

111 FERC ¶ 61,106
UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Before Commissioners: Pat Wood, III, Chairman;
Nora Mead Brownell, Joseph T. Kelliher,
and Suedeem G. Kelly.

Holyoke Gas & Electric Department

Project Nos. 2004-075

Holyoke Gas & Electric Department, Ashburnham
Municipal Light Plant, and Massachusetts Municipal
Wholesale Electric Company

11607-002

ORDER APPROVING SETTLEMENT AGREEMENT, AMENDING LICENSE, AND
DISMISSING STAY REQUEST

(Issued April 19, 2005)

1. Holyoke Gas & Electric Department (Holyoke G&E)¹ has filed an offer of settlement resolving issues relating to the new license issued by the Commission to Holyoke G&E's predecessor, Holyoke Water Power Company (Holyoke Water Power), authorizing the continued operation of the Holyoke Hydroelectric Project No. 2004. This order approves the offer of settlement and amends the project license accordingly. It also dismisses a stay request rendered moot by the amendment of the license. This order is in the public interest because it resolves issues regarding the project license in a manner consistent with the public interest and with the intent of the parties to the licensing proceeding.

Background

2. The 43.8-megawatt Holyoke project is located on the Connecticut River in Hampden, Hampshire, and Franklin Counties, Massachusetts. In an order issued on August 20, 1999,² the Commission issued a new license (1999 License) for the project to Holyoke Water Power and denied a competing license application filed jointly by Holyoke G&E, Ashburnham Municipal Light Plant (Ashburnham), and the

¹ Holyoke G&E is a department of the City of Holyoke.

² 88 FERC ¶ 61,186.

Massachusetts Municipal Wholesale Electric Company (Massachusetts Electric).³ The new license included a water quality certification that had been issued by the Massachusetts Department of Environmental Protection (Massachusetts DEP) on July 28, 1999, but was pending on appeal before that state body. The license was also issued before completion of consultation on threatened and endangered species, but with a requirement that the licensee file a threatened and endangered species protection plan based on consultation with the U.S. Fish and Wildlife Service (FWS) and the National Marine Fisheries Service (NOAA Fisheries).⁴

3. Requests for rehearing were filed by Holyoke Water Power; the City of Holyoke, Massachusetts (on behalf of Holyoke G&E); Ashburnham, Massachusetts Electric;⁵ the United States Department of the Interior (Interior); NOAA Fisheries; Trout Unlimited, and the Town of South Hadley. In addition, Holyoke Water Power requested a stay of certain license conditions contained in the water quality certification pending completion of Massachusetts DEP's administrative process and pending rehearing before the Commission. Objections to the stay motion were filed by the Commonwealth of Massachusetts (Massachusetts), and jointly by Interior and the Department of Commerce (Commerce).

4. On rehearing, the parties argued that the Commission had erred by issuing the license: (1) before completion of the state's proceeding concerning Holyoke Water Power's appeal of the state's water quality certification; and (2) before consultation on threatened and endangered species had been completed by the Commission's receipt of a biological opinion (BO) containing incidental take conditions. They also made various arguments taking issue with the Commission's determinations related to recommendations filed pursuant to section 10(j) and prescriptions filed under section 18 of the FPA.⁶ In addition, the City of Holyoke, Ashburnham, and Massachusetts Electric argued that the Commission erred in choosing Holyoke Water Power's application over theirs. Finally, the Town of South Hadley (South Hadley) requested its inclusion as a

³ Holyoke G&E and Ashburnham are municipal electric departments. Massachusetts Electric is a corporate and political subdivision of the State of Massachusetts, with cities and towns as members, which is empowered to own and operate electric power facilities, and buy and sell power on behalf of its members. *See* 88 FERC at 61,601 n. 4.

⁴ *See* Article 416, 88 FERC at 61,634.

⁵ Ashburnham's and Massachusetts Electric's requests were simply short statements supporting City of Holyoke's rehearing request.

⁶ 16 U.S.C. §§ 803(j) and 811, respectively.

consulting party in Articles 403, 404, 407 and 417 of the license, and correction of the location of a trail referenced in Article 418.

5. Subsequently, Holyoke Water Power transferred its license to Holyoke G&E.⁷ As the transferee, Holyoke G&E has stepped into the shoes of Holyoke Water Power in relation to all matters related to the new license, including the rehearing proceeding.⁸

6. On March 12, 2004, Holyoke G&E filed an offer of settlement, in which it was joined by Interior, through FWS; NOAA Fisheries; the Commonwealth of Massachusetts, Department of Environmental Protection (Massachusetts DEP); the Commonwealth of Massachusetts, Division of Fisheries and Wildlife (Massachusetts DFW); Trout Unlimited; Connecticut River Watershed Council; and South Hadley. Holyoke G&E asks the Commission to approve the settlement and incorporate its terms and conditions, as set out in the proposed modified license articles (Articles 301-422) contained in Appendix A to the settlement, without material change or modification. The settlement also provides for adoption of the water quality certification revised in accordance with the final decision of the Massachusetts DEP, and filed with the Commission on March 1, 2001. In addition, by letter filed March 16, 2005, Holyoke G&E notified the Commission that NOAA Fisheries' final biological opinion (BO), filed January 27, 2005, is consistent with the settlement, and requested that it be treated as supplementing the settlement. Holyoke G&E states that, once Commission approval of the settlement is final and no longer subject to appeal, the settlement parties with pending rehearing requests will withdraw those requests.

7. As discussed below, this order approves the settlement and amends the license to adopt the settlement's proposed modified license articles with minor changes. Since a

⁷ See 96 FERC ¶ 62,283 (2001). By letters filed July 27, 2001, the City of Holyoke, Ashburnham, and Massachusetts Electric withdrew their rehearing requests, subject to the Commission's approval of the transfer to Holyoke G&E, and subject to closing of the sale of the project from Holyoke Water Power to Holyoke G&E. The transfer was approved on September 20, 2001, and on December 28, 2001, Holyoke G&E filed its acceptance and conveyance documents and a letter noting that the sale had been closed on December 14, 2001. Receipt of the acceptance sheet and instruments of conveyance was acknowledged by a letter issued on February 7, 2002. Accordingly, the rehearing requests of City of Holyoke, Ashburnham, and Massachusetts Electric are deemed withdrawn.

⁸ *Id.* at 64,565, ordering paragraph (C). However, because Holyoke G&E is a municipality, it is not required to establish and maintain an amortization account. See *City of Hamilton*, 98 FERC ¶ 61,295 (2002). Accordingly, we have deleted Article 203 of the 1999 License, which contained that requirement.

revised water quality certification has now been issued, and we are issuing an order that disposes of the issues in the rehearing proceeding, Holyoke G&E's stay request is dismissed as moot.

Discussion

A. The Revised License Articles

8. For the most part, the revised license articles proposed by the offer of settlement do not result in substantive changes to the license requirements, but rather update them to provide clarity as to the manner in which those requirements will be implemented. We have made only very minor modifications to them, and we will replace the 1999 License's Articles 301-422 with the settlement's proposed Articles 301-422, as modified.⁹ For convenience and ease of administration, the order reprints below the complete set of license articles (Articles 201-422), and appendices to the license.¹⁰

9. A number of the revised license articles simply update articles adopted in the 1999 License. Where the 1999 License articles required the development and filing of plans, the proposed substitutions require implementation of the plans that have, in the interim, been filed, and approved by the Commission.¹¹ The settlement proposal also deletes

⁹ The settlement's proposed Articles 302-306, and 422, are identical to those in the 1999 License.

¹⁰ For the license articles, *see* ordering paragraph G.

¹¹ Articles requiring such implementation include: Article 403, shoreline erosion remediation plan approved in 96 FERC ¶ 62,100 (2001), and amended in 105 FERC ¶ 62,098 (2003); Article 404, water quality plan approved in 96 FERC ¶ 62,144 (2001); Article 408, comprehensive canal operations plan approved in 103 FERC ¶ 62,130 (2003); Article 409, aquatic habitat plan approved in 103 FERC ¶ 62,175 (2003); Article 410, downstream fish passage plan approved in 103 FERC ¶ 62,165 (2003); Article 411, upstream fish passage plan approved in 103 FERC ¶ 62,177 (2003), and amended in 106 FERC ¶ 62,213 (2004); Article 416, threatened and endangered species protection plan, approved in 103 FERC ¶ 62,131 (2003); Article 417, invasive species monitoring plan, approved in 96 FERC ¶ 62,174 (2001), and amended in 109 FERC ¶ 62,186 (2004); Article 418, comprehensive recreation and land management plan, approved in 106 FERC ¶ 62,243 (2004), rehearing granted in part in 109 FERC ¶ 61,206 (2004); and Article 419, cultural resources management plan, approved in 95 FERC ¶ 62,274 (2001). In addition, discrepancies between two studies conducted pursuant to Article 405 resulted in the development of a comprehensive operations and flow plan. *See* 103 FERC ¶ 62,178 (2003).

Article 419 of the 1999 License. That article required the licensee to file a plan outlining measures to minimize effects on recreational boaters during installation of the rubber dam. Since the rubber dam has now been installed, the requirement is no longer needed, and its deletion is appropriate. Finally, proposed Articles 414 and 421 set out requirements that were not specifically required as articles in the 1999 License, but which are reasonable.¹²

10. Certain requirements have been changed or expanded upon by the settlement's proposed articles, and we approve those changes. Article 405 of the 1999 License required the licensee to operate the project in a run-of-river mode (outflow approximating inflow) and maintain a minimum impoundment elevation of 100.6 feet, with an allowable fluctuation of plus or minus 0.2 feet. However, operating experience under the license showed that the original run-of-river provision exacerbated fluctuations in the project's headwater reaches. Therefore, the proposed Article 405 requires the project to maintain a minimum impoundment elevation of 100.4 feet with an allowable fluctuation of plus or minus 0.2 feet, and provides for the licensee to conduct an evaluation to determine whether there should be modifications to the run-of-river operations.¹³

11. Proposed Article 406 provides for higher zone-of-passage and interim bypassed minimum flows than those specified in the 1999 License. It also includes a provision for a flow study to determine a permanent bypass minimum flow. These changes are reasonable and in the public interest. The higher zone-of-passage flows will provide a flow sufficient for safe and effective migratory fish passage through the bypassed reach. The higher bypass minimum flows will protect water quality as well as aquatic and fishery resources in the bypassed reach.¹⁴ The flow study provision will leave open the possibility of modifying the bypass minimum flows based on additional study, and could

¹²Article 414 requires the licensee to prepare and file annually with the Commission a construction plan for fish passage facilities. The condition will allow the Commission to better track compliance with annual requirements for fish passage construction. Article 421 simply requires the licensee to comply with the water quality certification issued on February 14, 2001. Many of the certification's requirements are also contained in various license articles (e.g., Articles 401, 404, 406-408, 410- 414, 416, and 417).

¹³ The water quality certification, Condition 9, references a minimum impoundment elevation of 103.1 feet plus or minus 0.2 feet. We believe that the certification's reference is a misprint, and that the 100.4 feet plus or minus 0.2 feet requirement set out in the settlement's proposed Article 405 is the intended requirement.

¹⁴ For staff's flow analysis, *see* the final Environmental Impact Statement (EIS), at pages 4-18to 4-26, 4-151 to 160, 5-11, and C-14 to C-17.

lead to identification of a lower flow providing the same or similar levels of protection to aquatic habitat and organisms.¹⁵

12. Articles 410 through 413, dealing with upstream passage, downstream passage, eel passage, and the monitoring of such passage, are consistent with the requirements of the 1999 License, but set out the licensee's obligations with greater specificity. They also expand and clarify the schedule for implementation of the articles' required measures.¹⁶

13. All of the consultation requirements of the license are set out in proposed Article 420. The article also states that the licensee must comply with the conditions imposed on it by Part IV of the settlement, and the appendices referenced therein. Part IV of the settlement references Part III of the settlement, as well as settlement appendices related to the operating protocol for a downstream sampling facility, a description of the settlement's proposed research and construction activities related to downstream fish passage, a shortnose sturgeon handling plan, and overflow operating procedures. Parts III and IV of the settlement, and the settlement appendices which they reference are appended to the license, for clarity and informational purposes, as appendices C through G to this order.¹⁷

B. Water Quality Certification Conditions

14. Under Section 401(a) of the Clean Water Act (CWA),¹⁸ the Commission may not

¹⁵ Article 406(f) requires monitoring consistent with Articles 407 and 408. However, the text of Article 408 has been incorporated in Article 407, and we have revised Article 406(f) to reflect that fact.

¹⁶ Article 412(a) requires the licensee to provide interim measures for upstream eel passage consistent with an interim upstream eel passage plan supposedly filed with the Commission on December 31, 2003. We have not been able to document that this plan was filed. However, it appears that the provisions to which the proposed Article 412 refers are contained in the upstream fish passage plan approved pursuant to Article 411. We will revise Article 412(a) accordingly. (The licensee did file a request to install interim eel ladders at the project, which the Commission's New York Regional Office approved on August 6, 2003.)

¹⁷ See Appendix C (Parts III and IV of the Settlement Agreement); Appendix D (downstream sampling facility operating protocol); Appendix E (detailed description of Holyoke G&E proposed settlement downstream research and construction; Appendix F (shortnose sturgeon handling plan); and Appendix G (No. 2 overflow operating procedures).

¹⁸ 33 U.S.C. § 1341(a)(1).

issue a license for a hydroelectric project unless the state water quality certifying agency has either issued water quality certification for the project or has waived certification by failing to act on a request for certification within a reasonable period of time, not to exceed one year. Section 401(d) of the CWA provides that state certification shall become a condition on any license that is issued.¹⁹

15. The Massachusetts DEP timely issued a water quality certification for the Holyoke project on July 28, 1999. On August 18, 1999, Holyoke Water Power filed with the Massachusetts DEP an appeal of the certification. While that appeal was pending, the Commission issued the new license for the Holyoke project, attaching, as an appendix, 30 conditions contained in the July 28, 1999 Certification.²⁰

16. On March 19, 2001, the Massachusetts DEP filed with the Commission water quality certification provisions revised in accordance with a settlement agreement approved by the DEP in the state's appellate proceeding.²¹ The revised certification provisions, which are consistent with the terms of the settlement, will be substituted for

¹⁹ 33 U.S.C. § 1341(d).

²⁰ 88 FERC at 61,639. The Massachusetts DEP had originally issued one certification for both Holyoke Water Power's and Holyoke G&E's proposals. That certification contained a total of 37 conditions but, seven of them were applicable only to Holyoke G&E's proposal, not to that of Holyoke Water Power, who was granted the new license.

²¹ The revised certification imposes 23 conditions on the license for this project, including conditions which require: (1) an instantaneous run-of-river mode, stabilizing the impoundment to within 0.2 feet of normal pond elevation (i.e., 0.2 feet below the elevation of the new rubber dam crest) (Condition 9); (2) minimum flows for the bypassed reach (Condition 11); (3) project flows, including specified flow distribution prioritizations for the canal, the bypassed reach, the fish passage attraction facilities, zone of passage flows, and the Hadley Falls Station, during the Atlantic salmon downstream migratory period (April 1 through June 15 of each year), and during juvenile clupeid downstream migration period (September 1 through November 15 of each year) (Condition 12); (4) implementation of a canal system operation plan, a plan for protection and monitoring of aquatic resources in the canal system, and a plan to exclude shortnose sturgeon and other fish from the fishlift attraction water (Condition 13); (5) redesign and reconstruction of the project's upstream and downstream fish passage facilities, as well as requirements related to operation of the fish passage facilities (Condition 14); fish monitoring and counting (Condition 15); and submission to Massachusetts DEP of a riparian management plan (Condition 19).

the July 28, 1999 Certification. They are attached to this order as Appendix A and required by Article 421.

C. Threatened and Endangered Species

17. On April 19, 1999, Commission staff issued letters to FWS and to NOAA Fisheries, concluding that expanding, operating, and maintaining the project, with the staff's recommended measures, is not likely to adversely affect the shortnose sturgeon (in the letter to NOAA Fisheries), or the American bald eagle or Puritan tiger beetle (in the letter to FWS). The letters asked FWS and NOAA Fisheries to concur in staff's conclusion that formal consultation under section 7 of the Endangered Species Act (ESA)²² was not required.

18. FWS did not respond to staff's request for concurrence. NOAA Fisheries advised that it did not concur, and requested the initiation of formal consultation to assess the impact of the project's operation on endangered shortnose sturgeon and the incidental and unauthorized taking of shortnose sturgeon as a result of such operation.²³ On June 4, 1999, Commission staff initiated formal consultation with NOAA Fisheries, provided it with sections of the draft environmental impact statement (EIS) constituting staff's biological assessment of sturgeon, and requested a BO by July 15, 1999.

19. Neither the consultation with FWS or NOAA Fisheries was completed prior to issuance of the new license. However, the Commission determined that compliance with the provisions of the new license would potentially enhance, and not adversely alter, the environmental status quo, or make irreversible commitments of resources foreclosing the formulation or implementation of any reasonable and prudent alternative measures.²⁴ In addition, the Commission stated it would reserve authority to revise its terms and conditions to incorporate any measures necessary to comply with the ESA in light of any later-issued BO.²⁵

20. On October 13, 1999, after license issuance, FWS filed a letter stating its concurrence in the Commission's finding that the 1999 License for the Holyoke project

²² 16 U.S.C. § 1531-43.

²³ Section 9 of the ESA makes it unlawful for any person to "take" any endangered species. 16 U.S.C. § 1538. The ESA defines "take" as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." See ESA Section 3(10), 16 U.S.C. § 1532(19).

²⁴ See 88 FERC at 61,616.

²⁵ *Id.*

would not adversely affect the bald eagle, but stating that the activities authorized by the 1999 License would have adverse effects on the Puritan tiger beetle. It identified four potential measures to eliminate or reduce the adverse effects.²⁶

21. Pursuant to Article 416 of the 1999 License, and based on consultation with FWS, the licensee developed a threatened and endangered species protection plan that included measures satisfying FWS's concerns related to the Puritan tiger beetle.²⁷ FWS's comments on the draft plan were incorporated in the final plan that was filed with the Commission, and the Commission approved the plan on June 6, 2003.²⁸ Proposed Article 416 of the settlement, to which FWS is a party, requires the licensee to implement the threatened and endangered species protection plan approved by the Commission. In addition, proposed Article 405 requires the licensee to evaluate run-of-river operation in order to address water level fluctuations in the project's headwater reach, and associated effects on the Puritan tiger beetle and its habitat. Since the provisions of the threatened and endangered species protection plan, coupled with the provisions of the settlement, were developed in concert with FWS and are consistent with the measures recommended by FWS, it appears that issues regarding the beetle have been adequately addressed.

22. NOAA Fisheries filed its draft BO on August 18, 2000, after issuance of the 1999 License. It filed its final BO on February 1, 2005, after the settlement had been filed. The final BO treats the provisions of the settlement as the proposed action for purposes of

²⁶ These were measures to: (1) minimize erosion from water level fluctuations and boats; (2) continue a program of educating the public and policing recreational activities at beetle habitat sites, and identify additional ways to avoid or reduce the adverse effects on the Puritan tiger beetle from recreational use of shorelines; (3) implement a time-of-year restriction on flashboard replacement and installation of the rubber dam; and (4) identify potential tiger beetle habitat for protection, restoration and management as part of the threatened and endangered species plan required under Article 416 of the 1999 License.

²⁷ The plan includes requirements that the licensee: (1) conduct public education efforts; (2) continue to work with FWS and Massachusetts DFW to provide historic water level elevation data, impoundment maps and hydrology information to further the understanding of species' habitat needs; (3) provide support staff and share in research expenses; (4) establish no-wake zones at rainbow beach and provide appropriate signage (e.g., buoys, channel markers, posted speed limits, etc.); (5) consult with stakeholders to identify land within the project boundary suitable as beetle habitat, provide relocation support, and restrict use of such areas; and (6) undertake monitoring and reporting activities.

²⁸ 103 FERC ¶ 62,131.

ESA consultation. It finds that issuance of a license, as conditioned by the settlement and the settlement's proposed license articles, is likely to adversely affect, but is not likely to jeopardize the continued existence of, the endangered shortnose sturgeon.²⁹ To ensure that any incidental taking of shortnose sturgeon³⁰ will be authorized, NOAA Fisheries has identified reasonable and prudent measures to avoid or minimize incidental taking, as well as terms and conditions to implement those measures.³¹

23. The reasonable and prudent measures included as part of the incidental take statement require the licensee to minimize incidental taking of shortnose sturgeon that will result from: (1) collecting and handling at the downstream sampling station and stranding; and (2) inadequate water quality in the holding tanks at the downstream sampling station. NOAA Fisheries specifies five terms and conditions to implement these measures.³² NOAA Fisheries states that the incidental take statement and its

²⁹ NOAA Fisheries has not designated critical habitat for this species.

³⁰ NOAA Fisheries found that taking at this project may result from injury and mortality caused by attempts at upstream and downstream passage, as well as by harassment, trapping, capturing or collecting at the upstream and downstream fish passage facilities. Taking may also result from entrainment through the power facilities before modifications are complete, entrainment over the spillway or through the Bascule gate, abandonment of upstream or downstream passage, passage through the Holyoke bypassed reach, and stranding in the pools downstream from the Holyoke dam.

³¹ It has also provided detailed information on the amount of incidental taking authorized for the proposed action. *See* charts in the BO, at pages 66, 70, and 71, which set out levels of incidental take authorized for upstream migration, downstream migration, and stranding in pools below the dam for the time period before all modifications to the upstream and downstream fish passage facilities are completed, and for the time period after all modifications are completed.

³² The terms and conditions to implement measure (1) require the licensee to: (a) follow the Shortnose Sturgeon Handling Plan (included as Appendix F to this license order); (b) consult annually with NOAA Fisheries regarding the need for updates to the Handling Plan; (c) submit an annual report to NOAA Fisheries on the status of shortnose sturgeon at the Holyoke Project; and (d) notify NOAA Fisheries when the project reaches 75 percent of the incidental take statement levels for shortnose sturgeon. The term and condition to implement measure (2) requires the licensee to monitor water quality in the holding tanks used at the project's downstream sampling facility. It provides that sturgeon shall not be held for more than 12 hours. Water depth in the holding tanks shall be of sufficient depth to not unduly stress individual sturgeon. Water temperature shall not exceed 27° celsius and dissolved oxygen shall be at least 5 milligrams per liter (mg/l) at all times.

accompanying recommended reasonable and prudent measures and terms and conditions constitute an adaptive management process; that is, the monitoring that they require will continue to supply information on the level of take resulting from the proposed action, providing a basis for appropriate action, if needed.

24. We adopt as conditions of the license the incidental take conditions that implement the reasonable and prudent measures of the incidental take statement. These terms and conditions are set forth in Appendix B to this order and required by ordering paragraph E. In addition, because the 1999 License did not include monitoring, reporting, and notification requirements for shortnose sturgeon at the Holyoke Project, and since the BO was filed after the settlement, it is not clear whether the settlement and proposed license articles accommodate those requirements. Therefore, we have also amended Article 416 to require monitoring of shortnose sturgeon in accordance with the terms and conditions of NOAA Fisheries' incidental take statement.

25. In addition to the incidental take conditions, NOAA Fisheries recommends the implementation of several conservation measures³³ related to future research and monitoring of shortnose sturgeon passage and migration in the Connecticut river.

26. We support the on-going conservation efforts for shortnose sturgeon in the Connecticut River and, to the degree that those measures relate to the project, the license includes articles that address NOAA's recommended measures.³⁴ However, conservation measures are discretionary recommendations.³⁵ In this instance, the recommended measures relate primarily to general research. While we can require a licensee to do research prior to licensing that is needed for evaluation of its application, or to do research after licensing in order to monitor project effects, we do not have authority to require it to do more general research. Nevertheless, there is nothing in the settlement or

³³Section 7(a)(1) of the ESA directs federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species.

³⁴Article 410 addresses aspects of conservation measures (1), (2), and (5). Articles 404, 405, 411 and 413 address aspects of conservation measure (3). Article 411 addresses the requirement of conservation measure (4). Finally, the shortnose sturgeon handling plan, attached as Appendix F to this license, addresses the concerns raised by conservation measures (6) and (7).

³⁵The regulations implementing the ESA define conservation recommendations as "suggestions regarding discretionary measures to minimize or avoid adverse effects of a proposed action on listed species or critical habitat or regarding the development of information." See 50 CFR § 402.02.

the license which precludes the implementation of the measures, and we encourage the licensee to continue its cooperation with the resource agencies to manage the shortnose sturgeon.

Comprehensive Development

27. Under the amended license as conditioned by the settlement, the final water quality certification, and the final BO, the project will operate in a run-of-river mode; provide minimum flows for the bypassed reach, and upstream and downstream fish passage; and implement measures to protect endangered species. Based on our review of the settlement agreement filed by the parties, the water quality certification, the BO, our review of the environmental and economic effects of the proposed project and its alternatives,³⁶ and our analysis pursuant to FPA sections 4(e) and 10(a)(1), we find that the Holyoke Project, as conditioned herein, will be best adapted to the comprehensive development of the Connecticut river for beneficial public uses.

The Commission orders:

(A) The offer of settlement, filed on March 12, 2004, by Holyoke Gas and Electric Department, is approved.

(B) The requests for rehearing filed on September 20, 1999, by Holyoke Water Power Company, the City of Holyoke, Massachusetts, Ashburnham Municipal Light Plant, and Massachusetts Municipal Wholesale Electric Company are deemed withdrawn.

(C) The stay request filed by Holyoke Water Power on August 31, 1999, is dismissed.

(D) The license for the Holyoke Hydroelectric Project No. 2004 is amended by replacing Appendix A of the August 20, 1999 Order issuing license with the Appendix A (water quality certification conditions) attached to this order.

(E) The license for the Holyoke Hydroelectric Project No. 2004 is amended to make the license subject to the terms and conditions of the incidental take statement set forth in Appendix B to this order.

(F) The license for the Holyoke Hydroelectric Project No. 2004 is amended to attach, for clarity and information, appendices C (Parts III and Part IV of the settlement agreement filed with the Commission on March 12, 2004), D (Downstream Sampling

³⁶ The measures adopted in the license as a result of the settlement were addressed in the final EIS for the 1999 License.

Facility Operating Protocol), E (Detailed Description of Holyoke G&E Proposed Settlement Downstream Research and Construction (2004-2009/10)), F (Shortnose Sturgeon Handling Plan), and G (No. 2 Overflow Operating Procedures).

(G) The license for the Holyoke Hydroelectric Project No. 2004 is amended by replacing ordering paragraphs (G) and (H) of the August 20, 1999 Order issuing license with the following text:

(G) This license is subject to the articles set forth in Form L-3 (October 1975) (54 FPC 1817), entitled "Terms and Conditions of License for Constructed Major Project Affecting Navigable Waters of the United States," and the following additional articles:

Article 201. The licensee shall pay the United States the following annual charge, effective as of the date of commencement of project construction or relicensing.

For the purpose of reimbursing the United States for the cost of administration of Part I of the FPA, a reasonable amount as determined in accordance with the provisions of the Commission's regulations in effect from time to time. The authorized installed capacity for that purpose is 42,891 kW.

Article 202. Within 45 days of the date of issuance of the license, the licensee shall file an original set and two duplicate sets of aperture cards of the approved exhibit drawings. The set of originals shall be reproduced on silver or gelatin 35mm microfilm. The duplicate sets shall be copies of the originals made on diazo-type microfilm. All microfilm shall be mounted on type D (3-1/4' X 7-3/8") aperture cards.

Prior to microfilming, the FERC Drawing Number (11214-1 through 11214-7) shall be shown in the margin below the title block of the approved drawing. After mounting, the FERC Drawing Number shall be typed on the upper right corner of each aperture card. Additionally, the Project Number, FERC Exhibit (e.g., F-i, G-l, etc.), Drawing Title, and date of this license shall be typed on the upper left corner of each aperture card.

The original and one duplicate set of aperture cards shall be filed with the Secretary of the Commission, ATTN DLC/ECRB. The remaining duplicate set of aperture cards shall be filed with the Commission's New York Regional Office.

Article 203. Authority is reserved to the Commission to require the licensee, in a proceeding specific to this license, to conduct studies, modify minimum flow releases, or otherwise make reasonable provisions for modifying project facilities or operations as necessary to comply with the Endangered Species Act, where it concerns the federally listed endangered shortnose sturgeon, threatened bald eagle, and Puritan tiger beetle.

Article 301. The licensee shall commence construction of the enhancements to the Project works pursuant to the schedule(s) set forth in the individual License Articles.

Article 302. The licensee shall, at least 60 days prior to the start of construction, submit one copy to the Commission's Regional Director and two copies to the Commission (one of these shall be a courtesy copy to the Director, Division of Dam Safety and Inspections), of the final contract drawings and specifications for pertinent features of the Project, such as water retention structures, powerhouse or equivalent, and water conveyance structures. The licensee shall include, in the plans and specifications submitted, a soil erosion control plan. The Commission may require changes in the plans and specifications to assure a safe and adequate Project. If the licensee plans substantial changes to location, size, type, or purpose of the water retention structures, powerhouse or equivalent, or water conveyance structures, the plans and specifications must be accompanied by revised Exhibit F and G drawings, as necessary.

Article 303. Within 90 days after finishing construction, the licensee shall file, for Commission approval, eight copies of the revised exhibits A, F, and G describing the Project as built. The licensee shall submit six copies to the Commission, one copy to the Commission's Regional Director, and one to the Director, Division of Licensing and Compliance.

Article 304. Within 30 days after any changes in Project lands resulting from License Article 418, the licensee shall file, for Commission approval, a revised Exhibit G showing the changes in Project lands.

Article 305. If the Licensee's Project was directly benefited by the construction work of another licensee, a permittee, or the United States on a storage reservoir or other headwater improvement during the term of the original license (including extensions of that term by annual licenses), and if those headwater benefits were not previously assessed and reimbursed to the owner of the headwater improvement, the Licensee shall reimburse the owner of the headwater improvement for those benefits, at such time as they are assessed, in the same manner as for benefits received during the term of this new license.

Article 306. Before starting construction, the licensee shall review and approve the design of contractor-designed cofferdams and deep excavations, and shall make sure construction of cofferdams and deep excavations is consistent with the approved design. At least 30 days before starting construction of the cofferdam, the licensee shall submit one copy to the Commission's Regional Director and two copies to the Commission (one of these copies shall be a

courtesy copy to the Commission's Director, Division of Dam Safety and Inspections), of the approved cofferdam construction drawings and specifications, and the letters of approval.

Article 401. *Inflatable Rubber Dam.* The licensee shall operate and maintain the inflatable rubber dam installed in November 2001 at the Project.

Article 402. *Construction Control Plan.*

(a) At least 90 days before the start of any construction-related activities, including but not limited to land-disturbing, land-clearing, and spoil-producing activities, the licensee shall file with the Commission for approval, and with the Massachusetts Department of Environmental Protection (Massachusetts DEP), a final construction control plan for the purpose of controlling erosion, bank stability, sedimentation, turbidity, and water pollutant effects.

Relevant plans shall be developed for all construction-related activities. The plan shall be based on: (a) actual-site geological, soil, slope, and groundwater conditions; and (b) the final Project designs for all associated temporary and permanent features.

The plan shall contain, at a minimum, the following six items:

- (1) a description of the actual site conditions;
- (2) measures proposed to control erosion, to prevent slope instability, and to minimize the quantity of sediment resulting from construction activities;
- (3) detailed descriptions, final drawings and specifications, and specific topographic locations of all control measures;
- (4) specific details of site preparation and restoration including grading, revegetation, and fuel storage;
- (5) pre-construction sediment sampling in areas with potential contaminated sediments with a requirement for removing any contaminated sediments found prior to construction; and
- (6) a specific implementation schedule and details for monitoring and maintenance programs during construction activities and site restoration.

(b) The licensee shall follow the consultation process described in License Article 420.

(c) The Commission reserves the right to require changes to the plan. No construction-related activities shall begin until the Commission notifies the licensee that the plan is approved. The licensee shall implement the plan as approved by the Commission, including any changes required by the Commission.

Article 403. *Shoreline Erosion Remediation Plan.*

(a) The licensee shall implement the Shoreline Erosion Remediation Plan, as approved by the Commission on August 1, 2001 (96 FERC ¶ 62,100), and amended by order issued on November 17, 2003 (105 FERC ¶ 62,098), for inventorying, evaluating, stabilizing and monitoring shoreline erosion sites in the Project area.

(b) The licensee shall follow the consultation process described in License Article 420, and shall also consult with Town of South Hadley.

(c) The Commission reserves the right to require changes to any proposed modifications to the plan. No erosion site remediation work shall begin until the Commission notifies the licensee that the modified plan is approved. The licensee shall implement the modified plan as approved by the Commission, including any changes required by the Commission. The licensee shall solicit and coordinate the cooperation of other parties in implementing the approved modified plan.

Article 404. *Water Quality Monitoring Plan.*

(a) The licensee shall implement the Water Quality Monitoring Plan, as approved by the Commission on August 10, 2001 (96 FERC ¶ 62,144).

(b) The licensee shall follow the consultation process described in License Article 420, and shall also consult with Town of South Hadley.

(c) The Commission reserves the right to require changes to any proposed modifications to the monitoring plan. The licensee shall implement the modified monitoring plan as approved by the Commission, including any changes required by the Commission. If the results of monitoring indicate that changes in Project structures or operations are necessary to ensure compliance with state water quality standards, the Commission may direct the licensee to modify Project structures or operations.

Article 405. *Holyoke Project Operations.*

(a) *Run-of-River Operations.* The licensee shall operate the Project in a run-of-river mode and maintain a minimum impoundment elevation of 100.4 feet National Geodetic Vertical Datum (NGVD), with an allowable fluctuation of ± 0.2 foot for the protection of water quality, aquatic and fisheries, and recreational

resources of the Holyoke Project and Connecticut River. However, the licensee shall conduct an evaluation of potential modifications to run-of-river operations to address the goals stated in (b)(1) below. Until such time as the Commission authorizes the licensee to modify the run-of-river mode of operation through the process described in (b) and (c) below, the licensee shall at all times act to minimize the fluctuation of the impoundment surface elevation by maintaining a discharge from the Project so that, at any point in time, flows, as measured immediately downstream of the Project tailrace, approximate the sum of the inflows to the Project impoundment.

(b) *Testing of potential modifications to Run-of-River Operations.* As approved as part of the Comprehensive Operations Flow Plan (COFP) by FERC on June 24, 2003 (103 FERC ¶ 62,178), the licensee shall implement a plan for testing potential modifications to run-of-river operations that provides for the following:

(1) Consultation by the licensee as described in (e) below to identify management objectives related to the following resource goals: (A) to more effectively limit water level fluctuations at Rainbow Beach and other habitat areas for the federally threatened and state endangered Puritan tiger beetle upstream of the Project Dam; (B) to prevent injury or significant impairment of essential behavioral patterns to the federally and state endangered shortnose sturgeon; (C) to balance the magnitude of the fluctuations in the lower and upper sections of the Impoundment; (D) to balance the impact on wetland areas adjacent to the lower and upper sections of the Impoundment; (E) to maintain the seasonally adjusted minimum flows into the bypassed reach and the canal system as stated in License Article 406; and (F) to the extent possible, reduce fluctuations in river flows downstream of the Project;

(2) A provision pursuant to which the licensee would perform hydraulic model studies to evaluate effects of various operating regimes relative to the stated resource goals identified in (1) above;

(3) Consultation by the licensee, as described in (e) below, to develop a preferred operating regime and compliance measures that balance the licensee's operation constraints and the resource goals identified in (1) above;

(4) Implementation and monitoring by the licensee of the preferred operating regime determined under (3) above for a trial period of 12 months from the date of implementation, with a provision for continuation of the testing for up to an additional 12 months, if the U.S. Fish and Wildlife Service (FWS), the National Marine Fisheries Service (NOAA Fisheries), the Massachusetts Division of Fisheries and Wildlife (Massachusetts DFW), the Massachusetts Department of

Environmental Protection (Massachusetts DEP) and the licensee agree that river conditions in the impoundment during the test period were not representative of typical river flow conditions;

(5) Notification and response if, during the testing of the modified run-of-river operations, the licensee is unable to meet the Bypass Habitat Flows or the Bypass Zone-of-Passage Flows described in License Article 406; such notice to be provided to FWS, NOAA Fisheries, Massachusetts DFW, Massachusetts DEP, Trout Unlimited (TU), and the Connecticut River Watershed Council (Watershed Council) within 24 hours; with the licensee reverting immediately to the existing minimum flow; and with consultation as described in (e) below to modify or terminate the test of the modified run-of-river operations;

(6) Preparation by the licensee of the following evaluations using the data collected during the trial period: (A) an evaluation of the effects of the modifications to the run-of-river operations on the federally and state threatened and endangered species; (B) a determination of any appropriate revision to the Threatened and Endangered Species Protection Plan (including any necessary changes to reflect state species); (C) a determination of measures as appropriate to avoid adverse impacts to the federally and state endangered shortnose sturgeon, including stranding; (D) an evaluation of how the modifications to the run-of-river operations affects the licensee's ability to achieve flow elevations in the bypassed reach (*i.e.*, Bypass Habitat Flows and Bypass Zone-of-Passage Flows pursuant to License Article 406); (E) a recommendation, if necessary, to modify the Texon Gage as a compliance measure for Bypass Habitat Flows and Bypass Zone-of-Passage Flows; (F) an evaluation of how the modifications to the run-of-river operations affect wetland areas adjacent to the lower and upper sections of the impoundment; (G) an evaluation of impacts of modified run-of-river operation on downstream flow fluctuations; and (H) to the extent possible, proposed measures to reduce fluctuations in river flows downstream of the Project;

(7) Circulation by the licensee of the results of the test of modified run-of-river operations and evaluations performed under the plan to FWS, NOAA Fisheries, Massachusetts DFW, Massachusetts DEP, TU, and the Watershed Council, and consultation thereafter as described in (e) below on a proposed long-term resolution of the issue.

(c) *Proposed modification of run-of-river operations.* In the event that there is consensus among the consulted parties as identified in (b)(4) above that a modification of the run-of-river operation requirement is needed to meet the goals stated in (b)(1) above, the licensee shall file the following with the Commission and the Massachusetts DEP on or before November 30, 2004 [or within 3 months after any extension of the test period by written agreement of the licensee and

FWS, NOAA Fisheries, Massachusetts DFW, and Massachusetts DEP, pursuant to (4) above]: (A) a report containing the results of the test of modified run-of-river operations, the evaluations performed under the plan, and any comments from the consulted parties; and (B) a proposed amendment to the COFP for a modified operating protocol. Copies of the report and proposed amendment shall also be provided to FWS, NOAA Fisheries, Massachusetts DFW, Massachusetts DEP, TU, and the Water Council. The licensee shall implement the modified run-of-river operating protocol as approved by the Commission.

(d) *Emergencies and short period modifications.* The run-of-river mode of operation and minimum impoundment surface elevation requirements may be temporarily modified if required by operating emergencies, so long as the emergency is beyond the control of the licensee, is not reasonably foreseeable, and could not have been avoided by the exercise of due care by the licensee. Further, releases may be temporarily modified because of an emergency for short periods upon mutual agreement between the licensee, FWS, NOAA Fisheries, Massachusetts DEP, and Massachusetts DFW. If Project operations are so modified, the licensee shall notify the Commission and FWS, NOAA Fisheries, the Massachusetts DEP and Massachusetts DFW in advance if knowable or as soon as possible otherwise, but no later than 24 hours after each such incident, and shall provide the reason for the modified flow. The licensee shall also comply with the additional requirements in Condition 9(b) of the Water Quality Certification issued by Massachusetts DEP on February 14, 2001 (as incorporated in Article 421).

(e) *Consultation with resource agencies and other parties.* The licensee shall follow the consultation process described in License Article 420, and shall distribute all reports to the resource agencies and other parties listed in that Article.

Article 406. *Flow Releases to the Holyoke Bypassed Reach.* The licensee shall release seasonally-adjusted minimum flows into the bypassed reach and into the canal system for the protection and enhancement of water quality and aquatic and fisheries resources as described in this License Article. The flows released into the bypassed reach when the fish lifts are not operational shall be of an amount that is determined to ensure an adequate water level in all bypassed channels for fish habitat and that protects the federally and state endangered shortnose sturgeon from injury or significant impairment to essential behavioral patterns (Bypass Habitat Flows). Additionally, the flows released into the bypassed reach when the fish lifts are operational shall be of an amount that is determined to ensure safe and successful passage of fish without injury or significant impairment to essential behavioral patterns (Bypass Zone-of-Passage Flows).

(a) *Bypass Zone-of-Passage Flows.* Within 60 days after the date this order is issued, and after consultation (as described in (i) below), the licensee shall file with the Commission, for approval, an amendment to the Comprehensive Operations and Flow Plan (as approved by the Commission on June 24, 2001 (103 FERC ¶ 62,178) (COFP)) to provide for the release of flows into the bypassed reach, when the fish lifts are operational (as described in (a)(2) below), of an amount that ensures the safe and successful passage of diadromous fish (including the federally and state endangered shortnose sturgeon, when such passage is determined to be appropriate, as described below) and resident fish (when such passage is determined to be necessary, as described below), without injury or significant impairment to their essential behavioral patterns. All flows into the bypassed reach shall be correlated to the Texon Gage. The following provisions shall achieve that goal:

(1) A provision for the release of flows to the bypassed reach sufficient to achieve the water surface elevations in the bypassed reach which correspond to the 1997 Barnes & Williams IFIM Study of 1,300-cfs flow, as measured in the bypassed reach. Flows achieving a water surface elevation of 62.85 +/- 0.1 feet National Geodetic Vertical Datum (NGVD) at the Texon Gage (as defined in (a)(3) below) satisfy this requirement;

(2) A provision stipulating that the fish lifts at the Project shall be operational for the period April 1 through November 15 of each year, as refined by U.S. Fish and Wildlife Service (FWS), the National Marine Fisheries Service (NOAA Fisheries), Massachusetts Division of Fisheries and Wildlife (Massachusetts DFW), Massachusetts Department of Environmental Protection (Massachusetts DEP) on an annual basis; provided, however, that the fish lifts shall not be operational during the period July 15 through September 15 until such time as: (A) NOAA Fisheries determines that upstream passage of the federally and state endangered shortnose sturgeon over the dam is appropriate; or (B) Massachusetts DFW and FWS determine that resident fish passage is necessary; and

(3) A provision describing the Texon Gage as the benchmark to measure water surface elevations for the purposes of determining the Bypass Habitat Flows and the Bypass Zone-of-Passage Flows through: (A) the correlation of NGVD elevations to the readings on the existing Texon Staff Gage (located on the Texon Building); (B) the use of NGVD elevations as confirmed on an electronic gage to be located adjacent to the Texon Building; or (C) the use of an equivalent mechanism for determining NGVD elevations in the future as agreed to by the licensee and the resource agencies in consultation pursuant to paragraph (i) below.

(b) *Bypass Habitat Flows.* Within 60 days after the date this order is issued, and after consultation (as described in (i) below), the licensee shall file

with the Commission, for approval, an amendment to the COFP to provide for the release of flows into the bypassed reach, when the fish lifts are not operational (as described in (a)(2) above), of an amount that ensures an adequate water level in all bypassed channels for fish habitat and that protects the federally and state endangered shortnose sturgeon from injury, stranding, or significant impairment to their essential behavioral patterns. All flows into the bypassed reach shall be correlated to the Texon Gage. The following provisions shall achieve that goal:

(1) A provision for Interim Bypass Habitat Flows for the release of flows to the bypassed reach sufficient to achieve the water surface elevations in the bypassed reach which correspond to the 1997 Barnes & Williams IFIM Study of 840 cfs flow, as measured in the bypassed reach. Flows achieving a water surface elevation of 62.3 +/- 0.1 feet NGVD at the Texon Gage [as defined in (a)(3) above] satisfy this requirement; and

(2) A plan to establish Permanent Bypass Habitat Flows for normal operations and maintenance conditions at the Project based on the Interim Bypass Habitat Flows adjusted and modified based on flow demonstrations performed for normal operating conditions (*i.e.*, with releases through the Bascule Gate) and for maintenance conditions (*i.e.*, with releases through Rubber Dam Section No. 1 (section at South Hadley end of dam), when the Bascule Gate is out of service): (A) the evaluation of water surface elevations and the distribution of flows in the bypassed reach after the Spring 2004 fish passage season, and (B) determination if any channel modifications for flow distributions or changes to the Interim Bypass Habitat Flows are necessary to achieve the water surface target elevations from the 1997 Barnes and Williams study for each of the three bypassed channels in the bypassed reach to provide an adequate water level for fish habitat and to prevent any adverse impacts to the federally and state endangered shortnose sturgeon, including injury, stranding, or significant impairment to essential behavioral patterns. If it is determined that there is a need for modifications to the Holyoke (West) Channel or a need for changes to the Interim Bypass Habitat Flows, after consultation [as described in (i) below], the licensee shall file an application to amend the license for the Project to the extent required by the Commission's regulations. Any changes proposed under such an application for license amendment shall be coordinated with changes based on the modified run-of-river operations set forth under License Article 405.

(c) *Canal Minimum Flows.* Within 60 days after the date this order is issued, and after consultation (as described in (i) below), the licensee shall file with the Commission, for approval, an amendment to the COFP, as necessary, to provide for the release of seasonally-adjusted minimum flows into the canal system that include all of the following provisions:

(1) A provision for interim canal system minimum flows into the canal system, downstream of the louver bypass facility, of 400 cfs consistent with the Comprehensive Canal Operations Plan (as approved by the Commission on June 5, 2003 (103 FERC ¶ 62,130) (CCOP)) and the COFP. The licensee shall use generation records (consistent with the form and content of the filings made at the Commission for the period in question) and unit rating curves as an interim compliance measure; and

(2) The plan to establish permanent canal system minimum flow compliance measures to ensure a 400 cfs continuous minimum flow into the canal system downstream of the louver facility, as filed with the Massachusetts DEP in December 2003. The plan includes –

(A) The use of head gate openings and pond elevations to determine the quantity of flow (calculated from gate opening/discharge relationships) and flow measurements in the first level canal (using new flow measurement equipment installed in the first level canal) to ensure adequate flow distribution;

(B) The filing with the Commission and Massachusetts DEP on or before June 30 2004, of permanent compliance measures as a revision to the CCOP as necessary; and

(C) A provision that if significant modifications are made by the licensee or any other entity on the canal, after establishment of the permanent canal system minimum flows, that could change leakage or the distribution of flow in the canal system, the licensee shall evaluate the magnitude and distribution of flows in the canal system. Then, in consultation [as described in (i) below], the licensee shall file a proposed revision to the permanent canal system minimum flow compliance measures contained in the CCOP as necessary to achieve the resource management objectives and the minimum flow requirements set forth in this License Article and agreed to by the resource agencies and other parties [pursuant to consultation as described in (i) below].

(d) *Canal System Outage Procedures.* Within 60 days after the date this order is issued, and after consultation (as described in (i) below), the licensee shall file with the Commission for approval an amendment to the COFP, as necessary, to provide canal system drawdown procedures and operation of weirs in the canal to protect and enhance mussel species including the federally and state listed endangered dwarf wedgemussel and the state listed endangered yellow lampmussel as follows:

(1) To provide interim canal system outage procedures that provide for:

(A) Maintenance of minimum flows through the headgates sufficient to ensure that the pool between Boatlock and Riverside remains at an elevation equal to the Riverside Station intake sill elevation and at ambient river temperature throughout the drawdown period;

(B) Maintenance of sufficient flows from the Project headgates to provide water in the first level canal (once maintenance is completed) to protect the state listed endangered yellow lampmussel at the lower end of the louvers;

(C) Keeping the No. 3 Overflow closed until the end of the canal system outage period, at which time it may be opened for inspection and maintenance;

(D) Maintenance of measures for the protection of mussels if heavy machinery is used in the canal during the canal system outage period;

(E) A plan for evaluation of the experimental weir in the first level canal to determine if it retains water and develop and implement plans to modify as required; and

(F) A plan to evaluate the need for additional weirs to keep mussel habitat areas watered.

(2) To provide permanent canal system outage procedures that stipulates the following:

(A) Based on the evaluations of the Spring and Fall 2004 canal system outages, the licensee shall consult pursuant to (i) below to modify the interim canal system outage procedures (including the drawdown procedures, experimental weir, and any additional weirs) to the extent necessary to protect and enhance mussel species including the federally and state listed endangered dwarf wedgemussel and the state listed endangered yellow lampmussel, and to generally ensure sufficient flows into the canal system during the outages for the protection and enhancement of water quality and aquatic and fisheries resources;

(B) On or before January 31, 2005, the licensee shall file with the Commission, for approval as an amendment to the CCOP, a permanent canal system outage plan for canal drawdowns that addresses the following: Provisions implemented in the Spring and Fall 2004 canal system outage [as stated in (d)(2)(A) above], the evaluation and potential installation of a permanent weir in 2005 and/or additional weirs as necessary, and an update of the matters addressed in the interim canal system outage procedures;

(C) The licensee shall notify all canal water users and FWS, NOAA Fisheries, Massachusetts DEP, Massachusetts DFW, Trout Unlimited, and the Connecticut River Watershed Council prior to any canal system outage; and

(D) The licensee shall implement the plan as approved by the Commission.

(e) *Flow Prioritization.* The licensee shall operate the Holyoke Project according to the following flow prioritization plan:

Minimum Project Flow Prioritization During Fish Passage		
Priority	Spring Passage	Fall Passage
1	Canal to 400 cfs (plus 150 cfs for louvers)	Canal to 400 cfs (plus 150 cfs for louvers)
2	Bypassed Reach Habitat Flows	Bypassed Reach Habitat Flows
3	Fishway Attraction Water up to 440 cfs	Fishway Attraction Water up to 440 cfs
4	Bypassed Reach Zone-of-Passage Flows	Bypassed Reach Zone-of-Passage Flows
5	Hadley Falls Unit 1	Hadley Falls to capacity, as long as canal has at least 3,000 cfs
6	Canal to 2,000 cfs	
7	Hadley Falls to capacity	

The licensee shall file any proposed modification to that flow prioritization plan as a proposed revision to the COFP after consultation [as described in (i) below].

(f) *Monitoring.* The licensee shall specify the methods for operating and releasing bypassed reach and canal system minimum flows and shall monitor compliance with the minimum flows, as required by License Article 407.

(g) *Emergencies.* Releases from the Holyoke Project may be temporarily modified if required by operating emergencies, so long as the emergency is beyond the control of the licensee, is not reasonably foreseeable, and could not have been avoided by the exercise of due care by the licensee. Further, releases may be temporarily modified because of an emergency for short periods upon mutual agreement between the licensee, the FWS, NOAA Fisheries, Massachusetts DEP, and Massachusetts DFW. If the flows are so modified, the

licensee shall notify the Commission, FWS, NOAA Fisheries, Massachusetts DEP and Massachusetts DFW in advance if knowable or in advance or as soon as possible otherwise, but no later than 24 hours after each such incident, and shall provide the reason for the modified flow.

(h) *Changes.* If the information reported pursuant to this License Article indicates that a different flow regime is needed to protect and enhance water quality or aquatic and fisheries resources in the Project vicinity of the Connecticut River, the Commission may require such changes.

(i) *Consultation with resource agencies and other parties.* The licensee shall follow the consultation process described in License Article 420, and shall distribute all reports to the resource agencies and other parties listed in that Article.

Article 407. *Comprehensive Operations and Flow Plan.*

(a) The licensee shall implement the Comprehensive Operations and Flow Plan as approved by the Commission on June 24, 2003 (103 FERC ¶ 62,178) (COFP), including run-of-river operation, bypass flows, and fish passage operational flows.

(b) With respect to any proposed modifications to the COFP, the licensee shall follow the consultation process described in License Article 420.

(c) The Commission reserves the right to require changes to any proposed modifications to the COFP. Construction of any flow release mechanism(s) or structure(s) shall not begin until the Commission notifies the licensee that the proposed modifications to the COFP are approved. The licensee shall implement the modified COFP as approved by the Commission, including any changes required by the Commission. Any flow release mechanism(s) or structure(s) constructed by the licensee shall be shown on the as-built drawings filed pursuant to License Article 303 of this license.

(d) If the information reported pursuant to License Articles 404, 408, and 410 indicates that a different flow regime or method of achieving the flow regime is necessary to provide adequate protection and enhancement of water quality or aquatic and fisheries resources in the Project vicinity of the Connecticut River, the Commission may require such changes.

Article 408. *Holyoke Canal Operations.* The licensee shall operate the Project to protect and enhance water quality and mussel populations in the canal system.

(a) *General canal operations.* The licensee shall implement the Comprehensive Canal Operations Plan, as approved by the Commission on June 5, 2003 (103 FERC ¶ 62,130) (CCOP) [with the amendments to the CCOP contained in the Comprehensive Operations and Flow Plan, as approved by the Commission on June 24, 2003 (103 FERC ¶ 62,178)] to protect and enhance water quality and mussel populations in the canal system. With respect to any proposed modifications to the CCOP, the licensee shall consult with the resource agencies and the other parties as specified in paragraph (d) below.

(b) *Operation of the full depth louvers and exclusion racks.* The licensee shall continue to operate, clean and otherwise maintain the full depth louvers, installed in the first level of the canal system in Fall 2002 and the exclusion racks at the attraction water intake gates to ensure efficient and reliable operation of these facilities for the protection of aquatic resources. The licensee shall annually inspect the full depth louvers and exclusion racks, and repair them as necessary. In the event the full depth louver facility is out of service during the fish passage season as described in License Article 411(a)(2), the canal system shall not be operated and the headgates shall be closed to seal flows into the canal. If necessary, at the end of the fish passage season a slow drain of the canal shall be performed to return any fish to the Connecticut River. In the event of a failure of the canal louver bypass system, the licensee shall shut the canal down. If there is a structural failure of the louver panels, the licensee shall notify Massachusetts Division of Fisheries and Wildlife (Massachusetts DFW), U.S. Fish and Wildlife Service (FWS), and the National Marine Fisheries Service (NOAA Fisheries) within 24 hours, and shall implement a slow drain procedure to allow any fish in the canal downstream of the louver facility to return to the River.

(c) *Effectiveness studies of full depth louvers.* The licensee shall implement the effectiveness study plan for the full depth louvers, as they affect surface migrants, pursuant to the effectiveness study plan outlined in Section 4.3(g) of the Settlement (included as Appendix C to this license order). In consultation (as described in (d) below), the licensee shall prepare and file an effectiveness study plan for the full depth louvers, as they affect bottom migrants (as addressed in Section 4.7(c)(1)(B) of the Settlement), with the Commission and Massachusetts Department of Environmental Protection (Massachusetts DEP) on or before July 1, 2004. The effectiveness of the full depth louvers shall be evaluated based on the overall downstream fish passage goal of safely and successfully passing the fish without injury or significant impairment to essential behavioral patterns. The study results regarding facility effectiveness shall be circulated to FWS, NOAA Fisheries, Massachusetts DFW, Massachusetts DEP, Trout Unlimited, and the Connecticut River Watershed Council, and filed with the Commission and Massachusetts DEP no later than December 31 of the year of completion of the study. If, based on the louver effectiveness studies and any other relevant

information in the record of this proceeding, the licensee, the resource agencies and the other parties [in consultation as described in (d) below] determine that the full depth louvers are effective, the licensee may close the Boatlock Station Bypass.

(d) *Consultation with resource agencies and other parties.* The licensee shall follow the consultation process described in License Article 420, and will distribute all reports to the resource agencies and other parties listed in that Article.

(e) The Commission reserves the right to require changes to any proposed modification to the CCOP. The licensee shall implement the modified CCOP as approved, including any changes required by the Commission. If the results of monitoring indicate that changes in Project structures or operations are necessary to protect and enhance water quality and mussel populations in the canal system (e.g., canal operations and/or structures), the Commission may direct the licensee to modify Project structures or operations.

Article 409. *Fish and Aquatic Habitat Plan.*

(a) The licensee shall implement the Fish and Aquatic Habitat Plan, as approved by the Commission on June 24, 2003 (103 FERC ¶ 62,175), to monitor fish and aquatic habitat and fish populations within the bypassed reach and the Holyoke canals. The licensee shall propose to modify the plan, if necessary, based on the 2003 and 2004 canal system outages and to track the 12-year plan in the Fish and Aquatic Habitat Plan (as addressed in Section 4.11(e) of the Settlement). In addition, the licensee shall implement the provision of the Comprehensive Canal Operations Plan, as approved by the Commission on June 5, 2003 (103 FERC ¶ 62,130), with respect to monitoring of canal mussel populations.

(b) The licensee shall follow the consultation process described in License Article 420 with respect to any proposed modifications to, or reporting, under the Fish and Aquatic Habitat Plan.

(c) The Commission reserves the right to require changes to any proposed modifications to the Fish and Aquatic Habitat Plan. Implementation of the modified plan shall not commence until the Commission notifies the licensee that the filing is approved. The licensee shall implement the modified plan as approved by the Commission, including any changes required by the Commission.

(d) If the results of the monitoring plan indicate that changes in Project structures or operations [including any measures identified by the licensee, the resource agencies and the other parties in consultation as described in (b) above]

are necessary to protect aquatic and fisheries resources, the Commission may direct the licensee to modify Project structures or operations accordingly.

Article 410. *Downstream Fish Passage Facilities.* The licensee shall install, operate, and maintain downstream fish passage facilities at the Holyoke Project that safely and successfully pass diadromous and resident fish without injury or significant impairment to essential behavioral patterns. The licensee shall further implement and enhance downstream fish passage in several phases as described below. The downstream fish passage facilities are to be designed, constructed and operated to: (i) prevent entrainment or impingement in the Project intake system, (ii) prevent injury to fish if passed over or through the dam onto the spillway, and (iii) ensure that all downstream migrating diadromous and resident fish that appear on the upstream side of the dam shall be passed downstream without injury or significant impairment to essential behavioral patterns.

Operational deadlines for new downstream fish passage facilities shall depend on whether Phase 2A or Phase 2B is implemented, as determined by the licensee in consultation with the resource agencies [U.S. Fish and Wildlife Service (FWS), the National Marine Fisheries Service (NOAA Fisheries), Massachusetts Division of Fisheries and Wildlife (Massachusetts DFW), and Massachusetts Department of Environmental Protection (Massachusetts DEP)] and other parties [Trout Unlimited (TU) and the Connecticut River Watershed Council (Watershed Council)] pursuant to (c) below. If, in consultation with the resource agencies, the licensee implements Phase 2A, then the complete downstream passage facilities shall be operational no later than April 1, 2010, although the licensee shall provide interim (and potentially long-term) facilities to prevent entrainment and impingement in the intake system by April 1, 2006. If, in consultation with the resource agencies, the licensee implements Phase 2B, then the complete downstream passage facilities shall be operational no later than April 1, 2009. Regardless of the Phase implemented, the licensee shall monitor effectiveness of the facilities and make additional improvements as provided for below.

(a) *Downstream fish passage.* The licensee shall implement the Downstream Fish Passage Plan as approved by the Commission on June 19, 2003 (103 FERC ¶ 62,165), to cover the operation, maintenance, and evaluation of the existing downstream fish passage facilities at the Holyoke Project until modification of that plan is authorized by the Commission under paragraph (b) below. With respect to any proposed modifications to the Downstream Fish Passage Plan, the licensee shall consult with the resource agencies and the other parties as specified in paragraph (c) below.

(b) *Downstream fish passage enhancements* – Within 60 days after the date this order is issued, and after consultation [as described in (c) below and in

Article 420], the licensee shall file with the Commission and Massachusetts DEP, for approval, a plan to enhance the existing downstream fish passage facilities at the Holyoke Project that includes:

(1) *Phase 1 – 2004-2005.* During the period 2004 through 2005, in consultation with the agencies and other parties pursuant to paragraph (c) below, the licensee shall implement modifications to the Downstream Sampling Facility; shall potentially implement modifications to the Louver Bypass Discharge Pipe (as set forth below); shall implement operational changes to prioritize flows from the Hadley Falls units to the canal during Fall evening hours; and shall conduct research and studies (as set forth below). Based on such research, on or before December 31, 2005, the licensee [in consultation pursuant to paragraph (c) below], shall determine whether to implement Phase 2A or Phase 2B (as described below in paragraphs (c) and (d) below). The Phase 1 work shall include:

(A) To minimize the potential for injury to federally and state endangered shortnose sturgeon if they enter the Downstream Sampling Facility, after initial consultation pursuant to paragraph (c) below, the licensee shall develop a plan to modify the Downstream Sampling Facility with such modifications to be completed by April 15, 2004, and to test the effectiveness of such modifications thereafter in 2004. The plan shall be filed with the Commission and Massachusetts DEP on or before March 1, 2004. The licensee shall implement the plan as approved in writing by the Commission. If, after such modifications, evidence of injury to shortnose sturgeon is found, the licensee shall consult with the resource agencies and other parties pursuant to paragraph (c) below to determine if any additional modifications are appropriate. The licensee shall operate the Downstream Sampling Facility in accordance with the Downstream Sampling Facility Operating Protocol, attached as Appendix D to this license order.

(B) The licensee shall evaluate the effect of the height of the drop from the Louver Bypass Discharge Pipe to the tailrace on shortnose sturgeon through a radio tracking study. If, in consultation pursuant to paragraph (c) below, the licensee determines it is necessary to reduce the height of the drop from the Louver Bypass Discharge Pipe to the tailrace to enhance the survival of shortnose sturgeon, the licensee shall propose how best to modify the Louver Bypass Discharge Pipe in a plan to be filed [after consultation pursuant to paragraph (c) below] that provides for such modifications to be implemented in 2005, to be operational for the Spring 2006 Upstream Passage Season, and effectiveness testing of the modifications in 2006 after the modifications are implemented. The licensee shall file the plan with the Commission and Massachusetts DEP on or before April 1, 2005, and shall implement the plan as approved in writing by the Commission.

(C) To reduce entrainment, the licensee shall develop a plan [in consultation pursuant to paragraph (c) below] to change flow prioritization from the Hadley Falls units to the Canal during nighttime periods from October 1 through the later of: (i) the time when the River temperature reaches 5° C., or (ii) November 30 [unless the resource agencies and other parties, in consultation pursuant to paragraph (c) below, agree to an earlier time], with prioritizing the Canal first and then regulating the Hadley Falls Station. The licensee shall file the plan with the Commission and Massachusetts DEP on or before December 31, 2004, and shall implement the plan as approved in writing by the Commission. The licensee shall also consult with the resource agencies and other parties [pursuant to paragraph (c) below] to determine if additional or alternative operational changes will enhance downstream passage.

(D) In consultation pursuant to paragraph (c) below, the licensee shall conduct a Louver Field Study in 2004: (i) to evaluate effectiveness of the full depth louvers to guide shortnose sturgeon and American eels; and (ii) to evaluate the behavior of shortnose sturgeon and American eels at the ramp and the entrance to the bypass pipe.

(E) In consultation pursuant to paragraph (c) below, the licensee shall conduct CFD Modeling in 2004: (i) of the Hadley Falls unit's intakes to evaluate the potential of modifying the existing Hadley Falls unit's intake racks to be an effective interim (and potentially long term device to prevent entrainment and impingement of fish at the Hadley Falls; and (ii) of a potential bottom weir to evaluate if such a weir would produce flow patterns conducive to guide bottom migrants into the Canal.

(F) In consultation pursuant to paragraph (c) below, the licensee shall conduct a USGS Flume Study in 2004: (i) to determine the swimming depth and behavior of yearling, juvenile and adult shortnose sturgeon at a bar rack structure; (ii) to determine the threshold velocity for avoidance of impingement/entrainment of yearling, juvenile, and adult shortnose sturgeon at conditions present at the proposed modified Hadley Falls intake racks with 2-inch spacing; and (iii) to determine if yearling, juvenile, and adult shortnose sturgeon can avoid impingement/entrainment at conditions present at a potential alternative bar rack facility (2-inch spacing and velocities of 2 fps).

(G) In consultation pursuant to paragraph (c) below, the licensee shall conduct a USGS Flume Study in 2005: (i) to determine how shortnose sturgeon would respond to a bottom weir for guidance; and (ii) to determine how shortnose sturgeon would respond to a bypass entrance, integral with a rack structure.

(H) In consultation pursuant to paragraph (c) below, the licensee shall conduct a Bascule Gate and Rubber Dam Section No. 5 Analysis (comprised of a desk-top study) in 2005: (i) to identify potential solutions to the interference of the Bascule Gate discharge on the entrance to the spillway fishway; (ii) to evaluate the feasibility of using/modifying the Bascule Gate and/or modifying the spillway in the vicinity of Rubber Dam Section No. 5 (adjacent to the Bascule Gate) to pass shortnose sturgeon, American eels and other migratory fish; and (iii) to investigate modifications to the Bascule Gate and/or the spillway in the vicinity of Rubber Dam Section No. 5 to safely and successfully pass the fish without injury or significant impairment to essential behavioral patterns down the spillway and over the apron into the Bypassed Reach.

(I) In consultation pursuant to paragraph (c) below, the licensee shall conduct an Eel Study in 2004 to determine the timing of migration of silver-phase American eels at the Project.

(J) In consultation pursuant to paragraph (c) below, the licensee shall conduct a Spawning Study in 2005 to identify potential spawning sites for shortnose sturgeon downstream of the Dam.

(2) *Decision Point – 2005.* Based on the results of the Phase 1 research, on or before September 30, 2005, the licensee shall distribute to the resource agencies and other parties [as provided in paragraph (c) below] a recommendation on whether to implement Phase 2A or Phase 2B, as described below. The licensee shall implement Phase 2A as set forth in paragraph (b)(3) below if: (i) the results of the Phase 1 studies (described above) demonstrate that the licensee can modify the existing Hadley Falls intake racks to be an effective interim (and potentially long term) exclusion device while achieving the threshold velocity for avoidance of entrainment and impingement of fish; and (ii) there is a potential solution to the Bascule Gate discharge interference on the spillway fishway and a means of providing safe passage down the spillway and over the apron have been identified. If the two elements (i) and (ii) above are not confirmed by the FWS, NOAA Fisheries, Massachusetts DEP and Massachusetts DFW pursuant to the process described below, then the licensee shall implement Phase 2B.

The process for determining whether the licensee implements Phase 2A or Phase 2B shall be as follows: After circulation by the licensee of the study results and the licensee's recommendation for Phase 2A or Phase 2B, the licensee shall consult pursuant to paragraph (c) below. On or before December 31, 2005, FWS, NOAA Fisheries, Massachusetts DEP and Massachusetts DFW are to notify the licensee if they all agree with the licensee's recommendation; in which case, the licensee shall implement that recommendation. If FWS, NOAA Fisheries, Massachusetts DEP and Massachusetts DFW do not all agree with the licensee's

recommendation, they are to notify the licensee by December 31, 2005, and the licensee shall then implement Phase 2B.

(3) *Phase 2A – 2006-2010.* Based on the Phase 1 research, consistent with the decision made pursuant to paragraph (b)(2) above, and in consultation pursuant to paragraph (c) below, the licensee shall implement the work and research as outlined below for further enhancements of the downstream fish passage facilities. Under Phase 2A the licensee shall: (i) continue to implement operational changes commenced in 2005 to enhance downstream passage of shortnose sturgeon; (ii) construct and install an interim (and potentially long term) device by the end of 2006 that prevents entrainment and impingement at the Project based on modifications of the Hadley Falls intake racks and installation of a new trash rake structure connected with the intake racks; (iii) prepare a functional design drawing of the selected option to modify the Bascule Gate to safely and successfully pass fish without injury or significant impairment to essential behavioral patterns and to solve interference of Bascule Gate discharge on the spillway fishway, then build a prototype and field test (if necessary) in 2006, with engineering/permitting in 2007 and construction in 2008; (iv) undertake additional research during the period 2006 to 2010 to ensure that the downstream passage facilities are effective for exclusion and safe and successful passage of fish over the dam; (v) design, engineer, and permit in 2008: (A) an alternative exclusion and (B) an alternative passage device in the vicinity of Rubber Dam Section No. 5 (if the modifications to the Hadley Falls intake racks are determined not to be successful as a long-term exclusion device), to safely and successfully pass fish without injury or significant impairment to essential behavioral patterns, with construction of these facilities completed in 2009, and with the start of effectiveness testing of these facilities in 2010; and (vi) implement a long-term monitoring program for shortnose sturgeon from 2011 to the end of the Project License. The specific schedule is as follows:

2006

- The licensee shall design, engineer, permit, build and complete the modifications to existing Hadley Falls intake racks and installation of a new trash rake structure, as agreed to at the Decision Point 2005 above, as an exclusion device for downstream migrating fish including shortnose sturgeon to prevent entrainment and impingement at the Hadley Falls intakes. The modifications to the Hadley Falls intake racks and the installation of the new trash rake shall be completed by the end of 2006 (or earlier if possible depending on River conditions and obtaining necessary permits).
- The licensee shall continue to implement operational changes commenced in 2005.

- The licensee shall prepare a functional design drawing of the selected option to modify the Bascule Gate for safe passage and to solve interference of Bascule Gate discharge on spillway fishway; build prototype and field test (if necessary).
- The licensee shall conduct effectiveness studies of the modifications to the Louver Bypass Discharge Pipe if implemented in 2005, and shall distribute the results to the resource agencies and other parties pursuant to paragraph (c) below.
- The licensee shall perform radio tracking studies of shortnose sturgeon and silver-phase American eels, and shall distribute the results to the resource agencies and other parties pursuant to paragraph (c) below.

2007

- The licensee shall engineer, design and permit modifications to the Bascule Gate to provide safe and successful passage for the fish without injury or significant impairment to essential behavioral patterns and to solve the interference of Bascule Gate discharge on the spillway fishway.
- The licensee shall continue to perform radio tracking studies of shortnose sturgeon and use such studies to evaluate the effectiveness of the modifications to the Hadley Falls intake racks completed in 2006; shall continue to perform radio tracking studies of silver-phase American eels, if necessary; and shall distribute the results to the resource agencies and other parties pursuant to paragraph (c) below.

2008

- The licensee shall provide to the resource agencies and other parties (consulted pursuant to paragraph (c) below) the results of the effectiveness testing of the modifications to the Hadley Falls intake racks and other measures in 2006-2007, and the licensee's conclusion whether those modifications and other measures achieve the goals for Phase 2A as stated above. Based on that information the licensee, in consultation with the resource agencies and other parties (through the decisional process described in Appendix F, Part III, Decision Point – 2005, of the Settlement), shall determine if it is necessary to build an alternative exclusion device
 - If (through the decisional process described in Appendix F, Part III, Decision Point – 2005, of the Settlement) the resource agencies (FWS, NOAA Fisheries, Massachusetts DEP and Massachusetts DFW) determine that it is not necessary for the licensee to build an alternative exclusion device, then the licensee shall design, engineer, permit and construct the modifications to the Bascule Gate, for fish passage.

- If (through the decisional process described in Appendix F to the Settlement) the resource agencies (FWS, NOAA Fisheries, Massachusetts DEP and Massachusetts DFW) determine that it is necessary for the licensee to build an alternative exclusion and passage device(s), then the licensee shall design, engineer and permit: (i) an alternative exclusion device, and (ii) an alternative passage device (in the vicinity of Rubber Dam Section No. 5), as determined by the resource agencies and other parties (in consultation pursuant to paragraph (c) below) that would not only exclude fish from the Hadley Falls intakes without impingement, but would also provide for safe and successful downstream passage of fish without injury or significant impairment to essential behavioral patterns.
- The licensee shall continue to perform radio tracking studies of shortnose sturgeon, and distribute results to the resource agencies and other parties pursuant to paragraph (c) below.
- The licensee shall conduct a Population Survey for shortnose sturgeon in the Connecticut River, from Long Island Sound to Turners Falls (as described more fully in Appendix F to the Settlement Agreement and Appendix E to this license order), and distribute the results to the resource agencies and other parties pursuant to paragraph (c) below.

2009

- As determined to be necessary in 2008, the licensee shall bid, build and complete construction of device(s) designed and permitted in 2008 (in consultation with the resource agencies and other parties pursuant to paragraph (c) below).
- The licensee shall continue radio tracking studies of shortnose sturgeon and distribute the results to the resource agencies and other parties pursuant to paragraph (c) below.

2010

- The licensee shall commence operation of the device(s) constructed in 2009 prior to April 1, 2010.
- The licensee shall, in consultation pursuant to paragraph (c) below, develop a plan to study the effectiveness of the exclusion and passage device(s) completed in 2008-2009; shall implement that plan; and shall distribute the results to the resource agencies and other parties by January 31, 2011, pursuant to paragraph (c) below.

- The licensee shall consult [pursuant to paragraph (c) below] to develop long-term monitoring protocol for shortnose sturgeon during the term of the License for the Project, with distribution of the results annually to the resource agencies and other parties pursuant to paragraph (c) below. If after 2010 the licensee determines, in consultation pursuant to paragraph (c) below, that shortnose sturgeon are not passing safely downstream of the Project, the licensee shall consult further with the resource agencies and other parties pursuant to paragraph (c) below to determine a plan for re-evaluating the downstream passage facilities.

Plans to implement each part of Phase 2A above shall be prepared and submitted to the resource agencies and other parties pursuant to paragraph (c) below. The licensee shall consult with the resource agencies and other parties, and/or obtain the concurrence and/or approval of that plan, pursuant to paragraph (c) below. Thereafter, the licensee shall file such plans with the Commission and Massachusetts DEP, and shall implement such plans as approved in writing by the Commission.

(4) *Phase 2B – 2006-2009.* Based on the Phase 1 research, consistent with the decision made pursuant to paragraph (b)(2) above, and in consultation pursuant to paragraph (c) below, the licensee shall implement the work and research as outlined below for further enhancements of the downstream fish passage facilities. Under Phase 2B the licensee shall: (i) continue to implement operational changes commenced in 2005 to enhance downstream passage of shortnose sturgeon; (ii) continue studies and research to determine the appropriate alternative exclusion and passage device(s), including an angled bar rack; (iii) design/permit measures and modifications in 2007 for: (A) an alternative exclusion device, and (B) an alternative passage device (in the vicinity of Rubber Dam Section No. 5) to safely and successfully pass fish without injury or significant impairment to essential behavioral patterns and avoid any potential flow interference problems with the spillway fishway, construct these facilities in 2008, and start effectiveness testing of these facilities in 2009; (iv) undertake additional research and additional measures from 2006 to 2009 to ensure that the downstream passage facilities are effective for exclusion and guidance as described below; and (v) implement a long-term monitoring program for shortnose sturgeon from 2010 to the end of the Project License. The specific schedule is as follows:

2006

- The licensee shall perform a full feasibility study of options for an alternative passage device (in the vicinity of Rubber Dam Section No. 5) to: (i) safely and successfully pass the fish without injury or significant impairment to essential behavioral patterns down the spillway over the apron and into the Bypassed Reach, and (ii) avoid any potential flow interference problems with the spillway fishway. Build prototype and field test (if necessary).

- The licensee shall continue to implement operational changes commenced in 2005.
- The licensee shall consult pursuant to paragraph (c) below to develop a research and study program to evaluate alternative exclusion and passage device(s).
- The licensee shall perform radio tracking studies of shortnose sturgeon and silver-phase American eel; and shall distribute the results to the resource agencies and other parties pursuant to paragraph (c) below.
- The licensee shall conduct effectiveness studies of the modifications to the Louver Bypass Discharge Pipe if performed in 2005, and shall distribute the results to the resource agencies and other parties pursuant to paragraph (c) below.

2007

- In consultation with the resource agencies and other parties pursuant to paragraph (c) below, the licensee shall design/engineer/permit: (i) an alternative exclusion device and (ii) an alternative passage device (in the vicinity of Rubber Dam Section No. 5), determined in 2006 by the licensee, the resource agencies and the other parties (in consultation pursuant to paragraph (c) below) to safely and successfully pass the fish without injury or significant impairment to essential behavioral patterns down the spillway over the apron and into the Bypassed Reach, avoiding any potential flow interference problems with the spillway fishway, that would not only exclude fish from the Hadley Falls intakes without impingement, but also provide for safe and successful downstream passage of migratory and resident fish.
- The licensee shall continue to implement operational changes commenced in 2005.
- The licensee shall continue radio tracking studies of shortnose sturgeon, and shall distribute the results to the resource agencies and other parties pursuant to paragraph (c) below.

2008

- As designed and permitted in 2007, in consultation with the resource agencies and other parties pursuant to paragraph (c) below, the licensee shall bid, build and complete construction of: (i) the alternative exclusion device, and (ii) the alternative passage device.

- The licensee shall continue to implement operational changes commenced in 2005.
- The licensee shall continue radio tracking studies of shortnose sturgeon and shall distribute the results to the resource agencies and other parties pursuant to paragraph (c) below.
- The licensee shall conduct a Population Survey for shortnose sturgeon in the Connecticut River, from Long Island Sound to Turners Falls (as described more fully in Appendix F to the Settlement Agreement and in Appendix E to this license order), and distribute the results to the resource agencies and other parties pursuant to paragraph (c) below.

2009

- The licensee shall commence operation of the device(s) constructed in 2008 prior to April 1, 2009.
- The licensee shall, in consultation pursuant to paragraph (c) below, develop a plan to study the alternative exclusion and passage devices completed in 2008; shall implement the plan; and shall distribute the study results to resource agencies and other parties by January 31, 2010, pursuant to paragraph (c) below.
- The licensee shall consult resource agencies and other parties pursuant to paragraph (c) below to develop long-term monitoring protocol for shortnose sturgeon during the term of the License for the Project, with distribution of the results annually to the resource agencies and other parties pursuant to paragraph (c) below. If after 2009 the licensee determines, in consultation pursuant to paragraph (c) below, that shortnose sturgeon are not passing safely downstream of the Project, the licensee shall consult further with the resource agencies and other parties pursuant to paragraph (c) below to determine a plan for re-evaluating the downstream passage facilities.

Plans to implement each part of Phase 2B above shall be prepared and submitted to the resource agencies and other parties pursuant to paragraph (c) below. The licensee shall consult with the resource agencies and other parties, and/or obtain the concurrence and/or approval of that plan, pursuant to paragraph (c) below. Thereafter, the licensee shall file such plans with the Commission and Massachusetts DEP, and shall implement such plans as approved in writing by the Commission.

(c) *Consultation and the filing of plans.* The licensee shall follow the consultation process described in License Article 420.

(d) The Commission reserves the right to require changes to any plan filed. Implementation of any provision outlined in a plan shall not commence until the Commission notifies the licensee that the plan is approved. Upon Commission approval, the licensee shall implement the plan, including any changes required by the Commission. Any structure built in accordance with a plan shall be shown on the as-built drawings filed pursuant to License Article 303.

Article 411. *Upstream Fish Passage Facilities.* The licensee shall install, operate, and maintain upstream fish passage facilities at the Holyoke Project that ensure that all upstream migrating diadromous and resident fish are able to safely and successfully pass upstream of the Project without injury or significant impairment to essential behavioral patterns. Upstream passage shall include the federally and state endangered shortnose sturgeon and resident fish only when the resource agency(ies) determines it is necessary or appropriate as described more fully below. The licensee shall implement and enhance upstream fish passage as outlined in Phase 1 and Phase 2A/2B described below.

(a) *Upstream fish passage – Phase 1.* Within 60 days after the date of this order (as described in License Article 420), and after consultation [as described in (e) below], the licensee shall file with the Commission and the Massachusetts Department of Environmental Protection (Massachusetts DEP), for approval, an amendment to the Upstream Fish Passage Plan as approved by the Commission in an order issued on June 24, 2003 (103 FERC ¶ 62,177), and amended on March 18, 2004 (106 FERC ¶ 62,213), to cover the operation, maintenance, and evaluation of the existing upstream fish passage facilities (including the enhancements completed since issuance of the 1999 License Order) at the Holyoke Project that includes:

(1) The upstream passage facilities listed as including: (A) the attraction water system; (B) the tailrace entrance and lift tower; (C) the spillway entrance and lift tower; (D) the spillway transport channel; (E) the entrance flume with the fish trapping and viewing station; (F) the exit flume; (G) trapping and hauling system; and (H) the fish exit channel.

(2) The following enhancements already performed to the upstream passage facilities (completed after issuance of the 1999 License Order) listed as including: (A) modification of the gate insert in the west tailrace entrance to improve flows for fish passage; (B) modifications to the Holyoke (West) Channel in the bypassed reach to reduce stranding of upstream migrants; (C) improvement to the “V Gate” in the tailrace entrance gallery to reduce shad milling; and (D) increased elevation of the area above the Hadley Falls Station draft tubes to provide for operation up to 40,000 cfs river flow.

(3) The continued operation of the tailrace and spillway fish lift facilities, as described herein during the Upstream Passage Season (to be defined as from April 1 through November 15 of each year), as refined by the U.S. Fish and Wildlife Service (FWS), the National Marine Fisheries Service (NOAA Fisheries), Massachusetts DEP and the Massachusetts Division of Fisheries & Wildlife (Massachusetts DFW) on an annual basis; provided, however, that the fish lifts shall not be operational for the period from July 15 to September 15 of each year until such time as: (A) NOAA Fisheries determines that upstream passage of shortnose sturgeon over the Dam is appropriate; or (B) Massachusetts DFW and FWS determine that resident fish passage is necessary. The specific dates and hours of operation of the fish lifts during these periods would be determined by Massachusetts DFW in consultation with the licensee, in accordance with Condition 14(d) of the Water Quality Certification issued by Massachusetts DEP in February 2001, and in consultation with NOAA Fisheries once upstream passage of shortnose sturgeon is implemented;

(4) A provision that, except for Fall 2004, the licensee not interrupt fish lift operations during the Upstream Passage Season; and a functioning trap for salmon and the ability to trap and truck shad is available during the Upstream Passage Season before and after construction in 2004;

(5) A provision that when shortnose sturgeon appear at the fish lift facilities but are not to be lifted, the licensee follow the Shortnose Sturgeon Handling Plan (attached as Appendix F to this license order);

(6) A provision that the licensee implement measures and procedures to operate the No. 2 Overflow in such a manner to avoid releasing water during Upstream Passage Season when the fish lifts are operational pursuant to the No. 2 Overflow Procedures (attached as Appendix G to this license order);

(7) Provisions for: (A) maintaining the fish passage facilities in proper order and keeping such facilities clear of trash, logs, and material that would hinder passage; (B) performing maintenance such that the fish passage facilities would operate effectively prior to and during the Upstream Passage Season; and (C) developing a fish passage maintenance plan describing the anticipated maintenance, a maintenance schedule, and contingencies; and

(8) A provision to allow agency personnel access to the project site and to pertinent project records, for the purpose of inspecting the fish passage facilities.

(b) *Upstream fish passage – Phase 2.* Within 90 days after the date this order is issued, and after consultation (as described in (e) below and in Article 420), the licensee shall file with the Commission and Massachusetts DEP, for

approval, a plan to enhance the existing upstream fish passage facilities at the Holyoke Project that includes:

(1) Completion of the installation of the following improvements by the Spring 2005 Upstream Passage Season, with development of final detailed plans and schedule in consultation [as described in (e) below], and submittal of final detailed plans and schedule to the Commission for approval:

(A) Replacement of the tailrace lift tower, auxiliary equipment and hopper to accommodate 33 cubic feet per minute capacity;

(B) Replacement of the spillway tower, auxiliary equipment and hopper to accommodate 46 cubic feet per minute capacity;

(C) Increase of the width of the spillway transport channel to an average width of 6 feet;

(D) Modifications to the exit flume to accommodate the new spillway lift location;

(E) Increase of the width of the fish exit channel up to a maximum of 14 feet between the lift towers and the fish counting station;

(F) Installation of a high capacity adjustable drain valve in the flume;

(G) Addition of a second fish trap and viewing window in the exit flume;

(H) Expansion of the fish counting station to include both fish traps;

(I) Modification of the fish trapping and hauling system to improve the work area and minimize hoisting and netting of fish; and

(J) Modification of the attraction water supply system to provide up to 200 cfs at the spillway entrance and 120 cfs at each of the tailrace entrances.

(2) A schedule that provides for construction to begin in 2004 and be completed prior to the start of the Spring 2005 Upstream Passage Season;

(3) Milestones to identify target completion dates for key components to ensure compliance with Spring 2005 Upstream Passage Season requirements; and

(4) Contingency plans for unexpected delays in construction. If, by November 1, 2004, it is determined that the licensee would not meet the start of the operation of the fish lifts pursuant to (a)(1) above, or the planned construction is substantially

behind schedule, then the licensee shall promptly consult with the resource agencies and other parties (no later than November 30, 2004) to develop and agree on alternatives for fish lift operations for the Spring 2005 Upstream Passage Season.

(c) *Effectiveness testing of upstream fish passage facilities.* The licensee shall evaluate and monitor the effectiveness of the upstream fish passage facilities for diadromous and resident fish as follows:

(1) On or before September 30, 2004, the licensee shall circulate to the resource agencies and the other parties [as described in (e) below], a proposed plan for the evaluation and monitoring of the effectiveness of upstream fish passage facilities. Such plan shall include, but not be limited to, the following:

(A) Evaluation of operation and attraction flows;

(B) Evaluation of the adequacy and effectiveness of the 7-foot-wide exit channel upstream of the counting station, the existing 4.5-foot-wide spillway entrance, and the existing 6-foot-wide spillway entrance channel to provide upstream fish passage;

(C) Evaluation of the ability to achieve the target design populations for upstream fish passage at the Project (1,000,000 each for American shad and blueback herring; 6,000 for Atlantic salmon; unquantified for American eels, and an estimated 500 shortnose sturgeon); and

(D) Annual reports to be distributed to the resource agencies and other parties [as described in (e) below] by December 31st of each year.

After consultation as described in (e) below, on or before November 30, 2004, the licensee shall file that plan with the Commission and Massachusetts DEP, and shall implement the plan as approved by the Commission.

(2) By December 31, 2006, the licensee shall distribute a cumulative report of the study results of the effectiveness testing to the resource agencies and other parties [as described in (e) below], and the report shall include conclusions and recommendations as to whether the goal as stated at the first sentence of this License Article has been achieved. Within three months after distribution of the report, the licensee shall consult [as described in (e) below] with respect to the study results.

(3) If, based on the study plan and the study results described in (c)(1) and (c)(2) above, the report concludes that the upstream passage facilities and measures are

not accomplishing the objective stated above, or if the study does so conclude but Massachusetts DEP, Massachusetts DFW, FWS and/or NOAA Fisheries do not concur with the conclusions in the report, in consultation with the licensee and the other parties [as described in (e) below], the licensee shall develop plans to modify the upstream fish passage facilities including, if necessary:

(A) Increasing the width of the exit channel upstream of the counting station to 10 feet;

(B) Increasing the width of the spillway entrance to 8 feet; and/or

(C) Increasing the width of the spillway entrance channel to 8 feet.

The licensee shall circulate such plans and a schedule for the implementation of the modifications to the resource agencies and the other parties [as described in (e) below] and shall propose any modifications as a result of comments. After consultation [as described in (e) below], the licensee shall file the final plans and schedule with the Commission (in the form of an application to amend the License for the Project) and with Massachusetts DEP (for approval consistent with Condition 14(c) of the Water Quality Certification issued by Massachusetts DEP on February 14, 2001, as incorporated in Article 421) that addresses the proposed changes to fishway operations or structures determined to be necessary to protect and enhance fish passage for diadromous and resident fish. The licensee shall implement the plan as approved by the Commission.

(4) If, based on the effectiveness study results, Massachusetts DEP, Massachusetts DFW, FWS and NOAA Fisheries, in consultation with the licensee and the parties [as described in (e) below], are unable to determine whether or not the new upstream fish passage facilities are effective or what modifications are necessary to the facilities in order to meet the goal of safe and successful upstream fish passage as described above, the licensee shall extend the plan for evaluation and monitoring of the effectiveness of such facilities for diadromous and resident fish (as described in (c)(1) and (c)(2) above) for an additional year, with a report distributed to the resource agencies and other parties [as described in (e) below]. Based on the extension of the study, on or before December 31, 2007, the licensee shall prepare a cumulative report and follow the procedures in (c)(2) above. If, after this one-year extension of the study, the licensee, the resource agencies and the other parties are unable to determine whether or not the new facilities are effective or what modifications are necessary to the facilities in order to meet the goal of safe and successful upstream fish passage as described above, then the licensee shall extend or schedule additional evaluation and monitoring as determined to be needed pursuant to consultation described in (e) below.

(5) Following completion of construction under (c)(3) above, the licensee shall consult with the resource agencies and other parties [as described in (e) below] whenever necessary and as requested by the resource agencies to assess the effectiveness of the upstream fish passage facilities to pass shortnose sturgeon and other diadromous and resident, including an evaluation of the ability to achieve the target design populations for upstream fish passage as described in (c)(1)(C) above. If NOAA Fisheries, FWS, and/or Massachusetts DFW determine, based on the study results under (c)(1) above, that modifying the spillway entrance to the upstream passage facilities and/or an adjustment to the attraction flows is necessary to meet the goal of safe and successful upstream passage of shortnose sturgeon and other diadromous and resident, the licensee shall implement the modifications as directed by NOAA Fisheries, FWS and Massachusetts DFW, and as approved in writing, as necessary, by the Commission.

(d) *Annual report and monitoring of upstream fish passage facilities.* On or before January 31 of each year, the licensee shall submit to the resource agencies and other parties [as described in (e) below] and the Connecticut River Atlantic Salmon Commission a report of the previous year's activities relative to the operation of the upstream fish passage facilities [including the number of fish lifted, relative to the target design populations for upstream fish passage as described in (c)(1)(C) above and plans for the next year's activities]. The licensee shall monitor upstream passage for diadromous and resident fish including, but not limited to, counting, trapping, monitoring, and collection of biological data consistent with Condition 15 of the Water Quality Certification issued by Massachusetts DEP on February 14, 2001 (as incorporated in Article 421).

(e) *Consultation and the filing of plans.* The licensee shall follow the consultation process described in License Article 420.

(f) The Commission reserves the right to require changes to any plan filed. Implementation of any provision outlined in a plan shall not commence until the Commission notifies the licensee that the plan is approved. Upon Commission approval, the licensee shall implement the plan, including any changes required by the Commission. Any structure built in accordance with a plan shall be shown on the as-built drawings filed pursuant to License Article 303.

Article 412. *American Eel Passage Facilities.* The licensee shall install, operate, and maintain appropriate upstream and downstream fish passage facilities at the Holyoke Project to facilitate safe and successful passage for American eels.

(a) *Interim upstream eel passage.* The licensee shall operate pursuant to the Upstream Fish Passage Plan, approved by the Commission on June 24, 2003 (103 FERC ¶ 62,177). As stated in that plan, the licensee shall do the following in

furtherance of eel passage at the Project; all activities shall be undertaken in consultation as described in (e) below:

(1) By July 1, 2004, the licensee shall: (i) construct and implement modified eel collectors on the Holyoke side of the Project; (ii) construct and install a ramp and an eel collector on the South Hadley side of the Project; (iii) move eels upstream and collect data on how upstream migrants approach the dam; and (iv) conduct a marking study to determine if backdrop is an issue; and

(2) In 2005, the licensee shall: (i) continue to move eels upstream and collect as much data as possible on how upstream migrants approach the dam; and (ii) study where to locate the entrance passage on the Holyoke side of the Project.

(b) *Permanent upstream eel passage.* The licensee shall file with the Commission and the Massachusetts Department of Environmental Protection (Massachusetts DEP) on or before March 31, 2006, a permanent upstream eel passage plan that includes the following activities by year; all activities shall be conducted in consultation as described in (e) below:

(1) In 2006, the licensee shall implement permanent measures and shall construct permanent facilities for upstream eel passage on both the Holyoke and South Hadley sides of the Project and shall conduct effectiveness studies; and

(2) In 2007, the licensee shall complete additional effectiveness studies if determined necessary based on effectiveness studies conducted in 2006.

(c) *Annual reports of upstream eel passage.* Commencing on March 1, 2005, the licensee will distribute annual reports to U.S. Fish and Wildlife Service, the National Marine Fisheries Service, Massachusetts Division of Fisheries and Wildlife, Massachusetts DEP, Trout Unlimited, the Connecticut River Watershed Council, and the Connecticut River Atlantic Salmon Commission describing the actions taken in the prior year and the results of data collection at the eel facilities on the South Hadley and Holyoke sides of the Project. The licensee shall file the annual reports with the Commission and Massachusetts DEP on or before March 1 of each year.

(d) *Downstream eel passage.* The licensee shall implement and monitor downstream eel passage at the Holyoke Project as part of the downstream fish passage plan and facility enhancements under License Article 410.

(e) *Consultation with resource agencies and other parties.* The licensee shall follow the consultation process described in License Article 420, and distribute all reports to the resource agencies and other parties listed in that

Article. The licensee shall also provide copies of all reports to the Connecticut River Atlantic Salmon Commission.

(f) The Commission reserves the right to require changes to the proposed upstream eel passage plan. Implementation of any provision outlined in the plan shall not commence until the Commission notifies the licensee that the filing is approved. The licensee shall implement the plan as approved by the Commission, including any changes required by the Commission. Any structure built in accordance with this plan shall be shown on the as-built drawings filed pursuant to License Article 303.

Article 413. *Upstream and Downstream Fish Passage Facilities Monitoring.*

(a) Upon completing construction of new, or modifications to existing upstream and downstream fish passage facilities required by License Articles 410-412, the licensee shall monitor the use and effectiveness of those fish passage facilities, pursuant to the plans developed under those License Articles, to ensure effective fish and eel passage. In addition, the licensee shall monitor effectiveness of: (i) the channel modifications [as specified in the Comprehensive Operations and Flow Plan, as approved by the Commission on June 24, 2003 (103 FERC ¶ 62,178)]; and (ii) the full depth louvers in the first level of the canal system, pursuant to a plan to be filed with the Commission on or before July 1, 2004 [as specified in License Article 408(c) above].

The effectiveness monitoring plans shall include the specific provisions for monitoring the effectiveness of the specific facility, as well as a schedule for: (1) implementation of that plan; (2) consultation as described in (b) below concerning the results of the monitoring; and (3) filing the results, the resource agencies' and other parties' comments, and the licensee's response to the comments, with the Commission and the Massachusetts Department of Environmental Protection.

(b) The licensee shall follow the consultation process described in License Article 420, and shall also provide copies of all reports to the Connecticut River Atlantic Salmon Commission.

(c) The Commission reserves the right to require changes to the effectiveness monitoring plans. Implementation of any provision outlined in the plans shall not commence until the Commission notifies the licensee that the filing is approved. The licensee shall implement the plan(s) as approved by the Commission, including any changes required by the Commission.

Article 414. *Annual Fish Passage Construction Plans.*

(a) Except as otherwise provided in License Articles 410-412 above, the licensee shall prepare an annual construction plan for fishway construction to be undertaken in that coming year, in consultation as described in (b) below. A draft of that construction plan shall be provided to the resource agencies and other parties on or before January 31 of each year, containing the detailed plans and schedule for fishway construction to be undertaken during that calendar year; the construction plan shall be designed to avoid interruption of the operation of the fish lifts at the Project. The licensee shall file the construction plan with the Commission and Massachusetts Department of Environmental Protection on or before February 28 before the applicable construction period commences.

(b) The licensee shall follow the consultation process described in License Article 420.

(c) The Commission reserves the right to require changes to the proposed annual construction schedule. The licensee shall implement the annual construction plan(s) as approved by the Commission, including any changes required by the Commission.

Article 415. *Section 18 Fishway Prescription.* Authority is reserved to the Commission to require the Licensee to construct, operate, and maintain, or to provide for the construction, operation, and maintenance of, such fishways as may be prescribed by the Secretary of the Interior or the Secretary of Commerce, as appropriate, pursuant to section 18 of the Federal Power Act.

Article 416. *Threatened and Endangered Species Protection Plan.*

(a) The licensee shall implement the Threatened and Endangered Species Protection Plan (T&E Plan) as approved by the Commission on June 6, 2003 (103 FERC ¶ 62,131) covering the federally and state endangered shortnose sturgeon (*Acipenser brevirostrum*), federally threatened and state endangered bald eagle (*Haliaeetus leucocephalus*), federally threatened and state endangered Puritan tiger beetle (*Cicindela puritana*), federally endangered and state endangered dwarf wedge mussel (*Alismidonta heterodon*), and state endangered yellow lampmussel (*Lampsilis cariosa*).

(b) The licensee shall follow the consultation process described in License Article 420, with respect to any proposed modifications to the T&E Plan.

(c) The Commission reserves the right to require changes to any proposed modifications to the T&E Plan. The licensee shall implement the modified T&E Plan as approved by the Commission, including any changes required by the Commission.

(d) In addition to implementing the provisions of the Commission-approved T&E Plan, the licensee shall implement measures consistent with the Terms and Conditions included in the Incidental Take Statement attached to the Biological Opinion for shortnose sturgeon (attached as Appendix B to this license order).

(1) The licensee shall handle shortnose sturgeon in accordance with the Shortnose Sturgeon Handling Plan (attached as Appendix F to this license order), and shall annually (by January 1st) consult with the National Marine Fisheries Service (NOAA Fisheries) regarding updates to the Handling Plan. Any updates to the Handling Plan shall be made annually by April 1st. The licensee shall file any such updates to the Handling Plan with the Commission.

(2) The licensee shall annually submit (by January 1st) a report to NOAA Fisheries and the Commission on the status of shortnose sturgeon at the Holyoke Project, including: (1) the number of sturgeon identified passing upstream (and downstream, if detected); (2) the number of sturgeon rescued from the apron pools immediately downstream from the Holyoke dam; (3) the relative effectiveness of the fish passage facilities; and (4) mortality from the previous year.

(3) The licensee shall notify NOAA Fisheries and the Commission when the Holyoke Project reaches 75 percent of the incidental take levels for shortnose sturgeon at the project.

(4) The licensee shall monitor water quality in the holding tanks used at the Downstream Sampling facility. The licensee shall ensure that: (1) no shortnose sturgeon is held for more than 12 hours; (2) water depth in the holding tanks is sufficient; and (3) water temperature in the holding tanks does not exceed 27°C and dissolved oxygen in the tanks is at least 5mg/l at all times.

Article 417. *Invasive Species Monitoring Plan.*

(a) The licensee shall implement the Invasive Species Monitoring Plan as approved by the Commission on August 20, 2001 (96 FERC ¶ 62,174), and amended by order issued on December 13, 2004 (109 FERC ¶ 62,186), to monitor purple loosestrife (*Lythrum salicaria*), water chestnut (*Trapa natans*), and zebra mussel (*Dreissena polymorpha*) in Project waters.

(b) The licensee shall follow the consultation process described in License Article 420, with respect to any proposed modifications to the Invasive Species Monitoring Plan.

(c) The Commission reserves the right to require changes to any proposed modifications to the Invasive Species Monitoring Plan. The licensee shall

implement the modified monitoring plan as approved by the Commission, including any changes required by the Commission.

(d) If at any time during the term of the license, the U.S. Fish and Wildlife Service (FWS) and/or the Massachusetts Division of Fisheries and Wildlife (Massachusetts DFW) demonstrate that purple loosestrife, water chestnut, or zebra mussels are significantly affecting fish and wildlife populations at the Project and control measures are needed, and the Commission agrees with those determinations, the Commission may require the licensee to cooperate with the FWS and Massachusetts DFW to undertake reasonable measures to control or eliminate these species in Project waters.

Article 418. *Comprehensive Recreation and Land Management Plan.*

(a) The licensee shall implement the Comprehensive Recreation and Land Management Plan (CRLMP) for the Holyoke Project, as approved by the Commission on March 31, 2004 (106 FERC ¶ 62,243), and modified by the order issued on November 23, 2004 (109 FERC ¶ 61,206). The CRLMP includes a Recreation Plan, Land Management Plan, and Buffer Zone and Riparian Management Plan.

(b) The licensee shall follow the consultation process described in License Article 420, with respect to the CRLMP, and shall also consult with Town of South Hadley, City of Holyoke, Connecticut River Channel Marking Committee, Connecticut River Greenway State Park, Trustees of Reservation, U.S. National Park Service, Pioneer Valley Planning Commission, and local marinas.

(c) The Commission reserves the right to require changes to any proposed modification to the CRLMP. The licensee shall implement the modified plan as approved by the Commission, including any changes required by the Commission.

Article 419. *Cultural Resources Management Plan.*

(a) The licensee shall implement the Cultural Resources Management Plan as approved by the Commission on June 27, 2001 (95 FERC ¶ 62,274) (CRMP).

(b) The licensee shall follow the consultation process described in License Article 420, with respect to the Cultural Resources Management Plan.

(c) The Commission reserves the right to require changes to any proposed modification to the Cultural Resources Management Plan. The licensee shall implement the modified plan as approved by the Commission, including any changes required by the Commission.

Article 420. *Cooperative Management and Consultation.* The licensee must comply with the conditions imposed upon it in Part IV of the Settlement (and the Appendices referenced therein) covering the Holyoke Project, as filed with the Commission on March 12, 2004.

With respect to a plan, modification to a plan, or work to be undertaken pursuant to the Settlement, the licensee shall first provide a draft of such plan, modification to a plan, or description of work to the resource agencies [U.S. Fish and Wildlife Service (FWS), the National Marine Fisheries Service (NOAA Fisheries), Massachusetts Division of Fisheries and Wildlife (Massachusetts DFW), Massachusetts Department of Environmental Protection (Massachusetts DEP)] and to the other parties (Trout Unlimited and the Connecticut River Watershed Council), providing a minimum of 30 days for review, comment and recommendations prior to filing the plan with the Commission and Massachusetts DEP. Prior to filing the plan or description of work with the Commission and Massachusetts DEP, the licensee shall obtain the concurrence and/or approval of that plan/work from the resource agency or resource agencies as follows: (1) FWS and/or NOAA Fisheries for a plan/work which may impact a resource for which FWS and/or NOAA Fisheries have responsibilities under the Endangered Species Act (U.S.C. §1531, *et seq.*); (2) Massachusetts DFW and/or Massachusetts DEP for a plan/work which Massachusetts DFW and Massachusetts DEP have responsibilities under the Massachusetts Endangered Species Act (M.G.L. c. 131A); (3) Massachusetts DEP for a plan/work that is required by the Water Quality Certification issued by Massachusetts DEP on February 14, 2001 (as incorporated in Article 421); and/or (4) FWS and/or NOAA Fisheries for all decisions on measures needed for fish passage, fish passage design drawings, and fish passage implementation schedules for which the FWS and/or NOAA Fisheries have specific statutory responsibility under the Federal Power Act (with such concurrence and/or approval not unreasonably withheld, and with any refusal to concur/approve to be based on sound science).

The licensee shall include with the filing with the Commission and Massachusetts DEP, documentation of consultation; copies of comments and recommendations on the proposed plan, modified plan and/or work after it has been prepared and provided to the resource agencies and the other parties consulted; and specific descriptions of how the comments are accommodated by the licensee's proposed plan and/or work. If the licensee does not adopt a recommendation by an agency or other party [other than a recommendation by an agency(ies) from which the licensee shall obtain prior concurrence and/or approval, as described in (1), (2), (3) and (4) above], the filing shall include the licensee's reasons, based on project-specific information.

Article 421. *Compliance with Water Quality Certification.* The licensee shall comply with the Water Quality Certification issued by the Massachusetts

Department of Environmental Protection (Massachusetts DEP) on February 14, 2001 (pursuant to the settlement of the state administrative appeal of the 1999 Water Quality Certification). All of the conditions of the 2001 Water Quality Certification are incorporated into this License Article and are conditions on the License. A copy of the 2001 Water Quality Certification is attached to this license order as Appendix A.

Article 422. *Use and Occupancy.*

(a) In accordance with the provisions of this article, the licensee shall have the authority to grant permission for certain types of use and occupancy of project lands and waters and to convey certain interests in project lands and waters for certain types of use and occupancy, without prior Commission approval. The licensee may exercise the authority only if the proposed use and occupancy is consistent with the purposes of protecting and enhancing the scenic, recreational, and other environmental values of the project. For those purposes, the licensee shall also have continuing responsibility to supervise and control the use and occupancies for which it grants permission, and to monitor the use of, and ensure compliance with the covenants of the instrument of conveyance for, any interests that it has conveyed, under this article. If a permitted use and occupancy violates any condition of this article or any other condition imposed by the licensee for protection and enhancement of the project's scenic, recreational, or other environmental values, or if a covenant of a conveyance made under the authority of this article is violated, the licensee shall take any lawful action necessary to correct the violation. For a permitted use or occupancy, that action includes, if necessary, canceling the permission to use and occupy the project lands and waters and requiring the removal of any non-complying structures and facilities.

(b) The type of use and occupancy of project lands and waters for which the licensee may grant permission without prior Commission approval are: (1) landscape plantings; (2) non-commercial piers, landings, boat docks, or similar structures and facilities that can accommodate no more than 10 watercraft at a time and where said facility is intended to serve single-family type dwellings; (3) embankments, bulkheads, retaining walls, or similar structures for erosion control to protect the existing shoreline; and (4) food plots and other wildlife enhancement. To the extent feasible and desirable to protect and enhance the project's scenic, recreational, and other environmental values, the licensee shall require multiple use and occupancy of facilities for access to project lands or waters. The licensee shall also ensure, to the satisfaction of the Commission's authorized representative, that the use and occupancies for which it grants permission are maintained in good repair and comply with applicable state and local health and safety requirements. Before granting permission for construction of bulkheads or retaining walls, the licensee shall: (1) inspect the site of the proposed construction, (2) consider whether the planting of vegetation or the use

of riprap would be adequate to control erosion at the site, and (3) determine that the proposed construction is needed and would not change the basic contour of the reservoir shoreline. To implement this paragraph (b), the licensee may, among other things, establish a program for issuing permits for the specified types of use and occupancy of project lands and waters, which may be subject to the payment of a reasonable fee to cover the licensee's costs of administering the permit program. The Commission reserves the right to require the licensee to file a description of its standards, guidelines, and procedures for implementing this paragraph (b) and to require modification of those standards, guidelines, or procedures.

(c) The licensee may convey easements or rights-of-way across, or leases of project lands for: (1) replacement, expansion, realignment, or maintenance of bridges or roads where all necessary state and federal approvals have been obtained; (2) storm drains and water mains; (3) sewers that do not discharge into project waters; (4) minor access roads; (5) telephone, gas, and electric utility distribution lines; (6) non-project overhead electric transmission lines that do not require erection of support structures within the project boundary; (7) submarine, overhead, or underground major telephone distribution cables or major electric distribution lines (69-kV or less); and (8) water intake or pumping facilities that do not extract more than one million gallons per day from a project reservoir. No later than January 31 of each year, the licensee shall file three copies of a report briefly describing for each conveyance made under this paragraph (c) during the prior calendar year, the type of interest conveyed, the location of the lands subject to the conveyance, and the nature of the use for which the interest was conveyed. If no conveyance was made during the prior calendar year, the licensee shall so inform the Commission and the Regional Director in writing no later than January 31 of each year.

(d) The licensee may convey fee title to, easements or rights-of-way across, or leases of project lands for: (1) construction of new bridges or roads for which all necessary state and federal approvals have been obtained; (2) sewer or effluent lines that discharge into project waters, for which all necessary federal and state water quality certification or permits have been obtained; (3) other pipelines that cross project lands or waters but do not discharge into project waters; (4) non-project overhead electric transmission lines that require erection of support structures within the project boundary, for which all necessary federal and state approvals have been obtained; (5) private or public marinas that can accommodate no more than 10 watercraft at a time and are located at least one-half mile (measured over project waters) from any other private or public marina; (6) recreational development consistent with an approved Exhibit R or approved report on recreational resources of an Exhibit E; and (7) other uses, if: (i) the amount of land conveyed for a particular use is five acres or less; (ii) all of the

land conveyed is located at least 75 feet, measured horizontally, from project waters at normal surface elevation; and (iii) no more than 50 total acres of project lands for each project development are conveyed under this clause (d)(7) in any calendar year. At least 60 days before conveying any interest in project lands under this paragraph (d), the licensee must submit a letter to the Director, Office of Hydropower Licensing, stating its intent to convey the interest and briefly describing the type of interest and location of the lands to be conveyed (a marked exhibit G or K map may be used), the nature of the proposed use, the identity of any federal or state agency official consulted, and any federal or state approvals required for the proposed use. Unless the Director, within 45 days from the filing date, requires the licensee to file an application for prior approval, the licensee may convey the intended interest at the end of that period.

(e) The following additional conditions apply to any intended conveyance under paragraph (c) or (d) of this article:

(1) Before conveying the interest, the licensee shall consult with federal and state fish and wildlife or recreation agencies, as appropriate, and the State Historic Preservation Officer.

(2) Before conveying the interest, the licensee shall determine that the proposed use of the lands to be conveyed is not inconsistent with any approved Exhibit R or approved report on recreational resources of an Exhibit E; or, if the project does not have an approved Exhibit R or approved report on recreational resources, that the lands to be conveyed do not have recreational value.

(3) The instrument of conveyance must include the following covenants running with the land: (i) the use of the lands conveyed shall not endanger health, create a nuisance, or otherwise be incompatible with overall project recreational use; (ii) the grantee shall take all reasonable precautions to ensure that the construction, operation, and maintenance of structures or facilities on the conveyed lands will occur in a manner that will protect the scenic, recreational, and environmental values of the project; and (iii) the grantee shall not unduly restrict public access to project waters.

(4) The Commission reserves the right to require the licensee to take reasonable remedial action to correct any violation of the terms and conditions of this article, for the protection and enhancement of the project's scenic, recreational, and other environmental values.

(f) The conveyance of an interest in project lands under this article does not in itself change the project boundaries. The project boundaries may be changed to exclude land conveyed under this article only upon approval of revised Exhibit G

or K drawings (project boundary maps) reflecting exclusion of that land. Lands conveyed under this article will be excluded from the project only upon a determination that the lands are not necessary for project purposes, such as operation and maintenance, flowage, recreation, public access, protection of environmental resources, and shoreline control, including shoreline aesthetic values. Absent extraordinary circumstances, proposals to exclude lands conveyed under this article from the project shall be consolidated for consideration when revised Exhibit G or K drawings would be filed for approval for other purposes.

(g) The authority granted to the licensee under this article shall not apply to any part of the public lands and reservations of the United States included within the project boundary.

(H) The licensee shall serve copies of any Commission filing required by this order on any entity specified in this order to be consulted on matters relating to that filing. Proof of service on these entities must accompany the filing with the Commission.

(H) This order is final unless a request for rehearing is filed within 30 days of the date of its issuance, as provided in section 313(a) of the FPA. The licensee's failure to file a request for rehearing shall constitute acceptance of this order.

By the Commission.

(S E A L)

Linda Mitry,
Deputy Secretary.

APPENDIX A – Conditions of Water Quality Certification Issued by the Massachusetts Department of Environmental Protection on March 19, 2001

In accordance with the provisions of M.G.L. c. 21, §§ 314 CMR 4.00, and §401 of the Federal Clean Water Act (Public Law 92-500, as amended), MADEP has determined that there is reasonable assurance that the Project described above can be conducted in a manner which will not violate applicable water quality standards, and will be in compliance with §§301, 302, 303, 306, and 307 of the Federal Clean Water Act and other appropriate requirements of state law. MADEP issues this Water Quality Certification for the Project subject to the following conditions:

Compliance

1. The Project shall be operated by the Project Owner/license holder and its nominees, successors and/or assigns (hereinafter collectively referred to as “Project Owner”) in accordance with all provisions and conditions contained in this certification and the provisions of Project Owner’s FERC license, including any modifications or amend made thereto, to the extent such license provisions and modifications or amendments are consistent with this water quality certification. The Project shall be operated to maintain the designated uses of the Connecticut River as outlined in the Massachusetts Surface Water Quality Standards at 314 CMR 4.00 and to maintain an integrated and diverse biological community in the Connecticut River.
2. All activities shall be conducted in compliance with the Massachusetts Wetlands Protection Act, including the Rivers Protection Act, M.G.L. Chapter 131, Section 40, and the regulations promulgated thereunder. An application for a Water Quality Certification shall be submitted and approved by MADEP prior to any activity that will cause a discharge subject to §404 of the federal Clean Water Act. The Project Owner will be expected to develop and implement a plan to monitor and control erosion during any and all construction activities to keep waters free from turbidity in concentrations that are aesthetically objectionable or would impair any designated use(s) of these waters.
3. The Project Owner shall comply with M.G.L. c. 91 (Public Waterfront Act), and the regulations promulgated thereunder.
4. All maintenance and repair activities, including disposal of debris and removal of sediments in impounded areas, shall be conducted in a manner so as not to impair water quality.
5. Any change to the Project that would have a significant or material effect on the findings, conclusions, or conditions of this certification, including Project operation, must be submitted to MADEP for prior review and written approval where appropriate and authorized by law, and only as related to the change proposed.

6. Except as otherwise provided in Condition # 18 (Moratorium), MADEP may request, at any time during which this certification is in effect, that FERC reopen the license to make modifications necessary to maintain compliance with the Massachusetts Surface Water Quality Standards at 314 CMR 4.00 and/or other appropriate requirements of state law.

7. Except as otherwise provided in Condition #18 (Moratorium), MADEP reserves the right to add and alter the terms and conditions of this certification when authorized by law and as appropriate to carry out its responsibilities during the life of the Project with respect to water quality, threatened and endangered species, or new generation, such as a third turbine. MADEP's enabling legislation and regulations and M.G.L c. 30A govern whether such changes to this certification are subject to administrative and/or judicial review.

8. A copy of this certification shall be prominently posted within the Project powerhouse.

9. **Run-of-River**

(a) Upon certification, the Project shall be operated in an instantaneous run-of-river mode, which will result in the stabilization of the impoundment to within 0.2 feet of normal pond elevation. The "normal" pond elevation will be 0.2 feet below the elevation of the top of the flash boards (which is currently approximately 103.1 feet). MADEP understands that stabilization of the impoundment to within 0.2 feet of normal pond elevation may not be possible until the rubber dam has been installed. The Project Owner met with MADEP, the Massachusetts Division of Fish and Wildlife (MADFW) and the United States Fish and Wildlife Service (USFWS), and presented to MADEP, MADFW and USFWS for MADEP approval an interim run-of-river operations plan. The plan demonstrated the Project Owner's good faith efforts to comply with the run-of-river condition in the interim period before the rubber dam is installed.

(b) After completion of the rubber dam, the Project shall be operated in an instantaneous run- of-river mode, which will result in the stabilization of the impoundment to within 0.2 feet of normal pond elevation. The "normal" pond elevation will be 0.2 feet below the elevation of the new rubber dam crest (which will be approximately 103.1 feet). Within six months after installation of the rubber dam, the Project Owner shall meet with MADFW and USFWS and present to MADFW, USFWS and MADEP for MADEP approval a final run-of-river operation and monitoring plan. The plan shall describe the methods used to monitor headpond elevation and river flows, adjust Project operations, and shall also describe how Project operation records will be maintained and made available to FERC, MADEP, MADFW, and USFWS to verify compliance with run-of-river operations.

This run-of river operating regime may be modified due to operating emergencies beyond the control of the Project Owner (e.g. extreme runoff events, droughts, ice conditions, equipment failure, flood storage requirements or OP4 Action 13 events in which ISO New England calls upon the Project Owner to generate) that may result in conditions making the operational restrictions and requirements contained herein impossible to achieve without resort to extraordinary measures or that are inconsistent with the prudent and safe operation of the Project. Under such extreme conditions, operation at variance with the commitments contained in this condition shall not be deemed to violate this Water Quality Certification. This condition shall not be interpreted as providing the Project Owner broader authorization to operate at variance with the requirements provided herein than is provided for in the FERC license. The Project Owner shall notify MADEP, MADFW and USFWS within 24 hours of such an emergency event and shall prepare and provide the three agencies with a written report of each incident, identifying the variances from normal operations that occurred, and identifying ways of avoiding fixture occurrences, if applicable. The written report shall be submitted no later than 45 days after the emergency condition ends. MADEP will review the report and approve or disapprove of the Project Owner's decision to modify the operating regime because of extreme conditions, if MADEP disapproves Project Owner decision to modify the operating regime, it shall so notify Project Owner, in writing, within 45 days of receiving the report from the Project Owner. MADEP's written notification shall describe in reasonable detail the reasons for disapproval and shall serve as a Notice of Noncompliance pursuant to M.G.L c. 21A, sec. 16 and 310 CMR 5.00, unless otherwise specified in the written notification. At the Project Owner's request, MADEP officials will review with the Project Owner and with personnel of other regulatory agencies, including agencies responsible for electric power generation, the reasons for and appropriateness of the disapproved modification of the run-of-river operating regime. Project Owner may appeal any subsequent imposition of an administrative penalty pertaining to similar future violations of this condition and in that appeal may contest the original disapproval notice.

10. **Rubber Dam**

The Project Owner shall replace the existing wooden flashboards along the crest of the dam with an inflatable rubber fabric dam system. By April 15, 2001, the Project Owner shall submit to MADEP, MADFW, the Massachusetts Department of Environmental Management (MADEM) and USFWS for MADEP approval, a plan for rubber dam construction based upon consultation with MADFW, USFWS, MADEM and MADEP. The plan should include at a minimum: (i) the designs and installation schedule; (ii) procedures for installing the rubber dam, including measures to minimize effects on water quality, biological resources and impoundment boaters during the period of installation; and (iii) appropriate erosion and sedimentation controls. The Project Owner shall implement the plan as approved by MADEP.

11. Bypassed Reach flows

(a) Upon certification, from November 16 through March 31 of each year, and for any other periods of time when fish passage facilities are not in operation and flows provided for establishing a zone-of-passage are not needed, the Project Owner shall maintain a continuous minimum flow, as measured in the bypassed reach, of 840 cfs or inflow to the Project (less canal minimum flow) as measured at the USGS gauge at Montague, whichever is less. If, in the future, fish passage operations are modified by USFWS or the National Marine Fisheries Service (NMFS) to include these specified times, these habitat-based flows shall be superseded by zone- of-passage flows.

This operating regime may be modified during any construction activities that, as demonstrated to the satisfaction of MADE, make it unreasonable to achieve the restrictions and requirements contained herein or are inconsistent with the prudent and safe operation of the Project. If the bypassed reach is dewatered for any reason, the Project Owner shall be required to monitor for stranded shortnose sturgeon and notify MADEP and MADFW immediately if any stranded fish are observed. Shortnose sturgeon will be immediately transferred from dewatered areas to suitable habitat. Mi handling and transfer of shortnose sturgeon from the stranded location will be conducted according to the requirements of the NMFS Incidental Take Permit.

(b) Upon certification, the Project Owner shall release 1,300 cfs into the bypassed reach from April 1 through November 15 of each year, as zone of passage flows for migratory fish. The requirement for 1,300 cfs from July 16 through September 14 (for shortnose sturgeon zone of passage) will not be enforced until such time as safe and effective shortnose sturgeon downstream passage measures have been demonstrated, or until NIMFS or MADFW determine that upstream passage is otherwise appropriate.

(c) Upon certification, the Project Owner shall meet with MADFW, USFWS, MADEP and NMFS and by November 1, 2001 shall submit to MADEP, MADFW, USFWS and NMFS for MADEP approval, a plan to redistribute flow to the three channels in the bypassed reach. The plan shall address redistribution of water following installation of the rubber dam during periods when minimum bypassed reach flows are required, and shall be designed to provide approximately 600 cfs in the east channel, 100 cfs in the center channel and 140 cfs in the west channel. MADEP understands and agrees that the flow redistribution cannot be precisely engineered and following plan implementation, the actual flows as measured in each channel following modification may differ from the 600/100/140 cfs redistribution goal, but shall not be less than the total 840 cfs required.

The Project Owner shall implement the plan during the construction season following installation of the rubber dam as approved by MADEP. Upon completion of

channel modifications, the Project Owner shall maintain the flow redistribution to the three channels resulting from the channel modifications

(d) Bypassed reach minimum flows will be measured in the bypassed reach and recorded hourly. The Project Owner shall submit an interim plan by March 1, 2001 for estimating flows in the bypassed reach until such time as a final plan for bypassed reach flow measurement has been approved by MADEP. A final plan for measuring flows in the bypassed reach shall be submitted to MADFW, USFWS and MADEP for MADEP approval within three months after installation of the rubber dam and shall be implemented as soon as is practical, but no longer than one year after rubber dam completion. The final plan should address gauging total bypassed reach flow after both rubber dam installation and channel modifications are completed, gauging channel specific flows once to determine flow distributions resulting from channel modifications, adjustment of flows so as to maintain minimum bypassed reach flows, and recording and reporting of bypassed reach flows. The Project Owner shall implement the plan as approved by MADEP within one year after rubber dam installation and channel modifications are complete.

12. **Project flows**

(a) Upon certification, the Project Owner shall operate the Project using the following flow distribution prioritization during the Atlantic salmon smolt downstream migratory period (April 1 through June 15 of each year), and periodic review of this prioritization will be conducted with the Project Owner by MADFW, USFWS, and NMFS to determine effectiveness:

- (1) Canal minimum flows (400 cfs downstream of louver bypass pipe operating at 150 cfs);
- (2) Bypassed reach minimum habitat flows (840 cfs);
- (3) Flows sufficient to operate upstream fish passage attraction facilities (up to 440 cfs with new facilities- 200 at spillway entrance and 120 at each tailrace entrance);
- (4) Zone of passage flows (bypassed reach flow increases to 1,300 cfs);*
- (5) Hadley Falls Station to Unit One, if available (1,300 cfs to 3,300cfs);**
- (6) Canal operations jump to 2000 cfs*** (drop Hadley to 1,300 cfs); and then
- (7) Hadley Falls Station to capacity.

*Note: Project Owner will have to notch flashboards to pass 1,300 cfs.

****Note:** After rock is removed from second tailrace entrance, and MADEP is satisfied that the entrance is effective, either unit will be able to run.

*****Note:** Canal flow of 2,000 cfs may change after full depth louver installation and MADEP approval (new full depth louvers may require more or less water to maintain effectiveness).

Installation and verification of effectiveness of the angled bar rack (or other downstream passage protection structure) at Hadley Falls Intake may allow canal flows to remain at minimum flow while Hadley Units 1 and 2 run to maximum, and then additional water may be run through the canal.

(b) Upon certification, the Project Owner shall operate the Project using the following flow distribution prioritization during juvenile clupeid downstream migration period (September 1 through November 15 of each year), and periodic review of this regime will be conducted with the Project Owner by MADEP, MADFW, USFWS, and NIMFS to determine effectiveness:

- (1) Canal minimum flows (400 cfs downstream of louver bypass pipe operating at 150 cfs);
- (2) Bypassed reach minimum habitat flows (840 cfs);
- (3) Flows sufficient to operate upstream fish passage attraction facilities (up to 440 cfs with new facilities- 200 at spillway entrance and 120 at each tailrace entrance);
- (4) Zone of passage flows (bypassed reach flow increases to 1,300 cfs for sturgeon and fall salmon passage); and then
- (5) Hadley Falls Station to capacity or any combination of Hadley units and canal operations as long as canal operations jump from 400 to at least 3,000 cfs*.

*Note: 3,000 cfs was the minimum flow used in louver evaluation with juvenile clupeids- this flow may change after full depth louver installation and MADEP approval (new full depth louvers may require less water to maintain effectiveness).

(c) Within three months of this certification, the Project Owner shall submit a low flow contingency plan to MADEP, MADFW, and USFWS for MADEP approval. The Project Owner shall implement the plan as approved by MADEP. The low flow contingency plan should address conditions of low flow outside of the anadromous fish passage seasons. Spring passage season is generally April 1 through July 15; fall passage

season is generally September 15 through November 15; and shortnose sturgeon passage season is generally July 16 through September 14.

Low flow contingency plan should incorporate the following prioritization:

- (1) Run-of-river: stable pond (do not draw down pond to maintain minimum flows);
- (2) Canal minimum flows (400 cfs downstream of louver bypass);
- (3) Bypassed reach minimum habitat flow (840 cfs or remaining inflow, whichever is less); and then
- (4) Hadley Falls units.

13. **Canal Operations**

- (a) Upon certification, Project Owner shall implement an interim canal system operation plan, whereby minimum flows of 400 cfs, downstream of the louver bypass, are discharged through the canal system. Canal unit rating curves will be used to determine canal system flow. The Project Owner shall implement the plan as approved by MADEP.
- (b) Within three months of issuance of this certification, the Project Owner shall meet with MADFW and USFWS and submit to MADEP, MADFW and USFWS for MADEP approval a plan to provide permanent, continuous minimum flows of 400 cfs downstream of the louver bypass through the canal system. Canal unit rating curves will be used to determine canal system flow. The Project Owner shall implement the plan as approved by MADEP.
- (c) The Project Owner shall implement the August 10, 2000 interim plan for protecting aquatic resources during canal drawdowns until the 5 year plan described in Condition 13 (d) below is completed.
- (d) The Project Owner shall meet with MADFW and USFWS and by June 1, 2001, shall submit to MADEP, MADFW and USFWS for MADEP approval, a 5-year plan for protection and monitoring of aquatic resources, including mussel populations, in the canal system. The plan shall include, but not be limited to, an evaluation of the frequency and necessity of canal drawdowns. The Project Owner shall implement the plan as approved by MADEP. Results of the monitoring plan shall be submitted to MADFW, USFWS and MADEP for review. The five year report shall identify changes in the mussel populations over time, proposals for changes in canal operations or structures, if any, to protect mussel populations, and recommendations regarding future monitoring of mussel populations.

(e) By April 15, 2001, the Project Owner shall submit to MADFW, USFWS, NMFS, and MADEP a plan to exclude shortnose sturgeon and other fish from the fishlift attraction water.

The Project Owner shall implement the plan as approved by MADEP during the first canal drawdown after approval.

14. **Fish Passage Facilities**

(a) Upon certification, the Project Owner shall meet with MADFW, USFWS, and NMFS regarding the fishway improvements and submit an implementation schedule to MADEP, MADFW USFWS and NMFS for MADEP approval. The implementation schedule shall include a major redesign and reconstruction of the upstream and downstream fish passage facilities in three phases.

(1) Phase 1, to be completed in 2001, shall consist of:

- (i) Replacement of the existing wooden flashboards along the crest of the dam with an inflatable rubber fabric dam system;
- (ii) Installation of full depth louvers at the Holyoke canal louver facility by October 31, 2001;
- (iii) Modifications to both lifts for 40,000 cfs operation and fish lift attraction water modifications providing adjustable fishway entrance attraction flows of up to 200 cfs at the spill entrance and up to 120 cfs at each of the tailrace collection gallery entrances; and
- (iv) Removal of the rock outcropping at the West tailrace fishway entrance.

(2) Phase 2, to be completed in 2002, shall consist of

- (i) Replacement of the tailrace lift tower, auxiliary equipment, and hopper to accommodate 33 cubic feet per minute capacity;
- (ii) Replacement of the spillway lift tower, auxiliary equipment and hopper to accommodate 46 cubic feet per minute capacity;
- (iii) Modifications to exit flume to connect it with the new spill lift; and

(iv) Eel passage at both fish lifts.

The 2002 Phase 2 schedule above will require continuous construction during the period July 1, 2002 (or such earlier date as appropriate based on actual fish migration) through December, 2002. Continuous construction during this period may eliminate fall fishlift operations (September 15 through November 15) in 2002 only.

(3) Phase 3, to be completed in 2003, shall consist of:

(i) Increasing the width of the fish lift exit channel to 14 feet up to the fish counting station;

(ii) Installation of a high capacity adjustable drain valve in the flume;

(iii) Addition of a second fish trap in the exit flume;

(iv) Modifications to the fish trapping and hauling system;

(v) Eel ladder installation at the South Hadley side of the dam;

(vi) Installation of an angled bar rack or alternative structure at the Hadley Falls Intake, pending completion of site modeling and behavior studies, in accordance with the provisions of section (i) below; and

(vii) Construction of the No. 2 overflow channel barrier.*

*Note: The phased construction plans need not provide for construction of a barrier across the No. 2 overflow channel if all of the following conditions are met: the Holyoke canal fill depth louver system is installed and is effective; Boat Lock Station bypass is decommissioned; the No. 2 overflow will not be used for balancing canal flow during upstream passage; and a plan to address stranding of fish after watering of the No.2 overflow channel is submitted to MADEP, MADFW and USFWS, and is approved by MADEP. If the above conditions are not met, a barrier across the No. 2 overflow channel will be constructed after receiving approval of the construction plans from MADEP.

Upon completion and review of each construction phase, and thereafter as necessary, the Project Owner shall continue HWP's prior practice of consulting and cooperating with MADEP, MADFW, USFW and NMFS and shall continue making

Modifications and Adjustments to the fish passage facilities to improve their operation and efficiency (“Modifications and Adjustments”).³⁷

³⁷ Examples of HWP’s prior practice of voluntarily making modifications and adjustments to fish passage facilities include:

- Design and installation of the baffle in the Holyoke fishway exit flume to lower water level in the flume downstream of the baffle, thus allowing lift operation at higher pond elevations;
- Installation of underwater video camera and monitor to allow observation of fish entering the trap at Holyoke;
- Installation of staff gauges at various points in the Holyoke fishlift system to monitor water levels;
- New pneumatic pressure system in the gate control system at 1 to speed up trap gate operation;
- Addition of screening on the trap gate at Holyoke to prevent escape of small fish;
- Installation of an electric hoist to replace manual transfer of salmon to holding facilities at Holyoke;
- Extension of electrical circuits to include outlets for salmon holding facilities at Holyoke;
- Plywood overlays on rack (Hadley 1);
- Adjustments to the depth/width of bypass sluice or entrance weir (wing wall outside bascule gate);
- Rounding corners on concrete or other entrance changes to improve the flow field (stoplogs at spillway entrance);
- Adjusting flows through the fish passage facilities;
- Installing fish attraction lights under Turner’s Falls Gatehouse; and
- Changing hours/days of fishway operation.

(b) Upon certification, the Project Owner shall meet with MADEP, MADFW, USFWS and NMFS to develop detailed construction plans and schedules, which shall be submitted to these agencies by April 15, 2001 and thereafter by January 31 of each construction year for review and approval by MADEP. The detailed construction schedules shall be designed to minimize interruption of the fishlift operations and, to the extent possible, fishlift operation interruptions shall be scheduled during the months of July and August. The Project Owner shall implement the plans as approved by MADEP.

(c) By December 31 of the year of modification, Project Owner shall submit to MADEP, MADFW, USFWS, and NMFS for MADEP approval, a plan to study the effectiveness of:

- (i) The Holyoke canal full depth louver system;
- (ii) The rock removal at the West fishway entrance in the tailrace; and
- (iii) Channel modifications in the bypassed reach.

MADFW, USFWS and MADEP shall have the opportunity to comment and provide other input to the Project Owner on the study design. The study design shall include a schedule for completion of the studies and submission of the study results regarding facility effectiveness no later than December 31 of the year of study.

By December 31, 2003 (end of Phase 3), the Project Owner shall submit to MADEP, MADFW and USFWS for MADEP approval, a plan to study the effectiveness of all other Project modifications implemented to date. MADFW, USFWS and MADEP shall have the opportunity to comment and provide other input to the Project Owner on the study design. No study design shall be implemented until approved by MADEP. The study design shall include a schedule for completion of the studies and submission of the study results regarding the facility effectiveness no later than December 31 of the year of study.

The Project Owner shall study and evaluate the effectiveness of the spillway entrance and channel after completion of the other fishway modifications. Based on the results of the effectiveness study, MADEP may require modifications to the spillway entrance and channel. Effective passage of shortnose sturgeon into the spillway lift will be required if and when MADFW recommends that MADEP mandate upstream passage of shortnose sturgeon. The Project Owner shall implement any modifications as required or approved by MADEP. Modifications required by MADEP under this condition shall not be subject to Condition #18 (Moratorium).

(d) The Project Owner shall operate upstream fish passage facilities from April 1 to July 15 annually, to accommodate migratory fish. The Project Owner shall operate

upstream fish passage facilities from September 15 through November 15 annually to accommodate fall salmon passage. Additional dates or hours of operation may be necessary for shortnose sturgeon or resident fish passage, as required by MADFW. Operating dates can be adjusted by mutual agreement between the Project Owner and MADFW, as necessary. Hours of operation will be established by MADFW in consultation with the Project Owner. Lifts have historically operated from 9:00 a.m. to 3:00 p.m. at the start of the anadromous fish passage period when fish passage is less than 2,000 American shad per day, 8:00 a.m. to 6:00 p.m. once daily passage has exceeded 2,000 American shad, and from 8:00 a.m. to 8:00 p.m. during peak anadromous fish migration periods, as determined by MADFW. The lifts will continue to operate on this basic schedule per order of MADEP and as determined by MADFW. MADFW will provide 24 hour notice of any proposed changes to this basic schedule to the Project Owner.

(e) Ledge excavation is required on the west wall of the tailrace in the area immediately downstream of the existing (but non-functional) tailrace entrance to allow operation of this entrance. In Phase 1, the Project Owner will excavate the tailrace wall approaching the Hadley Unit 2 fishway entrance, removing the rock outcrop at the fishway entrance to shape the approach to lead fish up the side of the tailrace adjacent to the discharge from the Unit 2 side entrance. Phase 1 construction plans will include a survey of both Hadley Units 1 and 2 entrances, and shall provide that the Project Owner meet with MADFW and USEWS during construction and obtain MADEP approval of the final excavation. The Project Owner shall implement the construction plans as approved by MADEP.

(f) The Project Owner shall implement the Scope of Work for fishway monitoring operations as approved by MADEP. All operations necessary for safe, timely and efficient fish passage including, but not limited to, counting, trapping, monitoring and collection of biological data will be under the direction of MADFW and paid for by the Project Owner. The Project Owner may conduct operations using their own resources or may subcontract.

(g) On or before December 31, 2003, the Project Owner shall meet with MADFW and USFWS and submit to and MADFW, USFWS and MADEP for MADEP approval, a plan for evaluation and monitoring of upstream and downstream resident fish passage through the Project. The Project Owner shall implement the plan as approved by MADEP. The Project Owner shall prepare a report and a recommended schedule for implementation, consistent with Condition #18 (Moratorium), that identifies any changes to fishway operations or structures necessary to protect and enhance the passage of resident fish within 6 months after submitting the monitoring results to MADEP MADFW and USFWS. Based on the results of the studies and the recommendations of the Project

Owner, MADEP shall approve a schedule for implementation, consistent with Condition # 18 (Moratorium).³⁸

(h) The Project Owner will meet with MADFW and USFWS to develop, design, and install a new fish trapping and hauling system during Phase 3 construction. The system shall be similar to the system proposed by HG&E, unless Phase 1 and Phase 2 modifications result in incompatibility between the modified fish passage facilities and the HG&E system, or the Project Owner proposes a facility which provides substantially similar benefits to those provided by the HG&E design. The Project Owner will submit plans for a new, fish trapping and hauling system to MADFW, USFWS and MADEP for MADEP approval by January 31, 2003. The Project Owner shall design new trapping and hauling systems as an integral part of the phased construction. While it may be possible for the Project Owner to install the system at the end of Phase 3, MADEP will not allow any interruption of fish trapping and hauling during fish passage season. Trapping and trucking shad is an important function that the Project Owner cannot interrupt during migration seasons before, during, or after construction. The Project Owner must employ a functioning trapping and trucking system every lift season, including a functioning trap for salmon and the ability to trap and truck shad.

(i) The Project Owner shall consult with MADFW, USFWS, NMFS, Trout Unlimited, the Connecticut River Watershed Council and MADEP (consulting parties) and submit a final design for downstream passage improvements to the consulting parties for MADEP approval. This final design shall include, but not be limited to, improvements for downstream passage of eels, shortnose sturgeon, and other migratory fish. The Project Owner shall initiate a hydraulic research study to model hydraulics in the vicinity of the Hadley Falls intake structures to aid in the design of an angled bar rack. The study shall be completed by July 31, 2001. The consulting parties shall meet regularly to review the hydraulic research study and provide comments and other input to the Project Owner. The Project Owner has initiated a shortnose sturgeon flume study to evaluate fish guidance efficiency. Based on the results of these studies and other research results, the Project Owner shall work cooperatively with the consulting parties to design an angled bar rack or alternative downstream fish passage measures to be Stalled during Phase 3 construction, with construction completed by December 31, 2003. MADEP may approve delay of facility construction completion beyond December 31, 2003 if additional studies are needed or facility design takes longer than anticipated. The Project Owner shall implement the system for downstream passage improvements as approved by MAIDEP.

³⁸ For the 2002 construction season, these dates will be adjusted to permit the construction described in Condition No. 14(a).

(j) The Project Owner shall meet with MADFW, USFWS and NMFS and submit to MADFW and MADEP, for MADEP approval, a final design for the installation of new upstream eel passage at both existing fish lifts during Phase 2 construction in 2002. During 2002, the Project Owner shall study possible entrances to new upstream eel passage on the South Hadley side of the dam. The Project Owner shall meet with MADFW, USFWS and NMFS, and submit to MADFW USFWS, NMFS and MADEP for MADEP approval, a final design for the installation of new eel passage on the South Hadley side of the dam during Phase 3 construction in 2003. The Project Owner shall implement the design as approved by MADEP.

(k) By December 31, 2002³⁹ the Project Owner shall submit to MADEP a plan to meet shortnose sturgeon upstream and downstream passage need, timing and measures, and a schedule for implementation after consulting with MADFW, USFWS, and NMFS. The Project Owner shall implement the plan as approved by MADEP. Starting April 1, 2004, the Project Owner shall conduct a study of the effectiveness of the measures taken, and submit the results to MADEP. Results of the effectiveness study may result in:

- (i) changes in zone of passage timing;
- (ii) changes in zone of passage flows;
- (iii) changes in minimum flows in the bypassed reach;
- (iv) modifications to lift entrances; and/or
- (v) modifications to downstream passage facilities.

Continuing studies of effectiveness may be necessary at the discretion of MADEP.

(l) Unless and until otherwise ordered by MADEP, Project Owner shall continue to operate the Boatlock downstream bypass facility until the full depth louvers have been installed and determined to be effective by MADEP.

15. **Holyoke Fishway Monitoring Scope of Work**

(a) Fish Monitoring

Project Owner shall be responsible for fish monitoring activities as described herein from now through December 31, 2020. The Project Owner may appeal any

³⁹ Start of Phase 3 construction.

MADEP order requiring that it continue to pay reasonable costs of fish monitoring activities alter December 31, 2020. Such activities include: (i) fish counting; (ii) shad biological sampling, trapping and loading; (iii) shortnose sturgeon passage; (iv) salmon monitoring, trapping and holding; and (v) observation of lift operations, entrance gate settings, bypass facilities, and attraction water-flows to insure efficient fishway operation ('Fish Monitoring Work'). The Fish Monitoring Work will not be modified without prior written consent of MADEP and MADFW. Project Owners' responsibility for Fish Monitoring Work will be discharged either: (1) by directly paying⁴⁰ the actual costs of conducting the Fish Monitoring Work, as designated by MADFW, including salaries and equipment, in an amount not to exceed \$60,000/year, adjusted annually from the 4 quarter 1999 by the US Bureau of Labor Statistics Employment Cost Index, Wages and Salaries for Northeast Region (Series ID: ECU23 1021); or (2) by undertaking the Fish Monitoring Work itself, under the supervision of MADFW. If the Project Owner chooses to undertake the Fish Monitoring Work itself, it shall so inform MADEP and MADFW, in writing, by September 1 of the year before it first undertakes the work.

(b) Fish Counts

Anadromous and resident fish passing upstream through the Holyoke fish lift system will be identified and counted during the spring and early summer migration season (April 1 through July 15). Continuous counts will be recorded on an hourly basis, or the number of fish passing may be estimated using sub-sampling methods. If sub-sampling methods are employed, they shall be accepted and approved by MADFW prior to implementation. Water temperature will be monitored and recorded on an hourly basis during hours of fish lift operation. The number of lifts will be recorded hourly for each of the two lifts. Fish counts will be made available to the USFWS Connecticut River Coordinator and MADFW Anadromous Fish Biologist on a daily basis. During other times of year, lifts will be monitored for the presence of Atlantic salmon or shortnose sturgeon. The number of these fish lifted will be recorded. Disposition of lifted fish will be determined by MADFW.

(c) Shad Biological Sampling, Trapping and Loading

A subsample of the American shad passing upstream through the lifts will be measured and weighed. Their sex will be determined, and a scale sample will be removed and stored, using established procedures and methods. The number of fish to be processed, and their distribution over the duration of the migration season, will be determined on an annual basis by MADFW, but will not be in any higher proportions

⁴⁰ i.e., MADFW will not make any payment and then be reimbursed by Project Owner.

than in the past. The resulting length, weight, and sex data will be made available, along with fish counts, on a daily basis. Scale samples and all other biological sampling will be sent to MADFW for their use. Project Owner will continue to cooperate and assist regarding the trapping and transfer of shad to trucks at the facility.

(d) Salmon Trapping and Holding

Atlantic salmon migrating through the fish lifts may be trapped in the exit flume and transferred to on-site holding facilities. The lift crew will maintain contact with USFWS Cronin National Salmon Station (Cronin), or other facility as designated by MA.DFW, to arrange for the daily transfer of fish from the Project to Cronin by Cronin personnel or to an other designated facility by governmental agency personnel. The number of fish to be trapped (and the number to be released) will be determined by the Connecticut River Atlantic Salmon Commission (CRASC) and MADFW. On-site holding facilities will be maintained by MADFW, CRASC or USFWS. The Project Owner will maintain the trap and the facilities needed to transfer fish from the trap to the on-site holding facility.

(e) Shortnose Sturgeon

Dewatering of the bypass will necessitate monitoring of the bypassed reach for stranded shortnose sturgeon. Disposition of shortnose sturgeon that are lifted or in any other way collected will be determined by NMFS and MADFW. All handling and transfer of shortnose sturgeon will be conducted according to the requirements of the NMFS Incidental Take Permit.

16. Access To the Project

The Project Owner shall permit any employee, agent, consultant, contractor or authorized representative of MADEP or MADFW to enter the facilities in order to effectuate and ensure compliance with the terms and conditions of this Water Quality Certification including, but not limited to, entry for the purposes of: (i) investigating, sampling, inspecting, or photocopying documents or other writings, conditions, equipment, practices or property; (ii) interviewing facility personnel and contractors; (iii) making records of field activities; and (iv) observing any activities undertaken at the facilities under any of the provisions of this Water Quality Certification.

17. Cooperative Research/Management Activities

The Project Owner shall cooperate with research and management activities performed by holders of permits issued by MADFW, provided they ensure that any equipment and associated cables and wires used do not compromise safety or interfere with operation or maintenance of the Project. Parties shall contact the Project Owner in

advance to arrange for site access. The Project Owner shall determine whether unescorted or escorted access is appropriate for the activity to be performed. Requirements for unescorted site access may include execution of liability releases, safety training, limitation of access to specified areas and for specified activities only, approval of the proposed activity by other entities as applicable, and other similar precautions. The Project Owner shall provide escorted access free of charge on an occasional basis during normal business hours. Parties requiring access to the facility on a regular basis other than during normal business hours, shall either meet the Project Owner's requirements for unescorted access, or shall reimburse the Project Owner for the reasonable costs associated with regular or periodic escorted access.

18. Moratorium

This moratorium condition shall not apply to any changes to minimum flows or fish passage facilities that are deemed necessary to protect a threatened or endangered species by a state or federal agency authorized to protect such species. Nor shall this moratorium condition apply to: i) changes to minimum flows or fish passage facilities necessary to comply with changes to Massachusetts Water Quality Standards (currently set forth in 314 CMR 4.00); or ii)

"Modifications and Adjustments" or new facilities, as both are described in Condition #14.

(a) Minimum Flows

Prior to January 1, 2014, MADEP may issue an order requiring the Project Owner to increase the flows in the bypassed reach above the minimum flows set forth herein in Condition #11, provided that such increase shall not be effective until January 1, 2014, or if appealed for 18 months after issuance of that order, whichever is later ("Effective Date"). Project Owner may bring an appeal or other administrative or judicial action that challenges such an order, but shall make best efforts to have all such appeals or other actions resolved expeditiously. If all appeals or other actions by any party relating to an order for increased flows are not resolved by the Effective Date, Project Owner shall meet such increased flows from the Effective Date until such appeals or other actions are resolved.

After January 1, 2014, MADEP may amend the certificate as it relates to minimum flows to the extent allowed by then-existing law.

(b) Additional Fish Passage Facilities

Prior to January 1, 2014, MADEP may issue an order requiring the Project Owner to install new fish passage facilities beyond what is ordered in this 401 Certificate, provided that such installation shall not be required to commence for 18 months after the

issuance of that order if a permit is required or the Project Owner appeals, or 36 months if both a permit is required and the Project Owner appeals. Project Owner may bring an appeal or other administrative or judicial action that challenges such a MADEP order relating to fish passage facilities subject to this moratorium condition, but shall make best efforts to have all such appeals or other actions, as well as required permitting, resolved expeditiously and not later than January 1, 2014.

Any installations requiring construction to begin prior to January 1, 2014 shall not, in the aggregate, have a cost greater than \$350,000 installed book cost under Generally Accepted Accounting Principles, said \$350,000 (less that portion of it already spent) to be adjusted annually from the year 1999 by the Consumer Price Index-All Urban Consumers (Series ID: CUUR0000SAO). As discussed above in Condition #14, MADEP may require that Project Owner make "Modifications and Adjustments" to the fish passage facilities to improve their efficacy both before and after January 1, 2014. Any costs: i) of such "Modifications and Adjustments"; ii) of facilities ordered under this 401 Certification; iii) to protect threatened or endangered species; iv) to comply with any changes to MADEP Water Quality Standards; or v) of studies described in the next paragraph shall not count toward the inflation-adjusted \$350,000 cost cap.

Throughout the term of the license, Project Owner shall cooperate with MADEP, MADFW and other agencies with respect to the performance of studies related to habitat, minimum flows, and fish passage facilities, and to expedite improvements, including without limitation, reviewing fish passage efficacy, identifying problems with existing facilities, and discussing, designing and implementing solutions. Project Owner shall pay all reasonable costs of reasonably-required studies of such issues in a timely fashion. In order to avoid delay in installation of new facilities, the Project Owner shall cooperate with MADEP, MADFW and other agencies in the design and performance of studies to determine what, if any, modifications to existing minimum flows and fish passage facilities, or new fish passage facilities are necessary at the Holyoke Project.

After January 1, 2014, for the remainder of the FERC license, MADEP may amend the certificate as it relates to fish passage facilities to the extent allowed by then-existing law, and the provisions of this condition shall not apply.

19. Riparian Management Plan

(a) Within one year of certification, the Project Owner shall submit a riparian management plan to MADEP. The plan shall address the protection of water quality and designated uses including fishery and wildlife habitat, and primary and secondary contact recreation, from adverse impacts and degradation caused by development and use as a result of the Project. The plan shall encompass all riparian land extending the length of the FERC project boundary as of July 28, 1999, as shown generally on the map attached hereto, at a minimum of within 200 feet of the Connecticut River around and above the

Holyoke Dam (extending horizontally from 0.2 feet above the normal pond elevation) (hereinafter referred to as "Project Boundary"). The plan shall, without limitation:

(i) Specify how a riparian zone adequate to protect water quality and designated uses will be established around the perimeter of the Project impoundment, specifically addressing how long term conservation of important riparian areas will be assured as needed to achieve this objective;

(ii) Specify allowable uses within the proposed riparian zone, and how conflicts among uses will be minimized to protect water quality, fisheries, wildlife, and recreational values of the river and associated riparian lands;

(iii) Specify how and where the Project Owner will provide access to Project waters for swimming, boating and fishing in a way that is compatible with other designated uses and values; and

(iv) Specifically propose how the plan will be implemented. The plan shall be developed in consultation with MADFW, the MADEM, the USFWS, the City of Holyoke, the Town of South Hadley, the Connecticut River Watershed Council and other interested organizations. The Project Owner shall implement the plan as approved by MADEP on the Project property owned by HWP as of July 28, 1999.

(b) The riparian zone shall be sufficient to:

(i) Serve as a vegetative filter to substantially reduce non-point source discharges of oil and grease, sediment, nutrients and fertilizers, pesticides, and other contaminants that may be transported to Project waters in overland runoff from existing or potential adjacent residential, commercial or agricultural uses or roads;

(ii) Protect near shore fish, aquatic life and wildlife habitat from degradation resulting from adjacent uses and disturbances and from alterations to the shoreline including docks, riprap, and other structural modifications;

(iii) Include significant wildlife habitats and buffers adequate to avoid disturbance from adjacent uses, for species utilizing Project waters and associated wetlands, including but not limited to rare, threatened, or endangered wildlife species, or other state or federally listed species of concern; and

(iv) Protect riparian habitat areas and buffers for species which use the riparian area in conjunction with Project waters, including turtle nesting areas, and bald eagle perch trees used for feeding; and

(v) Include riparian areas of significant recreational value as points of public access to Project waters for primary and secondary contact recreation. To the extent the Land and Buffer Zone Management Plans required by Article 418 of the federal operating license and approved by FERC include and address all elements required by this condition, those plans may be submitted to MADEP as the Riparian Management Plan.

20. Sale of Land Within Riparian Zone

The HWP shall notify MADEP and MADEM in writing prior to any sale if its lands within the Project Boundary. The HWP shall provide all purchasers of such lands with a copy of the Riparian Management Plan.

21. Additional Plans

(a) The Project Owner shall cooperate with MADEP with respect to monitoring, control and elimination of invasive species (including but not limited to zebra mussel and water chestnut) within the Project Boundary. The Project Owner shall consult with and submit a plan setting forth the Project Owner's proposed activities with respect to monitoring, control, and elimination of invasive species to MADEP, MADFW, USFWS, MADEM and the Silvio O. Conte National Fish and Wildlife Refuge. The Project Owner shall implement the plan as approved by MADEP. The plan should identify appropriate remedial measures to control such species.

(b) The Project Owner shall cooperate with MADEP with respect to the protection, enhancement and management of animals and plants within the Project Boundary that are listed as protected under the Massachusetts Endangered Species Act. Within one year of certification, the Project Owner shall submit a plan setting forth activities the Project Owner proposes to protect, enhance and manage animals and plants within the Project Boundary that are listed as protected under the Massachusetts Endangered Species Act. The Project Owner shall consult with MADEP, MADFW, USFWS, MADEM and the Silvio O. Conte National Fish and Wildlife Refuge while developing the plan. The Project Owner shall implement the plan as approved by MADEP. The plan shall identify safeguards to avoid conflicts between recreational users and protection of populations of rare and endangered species and specify how lands within the Project Boundary will be managed to protect natural resources.

22. Water Sampling Standard Operation Procedures

Within three months of certification, the Project Owner shall begin working cooperatively with MADEP to develop standard operating procedures for water quality sampling. The operating procedures developed shall be consistent with the Water Quality Sampling Plan previously submitted by Project Owner to FERC. Project Owner shall

abide by the final Water Quality Sampling Plan and Standard Operating Procedures as approved by MADEP.

23. **Force Majeure**

If any event occurs which delays or will delay the Project Owner's performance of work beyond a deadline established by or pursuant to this Certification, which event was beyond the reasonable control and without the fault of the Project Owner or any person or entity subject to the Project Owner's control, and which event could not have been prevented or avoided by the exercise of due care, foresight, or due diligence on the part of the Project Owner (a "force majeure event"), then the time for performance shall be extended for an appropriate period of time, as determined by MADEP in its sole discretion, no longer than the delay resulting from such event. The Project Owner shall bear the burden of demonstrating that a force majeure event has occurred or will occur, and that the delay was beyond the reasonable control and without the fault of the Project Owner. Such an extension of time must be in writing to have effect.

APPENDIX B – Terms and Conditions of NOAA Fisheries’ Incidental Take Statement

Reasonable and Prudent Measures

NOAA Fisheries believes the following reasonable and prudent measures (RPMs) are necessary and appropriate to minimize impacts of incidental take of shortnose sturgeon in the Connecticut River resulting from the existence and operation of the Holyoke Dam under the terms of the new license:

1. Shortnose sturgeon must be collected and handled appropriately at the downstream sampling station and in the event of a stranding. In addition, such interactions must be reported to NOAA Fisheries.
2. Water quality in the holding tanks at the downstream sampling station must be adequate for holding shortnose sturgeon.

Terms and Conditions

In order to be exempt from prohibitions of section 9 of the ESA, the licensee must comply with the following terms and conditions, which implement the reasonable and prudent measures described above, and outline required reporting/monitoring requirements.

1. To implement RPM #1, the licensee must follow the shortnose sturgeon handling plan (*see* Appendix F to this order).
2. To implement RPM #1, by January 1 of each year, the licensee must discuss with NOAA Fisheries whether any updates to the shortnose sturgeon handling plan are necessary. If required, all updates must be made by April 1 of each year.
3. To implement RPM #1, by January 1 of each year, the licensee must submit a report to NOAA Fisheries on the status of shortnose sturgeon at the Holyoke Project, including the numbers of identified sturgeon passing upstream (and downstream), if detected, the number of sturgeon rescued from the apron pools, the relative effectiveness of fishways, and mortality from the previous year.
4. To implement RPM #1, the licensee must notify NOAA Fisheries when the Holyoke Project reaches 75 per cent of the incidental take levels for shortnose sturgeon, including upstream migrating, downstream migrating, and fish stranding below the dam levels.

5. To implement RPM #2, the licensee must monitor the water quality of the holding tanks used at the downstream sampling facility. Personnel must ensure that no shortnose sturgeon are held for longer than 12 hours, that water depth is sufficient, that water temperature does not exceed 27° celsius and that dissolved oxygen levels are at least 5 milligrams per liter at all times.

APPENDIX C – Parts III and IV of the Settlement Agreement Filed on March 12, 2004

Part III – General Provisions

Section 3.1. Effective Date and Term. The Settlement shall be effective as of the date of the Final FERC Order Approving Settlement and shall continue through the term of the license under the 1999 License Order (*i.e.*, until August 31, 2039), except as provided under Section 3.2 hereof. This Settlement shall terminate as to all Parties and have no further force or effect upon expiration of the term of the license under the 1999 License Order.

Section 3.2. Amendment to the Settlement. If, after the Settlement becomes effective pursuant to Section 3.1 above, all of the Parties agree that circumstances have changed sufficient to require an amendment to the Settlement, the Parties shall execute an amendment to the Settlement reflecting that agreement and shall jointly petition the FERC to amend the License Articles affected by the amendment to the Settlement, as necessary.

Section 3.3. Consultation on Plans/Work under the Settlement. With respect to a plan, modification to a plan, or work to be undertaken pursuant to Part IV of the Settlement, HG&E shall first provide a draft of such plan, modification to a plan, or description of work to the Resource Agencies, TU, and CRWC (and with South Hadley for certain plans, as defined in Section 4.10 below), providing a minimum of 30 days for review, comment and recommendations prior to filing the plan with the FERC and the MADEP. Prior to filing the plan or description of work with the FERC and the MADEP, HG&E shall obtain the concurrence and/or approval of that plan/work from the agency or agencies as follows: (1) FWS and/or NOAA Fisheries for a plan/work which may impact a resource for which FWS and/or NOAA Fisheries have responsibilities under the Endangered Species Act (16 U.S.C. §1531, *et seq.*); (2) MADFW and/or MADEP for a plan/work which the MADFW and MADEP have responsibilities under the Massachusetts Endangered Species Act (M.G.L. c. 131A); (3) MADEP for a plan/work that is required by the 2001 WQC; and/or (4) FWS and/or NOAA Fisheries for all decisions on measures needed for fish passage, fish passage design drawings, and fish passage implementation schedules for which the FWS and/or NOAA Fisheries have specific statutory responsibility under the Federal Power Act (with such concurrence and/or approval not unreasonably withheld, and with any refusal to concur/approve to be based on sound science). For any plan/work that is subject to the jurisdiction of the U.S. Army Corps of Engineers, HG&E shall ensure that arrangements are included in such plan/work to obtain all necessary permits or authorizations.

HG&E and all consulted Parties agree to make a good faith effort to reach consensus on all plans pursuant to Part IV of the Settlement before HG&E files such plans at the FERC for approval and at the MADEP for approval when required by the 2001 WQC. HG&E shall include with the filing with the FERC and the MADEP documentation of consultation; copies of comments and recommendations on the proposed plan, modified plan and/or work after it has been prepared and provided to the Resource Agencies and the Parties consulted, and specific descriptions of how the comments are accommodated by HG&E's proposed plan and/or work. If HG&E does not adopt a recommendation by a Resource Agency or other Party [other than a recommendation by a Resource Agency(ies) from which HG&E shall obtain prior concurrence and/or approval, as described in (1), (2), (3) and (4) above], the filing shall include HG&E's reasons, based on project-specific information. All plan(s)/work shall be implemented as approved in writing by FERC and by MADEP (when required by the 2001 WQC).

Part IV – Technical Agreements

Section 4.1. Modified Run-of-River Operations.

Section 4.1(a). Objective: The objective of Section 4.1 is for HG&E to evaluate and implement a modification to the run-of-river provisions (contained in Article 405 of the 1999 License Order and Condition 9 of the 2001 WQC) in order to limit adverse Project impacts on the federally threatened and state endangered Puritan tiger beetle.

The need for the modification to the existing Run-of-River Operations is based on operating experience to date which indicates that Run-of-River Operations as required by the 1999 License (and Condition 9 of the 2001 WQC) exacerbate fluctuations at Rainbow Beach and other habitat areas for the Puritan tiger beetle upstream of the Holyoke Dam, which fluctuations may be detrimental to the restoration and protection of this species. Therefore, the Parties have agreed that the existing Run-Of-River Operations need to be modified to more effectively limit fluctuations in the Impoundment as a result of Project operations; the process for determining the appropriate modifications is set forth below.

The Parties recognize that such a modified operating regime must take into account and achieve multiple goals as stated in (b)(1) below. The Parties further intend that any modifications to Project operations shall not adversely impact fish passage, result in the stranding (as defined in Part I above) of fish, or otherwise adversely impact fish species, and that HG&E shall not change the releases into the Bypass Reach for Bypass Habitat Flows and Bypass Zone-of-Passage Flows without agreement of the Parties under the procedures set forth below.

Section 4.1(b). Test of modified run-of-river operations:

Section 4.1(b)(1): For testing modified run-of-river operations, HG&E shall consult with the Parties pursuant to Section 3.3 above to investigate an alternative operating regime: (i) to more effectively limit water level fluctuations in the Impoundment at Rainbow Beach and at other habitat areas for the federally threatened and state endangered Puritan tiger beetle upstream of the Project; (ii) to prevent injury or significant impairment to essential behavioral patterns to federally and state endangered shortnose sturgeon; (iii) to balance the magnitude of the fluctuations in the lower and upper sections of the Impoundment; (iv) to balance the impact on wetland areas adjacent to the lower and upper sections of the Impoundment; (v) to maintain the seasonally adjusted minimum flows into the bypass reach and the canal system as stated in Section 4.2 of this Settlement; and (vi) to the extent possible, reduce fluctuations in river flows downstream of the Project.

Section 4.1(b)(2): Based on consultation under Section 4.1(b)(1) above, HG&E filed with FERC and the MADEP a plan to test the modified run-of-river operations to evaluate the proposed alternative operating regime with the elements listed below. The plan [as approved as part of the COFP by FERC on June 24, 2003 (103 FERC ¶ 62,178), and by MADEP on October 6, 2003] shall be implemented as approved by the FERC and the MADEP. The plan includes:

- (i) Consultation by HG&E with the Parties pursuant to Section 3.3 above to identify the Resource Agencies' objectives related to the goals stated in Section 4.1(b)(1) above;
- (ii) A provision pursuant to which HG&E would perform hydraulic model studies to evaluate effects of various operating regimes relative to the stated resource goals identified under (i) above;
- (iii) Consultation by HG&E with the Parties pursuant to Section 3.3 above to develop a preferred operating regime and compliance measures that balance HG&E operation constraints and the resource goals identified in (i) above;
- (iv) Implementation and monitoring by HG&E of the preferred operating regime determined under (iii) directly above for a trial period of 12 months from the date of implementation, with a provision for continuation of the testing for up to an additional 12 months, if the Resource Agencies and HG&E agree that River conditions in the Impoundment during the test period were not representative of typical River flow conditions;

- (v) If, during the testing of the modified run-of-river operations, HG&E is unable to meet the Bypass Habitat Flows or the Bypass Zone-of-Passage Flows described herein, HG&E shall: (A) provide notification to the Parties within 24 hours, (B) revert immediately to the applicable Bypass Habitat Flow or Bypass Zone-of-Passage Flow, and (C) consult with the Parties pursuant to Section 3.3 above to modify or terminate the test of the modified run-of-river operations;
- (vi) Using the data collected during the trial period, HG&E shall prepare the following evaluations: (a) an evaluation of the effects of the modifications to the run-of-river operations on the federally and state threatened and endangered species; (b) a determination of any appropriate revision to the Threatened and Endangered Species Protection Plan (including any necessary changes to reflect state listed species); (c) a determination of measures as appropriate to avoid adverse impacts to the federally and state endangered shortnose sturgeon, including stranding in the Bypass Reach (see the Shortnose Sturgeon Handling Plan, attached as Appendix E); (d) an evaluation of how the modifications to the run-of-river operations affected HG&E's ability to achieve flow elevations in the Bypass Reach (*i.e.*, Bypass Habitat Flows and Bypass Zone-of-Passage Flows pursuant to Section 4.2 below); (e) a recommendation, if necessary, to modify the Texon Gage as a compliance measure for Bypass Habitat Flows and Bypass Zone-of-Passage Flows pursuant to Section 4.2 of this Settlement; (f) an evaluation of how the modifications to the run-of-river operations affect wetland areas adjacent to the lower and upper sections of the Impoundment; (g) an evaluation of impacts of modified run-or-river operations on downstream flow fluctuations; and (h) to the extent possible, proposed measures to reduce fluctuations in river flows downstream of the Project;
- (vii) Circulation by HG&E of the results of the test of modified run-of-river operations and evaluations performed under the plan to the Parties pursuant to Section 3.3 above and consultation on a proposed long-term resolution of the issue.

Section 4.1(c). Permanent modification to run-of-river operations: Based on the results of the test of modified run-of-river operations and evaluation of results pursuant to Section 4.1(b) above, and upon agreement by the Parties pursuant to Section 3.3 above, on or before November 30, 2004 [or within 3 months after any extension of the test period by written agreement of HG&E and the Resource Agencies pursuant to Section 4.1(b)(2)(iv) above], HG&E shall file with FERC and the MADEP: (i) a report containing the results of the test of modified run-of-river operations and the evaluations performed under the plan, and any comments from the consulted Parties (pursuant to Section 3.3 above); and (ii) a proposed amendment to the COFP for a modified operating

protocol. Copies of the report and proposed amendment shall also be provided to the Resource Agencies, TU and CRWC. The modified run-of-river operations shall be only implemented as approved in writing by the FERC and MADEP.

Section 4.2. Bypass Flows.

Section 4.2(a). Objective: The objective of Section 4.2 is to have HG&E release seasonally-adjusted minimum flows into the Bypass Reach, correlated to the Texon Gage, for: (1) the protection and enhancement of water quality and aquatic and fisheries resources (Bypass Habitat Flows); and (2) effective flows for migratory fish passage (Bypass Zone-of-Passage Flows). This provision is based on Article 406 of the 1999 License Order and Conditions 11(a) and 11(b) of the 2001 WQC. HG&E agrees to make good faith effort to meet the flow elevations in this Section during the test period under Section 4.1(b) above. If, during the testing of the modified run-of-river operations, HG&E is unable to meet the Bypass Habitat Flows and Bypass Zone-of-Passage Flows described herein, HG&E shall: (i) provide notification to the Parties within 24 hours; (ii) revert immediately to the applicable Bypass Habitat Flow or Bypass Zone-of-Passage Flow; and (iii) consult with the Parties pursuant to Section 3.3 above to seek agreement on a procedure to modify or terminate the test of the modified run-of-river operations.

Section 4.2(b). Bypass Zone-of-Passage Flows: The goal of Bypass Zone-of-Passage Flows is to provide flows sufficient so that diadromous and resident fish can safely and successfully pass without injury or significant impairment to essential behavioral patterns. Based upon best scientific information presently available, the Parties agree that this goal can be reached by achieving the water surface elevations in the Bypass Reach that correspond to the 1997 Barnes & Williams IFIM Study of 1300 cfs flow as measured in the Bypass Reach. The Parties further agree that the 1300 cfs flow is achieved for compliance purposes by flows corresponding to a water surface elevation of 62.85 +/- 0.1 feet NGVD at the Texon Gage. The Bypass Zone-of-Passage Flows will be released whenever the Fish Lifts are operational as set forth in Section 4.5(b) below, unless for the purposes of resident fish only the Parties agree that lesser Bypass Zone-of-Passage Flows are appropriate for resident fish passage.

Section 4.2(c). Channel modifications: Based on Article 407 of the 1999 License Order and Condition 11(c) of the 2001 WQC and after consultation with the Parties, HG&E developed and implemented channel modifications to the Holyoke (West) Channel of the Bypass Reach in March 2003 to address fish passage/stranding issues. HG&E shall implement the study plan for evaluating the effectiveness of the Channel modifications for fish passage as approved by FERC as part of the COFP on June 24, 2003 (103 FERC ¶ 62,178), and filed with the MADEP on January 20, 2003.

Section 4.2(d). Interim Bypass Habitat Flows: The goal of Interim Bypass Habitat Flows is to provide flows sufficient for the protection and enhancement of water quality

and aquatic and fisheries resources. This provision is based on Article 406 of the 1999 License Order and Condition 11(d) of the 2001 WQC. The stated goal will be reached by achieving the water surface elevations in the Bypass Reach which correspond to the 1997 Barnes & Williams IFIM Study of 840 cfs flow as measured in the Bypass Reach, until Permanent Bypass Habitat Flows are determined pursuant to Section 4.2(e) below. The Parties further agree that the 840 cfs flow is achieved for compliance purposes by flows corresponding to a water surface elevation of 62.3 +/- 0.1 feet NGVD at the Texon Gage. The Interim Bypass Habitat Flows will be released whenever the Fish Lifts are not operational as set forth in Section 4.5(b).

Section 4.2(e). Permanent Bypass Habitat Flows: The intent of this Section is to determine surface elevations correlated to the Texon Gage for the Permanent Bypass Habitat Flows for normal operations and maintenance conditions at the Project for the protection and enhancement of water quality and aquatic and fisheries resources. This provision is based on Article 406 of the 1999 License Order and Condition 11(d) of the 2001 WQC. The permanent measure of compliance for Bypass Habitat Flows shall be the Interim Bypass Habitat Flows as specified in Section 4.2(d) above as adjusted and modified pursuant to this Section 4.2(e). The Permanent Bypass Habitat Flows will be released whenever the Fish Lifts are not operational as set forth in Section 4.5(b).

Section 4.2(e)(1): After consultation with the Parties HG&E developed a study plan for flow demonstrations to evaluate water surface elevations, the distribution of flows in the Bypass Reach, channel modifications already completed. Flow demonstrations and evaluations will occur after the Spring 2004 Upstream Passage Season. Flow demonstrations and evaluations shall be performed for normal operating conditions (*i.e.*, with releases through the Bascule Gate on the Holyoke side of the Project Dam) and maintenance conditions (*i.e.*, with releases through Rubber Dam Section No. 1 on the South Hadley side of the Project Dam, when the Bascule Gate is out of service).

Section 4.2(e)(2): Following the flow demonstrations and evaluations under Section 4.2(e)(1) above, and in consultation with the Parties pursuant to Section 3.3 above, HG&E shall determine if any Channel modifications for flow distributions or changes to the Interim Bypass Habitat Flows are necessary to provide an adequate water level for fish habitat. The Parties agree that the Permanent Bypass Habitat Flow determined pursuant to this Section 4.2 provides flows in each of the three channels of the Bypass Reach that achieve an adequate water level for fish habitat and prevent any adverse impacts to federally and state endangered shortnose sturgeon, including stranding in the channels of the Bypass Reach.

The Parties agree that this goal will be reached by achieving the water surface target elevations from the 1997 Barnes and Williams study for each of the three channels in the Bypass Reach. Based on the analysis of the additional flow demonstrations in 2004 and the testing of modified run-of-river operations, and in consultation with the Parties

pursuant to Section 3.3 above, if necessary HG&E shall file an application to amend the License for the Project to implement the Permanent Bypass Habitat Flows and shall file by December 31, 2004, for written approval from MADEP, as set forth in Section 4.1(c) above. HG&E shall only implement Permanent Bypass Habitat Flows as approved in writing by MADEP and FERC.

Section 4.3. Canal System Flows.

Section 4.3(a). Objective: The Objective of Section 4.3 is to have HG&E release seasonally-adjusted minimum flows into the Canal System for the protection and enhancement of water quality and aquatic and fisheries resources. This section is based on Article 406 of the 1999 License Order and Condition 13 of the 2001 WQC.

Section 4.3(b). Interim Canal System minimum flows: HG&E shall provide a continuous minimum flow into the Canal System, downstream of the louver bypass facility, of 400 cfs, consistent with the CCOP [approved by FERC on June 5, 2003 (103 ERC ¶ 62,130)], with the COFP [approved by FERC on June 24, 2003 (103 FERC ¶ 62,178)], and with Condition 13(a) of the 2001 WQC. HG&E will use generation records (consistent with the form and content of what is filed at the FERC for the period in question) and unit rating curves to demonstrate compliance with canal minimum flow requirements.

Section 4.3(c). Permanent Canal System minimum flows: Based on Article 409 of the 1999 License Order and Condition 13(b) of the 2001 WQC, in consultation with the Parties pursuant to Section 3.3 above, HG&E developed a plan to establish permanent compliance measures to ensure a 400 cfs continuous minimum flow into the Canal System downstream of the louver facility. The plan was filed with MADEP in December 2003 and includes the following:

- (i) HG&E to use head gate openings and pond elevations to determine the quantity of flow (calculated from gate opening/discharge relationships) and flow measurements in the First Level Canal (using new flow measurement equipment installed in the First Level Canal) to ensure adequate flow distribution;
- (ii) HG&E to consult with the Parties pursuant to Section 3.3 above to develop permanent compliance measures for minimum flows in the Canal System;
- (iii) HG&E to prepare and circulate to the Parties pursuant to Section 3.3 above a plan to establish permanent compliance measures for minimum flow in the Canal System;

- (iv) On or before June 30, 2004, HG&E to file with the FERC and the MADEP the permanent compliance measures as a revision to the CCOP as necessary; and
- (v) If significant modifications are made by HG&E or any other entity on the Canal that could change leakage or the distribution of flow in the Canal System, HG&E to evaluate the magnitude and distribution of flows in the Canal System; then, in consultation with the Parties pursuant to Section 3.3 above, to propose to MADEP a revision to the permanent canal system minimum flow compliance measures contained in the CCOP as necessary to achieve the resource management objectives and the minimum flow requirements set forth in Section 4.3 above as agreed to pursuant to Section 3.3 above.

HG&E shall implement the CCOP and any revisions thereto relating to permanent compliance measures for minimum flow in the Canal System as approved in writing by the FERC and the MADEP.

Section 4.3(d). Interim Canal System Outage: Consistent with Condition 13(c) of the 2001 WQC and consultation with the Parties, for the Fall 2003 Canal System Outage HG&E operated under the canal drawdown provisions as filed at FERC on August 15, 2003. Based on the Fall 2003 Canal System Outage, HG&E provided to the Parties a report that addressed the following:

- (i) Evidence of minimum flows through the headgates sufficient to ensure that the pool between Boatlock and Riverside (see Figure No. 1 above) remains at an elevation equal to the Riverside Station intake sill elevation and at ambient river temperature throughout the drawdown period;
- (ii) Evidence of sufficient flows from the headgates (see Figure No. 1 above) to provide water in the First Level Canal (once maintenance is completed) to protect the state listed endangered yellow lampmussel at the lower end of the louvers;
- (iii) Evidence that the No. 3 Overflow (see Figure No. 1 above) remains closed until the end of the Canal System Outage period, at which time it may be opened for inspection and maintenance;
- (iv) Evidence of measures for the protection of mussels if heavy machinery is used in the Canal during the Canal System Outage;

- (v) A plan for evaluation of the experimental weir in the First Level Canal to determine if it retains water and to develop and implement plans to modify as required; and
- (vi) A plan for evaluation of the need for additional weirs to keep mussel habitat areas watered.

Section 4.3(e). Permanent Canal System Outage: Based on the evaluations of the Spring and Fall 2004 Canal System Outages, HG&E shall consult with the Parties pursuant to Section 3.3 above to modify the drawdown procedures, experimental weir, and any additional weirs, to the extent necessary to protect and enhance mussel species including the federally and state listed endangered dwarf wedgemussel and the state listed endangered yellow lampmussel, and to generally ensure sufficient flows into the Canal System during the outages for the protection and enhancement of water quality and aquatic and fisheries resources.

HG&E shall file with FERC and the MADEP the final Canal System Outage plan, as a revision to the CCOP on or before January 31, 2005. That plan shall be implemented by HG&E as approved in writing by FERC and MADEP. The Canal System Outage plan shall include provisions implemented in the Spring and Fall 2004 Canal System Outage (as stated in Section 4.3(d) above), the evaluation and potential installation of a permanent weir in 2005 and/or additional weirs as necessary, and update the matters addressed in the 2004 report. HG&E shall notify all Canal water users and Resource Agencies prior to any Canal System Outage.

Section 4.3(f). Full depth louvers and exclusion racks: Consistent with Conditions 13(d), 13(e) and 14(a) of the 2001 WQC, and the CCOP as approved by the FERC, HG&E shall continue to operate, clean and otherwise maintain the full depth louvers in the First-Level Canal and the exclusion racks at the attraction water intake gates to ensure efficient and reliable operation of these facilities for the protection of aquatic resources. HG&E shall annually inspect the full depth louvers and exclusion racks, and repair them as necessary. In the event the full depth louver facility is out of service during the Upstream Passage Season (as defined in Part I above), the Canal System will not be operated and the headgates will be closed to seal flows into the Canal. If necessary, at the end of the Upstream Passage Season a slow drain of the Canal will be performed to return any fish to the River.

In the unlikely event of a failure of the canal louver bypass system, HG&E shall shut the Canal down. If there is a structural failure of the louver panels, HG&E shall implement a slow drawdown process to allow any fish in the Canal downstream of the louver facility to return to the River. As described below, the process consists of: (i) notification, and (ii) slow draining of the canal system.

- (i) Notification: HG&E shall notify MADFW, USFWS and NOAA Fisheries within 24 hours of the louver bypass system outage.
- (ii) Slow Drain: The No. 1 Overflow attraction water gate will be cracked to drain the First Level Canal; the No. 2 Overflow gates will be cracked to drain the 'upper' section of the Second Level Canal, and the Riverside Station sluice gate will be cracked to drain the 'lower' portion of the Second Level Canal. HG&E shall monitor the Canal System during the slow drain process and regulate the drain gates as required to allow fish to exit the Canal System.

In conjunction with the slow drain process, HG&E shall make all reasonable efforts to expedite repairs to the louver bypass and return the facility to service.

Section 4.3(g). Effectiveness study for full depth louvers (surface migrants):

Consistent with Condition 14(c)(1) of the 2001 WQC and the CCOP (as approved by FERC and MADEP), and in consultation with the Parties, HG&E developed an effectiveness study plan for the full depth louvers as they affect surface migrants. This plan was filed at MADEP on January 31, 2003; HG&E shall implement the plan as approved by the MADEP. The study results regarding facility effectiveness shall be circulated to the Parties pursuant to Section 3.3 above and filed with the FERC and the MADEP no later than July 1, 2004. The effectiveness of the full depth louvers to pass surface migrants will be evaluated based on whether velocities measured during guidance testing of surface migrants at the partial depth louvers have changed with the addition of bottom louver sections. If based on the louver effectiveness studies described in this section, and any other relevant information in the record of this proceeding, HG&E and the Parties determine, in consultation pursuant to Section 3.3 above, that the full depth louvers are effective, HG&E may close the Boatlock Station Bypass.

Section 4.4. Flow Prioritization and Low Flow Contingency Plan.

Section 4.4(a). Objective: The objective of Section 4.4 is to have HG&E follow an approved plan for operating the Project and for releasing flows at the Project. This section is consistent with Condition 12 of the 2001 WQC.

Section 4.4(b). Project flows – flow prioritization: HG&E shall operate the Project in accordance with the flow prioritization plan as outlined in Conditions 12(a) and 12(b) the 2001 WQC. Any modification to this prioritization shall be filed with FERC and MADEP as a proposed revision to the COFP. HG&E shall only implement the revisions as approved in writing by the FERC and the MADEP.

Section 4.4(c). Low Flow Contingency Plan: HG&E shall operate consistent with the Low Flow Contingency Plan as set forth in Section 3.3 of the COFP and as required by Condition 12(c) of the 2001 WQC. The Low Flow Contingency Plan directs Project

operations and prioritization for flows in the Canal System, specifically to protect the federally and state listed endangered dwarf wedgemussel and the state listed endangered yellow lampmussel.

Section 4.5. Upstream Fish Passage – Phase I:

Section 4.5(a). Objective: The objective of Section 4.5 is to ensure that diadromous and resident fish are able to safely and successfully pass upstream of the Project without injury or significant impairment to essential behavioral patterns. The Parties agree that this objective is achieved by HG&E operating, maintaining and enhancing upstream fish passage facilities at the Project for diadromous and resident fish as described below. This section is based on Article 412 of the 1999 License Order and Condition 14 of the 2001 WQC. The existing upstream fish passage facilities include the attraction water system, the tailrace entrance and lift tower and the spillway entrance and lift tower, the spillway transport channel, the entrance flume with the fish trapping and viewing station, the exit flume, and the fish exit channel. HG&E shall consult with the Parties pursuant to Section 3.3 above with respect to the analysis, design, construction, operation, and effectiveness evaluation of upstream fish passage facilities as described in this Section 4.5.

Section 4.5(b). Operation of Fish Lifts: Based on Article 412 of the 1999 License Order and Condition 14(d) of the 2001 WQC, HG&E shall operate the Fish Lifts for upstream passage during the April 1 through November 15 Upstream Passage Season, as defined in Part I above. However, the Fish Lifts shall be not be operated during the period July 15 through September 15 until such time as: (i) NOAA Fisheries determines that upstream passage of federally and state endangered shortnose sturgeon over the Dam is appropriate; or (ii) MADFW and FWS determine that resident fish passage is necessary. When shortnose sturgeon appear at the Fish Lifts, HG&E shall follow the Shortnose Sturgeon Handling Plan (attached as Appendix E, as modified based on an annual review of the Plan). Specific dates and hours of operation of the Fish Lifts during the periods stated above will be determined by MADFW in consultation with HG&E in accordance with Condition 14(d) of the 2001 WQC, and in consultation with NOAA Fisheries once upstream passage of shortnose sturgeon is implemented.

Section 4.5(c). No. 2 Overflow: Based on Condition 14(a)(3) of the 2001 WQC and Section 2.1 of the UFPP filed with FERC and MADEP on November 1, 2002, HG&E has implemented specific measures and modifications to the operating procedures, as necessary, to operate the No. 2 Overflow in such a manner to avoid releasing water during the April 1 through November 15 Upstream Passage Season when the Fish Lifts are operational as described in Section 4.5(b) above by implementing the procedures that prohibit operation of the No. 2 Overflow during that period when the Fish Lifts are operational (see No. 2 Overflow Procedures, attached as Appendix D). On December 26, 2003, HG&E filed a report documenting such actions with the FERC and the MADEP as a supplement to the COFP.

Section 4.5(d). Work prior to Spring 2003 Upstream Passage Season: Based on Article 412 of the 1999 License Order, and consistent with Condition 14(a) of the 2001 WQC and Section 7.1 of the UFPP, in consultation with the Parties prior to the Spring 2003 Upstream Passage Season HG&E has: (1) installed the modified gate insert in the west tailrace entrance to improve flows for fish passage; (2) made modifications to the Holyoke (West) Channel in the Bypass Reach to reduce stranding of upstream migrants per Section 4.2(c) of the Settlement; (3) improved the “V Gate” in the tailrace entrance gallery to reduce shad milling; and (4) increased the elevation of the area above the Hadley Falls Station draft tubes to provide for operation up to 40,000 cfs river flow. The Parties agree that such work was appropriate, necessary and in the public interest.

Section 4.6. Upstream Fish Passage – Phase II:

Section 4.6(a). Objective: The objectives of Section 4.6 are: (1) to have HG&E operate and maintain upstream fish passage facilities at the Project that safely and successfully pass diadromous and resident fish without injury or significant impairment to essential behavioral patterns; and (2) to complete the installation of Fish Lift improvements by the 2005 Fish Passage Season. This provision is based on Article 412 of the 1999 License Order and Conditions 13(b), 13(e), 14 and 15 of the 2001 WQC. HG&E shall consult with the Parties pursuant to Section 3.3 above with respect to the analysis, design, construction, operation, and effectiveness evaluation of Phase II upstream fish passage facilities as described in this Section 4.6.

Section 4.6(b). Plans and Schedule:

Section 4.6(b)(1). Detailed Plan and Schedule: In consultation with the Parties pursuant to Section 3.3 above, and consistent with the UFPP and 2001 WQC Conditions 14(a), 14(b), 14(h) and 14(j), HG&E filed plans on December 26, 2003 and February 1, 2004 for Upstream Fishway Construction Phase II, containing the elements listed in Section 4.6(c) below. HG&E shall implement the plan as approved in writing by the FERC and the MADEP.

Section 4.6(b)(2). Final Detailed Plan and Schedule. Upon completion of the bid cycle and before commencement of construction HG&E shall consult with the Parties, pursuant to Section 3.3 above, to develop a Final Detailed Plan and Schedule consistent with the UFPP and 2001 WQC Conditions 14(a) and 14(b) and that incorporate the general contractor’s plan and schedule for construction of the enhancements to the Upstream Fish Passage facilities. Prior to start of construction, HG&E shall file the Final Detailed Plans and Schedule, as approved by FWS and NOAA Fisheries, with the FERC and MADEP. HG&E shall implement the plan as approved in writing by the FERC and the MADEP.

Section 4.6(c). Contents of Detailed Plan: The detailed plan prepared and filed pursuant to Section 4.6(b)(1) above included:

- (i) Replacement of the tailrace lift tower, auxiliary equipment and hopper to accommodate 33 cubic feet per minute capacity.
- (ii) Replacement of the spillway tower, auxiliary equipment and hopper to accommodate 46 cubic feet per minute capacity.
- (iii) Increase the width of the spillway transport channel to an average width of 6 feet.
- (iv) Modifications to the exit flume to accommodate the new spillway lift location.
- (v) Increase the width of the fish exit channel up to a maximum of 14 feet between the lift towers and the fish counting station (see Figure No. 3, attached hereto).
- (vi) Installation of a high capacity adjustable drain valve in the flume.
- (vii) Addition of a second fish trap and viewing window in the exit flume.
- (viii) Expansion of the fish counting station to include both fish traps.
- (ix) Modification of the fish trapping and hauling system to improve the work area and minimize hoisting and netting of fish.
- (x) Modification of the attraction water supply system to provide up to 200 cfs at the spillway entrance and 120 cfs at each of the tailrace entrances.

In addition, the plan included:

- (1) A schedule that provides for construction to begin in 2004 and be completed prior to the start of the Spring 2005 Upstream Passage Season;
- (2) Milestones to identify target completion dates for key components to ensure compliance with Spring 2005 Upstream Passage Season requirements; and
- (3) Contingency plans for unexpected delays in construction. If, by November 1, 2004, it is determined that HG&E will not meet the start of the operation of the Fish Lifts pursuant to Section 4.5(b) above, or the planned construction is substantially behind schedule, then HG&E shall promptly consult with the Parties (no later than November 30, 2004) to develop and agree on

alternatives for Fish Lift operations for the Spring 2005 Upstream Passage Season.

Section 4.6(d). Effectiveness of upstream fish passage facilities:

Section 4.6(d)(1): The goal of the upstream fish passage facilities effectiveness testing is to determine whether diadromous and resident fish are able to safely and successfully pass upstream of the Project through the enhanced upstream fish passage facilities without injury or significant impairment to essential behavioral patterns. In consultation with the Parties pursuant to Section 3.3 above, HG&E shall prepare a proposed plan for the evaluation and monitoring of the effectiveness of upstream fish passage facilities for diadromous and resident fish species. Such plan shall include, but not be limited to, the following: (i) evaluation of operation and attraction flows; (ii) evaluation of the adequacy and effectiveness of the 7-foot-wide exit channel upstream of the counting station, the existing 4.5-foot-wide spillway entrance, and the existing 6-foot-wide spillway entrance channel to provide upstream fish passage (see Figure No. 3, attached hereto); (iii) evaluation of the ability to achieve the target design populations for upstream fish passage as described in Article 412 of the 1999 License Order; and (iv) annual reports to be distributed to the Parties by December 31st of each year.

On or before September 30, 2004, HG&E shall distribute the proposed plan to the Parties. On or before November 30, 2004, HG&E shall file the plan with MADEP and the FERC for approval. HG&E shall implement the plan as approved in writing by the FERC and the MADEP.

Section 4.6(d)(2)(A): By December 31, 2006, HG&E shall distribute a cumulative report of the study results to the Parties, which shall include conclusions and recommendations as to whether the goal as stated in Section 4.6(d)(1) above has been achieved. Within three months after distribution of the report, HG&E shall consult with the Parties pursuant to Section 3.3 above with respect to the study results.

Section 4.6(d)(2)(B): If the effectiveness study concludes that the upstream passage facilities and measures are not accomplishing the objective stated in Section 4.6(d)(1) above, or if the study does so conclude but the Resource Agencies do not concur, then HG&E shall develop plans to modify the facilities including, but not limited to, if necessary:

- (i) Increasing the width of the exit channel upstream of the counting station up to 10 feet;
- (ii) Increasing the width of the spillway entrance to 8 feet; and/or
- (iii) Increasing the width of the spillway entrance channel to 8 feet.

HG&E shall circulate such plans and a schedule for the implementation of the modifications to the Parties consulted and shall propose any modifications as a result of comments. After receiving affirmative concurrence from MADFW, FWS and NOAA Fisheries on the final proposed plans and schedule, HG&E shall file the final plans and schedule with the FERC (in the form of an application to amend the License for the Project) and with the MADEP (for approval consistent with Condition 14(c) of the 2001 WQC), that addresses the proposed changes to fishway operations or structures determined to be necessary to protect and enhance fish passage for diadromous and resident fish species. HG&E shall implement the plan for such modifications as approved in writing by FERC and the MADEP.

Section 4.6(d)(2)(C): If, based on such effectiveness study results, the Resource Agencies, in consultation with HG&E and the Parties, are unable to determine whether or not the new facilities are effective or what modifications are necessary to the facilities in order to provide adequate upstream fish passage, HG&E shall extend the plan for evaluation and monitoring of the effectiveness of upstream fish passage facilities for diadromous and resident fish species as approved under Section 4.6(d)(1) above for an additional year, with a report distributed to the Parties as set forth in Section 4.6(d)(1) above. Based on the extension of the effectiveness study, on or before December 31, 2007, HG&E shall prepare a cumulative report and follow the procedures in Section 4.6(d)(2)(B) above. If, after this one-year extension of the study the Parties are unable to determine whether or not the new facilities are effective or what modifications are necessary to the facilities in order to provide adequate upstream fish passage, then HG&E shall extend or schedule additional evaluation and monitoring as determined to be needed pursuant to consultation under Section 3.3 above.

Section 4.6(d)(3): If NOAA Fisheries, FWS, and/or MADFW determine, based on the study results under Section 4.6(d)(1) above, that modifying the spillway entrance to the upstream passage facilities and/or an adjustment to the attraction flows is necessary to safely and successfully provide upstream passage of shortnose sturgeon and other diadromous and resident species, HG&E shall implement the modifications as directed by NOAA Fisheries, FWS and/or MADFW, and as approved in writing, as necessary, by the FERC and MADEP.

Section 4.6(e). Annual Report and monitoring of the operation of upstream fish passage facilities: On or before January 31 of each year, HG&E shall submit to the Parties and the Connecticut River Atlantic Salmon Commission a report of the previous year's activities relative to the operation of the upstream passage facilities (including the number of fish lifted, relative to the target design populations for upstream fish passage as described in Article 412 of the 1999 License Order) and plans for the next year's activities. HG&E shall consult with MADEP on the next year's planned activities. The scope of work for the fishway monitoring shall be conducted consistent with Condition 15 of the 2001 WQC. HG&E shall monitor upstream fish passage for federally and state

endangered shortnose sturgeon including, but not limited to, counting, trapping, monitoring, and collection of biological data. Except for Fall 2004, HG&E will not interrupt Fish Lift operations during Upstream Passage Seasons; and a functioning trap for salmon and the ability to trap and truck shad will be available during Upstream Passage Seasons before and after construction in 2004.

Section 4.6(f). Further Consultation: Following completion of construction under Section 4.6(b) and subsequent evaluations and modifications described above, HG&E shall consult with the Parties whenever necessary and as requested by the Resource Agencies to assess the effectiveness of the upstream passage facilities to pass federally and state endangered shortnose sturgeon and other diadromous and resident fish, including an evaluation of the ability to achieve the target design populations for upstream fish passage as described in Article 412 of the 1999 License Order and Conditions 14(c) and 14(d) of the 2001 WQC.

Section 4.7. Downstream Fish Passage.

Section 4.7(a). Objective: The objective of Section 4.7 is to have HG&E install, operate and maintain downstream fish passage facilities for diadromous and resident fish at the Project that safely and successfully pass the fish without injury or significant impairment to essential behavioral patterns. HG&E shall consult with the Parties pursuant to Section 3.3 above with respect to the analysis, design, construction, operation, and effectiveness evaluation of downstream fish passage facilities as described in this Section. This provision is based on Article 411 of the 1999 License Order and Condition 14 of the 2001 WQC. The current primary downstream fish passage facilities are the louver bypass facility (including the Louver Bypass Discharge Pipe), Downstream Sampling Station, and the existing Bascule Gate.

Section 4.7(b). Operation under Existing Downstream Fish Passage Plan: Until the FERC approves the enhancements to the downstream fish passage plan as described in Section 4.7(c) below, HG&E shall operate and maintain the downstream fish passage facilities at the Project pursuant to the Downstream Fish Passage Plan approved by FERC on June 19, 2003 (103 FERC ¶ 62,165).

Section 4.7(c). Enhancements to Downstream Fish Passage Plan: In order to enhance downstream fish passage at the Project, HG&E shall implement interim measures to improve downstream passage and concurrently address a permanent solution for downstream passage and exclusion of diadromous fish (including shortnose sturgeon) and resident fish, with the goal that when such fish appear on the upstream side of the Project Dam they will be immediately passed downstream without injury or significant impairment to essential behavioral patterns. HG&E's activities shall be in several phases as follows:

Section 4.7(c)(1). Phase 1 – 2004-2005 (Interim Downstream Passage Measures and Research):

During the period 2004 through 2005, in consultation with the Parties pursuant to Section 3.3 above, HG&E shall (i) implement modifications to the Downstream Sampling Facility and potentially to the Louver Bypass Discharge Pipe (as set forth in Section 4.7(c)(1)(A) below), (ii) implement operational changes to prioritize canal flow during Fall, evening hours; and (iii) conduct research and studies (as set forth in Section 4.7(c)(1)(B) below). Based on such research, on or before December 31, 2005, HG&E and the Parties, in consultation pursuant to Section 3.3 above, shall determine whether to implement Phase 2A or Phase 2B below as provided in Section 4.7(c)(2) below. In further preparation for that 2005 Decision Point, HG&E shall meet with the Parties on or before December 31, 2004, to review the data then available and the research to be completed in 2005 prior to the 2005 Decision Point.

As more fully discussed in Appendix F attached to the Settlement, HG&E shall consult with the Parties, and/or obtain the concurrence and/or approval of each plan or work, pursuant to Section 3.3. Thereafter, HG&E shall file such plans with the FERC and the MADEP, and shall implement such plans as approved in writing by the FERC and MADEP. Following completion of studies, HG&E shall distribute the results to the Parties.

Section 4.7(c)(1)(A) – HG&E shall implement modifications to facilities to enhance downstream passage for diadromous fish as described below:

- *To minimize the potential for injury to shortnose sturgeon if they enter the Downstream Sampling Facility, in consultation with the Parties pursuant to Section 3.3 above, HG&E shall develop a plan to modify the Downstream Sampling Facility with such modifications to be completed by April 15, 2004, and to test the effectiveness of such modifications thereafter in 2004. The plan was filed with the FERC and the MADEP on March 1, 2004. HG&E shall implement the plan as approved in writing by the FERC and the MADEP. If, after such modifications, evidence of injury to shortnose sturgeon is found, HG&E shall consult with the Parties pursuant to Section 3.3 above to determine if any additional modifications are appropriate. HG&E shall operate the Downstream Sampling Facility in accordance with the Downstream Sampling Facility Operating Protocol, attached as Appendix G hereto.*
- HG&E shall evaluate the effect of the height of the drop from the Louver Bypass Discharge Pipe to the tailrace on shortnose sturgeon through a radio tracking study. If, in consultation with the other Parties, HG&E determines it is necessary to reduce the height of the drop from the Louver Bypass Discharge Pipe to the tailrace to enhance the survival of shortnose sturgeon, HG&E shall propose how best to modify the Louver Bypass Discharge Pipe in a plan (to be filed after consultation with the Parties pursuant to Section 3.3 above) that provides for such

modifications to be implemented in 2005, to be operational for the Spring 2006 Upstream Passage Season, and effectiveness testing of the modifications in 2006 after the modifications are implemented. HG&E shall file the plan with the FERC and the MADEP on or before April 1, 2005, and shall implement the plan as approved in writing by the FERC and the MADEP.

- To reduce entrainment, in consultation with the Parties (pursuant to Section 3.3 above), HG&E shall develop a plan to change flow prioritization from the Hadley Falls units to the Canal during nighttime periods from October 1 through the later of: (i) the time when the River temperature reaches 5° C., or (ii) November 30 (unless the Parties, in consultation pursuant to Section 3.3 above, agree to an earlier time), with prioritizing the Canal first and then regulating the Hadley Falls Station. HG&E shall file the plan with the FERC and the MADEP on or before December 31, 2004, and shall implement the plan as approved in writing by the FERC and the MADEP. HG&E shall also consult with the Parties pursuant to Section 3.3 above to determine if additional or alternative operational changes will enhance downstream passage.

Section 4.7(c)(1)(B) –Phase 1 of the research program (in 2004-2005) is intended to develop additional information on the downstream migration of American eels, shortnose sturgeon, and other migrating fish in preparation for a decision on whether to implement Phase 2A or Phase 2B as described below:

- Louver Field Study – 2004: (i) to evaluate effectiveness of the full depth louvers to guide shortnose sturgeon and American eels; and (ii) to evaluate the behavior of shortnose sturgeon and American eels at the ramp and the entrance to the bypass pipe.
- CFD Modeling – 2004: (i) of the Hadley Falls intakes, to evaluate the potential of modifying the existing Hadley Falls intake racks to be an effective interim (and potentially long-term) device to prevent entrainment and impingement of fish at the Hadley Falls; and (ii) of a potential bottom weir, to evaluate if such a weir would produce flow patterns conducive to guide bottom migrants into the Canal.
- USGS Flume Study – 2004: (i) to determine the swimming depth and behavior of yearling, juvenile and adult shortnose sturgeon at a bar rack structure; (ii) to determine the threshold velocity for avoidance of impingement/entrainment of yearling, juvenile, and adult shortnose sturgeon at conditions present at the proposed modified Hadley Falls intake racks with 2-inch spacing; and (iii) to determine if yearling, juvenile, and adult shortnose sturgeon can avoid impingement/entrainment at conditions present at a potential alternative bar rack facility (2-inch spacing and velocities of 2 fps).

- Eel Study – 2004: to determine the timing of migration of silver-phase American eels at the Project.
- USGS Flume Study – 2005: (i) To determine how shortnose sturgeon would respond to a bottom weir for guidance; and (ii) to determine how shortnose sturgeon would respond to a bypass entrance, integral with a rack structure.
- Bascule Gate and Rubber Dam Section No. 5 Analysis (a desk-top study) – 2005: (i) to identify potential solutions to the interference of the Bascule Gate discharge on the entrance to the spillway fishway; (ii) to evaluate the feasibility of using/modifying the Bascule Gate and/or modifying the spillway in the vicinity of Rubber Dam Section No. 5 (adjacent to the Bascule Gate) to pass shortnose sturgeon, American eels and other migratory fish; and (iii) to investigate modifications to the Bascule Gate and/or the spillway in the vicinity of Rubber Dam Section No. 5 to safely and successfully pass fish without injury or significant impairment to essential behavioral patterns down the spillway and over the apron into the Bypass Reach.
- Spawning Study – 2005: to identify potential spawning sites for shortnose sturgeon downstream of the Dam.

Section 4.7(c)(2). Decision Point – 2005: *Based on the results of the Phase 1 research, on or before September 30, 2005, HG&E shall distribute to the Parties a recommendation on whether to implement Phase 2A or Phase 2B, as described below. It is the intent of the Parties that HG&E shall implement Phase 2A as set forth in Appendix F of the Settlement Agreement if: (i) the results of the Phase 1 studies (described above) demonstrate that HG&E can modify the existing Hadley Falls intake racks to be an effective interim (and potentially long-term) device to achieve the threshold velocity for avoidance of entrainment and impingement of fish; and (ii) the Parties have identified a potential solution to the Bascule Gate discharge interference on the spillway fishway and a means of safely and successfully passing fish down the spillway and over the apron. If the two elements (i) and (ii) above are not confirmed by the Resource Agencies pursuant to the process described below, then HG&E shall implement Phase 2B.*

The process for determining whether HG&E shall implement Phase 2A or Phase 2B shall be as follows: After circulation by HG&E of the study results and its recommendation for Phase 2A or Phase 2B, HG&E shall consult with the Parties pursuant to Section 3.3 above. On or before December 31, 2005, the Resource Agencies (FWS, NOAA Fisheries, MADEP and MADFW) shall notify HG&E if they all agree with HG&E's recommendation; in which case, HG&E shall implement that recommendation. If the Resource Agencies do not all agree with HG&E's recommendation, they will so notify HG&E by December 31, 2005, and HG&E shall then implement Phase 2B.

Section 4.7(c)(3). Phase 2A (2006-2010): Based on the Phase 1 research (see Section 4.7(c)(1) above), consistent with the decision made pursuant to Section 4.7(c)(2) above, and in consultation with the Parties pursuant to Section 3.3 above, HG&E shall implement the work and research as outlined below for further enhancements of the downstream fish passage facilities.

Under Phase 2A the Parties intend to achieve the objectives for safe and successful downstream fish passage (as stated in Appendix F attached hereto, page 1) in the following way: (i) HG&E shall install and construct an interim (and potentially long-term) device by the end of 2006 that prevents entrainment and impingement at the Project based on modifications of the Hadley Falls intake racks and installation of a new trash rake structure connected with the intake racks; (ii) HG&E shall prepare a functional design drawing of the selected option to modify the Bascule Gate for safely and successfully passing fish without injury or significant impairment to essential behavioral patterns and to solve interference of Bascule Gate discharge on the spillway fishway, then build a prototype and field test (if necessary) in 2006, with engineering/permitting in 2007 and construction in 2008; (iii) HG&E shall undertake additional research during the period 2006 to 2010 to ensure that the downstream passage facilities are effective for exclusion and safe and successful passage of fish over the Dam; (iv) HG&E shall design, engineer, and permit in 2008: (A) an alternative exclusion device and (B) an alternative passage device in the vicinity of Rubber Dam Section No. 5 (if the modifications to the Hadley Falls intake racks are determined not to be successful as a long-term exclusion device), for safely and successfully passing fish without injury or significant impairment to essential behavioral patterns, with construction completed in 2009, and start of effectiveness testing in 2010; and (v) HG&E shall implement a long-term monitoring program for shortnose sturgeon from 2011 to the end of the Project License. The specific schedule is as follows:

2006

- HG&E shall design, engineer, permit, build and complete the modifications to the existing Hadley Falls intake racks and installation of a new trash rake structure, as agreed to at the Decision Point 2005 above, as an exclusion device for downstream migrating fish including shortnose sturgeon to prevent entrainment and impingement at the Hadley Falls intakes. The modifications to the Hadley Falls intake racks and the installation of the new trash rake will be completed by the end of 2006 (or earlier if possible depending on River conditions and obtaining necessary permits).
- HG&E shall continue to implement operational changes commenced in 2005 as agreed to by the Parties (through consultation pursuant to Section 3.3 above) to enhance downstream passage (as described above in Phase 1).

- HG&E shall prepare a functional design drawing of the selected option to modify the Bascule Gate for safe passage and to solve interference of Bascule Gate discharge on spillway fishway; and shall build prototype and field test (if necessary).
- HG&E shall conduct effectiveness studies of the modifications to the Louver Bypass Discharge Pipe if implemented in 2005, as provided for in the plan approved by the FERC and the MADEP (discussed in Phase 1 above); and shall distribute results to the Parties.
- HG&E shall perform radio tracking studies of shortnose sturgeon and silver-phase American eels (as discussed more fully in Appendix F to the Settlement Agreement); and shall distribute results to the Parties.

2007

- HG&E shall engineer, design and permit modifications to the Bascule Gate to provide safe and successful passage for the fish without injury or significant impairment to essential behavioral patterns and to solve the interference of Bascule Gate discharge on the spillway fishway.
- HG&E shall continue to perform radio tracking studies of shortnose sturgeon (as described more fully in Appendix F to the Settlement Agreement) and use the results of the studies to evaluate the effectiveness of the modifications to the Hadley Falls intake racks completed in 2006; continue to perform radio tracking studies of silver-phase American eels, if necessary; distribute results to the Parties.

2008

- HG&E shall provide to the Parties (consulted pursuant to Section 3.3 above) the results of the effectiveness testing of the modifications to the Hadley Falls intake racks and other measures in 2006-2007, and HG&E's conclusion whether or not those modifications and other measures achieve the goals for exclusion in Phase 2A as stated above. Based on that information HG&E and the Parties (through the decisional process described in Section 4.7(c)(2) above) shall determine if it is necessary to build an alternative exclusion device.
 - If (through the decisional process described in Section 4.7(c)(2) above) the Resource Agencies determine that it is not necessary for HG&E to build an alternative exclusion device, then HG&E shall design, engineer, permit and construct the modifications to the Bascule Gate for fish passage.
 - If (through the decisional process described in Section 4.7(c)(2) above) the Resource Agencies determine that it is necessary for the licensee to build an

alternative exclusion device, then the licensee shall design, engineer and permit: (i) an alternative exclusion device, and (ii) an alternative passage device (in the vicinity of Rubber Dam Section No. 5), as determined by the agencies and parties (in consultation pursuant to Section 3.3 above) that will not only exclude fish from the Hadley Falls intakes without impingement, but will also provide for safe and successful downstream passage of fish without injury or significant impairment to essential behavioral patterns.

- HG&E shall continue to perform radio tracking studies of shortnose sturgeon (as described more fully in Appendix F to the Settlement Agreement); and shall distribute results to the Parties.
- HG&E shall conduct a Population Survey for shortnose sturgeon in the Connecticut River, from Long Island Sound to Turners Falls (as described more fully in Appendix F to the Settlement Agreement) and distribute results to the Parties. Recapture studies will be conducted and any previously collected information will be used to calculate new estimates that could be compared to historical numbers.

2009

- HG&E shall bid, build and complete construction of the device(s) as determined to be necessary in 2008 (in consultation with the Parties pursuant to Section 3.3 above).
- HG&E shall continue radio tracking studies of shortnose sturgeon (as described more fully in Appendix F to the Settlement Agreement); and shall distribute results to the Parties.

2010

- HG&E shall commence operation of the device(s) constructed in 2009 prior to April 1, 2010.
- HG&E shall consult with the Parties (pursuant to Section 3.3 above) to develop a plan to study the effectiveness of the alternative exclusion and passage device(s) and the modifications to the spillway in the vicinity of Rubber Dam Section No. 5 completed in 2008-2009; shall implement the plan; and shall distribute results to the Parties by January 31, 2011.
- HG&E shall consult with the Parties (pursuant to Section 3.3 above) to develop long-term monitoring protocol for shortnose sturgeon during the term of the License for the Project, with distribution of the results annually to the Parties. If after 2010 HG&E determines, in consultation with the Parties (pursuant to Section

3.3 above), that shortnose sturgeon are not passing safely downstream of the Project, HG&E shall consult with the Parties (pursuant to Section 3.3 above) to determine a plan for re-evaluating the downstream passage facilities.

Plans to implement each part of Phase 2A above shall be prepared and submitted to the Parties pursuant to Section 3.3 above. HG&E shall consult with the Parties, and/or obtain the concurrence and/or approval of that plan, pursuant to Section 3.3 above. Thereafter, HG&E shall file such plans with the FERC and the MADEP, and shall implement such plans as approved in writing by the FERC and MADEP.

Section 4.7(c)(4). Phase 2B (2006-2009): Based on the Phase 1 research (see Section 4.7(c)(1) above), consistent with the decision made pursuant to Section 4.7(c)(2) above, and in consultation with the Parties pursuant to Section 3.3 above, HG&E shall implement the plan as outlined below for further enhancements of the downstream fish passage facilities.

Under Phase 2B the Parties intend to achieve the objectives for safe and successful downstream fish passage (as stated in Appendix F attached hereto, page 1) in the following way: (i) HG&E shall continue to implement operational changes commenced in 2005 to enhance downstream passage of shortnose sturgeon; (ii) HG&E shall continue studies and research to determine the appropriate alternative exclusion and passage device(s), including an angled bar rack; (iii) HG&E shall design/permit measures and modifications in 2007 for: (A) an alternative exclusion device and (B) an alternative passage device (in the vicinity of Rubber Dam Section No. 5) for safely and successfully passing the fish without injury or significant impairment to essential behavioral patterns and avoiding any potential flow interference problems with the spillway fishway, construct these facilities in 2008, and start of effectiveness testing of these facilities in 2009; (iv) HG&E shall undertake additional research and additional measures from 2006 to 2009 to ensure that the downstream passage facilities are effective for exclusion and guidance as described below; and (v) HG&E shall implement a long-term monitoring program for shortnose sturgeon from 2010 to the end of the Project License. The specific schedule is as follows:

2006

- HG&E shall perform a full feasibility study of the options for an alternative passage device (in the vicinity of Rubber Dam Section No. 5) to: (i) safely and successfully pass the fish without injury or significant impairment to essential behavioral patterns down the spillway over the apron and into the Bypass Reach, and (ii) avoid any potential flow interference problems with the spillway fishway. HG&E shall build a prototype and field test (if necessary).

- HG&E shall continue to implement operational changes commenced in 2005 as agreed to by the Parties (in consultation pursuant to Section 3.3 above) to enhance downstream passage (as described above in Phase 1).
- HG&E shall consult with the Parties (pursuant to Section 3.3 above) to develop a research and study program to evaluate alternative exclusion and passage device(s).
- HG&E shall perform radio tracking studies of shortnose sturgeon and silver-phase American eel (as described more fully in Appendix F to the Settlement Agreement); and shall distribute results to the Parties.
- HG&E shall conduct effectiveness studies of the modifications to the Louver Bypass Discharge Pipe if performed in 2005, as provided for in the plan approved by the FERC and the MADEP (discussed in Phase 1 above); and shall distribute the results to the Parties.

2007

- In consultation with the Parties pursuant to Section 3.3 above, HG&E shall design/engineer/permit: (i) an alternative exclusion device and (ii) an alternative passage device (in the vicinity of Rubber Dam Section No. 5), determined in 2006 by HG&E and the Parties to safely and successfully pass the fish without injury or significant impairment to essential behavioral patterns down the spillway over the apron and into the Bypass Reach, avoiding any potential flow interference problems with the spillway fishway, that will not only exclude fish from the Hadley Falls intakes without impingement, but will also provide for safe and successful downstream passage of diadromous and resident fish.
- HG&E shall continue to implement operational changes commenced in 2005 as agreed to by the Parties (in consultation pursuant to Section 3.3 above) to enhance downstream passage (as described above in Phase 1).
- HG&E shall continue radio tracking studies of shortnose sturgeon (as described more fully in Appendix F to the Settlement Agreement); and shall distribute results to the Parties.

2008

- As designed and permitted in 2007, in consultation with the Parties pursuant to Section 3.3 above, HG&E shall bid, build and complete construction of: (i) the alternative exclusion device, and (ii) the alternative passage device.

- HG&E shall continue to implement operational changes commenced in 2005 as agreed to by the Parties (in consultation pursuant to Section 3.3 above) to enhance downstream passage (as described above in Phase 1).
- HG&E shall continue radio tracking studies of shortnose sturgeon (as described more fully in Appendix F to the Settlement Agreement); and shall distribute results to the Parties.
- HG&E shall conduct a Population Survey for shortnose sturgeon in the Connecticut River, from Long Island Sound to Turners Falls (as described more fully in Appendix F to the Settlement Agreement) and distribute results to the Parties. Recapture studies will be conducted and any previously collected information will be used to calculate new estimates that could be compared to historical numbers.

2009

- HG&E shall commence operation of the exclusion and passage device(s) constructed in 2008 prior to April 1, 2009.
- HG&E shall consult with the Parties (pursuant to Section 3.3 above) to develop a plan to study the effectiveness of the alternative exclusion and passage device(s) completed in 2008; shall implement the plan; and shall distribute the study results to the Parties by January 31, 2010.
- HG&E shall consult with the Parties (pursuant to Section 3.3 above) to develop long-term monitoring protocol for shortnose sturgeon during the term of the License for the Project, with distribution of the results annually to the Parties. If after 2009 HG&E determines, in consultation with the Parties (pursuant to Section 3.3 above), that shortnose sturgeon are not passing safely downstream of the Project, HG&E shall consult with the Parties (pursuant to Section 3.3 above) to determine a plan for re-evaluating the downstream passage facilities.

Plans to implement each part of Phase 2B above shall be prepared and submitted to the Parties pursuant to Section 3.3 above. HG&E shall consult with the Parties, and/or obtain the concurrence and/or approval of that plan, pursuant to Section 3.3 above. Thereafter, HG&E shall file such plans with the FERC and the MADEP, and shall implement such plans as approved in writing by the FERC and MADEP.

Section 4.8. Upstream and Downstream Eel Passage.

Section 4.8(a). Objective: The objective of Section 4.8 is to have HG&E install, operate and maintain upstream and downstream eel passage facilities at the Project to

facilitate safe and successful passage for American eels. This provision is based on Article 413 of the 1999 License Order and Condition 14(j) of the 2001 WQC (and the MADEP extension of time letter dated January 21, 2004). HG&E shall consult with the Parties pursuant to Section 3.3 above with respect to the analysis, design, construction, operation, and effectiveness evaluation of any new eel passage facilities or modifications to existing facilities as described in this Section 4.8.

Section 4.8(b)(1). Interim upstream eel passage: In consultation with the Parties pursuant to Section 3.3 above, HG&E has developed and filed an interim plan on December 31, 2003, that includes the following activities by year:

- (i) By July 1, 2004, HG&E shall: (1) construct and implement modified eel collectors on the Holyoke side of the Project; (2) construct and install a ramp and an eel collector on the South Hadley side of the Project; (3) move eels upstream and collect data on how upstream migrants approach the Dam; and (4) conduct a marking study to determine if backdrop is an issue.
- (ii) In 2005, HG&E shall: (1) continue to move eels upstream and collect as much data as possible on how upstream migrants approach the Dam; and (2) study where to locate entrance passage on the Holyoke side of the Project.

The plan was approved in writing by MADEP on January 21, 2004. HG&E shall implement the plan as approved in writing by MADEP and FERC.

Section 4.8(b)(2). Permanent upstream eel passage: In consultation with the Parties pursuant to Section 3.3 above, on or before January 31, 2006, HG&E shall develop a permanent plan that includes the following activities by year:

- (i) In 2006, HG&E shall implement permanent measures and shall construct permanent facilities for upstream eel passage on both the Holyoke and South Hadley sides of the Project and shall conduct studies to evaluate the effectiveness of the measures and facilities.
- (ii) In 2007, HG&E shall complete additional effectiveness studies if determined necessary based on effectiveness studies conducted in 2006.

HG&E shall file the upstream eel passage plan with the FERC and the MADEP on or before March 31, 2006. HG&E shall implement the plan as approved in writing by MADEP and FERC.

Section 4.8(b)(3). Upstream eel passage – Annual Report. Commencing on March 1, 2005, HG&E shall distribute annual reports to the Parties and to the Connecticut River Atlantic Salmon Commission describing the actions taken in the prior year and the results

of data collection at the eel facilities on the South Hadley and Holyoke sides of the Project. HG&E shall file the annual reports with the FERC and the MADEP on or before March 1 of each year.

Section 4.8(c). Downstream eel passage: Downstream passage for eels at the Project will be implemented and enhanced as part of the downstream fish passage facilities pursuant to Section 4.7 above.

Section 4.9. Annual Plans for Fishway Construction. Except as otherwise provided for under Sections 4.6 through 4.8 above, in consultation with the Parties pursuant to Section 3.3 above HG&E shall prepare an annual construction plan, containing detailed plans and schedules for the fishway construction to be undertaken during the next year. A proposed construction plan shall be provided to the Parties on or before January 31 of each year before the construction season commences for that year, and shall be filed at the FERC and MADEP on or before February 28 of that year. The construction plan shall be designed to avoid interruption of the operations of the Fish Lifts. HG&E shall implement the construction plans as approved in writing by MADEP and FERC.

Section 4.10. Consultation with the Town of South Hadley. As set forth in Section 4.11(h) below, HG&E has included the Town of South Hadley in the entities consulted on matters relating to the Riparian Management Plan (filed as part of the CRLMP). In addition, prior to the submittal by HG&E to the FERC of any proposed modification or amendment to the Shoreline Erosion Remediation Plan, the Water Quality Monitoring Plan, or the CRLMP, HG&E shall consult with the Town of South Hadley.

Section 4.11. Compliance Plans pursuant to the 1999 License Order and the 2001 WQC. The following plans required by the 1999 License Order and the 2001 WQC (as described below) have been filed and approved as set forth below. The terms and conditions of these plans are incorporated herein by reference and made part of the Proposed Settlement License Articles as set forth in Appendix A hereto. HG&E shall implement all plans or modifications thereto as approved in writing by the FERC and the MADEP.

Section 4.11(a). Shoreline Erosion Remediation Plan – Consistent with Article 403 of the 1999 License Order, HG&E shall implement the Shoreline Erosion Remediation Plan approved by FERC (as modified) on August 1, 2001 (96 FERC ¶ 62,100).

Section 4.11(b). Water Quality Monitoring Plan – Consistent with Article 404 of the 1999 License Order and Condition 22 of the 2001 WQC, HG&E shall implement the Water Quality Monitoring Plan approved by FERC on August 10, 2001 (96 FERC ¶ 62,144) and by MADEP on October 10, 2003.

Section 4.11(c). Threatened and Endangered Species Protection Plan – Consistent with Article 416 of the 1999 License Order and Condition 21(b) of the 2001 WQC, HG&E shall implement the Threatened and Endangered Species Protection Plan approved by FERC on June 6, 2003 (103 FERC ¶ 62,131) and filed with the MADEP on January 30, 2003.

Section 4.11(d). Invasive Species Monitoring Plan – Consistent with Article 417 of the 1999 License Order and Condition 21(a) of the 2001 WQC, HG&E shall implement the Invasive Species Monitoring Plan as approved by FERC on August 21, 2001 (96 FERC ¶ 62,174) and by MADEP on October 10, 2003.

Section 4.11(e). Fish and Aquatic Habitat Monitoring Plan – Consistent with Article 410 of the 1999 License Order, HG&E shall implement the Fish and Aquatic Habitat Monitoring Plan as approved by FERC on June 24, 2003 (103 FERC ¶ 62,175) and filed with the MADEP on October 31, 2002. HG&E shall modify, if necessary, the Fish and Aquatic Habitat Monitoring Plan based on the Spring and Fall 2003 and 2004 Canal System Outages and to track the 12-year plan in the Fish and Aquatic Habitat Monitoring Plan.

Section 4.11(f). Comprehensive Recreation and Land Management Plan – Consistent with Article 418 of the 1999 License Order, HG&E shall implement the CRLMP as approved by FERC; the CRLMP was filed with FERC on May 1, 2003, and is pending. In consultation with the Town of South Hadley, HG&E included in the Recreation Plan (as part of the CRLMP) a proposal to develop the Riverside Park including a clarification of the location of the Riverside Trail below the dam in the Town of South Hadley (see Figure No. 1 above).

Section 4.11(g). Cultural Resources Management Plan – Consistent with Article 420 of the 1999 License Order, HG&E shall implement the Cultural Resources Management Plan as approved by the FERC on June 27, 2001 (95 FERC ¶ 62,274).

Section 4.11(h). Riparian Management Plan – Consistent with the 1999 License Order and Condition 19 of the 2001 WQC and in consultation with all Parties, including the Town of South Hadley, HG&E shall implement the Riparian Management Plan as approved by FERC and the MADEP; this Plan was included as part of the CRLMP as filed with the MADEP on April 30, 2003, and filed with FERC on May 1, 2003, and is pending.

Section 4.11(i). Comprehensive Canal Operations Plan – Consistent with Article 409 of the 1999 License Order and Condition 13 of the 2001 WQC, HG&E shall implement the CCOP as approved by FERC on June 5, 2003 (103 FERC ¶ 62,130) and filed at MADEP, with the amendments to the CCOP contained in the Comprehensive Operations and Flow Plan, as approved by the FERC on June 24, 2003 (103 FERC ¶ 62,178); and as

amended or modified pursuant to this Settlement Agreement.

Section 4.11(j). Comprehensive Operations and Flow Plan -- Consistent with Article 407 of the 1999 License Order and Condition 13 of the 2001 WQC, HG&E shall implement the COFP as approved by FERC on June 24, 2003 (103 FERC ¶ 62,178), and filed with the MADEP on January 20, 2003; and as amended or modified pursuant to this Settlement Agreement.

Section 4.11(k). Downstream Fish Passage Plan -- Consistent with Article 411 of the 1999 License Order and Condition 14 of the 2001 WQC, HG&E shall implement the Downstream Fish Passage Plan, as approved by FERC on June 19, 2003 (103 FERC ¶ 62,165); and as amended or modified pursuant to this Settlement Agreement.

Section 4.11(l). Upstream Fish Passage Plan -- Consistent with Article 412 of the 1999 License Order and Condition 14 of the 2001 WQC, HG&E shall implement the Upstream Fish Passage Plan, as modified and approved by FERC on June 24, 2003 (103 FERC ¶ 62,177) and filed with the MADEP November 11, 2002; and as amended or modified pursuant to this Settlement Agreement.

**APPENDIX D – Downstream Sampling Facility Operating Protocol, Filed as
Appendix G to the Settlement Agreement**

HOLYOKE CANAL SYSTEM

**LOUVER BYPASS PIPE AND FISH SAMPLING FACILITY
OPERATING PROCEDURES**

This procedure needs to be used when opening and closing the louver bypass pipe and operating the louver bypass fish sampling facility. **The fish sampling facility must be staffed whenever it is operating in sampling mode.**

TO FILL THE PIPE WITH WATER

The following instructions assume that the bypass pipe is empty and: 1) the upstream slide gate is closed; 2) the downstream slide gate is open and the pipe is empty; 3) both two-inch ball valve air vents are open; and 4) the sluice gates at the fish sampling facility are closed.

- Step 1. Close the downstream slide gate.
- Step 2. Open the upstream gate two inches. At this opening the pipe should fill in about ten minutes.
- Step 3. As the pipe fills, air should be coming out of both air vents. When water starts to come out of the downstream air vent at the access manhole, close the valve completely. When air stops coming out of the upstream air vent at the canal wall, the pipeline is full—close that air vent.
- Step 4. Open the upstream gate completely.

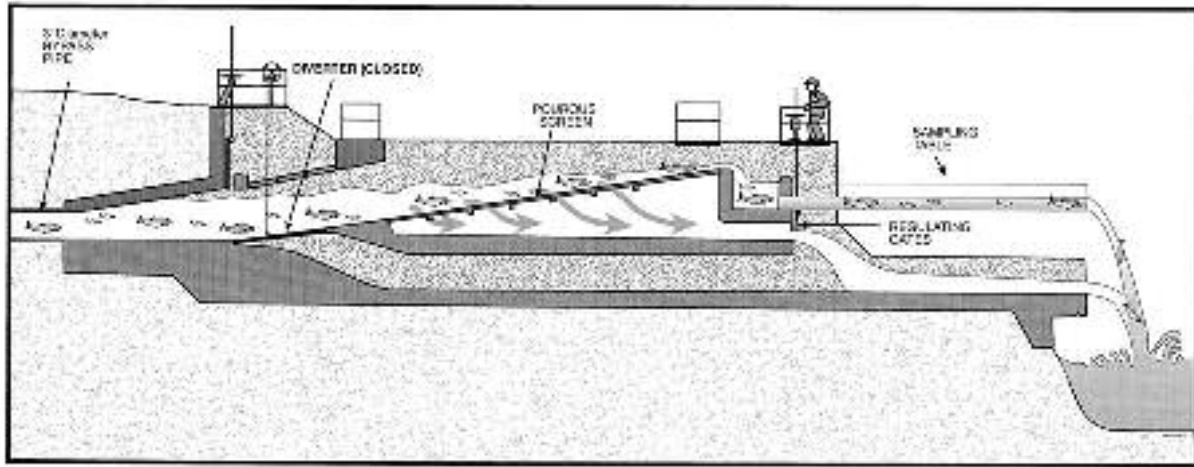
TO PLACE THE FACILITY IN SAMPLING MODE

Figure 1. Schematic of the louver bypass system in sampling mode.

The following instructions assume that the pipe is full of water:

- Step 1. Lower diversion vane.
- Step 2. Open both sluice gates on fish sampling facility.
- Step 3. Check to see that there is no one in the fish sampling facility (all three levels) and open the downstream slide gate slowly at a rate of no more than two feet per minute.
- Step 4. Allow 3-4 minutes for the flow to reach steady state.
- Step 5. Adjust the sluice gates to achieve the desired amount of flow over the weir into the sampling trough. Gates should be moved in 0.1 foot increments. Wait 1-2 minutes between gate adjustments for flow to return to steady state.

TO PLACE THE FACILITY IN NON-SAMPLING (BYPASS) MODE

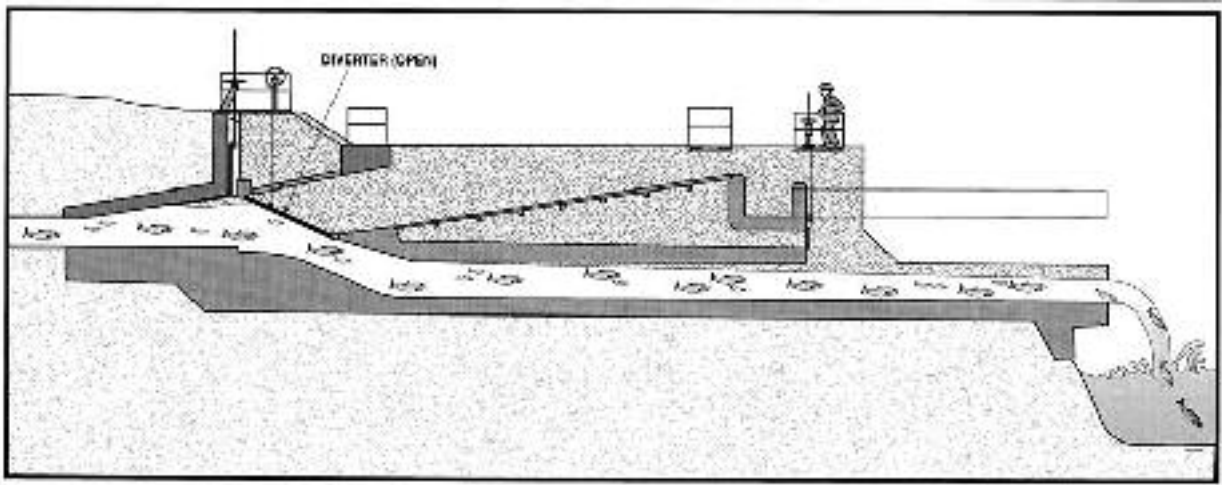


Figure 2. Schematic of the louver bypass system in non-sampling (bypass) mode.

The following instructions assume that the facility is in sampling mode:

- Step 1. Raise the diversion vane completely.
- Step 2. Check to see that there is no one in the fish sampling facility (all three levels) and open the downstream gate slowly, no more than two feet per minute.

TO SHUTDOWN AND DEWATER THE BYPASS PIPE

The following instructions assume that the sampling facility is in non-sampling (bypass) mode.

- Step 1. Close the downstream slide gate slowly at a rate of no more than two feet per minute.
- Step 2. Close the upstream slide gate completely.
- Step 3. Raise the manhole cover over the upstream air vent at the canal wall and open the valve completely.
- Step 4. Raise the diversion vane about a foot to allow flow and fish to pass under it.

- Step 5. Open the downstream slide gate 0.1 feet to drain the pipeline. Do not allow anything to block the flow of air to the vent. Do not open the gate more than 0.1 feet at this time.
- Step 6. After five minutes, open the downstream air vent. Water may come out of the vent at this time.
- Step 7. When water stops coming out of the downstream air vent, open the downstream slide gate to 1.0 feet.

NOTE: Except during emergency conditions, such as a pipe break, the upstream slide gate should not be used to shutdown flow in the pipeline. This could lead to excessive negative pressures in the pipeline which would cause the pipeline to collapse. If you must close the upstream slide gate, also open the upstream air vent.

**APPENDIX E – Detailed Description of HG&E Proposed Settlement
Downstream Research and Construction (2004-2009/10), Filed as
Appendix F to the Settlement Agreement**

This Appendix to the Settlement Agreement⁴¹ provides background on research that has been previously conducted and the proposed downstream research and construction activities relating to downstream fish passage facilities for diadromous and resident fish that will be undertaken as part of the Settlement. The downstream fish passage facilities are to be designed, constructed and operated to: (i) prevent entrainment or impingement in the Project intake system, (ii) prevent injury to fish if passed over or through the dam (including through the Bascule Gate or through Rubber Dam Section No. 5, adjacent to the Bascule Gate) and onto the spillway, and (iii) ensure that all downstream migrating diadromous and resident fish that appear on the upstream side of the Dam shall be passed downstream without injury or significant impairment to essential behavioral patterns. Under the phased research and construction program Holyoke Gas & Electric Department (HG&E) shall implement interim measures to improve downstream passage and concurrently address a permanent solution for downstream passage for diadromous and resident fish to safely and successfully pass the fish without injury or significant impairment to essential behavioral patterns. The proposed research and construction activities set forth in this Appendix will be performed during the period from 2004-2010 (under Phases 1 and 2A, as described below) or from 2004-2009 (under Phases 1 and 2B, also described below) with respect to downstream fish passage.

All plans (for studies and construction) will be prepared in consultation with the Parties pursuant to Section 3.3 of the Settlement Agreement. The Parties to the Settlement Agreement are HG&E, U.S. Fish and Wildlife Service (FWS), NOAA National Marine Fisheries Service (NOAA Fisheries), Massachusetts Department of Environmental Protection (MADEP), Massachusetts Department of Fish and Wildlife (MADFW), Trout Unlimited (TU), the Connecticut River Watershed Council (CRWC).

The Background Section of this Appendix F below provides a summary of previous research on the federally and state endangered shortnose sturgeon. The remainder of this Appendix provides details of a multi-phased research and construction program leading to a permanent solution for downstream fish passage at the Project. Phase 1 consists of research and studies on shortnose sturgeon and American eels that

⁴¹ Note that all definitions contained in the Settlement Agreement are applicable in this Appendix.

will be performed in 2004-2005. Based on the results of Phase 1 research and studies, a decision will be made at the end of 2005 to proceed down the path of either Phase 2A or Phase 2B. Under both Phase 2A and Phase 2B the goal is downstream fish passage facilities for diadromous and resident fish at the Project that safely and successfully pass the fish without injury or significant impairment to essential behavioral patterns. The schedules for construction, operational changes, and additional studies and research are slightly different for Phase 2A and Phase 2B. Additional details on the construction and research to be conducted are provided below. HG&E shall secure all necessary permits and/or authorizations to conduct the studies and work described herein.

A diagram of the Project is included as Figure No. 1 to the Settlement Agreement (submitted as CEII⁴² concurrently with the Settlement).

I. Background

During the relicensing of the Holyoke Project (from approximately 1994 to FERC license issuance in 1999), the parties involved in the relicensing process recognized that limited information was available for guidance of bottom-oriented fish, which include shortnose sturgeon and adult American eels. During the relicensing proceeding the NOAA Fisheries and FWS prescribed an angled bar rack guidance facility for the Hadley Falls intake area under Section 18 of the Federal Power Act (16 U.S.C. §811), as the only alternative identified at that time that could potentially protect shortnose sturgeon and other emigrating fish from entrainment in the Hadley Falls intakes and guide them downstream past the Project. Designs for downstream passage facilities that have been proven effective for bottom-oriented fish such as shortnose sturgeon were not available. In addition, at the time of relicensing, limited Connecticut River-specific information was available on daily and seasonal patterns of shortnose sturgeon migration, and which life stages migrate. Holyoke Water Power (HWP, prior owner of the Project) embarked on a multi-phased research project to improve downstream passage of fish past the Project. Upon acquiring the Project in December 2001, HG&E continued that research program.

During the first phase of relicensing, HWP (and subsequently HG&E) sponsored a multi-year shortnose sturgeon study conducted by Dr. Boyd Kynard (USGS) to determine, in part, when shortnose sturgeon migrate downstream (Kynard *et al.* 1999). Shortnose sturgeon located upstream of the Dam were radio-tagged and antennas were placed at the Dam, the tailrace, and the Canal System to record their passing at the Project. While evidence was collected that demonstrated that shortnose sturgeon do migrate downstream past the Dam, antennas placed at the facility recorded passage of

⁴² CEII refers to Critical Energy Infrastructure Information, pursuant to the Commission's Order No. 630.

only a small number of fish. The limited evidence available suggested that shortnose sturgeon may migrate downstream during high flow events. Even after this study, there was still limited information as to time of year or time of day when migration occurs.

HWP modeled the Hadley Falls intake area using Computational Fluid Dynamics (CFD) to determine if a new angled bar rack had the potential to guide bottom-oriented fish. Under contract from HWP, and later with HG&E, Alden Laboratories developed the CFD model using information from a physical model of the Dam that included the Canal gatehouse and the Hadley Falls intake structures. The model indicated that a new angled bar rack (with a 10-foot surface overlay) would change the surface water flow characteristics and had the potential to guide surface-oriented fish to the bypass gate, but would not produce changes in the lower portions of the water column sufficient to guide bottom-oriented fish.

Under the terms of the Settlement, HG&E shall conduct additional studies and implement measures to achieve a permanent solution for downstream fish passage at the Project. Details of this research and construction program are described in Sections II through VI below.

II. Phase 1 – 2004-2005: Interim Downstream Passage Measures and Research

In 2004 and 2005, HG&E shall implement modifications to facilities and additional research as described below. As also explained further in Part III below, some of the Phase 1 research is in preparation for a decision to be made by December 31, 2005, on whether to implement Phase 2A or Phase 2B. In further preparation for that 2005 Decision Point, HG&E shall meet with the Parties on or before December 31, 2004, to review the data then available and discuss the research to be completed in 2005 prior to the 2005 Decision Point. Plans to implement each element of Phase 1 below shall be prepared and submitted to the Parties pursuant to Section 3.3 of the Settlement Agreement. HG&E shall consult with the Parties, and/or obtain the concurrence and/or approval of that plan, pursuant to Section 3.3. Thereafter, HG&E shall file such plans with the FERC and the MADEP, and shall implement such plans as approved in writing by the FERC and MADEP.

A. Modifications to the Downstream Sampling Facility - 2004

1. In consultation with the Parties pursuant to Section 3.3 of the Settlement Agreement, HG&E shall develop a plan to minimize the potential for injury to shortnose sturgeon if they enter the Downstream Sampling Facility, by increasing the width of the steel trough at the end of the wedge wire screen ramp of the Downstream Sampling Facility by moving the existing steel end wall back approximately 1 foot, and by

installing a rubber lining on the facing of the end wall. The plan shall provide that such modifications will be completed by April 15, 2004 (*i.e.*, prior to the Louver Field Study described below), and shall provide for effectiveness studies of the modifications in 2004, as set forth below. The plan will be filed with the FERC and the MADEP on or before March 1, 2004. HG&E will implement the plan as approved in writing by the FERC and the MADEP.

2. Pursuant to paragraph A.1, above, HG&E shall evaluate the modifications to the Downstream Sampling Facility. The modifications will be evaluated through observations and records of the condition of any shortnose sturgeon found at the Downstream Sampling Facility. For each occurrence, the condition and other physical and biological parameters of the shortnose sturgeon will be recorded on observation sheets as set forth in the Shortnose Sturgeon Handling Plan (attached as Appendix E to the Settlement Agreement). HG&E shall accumulate all records of shortnose sturgeon in the Downstream Sampling Facility and shall submit to the Parties a copy of all completed sheets, along with a summary report, and any proposed further modifications (if necessary). If evidence of injury is found, HG&E shall consult with the Parties pursuant to Section 3.3 of the Settlement Agreement to determine if any additional modifications are appropriate.

3. HG&E shall operate the Downstream Sampling Facility in accordance with the Downstream Sampling Facility Operating Protocol (attached as Appendix G to the Settlement Agreement).

B. Analysis of potential modification to Louver Bypass Discharge Pipe – 2004

1. In consultation with the Parties pursuant to Section 3.3 of the Settlement Agreement, HG&E shall evaluate the effect of the height of the drop from the Louver Bypass Discharge Pipe to the tailrace on shortnose sturgeon. HG&E shall perform a radio tracking study to evaluate the effect of the drop on shortnose sturgeon. Ten wild adult shortnose sturgeon will be tagged and released into the Canal upstream of the louver array at the gatehouse during a period of flow which represents the maximum potential drop (*e.g.*, during Fall 2004 if River conditions allow). These tagged and released fish will be allowed to pass through the entire length of the louver facility and return to the River. An antenna will be installed at the downstream end of the tailrace and a second antenna will be installed 200 feet further downstream to monitor the progress of the released fish. The antenna equipment will track the movement of the released fish through the Project. In addition, after 24-hours and again after one week, HG&E shall survey the River downstream of the Bypass by boat with tracking equipment to confirm that the released fish are alive and displaying normal movements and behavior. If the released fish are alive and behaving normally, it will be assumed that they have

successfully passed through the Louver Bypass Discharge Pipe and no modification to that facility is needed.

2. If the released fish are not able to safely pass through the Louver Bypass Discharge Pipe and HG&E (in consultation with the Parties pursuant to Section 3.3 of the Settlement Agreement) determines it is necessary to reduce the height of the drop from the Louver Bypass Discharge Pipe to the tailrace to enhance the survival of shortnose sturgeon, HG&E shall propose how best to modify the Louver Bypass Discharge Pipe. HG&E shall consult with the Parties (pursuant to Section 3.3 of the Settlement Agreement) and develop a plan for modification of the Louver Bypass Discharge Pipe (as determined to be necessary) to be implemented in 2005 and operational for the Spring 2006 Upstream Passage Season. The plan shall include effectiveness testing of such modifications in 2006 after the modifications are implemented. After consultation with the Parties pursuant to Section 3.3 of the Settlement Agreement, HG&E shall file that plan with the FERC and the MADEP on or before April 1, 2005, and shall implement the plan as approved in writing by the FERC and MADEP.

3. HG&E shall determine if a PIT tag reader can be placed in the Louver Bypass Discharge Pipe to detect any shortnose sturgeon that may enter the bypass facility. Since several hundred of the shortnose sturgeon in the Connecticut River have been PIT tagged both above and below the Dam, HG&E shall determine if a PIT tag reader for the existing PIT tags on shortnose sturgeon above the Project could be placed inside the pipe portion of the Canal louver bypass to detect and track PIT tagged shortnose sturgeon that use the facility. If such a detection system can be installed, HG&E shall install that system by September 30, 2004.

C. Operational Changes - 2005

To reduce entrainment HG&E shall develop a plan, in consultation with the Parties (pursuant to Section 3.3 of the Settlement Agreement), to change flow prioritization from the Hadley Falls units to the Canal during nighttime periods from October 1 through the later of: (i) the time when the River temperature reaches 5° C., or (ii) November 30 (unless the Parties, in consultation pursuant to Section 3.3 of the Settlement Agreement, agree to an earlier time), with prioritizing the Canal first and then regulating the Hadley Falls Station. HG&E shall consider the potential effect of any such changes on the federally threatened and state endangered Puritan tiger beetle in developing these modifications. The operational changes will be implemented commencing in 2005. HG&E shall also consult with the Parties pursuant to Section 3.3 of the Settlement Agreement to determine if additional or alternative operational changes will enhance downstream passage.

HG&E shall file the plan with the FERC and the MADEP on or before December 31, 2004, and shall implement the plan as approved in writing by the FERC and the MADEP.

D. Additional Research and Studies in 2004 - 2005

HG&E shall perform additional research and studies to develop information on the downstream migration of shortnose sturgeon, American eels, and other migratory fish. As discussed in more detail below, the Phase 1 research will include:

- Louver Field Study - 2004: (i) to evaluate effectiveness of the full depth louvers to guide shortnose sturgeon and American eels; and (ii) to evaluate the behavior of shortnose sturgeon and American eels at the ramp and the entrance to the bypass pipe of the louver facility.
- CFD Modeling - 2004: (i) of the Hadley Falls units intakes to evaluate the potential of modifying the existing Hadley Falls units intake racks to be an effective interim (and potentially long-term) device to prevent entrainment and impingement of fish at the Hadley Falls; and (ii) of a potential bottom weir to evaluate if such a weir would produce flow patterns conducive to guide bottom migrants into the Canal.
- USGS Flume Study – 2004: (i) to determine the swimming depth and behavior of yearling, juvenile and adult shortnose sturgeon at a bar rack structure; (ii) to determine the threshold velocity for avoidance of impingement/entrainment of yearling, juvenile, and adult shortnose sturgeon at conditions present at the proposed modified Hadley Falls intake racks with 2-inch spacing; and (iii) to determine if yearling, juvenile, and adult shortnose sturgeon can avoid impingement/entrainment at conditions present at a potential alternative bar rack facility with 2-inch spacing and velocities of about 2 feet per second (fps).
- Eel Study - 2004: to determine the timing of migration of silver-phase American eels at the Project.
- USGS Flume Study – 2005: (i) to determine how shortnose sturgeon would respond to a bottom weir for guidance; and (ii) to determine how shortnose sturgeon would respond to a bypass entrance, integral with a rack structure.
- Bascule Gate and Rubber Dam Section No. 5 Analysis (a desk-top study) - 2005: (i) to identify potential solutions to the interference of the Bascule Gate discharge on the entrance to the spillway fishway; (ii) to evaluate the feasibility of using/modifying the Bascule Gate and/or the spillway in the vicinity of Rubber

Dam Section No. 5 (adjacent to the Bascule Gate) to pass shortnose sturgeon, American eels and other migratory fish; and (iii) to investigate modifications to the Bascule Gate and/or the spillway in the vicinity of Rubber Dam Section No. 5 to safely and successfully pass the fish without injury or significant impairment to essential behavioral patterns down the spillway and over the apron into the Bypass Reach.

- Spawning Study - 2005: to identify potential spawning sites of shortnose sturgeon downstream of the Dam.

1. Louver Field Study - 2004

The Louver Field Study will include: (a) effectiveness testing of the full depth louver facilities as a guidance device, and (b) data collection on the behavior of downstream migrating shortnose sturgeon and American eels as they encounter the facilities.

Objectives:

- 1) To test the effectiveness of full depth louver facilities in the Holyoke Canal to guide downstream movement of shortnose sturgeon and American eels; and
- 2) To evaluate behavior of downstream migrating shortnose sturgeon and American eels at the ramp and entrance to the bypass pipe.

HG&E shall conduct this Louver Field Study as a release-recapture study during the Fall of 2004 by marking approximately 50 cultured juvenile shortnose sturgeon and 10 wild adult shortnose sturgeon (depending on availability and the requirements of any Endangered Species Act (16 U.S.C. §1531, *et seq.*) permit or approval applicable to these studies) and approximately 60 American eels, releasing them in the Canal just below the gatehouse about 300 feet upstream of the louvers, and recapturing them in the Bypass collection facilities located downstream of the louver array. The 60 shortnose sturgeon to be used will be a combination of cultivated and wild fish. Currently the USGS Conte Anadromous Fish Research Center is holding 100 one-year old shortnose sturgeon that have been spawned from Connecticut River stock. Conte Anadromous Fish Research Center staff will test these fish to determine which ones are pre-disposed to moving downstream. HG&E shall radio-tag and release up to 50 of these pre-disposed out-migrating cultured fish, track them along the louver system, and recover them at the fish sampler. The 60 shortnose sturgeon will be recaptured and reused to test different flow regimes in the Canal. The ten wild adult shortnose sturgeon are the same shortnose sturgeon to be used in the Louver Bypass Discharge Pipe analysis (as discussed above in Section II-B) after this test is performed.

Radio telemetry tags will be used to monitor fish movement along the louver array and through the bypass system. Antennas will be placed at several depths (surface, mid-depth and bottom) along the length of the louvers, at the transition to the Bypass pipe, at the Bypass entrance, and in the First Level of the Canal System downstream of the louvers. In addition to release-recapture and telemetry efforts, in consultation with the Parties HG&E shall determine the best technology to observe the behavior of fish as they encounter the louvers, the ramp and the bypass pipe entrance (*e.g.*, hydroacoustics, video).

Sampling will be conducted both day and night. Flows through the Canal during testing will be varied to determine the best passage flow for shortnose sturgeon; such flows to be tested include 1,000 cfs, full run, and incremental flows in between those flows (*e.g.*, 2,000 cfs and 3,000 cfs).

The effectiveness of the louver facility as a guidance device for shortnose sturgeon will be determined based on consultation with the Parties (pursuant to Section 3.3 of the Settlement Agreement), after review of the effective rate for getting shortnose sturgeon into the Bypass pipe and keeping shortnose sturgeon out of the Canal; the effectiveness of the facilities will be evaluated based on the overall objective of downstream fish passage of safely and successfully passing the fish without injury or significant impairment to essential behavioral patterns. The effectiveness of the louver facility as a guidance device for American eels will be determined after review of the study results in consultation with the Parties.

Reporting: HG&E shall summarize the data collected in a draft report including all data, information on the methods, study procedures and a recommendation on the effectiveness of the Louver facility to guide shortnose sturgeon and silver-phase American eels. A draft report will be submitted to the Parties by March 31, 2005. All Parties will have access to any video taken during the data collection. If, based on the goals for downstream fish passage stated above on page 1 of this Appendix F, the Parties (in consultation pursuant to Section 3.3 of the Settlement Agreement) agree that the Louver Facilities are not effective for shortnose sturgeon and/or American eels, HG&E shall consult with the Parties (pursuant to that Section 3.3 consultation process) to develop a plan and schedule for implementing additional measures to achieve the overall objective of downstream fish passage of safely and successfully passing the fish without injury or significant impairment to essential behavioral patterns.

2. Computational Fluid Dynamics (CFD) Modeling - 2004

HG&E shall contract with Alden Research Laboratory to conduct CFD modeling of the Hadley Falls units with a proposed 2-inch rack to evaluate the potential of modifying the existing Hadley Falls intake racks to be an effective interim (and potentially long-term) device to prevent entrainment and impingement of fish at the

Hadley Falls intakes. In addition, Alden Laboratories will prepare a report summarizing the results of the CFD modeling to evaluate the potential for a bottom weir producing flow patterns conducive to guide bottom migrants into the Canal.

Objectives:

- 1) To determine the velocities at the intake racks along the current rack alignment and surface overlay fitted with 2-inch bar spacing and evaluate the potential for exclusion/impingement at various load levels of the Hadley Falls units; and
- 2) To determine the hydraulic conditions and the technical parameters (height, length and angle) for a potential bottom weir that would produce flow patterns to guide shortnose sturgeon into the Canal.

HG&E shall contract with Alden Laboratories to perform CFD modeling of the intake to the Hadley Falls units with a proposed 2-inch rack spacing and the existing surface overlay to evaluate the approach and through-rack velocities relative to impingement and exclusion of fish at various load levels of the Hadley Falls units. The contract will also include CFD modeling of a potential bottom weir to evaluate if the weir will produce flow patterns conducive to guide bottom migrants into the Canal. Alden Laboratories will develop the CFD model using information from an existing physical model of the Dam that includes the old timber crib dam, the Hadley Falls intake area, and the gatehouse.

HG&E shall model a total of six scenarios for a potential bottom guidance weir:

- Model a bottom guidance weir for two different weir lengths (100 ft and 150 ft.);
- Model two weir alignments (near-streamline direction (0 degrees) and 15 degrees towards the old dam); and
- Model two weir heights (5 ft. and another height to be determined after results for 5 ft. height simulation).

For the simulations, the Canal flow will be fixed at 6,000 cfs and both Hadley Falls units will be running at 4,200 cfs each.

Reporting: HG&E shall complete the Phase 1 CFD Modeling studies of the Hadley Falls intake with the proposed 2-in. racks and shall summarize the data collected in a draft report including all data, and information on the methods and study procedures by September 30, 2004; to the extent possible preliminary results will be provided to the Parties by April 30, 2004. Results of the CFD Modeling studies of a proposed guidance weir will be distributed to the Parties by September 30, 2004.

3. USGS Flume Study - 2004

While there is some behavioral information available on the response of shortnose sturgeon to structures, there is no information on the swimming height of migrating shortnose sturgeon. Also, an understanding of shortnose sturgeon's response to potential modifications to the existing Hadley Falls intake rack structure and a potential alternative bar rack structure at the Holyoke Project is needed prior to modifying the existing downstream passage facilities or constructing a new facility.

Objectives:

- 1) To determine the swimming depth and behavior of yearling, juvenile and adult shortnose sturgeon at a bar rack structure;
- 2) To determine the threshold velocity for avoidance of impingement/entrainment of yearling, juvenile, and adult shortnose sturgeon at conditions present at the proposed modified Hadley Falls intake racks with 2-inch spacing; and
- 3) To determine if yearling, juvenile, and adult shortnose sturgeon can avoid impingement/entrainment at conditions present at a potential alternative bar rack facility with 2-inch spacing and velocities of about 2 fps.

Dr. Kynard of the USGS has proposed to work with HG&E to research these behavioral questions and HG&E shall conduct this research as part of the Settlement. Work will be conducted in a 20 ft. wide, 20 ft. deep, and 120 ft. long flume at the Conte Anadromous Fish Research Center. Shortnose sturgeon available for testing include sixty 4+ year cultured juveniles, twenty wild adults and juveniles, and fifty to one hundred 1+ yearlings (subject to the requirements of any Endangered Species Act (16 U.S.C. §1531, *et seq.*) permit or approval applicable to these studies). Before testing, the cultured fish will be exercised in the Exercise Flume⁴³ to improve their level of fitness. Previous flume testing of shortnose sturgeon (personal communication, Dr. Kynard) revealed that they prefer to migrate at night but are guided by structure better during the day. Thus, both day and night testing will be conducted. The tests will be separated into three parts: swimming height, behavior at a proposed modified Hadley Falls intake rack, and behavior at a potential alternative bar rack structure.

⁴³ The exercise flume will be constructed on the outside pad at the Conte Anadromous Fish Research Center. It will be 8 feet by 40 feet and will be constructed of plywood with either steel beams or wood beam supports so that the flume could be tilted to increase velocity. There will also be a head tank fed by an approximately a 16-inch pipe tapped off of the existing 30-inch supply line to the pad.

Swimming height - Juvenile and adult shortnose sturgeon will be introduced at the upper end of the flume in 20 ft. deep water. They will be acclimated to depth in a Fish Introduction Cage and then allowed to swim freely in the flume to determine acclimation time. Movement rates down the flume will be monitored using telemetry. Swimming height of juveniles and adults will be monitored using telemetry and pressure sensitive tags during their movement in the flume.

Potential modified Hadley Falls intake rack structure – Flume studies will be performed to collect information on how shortnose sturgeon would respond to modified Hadley Falls intake racks (with 2-inch spacing and existing surface overlay) for a variety of flow regimes to determine the threshold velocity for impingement.

Potential alternative bar rack structure – Flume studies will be performed to collect information on how shortnose sturgeon would respond to a bar rack structure as it could be configured at Holyoke for velocities of approximately 2 fps.

Reporting: By March 31, 2005, HG&E shall distribute Dr. Kynard's report summarizing the results of the USGS Flume Study along with HG&E's recommendation for any follow up measures to the Parties. Preliminary data on the Hadley Falls intake rack analysis will be available and distributed to the Parties by September 30, 2004.

4. Eel Migration Timing Study - 2004

HG&E shall utilize data collected at the Louver Bypass Sampling Facility to develop information on the timing of silver-phase American eel migration at the Project.

Objective: To determine the timing of migration of silver-phase American eels at the Project.

In consultation with the Parties (pursuant to Section 3.3 of the Settlement Agreement), in 2004 HG&E shall develop a plan to collect the data from the Louver Bypass Sampling Facility to develop additional understanding of the timing of eel migration at the Project; the plan will be implemented in late Summer and Fall 2005. The date, time, weather, moon phase and physical parameters (*i.e.*, water temperature, dissolved oxygen) will be recorded when eels are passed.

Reporting: The study will be completed and a draft report of study results will be distributed to the Parties by March 30, 2006.

5. USGS Flume Study - 2005

HG&E shall continue the USGS Flume Study in 2005 to evaluate the potential for a bottom weir and/or a rack with a bypass entrance to guide shortnose sturgeon.

Objectives:

- 1) To determine how shortnose sturgeon would respond to a bottom weir for guidance; and
- 2) To determine how shortnose sturgeon would respond to a bypass entrance, integral with a rack structure.

The work in 2005 will be conducted in a 10-ft. wide or 20-ft. wide flume, depending upon availability. Information will be collected on the guidance efficiency of shortnose sturgeon by placing a partial-height wall diagonally across the main flow direction. The optimal height of the wall will be determined by CFD modeling and preferred swimming height of the fish. Based on the results of the CFD modeling two angles will be tested in the flume to determine guidance efficiency.

Information of the behavior of shortnose sturgeon at a surface, a mid-depth and a bottom bypass entrance will also be collected. Results from the 2004 Louver Bypass study will be evaluated to determine sturgeon response to ramps.

Reporting: By March 31, 2006, HG&E shall distribute a report summarizing the results of the 2005 USGS Flume Study to the Parties; preliminary data will be available and distributed to the Parties by September 30, 2005.

6. Evaluation of Bascule Gate and Rubber Dam Section No. 5 - 2005

The Bascule Gate is currently used to release minimum flows into the Bypass Reach and pass outgoing surface migrants over the Dam. HG&E shall perform a desk-top study to investigate solutions to the interference of discharge flows from the Bascule Gate on the spillway entrance to the upstream passage facilities, the potential of using or modifying the Bascule Gate and/or the spillway in the vicinity of Rubber Dam Section No. 5 to pass bottom migrating fish, and how fish can be safely passed over the spillway and the apron.

Objectives:

- 1) To identify potential solutions to the interference of the Bascule Gate discharge on the entrance to the spillway fishway;
- 2) To evaluate the feasibility of using/modifying the Bascule Gate and/or the spillway in the vicinity of Rubber Dam Section No. 5 to pass shortnose sturgeon, American eels, and other migrating fish; and
- 3) To investigate how to pass fish safely downstream through the Bascule Gate and/or the spillway in the vicinity of Rubber Dam Section No. 5, over the surface of the spillway and apron and then into the Bypass Reach.

Visual observations and operational evidence indicate that releases from the Bascule Gate are interfering with attraction water flows to the entrance of the spillway lift. HG&E shall undertake a literature review and perform a preliminary engineering evaluation to identify potential solutions to Bascule Gate discharge flows interfering with the spillway entrance. The engineering evaluation will include existing flow patterns from the Bascule Gate as well as potential flow patterns identified from modifications in the Bascule Gate area. HG&E shall investigate both operational changes and physical modifications to the Bascule Gate and the spillway in the vicinity of Rubber Dam Section No. 5 to identify potential measures to alleviate the interference of Bascule Gate discharges on attraction water flows at the spillway entrance.

Although the Bascule Gate has been used to pass outgoing surface migrants over the Dam, questions have been raised about the safety of fish traveling over the spillway and apron into the Bypass Reach. HG&E shall investigate the feasibility of modifying the spillway and/or apron to safely pass fish from the headpond to the Bypass Reach downstream of the Dam. The study will include a literature review of work done at other facilities similar to the Project to identify potential options for modifying the spillway and apron. HG&E shall consult with the Parties on the results of the literature review to rank the potential alternatives and then perform a preliminary engineering analysis of the top three options to evaluate their feasibility.

The effectiveness of using the Bascule Gate to pass bottom migrants has not been proven. As described above HG&E shall undertake an extensive research and study program to evaluate alternatives for passing outgoing bottom migrants. As part of this evaluation HG&E shall perform a preliminary engineering evaluation to determine if the Bascule Gate and the spillway in the vicinity of Rubber Dam Section No. 5 could be modified to safely pass bottom migrants. The evaluation will include a literature review of prior studies and research at the Project as well as work at other facilities similar to the Holyoke Dam. The review will identify potential modifications to the Bascule Gate and spillway in the vicinity of Rubber Dam Section No. 5. HG&E shall consult with the Parties on the results of the literature review to rank the potential alternatives to modify the Bascule Gate area. Based on this ranking HG&E shall perform a preliminary engineering analysis of the top three options to evaluate their feasibility to safely pass the fish. These results will be factored into the 2005 decision-making process described in Part III below.

Reporting: The study will be completed and a draft report of study results will be distributed to the Parties by September 30, 2005.

7. Spawning Study - 2005

HG&E shall undertake a shortnose sturgeon spawning study in 2005 to identify potential spawning sites downstream of Holyoke Dam. Prior research on shortnose

sturgeon spawning sites has concentrated on the reach immediately downstream of Holyoke Dam; information is lacking for areas farther downstream.

Objective: To conduct sampling at potential sites downstream of the Holyoke Dam to determine if shortnose sturgeon spawn in those areas.

HG&E shall work with Connecticut River shortnose sturgeon researchers to determine potential spawning areas downstream of the Holyoke Dam based on preferred spawning habitat and multiple years of radio tracking information. Plankton nets will be deployed in targeted areas to attempt to capture sturgeon eggs and larvae. HG&E shall consult with the Parties (pursuant to Section 3.3 of the Settlement Agreement) and with other appropriate shortnose sturgeon researchers to develop a comprehensive study plan (with numbers of shortnose sturgeon subject to availability and the requirements of any Endangered Species Act (16 U.S.C. §1531, *et seq.*) permit or approval applicable to these studies). The study plan will be distributed for review by the Parties before implementation.

Reporting: The studies will be completed and a draft report of study results of potential additional downstream spawning sites will be distributed to the Parties no later than March 31, 2006.

III. Decision Point – 2005

Conceptually Phase 2A involves modifying the Hadley Falls intakes as an exclusion device; if these modifications are effective for excluding fish, then HG&E shall modify the Bascule Gate for passage. Conceptually Phase 2B involves constructing an alternative exclusion device and an alternative passage device (in the vicinity of Rubber Dam Section No. 5). Based on the results of the Phase 1 research, on or before September 30, 2005, HG&E shall distribute to the Parties a recommendation on whether to implement Phase 2A or Phase 2B, as described below. At that point, the Parties will have received: (i) results of the 2004 USGS Flume Study with respect to the Hadley Falls intake analysis, which should indicate threshold velocities for entrainment/impingement of yearling, juvenile and adult shortnose sturgeon; (ii) preliminary results from the 2005 USGS Flume Study of bypass entrances; (iii) results from the 2004 CFD Modeling Study of the potential to modify the Hadley Falls intake racks with the proposed 2-inch rack spacing; and (iv) results from the evaluation of the Bascule Gate and alternative passage device (in the vicinity of Rubber Dam Section No. 5).

It is the intent of the Parties that HG&E shall implement Phase 2A as set forth in Part IV below if: (i) the results of the Phase 1 studies (described above) demonstrate that HG&E can modify the existing Hadley Falls intake racks to be an effective interim (and potentially long-term) device to achieve the threshold velocity for avoidance of entrainment and impingement of fish; and (ii) the Parties have identified a potential

solution to the Bascule Gate discharge interference on the spillway fishway and a means of safely and successfully passing the fish without injury or significant impairment to essential behavioral patterns down the spillway and over the apron. If the two elements (i) and (ii) above are not confirmed by the Resource Agencies pursuant to the process described below, then HG&E shall implement Phase 2B as set forth in Part V below.

The process for determining whether HG&E shall implement Phase 2A or Phase 2B, as described below, shall be as follows: HG&E shall circulate the study results and HG&E's recommendation for Phase 2A or Phase 2B on or before September 30, 2005, and consult with the Parties pursuant to Section 3.3 of the Settlement Agreement. On or before December 31, 2005, the Resource Agencies (FWS, NOAA Fisheries, MADEP and MADFW) shall notify HG&E whether they all agree with HG&E's recommendation; in which case, HG&E shall implement that recommendation. If the Resource Agencies do not all agree with HG&E's recommendation, HG&E shall then implement Phase 2B.

IV. Phase 2A (2006-2010)

Based on the Phase 1 research (described above) and pursuant to the decision made in Part III above, in consultation with the Parties pursuant to Section 3.3 of the Settlement Agreement HG&E shall implement the work and research as outlined below for further enhancements of the downstream fish passage facilities.

Under Phase 2A the Parties intend to achieve the objectives for downstream fish passage (as stated on page 1 of this Appendix F) in the following way:

- (i) HG&E shall install and construct an interim (and potentially long-term) device by the end of 2006 that prevents entrainment and impingement at the Project based on modifications of the Hadley Falls intake racks and installation of a new trash rake structure connected with the intake racks;
- (ii) HG&E shall prepare a functional design drawing of the selected option to modify the Bascule Gate for safely and successfully passing the fish without injury or significant impairment to essential behavioral patterns and to solve interference of Bascule Gate discharge on spillway fishway, build a prototype and field test (if necessary) in 2006, with engineering/permitting in 2007, and construction in 2008;
- (iii) HG&E shall undertake additional research during the period 2006 to 2010 to ensure that the downstream passage facilities are effective for exclusion and safe and successful passage of fish over the Dam;

- (iv) HG&E shall design, engineer, and permit: (A) an alternative exclusion device, and (B) an alternative passage device in the vicinity of Rubber Dam Section No. 5 (if the modifications to the Hadley Falls intake racks are determined not to be successful as a long-term exclusion device), for safely and successfully passing the fish without injury or significant impairment to essential behavioral patterns; with construction completed in 2009, and start of effectiveness testing in 2010; and
- (v) HG&E shall implement a long-term monitoring program for shortnose sturgeon from 2011 to the end of the Project License.

The specific schedule is as follows:

2006

- Design, engineer, permit, build and complete the modifications to the existing Hadley Falls intake racks and installation of a new trash rake structure, as agreed to under Part III above (Decision Point 2005), as an exclusion device for downstream migrating fish including shortnose sturgeon to prevent entrainment and impingement at the Hadley Falls intakes. The modifications to the Hadley Falls intake racks and the installation of the new trash rake will be completed by the end of 2006 (or earlier if possible depending on River conditions and obtaining necessary permits).
- Continue to implement operational changes commenced in 2005 as agreed to by the Parties (through consultation pursuant to Section 3.3 of the Settlement Agreement) to enhance downstream passage (as described above in Phase 1).
- Prepare a functional design drawing of the selected option to modify the Bascule Gate for safely and successfully passing the fish without injury or significant impairment to essential behavioral patterns and to solve interference of Bascule Gate discharge on spillway fishway. Build prototype and field test (if necessary).
- Conduct effectiveness studies of the modifications to the Louver Bypass Discharge Pipe if implemented in 2005, as provided for in the plan approved by the FERC and the MADEP (discussed in Phase 1 above); distribute results to the Parties.
- Perform radio tracking studies of shortnose sturgeon and silver-phase American eels (as discussed more fully in Part VI below); distribute results to the Parties.

2007

- Engineer, design and permit modifications to the Bascule Gate to provide safe and successful passage for fish without injury or significant impairment to essential behavioral patterns and to solve the interference of Bascule Gate discharge on the spillway fishway.
- Continue to perform radio tracking studies of shortnose sturgeon (as described more fully in Part VI below) and use to evaluate the effectiveness of the modifications to the Hadley Falls intake racks completed in 2006; continue to perform radio tracking studies of silver-phase American eels, if necessary; distribute results to the Parties.

2008

- Provide to the Parties the results of the effectiveness testing of the modifications to the Hadley Falls intake racks and other measures completed in 2006-2007, along with HG&E's conclusion whether or not those modifications and other measures achieve the goals for exclusion in Phase 2A as stated above.
 - If HG&E concludes that such modifications to the Hadley Falls intake racks and other measures completed in 2006-07 do not achieve the stated goals, then in consultation with the Parties pursuant to Section 3.3 of the Settlement Agreement HG&E shall commence the design, engineering, and permitting of: (i) an alternative exclusion device, and (ii) an alternative passage device (in the vicinity of Rubber Dam Section No. 5).
 - If HG&E concludes that such modifications to the Hadley Falls intake racks and other measures completed in 2006-2007 do achieve the stated goals for exclusion, then HG&E shall implement a decisional process parallel to that specified in Part III above (for the Decision Point in 2005) to determine if the Resource Agencies (FWS, NOAA Fisheries, MADEP and MADFW) concur. Through that process, the Resource Agencies shall notify HG&E whether they all agree with HG&E's conclusion.
 - If the Resource Agencies concur with HG&E's conclusion, then in consultation with the Parties pursuant to Section 3.3 of the Settlement Agreement HG&E shall design, engineer, permit, and construct the modifications to the Bascule Gate for fish passage and to eliminate interference of Bascule Gate discharge with the spillway fishway.
 - If the Resource Agencies do not concur with HG&E's conclusion, then in consultation with the Parties pursuant to Section 3.3 of the Settlement Agreement, HG&E shall commence the design, engineering, and permitting of: (i) an alternative exclusion device, and (ii) an alternative passage device (in the vicinity of Rubber Dam Section No. 5), to safely

and successfully pass the fish without injury or significant impairment to essential behavioral patterns down the spillway over the apron and into the Bypass Reach, avoiding any potential flow interference problems with the spillway fishway, that will not only exclude fish from the Hadley Falls intakes without impingement, but also provide for safe and successful downstream passage of diadromous and resident fish.

- Continue to perform radio tracking studies of shortnose sturgeon (as described more fully in Part VI below) and distribute results to the Parties.
- Conduct a Population Survey for shortnose sturgeon in the Connecticut River, from Long Island Sound to Turners Falls (as described more fully in Part VI below) and distribute results to the Parties. Recapture studies will be conducted and any previously collected information will be used to calculate new estimates that could be compared to historical numbers.

2009

- As determined to be necessary through the decision process in 2008, bid, build and complete construction of the device(s) (in consultation pursuant to Section 3.3 of the Settlement Agreement).
- Continue radio tracking studies of shortnose sturgeon (as described more fully in Part VI below) and distribute results to the Parties.

2010

- Commence operation of the exclusion and passage device(s) constructed in 2009 prior to April 1, 2010.
- Consult with the Parties (pursuant to Section 3.3 of the Settlement) to develop a plan to study the effectiveness of the exclusion and passage device(s) completed in 2008-2009; implement the plan; distribute results to the Parties by January 31, 2011.
- Consult with the Parties (pursuant to Section 3.3 of the Settlement Agreement) to develop a long-term monitoring protocol for shortnose sturgeon during the term of the License for the Project, with distribution of the results annually to the Parties. If after 2010 HG&E determines, in consultation with the Parties (pursuant to Section 3.3 of the Settlement Agreement), that shortnose sturgeon are not passing safely downstream of the Project, HG&E shall consult with the Parties (pursuant to Section 3.3 of the Settlement Agreement) to determine a plan for re-evaluating the downstream passage facilities.

Plans to implement each element of Phase 2A above shall be prepared and submitted to the Parties pursuant to Section 3.3 of the Settlement Agreement. HG&E shall consult with the Parties, and/or obtain the concurrence and/or approval of that plan, pursuant to Section 3.3. Thereafter, HG&E shall file such plans with the FERC and the MADEP, and shall implement such plans as approved in writing by the FERC and MADEP.

V. Phase 2B (2006-2009)

Based on the Phase 1 research (see above) and pursuant to the decision made in Part III, above, HG&E shall implement the plan as outlined below for further enhancements of the downstream fish passage facilities.

Under Phase 2B the Parties intend to achieve the objectives for downstream fish passage (as stated on page 1 of this Appendix F) in the following way:

- (i) HG&E shall continue to implement operational changes commenced in 2005 to enhance downstream passage of shortnose sturgeon;
- (ii) HG&E shall continue studies and research to determine the appropriate alternative exclusion and passage device(s), including an angled bar rack;
- (iii) HG&E shall design/permit measures and modifications in 2007 for: (A) an alternative exclusion device, and (B) an alternative passage device (in the vicinity of Rubber Dam Section No. 5) for safely and successfully passing the fish without injury or significant impairment to essential behavioral patterns and avoiding any potential flow interference problems with the spillway fishway; construct in 2008, and start effectiveness testing in 2009;
- (iv) HG&E shall undertake additional research and additional measures from 2006 to 2009 to ensure that the downstream passage facilities are effective for exclusion and guidance as described below; and
- (v) HG&E shall implement a long-term monitoring program for shortnose sturgeon from 2010 to the end of the Project License.

The specific schedule is as follows:

2006

- Perform a full feasibility study of options for an alternative passage device (in the vicinity of Rubber Dam Section No. 5) to: (i) safely and successfully pass the fish without injury or significant impairment to essential behavioral patterns down the spillway over the apron and into the Bypass Reach, and (ii) avoid any potential

flow interference problems with the spillway fishway. Build prototype and field test (if necessary).

- Continue to implement operational changes commenced in 2005 as agreed to by the Parties (in consultation pursuant to Section 3.3 of the Settlement Agreement) to enhance downstream passage (as described above in Phase 1).
- Consult with the Parties (pursuant to Section 3.3 of the Settlement Agreement) to develop a research and study program to evaluate alternative exclusion and passage device(s).
- Perform radio tracking studies of shortnose sturgeon and silver- phase American eels; distribute results to the Parties (as described more fully in Part VI below).
- Conduct effectiveness studies of the modifications to the Louver Bypass Discharge Pipe if performed in 2005, as provided for in the plan approved by the FERC and the MADEP (discussed in Phase 1 above); distribute results to the Parties.

2007

- Design/engineer/permit: (i) an alternative exclusion device and (ii) an alternative passage device (in the vicinity of Rubber Dam Section No. 5), determined in 2006 by the Parties (in consultation pursuant to Section 3.3 of the Settlement Agreement) to safely and successfully pass the fish without injury or significant impairment to essential behavioral patterns down the spillway over the apron and into the Bypass Reach, avoiding any potential flow interference problems with the spillway fishway, that will not only exclude fish from the Hadley Falls intakes without impingement, but also provide for safe and successful downstream passage of migratory and resident fish.
- Continue to implement operational changes commenced in 2005 as agreed to by the Parties (in consultation pursuant to Section 3.3 of the Settlement Agreement) to enhance downstream passage (as described above in Phase 1).
- Continue radio tracking studies of shortnose sturgeon and distribute results to the Parties (as described more fully in Part VI below).

2008

- As designed and permitted in 2007, bid, build and complete construction of: (i) the alternative exclusion device, and (ii) the alternative passage device. .

- Continue to implement operational changes commenced in 2005 as agreed to by the Parties (in consultation pursuant to Section 3.3 of the Settlement Agreement) to enhance downstream passage (as described above in Phase 1).
- Continue radio tracking studies of shortnose sturgeon and distribute results to the Parties (as described more fully in Part VI below).
- Conduct a Population Survey for shortnose sturgeon in the Connecticut River, from Long Island Sound to Turners Falls (as described more fully in Part VI below) and distribute results to the Parties. Recapture studies will be conducted and any previously collected information will be used to calculate new estimates that could be compared to historical numbers.

2009

- Commence operation of the device(s) constructed in 2008 prior to April 1, 2009.
- Consult with the Parties (pursuant to Section 3.3 of the Settlement Agreement) to develop a plan to study the effectiveness of the alternative exclusion and passage device(s) completed in 2008; implement the plan; distribute results to the Parties by January 31, 2010.
- Consult with the Parties (pursuant to Section 3.3 of the Settlement Agreement) to develop long-term monitoring protocol for shortnose sturgeon during the term of the License for the Project, with distribution of the results annually to the Parties. If after 2009 HG&E determines, in consultation with the Parties (pursuant to Section 3.3 of the Settlement Agreement), that shortnose sturgeon are not passing safely downstream of the Project, HG&E shall consult with the Parties (pursuant to Section 3.3 of the Settlement Agreement) to determine a plan for re-evaluating the downstream passage facilities.

Plans to implement each element of Phase 2B above shall be prepared and submitted to the Parties pursuant to Section 3.3 of the Settlement Agreement. HG&E shall consult with the Parties, and/or obtain the concurrence and/or approval of that plan, pursuant to Section 3.3. Thereafter, HG&E shall file such plans with the FERC and the MADEP, and shall implement such plans as approved in writing by the FERC and MADEP.

VI. Description of Studies in Phases 2A and 2B above.

A. Radio Tracking Study

HG&E shall collect data and evaluate how downstream migrating shortnose sturgeon approach the Project; these studies will include a 5-year radio-tracking program.

HG&E shall also review recent studies of downstream eel passage work to determine their applicability to the Project. If possible, the antenna arrays installed for the shortnose sturgeon will be used to track American eel movement through the Project. A draft detailed study plan addressing the eels will be developed by HG&E with input from the Parties and Dr. Alex Haro of the USGS, and then circulated to the Parties. After consultation with the Parties pursuant to Section 3.3 of the Settlement Agreement, HG&E shall file the plan with the FERC and the MADEP, and shall implement the plan as approved in writing by the FERC and the MADEP.

Objectives:

- 1) To determine the approach and passage route(s) of radio-tagged downstream migrating shortnose sturgeon; and
- 2) To determine the approach and passage route(s) of radio-tagged downstream migrating American eels.

HG&E shall undertake a long-term radio-tracking program to monitor downstream migration of shortnose sturgeon through the Project. To determine how shortnose sturgeon approach and pass through the Project, an array of antennas will be placed along the face of the louver bypass, the Bascule Gate, the Hadley Falls intakes, the louver entrance and the upstream and downstream end of the tailrace. Large detection zone antennas will be deployed to identify if any shortnose sturgeon are coming to the Dam on the South Hadley side. HG&E shall attempt to radio tag at least 20 shortnose sturgeon per year (as previously recommended by NOAA Fisheries in its 1999 Biological Opinion). If more than 20 shortnose sturgeon are available for capture and tagging HG&E shall not limit their tagging effort to 20 fish (with numbers of shortnose sturgeon subject to availability and the requirements of any Endangered Species Act (16 U.S.C. §1531, *et seq.*) permit or approval applicable to these studies). HG&E shall attempt to capture and tag a wide range of sizes and ages of shortnose sturgeon; however, this study is proposed to be limited to wild fish and availability of the fish will determine the final size and age distribution. Stage 4 female shortnose sturgeon will not be tagged during this study.

Prior to the launch of this 5-year effort, HG&E shall put together a summary of any new radio-tagging information, and then consult with the Parties and appropriate shortnose sturgeon researchers to develop a 5-year radio-tagging/tracking study plan.

The study plan will be distributed for review and approval by the Parties before implementation.

Reporting: A draft report of study results will be distributed to the Parties no later than March of the year following each year of study.

B. Re-estimation of Shortnose Sturgeon Population - 2008

Savoy (*in prep*)⁴⁴ and Dr. Kynard (personal communication at a Shortnose Sturgeon Work Group Meeting held on February 20, 2003) recently demonstrated that periodic re-estimation of the Connecticut River shortnose sturgeon population is important to tracking any changes in the population size.

Objective: To re-estimate the size of the shortnose sturgeon population in the Connecticut River from Long Island Sound to Turners Falls.

HG&E shall conduct an updated population estimate. HG&E shall consult with NOAA Fisheries to develop a sampling regime (with numbers of shortnose sturgeon subject to availability and the requirements of any Endangered Species Act (16 U.S.C. §1531, *et seq.*) permit or approval applicable to these studies). Recapture studies will be conducted and any previously collected information will be used to calculate new estimates that could be compared to historical numbers.

Reporting: The study will be completed and a report of study results of potential changes in the shortnose sturgeon population distributed to the Parties no later than March of the year following the last year of the study.

⁴⁴ Savoy, T. (*in prep*). Population estimate and utilization of the lower Connecticut River by shortnose sturgeon. Connecticut River Ecological Study, Re-Visiting the River and the Ecological Impact of a Nuclear Power Plant. American Fisheries Society Monograph.

APPENDIX F – Shortnose Sturgeon Handling Plan, Filed as Appendix E to the Settlement Agreement

Shortnose Sturgeon Handling Plan for Holyoke Dam 2004

This plan may be updated annually as appropriate

Shortnose sturgeon (SNS) are listed as a federally and state endangered species. Historically, over one hundred SNS have been lifted upstream at Holyoke Dam. With the use of radio tags and PIT tags, it has been determined that many SNS also migrate downstream of the Holyoke Dam. In the past, SNS have been found at Holyoke in the spillway lift, the attraction water flume, the tailrace attraction water channel, the bypass reach pools and the dam apron pools. This plan addresses how any SNS found at the Holyoke Dam will be handled and how this handling will be documented during 2004. SNS may be encountered by personnel during fish lift operations, at the downstream sampling station and in the event of stranding. Procedures for handling fish and documenting these interactions are outlined below. All contact information and the appropriate reporting form follow these procedures. All personnel counting fish at the fish lift counting windows and louver bypass fish sampler will be trained to properly handle SNS by Micah Kieffer or Boyd Kynard from USGS, Conte Anadromous Fish Research Center.

Fish Lift Operations

Due to concerns regarding the safety of downstream passage for SNS, SNS are not currently being passed above the Dam. Should any SNS be found in the fish lift, the licensee shall implement the procedures and reporting requirements outlined below. A number of Connecticut River SNS carry inactive radio tags that were implanted during earlier studies of SNS migratory behavior. All these SNS were also PIT tagged. A list of these PIT tag numbers will be provided to personnel counting fish. If any of these fish are captured, Micah Kieffer or Boyd Kynard from USGS, Conte Anadromous Fish Research Center will be contacted (see contact information below). They will remove the radio tags and record information on the internal condition of these SNS. If any SNS carrying an internal radio tag with an external antenna are observed, Micah Kieffer or Boyd Kynard from USGS, Conte Anadromous Fish Research Center, will be contacted and will respond and assess the condition of these fish.

1. For each SNS detected, the licensee shall record the weight, length, and condition of the fish. Each SNS will be checked for PIT, Carlin, radio, or other tags (see above). Tag numbers will be recorded and if not previously tagged, the fish may be tagged with a PIT tag. River flow, bypass reach minimum flow, and water temperature will be recorded. All relevant information will be recorded on the

reporting sheet (*SHORTNOSE STURGEON REPORTING SHEET FOR THE HOLYOKE PROJECT*, a copy of which is attached hereto).

2. The licensee shall follow the contact procedure outlined below to obtain a contact with the appropriate ESA permit/approval for handling SNS.
3. If alive and uninjured, the SNS will be immediately returned downstream. A long handled net will be used to place the SNS in the tailrace from the deck behind the powerhouse.
4. If any injured SNS are found, the licensee shall report immediately to NOAA Fisheries (see contact information below). Injured fish must be photographed and measured, if possible, and the reporting sheet must be submitted to NOAA Fisheries within 24 hours. If the fish is badly injured, the fish should be retained by the licensee, if possible, until obtained by a NOAA Fisheries recommended facility for potential rehabilitation
5. If any dead SNS are found, the licensee must report immediately to NOAA Fisheries (see contact information below). Any dead specimens or body parts should be photographed, measured and preserved by the licensee until they can be obtained by NOAA Fisheries for analysis.

Downstream Sampling Station

SNS may be encountered by personnel operating the downstream sampling station. Due to the shallow depths and tight turns of the sampling station table, it may not be appropriate for SNS to stay on the table and return to the River through the table exit. To help monitor downstream passage of SNS and to minimize the likelihood of adverse affects, the licensee shall implement the following procedures and reporting requirements:

1. Any SNS observed in the sampling station will be immediately removed with a net and placed in an appropriate holding tank. SNS will not be allowed to stay on the sampling station table. For each fish detected, the licensee shall record the weight, length, and condition. Each SNS will be checked for PIT, Carlin, radio, or other tags. The licensee shall record tag numbers and, if not previously tagged, the fish may be tagged with a PIT tag. A number of Connecticut River SNS carry inactive radio tags that were implanted during earlier studies of SNS migratory behavior. All these SNS were also PIT tagged. A list of these PIT tag numbers will be provided to personnel counting fish. If any of these fish are captured, Micah Kieffer or Boyd Kynard from USGS, Conte Anadromous Fish Research Center will be contacted. They will remove the radio tags and record information on the internal condition of these SNS. If any SNS carrying an internal radio tag with an

external antenna are observed, Micah Kieffer or Boyd Kynard from USGS, Conte Anadromous Fish Research Center will be contacted and will respond and assess the condition of these fish. River flow and water temperature will be recorded. All relevant information will be recorded on the reporting sheet (*SHORTNOSE STURGEON REPORTING SHEET FOR THE HOLYOKE PROJECT*, see attached form).

2. The licensee shall follow the contact procedure outlined below to obtain a contact with the appropriate ESA permit/approval for handling SNS.
3. If alive and uninjured, the SNS will be immediately returned downstream. A long handled net will be used to place the SNS in the tailrace.
4. If any injured SNS are found, the licensee shall report immediately to NOAA Fisheries (see contact information below). Injured fish must be photographed and measured, if possible, and the reporting sheet must be submitted to NOAA Fisheries within 24 hours. If the fish is badly injured, the fish should be retained by the licensee, if possible, until obtained by a NOAA Fisheries recommended facility for potential rehabilitation.
5. If any dead SNS are found, the licensee must report immediately to NOAA Fisheries (see contact information below). Any dead specimens or body parts should be photographed, measured and preserved by the licensee until they can be obtained by NOAA Fisheries for analysis.

Shortnose Sturgeon Stranding

The potential exists for SNS to be stranded in pools below the Dam whenever there is a significant change in the bypass flows or in minimum flows in the bypass reach. If this situation occurs, these pools need to be checked as soon as possible for the presence of SNS and the following protocol shall be followed:

1. Designated HG&E employees and fish lift operation staff must monitor the pools below the Dam as soon as possible after such a change.
2. The licensee shall follow the contact procedure outlined below to obtain a contact with the appropriate ESA permit/approval for handling SNS.
3. For each fish removed from the pool, the licensee shall record the weight, length, and condition. Each SNS will be checked for PIT, Carlin, radio, or other tags. Tag numbers will be recorded and if not previously tagged, the fish may be tagged with a PIT tag. River flow, bypass reach minimum flow, and water temperature will be recorded. All relevant information will be recorded on the reporting sheet

(SHORTNOSE STURGEON REPORTING SHEET FOR THE HOLYOKE PROJECT, see attached).

4. If stranded but alive and uninjured, the SNS will be moved to a pool in the bypass reach that will provide egress out of the area.
5. If any injured SNS are found, the licensee shall report immediately to NOAA Fisheries (see contact information below). Injured fish must be photographed and measured, if possible, and the reporting sheet must be submitted to NOAA Fisheries within 24 hours. If the fish is badly injured, the fish should be retained by the licensee, if possible, until obtained by a NOAA Fisheries recommended facility for potential rehabilitation.
6. The licensee shall report any dead fish immediately to NOAA Fisheries (see contact information below). Any dead specimens or body parts should be photographed, measured and preserved by the licensee until they can be obtained by NOAA Fisheries for analysis.
7. Contact Rich Murray (HG&E 413-536-9453; Chris Tomichek (Kleinschmidt Associates 860-526-2358; Bob Stira (NGS 860-810-1948).

Contact information:

- If any SNS are detected – contact Conte Anadromous Fish Lab: Micah Kieffer (413) 863-3817; or Boyd Kynard (413) 863-3807.
If unavailable, contact Massachusetts Division of Fish and Wildlife
Caleb Slater (508) 792-7270 (133); or Mark Tisa (508) 792-7270 (129).
- Within 24 hours of any stranding event or contact with an injured or dead SNS, contact NOAA Fisheries Northeast Regional Office – Pat Scida, (978-281-9208) or Julie Crocker (978-281-9328 x6530) and fax any reporting sheets to 978-281-9394.

Reports at end of passage seasons

- At the end of the upstream and downstream passage seasons, copies of all reporting sheets will be sent to:

Pat Scida
Protected Resource Division
NOAA Fisheries
One Blackburn Drive
Gloucester, MA 01930-2298

Chris Tomichek
Kleinschmidt Associates
161 River Street
P.O. Box 1050
Deep River , CT 06417

Boyd Kynard
S.O. Conte Anadromous Fish Research
Center
P.O. Box 796
Turners Falls, MA 01376

Caleb Slater
Massachusetts Div. Of Fisheries
& Wildlife
One Rabbit Hill Road
Westborough, MA 01581

Project Nos. 2004-075 and 11607-002

138

SHORTNOSE STURGEON REPORTING SHEET FOR THE HOLYOKE PROJECT

Date: _____ Time: _____

Physical conditions

Is spill being released over the dam? YES NO

What is the approximate gaged river flow? _____ (Ex. 45,000 cfs)

What is the approximate gaged minimum flow in the bypass reach? _____

What is the approximate gaged minimum flow in the canal reach? _____

Water temperature (°C): at surface _____ and/or at bottom _____

Are fishways operating (circle) YES NO

If yes, circle one or both: TAILRACE SPILLWAY

Is project generating? YES NO

If yes, what units are currently being operating? UNIT1 UNIT2

Location from where species was recovered (circle): TAILRACE LIFT

SPILLWAY LIFT DAM APRON POOLS ATTRACTION WATER STRUCTURE

CANAL BYPASS OTHER _____

If fish lift, estimate condition of lift: EMPTY FEW FISH MODERATE FULL
VERY FULL*Species information:*

Total Length _____ Fork length: _____ Weight: _____

Condition of fish: _____

Does the sturgeon have visible injuries or abrasions: YES NO

If Yes, circle and code area of abrasions on sturgeon diagram on back side of sheet.

Was sturgeon previously tagged? YES NO

If tagged, what type? CARLIN PIT RADIO OTHER _____

What is the tag number? _____

If not tagged, did you tag the fish? YES NO

If yes, what type of tag and ID number? TYPE _____ ID# _____

Project Nos. 2004-075 and 11607-002

139

Comments/other:_____

_____.

Name of watch observer:_____

Observer's
Signature:_____

Abrasion Codes**None****Light**

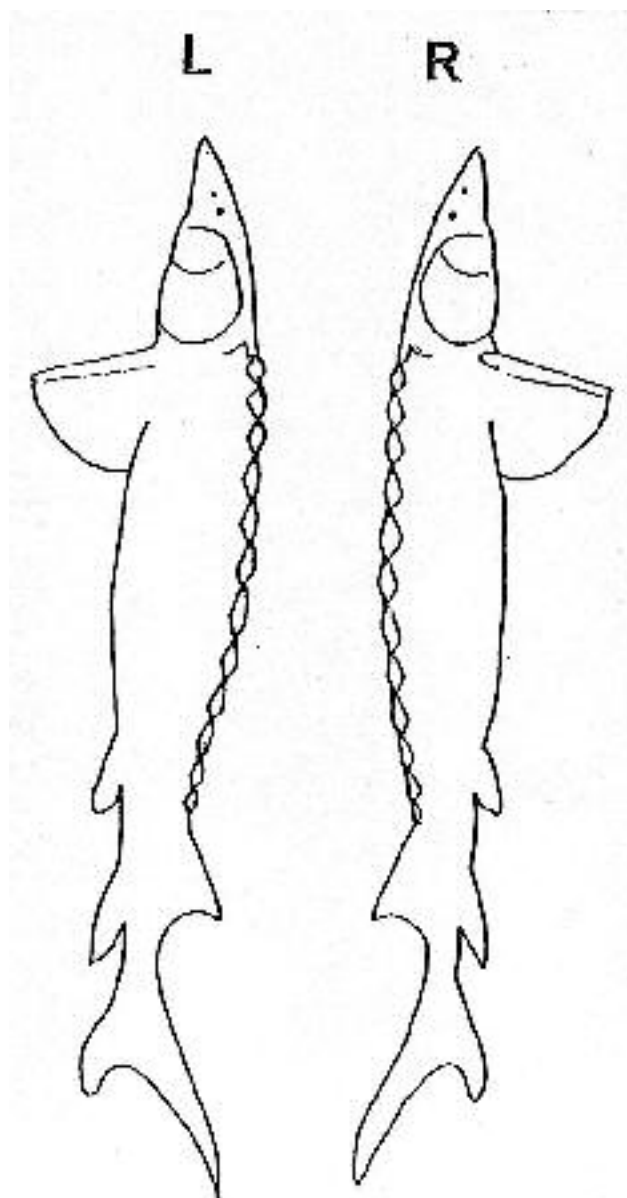
Whitening or smoothed scutes,
Early sign of skin abrasion.

Heavy

Large portion of skin red, scutes
excessively worn,
Damaged, or missing; patches
of skin missing,
Boney structures exposed;
flaccid musculature.

Moderate

Early sign of redness on skin,
scutes or fins, Erosion of skin
over bony structures,
Loss of skin pigment



**APPENDIX G – No. 2 Overflow Operating Procedures, Filed as Appendix D to the
Settlement Agreement**

APPLICABILITY

This procedure applies to any time that the Upstream Fish Passage facilities are operational (that is whenever the attraction water is on).

INSTRUCTIONS

1. The Gatehouse Operator continually monitors canal operations as part of normal duties. During the periods of time when Hadley Falls Station upstream fish passage is operational, the No. 2 Overflow Gates shall be maintained in the closed position. This applies to gate numbers 2, 3 and 4. This measure will eliminate migrating fish from entering the raceway near the overflow and becoming stranded.
2. During fish passage, the No. 2 Overflow gates can only be operated in the event of a major failure of canal automation or an emergency condition causing the Second Level Canal to potentially overtop the canal wall. If operation of the No. 2 Overflow gates occurs, the Gatehouse Operator shall immediately contact the Operation and Maintenance Supervisor or the Hydro Superintendent. An inspection of the raceway area will be required to avoid any stranding of fish in the pool area below the waste archways.
3. All operations of the No. 2 Overflow will be logged in the Gatehouse log book and will include the date, time, and reason for operation.