Date: 03-May-2024

FROM: Green Lake Water Power Company

TO: Public Files for the Green Lake Hydroelectric Project (FERC No. 7189-015)

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SUBJECT: Updated List of Threatened, Endangered, Candidate, and Proposed Species Generated by ECOS-IPaC Website on March 26, 2024

Introduction:

This document contains Green Lake Water Power Company (GLWP) comments on the Federal Energy Regulatory Commission (FERC) Memorandum (Memorandum) of 26-Mar-2024 (Accession #: 20240326-3035) with respect to the Green Lake Hydroelectric Project (Project). The Memorandum contains the *Updated List of Threatened, Endangered, Candidate, and Proposed Species Generated by ECOS-IPaC Website on March 26, 2024.*

The opening paragraph of the Memorandum states FERC staff accessed U.S. Fish and Wildlife Service's (USFWS) ECOS-IPaC "to generate an official list of federally threatened, endangered, candidate, and proposed species, and designated or proposed critical habitats that may occur within the boundary of or be affected by the licensing of the Green Lake Hydroelectric Project. […] Designated critical habitat for Atlantic salmon occurs within the project boundary." GLWP believes this statement is incorrect—Green Lake and Reeds Brook do not meet the necessary criteria to be critical habitat for Atlantic salmon, either now or historically.

Reeds Brook and Green Lake are not critical habitat for Atlantic salmon:

50 CFR 226.217[1] designates "Critical habitat for the Gulf of Maine Distinct Population Segment of Atlantic Salmon (Salmo salar)." It starts out:

> "Critical habitat is designated to include all perennial rivers, streams, and estuaries and lakes connected to the marine environment within the range of the Gulf of Maine Distinct Population Segment of Atlantic Salmon (GOM DPS), except for those particular areas within the range which are specifically excluded. Within the GOM DPS, the primary constituent elements (PCEs) for Atlantic salmon include sites for spawning and incubation, sites for juvenile rearing, and sites for migration. The essential physical and biological features of habitat are those features that allow Atlantic salmon to successfully use sites for spawning and rearing and sites for migration. These features include substrate of suitable size and quality; rivers and streams of adequate flow, depth, water temperature and water quality; rivers, streams, lakes and ponds with sufficient space and diverse, abundant food resources to support growth and survival; waterways that allow for free migration of both adult and juvenile Atlantic salmon; and diverse habitat and native fish communities in which salmon interact with while feeding, migrating, spawning, and resting."

[1] https://www.ecfr.gov/current/title-50/chapter-II/subchapter-C/part-224/section-224.101 and https://www.ecfr.gov/current/title-50/chapter-II/subchapter-C/part-226/section-226.217

Reeds Brook is not a perennial stream, and it has not been one historically, since around the last ice age, as described below. Reeds Brook does not naturally and historically have sites for migration. It is not historically, or practically, one of the "waterways that allow for free migration of both adult and juvenile Atlantic salmon".

The Project boundary is within the overall Union River watershed, and therefore is within a large area that has been designated as critical habitat for Atlantic salmon. 50 CFR 226.217, Section (b)(3) states:

> "Within the GOM DPS, the primary constituent elements (PCEs) for the conservation of Atlantic salmon include sites for spawning and incubation, sites for juvenile rearing, and sites for migration. The physical and biological features of the habitat that are essential to the conservation of Atlantic salmon are those features that allow Atlantic salmon to successfully use sites for spawning and rearing and sites for migration. These features include:
>
> […]
>
> "(viii) Freshwater and estuary migratory sites free from physical and biological barriers that delay or prevent access to spawning grounds needed to support a recovered population;"

Reeds Brook is an intermittent stream whether the dam exists or not. Green Lake, since it is connected downstream by Reeds Brook, would not be historical, nor practical, habitat for Atlantic salmon. Reeds Brook does not meet the criteria for designation as a migratory route. Even if fish passage were present at the Green Lake dam, Green Lake (being upstream of a non-functional migration route) would play little, if any, role in supporting a recovered population of Atlantic salmon.

Reeds Brook is an intermittent stream, not a perennial stream:

When the Project was being researched, as part of the early work for the initial licensing, the US Department of the Interior pointed out that Reeds Brook is an intermittent stream[2]. However, it is not clear from the DOI statement whether that condition was believed to be because of the Hatchery flow or if it had been true historically.

A flow analysis was performed as part of a US National Marine Fisheries Service study dispute. This analysis showed that summer flows at the Project are very low[3]. However, that flow analysis did not take evaporation into account. The basis of the flow values at the Project is flow data from USGS Gauge No. 01021480 on Old Stream near Wesley, Maine, scaled by the ratio of the drainage areas.

The Old Stream watershed, above the USGS gauge, does not contain any lakes, so it would not be influenced by lake surface evaporation. All significant Project flows come through Green Lake, so evaporation will affect available Project flows significantly during the summer months. An evaporation analysis was performed for Green Lake, as described in Appendix A below. The details of this analysis are contained in a page of the overall flow analysis spreadsheet that is

[2] Accession # 20240422-5314 – 19810930 DOI Memo re Green Lake Project
[3] Accession # 20200320-5152(34027600) – GLWP NMFS Dispute Letter – Appendix B

being filed with this document. Table 1 contains the estimated evaporation equivalent flows from evaporation at Green Lake during the summer months.

Green Lake Evaporation Equivalent Flows by Summer Month						
Month	May	June	July	August	September	October
Flow - cfs	18.43	19.46	20.79	18.01	12.83	7.05

Table 1: Estimated Green Lake evaporation equivalent flows.

A detailed flow analysis for the Project, that includes evaporation, is described in Appendix A. This flow analysis looked at daily flow values for 1998 through 2023 for the months May through October. Over 50% of the July, August, and September days are predicted to have no available flow. When Hatchery flows are included, the numbers get worse. When fish passage flows are considered, fully 95% of days in August and 91% of the days in September do not have available flow. Table 2 contains a summary of results from the daily flow analysis.

	May	June	July	August	September	October
Count of Daily Values	775	750	775	806	780	806
Percent <0 cfs	0.5%	12.9%	52.4%	62.3%	52.6%	13.6%
Percent < 1 cfs	0.5%	14.3%	54.3%	64.0%	56.3%	16.0%
Percent <(Hatchery+1) cfs	1.7%	31.9%	66.8%	77.4%	76.8%	41.2%
Percent <(Hatchery+25) cfs	16.1%	59.2%	81.9%	89.8%	86.4%	61.8%
Percent <(Hatchery+50) cfs	37.8%	73.5%	89.4%	95.2%	91.2%	71.8%

Table 2: Percentage of days within each month target flows would not be met.

The flow analysis also determined what percentage of years would have periods of zero flow during each summer month. The flow analysis shows that 52% of the Junes and 30% of the Octobers had one or more days with zero available flow. For July through September, 76%, 88%, and 88% had one or more (often many) days with no available flow. Only 2 of the 26 years examined have no days of zero flow. Clearly, Reeds Brook would historically go dry during some period most summers. Reeds Brook is intermittent during normal summers, not just during summers with abnormally low precipitation.

Month		May	June	July	August	Sept.	October
Count of 0-flow days	1998	0	0	0	31	30	0
	1999	0	11	30	28	16	0
	2000	0	0	5	31	25	5
	2001	0	4	31	31	29	23
	2002	0	0	23	31	29	16
	2003	0	1	31	29	30	0
	2004	0	2	13	5	1	0
	2005	0	0	9	20	7	0
	2006	0	0	0	6	3	0
	2007	0	5	25	31	30	11
	2008	0	5	22	7	13	0
	2009	0	0	0	9	11	0
	2010	4	6	29	31	22	0
	2011	0	3	25	2	8	0
	2012	0	0	22	23	15	0

	2013	0	0	0	0	0	0
	2014	0	0	0	0	6	0
	2015	0	0	2	4	5	0
	2016	0	9	29	31	30	19
	2017	0	0	25	31	30	24
	2018	0	10	20	31	28	1
	2019	0	0	0	13	0	0
	2020	0	14	27	31	30	11
	2021	0	20	11	19	1	0
	2022	0	7	27	27	11	0
	2023	0	0	0	0	0	0
Years with some flow <=0		1	13	19	23	23	8
Count years studied		25	25	25	26	26	26
Pct. years /0-flow days		4.0%	52.0%	76.0%	88.5%	88.5%	30.8%

Table 3: Yearly zero flow day counts and percentages.

Details on the data and calculations behind these tables are in the spreadsheet filed with this document[4]. The flow analysis methodology is described in Appendix A below.

GLWP experiences low flows during most summers. Little or no water can be used from Green Lake for power generation during most summer months. GLWP analyzed lake levels, generation run times, and precipitation levels for the 10 year period from 2011 through 2020. Project records show that six of these ten years inadequate flow was available at Green Lake to maintain the summer lake levels, maintain the minimum flow of 1 cfs into Reeds Brook, and provide the needed Hatchery flows, despite not running the turbine.[5]

The Green Lake National Fish Hatchery (Hatchery) water supply depends on the Project:

The Hatchery gets its water supply from Green Lake. Per 74 FR 29344[6] the conservation population of Atlantic salmon at the Hatchery is included in the endangered species listing for the Gulf of Maine Distinct Population Segment of Atlantic salmon. The Project plays an important role in the protection of the Hatchery's water supply. Restrictions are included in the Project license as to water levels, use of water, and operation of the Green Lake dam. Without various aspects of the Project, especially relating to the presence and operation of the dam, the Hatchery loses these protections to the safety and security of its water supply. GLWP believes that any evaluation of Project actual or potential effects on Atlantic salmon and other fish must include the benefits the Project provides to the Hatchery.

The presence of landlocked salmon in Green Lake may be misleading:

The presence of landlocked salmon does not indicate that Green Lake was historic habitat for anadromous Atlantic salmon in any recent period. Some areas in Maine have landlocked Atlantic salmon with unrestricted migratory paths to and from the ocean. Other landlocked

[4] Flow Analysis spreadsheet – filed with this submission.
[5] Accession # 20230706-5117 - GLWP response to the MDMR comments on the FLA – Appendix C
[6] https://www.federalregister.gov/documents/2009/06/19/E9-14269/endangered-and-threatened-species-determination-of-endangered-status-for-the-gulf-of-maine-distinct

salmon were created when land levels rebounded after the retreat of the last ice age.[7] That is what happened at Green Lake.

As the last ice age ice retreated in Maine about 14,000 years ago, the land that had been depressed by the glacier went through the process of rebounding, and the sea-level (relative to the land level at that time) in coastal Maine reached about 230 feet above the current relative level. As this occurred, the area that is now Green Lake would have been about 65 feet below the surface of the ocean. As the land rebounded over the next 3000 years or so, Green Lake would have risen to about 335 feet above sea level as glacier melt raised ocean levels worldwide. Eventually, over the next 10,000 years, Green Lake ended up at its current (pre-dam) level of about 155 feet above sea level as the land continued to rise.[8] This progression, over thousands of years, would have provided ample opportunity for Atlantic salmon and Arctic charr to become landlocked in Green Lake despite the lack of an effective migration path for the last 10,000 or more years.

Clearly, the current Green Lake conditions, with or without a dam, do not reflect the conditions that existed at the lake when it was below sea level nor when it first rose above sea level. Landlocked salmon have been in Green Lake since before 1868.[9] This strongly suggests that Atlantic salmon were not landlocked by the construction of the dam on Green Lake. Given the drastic nature of the transformation from being an anadromous species to a fresh water only species, it is unlikely that this would occur during the short period of time involved in dam construction.[10]

The USFWS report does not acknowledge the presence of the Hatchery:

The report section titled: ***USFWS NATIONAL WILDLIFE REFUGE LANDS AND FISH HATCHERIES*** states: "THERE ARE NO REFUGE LANDS OR FISH HATCHERIES WITHIN YOUR PROJECT AREA." This is incorrect. About 2 acres within the Project boundary are on the land of the Green Lake National Fish Hatchery.

Conclusion:

The Green Lake project area is not critical habitat for Atlantic Salmon per 50 CFR 226.217.[11]

GLWP believes viewing the Project area just as "in the Union River watershed" does not provide the understanding needed to reach valid conclusions as to the effects the Project has on the various diadromous and resident species. Evaluating the situation with these species scientifically and objectively with regard to the Project requires both a detailed knowledge of the physical and hydraulic aspects of the Project, as well as of the biology of the species.

Following "everybody knows" reasoning, rather than scientific reasoning, is very likely to damage resident fish species in Green Lake, some of which are unusual and historic in nature, as

[7] (Hutchings J. et al, 2019) – Life-history variability and conservation status of landlocked Atlantic salmon: an overview https://cdnsciencepub.com/doi/10.1139/cjfas-2018-0413

[8] Maine's History of Sea-Level Changes, Kelley J. et al, 1996 https://www11.maine.gov/dacf/mgs/explore/marine/facts/sealevel.pdf

[9] Landlocked Salmon, Maine Department of Inland Fisheries & Wildlife, Copyright 2024 https://www.maine.gov/ifw/fish-wildlife/fisheries/species-information/landlocked-salmon.html

[10] (Hutchings J. et al, 2019) – Life-history variability and conservation status of landlocked Atlantic salmon: an overview https://cdnsciencepub.com/doi/10.1139/cjfas-2018-0413

[11] https://www.ecfr.gov/current/title-50/chapter-II/subchapter-C/part-224/section-224.101

well as to hamper the Hatchery in its mission to protect the endangered Atlantic salmon. At the same time, an unscientific approach to fish at the Project is likely to consume valuable resources for all involved, while not actually helping the target species.

APPENDIX A

GREEN LAKE DETAILED FLOW ANALYSIS

This appendix discusses the methodology used for the analysis of the flow available at Green Lake during the different months of the year. The numeric details of the analysis are included in a spreadsheet that has been filed with this document.[12]

Green Lake Evaporation:

The first stage of the analysis determined an estimate of the effects of evaporation during the summer at Green Lake. This was done by consulting a National Weather Service (NWS) document *Mean Monthly, Seasonal, and Annual Pan Evaporation for the United States.*[13] Two Maine sites are recorded in the NWS document: New Gloucester, ME and Caribou, ME. The historic Class A Evaporation Pan average readings for the months of May through October at the two sites were gotten from Table 1 in the NWS document. Green Lake is between the two Maine sites, so the readings were averaged to get estimated pan evaporation readings by month for Green Lake.

Another NWS document, *Evaporation Atlas for the Contiguous 48 United States*[14]*,* was referenced to convert from measured pan evaporation to an estimate of lake evaporation. Map 4 in the document, *Map of Coefficients to Convert Class A Pan Evaporation to Free Water Surface Evaporation*, shows that the coefficient to use in the Green Lake area is approximately 78.5%.

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[12] Flow Analysis spreadsheet – filed with this submission.
[13] NOAA Technical Report NWS 34, Mean Monthly, Seasonal, and Annual Pan Evaporation for the United States, 1982 – https://www.weather.gov/media/owp/oh/hdsc/docs/TR34.pdf
[14] NOAA Technical Report NWS 33, Evaporation Atlas for the Contiguous 48 United States, 1982 – https://repository.library.noaa.gov/view/noaa/55711

Using the coefficient and the average pan reading for the two Maine sites, an estimate of the monthly Green Lake evaporation drop was calculated. Using the summer lake area, this drop was used to calculate the cubic-ft of water evaporated from Green Lake each month. Dividing by the number of seconds in each month gave the flow in cubic-ft per seconds (cfs) equivalent to the estimated evaporation at Green Lake. The estimated evaporation values at Green Lake are given in Table 1 in the main section of this document above.

Daily Summer Green Lake Flows:

During the flow analysis for Exhibit E of the Green Lake Project FLA, USGS flow gauge site No. 01021480 on Old Stream near Wesley, Maine was used to estimate flows into Green Lake. It was determined that the drainage area above the Old Stream gauge had similar characteristics and weather to the drainage area upstream of Green Lake[15]. Daily values from the gauge for 1998 through 2023 are available on a USGS site[16]. These values were retrieved for the months of May through October each year and entered into a spreadsheet organized by month. To scale values to the Green Lake watershed they were multiplied by 1.615, which is the ratio of the Green Lake drainage area to the Old Stream drainage area above the USGS gauge. The equivalent monthly evaporation flows, as described above, were subtracted from the scaled daily flow values. This resulted in an estimate of the daily summer inflows to Green Lake for 1998 through 2023.

Comparisons were performed of the estimated daily flows against various target flows to determine the percentages of days within each month each target flow was not met. These results are presented in detail in the spreadsheet and in Table 2 above.

Counts were also done by month and year to determine what percentage of the years studied had no available flow for some number of days within a given month. Table 3 above contains yearly zero flow day counts and year percentages by month.

[15] Accession No. 20220912-5163 - Green Lake Project FLA, Exhibit E, Section 5.3, Aquatic Resources
[16] Historical data for: USGS Gauge No. 01021480, Old Stream near Wesley, Maine – https://waterdata.usgs.gov/monitoring-location/01021480/