Great Lakes Hydro America, LLC
Central Rivers Power

Upper Androscoggin Projects
Proposed Study Plan Meeting

FERC Project Nos.
2422, 2423, 2326, 2327,
2311, 2300, 2287, 2288

Brookfield Renewable
Central Rivers Power
Kleinschmidt

Meeting Agenda

- Introductions
- Meeting Purpose
- Brief Background
- 2020 Schedule
- Proposed Studies
  - Water Quality and Minimum Flow
  - Botanical Reconnaissance Surveys
  - Recreation Use and Facility Assessment
  - Historical Architectural Surveys
  - Mussel Survey
  - Fish Entrainment Study
- Follow-Up Items

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Meeting Purpose

Purpose

- Review and discuss Licensees' Proposed Study Plan
- Provide forum for questions and answers regarding PSP

Combined PSP Meeting

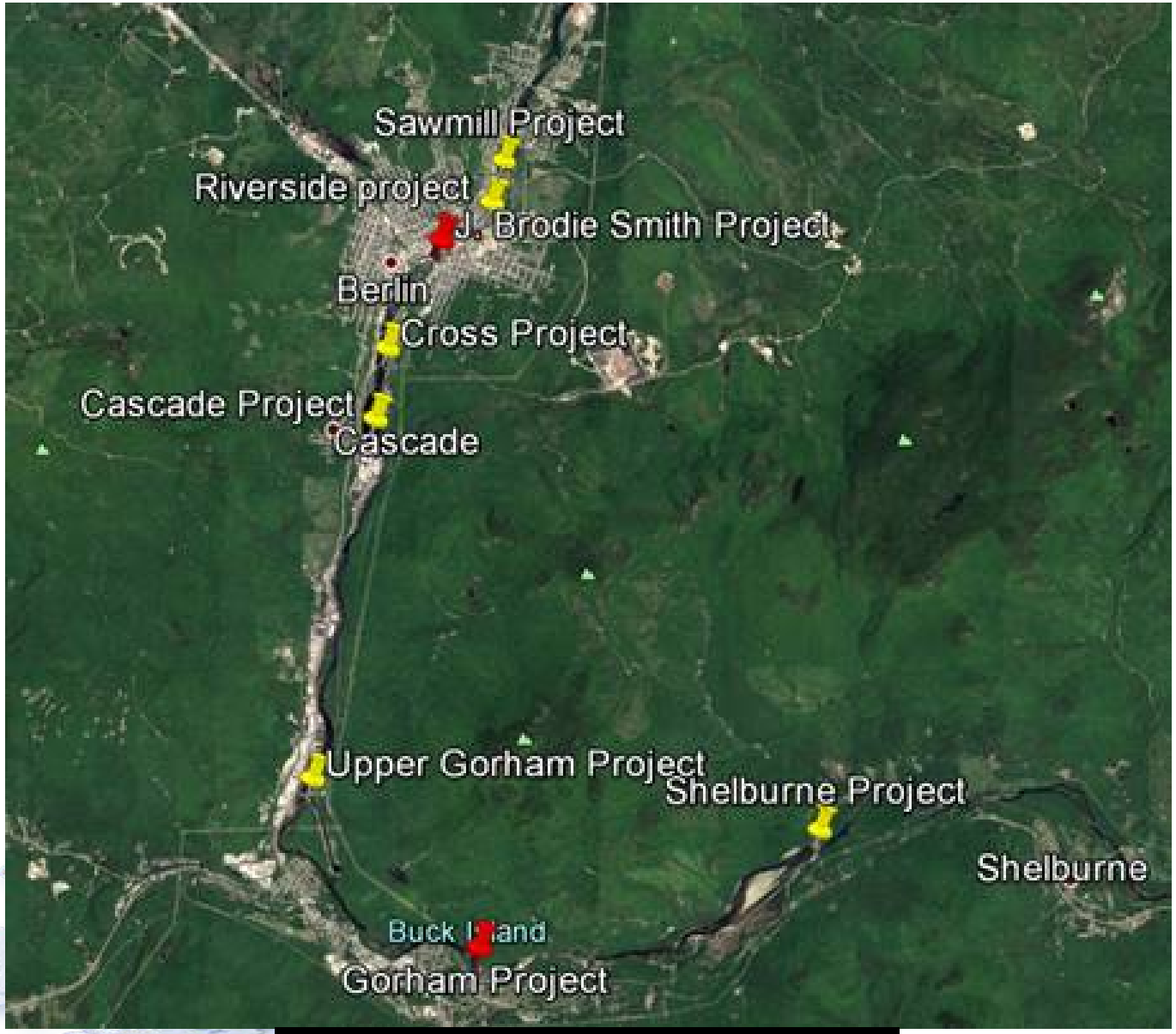
- To reduce duplicative efforts for all parties

Follow-up Steps

- Stakeholder comments on PSP
- Licensees' Revised Study Plan to address comments and revisions if needed

Background

- Androscoggin River, New Hampshire
- 8 Projects within 10 river miles
- Little to no impoundment fluctuation from operations
- All run-of-river Projects
- No proposed changes to the Projects.



Red pin - CRP Yellow pin - GLHA

2020 Schedule

Responsible Party	Pre-Filing Milestone	Date	FERC Regulation
GLHA/CRP	Submitted Pre Application Document	Summer 2019	5.6
FERC	Androscoggin Projects Environmental Site Review and Scoping Meetings	10/22/2019 and 10/23/2019	5.8(b)(viii)
All stakeholders	PAD/SD1 Comments and Study Requests Due	11/23/2019	5.9
FERC	Issue Scoping Document 2	1/7/2020	5.10
GLHA/CRP	File Proposed Study Plan (PSP)	1/7/2020	5.11(a)
All stakeholders	Proposed Study Plan Meeting	2/6/2020	5.11(e)
All stakeholders	Proposed Study Plan Comments Due	4/6/2020	5.12
GLHA/CRP	File Revised Study Plan	5/6/2020	5.13(a)
All stakeholders	Revised Study Plan Comments Due	5/21/2020	5.13(b)
FERC	Director's Study Plan Determination	6/5/2020	5.13(c)
Maine DEP, FWS, NMPS	Any Study Disputes Due	6/25/2020	5.14(a)
Dispute Panel	Third Dispute Panel Member Selected	7/10/2020	5.14(d)
Dispute Panel	Dispute Resolution Panel Convenes	7/15/2020	5.14(d)(3)
GLHA/CRP	Applicant Comments on Study Disputes Due	7/20/2020	5.14(j)
Dispute Panel	Dispute Resolution Panel Technical Conference	7/25/2020	5.14(j)
Dispute Panel	Dispute Resolution Panel Findings Issued	8/14/2020	5.14(k)
FERC	Director's Study Dispute Determination	9/3/2020	5.14(l)
GLHA/CRP	First Study Season	2020	5.15(a)
GLHA/CRP	Initial Study Report	6/5/2021	5.15(c)(1)

Project Schedule

- Study Plan Determination is anticipated by June 5, 2020.
- GLHA and CRP will file with FERC a brief progress report for studies implemented during the 2020 field season by December 31, 2020.
- The Initial Study Report will be filed no later than June 5, 2021 (one year following the Study Plan Determination).
- As needed, GLHA and CRP will file updated study reports within the time limits provided in 18 CFR § 5.15(f).

Proposed Studies

- Water Quality Study and Bypass Reach Minimum Flow Confirmation Study
- Botanical Reconnaissance Level Survey
- Recreation Use and Facility Assessment Study
- Historical Architectural Survey
- Mussel Survey
- Fish Entrainment Modeling

Water Quality and Bypass Reach Minimum Flow Confirmation Study

Water Quality and Bypass Reach Minimum Flow Confirmation Study

Requested by: NHDES

Goals

- Collect baseline information and document water quality conditions upstream and downstream of the projects to determine compliance with New Hampshire surface water quality standards.

- Confirm that bypass reach minimum flows are being provided.

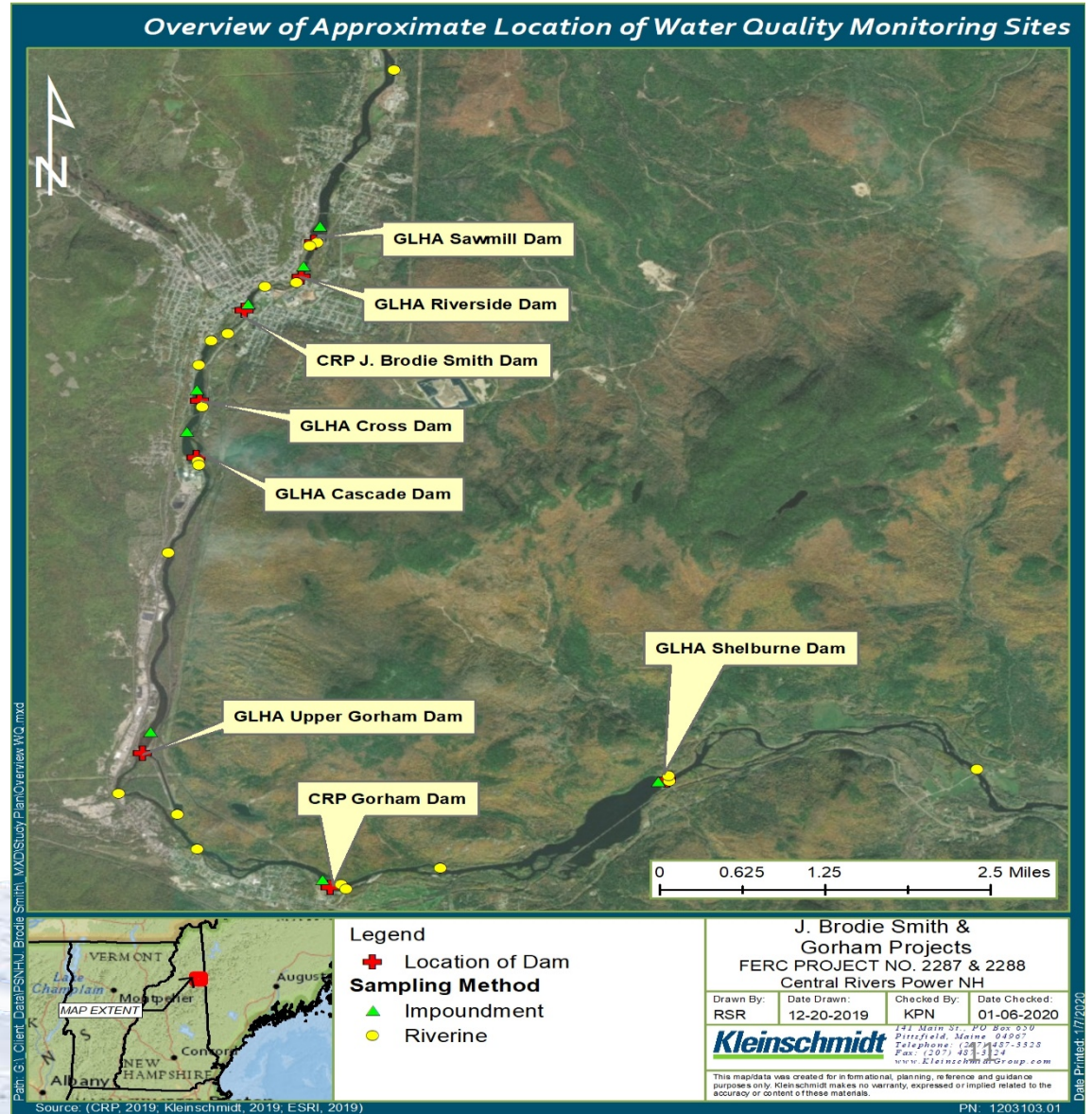
Water Quality and Bypass Reach Minimum Flow Confirmation Study

Objectives

- Collect dissolved oxygen (DO), water temperature, pH, nutrients, chlorophyll-a, and Secchi disk data at a deep spot in the impoundments of the GLHA NH and CRP Projects; and
- Collect DO, water temperature, and pH in a riverine reach upstream of each impoundment that is not influenced by project operations, bypass reaches, tailraces and at a site downstream of the confluence of the tailrace and bypass reach of each hydro facility, as practical.
- Collect photographs, instream flow measurements, and habitat data to confirm that minimum flow requirements are being met.

Proposed Water Quality Sampling Sites

- General Description of Proposed Monitoring Sites
  - upstream of each impoundment in a riverine section that is not influenced by project operation;
  - upstream of each project dam in the deepest spot of the impoundment;
  - downstream of each project dam in the bypass reach;
  - downstream of each project dam in the tailrace;
  - downstream of the confluence of the tailrace and bypass reach.
- The proposed WQ Sites are preliminary and are subject to change following site visits and field reconnaissance.
- With the industrialized nature of this stretch of river not all sites may be safely accessible.



Water Quality Monitoring

- Impoundment sampling
  - Monitor DO, temperature, and pH continuously for 10 weeks (15-minute intervals)
  - Collect a vertical profile of DO and water temperature at the deep spot in the impoundment once per week for 10 weeks
  - Collect sample for total Kjeldahl nitrogen and nitrate + nitrate nitrogen, total phosphorus, and chlorophyll-a
  - Secchi Disk reading
- Riverine Sampling
  - Monitor DO, temperature, and pH continuously for 10 weeks (15-minute intervals)
- Methods will follow NHDES Sampling Guidance #1 for Hydropower Studies
  - GLHA and CRP understand that this guidance has been updated as of January 23, 2020 and plans to submit the Revised Study Plan in accordance with the updated standards.

Bypass Reach Minimum Flow Confirmation Study

- GLHA and CRP propose to collect habitat data within the bypass reaches to evaluate conditions when flows through the bypassed reaches are at or near the existing flow requirement
- GLHA will consult with NHDES regarding placing locations of representative habitat transects at the Sawmill, Riverside, Cascade, Upper Gorham, and Shelburne project bypasses.
- CRP will consult with NHDES regarding the locations of representative habitat transects at J. Brodie Smith and Gorham

Bypassed Reach Instream Flow Measurements

GLHA proposes:

- one transect at projects with short, ledge-dominated bypassed reaches (Sawmill, Cascade, and Shelburne), and
- up to three transects at the projects with longer bypassed reaches with more diverse mesohabitat types (Riverside and Upper Gorham)

CRP proposes:

- one transect at Gorham, given the short, ledge-dominated bypassed reach, and two or three transects in the longer ledge-dominated bypass reach at J. Brodie Smith.

Classify mesohabitats, collect photographs, and document instream flow measurements including flow (cubic feet per second [cfs]), mean column velocity (feet per second), wetted area width, mean and maximum depth.

Botanical Reconnaissance Level Survey

Botanical Reconnaissance Level Survey

Proposed by: GLHA and CRP

Goal

Conduct reconnaissance level surveys to document the botanical resources within the project boundaries and to note any rare, threatened or endangered species.

Objectives

To provide information necessary to:

- Describe and map vegetation cover types within 200 feet of the shoreline
- Identify significant stands of invasive vegetation with 200 feet of the shoreline and within the known sugar maple, silver maple, white ash floodplain forest
- Identify and map occurrences of, or likely habitat for, rare, threatened, and endangered (RTE) botanical species.

Botanical Reconnaissance Level Survey

Vegetation mapping

- Identify general cover types and verification of NWI mapping through photo interpretation and field verification.
- Produce a cover type map
- Field verification for each mapped cover type

Information to be collected in desktop analysis and field verification surveys

- Plant species composition, including the dominant and more prominent associated species in each vegetation layer (tree, shrub and herbaceous layers);
- Structure data, including estimates of aerial cover of the dominant cover types;
- Predominant land use(s) associated with each cover type;
- Rare, unique, and particularly high-quality habitat; and
- Occurrence of exotic invasive species.

Botanical Reconnaissance Level Survey

- During shoreline survey work, biologists will attempt to observe/identify any RTE vegetation species.
  - Searches for rare plants would be conducted with a “wander” methodology,
  - A visual inspection of habitats with a closer inspection of any potential microhabitats that might support individuals or populations of rare species.
  - This type of so-called “Lévy-walk” and is a standard method used in rare plant searches.
- Field crews would document RTE species observed and/or suitable habitats identified with a global positioning system (GPS) unit.
- Significant habitats within 200 feet of the project shoreline would be surveyed, quantified and identified via GPS.

Recreation Use and Facility Assessment

Recreation Use and Facility Assessment

Requested by: FERC and the Town of Shelburne, Town of Gorham
Several additional stakeholders provided comments related to recreation use and access in the GLHA NH Projects area

Goals

- Evaluate the adequacy of existing recreational water access and facilities, determine if existing facilities are meeting user needs, and identify potential measures to enhance water access opportunities at the GLHA and CRP Projects.

Objectives

- Determine the adequacy of existing recreation-related water access opportunities
- Evaluate the potential effects of continued operation and maintenance on river recreation access opportunities
- Determine feasibility of providing new access sites or enhancing existing access.

Recreation Use and Facility Assessment

GLHA Projects:

- No licensee-managed GLHA recreation facilities; however a variety of recreation opportunities are available within the vicinity of the GLHA NH Projects including:
  - Four parks
  - Snowmobile and hiking trails
  - Pedestrian bridge

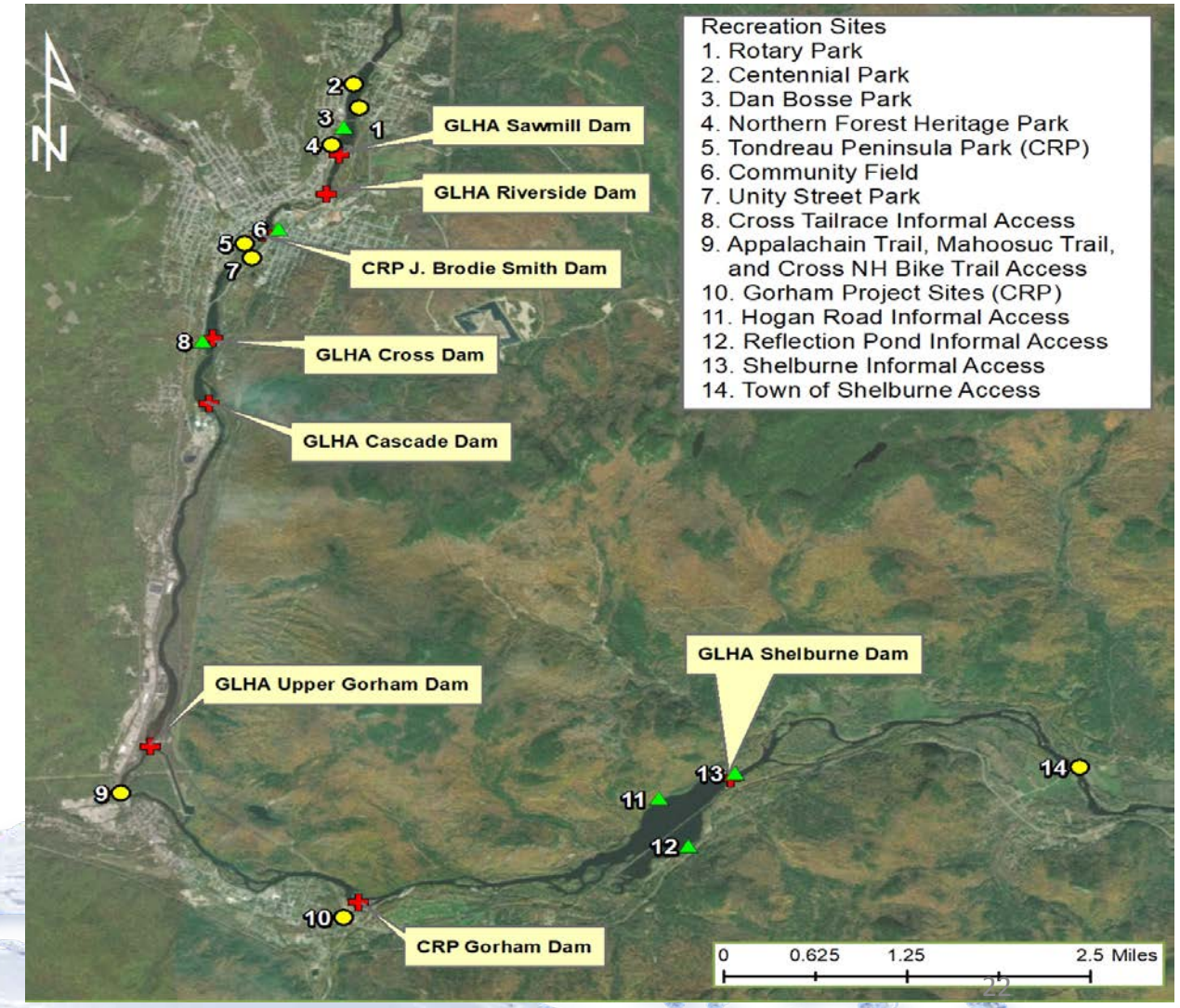
CRP Projects:

- The Tondreau Peninsula Park is located between the penstock and bypass reach of the J. Brodie Smith Project and provides walking trails, picnic tables, benches, and scenic overlooks.
- Facilities at the Gorham Project include a tailrace fishing area, picnic area, and a canoe portage.

Recreation Use and Facility Assessment

Methods – Site Inventory

- Tondreau Peninsula Park at J. Brodie Smith
- Recreation sites at the Gorham Project
- Rotary Park
- Centennial Park
- Dan Bosse Park
- Northern Forest Heritage Park
- Community Field
- Unity Street Park
- Cross Tailrace Informal Access
- Appalachian Trail, Mahoosuc Trail Access, and Cross NH bike tail access
- Hogan Road Informal Access
- Reflection Pond Informal Access
- Shelburne Informal Access
- Town of Shelburne Access



Recreation Use and Facility Assessment

Methods – Site Inventory (cont.)

- Complete a river access site inventory assessment of public recreation opportunities within the vicinity of the Androscoggin River Projects.
- The inventory will collect the following information:
  - the location and type of the access site in relation to the project boundaries;
  - the types and number of amenities provided at each site (e.g., parking, restroom facilities, picnic tables, and signage);
  - the condition of the facilities/amenities;
  - identification of whether the facility is a project or non-project recreation facility;
  - the entities responsible for the operation and maintenance of each facility;
  - hour/seasons of operation; and
  - accompanying photographs.

Recreation Use and Facility Assessment

Methods – Intercept Surveys

- Collect information on user characteristics (place of residency, age, group size, length of visit), frequency of visits, primary activities, and perceptions of the level of use, condition of amenities, number and type of available amenities, and the need for improvements to river access.
- The surveys would focus on:
  - Rotary Park
  - Centennial Park
  - Unity Street Park
  - Tondreau Peninsula Park, Mahoosuc Trail Access,
  - Gorham Project sites
  - Town of Shelburne Access.

Recreation Use and Facility Assessment

Methods – Intercept Surveys (cont.)

- Conduct intercept surveys two days per month from May to September 2020 for a total of ten survey days
    - include one weekday and one weekend/holiday (e.g., Memorial Day, July 4th, Labor Day).
- Two recreation clerks would conduct surveys at four sites.
- Each clerk would be stationed at one site for two hours and would then go to the second site and remain for two hours.
    - The survey shifts would be randomly selected to occur from 7 AM to 9 AM, 10 AM to 12 PM, 1 PM to 3 PM, or 4 PM to 6 PM.

Recreation Use and Facility Assessment

Methods – Spot Counts

- Conduct spot counts at Tondreau Peninsula Park, Gorham Project, and the 12 recreation sites on the same 10 days that surveys are conducted.
- Spot counts will include:
  - Date, time, weather conditions, number of vehicles and boat trailers observed at the site, license plate (state of origin), number of visitors observed at the site, and type of recreation activities being participated in

Recreation Use and Facility Assessment

Methods – Interviews and Meetings

- Interviews and/or meetings with interested agencies and stakeholders, such as the towns of Berlin, Gorham, Shelburne, the Appalachian Mountain Club, and local river outfitters, would be conducted to obtain their perspectives on existing and expected future use and access needs in the Androscoggin River Projects area.

Historical Architectural Survey

Historical Architectural Survey

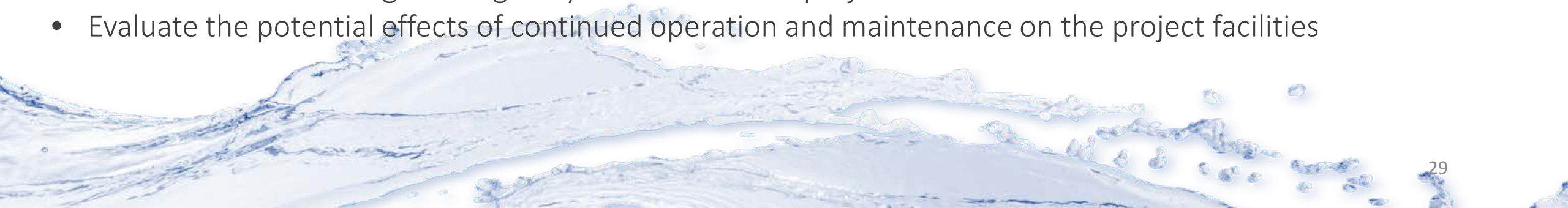
Requested by: FERC

Goals

- Determine whether the Riverside project, J. Brodie Smith project, and Gorham project facilities are eligible for the National Register
- Evaluate and determine the potential effects of continued project operation and maintenance on historic architectural resources that have become historic over the course of the existing license

Study Objectives

- Conduct a historic architectural survey of the project facilities
- Identify all facilities that are 50 years or older
- Assess the National Register eligibility of the identified project facilities
- Evaluate the potential effects of continued operation and maintenance on the project facilities



Historical Architectural Survey

Methods

- Consult with the New Hampshire SHPO to define the APE as well as finalize the methods for the Historic Architectural Survey
- Contract with a cultural resources consultant to perform the survey to evaluate the project infrastructure for historic relevance,
  - Desktop research including early maps and other available documentation for the presence of historical structures
  - Field component involving and inspection of the interior and exterior of the facilities.
- Qualified professional will prepare a report summarizing findings.
- In consultation with the SHPO, the information collected through research and field efforts would be used to determine the National Register eligibility of the project structures.

Mussel Survey

Mussel Survey

Requested by: NHFGD

Goals and Objectives

For a professional malacologist to characterize the species composition, distribution, and abundance of freshwater mussels throughout suitable habitat within the GLHA NH and CRP project areas and to evaluate whether they are affected by maintenance activities.

Current Status and Distribution of Freshwater Mussel Species in the Upper Androscoggin River

COMMON NAME	STATUS
Creeper	Not listed, considered vulnerable; known to occur downstream of the Shelburne Project and upstream of Berlin, NH.
Eastern elliptio	Not listed, population secure; occurs upstream of Berlin and within all major watersheds in New Hampshire.
Eastern floater	Not listed, population secure; occurs upstream of Berlin, NH.
Triangle floater	Not listed, population secure; known to occur downstream of Shelburne Project and upstream of Berlin, NH.

Mussel Survey

Study Area

- Includes shorelines and riverine habitat likely to provide suitable habitat for mussel species that may be affected by maintenance activities
  - Shelburne, Upper Gorham, and Sawmill project boundaries
  - J. Brodie Smith and Gorham project boundaries
- Biologists will also visually assess areas near the Riverside, Cross, and Cascade Projects to confirm presence or absence of suitable habitat
- Prior to beginning the survey work, licensees will invite NHDES and NHFGD to join researchers to visually assess the study areas and select survey sites with the most suitable mussel habitats.

Mussel Survey

Methods

- Contract a malacologist that is on the NHFDG's approved list of qualified contractors and experienced with the regional mussel fauna.
- Malacologist to perform a qualitative mussel survey using a combination of snorkeling and walking/ wading.
- Study will take place between June 1 and late September 2020, during period of normal flow and high water clarity.
  - 6-8 sites per project will be surveyed for up to 4 person-hours per site
  - Species present will be recorded; counts or density estimates, shell length for all creeper, triangle floater, or other uncommon species, habitat description, photographs, survey method and duration, GPS coordinates of study area.

Mussel Survey

Written report will include:

- Maps showing survey sites and high-quality habitat
- Raw data and summary statistics
- Photographs
- Summary of possible effects of maintenance drawdowns on freshwater mussels and habitat

Fish Entrainment Study

Fish Entrainment Study

Requested by: NHFGD, adopted with modification

Goal

- Assess the potential for entrainment and mortality of fishes at all GLHA and CRP projects

Objectives

- Describe the configuration of the intake at the six GLHA projects and two CRP projects, including the forebay characteristics, size of the intakes, trash rack spacing and extent of coverage of the intakes, approach velocities and the influence of trash rack debris and cleaning protocols;
- Assess entrainment and turbine survival that may result from passage through the project turbines for the four most abundant resident fish species known to occur in the Androscoggin river project areas and for stocked salmonids.

Fish Entrainment Study

Physical characteristics to be evaluated

- Trashrack configuration and clear spacing
- Hydraulic capacity and operating modes
- Maximum intake velocity (feet per second) in front of trashracks under a range of operating conditions.
- Debris accumulation and handling
- Alternate existing routes for spillage and downstream passage via gates, sluices
- Turbine characteristics (e.g., turbine type and orientation, revolutions per minute, number of turbine blades or buckets, peripheral runner velocity, head, and runner diameter)

Fish Entrainment Study

Biological characteristics to be evaluated

- Applicable life history information for each species (reproduction, length, body width and burst swim speed for juvenile and adult life stages)
- Habitat preferences
- Proclivity to migrate
- Applicable species- or family-specific turbine survival data (obtained from scientific literature such as Franke, et al., 1997, EPRI, 1997, and other gray literature)

Fish Entrainment Study

Analysis

- For each month, to address seasonal cycles, possible entrainment loss risk for juveniles and adults of each target species would be ranked as high, moderate or low according to
  - Swim speed
  - Body size
  - Likelihood of volitionally entering the intake zone
- Turbine survival will be estimated from results obtained in literature from past survival studies.

Next Steps

Next Steps

- Stakeholders file comments on Proposed Study Plan by April 6, 2020
- Licensee files Revised Study Plan by May 6, 2020
- Stakeholders file comments on RSP by May 21, 2020
- FERC issues Study Plan Determination by June 5, 2020
- Study Dispute Resolution Process, if necessary, June 25, 2020 –September 3, 2020
- Begin studies in summer 2020

Planned Study Schedule

Resource	Study	Estimated Start Date	Estimated Completion Date
Water Resources	Water Quality and Bypass Reach Minimum Flow Confirmation Study	July 2020	September 2020
Botanical Resources	Botanical Reconnaissance Level Survey	June 2020	October 2020
Recreation Resources	Recreation Use and Facility Assessment Study	May 2020	September 2020
Cultural Resources	Historical Architectural Survey	June 2020	December 2020
Aquatic Resources	Mussel Survey	June 2020	September 2020
Aquatic Resources	Fish Entrainment Modeling	No field work anticipated	

Questions?

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