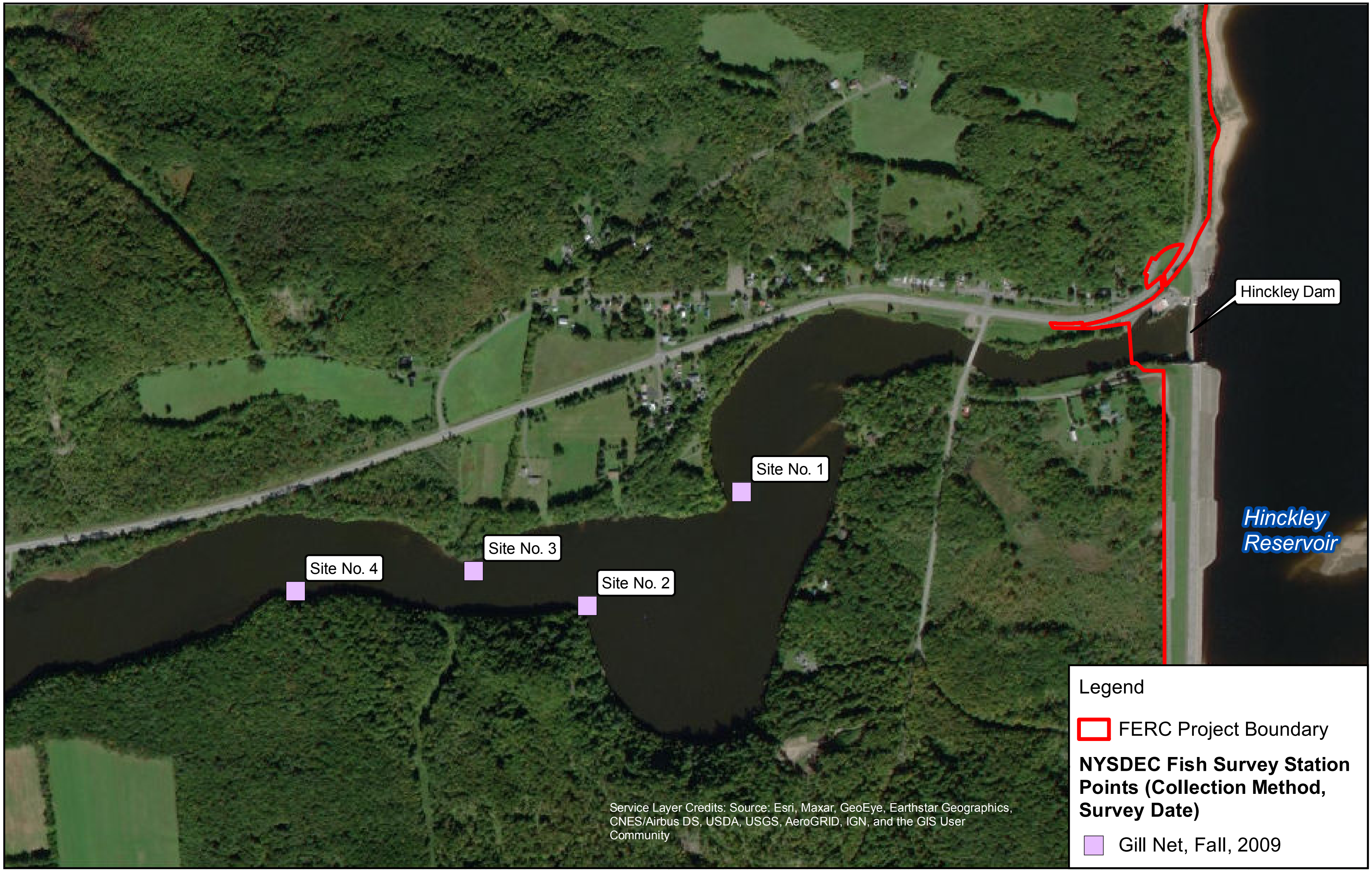

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Figure 4.5.1.3-1:
Fishery Survey Site Locations
in Prospect Reservoir, 2009

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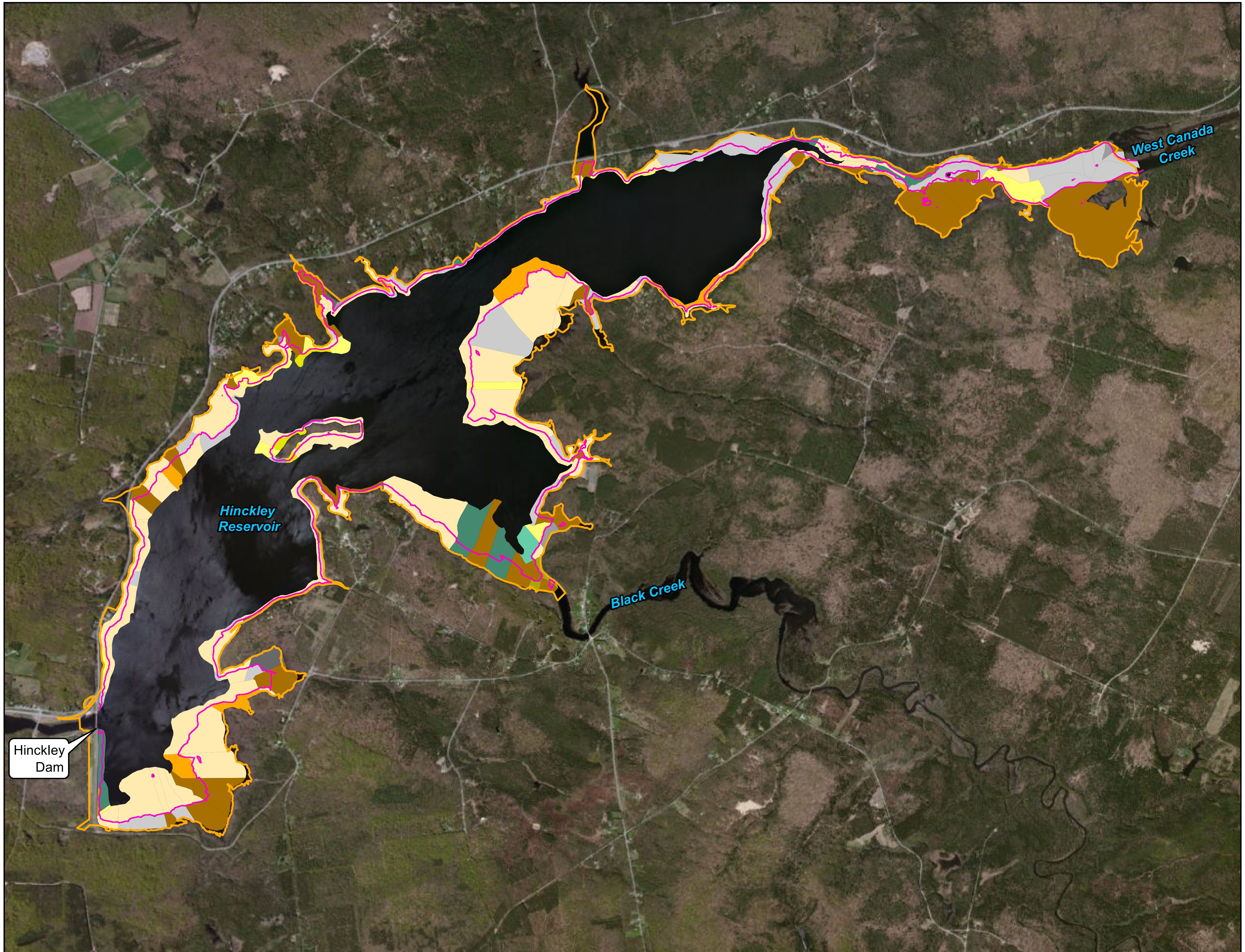

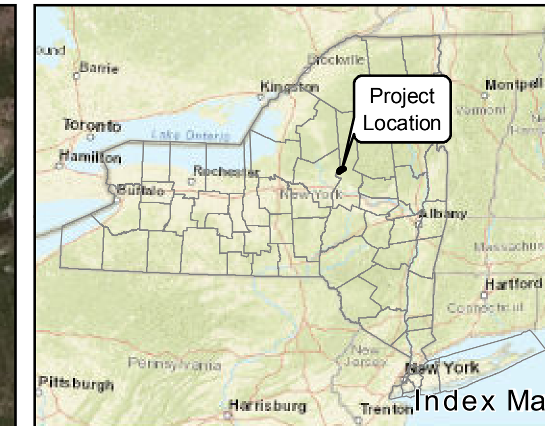

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Figure 4.5.1.4-1:
Littoral Zone Dominant Substrate

- Study Area
- Elevation 1213' BCD (WSEL at time of survey)

Dominant Substrate*

- Boulder
- Boulder, Sand
- Cobble
- Cobble, Gravel
- Cobble, Sand
- Gravel
- Gravel, Sand
- Riprap
- Sand
- Sand, Silt
- Silt

N

*Multiple dominant substrate types listed indicate near equal abundance of each substrate.

NOTES
1. Study Area generally represents El. 1225 ft. BCD.
2. WSEL at the time of the survey was approximately 1213 ft. BCD
3. Dominant = 50% or greater coverage

Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

0 1,250 2,500 5,000 Feet

1 inch = 2,500 feet

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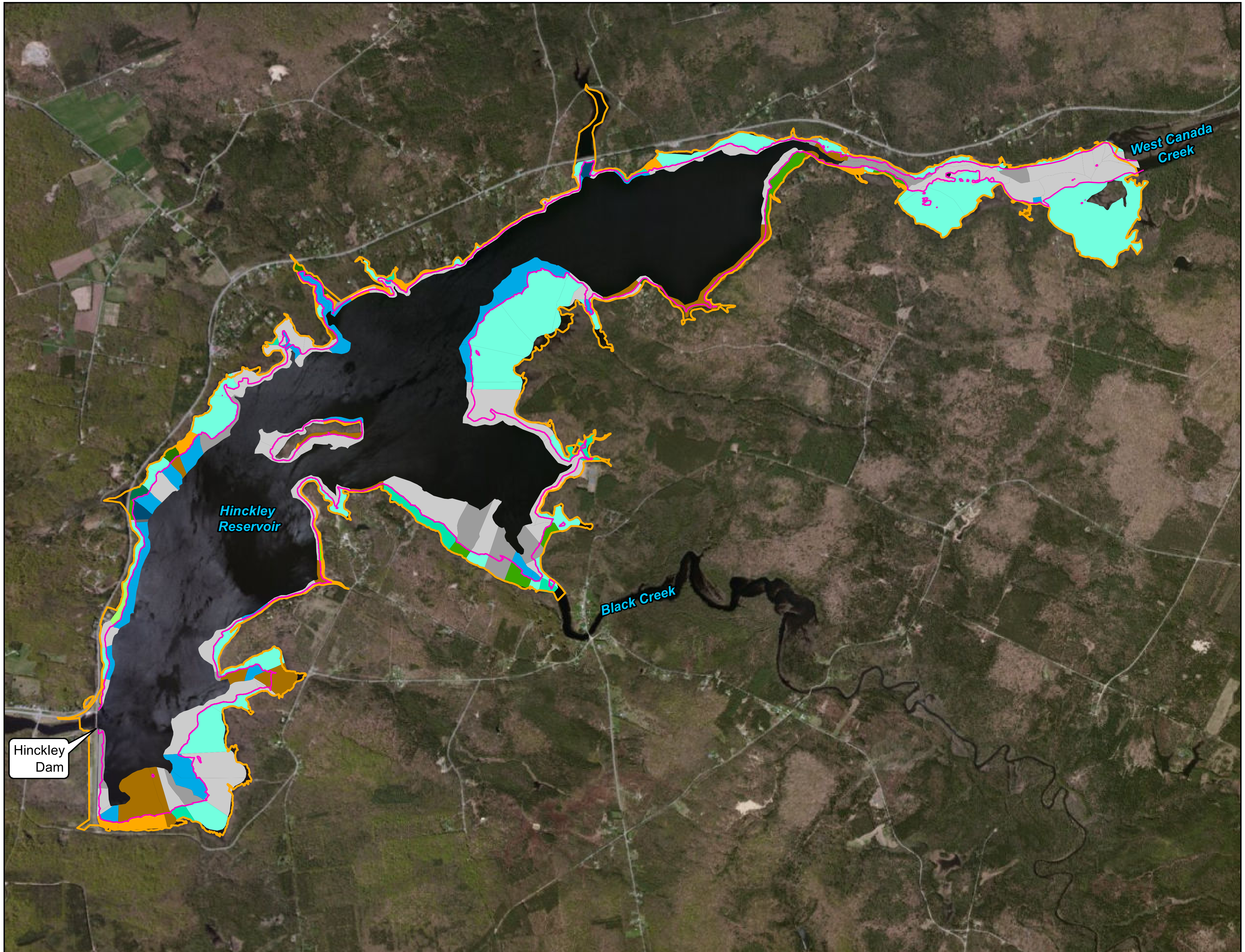
Path: J:\maps\FLA\exhibit_e\figure_4_5_1_4-1_substrate.mxd



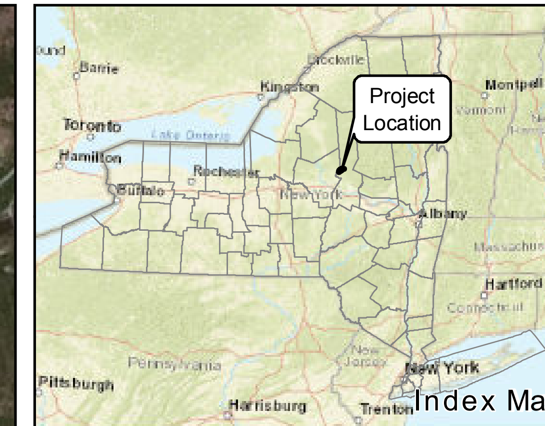


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Figure 4.5.1.4-2:
Littoral Zone Cover Resources

- Study Area
- Elevation 1213' BCD (WSEL at time of survey)

Cover Resource*

- Bare Substrate
- Boulder
- Boulder, Woody Debris/Detritus
- EAV
- EAV, FAV
- EAV, SAV
- EAV, FAV, SAV
- EAV, FAV, Boulder
- EAV, Boulder
- EAV, Woody Debris/Detritus
- FAV
- FAV, Boulder
- FAV, Woody Debris/Detritus
- SAV
- SAV, Woody Debris/Detritus
- Woody Debris/Detritus

N

*Multiple cover resources listed indicate near equal abundance of each resource. Abundance percentage of dominant and subdominant resources can be found in Appendix A table of the Hinckley Reservoir Fluctuation Field Study - Supplemental Analysis Report.

NOTES
1. Study Area generally represents El. 1225 ft. BCD
2. WSEL at the time of the survey was approximately 1213 ft. BCD

Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

0 1,250 2,500 5,000 Feet

1 inch = 2,500 feet

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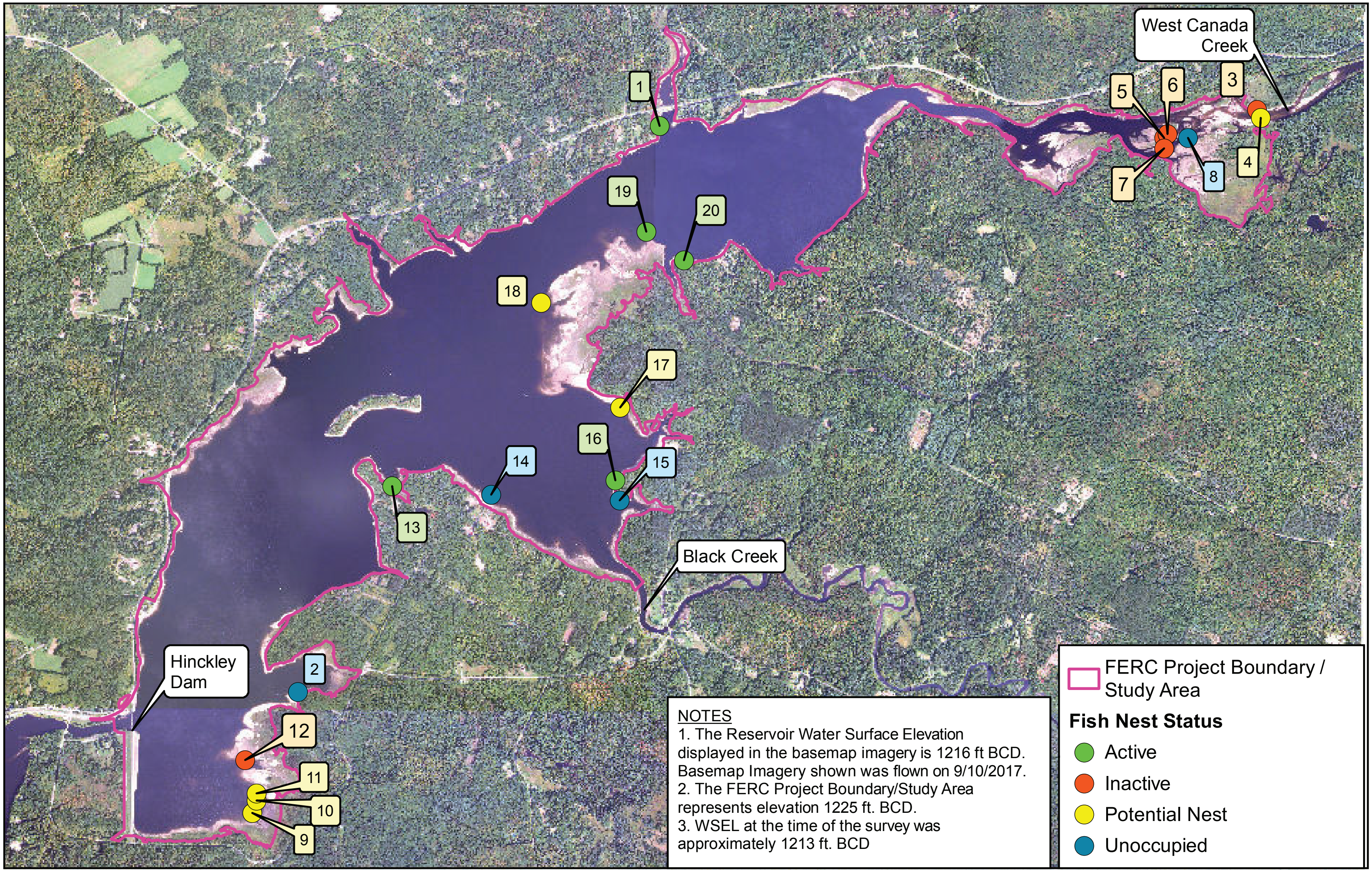
Path: J:\maps\FLA\exhibit_e\figure_4_5_1_4-2_cover_resources.mxd



NOTES
1. The Reservoir Water Surface Elevation displayed in the basemap imagery is 1216 ft BCD. Basemap Imagery shown was flown on 9/10/2017.
2. The FERC Project Boundary/Study Area represents elevation 1225 ft. BCD.
3. WSEL at the time of the survey was approximately 1213 ft. BCD

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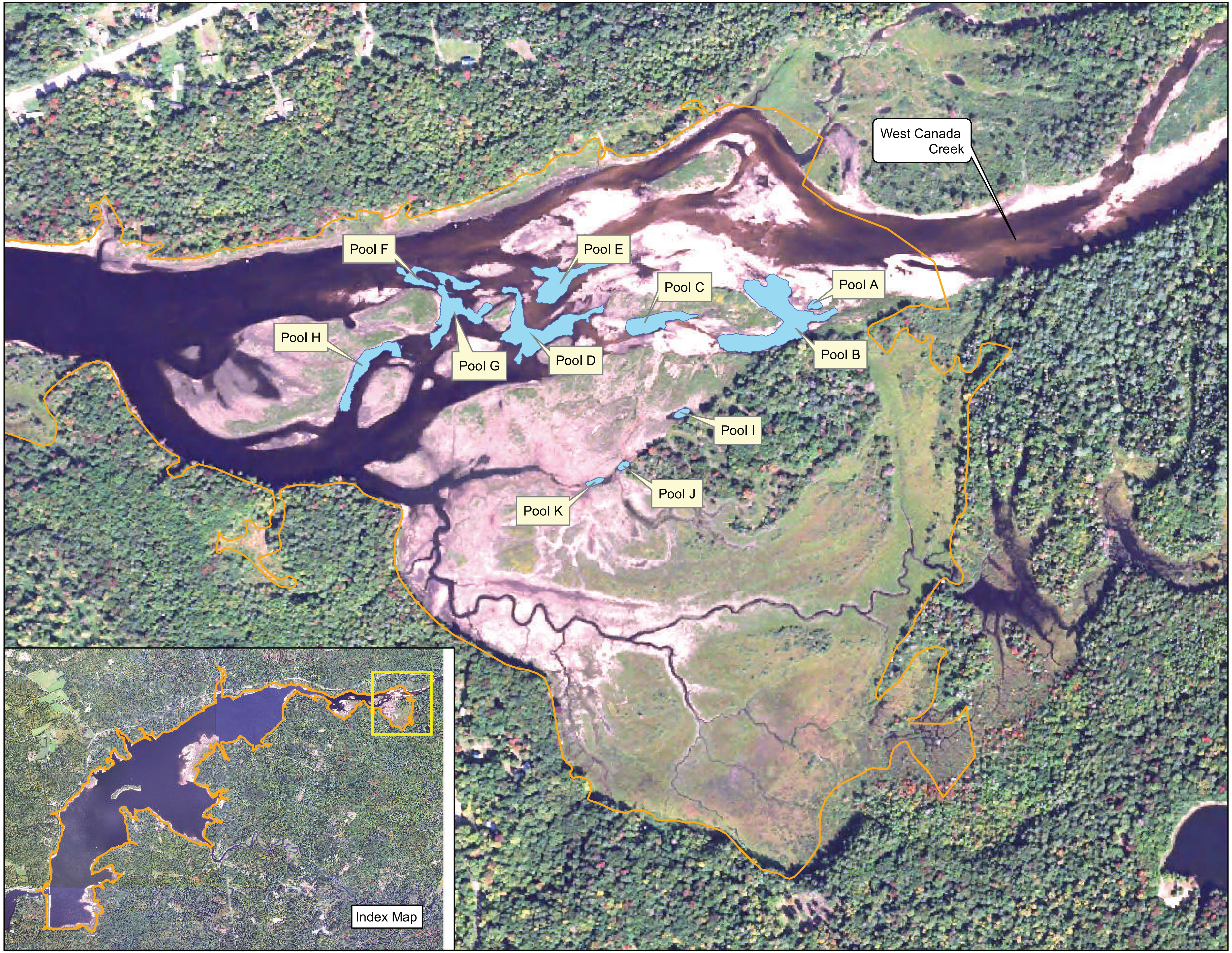
0 2,000 4,000 8,000 Feet

Figure 4.5.1.5-1:
Fish Nests Identified During 2018 Reservoir Survey

Path: J:\maps\FLA\exhibit_e\figure_4_5_1_5-1_fish_nests.mxd



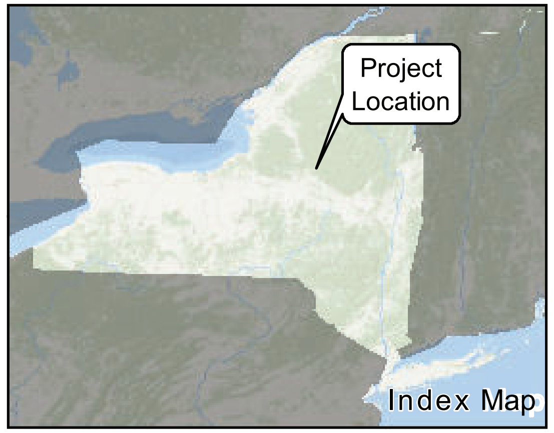


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Figure 4.5.1.5-2:
Approximate Location of Isolated Pools
Observed During 2018 Reservoir Survey

Legend

- Study Area
- Pool Location

N

NOTES
1. The Reservoir Water Surface Elevation displayed in the basemap imagery is 1216 ft BCD. Basemap Imagery shown was flown on 9/10/2017.
2. Study Area generally represents El. 1225 ft. BCD.
3. WSEL at the time of the survey was approximately 1213 ft. BCD

Service Layer Credits: Esri, Garmin, GEBCO, NOAA NGDC, and other contributors

0 200 400 800 Feet

1 inch = 400 feet

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Path: J:\maps\FLA\exhibit_e\figure_4_5_1_5-2_pools.mxd

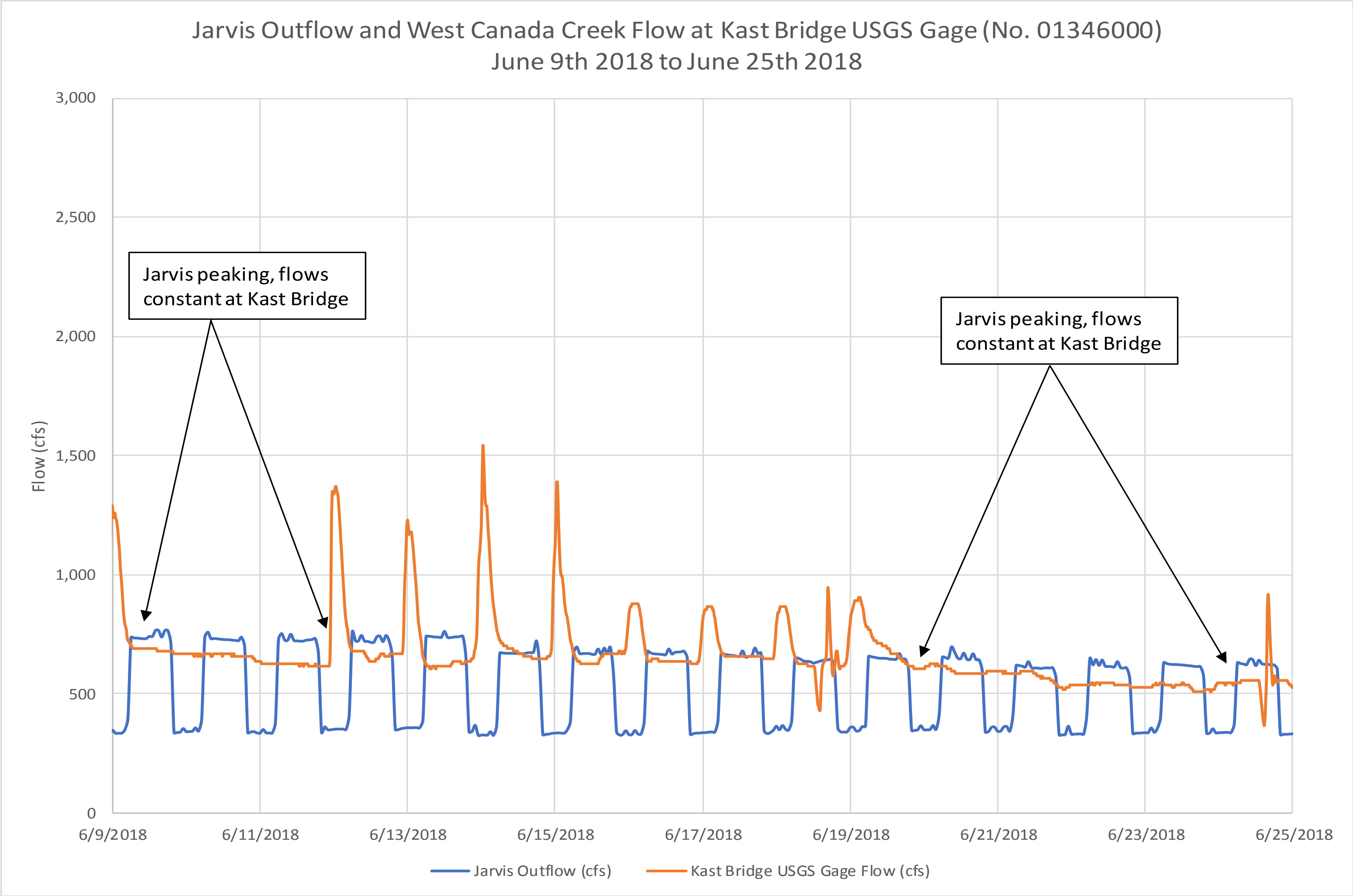


Figure 4.5.2-1: Jarvis Outflow and Kast Bridge Flow from June 9th 2018 to June 25th 2018

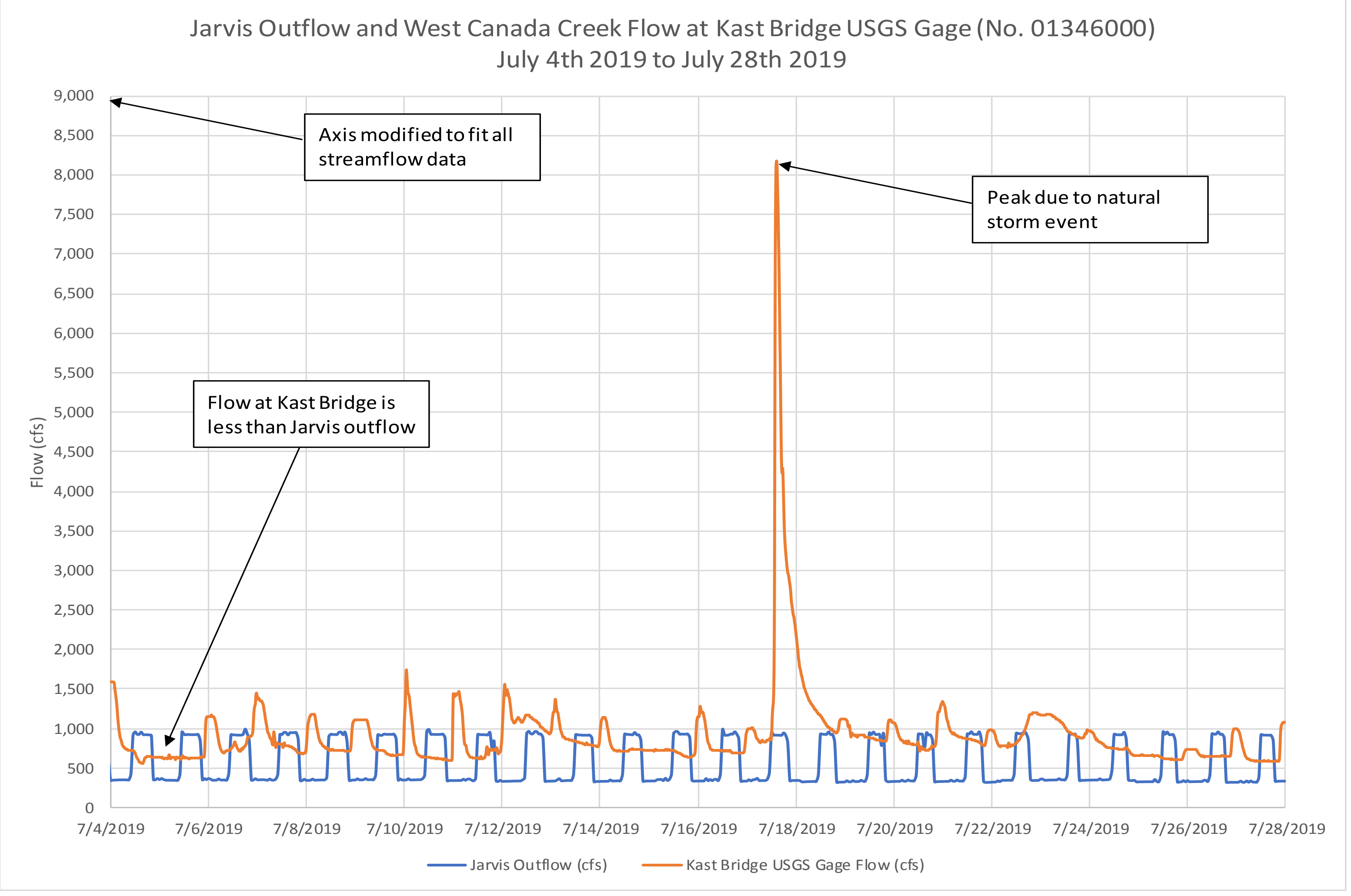


Figure 4.5.2-2: Jarvis Outflow and Kast Bridge Flow from July 4th 2019 to July 28th 2019

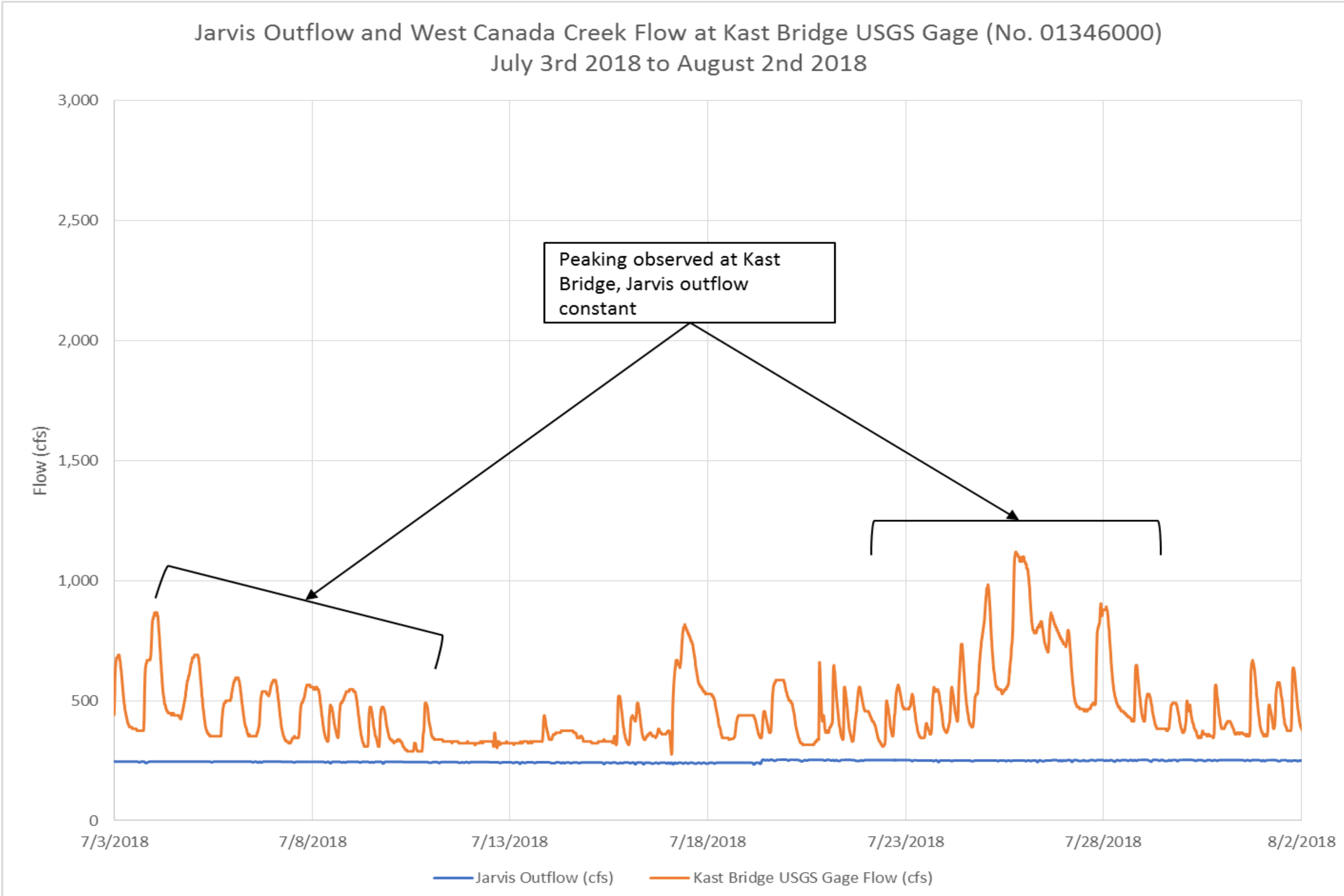


Figure 4.5.2-3: Jarvis Outflow and Kast Bridge Flow from July 3rd 3018 to August 2nd 2018

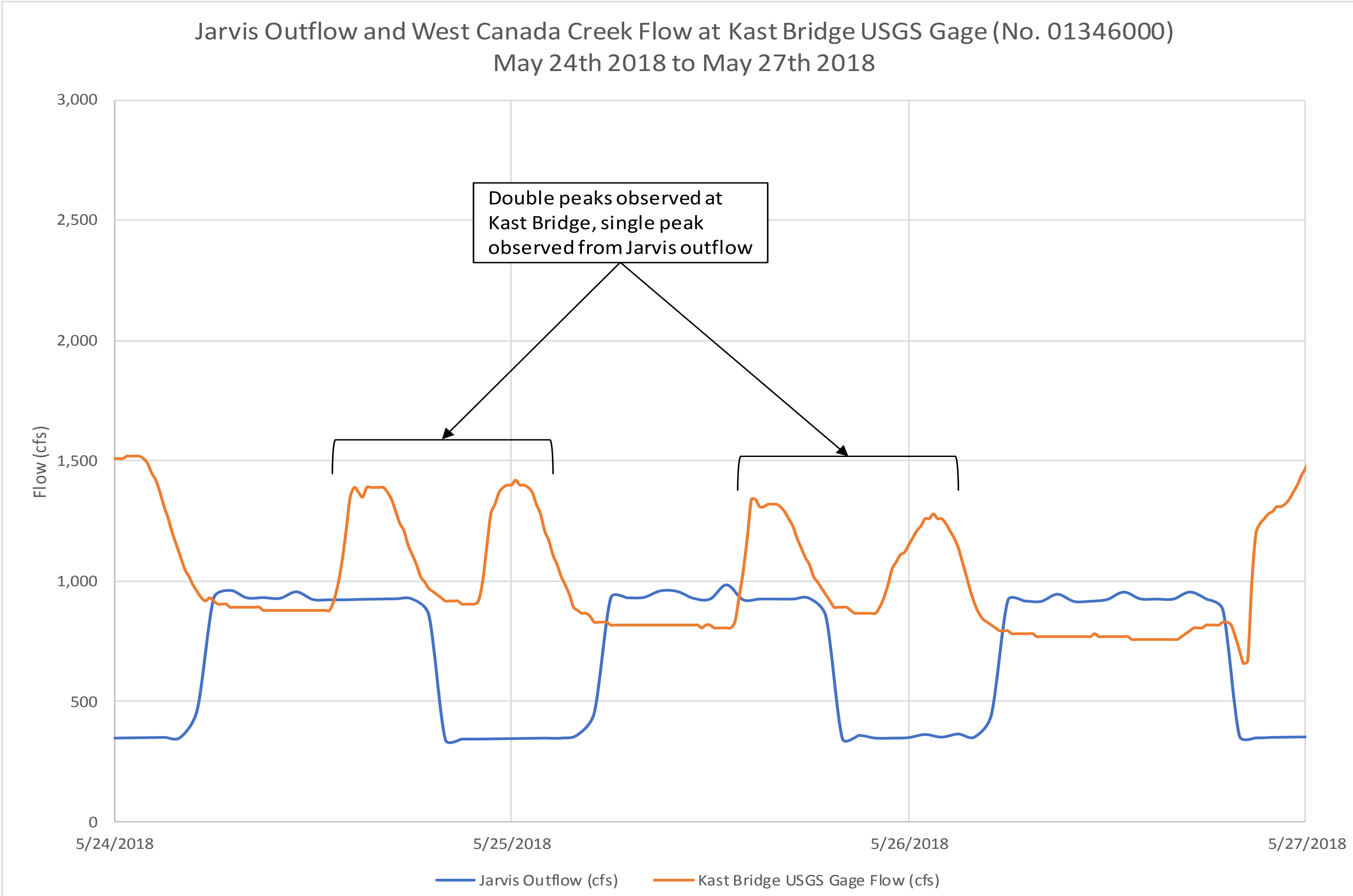


Figure 4.5.2-4: Jarvis Outflow and Kast Bridge Flow from May 24th 2018 to May 27th 2018

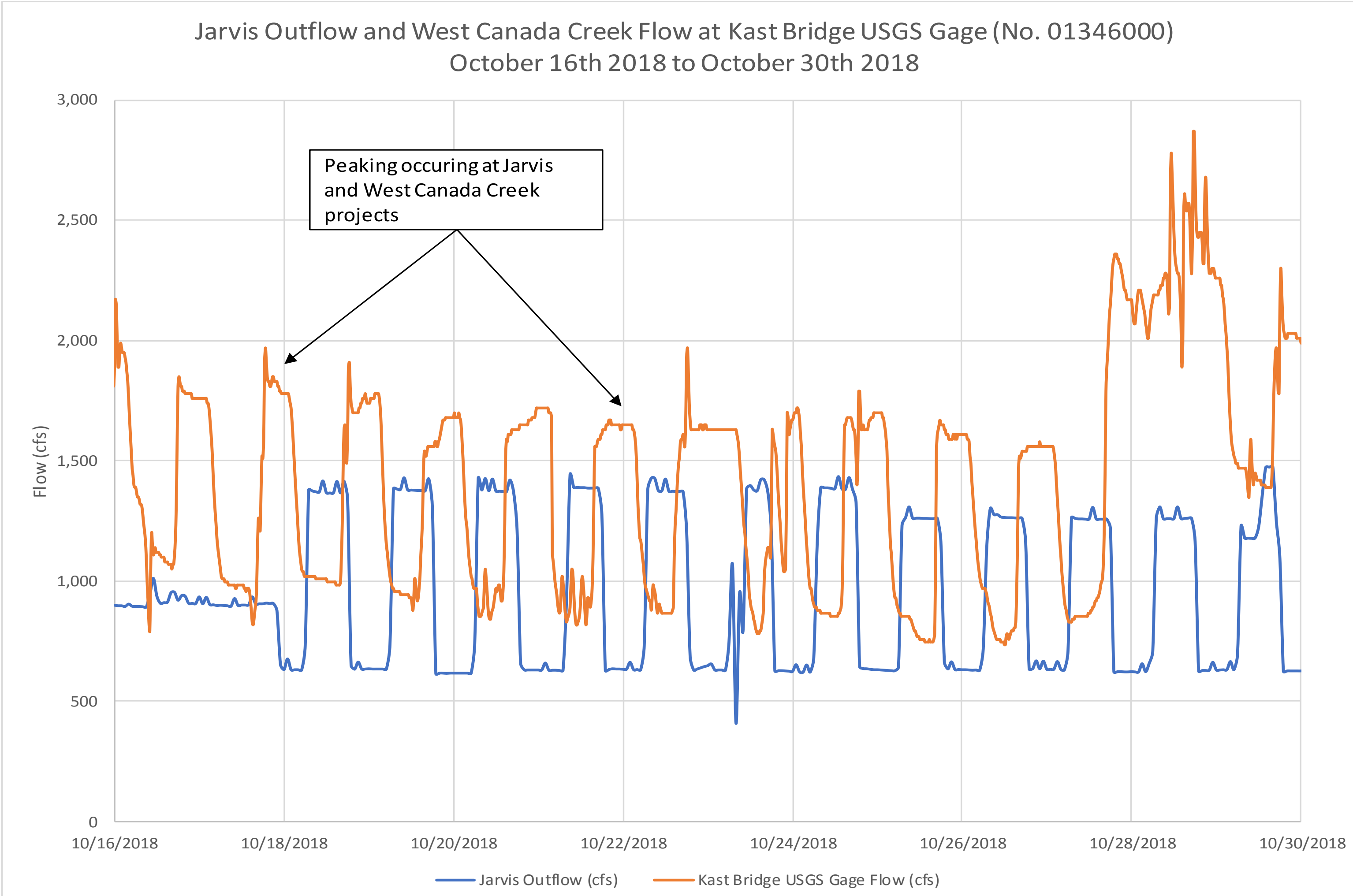


Figure 4.5.2-5: Jarvis Outflow and Kast Bridge Flow from October 16th 2018 to October 30th 2018

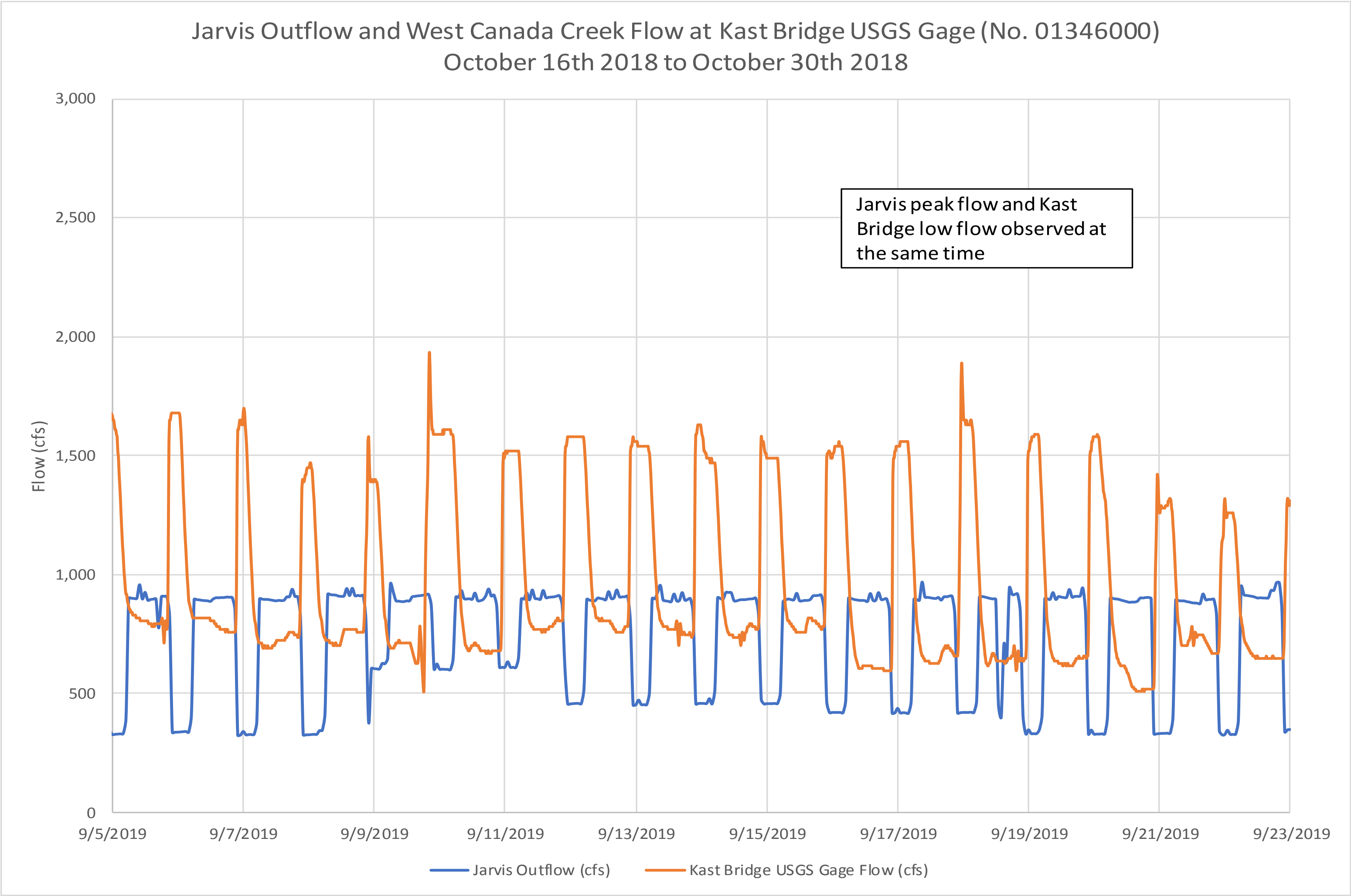


Figure 4.5.2-6: Jarvis Outflow and Kast Bridge Flow from September 5th 2019 to September 23rd 2019

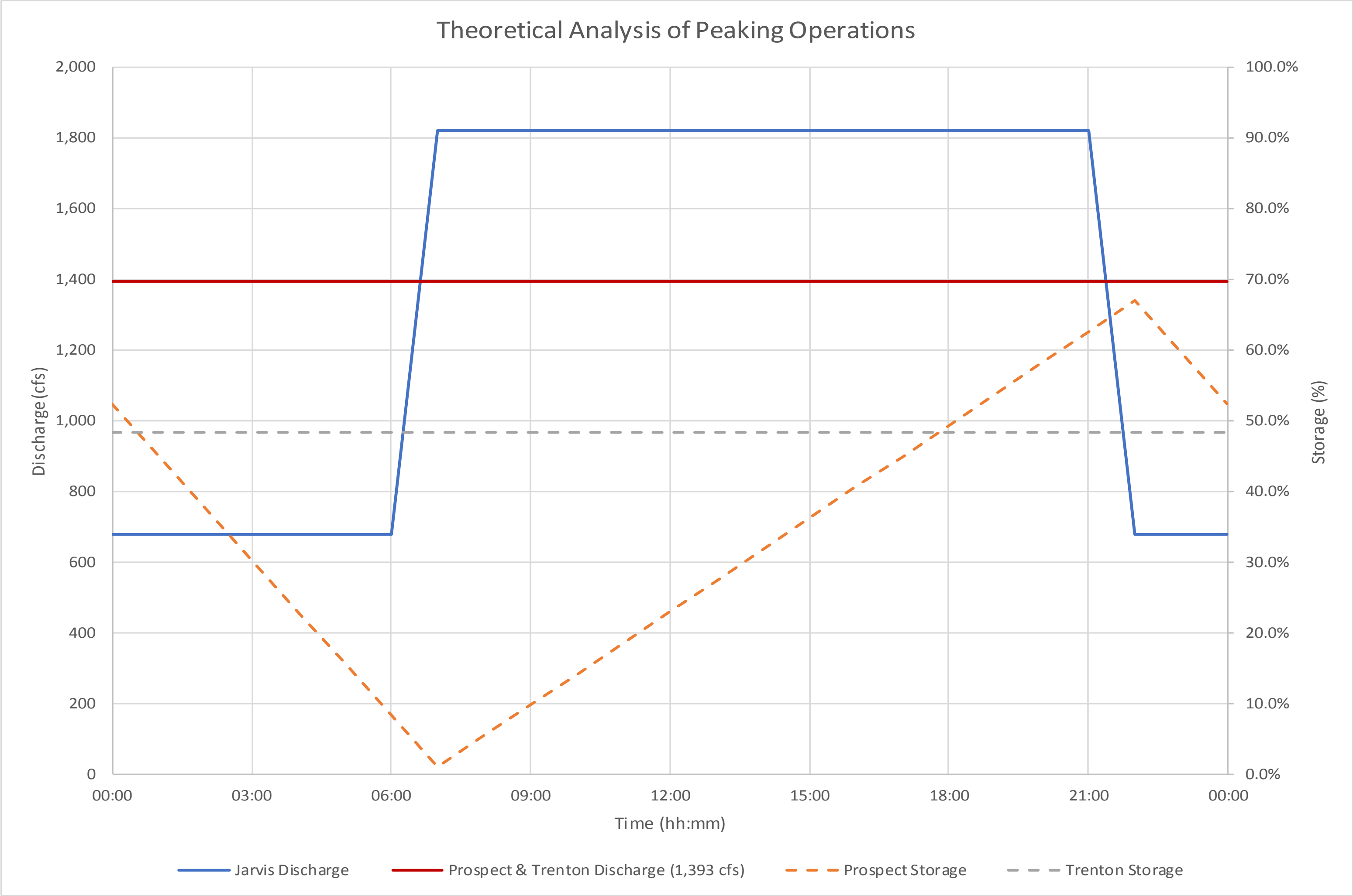


Figure 4.5.2-7: Theoretical Analysis of Peaking Operations

4.6 Wildlife and Botanical Resources

4.6.1 Affected Environment

4.6.1.1 Regional Setting

The Project is located in the southwestern foothills of the Adirondack Mountains. From a regional perspective, the Project is located at the transition of ecoregions, which are defined as areas where ecosystems (and the type, quality, and quantity of environmental resources) are generally similar (Bryce, *et al.*, 2010). To its north and east, the Project is located in the U.S. EPA Level IV ecoregion Northern and Western Adirondack Foothills. This area marks the change from more erodible shale and limestone in the Mohawk, Black, and St. Lawrence River valleys to the more resistant rocks of the Adirondack Mountains. The northern foothills rise slowly from 1000 to 1600 feet over 20 to 25 miles before meeting the higher hills and mountains of the Central Adirondacks. The water table is high, and many wetlands fill depressions in the outwash channels. In the west and southwest, the band of foothills is narrow, and elevations decline more quickly into the Black and Mohawk River valleys. Spruce was a dominant tree species in this region, but it was favored by early loggers, and most of the region is covered with second growth hardwood forests today. Natural vegetation in this ecoregion is described as being dominated by second growth northern hardwoods such as sugar maple, beech, black cherry, and yellow birch, with significant amounts of white pine in western foothills and in northern outwash areas.

The southwest areas of the Project are located in the Mohawk Valley ecoregion. The valley is underlain by limestone and shale dipping somewhat to the south away from the Adirondack Mountains. The Mohawk Valley, although broad, is irregular and hilly, and the flat Mohawk River floodplain is quite narrow in places. Canal building, channelization, and highway and railroad construction have affected the pattern and structure of the river's natural meanders and wetlands. Natural vegetation in this ecoregion includes sugar maple and beech-dominated forests on moist, fine-textured soils. Hemlock may be present in low numbers. Common shrubs include witch-hazel and hobblebush.

4.6.1.2 Upland Botanical Resources

As shown in Figure 3.1.1-1, the Project boundary follows the shoreline of Hinckley Reservoir at the spillway crest elevation (El. 1225). Downstream of the dam, the Project boundary generally only encompasses the Project facilities. Given that the Project boundary encircles the Hinckley Reservoir, there is limited upland habitat for botanical resources or terrestrial wildlife within the Project boundary. Upland botanical resources are described based on the dominant vegetative community types adjacent to the reservoir.

Upland habitats adjacent to the Hinckley Reservoir were determined based on the Northeast Terrestrial Habitat Map (Ferree and Anderson, 2013), which is a continuous, GIS coverage that maps upland wildlife habitats and ecological systems for the Northeast. The ecological systems represented in this data coverage are mosaics of plant community types that tend to co-occur within landscapes with similar ecological processes, substrates, and/or environmental gradients.

The dominant terrestrial habitat adjacent to the Hinckley Reservoir is the Laurentian-Acadian Northern Hardwood Forest. This habitat is described as a hardwood forest dominated by sugar maple, American beech, and yellow birch. Hemlock and red spruce are frequent but minor canopy associates. Paper birch, red maple, poplar, and white pine are common in successional stands. In NY, this natural community is referred to as a Beech-Maple Mesic Forest and is described as occurring on moist, well drained, usually acid soils. There are many spring ephemerals that bloom before the canopy trees leaf out. A few red spruce may also be present in the Adirondacks.

Another common terrestrial habitat adjacent to the reservoir includes Pine-Hemlock-Hardwood Forest, a coniferous/mixed forest widespread in the glaciated Northeast. Tree species include white pine, hemlock, and red oak as typical canopy dominants. Red maple is common, and other hardwoods like sugar maple, beech, and birch also occur. In NY, the natural community is referred to as a Pine-Northern Hardwood Forest. Pine-Northern Hardwood Forests in NY are often characterized by an emergent canopy of white pines that overtop a mixed forest of white and/or red pine with northern hardwood species such as red maple, red oak, paper birch, and yellow birch. Blueberries are characteristic shrubs, bracken fern is a common herb, and mosses and lichens may be common. Botanical resources commonly found in these forests are listed in Table 4.6.1.2-1.

There are also terrestrial land areas adjacent to Hinckley Reservoir comprised of anthropogenic habitats, including developed land, roads and park areas. Adjacent wetlands are discussed in Section 4.7.

Invasive Plant Species

Invasive species are defined by NYSDEC as non-native species that can cause harm to the environment, the economy, or to human health. The Project is located at the intersection of three New York State regional invasive species management partnership areas, including the Capital Mohawk, the St. Lawrence & Eastern Lake Ontario, and the Adirondack Park Invasive Plant Program (APIPP). These partnerships, known as PRISMs (Partnerships for Regional Invasive Species Management), maintain databases and maps of the distribution of target aquatic and terrestrial invasive species in their regions. This map (http://www.nyimapinvasives.org/) was searched for the occurrence of invasive plant species within the vicinity of the Hinckley Reservoir.

There are five invasive plant species that have been identified by the PRISMs that were found in the vicinity of the Project area (Table 4.6.1.2-2); all occurrences were found along adjacent roads. The species found include common reed, Japanese knotweed, purple loosestrife, and garlic mustard which are fairly common and established in New York State. Also found was giant hogweed (*Heracleum mantegazzianum*), which was confirmed in 2013 along Route 365 north of Hinckley Reservoir. Giant hogweed is a biennial herb that has a dangerous sap, which can displace native plants and worsen erosion problems. The sap causes severe skin blistering and scarring (APIPP, 2019).

Hinckley Reservoir is listed as an uninfested lake in terms of aquatic invasive plant species.

4.6.1.3 Wildlife Resources

As previously noted, the Project boundary essentially follows the reservoir shoreline and therefore has limited terrestrial habitat. Empirical data for wildlife use of land within the Project boundary are not readily available. There are, however, typical wildlife species associated with the forest community types, described above, that are adjacent to Hinckley Reservoir.

Based on the NYSDEC's Black River Wild Forest Management Plan (NYSDEC, 1996), typical central Adirondack mammal species inhabit this area, including black bear, white-tailed deer, coyote, raccoon, otter, beaver, mink, varying hare, red squirrel, Eastern chipmunk, and porcupine. Bobcat, red and gray fox, muskrat and fisher are less common mammals in the area. Due to its proximity to Hinckley Reservoir, wildlife found in the Black River Wild Forest may be expected to frequent areas around the Project. Moose (*Alces alces*), which had been locally extinct, have in recent years re-established a population within the Adirondack Park. NYSDEC biologists estimated that there were about 500 to 800 moose in New York State as of 2010.

Hinckley Reservoir and the surrounding wetlands also provide habitat for migrating bird species. Hinckley Reservoir is located within the Atlantic Flyway, which is a term describing the migration path used in the Eastern United States. Common birds listed in the Black River Wild Forest Management Plan include ruffed grouse, American woodcock, wood duck, American black duck, mallard, and great blue heron. Appendix D contains tables listing the common mammal (Table D-1), bird (Table D-2), and herptile species (Table D-3) that may utilize the Project.

4.6.2 Environmental Effects

In SD2, FERC identified the following issues related to terrestrial resources: (1) effects of continued Project operation on riparian and wetland habitat and associated wildlife, including waterfowl and wetland-dependent birds; (2) effects of continued Project operation and maintenance activities on upland wildlife habitat and associated wildlife; and (3) effects of continued Project operation and maintenance activities on state-listed species (e.g., bald eagle, common loon) and natural communities. Potential environmental effects pertaining to these resources are discussed in Section 4.7.2 and Section 4.8.2, respectively.

4.6.3 Proposed Environmental Measures

No environmental measures related to wildlife and botanical resources are proposed at this time.

4.6.4 Unavoidable Adverse Impacts

Continued operation of the Project will not result in unavoidable adverse effects to wildlife and botanical resources.

Table 4.6.1.2-1: Typical Botanical Resources Found in Upland Forests Surrounding the Project

Common Name	Scientific Name	Forest Layer
Red Oak	*Quercus rubra*	Canopy
Red Maple	*Acer rubrum*	Canopy
White Pine	*Pinus strobus*	Canopy
Sugar Maple	*Acer saccharum*	Canopy
Red Spruce	*Picea rubens*	Canopy
Yellow Birch	*Betula alleghaniensis*	Canopy
Sweet Birch	*Betula lenta*	Canopy
White Ash	*Fraxinus americana*	Canopy
Wild Black Cherry	*Prunus serotina*	Canopy
American Beech	*Fagus grandifolia*	Canopy
Eastern Hemlock	*Tsuga canadensis*	Canopy
Red Pine	*Pinus resinosa*	Canopy
Paper Birch	*Betula cordifolia*	Canopy
Blueberry/Huckleberry	*Vaccinium sp*	Understory
Witch Hazel	*Hamamelis virginiana*	Understory
Mapleleaf Viburnum	*Viburnum acerifolium*	Understory
Balsam Fir	*Abies balsamea*	Understory
Striped Maple	*Acer pensylvanicum*	Understory
Hobblebush	*Viburnum lantanoides*	Understory
Eastern Hay-Scented Fern	*Dennstaedtia punctilobula*	Ground
Spinulose Shield Fern	*Dryopteris carthusiana*	Ground
Canada May-Flower	*Maianthemum canadense*	Ground

Common Name	Scientific Name	Forest Layer
Christmas Fern	*Polystichum acrostichoides*	Ground
Northern Starflower	*Trientalis borealis*	Ground
Painted Trillium	*Trillium undulatum*	Ground
Bracken Fern	*Pteridium aquilinum*	Ground
Wild Sarsaparilla	*Aralia nudicaulis*	Ground
Bunchberry	*Cornus canadensis*	Ground
Goldthread	*Coptis trifolia*	Ground

Note: Characteristic plant species found in Beech-Maple Mesic and Pine-Northern Hardwood Forests (NYNHP, 2016).

Table 4.6.1.2-2: Invasive Plant Species Documented in the Vicinity of Hinckley Reservoir

Common Name	Scientific Name	Notes
Common Reed	*Phragmites australis*	Common reed is a tall, herbaceous perennial that thrives in wetlands and disturbed and degraded soils, often along roadsides, ditches, or dredged areas. It can tolerate salt water and a pH range of 3.7-9. Both native and nonnative strains of phragmites occur. Generally invasive populations are nonnative, but it may be difficult to tell the two apart. Plants can sprout from a rhizome fragment and form populations that overtake hundreds of acres and displace critical wetland species.
Garlic Mustard	*Alliaria petiolata*	Garlic mustard is a biennial herb that thrives in deciduous forests and partially shaded, moist habitats. With an early spring jump on native plants, this invader dominates forest understories. It releases chemicals harmful to soil fungus important to native trees.
Giant Hogweed	*Heracleum mantegazzianum*	Giant hogweed is a biennial herb that colonizes rich, moist soils along roadside ditches, stream banks, waste areas, and forest edges. Giant hogweed is on the federal noxious weed list because of its dangerous sap. It threatens riparian areas by displacing native plants and exacerbating soil erosion.
Purple Loosestrife	*Lythrum salicaria*	Purple loosestrife is an herbaceous perennial that spreads both vegetatively and by abundant seed dispersal. Purple loosestrife grows in a variety of wet habitats, including wet meadows, marshes, river banks, and the edges of ponds and reservoirs. It tolerates a wide variety of moisture, nutrient, and pH conditions. Purple loosestrife invades both natural and disturbed wetlands and alters their ecological structure and function.
Japanese Knotweed	*Reynoutria japonica*	Japanese knotweed is a fast growing, herbaceous perennial shrub found along forest edges, stream banks, and disturbed areas such as roadways. Knotweed's early spring emergence and dense growth enable it to take over large areas with thick rhizomes that can spread horizontally through soils for 60+ feet.

Source: APIPP, 2019.

4.7 Wetlands, Riparian, and Littoral Habitat

4.7.1 Affected Environment

4.7.1.1 Wetland Habitats

Wetlands are defined by the USFWS as "lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water. For purposes of this classification wetlands must have one or more of the following three attributes: (1) at least periodically, the land supports predominantly hydrophytes; (2) the substrate is predominantly undrained hydric soil; and (3) the substrate is non-soil and is saturated with water or covered by shallow water at some time during the growing season of the year" (USFWS, 2013).

As part of the 2018 *Hinckley Reservoir Fluctuation Field Study*, the Power Authority confirmed and documented previously identified National Wetland Inventory (NWI), NYSDEC, and Adirondack Park Agency (APA) wetlands in the study area. Wetland cover and types for previously undocumented wetlands were also identified during the field study. The results of this investigation found that, in total, 485 acres of wetlands were identified in the Project area. Of the 485 acres, 328 acres consisted of previously identified wetlands that were verified in the field (NWI – 187 acres, NYSDEC – 38 acres, APA – 103 acres). The remaining 157 acres of wetlands documented in the study area consisted of (1) previously unidentified wetlands, or (2) previously identified wetlands that warranted reclassification of cover type based on field observations. Figure 4.7.1.1-1 depicts the wetland habitats identified in the Project area.

4.7.1.2 Wetland and Riparian Zone Vegetation

Riparian zone habitat and vegetation within the Project area is, in most areas, comprised of forests or wetland habitats within 100 feet of the water's edge (at spillway crest elevation). In some developed locations, the riparian zone is limited by the presence of roads. At the dam, there is a graded and riprapped bank and road with little to no riparian zone. Sandy beaches with sparse vegetation are common along the reservoir, depending on the water surface elevation.

Wetland classifications within the reservoir were found to be dynamic and dependent upon the water surface elevation. Emergent wetland areas were observed at several locations throughout the reservoir that would be inundated at full pool. Emergent flats were found to be primarily comprised of bulrushes (*Scirpus*), rushes (*Juncus*), sedges (*Carex*), and sneezeweed (*Helenium*). These areas are seasonally inundated when the reservoir is at its full pool elevation. The scrub/shrub wetlands found on the fringes of the reservoir primarily consisted of willows, maple, alder, and herbaceous plants. Of the 485 acres mapped during the survey, 219 acres were classified as freshwater emergent wetlands, while the remaining 266 acres were classified as freshwater forested/shrub wetlands.

Table 4.7.1.2-1 presents a summary of each wetland type and the acreage and percentage of total area that is exposed (above water) at one-foot reservoir water surface elevation ranges. The table also provides the annual percentages of time that the minimum elevation of the range depicted is equaled or exceeded (based on historical water surface elevation data). For example, if the reservoir water surface elevation range shown is El. 1223 – 1224, then this column would depict the percentage of time that El. 1223 is equaled or exceeded (i.e., 25% of the time annually).

When the reservoir is at or above the spillway crest elevation, which annually occurs 10% of the time, 26% of emergent wetlands and 90% of forested/shrub wetlands are exposed. This illustrates that the forested/shrub wetlands are not strongly affected by reservoir operations. As previously discussed, emergent wetlands consist of large areas that are seasonally inundated when the reservoir is at its spillway crest elevation. This data can be utilized to quantify the extent of exposure or inundation at various reservoir water surface elevations. For example, 74% of emergent wetlands are inundated at the spillway crest elevation of 1225; however, when the reservoir water surface elevation is 1218, which occurs approximately 51% of the time annually, 76% of emergent wetlands are exposed (therefore 24% are inundated). This analysis further demonstrates the dynamic extent of emergent wetlands and reservoir water surface elevations.

4.7.1.3 Littoral Zone Habitat and Vegetation

Littoral zone habitat and vegetation are discussed in Section 4.5.1.4.

4.7.1.4 Wetland, Riparian, and Littoral Wildlife

Wetland and riparian areas serve as transition zones between aquatic and terrestrial systems and, as such, support many mammal, bird, reptile, and amphibious species that depend on both habitat types to survive. Section 4.6.1 and Appendix D provide additional information on the wildlife that may exist within the Project area.

4.7.2 Environmental Effects

In SD2, FERC identified the following issues related to wetlands, riparian, and littoral resources: (1) effects of continued Project operation on riparian and wetland habitat and associated wildlife, including waterfowl and wetland-dependent birds; and (2) effects of continued Project operation and maintenance activities on upland wildlife habitat and associated wildlife. Each of these issues is discussed in greater detail below.

Wetlands observed during the survey primarily consisted of scrub/shrub wetlands found along the fringes of the reservoir or emergent wetland complexes. Emergent wetland complexes were observed at several locations throughout the study area with the majority of them found in the West Canada Creek reach. Such complexes accounted for almost all of the EAV observed during the cover resource assessment. EAV accounted for the largest percentage of cover type in the study area (i.e., 28% of the total study area). The wetland complexes observed throughout the Project area have become established under NYSCC's water level management regime. Increases in water level would result in more frequent, or permanent, inundation of these emergent wetland complexes, which could materially change or eliminate them. Inundation of emergent wetlands observed during the survey could occur at water levels as low as El. 1215, depending on location. The water level management regime of the reservoir provides seasonally flooded conditions essential to maintaining these emergent wetlands' vegetative structure and classification.

Regarding riparian and upland areas, the operating range of the Project is El. 1195 to 1225. As discussed in Section 4.3.1.4, there is a clear topographic break at approximately El. 1225 around the perimeter of the reservoir. Habitat above this elevation is considered riparian or upland habitat. Although shoreline erosion is observed above El. 1225 at several locations around the reservoir, such erosion is caused by naturally occurring high flows and water levels and not Project operations. Given this, Project operations do not affect riparian or upland resources.

Environmental resources present throughout wetland, littoral, and riparian habitats in the Project area have become established under a reservoir operating regime which has remained generally the same for over 100 years and is prescribed by various existing legal agreements to which the Power Authority was not a signatory party. The Project simply utilizes the NYSCC prescribed flow releases to generate power. The reservoir water level management regime and associated outflows would still exist regardless of the presence of the Project, as they did for almost 70 years prior to Project construction.

Although the current FERC license allows the Project to operate in a peaking mode, the results of the *Desktop Modeling of Peaking Fluctuations Study* demonstrated that the maximum difference in daily water level fluctuations as a result of peaking is 0.32 ft. (3.84 inches) for the scenarios modeled. Differences in daily water level fluctuations of less than 4 inches were only observed to occur during the colder months (i.e., February and March) and are not expected to impact biological resources, which are dormant and less active. Peaking operations which occur during biologically sensitive periods (e.g., late spring, summer, fall) result in even smaller water level differences. Given this, the results of the peaking study indicate that peaking operations have minimal impact on environmental resources during biologically sensitive periods.

The continued operation of the Project has minimal impact on the environmental resources found in the wetland, littoral, and riparian habitats in the Project area.

4.7.3 Proposed Environmental Measures

The Power Authority proposes to continue existing operating conditions in the new license and is not proposing any changes with respect to wetlands, riparian, or littoral resources.

4.7.4 Unavoidable Adverse Impacts

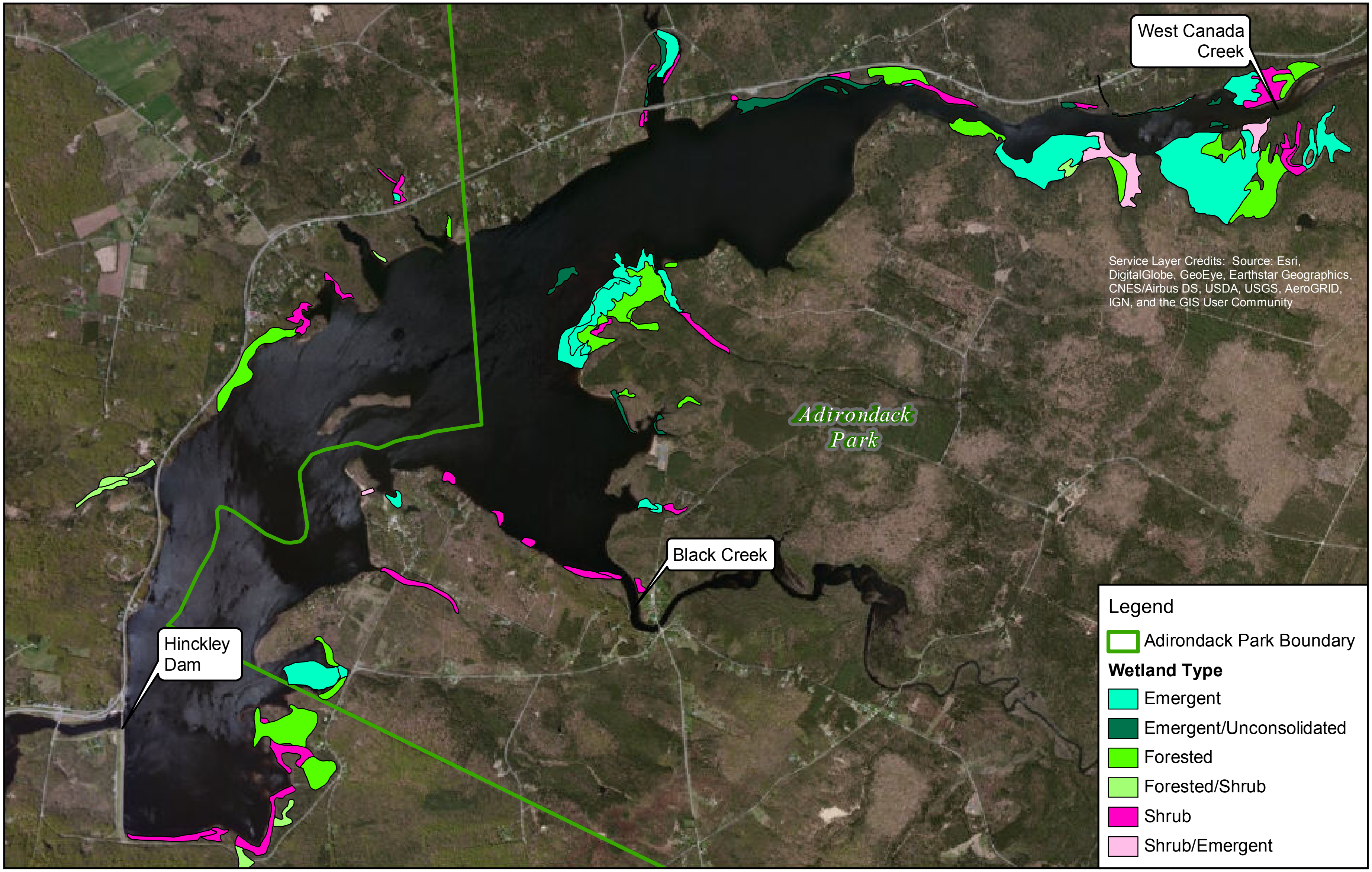
Continued Project operation is not expected to adversely affect wetlands, riparian, or littoral resources.

Table 4.7.1.1-1: Acreage Estimates for Wetlands within the Project Area Documented During the 2018 Reservoir Fluctuation Survey

Wetland Type	Acreage
Emergent	194
Emergent/Unconsolidated	25
Forested	142
Forested/Shrub	17
Shrub	86
Shrub/Emergent	21
Total	**485**

Table 4.7.1.2-1: Summary of Wetland Inundation or Exposure

Wetland Type	Reservoir Water Surface Elevation Range (ft.)	Acreage	Total Percentage of Wetland Exposed (above water)	Annual % of Time Reservoir Water Surface Elevation is Equaled or Exceeded - 2001-2019 (Low Elev. Range)
Freshwater Emergent Wetland	Above 1225	57	26%	10%
	1224-1225	10	31%	18%
	1223-1224	11	36%	25%
	1222-1223	12	41%	32%
	1221-1222	14	48%	38%
	1220-1221	17	55%	43%
	1219-1220	20	65%	47%
	1218-1219	25	76%	51%
	1217-1218	13	82%	54%
	1216-1217	10	86%	58%
	1215-1216	8	90%	62%
	1214-1215	7	93%	65%
	1213-1214	6	96%	68%
	1212-1213	3	97%	71%
	1211-1212	1	98%	74%
	1210-1211	1	98%	77%
	<1210	4	>99%	78%
Forested/Shrub	Above 1225	238	90%	10%
	1224-1225	7	93%	18%
	1223-1224	6	95%	25%
	1222-1223	4	97%	32%
	1221-1222	3	98%	38%
	1220-1221	2	99%	43%
	<1220	4	>99%	44%



Gregory B. Jarvis Project
(FERC No. P-3211)
Final License Application

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N

0 2,000 4,000 8,000 Feet

Figure 4.7.1.1-1:
Wetlands Documented During the 2018 Fluctuation Field Survey

Path: J:\maps\FLA\exhibit_e\figure_4_7_1_1-1_wetlands.mxd

4.8 Rare, Threatened, and Endangered Species

4.8.1 Affected Environment

4.8.1.1 T&E Species (Federal and State Listed Species)

A search of the USFWS's IPaC database was performed to identify species that may exist within the Project boundary that are listed as threatened or endangered under the ESA. The USFWS did not identify any federally listed species in the Project area.

New York Natural Heritage Program data was reviewed for any Rare, Threatened, or Endangered (RTE) species that may exist in this area. Bald Eagles are a New York State Threatened species, which occur in and use the waters within the Project vicinity. The New York Natural Heritage Program did not identify any other RTE species within the Project boundary.

4.8.1.2 Species of Special Concern

Species of Special Concern is a term that is used to refer to species that are declining or need conservation; it is not defined by the Federal Endangered Species Act. The USFWS does, however, designate birds of conservation concern, which are defined as "migratory and non-migratory bird species (beyond those already designated as federally threatened or endangered) that represent highest conservation priorities" (USFWS, 2015). This list was created to help fulfill the 1988 amendment to the Fish and Wildlife Conservation Act that mandates the USFWS to "identify species, subspecies, and populations of all migratory nongame birds that, without additional conservation actions, are likely to become candidates for listing under the ESA" (USFWS, 2015). Table 4.8.1.2-1 provides the Federal list of birds of conservation concern for the Project area (created via the IPaC tool). As observed in the table, Bald Eagle are known to occur in the Project area. In developing the FLA, the Power Authority consulted with NYSDEC to determine if there are any known Bald Eagle nesting sites in, or immediately adjacent to, the Project boundary. Based on the results of this outreach, there are no known nest sites in the Project area. The closest nesting site to the Project area is approximately 1-mile downstream of Hinckley Dam in the Prospect impoundment.

Table 4.8.1.2-2 provides the New York State list of special concern species for Oneida and Herkimer Counties (as provided by the New York Nature Explorer). The New York Nature Explorer pulls data from the New York Natural Heritage Program, the Second New York Breeding Bird Atlas Project, and the New York Amphibian and Reptile Atlas Project. Search results for Oneida County indicated that 22 species could be present in the Project area while 18 species could be present in the Project area in Herkimer County (NYSDEC, 2019).

One of the species of Special Concern in New York is the Common Loon. Statewide, the New York Annual Loon Census has occurred since 2001, with most of the lake surveys occurring in the Adirondack Park. The Wildlife Conservation Society conducts the census with the help of local volunteers. Table 4.8.1.2-3 provides a summary of available Loon Census data for Hinckley Reservoir. Based on the results of the 2019 survey, six adult loons, zero chicks, and zero immature loons were observed on Hinckley Reservoir. In addition, review of the NYSDEC Breeding Bird Atlas indicates that Common Loon were listed for the period 2000-2005 at Hinckley Reservoir. Per the NYS Breeding Bird Atlas database, a pair of Common Loon were observed in suitable habitat in breeding season on two separate occasions – July 20, 2002 and July 16, 2005. As a result, Common Loon were categorized as having a breeding bird atlas behavior category of 'Probable' in this area. However, based on correspondence with the Adirondack Communities and Conservation Program, it was noted that Hinckley Reservoir does not support successfully nesting pairs of loons, nor has it ever had chicks or immature loons reported for the period 2002 – 2019.

4.8.1.3 Significant Habitats

A search of the USFWS's IPaC (USFWS, 2019) was conducted to identify significant or critical habitats within the Project area. No federally designated critical habitat was identified by the USFWS within the Project area.

The Natural Heritage Program identified two Natural Communities, Rich Sloping Fen and Black Spruce-Tamarack Bog, which are located outside of the Project boundary. Black Spruce-Tamarack Bogs are naturally low in nutrients and are acidic. Canopy cover is quite variable, ranging from open canopy woodlands with as little as 20% cover of evenly spaced canopy trees to closed canopy forests with 80 to 90% cover. Vascular plant diversity is usually low in these forested peatlands; however, the bryophyte and epiphytic lichen flora may be relatively diverse. Rich Sloping Fens are often surrounded by upland forest and grade into other palustrine communities such as hemlock-hardwood swamp, shrub swamp, or shallow emergent marsh downslope. The water in this wetland type contains high concentrations of minerals and high pH levels. The structure of rich sloping fens is variable; usually there are scattered trees and shrubs and a nearly continuous ground layer of herbs and bryophytes. They may be shrub-dominated or herb-dominated. Species diversity is usually very high and may include species from the surrounding forest (NYNHP, 2016).

4.8.2 Environmental Effects

In SD2, FERC identified the effects of continued Project operations and maintenance activities on state-listed species (e.g., bald eagle, common loon), natural communities, and the federally listed threatened northern long-eared bat as potential issues associated with rare, threatened, and endangered species. Each of these is discussed in detail below.

When developing the PAD, the USFWS IPaC database indicated that the federally protected northern long-eared bat may be present in the Project area. During development of this final license application, IPaC was again consulted. The results of the updated IPaC inquiry indicate that northern long-eared bat is no longer a species that may occur in the Project vicinity. No federally listed species are known to occur in the Project area. Project operations do not affect state listed species know to occur in the Project area.

The reservoir has been operated in generally the same manner for over 100 years as prescribed by various existing legal agreements to which the Power Authority was not a signatory party. The Project simply utilizes the NYSCC prescribed flow releases to generate power. The reservoir water level management regime and associated outflows would still exist regardless of the presence of the Project, as they did for almost 70 years prior to Project construction.

Although the current FERC license allows the Project to operate in a peaking mode, the results of the *Desktop Modeling of Peaking Fluctuations Study* demonstrated that the maximum difference in daily water level fluctuations as a result of peaking is 0.32 ft. (3.84 inches) for the scenarios modeled. Differences in daily water level fluctuations of less than 4 inches were only observed to occur during the colder months (i.e., February and March) and are not expected to impact biological resources, which are dormant and less active. Peaking operations which occur during biologically sensitive periods (e.g., late spring, summer, fall) result in even smaller water level differences. Given this, the results of the peaking study indicate that peaking operations have minimal impact on environment resources during biologically sensitive periods.

In addition, according to the Adirondack Communities and Conservation Program, Hinckley Reservoir does not support nesting pairs of loons, nor has it ever had chicks or immature loons reported for the period monitored. Similarly, there are no known Bald Eagle nesting sites in the immediate vicinity of the Project. For the reasons noted above, the continued operation of the Project does not affect Common Loon or Bald Eagle.

Finally, regarding natural communities, according to the Natural Heritage Program, there are no natural communities within the Project boundary.

4.8.3 Proposed Environmental Measures

The Power Authority proposes to continue existing operating conditions in the new license and is not proposing any changes with respect to rare, threatened, or endangered species.

4.8.4 Unavoidable Adverse Impacts

Continued Project operation is not expected to adversely affect rare, threatened, and endangered species.

Table 4.8.1.2-1: Federally Listed Birds of Conservation Concern

Common Name	Scientific Name
Bald Eagle	*Halieetus leucocephalus*
Canada Warbler	*Wilsonia canadensis*
Eastern Whip-poor-will	*Antrostomus vociferus*
Semipalmated Sandpiper	*Hylocichla mustelina*
Wood Thrush	*Hylocichla mustelina*

All species with the exception of Bald Eagle may only be present during the breeding season

Species list is Project Area specific using the IPaC tool.

Source: USFWS, 2019

Table 4.8.1.2-2: New York State Listed Species of Conservation or Special Concern

Common Name	Scientific Name	County	State Conservation Rank
American Bittern	*Botaurus lentiginosus*	Herkimer/Oneida	Apparently Secure
Cerulean Warbler	*Setophaga cerulea*	Herkimer/Oneida	Vulnerable (B)
Common Loon	*Gavia immer*	Herkimer/Oneida	Apparently Secure
Common Nighthawk	*Chordeiles minor*	Herkimer/Oneida	Imperiled/Vulnerable (B)
Grasshopper Sparrow	*Ammodramus savannarum*	Herkimer/Oneida	Vulnerable (B)
Horned Lark	*Eremophila alpestris*	Herkimer/Oneida	Vulnerable/Apparently Secure (B)
Red-headed Woodpecker	*Melanerpes erythrocephalus*	Herkimer/Oneida	Imperiled (B)
Vesper Sparrow	*Pooecetes gramineus*	Herkimer/Oneida	Vulnerable (B)
Whip-poor-will	*Antrostomus vociferus*	Herkimer/Oneida	Vulnerable (B)
Cooper's Hawk	*Accipiter cooperii*	Herkimer/Oneida	Apparently Secure
Northern Goshawk	*Accipiter gentilis*	Herkimer/Oneida	Apparently Secure (B)/ Vulnerable (N)
Osprey	*Pandion haliaetus*	Herkimer/Oneida	Apparently Secure (B)
Red-shouldered Hawk	*Buteo lineatus*	Herkimer/Oneida	Apparently Secure (B)
Sharp-shinned Hawk	*Accipiter striatus*	Herkimer/Oneida	Apparently Secure
Wood Turtle	*Glyptemys insculpta*	Herkimer/Oneida	Vulnerable
Blue-spotted Salamander	*Ambystoma laterale*	Herkimer/Oneida	Apparently Secure
Jefferson Salamander	*Ambystoma jeffersonianum*	Herkimer/Oneida	Apparently Secure
Extra-striped Snaketail	*Ophiogomphus anomalus*	Herkimer/Oneida	Imperiled / Vulnerable
Golden-winged Warbler	*Vermivora chrysoptera*	Oneida	Vulnerable (B)
Yellow-breasted Chat	*Icteria virens*	Oneida	Imperiled (B)

Common Name	**Scientific Name**	**County**	**State Conservation Rank**
Spiny Softshell	*Apalone spinifera*	Oneida	Imperiled/ Vulnerable
Spotted Turtle	*Clemmys guttata*	Oneida	Vulnerable

(B) Indicates a breeding population of a migratory species

(N) Indicates a non-breeding population of a migratory species

Source: NYSDEC, 2019 NY Nature Explorer

Table 4.8.1.2-3: Summary of Available Loon Census Data for Hinckley Reservoir

Year	**Number of Loons Observed**
2002	4 adults
2005	2 adults
2007	5 adults
2008	0
2009	0
2010	1 adult
2011	2 adults
2012	1 adult
2013	1 adult
2014	2 adults
2016	0
2017	0
2018	3 adults
2019	6 adults

4.9 Recreation, Land Use, and Aesthetic Resources

4.9.1 Recreation

4.9.1.1 Affected Environment

This section provides a review of existing information regarding outdoor recreation at Hinckley Reservoir. Recreational fishing is described in Section 4.5.1.7. Although hunting has been anecdotally identified as an activity engaged in at the Project, outreach to NYSDEC indicates that there is not a significant waterfowl hunting effort on the reservoir. NYSDEC does not maintain waterfowl harvest estimates for any specific area of the state nor for individual waters. No permanent duck blind structures were observed during field studies in the Project boundary. NYSDEC asserts that, due to the draining of the reservoir in the fall, blinds would be impractical most seasons. Although migratory birds use the water for roosting and loafing during migration, NYSDEC does not consider Hinckley Reservoir to be a destination hunting area and anticipates that the area sees little use by waterfowl hunters (Todd Phillips, NYSDEC, personal communication).

The Power Authority conducted the 2018 *Recreation and Public Access Study* to evaluate the existing and future recreational use, capacity, condition, and accessibility of recreation facilities in the Project area. The following subsections discuss results of the study, including recreation facilities and opportunities provided for at the Project, existing and expected future recreational use of those facilities, and recreational user perceptions of Project recreation facilities.

4.9.1.1.1 Existing Recreation Facilities and Opportunities

Recreation opportunities in the Project area include boating, camping, fishing, hiking, hunting, birdwatching, picnicking, sightseeing, and swimming. A portion of the Project lies within the Adirondack Park, a six-million-acre state park with 2.6 million acres of state-owned land open to the public for recreation. Formal public recreation sites in the Project region include Hinckley State Forest, a 1,590-acre tract south of Hinckley Reservoir offering 6.5 miles of multi-use trails and primitive camping, and Black River Wild Forest, a 127,135-acre state preserve offering seasonal access roads and foot trails.

Recreation sites and facilities within or abutting the Project include two Project recreation facilities, one of which is a FERC-mandated recreation facility (i.e., Power Authority Boat Launch); the NYSDEC Day Use Area; several informal public recreation sites; and three commercial recreation facilities. Figure 4.9.1.1.1-1 depicts public and commercial recreation facilities in the Project area, including:

- Project Recreation Facilities:
    - Power Authority Boat Launch, a FERC-mandated facility consisting of an improved boat launch maintained by the Power Authority and operated by a private concessionaire.

- Scenic Overlook, an informal pullout area off New York State (NYS) Route 365 (Route 365) just north of the dam operated by the Power Authority.

- Non-Project Recreation Facilities:
    - Hinckley Reservoir Day Use Area (Day Use Area), a State-owned park operated by the NYSDEC.
- Informal Public Recreation Sites:
    - Tailwater Fishing Area, an informal fishing area near the Project tailrace.
    - Route 365 Boat Launch, a pullout area off of Route 365 with an access trail to the shoreline that appears to be used as an unimproved cartop boat launch.
    - Route 365 Beach, a trail leading from Route 365 to a rocky/sandy beach area
    - Fly Brook Road Boat Launch, an access road that appears to be used as an unimproved boat launch.
    - The Island, an island beach accessed via boat only.
    - Boaters' Beach, a beach accessed via boat or via an informal trail beginning on Stormy Hill Road.
- Commercial Recreation Facilities:
    - Adirondack Lakeside RV Park, a seasonal RV park.
    - Camp Northwood and the affiliated Northwood Center, summer camp programs for children and young adults with special needs.
    - Trail's End Campground, an RV and tent campground with a public boat launch.

Table 4.9.1.1.1-1 summarizes the amenities provided at each site. The following subsections describe each site in greater detail.

4.9.1.1.1.1 Project Recreation Facilities

4.9.1.1.1.1.1 Power Authority Boat Launch

The Power Authority Boat Launch is an improved boat launch maintained by the Power Authority and operated by a private concessionaire. The facility, located along the north side of the reservoir on Route 365 in the Town of Remsen, is typically opened for the season just before Memorial Day weekend and remains open as long as reservoir conditions are conducive to launching a boat. In 2018, there was an $8 per vehicle fee for use of the facility. There are two gravel parking areas with a combined capacity for approximately 80 standard vehicles or 40 vehicles with trailers. Parking is allowed only for launch vehicles; overnight parking is prohibited.

The facility's 12 foot wide boat launch consists of precast concrete planks extending 200 feet into the reservoir. The entrance to the launch site is wide to allow for vehicles to queue up while waiting to access the launch. There is a length of beach on either side of the launch which allows access for canoes and kayaks. The Power Authority intends to improve the boat launch to make it accessible over a greater range of water levels. The Boat Launch currently operates down to El. 1213. Following the planned improvements, the launch will be operated down to El. 1208. Improvements are scheduled to occur as soon as the right field conditions occur (i.e., water levels low enough to enable installation of the extension).

The facility provides recreational boating access for trailered and cartop boats. Signage indicates that swimming, picnicking, and overnight parking are prohibited. The site is not ADA compliant as it does not provide adequate access to the water or designated parking spaces.

4.9.1.1.1.1.2 Scenic Overlook

The Scenic Overlook, owned and operated by the Power Authority, is an informal site located on Route 365 in the Town of Trenton adjacent to the dam, north of the spillway. The site consists of a gravel parking area with views of the reservoir and dam. The parking area has capacity for approximately 10 standard vehicles. The site is open from dawn until dusk and does not charge a fee for use. Due to the size, location, and configuration of the site, the site does not have a designated ADA parking space with signage and access aisle, and therefore is not fully ADA compliant.

4.9.1.1.1.2 Non-Project Public Recreation Facilities

4.9.1.1.1.2.1 Hinckley Reservoir Day Use Area

The Day Use Area is located on Stormy Hill Road in the Town of Russia on the south side of Hinckley Reservoir. The staffed facility, owned and operated by the NYSDEC, is typically open to the public for a fee from Memorial Day weekend through Labor Day. Facility entrance fees in 2018 were $10 per car, $5 per motorcycle, $2 per walk-in, and $50 per bus. Facility amenities include multiple picnic areas, a large beach, an informational kiosk, and bathhouses with flush toilets and handwashing sinks. The picnic areas contain 92 picnic tables, 63 charcoal grills, and three pavilions. The pavilions can be reserved for $50 per day. Canoes, kayaks, and small row boats can access the reservoir from the beach. Other amenities include a basketball court, horseshoe pit, volleyball court, and hiking and biking trails. Swimming is permitted in the designated area when a lifeguard is on duty. Two paved lots and one unpaved overflow area provide an estimated 400 parking spaces for the facility. Parking spaces are not delineated. NYSDEC is considering expansion of the Day Use Area to potentially include campsites, a playground, a bike trail system, and a trailered boat launch.

4.9.1.1.1.3 Informal Public Access Sites

4.9.1.1.1.3.1 Tailwater Fishing Area

On West Canada Creek in the Town of Trenton, immediately downstream of the Hinckley dam and Project tailrace, is an unmarked, informal access area outside of the Project boundary known as the Tailwater Fishing Area. This site is located on land owned by Erie Boulevard and is not part of the Jarvis Project. The site provides fishing access to Prospect Pond as well as a view of Hinckley Dam. The entrance to the site, located off Route 365, leads to a level parking area with capacity for approximately 10 vehicles just prior to the gate to the Jarvis powerhouse. Fencing runs from the powerhouse access gate perpendicular to the river down the embankment, terminating at the downstream end of the tailrace. The parking area and access road are located on NYS property associated with the Route 365 right of way. The parcel containing the tailwater fishing area is owned by Erie Boulevard and appears to be unmaintained. Informal footpaths lead from the embankment down to the shore.

4.9.1.1.1.3.2 Route 365 Boat Launch

Approximately 0.3 miles north of the Power Authority boat launch is a flat, grassy area between Route 365 and Hinckley Reservoir in the Town of Remsen that serves as an informal parking area with capacity for approximately 25 vehicles. A steep and narrow path leads from the parking area down to the reservoir shoreline. The path is approximately eight feet wide with a 45 degree slope and does not appear capable of accommodating an automobile or trailer, particularly due to the abrupt transition from the steep embankment to the more level shoreline. Aside from the access lane and a portion of the parking area, which are within the Route 365 right of way owned by NYSDOT, the state-owned site is under the jurisdiction of NYSCC. The site appears to provide cartop boat launching access to the Reservoir. A desktop review of aerial mapping indicates that this site may also be used as an access for all-terrain vehicles (ATVs) at moderate to low water levels.

4.9.1.1.1.3.3 Route 365 Beach

Approximately 0.25 miles east of Barnhart Road along Route 365 in the Town of Russia is a roughly 400-foot long footpath that leads through a wooded area to the north shore of Hinckley Reservoir. This informal, unmaintained trail is unmarked aside from a handmade “No Dumping” sign at the trail’s entrance. The shoreline at the site is rocky and strewn with medium to large size boulders and contains several stone fire rings. The state-owned site is under the jurisdiction of NYSCC and appears to be used for hiking and primitive camping. Site users park at their own risk on the Route 365 shoulder on the reservoir side near the trail entrance.

4.9.1.1.1.3.4 Fly Brook Road Boat Launch

Located on the southeast side of Hinckley Reservoir at the end of Fly Brook Road in the Town of Ohio is an informal, unimproved boat launch access. The site is state-owned and under the jurisdiction of NYSCC. Private seasonal residences line either side of the maintained portion of Fly Brook Road, which ends roughly 250 feet from the reservoir shoreline. An unmaintained access road continues down to the shoreline. Two parking areas, one on either side of the access road, provide parking for four standard vehicles and one vehicle with a trailer. The launch area is mostly unimproved and appears to be adequate only for smaller craft such as kayaks, canoes, or small outboard engine boats. Signage at the site prohibits blocking the access road. It appears that local camp owners maintain the site and signage. A desktop review of aerial mapping indicates that this site may also be used as an access for ATVs when the water level is low enough.

4.9.1.1.1.3.5 The Island

The Island, located roughly in the middle of Hinckley Reservoir in the Town of Remsen, is a generally forested island with several sandy beaches. The site is state-owned and under the jurisdiction of NYSCC. The site provides swimming, picnicking, hiking, sightseeing, and fishing opportunities. Anecdotal evidence indicates that the site is also used for primitive camping.

4.9.1.1.1.3.6 Boaters' Beach

Located on the south side of the reservoir northwest of the Day Use Area in the Town of Russia, Boaters' Beach is an informal beach area accessed by boat or by a roughly two mile long informal trail leading from Stormy Hill Road. Two small clearings off Stormy Hill Road provide parking for six vehicles near the trailhead. The sandy beach is roughly 70 feet long at normal pool. Signs on the trees at the informal trailhead prohibit motorized vehicles and ATVs from using the trail. The state-owned beach area is under the jurisdiction of NYSCC, and the trailhead area is under the jurisdiction of the APA. The site provides swimming, picnicking, hiking, sightseeing, and fishing opportunities. Anecdotal evidence indicates that the site is also used for primitive camping.

4.9.1.1.2 Recreational Use

FERC uses recreation days as a metric for reporting recreational use at hydroelectric projects. A recreation day is defined as each visit by a person to a development for recreational purposes during any portion of a 24-hour period. Per the *Recreation and Public Access Study,* total recreational use of public, non-commercial recreation facilities at Hinckley Reservoir was estimated to be 26,924 recreation days during the 2018 open water recreation season (Memorial Day through Columbus Day). Table 4.9.1.1.2-1 provides a breakdown of use by site. As shown, the majority of the use, at nearly 60 percent, occurred at Project recreation facilities. The Scenic Overlook experienced the highest use over the study period, with 9,923 recreation days, followed by the Power Authority Boat Launch with 6,087 recreation days. The Day Use Area accounted for nearly 19 percent of total recreational use with 5,039 recreation days. Informal recreation sites combined accounted for 5,875 recreation days, which was nearly 22 percent of total recreational use in the study area.

Table 4.9.1.1.2-2 summarizes the estimated participation in each activity type at Project recreation facilities and informal recreation sites over the study period, based on the primary activity recreationists engaged in at each site. As shown, the most popular recreation activity type over the study period was sightseeing, with roughly 26 percent of total users participating. Over 55 percent of recreational users at the Scenic Overlook were reportedly engaged in sightseeing activities, which includes driving for pleasure. The second most popular activity was motorized water use, including powerboating, which accounted for nearly 25 percent of Project-wide use.

An estimated 77 percent of recreationists at the Power Authority boat launch were engaged in motorized water use activities. Hiking/running and non-motorized boating activities, including canoeing, kayaking, and tubing, were the next most popular activities. Activities categorized as “other use,” including unidentified activities, accounted for over 14 percent of estimated recreational use. This category included a large number of users stopping briefly at the Scenic Overlook, likely for a rest before continuing the drive to their destination.

Average summer weekend and peak capacity use by site for public, non-commercial recreation facilities at Hinckley Reservoir is presented in Table 4.9.1.1.2-3. Overall, non-commercial public recreation sites at Hinckley Reservoir are used below capacity on average summer weekends. Use of these sites on peak use days is typically below 50 percent of capacity with the exception of the Power Authority Boat Launch and the Scenic Overlook, both of which saw use that exceeded site capacity on at least one peak use day during the *Recreation and Public Access Study*.

Future recreational use of the recreation sites in the Project area was projected to 2060 based on expected regional population change as well as changing rates of participation in the various recreational activities engaged in at the Project. As discussed in the *Recreation and Public Access Study*, the population of the region served by Project area recreation facilities is expected to decline by approximately 14 percent. However, participation rates for all activities engaged in at the Project are expected to increase, with the exception of fishing, which is expected to decline in popularity. The decline in population is projected to outpace gains seen from participation growth, resulting in an overall decline in participation in all activities at the Project. Table 4.9.1.1.2-4 present, for the year 2060, the projected number of recreation days by activity at Hinckley Reservoir, as compared to estimated use over the 2018 open water recreation season. As shown, recreation use at Hinckley Reservoir is expected to decline by just over eight percent to 24,684 recreation days over the open water recreation season. Motorized water use is projected to surpass sightseeing as the most popular activity engaged in at Hinckley Reservoir. Sightseeing is projected to be the second most popular activity, followed by hiking/running and non-motorized boating. Table 4.9.1.1.2-5 presents the number of recreation days projected for the 2060 open water recreation season at each of the non-commercial recreation sites in the study area as well the percent change in use from 2018 to 2060. As shown, the Tailwater Fishing Area is projected to see the greatest decline in use, followed by the Scenic Overlook and the Day Use Area. Overall, recreational use at Hinckley Reservoir is expected to decline by 8.6 percent.

The growth rate for each recreation site serves as the basis for projecting future parking lot demand and capacity for average summer weekend use. Table 4.9.1.1.2-6 provides the projected level of parking lot use (percent utilization) for 2060 at each of the recreation sites in the study area. As shown, it is projected that all non-commercial public recreation sites at Hinckley Reservoir will be utilized below capacity on average summer weekends in 2060.

4.9.1.1.3 User Perceptions of Recreation Facilities

A survey of existing recreational users was administered at Project recreation facilities and at the Tailwater Fishing Area during the *Recreation and Public Access Study*. In total, 192 surveys were administered. The survey was designed to gather information about recreational user characteristics, use patterns, and preferences. According to survey responses, 77 percent of respondents had visited the Hinckley Reservoir area before; repeat visitors reportedly visit Hinckley Reservoir an average of 23 times per year. The median distance recreationists traveled to Hinckley Reservoir was just under 17 miles. The most popular recreation activities visitors reported participating in were powerboating, swimming, sightseeing, and fishing. Visitors reported summer as the highest use season, followed by fall and spring. The majority of respondents indicated that the site they were visiting that day was not crowded, and very few reported experiencing conflicts with other users.

The majority of respondents rated aspects of Project area recreation facilities favorably. At least 50 percent of all respondents rated as “excellent” the availability of parking, site condition, adequacy of access to the reservoir, and adequacy and placement of signage. For each of those aspects, less than 10 percent of respondents assigned a rating of less than “fair.” Adequacy of facilities received a slightly less positive rating, with 44 percent of respondents assigning an “excellent” rating and 30 percent assigning a rating between “fair” and “excellent”. Although few survey responses indicated dissatisfaction with Project area facilities, respondents were invited to provide open-ended feedback on recreational facilities. The most common topic at all three recreation sites investigated was the lack of restrooms. Insufficient directional signage was another common response topic, as was access to the reservoir and parking. When asked whether or not the recreation facility they were visiting that day served their interests, nearly 96 percent responded “yes.”

4.9.1.2 Environmental Effects

In SD2, FERC identified the following issues related to recreational resources: (1) the adequacy of public access and recreational facilities to meet current and future recreation demand; and (2) the effects of Project operation and maintenance on recreational opportunities and river access within the Project area. Each of these issues is discussed in greater detail below.

Adequacy of Public Access and Recreational Facilities

Recreation sites and facilities at the Project provide adequate public access to Hinckley Reservoir and have ample capacity to meet current and future demand. Recreation sites and facilities providing access to the Project include two improved boat launches, several unimproved launches, numerous beach areas for swimming and picnicking, angler access areas including at the Project tailrace, and a scenic overlook providing views of the dam and reservoir. Activities supported by these sites include boating, camping, fishing, hiking, hunting, picnicking, sightseeing, birdwatching, and swimming. The *Recreation and Public Access Study* found Project recreation sites, including the Power Authority Boat Launch and Scenic Overlook, to be in overall good or fair condition. The study also found that recreationists at the Project rate the current recreation sites and facilities, as well as the recreation opportunities provided, positively, and indicate that the facilities serve their recreational interests.

Public, non-commercial recreation sites including Project facilities, informal sites, and the Day Use Area provide a combined total of nearly 500 parking spaces at Hinckley Reservoir. Commercial facilities provide additional parking for campers and their guests, as well as nearly 50 parking spaces for boat launch users. The *Recreation and Public Access Study* found that, based on parking area utilization, the public, non-commercial recreation sites are used at 50% or less of capacity on average summer weekends. As recreational use is projected to decline slightly over the next 40 years, the sites will continue to have ample capacity to accommodate recreational demand on average summer weekends through 2060.

Effects of Project Operation and Maintenance

Impacts to recreation opportunities resulting from the water level management regime of Hinckley Reservoir are the result of prescribed releases associated with NYSCC's Operating Diagram and not Project operations. Hinckley Reservoir has been operated in generally the same manner for over 100 years as prescribed by various existing legal agreements to which the Power Authority was not a signatory party. The Project simply utilizes the NYSCC prescribed flow releases to generate power. The reservoir water level management regime and associated outflows would still exist regardless of the presence of the Project, as they did for almost 70 years prior to Project construction. The New York State Legislature's recent decision to restructure NYSCC as an entity within the Power Authority does not alter the long-standing contractual obligations associated with the Operating Diagram, to which the Power Authority was not a signatory party. Regardless of the current corporate structure of the Power Authority and NYSCC, neither the Power Authority nor NYSCC has the unilateral legal authority to modify the Operating Diagram or the water rights granted to MVWA or Erie Boulevard through past litigation.

Although the current FERC license allows the Project to operate in a peaking mode, the results of the *Desktop Modeling of Peaking Fluctuations Study* demonstrated that the maximum difference in daily water level fluctuations as a result of peaking is 0.32 ft. (3.84 inches) for the scenarios modeled. Differences in daily water level fluctuations of less than 4 inches were only observed to occur during the colder months (i.e., February and March). Peaking operations which occur during the spring, summer, and fall result in even smaller water level differences.

4.9.1.3 Proposed Environmental Measures

The Power Authority proposes to continue existing operating conditions in the new license. More specifically, the Power Authority proposes to continue operation and maintenance of the Power Authority Boat Launch and Scenic Overlook. The Power Authority also proposes the following recreation and public access enhancements:

- Improve directional signage at the Power Authority Boat Launch and Scenic Overlook, including placing along New York State Route 365 one sign north of each site and one site south of each site indicating the sites' location ahead;
- Replace the informational kiosk at the Power Authority Boat Launch;
- Provide a portable toilet facility at the Power Authority Boat Launch during the site's operational season; and
- Improve the Power Authority Boat Launch to El. 1205. As discussed in Section 4.9.1.1.1.1.1, this improvement would allow the launch to be operated down to El. 1208.

4.9.1.4 Unavoidable Adverse Impacts

Continued Project operation will not result in unavoidable adverse impacts to recreation resources.

4.9.2 Land Use

4.9.2.1 Affected Environment

Land use classifications found throughout the upper portion of the West Canada Creek watershed (i.e., the area upstream of Hinckley Dam) as well as within 1,000 ft. of the Project boundary were discussed in Section 4.2.2. As previously noted, the land use adjacent to and within the Project boundary is typically undeveloped and predominantly characterized by various forest or wetland classifications. Within the Project area there is limited development including various roadways and residences. NYSCC has jurisdiction over nearly all land immediately surrounding Hinckley Reservoir. Beyond this state-owned perimeter, the majority of land is privately owned, with the exception of Hinckley State Forest to the south, the Power Authority Boat Launch, the NYSDEC Day Use Area, and state Wild Forest lands north of the reservoir.

The approximately 17 mile Hinckley Reservoir shoreline is within four towns: Ohio (2.7 miles) and Russia (18.3 miles) in Herkimer County, and Remsen (4.7 miles) and Trenton (0.2 miles) in Oneida County (EPA, 2001). Approximately 93% of the Hinckley Reservoir watershed is located within the Adirondack Park, including much of the Town of Russia and all of the Town of Ohio (EPA, 2001).

4.9.2.1.1 Management of Project Lands

The lands immediately surrounding Hinckley Reservoir, including those lands within the Project boundary, are owned by the People of the State of New York, under the jurisdiction of the NYSCC. In 1984, the People of the State of New York granted an easement to these lands to the Power Authority. Lands within the Project boundary are managed in accordance with federal and state regulations. NYSCC has permitting authority within the Project boundary, as governed by New York Canal Law and NYSCC regulations. The NYSCC permit program is discussed in greater detail in Section 4.9.2.1.5. In general, Project operations and maintenance, along with recreation, are the primary activities that occur on Project lands.

Management of lands external to the Project boundary fall under the jurisdiction of the town or county in which they are located. In addition to town or county regulations, land uses within the Adirondack Park are also subject to APA regulations.

4.9.2.1.2 Protected Rivers

The Project site is not located within or adjacent to any river segment that is designated as a part of, or under study for inclusion in, the National Wild and Scenic River System (NWSRS, 2016) or included in the Nationwide Rivers Inventory (NPS, 2016).

New York State's Wild, Scenic and Recreational Rivers Act (WSRRA) protects rivers with outstanding scenic, ecological, recreational, historic, and scientific values (NYSDEC, 2016g). NYSDEC administers the WSRRA and has implemented regulations affecting the management, protection, enhancement, and control of land use and development on designated river areas. The APA administers the WSRRA for private lands within the Park boundary (NYSDEC, 2016g). West Canada Creek is a designated river under the WSRRA (NYSDEC, 2016g). The Act defines Wild Rivers as free of impoundments and generally inaccessible except by trail, with watersheds or shoreline essentially primitive and waters unpolluted. Scenic River Areas are defined as free of impoundment, with shorelines or watersheds still largely primitive and shorelines largely undeveloped, but accessible in places by roads. Recreational River Areas are readily accessible by road or railroad, may have some development along their shorelines, and may have undergone some impoundment or diversion in the past. West Canada Creek is designated as Wild for approximately 7 miles from the headwaters, Scenic for the next approximately 17 miles, and finally Recreational for approximately 9 miles, ending at the Harvey Road Bridge crossing just upstream from Hinckley Reservoir. The remainder of West Canada Creek, including the sections within the Project boundary, is not classified under the WSRRA.

4.9.2.1.3 National Trails System and National Wilderness Preservation System

No Project lands are included in, or under study for inclusion in, the National Trails System or the National Wilderness Preservation System.

4.9.2.1.4 The Adirondack Park

The State of New York created the Adirondack Park in 1892 to protect water and timber resources on state-owned and private lands. The Park encompasses approximately 6 million acres, nearly half of which is constitutionally protected as a "forever wild" State forest preserve. In 1971, the New York State Legislature created the APA to develop long-range land use plans for lands within the Park boundary, commonly referred to as the "Blue Line". The APA prepared two plans: the State Land Master Plan, signed into law in 1972, and the Adirondack Park Land Use and Development Plan, signed into law in 1973. Although the APA develops and updates land use policy and administers permits for land use within the Park, the NYSDEC is charged with the custody and management of State lands in the Park (APA, 1979).

4.9.2.1.5 Shoreline Management

There are a number of private residences adjacent to the reservoir that use Project lands for fishing, boating, swimming, and other forms of recreation. Applicants wishing to develop or use Project lands for dock installation or other similar activities are currently required to obtain a permit from NYSCC. NYSCC may issue a 30-day revocable permit upon review by the Division Permit Engineer, the Division Canal Engineer, and the Office of Real Property Management. NYSCC real property decisions, including those relating to sales, leases, and permitting of state lands, are governed by the New York Canal Law, NYSCC Rules and Regulations, Guidelines for the Disposal or Acquisition of Canal Corporation Real Property, and NYSCC's Occupancy and Work Permit Accommodation Guidelines (NYSCC, 2020).

In addition to the NYSCC permit, applicants may be required to obtain permits from the Town, the NYSDEC, the U.S. Army Corps of Engineers (USACE), and the jurisdictional municipality. Projects within the Adirondack Park boundary may also require a permit from the APA.

4.9.2.1.6 Shoreline Buffer Zones

The Power Authority does not maintain a buffer zone around the reservoir; however, a number of Town, APA, and NYSCC regulations are in place which provide for shoreline buffers. Shoreline buffer zones vary between jurisdictional municipalities within the Project Area. NYSCC has permitting authority within the Project boundary, while lands both inside and outside of the Project boundary are under the jurisdiction of the surrounding municipalities. The Towns of Trenton, Remsen, and Russia have local regulations providing for shoreline buffers; the Town of Ohio does not. APA shoreline restrictions apply to lands within the Park boundary, including the Town of Ohio and a portion of the Town of Russia. Although shoreline restrictions vary, the minimum shoreline setback requirement for any parcel abutting the Project boundary is 50 feet.

The Town of Trenton zoning law establishes a Land Conservation District, which includes the area within 300 feet on either side of the shoreline at normal water level. Construction of new structures in this overlay requires site plan review and is prohibited within 50 feet of the shoreline at normal water level. The Town of Trenton Planning Board may enforce a smaller or larger shoreline setback on a case-by-case basis, and is required by Town zoning law to consider the slope of the land (Town of Trenton, 2000).

The Town of Remsen Lot Size and Building Law prohibits construction closer than 50 feet from the front lot line, which includes any shoreline on a public water course (Town of Remsen, 2008). The Town of Russia employs a Shoreline Overlay Zone extending 150 feet from the high mean water mark for Hinckley Reservoir, West Canada Creek, and Black Creek. Land use in this overlay zone is subject to additional restrictions, including Site Plan Approval requirements for new principal buildings excepting single- and two-family residences, minimum frontage requirements for deeded or contractual access, and a 50 foot minimum shoreline setback (Town of Russia, 2012).

APA shoreline restrictions require shoreline setbacks according to land use classification as follows:

- Hamlet and Moderate Intensity - 50 feet
- Low Intensity Use and Rural Use - 75 feet
- Resource Management - 100 feet

Docks and boathouses are exempt from these restrictions (APA, 2015). The majority of private Park lands in the Project vicinity with shoreline frontage are classified Low Intensity or Rural Use, with the exception of the Hamlet of Grant at the mouth of Black Creek and a section classified Moderate Intensity on the north shore of the reservoir, just east of the Park boundary (APA, 2014).

4.9.2.2 Environmental Effects

In SD2, FERC identified the following issue related to land use resources: the effects of Project operation and maintenance activities on land use resources within the Project area.

The continued operation of the Project, as proposed, will maintain the character of surrounding lands and will continue to provide recreational public access to Hinckley Reservoir.

4.9.2.3 Proposed Environmental Measures

The Power Authority proposes to continue existing operating conditions in the new license and is not proposing any changes with respect to land use resources.

4.9.2.4 Unavoidable Adverse Impacts

Continued Project operation will not result in unavoidable adverse impacts to land use.

4.9.3 Aesthetic Resources

4.9.3.1 Affected Environment

4.9.3.1.1 Visual Character of Project Lands and Waters

Hinckley Reservoir is surrounded primarily by deciduous forest, with areas of evergreen and mixed forest, woody wetlands, and sandy beaches. The approximately 4.23 mi^2 reservoir is long and narrow, with a maximum width of around 1.7 miles. The low rolling hills surrounding the Project Area are heavily forested and offer limited or no views of the reservoir from the peaks. The area contains rural residential development, primarily single-family residences.

Route 365 runs along the north side of the reservoir, providing limited and occasional unobstructed views of the water. Various minor and local roads offer access and occasional limited views from the south side of the reservoir. Several formal and informal recreation areas offer views of the reservoir, including the Scenic Overlook, Power Authority Boat Launch, NYSDEC's Day Use Area, and a number of informal beaches.

The Town of Russia maintains a Scenic Corridor Overlay along Route 365, Hinckley Road, and Black Creek Road "to ensure that new development along scenic rural roadways and in historic hamlets is planned so as to visually harmonize with the scenic and/or historic character of the area, and not detract from it" (Town of Russia, 2012).

Hinckley Dam consists of a 570-foot long north (right) embankment dam, a 65-foot non-overflow intake structure, a 400-foot long concrete spillway, and a 2,600-foot south (left) embankment. There are only a few public locations from which the dam may be viewed. The Scenic Overlook provides a view of the reservoir, the dam, the top of the powerhouse, and the project substation on the north side of Route 365. The spillway is visible from a bridge where Hinckley Road crosses West Canada Creek just downriver from the dam. A turnout on South Side Road near the access to the south embankment also provides a view of the dam. Both the dam and the substation can be seen from Route 365.

Views of the Project are seasonally impacted. As the deciduous trees lose their leaves, the views become less obstructed, and areas with no view in summer may offer limited or clear views of the Project in winter.

4.9.3.1.2 Scenic Attractions

The historic Village of Barneveld in Trenton and the Town of Remsen are Adirondack Park Scenic Byway communities along the Central Adirondack Trail. Hinckley Reservoir, West Canada Creek, and NYSDEC's Hinckley Reservoir Day Use Area are along the Byway, which traverses U.S. Highway 9, NY Route 28 and NY Route 8.

The Town of Russia Comprehensive Plan considers the following roads as "particularly scenic": Partridge Hill Road, Hinckley Road north of Black Creek Road, Elm Flats Road, Black Creek Road east of Grant Road, Buck Hill Road, Norris Road, Simpson Road, Military Road between Dover Road and Hinckley Road, Military Road east of Buck Hill Road, and portions of Grant Road (Town of Russia, 2005).

Trenton Falls Gorge, downriver from the Project Area, features several waterfalls that drop 300 vertical feet over the course of approximately two miles. Erie Boulevard developed a scenic trail offering views of the falls; the trail is open to the public four weekends per year (Town of Trenton, 2007).

4.9.3.2 Environmental Effects

In SD2, FERC identified the following issue related to land use resources: the effects of Project operation and maintenance activities on aesthetic resources within the Project area.

No changes are proposed to the Power Authority's management of Project lands. Continued operation of the Project, as proposed, will maintain the existing aesthetics of the area.

4.9.3.3 Proposed Environmental Measures

The Power Authority proposes to continue existing operating conditions in the new license and is not proposing any changes with respect to aesthetic resources.

4.9.3.4 Unavoidable Adverse Impacts

Continued Project operation will not result in unavoidable adverse impacts to aesthetic resources.

Table 4.9.1.1.1-1: Recreation Sites in the Project Area

Site Name	Amenities
Project Recreation Facilities	
Power Authority Boat Launch	Boat launch, trash receptacle, parking
Scenic Overlook	Overlook, parking
Non-Project Public Recreation Facilities	
Hinckley Reservoir Day Use Area	Picnic areas, pavilions, basketball court, volleyball court, horseshoe pits, beach, benches, grills, hiking and biking trails, interpretive display, potable water, flush toilets, parking
Informal Public Recreation Sites	
Tailwater Fishing Area	Angler access, parking
Route 365 Boat Launch	Unimproved cartop boat launch, parking, ATV access
Route 365 Beach	Beach, trail, camping
Fly Brook Road Boat Launch	Unimproved boat launch, parking, ATV access
The Island	Beach, camping
Boaters' Beach	Beach, trail, parking
Commercial Recreation Facilities	
Adirondack Lakeside RV Park	Unimproved boat launches, RV camping, beach, angler access, picnic area, fire pits, picnic tables, playground, potable water, pavilion, parking
Camp Northwood and Northwood Center	Unimproved boat launch, cabins, beach, angler access, basketball courts, picnic tables, potable water, showers, laundry, flush toilets, trails, trash receptacles, parking
Trail's End Campground	Boat launch, floating dock, tent camping, RV camping, beach, grills, fire pits, picnic tables, playground, potable water, pavilion, volleyball court, store, showers, flush toilets, trash receptacles, parking

Table 4.9.1.1.2-1: Use of Public, Non-commercial Recreation Sites in the Project Area, May 25, 2018 to October 8, 2018

Recreation Site	Recreation Days	Percent of Total
Project Recreation Facilities	**16,010**	**59.5%**
Power Authority Boat Launch	6,087	22.6%
Scenic Overlook	9,923	36.9%
Non-Project Public Recreation Facilities	**5,039**	**18.7%**
Hinckley Reservoir Day Use Area	5,039	18.7%
Informal Public Recreation Sites	**5,875**	**21.8%**
Tailwater Fishing Area	1,180	4.4%
Route 365 Boat Launch	1,596	5.9%
Route 365 Beach	228	0.8%
Fly Brook Road Boat Launch	57	0.2%
The Island[1]	2,627	9.8%
Boaters' Beach[2]	6,104	22.7%
Study Area Total	**26,924**	**100.0%**

[1]As this site is only accessible by boat, users are assumed to be included as Power Authority Boat Launch users. They are not included toward Project total to avoid double counting.
[2] Includes users accessing the site via the Power Authority Boat Launch and Stormy Hill Road. To avoid double counting, only users accessing the site via Stormy Hill Road are included toward the study area total; 2,814 users are estimated to have used the trailhead during the study period.

Table 4.9.1.1.2-2: Participation Rate by Activity and Recreation Site, May 25, 2018 to October 8, 2018

Activity Type	Power Authority Boat Launch	Scenic Overlook	Tailwater Fishing Area	Route 365 Beach	Route 365 Boat Launch	Boaters' Beach Trailhead	Fly Brook Road Launch	Weighted Total
Camping	0.0%	0.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.3%
Fishing	3.6%	3.3%	65.7%	0.0%	0.0%	0.0%	0.0%	6.0%
Hiking/running	0.0%	8.6%	0.0%	100.0%	0.0%	100.0%	0.0%	17.8%
Mountain/road biking	0.0%	1.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.6%
Picnicking	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Sightseeing[1]	0.6%	55.6%	14.5%	0.0%	0.0%	0.0%	0.0%	26.2%
Swimming	0.0%	1.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.6%
Water use, motorized	77.3%	2.0%	0.0%	0.0%	28.6%	0.0%	100.0%	24.7%
Water use, non-motorized	15.8%	0.7%	10.0%	0.0%	57.1%	0.0%	0.0%	9.4%
Other use[2]	2.7%	26.5%	9.8%	0.0%	14.3%	0.0%	0.0%	14.4%

[1]Includes birding, wildlife viewing, photography, and driving for pleasure.
[2]"Other use" includes use that was not identified; this may include both recreational and non-recreational use.

Table 4.9.1.1.2-3: Average Summer Weekend and Peak Use by Site[1], May 25, 2018 to October 8, 2018

Recreation Site	Available Spaces	Average Summer Weekend		Peak Use Observed	
		Spaces in Use[2]	Percent Capacity	Spaces in Use[2]	Percent Capacity
Project Recreation Facilities					
Power Authority Boat Launch[3]	50	15	30%	91	182%
Scenic Overlook	10	5	50%	12	120%
Non-Project Public Recreation Facilities					
Hinckley Reservoir Day Use Area	400	35	9%	183	46%
Informal Public Recreation Sites					
Tailwater Fishing Area	10	1	10%	2	20%
Route 365 Boat Launch	25	3	12%	9	36%
Route 365 Beach	n/a	1	n/a	4	n/a
Fly Brook Road Boat Launch	5	0	0%	1	20%
The Island	n/a	n/a	n/a	n/a	n/a
Boaters' Beach Trailhead	6	2	33%	4	67%

[1]Data given where available. There are no parking spaces available at Route 365 Beach and the Island; however, cars parked along Route 365 near the trail to Route 365 Beach were tallied during *Recreation and Public Access Study* spot counts.
[2]Rounded up to nearest whole number.
[3]Capacity estimated at 50 spaces based on *Recreation and Public Access Study* data estimating the use ratio of vehicles without trailers to vehicles with trailers at 43:57.

Table 4.9.1.1.2-4: Projected Recreation Use by Activity Type, 2060

Recreation Activity	2018 Estimated Use (Recreation Days)	2060 Projected Use (Recreation Days)	Percent (%) of 2060 Recreation Use
Camping	81	71	0.3%
Fishing	1,615	1,357	5.5%
Hiking/running	4,792	4,459	18.1%
Mountain/road biking	162	160	0.7%
Sightseeing	7,054	6,236	25.3%
Swimming	162	152	0.6%
Water use, motorized	6,650	6,474	26.2%
Water use, non-motorized	2,531	2,270	9.2%
Other use[2]	3,877	3,504	14.2%
Project Total	26,924	24,684	100.0%

[1]Includes birding, wildlife viewing, photography, and driving for pleasure.
[2]"Other use" includes use that was not identified during the *Recreation and Public Access Study*; this may include both recreational and non-recreational use.

Table 4.9.1.1.2-5: Projected Recreation Days by Site, 2060 Open Water Recreation Season

Recreation Site	Estimated Recreation Days - 2018 Study Period	Projected Recreation Days – 2060 Open Water Recreation Season	Percent Growth, 2018 to 2060
Project Recreation Facilities	**16,010**	**14,697**	**-8.2%**
Power Authority Boat Launch	6,087	5,808	-4.6%
Scenic Overlook	9,923	8,889	-10.4%
Non-Project Public Recreation Facilities	**5,039**	**4,554**	**-9.6%**
Hinckley Reservoir Day Use Area	5,039	4,554	-9.6%
Informal Public Recreation Sites	**5,875**	**5,367**	**-8.6%**
Tailwater Fishing Area	1,180	1,013	-14.2%
Route 365 Boat Launch	1,596	1,468	-8.0%
Route 365 Beach	228	212	-6.9%
Fly Brook Road Boat Launch	57	55	-2.6%
The Island[1]	2,627	2,557	-2.6%
Boaters' Beach[2]	6,104	5,822	-4.6%
Project Total[3]	**26,924**	**24,618**	**-8.6%**

[1]As this site is only accessible by boat, users are assumed to be included as Power Authority Boat Launch users. As such they are not included toward Project total to avoid double counting.
[2] Includes users accessing the site via the Power Authority Boat Launch and Stormy Hill Road. To avoid double counting, only users accessing the site via Stormy Hill Road are included toward Project total.
[3]As these totals were calculated based on each sites' participation rates, these totals differ slightly from those in Table 4.9.1.1.2-4.

Table 4.9.1.1.2-6: Projected Average Summer Weekend Use by Site, 2060[1]

Recreation Site	Available Spaces	2060 Spaces in Use, Average Summer Weekend[2]	Percent Capacity
Project Recreation Facilities			
Power Authority Boat Launch[3]	50	15	30%
Scenic Overlook	10	5	50%
Non-Project Public Recreation Facilities			
Hinckley Reservoir Day Use Area	400	32	8%
Informal Public Recreation Sites			
Tailwater Fishing Area	10	1	10%
Route 365 Boat Launch	25	3	12%
Route 365 Beach	n/a	1	n/a
Fly Brook Road Boat Launch	5	0	0%
The Island	n/a	n/a	n/a
Boaters' Beach Trailhead	6	2	33%

[1]Data given where available. There are no parking spaces available at Route 365 Beach and the Island; however, cars parked along Route 365 near the trail to Route 365 Beach were tallied during *Recreation and Public Access Study* spot counts.
[2]Rounded up to nearest whole number.
[3]Capacity estimated at 50 spaces based on *Recreation and Public Access Study* data estimating the use ratio of vehicles without trailers to vehicles with trailers at 43:57.

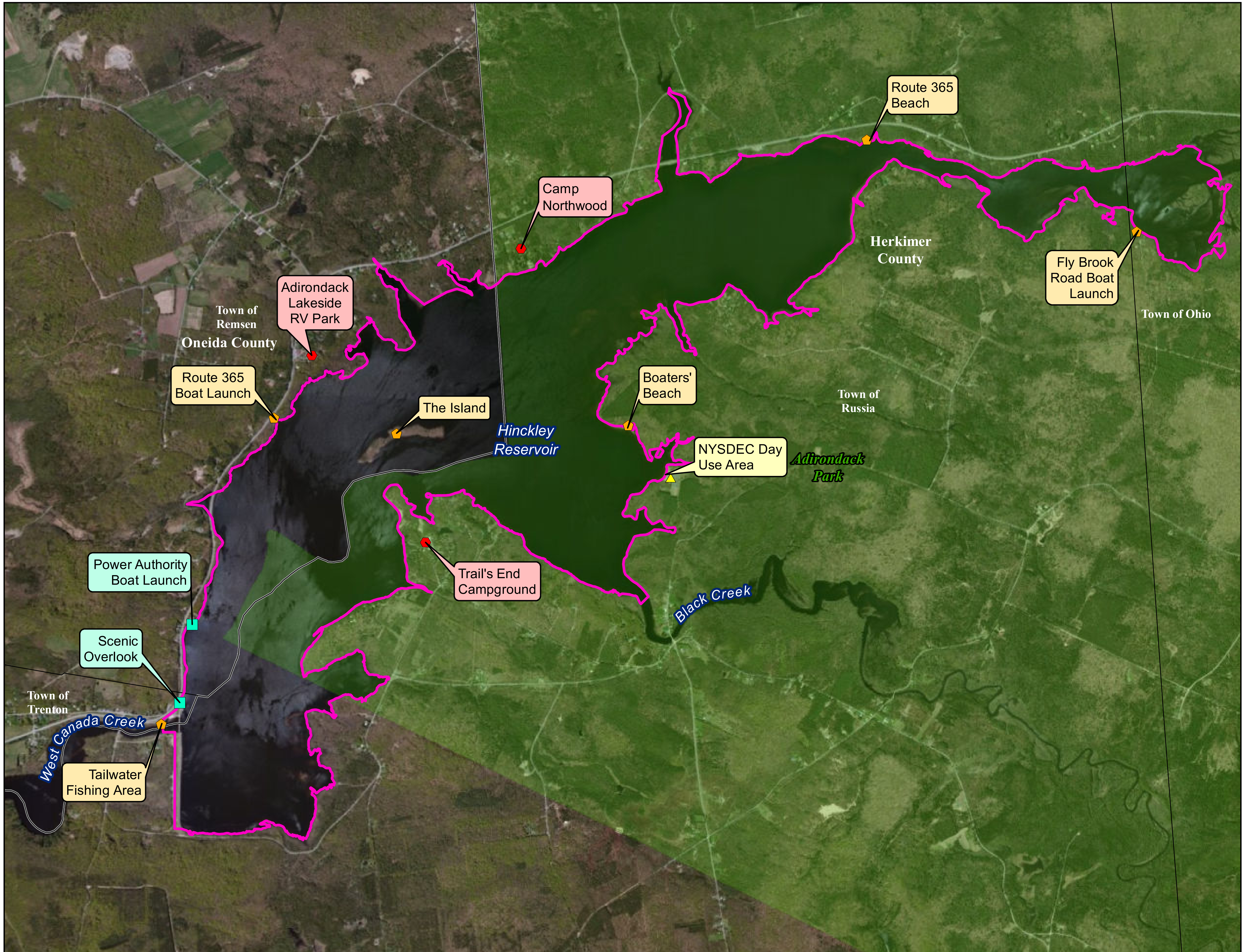

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Figure 4.9.1.1.1-1:
Recreation Sites in the Project Area

Legend

- FERC Project Boundary
- Project Recreation Facility
- Non-Project Public Recreation Facility
- Informal Public Recreation Site
- Commercial Recreation Facility
- Adirondack Park Boundary

N

Service Layer Credits: Esri, Garmin, GEBCO, NOAA NGDC, and other contributors
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

0 1,250 2,500 5,000 Feet
1 inch = 2,500 feet

NEW YORK STATE OF OPPORTUNITY. | NY Power Authority

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4.10 Cultural Resources

4.10.1 Affected Environment

4.10.1.1 Cultural Resources Introduction and Geographic Overview

On January 23, 2018, the Power Authority submitted an Area of Potential Effects (APE) justification letter, map, and shapefiles to the State Historic Preservation Office (SHPO) for their review. By letter dated March 14, 2018, the SHPO noted that they concurred with the proposed APE. Copies of this correspondence are included in Appendix E. The SHPO approved APE is shown in Figure 4.10.1.1-1.

As stated in the RSP, the Power Authority did not conduct cultural resource studies nor does it propose to develop a Historic Properties Management Plan (HPMP). The Hinckley Dam and Reservoir are discontiguous contributing properties of the New York State Barge Canal, which was designated as a National Historic Landmark (NHL) in January 2016. The majority of the Project boundary and APE are located within said NHL. In addition, the powerhouse itself is less than 50 years old and is currently not eligible for listing in the National Register. Finally, the properties noted above will not be affected by the continued operation of the Project. Although cultural resource studies were not conducted, research characterizing the cultural history of the Project area was conducted as part of licensing.

Research was conducted using the New York State Cultural Resource Information System (CRIS), which is maintained by the SHPO and the Division for Historic Preservation (DHP) within NYS Office of Parks, Recreation, and Historic Preservation (OPRHP). CRIS contains a comprehensive inventory of archeological sites, State and National Register (NR) properties, properties determined eligible for the NR (NRE), and previous cultural resource surveys.

4.10.1.2 Archeological Sites

An examination of CRIS identified eleven reported archeological sites within two miles of the Project (Table 4.10.1.2-1). Previously reported archeological sites provide an overview of both the types of sites that may be present in the Project and relation of sites throughout the surrounding region. The presence of few reported sites, however, may result from a lack of previous systematic survey and does not necessarily indicate a decreased archeological sensitivity within the Project.

The reported sites include three precontact sites and eight historic sites. Seven of the sites were identified during the archeological study for the Iroquois Gas Transmission system (IGTS) pipeline located to the southwest of the Project. Another three historic sites in the village of Hinckley were identified during a 2009 study for the proposed sewer system (Rush & Keck, 2009).

Seven of the historic period sites were scatters of materials associated with 19th and early 20th-century farmsteads and houses associated with the industrial development of the Hinckley area. The “traces of occupation” precontact site to the north of Hinckley is part of a large group of sites reported by Arthur C. Parker, the state archeologist, in the 1920s. Parker rarely visited or investigated the sites but instead relied on local informants and mapped the sites based on written descriptions. The other two precontact sites were lithic scatters, or the waste debris from the production of stone tools. Since no diagnostic material was recovered, the dates of these sites are unknown.

4.10.1.3 Historic Properties

An examination of CRIS identified one property listed on the National Register (NRL) (Table 4.10.1.3-1) within two miles of the Project boundary, the Hinckley Dam and Reservoir. Both are discontiguous contributing properties of the Barge Canal. The listing encompasses the entire Project boundary.

The Trenton Falls Dam and powerhouse lie downstream of the Project (but beyond the 2-mile radius) along West Canada Creek. Both are considered eligible for the National Register (Figure 4.2.4-1). The Trenton Project dates back to the late 19th and early 20th century and represents an early example of hydroelectric generation in the State. Also eligible is a nearby bridge, built between 1906 and 1918, that is not related to the hydroelectric facility. Slightly further downstream is the Nine Mile Creek Feeder Dam (Morgan Dam). Like the Hinckley Dam and Reservoir, this dam and its associated gatehouse are included as contributing elements (Discontiguous Features) to the broader New York State Barge Canal NHL.

None of the properties will be adversely affected by the continued operation of the Project. The powerhouse itself is less than 50 years old and is currently not eligible for the National Register, according to the criteria developed by the National Park Service. However, it is included in the National Register nomination form for the NYS Barge Canal Historic District as a non-contributing element.

4.10.1.4 Previous Surveys

A review of CRIS identified eight previous surveys within two miles of the Project (Table 4.10.1.4-1). The closest archeological survey occurred on Old Main Street in the hamlet of Hinckley, Town of Trenton. No archeological sites were identified in the shovel testing program near the hydroelectric facility (Abel, 2011). Three sites were identified downstream in the Village of Hinckley (see A06520.000077 through 79 in Table 4.10.1.2-1). None of the sites are within the Project boundary. A survey of the old Hinckley Road Bridge did not identify any historic or archeological properties (New York State Museum, 1984). A large survey for a natural gas pipeline passed approximately 1 mile south of the Project. Seven sites were identified within the vicinity, including two small precontact sites and five sites associated with the commercial/industrial development of the Hinckley area (Garrow & Associates, 1990). None of the sites identified in these surveys were subjected to extensive excavations, nor were they determined to be eligible for the National Register.

4.10.1.5 Precontact Background

Although the middle portions of the Mohawk Valley have been the subject of intensive archeological study (Snow, 1994, 1995), the upper portion of the valley and especially the smaller tributaries such as the West Canada Creek have received far less scholarly attention. As a result, much of what is known about the precontact period in this portion of the valley is based on inference from nearby locales.

The first evidence of human occupation in New York State dates to the Paleo-Indian period (10,500-8000 B.C.), shortly after the last ice age. The environment and climate of this period was in rapid flux, with dramatic warming and cooling periods. The megafauna of the Pleistocene had become extinct and human hunters in New York focused on caribou, elk, and deer.

This period of time is poorly defined in the Northeast and is recognized by sporadic surface finds of “fluted” projectile points. Paleo-Indian peoples were organized in small mobile bands of hunters with groups that usually contained about 25 people. The identification of Paleo-Indian remains along with extinct types of fauna is consistent with other sites from this period in North America. Dependence on game animals was probably only one part of the Paleo-Indian subsistence as shown by excavations in Pennsylvania along the Delaware River, which have produced evidence of fishing and wild plant collection by Paleo-Indian groups (Ritchie, 1969). In general, there are few known Paleo-Indian sites along the West Canada Creek. Surface finds of “fluted” points are more common along the principal terraces of the Mohawk River at lower elevations.

The climate continued to change but was becoming progressively more stable, and New York State was covered with essentially a modern, mixed, hardwood forest. Human populations slowly began to increase. There is evidence of increased mobility and perhaps wider distribution of population throughout the Northeast during this time, which defines the Archaic period (8000-1000 B.C.). During the Archaic, mobility was influenced by the extraction of food and other subsistence resources within limited areas. Seasonal campsites by small bands were common, and food procurement activities occurred in various areas as the seasons progressed (Ritchie, 1969).

Studies of sites associated with the Archaic period have shown that a wide variety of subsistence patterns existed prior to the presence of horticulture and ceramics, which are indicators of semisedentary lifestyles. The utilization of such a variety of food sources necessitated a nomadic type of settlement pattern. For example, small hunting camps, fishing stations, shellfish collecting and gathering sites are associated with these groups, as are large multi-activity sites (Ritchie, 1969).

Following the Archaic, the Woodland period (1000 B.C.-A.D. 1600) was marked by increased sedentism and increased population density as precontact groups established fixed home bases. There is evidence of large-scale storing of food resources in pits excavated into the ground and in large ceramic vessels. Populations began settling in more resource-rich lowlands. By A.D.

1100, the Northern Iroquoian linguistic culture began moving up the Susquehanna Valley and east into the Mohawk Valley during the medieval optimum global warming period (Snow, 1994). During this phase, palisades and earthworks begin to appear in the archeological record, as well as a close association of living space with agricultural space. Longhouse and settlement improvements appear. This period is also characterized by increased warfare and elaborate matrilocal settlement patterns (Snow, 1994). This phase lasted until about A.D. 1350 and seems to be the direct predecessor to the Iroquois (Snow, 1994).

The late Woodland period, the last stage of precontact history in the Northeast, was characterized by population expansion that resulted in the development of the nations and tribes, such as the Iroquois, that were later encountered by European settlers. This portion of the Mohawk River lay between two major tribal groups, the Mohawk to the east and the Oneida to the west. During the late 17th and early 18th centuries, these Iroquoian groups — antagonistic towards Native populations allied with the French colonists to the north — were under near-constant pressure from French attacks. In addition, French Jesuit missionaries commonly proselytized among the larger villages. As a result, Native settlement moved frequently, but no substantial villages are known in the West Canada Creek drainage area (Snow, 1994). Many Natives began to emigrate out of the Mohawk Valley throughout the early 18th century as German Palatine settlers flooded into the rich farmlands (Fenton & Tooker, 1978). Iroquoian groups were further marginalized in the Mohawk Valley after the Revolutionary War. The Mohawk sided with the English, largely due to the investment of Sir William Johnson into diplomacy with the tribe before the war. Conversely, the Oneida sided with the Americans under the influence of Reverend Samuel Kirkland (Campisi & Tooker, 1978). Despite their allegiances, both tribes lost significant territory after the war, as the newly formed American government parceled out former tribal lands as rewards to soldiers and officers in the war, especially on the north side of the Mohawk Valley.

In summary, the upper West Canada Creek is located in an area known to have been frequented by small Native American groups. Typically, larger settlements were along the Mohawk to the south; smaller settlements and short-term encampments are more likely in upland settings. Along the West Canada Creek, which is greatly affected by local rainfall, even smaller and shorter-term Native American encampments may be expected.

4.10.1.6 Historic Background

The Hinckley Dam and Reservoir were constructed starting in 1911 to provide low-flow augmentation to the newly constructed Barge Canal during the summer months (HRWG, 2008). The New York State Barge Canal was created in response to the deteriorating conditions of the canal system, which included the Erie and Champlain Canals. Despite a major investment of $9,000,000 at the end of the 19th century, the canal system was woefully inadequate (Whitford 1922). As a result, a new barge canal system that operated largely within the Hudson and Mohawk River systems was devised, taking advantage of new engineering and technological capabilities that allowed for massive dredging of the river bottoms. The new system required additional water to elevate the level of the in-river canal. As a result, the Hinckley Dam and Reservoir (along with the larger Delta Reservoir system near Rome, NY) and the Nine Mile Creek Feeder Canal were constructed to provide water for the canal, especially during the low-flow summer months (Tippetts-Abbett-McCarthy-Stratton Engineers and Architects, 1980).

A smaller facility previously existed on the site to provide drinking water to the City of Utica. The Consolidated Water Company, a private concern, owned the rights to the water of the West Canada Creek and provided water to the City. Following the completion of the Hinckley Dam and reservoir, litigation ensued. The settlement of those suits included the creation of an Operating Diagram in 1920 to govern the operation and ensure reliable flows for the multiple water users of the West Canada Creek. In 1937, the City purchased the water supply facilities, which were later transferred to the MVWA. At the time of construction, the dam affected the water flow to the Utica Gas & Electric Companies (now Erie Boulevard) power plant at Trenton Falls. Today, the NYSCC and MVWA utilize the water impounded in the reservoir, along with the several downstream hydroelectric facilities (including the Project) (HRWG, 2008).

The Project area was not densely settled by Europeans until well after the Revolutionary War, when allotments and land grants were offered to veterans of the war. This area was formerly part of the 3rd allotment of the Royal Grant of Sir William Johnson, the crown's principal Indian agent in New York (DeWitt, 1802).

In the late 18th century, the lands on the west side of the Creek were part of a large grant to a company of investors led by Peter Servis. The grant actually benefitted Sir William Johnson and his family's holding by using the other investors as fronts. After the Revolutionary War, most of the land (not previously sold) on both sides of the Creek was confiscated by the Americans from the Loyalist Johnson family and subdivided and sold to new settlers (Benton, 1856).

The incipient Tryon County created just before the war and named after the royal governor included most of the Mohawk Valley. After the war, the county was broken into several smaller counties including Herkimer and Oneida. At the beginning of the 19th century, lands that now include the Project were situated in the Herkimer County town of Norway and the Oneida County town of Trenton. There is some suggestion that by 1810, a sawmill had already been built in the vicinity of Hinckley Dam (Durant, 1878). By 1820, the Town of Russia had annexed the area around Hinckley.

Further south and west, a sizable hamlet called Prospect had become established at this time, centered on Prospect Falls, which featured a number of prosperous mills. The area of the Project was becoming known as "Gang Mills" and later as Hinckley (Durant, 1878). By the mid-19th century, most of the area on the west side of the Creek was owned by Gardener Hinckley and family, who established a large lumbering operation near the Project. With state aid to help clear the Creek of obstacles, Hinckley could float logs downstream to his large gang sawmill to cut the timber into boards. Later, he built a planing mill as well. The village of Hinckley was officially designated as Gang Mills in 1891 in Oneida County (although part of the unofficial village extended south into Herkimer County) (Hardin & Willard, 1893).

The "gang mills," so called due to the large set of parallel saw blades that performed the cutting (unlike later circular saws), were situated on the southeast side of the Creek and were notable in their day. Many thought the mill carried the greatest capacity of horsepower of any mill in that part of the State, with an ability to cut over 5 million board feet of lumber per year. The company manufactured boards, broom handles, laths and joists, as well as boxes (Durant, 1878). Gardener Hinckley passed away in 1874, and the operations were carried on by his family and in-laws.

With the decline of hardwood in the Adirondacks to the north, many sawmills converted to process soft woods for paper products. Hinckley was no exception; by 1894 the gang mill was converted to a pulp mill and the concern was renamed Hinckley Fiber Company (New York Department of Health, 1917). The successful lumber mills at Hinckley drew the interest of the New York Central Railroad, which built a branch line to the village in 1882 that operated until about 1931 (Johnson, 2001).

The Consolidated Water Company of Utica began to draw water from behind the Hinckley Fiber Company dam around 1906. The 24-inch main followed a circuitous route, crossing over the West Canada Creek several times before reaching the city (Century Map Company, 1906, 1907). Construction of the new dam for the barge canal system began in 1911. Following the completion of the new dam, the Consolidated Water Company drew water from a pipe and valve at the southern abutment. Previously, the water was pumped from the Creek itself, just upstream of the pulp mill dam.

The Hinckley Dam was completed in 1915 under the auspices of the New York State Department of Public Works. The project required the demolition of over 50 structures on the eastern portion of the Village of Hinckley on both the north and south sides of the Creek. One of the few structures to be saved on the south side was the original Hinckley house built circa 1852, now on Cady Road (named after the chief engineer of the dam). An additional four bridges over the Creek were also removed (State of New York, 1910). The Hinckley Fiber Company's mills downstream to the west remained intact.

The new dam severely impacted the mill's ability to receive logs from their upstream land holdings and the State expressly forbade the company from floating logs over the dam. As a result, the company sued the State, and in 1918, forced a small monetary settlement and the right to float logs to the dam and remove them via a mechanical lift (Reswick, 1916). As part of the settlement, the pulp mill built a new "slasher house," sawdust bin, and conveyance system to take logs from the reservoir on the northern abutment and move them into the larger processing complex downstream about 2,000 feet (Figure 4.10.1.6-1**Error! Reference source not found.Error! ference source not found.Error! Reference source not found.Error! Reference source not found.Error! Reference source not found.**). In actuality, a saw mill, the "slasher house," took the nearly whole logs and cut them into blocks that could be more easily handled in the pulp mill. The facility included a reinforced concrete basement that housed the engines for the machinery above, covered with a two-story wood frame (Reswick, 1916). The slasher house, sawdust bin, and parts of the conveyor system are now northeast of the Project powerhouse. A portion of the conveyor system crossed over the powerhouse and current tailrace.

In 1920, the company was purchased by the Oswego Pulp and Paper Company to augment its expanding operations, though the mills at Hinckley remained in operation only for another three years. In 1924, the remaining facilities were purchased by the Consolidated Water Company and subsequently demolished and filled. In 1959, a new hydroelectric facility was constructed one mile downstream in the village of Prospect. The facility is currently owned and operated by Erie Boulevard (Bashant & Kelly, 1977).

The Hinckley Dam remained largely unchanged until the completion of the Gregory B. Jarvis Power Project by the Power Authority in 1984. Through that time, the small hamlet of Hinckley slowly contracted. Many of the 19th- and early 20th-century structures of the settlement remain downstream of the dam, except for those directly related to the pulp mills.

4.10.2 Environmental Effects

In SD2, FERC identified the following issues related to cultural resources: (1) effects of Project operation and maintenance on historic properties and archaeological resources that are included in, eligible for listing in, or potentially eligible for inclusion in the National Register of Historic Places, and (2) effects of Project operation and maintenance on any previously unidentified historic or archaeological resources or traditional cultural properties that may be eligible for inclusion in the National Register of Historical Places.

The Power Authority is not proposing any changes in the operation of the Project that would affect any potential archaeological resources that may exist within the Project's APE. The Power Authority is not proposing the construction of any new Project facilities or recreation facilities or ground disturbing activities that have the potential to impact NRHP-listed or eligible historic properties.

4.10.3 Proposed Environmental Measures

Hinckley Dam and Reservoir are discontiguous contributing properties of the New York State Barge Canal, which was designated as a National Historic Landmark in January 2016. In addition, the Project itself is less than 50 years old and is currently not eligible for inclusion in the National Register. Finally, the properties noted above will not be affected by the continued operation of the Project. For these reasons, the Power Authority believes that development of an HPMP is not warranted; however, the Power Authority will consult with the SHPO and NYSCC, as appropriate, in the event that future Project maintenance is required that could potentially have an adverse effect on cultural resources.

4.10.4 Unavoidable Adverse Impacts

Continued operation of the Project will not result in unavoidable adverse effects to cultural resources.

Table 4.10.1.2-1: Archeological Sites within Two Miles (3.2 km) of the Project

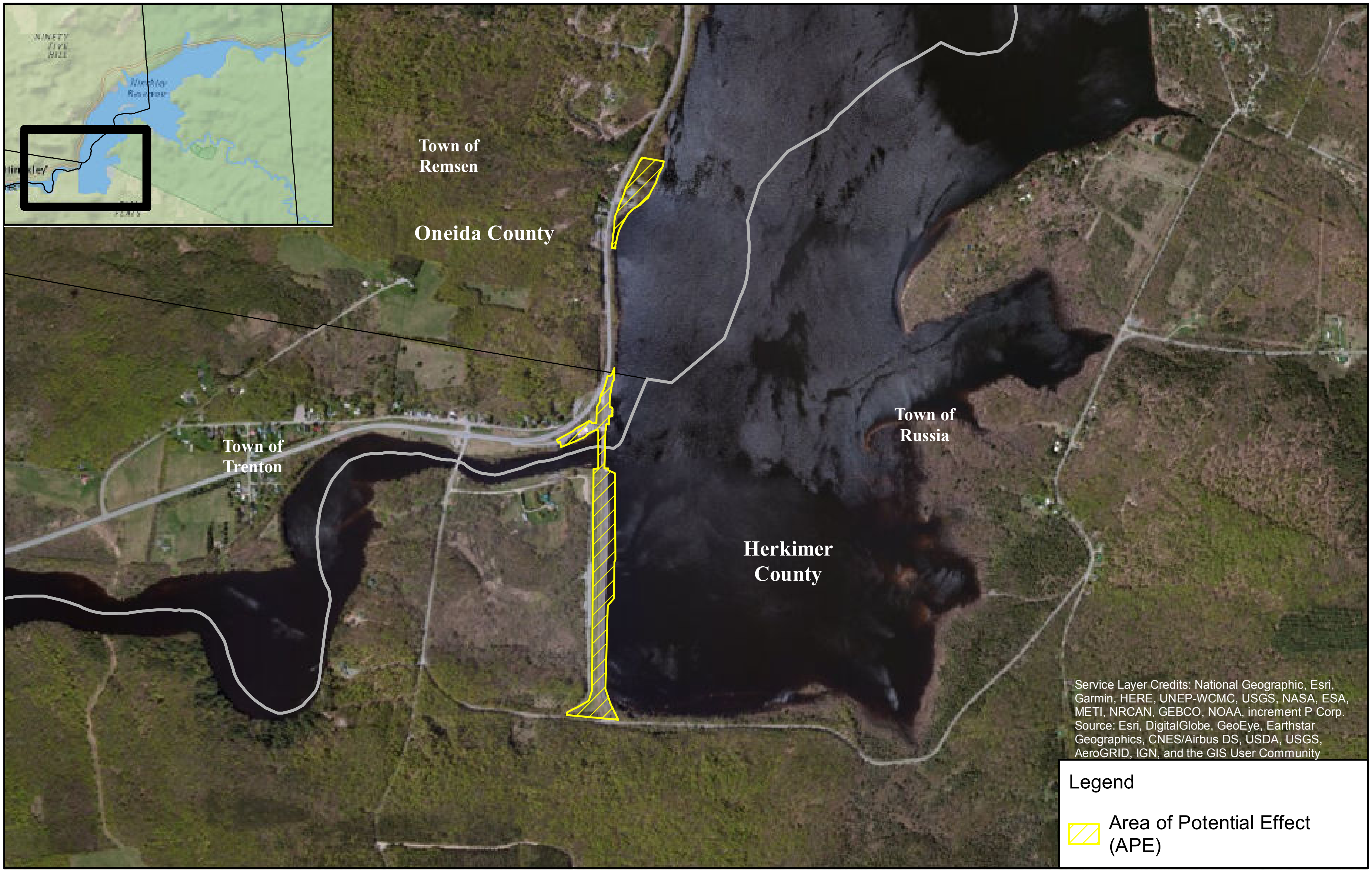
OPRHP Site No.	Status	Site Identifier	Description
06517.000003 (NYSM 4149)	Undetermined	ACP OND No #	Traces of occupation
04313.000007	Undetermined	IGTS 106A-1-1	19th- and 20th-century historic house site; filled in cellar hole; proposed pipeline runs across cellar hole, artifacts included: pearlware, pipe stem fragments, glass, nails, bone, brick and mortar
04313.000008	Undetermined	IGTS 106A-3-1	This 19th-to 20th-century farm complex includes 3 stone and mortar foundations representing a house, barn and silo
04313.000009	Undetermined	IGTS 107-1-1	This 19th-century scatter of historic artifacts include brick, glass, pearlware, redware and whiteware
04313.000010	Undetermined	IGTS 107-2-1	Precontact camp consisting of 6 chert flakes
06517.000009	Undetermined	IGTS 105A-1-1	Precontact camp consisting of 13 chert flakes
06517.000010	Not Eligible	IGTS 105-1-2	This 19th- to 20th-century historic artifact scatter incudes: glass, brick, coal, creamware, pearlware, nails, bone, metal, and 1 button
06520.000064	Undetermined	IGTS 105-1-1	19th- and 20th-century house site and associated artifact scatter; pearlware, redware, and whiteware
06520.000077	Undetermined	Union High School	Historic site of school; occupation period from 1840-1958
06520.000078	Not Eligible	7200 Block of Main Street Historic Site	Mid-19th-century historic house site; stone cellar- possible associated with Hinckley/Ballou mill
06520.000079	Not Eligible	Tax Map #161.0031-25 Historic Site	Mid-19th-century historic site; may have been a commercial property associated with the Gang Mills saw mill

Table 4.10.1.3-1: Inventoried Properties within Two Miles (3.2 km) of the Project

OPRHP USN/NR no.	Property Name	Status	Description	Proximity to Project
14NR06559	New York State Barge Canal Historic District	NHL	Waterford to Tonawanda, Whitehall, Oswego and Waterloo; 1905-1963	Within the Project boundary
06520.000014	Hinckley Dam and Reservoir	Discontiguous contributing element to New York State Barge Canal NHL	Off of NY 365; in between southwest end of Kuyahoora Lake and West Canada Creek; built between 1911-1914 to supply water for the Barge Canal; towns of Trenton and Russia	Within the Project boundary

Table 4.10.1.4-1: Relevant Previous Surveys within Two Miles (3.2 km) of the Project

Project/Phase	Summary	Citation
Hinckley Sewer District, Phase I and Addendum	No archeological sites found along Old Main Street north of current Project. Testing downstream within village of Hinckley located three historic sites.	(Abel, 2011; Rush & Keck, 2009)
Proposed New Main Post Office, Phase I	Testing along Rte. 365 in village of Hinckley, no sites located.	(Dean & Barbour, 2000)
PIN 2016.66.121, BIN 1-00950-9, NY Routes 12 and 365 Interchange, Phase I	Located downstream in Town of Trenton. No sites discovered.	(New York State Museum, 2005)
Proposed Trenton-Middleville Pole Replacement, Phase I	Survey conducted east of Trenton Falls, in Town of Russia. No archeological sites identified.	(Panamerican, 2007)
PIN 2751.01, BIN 3308030, Hinckley Road over West Canada Creek, Phase I	The survey included the downstream portion of the Project along the West Canada Creek as part of a bridge replacement project. No archeological sites identified.	(New York State Museum, 1984)
Iroquois Gas Transmission System, Volume 1- New York, Phase I	Large survey conducted for extensive pipeline across New York. Nearby testing occurred downstream of the Project approximately 1 mile. Several sites identified.	(Garrow & Associates, 1990)



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N

0 750 1,500 3,000 Feet

Figure 4.10.1.1-1:
Project Location Map Showing APE

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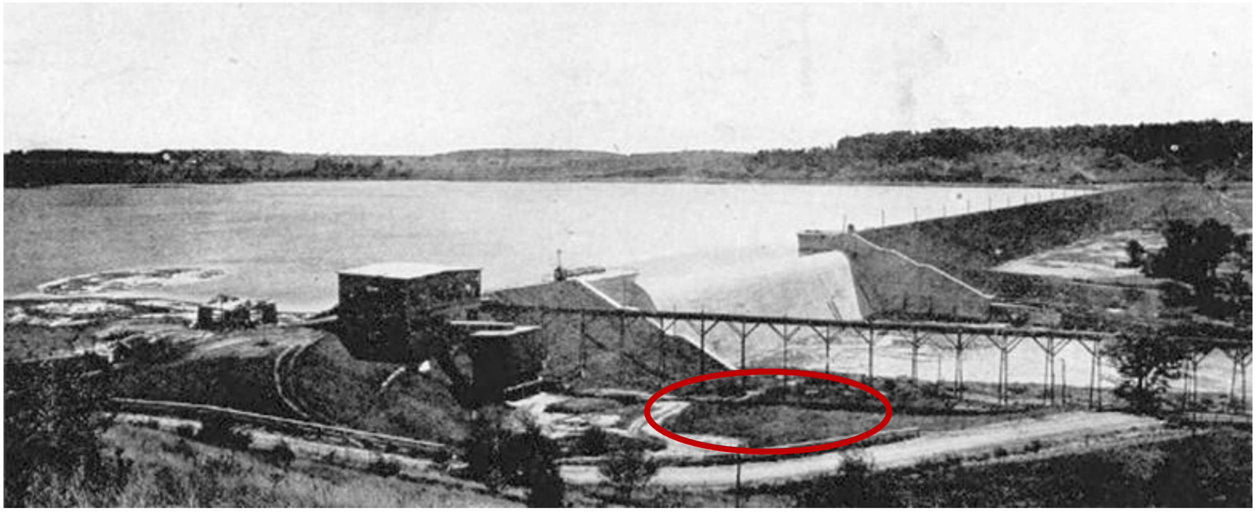

(Whitford, 1922). http://www.eriecanal.org/texts/Whitford/1921/Hinckle.jpg

Figure 4.10.1.6-1: A circa 1920 view of the Hinckley Dam with the pulp mill's log boom behind the dam, slasher house on the earthen portion of the dam, and a large conveyor system below the dam, at the site of future Gregory B. Jarvis Power Project, see circle

4.11 Socioeconomics

4.11.1 Affected Environment

4.11.1.1 Development Patterns

Hinckley Reservoir is within the Towns of Remsen and Trenton in Oneida County, and Russia and Ohio in Herkimer County. As discussed in Section 4.2.2, the Project region is primarily undeveloped and sparsely populated, with limited roadway and residential development scattered throughout the area. Table 4.11.1.1-1 presents population density at the time of the last census. While Oneida and Herkimer Counties were overall 67 and 48 percent urban, respectively, the four towns surrounding the reservoir were considered 100 percent rural. Population densities within the towns ranged from just over three persons per square mile in the Town of Ohio to over 130 in the Town of Trenton. By comparison, the density of the State of New York was 411 persons per square mile, and Oneida and Herkimer Counties had roughly 194 and 46 persons per square mile, respectively (Census, 2010).

Regional housing characteristics are presented in Table 4.11.1.1-2. As shown, vacancy rates for Oneida and Herkimer Counties are higher than that of the State of New York. Aside from the Town of Trenton, the towns abutting Hinckley Reservoir have even higher vacancy rates, with the Town of Ohio topping the list at 58 percent. These higher vacancy rates seem to reflect the higher percentage of seasonal housing units within the towns. With the exception of the Town of Trenton, with just six percent of its housing stock in seasonal use, the Towns of Russia, Remsen, and Ohio have high seasonal usage relative to their respective counties and the state as a whole.

4.11.1.2 Population Patterns and Projections

Current and historical population projections for the municipalities abutting the Project are presented in Table 4.11.1.2-1. Between 1980 and 2018, the population in Oneida County as a whole declined by 8.3 percent. The Town of Trenton in this same time frame grew by 2.8 percent, while the Town of Remsen maintained roughly the same population. During the same time frame, Herkimer County population declined by 5.7 percent, although both the Town of Ohio and the Town of Russia experienced population growth, with a 28.3 percent increase for the Town of Ohio and a 5.8 percent increase for the Town of Russia.

Cornell University's Program on Applied Demographics has developed county-level population projections for New York in five-year increments through the year 2040. The projections are based on the rates of change from historical data. Population counts from the 2010 Census serve as the starting point for the projections. As shown in Table 4.11.1.2-2, populations for Oneida and Herkimer Counties are projected to steadily decline through 2040. Based on this change, growth was extrapolated to provide population projections through 2060. As shown, collectively the population of the region is expected to decline by 14 percent over the period 2018 to 2060.

4.11.1.3 Economic and Employment Patterns

Table 4.11.1.3-1 presents 2018 labor force and unemployment estimates for the municipalities abutting the Project Area. Oneida County's unemployment rate is just below the State of New York's 6.0 percent unemployment rate, while the Towns of Remsen and Trenton are well below at 4.1 and 3.1 percent, respectively. Herkimer County's unemployment rate is higher than that of the state at 7.2 percent. The Town of Ohio has a relatively high rate at 8.9 percent, while the Town of Russia's unemployment rate matches the statewide rate.

Table 4.11.1.3-2 presents 2018 income and poverty data for the municipalities abutting the Project. As shown, all municipalities have lower median household incomes than the state as a whole with the exception of the Town of Trenton, which is nearly seven percent higher than the state and 16 percent higher than the nation. The Town of Ohio has the lowest median household income at $44,297 or 67.8 percent of the statewide median. Poverty rates for the abutting municipalities are comparable to the statewide rate, again with the exception of the Town of Trenton's 6.8 percent poverty rate, which is less than half that of the State of New York.

Table 4.11.1.3-3 depicts the percentage of the civilian population employed in the various industry categories for the abutting municipalities and the State of New York. Educational, health and social services was the highest reported industry category for all municipalities, followed by retail trade. The manufacturing industry was also well represented in each of the municipalities.

4.11.2 Environmental Effects

FERC did not identify any issues pertaining to socioeconomic resources in SD1 or SD2.

4.11.3 Proposed Environmental Measures

The Power Authority proposes to continue existing operating conditions in the new license and is not proposing any changes with respect to socioeconomic resources.

4.11.4 Unavoidable Adverse Impacts

Continued operation of the Project will not result in unavoidable adverse effects to socioeconomic resources.

Table 4.11.1.1-1: Place of Residence and Density, 2010

	Oneida Co.	Town of Remsen	Town of Trenton	Herkimer Co.	Town of Ohio	Town of Russia	NY State
Place of residence: Urban	67%	0%	0%	48%	0%	0%	86%
Place of residence: Rural	33%	100%	100%	52%	100%	100%	14%
Persons per square mile	193.7	54.4	130.7	45.7	3.3	45.4	411.2

Source: Census, 2010

Table 4.11.1.1-2: Housing Characteristics, 2017

	Oneida Co.	Town of Remsen	Town of Trenton	Herkimer Co.	Town of Ohio	Town of Russia	NY State
Housing units: Total	104,998	1,072	2,027	33,726	1,033	1,364	8,255,911
Occupancy Status: Occupied	86%	67%	86%	75%	42%	75%	89%
Occupancy Status: Vacant	14%	33%	14%	23%	58%	25%	11%
Seasonal use	4%	24%	6%	15%	52%	20%	4%

Source: Census, 2017

Table 4.11.1.2-1: Historical Population, 1980 through 2018

	1980[1]	1990[1]	2000[1]	2010[2]	2018[3]
Oneida County	253,466	250,836	235,469	234,878	232,324
Change		-1.0%	-6.1%	-0.3%	-1.1%
Cumulative from 1980		-1.0%	-7.1%	-7.3%	-8.3%
Town of Remsen	1,614	1,739	1,950	1,929	1,612
Change		7.7%	12.1%	-1.1%	-16.4%
Cumulative from 1980		7.7%	20.8%	19.5%	-0.1%
Town of Trenton	4,449	4,682	4,668	4,498	4,574
Change		5.2%	-0.3%	-3.6%	1.7%
Cumulative from 1980		5.2%	4.9%	1.1%	2.8%
Herkimer County	66,714	65,797	64,427	64,519	62,943
Change		-1.4%	-2.1%	0.1%	-2.4%
Cumulative from 1980		-1.4%	-3.4%	-3.3%	-5.7%
Town of Ohio	788	880	926	1,002	1,011
Change		11.7%	5.2%	8.2%	0.9%
Cumulative from 1980		11.7%	17.5%	27.2%	28.3%
Town of Russia	2,405	2,294	2,488	2,587	2,544
Change		-4.6%	8.5%	4.0%	-1.7%
Cumulative from 1980		-4.6%	3.5%	7.6%	5.8%
New York State	17,558,072	17,990,455	18,976,457	19,378,102	19,798,228
Change		2.5%	5.5%	2.1%	2.2%
Cumulative from 1980		2.5%	8.1%	10.4%	12.8%

[1] Vink, 2013

[2] Census, 2015

[3] Census, 2017

Table 4.11.1.2-2: Population Projections, 2010 through 2060

County	Census 2010	Projection 2018[1]	Projection 2040[2]	% Change, 2010-2040	Extrapolated Projection 2060	% Change, 2018-2060
Herkimer	64,519	61,274	52,350	-18.9%	44,237	-27.8%
Oneida	234,878	230,350	217,899	-7.2%	206,580	-10.3%
Total	**299,397**	**291,624**	**270,249**	**-9.7%**	**250,817**	**-14.0%**

[1]Interpolated from the projected change from 2010 to 2040.

Source: Vink, 2011

Table 4.11.1.3-1: Labor Force and Unemployment, 2018

	Oneida Co.	Town of Remsen	Town of Trenton	Herkimer Co.	Town of Ohio	Town of Russia	NY State
Labor Force	108,640	808	2,288	30,898	427	1,240	10,070,138
Unemployment	5.5%	4.1%	3.1%	7.2%	8.9%	6.0%	6.0%

Source: Census, 2018

Table 4.11.1.3-2: Income and Poverty, 2018

	Oneida Co.	Town of Remsen	Town of Trenton	Herkimer Co.	Town of Ohio	Town of Russia	NY State
Median household income	$53,844	$59,293	$ 69,811	$51,862	$44,297	$57,269	$65,323
Percentage of State	82.4%	90.8%	106.9%	79.4%	67.8%	87.7%	100.0%
Percentage of U.S.[1]	89.3%	98.3%	115.8%	86.0%	73.5%	95.0%	108.3%
Percent below poverty level	16.1%	11.5%	6.8%	14.6%	16.1%	12.0%	14.6%

Source: Census, 2018

[1]US Median Household Income: $60,293

Table 4.11.1.3-3: Industry by Occupation for Civilian Population 16 Years and Over, 2018

	Oneida Co.	Town of Remsen	Town of Trenton	Herkimer Co.	Town of Ohio	Town of Russia	NY State
Agriculture, forestry, fishing, hunting, mining	1.2%	1.0%	1.0%	2.4%	2.1%	2.4%	0.6%
Construction	4.8%	5.1%	5.0%	6.8%	12.6%	7.7%	5.6%
Manufacturing	9.2%	12.0%	10.5%	12.1%	12.1%	6.8%	6.1%
Wholesale trade	1.6%	3.4%	1.8%	2.8%	0.0%	1.3%	2.4%
Retail trade	11.5%	17.7%	13.1%	13.2%	12.6%	13.4%	10.4%
Transportation & warehousing, & utilities	4.3%	5.7%	4.7%	4.8%	3.3%	7.2%	5.4%
Information	1.2%	0.4%	0.1%	1.1%	1.5%	0.9%	2.9%
Finance, insurance, real estate & rental	6.9%	6.6%	6.8%	5.3%	4.1%	5.9%	8.0%
Professional, scientific, management, administrative, & waste management services	7.6%	5.2%	9.0%	6.5%	6.9%	8.8%	11.9%
Educational, health & social services	30.2%	21.9%	28.6%	28.5%	22.4%	24.9%	27.7%
Arts, entertainment, recreation, accommodation & food services	9.3%	5.8%	7.3%	7.7%	12.3%	5.0%	9.6%
Other services (except public administration)	4.8%	3.2%	4.4%	4.2%	3.9%	7.8%	4.9%
Public administration	7.4%	11.9%	7.6%	4.5%	6.2%	8.0%	4.6%

Source: Census, 2018

4.12 Tribal Resources

4.12.1 Affected Environment

There are no Native American lands, traditional cultural properties (TCPs), or religious properties within the Project boundary, nor are there known National Register-eligible or -listed sites associated with Native American Nations.

According to the Bureau of Indian Affairs and the New York State OPRHP, Native American Nations that may have an interest in the relicensing of the Project include the St. Regis Mohawk Tribe and the Oneida Indian Nation of New York. The St. Regis Mohawk Tribe and Oneida Indian Nation were consulted for the relicensing of the Project.

4.12.2 Environmental Effects

FERC did not identify any issues pertaining to Tribal Resources in SD1 or SD2. Furthermore, given that there are no Native American lands, TCPs, or religious properties within the Project boundary, the continued operation of the Project will not have any impact on Tribal resources.

4.12.3 Proposed Environmental Measures

The Power Authority proposes to continue existing operating conditions in the new license and is not proposing any changes with respect to tribal resources.

4.12.4 Unavoidable Adverse Impacts

Continued operation of the Project will not result in unavoidable adverse effects to Tribal resources.

5 Developmental Analysis

This section analyzes the cost of continued operation and maintenance of the Project under the No Action and Proposed Alternatives. Costs are associated with the operation and maintenance of the Project's facilities as well as the cost of providing proposed PME measures.

5.1 Power and Economic Benefits of the Project

The Project has two 4.5-MW horizontal Kaplan turbine/generator units with an installed capacity of 9-MW and a total estimated hydraulic capacity of 1,800 cfs. The Project generates electricity with the water that is available in accordance with the 2012 Operating Diagram. When feasible, the Project generates low-cost electricity utilizing a within day peaking schedule to align generation with demand. The NYISO market also values the installed capacity (ICAP) and ancillary services provided by generation facilities. ICAP is required by the NYISO to ensure reliability of the electric system. The NYISO market rewards those generating units capable of meeting the NYISO's reliability rules.

Table 5.1-1 provides operating revenues for the Project from 2010 through 2019. Operating revenues include revenues from wholesale customers and market-based power sales. The average annual operating revenue from 2010 to 2019 was $3.85 million but ranged between $580,000 in 2016 to over $7 million in 2011. Therefore, under the No-Action Alternative, the Project is expected to generate approximately $3.85 million annually ($133/MWh) (2020 dollars).

The estimated annual cost of Project operations includes the costs of purchased power and related expenses, fuel consumed, operation and maintenance, and administrative expenses. The Power Authority is a subdivision of the State of New York and pays no federal, state, or local taxes. As shown in Table 5.1-1, the average operational cost from the period 2010-2019 was $2.41 million per year varying between $1.70 million in 2012 and 2013 to $3.48 million in 2018. Under the No-Action Alternative, the Project is expected to have operational costs of approximately $2.41 million annually ($83/MWh) (2020 dollars). The revenue and operating costs per MWh were calculated based on average annual generation of 28,863 MWh for the period 2010-2019.

Table 5.1.1. Project Annual Revenue and Operating Costs

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	10-yr avg.
Operating Revenue (Millions)	$6.98	$7.29	$3.97	$6.15	$7.76	$2.99	$0.58	$0.89	$0.93	$0.91	$3.85
Revenue per MWh	$242	$228	$166	$257	$293	$142	$20	$24	$36	$22	$133
Operating Expenditure (Millions)	$1.71	$1.78	$1.70	$1.70	$2.69	$2.77	$2.12	$2.90	$3.48	$3.21	$2.41
Costs per MWh	$59	$56	$71	$71	$102	$132	$73	$78	$135	$79	$83

5.2 Comparison of Alternatives

5.2.1 No-Action Alternative

The No-Action Alternative would allow the Power Authority to continue Project operations under the terms and conditions of the current license, including maintaining the current Project boundary, facilities, existing PME measures listed below, and operation and maintenance procedures.

The Power Authority currently implements several measures that contribute to the protection and enhancement of environmental resources:

- Continuous minimum flow release of 160 cfs;
- Power Authority Boat Launch, which operates between water surface elevations 1213 and 1225; and
- Scenic Overlook, an informal pullout area off Route 365 just north of the dam.

Based on the data discussed in Section 5.1 the average annual revenue of Project power for the period 2010-2019 is approximately $3.85 million (2020 dollars) and the average operational cost for the same period was $2.41 million (2020 dollars).

5.2.2 Proposed Alternative

The Proposed Action is to continue to operate and maintain the Project with existing and additional environmental PME measures. The Power Authority is not proposing any new development or changes in operation. Under this alternative, the Power Authority would continue to implement the existing PME measures identified in Section 5.2.1. The alternative also includes the implementation of new PME measures that would contribute to the protection and enhancement of recreation and environmental resources. The new PME measures are the following:

- Improve directional signage at the Power Authority Boat Launch and Scenic Overlook;
- Replace the informational kiosk at the Power Authority Boat Launch;
- Provide a portable toilet facility at the Power Authority Boat Launch;
- Improve the Power Authority Boat Launch so it can operate between El. 1208 and El. 1225; and
- Dissolved Oxygen Enhancement Measure (to be determined later).[22]

The cost of the proposed PME measures at the Project, less those costs associated with DO enhancements which are currently being evaluated, is estimated to be $3,928 dollars (2020 dollars) annually during the term of the license levelized using an interest and discount rate of 7.2%, and a period of analysis and financing of 30 years.

Under the Proposed Action the average annual value of Project power is expected to remain the same as the No-Action Alternative, $3.85 million. Annual operating costs are expected to increase only $3,928 for a total of $2.41 million with the proposed environmental measures. Table 5.2.2-1 provides a summary comparing the No Action and Proposed Alternatives.

[22] The Power Authority is currently conducting a Dissolved Oxygen Enhancement Study for the Project. Upon completion of the study, the Power Authority will propose measure(s) to improve stream dissolved oxygen concentration downstream of the Project tailrace when the Project is operating.

Table 5.2.2-1: Comparison of the Power Value, Annual Costs, and Net Benefits of the No Action and Proposed Alternatives

	No Action	**Proposed Alternative**
Annual Generation (MWh)	28,863	28,863
Annual Power Value: Annual		
$ per year	3,845,000	3,845,000
$/MWh	133	133
Annual Costs		
$ per year	2,406,000	2,409,928
$/MWh	83	83
Annual Net Benefits		
$ per year	1,439,000	1,435,072
$/MWh	50	50

5.3 Cost of Environmental Measures

Costs of existing and proposed PME measures are shown in Table 5.3-1.

Table 5.3-1: Estimated Cost of Existing and Proposed Environmental Measures

Proposed PME Measure	Existing or Proposed	Capital Cost (2020 dollars)	Annual Operations and Maintenance Cost (2020 dollars)
Minimum flow release of 160 cfs	Existing	N/A	N/A
Power Authority Boat Launch for Hinckley water levels between El. 1213 and El. 1225	Existing	N/A	$12,160
Power Authority Scenic Overlook	Existing	N/A	$0
Improve directional signage at the Power Authority Boat Launch and Scenic Overlook, including placing along New York State Route 365 one sign north of each site and one site south of each site indicating the sites' location ahead.	Proposed	$1,200[1]	$130[2]
Replace existing informational kiosk at Power Authority Boat Launch	Proposed	$5,000	$0
Provide a portable toilet facility at the Power Authority Boat Launch during the site's operational season.	Proposed	$7,000[3]	$1,800[4]
Improve the Power Authority Boat Launch so it can operate between Hinckley water levels of El. 1208 and El. 1225	Proposed	$11,098	$0
DO Enhancement Measure(s)	Proposed	TBD	TBD
TOTAL		$24,298	$14,090

[1] Installation of four 12" x 18" signs or equivalent.

[2] Washing the each of the four signs twice a year.

[3] Installation of 7.25' x 5.5' concrete pad.

[4] Includes maintenance and cleaning by the portable toilet facility rental company.

6 Conclusions and Recommendations

6.1 Comparison of Alternatives

Under the No-Action Alternative, the Power Authority would continue existing operations of the Jarvis Project without any new development or changes in operation. Under this alternative, only the existing PM&E measures in the current license would be implemented. No new PM&E measures would be implemented.

Under the Proposed Alternative, the Power Authority also proposes to continue existing operations of Project without any new development or changes in operation. Under this alternative, however, the Power Authority would implement several new PM&E measures in addition to the existing measures that would contribute to the protection and enhancement of recreation and environmental resources. Proposed new measures include:

- Improve directional signage at the Power Authority Boat Launch and Scenic Overlook;
- Replace the informational kiosk at the Power Authority Boat Launch;
- Provide a portable toilet facility at the Power Authority Boat Launch;
- Improve the Power Authority Boat Launch so it can operate between El. 1208 and El. 1225; and
- Dissolved Oxygen Enhancement Measure (to be determined later).[23]

6.2 Comprehensive Development and Recommended Alternative

[This section will be completed by FERC in its NEPA document.]

6.3 Unavoidable Adverse Impacts

Continued Project operation is not expected to adversely affect geology and soils; water quantity; wildlife and botanical resources; wetlands, riparian, or littoral habitat; RTE species; recreation, land use, and aesthetic resources; socioeconomic resources; or cultural and tribal resources.

The continued operation of the Project results in occasional releases of water with DO levels below NYS standards when generation occurs during periods of reservoir stratification. The Power Authority is currently evaluating potential PME measures to address this issue.

Regarding fish and aquatic resources, while the entrainment risk to fish species at the Project is low, some entrainment of fish will occur at the Project. However, the survival of any fish passing

[23] The Power Authority is currently conducting a Dissolved Oxygen Enhancement Study for the Project. Upon completion of the study, the Power Authority will propose measure(s) to improve stream dissolved oxygen concentration downstream of the Project tailrace when the Project is operating.

through the Project turbines is relatively high.

6.4 Consistency with Comprehensive Plans

Section 10(a)(2) of the FPA requires the Power Authority to review applicable federal and state comprehensive plans, and to consider the extent to which a project is consistent with the federal or state plans for improving, developing, or conserving a waterway or waterways affected by the Project. A list of existing FERC-approved State of New York and federal plans was obtained from the Commission's website as of December 2019 (FERC 2016). FERC currently lists 49 comprehensive plans for the State of New York. Of those, the Power Authority identified the following plans as pertaining to waters in the vicinity of the Project. No inconsistencies were found.

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[24] An updated version, 2020-2025 is available but not included in the FERC 2019 List.

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Appendix A – Summary of DLA Comments Received and the Power Authority's Responses

DLA Comment Responsiveness Matrix

Affiliation / Comment ID	Stakeholder Comment	Power Authority Response
FERC-1	[With respect to the Power Authority's request for waiver of the SDR]…we believe there is a benefit to having as much of the project's relicensing information consolidated within the relicense application as possible. Therefore, your request is denied and an SDR must be filed as part of the FLA for the project.	The Power Authority prepared a SDR, which is included in Exhibit F.
FERC-2	**General** Throughout your filings, you refer to the project as the Gregory B. Jarvis Hydroelectric Project. We note, however, that the August 12, 1982 Order Issuing License (Major) identifies the official project name as the Hinckley Hydroelectric Project and there is no documentation with the Commission to officially change the name of the project. While the Commission has referred to the Hinckley (Gregory B. Jarvis) Hydroelectric Project (Jarvis Project) throughout this proceeding, the official name remains the Hinckley Hydroelectric Project. If the Power Authority of the State of New York (Power Authority) seeks to officially change the name of the project, please include that request when filing the final license application (FLA).	As stated in the FLA cover letter, the Power Authority is formally requesting that the Project's name be changed to the 'Gregory B. Jarvis Power Project', however, the reservoir will still be known as 'Hinckley Reservoir'.
FERC-3	**Initial Statement** On page 3 of the Initial Statement, you state that you are seeking concurrence from the New York State Department of State (New York DOS) that relicensing of the Jarvis Project will not affect resources within the designated coastal zone of the State of New York. Please provide all correspondence regarding this request in the FLA, including the date on which you requested concurrence from New York DOS.	The requested NYSDOS correspondence is included in Appendix A of the Initial Statement.
FERC-4	**Exhibit E – Geologic and Soil Resources** In its March 8, 2018 comments on the Proposed Study Plan (PSP), staff requested that the Power Authority provide	Additional information addressing FERC's request is provided in Section 4.3.1.6 of Exhibit E.

Affiliation / Comment ID	Stakeholder Comment	Power Authority Response
	information on any [groundwater] wells in the vicinity of Hinckley reservoir that have ceased functioning (including the location, well depth, and date the well stopped functioning), through contact with private well owners identified in New York State Department of Environmental Conservation's (New York DEC's) dataset or other information sources. While section 4.3.1.6 of Exhibit E (*Groundwater and Wells*) provides the location of residential wells near the project and information on a 1998 low-water year that affected wells near the project, no information requested by staff in its comments on the PSP was provided. So that staff has sufficient information to describe the existing condition and status of residential wells in the vicinity of Hinckley reservoir, please include the information staff requested in its PSP comments. Also, please confirm that the data source for the well information provided on Figure 4.3.1.6-1 in Exhibit E is New York DEC's well data.	
FERC-5	**Exhibit E – Aquatic Resources** Section 4.5.1.8 of Exhibit E (*Fish Entrainment and Turbine Passage Survival*) summarizes information from the Power Authority's Assessment of Fish Entrainment and Turbine Survival Report (Survival Report), filed on October 30, 2019. However, pages 63 and 64 of that report state the blade strike model for Francis turbines was used to predict turbine survival at the project. The project has horizontal Kaplan units, not Francis turbines. Therefore, please explain this discrepancy and confirm which blade strike model (Francis or Kaplan) was used to generate the turbine survival estimates provided in Table 6.3-1 of the Survival Report.	Upon review of the *Fish Entrainment and Turbine Passage Survival* report, it was determined that the correct equations were used (i.e., Kaplan equations) and that references to the Francis equations were a typographical error.
FERC-6	**Exhibit E – Terrestrial Resources and Threatened and Endangered Species** So that staff has sufficient information to conduct its analysis of project effects on state and federally listed species, please	Updated discussion pertaining to bald eagle and loon activity in the Project area is included in Section 4.8.1.2 of Exhibit E.

Affiliation / Comment ID	Stakeholder Comment	Power Authority Response
	provide in the FLA any information, through consultation with New York DEC, on bald eagle nesting activity at or near Hinckley reservoir. Also, please provide the most current data on common loon presence and breeding status within the reservoir from the Annual Loon Census or other relevant datasets.	
FERC-7	**Recreation, Land Use, and Aesthetic Resources** So that staff can adequately describe existing waterfowl hunting within the project boundary, and its effects on recreation and terrestrial resources at the project, please provide the following in the FLA (to the extent that such information is available): (1) the locations of sites within the project boundary that are commonly used by waterfowl hunters; (2) whether permanent or seasonal duck blind structures are permitted for use within Hinckley reservoir or its shoreline, or if all waterfowl hunting is done by boat; and (3) any available estimates of waterfowl harvest from Hinckley reservoir, through consultation with New York DEC.	Discussion pertaining to hunting in the Project area is included in Section 4.9 of Exhibit E.
FERC-8	**Recreation, Land Use, and Aesthetic Resources** On page 158 of Exhibit E, you describe the Power Authority Boat Launch, stating it extends 200 feet into the reservoir. On page ii of the May 8, 2019 Recreation Study Report, the Power Authority states that it "has plans in place to extend the boat launch and make it accessible over a greater range of water levels. The boat launch currently operates down to elevation 1213 and the maintenance improvements will allow it to operate down to elevation 1208." In the FLA, please clarify whether that extension has occurred.	As of the date of this filing, the boat launch improvements have not occurred. The improvements are scheduled to occur as soon as the right field conditions occur (i.e., water levels low enough to enable installation of the extension).
FERC-9	**Exhibit G** When filing the Exhibit G drawings with the FLA, please ensure all drawings are stamped by a registered land surveyor.	The Exhibit G drawings have been stamped by a registered land surveyor.

Affiliation / Comment ID	Stakeholder Comment	Power Authority Response
USFWS-1	**Fish Entrainment and Turbine Passage Survival** Section 4.5.1.8 of the DLA discusses fish entrainment and turbine passage survival. The DLA (page 113) states that "...survival of any fish passing through the Project turbines is relatively high." However, the estimated survival rates are only 70.8% to 78.1% for fish greater than 8 inches in length. That equates to a 20-30% mortality rate, which is much higher than would be found in most fish passage facilities. Even the mortality rates for smaller fish are somewhat high (7-15%). The Service will be discussing fish protection measures with the NYPA throughout the rest of the relicensing process.	For the reasons discussed throughout Section 4.5 of Exhibit E, the Power Authority is not proposing any PME measures related to entrainment or the downstream passage of resident fish.
USFWS-2	**Peaking Operations** The NYPA claims that downstream impacts are the responsibility of the West Canada Creek Project (FERC # 2701). However, the releases from Jarvis set up the flow regime for the entire West Canada Creek from Hinckley Reservoir to the junction with the Mohawk River. If the West Canada Creek Project operated in a strict run-of-river mode, any downstream fluctuations resulting from peaking operations at Jarvis would be automatically transferred downriver and would affect resources throughout the downstream reaches. In order for the Jarvis peaking operations to have no downstream effects, the NYPA is relying on the West Canada Creek Project to re-regulate the river to offset these effects. Although not strictly the NYPA's responsibility, it is clear that downstream impacts from flow fluctuations (i.e., peaking operations) are a cumulative effect that must be addressed in both licenses. The Service anticipates that the Federal Energy Regulatory Commission will examine the cumulative impacts from these two projects in determining the license conditions necessary at each project to protect the downstream aquatic resources.	Discussion pertaining to the downstream effects of Jarvis Project operations has been included in Section 4.5.2 of Exhibit E.

Affiliation / Comment ID	Stakeholder Comment	Power Authority Response
NYSDEC-1	**Exhibit A** The current trashracks on the turbine intake structure and the sluice gate do not meet recommended specifications of 1-inch-clear-spaced trashracks that have been shown to be effective on many hydroelectric projects throughout New York State. Currently, the intake trashracks provide 5 3/8-inches of clear space and the trashracks over the sluice gate are listed as providing 3 1/2-inches of clear space. New licenses issued for projects throughout New York and the northeast have incorporated 1"-clear-spaced trashracks to physically exclude most adult fish from the turbines, provide alternate downstream passage routes, and other features (e.g., reduced approach velocities, adequate plunge pools, etc.) to encourage safe downstream fish passage.	See response to USFWS-1.
NYSDEC-2	**Exhibit E** Section 1.3.2 (Studies) states that after consultation with the DEC and the U.S. Fish and Wildlife Service (USFWS), NYPA filed its study plan for the Dissolved Oxygen Enhancement Study with FERC on 15 Jan 2020. The DEC looks forward to consulting with NYPA and their consultants to address appropriate PME measures upon reviewing the results of the Dissolved Oxygen Enhancement Study and the additional analysis for the Reservoir Fluctuation Field Study.	Comment is noted.
NYSDEC-3	**Exhibit E** Section 3.1.1 (Existing Project Location and Lands) lists the Project boundary as approximately 2,794 acres while in Section 4.3.1.4 (Reservoir Shoreline and Streambanks) the DLA lists the Project boundary as approximately 2,709 acres. This discrepancy, and any subsequent analysis performed using either reported Project boundary area, should be addressed, and corrected in the Final License Application (FLA).	2,709 acres represents the surface area of Hinckley Reservoir, not the total acreage of the Project boundary. 2,794 acres noted in the DLA represented the total area of the Project boundary. Since the filing of the DLA, another minor revision to the Project boundary has occurred, bringing the total acreage within the Project boundary as shown in Exhibit G to approximately 2,799 acres.

Affiliation / Comment ID	Stakeholder Comment	Power Authority Response
NYSDEC-4	**Exhibit E** Section 3.1.2.2 (Non-Overflow Intake) reports that the calculated water velocity measured approximately 1-foot in front of the intake trashracks is 2.57 ft./sec. The intake structure trashracks are reported to have a clear rack spacing of 5 3/8-inches and the clear spacing of the trashracks on sluice gate no. 4 is reported to be 3 ½-inches between bars. The current USFWS guidelines for the Fish Passage Engineering Design Criteria (2019) recommend a velocity near the intake to be 2.0 ft./sec or less and trashrack spacing to be no more than 1-inch clear spacing.	See response to USFWS-1.
NYSDEC-5	**Exhibit E** Section 4.3.1.2.2 (Surficial Geology) states that based on the results of the analysis, approximately fifty (50) percent of the area was covered by reservoir and therefore classified as water, while; Section 4.3.1.3 (Soils) states that based on the results of the analysis, approximately fifty-one (51) percent of the area was covered by the reservoir and therefore classified as water. This discrepancy, and any subsequent analysis performed using the non-matching percentages classified as water (50 vs 51) within the Project, should be addressed and corrected in the FLA.	The percentages and classifications reported in Section 4.3.1.2.2 (Surficial Geology) and 4.3.1.3 (Soils) are based on data gathered from the NYS Museum GIS website (surficial geology) and the NRCS Web Soil Survey website (soils). Differences in percentages reflect differences in how the varying data sources were digitized. Given that this information is from other sources, and not from mapping conducted by the Power Authority, the percentages were not updated.
NYSDEC-6	**Exhibit E** Section 4.3.1.4 (Reservoir Shoreline and Streambanks) states that approximately 5,890 ft. (1.1 miles) of shoreline was classified as 'Potential Future Erosion' and approximately 14,955 ft. (2.8 miles) of shoreline was classified as 'Active or Eroded', indicating that erosion had occurred or is occurring. The DLA failed to address comments made by the DEC on the ISR and the Hinckley Reservoir Fluctuation Field Study regarding areas that clearly indicated additional shoreline erosion. Photographs on pages 46-48 in Section 3.6 (Erosion) of the Hinckley Reservoir Fluctuation Field Study where information was classified as "Eroded Bank" should be	The Power Authority received a similar comment from NYSDEC following the ISR. The Power Authority responded to the ISR comment in the August 9, 2019 *Response to Initial Study Report Comments*. As stated in the Power Authority's August 2019 response, the reconnaissance-level survey delineated bank segments based on common characteristics and erosion classifications. As is consistent with such surveys, bank delineation generally results in larger segments (e.g., >100 ft.) based on dominant traits,

Affiliation / Comment ID	Stakeholder Comment	Power Authority Response
	classified as "Active Erosion", clearly showing leaning vegetation, undercut banks, and active rill erosion.	as opposed to smaller, discrete segments (e.g., 20-50 ft.). The stage of erosion at a given segment (e.g., Active, Eroded, etc.) represents the dominant stage of that segment (considered to be greater than 50% of the segment area). Portions of a given segment may still exhibit other stages of erosion besides the dominant stage. For example, although a segment may be classified as 'Eroded', small portions of that segment may exhibit active erosion. In addition, just because a segment is classified as 'Eroded' does not necessarily mean that future erosion may not still occur under the right conditions. Regarding rill erosion, overland runoff is expected to occur down any steep bank. In some instances, this may be significant, leading to wide and deep depressions or cracks and in other instances it may be minor and surficial. The magnitude of such rills is important to keep in mind when classifying such bank segments. For the reasons noted above the Power Authority has not updated its classifications as recommended by the NYSDEC.
NYSDEC-7	**Exhibit E** Section 4.3.1.4 (Reservoir Shoreline and Streambanks) states that there is some limited streambank erosion downstream of the dam extending to the end of the Project boundary. However, Section 4.3.3 (Proposed Environmental Measures) indicates that NYPA intends to continue existing operating conditions in the new license and are not proposing any changes with respect to geology and soils resources. No PME measures are currently being proposed to ameliorate the erosion noted along the Hinckley Reservoir shoreline or the	Erosion below the dam extending to the downstream end of the Project boundary is the result of naturally occurring high flows and not Jarvis Project operations. More specifically, the observed erosion was the result of the flood of record, which occurred on November 1, 2019. Regardless, the Power Authority intends to repair the downstream erosion in 2020. Regarding Hinckley Reservoir, erosion observed throughout the reservoir is the result of high, steep

Affiliation / Comment ID	Stakeholder Comment	Power Authority Response
	streambank erosion downstream of the dam. PME measures to address the erosion issues associated with the Project should be presented in the FLA.	banks being undercut over time when water levels are at, or above, elevation 1225 (Barge Canal Datum, feet). Such processes have occurred since the reservoir was first established over 100 years ago and are not the result of Jarvis Project operations. Erosion processes were not observed in the drawdown zone. As such, the Power Authority is not proposing any PME measures pertaining to erosion observed throughout the reservoir.
NYSDEC-8	**Exhibit E** Section 4.4.3 (Proposed Environmental Measures) indicates that upon completion of the Dissolved Oxygen Enhancement Study plan, filed with FERC on 15 Jan 2020, NYPA will propose measures(s) to improve stream dissolved oxygen concentration downstream of the Project tailrace when the Project is operating. The DEC looks forward to consulting with NYPA and their consultants to address appropriate PME measures upon reviewing the results of the Dissolved Oxygen Enhancement Study and the additional analysis for the Reservoir Fluctuation Field Study to address the issue of low dissolved oxygen and erosion associated with the Project.	Comment is noted.
NYSDEC-9	**Exhibit E** Section 4.5.1.8 (Fish Entrainment and Turbine Passage Survival) states that the median monthly intake velocities at the Project are lowest during the late spring and summer and highest during the colder water period from late fall through early spring. Analysis of entrainment and impingement should account for species that breed during spring and summer seasons and account for the movement that correlates with such activity. Analysis should account for additional protection from possible impingement and entrainment of juvenile and adult life stages of a variety of fish species. As such, DEC recommends installation of 1-inch-clear-space trashracks over	See response to USFWS-1.

Affiliation / Comment ID	Stakeholder Comment	Power Authority Response
	both the intake and the sluice gate meeting standards implemented by many other hydroelectric projects in New York State and the northeast.	
NYSDEC-10	**Exhibit E** Section 4.5.1.9 (Benthic Macroinvertebrates) identifies that during the 2018 Hinckley Reservoir Fluctuation Field Study, a minimal number of snails were observed throughout the study area. The DLA fails to address the fact that these were casual observations made during a fluctuation field study and not quantifiable results that would be produced from performing a formal macroinvertebrate study with approved methodology. Such methodologies can be found in DEC Standard Operating Procedure (SOP) #208-18 for the Biological Monitoring of Surface Waters in New York State which can be found at the following URL: https://www.dec.ny.gov/docs/water_pdf/sop20818biomon.pdf	As stated in the Proposed Study Plan, the Power Authority did not propose to conduct a macroinvertebrate (or mussel) study as there is no nexus to Project operations, nor would the study inform the development of license conditions as required by FERC's study criteria. Reservoir flow releases are determined by the Operating Diagram and associated legal agreements governing reservoir operations, none of which include Jarvis Project operations. Non-peaking Jarvis operations (i.e., constant flow) have no impact on reservoir water level fluctuations or downstream flows and peaking operations have minimal to no impact. In addition, the impoundment of the downstream Prospect development backwaters to the base of Hinckley Dam.
NYSDEC-11	**Exhibit E** Section 4.5.1.10 (Mussels) states that during the 2018 Hinckley Reservoir Fluctuation Field Study no live mussel concentrations or evidence of mussel presence were observed at any location in the study area. The DLA fails to address the fact that these were casual observations made during a fluctuation field study and not quantifiable results that would be produced from performing a formal Freshwater Mussel Study with approved methodology such as the 2018 West Virginia Mussel Survey Protocols which can be found at the following URL: http://www.wvdnr.gov/Mussels/2018%20WV%20Mussel%20Survey%20Protocols.pdf	See response to NYSDEC-10. In addition, as noted in FERC's May 11, 2018 Study Plan Determination (SPD), "*the presence of mussels in the project reservoir will be assessed during the required reservoir fluctuation field study…Therefore, staff does not recommend that NYPA conduct a separate macroinvertebrate and mussel survey that is independent of…the reservoir fluctuation field study.*" The Power Authority conducted the reservoir fluctuation field study in accordance with the SPD. No live mussel concentrations or evidence of mussel presence (i.e., shells) were found at any location in the study

Affiliation / Comment ID	Stakeholder Comment	Power Authority Response
		area, which included the littoral zone of the entire reservoir. An additional mussel survey is unnecessary, would not be informative, and would not further our understanding of mussel presence in the Project area.
NYSDEC-12	**Exhibit E** NYPA proposes in Section 4.5.3 (Proposed Environmental Measures) to continue existing operating conditions in the new license and is not proposing any changes with respect to fish and aquatic resources. However, Section 4.5.4 (Unavoidable Adverse Impacts) clearly indicates that some entrainment of fish is likely to occur at the Project under its current configuration and existing operating conditions. NYPA is highly encouraged to work with both the NYSDEC and the USFWS to develop PME measures that would address the issues of fish entrainment and downstream passage.	See response to USFWS-1.
NYSDEC-13	**Exhibit E** Section 4.9 (Recreation, Land Use, and Aesthetic Resources) fails to mention any assessment of condition of the current recreational facilities with regards to Americans with Disabilities Act (ADA) guidelines and standards. This was a request made by the DEC in their 27 October 2017 review of the Notice of Intent to File Application for New License and Comments on the Pre-Application Document and Request for Studies for this Project. The DEC again reiterated the need for this type of assessment in their comments on the Proposed Study Plan on 12 March 2018.	As noted in NYSDEC's comment letter, detailed discussion pertaining to ADA compliance at formal Project recreation facilities was included in the report for the *Recreation and Public Access Study*. This is also detailed in both the Proposed and Revised Study Plans and was discussed during the ISR. The Power Authority has updated Exhibit E, Section 4.9.1.1.1.1 to include discussion pertaining to ADA.
NYSDEC-14	**Exhibit E** Section 4.9.1.3 (Proposed Environmental Measures) proposes to continue existing operating conditions in the new license. NYPA also states that it proposes to continue operation and maintenance of the Power Authority Boat Launch and Scenic	The Power Authority is proposing to extend the boat launch to El. 1205, seasonally place a temporary toilet facility (i.e., porta-potty) at the Boat Launch, and improve directional signage at the Boat Launch and Scenic Overlook. Proposed

Affiliation / Comment ID	Stakeholder Comment	Power Authority Response
	Overlook. No changes are proposed to recreation resources. The DLA fails to address any updates or modifications that would make the formal sites ADA compliant and more user friendly such as improvements to restroom amenities and increased access and parking as mentioned by the user perceptions recorded during the Recreation and Public Access Study (Section 4.9.1.1). The NYPA owned and operated boat launch should be free to use by the public (no fee for parking) and improved to allow boats to access and launch at the reservoirs lowest operating elevation of 1,195 feet. The DLA also fails to mention any planned management or improvements of the informal sites that are being used by the public which equate to approximately one-quarter of the total recreational use in the study area. There is the opportunity for NYPA to improve access and usage of the informal sites. Most of the informal sites are on property owned by NYS Canal Corporation; now under the management of NYPA. While the DLA states that continued operation of the existing operating conditions will not result in unavoidable adverse impacts to land use resources, it is clear from the Recreation and Public Use Study results that adverse impacts to the land use resources in the Project area are occurring and appropriate management plans are needed at this site to contend with the current and future recreational use.	recreation enhancements are discussed in Exhibit E, Section 4.9.1.3. Due to the short duration of typical visits to the Scenic Overlook, no toilet facility is proposed for that location. As noted in Exhibit E, Section 4.9.1.2, the *Recreation and Public Access Study* found that the Project recreation sites provide adequate public access to Hinckley Reservoir, have ample capacity to meet current and future demand, and were rated favorably by site users during the study. As such, the Power Authority does not see a need for additional site improvements, increased access to the reservoir, or parking capacity. The fee collected for use of the boat launch and parking area serves to offset the cost of site operations and maintenance. Only one respondent to the *Recreation and Public Access Study* indicated dissatisfaction with the site use fee. The extension of the boat launch from El. 1210 down to El. 1205 will allow for use of the facility over nearly all of the peak recreation season (Memorial Day through Labor Day) and the majority of the open water recreation season (May through October). Based on the water surface elevation duration analysis presented in the *Recreation and Public Access Initial Study Report*, water surface elevations below the minimum viable water level for this facility once it is extended (El. 1208) did not occur until August; such levels occurred in August less than ten percent of the time. Water surface elevations below El. 1208 occurred 30 and 40 percent of the time in September and October, respectively.

Affiliation / Comment ID	Stakeholder Comment	Power Authority Response
		The *Recreation and Public Access Study* did not identify any adverse impacts to land use resources due to current and future recreational use.
NYSDEC-15	**Exhibit E** Section 4.9.3.4 (Unavoidable Adverse Impacts) states that continued Project operation will not result in unavoidable adverse impacts to aesthetic resources. However, it is clear from the information provided in the Recreation and Public Use Study that adverse impacts to the aesthetics of the Project area are occurring and appropriate management plans are needed to contend with the current and future recreational use. This could include formalizing some of the informal public access that is occurring on the Project lands and appropriately managing and maintaining their use by the public. The DEC encourages NYPA to develop appropriate management plans and PME measures to address the informal public access that is currently affecting the resources within the Project area.	See response to NYSDEC-14.
NYSDEC-16	**General Comment** The DEC would like to continue to urge FERC to review the impacts of the Project and its peaking operations on the downstream sections of West Canada Creek. NYPA's claim that they pass what they are allowed to pass is semantically inaccurate. It is true that the Project must currently adhere to the 2012 Operating Diagram for discharge values. However, those discharge values are a daily average, allowing for extreme peaking periods. The DEC requests that FERC concurrently review the information provided by NYPA for this Project with information being filed for the West Canada Creek project (P-2709) located immediately downstream. The aquatic habitat in downstream sections of West Canada Creek would benefit if both projects were licensed to release daily average discharges at a constant rate or under higher constraints on peaking discharge.	See response to USFWS-2.

Affiliation / Comment ID	Stakeholder Comment	Power Authority Response
Trout Unlimited-1	**4.5.1.9 Benthic Macroinvertebrates** NYPA states that a minimum number of snails were observed during the 2018 Hinckley Reservoir Field Study. Earlier, however, it is stated that in 2007 DEC biologists found thousands of stranded and dehydrated snails that had died in Hinckley Reservoir due to low water levels. The obvious conclusion, not stated by NYPA, is that fluctuating water levels periodically kill thousands of snails, which might account for the fact that few were found in the 2018 Field Study. Snails are a significant food source for fish and birds.	During the 2018 *Hinckley Reservoir Fluctuation Field Study*, a minimal amount of snails were observed throughout the study area. Reservoir flow releases are determined by the Operating Diagram and associated legal agreements governing reservoir operations, none of which include Jarvis Project operations. Non-peaking Jarvis operations (i.e., constant flow) have no impact on reservoir water level fluctuations or downstream flows and peaking operations have minimal to no impact.
Trout Unlimited-2	**4 .5.2. Environmental Effects** Contrary to NYPA's analysis, peaking operations, along with periodic drawdowns of Hinckley Reservoir, do have significant impacts downstream. These impacts would be even more severe except for the mitigating influence of downstream Brookfield projects which temper these peaking operations to some extent. Despite Brookfield's role, it is obvious to impartial observers that Jarvis/Hinckley is the big dog in the West Canada kennel, and that it plays a major role in the totality of West Canada stream dynamics. It is unfortunate that FERC did not require the joint relicensing of these projects, as they share mutual responsibilities for downstream flows in the West Canada. Regardless, it is now FERC's responsibility to thoroughly examine the cumulative impacts of both of these projects on West Canada aquatic resources.	See response to USFWS-2.
Trout Unlimited-3	**Downstream Minimum Flows** It was an unexpected, though pleasant surprise to find that NYPA, in its analysis of Downstream Minimum flows, is now making the case for the mandatory licensing of Hinckley Dam. NYPA portrays itself as an innocent and powerless bystander, wholly at the mercy of flows from Hinckley governed by the	The New York State Legislature's decision to reconstitute and continue NYSCC as a subsidiary entity of the Power Authority does not eliminate the long-standing obligations associated with the 1920 or 2012 Operating Diagram that serve uses other than the Jarvis Project. Regardless of the current corporate structure of the Power Authority

Affiliation / Comment ID	Stakeholder Comment	Power Authority Response
	infamous Operating Diagram. As NYPA itself states, "if the Jarvis Project were not to exist, the same reservoir levels and water discharges would still occur in accordance with the Operating Diagram." It logically follows that if such is the case, then Hinckley, as the prime player in the control of downstream flows, cries out for licensing under all the standards previously applied by FERC in such matters. It should not be forgotten that Hinckley is owned by the New York State Canal Corporation, a creature completely within the corporate fold of NYPA, and that for real world purposes, they are one and the same. NYPA cannot hide behind the shield of the Operating Diagram to protect Hinckley from its urgent and obvious requirement to be licensed by FERC, nor can FERC any longer fail to take cognizance of the Operating Diagram and its impact on downstream flows, habitat, and power generation in the West Canada Corridor.	and NYSCC, neither entity has the unilateral legal authority to modify the Operating Diagram or the water rights granted to third parties through litigation and well-established agreements that date back nearly a century. In addition, Hinckley Reservoir and Dam are already included as project works under the current license, and the Power Authority has not proposed in this application to remove the reservoir or dam from the project works. The Power Authority has satisfied Federal Power Act requirements by acquiring sufficient property rights in the dam and reservoir for project purposes; therefore, there is no need for the NYSCC to become a joint licensee or to file a separate application to license Hinckley Reservoir and Dam.
Trout Unlimited-4	As noted in earlier correspondence and found throughout the proceeding, FERC has ample and indeed overwhelming evidence that Hinckley provides major headwater benefits to multiple users, is a principal player in downstream flows, and meets every standard for mandatory licensing. FERC has the complete regulatory and statutory power to do so and should do so forthwith.	See response to Trout Unlimited-3.
Citizens for Hinckley Lake-1	The 2012 Operating Diagram is outdated and does not take into consideration present hydrological conditions in the water shed. NYPA states on page 11 of its Draft License Application, Exhibit E – Environmental Report, that "In Comparison to the 1920 Operating Diagram, the 2012 Operating Diagram generally has a higher elevation associated with lower flows and less of a draw down in the early spring". This is not what has been observed at the lake since the 2012 Operating Diagram's inception. We have consistently experienced below average water levels, especially in the spring/early summer	It is true that the 2012 Operating Diagram does not take into consideration current hydrological conditions in the watershed but neither did the 1920 Operating Diagram. Both diagrams specify releases for a particular calendar day based on the reservoir water level. Other factors that are often taken into account in the water management of other reservoirs such as inflow, the amount of snow pack, watershed soil moisture, forecast of major storm events, etc. are ignored.

Affiliation / Comment ID	Stakeholder Comment	Power Authority Response
	leading to extreme low levels in later summer and early fall. In fact, we have seen some of the lowest levels on record during three of the last five spring seasons. The 2012 Operating Diagram draws the top 4-5 feet of water level down as quickly as possible creating many issues on shorelines, including stranded boats and docks, as well as negatively impacting habitat. The 1920 Operating Diagram never did that. This management also releases water that we can never get back and puts the lake at levels well below average throughout the summer months. We are again experience well below average levels for this spring, which seems to be a regular occurrence under the 2012 Operating Diagram.	The Operating Diagrams are only one factor that affect reservoir water level and the downstream flow release. Other factors are also inflow and deviations by Canals. Canals frequently deviates from the Operating Diagram during the summer months to maintain higher water levels when inflow is low as has happened during summer 2020. Although the Operating Diagram since June 19, 2020 has indicated that releases should be 400 cfs, the release has been 250 cfs. Similarly, for high flow conditions, the NYSCC deviates from the Operating Diagram. Prior to the Halloween 2019 storm of record, the NYSCC increased releases on October 30, 2019 from the 1530 cfs prescribed by the Operating Diagram to approximately 2,500 cfs to alleviate flooding.
Citizens for Hinckley Lake-2	The New York State Canal Corporation (NYSCC), a branch of NYPA, plays a major role in power production at Hinckley and the West Canada river system. While the NYSCC is owned and operated by NYPA, the NYSCC needs to be brought under license by FERC for the head water benefits it provide Brookfield's West Canada Creek Project (P-2701) and the water releases that provide NYPA's project. This will also ensure that NYPA/NYSCC are compensated by Brookfield.	See response to Trout Unlimited-3.
Citizens for Hinckley Lake-3	While we are against the proposal of using current operations in a new license, we are not necessarily against peaking operations under certain conditions. Peaking when water levels are higher, around 1218' and above, does not have as much of an impact on shorelines as when levels are lower. An inch or two of vertical water level drop equals to a foot or more of water level drop along a gradual pitched shoreline and flat, shallow areas. This needs to be more closely looked at as we move forward in the licensing process.	Comment is noted.

Affiliation / Comment ID	Stakeholder Comment	Power Authority Response
Citizens for Hinckley Lake-4	If Brookfield's West Canada Creek Project (P-2701) was not here, it can be assumed that Hinckley would be managed much more respectfully, similar to other human-controlled lakes in the region. There was a bad deal made many years ago that created the operating protocols for Hinckley which are no longer conducive to its uses today. The Mohawk Valley Water Authority (MVWA) has also worked itself into the situation over the years as well. These "agreements" contradict each other as the MVWA's "agreement" is that water levels must not drop below 1195'. Yet the "agreement" for Brookfield's project is that the 2012 Operating Diagram must be followed. But the 2012 Operating Diagram allows for the lake to drop below 1195'. These contradicting agreements continue to cause issues today. And as we have stated in our previous comments, there is an old common law standard that states "contracts contrary to public good are inherently invalid". These agreements are most definitely not in the best interest of the public.	Comment is noted.
Citizens for Hinckley Lake-5	A new license utilizing current operations of Hinckley Lake would be devastating for various reasons. There are most definitely better methods to manage the reservoir so that all the needs and interests of it are met, protected, and improved. Hydropower production has been the main abuser of the water way for too many years now. It is time to find a healthy balance for all. Issuing a new license utilizing current operations is not in the best interest of the public. Hinckley Lake should be managed using target water levels, keeping levels higher and steadier from May through Columbus Day weekend each year. We look forward to continue to work with FERC and all other parties as we move forward in this process.	Comment is noted.

Appendix B – Letter to Abutting Well Owners

June 18, 2020

Re: Hinckley (Gregory B. Jarvis) Hydroelectric Project, FERC No. 3211-009, Residential Well Information Request in Support of Relicensing

Dear Sir/Madam:

The Power Authority of the State of New York (Power Authority) is relicensing the Hinckley (Gregory B. Jarvis) Hydroelectric Project (FERC No. 3211) (Project) using the Federal Energy Regulatory Commission's (FERC) Integrated Licensing Process (ILP). As part of that process, FERC has requested that the Power Authority solicit feedback from abutting landowners with residential wells to determine if there are, or have been, impacts to residential wells as a result of groundwater levels.

Review of publicly available New York State Department of Environmental Conservation (NYSDEC) well information indicates that you have a residential well on property abutting Hinckley Reservoir. As such, the Power Authority respectfully requests your feedback regarding the following questions:

1. Has your well ever ceased functioning?
2. If so, during what dates did the well cease functioning?

Please provide your responses via email to Ms. Cindy Brady – Manager, Licensing (cindy.brady@nypa.gov) no later than July 10, 2020. If you have any questions regarding this request, please direct them to the undersigned at the aforementioned email. Thank you for your consideration in this matter.

Sincerely,

Cindy Brady

Cindy Brady
Manager, Licensing

Appendix C – Flow Comparison Plots

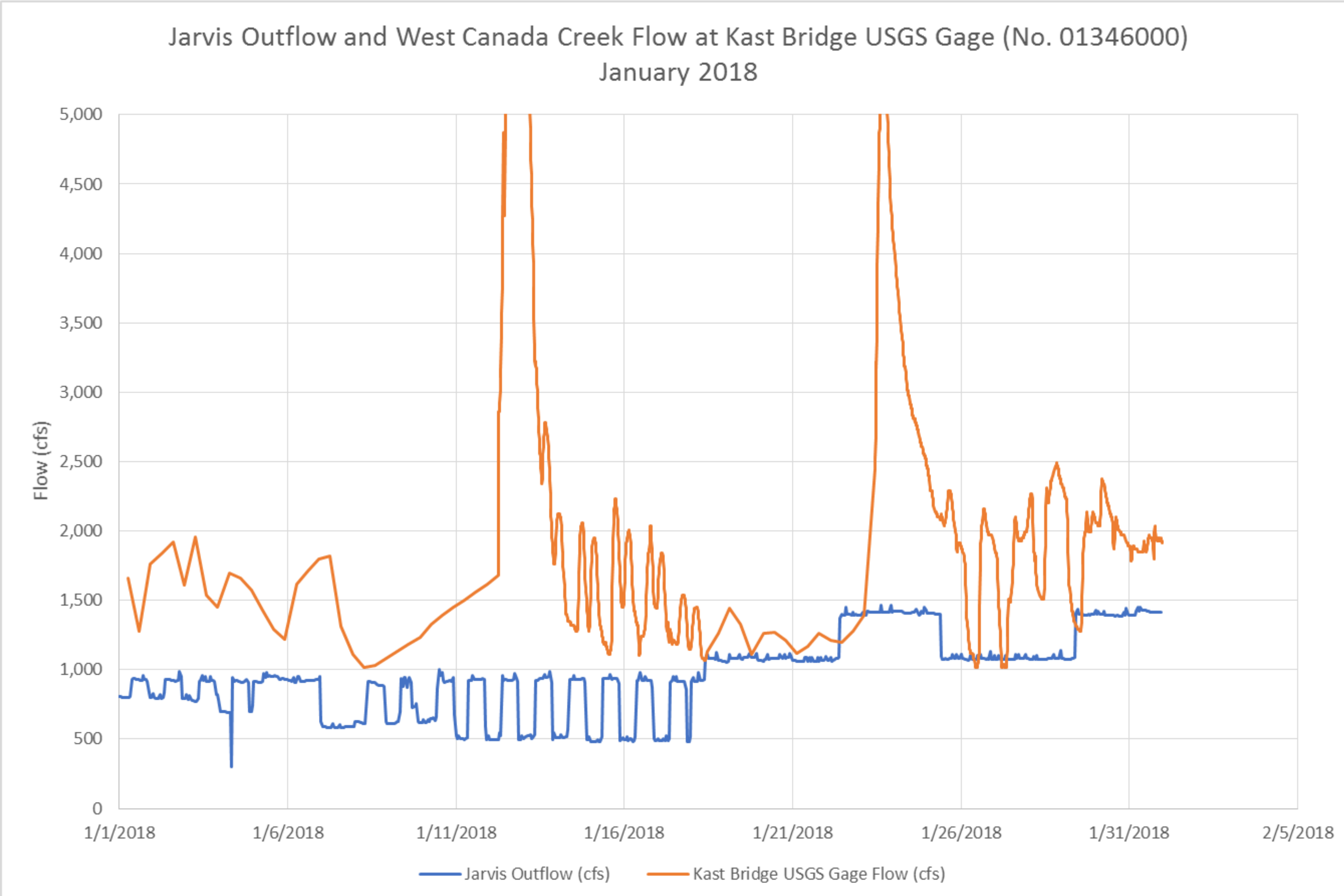

Figure C-1: Flow Comparison – January 2018

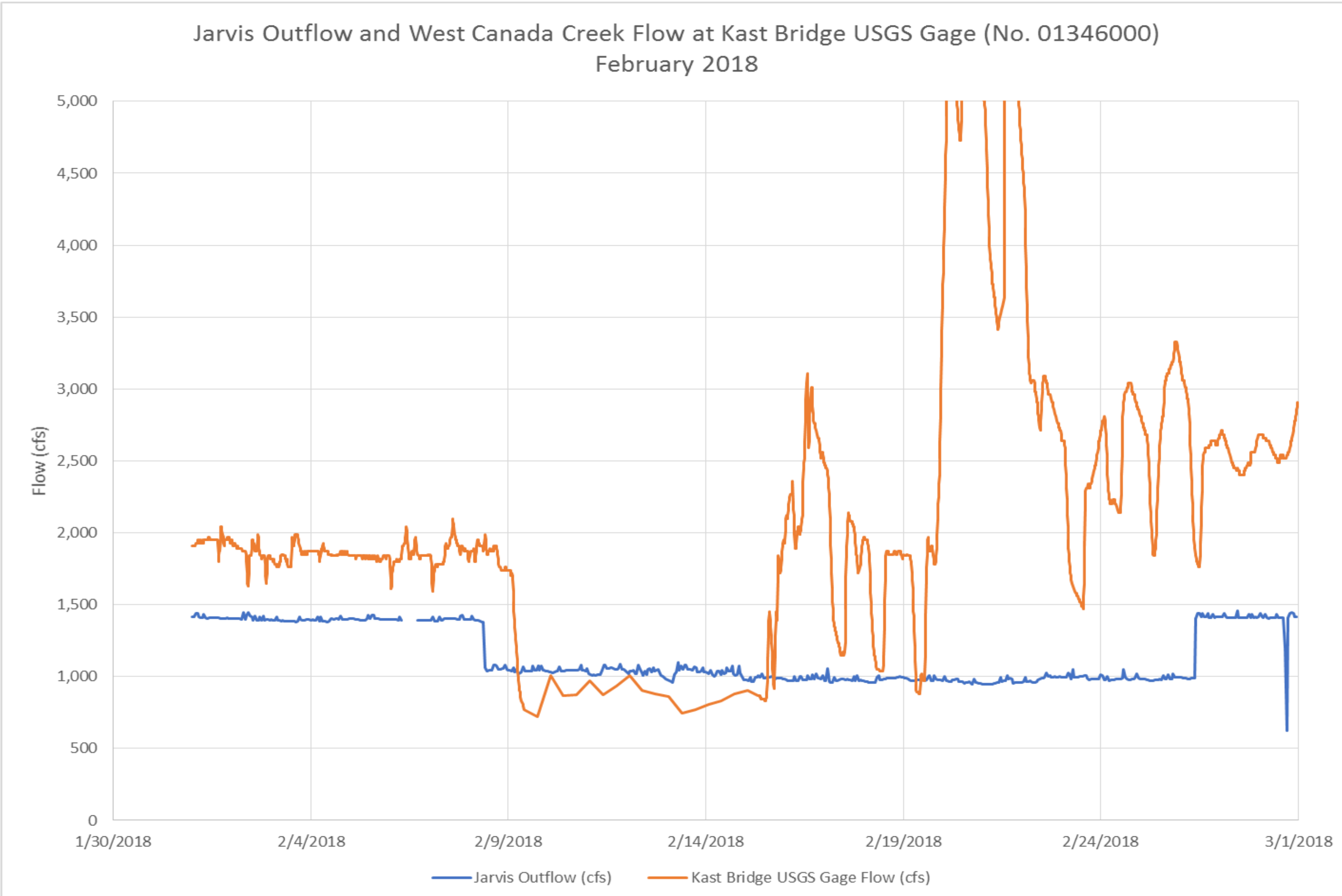

Figure C-2: Flow Comparison – February 2018

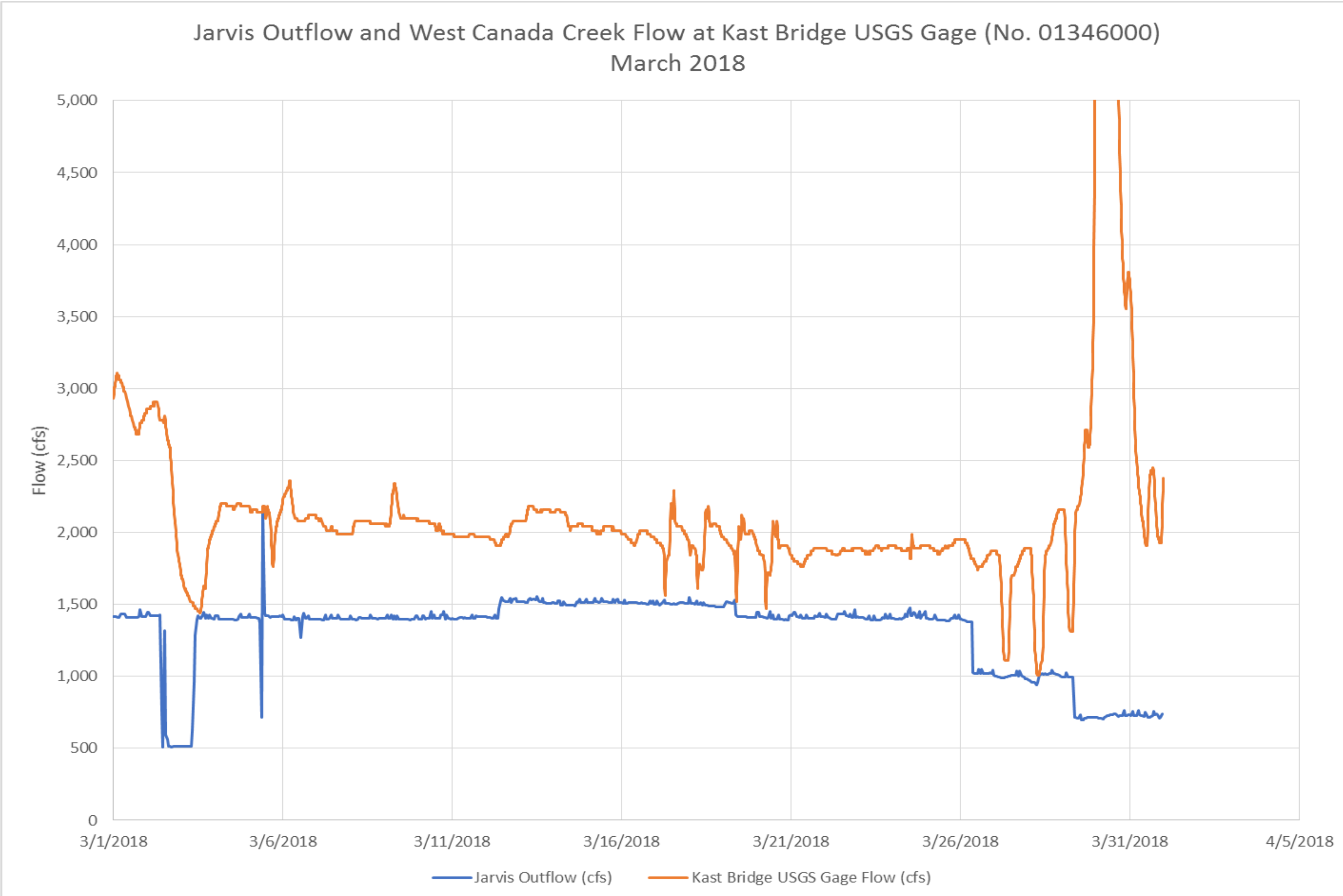

Figure C-3: Flow Comparison – March 2018

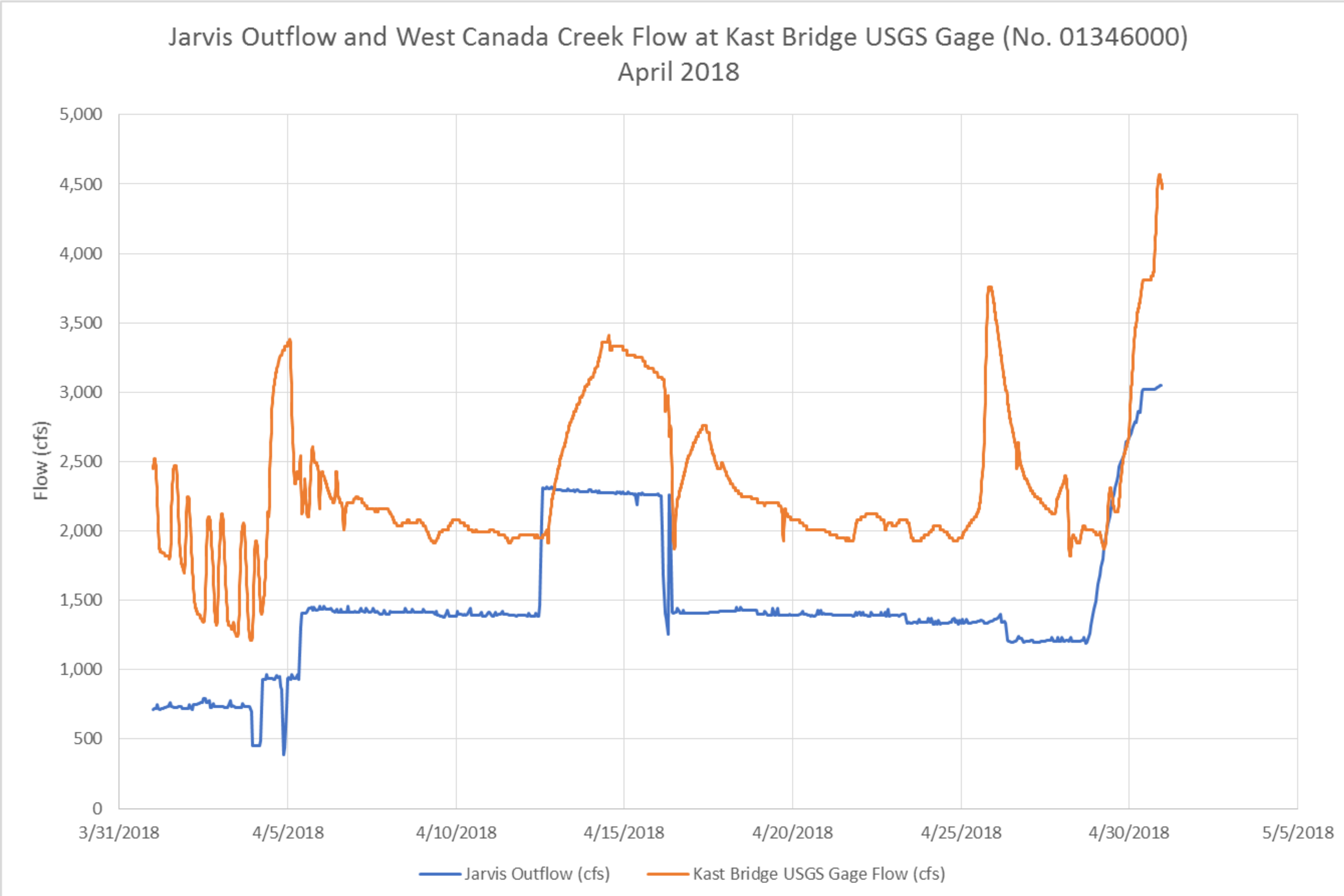

Figure C-4: Flow Comparison – April 2018

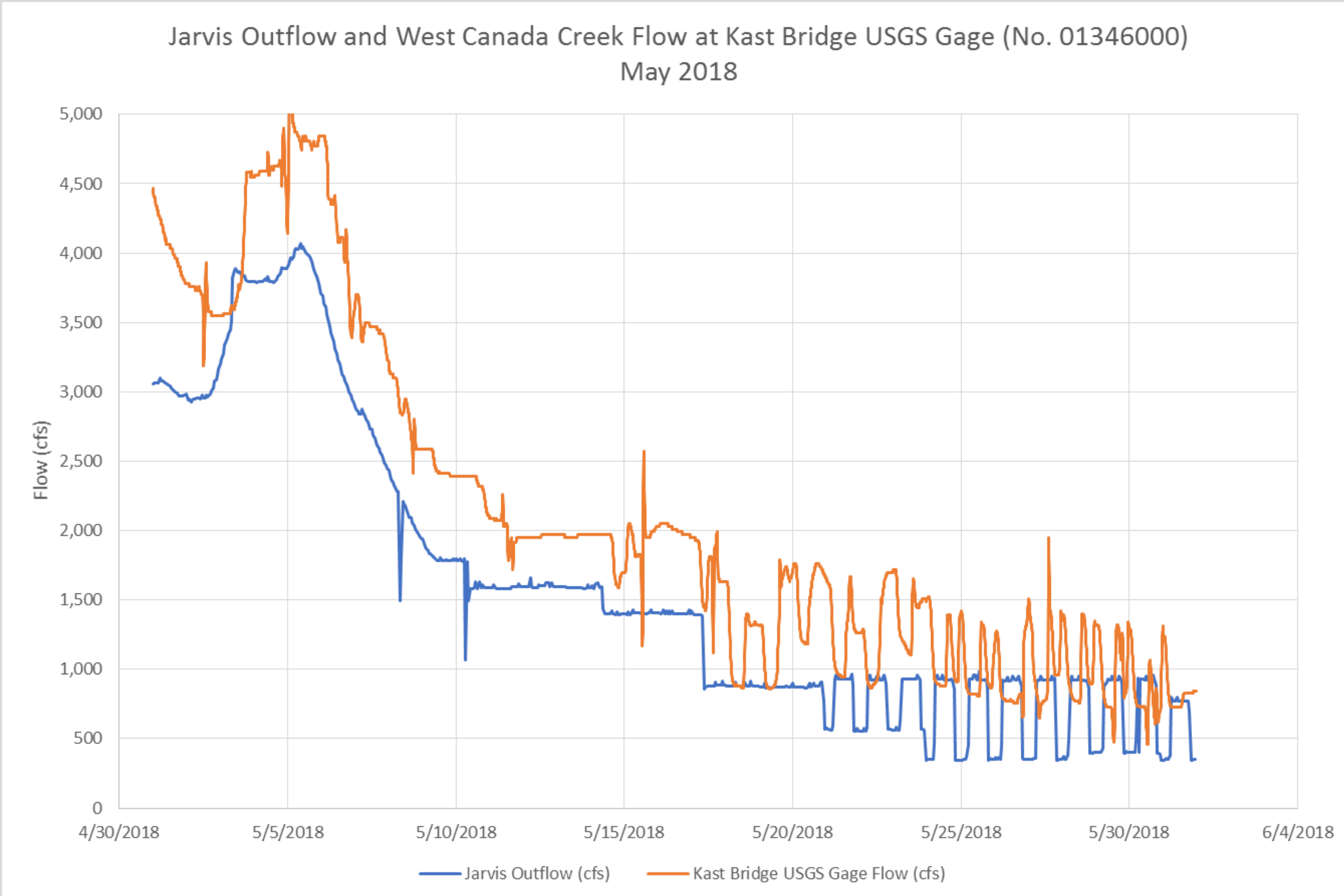

Figure C-5: Flow Comparison – May 2018

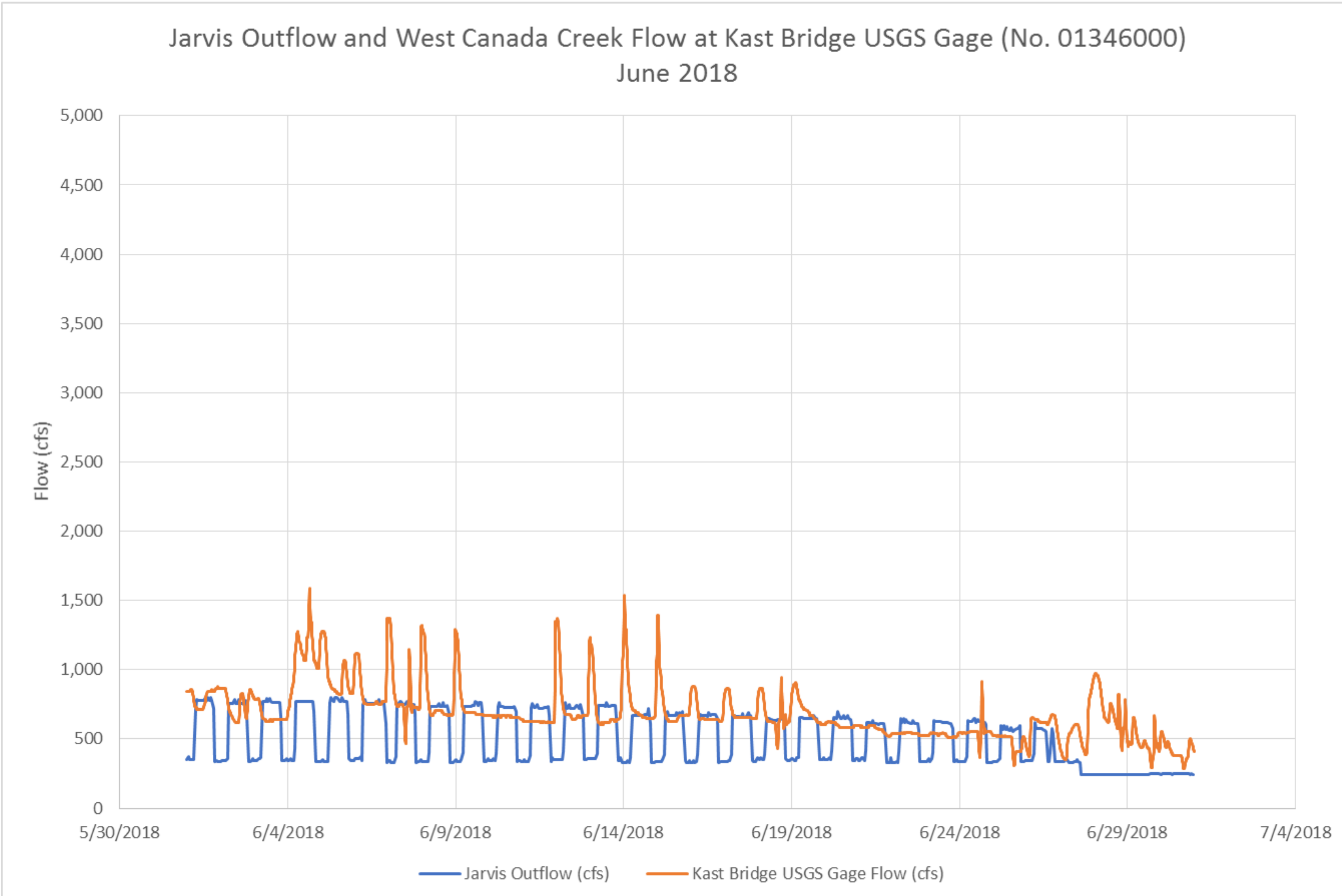

Figure C-6: Flow Comparison – June 2018

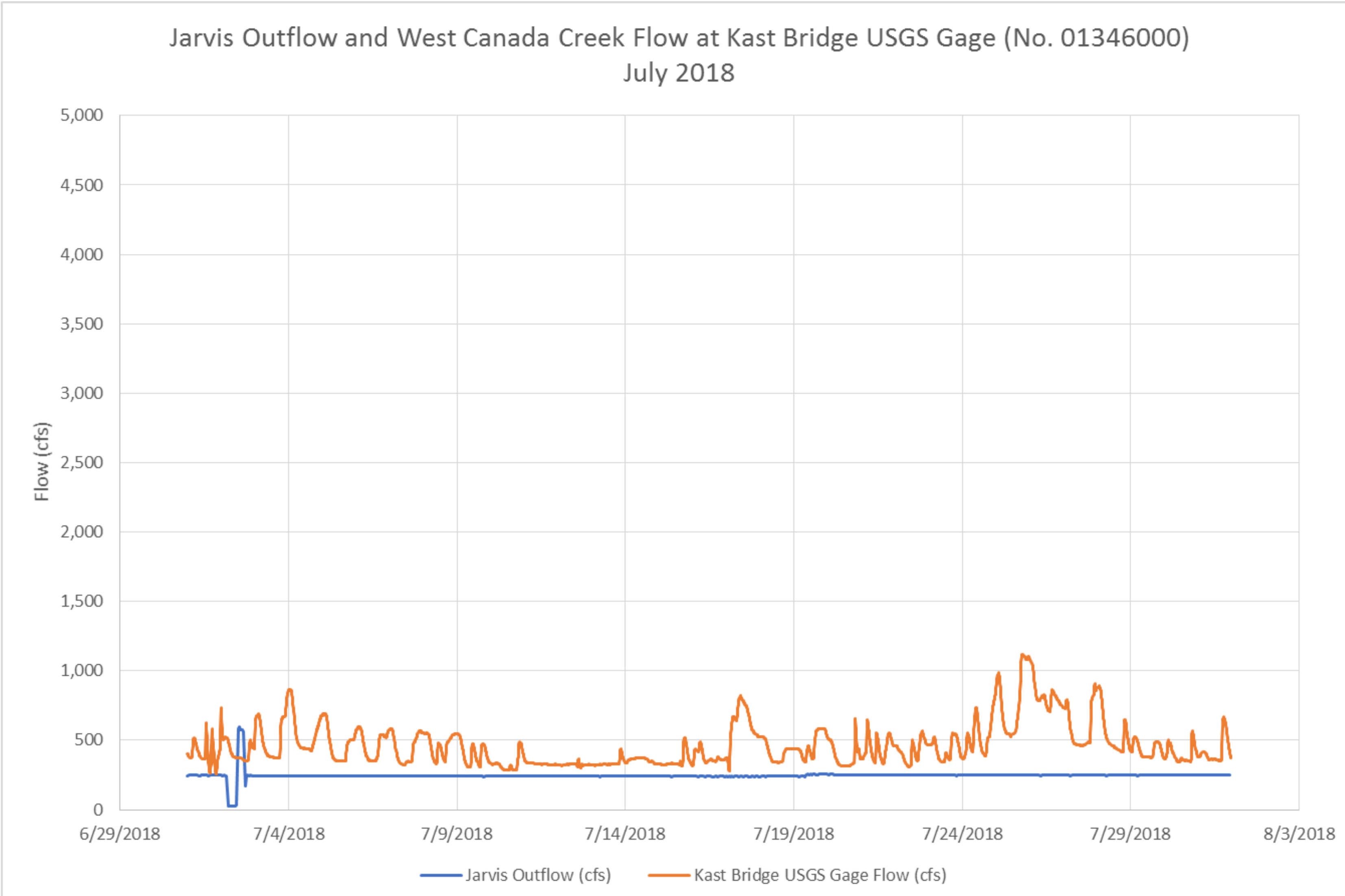

Figure C-7: Flow Comparison – July 2018

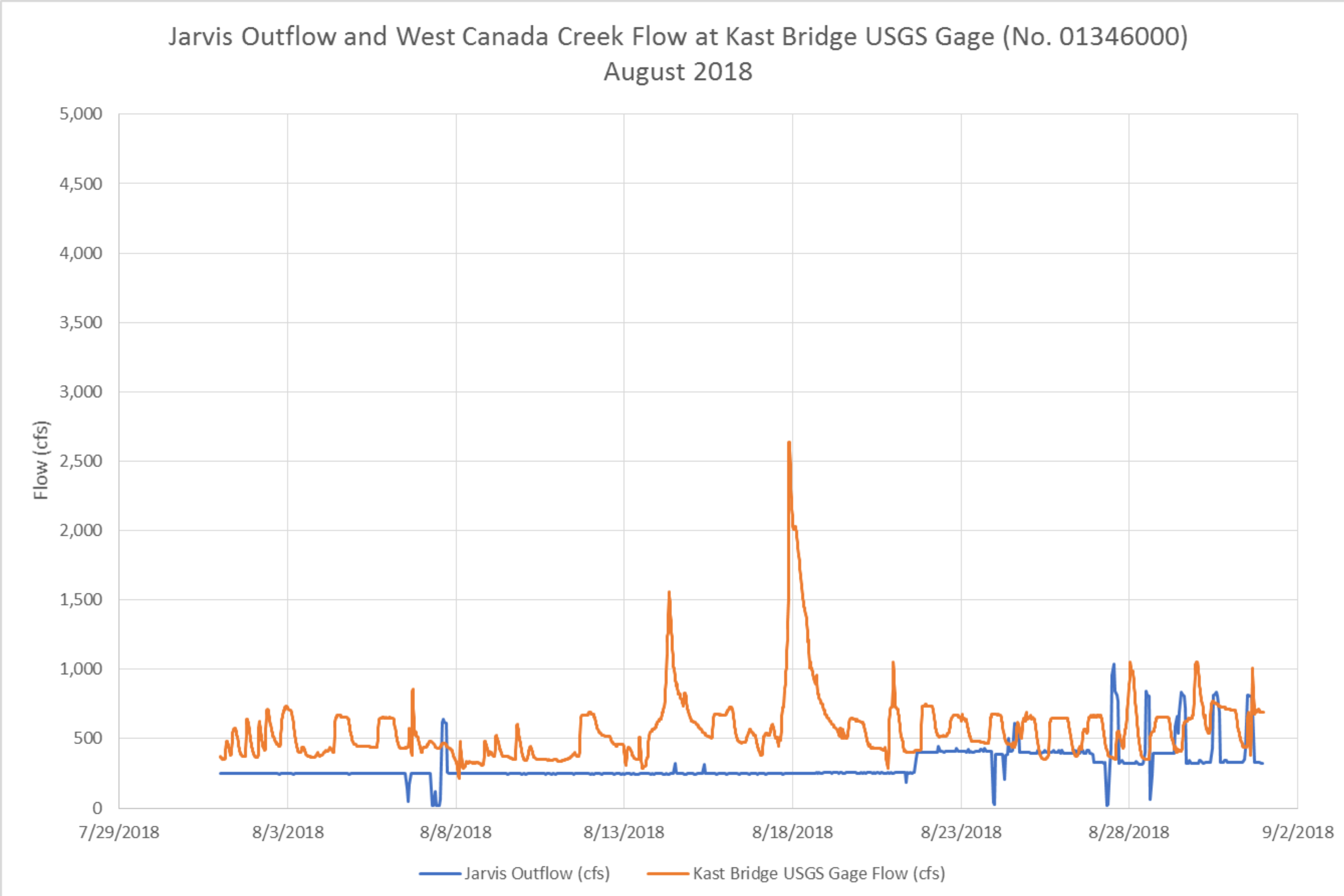

Figure C-8: Flow Comparison – August 2018

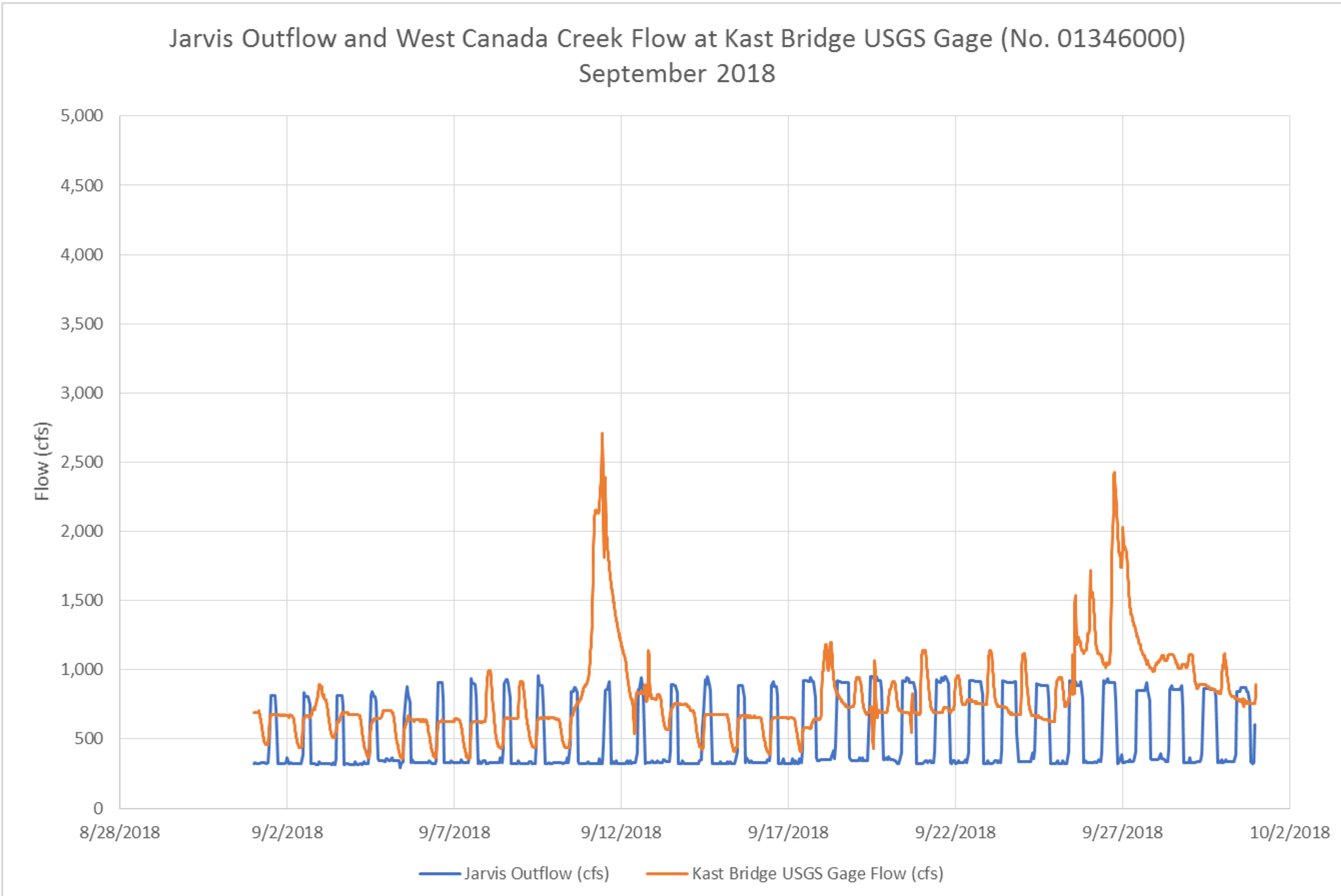

Figure C-9: Flow Comparison – September 2018

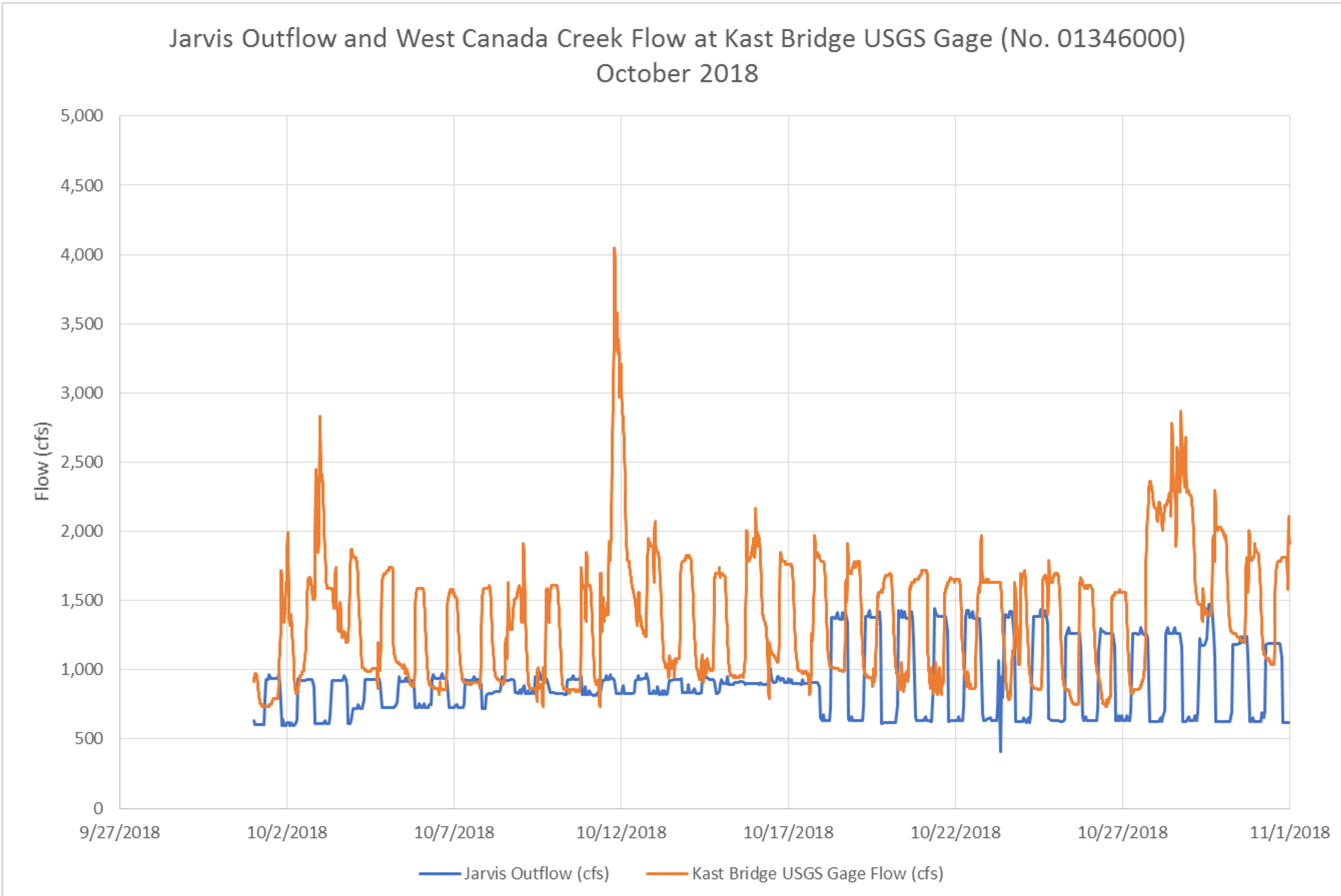

Figure C-10: Flow Comparison – October 2018

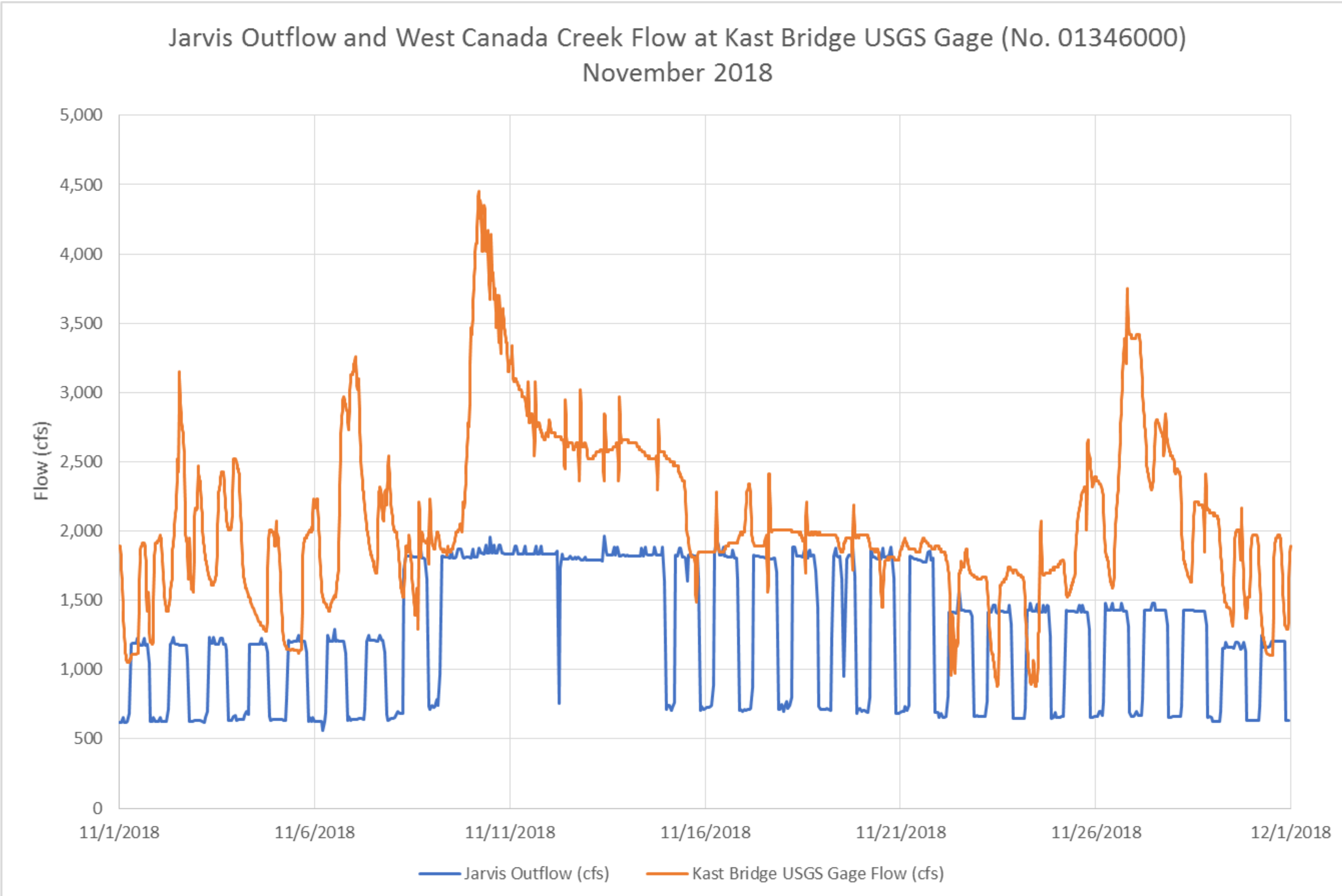

Figure C-11: Flow Comparison – November 2018

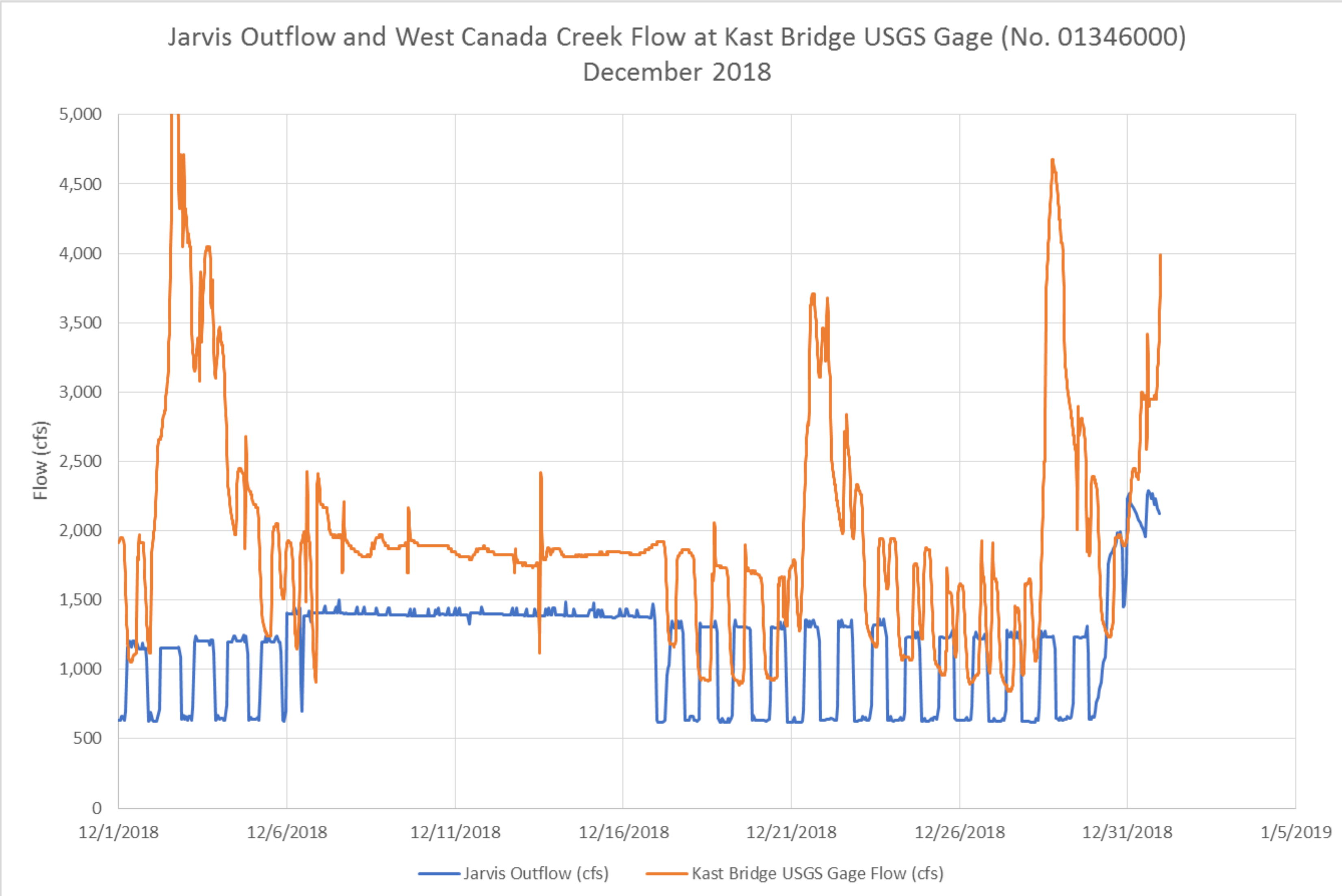

Figure C-12: Flow Comparison – December 2018

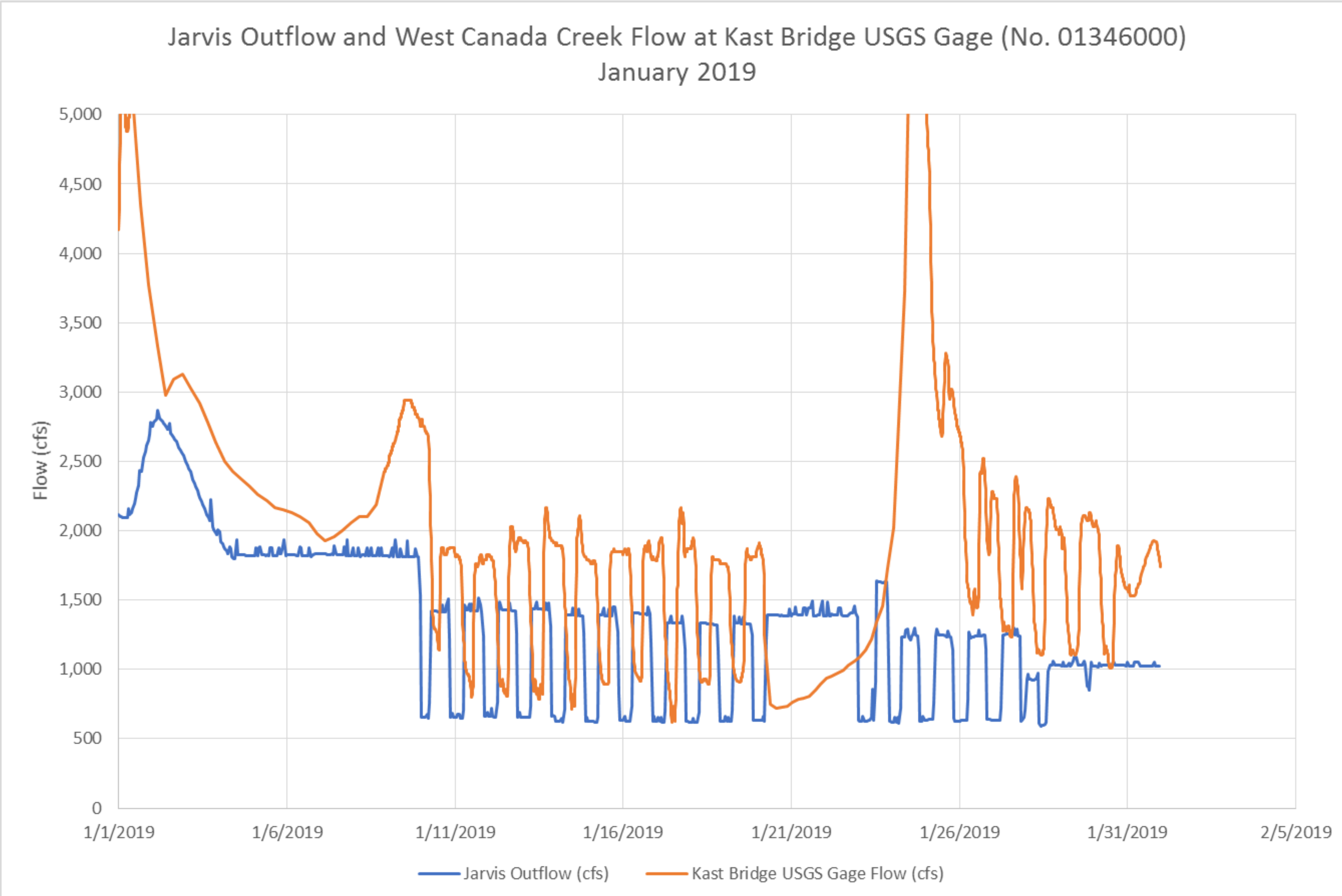

Figure C-13: Flow Comparison – January 2019

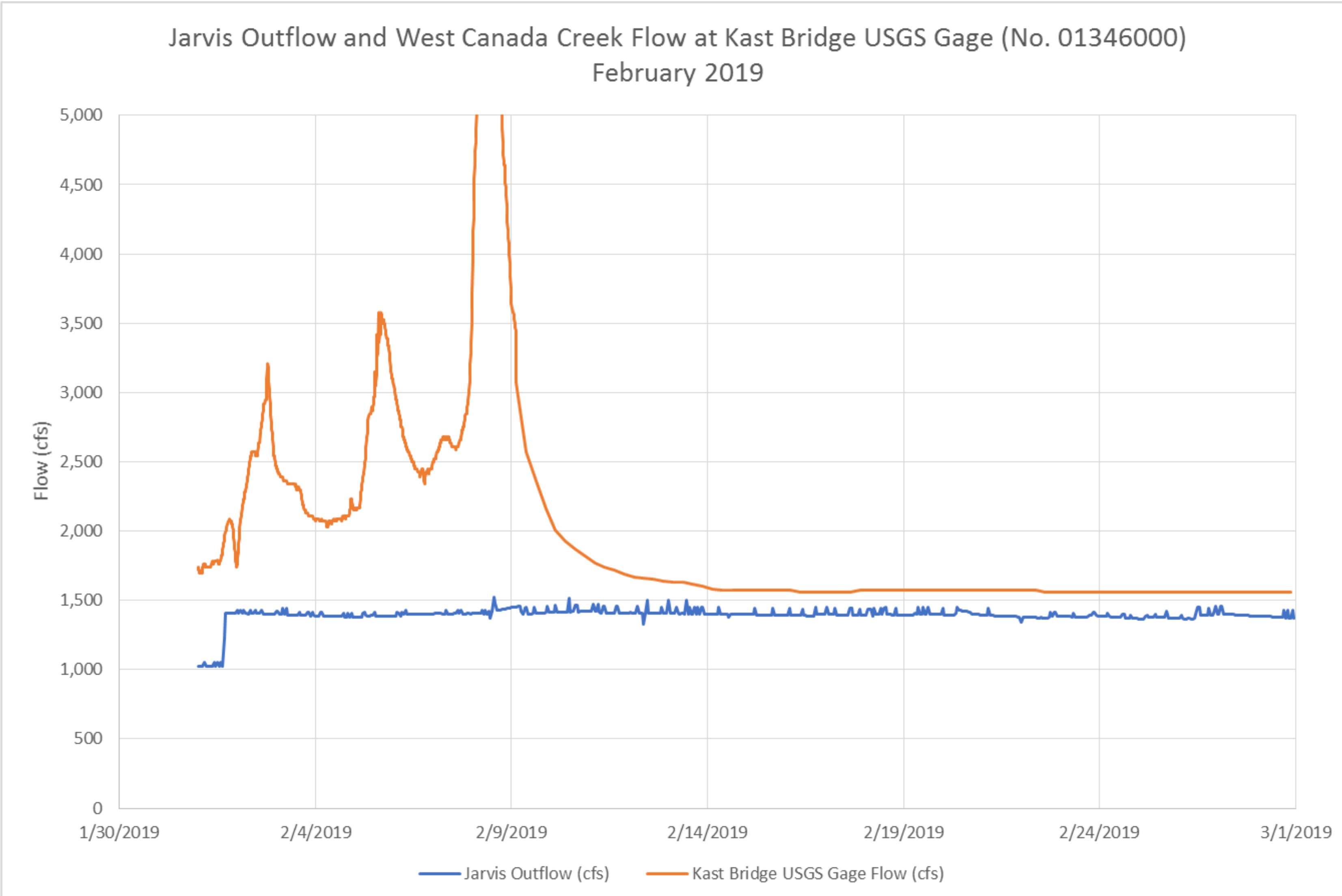

Figure C-14: Flow Comparison – February 2019

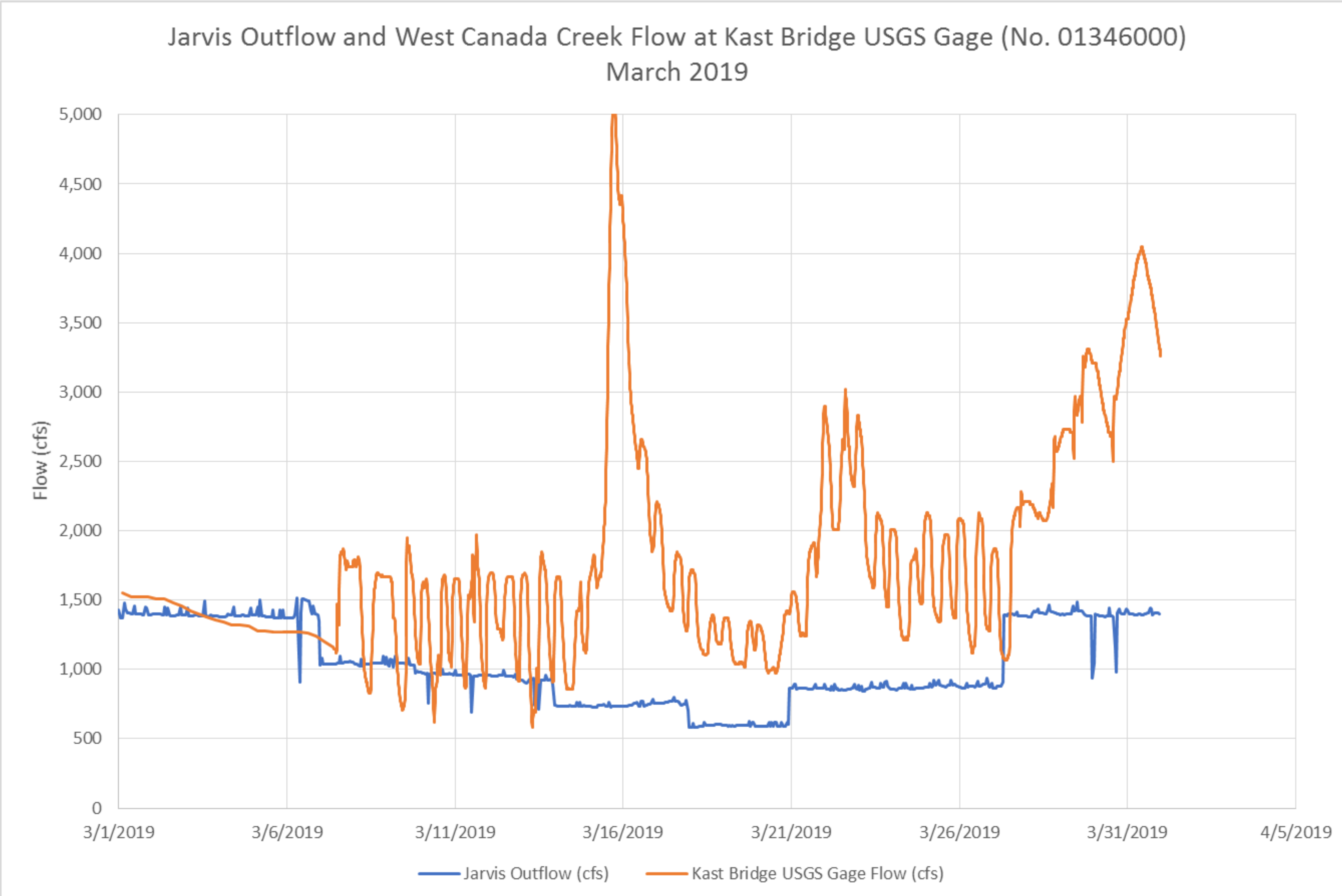

Figure C-15: Flow Comparison – March 2019

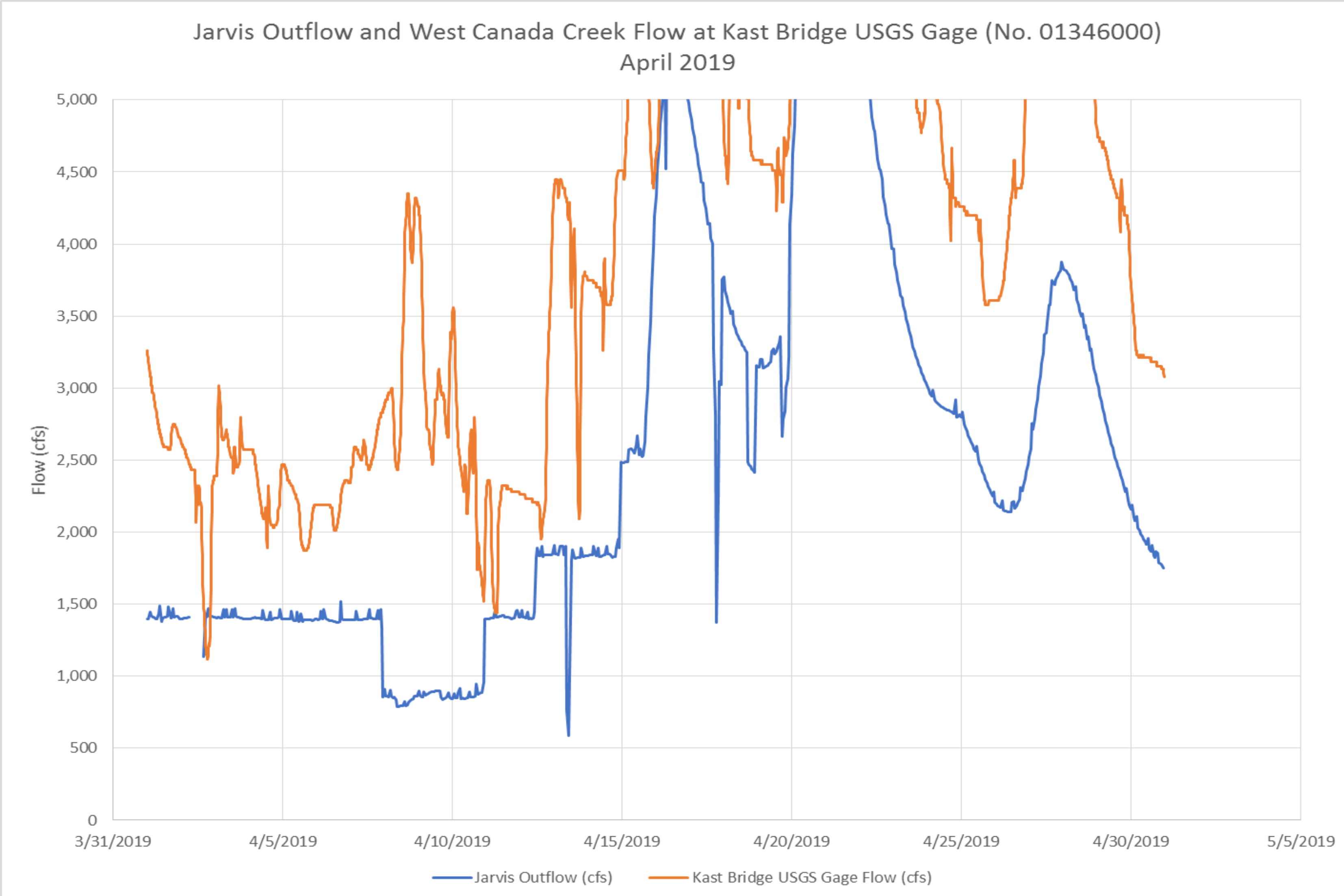

Figure C-16: Flow Comparison – April 2019

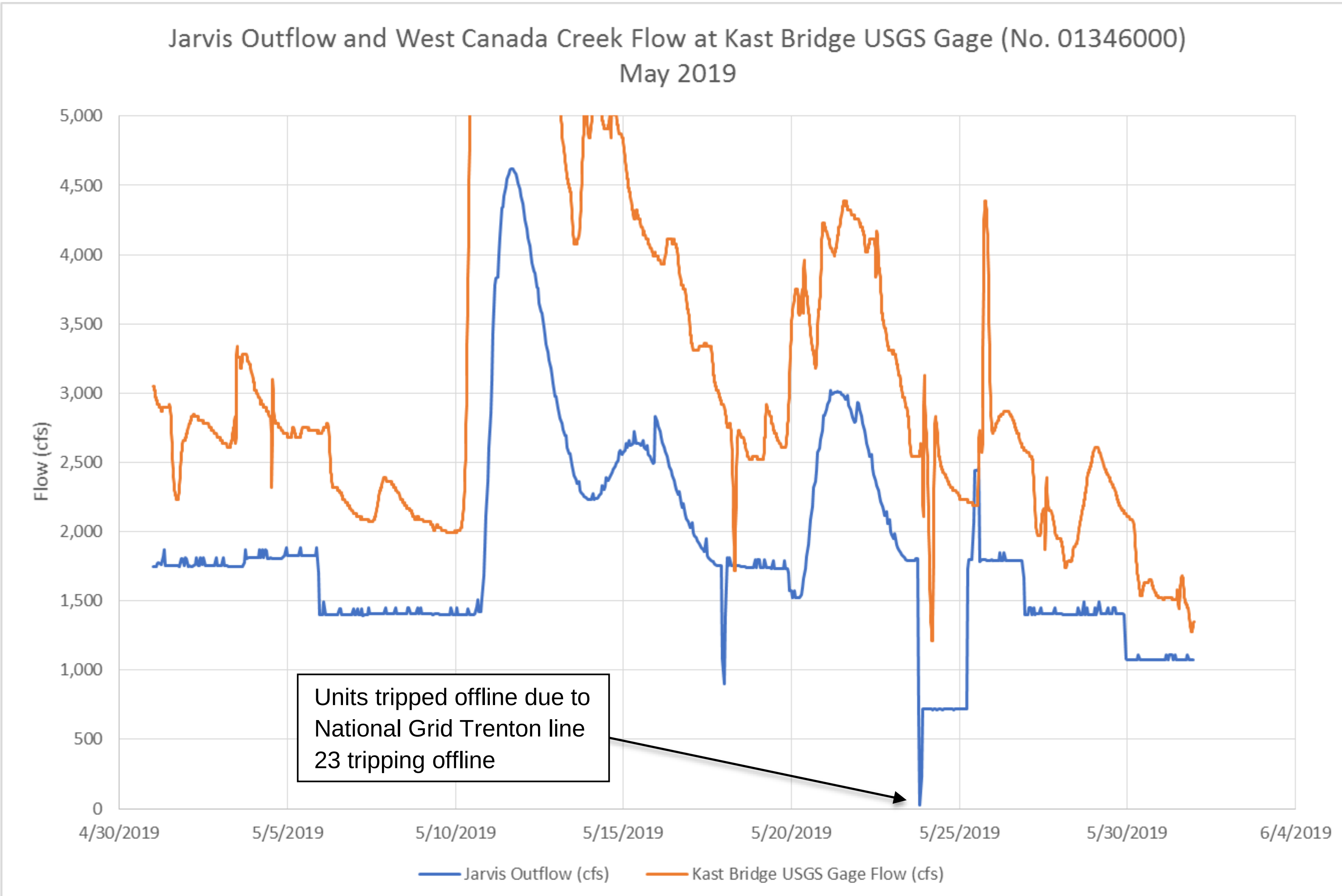

Figure C-17: Flow Comparison – May 2019

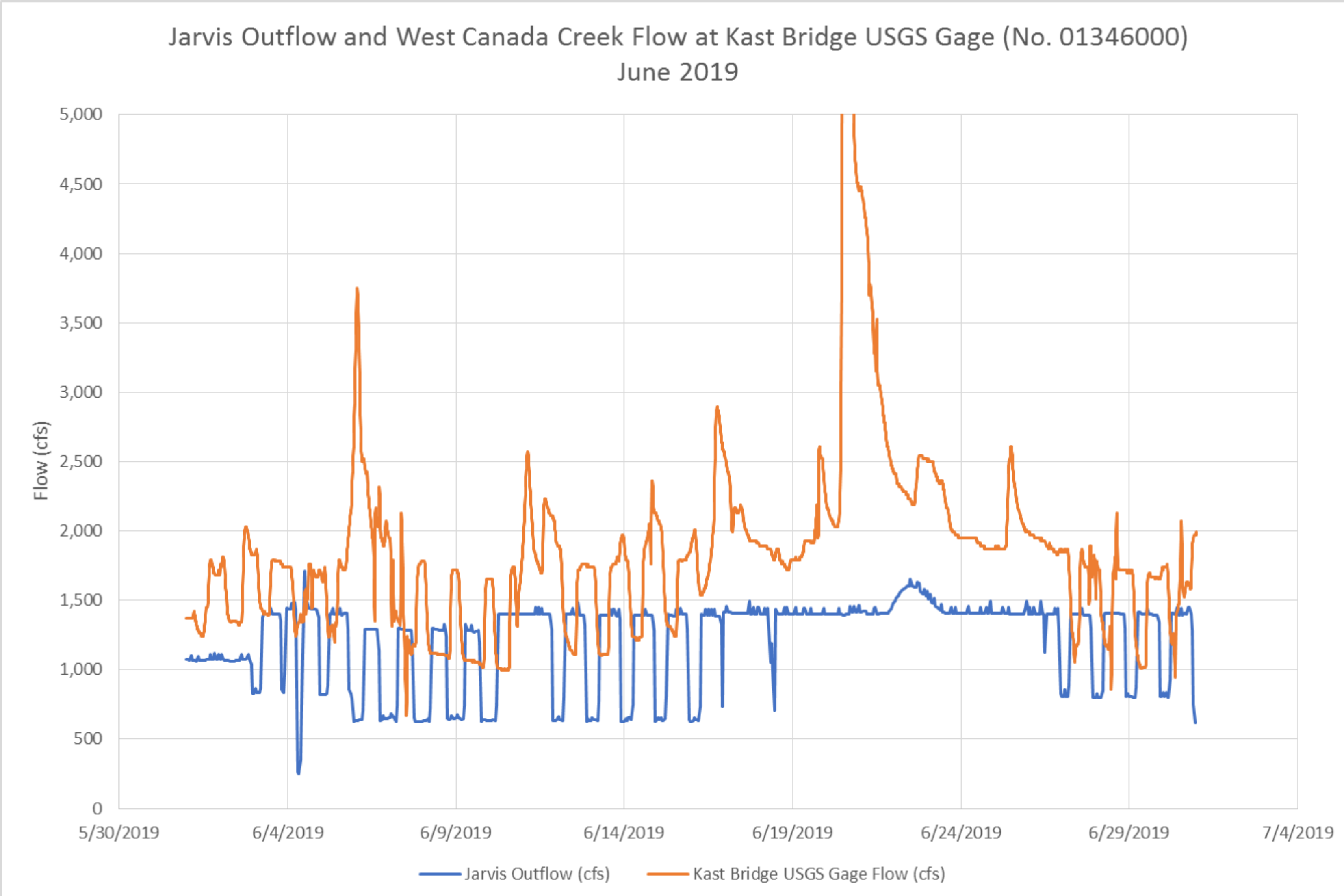

Figure C-18: Flow Comparison – June 2019

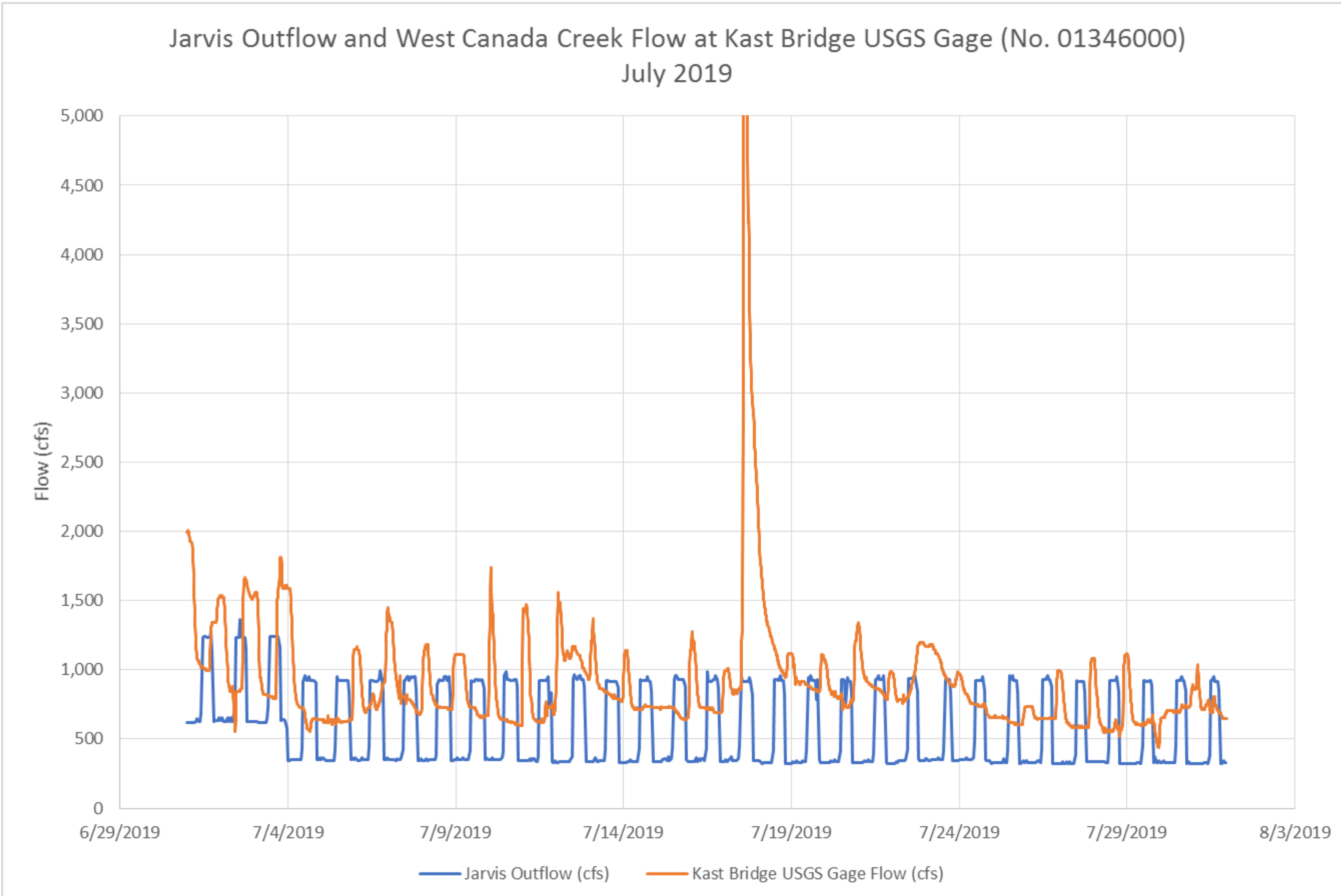

Figure C-19: Flow Comparison – July 2019

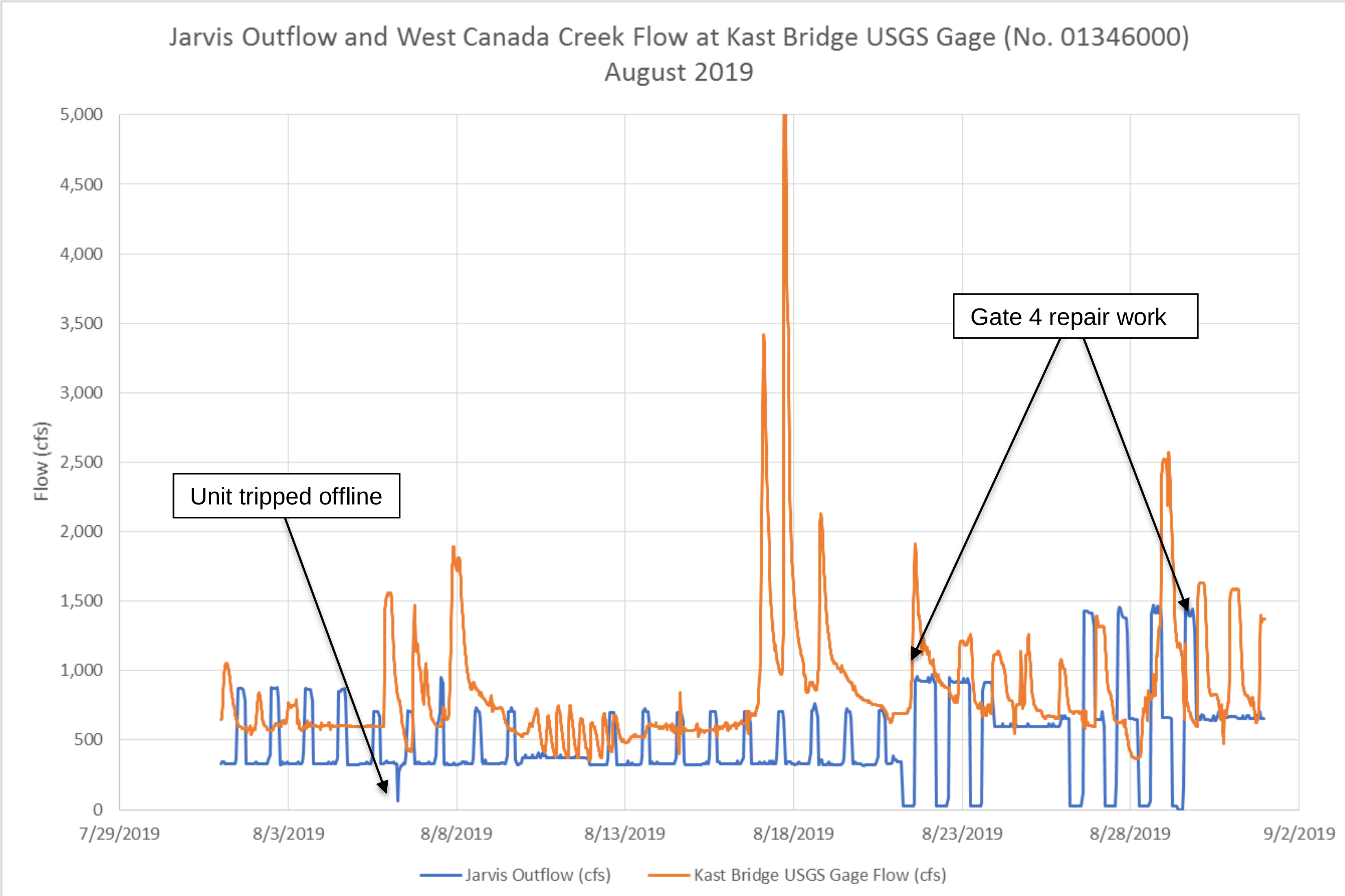

Figure C-20: Flow Comparison – August 2019

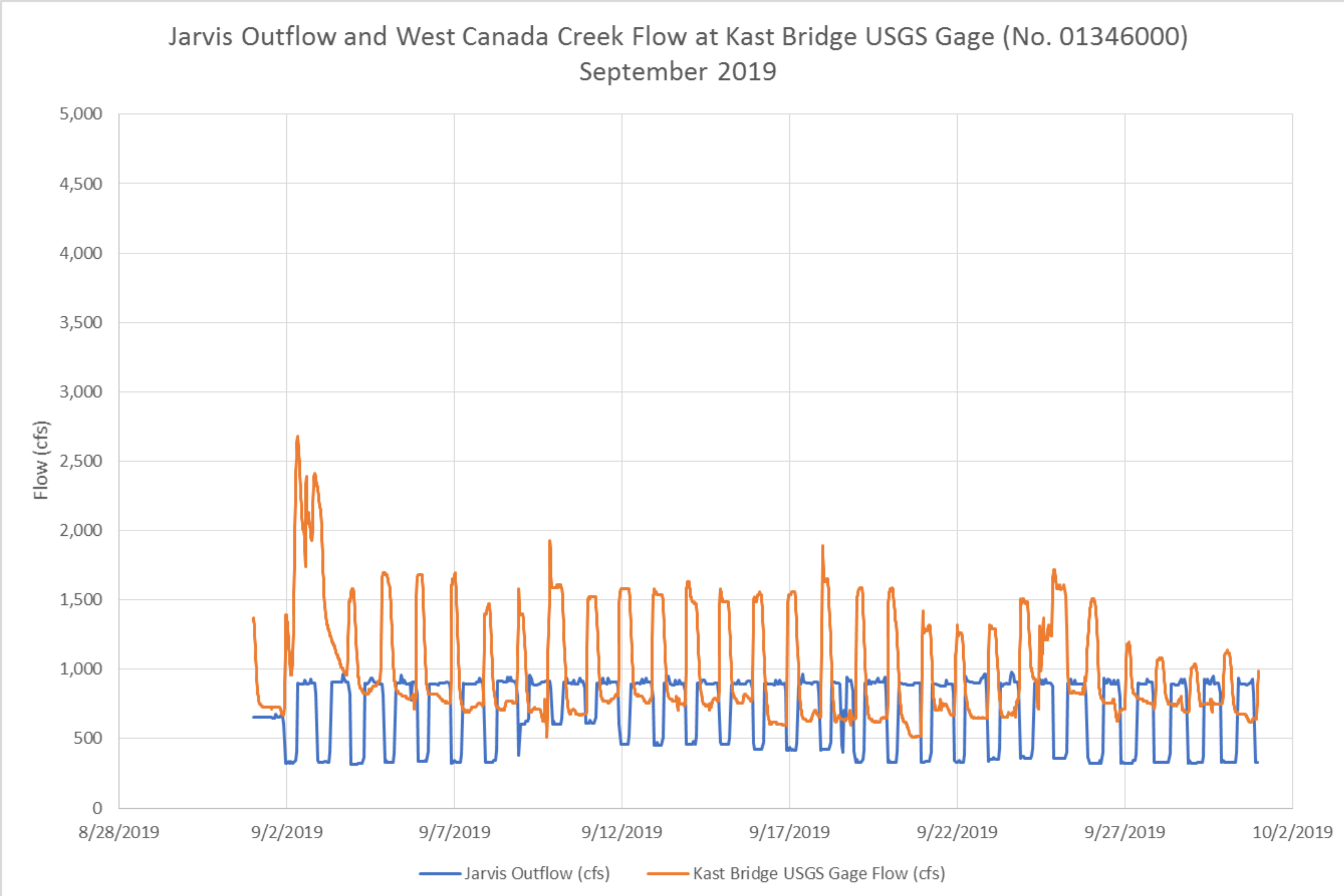

Figure C-21: Flow Comparison – September 2019

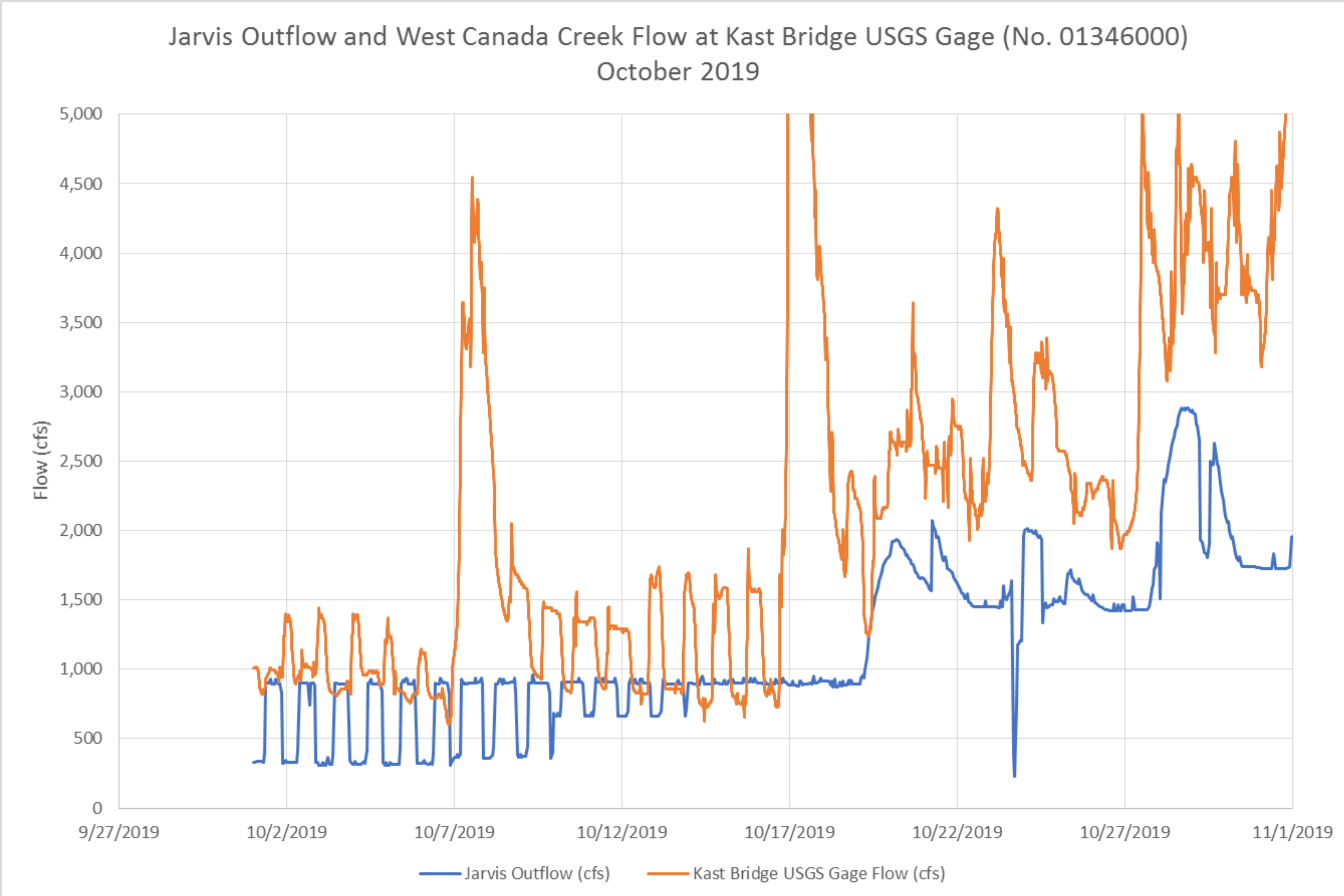

Figure C-22: Flow Comparison – October 2019

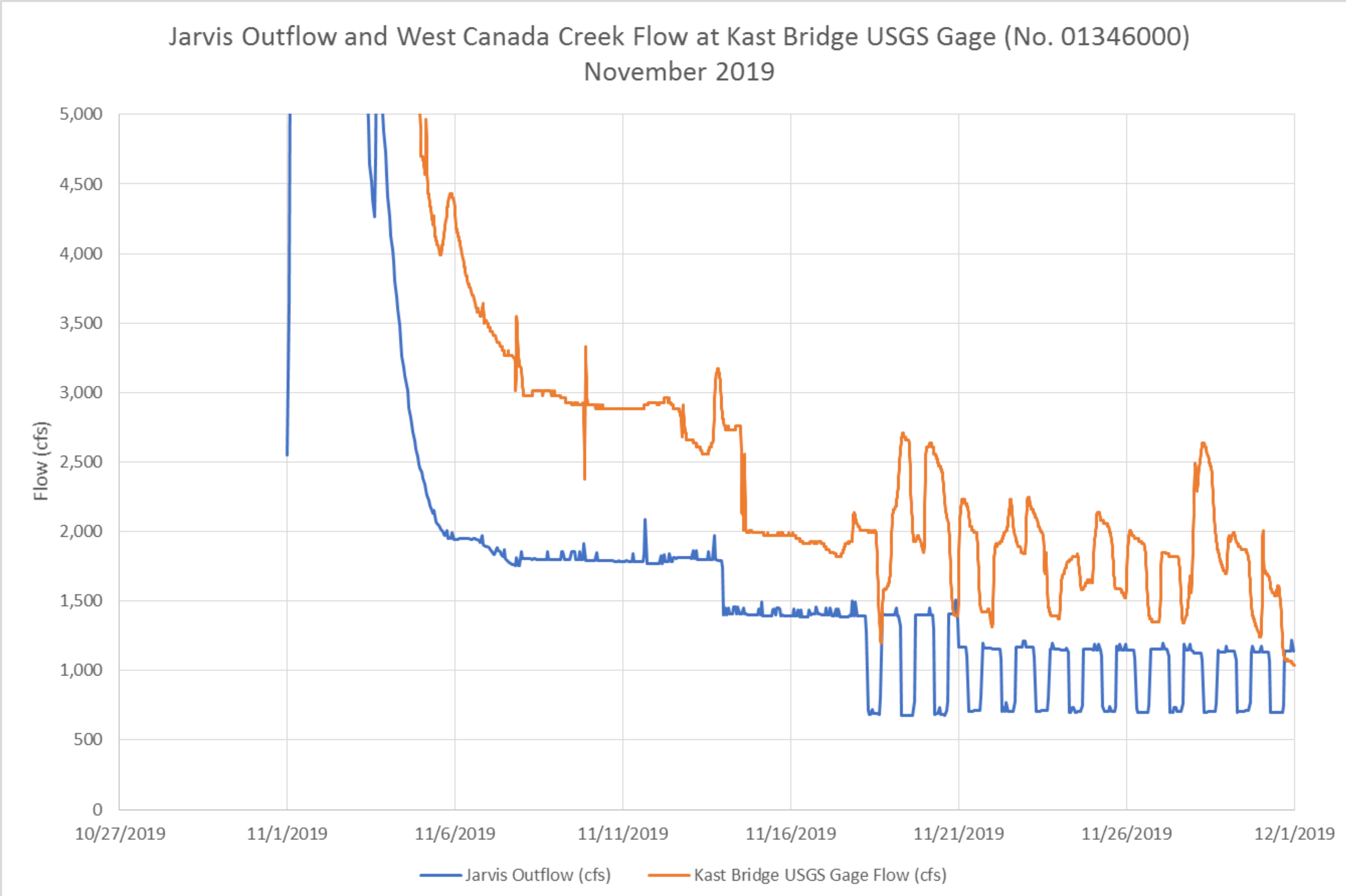

Figure C-23: Flow Comparison – November 2019

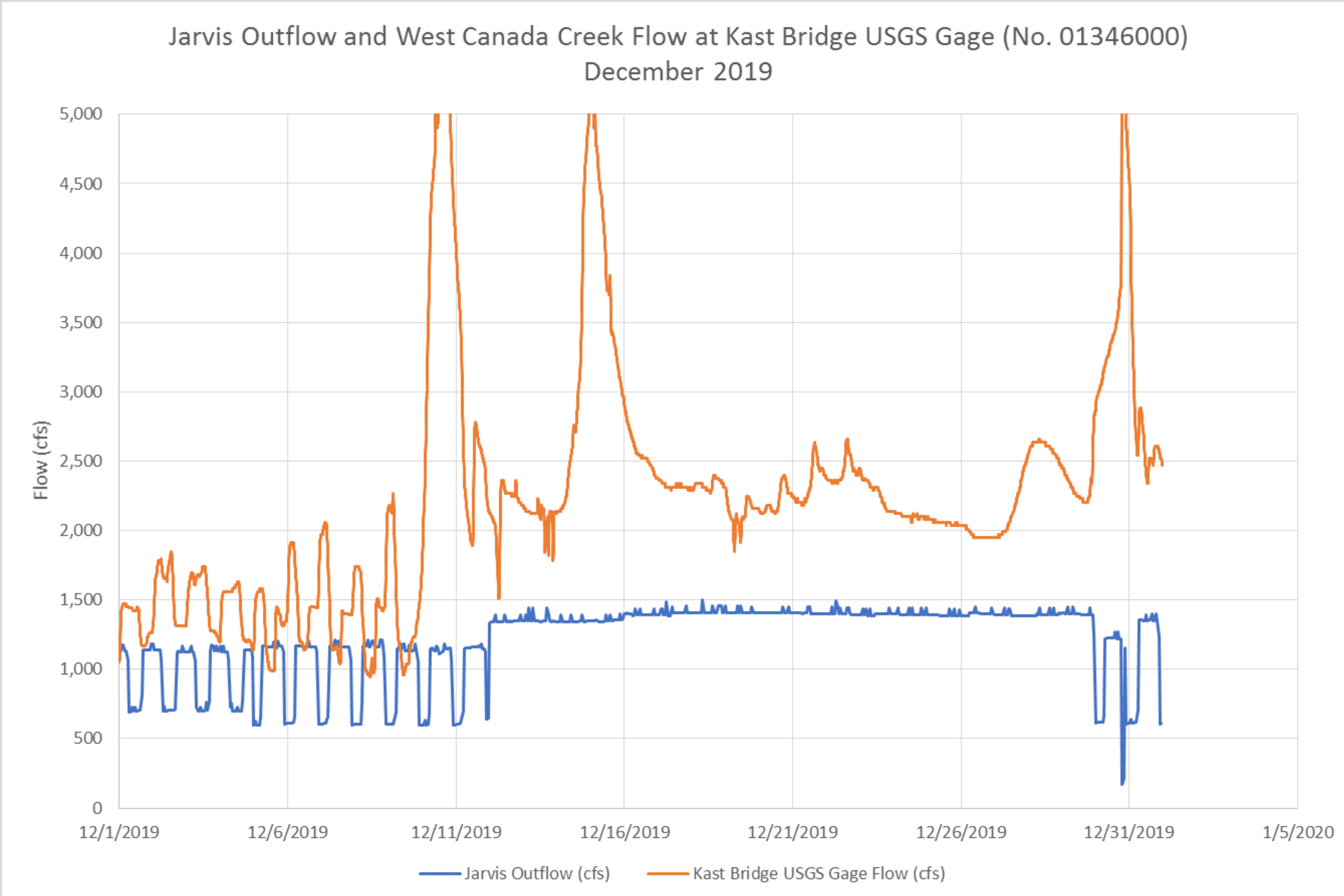

Figure C-24: Flow Comparison – December 2019

Appendix D – Potential Wildlife Species in the Vicinity of the Project

Table D-1: Mammals that May be Found in the Vicinity of the Project

Common Name	Scientific Name
Virginia opossum	*Didelphis virginiana*
Long-tailed shrew	*Sorex dispar*
Masked shrew	*Sorex cinereus*
Pygmy shrew	*Sorex hoyi*
Smoky shrew	*Sorex fumeus*
Water shrew	*Sorex palustris*
Short-tailed shrew	*Blarina brevicauda*
Hairy-tailed mole	*Parascalops breweri*
Star-nosed mole	*Condylura cristata*
Eastern cottontail	*Sylvilagus floridanus*
Snowshoe hare	*Lepus americanus*
Eastern coyote	*Canis latrans*
Gray fox	*Urocyon cinereoargenteus*
Red fox	*Vulpes vulpes*
Bobcat	*Lynx rufus*
Canada lynx	*Lynx canadensis*
Striped skunk	*Mephitis mephitis*
Ermine	*Mustela erminea*
Fisher	*Martes pennanti*
Long-tailed weasel	*Mustela frenata*
American marten	*Martes americana*
American mink	*Mustela vison*
Northern river otter	*Lontra canadensis*
Raccoon	*Procyon lotor*
Black bear	*Ursa americana*
American beaver	*Castor canadensis*
Muskrat	*Ondatra zibethicus*
Rock vole	*Microtus chrotorrhinus*
Meadow vole	*Microtus pennsylvanicus*
Woodland vole	*Microtus pinetorum*
Southern red-backed vole	*Myodes gapperi*

Common Name	Scientific Name
Southern bog lemming	*Synaptomys cooperi*
White-footed mouse	*Peromyscus leucopus*
Deer mouse	*Peromyscus maniculatus*
North American porcupine	*Erethizon dorsatum*
Eastern chipmunk	*Tamias striatus*
Gray squirrel	*Sciurus carolinensis*
Red squirrel	*Tamiasciurus hudsonicus*
Northern flying squirrel	*Glaucomys sabrinus*
Southern flying squirrel	*Glaucomys volans*
Woodchuck	*Marmota monax*
Meadow jumping mouse	*Zapus hudsonius*
Woodland jumping mouse	*Napaeozapus insignis*
White-tailed deer	*Odocoileus virginianus*

Source: AEC, 2016

Table D-2: Birds that May be Found in the Vicinity of the Project

Common Name	Scientific Name
American black duck	*Anas rubripes*
American crow	*Corvus brachyrhynchos*
American goldfinch	*Spinus tristis*
American robin	*Turdus migratorius*
American tree sparrow	*Spizella arborea*
Bald eagle	*Haliaeetus leucocephalu*
Barred owl	*Strix varia*
Black Scoter	*Melanitta americana*
Black-capped chickadee	*Poecile atricapillus*
Black-throated green warbler	*Setophaga virens*
Blue jay	*Cyanocitta cristata*
Bonaparte’s gull	*Chroicocephalus philadelphia*
Broad-winged hawk	*Buteo platypterus*
Brown-headed cowbird	*Molothrus ater*
Bufflehead	*Bucephala albeola*
Canada goose	*Branta canadensis*
Cedar waxwing	*Bombycilla cedrorum*
Cerulean warbler	*Setophaga cerulea*
Common goldeneye	*Bucephala clangula*
Common raven	*Corvus corax*
Dark-eyed junco	*Junco hyemalis*
Double-crested cormorant	*Phalacrocorax auritus*
Downy woodpecker	*Picoides pubescens*
European starling	*Sturnus vulgaris*
Great horned owl	*Bubo virginianus*
Great-blue heron	*Ardea herodias*
Greater scaup	*Aythya marila*
Hairy woodpecker	*Leuconotopicus villosus*
Herring gull	*Larus argentatus*
Hooded merganser	*Lophodytes cucullatus*
House finch	*Haemorhous mexicanus*

Common Name	Scientific Name
House sparrow	*Passer domesticus*
Mallard duck	*Anas platyrhynchos*
Mourning dove	*Zenaida macroura*
Mourning warbler	*Geothlypis philadelphia*
Northern cardinal	*Cardinalis cardinalis*
Northern pintail	*Anas acuta*
Pileated woodpecker	*Hylatomus pileatus*
Red-bellied woodpecker	*Melanerpes carolinus*
Red-tailed hawk	*Buteo jamaicensis*
Ring-billed gull	*Larus delawarensis*
Ring-necked pheasant	*Phasianus colchicus*
Rock pigeon	*Columba livia*
Ruffed grouse	*Bonasa umbellus*
Saw-whet owl	*Aegolius acadicus*
Screech owl	*Megascops asio*
Snow bunting	*Plectrophenax nivalis*
Snow goose	*Chen caerulescens*
Tufted titmouse	*Baeolophus bicolor*
Tundra swan	*Cygnus columbianus*
White-breasted nuthatch	*Sitta carolinensis*
White-winged scoter	*Melanitta deglandi*
Wild turkey	*Meleagris gallopavo*
Wood duck	*Aix sponsa*
Woodcock	*Scolopax minor*
Yellow-bellied sapsucker	*Sphyrapicus varius*

Note: Table does not include Federally Listed Birds of Conservation Concern (shown in Table 4.8.1.2-1).

Table D-3: Reptiles and Amphibians that May be Found in the Vicinity of the Project

Common Name	Scientific Name
Spotted salamander	*Ambystoma maculatum*
Spring salamander	*Gyrinophilus porphyriticus*
Four-toed salamander	*Hemidactylium scutatum*
Red-backed salamander	*Plethodon cinereus*
Two-lined salamander	*Eurycea bislineata*
Mountain dusky salamander	*Desmognathus ochrophaeus*
Northern dusky salamander	*Desmognathus fuscus*
Red-spotted newt	*Notophthalmus viridescens*
Mud puppy	*Necturus maculosus*
American toad	*Anaxyrus americanus*
Spring peeper	*Hyla crucifer*
Gray tree frog	*Hyla versicolor*
American bullfrog	*Lithobates catesbeiana*
Green frog	*Lithobates clamitans*
Mink frog	*Lithobates septentrionalis*
Wood frog	*Lithobates sylvatica*
Leopard frog	*Lithobates pipiens*
Pickerel frog	*Lithobates palustris*
Common snapping turtle	*Chelydra serpentine*
Painted turtle	*Chrysemys picta*
Five-lined skink	*Eumeces fasciatus*
Eastern racer	*Coluber constrictor*
Ringneck snake	*Diadophis punctatus*
Milk snake	*Lampropeltis triangulum*
Northern water snake	*Nerodia sipedon*
Smooth green snake	*Opheodrys vernalis*
Brown snake	*Storeria dekayi*
Red-bellied snake	*Storeria occipitomaculata*
Eastern ribbon snake	*Thamnophis sauritus*
Common garter snake	*Thamnophis sirtalis*
Timber rattlesnake	*Crotalus horridus*

Source: Saunders, 1989

Appendix E – SHPO Correspondence

ANDREW M. CUOMO
Governor

JOHN R. KOELMEL
Chairman

GIL C. QUINIONES
President and Chief Executive Officer

9 January 2018

Daniel Mackay, Deputy Commissioner
New York State Office of Parks, Recreation
and Historic Preservation
Peebles Island Resource Center
Delaware Avenue
Cohoes, NY 12047

SUBJECT: Gregory B. Jarvis Power Project Relicensing (17PR03658)
Proposed Area of Potential Effect
Towns of Rensen and Trenton, Oneida County and
Town of Russia, Herkimer County

Dear Mr. Mackay:

On May 25, 2017, the New York Power Authority (NYPA or the Power Authority) informed the New York State Division for Historic Preservation of its intent to commence the relicensing process for the Gregory B. Jarvis Power Project (Jarvis Project or the Project; FERC No.3211). On June 30, 2017, the Power Authority commenced the relicensing process by filing its Notification of Intent (NOI) to file an Application for New License and Request for Designation as Non-Federal Representative along with the accompanying Pre-Application Document (PAD) with the Federal Energy Regulatory Commission (FERC). Since the Jarvis Project's new license will be issued by FERC, the relicensing is subject to Section 106 review under the National Historic Preservation Act (36 CFR Part 800). As part of the Section 106 process, the Power Authority proposes the following Area of Potential Effect.

Project Description

The Power Authority's Jarvis Project is located on West Canada Creek approximately 0.5 miles upstream of the Hamlet of Hinckley in the towns of Remsen, Russia, Ohio, and Trenton, in the counties of Oneida and Herkimer, NY. In this area, West Canada Creek flows south out of the Adirondack Mountains, through the reservoir, and then approximately 35 miles to its confluence with the Mohawk River. The Hinckley Dam, Reservoir, and associated lands are owned by the State of New York, under the jurisdiction of the New York State Canal Corporation (NYSCC).[1] Hinckley Reservoir was constructed by the State of New York in the valley formed by West Canada Creek for the purpose of supplying water to the New York State Barge Canal. The reservoir was commissioned in 1915. When full, the reservoir has a surface area of approximately 4.46 square miles (mi^2). When full (El. 1225[2]), the volume of the reservoir is approximately 25.8 billion gallons. Much of the northern and eastern portions of the reservoir are within the Adirondack Park

[1] The New York State Legislature transferred control of the NYS Canal System from NYSDOT to NYSTA in 1992 and then from NYSTA to the Power Authority in 2016. Effective April 1, 2016, the Power Authority is financially responsible for the NYSCC. As of January 1, 2017, the NYSCC became a subsidiary of the Power Authority.
[2]All elevations are referenced to Hinckley Datum. Elevations referenced to the Hinckley datum are 1.04 feet higher than elevations referenced to the National Geodetic Vertical Datum (MSL of 1929), thus, 1225.00 Hinckley Datum = 1223.96 NGVD29. (The Hinckley Datum is the same as the Barge Canal Datum).

The 9-megawatt (MW) Jarvis Project was issued a 40-year license by the Federal Energy Regulatory Commission (FERC or the Commission) on August 12, 1982. In 1984, the New York State Department of Transportation (NYSDOT) conveyed a permanent easement to NYPA for hydroelectric generating facility or facilities. This easement includes the area surrounding the generating facilities, the dam itself, a substation site on the north side of NYS Route 365, a recreational boat launching site, and the reservoir upstream of the dam up to elevation 1225.00 feet. NYPA owns the generating station and ancillary equipment. The power plant was commissioned on June 22, 1986. The current license is set to expire on July 31, 2022.

The Hinckley Reservoir Dam is a contributing element of the New York State Barge Canal National Historic Landmark. The dam consists of a 570-foot long north earthen embankment dam, a 65-foot long concrete non-overflow intake structure, a 400-foot long concrete ogee spillway, and a 2,600-foot long south earthen embankment. Water is conveyed to the powerhouse through a 15-foot diameter penstock, which bifurcates into two 90-foot long, 10.5-foot diameter penstocks, which lead to the two horizontal Kaplan turbine units. The powerhouse discharges into a short tailrace that meets West Canada Creek approximately 150 feet downstream of the powerhouse. This tailrace is cut into bedrock and has nearly vertical side slopes. A 60-inch diameter pipe acts as a low level outlet for the Project in addition to a penstock bypass.

The upstream section of the spillway south (left) wingwall contains a gatehouse from which the Mohawk Valley Water Authority (MVWA) on average draws up to 30-35 cubic feet per second (cfs) for water supply under existing agreements. Flow into each of the two 42-inch diameter water supply conduits is controlled by two 3- by 4-foot gate valves located on an outer gate shaft. These valves lead to a 42-inch diameter sluice gate at invert El. 1161.5, located in an inner gate shaft. The water supply conduits pass under the south embankment dam in a trench excavated into rock and backfilled with concrete.

The Project's concrete powerhouse is a semi-underground structure located 200 feet downstream of the non-overflow intake. The powerhouse is 120 feet long, 55 feet wide, and 43 feet deep below grade. The powerhouse contains two 4.5-megawatt horizontal Kaplan turbines operating under a maximum head of 67.5 feet, plus surcharge, at normal pool (El. 1225) with tailwater level at El. 1157.5. It should be noted that the powerhouse is not located within the boundary of the New York State Barge Canal National Historic Landmark.

Project Operation

The Project is operated in accordance with the 2012 Hinckley Reservoir Operating Diagram (Operating Diagram, Figure 1).[3] In accordance with a February 1, 2013 Settlement Agreement, NYSCC agreed to maintain the reservoir within a normal operating range of El. 1195 and above, except during certain adverse conditions. Under some conditions, NYSCC deviates from the Operating Diagram as necessary to maintain reservoir releases. Releases through the powerhouse are determined by the time of year and Hinckley Reservoir elevation, as plotted in the Operating Diagram. Project operations are adjusted on a twice weekly basis in accordance with the Operating Diagram. The Jarvis Project has the ability to peak on a limited basis, so long as Project operations meet the criteria of the Operating Diagram.

Based upon these operating criteria, the reservoir levels are usually maintained between El. 1195 and El. 1225 (the elevation of the spillway crest); however reservoir water levels can fall below El. 1195 when

[3] The 2012 Hinckley Reservoir Operating Diagram was established as part of a settlement between NYS and MVWA, effective February 1, 2013.

prolonged dry conditions occur. The Jarvis Project does not operate when reservoir levels are below El. 1195. Consistent with the Operating Diagram, during the winter months, the reservoir is generally drawn down and then allowed to refill during spring melt. Deviations from the Operating Diagram may occur in the following situations:

Decreased release

- at low reservoir levels to maintain MVWA water supply
- at low reservoir levels so that 160 cfs minimum flow downstream of the diversion weir for the NYS Barge Canal (Morgan Dam, also known as the Nine Mile Creek Feeder Dam) will always be available if it is anticipated that low reservoir inflow will occur in the immediate future
- for public safety (to allow bridge reconstruction, alleviate downstream flooding, etc.)

Increased release

- at high reservoir levels to possibly provide some flood storage

Area of Potential Effect

NYPA has given careful consideration to the APE for the Jarvis Project's relicensing. In crafting the APE, NYPA referred to both NHPA regulations, 36 C.F.R. § 800.16(d), as well as FERC's guidelines. 36 C.F.R. § 800.16(d) defines the APE as:

> the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist. The area of potential effects is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking.

As indicated above, the NYS Department of Public Works constructed the Hinckley Dam and Reservoir In 1915, for the purpose of supplying water to the NYS canal system. Hinckley Reservoir is owned by the NYSCC and outflows from the reservoir are governed by legally binding operating agreements between the NYSCC, MVWA and Erie Boulevard. In 1986, the Power Authority constructed the Jarvis Project at the Hinckley Dam to capture hydropower generation from NYSCC's reservoir releases. Construction of the Jarvis Project entailed reconfiguring discharge outlets at the dam to install turbine generators capable of producing hydropower from the existing releases. The Power Authority does not have the authority or the rights to deviate from these releases and if the Jarvis Project were not to exist, the same reservoir water levels and discharges would still occur in accordance with the Operating Diagram. In other words, the Jarvis Project simply redirects reservoir outflow (determined by the Operating Diagram) through the Project's power generating equipment, which is released by the NYSCC for purposes other than generation at the Jarvis Project and which would be made even in the absence of the Project. NYSCC does not manage Hinckley Reservoir water levels or releases to promote generation at the Jarvis Project.

NYPA does not have any discretion in how the Hinckley Reservoir is utilized. The Hinckley Reservoir is currently operated by the NYSCC in accordance with the 2012 Hinckley Reservoir Operating Diagram for which the Jarvis Hydroelectric Project utilizes the reservoir releases to generate power.

Taking both the NHPA definition of the APE, the way in which water is released from Hinckley Reservoir, and the manner in which the Jarvis Project is operated into account, NYPA has drawn the APE to include:

- the north earthen embankment
- the non-overflow intake structure,
- the Project's intakes, penstocks, powerhouse, discharges, and low level outlets,
- the areas within the Project's fenceline at the entrance, extending to the north wingwall and the top of the north non-overflow intake structure,
- the concrete ogee spillway,
- the south earthen embankment, and
- the two parcels of land that comprise the Power Authority's boat launch north of the Project.

The total area of the APE equals approximately 19.7 acres of which approximately 14.43 acres are within the New York State Barge Canal National Historic Landmark.

Within the APE, but not subject to control by the Power Authority or this relicensing are those facilities associated with and/or owned by the Mohawk Valley Water Authority (MVWA), including an upstream section of the spillway south wingwall containing a gatehouse; two 42-inch diameter water supply conduits controlled by two 3- by 4-foot gate valves located on an outer gate shaft; a 42-inch diameter sluice gate at invert El. 1161.5, located in an inner gate shaft; the water supply conduits passing under the south embankment of the dam in a trench excavated into rock and backfilled with concrete; and appurtenances The MVWA draws, on average, up to 30-35 cubic feet per second (cfs) for water supply under existing agreements.

As always, the Authority welcomes the opportunity to discuss this matter with any of the consulted parties. Should there be any questions, please contact the Power Authority's Cultural Resources Specialist, Robert F. Panepinto, at 914.681.6404.

Very truly yours,

Cindy Brady

Cindy Brady
Business Development Manager, Project and Business Development

cc: M. Slade (NYPA)
R. Panepinto (NYPA)

Figure 2: Area of Potential Effect
Gregeory B. Jarvis Power Project Relicensing
Towns of Rensen and Trenton, Oneida County &
Town of Russia, Herkimer County

March 14, 2018

Mr. Robert Panepinto
Cultural Resource Specialist
New York Power Authority
123 Main Street-5E
White Plains, NY 10601

Re: FERC
Gregory B. Jarvis Power Project (Hinckley Reservoir) FERC Relicensing
17PR03658

Dear Mr. Panepinto:

Thank you for continuing to consult with the New York State Historic Preservation Office (SHPO). We have reviewed the provided documentation in accordance with Section 106 of the National Historic Preservation Act of 1966. These comments are those of SHPO and relate only to Historic/Cultural resources. They do not include other environmental impacts to New York State Parkland that may be involved in or near your project. Such impacts must be considered as part of the environmental review of the project pursuant to the National Environmental Policy Act and/or the State Environmental Quality Review Act (New York Environmental Conservation Law Article 8).

We have reviewed the project submission received on 1/23/2018, including the Area of Potential Effect (APE) justification letter, map, and shape files. Based upon this review, the SHPO has no concerns with the proposed APE.

If you have any questions, I can be reached at (518) 268-2217.

Sincerely,

Christina Vagvolgyi
Historic Preservation Technical Specialist
e-mail: christina.vagvolgyi@parks.ny.gov

via e-mail only