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January 11, 2021

Honorable Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, D.C. 20426

SUBJECT: West Canada Creek Project (FERC No. 2701-059)
ILP Relicensing Updated Study Report

Dear Secretary Bose:

Erie Boulevard Hydropower, L.P. (Erie or Licensee), a Brookfield Renewable company, is the Licensee, owner and operator of the West Canada Creek Hydroelectric Project (FERC No. 2701) (Project). The West Canada Creek Project consists of two developments, Prospect and Trenton, and is located on West Canada Creek in Oneida and Herkimer counties, New York. The current license for the West Canada Creek Project expires on February 28, 2023.

Erie is pursuing a new license for the Project using the Commission's Integrated Licensing Process (ILP) pursuant to 18 C.F.R. Part 5 of the Commission's regulations. On December 11, 2018, Erie filed a Revised Study Plan (RSP), and on March 7, 2019, FERC issued the Study Plan Determination (SPD) approving the RSP with modifications. Pursuant to 18 C.F.R. §5.15(b) and as identified in its RSP, Erie filed with FERC the first and second ILP Relicensing Studies Progress Reports for the West Canada Creek Project on July 29, 2019, and October 31, 2019, respectively. On October 31, 2019, Erie requested a revision of the Process Plan and Schedule to change the ISR filing date to March 7, 2020, to align with one year following the issuance of FERC's SPD, and FERC granted this revision on December 5, 2019.

On March 6, 2020, Erie filed an Initial Study Report (ISR) and associated supporting documents including the results of the West Canada Creek Project studies conducted during the 2019 field season. Erie held an IRS meeting on March 19, 2020 and filed an ISR meeting summary on April 3, 2020. Comments on the ISR and meeting summary were filed by Commission staff on May 5, 2020, and by American Whitewater, the New York Department of Environmental Conservation, and the U.S. Fish and Wildlife Service on May 6, 2020. Erie filed with FERC its responses to the ISR comments on June 5, 2020. FERC issued a Director's determination on requests for study modifications on July 6, 2020, which required additional information pertaining to the Fish Entrainment and Turbine Passage Survival Assessment.

In accordance with 18 C.F.R § 5.15(f), Erie encloses for filing the attached Updated Study Report (USR). The USR and supporting report documents provide the results of Whitewater Boating Flow and Access Study conducted in 2020, and additional information associated with the Aesthetic Flow Assessment Study and the Fish Entrainment and Turbine Passage Survival Assessment.

Pursuant to 18 C.F.R. § 5.15(f), Erie will hold an USR meeting with interested parties and FERC staff within 15 days of filing the USR. The USR meeting will be held on **January 25, 2021, from 10 am to 12 pm, via virtual conference call.** To assist with meeting planning and logistics, Erie requests that all agencies or stakeholders who plan to attend the meeting RSVP by sending an email to Steven Murphy at steven.murphy@brookfieldrenewable.com on or before January 18, 2021.

Pursuant to 18 C.F.R. § 5.15(f), Erie will file an USR meeting summary with the Commission within 15 days of the USR meeting, on or before February 9, 2021. Within 30 days of the filing of the USR meeting summary, on or before March 11, 2021, stakeholders may file any disagreements concerning the USR meeting summary, as well as any recommendations and associated justification for modifications to on-going studies or requests for new studies.

If you have any questions or require any additional information, please contact me at (315) 598-6130 or via email at steven.murphy@brookfieldrenewable.com.

Steven Murphy
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Attachments: Attachment A – Updated Study Report

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UPDATED STUDY REPORT

WEST CANADA CREEK HYDROELECTRIC PROJECT

FERC NO. 2701-NY

Prepared for:

Erie Boulevard Hydropower, L.P.
Fulton, New York

Prepared by:

Kleinschmidt

Pittsfield, Maine
www.KleinschmidtGroup.com

January 2021

UPDATED STUDY REPORT
WEST CANADA CREEK HYDROELECTRIC PROJECT
FERC NO. 2701

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DEFINITIONS OF TERMS, ACRONYMS, AND ABBREVIATIONS

AW	American Whitewater
Brookfield	Brookfield Renewable
CFR	Code of Federal Regulations
cfs	cubic feet per second
Commission	Federal Energy Regulatory Commission
DLA	Draft License Application
Erie or Licensee	Erie Boulevard Hydropower, L.P.
FERC	Federal Energy Regulatory Commission
FLA	Final License Application
kV	kilovolts
kW	kilowatts
ILP	Integrated Licensing Process
ISR	Initial Study Report
Interested Parties/ Stakeholders	The broad group of individuals and entities that have an interest in a proceeding
NYTU	New York Trout Unlimited
NYSDEC	New York State Department of Environmental Conservation
Project	FERC Project No. 2701, West Canada Creek Project
Relicensing	The process of acquiring a new FERC license for an existing hydroelectric project upon expiration of the existing FERC license
Relicensing Participants	Individuals and entities that are actively participating in a proceeding
RSP	Revised Study Plan
SPD	Study Plan Determination
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
USR	Updated Study Report

1.0 INTRODUCTION

Erie Boulevard Hydropower, L.P. (Erie or Licensee), a Brookfield Renewable company (Brookfield), is the Licensee, owner, and operator of the West Canada Creek Hydroelectric Project (FERC Project No. 2701) (Project). The West Canada Creek Project consists of two developments, Prospect and Trenton, and is located on West Canada Creek in Oneida and Herkimer counties, New York. The Federal Energy Regulatory Commission (FERC or Commission) issued the current license for the Project on March 18, 1983, which expires February 28, 2023. Erie is pursuing a new license under FERC's Integrated Licensing Process (ILP) and intends to file an application for a new license with FERC before February 28, 2021. Erie filed the Draft License Application (DLA) on October 1, 2020 and must file the Final License Application (FLA) with FERC no later than February 28, 2021.

On December 11, 2018, Erie filed a Revised Study Plan (RSP), and on March 7, 2019, FERC issued the Study Plan Determination (SPD) approving the RSP with modifications. Erie requested a revision of the Process Plan and Schedule to change the Initial Study Report (ISR) filing date to March 7, 2020, and FERC granted this revision on December 5, 2019. On March 6, 2020, Erie filed an ISR and associated supporting documents of the studies conducted during the 2019 season. Erie held an IRS meeting on March 19, 2020 and filed an ISR meeting summary on April 3, 2020. Comments on the ISR and meeting summary were filed by Commission staff on May 5, 2020, and by American Whitewater (AW), the New York Department of Environmental Conservation (NYSDEC), and the U.S. Fish and Wildlife Service (USFWS) on May 6, 2020. Erie filed with FERC its responses to the ISR comments on June 5, 2020. FERC issued a Director's determination on requests for study modifications on July 6, 2020, which required additional information pertaining to the Fish Entrainment Study.

This Updated Study Report (USR) and associated supporting study documents include the results of the Whitewater Boating Flow and Access Study conducted in 2020, and additional information associated with the Aesthetic Flow Assessment Study and the Fish Entrainment and Turbine Passage Survival Assessment. Section 2.0 of this USR includes a brief description of the Project facilities. Section 3.0 provides an overview of consultation conducted relative to the USR studies and summary of the completed studies. Section 4.0 provides a description of the ILP schedule, including details regarding the USR meeting date and location.

2.0 PROJECT DESCRIPTION

The West Canada Creek Project is located in the Towns of Trenton and Russia, and Oneida and Herkimer counties, New York. The upstream Prospect Development is located approximately 33 river-miles from the confluence of West Canada Creek with the Mohawk River. The downstream Trenton Falls Development is located approximately 31 river-miles from the confluence of West Canada Creek with the Mohawk River. Additional information pertaining to the Project and Project vicinity is provided in the DLA (Erie 2020). See Figure 2-1 for Project location.

2.1 PROSPECT DEVELOPMENT

The Prospect Development is composed of: a 176-acre impoundment; a concrete overflow dam with earthfill dikes on either end; a 4,500-foot-long canal extending from a south dike to a concrete intake; a 430-foot-long steel penstock; an approximate 1.2-mile-long bypass reach; a reinforced concrete powerhouse containing a single turbine generator unit with a nameplate capacity of 17.3 MW; 6.9 kilovolts (kV) generator leads, 15-kV breaker, 6.6/46-kV transformer, a 46-kV switch connecting to the National Grid interconnection point within the substation; and appurtenant facilities.

2.2 TRENTON DEVELOPMENT

The Trenton Development is located at RM 31 and is the lowermost Project development. The Trenton Development is composed of: a 9 acre impoundment; a concrete masonry dam with a spillway, non-overflow sections, and auxiliary spillway; a concrete intake and a 14-foot-diameter tunnel/pipeline; a surge tank; four 7-foot-diameter penstocks; an approximate 4,000-foot-long bypass reach; two adjoining powerhouses housing retired in-place (Unit Nos. 1, 2, 3, and 4) and operational Unit Nos. 5, 6, and 7 with a total rated capacity of 22.5 MW; 13.2-kV generator leads, three 15-kV breakers, two 13.2/46-kV transformers, two 46-kV switches connecting to the National Grid interconnection point within the substation; and appurtenant facilities.

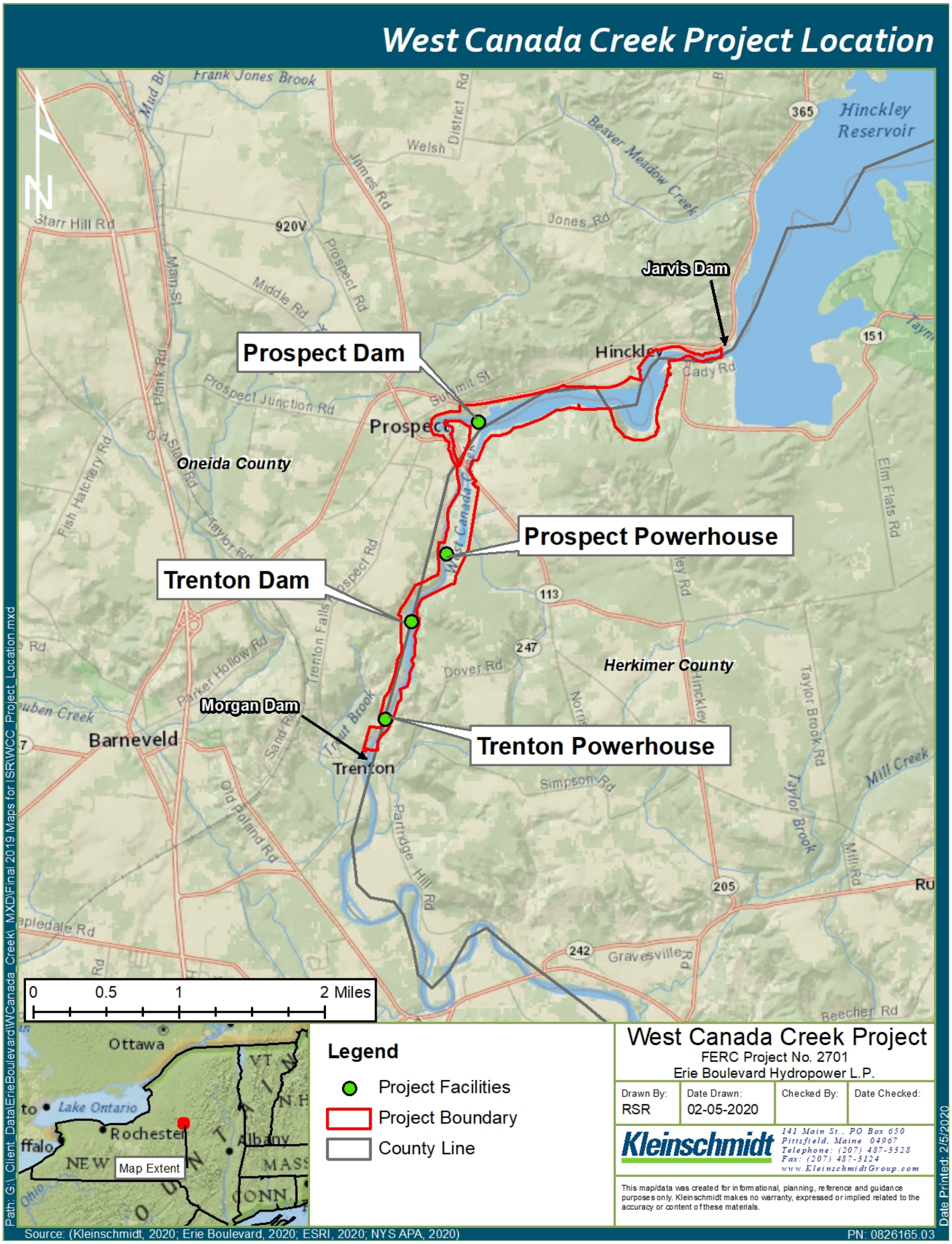

FIGURE 2-1 WEST CANADA CREEK PROJECT LOCATION

3.0 STUDY CONSULTATION AND COMPLETED STUDIES

3.1 STUDY CONSULTATION

As part of the study implementation and in accordance with FERC's SPD, Erie initiated consultation with agencies and stakeholders, including NYSDEC, the USFWS, AW, New York State Fish and Wildlife Management Board, New York Trout Unlimited (NYTU), and the Town of Trenton, regarding aspects of the Project's relicensing studies. Documentation of this consultation was provided in the ISR, and the Study Progress Reports filed with FERC and distributed to the stakeholders on July 29, 2019, October 31, 2019, and November 30, 2020. Documentation of consultation is also provided, as appropriate, in the study reports.

3.2 COMPLETED STUDIES

Erie successfully completed all nine studies, included in the Commission's SPD. The results of these studies are provided via separate study report documents as part of the ISR and this USR filing, as noted in Table 3-1.

TABLE 3-1 LIST OF STUDIES AND STUDY STATUS

STUDY REPORT	STATUS
Aquatic Mesohabitat Assessment Study (Kleinschmidt 2020a)	Completed and filed in the ISR[1]
Macroinvertebrate and Freshwater Mussel Survey (Kleinschmidt 2020b)	Completed and filed in the ISR
Impoundment Shoreline Characterization Study (Kleinschmidt 2020c)	Completed and filed in the ISR
Fish Assemblage Assessment (Kleinschmidt 2020d)	Completed and filed in the ISR
Updated Fish Entrainment and Turbine Passage Survival Assessment (Kleinschmidt 2020e)	Completed initial study report and filed in the ISR; updated study report provided in this USR
Water Quality Study (Kleinschmidt 2020f)	Completed and filed in the ISR
Recreation Use, Needs and Access Study (Kleinschmidt 2020g)	Completed and filed in the ISR
Whitewater Boating Flow and Access Study (Kleinschmidt 2020h)	Progress report provided in the ISR, study completed in 2020 and study report provided in this USR
Aesthetic Flow Assessment Study (EDR 2020)	Completed and filed in the ISR, additional information provided in this USR

[1] Initial Study Report, filed on March 6, 2020.

3.3 USR STUDY INFORMATION

3.3.1 FISH ENTRAINMENT AND TURBINE PASSAGE SURVIVAL ASSESSMENT

In the Director's determination on requests for study modification, FERC recommended that Erie evaluate the potential entrainment, impingement, and survival of trout that have been stocked in the Prospect impoundment by NYSDEC in recent years. The NYSDEC (letter dated May 6, 2020) requested that Erie conduct an additional evaluation that considers swim burst swim speeds to produce more accurate results. In the response to ISR comments, FERC (July 6, 2020) stated that the sustained swim speed approach to estimate swim speed is reasonable and the information presented in the study report should be adequate for staff to conduct its environmental analysis of turbine passage survival and entrainment potential. However, Erie incorporated additional information pertaining to burst speeds, as appropriate, in this USR to address the NYSDEC request. Appendix A of this USR provides the updated Fish Entrainment and Turbine Passage Survival Assessment.

3.3.2 WHITEWATER BOATING FLOW AND ACCESS STUDY

The ISR filing provided a study progress report for the Whitewater Boating Flow and Access Study, which was to be completed during the 2019 study season, according to the approved study plan. The on-water controlled flow component for downstream West Canada Creek was scheduled multiple times during the 2019 season; however, the study was postponed due to field conditions that were not conducive to the controlled flow study (high flow events[1]) and participant availability. Due to anticipated higher flows, colder weather, shorter daylight periods and associated safety considerations of the participants, Erie, in consultation with AW, postponed the study until the 2020 study season.

The on-water controlled flow study was completed during the 2020 field season as well as an additional on-water controlled flow assessment of the Prospect bypass reach. The results of the 2020 study season assessment are provided in Appendix B of this USR.

[1] Travel times and downstream tributary inflows were significant obstacles in 2019 scheduling attempts to complete the downstream flow assessment.

3.3.3 AESTHETICS FLOW ASSESSMENT ADDITIONAL INFORMATION

The Aesthetics Flow Assessment Study was completed according to the approved study plan and filed with the ISR. Erie provides photographs of the leakage/flow conditions at key observation point locations in Appendix C of this USR. Erie also conducted a desktop evaluation of existing available data regarding the timing and volume of Prospect and Trenton bypass reach spillage flow events within the past 5 years (2015-2019) (see Appendix C of this USR).

4.0 PROCESS AND SCHEDULE

4.1 OVERALL PROCESS PLAN AND SCHEDULE

Table 4-1 provides the West Canada Creek Project relicensing ILP schedule. This schedule is based on the Revised Process Plan issued by FERC on December 5, 2019.

TABLE 4-1 WEST CANADA CREEK RELICENSING PROCESS PLAN AND SCHEDULE

RESPONSIBLE PARTY	PRE-FILING MILESTONE	DATE	FERC REGULATION
Erie	Second Study Season	Spring- Fall 2020	5.15(a)
Erie	File Updated Study Report	1/10/2021	5.15(f)
All Stakeholders	Updated Study Report Meeting	On or Before 1/25/2021	5.15(f)
Erie	File Updated Study Report Meeting Summary	2/9/2021	5.15(f)
Erie	File Final License Application	2/28/2021	5.17
All Stakeholders	File Disagreements/Requests to Amend Study Plan	3/11/2021	5.15(f)
Erie	Issue Public Notice of Final License Application Filing	3/15/2021	5.17(d)(2)
All Stakeholders	File Responses to Disagreements/Amendment Requests	4/10/2021	5.15(f)
FERC	Issue Director's Determination on Disagreements/Amendments	5/10/2021	5.15(f)

1 Activities in shaded areas are not necessary if there are no study disputes.
2 If the due date falls on a weekend or holiday, the deadline is the following business day.
3 Early filings or issuances will not result in changes to these deadlines.
4 The schedule is subject to change throughout the relicensing proceeding.

4.2 UPDATED STUDY REPORT MEETING

Pursuant to 18 C.F.R. § 5.15(f), Erie will hold an USR meeting with interested parties and FERC staff within 15 days of filing the USR. The USR meeting will be held on January 25, 2021, from 10 am to 12 pm, via virtual conference call. To assist with meeting planning and logistics, Erie requests that all agencies or stakeholders who plan to attend the meeting RSVP by sending an email to Steven Murphy at steven.murphy@brookfieldrenewable.com on or before January 18, 2021. Pursuant to 18 C.F.R. § 5.15(f), Erie will file an USR meeting summary with the Commission within 15 days of the USR meeting, on or before February 9, 2021.

4.3 STUDY PLAN MODIFICATION AND FERC DETERMINATION

Within 30 days of the filing of the USR meeting summary, on or before March 11, 2021, stakeholders may file any disagreements concerning the USR meeting summary, as well as any recommendations and associated justification for modifications to on-going studies or requests for new studies. Recommendations for modified or new studies must be accompanied by justification in accordance with FERC's regulations (18 CFR § 5.15(c)(4), and meet the applicable criteria as defined by 18 CFR §5.15(d) and §5.15(e). Additionally, as defined in 18 CFR § 5.15(f), the proponent of any proposed or modified studies must also demonstrate extraordinary circumstances warranting approval of any proposal for new information gathering or studies. Erie subsequently has 30 days, on or before April 10, 2021, to file any responses to comments. FERC will then have an additional 30 days, on or before May 10, 2021, to resolve any disagreements and/or modifications to the study plan and to issue a determination regarding any disagreements and/or modifications to the approved study plans.

5.0 REFERENCES

Environmental Design & Research. (EDR). 2020. West Canada Creek Hydroelectric Project (P-2701) Aesthetic Flow Assessment Report, March 2020.

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Erie. 2020. West Canada Creek Hydroelectric Project (P-2701) Initial Study Report, March 2020.

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Kleinschmidt Associates. (Kleinschmidt). 2020a. West Canada Creek Hydroelectric Project (P-2701) Aquatic Mesohabitat Assessment, March 2020.

Kleinschmidt Associates. (Kleinschmidt). 2020b. West Canada Creek Hydroelectric Project (P-2701) Macroinvertebrate and Freshwater Mussel Survey, March 2020.

Kleinschmidt Associates. (Kleinschmidt). 2020c. West Canada Creek Hydroelectric Project (P-2701) Impoundment Shoreline Characterization Study, March 2020.

Kleinschmidt Associates. (Kleinschmidt). 2020d. West Canada Creek Hydroelectric Project (P-2701) Fish Assemblage Assessment, March 2020.

Kleinschmidt Associates. (Kleinschmidt). 2020e. West Canada Creek Hydroelectric Project (P-2701) Updated Fish Entrainment and Turbine Passage Survival Assessment, January 2021.

Kleinschmidt Associates. (Kleinschmidt). 2020f. West Canada Creek Hydroelectric Project (P-2701) Water Quality Study, March 2020.

Kleinschmidt Associates. (Kleinschmidt). 2020g. West Canada Creek Hydroelectric Project (P-2701) Recreation Use, Needs and Access Study, March 2020.

Kleinschmidt Associates. (Kleinschmidt). 2020h. West Canada Creek Hydroelectric Project (P-2701) Whitewater Boating Flow and Access Study, January 2021.

APPENDIX A

UPDATED FISH ENTRAINMENT AND TURBINE PASSAGE SURVIVAL ASSESSMENT REPORT

UPDATED FISH ENTRAINMENT AND TURBINE PASSAGE SURVIVAL ASSESSMENT

WEST CANADA CREEK HYDROELECTRIC PROJECT

FERC NO. 2701-NY

Prepared for:

Erie Boulevard Hydropower, L.P.
Fulton, New York

Prepared by:

Kleinschmidt

Pittsfield, Maine
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January 2021

UPDATED FISH ENTRAINMENT AND TURBINE PASSAGE SURVIVAL ASSESSMENT
WEST CANADA CREEK HYDROELECTRIC PROJECT
FERC NO. 2701-NY

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DEFINITIONS OF TERMS, ACRONYMS, AND ABBREVIATIONS

Brookfield	Brookfield Renewable
cfs	cubic feet per second
Commission	Federal Energy Regulatory Commission
Erie or Licensee	Erie Boulevard Hydropower, L.P.
FERC	Federal Energy Regulatory Commission
fps	feet per second
ft	foot/feet
ILP	Integrated Licensing Process
in	inches
MCF	Million cubic feet per second
MW	Megawatts
NYSDEC	New York State Department of Environmental Conservation
PAD	Pre-Application Document
Project	FERC Project No. 2701, West Canada Creek Project
Project Area	The area within the FERC project boundary
Project Vicinity	The general geographic area in which the Project is located; the towns of Trenton and Prospect, New York
RPM	Rotations per Minute
RSP	Revised Study Plan
SPD	Study Plan Determination
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey

1.0 INTRODUCTION

Erie Boulevard Hydropower, L.P. (Erie or Licensee), a Brookfield Renewable company (Brookfield), is the Licensee, owner, and operator of the existing West Canada Creek Hydroelectric Project (FERC Project No. 2701-NY) (Project). The Project consists of two developments, Prospect and Trenton, and is located on West Canada Creek in Oneida and Herkimer counties, New York. The Federal Energy Regulatory Commission (FERC or Commission) issued the current license for the Project on March 18, 1983, which expires February 28, 2023. Erie is pursuing a new license under FERC's Integrated Licensing Process (ILP) and intends to file an application for a new license with FERC before February 28, 2021. On December 11, 2018, Erie filed a Revised Study Plan (RSP), and on March 7, 2019, FERC issued the Study Plan Determination (SPD) approving the RSP with modifications.

As part of the study implementation and in accordance with FERC's SPD, Erie initiated consultation with the U.S. Fish and Wildlife Service (USFWS) and New York State Department of Environmental Conservation (NYSDEC) regarding the Aquatic Mesohabitat Assessment, Macroinvertebrate and Mussel Surveys, Fish Assemblage Assessment, and Fish Entrainment and Turbine Passage Survival Assessment studies on April 18, 2019, July 16, 2019, and August 9, 2019. Documentation of this consultation was provided in the Study Progress Reports filed with FERC and distributed to the stakeholders on July 29, 2019, and October 31, 2019.

In accordance with 18 C.F.R § 5.15(c), Erie filed the Initial Study Report (ISR) on March 6, 2020 to provide the results of the field studies conducted in 2019 pursuant to the Commission's SPD, which included the Fish Entrainment and Turbine Passage Survival Assessment Report. According to 18 CFR §5.15, Erie held the ISR meeting on March 19, 2020, and filed an ISR meeting summary with the Commission on April 3, 2020. Comments on the ISR were filed by FERC (dated May 5, 2020), the USFWS (dated May 6, 2020), the NYSDEC (dated May 6, 2020), and American Whitewater (dated May 5, 2020). In accordance with 18 CFR § 5.15(c)(5), Erie filed with FERC its responses to the ISR comments on June 5, 2020, including responses to comments relative to this study. FERC issued a Director's determination on requests for study modifications on July 6, 2020.

This report describes the methods and results of the Fish Entrainment and Turbine Passage Survival Assessment for the Prospect and Trenton developments, including updates as noted below. The purpose of the Fish Entrainment and Turbine Passage Survival Assessment is to assess the potential effects of Project operations on fish entrainment and turbine strike mortality.

In the Director's determination on requests for study modification, FERC recommended that Erie evaluate the potential entrainment, impingement, and survival of trout that have been stocked in the Prospect impoundment[1] by NYSDEC in recent years. Erie maintains that the inclusion of trout in the Prospect entrainment evaluation is not appropriate because a *put-and-take* fishery assumes 100 percent annual mortality, is not representative of a naturally occurring population, and the extent of annual recruitment of trout to the Prospect impoundment is wholly at the discretion of stocking activities and not natural production. However, Erie provides in this updated study report additional discussion and evaluation of trout entrainment, impingement, and survival of trout in response to FERC's request.

The NYSDEC (letter dated May 6, 2020) requested that Erie conduct an additional evaluation that considers burst swim speeds to produce more accurate results. Erie in the ISR report conducted the assessment based on sustained swim speeds, which assumes a conservative approach, as burst swim speeds are much higher speeds than sustained speeds[2] and use of burst speed criteria would yield even fewer fish as being potentially susceptible to entrainment. In addition, the intake velocity was calculated based on the assumptions of constant generation at maximum hydraulic capacity, which would reflect a conservative estimate (i.e., over estimates entrainment potential) as generation would not be at maximum capacity levels during most periods. FERC (July 6, 2020) stated that the sustained swim speed approach to estimate swim speed is reasonable and the information presented in the study report should be adequate for staff to conduct its environmental analysis of turbine passage survival and entrainment potential. However, Erie incorporated additional information pertaining to burst speeds, as appropriate, in this updated study report to address the NYSDEC request.

[1] FERC's request was for the Prospect impoundment. NYSDEC does not stock trout in the Trenton impoundment, and therefore, Erie's response includes Prospect impoundment only.

[2] Sustained speeds are generally defined as those speeds that fish can maintain for long periods (i.e., greater than 200 minutes) without muscular fatigue (Beamish 1978). Burst speeds are generally defined as the highest speeds attainable by fish and can be maintained for only short periods of time (i.e., less than 20 seconds) (Beamish 1978).

In addition to providing burst speed information, the source studies used to estimate the entrainment rates at the Trenton Development were refined to include entrainment density data from regionally appropriate New York projects with trophic, fish assemblage, and habitat characteristics that more closely resemble the Trenton impoundment. This updated source study list more accurately reflects specific Project and biological parameters used to calculate project specific entrainment rates at the Trenton Development. The source studies used to estimate the entrainment rates at the Prospect Development were maintained as provided in the Initial Study Report.

2.0 METHODOLOGY

2.1 STUDY AREA

As proposed in the RSP, the study area consists of the Prospect and Trenton impoundments and the Prospect power canal.

2.2 DATA COLLECTION

Kleinschmidt conducted a literature review of species of interest, identified site-specific data (intake depth, location and velocities, and generating unit characteristics and hydraulic capacities), and conducted an estimate of entrainment and turbine passage survival. In addition, Kleinschmidt reviewed data collected from the Project's Fish Assemblage Assessment (Kleinschmidt 2020d) including species occurrence, distribution, and relative abundance. FERC recommended in the SPD that Erie provide an analysis or discussion of potential impingement effects based on trashrack spacing, intake velocities, size of fish species present in the impoundment, and swimming speeds of these species. In addition, FERC recommended that Erie describe its goals and methods for collecting site-specific data (e.g., intake velocity) and provide this information to USFWS and NYSDEC so that the agencies may provide comments and recommendations prior to conducting the study. Accordingly, Erie consulted with USFWS and NYSDEC on April 18, 2019, as documented in Study Progress Report 1 (July 29, 2019).

2.3 DATA ANALYSIS

Estimates of entrainment and the rate of mortality from turbine stressors are provided with equations that predict the probability of a leading-edge turbine strike (Franke et al. 1997). The blade strike equations use turbine parameters specific to each development. The blade strike model allows for the manipulation of parameters such as fish size or turbine characteristics to determine the relative effect on turbine passage survival. This predictive model is based on the work of Von Raben (Bell 1981). Franke et al. (1997) refined the Von Raben model to consider the effect of tangential projection of the fish length on blade strike probability, as a large percentage of entrainment mortality is caused by fish strikes from a turbine blade or some other turbine component.

A correlation factor is utilized in the Advanced Hydro Turbine model to adjust the predictive model results to correspond with documented empirical data. This correlation factor was originally introduced by Von Raben (Bell 1981) because the contact of a fish with a turbine component does not always result in injury or mortality (Bell 1981; Cada 1998). Therefore, Von Raben introduced the correlation factor to adjust the predicted turbine strike results to more closely match empirical results. The correlation factor is necessary because not all strikes lead to death, and not all mortality is due to blade strike. This factor also extends the applicability of these predictive equations to all injury mechanisms related to the variable parameters. As stated in Franke et al. (1997) "*such mechanisms could include mechanical mechanisms such as leading-edge strike and gap grinding as well as fluid induced mechanisms related to flow through gaps or other flow phenomena associated with blades.*" Based on a substantial number of test results obtained from studies conducted with salmonids on the west coast, Franke et al. (1997) recommends a correlation factor between 0.1 to 0.2.

The blade strike correlation factor is calibrated with turbine passage mortality rates for target fish species estimated from literature values. Turbine passage survival studies have been independently performed at numerous hydroelectric projects throughout the country for a wide range of species (Franke et al. 1997). Study data were reviewed to identify a subset of applicable source studies that were used to estimate mortality and strike probability of target fish species based on the design characteristics of the Trenton and Prospect developments.

The results of the entrainment and turbine stressor mortality analysis were used to determine the basis to explore any fish passage or protection alternatives, if needed, at the Project. The desktop analysis followed a six-step iterative process. The steps included the following:

1. Development of estimates of fish entrainment rates based upon applicable entrainment study data from existing literature;
2. Development of total annual entrainment at the Project based upon Project-specific operational data combined with estimated entrainment rates;
3. Development of estimates of species and length class composition of potentially entrained fishes at the Project based upon available site-specific sampling data;
4. Development of physical and biological filters used to screen the total annual entrainment estimate;
5. Development of estimated turbine passage mortality based on existing literature; and
6. Estimation of turbine mortality fish losses computed by applying site-specific turbine mortality rates to annual entrainment estimates.

Each step of the chronological analysis is described below in greater detail.

2.3.1 DEVELOPMENT OF ENTRAINMENT DATABASE AND ENTRAINMENT RATE

The FERC (1995) database of existing entrainment data was reviewed to establish a database of surrogate studies at sites similar to the Project. To identify appropriate source data, a wide range of site characteristics were reviewed. This included identification of projects with similar physical, biological and limnological characteristics, such as:

- Project size: discharge capacity and power production;
- Location: geographic proximity to the Project;
- Mode of operation - e.g., peaking, run-of-river, etc.;
- Biological factors: similarity of fish species composition, trophic condition;
- Impoundment characteristics: general water quality, impoundment size, flow regime; and
- Physical project characteristics: trashrack spacing, intake velocity, etc.

Using these criteria, the list of potential surrogate studies was narrowed to sites with characteristics similar to the Trenton and Prospect developments. These sites were then used to estimate an entrainment rate for the Project.

The reported annual entrainment rates for each of the sites were averaged to provide an annual entrainment rate for each Project development. Annual entrainment rates were used because monthly entrainment rates were calculated differently in the individual surrogate studies. The annual entrainment rates for all projects in the FERC entrainment study database were reported in fish per hour using 100 percent of the plant capacity. These hourly entrainment rates were converted to fish per million cubic feet (MCF) using the reported maximum plant capacity for each site. Entrainment rates expressed as fish per volume of water created a common denominator to allow scaling of entrainment at different sites despite varying characteristics, such as plant hydraulic capacity. Once an entrainment rate, in fish per MCF, was established for each surrogate site, the rates were averaged to estimate an annual entrainment rate for each of the two developments.

2.3.2 ESTIMATION OF TOTAL ANNUAL ENTRAINMENT

Annual estimates of total entrainment (entrainment abundance) were developed for the Project by multiplying the annual entrainment rate by the estimated monthly generation flows. Due to differences in methods used to calculate monthly entrainment rates for sites within the FERC database, the annual entrainment rate was applied across all months. Monthly generation flow estimates were derived using mean monthly values from the USGS gage at Kast Bridge (USGS 01346000), located on West Canada Creek, for the full calendar years of 1997 through 2017. Mean daily flows were pro-rated to account for the difference in drainage area at the USGS gage versus at the Project. Mean daily flows were also adjusted to account for the limitations of each of the powerhouse hydraulic capacities. Flows were limited to the maximum powerhouse flow of 1,855 cfs for the Prospect Development and 1,425 cfs for the Trenton Development. Excess flows would pass over the dam and were not included in the calculation of generation flows.

After calculating average daily flows that pass through the powerhouses, monthly flow estimates were calculated by multiplying the average daily powerhouse flows by the number of days in the month. The monthly flow (cfs) was then converted to the volume of water expected to pass through each powerhouse in MCF. The monthly MCF values were summed to calculate annual volume of water expected to be passed through the Project powerhouses. This approach is very conservative and assumes that the Project operates continuously at maximum capacity with no turbine outages during the year.

2.3.3 SPECIES AND LENGTH CLASS COMPOSITION

Site-specific data from the 2019 electrofishing survey at the Prospect impoundment were deemed most appropriate for characterizing typical species and length class composition at the Prospect Development. Species composition was applied from data collected during the September 2019 electrofishing study conducted in the Prospect impoundment and power canal (Kleinschmidt 2020d) including length-frequency distributions[3]. The same data were also used to define length class composition of fish susceptible to entrainment. Length data from electrofishing efforts was used to report relative abundance of fish within the following length classes: 0-2 inches (in), 2.1-4 in, 4.1-6 in, 6.1-8 in, 8.1-10 in, 10.1-11 in, 11.1-20 in, and 20.1-25 in. The same species and sizes of fish was conservatively applied for characterizing the typical species and length class composition at the Trenton Development although the Trenton impoundment has low fish

[3] Some fish collected during 2019 sampling were weighed but not measured. Lengths for these fish were estimated using species specific length weight relationships (Schneider et al. 2000).

densities as compared to Prospect impoundment, as evidenced in the 2019 Fish Assemblage Assessment (Kleinschmidt 2020d).

Trout were not collected during the 2019 electrofishing efforts within the Prospect impoundment. As documented in the Fish Assemblage Assessment Report (Kleinschmidt 2020d), NYSDEC stocked a total of 2,800 brown trout in May 2017, 2,960 brown trout in May 2018, and 3,010 brown trout in April 2019 in the Prospect impoundment. Length classes of stocked trout included fish approximately 8 inches (2017), 8.5 inches (2019), and 9 inches (2018) at time of release (Jana Lantry, NYSDEC, *personal communication* January 7, 2020).

For the Trenton entrainment analysis, the use of fish data collected in the Prospect impoundment would likely result in an overestimation of potential entrainment. The 2019 fish sampling data[4] and observations indicate that most littoral and lithophilic-spawning species common to Prospect would likely not be as abundant in the Trenton impoundment. Trenton impoundment is a backwatered gorge, with steep, nearly vertical walls of bedrock and contains little littoral habitat. Substrates are largely coarse, consisting of boulder, cobble and a small amount of gravel. In-water cover is minimal except a few areas where large and small boulders and cobble concentrated. Given the limited catch data at Trenton, the Prospect impoundment fish assemblage data, located upstream of the Trenton impoundment, provided a source of potential fish assemblage data. Therefore, although a more robust and a more conservative data set than what would likely occur at the Trenton impoundment, species and size relative abundance from the Prospect impoundment data were applied to the annual entrainment density estimates to develop annual estimates of fish species entrainment at the Trenton Development.

2.3.4 ENTRAINMENT DATABASE AND ENTRAINMENT RATES

Using the methods described in Section 2.1, the FERC database of entrainment studies was narrowed to nine sites that are comparable to Trenton and seven sites that are comparable to Prospect. It was important to distinguish the differing biological characteristics of the two developments because the same biological data could not be applied generically to both developments. The Prospect impoundment is mesotrophic and characterized by an extensive littoral zone populated by warmwater benthic and lithophilic-spawning fish species

[4] Two nets were deployed from the shore, extending to depths of approximately 25 feet. The net-set time ranged from 24 hours, to 25 hours and 11 minutes and resulted in the catch of a single Rock Bass (Kleinschmidt 2020d).

(Kleinschmidt 2020d) and is represented in data sources from other entrainment studies featuring mesotrophic warmwater impoundments. Trenton is relatively oligotrophic, lacks a littoral zone, and supports a less robust and diverse fish assemblage. In this updated report, Trenton source studies were, therefore, refined to more accurately reflect specific Project and biological parameters. Thus, projects occurring in warmer climates that support more productive warmwater fish assemblages were applied to Prospect, but do not accurately reflect the type of habitat and fish productivity present at Trenton. Source studies for Trenton were, therefore, replaced with data from more regionally appropriate New York projects with similar trophic, fish assemblage, and habitat characteristics. To increase the number of projects within the database, several sites with similar characteristics outside of the general geographic region of the Project were still included for both Prospect and Trenton.

Entrainment rates for the Project were calculated using the results of the selected source studies. If a source study had multiple entrainment studies, the most appropriate and/or complete study was selected. For example, the Kleber study had both a netting and hydroacoustic study completed. However, only the hydroacoustic study reported annual entrainment, so that particular study was deemed more complete. Another example includes the Millville study, which had three years of results. Only one of the years represented a continuous, year-long sample, so the results of that particular study were used. Table 2-1 and Table 2-2 summarizes the study sources that were applied to the calculated entrainment rates for each of the two Project developments.

TABLE 2-1 PROSPECT DEVELOPMENT ENTRAINMENT DATABASE

PROJECT (FERC NO.)	PROJECT SIZE (MW)	TOTAL HYDRAULIC CAPACITY (CFS)	OPERATING MODE	LOCATION	ENT. RATE (FISH/MCF[2])
Dam #4 (P-2516)	2.1	1,849	run-of-river	West Virginia	0.1
Millville (P-2343)	2.8	2,220	run-of-river	West Virginia	0.4
Tower (P-10615)	0.6	360	run-of-river	Michigan	2.6
Saluda (P-516)	2.4	800	peaking	South Carolina	2.9
Flambeau Lower (P-2421)	1.2	930	run-of-river	Wisconsin	3.5
99 Islands (P-2331)	18.0	4,498	peaking	South Carolina	1.1

PROJECT (FERC NO.)	PROJECT SIZE (MW)	TOTAL HYDRAULIC CAPACITY (CFS)	OPERATING MODE	LOCATION	ENT. RATE (FISH/MCF[2])
Hawks Nest (P-2512)	102.0	10,000	run-of-river	West Virginia	0.2
Prospect Development[1]	**17.3**	**1,855**	**peaking**	**New York**	**1.5**

[1] Estimated entrainment rate for the Prospect Development
[2] Million cubic feet

TABLE 2-2 TRENTON DEVELOPMENT ENTRAINMENT DATABASE

PROJECT (FERC NO.)	PROJECT SIZE (MW)	TOTAL HYDRAULIC CAPACITY (CFS)	OPERATING MODE	LOCATION	ENT. RATE (FISH/MCF[2])
Dam #4 (P-2516)	2.1	1,849	run-of-river	West Virginia	0.1
Millville (P-2343)	2.8	2,220	run-of-river	West Virginia	0.4
E.J. West (P-2318)	22.1	5,400	peaking	New York	1.7
Hudson Spier Falls (P-2482)	56.0	8,970	peaking	New York	1.8
Sherman Island (P-2482)	38.2	6,600	peaking	New York	1.8
Hawks Nest (P-2512)	102.0	10,000	run-of-river	West Virginia	0.2
Trenton Development[1]	**22.5**	**1,425**	**peaking**	**New York**	**1.0**

[1] Estimated entrainment rate for the Trenton Development
[2] Million cubic feet

2.3.5 ENTRAINMENT SCREENING

Physical and biological filters refer to the physical layout of the Project intakes or biological factors that could influence entrainment. Examples of this include trashrack spacing that is so small that fish cannot enter the intakes; intake velocities that are so low that fish would not be entrained into the intakes; and/or lake stratification that would create a low dissolved oxygen environment excluding fish from the intake areas. The first potential filter analyzed was the expected approach velocity of water into the Project intakes. This was calculated using Project specific characteristics, including trashrack spacing (inches), intake area (ft^2), and the maximum flow capacity (cfs) (Table 2-3).

TABLE 2-3 PROSPECT AND TRENTON DEVELOPMENT INTAKE AND TRASHRACK DIMENSIONS

INTAKE AND TRASHRACK DIMENSIONS	PROSPECT	TRENTON
Intake Height (ft)	29.0	25.0
Intake Width (ft)	30.0	20.0
Intake Area (ft^2)	870.0	500.0
Trashrack Bar Spacing (in)	3.6	2.0
Trashrack Bar Thickness (in)	0.4	0.4
Bar Percentage	0.1	0.2
Bar Area (ft^2)	91.2	95.0
Free Area (ft^2)	778.8	405.0

Project specific parameters were used to calculate the approach velocity of water (feet per second or fps) at the intakes; velocity was then compared to swimming speeds of fish that could potentially encounter the intakes. Fish swimming speeds were estimated using methods described in a USFWS bulletin (USFWS 1989). The bulletin offers methods for calculating maximum intake velocities at power plant intakes and defines a conservative estimate of a fishes sustained swimming speed as 3 times its body length. We calculated the expected swimming speed of fish at the Project using the following equation:

$$\text{Sustained Swimming Speed (fps)} = \text{Fish Length (ft)} \times 3 \text{ body lengths per second (fps)}$$

This information was used to exclude fish that can escape intake flows from the entrainment estimate.

In comments on the Fish Entrainment and Turbine Passage Survival Assessment Report filed with the ISR, the NYSDEC recommended that Erie conduct literature reviews of published burst swim speeds of studied species to produce more accurate results (letter dated May 6, 2020). Accordingly, Erie has added an additional analysis to this Updated Report to include an assessment of burst speeds. A USFWS bulletin (USFWS 2019) provides a formula for deriving burst speeds from sustained speeds using the following equation:

$$\text{Burst Swimming Speed (fps)} = \text{Sustained Swimming Speed (fps)} \times 2$$

This information was used to provide entrainment rates that account for fish that can exclude intakes based on body size and associated burst swim speeds.

2.3.6 FISH IMPINGEMENT

Impingement could occur if a fish is too wide to travel through the trashracks but cannot escape the intake flow. The widths of fish determined to be susceptible to entrainment at the Project were estimated to assess the potential for impingement at the trashracks. Interorbital width is the distance between eyes as measured across the head and is roughly equivalent to skull width. The skull is the least compressible part of the fish body and provides a conservative index of what size fish the trashrack may exclude. Species-specific interorbital widths were calculated using the ratio of a fish's total length, standard length, and interorbital width as defined in Smith (1985).

2.3.7 TURBINE PASSAGE MORTALITY RATES AND ESTIMATION OF TOTAL FISH MORTALITY

Mortality estimates were calculated using methods defined in Franke et al. (1997), which presents equations for calculating the probability that a turbine blade would strike an entrained fish based on Project specific turbine parameters, including turbine type. Both Prospect and Trenton utilize Francis turbines. Table 2-4 contain the parameters at the Project assuming operation at the maximum hydraulic capacity. The equation used to calculate the blade strike probability for a Francis unit is as follows:

$$P = \lambda \frac{N \cdot L}{D} \cdot \left[\frac{\sin\alpha_t \cdot \frac{B}{D_1}}{2Q_{\omega d}} + \frac{\cos\alpha_t}{\pi} \right]$$

S = 1 – P where,

λ = Blade strike correlation factor

N = Number of buckets

L = Fish length

D = Diameter of runner

B = Runner height at inlet

D1 = Diameter of runner at inlet

$Q_{\omega d}$ = Discharge coefficient = $(Q/\omega D^3)$

TABLE 2-4 PROSPECT AND TRENTON DEVELOPMENT SPECIFICATIONS OF FRANCIS TURBINE

TURBINE CHARACTERISTICS	PROSPECT	TRENTON
Turbine Type	Francis	Francis
No. of Blades	14	13
Runner Diameter (ft)	8	5
Rotations per Minute (RPM)	180	327
Head (ft)	135	255
Hydraulic Capacity (cfs)	1855	475

Mortality rates for each length class at the Project were calculated using the longest fish in a length class. For example, all fishes within the 6 to 8-in length class were assigned the mortality rate calculated for an 8-in fish. After calculating the mortality rate for each length class, mortality rates were applied to the estimated number of fish entrained annually for each length class. This provided a range of annual Project induced mortality estimates across a range of correlation factors. A description of correlation factors and their effects on estimated mortality rates are noted in Section 2.3, *Data Analysis*.

2.4 VARIANCES FROM APPROVED STUDY PLAN

The Fish Entrainment and Turbine Passage Survival Assessment was implemented according to Erie's RSP and the FERC SPD. Additional assessment was added to this updated study report to include an evaluation of burst swim speeds, as requested by NYSDEC, and potential entrainment, impingement, and survival of trout that have been stocked in the Prospect impoundment, as requested by FERC. In addition, although not a variance, for this updated report, the entrainment database for Trenton was updated to include data from more regionally appropriate New York region studies with similar trophic, fish assemblage, and habitat characteristics.

3.0 STUDY RESULTS

3.1 ENTRAINMENT ESTIMATE

Table 3-1 and Table 3-2 provide the calculated annual flow through the Project powerhouses for an average water year (i.e., average flows observed during 1997-2017) and the estimated monthly total entrainment. The monthly flows were multiplied by the annual entrainment rate calculated for the Prospect Development (estimated entrainment rate of 1.5) and Trenton Development (estimated entrainment rate of 1.0) to estimate annual entrainment for each of the Project developments. This calculation estimated annual entrainment at 52,211 fish per year at the Prospect Development, and 32,461 fish per year at the Trenton Development, prior to the application of biological and physical filters that influence entrainment.

TABLE 3-1 PROSPECT DEVELOPMENT POWERHOUSE FLOWS AND ENTRAINMENT

MONTH	POWERHOUSE MONTHLY FLOW (MCF)	ESTIMATED FISH ENTRAINED
January	3,166	4,911
February	2,761	4,284
March	3,653	5,667
April	4,968	7,707
May	3,327	5,160
June	2,448	3,798
July	1,939	3,008
August	1,551	2,406
September	1,537	2,385
October	2,341	3,631
November	2,906	4,508
December	3,059	4,745
Annual	33,657	52,211

TABLE 3-2 TRENTON DEVELOPMENT POWERHOUSE FLOWS AND ENTRAINMENT

MONTH	POWERHOUSE MONTHLY FLOW (MCF)	ESTIMATED FISH ENTRAINED
January	3,174	3,164
February	2,767	2,758
March	3,661	3,650
April	3,817	3,805
May	3,335	3,324
June	2,453	2,446
July	1,942	1,936
August	1,553	1,549
September	1,540	1,535
October	2,346	2,339
November	2,911	2,902
December	3,064	3,054
Annual	32,564	32,461

3.2 SPECIES AND LENGTH CLASS COMPOSITION

Species and length class composition were calculated using the results of 2019 electrofishing surveys within the Prospect impoundment. Species composition and length-class compositions are presented in Table 3-3 and Table 3-4. Yellow perch dominated the fish assemblage, accounting for 61 percent, and pumpkinseed was the next most abundant species at 23 percent. Most of these fish were in the 2.1-4 in length class.

TABLE 3-3 SPECIES COMPOSITION WITHIN THE PROSPECT IMPOUNDMENT

COMMON NAME	ABUNDANCE (N)	RELATIVE ABUNDANCE (%)
Yellow Perch	894	60.8
Pumpkinseed	331	22.5
Golden Shiner	63	4.3
Rock Bass	57	3.9
Smallmouth Bass	51	3.5
Chain Pickerel	33	2.2
White Sucker	15	1.0
Spottail Shiner	13	0.9
Brown Bullhead	9	0.6
Tessellated Darter	3	0.2
Banded Killifish	2	0.1
Total	**1,471**	**100.0**

TABLE 3-4 LENGTH CLASS COMPOSITION PERCENTAGES BY SPECIES WITHIN THE PROSPECT IMPOUNDMENT

LENGTH CLASS (IN)	PERCENTAGES (%)										
	BROWN BULLHEAD	BANDED KILLIFISH*	CHAIN PICKEREL	PUMPKINSEED	ROCK BASS	SMALLMOUTH BASS	SPOTTAIL SHINER*	TESSELLATED DARTER*	WHITE SUCKER	YELLOW PERCH	GOLDEN SHINER
0-2	0	0	0	0	0	0	0	0	0	0	0
2.1-4	0	100	0	99.7	0	0	100	100	0	86.5	0
4.1-6	0	0	42.4	0	80.7	64.7	0	0	0	12.3	98.4
6.1-8	11.1	0	33.3	0.3	17.5	11.8	0	0	0	0.4	0
8.1-10	33.3	0	0	0	1.8	17.6	0	0	0	0.8	1.6
10.1-15	55.6	0	9.2	0	0	5.9	0	0	0	0	0
15.1-20	0	0	12.1	0	0	0	0	0	26.7	0	0
20.1-25	0	0	3.0	0	0	0	0	0	73.3	0	0
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

*Length data not provided in electrofishing data. Average adult standard length for both species ranges from 55-90 mm (approximately 2.2 -3.5 inches) (Jenkins and Burkhead 1993).

3.3 PROSPECT ENTRAINMENT FILTERS

The calculated approach velocity at the maximum station hydraulic capacity (determined to be 2.1 fps) was compared to the calculated swim speed of fish for each length class. Fish swim speeds were calculated using an assumed minimum sustained swim speed of 3 body lengths/second (USFWS 1989), and an assumed burst speed of two times sustained speed. Results of the swim speed calculations are presented in Table 3-5. The sustained swim speed calculations show that fish greater than 8 inches in length would likely be able to escape flow entering the Project intake and avoid entrainment; therefore, fish larger than 8 inches were excluded from the entrainment estimate.

Swimming speed generally excluded trout from entrainment risk based on fish size. The NYSDEC has previously stocked trout as small as 8-inches during some years. Fish of this length class would potentially have a small window of time initially after stocking where they could be marginally susceptible to entrainment, with swim speeds that are nominally less than the maximum Prospect intake approach velocity of 2.1 fps. However, as the season progresses and these fish grow their swim speed would increase and entrainment risk would decrease as a result. Burst speeds for these fish would still be greater than approach velocities, and the stocked trout would be able grow to a size greater than 8-inches over the course of several months. Additionally, stocked trout were greater than 8 inches during some years. Thus, trout were not included in the analysis as a target species.,

Species composition and length composition percentages were applied to the total annual entrainment numbers to estimate entrainment rates by species and length class for both swim speed scenarios. Swim speeds and associated body sizes are described in Table 3-5. Total entrainment estimates after screening all fish larger than 8 inches (when considering sustained swim speeds) and larger than 4 inches (when considering burst swim speeds) are presented in Table 3-6 and Table 3-7.

Trout were not included in the entrainment estimate due to the minimum length (8 in) of individuals recently stocked and swim capabilities. The sustained swim speed for trout 8 and 9 inches in length was calculated as approximately 2.0 fps and 2.3 fps, respectively, and increases with increasing fish length. Therefore, trout larger than 8 inches in length (i.e., the minimum stocked size) are capable of escaping the flow entering the Prospect intake at maximum generation, and accordingly, were not included in the entrainment estimates. Additionally, burst speeds for all species, including trout, would be greater and allow smaller fish to outswim the 2.1 fps approach velocities.

3.4 TRENTON ENTRAINMENT FILTERS

The calculated approach velocity at the maximum plant hydraulic capacity is 2.9 fps. Similar to the analysis for Prospect, the calculated approach velocity was then compared to the calculated swim speed of fish for each length class (Table 3-5). The sustained swim speed calculations show that fish greater than 11 inches in length would likely be able to escape flow entering the Project intake; therefore, fish larger than 11 inches were not included in the entrainment estimate. Additionally, burst speed estimates show that fish 6 inches in length would likely be able to escape flow entering the Project intake.

Species composition and length composition percentages were applied to the total annual entrainment numbers to estimate entrainment rates by species and length class. Total entrainment estimates after screening all fish larger than 11 inches (for sustained speed consideration) and larger than 6 inches (for burst speed consideration) are presented in Table 3-8 and Table 3-9 for the Trenton Development.

TABLE 3-5 FISH SWIM SPEEDS BY LENGTH

FISH LENGTH (IN)	SUSTAINED SWIM SPEED (FPS)	BURST SWIM SPEED (FPS)
1.0	0.3	0.5
2.0	0.5	1.0
3.0	0.8	1.5
4.0	1.0	2.0
5.0	1.3	2.5
6.0	1.5	3.0
7.0	1.8	3.5
8.0	2.0	4.0
9.0	2.3	4.5
10.0	2.6	5.0
12.5	3.1	6.3
15.0	3.8	7.5
17.5	4.4	8.8
20.0	5.0	10.0
22.5	5.6	11.3

FISH LENGTH (IN)	SUSTAINED SWIM SPEED (FPS)	BURST SWIM SPEED (FPS)
25.0	6.3	12.5
27.5	6.9	13.8
30.0	7.6	15.0

TABLE 3-6 PROSPECT DEVELOPMENT FILTERED ANNUAL ENTRAINMENT RESULTS (SUSTAINED SWIM SPEED)

LENGTH CLASS (IN)	0-2	2.1-4	4.1-6	6.1-8	TOTAL
Brown Bullhead	0	0	0	35	35
Banded Killifish	0	71	0	0	71
Chain Pickerel	0	0	497	390	887
Pumpkinseed	0	11,713	0	35	11,748
Rock Bass	0	0	1,633	355	1,988
Smallmouth Bass	0	0	171	213	1,384
Spottail Shiner	0	461	0	0	461
Tessellated Darter	0	106	0	0	106
White Sucker	0	0	0	0	0
Yellow Perch	0	27,437	3,904	142	31,483
Golden Shiner	0	0	2,201	0	2,201
Total					**50,366**

TABLE 3-7 PROSPECT DEVELOPMENT FILTERED ANNUAL ENTRAINMENT RESULTS (BURST SWIM SPEED)

LENGTH CLASS (IN)	0-2	2.1-4	TOTAL
Brown Bullhead	0	0	0
Banded Killifish	0	71	71
Chain Pickerel	0	0	0
Pumpkinseed	0	11,713	11,713
Rock Bass	0	0	0
Smallmouth Bass	0	0	0
Spottail Shiner	0	461	461
Tessellated Darter	0	106	106
White Sucker	0	0	0
Yellow Perch	0	27,437	27,437
Golden Shiner	0	0	0
Total			**38,789**

TABLE 3-8 TRENTON DEVELOPMENT FILTERED ANNUAL ENTRAINMENT RESULTS (SUSTAINED SWIM SPEED)

LENGTH CLASS (IN)	0-2	2.1-4	4.1-6	6.1-8	8.1-10	10.1-11	TOTAL
Brown Bullhead	0	0	0	22	66	44	132
Banded Killifish	0	44	0	0	0	0	44
Chain Pickerel	0	0	309	243	0	22	574
Pumpkinseed	0	7,282	0	22	0	0	7,304
Rock Bass	0	0	1,015	221	22	0	1,257
Smallmouth Bass	0	0	728	132	199	0	1,059
Spottail Shiner	0	287	0	0	0	0	286
Tessellated Darter	0	66	0	0	0	0	66
White Sucker	0	0	0	0	0	0	0
Yellow Perch	0	17,058	2,247	88	154	0	19,728
Golden Shiner	0	0	1,368	0	0	0	1,390
Total							**31,843**

TABLE 3-9 TRENTON DEVELOPMENT FILTERED ANNUAL ENTRAINMENT RESULTS (BURST SWIM SPEED)

LENGTH CLASS (IN)	0-2	2.1-4	4.1-6	TOTAL
Brown Bullhead	0	0	0	0
Banded Killifish	0	44	0	44
Chain Pickerel	0	0	309	309
Pumpkinseed	0	7,282	0	7,282
Rock Bass	0	0	1,015	1,015
Smallmouth Bass	0	0	728	728
Spottail Shiner	0	287	0	287
Tessellated Darter	0	66	0	66
White Sucker	0	0	0	0
Yellow Perch	0	17,058	2,247	19,486
Golden Shiner	0	0	1,368	1,368
Total				**30,586**

3.5 PROSPECT DEVELOPMENT FISH IMPINGEMENT

No fish within the electrofishing dataset for the Prospect Development was found to be too wide to fit through the 3 5/8-inch spacing of the trashracks. If any fish is too wide to fit through that spacing, it is likely that it would be greater than 8 inches and capable of escaping the influence of the intake velocities, thereby avoiding impingement.

3.6 TRENTON DEVELOPMENT FISH IMPINGEMENT

Only four white suckers within the electrofishing dataset for the Trenton Development were found to be too wide to fit through the trashrack spacings. All four fish were greater than 11 inches in length and would likely be capable of escaping the influence of the intake velocities. Due to size and interorbital width, no other fishes within the dataset would likely be susceptible to impingement on the Trenton trashracks.

3.7 MORTALITY ESTIMATE

Mortality rates are presented in Table 3-10 and Table 3-11. Table 3-12 through Table 3-23 provide fish mortality estimates for correlation factors of 0.10, 0.15, and 0.20. Mortality rates across size classes and correlation factors (0.1-0.2) ranged from 0.9 percent to 7.5 percent at Prospect, and 2.3 percent to 34.3 percent at Trenton. Estimated annual mortality across correlation factors based on sustained swim speeds ranged from 1,056 to 2,117 fish per year at the Prospect Development and 1,663 to 3,329 fish per year at the Trenton Development. When accounting for fish that can overcome the velocities at Project intakes based on burst swim speed, mortality across correlation factors (0.1-0.2) ranged from 748 to 1,498 fish per year at the Prospect Development and 1,533 to 3,076 fish per year at the Trenton Development.

TABLE 3-10 PROSPECT DEVELOPMENT MORTALITY RATES BY LENGTH CLASS AND CORRELATION FACTOR

LENGTH CLASS (IN)	CORRELATION FACTOR		
	0.10	0.15	0.20
0-2	0.9%	1.4%	1.9%
2.1-4	1.9%	2.8%	3.8%
4.1-6	2.8%	4.2%	5.6%
6.1-8	3.8%	5.6%	7.5%

TABLE 3-11 TRENTON DEVELOPMENT MORTALITY RATES BY LENGTH CLASS AND CORRELATION FACTOR

LENGTH CLASS (IN)	CORRELATION FACTOR		
	0.10	0.15	0.20
0-2	2.3%	3.4%	4.6%
2.1-4	4.6%	6.9%	9.1%
4.1-6	6.9%	10.3%	13.7%
6.1-8	9.1%	13.7%	18.3%
8.1-10	11.4%	17.2%	22.9%
10.1-11	17.2%	25.7%	34.3%

TABLE 3-12 PROSPECT DEVELOPMENT MORTALITY ESTIMATES WITH CORRELATION FACTOR OF 0.10 (SUSTAINED SWIM SPEED)

LENGTH CLASS (IN)	0-2	2.1-4	4.1-6	6.1-8	TOTAL	PERCENT
Yellow Perch	0	516	110	5	631	60
Pumpkinseed	0	220	0	1	221	21
Golden Shiner	0	0	62	0	62	6
Rock Bass	0	0	46	13	59	5
Smallmouth Bass	0	0	33	8	41	4
Chain Pickerel	0	0	14	15	29	3
Spottail Shiner	0	9	0	0	9	1
Tessellated Darter	0	2	0	0	2	0
Brown Bullhead	0	0	0	1	1	0
Banded Killifish	0	1	0	0	1	0
Total	**0**	**748**	**265**	**43**	**1,056**	**100**

TABLE 3-13 PROSPECT DEVELOPMENT MORTALITY ESTIMATES WITH CORRELATION FACTOR OF 0.10 (BURST SWIM SPEED)

LENGTH CLASS (IN)	0-2	2.1-4	TOTAL	PERCENT
Yellow Perch	0	516	516	69
Pumpkinseed	0	220	220	29
Spottail Shiner	0	9	9	2
Tessellated Darter	0	2	2	0
Banded Killifish	0	1	1	0
Total	**0**	**748**	**748**	**100**

TABLE 3-14 PROSPECT DEVELOPMENT MORTALITY ESTIMATES WITH CORRELATION FACTOR OF 0.15 (SUSTAINED SWIM SPEED)

LENGTH CLASS (IN)	0-2	2.1-4	4.1-6	6.1-8	TOTAL	PERCENT
Yellow Perch	0	775	165	8	948	59
Pumpkinseed	0	331	0	2	333	21
Golden Shiner	0	0	100	0	100	6
Rock Bass	0	0	69	20	89	6
Smallmouth Bass	0	0	50	12	62	4
Chain Pickerel	0	0	21	22	43	3
Spottail Shiner	0	13	0	0	13	1
Tessellated Darter	0	3	0	0	3	0

LENGTH CLASS (IN)	0-2	2.1-4	4.1-6	6.1-8	TOTAL	PERCENT
Brown Bullhead	0	0	0	2	2	0
Banded Killifish	0	2	0	0	2	0
White Sucker	0	0	0	0	0	0
Total	**0**	**1,124**	**405**	**66**	**1,595**	**100**

TABLE 3-15 PROSPECT DEVELOPMENT MORTALITY ESTIMATES WITH CORRELATION FACTOR OF 0.15 (BURST SWIM SPEED)

LENGTH CLASS (IN)	0-2	2.1-4	TOTAL	PERCENT
Yellow Perch	0	775	775	69
Pumpkinseed	0	331	331	29
Spottail Shiner	0	13	13	2
Tessellated Darter	0	3	3	0
Banded Killifish	0	2	2	0
Total	**0**	**1,124**	**1,124**	**100**

TABLE 3-16 PROSPECT DEVELOPMENT MORTALITY ESTIMATES WITH CORRELATION FACTOR OF 0.20 (SUSTAINED SWIM SPEED)

LENGTH CLASS (IN)	0-2	2.1-4	4.1-6	6.1-8	TOTAL	PERCENT
Yellow Perch	0	1,033	220	11	1,264	60
Pumpkinseed	0	441	0	3	444	21
Golden Shiner	0	0	124	0	124	6
Rock Bass	0	0	92	27	119	6
Smallmouth Bass	0	0	66	16	82	4
Chain Pickerel	0	0	28	29	57	3
Spottail Shiner	0	17	0	0	17	1
Tessellated Darter	0	4	0	0	4	0
Brown Bullhead	0	0	0	3	3	0
Banded Killifish	0	3	0	0	3	0
White Sucker	0	0	0	0	0	0
Total	**0**	**1,498**	**530**	**89**	**2,117**	**100**

TABLE 3-17 PROSPECT DEVELOPMENT MORTALITY ESTIMATES WITH CORRELATION FACTOR OF 0.20 (BURST SWIM SPEED)

LENGTH CLASS (IN)	0-2	2.1-4	TOTAL	PERCENT
Yellow Perch	0	1,033	1,033	69
Pumpkinseed	0	441	441	29
Spottail Shiner	0	17	17	2
Tessellated Darter	0	4	4	0
Banded Killifish	0	3	3	0
Total	**0**	**1,498**	**1,498**	**100**

TABLE 3-18 TRENTON DEVELOPMENT MORTALITY ESTIMATES WITH CORRELATION FACTOR OF 0.10 (SUSTAINED SWIM SPEED)

LENGTH CLASS (IN)	0-2	2.1-4	4.1-6	6.1-8	8.1-10	10.1-11	TOTAL	PERCENT
Yellow Perch	0	780	167	8	18	0	973	58
Pumpkinseed	0	333	0	2	0	0	335	20
Golden Shiner	0	0	94	0	3	0	97	6
Rock Bass	0	0	70	20	3	0	93	6
Smallmouth Bass	0	0	50	12	23	0	85	5
Chain Pickerel	0	0	21	22	0	3	46	3
Brown Bullhead	0	0	0	2	8	6	16	1
Spottail Shiner	0	13	0	0	0	0	13	1
Tessellated Darter	0	3	0	0	0	0	3	0
Banded Killifish	0	2	0	0	0	0	2	0
Total	**0**	**1,131**	**402**	**66**	**55**	**9**	**1,663**	**100**

TABLE 3-19 TRENTON DEVELOPMENT MORTALITY ESTIMATES WITH CORRELATION FACTOR OF 0.10 (BURST SWIM SPEED)

LENGTH CLASS (IN)	0-2	2.1-4	4.1-6	TOTAL	PERCENT
Yellow Perch	0	780	167	947	62
Pumpkinseed	0	333	0	333	22
Golden Shiner	0	0	94	94	6
Rock Bass	0	0	70	70	5
Smallmouth Bass	0	0	50	50	3
Chain Pickerel	0	0	21	21	1
Spottail Shiner	0	13	0	13	1
Tessellated Darter	0	3	0	3	0
Banded Killifish	0	2	0	2	0
Total	**0**	**1,131**	**402**	**1,533**	**100**

TABLE 3-20 TRENTON DEVELOPMENT MORTALITY ESTIMATES WITH CORRELATION FACTOR OF 0.15 (SUSTAINED SWIM SPEED)

LENGTH CLASS (IN)	0-2	2.1-4	4.1-6	6.1-8	8.1-10	10.1-11	TOTAL	PERCENT
Yellow Perch	0	1,175	250	12	27	0	1,464	58
Pumpkinseed	0	501	0	3	0	0	504	20
Golden Shiner	0	0	141	0	4	0	145	6
Rock Bass	0	0	105	30	4	0	139	6
Smallmouth Bass	0	0	75	18	34	0	127	5
Chain Pickerel	0	0	32	33	0	4	69	3
Brown Bullhead	0	0	0	3	12	14	29	1
Spottail Shiner	0	20	0	0	0	0	20	1
Banded Killifish	0	4	0	0	0	0	4	0
Tessellated Darter	0	4	0	0	0	0	4	0
Total	**0**	**1,704**	**603**	**99**	**81**	**18**	**2,505**	**100**

TABLE 3-21 TRENTON DEVELOPMENT MORTALITY ESTIMATES WITH CORRELATION FACTOR OF 0.15 (BURST SWIM SPEED)

LENGTH CLASS (IN)	0-2	2.1-4	4.1-6	TOTAL	PERCENT
Yellow Perch	0	1,175	250	1,425	62
Pumpkinseed	0	501	0	501	22
Golden Shiner	0	0	141	141	6
Rock Bass	0	0	105	105	5
Smallmouth Bass	0	0	75	75	3
Chain Pickerel	0	0	32	32	1
Spottail Shiner	0	20	0	20	1
Banded Killifish	0	4	0	4	0
Tessellated Darter	0	4	0	4	0
Total	**0**	**1,704**	**603**	**2,307**	**100**

TABLE 3-22 TRENTON MORTALITY ESTIMATES WITH CORRELATION FACTOR OF 0.20 (SUSTAINED SWIM SPEED)

LENGTH CLASS (IN)	0-2	2.1-4	4.1-6	6.1-8	8.1-10	10.1-11	TOTAL	PERCENT
Yellow Perch	0	1,566	334	16	35	0	1951	58
Pumpkinseed	0	669	0	4	0	0	673	20
Golden Shiner	0	0	188	0	5	0	193	6
Rock Bass	0	0	140	40	5	0	185	6
Smallmouth Bass	0	0	100	24	45	0	169	5
Chain Pickerel	0	0	43	44	0	5	92	3
Brown Bullhead	0	0	0	4	15	11	30	1
Spottail Shiner	0	26	0	0	0	0	26	1
Tessellated Darter	0	6	0	0	0	0	6	0

LENGTH CLASS (IN)	0-2	2.1-4	4.1-6	6.1-8	8.1-10	10.1-11	TOTAL	PERCENT
Banded Killifish	0	4	0	0	0	0	4	0
Total	**0**	**2,271**	**805**	**132**	**105**	**16**	**3,329**	**100**

TABLE 3-23 TRENTON MORTALITY ESTIMATES WITH CORRELATION FACTOR OF 0.20 (BURST SWIM SPEED)

LENGTH CLASS (IN)	0-2	2.1-4	4.1-6	TOTAL	PERCENT
Yellow Perch	0	1,566	334	1,900	62
Pumpkinseed	0	669	0	669	23
Golden Shiner	0	0	188	188	6
Rock Bass	0	0	140	140	5
Smallmouth Bass	0	0	100	100	3
Chain Pickerel	0	0	43	43	1
Spottail Shiner	0	26	0	26	0
Tessellated Darter	0	6	0	6	0
Banded Killifish	0	4	0	4	0
Total	**0**	**2,271**	**805**	**3,076**	**100**

4.0 DISCUSSION AND CONCLUSIONS

The estimates of annual entrainment and turbine mortality presented in this report were developed based on the best-available data and are intended to provide an order-of-magnitude estimate of potential fish entrainment and turbine passage mortality at the Project. The annual fish entrainment estimate presented in this report, and most desktop entrainment studies, conservatively overestimates entrainment that typically occurs at the Project for the following reasons.

1. The method used to determine Project operations was based on “ideal” conditions and assumes the Project is always available to operate at maximum capacity. However, such ideal conditions are rarely consistently present. The ability to account for times when the Project is not operating, or operating at a reduced flow, would further reduce entrainment and mortality estimates.
2. Entrainment rates tend to vary seasonally, with relatively low entrainment occurring during peak winter and summer months (FERC 1995). For example, fish move less during extremely cold weather and there is limited young-of-year recruitment to fish populations during that season. However, this study assumed a constant annual entrainment rate, where the higher entrainment rates generated during spring and fall were applied to the winter and summer months, thus resulting in a more conservative estimate.
3. Size class mortality rate estimates were based on the longest fish within each size class, and multiple correlation factors were used to estimate a potential range for the number of fish potentially impacted annually.

Over 75 percent of the estimated number of fish potentially entrained and lost to turbine passage mortality are small yellow perch and pumpkinseed. Both species have high fecundity and can produce thousands of offspring per individual female each season (Jenkins and Burkhead 1993). Additionally, length-frequency data suggests that fishes most susceptible to entrainment are juveniles and young-of-year, which have high natural mortality rates (typically 95 percent or greater) (Jenkins and Burkhead 1993) due to numerous environmental and ecological factors that eclipses the entrainment mortality rates that these species and size classes experience due to turbine entrainment.

Additionally, several white suckers collected during fish assemblage surveys were estimated as being too wide to fit through trash racks based on interorbital width. These large adults would have sustained swim speeds greater than intake velocities, and would likely be able to avoid impingement. Fish with swim speeds lower than intake velocities may be at risk of entrainment, but would have body widths that do not allow for impingement on trash racks.

4.1 PROSPECT DEVELOPMENT

Mortality estimates vary across correlation factors, but even the highest correlation factor applied (0.20) provides a mortality estimates of 1,498 fish lost in a year when accounting for burst swim speeds, and less than 2,200 fish killed when accounting for sustained swim speeds. The lowest correlation factor used provides a mortality estimate of 1,056 fish lost annually when accounting for sustained speed, and 748 fish lost per year when factoring for burst speed. Additionally, fish sampling throughout the Prospect impoundment and power canal demonstrated that most fish collected were from reservoir sampling, with much fewer fish in the power canal. This canal reach, adjacent to the intake, provides less suitable habitat than the reservoir, and would be less likely to contain fish at high concentrations. Given the results of this analysis, it is reasonable to conclude that entrainment resulting from operation of the Project will have little effect on the health of the reservoir fishery.

Based on the analysis of sustained swim speeds, the majority of the NYSDEC stocked trout within Prospect impoundment are greater than 8 inches in length, and therefore, these sized fish should be able to escape flow entering the Prospect intake at maximum generation. The 8-inch fish, the smallest size class stocked by the NYSDEC, would potentially have a small window of time initially after stocking where they could be susceptible to entrainment. These fish would have sustained swim speeds that are nominally less than the maximum Prospect intake approach velocity (2.1 fps), although burst speeds for these fish would still be greater than approach velocities. Additionally, trout are stocked in the Prospect impoundment as part of a put-and-take fishery that assumes 100 percent annual mortality and is not representative of a naturally occurring population. Thus, the extent of annual recruitment of trout to the Prospect impoundment is wholly at the discretion of stocking activities and not natural production.

4.2 TRENTON DEVELOPMENT

Mortality estimates vary across correlation factors, but even the highest correlation factor used provides an annual mortality estimate of 3,076 fish at Trenton when factoring for burst speed, and 3,329 fish lost annually when factoring for sustained speeds. The lowest correlation factor used provides an annual mortality estimate of 1,533 fish when factoring for burst speed, and

1,663 fish when accounting for sustained speed. Additionally, fish assemblage estimates used for this assessment are based on data collected in the Prospect impoundment, which provides more suitable habitat, including cover and depth ranges as compared to Trenton. It is likely that there are fewer fishes available, and therefore less fishes susceptible to entrainment at Trenton than Prospect. The Trenton impoundment has steep, nearly vertical walls of bedrock, contains little littoral habitat, and is comprised of large course boulder or cobble substrates providing minimum in-water cover and habitat for a sustained fishery with natural reproduction. Therefore, the fish composition in Trenton would largely be comprised of fishes passed downstream from Prospect. The entrainment composition of fish entrained from Prospect consists largely of smaller size classes with high survival rates. Thus, fish entrained at Trenton are unlikely to experience high project mortality rates associated with entrainment. Given the results of this analysis, it is reasonable to conclude the operation of the Project will have little effect on the health of the reservoir fishery.

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APPENDIX B

WHITEWATER BOATING FLOW AND ACCESS STUDY

WHITEWATER BOATING FLOW AND ACCESS STUDY REPORT

WEST CANADA CREEK HYDROELECTRIC PROJECT

FERC NO. 2701-NY

Prepared for:

Erie Boulevard Hydropower, L.P.
Fulton, New York

Prepared by:

Kleinschmidt

Pittsfield, Maine
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January 2021

WHITEWATER BOATING FLOW AND ACCESS STUDY REPORT
WEST CANADA CREEK HYDROELECTRIC PROJECT
FERC NO. 2701-NY

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DEFINITIONS OF TERMS, ACRONYMS, AND ABBREVIATIONS

AW	American Whitewater
Brookfield	Brookfield Renewable
cfs	cubic feet per second
Commission	Federal Energy Regulatory Commission
DLA	Draft License Application
Erie or Licensee	Erie Boulevard Hydropower, L.P.
FERC	Federal Energy Regulatory Commission
ILP	Integrated Licensing Process
ISR	Initial Study Report
Interested Parties/ Stakeholders	The broad group of individuals and entities that have an interest in a proceeding
MVWA	Mohawk Valley Water Authority
NFCT	Northern Forest Canoe Trail
NOAA	National Oceanic and Atmospheric Administration
NYSDEC	New York State Department of Environmental Conservation
NYSDOT	New York State Department of Transportation
NYTU	New York Trout Unlimited
PAD	Pre-Application Document
Project	FERC Project No. 2701, West Canada Creek Project
Project Area	The area within the FERC project boundary
Project Boundary	The boundary line defined in the Project license issued by FERC that surrounds the Project
Project Vicinity	The general geographic area in which the Project is located; the towns of Trenton and Prospect, New York
PSP	Proposed Study Plan
Relicensing	The process of acquiring a new FERC license for an existing hydroelectric project upon expiration of the existing FERC license
Relicensing Participants	Individuals and entities that are actively participating in a proceeding
RSP	Revised Study Plan
SPD	Study Plan Determination
Tailrace	Channel through which water is discharged from the powerhouse turbines
UAV	unmanned aerial vehicle
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey

1.0 INTRODUCTION

Erie Boulevard Hydropower, L.P. (Erie or Licensee), a Brookfield Renewable company (Brookfield), is the Licensee, owner, and operator of the existing West Canada Creek Hydroelectric Project (FERC Project No. 2701-NY) (Project). The Project consists of two developments, Prospect and Trenton, and is located on West Canada Creek in Oneida and Herkimer counties, New York. A detailed description of the Project is provided in the Draft License Application (DLA) (Erie 2020).

The Federal Energy Regulatory Commission (FERC or Commission) issued the current license for the Project on March 18, 1983, which expires February 28, 2023. Erie is pursuing a new license under FERC's Integrated Licensing Process (ILP) and intends to file an application for a new license with FERC before February 28, 2021. On December 11, 2018, Erie filed a Revised Study Plan (RSP), and on March 7, 2019, FERC issued the Study Plan Determination (SPD) approving the RSP with modifications. Erie requested a revision of the Process Plan and Schedule to change the Initial Study Report (ISR) filing date to March 7, 2020, and FERC granted this revision on December 5, 2019.

On March 6, 2020, Erie filed an ISR and associated supporting documents including the results of the Project studies conducted during the 2019 season. Erie held an ISR meeting on March 19, 2020, and filed an ISR meeting summary on April 3, 2020. Comments on the ISR and meeting summary were filed by Commission staff on May 5, 2020, and by American Whitewater (AW), the New York Department of Environmental Conservation (NYSDEC), and the U.S. Fish and Wildlife Service (USFWS) on May 6, 2020. Erie filed with FERC its responses to the ISR comments on June 5, 2020. FERC issued a Director’s determination on requests for study modifications on July 6, 2020.

The ISR filing provided a study progress report for the Whitewater Boating Flow and Access Study, which was to be completed during the 2019 study season, according to the approved study plan. The on-water controlled flow component for downstream West Canada Creek was scheduled multiple times during the 2019 season; however, the study was postponed due to field conditions that were not conducive to the controlled flow study (high flow events[1]) and participant availability. Due to anticipated higher flows, colder weather, shorter daylight periods and associated safety considerations of the participants, Erie, in consultation with AW, postponed the study until the 2020 study season. The on-water controlled flow study was completed during the 2020 field season, as well as an additional on-water controlled flow assessment of the Prospect bypass reach. The results of the 2020 study season assessment are provided in this study report.

As part of the study implementation and in accordance with FERC's SPD, Erie initiated consultation with agencies regarding aspects of the Project's relicensing studies. Erie reached out to the NYSDEC, the USFWS, AW, New York State Fish and Wildlife Management Board, New York Trout Unlimited (NYTU), and the Town of Trenton to conduct consultation calls during 2019 and 2020 regarding the methodology, survey instruments and various components of the Recreation Use, Needs, and Access Study, Whitewater Boating Flow and Access Study, and Aesthetics Flow Assessment. Attendees on the calls included representatives from the USFWS, NYSDEC, AW, and NYTU (Recreation Working Group). Documentation of this consultation is provided in the Study Progress Reports filed with FERC and distributed to the stakeholders on July 29, 2019, October 31, 2019, and November 30, 2020.

Relative to the Whitewater Boating Flow and Access Study, Erie consulted with the Recreation Working Group regarding: the establishment of an Expert Panel (boating participants); assessment of the Prospect bypass reach whitewater boating opportunities; access and safety considerations; and the downstream whitewater boating controlled flow assessment, including target for flow releases, survey instruments, reaches for assessment, schedule, and logistics. Based on this consultation, Erie refined the study methodology and logistics. See Section 2.0 for information regarding methodology. Section 3.0 provides the study results, including a discussion of regional whitewater boating opportunities, the Prospect bypass reach assessment, and the downstream West Canada Creek whitewater boating assessment.

[1] Travel times and downstream tributary inflows were significant obstacles in 2019 scheduling attempts to complete the downstream flow assessment.

2.0 METHODOLOGY

The goal of the Whitewater Boating Flow and Access Study is to characterize and assess whitewater boating opportunities within the Prospect bypass reach study area and West Canada Creek downstream of the Trenton powerhouse within the study area. Following are the key objectives of the study:

- Characterize whitewater boating opportunities within an hour’s drive of the study area;
- Characterize hydrology data and operational constraints including historic records of minimum, maximum, and average flow rates and seasonal variations for the previous 5-year period;
- Assess public access opportunities and safety considerations for whitewater boating access at the Prospect bypass reach;
- Assess adequacy of existing put-in and take-out locations for the downstream study area;
- Characterize the type of boating experience and potential demand; and
- Evaluate the potential effects of whitewater boating flow releases on other resources including recreational uses, aquatic resources, water quality and project generation.

2.1 DATA COLLECTION AND ANALYSIS

2.1.1 REGIONAL WHITEWATER BOATING OPPORTUNITIES

The study area for the regional assessment of comparable whitewater boating opportunities includes areas within approximately a one-hour drive from the Project area. Kleinschmidt conducted a desk-top literature review of existing available information about existing downstream West Canada Creek recreation opportunities, and regional whitewater boating opportunities within one-hour of the Project area. The results of this review of regional opportunities are provided in Section 3.1.

2.1.2 PROSPECT BYPASS REACH

As described in the RSP, the study area for the Prospect bypass reach includes the area from below Prospect Falls to the Prospect powerhouse (see Figure 2-1). Erie consulted with USFWS, NYSDEC and AW on May 29, 2019, and subsequently with USFWS, NYSDEC and AW and NYTU on September 9, 2019, regarding the status and methodology approach to the Whitewater Boating study, including the Prospect bypass reach. Documentation of consultation is provided in the Study Progress Reports filed on July 29, 2019, October 31, 2019, and November 30, 2020.

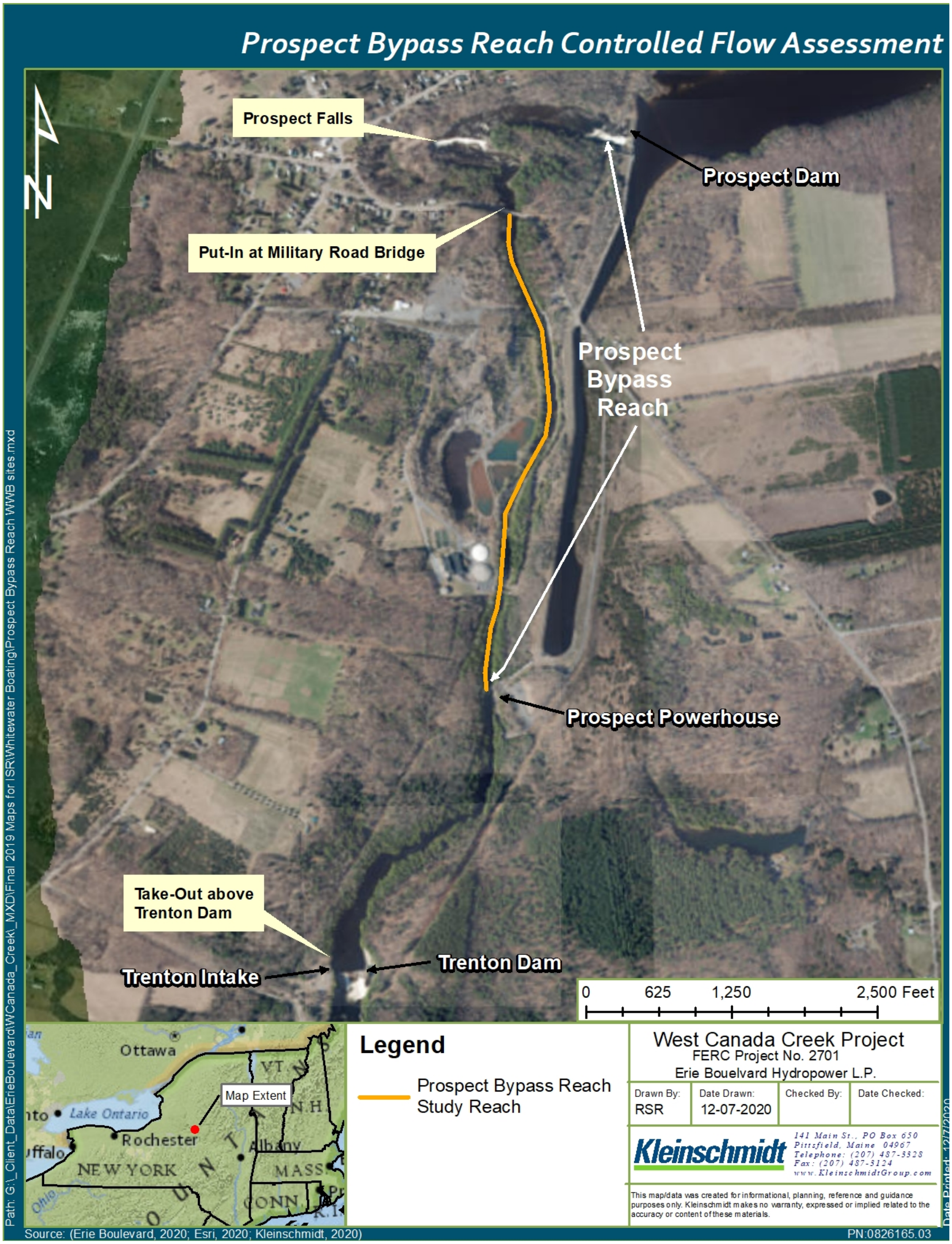

FIGURE 2-1 LOCATION OF THE PROSPECT BYPASS STUDY REACH

2.1.2.1 Access and Adjacent Land Use Assessment

Erie conducted consultation with USFWS, NYSDEC and AW (September 12, 2019) to review additional information pertaining to the Prospect bypass reach assessment of whitewater boating opportunities, including: adjacent land ownership; general topography and characterization of the adjacent shoreline embankment; opportunities and limitations for ingress and egress locations; and potential whitewater boating features, including length of potential boating run and anticipated whitewater features. See Section 3.2.1 for assessment information.

Erie and representatives from AW and USFWS conducted an in-field review of the Prospect bypass reach on September 24, 2019, to review potential put-in and take-out locations. Erie collected additional drone footage of the Prospect bypass reach at flows of 600 cubic feet per second (cfs)[2]. Erie reviewed the drone footage specific to whitewater features and access with representatives from AW on November 15, 2019, and December 12, 2019, to determine if additional study was warranted for the Prospect bypass whitewater boating study. Following this review, AW stated that additional information was necessary and proposed conducting a single controlled flow in-field assessment of the Prospect bypass reach to evaluate potential whitewater boating features, and further evaluation of potential ingress and egress locations.

2.1.2.2 On-Water Controlled Flow Assessment

Erie conducted additional consultation calls in 2020 with AW and the Recreation Working Group regarding the Prospect bypass reach assessment, as summarized in Study Progress Report 3 (filed November 30, 2020). Key items discussed included conducting a single controlled flow assessment with a target flow of approximately 600 cfs and study logistics for the Prospect bypass reach assessment. Kleinschmidt developed and consulted with the Recreation Working Group regarding the pre-run, post-run, and focus group survey forms (see Appendix A for Prospect bypass survey forms and Appendix C for downstream West Canada Creek survey forms). Erie identified field safety protocols and procedures, including COVID safety procedures, and all participants were required to adhere to these requirements during the field study component.

[2] Note that the Study Progress Report (October 31, 2019) incorrectly stated the drone footage captured flows of 500 cfs; flows captured during this assessment were within the range of approximately 600 cfs.

Erie conducted the Prospect bypass reach assessment on September 23, 2020, in coordination with AW, which included four whitewater boaters (all Class V[3] boaters), and three land-based observers (including representatives from AW, USFWS, and a local whitewater boater). The on-water boating participants completed the pre-run, and post-run surveys, and all participants (except USFWS) joined in the focus group discussion. See Section 3.2.2 for study results.

2.1.2.3 PROSPECT FALLS REACH LAND-BASED EVALUATION

Just prior to the controlled flow study implementation, AW requested expansion of the study area to include Prospect Falls, an approximately 35-foot-high waterfall, and the Prospect bypass reach above the falls. This area is located outside of Erie's stated study area in the RSP, and as approved in FERC's SPD. Erie, FERC staff, and AW conducted a call on September 18, 2020, to discuss AW's request.[4] Erie considers Prospect Falls to be high risk and maintained safety concerns about conducting any boating runs of Prospect Falls. The study area, the area from below Prospect Falls to the Prospect powerhouse, as stated in the RSP, was maintained. However, to address AW's request and as suggested by FERC during the September 18, 2020 call, Erie agreed to conduct a land-based assessment of Prospect Falls. Accordingly, Erie developed and implemented a separate participant survey form to obtain this additional information from the boating participants and focus group questions (see Appendix B). Four whitewater boating participants and two on-land participants (AW and local whitewater boater) conducted the land-based assessment of Prospect Falls for whitewater boating considerations. See Section Appendix B for study results.

2.1.3 DOWNSTREAM WEST CANADA CREEK

2.1.3.1 RECREATION ACCESS, USE AND NEEDS

Kleinschmidt conducted a Recreation Use, Needs and Access Study (Kleinschmidt 2020g) that included inventory and spot counts of downstream public recreation access areas along West Canada Creek. The visitor survey conducted for the Recreation Study included questions regarding recreation use in these downstream reaches and effects of water level fluctuations on recreation activities. In addition, the study provided an assessment of existing public access and safety of the West Canada Creek Project, including safety mechanisms and alerts immediately

[3] International Scale of River Difficulty, AW 2005. See Appendix A for additional description of the whitewater classifications.
[4] FERC filed a summary of the call discussion on the e-Library on October 22, 2020.

downstream of the Project. Information pertaining to the downstream access locations, survey results, and public access and safety assessment are provided in the Recreation Use, Needs and Access Study (Kleinschmidt 2020g). Section 3.3.1 provides a summary of key boating reaches of downstream West Canada Creek.

2.1.3.2 FLOW CHARACTERIZATION AND INFORMATION

Information pertaining to river channel characteristics and substrates in downstream West Canada Creek is provided in the Aquatic Mesohabitat Assessment Report (Kleinschmidt 2020a). Information related to publicly available flow data is summarized in Section 3.3.2, and in the Recreation Use, Needs, and Access Study (Kleinschmidt 2020g). Kleinschmidt reviewed available hydrology information from the USGS gage at Kast Bridge gage (USGS No. 01346000) to characterize flow rates and seasonal variations for the previous 5-year period (2015-2019) in downstream West Canada Creek (see Appendix E).

2.1.3.3 ON-WATER CONTROLLED FLOW ASSESSMENT

During consultation, the Recreation Working Group agreed that the downstream reach controlled flow assessment would focus on whitewater boating (canoe/kayak) and tubing participants would not be involved in the in-field study assessment. Information pertaining to tubing use was obtained from the West Canada Creek tubing outfitter and the Recreation Study visitor survey information. The West Canada Creek Campground (tubing outfitter) provided tube and boating rentals data, and the outfitter’s website provided a detailed breakdown of suitable flow conditions for tubing on West Canada Creek (see Section 3.3.1). This information is summarized in the Recreation Use, Needs, and Access Study (Kleinschmidt 2020g).

In order to assist in the logistics of the controlled flow study and based on consultation with the Recreation Working Group and later refinement with AW, the on-water assessment targeted a portion of the reach (rather than the entire approximately 28-mile reach from Morgan Dam to Kast Bridge). Accordingly, the study area for the controlled flow study included West Canada Creek from the Middleville (NYSDEC access site DS Rec 9) to the take-out location at Kast Bridge, a length of approximately 4 river miles (see Figure 2-2).

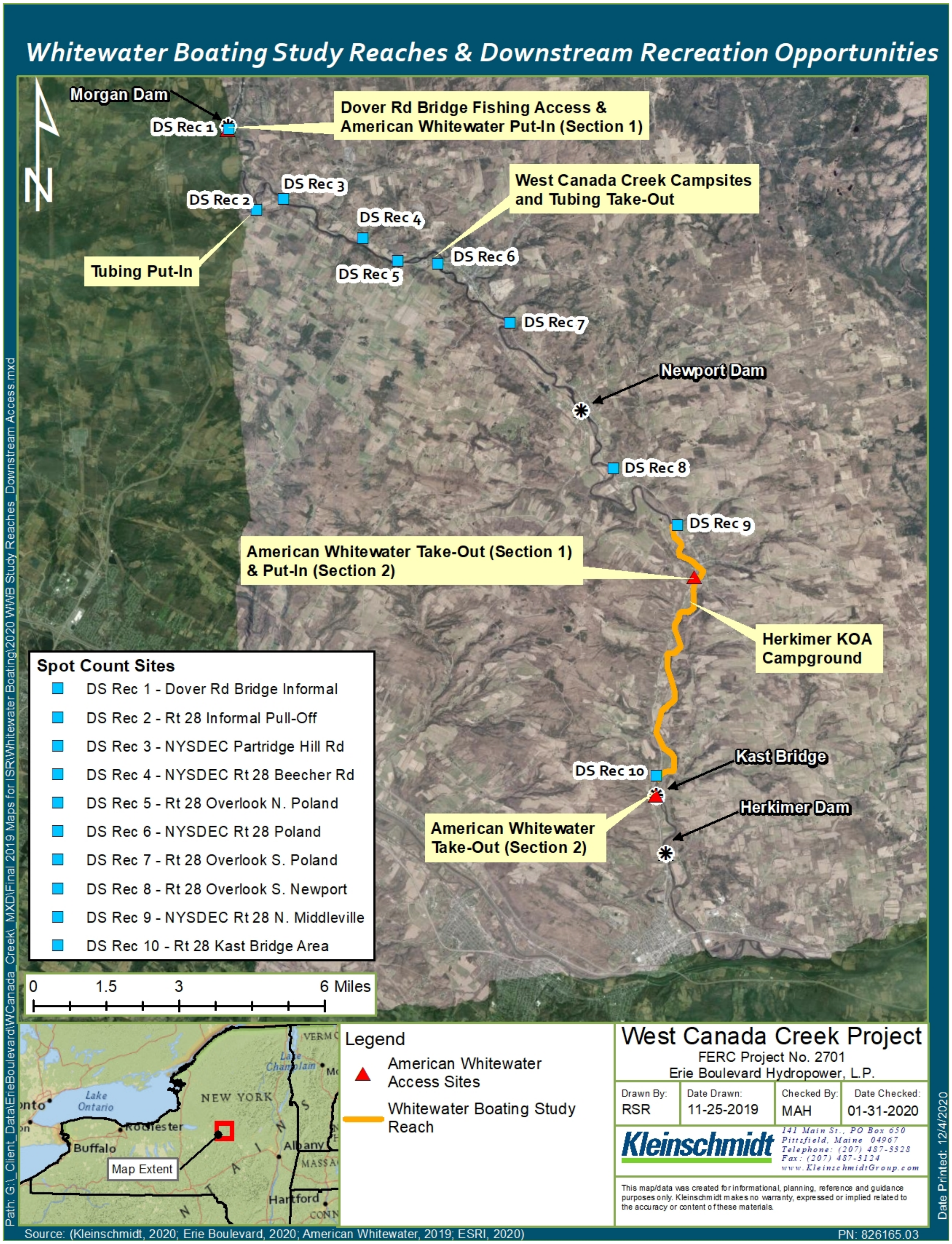

FIGURE 2-2 LOCATION OF THE LOWER WEST CANADA CREEK STUDY REACH

Kleinschmidt with the assistance of AW and whitewater boating participants conducted an on-water controlled flow assessment to evaluate the suitability for whitewater boating opportunities and to assess the type of experience flows provide for the downstream study area. The controlled flow study was conducted on November 6, 2020 (6 participants) and November 7, 2020 (11 participants). The study participants included Class II-IV boaters, and five of the participants boated on both days.

Erie proposed in the RSP downstream controlled flow releases of approximately 1,000 cfs and 1,400 cfs, within the range of potential station-controlled flow releases.[5] The FERC SPD required that Erie consult with the Recreation Working Group to collaboratively determine the flow levels to be studied during the whitewater boating controlled release assessment. Based on additional consultation, AW initially proposed study flow releases of approximately 600 cfs, 1,000 cfs and 1,400 cfs. Due to drought conditions, water had not been available to provide the target flows for the study, which led to the review of conditions and rescheduling the field study dates over multiple weeks. The first week of November, Hinckley Reservoir increased discharges, which allowed sufficient flow for the study to be scheduled for November 6, 2020 and November 7, 2020. Given logistical considerations (COVID, flow travel time, shuttle time, and limited daylight), Erie scheduled the field study to include two targeted flow releases: approximately 1,000 cfs and approximately 1,400 cfs, over two days (one flow each day), which was supported by AW.

Kleinschmidt developed and consulted with the Recreation Working Group regarding the pre-run, post-run, and focus group survey forms (see Appendix C). Erie identified field safety protocols and procedures, including COVID safety procedures, and all participants were required to adhere to these requirements during the field study component. The boating participants completed evaluation forms following the in-field controlled flow whitewater boating runs to document characteristics of the downstream reach with respect to:

- Estimate of typical trip durations and existing and potential ingress and egress locations.
- Description of features such as rapids and eddies, numbers of portages, likely "attraction" rapids, or other places where boaters are likely to stop or travel on land.
- Estimate of acceptable and optimal flow ranges for different types of whitewater boating opportunities (e.g., for different skill levels, boat types, or types of boating).

[5] The maximum hydraulic capacity of Trenton Station is approximately 1,425 cfs.

- Comparability to similar rivers in the region.
- Qualitative description and estimate of likely demand for boating opportunities.
- Review flow information needs and ability for existing gages to predict flow ranges (i.e., flows suitable for boating).
- Identify safety concerns related to flows, access, and channel features.

All boating participants completed the pre-run and post-run surveys, and participated in the focus group discussion. The five boaters that conducted the on- water assessment both days also completed flow comparison surveys. See Section 3.3.3 for the study results.

2.2 VARIANCES FROM APPROVED STUDY PLAN

During 2019, due to high flows, colder weather, shorter daylight periods and associated safety considerations of the participants, Erie, in consultation with AW, postponed the downstream controlled flow assessment until the following year's study season. During 2020, Erie consulted with AW to review study modifications necessary to implement the study given the existing COVID pandemic and flow (drought) conditions. Erie implemented and AW supported (see Study Progress Report 3, November 30, 2020) the following study scope variances:

- Modification of the study area to include one expanded study reach (versus the two as stated in the ISR Study Progress Report) due to logistical and COVID considerations.
- Per AW's request, the study reach was modified to include the reach from the put-in location at approximately NYSDEC Middleville access (DS Rec 9) as identified in the Recreation Study) to the take-out location at Kast Bridge near the New York State Department of Transportation (NYSDOT) roadside pull-off.
- AW agreed to conduct two controlled flow events, one at target flow of approximately 1,000 cfs and one at target flow of approximately 1,400 cfs, and assuming no major unforeseen issues, agreed that these two target flows would be sufficient for study purposes.
- Due to weather and flow conditions and extending the reach per AW's request, the study was conducted over a two-day period, providing a single target flow each day.

Additional items to note that were not variances, but supported by AW:

- AW agreed that participants within this range targeting above 5, but no more than 10 participants, would provide adequate resources for the evaluation of the study flows. The ISR Study Progress Report states that "The Expert Panel will be no more than 10 people, targeting about 5 to 6 people per reach for logistical purposes."
- AW agreed that the participants conducting the evaluation could vary between the two controlled flows and study dates.

3.0 STUDY RESULTS

3.1 REGIONAL WHITEWATER BOATING OPPORTUNITIES

The West Canada Creek Project is located just south of the Adirondack Park region within New York State. New York's Adirondack region has over 3,000 lakes and 30,000 miles of rivers and streams, and is a popular destination for outdoor enthusiasts (Adirondack Park Agency 2020). Regional recreation opportunities include both whitewater and flatwater boating paddling opportunities, within the Adirondack region and also outside of the Adirondack Park.

Multiple lakes within the Project region offer flatwater boating opportunities, and rivers and creeks offer whitewater boating opportunities. North of the Project, the Northern Forest Canoe Trail (NFCT), a 740-mile long water trail extends from Old Forge, New York to Fort Kent, Maine. The NFCT traverses 23 rivers and streams, and 59 lakes and ponds, and provides both flatwater and whitewater (Class I to Class IV+). boating opportunities (NFCT 2020).

Figure 3-1 denotes whitewater boating opportunity locations (general put-in locations) within approximately a 60-mile radius of the West Canada Creek Project. Whitewater boating opportunities range from Class I to Class IV+ reaches. Figure 3-1 data and paddler ability level is based on AW map information, and denotes locations by paddler ability levels (1 through 5) , including approximately 1 location within Class 1, 15 Class 2, 30 Class III, 36 Class IV, and 19 Class V for a total of 101 locations within 60 miles of the Project vicinity (AW 2020b).

Table 3-1 provides a summary of the identified whitewater boating opportunities, including class designation and approximate run length, that are located within approximately 60 miles of the Project based on additional data provided by Riverfacts (2020). These reaches provide almost 500 river miles of whitewater boating opportunities within close vicinity to the West Canada Creek Project. This includes about 205 river miles with whitewater boating opportunities for Class I-III intermediate ability levels, about 207 river miles with ranges from Class I-V, and about 75 river miles for Class IV-V+ expert level capabilities.

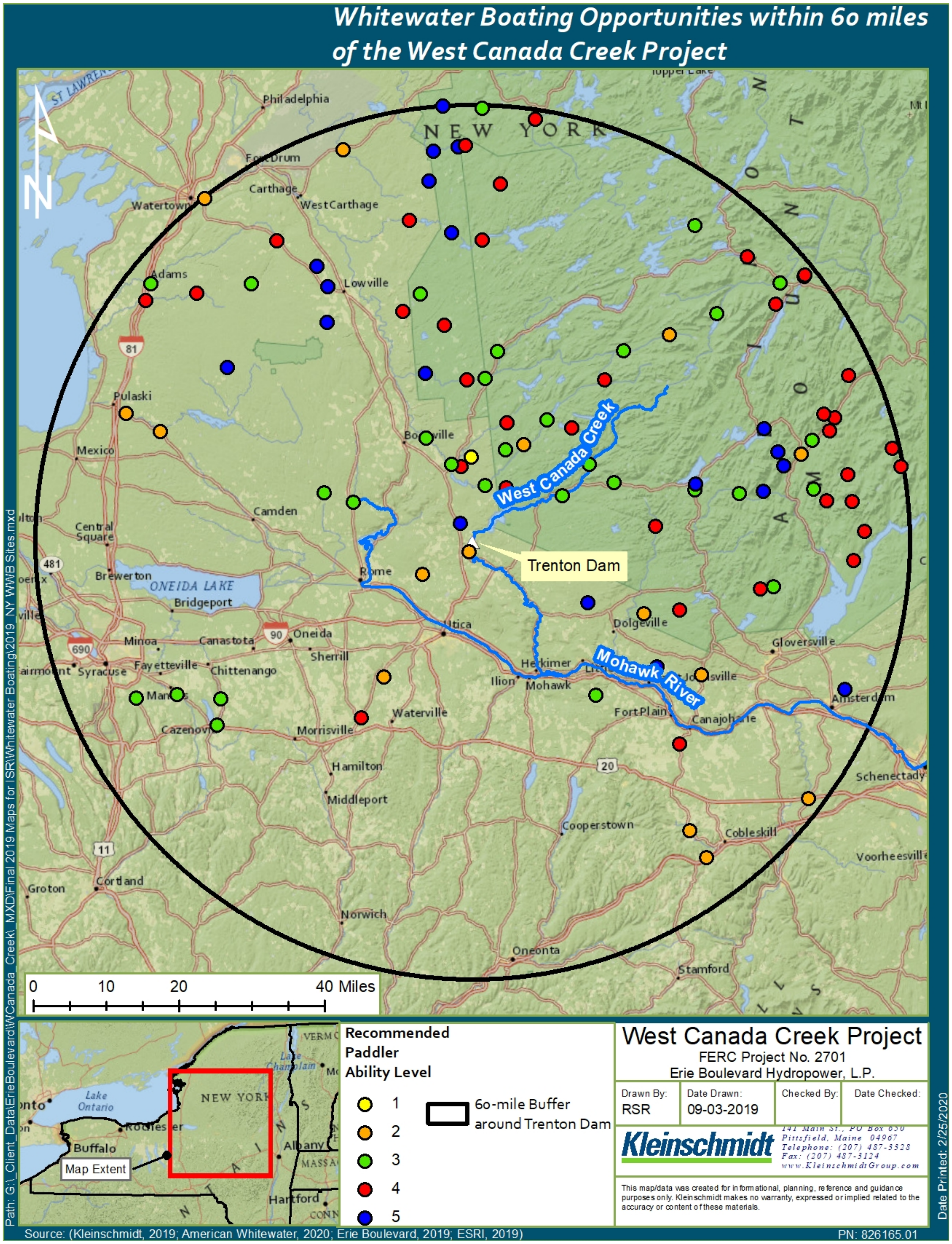

FIGURE 3-1 WHITEWATER BOATING OPPORTUNITIES WITHIN 60 MILES OF THE PROJECT
Source: AW 2020b

TABLE 3-1 SUMMARY OF WHITEWATER BOATING OPPORTUNITIES WITHIN APPROXIMATELY 60 MILES OF THE WEST CANADA CREEK PROJECT

RIVER NAME	REACH DESCRIPTION	WHITEWATER BOATING CLASS	APPROX. LENGTH (RIVER MILES)
Black River	Route 3 Wave	Class II	1
Moose River - South Branch	Silver Run to Bridge at Plains	Class II	6
Ninemile Creek	Feeder Canal to Stittville	Class II	6
North Sandy Creek	Rodman to Route 3	Class II	17
Sacandaga River	East Branch to Hope	Class II	13
West Canada Creek - South Branch	Fayle Road to Nobleboro	Class II(IV)	5
Indian River	Natural Bridge to Antwerp	Class II,	20
Moose River	McKeever to Rock Island	Class III	3
West Canada Creek	Big Brook to Route 8	Class III	3.5
West Canada Creek	Ohio Gorge	Class III	1.5
Caroga Creek	Ephratah to Route 5	Class I-III	9.5
Cobleskill Creek	Warnerville to Sidney Corners	Class I-III	13
East Canada Creek	Dolgeville to Route 5	Class I-III	8
Salmon River	Route 2A to Black Hole through Pulaski	Class I-III	3.9
Schoharie Creek	Esperance to Fort Hunter	Class I-III	21
West Creek	Bridge Close to Hyndsville to Route 7	Class I-III	5
Black River	Enos to Route 72	Class II-III	6
Black River	Hawkinsville to Norton Road	Class II-III	6
Black Creek	Sterlingville to Philadelphia	Class II-III	5
Deer River	New Boston to High Falls Dam	Class II-III	12.4
Little River	Aldrich to Oswegatchie	Class II-III	6.2
Mohawk River	West Branch to Hillside	Class II-III	7
Piseco Outlet	Route 10 to West Branch Sacandaga	Class II-III	4
Raquette River	Forked Lake Campground to Deerland	Class II-III	4.5
Sacandaga River - West Branch	Whitehouse to Sacandaga Campsite	Class II-III	7.3
West Stony Creek	Pinnacle to Route 30	Class II-III	10.5
Doig Creek	Pumpkin Hollow Road to Sacandaga River	Class III+(IV)	3
Sprite Creek	Stewart Landing to Youker Road	Class III+(V)	4.55
Beaver River	Taylorville Section	Class III-IV	2
East Stony Creek	Harrisburg Road to Tenant Creek	Class III-IV	6
Indian River	Brooktrout Lake to South Branch Moose	Class III-IV	13
South Sandy Creek	Route 95 to Route 11	Class III-IV	12
Black River	Hawkinsville to Port Leyden	Class III-IV+	2.7
Black River	Watertown to Brownville	Class III-V	8
Holmes Lake Outlet	Route 125 to West Stony Creek	Class III-V	1
Otter Creek	Partridgeville Road to Pine Grove Road	Class III-V	10.4

RIVER NAME	REACH DESCRIPTION	WHITEWATER BOATING CLASS	APPROX. LENGTH (RIVER MILES)
Woodhull Creek	Chub Pond to Horton Road	Class III-V	10
Black River - South Branch	South Lake to Black River	Class II-IV	8
East Canada Creek	Powley Place to Stratford	Class II-IV	12
Fish Creek - East Branch	Point Rock to Taberg	Class II-IV	9.4
Moose River - South Branch	Rock Dam to McKeever	Class II-IV	20
Oswegatchie River - East Branch	Inlet to Wanakena	Class II-IV	2.2
Sacandaga River	Christine Falls to East Branch	Class III-V+	7.5
Cedar River	Wakeley Dam to Spraque Brook	Class II-V	8
East Stony Creek	Tenant Creek to Old State Highway	Class II-V	8
Little Black Creek	Hughes Road to Black River	Class II-V	5.5
Rock River	Lake Durant to Cedar River	Class II-V	5
Black River	North Lake to Farr Road	Class I-IV	6
Independence River	Bradish Road to Old Pine Grove Road	Class II-V+	2.6
Oswegatchie River - Middle Branch	Long Pond Road to Bryants Bridge	Class II-V+	22
Spruce Creek	Salisbury to Dolgeville	Class II-V+	6.5
Black River	Farr Road to Enos	Class I-V	8
Oswegatchie River - Middle Branch	Bryants Bridge to Fish Creek	Class I-V(V+)	4
Moose River	Rock Island to Fowlersville	Class IV	9
Beaver River	Moshier Section	Class IV-V	3
Mad River	Road from Castor Hill to North Branch	Class IV-V	8
Round Lake Outlet	Round Lake to Bog River	Class IV-V	8.5
Jenny Creek	Jayville Road to Pitcairn	Class IV-V+	5
Negro Brook	Boshart Road to East Road	Class IV-V+	1
Sacandaga River - West Branch	Arietta - Piseco to Whitehouse	Class IV-V+	9.2
Beaver River	Eagle Section	Class V	1
Cincinnati Creek	Remsen to Barneveld	Class V	4.5
Mill Creek	West Lowville to Lowville	Class V	4
Moose River	Fowlersville to Lyons Falls	Class V	5
Sacandaga River - Middle Branch	Speculator to Old Route 30 Road Bridge	Class V	2.5
Sacandaga River - Middle Branch	Old Route 30 Bridge to Route 8/30 Jct Bridge	Class V	6.8
Oswegatchie River - West Branch	Bisha Falls to Jerden Falls	Class V+	7

Source: Riverfacts 2020

During the Prospect bypass reach assessment (see Section 3.2), several boaters referenced Ausable Chasm Falls whitewater run as a comparable reach. This reach is located approximately 3 hours northeast of the Project, near Keesville, New York. AW (2020c) describes the 3.3-mile-long Ausable River reach at Ausable Chasm as a Class IV/IV+ reach with the first mile within a vertical walled canyon that offers 6 to 8 high quality Class IV rapids ranging from vertical ledges to long slides to rapids with waves and holes. The remaining reach is characterized as wide and shallow with small riffles and few rapids. AW (2020c) estimates a flow range from about 240 cfs to 1,400 cfs, stating that suitable flows are available throughout the year, including summer and fall, and that the Chasm run is open June through October.

3.2 PROSPECT BYPASS REACH

3.2.1 ACCESS AND ADJACENT LAND USE ASSESSMENT

The Prospect bypass reach mesohabitat and substrates were mapped as part of the Mesohabitat Assessment Study, denoting the substrate types including several pools and riffles (see Aquatic Mesohabitat Assessment Report, Kleinschmidt 2020a). The reach between Military Road Bridge and Prospect tailrace is approximately 0.8 mile in length, and almost 100 percent of the eastern shoreline consists of steep cliff and provides no access. Approximately 70 percent of the western shoreline is steep/cliff, and the remaining predominantly consists of loose rock with difficult access to the stream channel. Figure 3-2 provides the documentation of Prospect bypass reach mesohabitat and substrates, as well as adjacent topographic information. Photos of the Prospect bypass reach during primarily leakage conditions are provided in Appendix D.

Adjacent landownership to the Prospect bypass reach along the eastern shoreline is comprised of primarily Erie-owned parcels, with one small parcel owned by the Mohawk Valley Water Authority (MVWA), which is in close proximity to, but not directly adjacent to the Prospect bypass reach. The western shoreline ownership includes a private parcel near Military Road Bridge, Town of Trenton lands, MVWA lands, and a small portion of Erie lands near the Prospect powerhouse (see Figure 3-3). The MVWA facility is a regional water supply treatment plant that supplies drinking water for approximately 128,000 residents within the MVWA service area, including the City of Utica (MVWA 2020). The MVWA plant includes water treatment infrastructure facilities and settling pond areas.

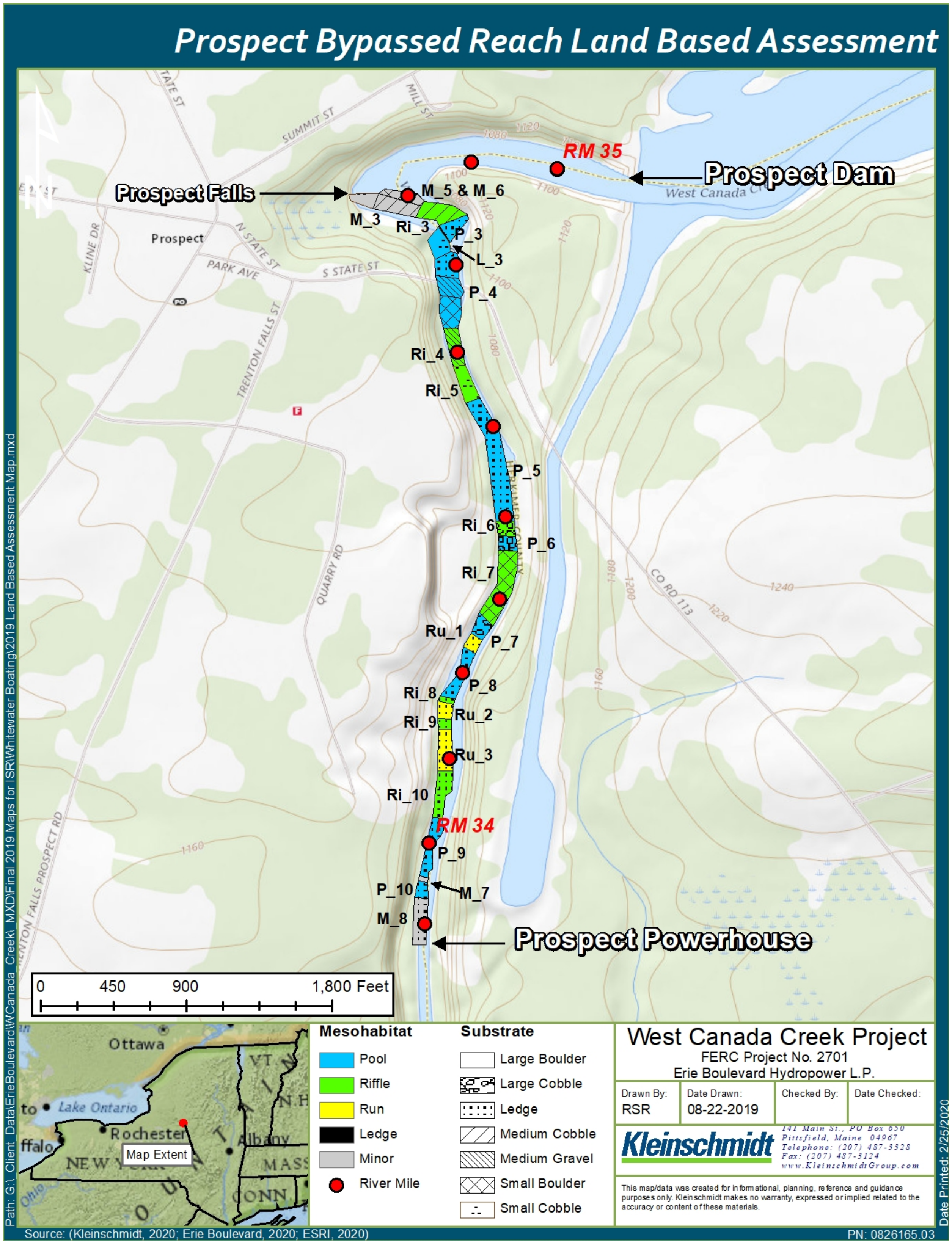

FIGURE 3-2 PROSPECT BYPASS REACH MESOHABITAT AND SUBSTRATES

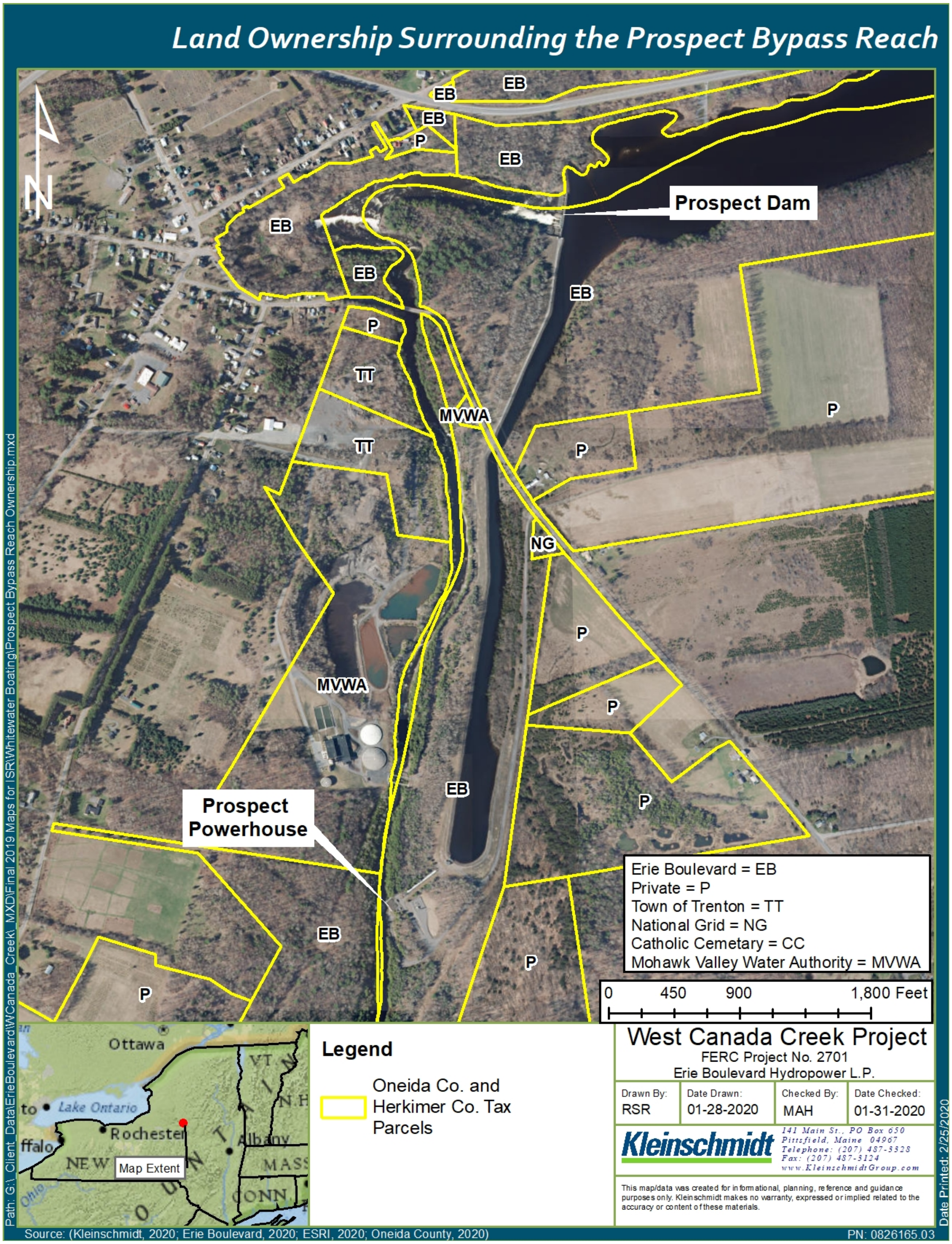

FIGURE 3-3 ADJACENT LAND OWNERSHIP SURROUNDING THE PROSPECT BYPASS REACH

During consultation, Erie again stated concerns with safety given the difficult access and gorge-like banks with high cliffs or unstable rock outcroppings along the Prospect bypass reach riverbanks. Erie also raised concerns in the immediate area of the Prospect tailrace regarding the narrow gorge-like channel, turbulent discharges from the Prospect powerhouse and close proximity of the undercut ledges adjacent to the Prospect tailrace area (see Appendix D). See the Recreation Use, Needs, and Access Study (Kleinschmidt 2020g) for additional information regarding the public access and safety assessment.

3.2.2 ON-WATER CONTROLLED FLOW ASSESSMENT

The Prospect bypass reach whitewater boating controlled flow assessment was conducted on September 23, 2020 (Photos 3-1 through 3-5). The study included a single-flow (approximately 600 cfs) assessment of the Prospect bypass reach from below Prospect Falls downstream to the take-out at Trenton impoundment (near Trenton Dam). Four, Class V boaters participated in conducting the on-water assessment, with put-in at about 12:00 pm below Prospect Falls and take-out at the Trenton impoundment dam area at approximately 2:45 pm (Figure 2-1). The participants completed individual pre-run forms (characterizing their skill levels and initial impressions), individual post-run evaluation forms (characterizing key features, impressions, ingress/egress, safety considerations, etc.), and the attendees conducted a focus group discussion post-run to discuss collectively the boaters evaluation of the reach.

3.2.2.1 PARTICIPANT PRE-RUN INFORMATION

The participants ranged in age from 28 to 35 years old and resided within approximately 150 miles of the Prospect Development. The primary on-water boating activity of all participants was whitewater kayaking using a hardshell kayak. The participants rated themselves as Expert level Class V whitewater boaters that have participated in on-water boating activities for 10 to 25 years (average 17 years). The boaters stated that they participate in on-water boating activities from 30 to 90 days per year (average 65 days).

(Photo Courtesy of Eric Adsit)

PHOTO 3-1 PROSPECT BYPASS (MID REACH) DURING PROSPECT BYPASS FLOW STUDY

(Photo Courtesy of Eric Adsit)

PHOTO 3-2 REACH DOWNSTREAM OF MILITARY BRIDGE DURING PROSPECT BYPASS FLOW STUDY

(Photo Courtesy of Tyler Merriam)

PHOTO 3-3 RAPID UPSTREAM OF PROSPECT TAILRACE DURING PROSPECT BYPASS FLOW STUDY

(Photo Courtesy of Eric Adsit)

PHOTO 3-4 DROP UPSTREAM OF PROSPECT TAILRACE DURING PROSPECT BYPASS FLOW STUDY

Note: Prospect Station is not generating in this photo.

PHOTO 3-5 PROSPECT TAILRACE AREA DURING PROSPECT BYPASS FLOW STUDY

3.2.2.2 POST-RUN ASSESSMENT

The participants stated that the access was easy with a short trail to the put-in location and sufficient parking could be available along Military Road or constructed at a small field upstream of the bridge. Participants indicated that the take-out near the Trenton Dam was easy due to the temporary[6] structure, but some participants noted egress would be difficult without that structure.

The participants evaluated the suitability of the flow for whitewater boating for each experience level (Table 3-2). All participants rated the flow as unacceptable for the Class I experience level. A mix of responses for the Class II and Class III levels were obtained. All participants rated the flow as good or excellent and responded that the flow was just right for boaters at the Class IV and Class V experience levels.

[6] The take-out was via a temporary platform located near the Trenton Development intake area that was constructed for the Trenton auxiliary dam rubber flashboard construction activities. This platform has since been removed following completion of the rubber flashboard construction.

TABLE 3-2 SUITABILITY OF STUDY FLOW FOR EXPERIENCE LEVEL (Q6)

EXPERIENCE LEVEL	UNACCEPTABLE	POOR	NEUTRAL	GOOD	EXCELLENT	FLOW WAS TOO LOW	FLOW WAS JUST RIGHT	FLOW WAS TOO HIGH
Class I	4	0	0	0	0	0	0	1
Class II	2	1	0	0	1	0	1	0
Class III	1	0	1	1	1	1	2	0
Class IV	0	0	0	2	2	0	3	0
Class V	0	0	0	1	3	0	4	0

The participants evaluated the flow for several characteristics of whitewater boating based on their activity and experience levels (Table 3-3). None of the characteristics were rated as unacceptable. All participants rated navigability, aesthetic quality, and overall quality of the target flow as excellent (Table 3-3). All participants rated safety due to flow levels as good. Mixed responses were provided for wadeability of the flow (2 responded as poor, 1 as good, 1 as excellent). Ratings ranged between neutral and excellent for water depth, availability of play areas, rate of travel, and exposure of rocks and sand/gravel bars (Table 3-3). Ratings were good or excellent for availability of rapids, eddies, force of water, speed of water/current, and safety (due to debris or other hazards). For all characteristics, except for wadeability, the participants stated that the flow was either too low or just right (Table 3-3).

Three of the four study participants responded that they experienced or observed a significant problem or safety hazard. The locations of the hazards were identified as just below Prospect Falls where there were some small trees along the shoreline and portions of the last rapid located just upstream of the Prospect tailrace. This rapid was also noted to have a large hole that could be hazardous to less experienced boaters but that could be scouted and avoided.

The study participants all responded that they experienced or observed outstanding features or opportunities. The locations were identified as the wave just downstream of Military Road Bridge, the whole run, Prospect Falls, and the rapids above the Prospect tailrace. One participant stated preference for no change in the flow level, and three participants stated they would prefer a higher flow level compared to the target flow level (600 cfs). All study boaters responded that they would choose to participate in the same activity on the Prospect bypass reach at the same flow level if given the opportunity.

TABLE 3-3 PRIMARY ACTIVITY AND EXPERIENCE LEVEL (Q7)

CHARACTERISTIC	UNACCEPTABLE	POOR	NEUTRAL	GOOD	EXCELLENT	FLOW WAS TOO LOW	FLOW WAS JUST RIGHT	FLOW WAS TOO HIGH
Navigability	0	0	0	0	4	1	3	0
Wadeability	0	2	0	1	1	1	1	2
Availability of Rapids	0	0	0	1	3	1	3	0
Water Depth	0	0	1	2	1	2	2	0
Availability of Whitewater Play Areas	0	0	1	1	2	2	2	0
Watercraft Rate of Travel	0	0	1	0	3	0	4	0
Exposure of Rocks	0	0	1	3	0	1	3	0
Exposure of Sand/Gravel Bars	0	0	1	2	1	1	3	0
Eddies	0	0	0	2	2	1	3	0
Force of Water	0	0	0	2	2	1	3	0
Speed of Water/Current	0	0	0	2	2	1	3	0
Safety (due to flow levels)	0	0	0	4	0	1	3	0
Safety (due to debris, other hazards)	0	0	0	2	2	1	3	0
Aesthetic Quality	0	0	0	0	4	1	3	0
Overall Quality	0	0	0	0	4	1	3	0

3.2.2.3 FOCUS GROUP DISCUSSION

Participants stated that potential put-in locations for downstream of Prospect Falls could include either at the base of Prospect Falls via a trail adjacent to Military Road Bridge or access from Military Road Bridge on downstream river right side of the bridge. Participants indicated that potential take-out locations could include: at river left river upstream of Prospect tailrace via implementation of a constructed staircase or implement a take-out at Trenton impoundment via a steel staircase or other structure.

Participants stated that the highlight of the run was scenery of the gorge, and that it was in the same category, if not better than the Ausable Chasm (NY) whitewater boating run. Participants stated preference for a release time of approximately 4 hours, and the potential to conduct multiple (2 runs) runs during one trip. Participants stated that the reach was runnable and 600 cfs provided a good flow level, and that a flow range of 700-800 cfs may provide optimal flows.

Participants indicated whitewater boating features included: a play spot for surfing waves (Class II-III) below Military Road Bridge, the final rapids above Prospect tailrace (Class IV - IV+, with potentially one area of low Class V), and series of rapids (4 distinct areas) with multiple eddies. Participants discussed the experience of one boater that "swam" and lost the boat in the rapid (the boat was later retrieved in the Trenton impoundment). The participant was able to self-rescue and move to river right and reach the shoreline without harm. Participants stated that boaters could scout and set up or may opt to portage this series of rapids.

In terms of potential hazards, participants indicated that the most difficult section was the last two ledges/rapids above Prospect tailrace. The participants discussed rescue options and indicated that due to nature of the gorge rescue would likely involve litter carry out. One of the participants who teaches swift-water training for the New York Department of Homeland and Emergency Services indicated that local fire/police departments are likely not trained for technical/vertical rescue, so rescue services would need to be called in from other locations. Participants felt that the reach would be a large regional area draw, particularly if coordinated with other releases in the region, and provided a good "skill builder" reach. Participants indicated that the scenery, multiple skill level challenges, and potential to complete multiple (2) runs would be potential draws for boaters.

3.3 DOWNSTREAM WEST CANADA CREEK

3.3.1 RECREATION ACCESS, USE AND NEEDS

Recreation opportunities along West Canada Creek downstream of the Trenton Development include angling, whitewater boating, tubing, picnicking, hiking/walking, sightseeing, and camping. The downstream reach is all located outside of the West Canada Creek Project boundary, with the downstream whitewater boating reaches (see Figure 3-4). Approximately 13 miles downstream of the Morgan Dam is the Newport Dam associated with the Newport Hydroelectric Project which operates under an exempt FERC license (FERC No. 5196) with a 1,960-kilowatt (kW) capacity. Further downstream, approximately 26 miles below the Morgan Dam is the Herkimer Dam associated with the Herkimer Hydroelectric Project (FERC No. 9709), with a licensed capacity of 1,680 kW.

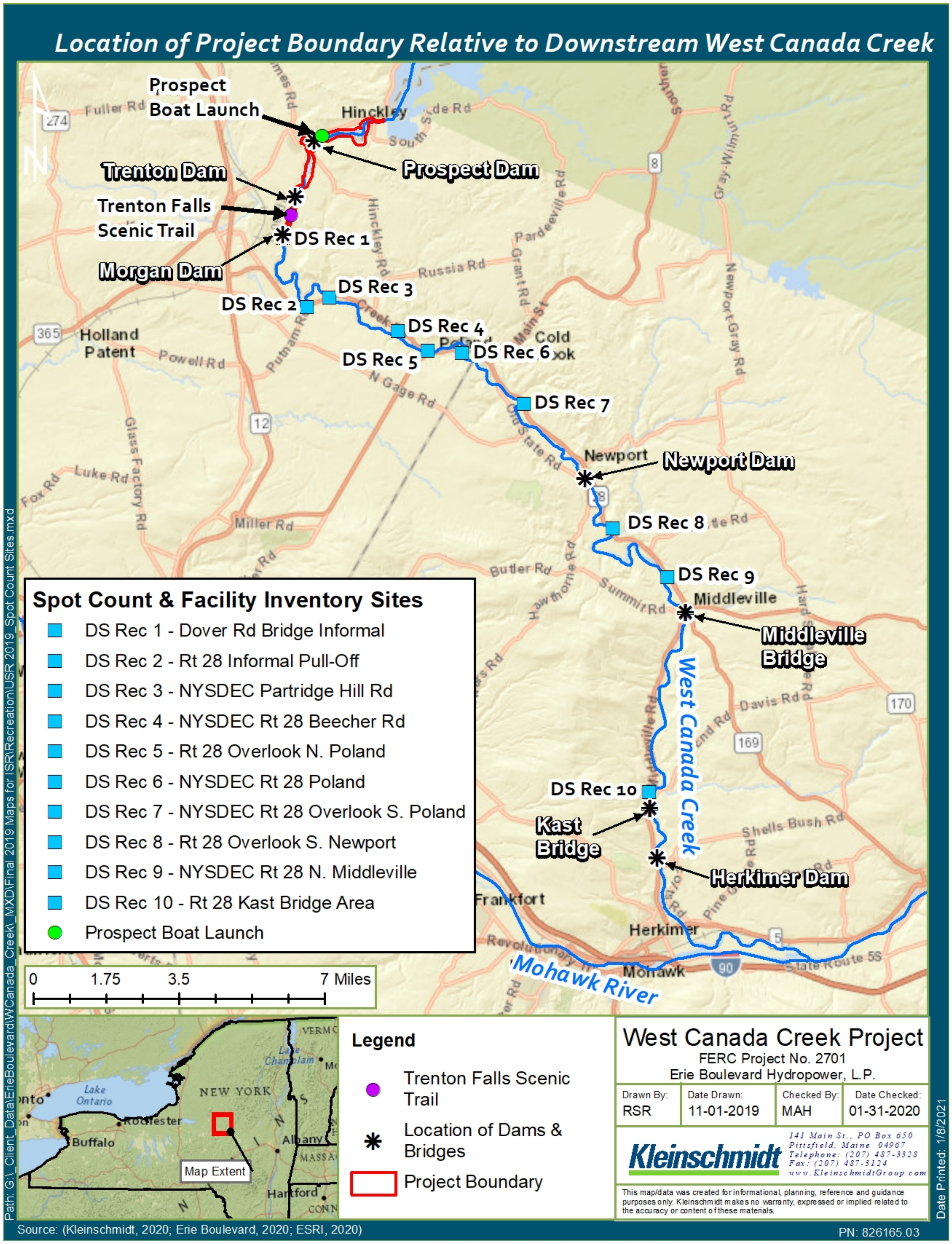

FIGURE 3-4 LOCATION OF PROJECT BOUNDARY RELATIVE TO DOWNSTREAM WEST CANADA CREEK

Numerous public access areas exist along the downstream West Canada Creek, including NYSDEC access sites and roadside pull-offs (Figure 3-4 denotes some of the existing access sites). As stated by NYSDEC, "With approximately 26 miles of accessible stream frontage and 11 parking lots, West Canada Creek is easy to get to" (NYSDEC 2020). Additional information regarding these opportunities and access is provided in the Recreation Use, Needs and Access Study Report (Kleinschmidt 2020g).

West Canada Creek is a renowned trout stream in central New York (NYSDEC 2020). The reach that extends approximately 2.5 miles from Dover Road Bridge downstream to the first bridge (Comstock Bridge) below the mouth of Cincinnati Creek is a catch-and-release zone known as the Trophy Section (Figure 3-5). This "trophy section" has special regulations established by NYSDEC where no kill restrictions, use of artificial lures, and extended fishing seasons are used to help produce trophy fish (NYSDEC 2020).

AW identifies a Class I-II (beginner/intermediate) whitewater boating run beginning at the Dover Road Bridge, located approximately 0.3 mile downstream of Trenton Station, and extending to Kast Bridge, approximately 28 miles downstream of Trenton Station (AW 2020a). AW identifies two runs along this stretch with Section 1 extending from Dover Road to Route 29 in Middleville, and Section 2 from Route 29 in Middleville to Route 7 at Kast Bridge north of Herkimer. Section 1 is described as Class I-II with one portage around the Newport Dam, and Section 2 is described as Class II-II+ (AW 2020a).

In addition to whitewater boating, the downstream reach supports recreational tubing opportunities starting below the catch-and-release section (about 2.5 miles downstream of Dover Road Bridge) and extending about 5 miles downstream to the West Canada Creek Campground (see Figure 3-5). According to West Canada Creek Tubing (2020), flows less than 300 cfs are considered poor floating conditions and no canoe/kayak rentals are available; flows of 301 cfs to 900 cfs are considered good floating conditions and all rentals (canoe/kayak and tubing) are available; flows of 900 cfs to 1,750 cfs are considered fast floating conditions and all rentals are available; and at flows greater than 1,750 cfs, no rentals are available (West Canada Creek Tubing 2020).

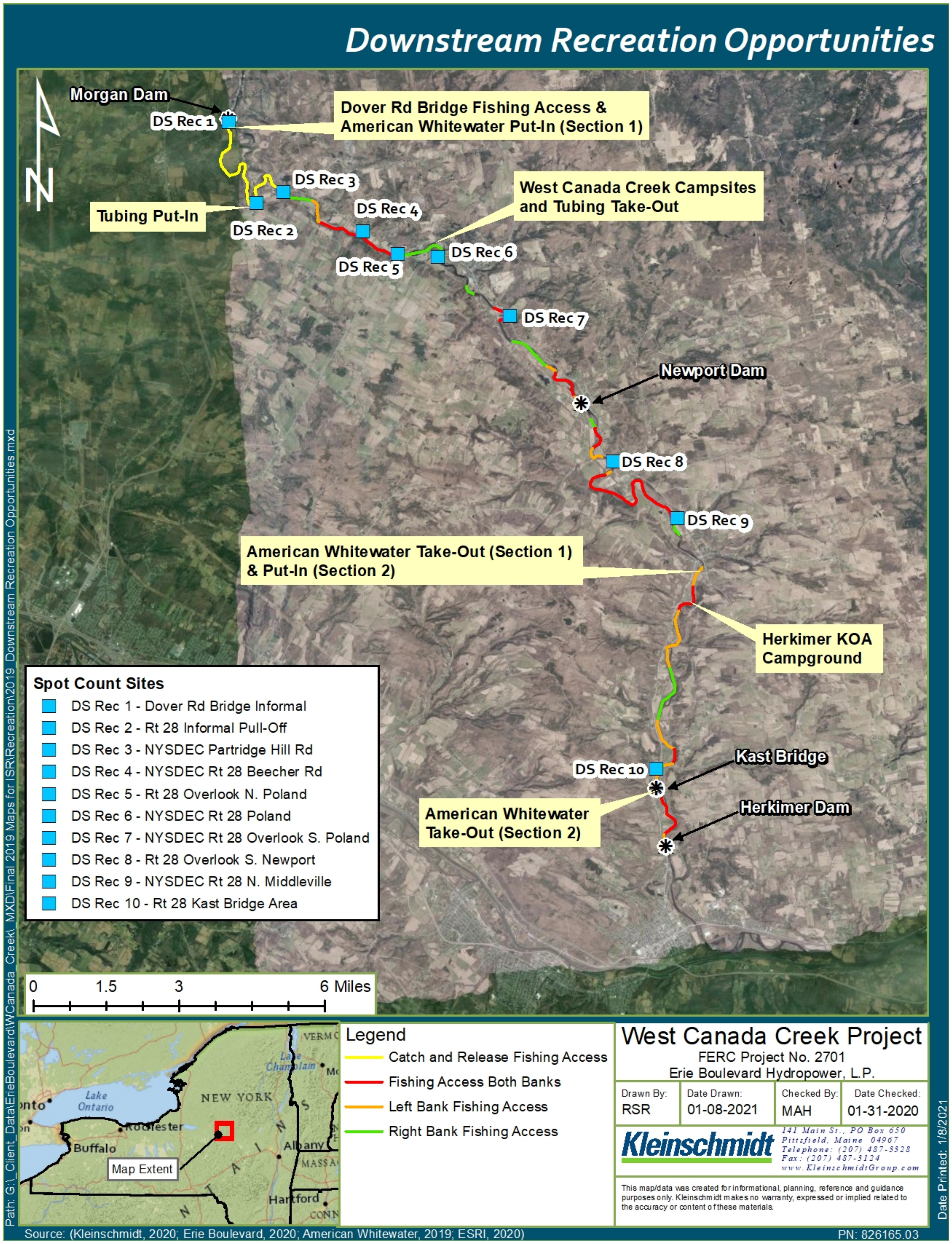

FIGURE 3-5 RECREATION OPPORTUNITIES DOWNSTREAM OF THE WEST CANADA CREEK PROJECT

The West Canada Creek Campsites reported that the number of tube rentals ranged from 156 to 928 annually during the 2015 to 2018 period, with average annual rental of 505 tubes. Kayak/canoe annual rentals ranged from 22 (2016) to 135 (2014), during the 2014 through 2018 period with average annual rental of 76 kayaks/canoes (personal communication with West Canada Creek Campground, 2020). See additional information in the Recreation Use, Needs, and Access Study (Kleinschmidt 2020g).

3.3.2 FLOW CHARACTERIZATION AND INFORMATION

The downstream West Canada Creek whitewater boating reach extends from the Dover Road Bridge downstream approximately 25 miles to Kast Bridge (see Figure 3-3). An existing USGS gage is located at Kast Bridge (USGS No. 01346000). Estimated[7] flow travel time from Trenton tailrace down to Kast Bridge is approximately 6 to 8 hours depending on flow levels. Inflow to the West Canada Creek that would be available for downstream flow releases would be dependent on inflow releases from Hinckley Reservoir (Erie 2020). Tributaries in the downstream reach, such as Cincinnati Creek, Cold Brook and Mill Creek, can contribute significantly to overall flow and "flashiness" in the downstream reaches during a significant rain event. Appendix E provides a summary of the USGS Kast Bridge data based on review of historic records of flow and seasonal variations during the previous 5 -year period (2015-2019).

Erie provides information regarding flow releases at the Trenton powerhouse via SafeWaters, a publicly accessible website and toll-free phone line (SafeWaters 2020). SafeWaters is updated daily based on river gauge information, approximate forecasts, and estimated flows. The actual flows can vary and change quickly at any time. The SafeWaters information should be used as an additional source of information of potential flow ranges. Users are encouraged to always be alert and wear an approved flotation device and to never go in or near the water until the user knows and accepts the risks in the area (SafeWaters 2020).

[7] Based on level logger data and in-field experience obtained during the 2019 studies, and input from AW and boating participants from the local area with previous experience boating the downstream reach.

3.3.3 ON-WATER CONTROLLED FLOW ASSESSMENT

The downstream West Canada Creek on-water whitewater boating controlled flow assessment was completed on Friday, November 6, 2020 (Day 1), and Saturday, November 7, 2020 (Day 2) (Photos 3-6 through Photo 3-9). A total of 12 individuals participated in the study, including 6 participants on November 6, 2020 and 11 participants on November 7, 2020, with five boaters participating both days[8]. The participants completed individual pre-run forms (characterizing their skill levels and initial impressions), individual post-run evaluation forms (characterizing key features, impressions, ingress/egress, safety considerations), and participated in a post-run focus group to discuss collectively the boaters evaluation of the reach.

PHOTO 3-6 DOWNSTREAM WEST CANADA CREEK FLOW STUDY PUT-IN LOCATION

[8] One of the participants from Friday, November 6, did not participate on Saturday, November 7.

PHOTO 3-7 BOATER PARTICIPANTS DOWNSTREAM WEST CANADA CREEK, NOVEMBER 7, 2020

PHOTO 3-8 BOATER PARTICIPANTS DOWNSTREAM WEST CANADA CREEK NOVEMBER 6, 2020

(Photo Courtesy of Rob Griffiths)

PHOTO 3-9 DOWNSTREAM WEST CANADA CREEK DURING FLOW STUDY, NOVEMBER 7, 2020

During the controlled flow study period, the target flow on November 6, 2020 (Day 1) was 1,400 cfs[9], and the Kast Bridge gage identified flows of 1,140[10] cfs at put-in time[11] and approximately 1,140 cfs at take-out time. The target flow on November 7, 2020 (Day 2) was 1,000 cfs[9], and the Kast Bridge gage identified flows of approximately 1,140 at put-in time and approximately 970 cfs at take-out time (see Figure 3-6 and Appendix E).

[9] Flows were originally targeted for 1,000 cfs for the first day, but based on inflows, snow melt run-off, and Kast Bridge data, the field conditions represented flows closer to 1,400 cfs and the team agreed to transition to the higher flow on the first day and target the lower flow (1,000 cfs) on the second day.
[10] The USGS Kast Bridge gage originally showed higher flow for this period, however, the gage and flow estimate has been recalibrated following the field effort based on in-field gage calibration by USGS. The flow estimate numbers (cfs) above represent the recalibrated estimate.
[11] Based on estimated flow travel time of about 2-3 hours from the put-in location to the USGS Kast Bridge gage.

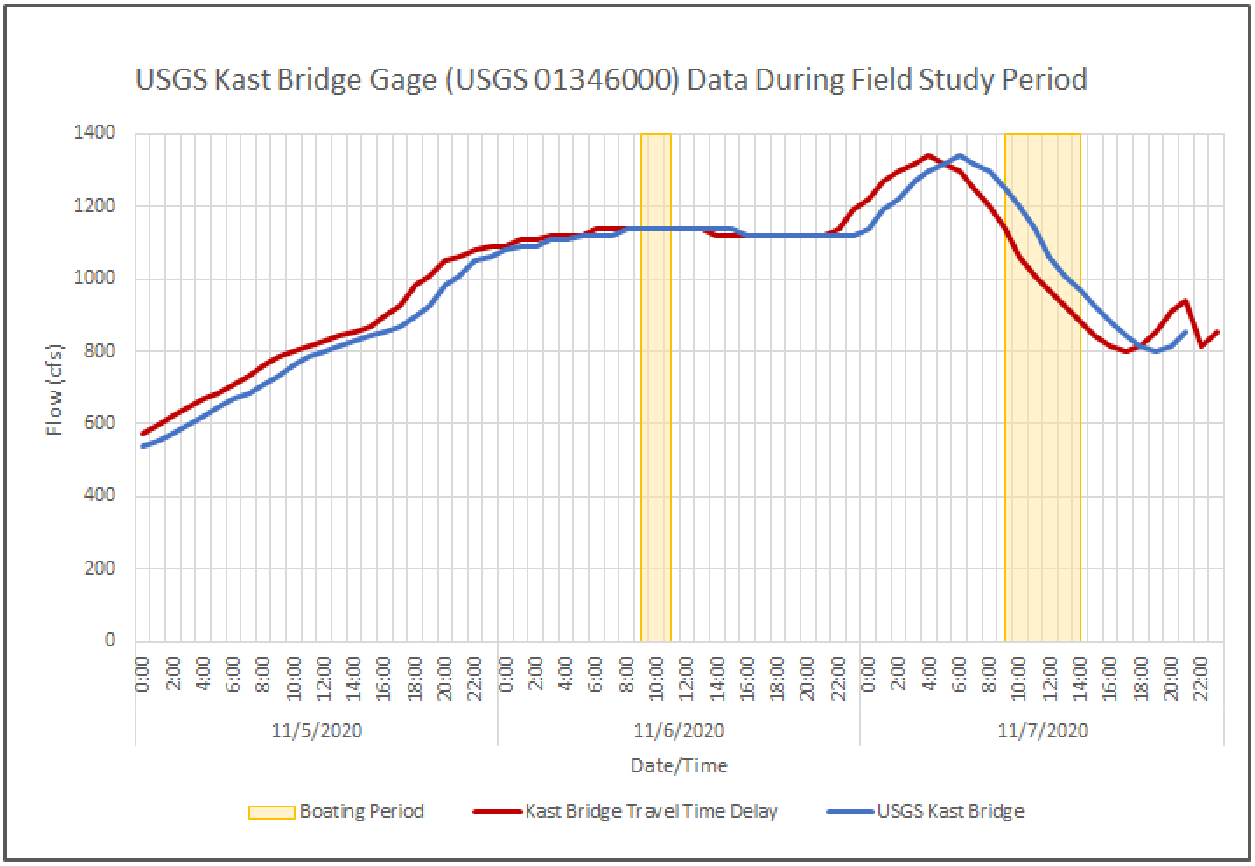

FIGURE 3-6 USGS KAST BRIDGE DATA FOR FIELD STUDY PERIOD

3.3.3.1 PARTICIPANT PRE-RUN INFORMATION

The study participants reside in New York and Massachusetts with ages ranging from 21 to 63 years (average age = 47 years). The primary activity of the study participants for on-water boating was whitewater kayaking (n=11) and whitewater canoeing (n=1). The participants rated their skill level for whitewater boating as intermediate (Class III) (n=5), advanced (Class IV) (n=5), and expert (Class V) (n=2). The participants whitewater boating experience ranged from 2 years to 40 years (average = 21 years) and their annual participation in whitewater boating ranged from 10 to 100 days (average = 37 days). Two boaters responded that they also participate in tubing between 1 to 10 days per year.

Six of the boaters had previously participated in recreation activities on West Canada Creek; two boaters participated at least once per month (Table 3-4). The participants typically recreate on West Canada Creek between March and December (Figure 3-7). Four participants responded that they are very familiar with West Canada Creek, one volunteer was somewhat familiar, and one was moderately familiar. The six participants that had recreated on West Canada Creek before had 1 to 38 years of experience (average = 19 years) boating or tubing on West Canada Creek; in the past year, they had participated in boating or tubing on West Canada Creek between 0 and 20 days (average=3 days).

TABLE 3-4 FREQUENCY OF BOATING OR TUBING ON WEST CANADA CREEK (PRE-RUN Q10)

FREQUENCY	COUNT
Weekly/at least once per week	1
Monthly/at least once per month	2
Several times per year	1
At least once per year	1
Less than one time per year	1
Never	6
Total	12

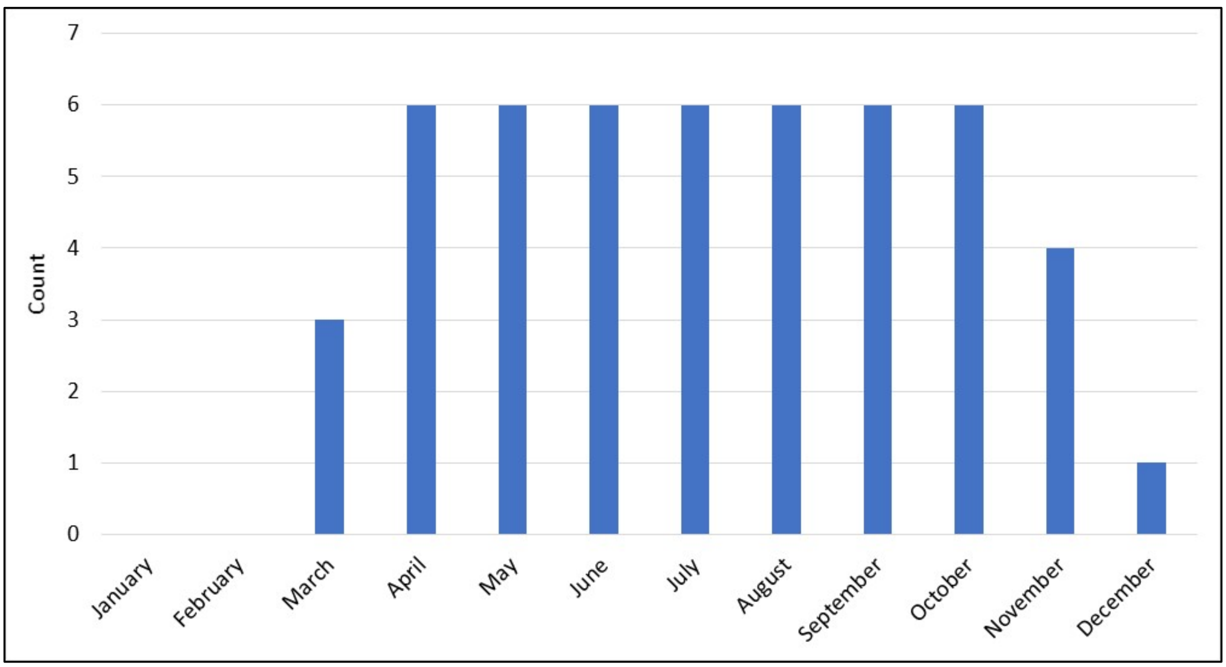

FIGURE 3-7 TYPICAL MONTHS PARTICIPANTS RECREATED ON WEST CANADA CREEK (PRE-RUN Q11)

Four respondents stated they primarily use a hardshell kayak on West Canada Creek; one respondent said they use a one-person open canoe. Three participants stated they typically use the section of West Canada Creek between Morgan Dam and Newport impoundment, three participants stated they use the section between Newport Dam and Herkimer, and two participants stated they use the section between Middleville and Kast Bridge (subsection of the reach from Newport to Herkimer). These participants all responded that they use a NYSDEC put-in access site, typically north of Middleville; they all take-out at or above Kast Bridge. Participants obtain information about flow levels prior to their trips from the USGS, the SafeWaters website, and from the AW website.

Participants responded that flows above 600 cfs were acceptable for whitewater boating, and that flows greater than 800 cfs were acceptable for tubing on West Canada Creek. Flows of 1,200 cfs or above were selected as optimal for whitewater boating (Table 3-5).

TABLE 3-5 ACCEPTABLE AND OPTIMAL FLOW RANGES (PRE-RUN Q20 AND Q21)

FLOW RANGE	WHITEWATER BOATING		TUBING	
	ACCEPTABLE	OPTIMAL	ACCEPTABLE	OPTIMAL
< 300 cfs	0	0	0	0
>300 cfs to 500 cfs	0	0	0	0
>500 cfs to 600 cfs	0	0	0	0
>600 cfs to 800 cfs	1	0	0	0
>800 cfs to 1,000 cfs	4	0	2	0
>1,000 cfs to 1,200 cfs	4	0	0	0
1,200 cfs to 1,400 cfs	3	1	1	0
>1,400 cfs	3	3	1	1

The six participants that had recreated on West Canada Creek previously all responded that fluctuations in water levels had affected their ability to participate in boating or tubing activities on West Canada Creek. In response to the fluctuations in water level, the boaters indicated they decided not to participate in the activity (n=4), adjusted the timing of their visit (n=3), moved to a different location on West Canada Creek (n=2), or avoided a specific area on West Canada Creek (n=1). Participants also responded that they paddled a different river and waited for rain.

3.3.3.2 POST-RUN FLOW ASSESSMENT (NOVEMBER 6, 2020)

Six boaters, ranging in skill levels from Class III-Class V, participated in conducting the on-water assessment on Day 1, November 6, 2020, with put-in at about 9:20 am at the NYSDEC access off Route 28 at Middleville (DS Rec 9) and take-out at Kast Bridge at approximately 11:15 am, for a total run time of about 2 hours. The target flow was 1,400 cfs and the Kast Bridge gage identified flows of 1,140 cfs at put-in time[12] and approximately 1,140 cfs at take-out

[12] Based on estimated flow travel time of about 2-3 hours from the Middleville put-in location to the USGS Kast Bridge gage.

time. Three of the participants had previously boated this reach, and participants stated they had boated the reach between 70 and hundreds of times before. Five participants boated the run in a hardshell kayak and one boated in a closed canoe.

POST RUN SURVEY DATA ANALYSIS

After completing the run, the participants rated the suitability of the flow for the different whitewater boating experience levels. The flow was rated between unacceptable (n=1), poor (n=1), and acceptable (n=4) for the Class I experience level (Table 3-6). The flow was rated as excellent (n=4) or acceptable (n=2) for the Class II level. Responses were mixed for Class III and ranged between poor and excellent. Responses were also mixed for Class IV and Class V and varied between unacceptable and good (Table 3-6). The flow was rated as just right or too high for the Class I and Class II experience levels and was rated as too low or just right for the Class IV and Class V levels (Table 3-6).

The study participants rated several whitewater boating characteristics based on their activity and experience level (Table 3-7). Navigability, availability of rapids, watercraft rate of travel, exposure of rocks and sand/gravel bars, eddies, force of water, speed of water, safety due to flow levels, safety due to other hazards, aesthetic quality, and overall quality were rated as acceptable, good, or excellent by all participants (Table 3-8). All participants rated the water depth as acceptable. A mix of responses were obtained for wadeability. The flow was described at just right or too high for navigability and wadeability and as too low or just right for water depth, availability of play areas, and exposure of sand/gravel bars (Table 3-7). The respondents rated the flow as just right for the other characteristics (availability of rapids, exposure of rocks, eddies, force of water, speed of water, safety, aesthetic quality, overall quality).

The explanations given for the overall ratings were that the reach is great for beginner/intermediate boaters (Class II/III), for teaching and for less experienced boaters to gain experience. The participants thought the reach was mellow and that some features were washed out, but overall, it was a fun river to run. One participant responded that they observed a hazard just below the Class III rapid where there was a piece of rebar protruding from the water in the middle of the river. Three participants observed or experienced outstanding features or opportunities during the run including eddies in the area just downstream of the put-in location, and the Class III rapid (Willow Rapid) just upstream of Kast Bridge.

TABLE 3-6 EVALUATION OF SUITABILITY OF FLOW (POST-RUN Q7)

EXPERIENCE LEVEL	UNACCEPTABLE	POOR	ACCEPTABLE	GOOD	EXCELLENT	FLOW WAS TOO LOW	FLOW WAS JUST RIGHT	FLOW WAS TOO HIGH
Class I	1	1	4	0	0	0	2	4
Class II	0	0	2	0	4	0	4	2
Class III	0	1	2	1	2	1	3	2
Class IV	2	1	1	2	0	4	1	0
Class V	3	0	2	1	0	3	1	0

TABLE 3-7 EVALUATION OF PRIMARY ACTIVITY AND EXPERIENCE LEVEL (POST-RUN Q8)

CHARACTERISTIC	UNACCEPTABLE	POOR	ACCEPTABLE	GOOD	EXCELLENT	N/A	FLOW WAS TOO LOW	FLOW WAS JUST RIGHT	FLOW WAS TOO HIGH
Navigability	0	0	1	2	3	0	0	5	1
Wadeability	1	1	2	1	0	1	0	3	2
Availability of Rapids	0	0	3	2	1	0	0	5	0
Water Depth	0	0	6	0	0	0	2	3	0
Availability of Whitewater Play Areas	0	1	3	2	0	0	1	3	0
Watercraft Rate of Travel	0	0	1	3	2	0	0	5	0
Exposure of Rocks	0	0	2	2	2	0	0	5	0
Exposure of Sand/Gravel Bars	0	0	4	1	1	0	2	3	0
Eddies	0	0	1	2	3	0	0	5	0

CHARACTERISTIC	UNACCEPTABLE	POOR	ACCEPTABLE	GOOD	EXCELLENT	N/A	FLOW WAS TOO LOW	FLOW WAS JUST RIGHT	FLOW WAS TOO HIGH
Force of Water	0	0	2	1	3	0	0	5	0
Speed of Water/Current	0	0	2	0	4	0	0	5	0
Safety (due to flow levels)	0	0	1	0	5	0	0	5	0
Safety (due to debris, other hazards)	0	0	1	1	4	0	0	5	0
Aesthetic Quality	0	0	1	2	3	0	0	5	0
Overall Quality	0	0	1	2	3	0	0	5	0

The participants were asked if they would prefer a flow level that was higher, lower, or the same as they participated in on the survey day. One volunteer responded they would prefer a lower flow, two responded they would prefer no change to the flow, and three stated they would prefer a higher flow. Participants indicated that different flow levels would provide different boating opportunities for different craft and skill levels. All participants responded that they would choose to participate in the same activity on West Canada Creek at the same flow level again if given the opportunity. The reasons given for why they would choose to participate in the same activity were that it was a fun run, close to home, and that the flow was navigable and good for training.

FOCUS GROUP DISCUSSION

Participants indicated that the put-in access at Middleville (DS Rec 9) was a good location with sufficient parking, good staging area and easy put-in area. Participants discussed potential "angler access only" restrictions at some of the NYSDEC access sites; however, indicated that many boaters and tubers use NYSDEC access locations both at this location and upstream reaches. Participants indicated that Kast Bridge was the preferred take-out location, given there are key whitewater boating features just upstream of Kast Bridge. The Kast Bridge take-out location includes a short trail from the take-out to an informal parking area, with additional vehicle parking at nearby (within about 0.5 mile) NYSDOT access, allowing for shuttling between the two locations.

Participants commented that the run was an excellent flow, and stated that the optimal flow range is between 900-1,000 cfs on the low end. At higher flows the reach would still be boatable as the river fills in around boulder areas. Participants indicated that the run was scrappy in a couple of spots and that a few areas with little boulders create eddies with nice features. Participants indicated that this flow was too high for tubing due to safety considerations. Participants indicated that the reach allows for overall "eddie hopping", and provides opportunities for training, with 2-3 surf wave spots. Participants also indicated that the overall reach is good beginners/teaching as it starts out straight-forward and then grows in more technical difficulty downstream (i.e., rapids above Kast Bridge).

Participants stated that there were no encounters with any other groups while on-river. Participants stated there was one safety issue at the drop above Kast Bridge, with a piece of rebar protruding from the surface of the river, but that boaters were able to avoid the area. Participants stated there were many areas along the run to exit the river or access for rescue. Participants also stated that lower water levels expose more and wet/slippery rocks. Participants stated that sources of flow information included: Kast Bridge USGS gage (located near take-out location), SafeWaters, American Whitewater app and website, and local knowledge.

Participants stated a desire for consistent availability of flows that would allow boaters to schedule group boating events and training sessions. Participants recalled previous Wednesday evening boating groups in the 1990s/early 2000s, in which boating flow ranges were typically between 1,000-1,500 cfs, and there were typically between 20-30 participants for those Wednesday evening events. Participants stated that the reach was previously used for training reach by local and college area boating group classes. Participants indicated that there would likely be a regional whitewater boater draw from the Utica, Syracuse and Albany area and potentially larger draw if scheduled with other area whitewater boating events. Participants indicated that a minimum 4-hour block of stable water flow was desirable and that the reach can typically be run within a 2 to 3-hour block of time.

3.3.3.3 POST-RUN FLOW ASSESSMENT (NOVEMBER 7, 2020)

Eleven boaters, ranging in skill levels from Class III-Class V, participated in conducting the on-water assessment on Day 2, November 7, 2020, with put-in about 9:20 am at the NYSDEC access off Route 28 at Middleville (DS Rec 9) and take-out at Kast Bridge at approximately 1:40 pm. The total run time was about 4 hours, however, participants stopped several times along the boating run, as compared to the previous day where participants primarily boated without substantial stops. The target flow was 1,000 cfs, and the Kast Bridge gage identified flows of approximately 1,140 cfs at put-in time[13] and approximately 970 cfs at take-out time. Participants noted that flow during the run was noticeably lower than the previous day's run.[14] Five of the study participants had boated the previous study day (November 6, 2020). Eight of the participants stated they had experience boating the reach previously, with a range of between one and hundreds of times before. Ten of the participants boated in a hardshell kayak and one boated in a one-person open canoe.

[13] Based on estimated flow travel time of about 2-3 hour from the Middleville put-in location to the USGS Kast Bridge gage.
[14] Five of the participants boated both days of the whitewater boating study.

POST RUN SURVEY DATA ANALYSIS

After completing the run, the participants rated the suitability of the flow for the different whitewater boating experience levels. The flow was rated between unacceptable (n=1), poor (n=1), and acceptable (n=4) for the Class I experience level (Table 3-8). The flow was rated as excellent (n=4) or acceptable (n=2) for the Class II level. Responses were mixed for Class III and ranged between poor and excellent. Responses were also mixed for Class IV and Class V and varied between unacceptable and good (Table 3-8). The flow was rated as just right or too high for the Class I and Class II experience levels and was rated as too low or just right for the Class IV and Class V levels (Table 3-8).

The study participants rated several whitewater boating characteristics based on their activity and experience level (Table 3-9). Navigability, availability of rapids, watercraft rate of travel, exposure of rocks and sand/gravel bars, eddies, force of water, speed of water, safety due to flow levels, safety due to other hazards, aesthetic quality, and overall quality were rated as acceptable, good, or excellent by all participants (Table 3-8). All participants rated the water depth as acceptable. A mix of responses were obtained for wadeability. The flow was described at just right or too high for navigability and wadeability and as too low or just right for water depth, availability of play areas, and exposure of sand/gravel bars (Table 3-9). The respondents rated the flow as just right for the other characteristics (availability of rapids, exposure of rocks, eddies, force of water, speed of water, safety, aesthetic quality, overall quality).

The explanations given for the overall ratings were that the reach is great for beginner/intermediate boaters (Class II/III), for teaching and for less experienced boaters to gain experience. The participants thought the reach was mellow and that some features were washed out, but overall, it was a fun river to run. One participant responded that they observed a hazard just below the Class III rapid where there was a piece of rebar protruding from the water in the middle of the river. Three participants observed or experienced outstanding features or opportunities during the run including eddies in the area just downstream of the put-in location, and the Class III rapid (Willow Rapid) just upstream of Kast Bridge.

TABLE 3-8 EVALUATION OF SUITABILITY OF FLOW (POST-RUN Q7)

EXPERIENCE LEVEL	UNACCEPTABLE	POOR	ACCEPTABLE	GOOD	EXCELLENT	FLOW WAS TOO LOW	FLOW WAS JUST RIGHT	FLOW WAS TOO HIGH
Class I	1	1	4	0	0	0	2	4
Class II	0	0	2	0	4	0	4	2
Class III	0	1	2	1	2	1	3	2
Class IV	2	1	1	2	0	4	1	0
Class V	3	0	2	1	0	3	1	0

TABLE 3-9 EVALUATION OF PRIMARY ACTIVITY AND EXPERIENCE LEVEL (POST-RUN Q8)

CHARACTERISTIC	UNACCEPTABLE	POOR	ACCEPTABLE	GOOD	EXCELLENT	N/A	FLOW WAS TOO LOW	FLOW WAS JUST RIGHT	FLOW WAS TOO HIGH
Navigability	0	0	1	2	3	0	0	5	1
Wadeability	1	1	2	1	0	1	0	3	2
Availability of Rapids	0	0	3	2	1	0	0	5	0
Water Depth	0	0	6	0	0	0	2	3	0
Availability of Whitewater Play Areas	0	1	3	2	0	0	1	3	0
Watercraft Rate of Travel	0	0	1	3	2	0	0	5	0
Exposure of Rocks	0	0	2	2	2	0	0	5	0
Exposure of Sand/Gravel Bars	0	0	4	1	1	0	2	3	0

CHARACTERISTIC	UNACCEPTABLE	POOR	ACCEPTABLE	GOOD	EXCELLENT	N/A	FLOW WAS TOO LOW	FLOW WAS JUST RIGHT	FLOW WAS TOO HIGH
Eddies	0	0	1	2	3	0	0	5	0
Force of Water	0	0	2	1	3	0	0	5	0
Speed of Water/Current	0	0	2	0	4	0	0	5	0
Safety (due to flow levels)	0	0	1	0	5	0	0	5	0
Safety (due to debris, other hazards)	0	0	1	1	4	0	0	5	0
Aesthetic Quality	0	0	1	2	3	0	0	5	0
Overall Quality	0	0	1	2	3	0	0	5	0

Ten of the participants responded that they would prefer a flow that was higher for the same activity compared to the target flow; one participant stated they would prefer no change in the flow level. All participants responded that given the opportunity, they would choose to participate in the same activity on West Canada Creek at the same flow level as the study day. The reasons given for why they would participate in the same activity at the same level on West Canada Creek were that different flow levels provide different opportunities for various crafts and skill levels, it was fun, it is a great run, it is a good teaching level, higher flows would be nice but it is still fun, and they would like to bring beginners.

FOCUS GROUP DISCUSSION

Participants indicated that the access at Middleville (DS Rec 9) was a good location with sufficient parking, good staging area and easy put-in area. Participants indicated that Kast Bridge was the preferred take-out location, similar to the discussion conducted during the previous day focus group. Participants indicated that this flow level was about the lowest for an enjoyable run; more scrappy spots and a slower run than the previous day's flow. Participants indicated there were more play features at this flow than the previous day, and that features near Kast Bridge more pronounced and could be "park and play" features. Participants again reiterated that the reach was a good beginner/teaching reach, starts out straight-forward and then grows in technical difficulty downstream (i.e., rapids above Kast Bridge). One participant commented that much higher flow levels could be boated due to nature of river (no anticipated safety issues) with exception of flows being low enough to safely pass under Kast Bridge.

Participants stated that there were no encounters with any other groups while on-river. Participants stated there was one safety issue at the drop above Kast Bridge, where a piece of rebar protruded from the river, but that boaters could avoid it. Participants stated there were many areas available to exit river or access the river for rescue along the reach. Participants also stated that lower water levels expose more and wet/slippery rocks. Participants stated that sources of flow information included: Kast Bridge USGS gage (located near take-out location), SafeWaters website, AW's app and website, National Oceanic and Atmospheric Administration's (NOAA) water prediction levels/NOAA river forecast, and local knowledge.

Participants stated a desire for consistent availability of flows, which would allow to schedule group boating events and training sessions. Participants stated the potential for special boating or slalom events, particularly if scheduled with other area whitewater boating events, and potential tourism attraction and associated economic gains to local industries. Participants indicated rivers with comparable whitewater boating opportunities within the region could include Salmon, Fife Brook, Sacandaga, and East Canada upper section of Wood Hole.

3.3.3.4 FLOW COMPARISON EVALUATION

Five of the boaters participated in both target flows and completed the flow comparison evaluation. All five participants boated in a hardshell kayak. One had rated his/her whitewater experience level as intermediate (Class III), three rated their level as advanced (Class IV), and one rated their experience level as expert (Class V). All five participants described their desired experience as they are interested in whitewater boating trips that include technical elements such as play areas, powerful hydraulics, and challenging rapids.

The five participants provided an overall evaluation of the target flows based on their watercraft, skill, and desired experience. The target flow of 1,400 cfs was rated as neutral (n=1), good (n=3), and excellent (n=1) (Table 3-10). The target flow of 1,000 cfs was rated as good (n=4) and excellent (n=1).

TABLE 3-10 OVERALL EVALUATION OF TARGET FLOWS (FLOW COMPARE Q6)

TARGET FLOW	UNACCEPTABLE	POOR	NEUTRAL	GOOD	EXCELLENT
1,400 cfs	0	0	1	3	1
1,000 cfs	0	0	0	4	1

The participants were asked to specify what flows in their opinion would provide certain types of experiences on West Canada Creek based on their skill level and watercraft. The lowest flow range that was considered acceptable for a minimum quality experience was 700 cfs to 1,100 cfs. Flows ranging from 900 cfs to 1,500 cfs would provide the highest quality (i.e., optimal flow) experience. The lowest flow range that would provide a safe experience was 800 cfs to 1,000 cfs. The highest flow range that provides a safe experience was 3,000 cfs to greater than 5,000 cfs. The highest flow the participants would consider boating was 3,500 cfs to greater than 5,000 cfs.

Compared to river reaches of similar difficulty within a one-hour drive, West Canada Creek was rated as average (n=1), above average (n=2), and much better than average (n=1) (Table 3-11). Compared to other rivers in New York State, West Canada Creek was also rated as average (n=3), above average (n=1), or much better than average (n=1). When compared to other rivers in the northeast, three participants rated West Canada Creek as average, one rated it as below average, and one rated it as above average.

TABLE 3-11 RATING IN COMPARISON TO OTHER COMPARABLE RIVER REACHES (FLOW COMPARE Q8).

REACHES	FAR BELOW AVERAGE	BELOW AVERAGE	AVERAGE	ABOVE AVERAGE	MUCH BETTER THAN AVERAGE
Other rivers within a one-hour drive	0	0	1	2	2
Other rivers in New York State	0	0	3	1	1
Other rivers in the Northeast	0	1	3	1	0

Additional comments included that the different flow levels provide different types of whitewater boating experiences and opportunities for various experience levels, and that it is a good and fun river and a great run.

3.4 DISCUSSION

3.4.1 PROSPECT BYPASS REACH

Evaluation of the Prospect bypass reach was conducted via both on-land and a single controlled flow (600 cfs) evaluation by Class V expert whitewater boaters. The Prospect bypass reach is within a gorge-like setting with almost 100 percent of the eastern shoreline comprised of steep cliff and provides no access, and approximately 70 percent of the western shoreline comprised of steep/cliff, with the remaining shoreline predominantly comprised of loose rock with difficult access to the stream channel. Adjacent land ownership includes private, Town of Trenton, MVWA, and a small portion of Erie lands near the Prospect powerhouse. The MVWA facility is a regional water supply treatment plant that includes water treatment infrastructure facilities and settling pond areas.

Identified put-in locations would be available at Military Road Bridge, downstream of the Prospect Falls. However, no existing suitable take-out locations (egress) from the reach were identified that did not include the need for substantial construction of egress facilities. Discussion of the potential take-out locations was conducted as part of the controlled flow assessment focus group discussion. Boaters identified potential take-out options; however, options were related to installation of near vertical steel stairways that would provide costly construction implementation and maintenance costs, operational considerations including reservoir fluctuations, ice and debris), and would not alleviate safety concerns with boaters in the bypass reach. In addition, focus group participants discussed egress options of a potential take-out near the Trenton Dam, which would involve take-out near the intake area and significant safety concerns associated with public access near the Project intake and release structures (dam spillway sections and flood gate).

The participants discussed rescue options and indicated that due to nature of the gorge rescue would likely involve litter carry out that would require rescue by those trained for technical/vertical rescue; services that were likely limited within the Project region as indicated by one of the participants trained in these services. In addition, even one of the Class V boaters experienced difficulties in the rapids above Prospect tailrace losing the boat downstream, indicating that even experienced boaters may encounter boating “swims” and difficulties in this reach.

Participants indicated that the reach had high scenic value and was comparable or better that the Ausable Chasm gorge whitewater boating run. This regionally available whitewater boating reach is within 3 hours of the Project and provides a 3.4-mile-long run, with a challenging 1-mile portion within the first mile of the reach, with flows available throughout the year (per AW 2020c) (see Section 3.1). Accordingly, the Ausable Chasm whitewater boating resource is available to meet any potential regional demand for whitewater boating experience within a gorge-like setting and provides a longer and more diverse whitewater boating run than what would occur at Prospect.

Erie raised concerns in the immediate area of the Prospect tailrace regarding the narrow gorge-like channel, turbulent discharges from the Prospect powerhouse and close proximity of the undercut ledges adjacent to the Prospect tailrace area. Erie has stated on numerous consultation meetings and maintains significant safety concerns of providing public access to the bypass reach given the difficult access for potential swiftwater rescues once in the reach and difficult egress due to proximity to Project facilities and gorge-like banks with high cliffs or unstable rock outcroppings along the Prospect bypass reach riverbanks.

3.4.2 DOWNSTREAM WEST CANADA CREEK

The downstream reach is all located outside of the West Canada Creek Project boundary, with the downstream whitewater boating reaches. Approximately 13 miles downstream of the Morgan Dam is the Newport Dam associated with the Newport Hydroelectric Project and further downstream, approximately 26 miles below the Morgan Dam is the Herkimer Dam associated with the Herkimer Hydroelectric Project. The downstream West Canada Creek provides recreation opportunities for multiple recreation user groups, including fishing, tubing, whitewater boating, scenic viewing. Various existing public (NYSDEC and informal roadside access) and private (campground) access areas are available at multiple locations along the downstream reach. Additional information regarding these opportunities and access is provided in the Recreation Use, Needs and Access Study Report (Kleinschmidt 2020g).

Multiple lakes within the Project region offer flatwater boating opportunities, and multiple rivers and creeks offer whitewater boating opportunities. Within close vicinity to the West Canada Creek Project (approximately 60 miles of the Project), these reaches provide close to 500 river miles of whitewater boating opportunities. This includes about 205 river miles with whitewater boating opportunities for Class I-III intermediate ability levels, about 207 river miles with ranges from Class I-V, and about 75 river miles for Class IV-V+ expert level capabilities.

For the downstream West Canada Creek, AW identifies a Level I-II (beginner/intermediate) 28-mile long whitewater boating run beginning at the Dover Road Bridge and extending downstream to Herkimer. AW identifies two runs along this stretch with Section 1 extending from Dover Road to Route 29 in Middleville, and Section 2 from Route 29 in Middleville to Route 7 at Kast Bridge north of Herkimer. Section 1 is described as Class I-II with one portage around the Newport Dam, and Section 2 is described as Class II-II+ (AW 2020a) (see section 3.3).

The study reach extended from the Middleville (DS Rec 9) access area to the take-out at the Kast Bridge site. Target flows were 1,000 and 1,400 cfs and recorded flows were within the range of approximately 970 to 1,140 cfs. Estimated flow travel time from Trenton tailrace down to Kast Bridge is approximately 6 to 8 hours depending on flow levels. Tributaries in the downstream reach, such as Cincinnati Creek, Cold Brook and Mill Creek, can contribute significantly to overall flow in the downstream reaches during a significant rain event, in addition to flow releases from Hinckley Reservoir. Even with careful planning and no significant precipitation immediately prior or during the field study, target flows were difficult to obtain and hold over an extended period.

Participants noted the reach serves as a good teaching and beginners learning reach, with progressive difficulty from the upstream put-in location to the downstream Kast Bridge take-out. Participants indicated the desire for availability of known controlled flow releases to enable scheduling of group boating outings or teaching classes. Participants noted that the whitewater boating demand would likely be regional, unless scheduled for special slalom event or in tandem with other regional whitewater boating events.

Participants noted that boatable flows were within the range on the low end of approximately 700 to 800 cfs up to the high flow end of approximately 3,000 to 5,000 cfs, and that a range of flows could provide a range of boating experiences and opportunities. Participants indicated that sufficient flow data information was available through Kast Bridge USGS gage (located near the take-out location), SafeWaters website, AW's app and website, and NOAA's water prediction levels/NOAA river forecast.

Flows within the lower end of the range for whitewater boating are within the flow ranges identified for fast flowing tubing conditions (900 cfs to 1,750 cfs). Tubing activities typically occur in the upper reach and the primary draw for whitewater boating is within the lower Section 2 reach. Whitewater boating flow releases would likely need to consider the potential effects of the timing and magnitude of flow releases on other recreation activities within West Canada Creek, including fishing activities in the upper "trophy" section, tubing activities, and camping and scenic viewing activities along portions of the reaches.

In consultation with AW, the whitewater boating controlled flow study was scheduled for multiple dates during 2019, and multiple attempts were made to schedule in 2020, until the study was implemented in November 2020. Erie and AW consulted the week prior to scheduled field study date to review USGS Gage data at Kast Bridge (USGS 01346000) and meteorological data (potential upcoming rain events). Difficulties with scheduling were due to field conditions that were not conducive to the controlled flow study, such as flow conditions, scheduling, and participant availability. Several factors contributed to the complexities of providing controlled flows for the two-day study period, including distance (flow travel time) downstream to the whitewater boating reach from the Project area and Trenton Station releases, precipitation influences (rain events), inflows from Hinckley Reservoir, tributary influences, and snow melt influences.

During 2019, high flow precipitation events and/or high inflow from Hinckley Reservoir outflows, and low flow (drought) conditions and restricted outflows from Hinckley Reservoir during 2020 resulted in conditions that were not conducive to provide controlled flows, until the study was implemented in November 2020. During 2019, on occasions when inflows from Hinckley Reservoir were within levels such that Erie could provide controlled flows within the targeted flow levels (600, 1,000 and 1,400 cfs), the downstream inflows from contributing tributaries were at such high flow levels that the targeted flow levels could not be obtained during the targeted study dates.

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APPENDIX A

PROSPECT BYPASS REACH

WHITEWATER BOATING CONTROLLED FLOW STUDY

ASSESSMENT FORMS

PROSPECT BYPASS REACH WHITEWATER BOATING
FLOW AND ACCESS ASSESSMENT - LOGISTICS

The following summarizes the logistics for the Prospect Bypassed Reach Whitewater Boating Flow and Access Assessment.

Prior to Arrival

- American Whitewater will identify an expert panel of whitewater boaters to participate in a single flow study of the Prospect Bypassed Reach.
- Study participants must use a suitable whitewater boat for the study, wear a PFD and helmet, carry a throw rope, and have sufficient skill to participate in the study.
- Participants will bring their own bike or alternative transportation for shuttling purposes.
- Participants will review drone footage distributed by Erie.
- Erie will provide logistics information (this document), and other forms to be completed and provided prior to travel to event.
- At least one day prior to the study, AW's coordinator will provide Erie with a list of participants, their State of origin and a list of any States they have traveled to in the past 14 days. This will be reviewed against Governor Cuomo's Executive Order 205, issued June 25, 2020 Travel Restrictions (https://coronavirus.health.ny.gov/covid-19-travel-advisory).
- The morning of the study and prior to showing up on site each participant must complete and provide to Erie the COVID-19 health screening via email to steven.murphy@brookfieldrenewable.com
- Prior to participating in the study, participants must complete and provide to Erie the liability waiver form.

Controlled Flow Event - September 23, 2020

10:00 -10:30 am

- Study participants to meet at the Military Road Bridge at 10 a.m.
- Erie to review of COVID and safety protocols and procedures.
- Erie to review schedule, logistics and plan for the study run.
- Participants to complete a pre-run survey provided by Erie.

10:30 -12:00

- Study participants conduct a land-based reconnaissance of the bypassed reach where accessible as guided by Erie, set shuttle, scout the take-out, and have lunch (participants to bring their own lunch).
- Erie will initiate release in sufficient time for flows to stabilize by 12:00 pm.

12:00 - @2:00

- Study participants will put on the water at Military Bridge, below Prospect Falls, and continue down the bypassed reach to the Trenton impoundment, setting safety and taking photos and video at their discretion.
- Study observers will seek visual contact with the participants whenever safe and possible during their descent, and meet the participants at the take-out.
- Following the on-water assessment, study participants will complete a post-run survey and engage in focus group discussion facilitated by Erie.
- Adjourn

Following Departure

- Study participants will share any photos and video taken during the study with American Whitewater and Erie for inclusion in the study report as relevant.
- Participants agree that no photos or video taken during event will be publicly posted or shared.

PRE-RUN PARTICIPANT INFORMATION FORM
PROSPECT BYPASS WHITEWATER BOATING ASSESSMENT

Date:___________ **Participant Initials:**_____________________________

Thank you for participating in the assessment of the Prospect Bypass Reach for whitewater boating opportunities. The following are questions to provide information regarding the background and experience levels of the participants.

THIS SECTION ASKS ABOUT YOU PERSONALLY

1. Participant Name:____
2. Participant Affiliation:____
3. Home Zip Code:___________________
4. Age: ____________ ☐ Prefer not to answer
5. Gender of respondent: ☐ Male ☐ Female ☐ Prefer not to answer

THIS SECTION ASKS ABOUT YOUR BOATING EXPERIENCE

6. What is your primary activity for on-water boating activity? *(Check one box.)*
   - ☐ Whitewater kayaking
   - ☐ Flatwater kayaking
   - ☐ Whitewater canoeing
   - ☐ Flatwater canoeing
   - ☐ Rafting
   - ☐ Stand up paddle board (SUP)
   - ☐ Other, *please specify*____
7. How many total years have you been participating in on-water boating activities? *(Fill in blank.)*

   ___________ years boating
8. How would you rate your skill level with on-water boating activities? (*Check one box.*)
   - ☐ Prefer flatwater float trips
   - ☐ Intermediate (Class III whitewater)
   - ☐ Beginner (Class I whitewater)
   - ☐ Advanced (Class IV whitewater)
   - ☐ Novice (Class II whitewater)
   - ☐ Expert (Class V whitewater)
9. How many days per year do you typically participate in on-water boating activities? *(Fill in blank.)*

   ___________ days whitewater boating
10. What type of watercraft do you primarily use for boating related recreation activities? (*Check one box.*)
    - ☐ 1 Person Open Canoe
    - ☐ Hardshell Kayak
    - ☐ 2 Person Open Canoe
    - ☐ Inflatable Kayak
    - ☐ Closed Canoe
    - ☐ Inflatable Raft
    - ☐ Other, *please specify*:___________________________________
11. Please provide any initial comments you may have regarding the Prospect bypass reach for whitewater boating opportunities.____

    ____

    ____

THANK YOU !

POST-RUN FLOW EVALUATION FORM
PROSPECT BYPASS WHITEWATER BOATING ASSESSMENT

Date:___________ **Participant Initials:______________________________**

Reference Information: Figure 1 provides mesohabitat and substrate data for the Prospect Reach and identifies river mile (RM) locations. Figure 2 provides adjacent parcel and land ownership information. The International Scale Of River Difficulty Whitewater Classifications is also provided. **The study area includes the Prospect bypass reach <u>downstream</u> of Prospect Falls to Trenton Impoundment.**

THIS SECTION ASKS ABOUT YOUR PARTICIPATION IN WHITEWATER BOATING ON THE PROSPECT BYPASS REACH TODAY

1. Please describe the section of the Prospect bypass reach that was run (i.e., length and general characteristics).

   ____

2. What was the approximate target flow (cfs) for this run? _________cfs

3. What type of craft did you use on this run? *(Check one box.)*

   ☐ 1 Person Open Canoe
   ☐ 2 Person Open Canoe
   ☐ Closed Canoe
   ☐ Hardshell Kayak
   ☐ Inflatable Kayak
   ☐ Inflatable Tube
   ☐ Inflatable Raft
   ☐ Other, please specify:________________________

4. What was your put-in and take-out location and times for this run on the Prospect bypass reach today? *(Fill in blank and mark on Figure 1 and Figure 2.)*

   Put-in Location:_____________________ Time:__________ am / pm
   Take-out Location:___________________ Time:__________ am / pm

5. Please describe put-in location and take-out location access locations and observations (*Fill in the blank.*)

   ____

   ____

6. Please evaluate the suitability of this flow on the Prospect bypass reach today for your primary activity for each experience level. *(Circle one rating number for each experience level or check "Don't Know" if you cannot provide a rating. Check one box for flow level rating.)*

Experience Level	**Please Rate the Suitability of this Flow for Each Experience Level (Circle one number)**						**Flow was? (Check one box)**		
	Unacceptable	**Poor**	**Neutral**	**Good**	**Excellent**	**Don't Know**	**Too Low**	**Just Right**	**Too High**
Class I (Riffles)	1	2	3	4	5	☐	☐	☐	☐
Class II (Novice)	1	2	3	4	5	☐	☐	☐	☐
Class III (Intermediate)	1	2	3	4	5	☐	☐	☐	☐
Class IV (Advanced)	1	2	3	4	5	☐	☐	☐	☐
Class V (Expert)	1	2	3	4	5	☐	☐	☐	☐

POST-RUN FLOW EVALUATION FORM
PROSPECT BYPASS WHITEWATER BOATING ASSESSMENT

Date:___________ **Participant Initials:_____________________________**

THIS SECTION ASKS ABOUT YOUR EXPERIENCE ON PROSPECT BYPASS REACH TODAY

7. Please evaluate this flow for your primary activity and experience level for each of the following characteristics on the Prospect bypass reach today. (Check N/A box if characteristic is not applicable to your activity. Circle one rating number for each characteristic. *Check one box for flow level rating.)*

Characteristic	N/A	Please Rate Each Characteristic (Circle one number)					Flow was? (Check one box)		
		Unacceptable	Poor	Neutral	Good	Excellent	Too Low	Just Right	Too High
Navigability	☐	1	2	3	4	5	☐	☐	☐
Wadeability	☐	1	2	3	4	5	☐	☐	☐
Availability of Rapids	☐	1	2	3	4	5	☐	☐	☐
Water Depth	☐	1	2	3	4	5	☐	☐	☐
Availability of Whitewater "Play Areas"	☐	1	2	3	4	5	☐	☐	☐
Water Craft Rate of Travel	☐	1	2	3	4	5	☐	☐	☐
Exposure of Rocks	☐	1	2	3	4	5	☐	☐	☐
Exposure of Sand/Gravel Bars	☐	1	2	3	4	5	☐	☐	☐
Eddies	☐	1	2	3	4	5	☐	☐	☐
Force of Water	☐	1	2	3	4	5	☐	☐	☐
Speed of Water/Current	☐	1	2	3	4	5	☐	☐	☐
Safety (due to flow levels)	☐	1	2	3	4	5	☐	☐	☐
Safety (due to debris, other hazards)	☐	1	2	3	4	5	☐	☐	☐
Aesthetic Quality	☐	1	2	3	4	5	☐	☐	☐
Overall Quality	☐	1	2	3	4	5	☐	☐	☐

8. Please provide a brief explanation of your rating of the overall quality of your experience or observation. (*Fill in the blank*.)

____

____

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POST-RUN FLOW EVALUATION FORM
PROSPECT BYPASS WHITEWATER BOATING ASSESSMENT

Date:___________ **Participant Initials:**______________________________

9. Did you experience, or did you observe any significant problems or specific safety hazards associated with your primary activity during this flow on the Prospect bypass reach? *(Check one box.)*

   ☐ Yes ☐ No (Skip to Question 12) ☐ No Response

10. Please provide the location and a brief description of any experienced or observed hazards during this flow on the Prospect bypass reach today. (*Fill in the blank.*)

    Location: ______________________ Description: ______________________

    ____

    Location: ______________________ Description: ______________________

    ____

11. Did you experience, or did you observe any outstanding features or opportunities associated with your primary activity during this flow on the Prospect bypass reach today? *(Check one box.)*

    ☐ Yes ☐ No (Skip to Question 14) ☐ No Response

12. Please provide a brief description and location of any experienced or observed outstanding features or opportunities during this flow on the Prospect bypass reach. (*Fill in the blank.*)

    Location: ______________________ Description: ______________________

    ____

    Location: ______________________ Description: ______________________

    ____

13. Compared to ***this flow level***, would you prefer a level that was higher, lower, or about the same for the activity you participated in or observed on the Prospect bypass reach? (*Circle one number.)*

1	2	3	4	5
Much Lower	Lower	No Change	Higher	Much Higher

14. Given the opportunity, would you choose to participate in this activity on the Prospect bypass reach at ***this flow level***? *(Check one box.)*

    ☐ Yes ☐ No ☐ No Response

15. Why or why not? (*Fill in the blank.*)____

    ____

16. Do you have any additional comments? (*Fill in the blank.*)______________________________

    ____

    ____

THANK YOU!

POST RUN FOCUS GROUP DISCUSSION TOPICS
PROSPECT BYPASS WHITEWATER BOATING ASSESSMENT

Topics to be discussed with the expert panel group following completion of the post-run individual evaluation forms.

THIS SECTION ASKS ABOUT ACCESS CONSIDERATIONS FOR BOATING THE PROSPECT BYPASS REACH STUDY AREA

1. Discuss the availability and suitability of the conditions of the put-in and take-out access locations.
    a. Proximity to public roadway or (potential) parking area.
    b. Compatibility of access location with adjacent land use/ownership.
    c. Slope/gradient/stability of potential trail location for transporting boat from vehicle to launch location.
    d. Length of the potential access trail.
2. Where would you prefer to both park and put in for future descents?

THIS SECTION ASKS ABOUT FLOW AND FEATURES FOR BOATING THE PROSPECT BYPASS REACH STUDY AREA

3. What flow do you consider are the lowest, highest and optimal flow conditions that provide safe runs?
4. How long in duration do you think a release would need to be for the public to enjoy this reach?
5. Identify challenging features, play areas, rapids or sections and rate their difficulty.
6. Discuss the overall class and difficulty level based on *International Scale of River Difficulty* experience level and associated locations and features.

THIS SECTION ASKS ABOUT SAFETY CONSIDERATIONS FOR BOATING THE PROSPECT BYPASS REACH STUDY AREA

7. Review potential areas where emergency egress would be difficult.
8. Identify public safety responder considerations for providing safety/rescue services to the Prospect bypass reach.
9. Review and identify any observed hazards and public safety considerations for boating in the Prospect bypass reach.
10. Discuss any additional comments associated with safety considerations.

Post Run Focus Group Discussion Topics
Prospect Bypass Whitewater Boating Assessment

THIS SECTION ASKS ABOUT POTENTIAL PUBLIC DEMAND FOR BOATING THE PROSPECT BYPASS REACH STUDY AREA

11. What distance would you travel to boat this reach?
12. How many times per year would boat this reach?
13. Please describe any unique features that would draw boaters to this location.
14. Please identify other whitewater boating locations within one-hour of the Prospect bypass reach that you have previously boated.

Overall General Comments

15. Any additional comments?

POST-RUN FLOW EVALUATION FORM
PROSPECT FALLS WHITEWATER BOATING ASSESSMENT

WHITEWATER CLASSIFICATIONS

INTERNATIONAL SCALE OF RIVER DIFFICULTY

(Source: Safety Code of American Whitewater, 2005)

Class I: Riffles - Fast moving water with riffles and small waves. Few obstructions, all obvious and easily missed with little training. Risk to swimmers is slight; self-rescue is easy.

Class II: Novice- Straightforward rapids with wide, clear channels which are evident without scouting. Occasional maneuvering may be required, but rocks and medium-sized waves are easily missed by trained paddlers. Swimmers are seldom injured and group assistance, while helpful, is seldom needed. Rapids that are at the upper end of this difficulty range are designated “Class II+”

Class III: Intermediate - Rapids with moderate, irregular waves which may be difficult to avoid and which can swamp an open canoe. Complex maneuvers in fast current and good boat control in tight passages or around ledges are often required; large waves or strainers may be present but are easily avoided. Strong eddies and powerful current effects can be found, particularly on large-volume rivers. scouting is advisable for inexperienced parties. Injuries while swimming are rare; self-rescue is usually easy but group assistance may be required to avoid long swims. Rapids that are at the lower or upper end of this difficulty range are designated “Class III-” or “Class III+” respectively.

Class IV: Advanced -Intense, powerful but predictable rapids requiring precise boat handling in turbulent water. Depending on the character of the river, it may feature large, unavoidable waves and holes or constricted passages demanding fast maneuvers under pressure. A fast, reliable eddy turn may be needed to initiate maneuvers, scout rapids, or rest. Rapids may require “must” moves above dangerous hazards. Scouting may be necessary the first time down. Risk of injury to swimmers is moderate to high, and water conditions may make self-rescue difficult. Group assistance for rescue is often essential but requires practiced skills. A strong eskimo roll is highly recommended. Rapids that are at the lower or upper end of this difficulty range are designated “Class IV-” or “Class IV+” respectively.

Class V: Expert - Extremely long, obstructed, or very violent rapids which expose a paddler to added risk. Drops may contain large, unavoidable waves and holes or steep, congested chutes with complex, demanding routes. Rapids may continue for long distances between pools, demanding a high level of fitness. What eddies exist may be small, turbulent, or difficult to reach. At the high end of the scale, several of these factors may be combined. Scouting is recommended but may be difficult. Swims are dangerous, and rescue is often difficult even for experts. A very reliable eskimo roll, proper equipment, extensive experience, and practiced rescue skills are essential. Because of the large range of difficulty that exists beyond Class IV, Class 5 is an open-ended, multiple-level scale designated by class 5.0, 5.1, 5.2, etc. each of these levels is an order of magnitude more difficult than the last. Example: increasing difficulty from Class 5.0 to Class 5.1 is a similar order of magnitude as increasing from Class IV to Class 5.0.

APPENDIX B

PROSPECT FALLS

LAND-BASED ASSESSMENT

LAND-BASED EVALUATION FORM
PROSPECT FALLS WHITEWATER BOATING ASSESSMENT

Date:___________ **Participant Initials:**______________________________

Reference Information: Figure 1 provides mesohabitat and substrate data for the Prospect Reach and identifies river mile (RM) locations. Figure 2 provides adjacent parcel and land ownership information. The International Scale Of River Difficulty Whitewater Classifications is also provided.

The following are additional topics outside of the existing study plan to be discussed with the expert panel group at the Prospect bypass reach whitewater boating opportunities evaluation. **The study area for this additional land-based assessment includes *Prospect Falls* within the Prospect bypass reach.**

THIS SECTION ASKS ABOUT POTENTIAL ACCESS TO AND FEATURES AT PROSPECT FALLS FOR WHITEWATER BOATING ACTIVITIES

1. What was the approximate target flow (cfs) for this assessment? _________cfs

2. Discuss and identify on *Figure 1* potential **put-in** or **take-out** access locations for whitewater boating activities above and below ***Prospect Falls***. Discuss the following characteristics:

   <u>Access Trail</u>

   (a) Proximity to public roadway or (potential) parking area.

   (b) Compatibility of access location with adjacent land use/ownership.

   (c) Slope/gradient/stability of potential trail location for transporting boat from vehicle to launch location.

   (d) Length of the potential access trail.

   <u>Potential Put-in Location</u>

   (e) Potential for boating staging area.

   (f) Height above water for launch location.

   (g) Slope/gradient/stability of streambank at potential put-in location.

3. Please evaluate the suitability of this flow for ***Prospect Falls*** for each experience level. *(Circle one rating number for each experience level or check "Don't Know" if you cannot provide a rating. Check one box for flow level rating.)*

Experience Level	**Please Rate the Suitability of this Flow for Each Experience Level (Circle one number)**						**Flow was? (Check one box)**		
	Unacceptable	**Poor**	**Neutral**	**Good**	**Excellent**	**Don't Know**	**Too Low**	**Just Right**	**Too High**
Class I (Riffles)	1	2	3	4	5	☐	☐	☐	☐
Class II (Novice)	1	2	3	4	5	☐	☐	☐	☐
Class III (Intermediate)	1	2	3	4	5	☐	☐	☐	☐
Class IV (Advanced)	1	2	3	4	5	☐	☐	☐	☐
Class V (Expert)	1	2	3	4	5	☐	☐	☐	☐

LAND-BASED EVALUATION FORM
PROSPECT FALLS WHITEWATER BOATING ASSESSMENT

Date:___________ **Participant Initials:**_____________________________

4. Please evaluate this flow for your primary activity and experience level for each of the following characteristics at ***Prospect Falls today***. *(Circle one rating number for each characteristic. Check one box for flow level rating.)*

Characteristic	N/A	Please Rate Each Characteristic (Circle one number)					Flow was? (Check one box)		
		Unacceptable	Poor	Neutral	Good	Excellent	Too Low	Just Right	Too High
Navigability	☐	1	2	3	4	5	☐	☐	☐
Sufficient Plunge Pool Depth	☐	1	2	3	4	5	☐	☐	☐
Sufficient Water for Boating Clearance of Falls/Rock Ledge	☐	1	2	3	4	5	☐	☐	☐
Water Depth Upstream of Falls	☐	1	2	3	4	5	☐	☐	☐
Water Depth Downstream of Falls	☐	1	2	3	4	5	☐	☐	☐
Water Craft Rate of Travel	☐	1	2	3	4	5	☐	☐	☐
Exposure of Rocks	☐	1	2	3	4	5	☐	☐	☐
Exposure of Sand/Gravel Bars	☐	1	2	3	4	5	☐	☐	☐
Eddies	☐	1	2	3	4	5	☐	☐	☐
Force of Water	☐	1	2	3	4	5	☐	☐	☐
Speed of Water/Current	☐	1	2	3	4	5	☐	☐	☐
Safety (due to flow levels)	☐	1	2	3	4	5	☐	☐	☐
Safety (due to debris, other hazards)	☐	1	2	3	4	5	☐	☐	☐
Aesthetic Quality	☐	1	2	3	4	5	☐	☐	☐
Overall Quality	☐	1	2	3	4	5	☐	☐	☐

5. Please provide a brief explanation of your rating of the overall quality of the potential whitewater boating observation. (*Fill in the blank.*)

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LAND-BASED EVALUATION FORM
PROSPECT FALLS WHITEWATER BOATING ASSESSMENT

Date:___________ **Participant Initials:**_____________________________

THIS SECTION ASKS ABOUT SAFETY CONSIDERATIONS FOR BOATING PROSPECT FALLS

6. Review potential areas where emergency egress would be difficult (refer to *Figure 1*).

7. Identify public safety responder considerations for providing safety/rescue services to ***Prospect Falls*** section of the bypass reach.

8. Review and identify any observed hazards and public safety considerations for boating associated with ***Prospect Falls*** section of the bypass reach.

9. Discuss any additional comments associated with safety considerations.

10. Did you observe any significant problems or specific safety hazards during this flow at ***Prospect Falls***? *(Check one box.)*

    ☐ Yes ☐ No (Skip to Question 12) ☐ No Response

11. Please provide the location and a brief description of any observed hazards during this flow. (*Fill in the blank.*)

    Location: ______________________ Description: ______________________

    ____

    Location: ______________________ Description: ______________________

    ____

THIS SECTION ASKS ABOUT YOUR OBSERVATIONS OF PROSPECT FALLS TODAY

12. Did you observe any outstanding features or opportunities at ***Prospect Falls*** ? *(Check one box.)*

    ☐ Yes ☐ No (Skip to Question 14) ☐ No Response

13. Please provide a brief description and location of any observed outstanding features or opportunities during this flow at ***Prospect Falls***. (*Fill in the blank.*)

    Location: ______________________ Description: ______________________

    ____

    Location: ______________________ Description: ______________________

    ____

14. Compared to ***this flow level***, would you prefer a level that was higher, lower, or about the same for the activity you participated in or observed ***at Prospect Falls***? (*Circle one number.)*

1	2	3	4	5
Much Lower	Lower	No Change	Higher	Much Higher

LAND-BASED EVALUATION FORM
PROSPECT FALLS WHITEWATER BOATING ASSESSMENT

Date:___________ **Participant Initials:_____________________________**

15. Given the opportunity, would you choose to participate in this activity at ***Prospect Falls*** at ***this flow level***? *(Check one box.)*

    ☐ Yes ☐ No ☐ No Response

16. Why or why not? (*Fill in the blank.*)

    ____

    ____

17. Do you have any additional comments? (*Fill in the blank.*)____

    ____

    ____

    ____

    ____

    ____

THANK YOU FOR YOUR HELP! WE APPRECIATE YOUR TIME TODAY!

FOCUS GROUP DISCUSSION TOPICS
PROSPECT FALLS WHITEWATER BOATING ASSESSMENT

Topics to be discussed with the expert panel group following land based evaluation of Prospect Falls.

THIS SECTION ASKS ABOUT ACCESS CONSIDERATIONS FOR BOATING PROSPECT FALLS

1. Discuss the availability and suitability of the conditions of the put-in and take-out access locations.

   a. Proximity to public roadway or (potential) parking area.

   b. Compatibility of access location with adjacent land use/ownership.

   c. Slope/gradient/stability of potential trail location for transporting boat from vehicle to launch location.

   d. Length of the potential access trail.

2. Where would you prefer to both park and put in if future descents were available?

THIS SECTION ASKS ABOUT FLOW AND FEATURES FOR BOATING PROSPECT FALLS

3. What flow do you consider are the lowest, highest and optimal flow conditions that provide safe runs?

4. How long in duration do you think a release would need to be for the public to enjoy this reach?

5. Identify challenging features, play areas, rapids or sections and rate their difficulty.

6. Discuss the overall class and difficulty level based on *International Scale of River Difficulty* experience level and associated locations and features.

7. Would you have run the falls today if that was part of the study? Why or why not, and if so, what line would you have selected and how would you have set safety?

8. How would including or excluding falls access change the desirability of paddling the bypassed reach?

THIS SECTION ASKS ABOUT SAFETY CONSIDERATIONS FOR BOATING PROSPECT FALLS

9. Review potential areas where emergency egress would be difficult.

10. Identify public safety responder considerations for providing safety/rescue services to the Prospect bypass reach.

11. Review and identify any observed hazards and public safety considerations for boating in the Prospect bypass reach.

12. Discuss any additional comments associated with safety considerations.

Focus Group Discussion Topics
Prospect Falls Whitewater Boating Assessment

THIS SECTION ASKS ABOUT POTENTIAL PUBLIC DEMAND FOR BOATING PROSPECT FALLS

13. What distance would you travel to boat this reach?

14. How many times per year would boat this reach?

15. Please describe any unique features that would draw boaters to this location.

16. Please identify other whitewater boating locations within one-hour of the Prospect bypass reach that you have previously boated.

17. Do you think there would be public interest / demand for running the falls if releases and access were provided?

Overall General Comments

18. Any additional comments?

POST-RUN FLOW EVALUATION FORM
PROSPECT FALLS WHITEWATER BOATING ASSESSMENT

WHITEWATER CLASSIFICATIONS

INTERNATIONAL SCALE OF RIVER DIFFICULTY

(Source: Safety Code of American Whitewater, 2005)

Class I: Riffles - Fast moving water with riffles and small waves. Few obstructions, all obvious and easily missed with little training. Risk to swimmers is slight; self-rescue is easy.

Class II: Novice- Straightforward rapids with wide, clear channels which are evident without scouting. Occasional maneuvering may be required, but rocks and medium-sized waves are easily missed by trained paddlers. Swimmers are seldom injured and group assistance, while helpful, is seldom needed. Rapids that are at the upper end of this difficulty range are designated "Class II+"

Class III: Intermediate - Rapids with moderate, irregular waves which may be difficult to avoid and which can swamp an open canoe. Complex maneuvers in fast current and good boat control in tight passages or around ledges are often required; large waves or strainers may be present but are easily avoided. Strong eddies and powerful current effects can be found, particularly on large-volume rivers. scouting is advisable for inexperienced parties. Injuries while swimming are rare; self-rescue is usually easy but group assistance may be required to avoid long swims. Rapids that are at the lower or upper end of this difficulty range are designated "Class III-" or "Class III+" respectively.

Class IV: Advanced -Intense, powerful but predictable rapids requiring precise boat handling in turbulent water. Depending on the character of the river, it may feature large, unavoidable waves and holes or constricted passages demanding fast maneuvers under pressure. A fast, reliable eddy turn may be needed to initiate maneuvers, scout rapids, or rest. Rapids may require "must" moves above dangerous hazards. Scouting may be necessary the first time down. Risk of injury to swimmers is moderate to high, and water conditions may make self-rescue difficult. Group assistance for rescue is often essential but requires practiced skills. A strong eskimo roll is highly recommended. Rapids that are at the lower or upper end of this difficulty range are designated "Class IV-" or "Class IV+" respectively.

Class V: Expert - Extremely long, obstructed, or very violent rapids which expose a paddler to added risk. Drops may contain large, unavoidable waves and holes or steep, congested chutes with complex, demanding routes. Rapids may continue for long distances between pools, demanding a high level of fitness. What eddies exist may be small, turbulent, or difficult to reach. At the high end of the scale, several of these factors may be combined. Scouting is recommended but may be difficult. Swims are dangerous, and rescue is often difficult even for experts. A very reliable eskimo roll, proper equipment, extensive experience, and practiced rescue skills are essential. Because of the large range of difficulty that exists beyond Class IV, Class 5 is an open-ended, multiple-level scale designated by class 5.0, 5.1, 5.2, etc. each of these levels is an order of magnitude more difficult than the last. Example: increasing difficulty from Class 5.0 to Class 5.1 is a similar order of magnitude as increasing from Class IV to Class 5.0.

PROSPECT FALLS LAND-BASED EVALUATION

Six participants completed a land-based evaluation of Prospect Falls on September 23, 2020. The target flow for the assessment was 600 cfs. The participants evaluated the suitability of the flow for Prospect Falls for each whitewater experience level. All participants rated the suitability as unacceptable for Class I boaters and most rated it as unacceptable (n=5) or poor (n=1) for the Class II experience level (Table B-1). All participants rated the suitability of the flow as good or excellent for the Class IV and Class V experience levels. Overall, participants thought that the flow was too low or just right for Class IV or Class V boaters (Table B-1).

The participants evaluated the flow based on their primary activity and experience level for several whitewater boating characteristics. None of the participants rated any of the characteristics as unacceptable (Table B-1). Navigability, watercraft rate of travel, eddies, aesthetic quality, and overall quality were rated as good or excellent by all participants. Sufficient water for boating clearance, water depth upstream of the falls, force of water, speed of water, and safety due to flow levels were rated as neutral, good, or excellent (Table B-1). Sufficient plunge pool depth, water depth downstream of the falls, exposure or rocks and sand/gravel bars, and safety due to other hazards (e.g., debris) were rated as poor, neutral, good, or excellent. All participants thought that the flow was too low or just right for all characteristics considered (Table B-2).

TABLE B-1 SUITABILITY OF CONTROLLED FLOW FOR EXPERIENCE LEVEL (Q3)

EXPERIENCE LEVEL	UNACCEPTABLE	POOR	NEUTRAL	GOOD	EXCELLENT	FLOW WAS TOO LOW	FLOW WAS JUST RIGHT	FLOW WAS TOO HIGH
Class I	6	0	0	0	0	1	0	1
Class II	5	1	0	0	0	1	0	1
Class III	2	1	1	1	1	2	2	1
Class IV	0	0	0	3	3	2	3	0
Class V	0	0	0	2	4	2	3	0

TABLE B-2 EVALUATION OF CONTROLLED FLOW FOR ACTIVITY AND EXPERIENCE LEVEL (Q4)

CHARACTERISTIC	UNACCEPTABLE	POOR	NEUTRAL	GOOD	EXCELLENT	N/A	FLOW WAS TOO LOW	FLOW WAS JUST RIGHT	FLOW WAS TOO HIGH
Navigability	0	0	0	4	2	0	3	3	0
Sufficient Plunge Pool Depth	0	1	0	4	1	0	5	1	0
Sufficient Water for Boating Clearance of Falls/Rock Ledge	0	0	2	2	2	0	4	2	0
Water Depth Upstream of Falls	0	0	3	1	1	1	4	2	0
Water Depth Downstream of Falls	0	1	1	3	1	0	4	2	0
Watercraft Rate of Travel	0	0	0	4	2	0	3	3	0
Exposure of Rocks	0	1	1	3	1	0	5	1	0
Exposure of Sand/Gravel Bars	0	1	1	2	2	0	3	2	0
Eddies	0	0	0	3	3	0	3	3	0
Force of Water	0	0	1	1	4	0	3	3	0
Speed of Water/Current	0	0	1	1	4	0	3	3	0
Safety (due to flow levels)	0	0	1	3	2	0	4	2	0
Safety (due to debris, other hazards)	0	1	0	4	1	0	4	2	0
Aesthetic Quality	0	0	0	1	5	0	4	2	0
Overall Quality	0	0	0	3	3	0	4	2	0

The participants were asked if they observed any problems or safety hazards or any outstanding features or opportunities. Two participants responded that the falls was a hazard because it is a waterfall and needs to be scouted properly. Five participants stated that the Prospect Falls is an outstanding feature because of the scenic quality and because it is runnable by experienced boaters. All participants responded that they would prefer a flow level that was higher for the activity they participated in or observed. All participants stated that they would choose to participate in the same activity at Prospect Falls at the same flow level if given the opportunity.

FOCUS GROUP DISCUSSION

Participants indicated potential put in locations for the reach upstream of Prospect Falls would include at base of dam on river right and on river left with a trail through the wooded area. Participants indicated that Prospect Falls has a deep pool below the falls and good access, is likely Class IV-IV+ difficulty, and based on the review at 600 cfs low, likely would need a minimum a flow of 700-800 cfs for boatability. Participants felt that the run would potentially be a regional draw, particularly if combined with lower Prospect bypass reach, and that the falls could be a good “learning falls” for higher skill levels.

APPENDIX C

DOWNSTREAM WEST CANADA CREEK

WHITEWATER BOATING CONTROLLED FLOW STUDY

ASSESSMENT FORMS

WEST CANADA CREEK REACH WHITEWATER BOATING CONTROLLED FLOW ASSESSMENT - LOGISTICS

The following summarizes the logistics for the downstream West Canada Creek Whitewater Boating Controlled Flow Assessment. The study reach will include West Canada Creek from NYSDEC Access Off Route 28 north of Middleville downstream to area above Kast Bridge. The target flow for the study will be 1,000 cfs on Friday 11/6/2020, and 1400 cfs on Saturday 11/7/2020. The reach is classified by American Whitewater as Class II-II+ (Section 2 - Route 29 in Middleville to Route 7/Kast bridge above Herkimer see https://www.americanwhitewater.org/content/River/view?#/river-detail/1453/main)

Prior to Arrival

- **Study participants must use a suitable whitewater boat for the study, wear a PFD and helmet, carry a throw rope, and have sufficient skill to participate in the study.**
- **Participants need to bring/coordinate their own transportation for shuttling purposes.**
- COVID Related Requirements
  - All participants must wear masks when within 6 feet of other participants and at all times when conducting surveys and discussion group.
  - All participants must follow and comply with COVID procedures and requirements and comply with Governor Cuomo's Executive Order 205, issued June 25, 2020 Travel Restrictions as updated at (https://coronavirus.health.ny.gov/covid-19-travel-advisory).
  - The morning of the study and prior to showing up on site each participant must complete and provide to Erie the COVID-19 health screening via email to steven.murphy@brookfieldrenewable.com
- Prior to participating in the study, participants must complete and provide to Erie the liability waiver form.

During Field Study

- Participants will be required to wear face coverings (masks) during all group settings.
- Boaters can wear face coverings (masks) on the river if they feel comfortable doing so.
- All boats and boaters will be encouraged to distance while boating and during field efforts.
- Avoid sharing eddies with other boats if possible. No hand shaking, high fives, or elbow bumps.
- Participants will place completed survey forms in boxes provided; no person-to-person handling of forms.

Controlled Flow Event Schedule- Friday, 11/6 /2020 and Saturday, 11/7/2020

8:00 -9:00 am

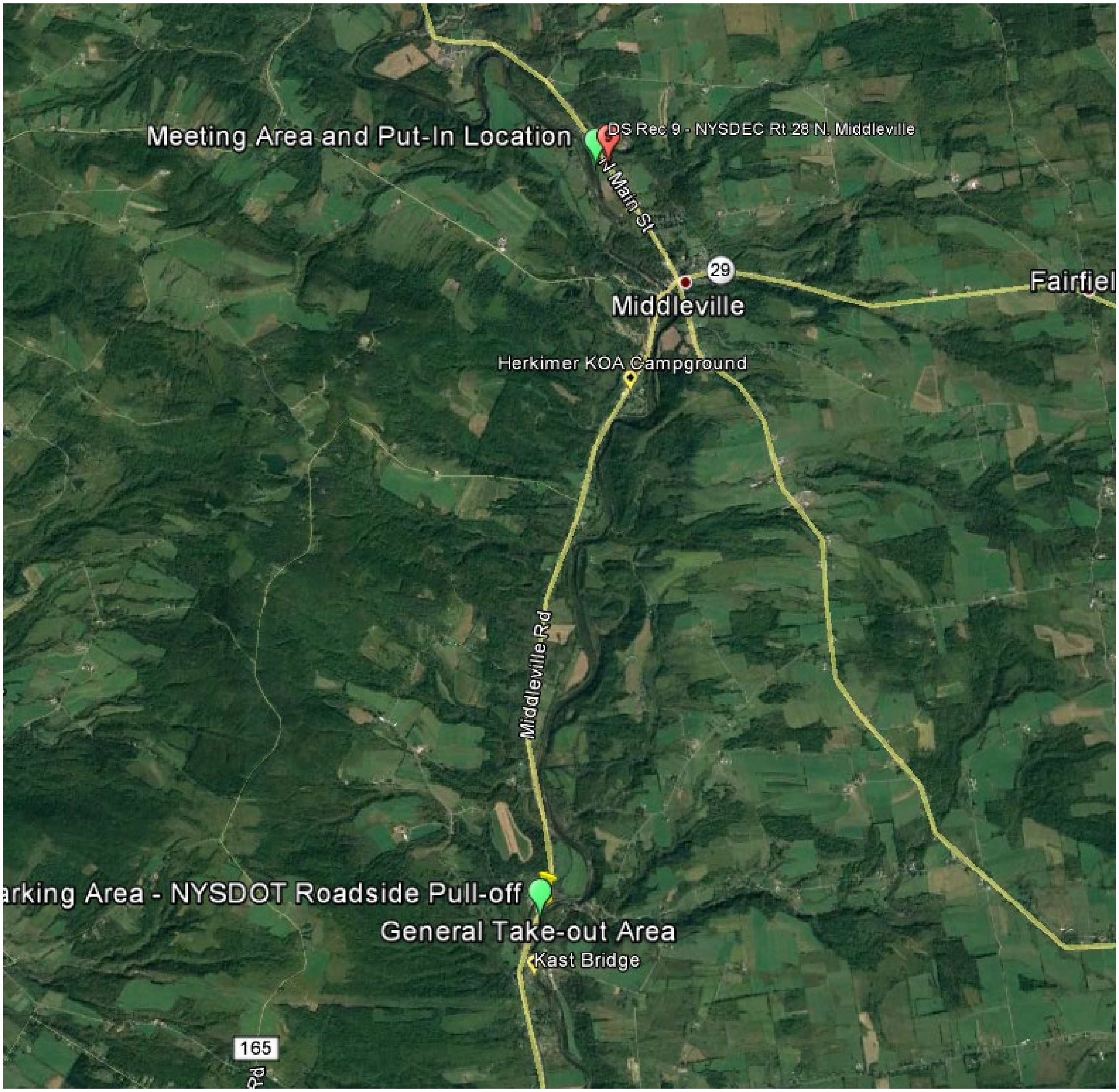
- Study participants to meet at the NYSDEC Fishing Rock Access Site at 8:00 a.m.
- Erie to review of COVID and safety protocols and procedures.
- Erie to review schedule, logistics and plan for the study run.
- Participants to complete a pre-run survey provided by Erie.

9:00 am -12:00 pm- Target Flow of 1000 CFS on 11/6, and 1400 cfs on 11/7

- Study participants will put on the water at roadside pull-off location, and continue down West Canada Creek to Kast Bridge take-out location, setting safety and taking photos and video at their discretion.
- Study observers will seek visual contact with the participants whenever safe and possible during their descent, and meet the participants at the take-out.
- Following the on-water assessment, study participants will complete a post-run survey and engage in focus group discussion facilitated by Erie.

Meeting Location - 8:00 am both days
NYSDEC Access Site - NYSDEC Access Site off Route 28 North of Middleville – located on river left
Access is located approximately 0.10 miles north of Hoof N Paws Farm, 5046 NY-28, Newport, NY 13416

Take-out Location
NYSDOT Roadside pull-off (per Google maps - Herkimer County Parking Lot)- near Kast Bridge.
Approximately 3619 Middleville Road (Route 28) Herkimer, NY 13350



PRE-RUN FLOW BOATER INFORMATION FORM
WEST CANADA CREEK WHITEWATER BOATING FLOW AND ACCESS STUDY

Date:___________________________

THIS SECTION ASKS ABOUT YOU PERSONALLY

1. Participant Name:____
2. Participant Affiliation:____
3. Home Zip Code:___________________
4. Age: ____________ ☐ Prefer not to answer
5. Gender of respondent: ☐ Male ☐ Female ☐ Prefer not to answer

THIS SECTION ASKS ABOUT YOUR BOATING OR TUBING EXPERIENCE

6. What is your primary activity for on-water boating or tubing activity? *(Check one box.)*
   - ☐ Whitewater kayaking
   - ☐ Flatwater kayaking
   - ☐ Whitewater canoeing
   - ☐ Flatwater canoeing
   - ☐ Tubing/rafting
   - ☐ Stand up paddle board (SUP)
   - ☐ Other, *please specify*____

7. How many total years have you been participating in whitewater boating or tubing activities? *(Fill in blank.)*

   ___________ years whitewater boating ___________ years tubing

8. How would you rate your skill level with whitewater boating? (*Check one box.*)
   - ☐ Prefer flatwater float trips
   - ☐ Intermediate (Class III whitewater)
   - ☐ Beginner (Class I whitewater)
   - ☐ Advanced (Class IV whitewater)
   - ☐ Novice (Class II whitewater)
   - ☐ Expert (Class V whitewater)

9. How many days per year do you typically spend whitewater boating or tubing? *(Fill in blank.)*

   ___________ days whitewater boating ___________ days tubing

THIS SECTION (Q 5-18) ASKS ABOUT YOUR EXPERIENCES IN THE REACHES OF WEST CANADA CREEK FROM BELOW MORGAN DAM DOWNSTREAM TO HERKIMER

10. How often do you typically participate in boating or tubing recreation activities on West Canada Creek? (*Check one box.*)
    - ☐ Weekly / At least once per week
    - ☐ At least once per year
    - ☐ Monthly / At least once per month
    - ☐ Less than one time per year
    - ☐ Several times per year
    - ☐ Never

11. During what month(s) do you typically participate in boating or tubing recreation activities on West Canada Creek? *(Check all that apply.)*
    - ☐ January
    - ☐ April
    - ☐ July
    - ☐ October
    - ☐ February
    - ☐ May
    - ☐ August
    - ☐ November
    - ☐ March
    - ☐ June
    - ☐ September
    - ☐ December

12. In the past year, how many days have you participated in boating or tubing related recreation activities on West Canada Creek? *(Fill in blank.)*

    ___________ days whitewater boating ___________ days tubing

13. On a scale from 1 to 5, with 1 being not at all familiar, 3 being moderately familiar, and 5 being very familiar, how would you rate your familiarity with West Canada Creek? *(Circle one number.)*

1	2	3	4	5
Not at all Familiar	Somewhat Familiar	Moderately Familiar	Familiar	Very Familiar

14. How many years of experience do you have participating in boating or tubing related recreation activities on West Canada Creek? *(Fill in blank.)*

    ___________ years whitewater boating

    ___________ years tubing

15. What type of watercraft do you primarily use for boating or tubing related recreation activities on West Canada Creek? (*Check one box.*)

    ☐ 1 Person Open Canoe
    ☐ 2 Person Open Canoe
    ☐ Closed Canoe
    ☐ Hardshell Kayak
    ☐ Inflatable Kayak
    ☐ Inflatable Tube
    ☐ Inflatable Raft
    ☐ Other, *please specify*:______________________

16. What section(s) of West Canada Creek downstream of the Morgan Dam do you typically use when participating in recreation activities? *(Check **all** that apply – please indicate specific location as appropriate.)*

    ☐ West Canada Creek - Below Morgan Dam to Newport Impoundment
    ☐ West Canada Creek - Below Newport Dam to Herkimer
    ☐ Other, *please specify*:____
    ☐ I have not paddled the West Canada Creek downstream of the Trenton Development

17. What **put-in** access do you typically use when participating in boating or tubing on West Canada Creek downstream of the Trenton Development? *(Check one box.)*

    ☐ NYSDEC site, *please specify*____
    ☐ Other, *please specify*____
    ☐ None - I have not paddled the West Canada Creek downstream of the Trenton Development

18. What **take-out** access site do you typically use when participating in boating or tubing on West Canada Creek downstream of the Trenton Development? *(Check one box.)*

    ☐ NYSDEC site, *please specify*____
    ☐ Other, *please specify*____
    ☐ None - I have not paddled the West Canada Creek downstream of the Trenton Development

PRE-RUN FLOW EVALUATION FORM
WEST CANADA CREEK WHITEWATER BOATING FLOW AND ACCESS STUDY

19. What sources do you use to obtain information about flow levels prior to your trips? *(Check all that apply.)*

- ☐ USGS Kast Bridge Gage
- ☐ American Whitewater Website
- ☐ Safewaters Website
- ☐ Other, please specify____________________

20. What flow ranges do you consider **acceptable** (boatable conditions) for your **whitewater boating** recreation activities on West Canada Creek? *(Check all that apply.)*

- ☐ less than 300 cfs
- ☐ >800 cfs to 1,000 cfs
- ☐ >300 cfs to 500 cfs
- ☐ >1,000 cfs to 1,200 cfs
- ☐ >500 cfs to 600 cfs
- ☐ 1,200 cfs to 1,400 cfs
- ☐ >600 cfs to 800 cfs
- ☐ >1,400 cfs
- ☐ Other, *please specify*________________
- ☐ No Response

What flow ranges do you consider **optimal** (best conditions) for your **whitewater boating** recreation activities on West Canada Creek? *(Please circle one flow range above).*

21. What flow ranges do you consider **acceptable** (floating conditions) for your **tubing/rafting** recreation activities on West Canada Creek? *(Check all that apply.)*

- ☐ less than 300 cfs
- ☐ >800 cfs to 1,000 cfs
- ☐ >300 cfs to 500 cfs
- ☐ >1,000 cfs to 1,200 cfs
- ☐ >500 cfs to 600 cfs
- ☐ 1,200 cfs to 1,400 cfs
- ☐ >600 cfs to 800 cfs
- ☐ >1,400 cfs
- ☐ Other, *please specify*________________
- ☐ No Response

What flow ranges do you consider **optimal** (best conditions) for your **tubing/rafting** recreation activities on West Canada Creek? *(Please circle one flow range above).*

22. Have fluctuations in water levels ever affected your ability to participate in boating or tubing recreation activities on West Canada Creek? *(Check one box.)*

- ☐ Yes
- ☐ No (Skip to Question 19)
- ☐ No Response

23. If you answered Yes to Question 17, please select how the fluctuations in water level affected your activity. (*Select all that apply*)

- ☐ Decided not to participate in activity
- ☐ Adjusted timing of visit to participate when flows were suitable for recreation activity
- ☐ Participated in a different activity on West Canada Creek
- ☐ Moved to a different location on West Canada Creek
- ☐ Avoided a specific area on West Canada Creek, *please specify*_______________________________
- ☐ Other, *please specify*____

THANK YOU!

POST-RUN FLOW EVALUATION FORM
WEST CANADA CREEK WHITEWATER BOATING FLOW AND ACCESS STUDY

Date:___________________________ **Participant Name:**_________________

THIS SECTION ASKS ABOUT YOUR PARTICIPATION IN WHITEWATER BOATING OR TUBING ON THE WEST CANADA CREEK TODAY

1. Please describe the section of the West Canada Creek reach that was run (i.e., location, length and general characteristics).

____

____

2. What was the target flow (cfs) for this run? _________cfs

3. What type of craft did you use on this run? *(Check one box.)*

☐ 1 Person Open Canoe ☐ Inflatable Kayak
☐ 2 Person Open Canoe ☐ Inflatable Tube
☐ Closed Canoe ☐ Inflatable Raft
☐ Hardshell Kayak ☐ Other, please specify:_______________________

4. What was your put-in and take-out location and times for this run on the West Canada Creek today? *(Fill in blank.)*

Put-in Location:____________________ Time:__________ am / pm
Take-out Location:___________________ Time:__________ am / pm

5. Was this your first time boating this reach?

☐ Yes ☐ No (Skip to Question 7) ☐ No Response

6. If you answered *No* to Question 5, approximately how many times have you previously run this reach? ________

7. Please evaluate the suitability of this flow on West Canada Creek today for your primary activity for each experience level. *(Circle one rating number for each experience level or check "Don't Know" if you cannot provide a rating. Check one box for flow level rating.)*

Experience Level	Please Rate the Suitability of this Flow for Each Experience Level (Circle one number)						Flow was? (Check one box)		
	Unacceptable	Poor	Acceptable	Good	Excellent	Don't Know	Too Low	Just Right	Too High
Class I (Riffles)	1	2	3	4	5	☐	☐	☐	☐
Class II (Novice)	1	2	3	4	5	☐	☐	☐	☐
Class III (Intermediate)	1	2	3	4	5	☐	☐	☐	☐
Class IV (Advanced)	1	2	3	4	5	☐	☐	☐	☐
Class V (Expert)	1	2	3	4	5	☐	☐	☐	☐

POST-RUN FLOW EVALUATION FORM
WEST CANADA CREEK WHITEWATER BOATING FLOW AND ACCESS STUDY

THIS SECTION ASKS ABOUT YOUR EXPERIENCE ON WEST CANADA CREEK TODAY

8. Please evaluate this flow for your primary activity and experience level for each of the following characteristics on ***West Canada Creek today***. *(Check N/A box if characteristic is not applicable to your activity. Circle one rating number for each characteristic. Check one box for flow level rating.)*

Characteristic	**N/A**	**Please Rate Each Characteristic (Circle one number)**					**Flow was? (Check one box)**		
		Unacceptable	**Poor**	**Acceptable**	**Good**	**Excellent**	**Too Low**	**Just Right**	**Too High**
Navigability	☐	1	2	3	4	5	☐	☐	☐
Wadeability	☐	1	2	3	4	5	☐	☐	☐
Availability of Rapids	☐	1	2	3	4	5	☐	☐	☐
Water Depth	☐	1	2	3	4	5	☐	☐	☐
Availability of Whitewater “Play Areas”	☐	1	2	3	4	5	☐	☐	☐
Water Craft Rate of Travel	☐	1	2	3	4	5	☐	☐	☐
Exposure of Rocks	☐	1	2	3	4	5	☐	☐	☐
Exposure of Sand/Gravel Bars	☐	1	2	3	4	5	☐	☐	☐
Eddies	☐	1	2	3	4	5	☐	☐	☐
Force of Water	☐	1	2	3	4	5	☐	☐	☐
Speed of Water/Current	☐	1	2	3	4	5	☐	☐	☐
Safety (due to flow levels)	☐	1	2	3	4	5	☐	☐	☐
Safety (due to debris, other hazards)	☐	1	2	3	4	5	☐	☐	☐
Aesthetic Quality	☐	1	2	3	4	5	☐	☐	☐
Overall Quality	☐	1	2	3	4	5	☐	☐	☐

9. Please provide a brief explanation of your rating of the overall quality of your experience or observation. (*Fill in the blank*.)

____

____

____

____

____

POST-RUN FLOW EVALUATION FORM
WEST CANADA CREEK WHITEWATER BOATING FLOW AND ACCESS STUDY

10. Did you experience, or did you observe any significant problems or specific safety hazards associated with your primary activity during this flow ***on West Canada Creek today***? *(Check one box.)*

☐ Yes ☐ No (Skip to Question 12) ☐ No Response

11. Please provide the location and a brief description of any experienced or observed hazards during this flow on West Canada Creek today. (*Fill in the blank.*)

Location: ______________________ Description: ______________________

____

Location: ______________________ Description: ______________________

____

12. Did you experience, or did you observe any outstanding features or opportunities associated with your primary activity during this flow on West Canada Creek today? *(Check one box.)*

☐ Yes ☐ No (Skip to Question 14) ☐ No Response

13. Please provide a brief description and location of any experienced or observed outstanding features or opportunities during this flow ***on West Canada Creek today***. (*Fill in the blank.*)

Location: ______________________ Description: ______________________

____

Location: ______________________ Description: ______________________

____

14. Compared to ***this flow level***, would you prefer a level that was higher, lower, or about the same for the activity you participated in or observed on West Canda Creek reach? (*Circle one number.)*

1	2	3	4	5
Much Lower	Lower	No Change	Higher	Much Higher

15. Given the opportunity, would you choose to participate in this activity on West Canada Creek at ***this flow level***? *(Check one box.)*

☐ Yes ☐ No ☐ No Response

16. Why or why not? (*Fill in the blank.*)____

____

____

17. Do you have any additional comments? (*Fill in the blank.*)____

____

____

____

THANK YOU FOR YOUR HELP! WE APPRECIATE YOUR TIME TODAY!

Flow Comparison Evaluation Form
West Canada Creek Whitewater Boating Flow and Access Study

Date:____________________________ **Participant ID#:**__________________

1. What section(s) of West Canada Creek downstream of the Morgan Dam was this run?

   Describe____

2. Which target flows did you participate in? *(Check all that apply.)*

   ☐ _______ cfs ☐ _______ cfs

3. What type of craft did you use for your runs? *(Check one box.)*

   ☐ 1 Person Open Canoe
   ☐ 2 Person Open Canoe
   ☐ Closed Canoe
   ☐ Hardshell Kayak
   ☐ Inflatable Kayak
   ☐ Inflatable Tube
   ☐ Inflatable Raft
   ☐ Other, *please specify:*________________________

4. How would you rate your skill level with whitewater boating? (*Check one box.*)

   ☐ Novice (Class II whitewater)
   ☐ Intermediate (Class III whitewater)
   ☐ Advanced (Class IV whitewater)
   ☐ Expert (Class V whitewater)

5. Which of the following best describes your desired experience for this reach? (*Check one*)

   ☐ I am interested in whitewater boating trips that include technical elements (e.g., powerful hydraulics, whitewater "play areas," challenging rapids)

   ☐ I am interested in family-friendly, non-technical float trips that do not require previous technical boating experience, specialized equipment, or include challenging rapids.

   ☐ I am interested in floating/tubing activities

   ☐ I am interested in other activities, *please specify*________________________

6. Please provide overall evaluations for the following flows based on your craft, skill level, and desired experience. Please consider all of the flow-dependent characteristics that contribute to high quality trips (e.g., boatability, challenge, safety, aesthetics, etc.).

Target Flow	**Unacceptable**	**Poor**	**Neutral**	**Good**	**Excellent**
______ cfs	1	2	3	4	5
______ cfs	1	2	3	4	5

Flow Comparison Evaluation Form
West Canada Creek Whitewater Boating Flow and Access Study

7. Based on your desired experience selected in Question 6, your skill level, and craft, please specify the flows that you think would provide the following types of experiences on West Canda Creek. (*You may specify flows which you have not observed, but which you think would provide the type of experience specified.*)

Experience	**Flow in cfs**
What is the lowest flow that you consider acceptable for a minimum quality experience?	
What flow provides the highest quality (i.e., optimal flow) experience?	
What is the lowest flow that provides a safe experience?	
What is the highest flow that provides a safe experience?	
What is the highest flow you would consider boating?	

8. Compared to other river reaches of similar difficulty, how would you rate the boating opportunity on West Canada Creek (assume optimal flows). (Circle one number for each.

Compared to river reaches of similar difficulty	**Far Below Average**	**Below Average**	**Average**	**Above Average**	**Much Better than Average**	**No Response**
Other rivers within a one-hour drive	1	2	3	4	5	NA
Other rivers in New York State	1	2	3	4	5	NA
Other rivers in the Northeast	1	2	3	4	5	NA

9. Please provide any additional comments or relevant information regarding the flows that you participated in today.

____

____

____

____

____

____

____

THANK YOU FOR YOUR PARTICIPATION!

POST RUN STUDY FOCUS GROUP DISCUSSION TOPICS

WEST CANADA CREEK WHITEWATER BOATING FLOW AND ACCESS STUDY

Topics to be discussed with the expert panel group following completion of the post-run individual evaluation forms:

1. Availability and suitability of the conditions of the put-in and take-out access locations.
2. What are the lowest, highest and optimal flow conditions that provide safe runs.
3. Discuss advantages and disadvantages of each flow.
4. Discuss the potential typical recreation use activity for the various flow ranges.
5. Identify challenging features, play areas, rapids or sections and rate their difficulty.
6. Discuss any encounters with other recreation user groups or any interaction or conflicts.
7. Discuss any safety concerns or considerations.
8. Overall evaluation of the sources of information for flow levels.
9. Overall evaluation of the sources of safety warnings for flow levels.
10. Overall evaluation on the range of water flows available.
11. Any additional comments?

APPENDIX D

PROSPECT BYPASS REACH PHOTOS

Figure D-1 Location of Photos for Prospect Bypass Reach and Tailrace Area

PHOTO D-1 LOOKING UPSTREAM TO MILITARY BRIDGE AREA

PHOTO D-2 LOOKING DOWNSTREAM OF MILITARY BRIDGE

PHOTO D-3 LOOKING DOWNSTREAM FROM BELOW WATERFALL AREA

PHOTO D-4 LOOKING UPSTREAM TO JUST BELOW MILITARY BRIDGE AREA

PHOTO D-5 LOOKING FURTHER DOWNSTREAM BELOW WATERFALL AREA

PHOTO D-6 LOOKING UPSTREAM TO WATERFALL AREA

PHOTO D-7 LOOKING FURTHER DOWNSTREAM NEAR ADJACENT MVWA LANDS

PHOTO D-8 LOOKING FURTHER DOWNSTREAM NEAR ADJACENT MVWA LANDS

PHOTO D-9 LOOKING UPSTREAM TO POWER CANAL

PHOTO D-10 LOOKING FURTHER DOWNSTREAM NEAR ADJACENT MVWA LANDS

PHOTO D-11 LOOKING UPSTREAM OF PROSPECT TAILRACE

PHOTO D-12 DOWNSTREAM OF PROSPECT TAILRACE

PHOTO D-13 PROSPECT TAILRACE AREA

PHOTO D-14 PROSPECT TAILRACE AREA

PHOTO D-15 PROSPECT TAILRACE AREA

PHOTO D-16 PROSPECT BELOW TAILRACE AREA

APPENDIX E

DOWNSTREAM WEST CANADA CREEK

USGS KAST BRIDGE FLOW DATA

CONTROLLED FLOW STUDY PERIOD FLOWS

An existing USGS Gage is located at Kast Bridge (USGS 01346000). Estimated flow travel time from Trenton tailrace down to Kast Bridge is approximately 6 to 8 hours depending on flow levels. Table E-1 provides a summary of the estimated flow travel time from Trenton tailrace to the location of the level loggers provided as part of the Aquatic Mesohabitat Assessment Report, March 2020 (see Figure E-1 for general transect locations). Available inflow to the West Canada Creek that would be available for downstream flow releases would be dependent on inflow releases from Hinckley Reservoir (see DLA, Erie 2020). Tributaries in the downstream reach, such as Cincinnati Creek, Cold Brook and Mill Creek, can contribute significantly to overall flow and "flashiness" in the downstream reaches during a significant rain event.

TABLE E-1 TRANSECT LOCATION ESTIMATED TRAVEL TIME FROM TRENTON TAILRACE

		Estimated Flow Travel Time (hours)		
Logger ID	**Location**	**Low**	**High**	**Approximate Distance from Trenton Tailrace (river miles)**
T-1	Downstream Morgan Dam	NA	NA	0.4
T-2	Poland area	2	2.5	7.6
T-3	Newport Marketplace	3	4	12.2
T-4	Downstream Brown Island	4	5.5	15.0
T-5	Upstream Herkimer (Kast Bridge)	6.5	8.75	25.3
T-6	Upstream Mohawk Confluence	7	9.25	27.3

During the controlled flow study period, the target flow on November 6, 2020 (Day 1) was 1,400 cfs[1], and the Kast Bridge gage identified flows of 1,140[2] cfs at put-in time[3] and approximately 1,140 cfs at take-out time. The target flow on November 7, 2020 (Day 2) was 1,000 cfs[1], and the Kast Bridge gage identified flows of approximately 1,140 at put-in time and approximately 970 cfs at take-out time. See Figures E-2 and E-3 for USGS Kast Bridge flow data for the controlled flow study period.

---

[1] Flows were originally targeted for 1,000 cfs for the first day, but based on inflows, snow melt run-off, and Kast Bridge data, the field conditions represented flows closer to 1,400 cfs and the team agreed to transition to the higher flow on the first day and target the lower flow (1,000 cfs) on the second day.
[2] The USGS Kast Bridge gage originally showed higher flow for this period, however, the gage and flow estimate has been recalibrated following the field effort based on in-field gage calibration by USGS. The flow estimate numbers (cfs) above represent the recalibrated estimate.
[3] Based on estimated flow travel time of about 2-3 hours from the put-in location to the USGS Kast Bridge gage.

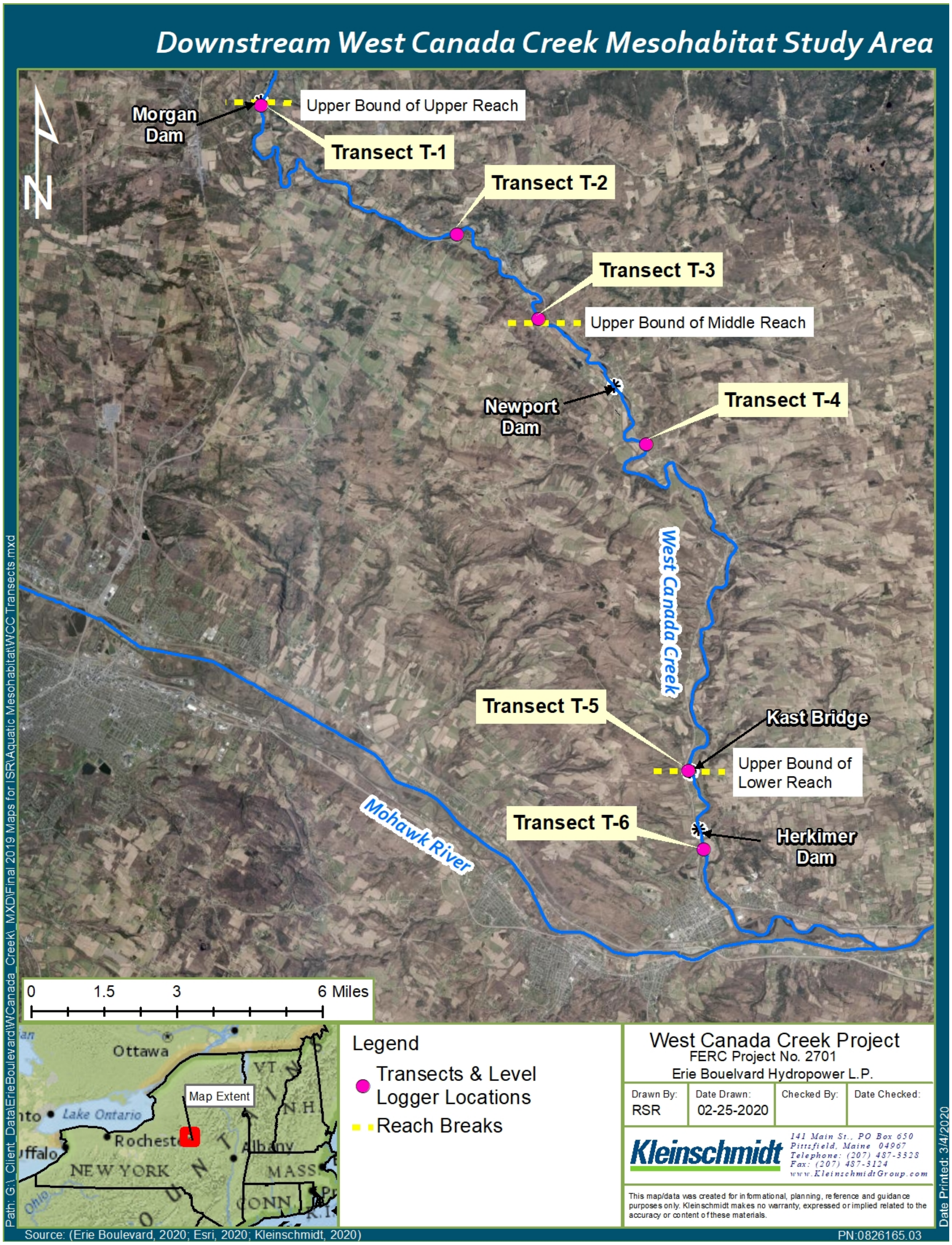


FIGURE E-1 DOWNSTREAM WEST CANADA CREEK TRANSECT LOCATION

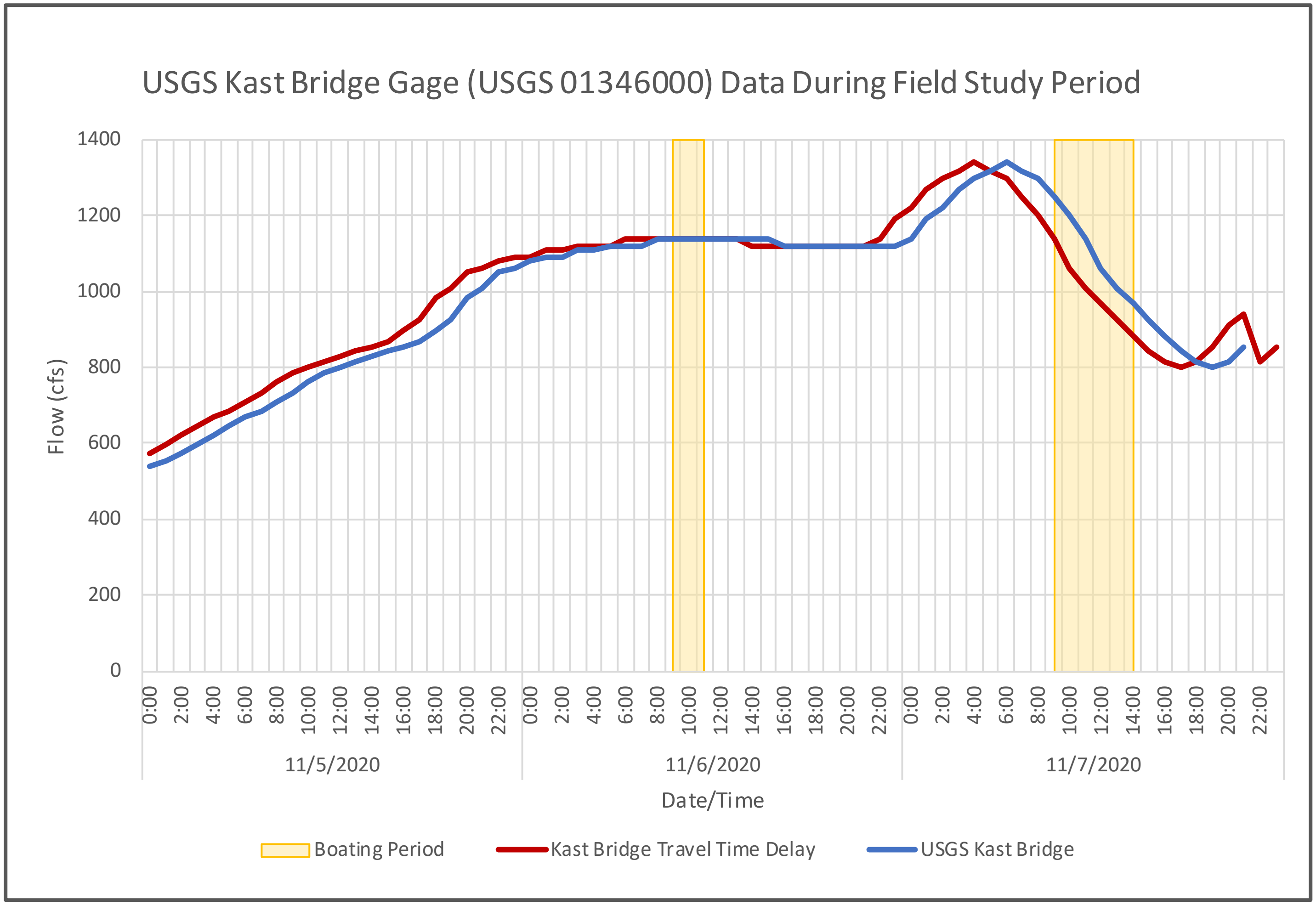


Figure E-2 USGS Kast Bridge Data for Field Study Period

Source: USGS 01346000 West Canada Creek at Kast Bridge NY; https://waterdata.usgs.gov/nwis/uv?site_no=01346000

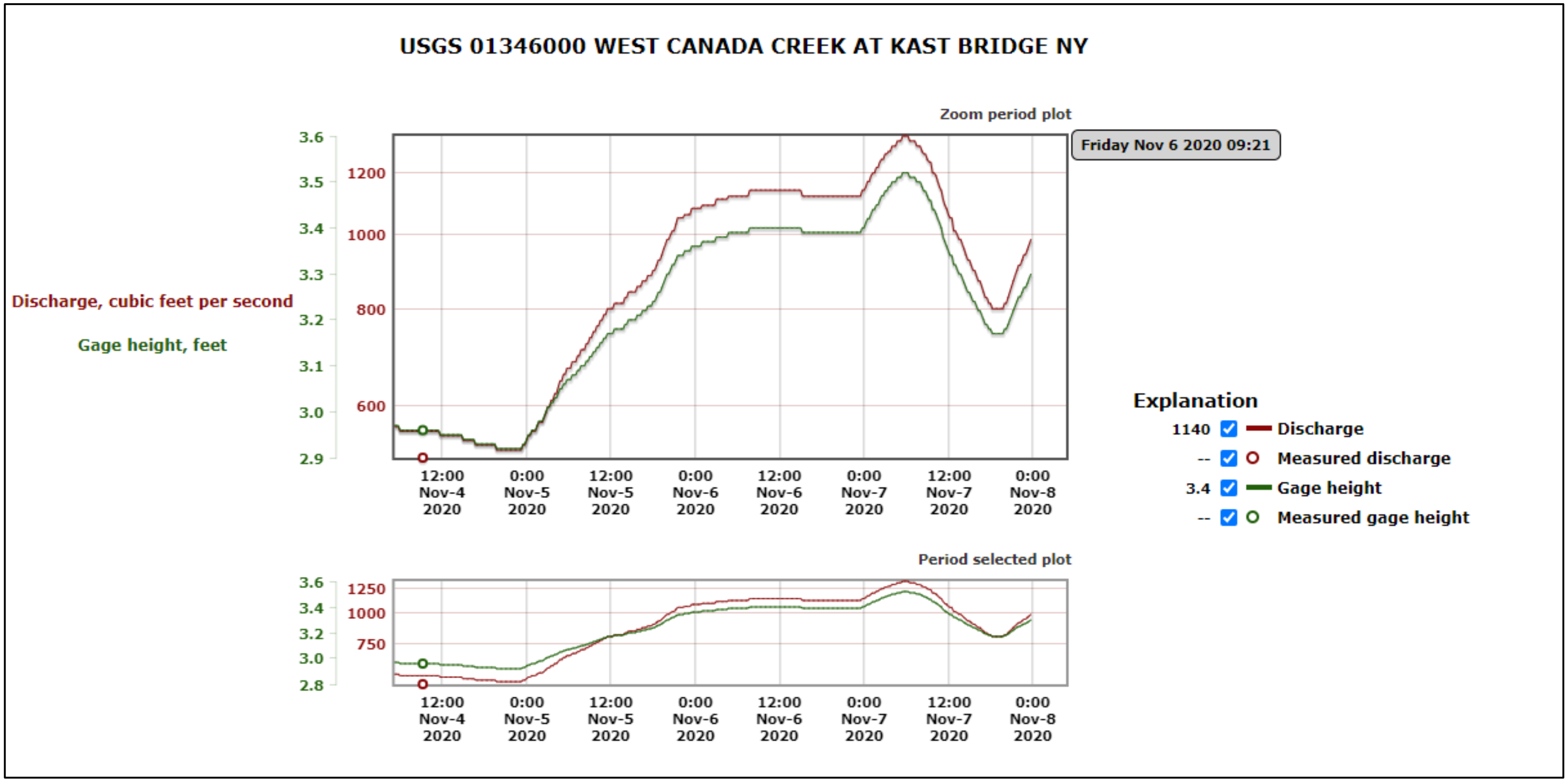


FIGURE E-3 USGS KAST BRIDGE DATA FOR THE NOVEMBER 6 AND 7, 2020 STUDY PERIOD
Source: USGS 01346000 West Canada Creek at Kast Bridge NY; https://waterdata.usgs.gov/nwis/uv?site_no=01346000

KAST BRIDGE DATA (2015-2019)

A five-year data set (January 1, 2015 to December 31, 2019) of river flow were obtained for USGS Gage #01346000 West Canada Creek at Kast Bridge, New York, in 15-minute intervals. Hourly average data was used in the calculation of monthly and annual statistics; daily average data were used in creating the flow duration curves (see Attachment 1). The average annual flow at Kast Bridge was 1,618 cfs (Table E-2). The monthly average flow ranged from 719 cfs in August to 3,101 cfs in April. The monthly minimum flow ranged from 159 cfs in June to 659 cfs in December; the maximum monthly flow was lowest (2,930 cfs) in September and was highest in October (26,775 cfs) (Table E-2). The average annual flow ranged from 1,238 cfs in 2016 to 2,206 cfs in 2019 (Table E-3). The two highest outflow events occurred on October 31 to November 1, 2019, and July 1, 2017 (Figure E-4).

AW initially requested evaluation of flows of 600 cfs, 1000 cfs, and 1,400 cfs for the West Canada Creek during the Whitewater Boating Study. As discussed in the study report, the given low flow (drought) conditions, logistical considerations (COVID, flow travel time, shuttle time, and limited daylight), Erie scheduled the field study (2020) to include two targeted flow releases: approximately 1,000 cfs and approximately 1,400 cfs, over two days (one flow each day), which was supported by AW.

Annually, flows of 600 cfs, 1000 cfs, and 1,400 cfs or more occurred approximately 87 percent, 64 percent, and 47 percent of the time, respectively (Table E-4, Attachment 1). Flows of 600 cfs or more occurred approximately 99 percent, 95 percent, 79 percent, 73 percent, 59 percent, and 73 percent of the time in April, May, June, July, August, and September, respectively (Table E-4). Flows of 1,400 cfs or more occurred 98 percent, 56 percent, 37 percent, 21 percent, 3 percent, and 3 percent of the time in April, May, June, July, August, and September, respectively.

The flood of record in West Canada Creek (as recorded at USGS Gage #01346000 Kast Bridge) occurred from October 31 to November 1, 2019. The flow event followed approximately 2 to 5 inches of rain throughout the southern Adirondacks and Mohawk Valley (NWS 2020). At the Poland, NY, weather station (KNYPOLAN5), 3.9 inches of rain fell on October 31, 2019 (WeatherUnderground 2020). The river stage at both Hinckley Dam and Kast Bridge exceeded the major flood stage level on November 1, 2019 (NWS 2020a). The major flood stage at Kast Bridge gage is 8 feet or 14,216 cfs, and on November 1 the recorded flood crest was 10.94 feet or approximately 27,300 cfs based on preliminary reviews of USGS (NWS 2020b, NWS 2020c).

TABLE E-2 KAST BRIDGE MONTHLY FLOW DATA

MONTH	TOTAL FLOWS (CFS) [1,2,3]			
	AVERAGE	MEDIAN	MINIMUM	MAXIMUM
January	1,888	1,755	586	8,155
February	2,093	1,910	257	10,488
March	1,849	1,836	338	7,864
April	3,101	2,412	510	11,763
May	1,880	1,593	295	8,889
June	1,185	838	159	8,514
July	1,010	742	205	17,300
August	719	648	203	4,908
September	746	680	164	2,930
October	1,278	940	448	26,775
November	2,193	1,793	641	24,288
December	1,740	1,608	659	6,010
Total	**1,618**	**1,370**	**159**	**26,775**

[1] USGS Gage #01346000 West Canada Creek at Kast Bridge, NY.
[2] Data for period January 1, 2015-December 31, 2019.
[3] 2019 data reflect 99-year flood of record on November 1, 2019.

TABLE E-3 KAST BRIDGE ANNUAL FLOW DATA

YEAR	TOTAL FLOWS (CFS) [1,2,3]			
	AVERAGE	MEDIAN	MINIMUM	MAXIMUM
2015	1,246	1,143	164	9,105
2016	1,238	1,011	159	8,986
2017	1,803	1,461	341	17,300
2018	1,548	1,560	258	8,155
2019	2,206	1,856	328	26,775
Total	**1,618**	**1,370**	**159**	**26,775**

[1] USGS Gage #01346000 West Canada Creek at Kast Bridge, NY.
[2] Data for period January 1, 2015-December 31, 2019.
[3] 2019 data reflect 99-year flood of record on November 1, 2019.

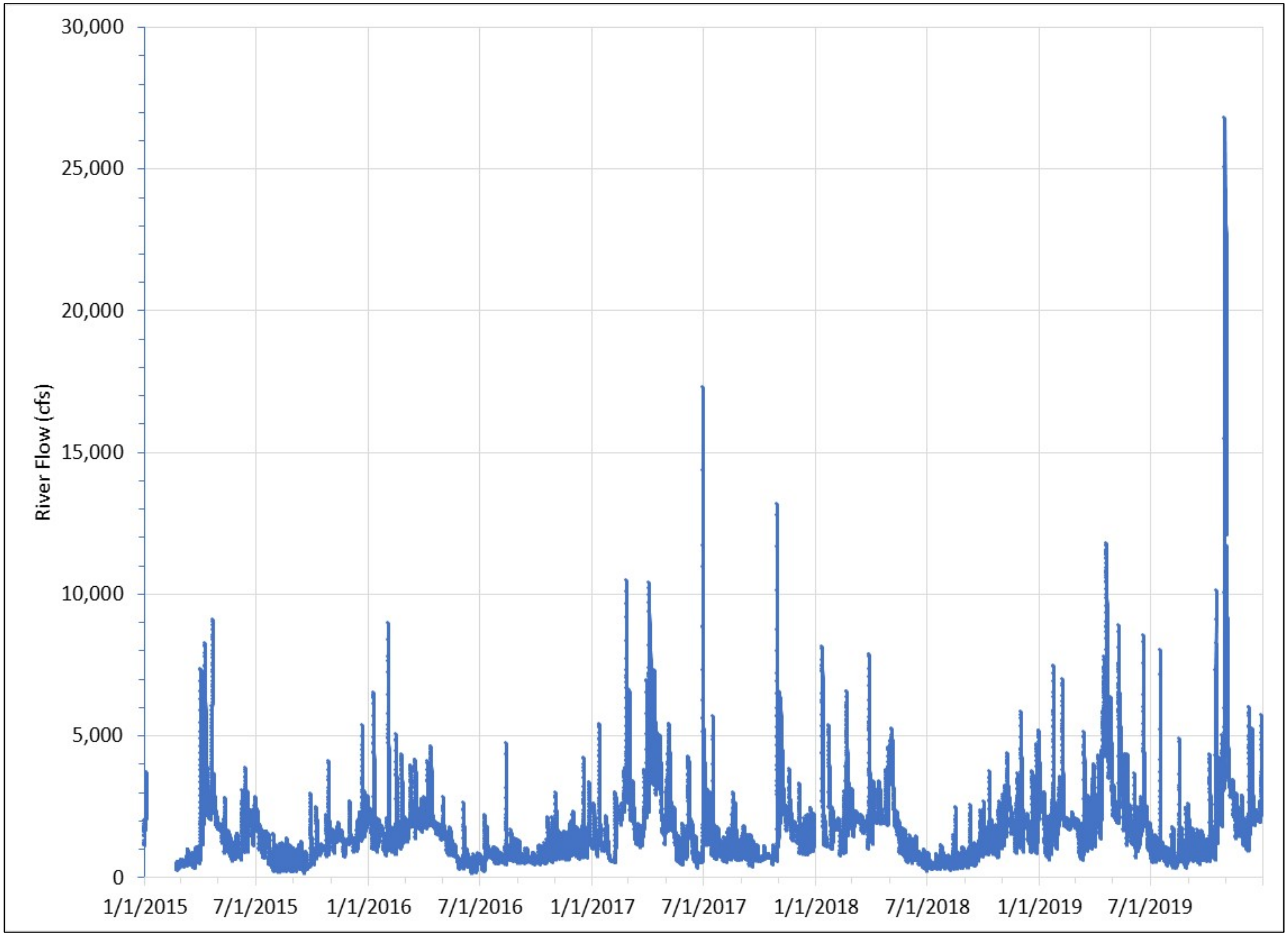


FIGURE E-4 RIVER FLOW (CFS) AT THE USGS KAST BRIDGE GAGE (01346000)
Source: USGS 01346000 West Canada Creek at Kast Bridge NY; https://waterdata.usgs.gov/nwis/uv?site_no=01346000

TABLE E-4 KAST BRIDGE FREQUENCY OF WHITEWATER BOATING STUDY FLOW RANGES

MONTH	**PERCENT OF TIME FLOW EQUALED OR EXCEEDED[1, 2, 3]**		
	600 CFS	**1,000 CFS**	**1,400 CFS**
January	99	85	61
February	85	71	68
March	87	80	72
April	99	99	98
May	95	78	56
June	79	46	37
July	73	32	21
August	59	16	3
September	73	14	3
October	90	53	24
November	100	93	63
December	100	100	64
Annual	**87**	**64**	**47**

[1]USGS Gage #01346000 West Canada Creek at Kast Bridge, NY.
[2]Data for period January 1, 2015-December 31, 2019.
[3] 2019 data reflect 99-year flood of record on November 1, 2019.

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National Weather Service (NWS). 2020. October 31-November 1, 2019 Record Flooding and High Winds. Available: https://www.weather.gov/aly/Halloween2019Storm [Accessed February 13, 2020].

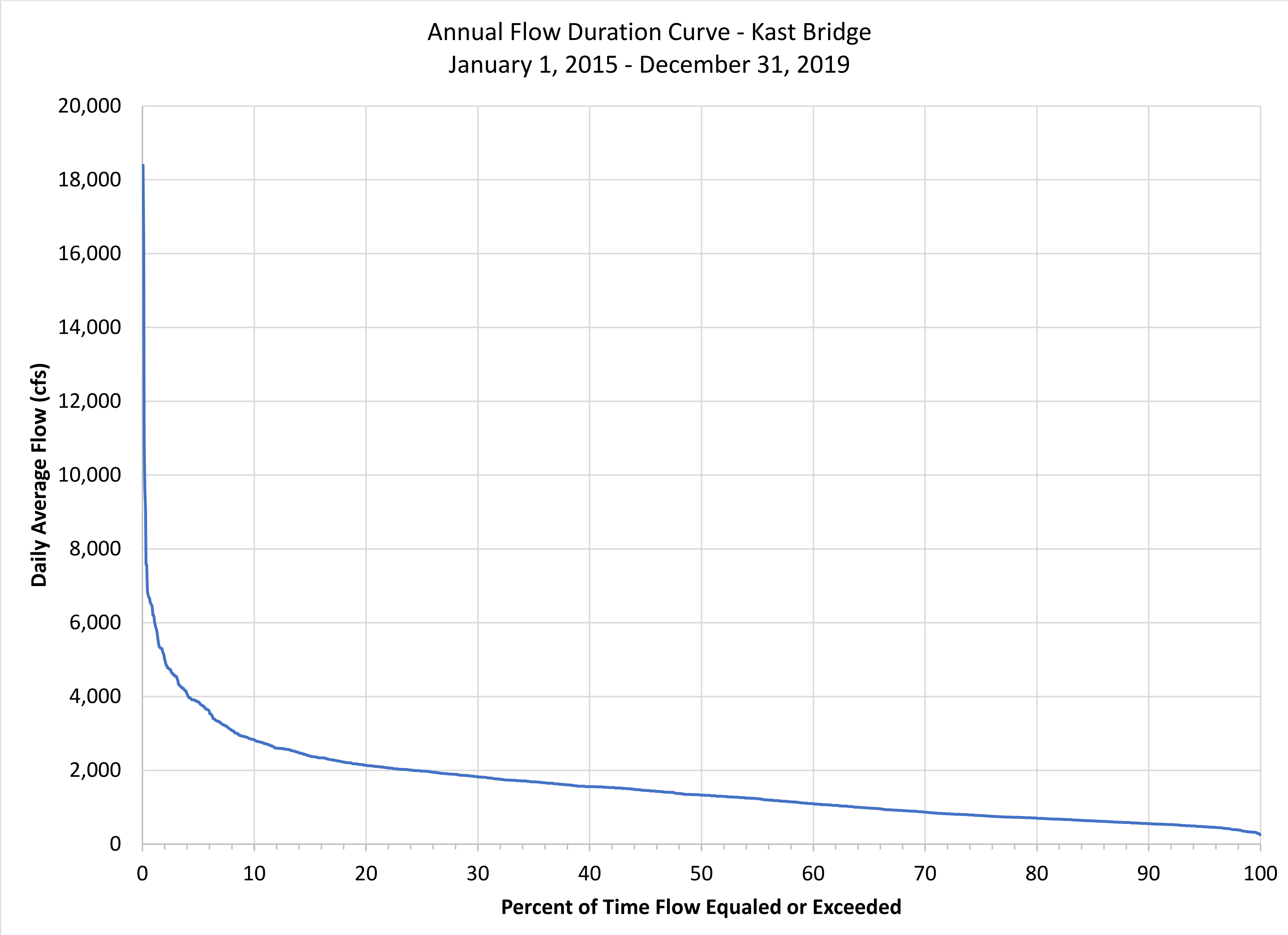
National Weather Service (NWS) 2020b. West Canada Creek at Kast Bridge, National Weather Service, Advanced Hydrologic Prediction Service. Available: https://water.weather.gov/ahps2/hydrograph.php?wfo=aly&gage=kasn6.

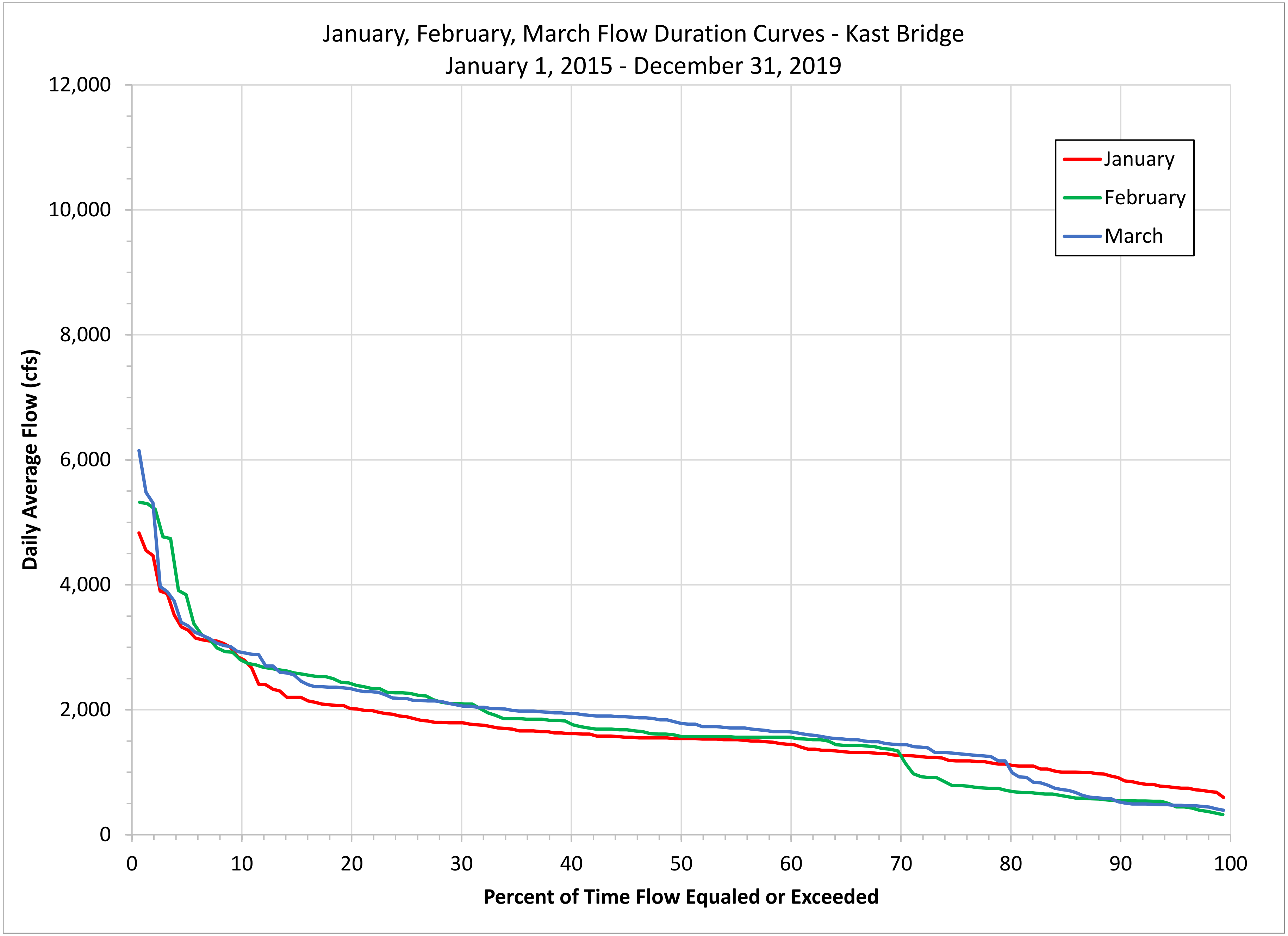
National Weather Service (NWS) 2020c. USGS 01346000 West Canada Creek at Kast Bridge, National Weather Service. Available: https://waterdata.usgs.gov/nwis/uv?cb_00060=on&cb_00065=on&format=html&site_no=01346000&period=&begin_date=2019-10-30&end_date=2019-11-02

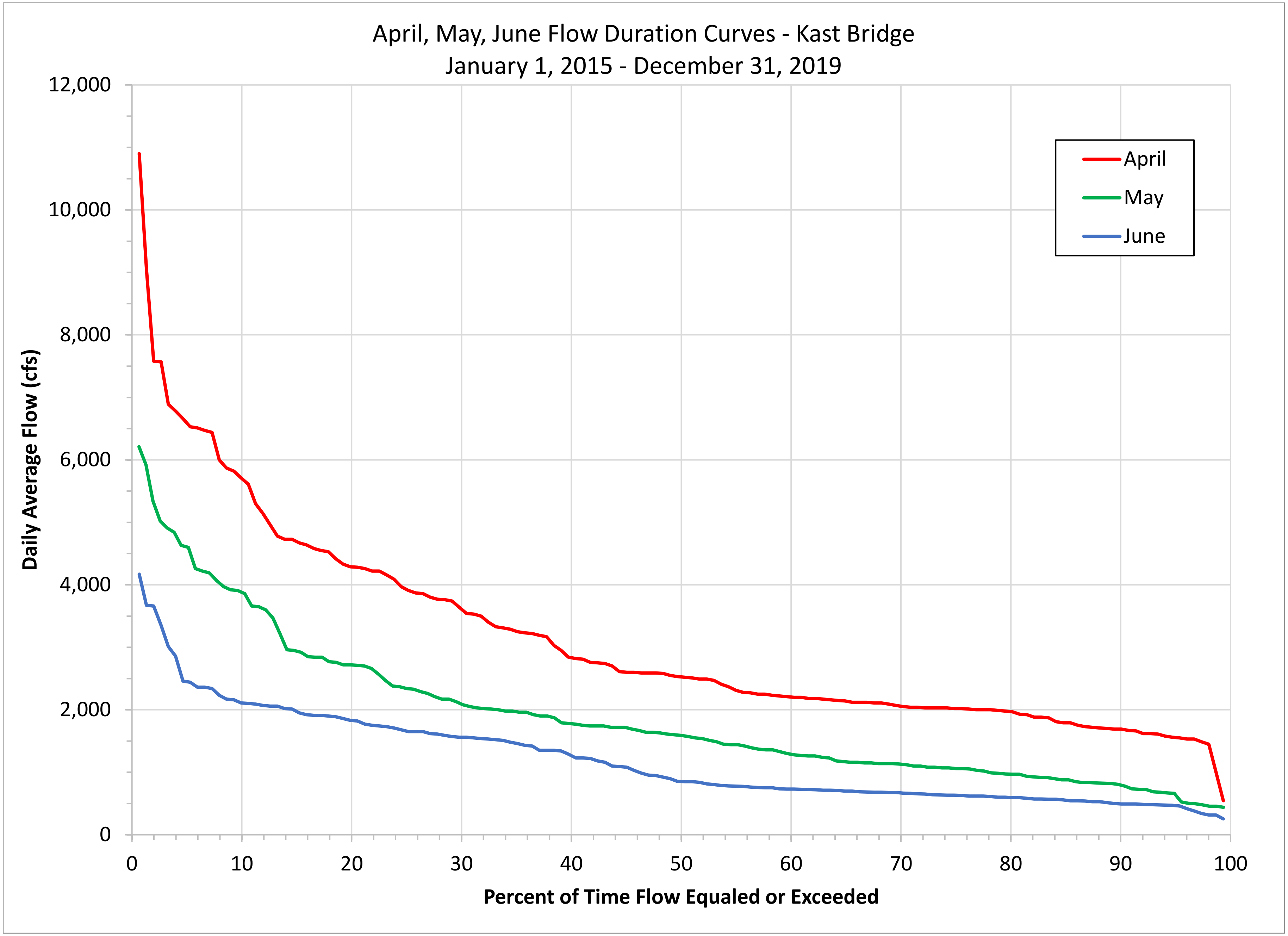
Weather Underground. 2020. Available: https://www.wunderground.com/weather/us/ny/poland

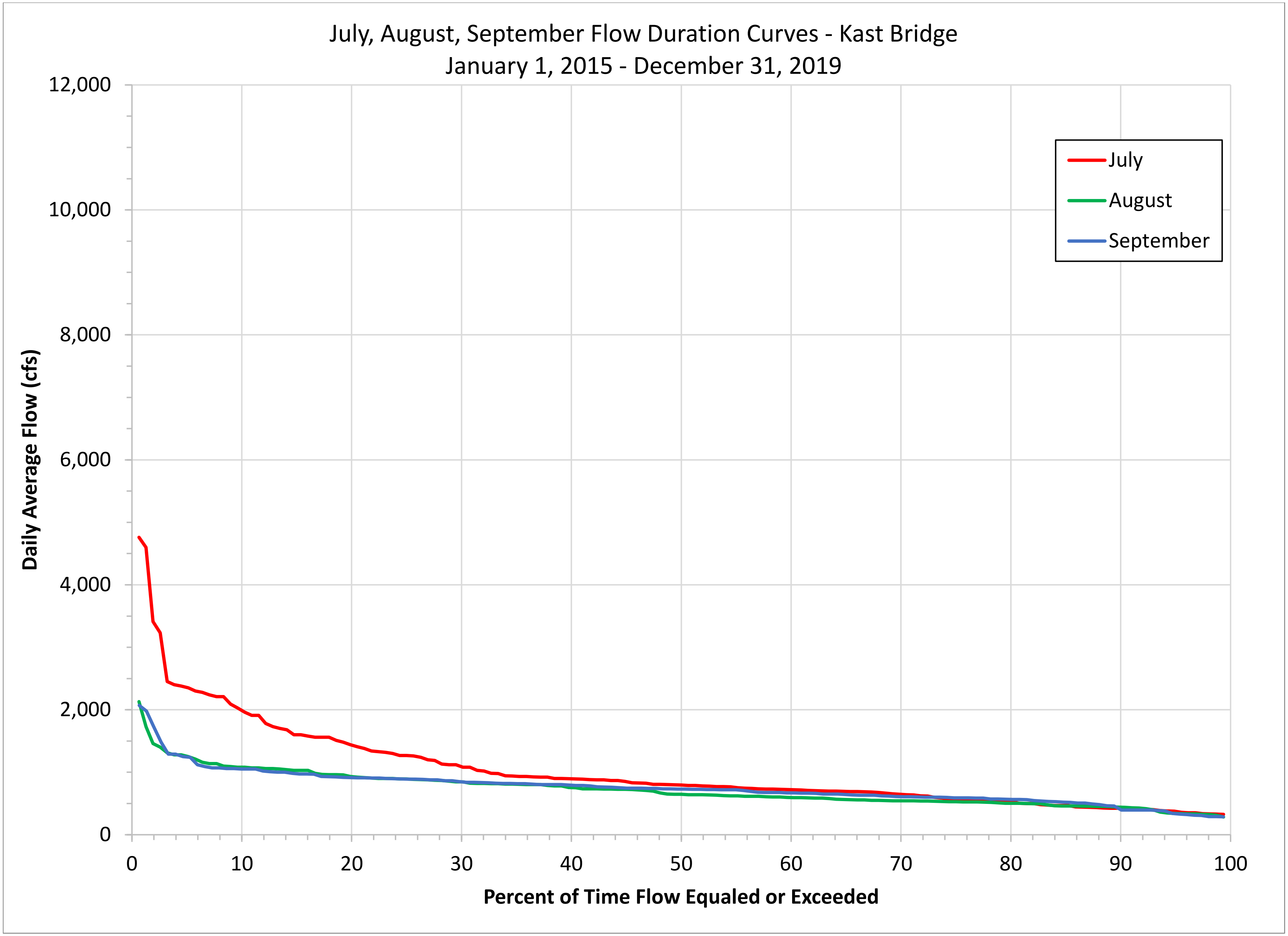
ATTACHMENT 1

USGS KAST BRIDGE DATA FLOW DURATION CURVES

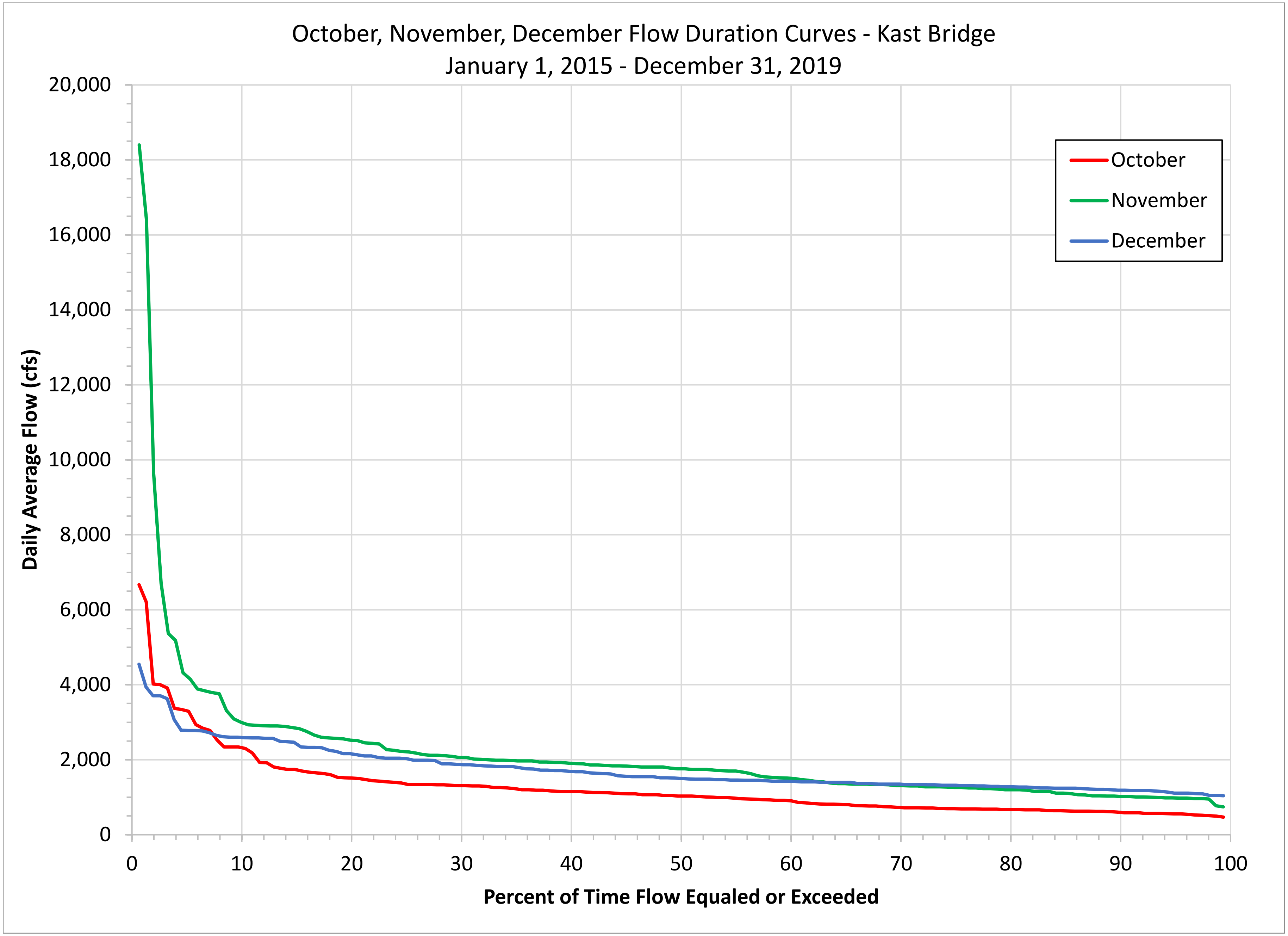

Annual Flow Duration Curve - Kast Bridge
January 1, 2015 - December 31, 2019
Daily Average Flow (cfs)
20,000
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Flow Equaled or Exceeded


January, February, March Flow Duration Curves - Kast Bridge
January 1, 2015 - December 31, 2019
Daily Average Flow (cfs)
12,000
10,000
8,000
6,000
4,000
2,000
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Flow Equaled or Exceeded
January
February
March


April, May, June Flow Duration Curves - Kast Bridge
January 1, 2015 - December 31, 2019
Daily Average Flow (cfs)
12,000
10,000
8,000
6,000
4,000
2,000
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Flow Equaled or Exceeded
April
May
June



July, August, September Flow Duration Curves - Kast Bridge
January 1, 2015 - December 31, 2019
Daily Average Flow (cfs)
12,000
10,000
8,000
6,000
4,000
2,000
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Flow Equaled or Exceeded
July
August
September


October, November, December Flow Duration Curves - Kast Bridge
January 1, 2015 - December 31, 2019
Daily Average Flow (cfs)
20,000
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Flow Equaled or Exceeded
October
November
December

APPENDIX C

ADDITIONAL INFORMATION FOR THE AESTHETIC FLOW ASSESSMENT STUDY

PHOTOS OF KEY OBSERVATION POINTS AT LEAKAGE CONDITIONS

Following are photos of key observation points (KOPs) at leakage conditions for the KOPs assessed during the Aesthetic Flow Assessment (EDR 2020). See the Aesthetic Flow Assessment Report (EDR 2020) for additional information. Figure C-1 provides the locations of the KOPs.

PHOTO C-1 PROSPECT FALLS OVERLOOK

PHOTO C-2 PROSPECT FALLS (UNDEVELOPED LOCATION)

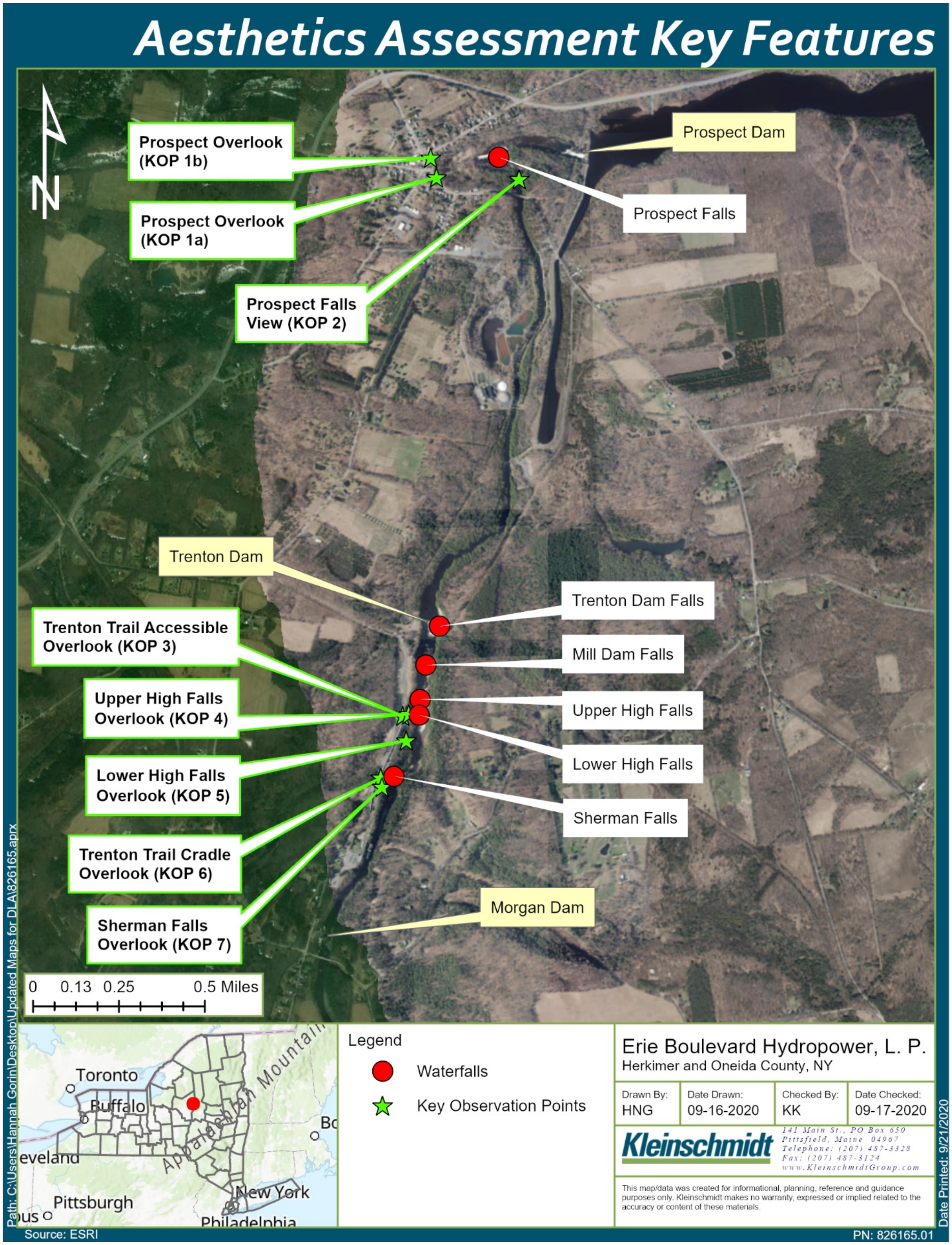


FIGURE C-1 WEST CANADA CREEK AESTHETIC ASSESSMENT STUDY AREA WITH KOP LOCATIONS

PHOTO C-3 UPPER AND LOWER HIGH FALLS

PHOTO C-4 TRENTON TRAIL CRADLE OVERLOOK

SUMMARY OF PROSPECT AND TRENTON BYPASS SPILL (2015-2019)

Following is a summary of available Prospect and Trenton bypass reach spill data during the five year period (January 1, 2015, through December 31, 2019). Additional information pertaining to West Canada Creek Project inflows and operations is available in the Draft License Application (Erie 2020). The Aquatic Mesohabitat Assessment Report (Kleinschmidt 2020a) and the Water Quality Study Report (Kleinschmidt 2020f) provide information pertaining to the characteristics (e.g., length, mesohabitat, etc.) and additional inflows (e.g., leakage, waterfalls) associated with the Prospect and Trenton bypass reaches.

Methodology/Data

Bypass flows typically occur during periods where inflow exceeds the station's hydraulic capacity (Prospect Development at 1,855 cfs and Trenton Development at approximately 1,425). In addition, bypass flows can occur when inflow is below the station's minimum hydraulic capacity for prolonged periods and during periods when there are planned or unplanned station outages, such as construction or maintenance activities and transmission line outages.

Station outflow and spill data in hourly intervals for the Prospect and Trenton Developments were obtained from Erie operation records for the period of January 1, 2015, to December 31, 2019. Hourly data was used for the time series analysis and daily average data was used for the flow exceedance analysis. Daily average discharge data for the Hinckley Reservoir was obtained from New York State Canal Corporation for the 5-year period of January 1, 2015, through December 31, 2019 (NYSCC 2020[2]). Hinckley inflow data was evaluated to assess periods when inflow was in exceedance of station capacities.

PROSPECT DEVELOPMENT BYPASS SPILL

Inflow to the West Canada Creek Project at the Prospect Development is provided from Hinckley Reservoir through discharges from the upstream Jarvis Hydroelectric Project (P-3211) and/or spill over the Hinckley dam. Based on daily average discharge data for the period 2015-2019, the percent of time discharge from the Hinckley Reservoir was above the Prospect Station hydraulic capacity (1,855 cfs or above) ranged from approximately 0 percent to 9 percent, except in April and May when discharge was above 1,855 cfs approximately 38 percent and 15 percent

[2] New York State Canal Corporation, 2020, available at: http://www.canals.ny.gov/wwwapps/waterlevels/hinckley/hinckleywaterlevels.aspx

of the time, respectively (Table C-1). During the 2015-2019 period, average daily discharge from Hinckley Reservoir was reported to be less than 1,855 cfs in August, September, and December (NYSCC 2020).

TABLE C-1 PERCENT OF TIME HINCKLEY RESERVOIR DISCHARGE WAS GREATER THAN 1,855 CFS (2015-2019)

Month	Approximate Percent of Time Hinckley Reservoir Discharge was Greater than 1,855 cfs (%)[1, 2, 3]
January	2.5
February	2.8
March	5.1
April	38.0
May	15.3
June	2.5
July	2.4
August	0
September	0
October	2.4
November	9.0
December	0
Annual	**6.3**

[1] Data for period January 1, 2015-December 31, 2019.
[2] Based on daily average discharge data provided by NYSCC 2020.
[3] 2019 data reflect 99-year flood of record on November 1, 2019.

Figure C-2 shows the time series for spill into the Prospect bypass reach based on Project operations hourly data. The graph illustrates that spill occurs during spring run-off, following precipitation events (e.g., October 31, 2019), and during station outage due to maintenance events (e.g., late July-early November 2015).

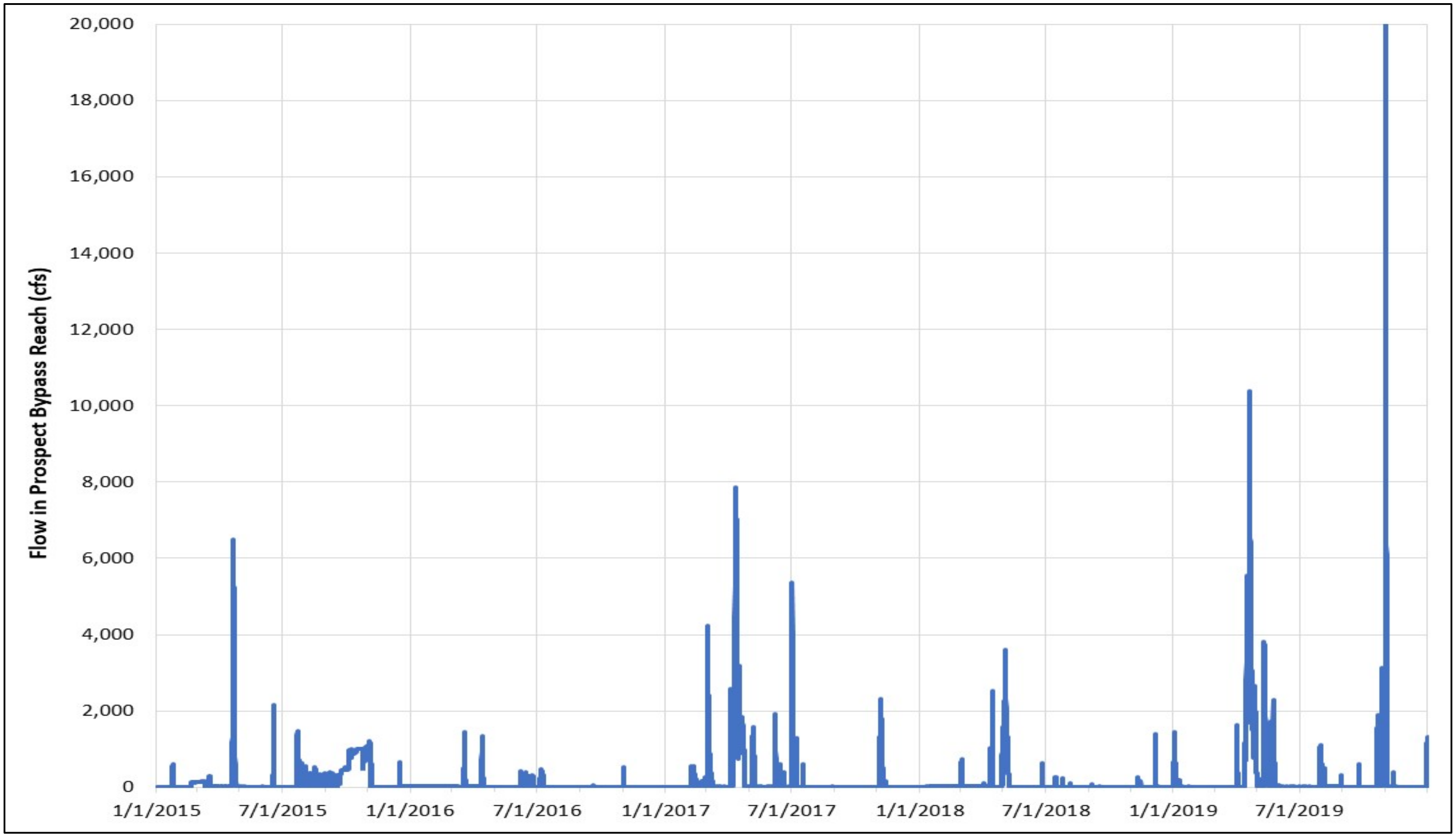


FIGURE C-2 PROSPECT BYPASS REACH SPILL, JANUARY 1, 2015 – DECEMBER 31, 2019

Note: Includes spill that occurred during station outage period from late July 2015- November 2015 due to maintenance activities.

Erie completed an Aesthetics Assessment Study (EDR 2020) to evaluate the aesthetic quality of targeted flows of 100 cfs, 200 cfs, and 300 cfs through the Prospect bypass reach. On an annual basis, Prospect bypass flows (spill) of 100 cfs, 200 cfs, 300 cfs are available approximately 16 percent, 13 percent, and 10 percent or more of the time, respectively (Table C-2). Prospect bypass flows (spill) of 100 cfs to 300 cfs are available most frequently in April (approximately 37 to 38 percent of the time). During the main recreation season, Prospect bypass flows (spill) of 100 cfs to 300 cfs are available approximately 17 to 20 percent of the time in May, 2 to 7 percent in June, 8 to 14 percent in July, 6 to 22 percent in August, and 10 to 20 percent in September[3] (Table C-2).

TABLE C-2 PROSPECT BYPASS REACH FREQUENCY OF TARGETED AESTHETIC STUDY FLOW RANGES (2015-2019)

MONTH	PERCENT OF TIME FLOW EQUALED OR EXCEEDED			
	100 CFS	200 CFS	300 CFS	400 CFS
January	5	3	2	2
February	11	2	1	0
March	16	6	5	4
April	38	37	37	35
May	20	17	17	15
June	7	5	2	2
July[3]	14	12	8	7
August[3]	22	20	6	1
September[3]	20	19	10	5
October[3]	25	25	25	24
November[3]	15	11	9	9
December	3	2	2	1
Annual	**16**	**13**	**10**	**9**

[1] Data for period January 1, 2015-December 31, 2019, based on daily average data.
[2] 2019 data reflect 99-year flood of record on November 1, 2019.
[3] Includes spill that occurred during station outage period from late July 2015- November 2015 due to maintenance activities.

[3] Includes spill that occurred during station outage period from late July 2015- November 2015 due to maintenance activities

TRENTON DEVELOPMENT BYPASS SPILL

Based on daily average discharge data (NYSCC 2020), the percent of time discharge from the Hinckley Reservoir was above Trenton station's maximum hydraulic capacity (1,425 cfs or above), ranged from approximately 0 percent to 20 percent, except in April and May when inflow was above 1,425 cfs approximately 58 percent and 30 percent, respectively (Table C-3). Discharge was less than 1,425 cfs in August, September, and December.

TABLE C-1 PERCENT OF TIME HINCKLEY RESERVOIR DISCHARGE WAS GREATER THAN 1,425 CFS (2015-2019)

Month	Approximate Percent of Time Hinckley Reservoir Discharge Greater Than 1,425 cfs (%)[1, 2, 3]
January	6
February	15
March	22
April	58
May	30
June	10
July	11
August	0
September	0
October	8
November	21
December	0
Annual	**15**

[1] Data for period January 1, 2015-December 31, 2019.
[2] Based on daily average discharge data provided by NYSCC 2020.
[3] 2019 data reflect 99-year flood of record on November 1, 2019.

The time series for spill to the Trenton bypass reach based on Project operations hourly data for January 1, 2015, to December 31, 2019, is shown in Figure C-3. Similar to Prospect bypass spill events, the graph illustrates that spill occurs during spring run-off, following precipitation events (e.g., October 31, 2019), and during station outage events.

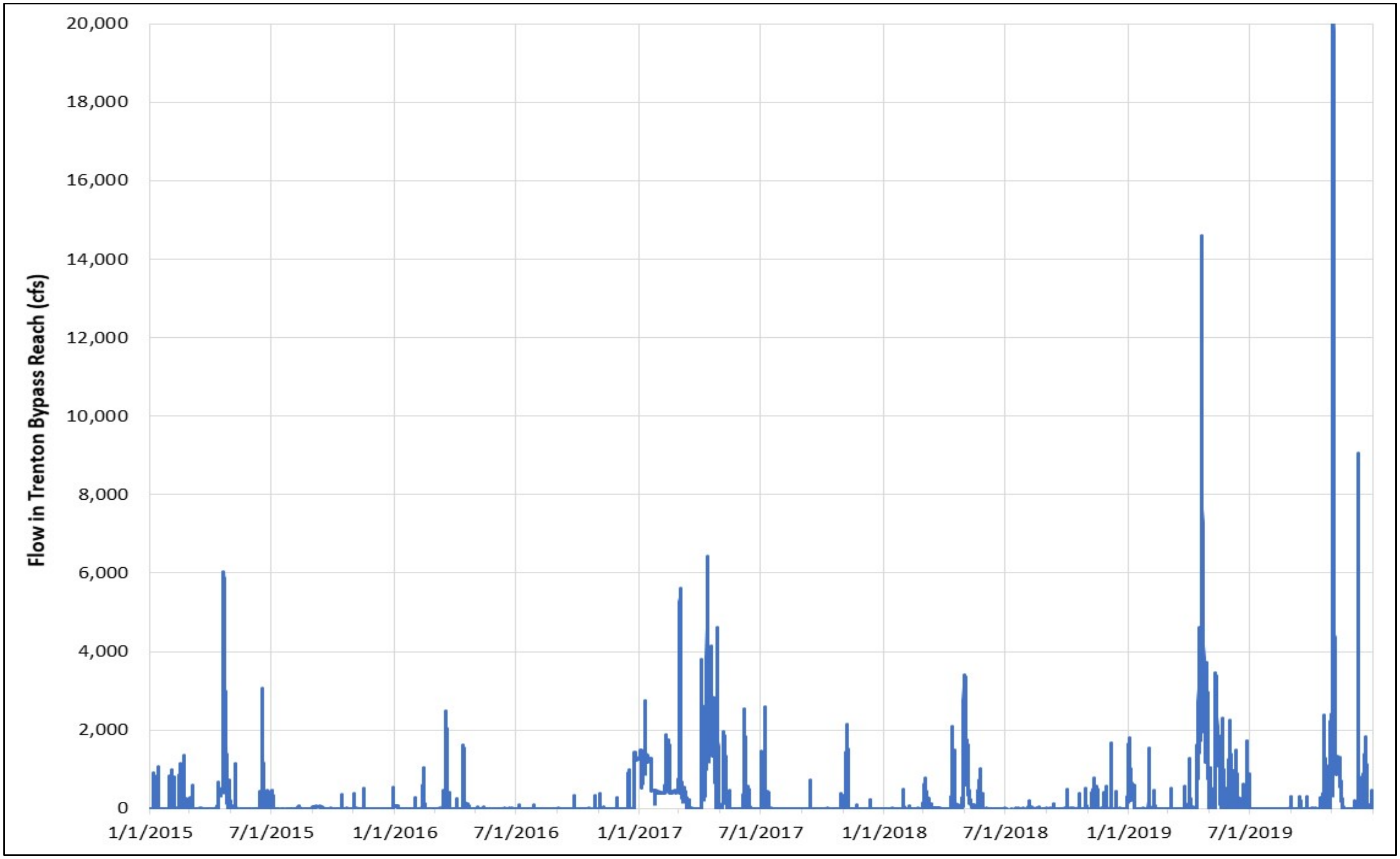


FIGURE C-3 TRENTON BYPASS REACH SPILL, JANUARY 1, 2015 TO DECEMBER 31, 2019

Erie completed an Aesthetics Assessment Study (EDR 2020) to evaluate the aesthetic quality of targeted flows of 100 cfs, 200 cfs, and 300 cfs through the Trenton bypass reach, and flows within the range of 180 cfs to 400 cfs were provided during the 2019 Trenton Scenic Trail events. Annually, spill rates of 100 cfs, 200 cfs, 300 cfs, and 400 cfs occur approximately 18 percent, 16 percent, 14 percent, and 12 percent of the time, respectively (Table C-4). Flows (spill) of 100 cfs to 400 cfs are available most frequently in April (approximately 44 to 52 percent of the time). During the main recreation season, flows (spill) of 100 cfs to 400 cfs are available approximately 16 to 28 percent of the time in May, 6 to 17 percent in June, 2 to 8 percent in July, 0 percent in August, and less than 2 percent in September (Table C-4).

TABLE C-4 TRENTON BYPASS FREQUENCY OF TARGETED AESTHETIC STUDY FLOW RANGES

MONTH	**PERCENT OF TIME FLOW EQUALED OR EXCEEDED**			
	100 CFS	**200 CFS**	**300 CFS**	**400 CFS**
January	29	28	28	22
February	27	25	22	18
March	17	15	10	6
April	52	49	46	44
May	28	23	21	16
June	17	12	8	6
July	8	6	4	2
August	0	0	0	0
September	2	1	1	<1
October	7	6	5	5
November	19	17	16	15
December	14	12	11	10
Annual	**18**	**16**	**14**	**12**

[1] Data for period January 1, 2015-December 31, 2019, based on daily average data.
[2] 2019 data reflect 99-year flood of record on November 1, 2019.