EXHIBIT 1

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION
17 STATE HOUSE STATION AUGUSTA, MAINE 04333-0017

DEPARTMENT ORDER

IN THE MATTER OF

BLACK BEAR HYDRO PARTNERS, LLC Ellsworth, Mariaville, Waltham, Fletchers Landing, Hancock County ELLSWORTH HYDROELECTRIC PROJECT #L-13256-33-L-N DENIAL	MAINE WATER QUALITY PROGRAM; FEDERAL CLEAN WATER ACT DENIAL OF WATER QUALITY CERTIFICATION

Pursuant to the provisions of 38 M.R.S. §§ 464 *et seq*., Section 401 of the Clean Water Act, 33 U.S.C. §§ 1251 *et seq*. (formerly known as the Federal Water Pollution Control Act) (CWA), Department Rules, including 06-096 CMR Chapters 579-581, the Department of Environmental Protection (Department) has considered the application of BLACK BEAR HYDRO PARTNERS, LLC (Applicant) with all supporting data, agency review comments, public review comments, and other related materials in the administrative record. Based on the record evidence and the Department's professional experience, judgment, and expertise, the Department makes the following findings of fact, determinations, and conclusions:

1. APPLICATION SUMMARY

A. Application: On March 21, 2019, the Applicant submitted an application to the Department for Water Quality Certification (WQC) pursuant to Section 401 of the CWA for the proposed relicensing and continued operation of the existing Ellsworth Hydroelectric Project, Project P-2727 (the Project or Ellsworth Project) located on the Union River in the towns of Ellsworth, Mariaville, Waltham, and Fletchers Landing, Hancock County, Maine.

B. Background: A WQC application was submitted to the Department on April 9, 2018 establishing a statutory 1-year deadline of April 8, 2019 for the Department to complete its certification review and issue its decision. Of their own accord in response to a November 2018 draft Environmental Assessment by FERC and comments from resource agencies and others, on March 21, 2019 the Applicant withdrew its WQC application and, also on March 21, 2019, filed a new WQC application with new application fees, requesting a new Department review of the substantially different drawdown regime and revised downstream minimum flows for the Graham Lake impoundment detailed in its new application. This application was accepted for processing on April 2, 2019, establishing a 1-year statutory deadline of March 20, 2020.

C. History: The Department finds that the Ellsworth Project is comprised of two Dams, constructed by the Bar Harbor and Union River Power Company. The lower

Ellsworth Dam (Ellsworth Dam) was completed in 1907 and forms both a small, riverine impoundment (Leonard Lake) and the upper limit of tidal influence in the Union River. The Project's upper Dam (Graham Lake Dam) forms a larger impoundment (Graham Lake) and was completed in 1924 as a storage reservoir, replacing the Brimmers Bridge earthen dam following its failure during a flood in 1923. The Project was initially licensed by the Federal Energy Regulatory Commission (FERC) in 1977 and was relicensed by FERC in 1987 to Bangor Hydroelectric Company for continued operations.

D. Existing Project Features: The Department finds that the Project currently consists of two dams, Graham Lake Dam and Ellsworth Dam, and their respective impoundments, Graham Lake and Leonard Lake. Graham Lake Dam includes a downstream fish passage facility; the Ellsworth Dam includes a vertical slot fishway and fish trap to provide upstream fish passage and a facility for commercial harvest of river herring, and a downstream fish passage feature. Each dam also contains appurtenant features, including cranes, trash racks and other equipment necessary for day-to-day operations and maintenance.

1) Project Dams. The Department finds that the Ellsworth Dam is a concrete buttress, ambursen-style dam, which was partially filled with concrete in the early 1990's. The Ellsworth Dam is between 57 and 60 feet high (the majority of the Dam is reported to be 57 feet high) and 377 feet long, comprised of a 275-foot-long concrete overflow spillway section with 1.7-foot-high flashboards; a 102-foot-long, 60-foot-high concrete bulkhead section with a 15-foot-wide by 10-foot-high headgate and 15-foot-wide, 12.5-foot-high trashrack with 2.44-inch spacing; and an 87-foot-long, 60-foot-high concrete dam section with an apron at its base that terminates on a bedrock ledge, visible at low tide. The intake structure is located on the west end of the bulkhead structure and includes two 15-foot-wide, 15-foot-high headgates with 15-foot-wide 13.75-foot-high trashracks with one-inch clear spacing for approximately 6.75 vertical feet of the trashrack and 2.37-inch clear spacing for the lower seven feet. A third intake structure is a 12-foot-wide, 15-foot-high headgate with a 15-foot-wide, 15.75-foot-high trashrack with one-inch clear spacing for the upper 6.75 feet of the trashrack and 2.37-inch clear spacing over the lower nine feet. The Ellsworth Dam has an 85-foot-long, 71-foot-high concrete non-overflow wall, located perpendicular to the dam on the west end of the bulkhead, and a 26-foot high abutment at the east end of the spillway. The non-overflow section contains an integral powerhouse and adjacent second powerhouse, with four penstocks to deliver water to four turbine generators.

Further, the Department finds that the Graham Lake Dam is a non-generating dam, located approximately four miles upstream of the Ellsworth Dam. Graham Lake Dam consists of a 630-foot-long earthen and concrete structure, with a flood control structure immediately downstream of the dam. The Graham Lake Dam consists of a 58-foot-high, 80-foot-long concrete spillway section with a crest elevation of 104.2 feet NGVD29[1], three 20-foot-wide, 22.5-foot-high Tainter gates, a 4-foot-wide overflow weir controlled with stoplogs positioned inside an 8-foot-wide sluice gate, and a 550-foot-long, 45-foot-high earthen embankment section with a concrete and sheet pile core wall. The eight-foot-wide sluice has been retro-fitted with an Alden weir, to provide downstream fish passage. The flood control structure, located on the downstream side of the earthen embankment, consists of a concrete flood wall that is approximately 720 feet long and 58 feet high, a 65-foot diameter, 55-foot-high stone-filled sheetpile, retaining structure, and a 71-foot-long, 36.5-foot-high concrete wing wall extension that connects to the gate structure and serves as an emergency overflow spillway.

2) Project Impoundments. The Department finds that the Ellsworth Project has a drainage area of approximately 547 square miles. The Ellsworth Dam impounds a small portion of the Union River creating the area referred to as Leonard Lake, which has a surface area of 90 acres at its normal maximum elevation of 66.7 feet, and a length of one mile. Normal water elevations in Leonard Lake range between 65.7 feet and 66.7 feet, and at full pond, the shoreline measures 4.4 miles. With only one foot of allowable water fluctuation, Leonard Lake has 2,456 acre-feet of usable storage; the Applicant reports gross storage as 0.107 billion cubic feet of water. (Although commonly referred to a Leonard Lake, as discussed below, this impounded section of the Union River is classified as being part of the main stem of the river.)

The Department further finds that the reservoir at Graham Lake has a normal maximum surface area of approximately 10,000 acres and a maximum length of approximately 10 miles at a normal maximum surface elevation of 104.2 feet. The shoreline of Graham Lake at its normal maximum water surface elevation is approximately 80 miles, not including islands. Water levels at Graham Lake are managed between 93.4 feet and 104.2 feet and provide a usable storage capacity of 133,150 acre-feet; the Applicant reports gross storage as approximately 5.4 billion cubic feet of water. Water is drawn down in summer and fall and more extensively in winter months, providing significant flood control benefits.

[1] All elevations in this document are based on information provided by the applicant and are relative to National Geodetic Vertical Datum 1929.

Drawdown of Graham Lake also provides flow augmentation during dry periods, to provide minimum flows to the Union River between the two Project dams.

3) Penstocks. The Department finds that the Ellsworth Project includes four penstocks and four turbine-generators at the Ellsworth Dam. Turbine-generator Unit No. 1 receives flow from Lake Leonard through a 10-foot-diameter, 74-foot-long vertical penstock to the single 2.5 megawatt (MW) turbine-generator located in Generating Facility No. 1. Flow from Leonard Lake is also conveyed through an 88.4-foot-wide intake structure via three parallel penstocks, including an 8-foot-diameter by 164-foot-long penstock, an 8-foot-diameter by 195-foot-long penstock, and an 8-foot-diameter by 225-foot-long penstock, to a second powerhouse containing two 2.0 MW turbine-generator units (Units 2 and 3), and on a 2.4-MW turbine-generator unit (Unit 4).

4) Powerhouse. The Department finds that the Project contains two powerhouses at the Ellsworth Dam. Generating Facility No. 1 is integral to the Ellsworth Dam and is a 26-foot-long, 28-foot-wide concrete and masonry powerhouse. The powerhouse contains one turbine-generator unit with a total rated generating capacity of 2.5 MW at a normal operating head of 66.7 feet. Generating Facility No. 2, located adjacent to the original powerhouse, is a 52.5-foot-long, 68-foot-wide concrete and masonry structure that is attached to a 15-foot-long, 30-foot-wide switch house, and contains three turbine-generator units with total generator rating capacity of 2 MW, 2 MW and 2.4 MW (respectively for Units 2, 3, and 4); the total nameplate rated capacity of the Ellsworth Project is 8.9 MW. The Ellsworth Dam provides an average annual energy output of 30,511 megawatt-hours (MWh) at a plant factor of 39% between 1994 and 2014. The total hydraulic capacity of the facility is 2,460 cubic feet per second (cfs).

5) Bypass. The Department finds that no generating facilities are present at the Graham Lake Dam, and the powerhouses for the Ellsworth Project are integral to the Ellsworth Dam and adjacent to its toe; therefore, there is no bypass reach at either of the Project dams.

6) Fish Passage Facilities. The Department finds that some fish passage facilities are present at both the Ellsworth Dam and the Graham Lake Dam.

a. Downstream Fish Passage Facility. The Department finds that downstream fish passage at the Ellsworth Dam is provided for Atlantic salmon and river herring. Downstream passage is provided by operation of three 3-foot-wide surface weirs, one located between the

Generating Facility No. 1 intake and the overflow spillway and two located on either side of the Generating Facility No. 2 intake. A recirculating pump returns 28 to 35 cfs of the 40 cfs conveyance flow from the two western surface weirs at Generating Facility No. 2 to attract fish to the downstream facility. A 48-inch-wide spillway flume with a hardened plastic bottom and 18-inch-high steel sidewalls uses a 16 cfs conveyance flow to move fish from the eastern surface weir at Generating Facility No. 1 down the face of the spillway into the Union River which, depending on tides, can vary in depth from a natural plunge pool to exposed bedrock ledge. A 30-inch-diameter downstream migrant pipe, that uses a 12 cfs conveyance flow during normal operation transports fish from the western surface weirs located adjacent to the Generating Facility No. 2 intake and moves them across the downstream face of the non-overflow section of the Dam to the spillway flume. Downstream passage at the Graham Lake Dam is provided by normal operation of the three 20-foot-wide Tainter gates and a 4-foot-wide by 7.5-foot-deep surface-oriented bypass, located on the west end of the spillway. Flows from the surface bypass weir and Tainter gates discharge into an approximately 9.5-foot-deep natural plunge pool in the Union River below the Dam. Eels are known to use these facilities for passive downstream passage at Graham Lake Dam.

b. Upstream Fish Passage. The Department further finds that upstream fish passage is provided at the Ellsworth Dam by a 120-foot-long, 8-foot-wide vertical slot fishway with a 3-foot-wide opening and collection station (trap). The upstream fish passage facility is operated under a cooperative agreement between the Maine Department of Marine Resources (MDMR) and the City of Ellsworth as a commercial harvest facility, as well as for collection and upstream distribution of alewives within the Union River watershed.

E. Existing Project Operation: The Department finds that the Ellsworth Project operates as a water storage facility and as a peaking generation facility depending on available inflows and storage, while providing minimum flow to the Union River between the Graham Lake Dam and the Ellsworth Dam. The Project is comprised of two developments, including the Graham Lake Development and the Ellsworth Development. The Graham Lake development consists of the Graham Lake Dam and an approximately 10,000-acre storage reservoir, with an allowable annual operating range of 10.8 feet, between the elevations of 104.2 feet and 93.4 feet. The Ellsworth Development, located

on the Union River, operates in a run-of-river mode with pond level control. Timed releases at Graham Lake are used at Ellsworth Dam for power production and may result in minor (up to but not greater than a 1-foot change) surface elevation changes in Leonard Lake. The Union River has an annual average flow of 958 cfs. Current license requirements include a continuous minimum flow of 105 cfs from the Graham Lake Development and the Ellsworth Development from July 1 through April 30, and 250 cfs from May 1 through June 30, annually. Minimum flows to the Union River between the Graham Lake and Leonard Lake Developments are maintained during dry inflow periods through drawdown of Graham Lake. During periods of high flows (typically in spring and fall), the Ellsworth Project generates at full capacity, up to 24 hours per day. The ability to store large volumes of water in spring at Graham Lake provides valuable flood control and protection to the City of Ellsworth by managing water levels through dam operation, to minimize risk and flood Damage.

F. Proposed Operations and Protection, Mitigation and Enhancement Measures: The Applicant proposes the following:

G. Proposed Minimum Flows: Except as temporarily modified by the Department for (1) approved maintenance activities, (2) extreme hydrologic conditions[2], or (3) emergency electrical system conditions[3], or by the Department pursuant to (4) an agreement between the licensee, the Department, and appropriate state and/or federal fisheries management agencies, the Applicant proposes to release a continuous minimum flows of 105 cfs from January 1 to March 31, 125 cfs from April 1 to April 30, 250 cfs from May 1 to June 30, and 125 cfs from July 1 to December 31, annually, from the Graham Lake Development and the Ellsworth Development.

H. Proposed Impoundment Water Levels: The Ellsworth Project is operated automatically via a programmable logic controller (PLC) system. The PLC system monitors and controls Project operations including headpond levels at both Graham Lake and Leonard Lake. Except as temporarily modified by the Department for (1) approved maintenance activities, (2) extreme hydrologic conditions, or (3) emergency electrical system conditions, or by the Department pursuant to (4) an agreement between the licensee, the Department, and appropriate state and/or federal fisheries management

[2] For the purpose of this WQC, extreme hydrologic conditions means the occurrence of events beyond the Applicant's control such as, but not limited to, abnormal precipitation, extreme runoff, flood conditions, ice conditions or other hydrologic conditions such that the operational restrictions and requirements contained herein are impossible to achieve or are inconsistent with the safe operation of the Project.
[3] For the purpose of this WQC, emergency electrical system conditions means are operating emergencies beyond the Applicant's control that require changes in flow regimes to eliminate such emergencies which may in some circumstances include, but are not limited to, equipment failure or other temporary abnormal operating conditions, generating unit operational or third-party mandated interruptions under power supply emergencies, and orders from local, state, or federal law enforcement or public safety authorities.

agencies, the Applicant proposes to operate the Project so that water levels in Leonard Lake are maintained between the elevations of 65.7 feet and 66.7 feet (flashboard crest) during normal operation, and water levels in Graham Lake are maintained between 104.2 feet and 98.5 feet.

I. Proposed Environmental Protection, Mitigation, and Enhancement Measures: The Applicant proposes to install upstream eel passage facilities at both the Ellsworth and Graham Lake dams within two years of the effective date of a new FERC license. Further, the Applicant proposes to relocate the Graham Lake canoe portage within two years of the effective date of a new FERC license.

2. JURISDICTION

The Department finds and determines that the proposed continued operation of the Project qualifies as an "activity…which may result in [a] discharge into the navigable waters [of the United States]" under the federal Clean Water Act, 33 USC §§ 1251 *et seq*. (CWA). Section 401 of the CWA requires that any applicant for a federal license or permit to conduct such an activity obtain a certification that the activity will comply with applicable State water quality standards and any other appropriate requirement of State law. The Department may approve a WQC pursuant to Section 401 of the CWA if the standards of classification of the water body and the State's antidegradation policy are met, or for a project affecting a waterbody in which the standards of classification are not met, if the project does not cause or contribute to the failure of the waterbody to meet the standards of classification. 38 M.R.S. § 464(4)(F)(3).

The Project is licensed by FERC as a water power project under the Federal Power Act (FERC Project No. 2727). The initial FERC license for the Project was issued on April 12, 1977, was determined by FERC to be effective as of January 1, 1938, and expired on December 31, 1987. A subsequent license to operate the facility was issued by FERC on December 29, 1987, and expired on December 31, 2018. Since then, the Applicant has continued operating the Project under an annual FERC license. The Applicant has also filed an Application for New License with FERC to continue to operate the Project for another 40 years. This application is currently pending before the FERC.

State WQC for the Project was last issued by the Board of Environmental Protection on April 22, 1987, in connection with installation of hydroelectric power generating facilities at the site of the Ellsworth Dam and FERC's relicensing of the Project that year. Under a 1996 Executive Order of the Governor of the State of Maine (Executive Order No. 3 FY 96/97), the Department is designated as the certifying agency for issuance of Section 401 WQC for all activities in the State not subject to Land Use Planning

Commission (LUPC) permitting and review, including all activities not wholly located within areas of LUPC regulatory jurisdiction. Therefore, the DEP is the certifying agency for the Project.

3. APPLICABLE STATE WATER QUALITY STANDARDS

A. Classification: The Department finds and determines that Graham Lake is an impounded waterbody located on the Union River in Ellsworth, Fletcher's Landing Township, Waltham, and Mariaville, and meets the definition of a great pond pursuant to 38 M.R.S. § 480-B(5), being an inland body of water artificially formed with a surface area in excess of 30 acres. Graham Lake is also specifically mentioned in Section 467(18), which establishes classification of the Union River, noting the river begins at the outlet of Graham Lake but does not include this lake. Therefore, the water classification of Graham Lake is Class GPA, pursuant to 38 M.R.S. § 465-A. Project waters downstream of Graham Lake on the main stem of the Union River are designated as Class B, including the Leonard Lake impoundment, which is considered part of the Union River pursuant to 38 M.R.S. § 467(18)(A)(1).

B. Designated Uses: The Applicant must demonstrate that Graham Lake and the Union River meet the following designated uses:

1) The Class GPA waters of Graham Lake must be of such quality that they are suitable for the designated uses of drinking water after disinfection, recreation in and on the water, fishing, agriculture, industrial process and cooling water supply, hydroelectric power generation, navigation, and as habitat for fish and other aquatic life, and the habitat must be characterized as natural. 38 M.R.S. § 465-A(1)(A).

2) The Class B waters of the Union River from the outlet of Graham Lake to tidewater, including Leonard Lake, must be of such quality that they are suitable for the designated uses of drinking water supply after treatment, fishing, agriculture, recreation in and on the water, industrial process and cooling water supply, hydroelectric power generation, except as prohibited under Title 12, section 403, navigation, and as habitat for fish and other aquatic life, and the habitat must be characterized as unimpaired. 38 M.R.S. § 465(3)(A).

C. Numeric Criteria: The Applicant must demonstrate that Graham Lake and the Union River meet the following numeric criteria:

1) The Class GPA waters of Graham Lake must have a stable or decreasing trophic state, subject only to natural fluctuations, based on measures of the chlorophyll-*a* content, Secchi disk transparency, total phosphorus and other appropriate criteria, and must be free of culturally induced algal blooms that impair their use and enjoyment. 38 M.R.S. § 465-A(1)(B). [4]

2) The dissolved oxygen (DO) content of the Class B waters of the Union River below the Graham Lake Dam, including in Leonard Lake, may not be less than 7 parts per million (ppm) or 75% of saturation, whichever is higher, except for that period from October 1st to May 14th, in order to ensure spawning and egg incubation of indigenous fish species, the 7-day mean DO concentration may not be less than 9.5 ppm and the 1-day minimum DO concentration may not be less than 8.0 ppm in identified fish spawning areas. 38 M.R.S. § 465(3)(B). [5] Compliance with DO criteria in existing riverine impoundments such as Leonard Lake must be measured in accordance with 38 M.R.S. § 464(13).

D. Narrative Criteria: The Applicant must demonstrate that Graham Lake and the Union River meet the following narrative criteria:

1) There may be no new direct discharge of pollutants into the Class GPA waters in Graham Lake. 38 M.R.S. § 465-A(1)(C). [6] In addition, the habitat of the Class GPA waters of Graham Lake must be characterized as natural. 38 M.R.S. § 465-A(1)(A).

However, certain existing hydropower impoundments managed as great ponds (such as the Graham Lake impoundment) are additionally subject to 38 M.R.S. § 464(9-A), which also governs habitat and aquatic life criteria for such waters. Under Section 464(9-A), and with certain specified exceptions that are not applicable here, all hydropower projects with impoundments in existence on June

[4] Numeric standards for GPA waters also include standards for the number of Escherichis coli (E-coli) bacteria. *See* 38 M.R.S. § 465-A(1)(B). However, the presence or operation of a dam generally does not implicate E-coli bacteria levels and absent affirmative evidence to the contrary, E-coli standards are generally not applied in the context of a water quality certification with respect to a hydropower project's operations.

[5] Numeric standards for Class B waters also include standards for the number of E-coli bacteria *See* M.R.S. § 465(3)(B). However, the presence or operation of a Dam does not implicate E-coli bacteria levels, and absent affirmative evidence to the contrary, E-coli standards are generally not applied in the context of a water quality certification with respect to a hydropower project's operations.

[6] Among other things, 38 M.R.S. § 465-A(1)(C) also states: "Discharges into these waters licensed prior to January 1, 1986 are allowed to continue only until practical alternatives exist. Materials may not be placed on or removed from the shores or banks of a Class GPA water body in such a manner that materials may fall or be washed into the water or that contaminated drainage may flow or leach into those waters, except as permitted pursuant to section 480-C. A change of land use in the watershed of a Class GPA water body may not, by itself or in combination with other activities, cause water quality degradation that impairs the characteristics and designated uses of downstream GPA waters or causes an increase in the trophic state of those GPA waters."

30, 1992, that remain classified as GPA after that date (such as Graham Lake) and that do not attain Class GPA habitat and aquatic life criteria must, at a minimum, satisfy the Class C aquatic life criteria contained in 38 M.R.S. § 465(4)(C). 38 M.R.S. § 464(9-A)(D). In addition, when the actual water quality of such impounded waters attains any more stringent characteristic or criteria of those waters' classification, that water quality must be maintained and protected. 38 M.R.S. § 464(9-A)(E).

2) Discharges to the Class B water of the Union River from the outlet of the Graham Lake Dam to tidewater, including the waters of Leonard Lake, may not cause adverse impact to aquatic life in that the receiving waters must be of sufficient quality to support all aquatic species indigenous to the receiving water without detrimental changes in the resident biological community. 38 M.R.S. § 465(3)(C). In addition, the habitat of Class B waters must be characterized as unimpaired. 38 M.R.S. § 464(3)(A).

However, certain existing hydropower impoundments managed under riverine classifications under 38 M.R.S. § 464 (such as the Leonard Lake impoundment) are additionally subject to 38 M.R.S. §464(10) in recognition of some changes to aquatic life and habitat that have occurred due to the existing impoundments of these projects. Under Section 464(10), Class A and B riverine impoundments (including Leonard Lake) are generally deemed to meet their habitat characteristics and aquatic life criteria if the impounded waters achieve the Class C aquatic life criteria of 38 M.R.S. § 464(4)(C), provided that no reasonable changes can be implemented to improve habitat and aquatic life that do not significantly affect existing energy generation capacity. 38 M.R.S. § 464(10)(A)-(B). In addition, when the actual water quality of water affected by this standard attains any more stringent characteristic or criteria under the waters' classification, that water quality must be maintained and protected. 38 M.R.S. § 464(10)(D).

3) The minimum Class C aquatic life criteria referenced by both the GPA and riverine impoundment standards pursuant to 38 M.R.S. § 464(9-A) & (10), as described above, provide, among other things, that discharges to such waters "may cause some changes to aquatic life, except that the receiving waters must be of sufficient quality to support all species of fish indigenous to the receiving waters and maintain the structure and function of the resident biological community."[7]

[7] 38 M.R.S § 465 (4)(C).

E. Antidegradation: The Department may only approve a WQC if the standards of classification of the waterbody and the requirements of the State's antidegradation policy will be met. 38 M.R.S. § 464(4)(F)(3). The Department may approve WQC for a project affecting a waterbody in which the standards of classification are not met if the project does not cause or contribute to the failure of the waterbody to meet the standards of classification. *Id.* The State's antidegradation policy also requires the maintenance and protection of existing in-stream water uses and the level of water quality necessary to protect those existing uses. 38 M.R.S. § 464(4)(F)(1), (1-A).

F. Department Rules: Attainment of water quality standards is also assessed through application of various Department regulations, including:

1) 06-096 Chapter 579: Classification Attainment Evaluation Using Biological Criteria for Rivers and Streams (Chapter 579). Criteria to quantify aquatic life standards for Classes AA, A, B, and C waters are defined in this chapter. The benthic macroinvertebrate community is used as a surrogate to determine conformance with statutory aquatic life standards, related statutory definitions, and statutory provisions for the implementation of biological water quality criteria that are provided in Maine's standards for classification of fresh surface waters. Methods described in this chapter are used to make decisions about classification attainment.

2) 06-096 Chapter 580: Regulations Relating to Sampling Procedures and Analytical Procedures (Chapter 580). This rule establishes standards whereby all sampling and analysis is to be performed according to accepted technical procedures for chemical and biological analysis.

3) 06-096 Chapter 581: Regulations Relating to Water Quality Evaluations (Chapter 581). These rules provide for the maintenance of stream and lake classifications without violations by computing capacity of the waters to break down waste and shows fish, wildlife, and organisms in the receiving water to migrate both up and downstream in an undisturbed section of river adjacent to the waste discharge outfall. In addition, a scale of 0-100 is established in order to measure the trophic state or degree of enrichment of lakes due to nutrient input.

4. DEPARTMENT ANALYSIS

A. Trophic State Storage Impoundment: 38 M.R.S. §§ 465(3)(A) & 465-A(1)(A)-(B). In order for the Graham Lake and Leonard Lake impoundments to meet their respective GPA and Class B designated use of recreation in and on the water, which

generally includes swimming, the Applicant must demonstrate that the trophic state of each of those Project impoundments is stable or decreasing and must be free of culturally induced algal blooms that impair their use and enjoyment.

A Class GPA waterbody, such Graham Lake, shall be considered to have a stable or declining trophic state unless it exhibits (1) a perceivable and sustained increase in its trophic state as characterized by its Trophic State Index or other appropriate indices, or (2) the onset of algal blooms. 06-096 Chapter 581(6)(C). The trophic state is the ability of water to produce algae and other aquatic plants and the trophic state of a body of water is a function of its nutrient content and may be estimated using the Maine Trophic State Index (TSI), which includes measurements of chlorophyll, phosphorus or Secchi disc transparency. 06-096 Chapter 581(6)(A). An algal bloom is defined as a planktonic growth of algae which causes Secchi disk transparency to be less than 2.0 meters. 06-096 Chapter 581 (6)(B). Where, as here, an applicant does not propose another acceptable method to demonstrate that riverine impoundments meet the designated use of recreation in and on the water, the Department, based on its professional expertise and judgment, utilizes a trophic state analysis under the guidelines found in Chapter 581. The Department did so here with respect to the Class B Leonard Lake impoundment[8] to determine whether algal blooms are present that could affect the use and enjoyment of the Project waters, in order to evaluate attainment of this criterion.

1) Existing Conditions. The Department finds that the Project is located in the Union River watershed and is comprised of Graham Lake, and a portion of the Union River, including Lake Leonard, in Hancock County. The Project creates two impoundments; Graham Lake is a large storage impoundment created by the Graham Lake Dam, and Leonard Lake is a smaller riverine impoundment created by the Ellsworth Dam and is adjacent to its associated power generation facilities. A continuous minimum flow of 250 cfs is released from May 1 through June 30, and 105 cfs is release from July 1 through April 30 for the protection of habitats in the Union River.

2) The Department finds that Lake Leonard has a surface area of approximately 90 acres at full pond, a width of up to 0.3 miles and a maximum length of approximately 1 mile and is specifically within the Class B stretch of

[8] While Chapter 581(6)(C) applies to Class GPA waters and does not expressly mention non-GPA riverine impoundments, the Department, where appropriate, utilizes Chapter 581's provisions to analyze the trophic state of such non-GPA impoundments in a similar way for purposes of evaluating applicable water quality standards, such as the designated use of recreation in and on the water. This has been done here because, based on the Department's professional expertise and judgment, as well as the size and nature of the Project's Class B Leonard Lake impoundment, the Department has determined that use of the trophic analysis outlined in Chapter 581 is appropriate for evaluating attainment of the designated use of recreation in and on the water for that non-GPA waterbody and no other trophic analysis for such non-GPA impoundments is expressly provided for by the Department's rules.

water from the outlet of Graham Lake to the tidewater as identified in 38 M.R.S. § 467(18)(A)(1). Leonard Lake contain approximately 751 acre-feet of water. The Ellsworth Project is operated in run-of-river mode, with as much as one foot of surface water elevation fluctuation.

3) The Department finds that Graham Lake is the storage reservoir formed by the Graham Lake Dam. Located approximately four miles upstream of the Ellsworth Dam, Graham Lake has a surface area of approximately 10,000 acres at normal full pond, a maximum width of 2.75 miles and a maximum length of approximately 10 miles. Graham Lake contains approximately 124,000 acre-feet of water. Graham Lake Dam is operated with an allowable annual operating range of 10.8 feet in order to supply water to Ellsworth Dam for power generation, where timed releases from Graham Lake are captured at Ellsworth Dam for power production.

4) Water Quality Data. The Department finds that the Applicant conducted water quality monitoring at three locations (north, central, and south) in Graham Lake and at one location in Leonard Lake. Trophic state sampling was performed twice per month for seven consecutive months, from April to October 2013. Sampling was conducted in accordance with water sampling protocols provided by the Department, and included Secchi disk transparency, temperature, and dissolved oxygen (DO) profiles, and total phosphorus, chlorophyll a, color, pH, and total alkalinity. DO-temperature profiles were collected at one-meter intervals. Total phosphorus, chlorophyll a, color, pH and total alkalinity were sampled as epilimnetic cores. Additional parameters, including color, pH, total alkalinity, total phosphorus, total sulfate, total iron, total manganese, total calcium, total magnesium, and total dissolved silica, were sampled by the Applicant on one occasion when the lakes were stratified (on August 28, 2013 at Graham Lake and August 22, 2013 at Leonard Lake). These late season samples were collected at three depths, the epilimnion, top of the hypolimnion, and bottom of the hypolimnion.

<u>Graham Lake</u>

The Department finds as follows: Water quality was sampled by the Applicant at Graham Lake between April 23 and October 24, 2013. Thermal stratification was first documented on June 27, 2013 and occurred at all three of the sampling stations in Graham Lake. Total Phosphorus is an indicator of nutrient enrichment and is measured in hydropower impoundments in conjunction with Chlorophyll-a to assess the trophic state of the waters. Total phosphorus ranged from 4.5 µg/L[9]

[9] Micrograms per Liter.

to 28 µg/L, with an average concentration of 17.4 µg/L at the north sampling station, 15.5 µg/L at the central sampling station, and 16.3 at the southern sampling station. The Department considers average total phosphorus above ≤15.0 µg/L for Class GPA waters in Maine to be elevated.

Chlorophyll-a is a measure of algae in the water column and can be an indicator or eutrophication. Chlorophyll-a concentrations measured in the impoundment ranged from 1.0 µg/L to 4.8 µg/L, with average concentrations of 2.4 µg/L at the northern sampling station, 2.2 µg/L at the central sampling station, and 2.3 at the southern sampling station. Average chlorophyll-a concentrations were below an average of ≤ 8 µg/L with no single value >10 µg/L, which the Department considers to be an acceptable concentration.

Secchi disk transparency ranged from 0.7 meters (2.3 feet) to 2.9 meters (9.5 feet), with average measurements of 1.7 meters (5.5 feet) at the northern and central sampling stations and 1.9 meters (6.2 feet) at the southern sampling station. The pH of impoundment water ranged from 6.37 to 6.91 and averaged 6.62 at the northern sampling station, 6.66 at the central sampling station, and 6.63 at the southern sampling station; all values were within the recommended range of 6.0 to 8.5 for Maine waters. Alkalinity is an indicator of the water's capacity to neutralize acids, or to buffer against changes in pH.[10] Alkalinity measured in the Graham Lake impoundment averaged 130 µeq/L[11] at the northern sampling station, 124.4 µeq/L at the central sampling station, and 120.2 µeq/L at the southern sampling station.

Color, an indication of water clarity, reflects the amount of dissolved organic acids and suspended solids in the water. Color in the Graham Lake impoundment ranged from 39 platinum cobalt units (PCU) to 121 PCU, with an average of 89.1 PCU at the northern sampling station, 73.7 PCU at the central sampling station, and 62.8 PCU at the southern sampling station. Concentrations of iron ranged from 558 to 593 µg/L in the epilimnion, with measurements of 1400 and 8940 µg/L at depths of 11 and 13 meters in the hypolimnion. Dissolved metals measured in the impoundment included calcium (2.26 to 2.52 µg/L in the epilimnion, and 2.32 and 3.19 µg/L in the hypolimnion), magnesium (0.62 to 0.64 µg/L in the epilimnion, and 0.65 and 0.76 in the hypolimnion), manganese (31 to 36 µg/L in the epilimnion, and 220 and 872 µg/L in the hypolimnion), sulfate (25 µg/L to 30 µg/L I the epilimnion, and 17 µg/L and 29 µg/L in the

[10] pH is a scale of acidity from 0 to 14; pH means potential of hydrogen and is a measurement of the activity of free hydrogen and hydroxyl ions in a solution. More acidic solutions have lower pH, and more alkaline solutions have higher pH. Substances that aren't acidic or alkaline (that is, neutral solutions) usually have a pH of 7.
[11] ueq/L is microequivalents per liter.

hypolimnion), and total dissolved silica (3.66 to 4.02 µg/L in the epilimnion, and 3.85 µg/L and 4.86 µg/L in the hypolimnion).

Leonard Lake

The Department finds as follows: Water quality was sampled at Leonard Lake between June 13 and October 24, 2013. Thermal stratification was first documented on July 11, 2013. Chlorophyll-a concentrations measured in the impoundment ranged from 1.2 µg/L to 3.4 µg/L, with average concentrations of 2.4 µg/L. Average chlorophyll-a concentrations were below an average of ≤ 8 µg/L with no single value >10 µg/L. Secchi disk transparency ranged from 1.5 meters (4.9 feet) to 2.5 meters (8.2 feet), with average measurements of 2.1 meters (6.9 feet).

The pH of impoundment water ranged from 6.617 to 6.79 and averaged 6.66; all values were within the recommended range of 6.0 to 8.5 for Maine waters. Alkalinity measured in the Leonard Lake impoundment ranged from 103.0 µeq/L to 153.0 µeq/L, averaging 124.4 µeq/L.

Color in the Leonard Lake impoundment ranged from 56.0 platinum cobalt units (PCU) to 92.0 PCU, with an average of 67.8 PCU. The concentration of iron measured 552 µg/L in the epilimnion with measurements of 2120 µg/L and 9010 µg/L at depths of 12 and 15 meters in the hypolimnion. Dissolved metals measured in the impoundment included calcium (2.17 µg/L in the epilimnion, and 2.92 and 3.64 µg/L in the hypolimnion), magnesium (0.59 µg/L in the epilimnion, and 0.66 and 0.77 in the hypolimnion), manganese (28 µg/L in the epilimnion, and 1240 and 1740 µg/L in the hypolimnion), sulfate (31 µg/L in the epilimnion, and 32 µg/L and 20 µg/L in the hypolimnion), and total dissolved silica (1.69 µg/L in the epilimnion, and 2.23 µg/L and 2.65 µg/L in the hypolimnion).

5) Applicant's Proposal. The Applicant proposes to operate the Project with seasonal minimum flows of 105 cubic feet per second (cfs) from January 1 to March 31; 125 cfs from April 1 to April 30; 250 cfs from May 1 to June 30; and 125 cfs from July 1 to December 31, annually. Further, the Applicant proposes to continue operating Graham Lake as a storage impoundment, with an annual water level fluctuation of 5.7 feet, between water elevations 98.5 feet and 104.2 feet, generally following historic operating curves targeting the largest drawdown at the end of March, in preparation of spring run-off conditions that peak in the month of May, followed by a gradual drawdown to a water level around 98 feet in early October, and then a partial refill to an approximate water level of 102 feet in January, followed by a winter drawdown. Water levels in Leonard Lake are

managed with minimal fluctuation year-round, between 65.7 and 66.7 feet and in a run-of-river operational mode, where inflow is essentially equal to outflow.

6) Discussion and Findings. Based on water quality studies conducted by the Applicant, the Department finds and determines that water in Graham Lake is impacted by phosphorus in concentrations exceeding an average of ≤15.0 µg/L; however, chlorophyll-*a* concentrations were found to be within acceptable ranges, suggesting that the phosphorus present in Graham Lake is associated with turbidity effects related to erodible bank substrate, shallow water depths, and wind and wave driven erosion. Water quality in both the Graham Lake and Leonard Lake impoundments do not show signs of eutrophication, with a low potential for nuisance algal blooms. An algal bloom is defined as a planktonic growth of algae which causes Secchi disk transparency to be less than 2.0 meters. Chapter 581. Chlorophyll-*a* concentrations in Graham Lake were found to be within nutrient limit criteria, indicating that the cause of reduced Secchi disk measurements in Graham Lake are not the result of algae growth, but are related to turbidity. No new direct discharges to Graham Lake were identified by the Applicant, and the Department has received no reports of new discharges to Graham Lake. Based on the information provided by the Applicant, the Department further finds and determines that the Project impoundments are free of culturally induced algal blooms which would impair its use or enjoyment. Therefore, in accordance with Chapter 581 and the exercise of the Department's professional expertise and judgment, the Department finds and determines that the trophic state of the Ellsworth Project is stable or is declining and its impoundments are suitable for swimming and for the designated use of recreation in and on the water. The Department further finds that there are no new direct discharges of pollutants to Graham Lake.

B. Aquatic Life and Habitat – Project Impoundments (38 M.R.S. § 465(3)(A), 38 M.R.S. § 465-A(1)(A); 38 M.R.S. § 464(9-A), (10); 38 M.R.S. § 465(4)(C)): For this standard, the Applicant must demonstrate that the Graham Lake impoundment, as a Class GPA water is suitable for fish and other aquatic life, and is characterized as natural. The Applicant must also demonstrate that the Leonard Lake impoundment as a Class B water, is suitable for fish and other aquatic life, and is characterized as unimpaired. In certain existing riverine impoundments such as the Leonard Lake impoundment, the Class B aquatic life and habitat standards are minimally met if Class C aquatic life criteria are met (38 M.R.S. § 464(10)). In certain existing hydropower impoundments managed as great ponds and classified as GPA, such as the Graham Lake impoundment, the GPA aquatic life and habitat standards are minimally met if Class C aquatic life criteria are met (38 M.R.S. § 464(9-A)).

Under Class C aquatic life standards, 38 M.R.S. § 465(4)(C), there may be some changes to aquatic life, except that the waters must be of sufficient quality to support all species of indigenous fish and maintain the structure and function of the resident biological community. Attainment of such standards can be demonstrated in a variety of ways, including through the application of Chapter 579, or evaluation of the structure and function of the biotic community, including measurements or other evidence that demonstrate a sufficient maintenance of the impoundment's littoral zone[12]. Absent other evidence, and based on its professional experience, expertise, and judgment, the Department generally presumes the presence and suitability of sufficient aquatic life and habitat, especially for small or young fish as well as other aquatic life that rely on that refuge and forage provided by nearshore aquatic vegetation, when at least 75% of an impounded area, called the littoral zone, remains watered at all times. Conversely, and again absent other evidence, water levels that provide wetted conditions for approximately 75% of the littoral zone of an impounded area, as measured from full pond conditions, are generally presumed necessary to meet aquatic life and habitat standards. This rebuttable presumption, as developed through the exercise of the Department's professional experience, expertise, and judgment, is also reflected in the Department's Hydropower Project Flow and Water Level Policy, dated February 4, 2002 (Water Level Policy). This rebuttable presumption is not a rule, but a guideline the Department applies on case-by-case basis, informed by best professional judgment, and considering site-specific circumstances.

1) Existing Habitat and Resources-Graham Lake Impoundment.

The Department finds that the Graham Lake impoundment extends approximately ten miles upstream of the Graham Lake Dam and is comprised of approximately 10,000 acres at its normal, full pond surface elevation of 104.2 feet. The impoundment is operated as a storage facility for downstream power generation at the Ellsworth Dam. Water levels fluctuate up to 10.8 feet, between the water surface elevations of 93.4 feet and 104.2 feet. The volume of water available for generating electricity is 5.4 billion cubic feet (equivalent to 133,150 acre-feet). The impoundment was created by construction of a 58-foot-high Graham Lake Dam on the Union River. The impoundment is relatively shallow and is deepest

[12] The 'littoral zone' of lakes and lake-like waterbodies (including impoundments) is defined in limnology as the portion of a lake where light penetration allows plant growth on the bottom. The littoral zone extends from the shoreline to the maximum depth where plants on the bottom receive enough sunlight for photosynthesis. This depth, known as the euphotic zone, is commonly estimated as the depth which receives approximately 1% of incident light (Cole, 1979). While depth of the zone varies with many factors, it can be estimated as a multiple of the Secchi disk transparency (SDT). Based on Tyler (1968), for more than 20 years DEP has delineated the littoral zone using a depth two times the SDT for purposes of determining attainment of Maine's water quality standards.
Cole, GA. (1978) *Textbook of Limnology*, 2nd Ed. 165, St. Louis, MO: The CV Mosby.
Tyler, JE. (1968) *The Secchi disk, Limnology and Oceanography* 13(1): 1-6.

along the original Union River channel, with a maximum depth of 47 feet and a mean depth of 17 feet. Graham Lake is divided by a large peninsula into two basins and has an irregular shoreline with numerous coves and inlets. The substrate of Graham Lake is boulder and cobble mixed with sand and gravel, both along its east shore and the lake's island shorelines. This substrate type extends approximately to 4-5 feet of water depth. The western shore is comprised of coarse sand to fine gravel, with clay and finer sands. Some localized areas also have boulder and cobble mixed with the sand and gravel. The north end of the lake also has clay, sand, and gravel substrate, with some organic matter. Substrates surrounding the heath areas within Graham Lake are dominated by clay and fine sand. Clay and fine sand substrates are subject to erosion and cause turbidity in the waters of Graham Lake under certain conditions, decreasing the depth of Secchi disk transparency measurements.

2) Existing Habitat and Resources-Leonard Lake Impoundment. The Department finds that the Leonard Lake impoundment is approximately 1 mile long and covers 90 acres at its normal full pond water surface elevation of 66.7 feet (including 1.7-foot-high flashboards). The impoundment is operated in a run-of-river mode, with water level fluctuations limited to one foot or less. The mean depth of Leonard Lake is 25 feet, its maximum depth is 55 feet. Substrates within Leonard Lake are expected to be similar to those observed in the Union River because it is an impounded river, with fine sediment, gravel cobble and bedrock.

3) Studies. The Department finds as follows: The Applicant conducted an impoundment aquatic habitat study of Graham Lake in 2013 and a benthic macroinvertebrate study of Graham Lake in August and September 2019 to determine the effects of reservoir drawdowns on the littoral zone as it relates to the support of fish and other aquatic life. The 2013 impoundment aquatic habitat study of Graham Lake indicates that aquatic habitat extends to a depth of 3.5 meters or approximately 11.5 feet, based on twice the Secchi disk transparency measurement. Department analysis of the littoral zone at Graham Lake indicates that a drawdown of 5.7 feet from full pond preserves 52.7 % of the littoral area and 45.1% of the littoral volume.

The Department finds that the Applicant conducted a benthic macroinvertebrate study in Graham Lake in 2019. The Applicant reports that based on this 2019 study the benthic macroinvertebrate community in Graham Lake is similar to that of Attean Pond, which the Applicant treated as a reference lake. The Applicant submitted its 2019 study report but did not submit the underlying data to the Department. The Applicant also did not submit the report or data associated with

Attean Pond or explain why this lake, which is high in the watershed of the Kennebec River, and not in the Union River watershed, is an appropriate baseline against which to evaluate aquatic life and habitat in Graham Lake.

Additionally, the Applicant assessed tributary connectivity in Graham Lake at a water level elevation between 97.9 feet and 98.0 feet, or an impoundment drawdown of 6.25 feet, and in Leonard Lake at a water level elevation between 65.7 feet and 66.7 feet or an impoundment drawdown of 1 foot. The study found that at elevation 97.9 feet the concrete culvert on Route 179 at Hapworth Brook was fully submerged with a water depth of five feet, ensuring connectivity to Graham Lake; that Webb Brook was connected to Graham lake with water depths from several inches to a few feet across the width of the brook, but that beaver dams may impede passage further up the brook; that the East Branch of the Union River is accessible with water depths from several inches to a few feet, up to a natural 15-foot waterfall just east of Route 179; that the West Branch of the Union River is accessible with water several feet deep at its deepest part; that Garland Brook is connected to Graham Lake with water depths ranging to more than 5 feet; that Tannery Brook is accessible with water depths between .5 and 2 feet deep; that Beech Hill Pond Stream is accessible with water depths from .5 to 2 feet, from the lake to a beaver Dam and ledge drop of eight feet; and that Reed Brook (also known as Green Lake Outlet Stream) is accessible with water depths of 2-3 feet below the hatchery outflow confluence. Further, the study found that Branch Lake Stream has a small concrete dam with a four-foot-wide stop log section at its confluence with Leonard Lake that would limit access when the stop logs are in place[13].

4) Applicant's Proposal. The Applicant proposes to operate the Project with seasonal minimum flows of 105 cfs from January 1 to March 31; 125 cfs from April 1 to April 30; 250 cfs from May 1 to June 30; and 125 cfs from July 1 to December 31. The Applicant proposes to operate the Project with an annual water level fluctuation of 5.7 feet in Graham Lake, between water elevations 98.5 feet and 104.2 feet; and water level fluctuations of less than one foot, between 65.7 and 66.7 feet in Leonard Lake.

5) Discussion and Findings. Based on the Department's experience, expertise, and professional judgment, and consistent with its longstanding practice and the rebuttable presumption as reflected in its Water Level Policy, the Department finds and determines that the structure and function of the resident biological community is not maintained in the Graham Lake impoundment under

[13] The Branch Lake dam was removed in 2019 under a permit-by-rule.

the current water level drawdown, and the designated use of habitat for fish and other aquatic life, as well as other aquatic life and habitat standards, are not maintained in the Graham Lake impoundment under the current water level regime. The Department makes this finding because at least 75% of the littoral zone is not wetted at all times, and the Applicant has not submitted evidence to overcome the presumption that 75% of the littoral zone of an impounded area must provide wetted conditions to meet aquatic life and habitat standards.

The Applicant's study found, and the Department agrees, that using a measure of twice the mean summer sampling Secchi disk transparency (1.77 meters, or 5.8 feet) to determine the depth of the littoral zone at Graham Lake results in a littoral zone depth of 11.6 feet, or an elevation of 92.6 feet. The Applicant calculated that the surface area at the normal full pond elevation of 104.2 feet is 10,042 acres and that the surface area of the bottom of the littoral zone is 7,232 acres. Based on the available bathymetric data, the Applicant reports, and the Department finds, that a drawdown of the lake level to an elevation of approximately 102.5 feet would provide sufficient wetted littoral habitat to meet the rebuttable presumption outlined in the Water Level Policy, and support the designated use of habitat for fish and other aquatic life and other aquatic life and habitat standards in Graham Lake, absent any additional data. The current drawdown is to an elevation of 93.4 feet.

Before the Department is a proposal by the Applicant to be able to draw down the Graham Lake impoundment to an elevation of 98.5 feet. While less than the current drawdown, based on the Secchi disk readings collected and submitted by the Applicant the Department finds and determines that the Applicant has not demonstrated the structure and function of the resident biological community will be maintained in the Graham Lake impoundment under the proposed drawdown because at least 75% of the littoral zone will nor remain wetted.[14]

The report submitted by the Applicant is insufficient to overcome the presumption that the drawdown is too great to support the structure and function of the residential biological community. The Applicant did not submit the data it collected in 2019 to the Department, limiting the Department's ability to evaluate the conclusions of the report and preventing the Department from attempting to

[14] A reduction in the Graham Lake drawdown range may enhance vegetative growth and help to stabilize shorelines and may help to reduce turbidity by limiting erosion associated with extensive drawdowns. Reduced erosion may help to expand the littoral zone by allowing more light penetration as a direct result of turbidity reductions. Expansion of the littoral zone will support natural expansion of the aquatic vegetation found there and provide additional littoral habitat for fish and other aquatic organisms. This possibility and the water quality implications were not addressed by the Applicant in its submissions to the Department.

use its linear discriminant model to assess whether the data support a finding that the aquatic life and habitat standard is met. Further, the Applicant did not provide the Attean Pond study used as a baseline or scientifically explain the rational for its selection as a baseline. This also limited the Department's ability to meaningfully review the conclusion reached by the Applicant in its 2019 report.

The Department finds that the average Secchi disk transparency measured in the Leonard Lake impoundment was 2.1 meters or 6.9 feet, and that the littoral zone extends to a depth of 13.8 feet. The Department finds and determines that continued run-of-river operation of the Leonard Lake impoundment where outflow is generally equal to inflow and impoundment water level fluctuations are limited to one foot or less maintains and protects an almost fully wetted littoral zone throughout the year during normal operations, and the structure and function of the shoreline habitat remains intact.

The Department finds that, based on the Applicant's Secchi disk transparency data and operational mode, Project operations meet the Class B designated use of habitat for fish and other aquatic organisms in Leonard Lake. The Department further finds that, based on the Applicant's Secchi disk transparency analysis and impoundment depth measurements, and the Department's professional expertise and judgment, the proposed operating range of 5.7 feet at Graham Lake, between elevations 104.2 feet and 98.5 feet, does not maintain 75% of the littoral zone of the Graham Lake impoundment. Further, the Department finds that a benthic macroinvertebrate study of the aquatic community in the GPA classified Graham Lake did not establish that the aquatic habitat meets Class C aquatic life and habitat criteria, as provided in 38 M.R.S. § 464(9-A)(D). The Applicant's Project operations, as proposed, do not meet the Class GPA designated use of habitat for fish and other aquatic life in Graham Lake and, because the proposed drawdown does not maintain the aquatic habitat in a condition similar to habitats free of effects from human activity, the habitat in Graham Lake cannot be characterized as natural. Based on the Department's professional expertise and judgment, the Department further finds that the Applicant's Project operations, as proposed, including the proposed drawdown of Graham Lake, cause or contribute to the failure of the Graham Lake to meet these applicable standards of classification, and the Applicant has not submitted data or other evidence establishing otherwise.

C. Aquatic Habitat – Union River between Graham Lake and Leonard Lake (38 M.R.S. § 465(3)(A), (C)): Class B waters such as those waters of the Union River between Graham Lake Dam and Leonard Lake must be of such quality that they are suitable for the designated use of habitat for fish and other aquatic life, and the habitat

must be characterized as unimpaired. In addition, discharges to the Class B waters at the outlet of Graham Lake may not cause adverse impacts to aquatic life and the receiving waters must be of sufficient quality to support all aquatic species indigenous to the receiving water without detrimental changes in the resident biological community.

To meet these Class B aquatic life standards for the riverine waters between the Graham Lake Dam and Leonard Lake, an applicant must demonstrate two things. One, the applicant must show that the benthic macroinvertebrate community attains aquatic life standards contained in the Department's Chapter 579 rule. The benthic macroinvertebrate community is an indicator of the general state of aquatic life for the purpose of attainment of outlet stream aquatic life classification standards. Where there is documented evidence of conditions that could result in uncharacteristic findings, such as effects related to the discharge of nutrient rich water at a lake's outlet, the Department may account for those situations by adjusting the classification attainment decision by the use of professional judgment. Chapter 579(3)(G).

The second demonstration an applicant is requested to make is that the flow of water in the Union River between the Graham Lake Dam and Leonard Lake is sufficient to support the designated use of habitat for fish and other aquatic life by providing a minimum flow that maintains the forage and refuge functions of riparian habitat. Based on its professional experience, expertise, and professional judgment, and consistent with its longstanding practice reflected in its Water Level Policy, the Department generally presumes (absent evidence to the contrary) that a flow providing wetted conditions in a weighted average of 3/4ths of the cross-sectional area of the affected river or stream, as measured from bank full conditions, or a water level that provides wetted conditions for 3/4ths of the littoral zone of a lake or pond, as measured from full pond conditions, is needed to meet aquatic life and habitat standards. This rebuttable presumption is not a rule, but a guideline the Department applies on a case-by-case basis, informed by best professional judgment, and considering site-specific circumstances. The second demonstration may be met if an applicant demonstrates that 75% of the cross section of the outlet stream is wetted at all times.

As discussed below, for the Class B waters below Graham Lake, the Department requested and the Applicant provided site-specific studies and survey information related to each of these two required demonstrations.

1) Existing Habitat and Resources. The Department finds that the Union River between the Graham Lake Dam and the Ellsworth Dam is approximately

four miles long; Leonard Lake is one mile long and, therefore, the Union River between Graham Lake and Leonard Lake is approximately three miles long and contains different habitat types, including sections of riffle, run, and pool habitats. Greys, Shakford, Moore, and Gilpatrick brooks are tributaries that enter this reach of the Union River.

2) Studies. The Department finds as follows: The Applicant conducted an Outlet Stream Habitat Study to provide information on the quality and quantity of habitat for aquatic organisms in the Union River downstream of the Graham Lake Dam, under current instream flow releases. The study consisted of collecting measurements of the wetted width and bankfull width under minimum flow conditions. Wetted width and bankfull conditions were measured on September 8, 2014 at the transect location closest to Graham Lake, at a flow of 150 cfs. Bankfull elevation was determined by field assessment of indicators, including change in vegetation, breaks in bank slope, change in bank material particle size, bank undercuts, and signs of past flood levels. The edges of water surface and water surface elevation were recorded at the study flow of 150 cfs to document low flow wetted width (the study flow of 150 cfs was higher than the minimum seasonal flow of 105 cfs, and so wetted width for the minimum flow of 105 cfs were extrapolated from the field data collected). The wetted width at the observed low flow for the Union River downstream of Graham Lake transect was 203 feet, compared to a bankfull width of 242 feet, which provides approximately 84% of wetted area across the river channel. The depth of the Union River between Graham Lake Dam and Leonard Lake was found to be approximately 12 feet. Wetted widths downstream of the study transect were higher in the upper reach of the river (83% to 85% wetted width), than in the middle reach of the river (68% to 75%) or the lower reach of the river (73% to 74%). Lower values are extrapolated from measured widths to represent the expected wetted width at the minimum flow of 105 cfs.

Further, the Applicant conducted an instream flow study to evaluate aquatic habitat at four different flows; the current seasonal minimum flows of 105 cfs and 250 cfs, as well as higher flows of 1,230 cfs and 2,460 cfs. The river was divided into sub-reaches (upper, middle, and lower), each sub-reach included a transect representing a riffle, a run, and a pool habitat. The upper reach was the widest with deep pool/run features. The middle reach has distinct riffle, pool and run habitats. The lower reach contains deep, run-type habitat at Gilpatrick Brook, and large bedrock outcrops defining the channel. The study demonstrated, in part, that at the lowest flows the maximum depth ranged from 2.8 feet to 11.0 feet, providing an adequate zone of passage.

The Applicant conducted a Benthic Macroinvertebrate Survey in the tailwater section of the Union River, just below the Graham Lake Dam. Standard rock baskets were installed at a site approximately 450 feet downstream of the Graham Lake Dam on July 24, 2014 and were retrieved on August 21, 2014. Habitat measurements were collected at the time of retrieval, documenting substrate type, depth, and temperature. The study was conducted in accordance with Department protocols. Study results indicate that benthic macroinvertebrates downstream of the Graham Lake Dam are abundant but not diverse. The community is dominated by filter-feeding caddisflies, with mayflies also present but at a very low abundance (mean abundance of Ephemeroptera species 10.33, relative abundance 0.02). No stoneflies were collected. The Applicant conducted a second Benthic Macroinvertebrate Survey in the Union River between July 15, 2015 and August 11, 2015, installing standard rock bags at three sites located approximately 950 feet, approximately 1,750 feet, and 1.92 miles downstream of the Graham Lake Dam. Habitat measurements were collected during retrieval of the rock bag samples, recording substrate type, depth, and temperature. Samples from sites two and three were analyzed. The rock bag at site one was disturbed and, therefore, not representative of undisturbed colonization and so was not analyzed. The data were analyzed using the Department's linear discriminate model. The community at sample station S-1080, located approximately 1,750 feet downstream of the Graham Lake Dam, was dominated by filter-feeding caddisflies with mayflies also present but at a very low abundance (mean abundance of Ephemeroptera species 12.00, relative abundance 0.03).

Further benthic macroinvertebrate sampling in the vicinity of Graham Lake Dam was conducted in August and September 2019, again showing an over-abundance of filter-feeding caddisfly species with mayflies present but not abundant (mean abundance Ephemeroptera species 12.33, relative abundance 0.03). The community sampled downstream of the railroad bridge and approximately 1.92 miles downstream of the Graham Lake Dam was also dominated by caddisfly species, with mayflies also present but, at a very low abundance (mean abundance Ephemeroptera species 48.00, relative abundance 0.02).

The Applicant also conducted a Brook Floater Mussel Survey to document its presence, distribution, and relative abundance in the Union River. The Brook Floater is a state-listed species of concern. The field survey was conducted in the river between the Graham Lake Dam and Leonard Lake on three days during the summer of 2014. The effort consisted of a view tube/boat reconnaissance of the entire shoreline, followed by a SCUBA survey of 19 transects distributed

throughout the upper river reach and view tube/wading throughout the lower reach. No Brook Floater mussels were observed during the survey.

3) Applicant's Proposal. The Applicant proposes to provide a continuous minimum flow from the Graham Lake Dam to the Union River and from the Ellsworth Dam of 105 cfs from January 1 to March 31; to release a continuous minimum flow of 125 cfs from April 1 to April 30; to release a continuous minimum flow of 250 cfs from May 1 to June 30; and to release a continuous minimum flow of 125 cfs from July 1 to December 31, annually.

4) Discussion and Findings. The Department finds as follows: Flow data collected by the Applicant demonstrated that the wetted width at the transect location downstream of the Graham Lake Dam supports habitat for fish and other aquatic organisms; measurements collected at additional downstream locations were near or exceeded the wetted width necessary to support aquatic habitat for fish and other aquatic species in the reach of the Union River between Graham Lake and Leonard Lake. Thus, the Department finds that there is sufficient evidence with respect to the second of the two required demonstrations described above.

However, with respect to the first required demonstration, Department staff analyzed the macroinvertebrate study data submitted by the Applicant for 2014, 2015, and 2019 using a linear discriminant model and determined that samples collected in each of these three years from the Union River immediately downstream of the Graham Lake Dam do not meet the applicable Class B aquatic life standards. In some cases, when considering factors such as Lake Outlet Effect and applying the Department's best professional judgement, model results may be raised to support a finding of the next highest standards. The model results when run using the 2014, 2015, and 2019 data showed the Union River at the outlet of the Graham Lake Dam did not meet Class C standards. Thus, even when the Department exercised its professional judgment due to factors such as the Lake Outlet Effect this section of the river could only be found to meet Class C aquatic life standards. The Union River is a Class B water. The Department concludes that, based on the data and the model results, and on the Department's professional expertise and judgment, the habitat downstream of the Graham Lake Dam has a diminished capacity to support the aquatic life expected to exist there as a result of turbidity caused from the Graham Lake drawdown and discharged at the dam and, therefore, the Department finds that the aquatic habitat in the Union River between the Graham Lake Dam and Leonard Lake is impaired. Based on evidence in the record, specifically evaluation of the benthic macroinvertebrate

community, the Department determines that the waters of the Union River downstream of Graham Lake do not meet the Class B aquatic life standards.[15] Based on the Department's professional expertise and judgment, the Department further finds that the Applicant's Project operations, as proposed, and the resulting turbidity caused by the Graham Lake drawdown, cause or contribute to the failure of the Union River downstream of Graham Lake Dam to meet these applicable standards of classification, and the Applicant has not submitted data or other evidence establishing otherwise.

D. Dissolved Oxygen (38 M.R.S. § 465(3)(B)): For this standard, the Applicant must demonstrate that the DO criteria for the Class B waters below the Graham Lake Dam are met. Waters subject to these standards include the Union River below the Graham Lake Dam to Leonard Lake and the Class B Leonard Lake impoundment. DO concentrations in these waters shall be not less than 7 ppm[16] or 75% of saturation, whichever is higher, except that from October 1st to May 14th annually, in order to ensure spawning and egg incubation of indigenous fish species, the 7-day mean DO concentration may not be less than 9.5 ppm and the 1-day minimum DO concentration may not be less than 8.0 ppm in identified fish spawning areas.[17] Compliance with dissolved oxygen criteria in existing riverine impoundments must be measured in accordance with standards set forth in 38 M.R.S. § 464(13).

Leonard Lake Impoundment

1) Existing Conditions. The Department finds that the Leonard Lake impoundment has a surface area of 90 acres at full pond and extends approximately one mile upstream of the Ellsworth Dam. The normal, full pond water surface elevation is 66.7 feet. The Leonard Lake impoundment will continue to operate in run-of-river mode, where inflow generally equals outflow.

2) Studies. The Applicant conducted water quality studies of the Leonard Lake impoundment between June 13 and October 24, 2013, including water temperature and DO profiles at 1-meter intervals, in accordance with Department sampling protocols and a study plan reviewed and approved by the Department, to assess the effects of continued operation of the Project on impoundment water quality.

[15] The Applicant did not address whether, and if so, how, a drawdown smaller than the existing drawdown under which the benthic macroinvertebrate surveys were conducted could affect the benthic macroinvertebrate community in the river.
[16] Parts per million, or ppm, is a measure of concentration and is equivalent to mg/L because a liter of water weighs approximately 1000 grams.
[17] MDIFW reports there are no identified salmonid spawning habitat in the main stem of the Union River below Graham Lake Dam or associated with Leonard Lake. Gray's Brook, a tributary of the Union River downstream of Graham Lake Dam is the only identified salmonid (brook trout) spawning habitat in the vicinity.

DO is dependent on temperature; as temperature decreases, DO increases. The Department finds that DO profiles in the Leonard Lake impoundment were highest at the beginning and end of the monitoring period, with values greater than 9 mg/L in mid-June, early September, and in October, and values greater than 10 mg/L in mid-September and early October. The Department finds that the Class B waters of the Leonard Lake impoundment stratify during the summer months.

3) Applicant's Proposal. The Applicant proposes to provide a continuous minimum flow from the Ellsworth Dam of 105 cfs from January 1 to March 31; to release a continuous minimum flow of 125 cfs from April 1 to April 30; to release a continuous minimum flow of 250 cfs from May 1 to June 30; and to release a continuous minimum flow of 125 cfs from July 1 to December 31, annually.

4) Discussion. DO data collected by the Applicant demonstrates, and the Department finds and determines, that water in the Leonard Lake impoundment is not sufficiently oxygenated. The Applicant's sampling results demonstrate that the Leonard Lake impoundment does not meet applicable Class B DO criteria at all times. Specifically, DO concentration fell below 7.0 ppm on June 27, 2013 (6.8 mg/L and less at 12 meters depth and lower in unstratified water); July 25, 2013 (6.9 mg/L and less at 8 meters depth and lower in water that stratified at a depth of 10 meters); August 8, 2013 (6.8 mg/L at 7 meters depth and lower in water that stratified at a depth of 12 meters); and August 22, 2013 (6.5 mg/L at 11 meters depth and lower in water that stratified at a depth of 12 meters). DO must meet Maine's water quality criteria throughout the water column above the thermocline,[18] or point of stratification.[19] Based on the evidence in the record the Department concluded that Project water in Leonard Lake does not meet applicable Class B water quality standards under current operating conditions. The Applicant did not submit evidence demonstrating the DO would be improved under the proposed operation of the Project. Based on the Department's professional expertise and judgment, the Department further finds that the Applicant's Project operations, as proposed, including the presence of the Ellsworth Dam and the impoundment of Leonard Lake, cause or contribute to the

[18] Where mixing is inhibited due to thermal stratification in an existing riverine impoundment, compliance with numeric dissolved oxygen criteria may not be measured below the higher of: (1) the point of thermal stratification when such stratification occurs or (2) the point proposed by the Department as an alternative depth for a specific riverine impoundment based on all factors included in section 466, subsection 11-A and for which an use attainability analysis is conducted if required by the United States Environmental Protection Agency.
[19] Thermal stratification means a change of temperature of at least one degree Celsius per meter of depth, causing water below this point in an impoundment to become isolated and not mix with water above this point in the impoundment.

failure of Leonard Lake to meet these applicable standards of classification, and the Applicant has not submitted data or other evidence establishing otherwise.

Union River Below Graham Lake

5) Existing Conditions. The Department finds that the Union River below the Graham Lake Dam and above the Leonard Lake impoundment receives flows released from the dam, runoff, ice melt, and water from tributary streams. The reach of the Union River between the Graham Lake Dam and Leonard Lake is approximately three miles long.

6) Studies. The Applicant monitored DO and temperature weekly, from July 2 through September 12, 2013, at a mid-channel location approximately 450 feet downstream of the Graham Lake Dam, in accordance with a sampling plan reviewed and approved by the Department. Samples were collected in the early morning (before 7:00 am) and afternoon (after 1:00 pm) on each sampling day. Over the course of the 11-week sampling period temperatures ranged from 19.1˚C to 26.6˚C and DO concentrations ranged from 8.3 mg/L to 10.4 mg/L.

7) Applicant's Proposal. The Applicant proposes to operate the Graham Lake impoundment as a storage dam with an annual operating range of up to 5.7 feet, between water surface elevations 104.2 feet and 98.5 feet, following historic operating curves. The Applicant proposes to provide a continuous minimum flow from the Graham Lake Dam to the Union River of 105 cfs from January 1 to March 31; to release a continuous minimum flow of 125 cfs from April 1 to April 30; to release a continuous minimum flow of 250 cfs from May 1 to June 30; and to release a continuous minimum flow of 125 cfs from July 1 to December 31, annually.

8) Discussion. DO data collected by the Applicant indicates, and the Department finds, that water below the Graham Lake Dam is sufficiently oxygenated and that water temperature and DO are not adversely affected by operations of the Ellsworth Project, specifically operations of the Graham Lake Dam. The Applicant's sampling results demonstrate, and the Department finds and determines, that the Union River below the Graham Lake Dam (but before Leonard Lake) meets applicable Class B DO criteria, including during critical water quality conditions. The Department further finds there is no reason to believe the proposed operation of the Project, with increased flows from the Graham Lake Dam at certain times of year when compared to current operations, will adversely affect DO levels in this section of the Union River.

Union River Below Ellsworth Dam

9) The Union River below the Ellsworth Dam is tidal. No DO data was collected by the Applicant or requested by the Department.

10) Findings. DO data was collected by the Applicant in the Union River below Graham Lake Dam and in Leonard Lake during the summer of 2013. Compliance with Class B DO criteria of 7 parts per million was demonstrated in the Union River; Leonard Lake was found to not meet Class B DO criteria in four out of ten samples collected. Based on the evidence in the record the Department concludes that the Project does not meet applicable Class B water quality standards and that the Applicant did not present evidence demonstrating the DO would be improved in Leonard Lake under the proposed operation of the Project.

E. Fishery Resources (38 M.R.S. § 465(3)(A), 38 M.R.S. § 465-A(1)(A)): For this standard, the Applicant must demonstrate that the proposed impoundment water levels and flow releases to the Union River below the two Project dams will be adequate to ensure that these waters will be suitable for the designated uses of habitat for fish and for fishing.

The Department finds as follows: The Union River watershed is inhabited by a diversity of coldwater and warmwater fish, including 36 species. Long-term fishery management goals are identified in 2015 *Comprehensive Fishery Management Plan for the Union River Drainage* (CFMP) and by the Union River Fisheries Coordinating Committee (URFCC). The Union River below the Ellsworth Dam is managed by the Maine Department of Marine Resources (MDMR) in cooperation with the City of Ellsworth and the Applicant as a river herring fishery to supply lobster bait to local lobstermen. The Union River between the Graham Lake Dam and the Ellsworth Dam is managed for the sustained production of brook trout and as a migratory pathway for Atlantic salmon, American shad, river herring and American eels. American shad, river herring, American eels, and striped bass are managed in accordance with the Atlantic States Marine Fisheries Commission's Interstate Fisheries Management Plans. Atlantic salmon, Atlantic sturgeon, and shortnose sturgeon are listed under the federal Endangered Species Act (ESA).

1) Existing Habitat and Resources – Graham Lake and Leonard Lake Impoundments. The Department finds that warmwater species including smallmouth bass, chain pickerel, and white perch are resident species in Graham Lake and Leonard Lake; largemouth bass were introduced illegally into Graham Lake approximately in 2010 and are expanding rapidly throughout the drainage. Other resident fish known to occur in the Union River watershed include

pumpkinseed, redbreast sunfish, common shiner, golden shiner, blacknose shiner, northern redbelly dace, creek chub, fallfish, banded killifish, mummichog, tomcod, threespine stickleback, ninespine stickleback, brown bullhead, rainbow smelt, white sucker, yellow perch, sea lamprey, landlocked arctic char, lake trout, splake, landlocked salmon, and browntrout. Fish that occur in Graham Lake and the Union River upstream of Leonard Lake are expected to occur in Leonard Lake, as well. MDIFW stocks brown trout in some lakes and ponds in the Union River drainage. Surveys conducted by the Applicant in 2012 indicate that the eastern shore of the lake and island shorelines are suitable habitat for smallmouth bass and that riprap area along the shore offers juvenile and spawning habitat for bass. Chain Pickerel would use the heath areas and abundant vegetation here, though habitat for spawning is determined to be scarce.

2) Existing Habitat and Resources, Union River. The Department finds as follows: Wild brown trout occur in the Union River and MDIFW stocked brook trout in the riverine reach between Leonard Lake and Graham Lake from 2004 to 2007; however, that effort was determined to be unsuccessful and was cancelled. Alewives are common in the Union River in May and June, migrating upstream to spawn in quite water with slow current or in still pools. Adult alewives return downstream after spawning. Juveniles remain in primary nursery areas until October and then migrate to estuaries for the winter. A small, remnant population of blueback herring is reported to exist in the Union River below the Ellsworth Dam. Alewives and blueback herring, collectively referred to as river herring, are managed by MDMR in cooperation with the City of Ellsworth, which holds commercial fishing rights for river herring on the Union River. The annual commercial harvest of river herring has ranged from 5,000 to 1,066,297 herring; the catch is generally used as bait in the lobster fishery. A residual population of American shad is reported in the Union River estuary below the Ellsworth Dam, which may include strays from other river systems.

The Department further finds that the Applicant operates an upstream passage facility (completed in 1974) at Ellsworth Dam where river herring are trapped and transported to Leonard Lake and Graham Lake. The existing fish trapping facility is owned by MDIFW, however, the trap and truck facility is contained within the Project boundary and is integral to the CFMP. Leonard Lake and Graham Lake are the primary stocking locations for river herring trapped at the Ellsworth Dam facility, because they contain the majority of potential spawning habitat. The upstream fishway is operated in conjunction with alewife migration, from early May to early/mid-June, but its operation has in some years extended as late as July, depending on the fish run. Currently, the Applicant targets transport of

315,000 river herring upstream annually into five additional pond and lakes (for a total of seven bodies of water) throughout the migratory season. Late season stocking efforts are to enhance and expand the small population of blueback herring. The overall goal of the stocking program is to reach an annual alewife run size that would allow for harvest of two million fish in addition to the spawning escapement of up to 315,000 fish. In 2015, the Applicant transported 329,160 river herring, exceeding its target of 315,000). Based on incidental occurrence in the commercial river herring harvest, occasional catch by anglers and historic reports by agency personnel attending the fishway and trap, a small population of American shad are believed to exist in the Union River estuary below Ellsworth Dam. Management plans for the restoration of American shad are outlined in the 2015 *Comprehensive Fisheries Management Plan for the Union River Drainage*; stocking efforts to restore American shad to the watershed are not yet implemented due to difficulty in finding suitable brood stock.

Striped bass use the Union River during spring, summer, and fall, and are believed to be attracted to the river by the presence of migrating river herring and eel. They are not known to spawn in the Union River. Striped bass are a popular sport fish in the lower Union River estuary downstream of Ellsworth Dam and are protected through the use of regulated size and creel limits. Rainbow smelt also occur in the lower river and are managed in accordance with statewide regulations governing recreational and commercial harvest.

The Department finds that Project falls within the designated critical habitat of the Downeast Coastal Salmon Habitat Recovery Unity for Atlantic salmon. Historically, hatchery raised salmonids were stocked in most lakes and ponds of the Union River. Annual releases of hatchery-reared Atlantic salmon smolts occurred between 1971 and 1991; since 1993, stocking has been sporadic and focused on salmon parr, with salmon fry stocked annually since 2001. In 2011, 282 captive-reared, pre-spawn brood stock salmon were released into the West Branch of the Union River. A subsequent survey by MDMR documented over 200 redds upstream of the Project. Smolts hatched from these nests would migrate to the sea in 2014-2015.

Atlantic salmon returns to the Union River are sporadic. Between 2006 and 2011 no fish returned; in 2012 three aquaculture salmon were identified; in 2013 one wild salmon was identified; in 2014 two salmon were counted, one wild and one hatchery fish that was released downstream of the Project. In 2015, no Atlantic salmon were observed, although the upstream fishway was checked four times per day for an extended period form May 1 to October 31. No Atlantic salmon were

reported to have returned to the Union River in 2016, 2017, or 2018. In 2019, two wild Atlantic salmon were trapped at the Project fishway and transported for release in the West Branch of the Union River.

The National Marine Fisheries Service (NMFS) and the University of Maine have maintained an array of acoustic telemetry receivers in the Union River annually since 2008. A single acoustically tagged shortnose sturgeon was detected in the Union River in June 2014; no other tagged fish have been detected in the Union River.

The Magnuson-Stevens Fishery Conservation and Management Reauthorization Act of 2006 mandates that habitats essential to federally managed commercial fish species (EFH) be identified and that measures be taken to conserve and enhance habitat. The EFH designated habitat for all life stages of Atlantic salmon in Maine, including the Union River and including the Project area. The Applicant states that the Project protects EFH for Atlantic salmon by providing upstream and downstream fish passage and migratory pathways to habitat and by ensuring suitable habitat downstream of each Project Dam through minimum flows.

Atlantic sturgeon is ESA listed as threatened in the Gulf of Maine distinct population segment (GOMDPS). Atlantic sturgeon spawn in freshwater, but spend most of their adult life in the marine environment. Spawning adults typically migrate upriver in spring or early summer. Shortnose sturgeon are ESA listed as endangered. Shortnose sturgeon spawn in freshwater, but regularly enter seawater during various stages of its life. Juveniles move upstream in rivers in spring and summer, and downstream in fall and winter, but inhabit reaches upstream of the freshwater-saltwater interface. The status of Atlantic sturgeon and shortnose sturgeon is unknown. A single tagged shortnose sturgeon and no Atlantic sturgeon were detected by acoustic receivers in the lower Union River in 2014.

American eel is a catadromous fish, present in the Union River estuary and in inland water above the Project Dams. Juvenile eels (glass eel or elver) hatched in the Sargasso Sea enter river systems in spring and migrate upstream, spending a great portion of their lives in fresh or estuarine water as yellow eels before migrating as silver eels to the Sargasso Sea to spawn. Maine manages three different eel fisheries, glass eel/elver fishery, yellow eel fishery, and mature adult silver eel fishery. There is an active elver fishery downstream of Ellsworth Dam.

The Department further finds and determines that the Applicant operates downstream passage facilities at both the Ellsworth and Graham Lake Dams between April 1 and December 31, annually, as river conditions allow. The Ellsworth Dam is equipped with a vertical slot upstream fishway and trap, built in 1974 and managed in consultation with the agencies through a management plan, used primarily during the river herring migration for commercial harvest of the fish as well as to facilitate their upstream distribution. The fishway continues to be used to facilitate upstream migration of any returning Atlantic salmon in the Union River. Downstream passage facilities are operated at both the Ellsworth Dam and Graham Lake Dam. The Ellsworth Dam offers two stoplog controlled surface weirs and a transport pipe leading to a plunge pool immediately downstream of the Dam, and a third surface weir that discharges directly to a plunge pool at higher tides or onto ledge at low tide. Outmigrating alosines and American eel are also known to pass through the Project turbines, and the Applicant has implemented operational measures to minimize entrainment. Downstream passage for out-migrating Atlantic salmon and river herring was constructed at Graham Lake in 2003 and consists of a surface weir containing stoplogs that empties into a downstream plunge pool. Out-migrating fish also pass through the tainter gates, used to pass minimum downstream flows.

3) Studies. The Department finds as follows: MDIFW studied the effects of stocking alewives in Graham Lake on the smallmouth bass population between 1997 and 2003, and concluded that increased stocking rate of alewives did not have a detrimental effect on the smallmouth bass population.

In 2014, the Applicant conducted nighttime eel surveys at Ellsworth Dam and Graham Lake Dam, weekly, from June to August 2014. Numbers of eels observed ranged from 10 to 700 at Ellsworth Dam and from 40 to 600 at Graham Lake Dam, with the highest densities observed in early July 2014. The study concluded that eels are able to migrate upstream through Project facilities under existing conditions.

An instream Flow and Union River Tributary Access Study was conducted in 2014 by the Applicant to evaluate habitat within the Union River between Graham Lake Dam and Leonard Lake. Habitat in the Union River consists primarily of runs with periodic pools and riffles upstream of Route 1A. Most of the upper reach of the Union River consisted of deep run habitat with abundant instream cover, including submerged woody debris, snags, and vegetation. Substrate consisted of fine sediment, gravel, cobble, and bedrock. Portions of the upper reach were uncharacteristically wide, with deeper run and pools. Farther

downstream the river deepens into a slower pool-type habitat containing submerged large woody debris and large boulders. The middle reach contains distinct riffle, pool, and run habitats. Riffle substrate was gravel, cobble, and large boulders; pool substrate included silt, gravel, and large boulders with submerged woody debris along the left bank; run substrate consisted of silt, gravel, and large boulders. The lowest river reach is located at the upper end of Lake Leonard. This reach has numerous large bedrock outcrops, large boulders, and woody debris providing cover. The habitat near Gilpatrick Brook is deep run habitat with a large vegetated island located immediately downstream. Both sides of the island consist of riffle habitat. The tributary access observations were made during October 2014 to assess connectivity between tributaries and Project waters during low water conditions in Graham Lake and Leonard Lake. Water levels at the time of the study were 2 inches above the target elevation for October and one foot below the long-term average elevation. Similarly, access observations of tributaries to the Union River was conducted in September 2014 during low flow conditions. All tributary confluences were observed to have at least six inches of water depth at low flow, allowing adequate zone of passage into the tributaries for spawning. Natural low flows were observed within the tributaries during the tributary access survey, suggesting a possible limitation to migratory fish spawning within the tributaries themselves.

In 2014, the Applicant conducted an upstream fish passage study to evaluate the effectiveness of the existing upstream trap and transport operations. Observations of the fish passage facility entrance indicate that herring approach the fishway from both sides of the river and occasionally, from the middle of the river. No apparent pattern was observed associated with river flows, weather conditions, or Project operations. Further, the Applicant assessed injury, stress, and mortality during and after handling at the fishway and at trap and release sites. The Applicant reported no observed or measured immediate or delayed mortality, injury, or stress associated with handling, reporting a total of 21 mortalities (out of 857 fish) related to entanglement in the pen net used to hold the fish for study. The study also evaluated the trap and transport function for adult river herring. Observations show that when fish are abundant the fish trap fills rapidly, transport trucks leave immediately, and fish are released into Graham Lake within 14 minutes 90% of the time. As noted previously, the Project has a target escapement of 315,000 river herring, an increase since 2015 from 150,000 fish. The trap and transport study concluded that the current fishway operation is sufficient to provide the spawning escapement goal of 315,000. An increase in the annual river herring runs to two million fish was anticipated to occur by 2019

-2020; 394,346 river herring were counted at the Ellsworth fishway in 2019, 315,225 of which were transported upstream to Graham Lake.

The Applicant studied the effectiveness of downstream passage facilities at the Ellsworth Dam for both American eel and Atlantic salmon smolts. Downstream passage of Atlantic salmon smolts at the Project was initially studied in May 2016. Based on observations and poor results during the first study year, the Applicant temporarily modified the existing passage measures at both Project dams, adding a sloped floor and side panels to create an Alden weir and bell shaped approach in order to modify approach velocities and to improve attraction at the Graham Lake Dam and removing three seven-foot-wide section of flashboards adjacent to the existing downstream passage weir at the Ellsworth Dam to provide a potential additional downstream passage route. Second-study-year results showed improved effectiveness and timeliness of fish passing the Graham Lake Dam at 74.4% (including background and Project related effects), compared to 14.0% during the first year of study. Survival efficiency is estimated at 82.2% when corrected for background effects. The improved downstream passage survival at Graham Lake Dam is attributed to the weir modifications installed to improve the downstream bypass and increased flows through the facility. Similarly, downstream passage survival at Ellsworth Dam was estimated at 62.3% (including background and Project related effects), or 80.8% when adjusted to consider only Project related effects.

In a separate study, the Applicant also evaluated the downstream survival of juvenile salmonids. Juvenile brown trout were used as a surrogate for juvenile Atlantic salmon in the evaluation, resulting in an estimate of 80.5% downstream passage survival rate, accounting for only dam related effects.

In 2015, the Applicant conducted a field study of downstream passage of eels at the Project, tracking the movement of 47 test subjects. 100% of the study fish successfully passed the Graham Lake Dam; 100% of the eels also passed the Ellsworth Dam, however, 91% were detected passing through the turbines and four passed the Project through an unidentified route (based on detections further downstream of the Dam). Turbine passage survival was 25% through turbine Unit 2, 47% through Unit 3, and 86% through Unit 4 (Unit 1 was not in operation during the study).

4) Existing Management Plans. A *Comprehensive Fishery Management Plan for the Union River Drainage* (Plan) was filed for the Project on August 7, 2000, and approved by FERC on February 26, 2010 and subsequently updated on

February 27, 2015 and approved by FERC on July 30, 2015. The Plan's overall goal is to manage all sport and commercial fish species in the Union River drainage for optimum habitat utilization, abundance, and public benefit. The Applicant is required to comply with provisions of the Plan that pertain to the restoration of anadromous and catadromous fish and their effects on resident fish within the lower reaches of the Union River up to and including Graham Lake. The 2015 Plan focuses on managing the Union River as a migratory pathway for Atlantic salmon, river herring, American shad, and American eel; evaluating existing upstream and downstream fish passage facilities and developing recommendations to support safe, effective, and timely fish passage at the Project; increasing the minimum river herring escapement to 315,000; and including resident fish populations in its management plans.

5) Applicant's Proposal. The Applicant proposes to operate the Project under new seasonal minimum flows and water level fluctuations as follows.

i. Water Levels: The Applicant proposes to operate the Graham Lake impoundment with an annual water level fluctuation of 5.7 feet, between water elevations 98.5 feet and 104.2 feet, and to continue operating the Leonard Lake impoundment in a run-of-river operational mode, with water level fluctuations limited to no more than one foot.

ii. Minimum Flows: The Applicant proposes to provide a continuous minimum flow from the Graham Lake Dam to the Union River of 105 cfs from January 1 to March 31; to release a continuous minimum flow of 125 cfs from April 1 to April 30; to release a continuous minimum flow of 250 cfs from May 1 to June 30; and to release a continuous minimum flow of 125 cfs from July 1 to December 31, annually.

iii. Fish Passage: The Applicant proposes to install upstream eel passage facilities at both the Ellsworth and Graham Lake Dams within two years of the effective date of a new license.

iv. Other: Section 10(j) of the Federal Powers Act (FPA) requires that each license issued for a hydropower project contain conditions to adequately and equitably protect and mitigate damages to, and enhance, fish and wildlife affected by the development, operation, and management of a project. Section 18 of the FPA grants the Department of Commerce and the Department of the Interior unilateral authority to prescribe fishways. Accordingly, each license issued shall include such conditions, based on

recommendations of the United States Fish and Wildlife Service (USFWS) and NMFS, along with Maine Department of Inland Fisheries and Wildlife (MDIFW) and MDMR.

In developing its prescriptions for fish and wildlife protections, the USFWS and NMFS consulted with the Applicant and reviewed various studies conducted by the Applicant and its consultants. In their responses to FERC's Notice of Application Accepted for Filing, Soliciting Motions to Intervene and Protests, Ready for Environmental Analysis, and Soliciting Comments, Recommendations, Terms and Conditions, and Prescriptions for the Ellsworth Project, USFWS and NMFS prescribe certain measures and studies for the protection and enhancement of fish species including operation of existing upstream fish passage facilities at the Ellsworth dam (fishway and trap) for alosines and Atlantic salmon until new fish passage measures are provided; effectiveness testing of attraction to and passage through existing upstream fish passage facilities for Atlantic salmon and modification, as needed based on the effectiveness testing, of the existing fishway entrance location or attraction water system; design and installation new upstream Atlantic salmon passage measures and effectiveness testing of the new upstream passage measures to meet a performance standard of 90% passage effectiveness; and design modifications to the existing fish passage measures and any new fish passage measures required to meet the performance standard of 90% passage effectiveness for upstream passage.

In addition to providing effective fish passage at Ellsworth Dam, USFWS and NMFS require certain measure to protect and enhance fish at the Graham Lake Dam, including design and installation of upstream fish passage measures for Atlantic salmon, to occur concurrently with any new upstream Atlantic salmon passage measures at the Ellsworth Dam. Further, USFWS and NMFS require that any new upstream fish passage measures at Graham Lake Dam undergo effectiveness testing to meet a performance standard of 90% effectiveness.

USFWS and NMFS also require certain downstream fish passage measures at the Project dams to ensure the fish are able to migrate downstream passed the Project. Downstream fish passage measures the federal agencies require at the Ellsworth Dam include installation of a Worthington boom or similar guidance technology; installation of 1-inch

clear-space full-depth trashracks or overlays to the existing trashracks; in consultation with USFWS, NMFS and MDMR, prioritize generation units 1 and 4 over units 2 and 3 during critical downstream passage seasons; modify the existing downstream fish passage weir entrance to increase its depth; install tapered walls (similar to an Alden weir) to reduce passage delays; and increase the downstream weir capacity to pass up to five percent of station hydraulic capacity.

Further, USFWS and NMFS require the sides of the downstream passage facility flume be raised to improve containment of the passing fish; and improve the angle of the existing fish transport pipe into the flume to better protect out-migrating fish from injury. USFWS and NFMS also require effectiveness testing of the downstream passage measures, and adaptive management of the installed measures, based on effectiveness testing, to improve such measures in order to meet performance standards of 90% effective downstream passage.

Downstream fish passage measures USFWS and NMFS require at the Graham Lake Dam include modifying the invert elevation of the existing downstream passage weir to achieve a 3-foot depth of flow over the full range of lake elevations allowed in the new license and implement structural modifications of the Alden weir, if necessary, to accommodate changes in headpond elevation; conduct downstream Atlantic salmon smolt passage effectiveness testing; and conduct a study to investigate the potential cause(s) of smolt losses in the downstream most reaches of the Union River. USFWS and NMFS also require additional downstream passage adaptive management measures, if necessary, following effectiveness testing of any modified downstream passage conditions to further improve fish passage to meet the performance standard of 90% effectiveness for downstream passage.[20]

6) Public Comments Concerning Fish Passage. Public comments in support of volitional upstream and downstream passage for migratory fish were received from the Downeast Salmon Federation (DSF), the Passamaquoddy Tribe, Joint Chiefs and Tribal Council, Friends of Graham Lake, the Schoodic Riverkeepers Association, and from local residents. DSF provided substantive comments supporting upstream passage for American shad (shad) that replaces the existing vertical slot fishway and trap at the Ellsworth Dam and improves existing

[20] The 90% downstream fish passage standard is for whole Project effectiveness (Graham Lake Dam and Ellsworth Dam facilities inclusive).

downstream passage, followed by installation of new upstream and downstream passage facilities at the Graham Lake Dam. DSF notes that upstream passage facilities designed to pass shad are successfully used by other migratory species, including Atlantic salmon and river herring, while fishways designed to pass alosines and salmon are not always used by shad. DSF's rationale notes that shad do not use the current upstream fishway, even though the presence of a remnant population of shad at the mouth of the Union River and historical evidence indicate that shad are indigenous to the upper Union River. DSF believes these facts should support efforts to restore shad to their historical waters, along with Atlantic salmon and river herring. DSF, the Passamaquoddy Tribe, Friends of Graham Lake, and the Schoodic Riverkeepers refute lack of adequate downstream passage as reason to address fish passage later in the license period as recommended by NOAA and USFWS, noting that shad restoration can survive poor downstream passage conditions because greater fecundity and high survival rates will have positive population effects, even as work to improve downstream passage conditions commences.

7) Discussion and Findings. Instream flow studies conducted by the Applicant demonstrate, and the Department finds, that the existing minimum flows and the seasonal augmented flows at the Project maintain and support habitat for aquatic species in the Project water in the Union River below the Graham Lake Dam. And based on record evidence, the Department finds that the fish passage prescriptions of the USFWS and NMFS, as outlined above, are each necessary and required to meet applicable Maine water quality standards.

The responsibility for deciding whether the State's water quality standards are met, including as they pertain to fish passage, rests solely with the Department in its review of water quality certification applications. The Department, however, consults with and often relies on the expertise of resource agencies, such as MDMR, in evaluating the adequacy of upstream and downstream fish passage. The opinions of these resource agencies on matters such as the effectiveness of fish passage proposals and the impacts of operating regimes on resident fish populations informs the Department's application of its water quality standards. Comments submitted to the Department, including particularly those submitted by DSF, present questions about the potential need for fish passage. The Department has not had the benefit of MDMR's assessment of those comments. Because the Department finds the proposed operation of the Project does not meet State water quality standards on other grounds, and considering that MDMR has not yet had the opportunity to offer its assessment of the substantial historical and technical information that DSF filed in support of fish passage enhancements, the

Department finds it unnecessary and elects not to reach any conclusion on the adequacy of fish passage at the Project dams under the State's water quality laws on the present record.

F. Recreational Access and Use (38 M.R.S. § 465(3)(A), 38 M.R.S. § 465-A(1)(A)): For this standard, the Applicant must demonstrate that the Project waters are suitable for the designated use of recreation in and on the water.

1) Existing Facilities and Use. The Department finds that the Project is located within the Downeast and Acadia Tourism Region, and that regional recreational opportunities on water and land include both motorized and non-motorized boating, fishing, hunting, hiking, biking, and climbing, along with whale watching and puffin watching. Regional tourist attractions include Acadia National Park and Lamoine State Park.

The Applicant states, and the Department finds, that the area surrounding the Project includes a mixture of year-round and seasonal residential development and undeveloped forest land. Recreational facilities associated with the Project include a carry-in boat launch and angler access site off Shore Road on the Leonard Lake impoundment with parking for two vehicles and a six-foot-wide concrete plank ramp; the Graham Lake Dam boat launch on Mariaville Road on the west side of the Graham Lake impoundment, with parking for eight vehicles and trailers and a 12-foot-wide concrete plank ramp suitable for motorized boat launching; and a canoe portage trail around Graham Lake Dam, located off Patriot Road on the east side of that Dam, with parking for 19 vehicles in two parking areas. The canoe portage trail also provides shoreline angler access downstream of the Graham Lake Dam.

The Applicant states, and the Department finds, that municipal, state and private lands provide additional recreational access, including a municipal picnic area and day use site on Shore Road, municipal access to the Union River from Infant Street, a municipal carry-in boat launch on the west side of Graham Lake in Mariaville, and a private carry-in site on the West Branch of the Union River.

In addition to the formal and municipal access points, the Department finds that informal recreation likely occurs along undeveloped portions of the shoreline and on some islands in Graham Lake, including camping and fishing. Additionally, some boating occurs on the Union River between Graham Lake Dam and Leonard Lake, including limited whitewater boating when flows are available.

Winter activities include cross-country skiing, snowmobiling, ice fishing, snowshoeing, and ice skating.

2) Existing Management Plans. No existing recreation management plans were submitted by the Applicant.

3) Applicant's Proposal. The Applicant proposes to enhance access and use of Project lands and waters by improving the Graham Lake Dam boat launch parking area to improve vehicular access; relocate and lengthen the existing canoe portage trail to address public safety concerns; improve the existing fishermen access trail below Graham Lake on the east side, and implement a Recreation Facilities Management Plan for maintenance and improvement of recreation amenities at the Project for the term of a new license.

4) Other. MDIFW filed comments to FERC on the Final License Application for the Project, recommending that water level fluctuations in the Graham Lake impoundment be limited to between 104.2 feet and 97.0 feet (an operation range of 7.2 feet) in order to enhance winter angling opportunities in basins associated with angler residences and camps, reduce the likelihood of fish stranding, and reduce impacts to angler access and navigation.

5) Discussion and Findings. The Department finds that the Ellsworth Project land and waters are lightly used for recreational purposes, primarily for fishing and boating. Further, the Department finds that the Applicant provides sufficient access and recreational opportunities, and plans to enhance its facilities to improve access, and to implement a Recreation Facilities Management Plan for the benefit of its recreational amenities. Based on the evidence on the record, the Department determines that the Project operations meet the Class GPA and Class B designated uses of recreation in and on the water.

G. Wetlands and Wildlife Resources (38 M.R.S. § 465 (3)(A), 38 M.R.S. § 465-A (1)(A)): For this standard, the Applicant must demonstrate that the Project waters, including those areas contained in wetlands, are suitable for the designated use of habitat for fish and other aquatic life, can be characterized as natural with respect to Graham Lake's Class GPA waters, and can be characterized as unimpaired with respect to the Project's remaining Class B waters. Habitat in Graham Lake and Leonard Lake impoundments, as well as in the Project's other Class B Union River waters, was analyzed in Section 4(B), (C), and (E), above. This subsection G focuses on habitat in the Project's wetlands and other adjoining areas.

1) Existing Resources. The Department finds that the Project is located in the Downeast region of Maine, on the lower reach of the Union River. Development in the immediate vicinity of the Project includes year-round and seasonal residences, commercial businesses, and undeveloped forested areas. The Project area and its immediate vicinity provides diverse surroundings including forests, open areas, wetland, islands, and riverside habitats. In general, habitats within the Project boundary includes terrestrial and aquatic habitats along the shoreline of the Graham Lake, Leonard Lake, and the Union River between the Project impoundments, comprising approximately 3,350 acres of land and 10,099 acres of open water cover types. Most of the upland habitats and associated wildlife resources occur on private land adjacent to the Project boundary, and consist predominantly of Northern Hardwood Forest, including distinct forested areas that also feature white pine or spruce.

Lacustrine, riverine, and estuarine wetland systems are associated with Graham Lake, Leonard Lake, and the Union River and its tributaries, and a number of palustrine wetlands are present within the Project boundary, primarily associated with Graham Lake, at the narrow fringes along the lake's shoreline and along tributary streams. Three large islands in Graham Lake exhibit palustrine emergent wetlands and Palustrine scrub-shrub and some tributary streams are bordered by palustrine emergent wetlands. Bog habitats are present on three large wetland islands and the large wetland peninsula on the south side of Graham Lake. Forested swamps are also associated with Graham Lake and with wetland complexes within the Project boundary. Narrow fringes of wetland are located along Leonard Lake and at some locations along the Union River.

The Department finds that significant wildlife habitats within the Project boundary include one deer wintering areas and nine inland waterfowl and wading-bird habitat areas; all the known significant habitats are associated with Graham Lake and its tributaries. No significant vernal pools are known to be located within the Project boundary.

Three bald eagle nesting areas are identified within the Project boundary, two of which supported breeding nest sites in 2013.

Based on identified habitats, a number of mammalian and avian species potentially occur within the Project boundary and its immediate vicinity. Wildlife studies conducted in 2013-2014 included a Common Loon Nesting Study and a Marsh-Nesting Bird Habitat and Call back Survey; other wildlife observations were collected during the conduct of the studies and identified the presence of

beaver, black bear, mink, moose, raccoon, red fox, river otter, white-tailed deer, American black duck, American goldfinch, American kestrel, bald eagle, blue-winged teal, broad-winged hawk, Canada goose, cedar waxwing, common loon, common yellowthroat, downy woodpecker, great blue heron, green-winged teal, hermit thrush, lesser yellowlegs, mallard, merlin, northern flicker, osprey, pileated woodpecker, swamp sparrow, and wood duck. Some species are likely to be present year-round, while others migrate seasonally.

Common loons are a piscivorous bird that occur and breed on Graham Lake. Loons are adapted for diving and submergent swimming, and so have characteristics that make them awkward on land and susceptible to water level fluctuations during nesting season. The Common Loon Nesting Study identified four nesting attempts on Graham Lake in 2014; three of those nests successfully hatched at least one chick and the fourth nest, containing two eggs, was abandoned for unknown reasons. It was determined that the nest was accessible to the incubating loons throughout the nesting period and for some time after abandonment, discounting fluctuating water levels as a possible cause of the nest failure.

2) Applicant's Proposal. The Applicant proposes to continue generally operating under the existing regime, but limiting impoundment drawdowns to no more than 5.7 feet annually at the Graham Lake impoundment and no more than one foot water level fluctuation at the Leonard Lake impoundment. The Applicant proposes no environmental measures specifically related to wildlife or botanical resources at either the Graham Lake or Leonard Lake impoundments.

3) Discussion and Findings. The Department finds that potential effects of Project operation on wildlife habitats and wetland are primarily associated with water level fluctuations and flow regimes. The Project is operated for water storage and associated power generation; the Project is operated as a peaking facility with water stored in Graham Lake released for power generation at the downstream Ellsworth Dam. Leonard Lake is operated in the run-of-river mode; therefore, no impacts related to Project operations is anticipated with respect to wetlands around Leonard Lake. While water level fluctuations in Leonard Lake are limited to one foot, water levels proposed in Graham Lake can fluctuate up to 5.7 feet annually. Habitats at elevations greater than 104.2' are not affected by Project operations. Approximately 35 acres of upland area within the Project boundary, including an open field, the electrical transmission corridor, and maintained lawn are expected to be unaffected by Project operations. Wetlands and the wildlife that depend on them can be affected by Project operations related

to water level fluctuations. Wetlands can be changed over time as a result of the periodic drawdowns; the Applicant reports that approximately 1,171 acres of vegetated wetlands are found within the Project boundary. Current wetland habitats around Leonard Lake and Graham Lake are stable under the existing operation regime, which has been in practice since 1979. Wetland habitats in Graham Lake are expected to expand under the proposed reduced drawdown, with more emergent wetland vegetation able become established as a result of an additional 1,046 acres of reservoir substrate remaining wetted year-round. Wetland habitats in Leonard Lake and in the Union River are expected to remain stable, and are not subject to the water level fluctuations that occur in Graham Lake. Nesting shorebirds can be negatively affected by water levels increasing by more than 0.5 feet, or decreasing by more than 1.0 feet, particularly common loons which are known to abandon their nests that become inaccessible. Beavers are known to be present in the Project vicinity, however, no beaver dams or lodges are reported to be located on Graham Lake and therefore subject to large water level fluctuations. A nesting loon survey conducted in 2014 determined that no loon nests were affected by water level fluctuations related to Project operations. Based on the evidence in the record, the Department concludes that the Project operations meet the Class B and Class GPA designated use of habitat for other aquatic species in the context of wetlands.

H. Hydroelectric Power Generation (38 M.R.S. § 465(3)(A), 38 M.R.S. § 465-A (1)(A)):

1) Existing Generation. The Graham Lake Dam stores and releases water for the generation downstream at the Ellsworth Dam for an average of 30,511,000 kilowatt-hours (KWH) of electricity annually. This is equivalent to the energy that would be produced by burning approximately 50,852 barrels of oil or 14,139 tons of coal each year.

2) Energy Utilization. Project power is fed by a 320-foot transmission line to a step-up transformer located in an adjacent, non-Project public utility substation.

3) Applicant's Proposal. The Applicant proposes to continue generating power under the current operational mode during the term of a new Project license. The Applicant proposes no additional turbine generator units or other redevelopment activities at the Project at the is time.

4) Discussion and Findings. The Applicant proposes to continue the current mode of operations at the Project during the term of a new license, providing a

dependable source of energy to ISO-New England. Based on the evidence on record, the Department finds and determines that Project operations demonstrate that the Project meets the Class B and Class GPA designated use of hydroelectric power generation.

I. Drinking Water Supply (38 M.R.S. § 465(3)(A), 38 M.R.S. § 465-A(1)(A)): Class B and Class GPA standards indicate that water must be of sufficient quality to be used as drinking water after disinfection or treatment.

1) Discussion and Findings. The Applicant did not submit information indicating that the Graham Lake impoundment, the Leonard Lake impoundment, or the Union River is used as a drinking water supply. However, the Department finds that water quality data collected for the Trophic State Study of the Project impoundment and for DO and the data collected downstream of the dams generally indicate that water quality meets state standards and there are no culturally induced algal blooms. The Department thus finds and determines that Project operations meet the Class B and Class GPA designated use of drinking water after treatment or disinfection.

J. Industrial Process or Cooling Water Supply (38 M.R.S. § 465(3)(A), 38 M.R.S. § 465-A(1)(A)). Class B and Class GPA standards indicate that water must be of sufficient quality to be used as an industrial process and cooling water supply.

1) Discussion and Findings. The Department finds that the Graham Lake impoundment, the Leonard Lake impoundment, and the Union River below the Graham Lake Dam are not used for any industrial processes. However, water quality data indicates that it could be suitable as an industrial process or cooling water supply. Thus, the Department determines that the Project operations meet the Class B and Class GPA designated use of industrial process and cooling water supply.

K. Antidegradation (38 M.R.S. § 464(4)(F)): For this standard, the Applicant must demonstrate that the Project waters maintain existing in-stream water uses occurring on or after November 28, 1975.

1. Discussion and Findings. The Ellsworth Project hydroelectric station was constructed in 1907, with two generation units. A third generating unit was added in 1919 and a fourth unit was added in 1923. The Graham Lake Dam was constructed in 1922-1923. While operations and facilities have been modified over time, in-stream uses are generally the same on and after November 1975 as

those in place prior to November 1975. Therefore, based on the evidence in the record, the Department determines that the Project will maintain the instream water uses in place on and after November 28, 1975, and therefore meets this requirement of the antidegradation policy.

L. Navigation (38 M.R.S. § 465(3)(A), 38 M.R.S. § 465-A(1)(A)): Class B and Class GPA standards indicate that Project waters must be of sufficient quality to be used for navigation.

1) Discussion and Findings. The Department finds that the Project impoundments at Graham Lake and at Leonard Lake and the Union River between the impoundments are used for recreational boating and that the Applicant maintains boat launch sites sufficient to access the Project waters by motorized and non-motorized watercraft, providing evidence of the Project's adequacy of navigation. Based on the evidence in the record, the Department determines that current and proposed Project operations meet the Class B and Class GPA designated use of navigation.

5. PUBLIC COMMENTS

Comments on Application. The Department held a public information meeting on July 9, 2019 to collect public comment on the proposed relicensing of the Ellsworth Hydropower Project. Approximately 90 people attended the meeting, 23 people provided public comment. Comments included concerns around erosion and resulting turbidity in Graham Lake; water levels and associated access to Graham Lake for recreation; the effect of water level fluctuations on habitats; and the need for effective upstream and downstream fish passage at both the Ellsworth Dam and Graham Lake Dam. The Department also received numerous written comments from the public and interested persons over the course of the licensing period, mostly related to the magnitude of drawdown in the Graham Lake impoundment and its impact on recreation, navigation, waterfront property access, and erosion, and on a need for volitional fish passage through the Project. Additionally, the Department received written comments from the Downeast Salmon Federation expressing concerns around the magnitude of water level drawdown at Graham Lake; application of GPA classification standards for Leonard Lake, as opposed to Class B standards, and that Leonard Lake was in non-attainment for applicable DO standards; non-attainment of aquatic life criteria in the Union River below the Graham Lake Dam; the lack of volitional fish passage at the Project dams for American shad; and the efficacy of downstream passage facilities for diadromous fish. Public comments were reviewed and considered by the Department.

A Draft Order was issued on March 9, 2020 for a five-business-day review period. Comments on the Draft Order were received from Downeast Salmon Federation. Comments were also received from Friends of Graham Lake and from the Passamaquoddy Tribe, generally supporting denial of the WQC. Comments were reviewed and incorporated into the final Order, as appropriate.

6. DEPARTMENT CONCLUSIONS

BASED on the above findings and determinations, and on the evidence contained in the record, including the application and supporting documents, the Department CONCLUDES that the proposed operation of the PROJECT, as described above, will not result in all waters affected by the Project being suitable for all designated uses and meeting all other applicable water quality standards. In particular, the Department CONCLUDES as follows:

A. The Applicant has provided sufficient evidence, and the Department finds and determines, that under the proposed operations, the Project would meet some of the narrative classification standards for the Class GPA impoundment water in Graham Lake, which are determined to be of such quality that they are and would be suitable for the designated uses of drinking water after disinfection; recreation in and on the water; fishing; agriculture; industrial process and cooling water supply; hydroelectric power generation; and navigation. 38 M.R.S. § 465-A(1)(A).

B. The Department finds and determines that there are and would be no new direct discharges of pollutants into Graham Lake and that the Project, under its proposed operations, would meet that particular Class GPA narrative standard. 38 M.R.S. § 465-A(C).

C. The Applicant has provided sufficient evidence, and the Department finds and determines, that Graham Lake is free of culturally induced algal blooms. Based on the evidence provided by the Applicant and in accordance with Chapter 581, the Department concludes that the Graham Lake impoundment has a stable or declining trophic state and under the proposed operations, would meet that trophic standard. 38 M.R.S. § 465-A(1)(B).

D. The Applicant has not demonstrated, however, that under its proposed operations, the Project would meet the narrative classification standards for Class GPA waters for the designated use of habitat for fish and other aquatic life, generally due to the impact of the proposed annual drawdowns on the benthic macroinvertebrate community of Graham Lake. The Department also finds and determines that the habitat of Graham Lake under the proposed Project operations would not be characterized as natural, as defined in 38

M.R.S. § 466(9) due to the impact of the proposed annual drawdowns on the littoral zone. The Department cannot conclude that the Project's proposed annual drawdowns would not adversely affect the habitat for fish and other aquatic life in Graham Lake, 38 M.R.S. § 465-A(1), or the structure and function of the resident biological community, which is minimally required under Class C standards, 38 M.R.S. § 465(4)(C), in Class GPA impoundments such as Graham Lake, 38 M.R.S. § 464-(9-A)(D). The Department concludes that these standards will not be met under the Project's proposed operations, which cause or contribute to the failure of Graham Lake to meet these applicable standards of classification. The Department further finds and determines that the Applicant has not established that the proposed Project operations will not cause or contribute to the failure of Graham Lake to meet these standards of classification.

E. The Applicant has provided sufficient evidence, and the Department finds and determines, that under the Project's proposed operations, and with the exception of any DO standards or criteria, Leonard Lake would meet the narrative classification standards for Class B waters, which are determined to be of such quality that they are and would be suitable for the designated used of drinking water after treatment; fishing; agriculture; recreation in and on the water; industrial process and cooling water supply; hydroelectric power generation; navigation; and as habitat for fish and other aquatic life. 38 M.R.S. § 465(3)(A).

F. The Applicant has provided sufficient evidence, and the Department finds and determines, that the Union River below the Graham Lake Dam (but before Leonard Lake) meets some of the narrative classification standards for Class B waters and is determined to be of such quality that it is and would be suitable for the designated uses of drinking water after treatment; fishing; agriculture; recreation in and on the water; industrial process and cooling water supply; hydroelectric power generation; and navigation. 38 M.R.S. § 465(3)(A).

G. The Applicant has not demonstrated, however, that the Union River below Graham Lake Dam (but before Leonard Lake) would meet the narrative classification standards for Class B waters for the designated use of habitat for fish and other aquatic life, specifically the aquatic life standards by maintaining the resident biological community without detrimental change, generally due to the impact on the benthic macroinvertebrate community from water discharged at the Graham Lake Dam, which, even if the Department exercised its professional judgment under Chapter 579(3)(G) to raise the attainment findings for such outlet waters, would not meet Class B habitat standards. The Department also finds and determines that the habitat of the Union River below the Graham Lake Dam (but before Leonard Lake) under the proposed Project operations would not be characterized as unimpaired, as defined in 38 M.R.S. § 466(11)

and required by 38 M.R.S. § 465(3)(A), again generally due to the impact on the benthic macroinvertebrate community in the Union River from water discharged at the Graham Lake Dam. The Department also finds and determines that the proposed annual drawdowns and minimum flows would adversely affect the habitat for fish and other aquatic life in the Union River. 38 M.R.S. § 465 (3)(A). Thus, the Department finds and determines that the water immediately downstream of and measurably affected by the Project is not of sufficient quality to meet all Class B habitat and aquatic life standards, and that the Applicant's Project operations, as proposed, cause or contribute to the failure of such Union River waters to meet these applicable standards of classification. The Department further finds and determines that the Applicant has not established that the proposed Project operations will not cause or contribute to the failure of such Union River waters to meet these standards of classification.

H. The Applicant has provided sufficient evidence, and the Department finds and determines, that with the exception of Leonard Lake, the Project meets, and under proposed operations would meet, all applicable DO measurement standards and other requirements, and further finds and determines that DO concentrations in the Union River below the Graham Lake Dam and upstream of the Leonard Lake impoundment meets or exceed seven parts per million or 75% saturation and meet all Class B numeric water quality standards for DO. 38 M.R.S. § 464(13), 38 M.R.S. 465(3)(B).

I. The Applicant has not demonstrated, however, that the Leonard Lake Class B riverine impoundment meets, and under proposed operations would meet, all applicable DO measurement standards and other requirements. The Department finds and determines that DO concentrations in the Leonard Lake impoundment does not meet or exceed seven parts per million or 75% saturation at all times in the unstratified waters, or above the thermocline in stratified waters, and thus, does not meet all Class B numeric water quality standards for DO. 38 M.R.S. § 464(13), 38 M.R.S. § 465(3)(B). The Department further finds and determines that the Applicant's Project operations, as proposed, cause or contribute to the failure of Leonard Lake to meet these applicable standards of classification. The Department further finds and determines that the Applicant has not established that the proposed Project operations will not cause or contribute to the failure of Leonard Lake to meet these standards of classification.

EXHIBIT 1

7. DECISION AND ORDER

THEREFORE, the Department DENIES the water quality certification of the Applicant, BLACK BEAR HYDRO PARTNERS, LLC, pursuant to Section 401 (a) of the CWA because there is a reasonable assurance that the proposed operation of the ELLSWORTH HYDROELECTRIC PROJECT, as described above, will violate applicable State water quality standards.

DONE AND DATED AT AUGUSTA, MAINE, THIS 19TH DAY OF MARCH, 2020.

DEPARTMENT OF ENVIRONMENTAL PROTECTION

BY: _____
For: Gerald D. Reid, Commissioner

Filed
MAR 19 2020
State of Maine
Board of Environmental Protection

PLEASE NOTE THE ATTACHED SHEET FOR GUIDANCE ON APPEAL PROCEDURES…

KDH/L13256JN/ATS#83018

EXHIBIT 1

DEP INFORMATION SHEET

Appealing a Department Licensing Decision

Dated: March 2012 **Contact: (207) 287-2811**

SUMMARY

There are two methods available to an aggrieved person seeking to appeal a licensing decision made by the Department of Environmental Protection's ("DEP") Commissioner: (1) in an administrative process before the Board of Environmental Protection ("Board"); or (2) in a judicial process before Maine's Superior Court. An aggrieved person seeking review of a licensing decision over which the Board had original jurisdiction may seek judicial review in Maine's Superior Court.

A judicial appeal of final action by the Commissioner or the Board regarding an application for an expedited wind energy development (35-A M.R.S.A. § 3451(4)) or a general permit for an offshore wind energy demonstration Project (38 M.R.S.A. § 480-HH(1)) or a general permit for a tidal energy demonstration Project (38 M.R.S.A. § 636-A) must be taken to the Supreme Judicial Court sitting as the Law Court.

This INFORMATION SHEET, in conjunction with a review of the statutory and regulatory provisions referred to herein, can help a person to understand his or her rights and obligations in filing an administrative or judicial appeal.

I. ADMINISTRATIVE APPEALS TO THE BOARD

LEGAL REFERENCES

The laws concerning the DEP's *Organization and Powers*, 38 M.R.S.A. §§ 341-D(4) & 346, the *Maine Administrative Procedure Act*, 5 M.R.S.A. § 11001, and the DEP's *Rules Concerning the Processing of Applications and Other Administrative Matters* ("Chapter 2"), 06-096 CMR 2 (April 1, 2003).

HOW LONG YOU HAVE TO SUBMIT AN APPEAL TO THE BOARD

The Board must receive a written appeal within 30 days of the date on which the Commissioner's decision was filed with the Board. Appeals filed after 30 calendar days of the date on which the Commissioner's decision was filed with the Board will be rejected.

HOW TO SUBMIT AN APPEAL TO THE BOARD

Signed original appeal documents must be sent to: Chair, Board of Environmental Protection, c/o Department of Environmental Protection, 17 State House Station, Augusta, ME 04333-0017; faxes are acceptable for purposes of meeting the deadline when followed by the Board's receipt of mailed original documents within five (5) working days. Receipt on a particular day must be by 5:00 PM at DEP's offices in Augusta; materials received after 5:00 PM are not considered received until the following day. The person appealing a licensing decision must also send the DEP's Commissioner a copy of the appeal documents and if the person appealing is not the Applicant in the license proceeding at issue the Applicant must also be sent a copy of the appeal documents. All of the information listed in the next section must be submitted at the time the appeal is filed. Only the extraordinary circumstances described at the end of that section will justify evidence not in the DEP's record at the time of decision being added to the record for consideration by the Board as part of an appeal.

EXHIBIT 1

WHAT YOUR APPEAL PAPERWORK MUST CONTAIN

Appeal materials must contain the following information at the time submitted:

1. *Aggrieved Status*. The appeal must explain how the person filing the appeal has standing to maintain an appeal. This requires an explanation of how the person filing the appeal may suffer a particularized injury as a result of the Commissioner's decision.
2. *The findings, conclusions or conditions objected to or believed to be in error*. Specific references and facts regarding the appellant's issues with the decision must be provided in the notice of appeal.
3. *The basis of the objections or challenge.* If possible, specific regulations, statutes or other facts should be referenced. This may include citing omissions of relevant requirements, and errors believed to have been made in interpretations, conclusions, and relevant requirements.
4. *The remedy sought.* This can range from reversal of the Commissioner's decision on the license or permit to changes in specific permit conditions.
5. *All the matters to be contested*. The Board will limit its consideration to those arguments specifically raised in the written notice of appeal.
6. *Request for hearing.* The Board will hear presentations on appeals at its regularly scheduled meetings, unless a public hearing on the appeal is requested and granted. A request for public hearing on an appeal must be filed as part of the notice of appeal.
7. *New or additional evidence to be offered.* The Board may allow new or additional evidence, referred to as supplemental evidence, to be considered by the Board in an appeal only when the evidence is relevant and material and that the person seeking to add information to the record can show due diligence in bringing the evidence to the DEP's attention at the earliest possible time in the licensing process or that the evidence itself is newly discovered and could not have been presented earlier in the process. Specific requirements for additional evidence are found in Chapter 2.

OTHER CONSIDERATIONS IN APPEALING A DECISION TO THE BOARD

1. *Be familiar with all relevant material in the DEP record.* A license application file is public information, subject to any applicable statutory exceptions, made easily accessible by DEP. Upon request, the DEP will make the material available during normal working hours, provide space to review the file, and provide opportunity for photocopying materials. There is a charge for copies or copying services.
2. *Be familiar with the regulations and laws under which the application was processed, and the procedural rules governing your appeal.* DEP staff will provide this information on request and answer questions regarding applicable requirements.
3. *The filing of an appeal does not operate as a stay to any decision.* If a license has been granted and it has been appealed the license normally remains in effect pending the processing of the appeal. A license holder may proceed with a Project pending the outcome of an appeal but the license holder runs the risk of the decision being reversed or modified as a result of the appeal.

WHAT TO EXPECT ONCE YOU FILE A TIMELY APPEAL WITH THE BOARD

The Board will formally acknowledge receipt of an appeal, including the name of the DEP Project manager assigned to the specific appeal. The notice of appeal, any materials accepted by the Board Chair as supplementary evidence, and any materials submitted in response to the appeal will be sent to Board members with a recommendation from DEP staff. Persons filing appeals and interested persons are notified in advance of the date set for Board consideration of an appeal or request for public hearing. With or without holding a public hearing, the Board may affirm, amend, or reverse a Commissioner decision or remand the matter to the Commissioner for further proceedings. The Board will notify the appellant, a license holder, and interested persons of its decision.

EXHIBIT 1

II. JUDICIAL APPEALS

Maine law generally allows aggrieved persons to appeal final Commissioner or Board licensing decisions to Maine's Superior Court, see 38 M.R.S.A. § 346(1); 06-096 CMR 2; 5 M.R.S.A. § 11001; & M.R. Civ. P 80C. A party's appeal must be filed with the Superior Court within 30 days of receipt of notice of the Board's or the Commissioner's decision. For any other person, an appeal must be filed within 40 days of the date the decision was rendered. Failure to file a timely appeal will result in the Board's or the Commissioner's decision becoming final.

An appeal to court of a license decision regarding an expedited wind energy development, a general permit for an offshore wind energy demonstration Project, or a general permit for a tidal energy demonstration Project may only be taken directly to the Maine Supreme Judicial Court. See 38 M.R.S.A. § 346(4).

Maine's Administrative Procedure Act, DEP statutes governing a particular matter, and the Maine Rules of Civil Procedure must be consulted for the substantive and procedural details applicable to judicial appeals.

ADDITIONAL INFORMATION

If you have questions or need additional information on the appeal process, for administrative appeals contact the Board's Executive Analyst at (207) 287-2452 or for judicial appeals contact the court clerk's office in which your appeal will be filed.

Note: The DEP provides this INFORMATION SHEET for general guidance only; it is not intended for use as a legal reference. Maine law governs an appellant's rights.