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HAND DELIVERY

March 12, 2004
(Public Version)

The Honorable Magalie Roman Salas
Secretary
Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, D.C. 20426

Re: The City of Holyoke Gas & Electric Department
Project No. 2004 – Offer of Settlement
Contains Critical Energy Infrastructure Information – Figures 1 and 3 – Please Do Not Publicly Release Sealed Attachment

Dear Ms. Salas:

Pursuant to the Federal Energy Regulatory Commission's (Commission) Rules and Regulations in 18 CFR §385.602 (c)(i), the City of Holyoke, Gas & Electric Department ("HG&E") hereby files an original and eight copies of a Settlement Agreement ("the Settlement") and supporting appendices A through H, and Figure 2 for the Holyoke Hydroelectric Project, FERC No. 2004. A CD-ROM containing these documents in Adobe Acrobat is also included with this filing for the Commission's convenience in posting to the E-library. Per the Commission's rules under 18 CFR §385.602 (c)(ii), HG&E is also hereby filing an original and eight copies of the Explanatory Statement supporting the Settlement.

Figures 1 and 3 of the Settlement contain detailed design drawings of the Project referenced above and contain Critical Energy Infrastructure Information ("CEII"), pursuant to Section 388.113 of the Commission's Regulations, as described in the Commission's Order No. 630. Therefore, pursuant to Section 388.112 of the Commission's Regulations, HG&E requests that Figures 1 and 3 be protected as CEII. Accordingly, HG&E is providing herewith an original and two (2) copies of this cover letter with the CEII materials in a sealed envelope, and is providing an original and eight copies of this letter and a public version of the Settlement, with a sheet attached only referencing the CEII materials where Figures 1 and 3 would be inserted.

The Settlement addresses issues presented in pending requests for rehearing of the Commission's August 20, 1999, "Order Issuing New License and Denying Competing

Application,"[1] for this Project. The Settlement is being filed jointly by HG&E, U.S. Department of the Interior, through U.S. Fish and Wildlife Service ("FWS"); U.S. Department of Commerce, National Oceanic & Atmospheric Administration, National Marine Fisheries Service ("NOAA Fisheries"); Commonwealth of Massachusetts, Department of Environmental Protection ("MADEP"); Commonwealth of Massachusetts, Division of Fisheries and Wildlife; Trout Unlimited; Connecticut River Watershed Council; and the Town of South Hadley, Massachusetts (referred to herein jointly as "Settling Parties"). This Settlement is uncontested; all key parties to the relicensing proceeding — with the exception of MADEP — have signed the Settlement. HG&E expects MADEP's signature page within the next few days and will file MADEP's signature page with the Commission as a supplement to the Settlement upon receipt.

The Settlement is intended to resolve pending issues with respect to the operation and maintenance of the Project sufficient for those Settling Parties that filed requests for rehearing of the 1999 License Order to withdraw their respective requests once Commission approval of the Settlement is final and no longer subject to appeal. However, as discussed in the "Accordingly" clause and explained in detail in Section 2.4 of the Settlement, the Settling Parties request that the Commission defer issuance of such an order approving the Settlement until NOAA Fisheries issues a Biological Opinion based on the Settlement and withdraws the August 2000 Biological Opinion, and the Settling Parties complete the procedures set forth in Section 2.4. Accordingly, as explained in the Settlement, the Settling Parties request that after the Commission has been notified that the Biological Opinion has been issued and that the Settlement is not to be reopened, the Commission then issue an order approving this Settlement and incorporating the terms and conditions therein into modified license articles for this Project, without material change or modification. Proposed Settlement License Articles are included with this filing in Appendix A for the Commission's convenience.

The Settling Parties have worked very diligently and cooperatively to reach agreement on a numerous complex and challenging issues. HG&E deeply appreciates the conscientious efforts of the parties and the patience and support of the Commission staff during the Settlement process. If there are any questions concerning this filing, please do not hesitate to contact me at (413) 536-9340.

Sincerely,

Paul S. Ducheney (PSS)

Paul S. Ducheney
Superintendent of Hydro Operations

Enclosures

cc: All parties on the official service list for Project No. 2004
Allan Creamer (FERC) (w/encls.)

[1] 88 FERC ¶ 61,186 (1999) (referred to herein as "1999 License Order").

John Katz (FERC-OGC) (w/encls.)

J. Warner (USFWS) (w/encls.)
J. Stolfo (USDOI) (w/encls.)
P. Scida (NOAA Fisheries) (w/encls.)
J. Crocker (NOAA Fisheries) (w/encls.)
C. Lynch (NOAA) (w/encls.)
J. Williams (NOAA) (w/encls.)
R. Kubit (MADEP) (w/encls.)
D. Desmond (MADEP) (w/encls.)
C. Slater (MADFW) (w/encls.)
D. Pugh (TU) (w/encls.)
T. Miner (CRWC) (w/encls.)
P. Vinchesi (So. Hadley) (w/encls.)

J. Lavelle (HG&E) (w/encls.)
N. Skancke (GKRSE) (w/encls.)
F. Szufnarowski (Kleinschmidt) (w/encls.)
K. Schaeffer (Kleinschmidt) (w/encls.)

ORIGINAL

UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

Holyoke Gas & Electric Department) Project No. 2004

Settlement Agreement

March 12, 2004

HOLYOKE GAS & ELECTRIC DEPARTMENT
PROJECT NO. 2004
SETTLEMENT AGREEMENT

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HOLYOKE GAS & ELECTRIC DEPARTMENT
PROJECT NO. 2004
SETTLEMENT AGREEMENT

This Settlement Agreement ("Settlement") is entered into March 1, 2004, pursuant to Rule 602 of the Rules of Practice and Procedure (18 C.F.R. § 385.602) of the Federal Energy Regulatory Commission ("FERC"), by and among the following entities (individually referred to herein as "Party" and collectively referred to herein as "Parties") with respect to the Holyoke Project (FERC No. 2004):

- Holyoke Gas & Electric Department ("HG&E" or "Licensee")
- U.S. Department of the Interior, through U.S. Fish and Wildlife Service ("FWS")
- U.S. Department of Commerce, National Oceanic & Atmospheric Administration, National Marine Fisheries Service ("NOAA Fisheries")
- Commonwealth of Massachusetts, Department of Environmental Protection ("MADEP")
- Commonwealth of Massachusetts, Division of Fisheries and Wildlife ("MADFW")
- Trout Unlimited ("TU")
- Connecticut River Watershed Council ("CRWC")
- The Town of South Hadley, Massachusetts ("South Hadley")

Whereas, the FERC issued to Holyoke Water Power Company a new license for the Holyoke Project, FERC Project No. 2004, on August 20, 1999 (88 FERC ¶ 61,186) (hereinafter referred to as "1999 License Order" or "1999 License"), which included a Water Quality Certification issued by the MADEP on July 28, 1999 (pursuant to Section 401 of the Federal Clean Water Act, 33 U.S.C. §1251, *et seq.*, and the Massachusetts Clean Waters Act, M.G.L. c. 21, §§26-53); and

Whereas, a number of parties to the proceedings in Project No. 2004 (including many of the Parties listed above) filed requests for rehearing of the 1999 License Order; and

Whereas, NOAA Fisheries issued a Biological Opinion on August 18, 2000, that contained reasonable and prudent alternatives and an Incidental Take Statement, but FERC has not yet acted on the 2000 Biological Opinion; and

Whereas, the MADEP issued a final Water Quality Certification on February 14, 2001, based on a settlement of the state administrative appeal of the MADEP Water Quality Certification issued in July 1999, but the FERC has taken no action on the 2001 Water Quality Certification; and

Whereas, following issuance of the 1999 License Order and the 2001 Water Quality Certification, HG&E acquired the Holyoke Project from Holyoke Water Power Company; and

Whereas, the FERC approved the transfer of the 1999 License for the Project to HG&E by order issued September 20, 2001 (96 FERC ¶ 62,283), which transfer became effective on December 28, 2001, with the submittal to the FERC of appropriate filings; and

Whereas, certain of the issues addressed in the requests for rehearing and certain entire requests for rehearing filed on the 1999 License Order were withdrawn (by reason of HG&E's acquisition of the Project), but certain requests for rehearing remain pending, and further the FERC has not incorporated the 2001 final Water Quality Certification into the 1999 License or incorporated the 2000 Biological Opinion; and

Whereas, the Parties to this Settlement include the entities which filed Requests for Rehearing of the 1999 License Order that are still pending, and the entities which were parties to the settlement of the state administrative appeal of the MADEP Water Quality Certification as reflected in the 2001 final Water Quality Certification; and

Whereas, through extensive discussion and negotiations, and based on activities undertaken subsequent to the issuance of the 1999 License Order, the Parties have now determined that they can best resolve all of the issues presented in the requests for rehearing (which remain pending) through a settlement; and

Whereas, NOAA Fisheries will not be able to issue a new Biological Opinion before this Settlement is filed with the FERC due to the need to complete formal consultation based on this Settlement Agreement; and

Whereas, the Parties agree that the 2001 Water Quality Certification should be incorporated into this Settlement and should be incorporated into the Order Approving Settlement and the modified license issued for the Project based upon this Settlement through Proposed Settlement License Article 421; and

Whereas, the Parties have agreed that this Settlement is supported by substantial evidence in the record of this proceeding, is a fair and reasonable resolution of pending issues, is in the public interest, and is subject to issuance of a new Biological Opinion by NOAA Fisheries (and terms therein) and withdrawal of the August 2000 Biological Opinion.

Accordingly, the Parties hereby request that the FERC issue an order approving this Settlement and incorporating the terms and conditions on which the Parties have reached agreement into the modified license for this Project, without material change or modification to the provisions of this Settlement; however, the Parties request that the FERC defer issuance of such an order approving the Settlement until NOAA Fisheries issues a Biological Opinion based on the Settlement, NOAA Fisheries withdraws the August 2000 Biological Opinion, and the procedures set forth in Section 2.4 below are completed.

Part I – Definitions

For the purposes of this Settlement, the following definitions and abbreviations shall apply. Where a term is not otherwise defined in the Settlement, the generally accepted definition of that term shall apply under this Settlement.

1.1. "1997 Barnes & Williams IFIM Study" shall mean the field study and associated report, cited in the 1999 License Order, that establishes the magnitude, distribution and corresponding water surface elevations velocities and depths for the Bypass Habitat Flows and Bypass Zone-of-Passage Flows.

1.2. "1999 License Order" shall mean the order granting a License for the Holyoke Project, issued by the FERC on August 20, 1999, for the Project (88 FERC ¶ 61,186).

1.3. "2001 WQC" shall mean the final Water Quality Certification approved by the MADEP on February 14, 2001, pursuant to the settlement of the state administrative appeal of the 1999 Water Quality Certification.

1.4. "Biological Opinion" shall mean a Biological Opinion issued by NOAA Fisheries pursuant to Section 7 of the Endangered Species Act (16 U.S.C. §1536).

1.5. "Boatlock Station Bypass" shall mean the existing downstream fish passage facility located in the First Level Canal at Boatlock Station.

1.6. "Bypass Reach" shall mean the area of the Connecticut River downstream of the Holyoke Dam to the confluence with the Hadley Falls tailrace, comprised of 3 channels (*i.e.*, the East Channel, the Center Channel, and the West Channel).

1.7. "Bypass Zone-of-Passage Flows" means releases from the Holyoke Dam into the Bypass Reach to provide minimum flows for upstream and downstream fish passage at the Holyoke Dam during the period when the Fish Lifts are operational as described in Section 4.5(b) below.

1.8. "**Canal System**" shall mean the three levels of canals (designated First-Level, Second-Level, and Third-Level) beginning with the canal gatehouse structure located at the west end of the Hadley Falls Station, at the west end of the Holyoke Project dam, and including the No. 2 and No. 3 Overflows.

1.9. "**Canal System Outage**" shall mean the lowering of the water surface elevations of the Canal System for inspection and maintenance as described in Sections 4.3(d) and 4.3(e) below.

1.10. "**CCOP**" shall mean the Comprehensive Canal Operations Plan approved by FERC on June 5, 2003 (103 FERC ¶ 62,130), 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 pending at the MADEP.

1.11. "**COFP**" shall mean the Comprehensive Operations and Flow Plan approved by FERC on June 24, 2003 (103 FERC ¶ 62,178), and filed with the MADEP on January 20, 2003.

1.12. "**CRLMP**" shall mean the Comprehensive Recreation and Land Management Plan filed with the MADEP on April 30, 2003, and with the FERC on May 1, 2003.

1.13. "**CRMP**" shall mean the Cultural Resources Management Plan approved by FERC on June 27, 2001 (95 FERC ¶ 62,274).

1.14. "**Downstream Fish Passage Plan**" shall mean the plan approved by FERC on June 19, 2003 (103 FERC ¶ 62,165).

1.15. "**Final FERC Order Approving Settlement**" shall mean the Order Approving Settlement (as defined below) that is no longer subject to rehearing or appeal under the Federal Power Act. If no timely requests for rehearing are filed in response to the Order

Approving Settlement, then the Order Approving Settlement shall be deemed the Final FERC Order Approving Settlement as of the expiration of the time for filing requests for rehearing and appeals.

1.16. "Fish and Aquatic Habitat Monitoring Plan" shall mean the plan approved by FERC on June 24, 2003 (103 FERC ¶ 62,175) and filed with the MADEP October 31, 2002.

1.17. "Fish Lifts" shall mean the spillway and tailrace fish lift facilities at Project No. 2004.

1.18. "Holyoke Dam" shall mean the dam which is part of the Project.

1.19. "Impoundment" shall mean the Project reservoir extending from the Holyoke Dam to upstream on the Connecticut River (as included within the Project Boundary, defined below); the impoundment is divided into an upper section (the portion upstream of the narrow section of river adjacent to the local landmark known as Dinosaur Footprints) and a lower section (the portion between the narrows and the Holyoke Dam, 5-miles south of the narrows).

1.20. "Interim Bypass Habitat Flows" shall mean the releases from the Holyoke Dam into the Bypass Reach during periods when the Fish Lifts are not operational to provide minimum flows for the protection and enhancement of water quality and aquatic and fisheries resources determined on an interim basis until Permanent Bypass Habitat Flows are established pursuant to Section 4.2(e) below.

1.21. "Invasive Species Monitoring Plan" shall mean the plan approved by FERC on August 21, 2001 (96 FERC ¶ 62,174) and approved by MADEP on October 10, 2003.

1.22. "License Articles" shall mean the terms and conditions contained in the 1999 License Order. The term "Proposed Settlement License Articles" shall mean the draft license articles proposed by the Parties to implement the Settlement, as contained in Appendix A to this Settlement.

1.23. "Low Flow Contingency Plan" shall mean the plan for prioritizing water flow through the Project during periods of low flow as discussed in the COFP.

1.24. "Mandatory Conditions" shall mean the terms and conditions issued by the FWS and/or the NOAA Fisheries for the Project pursuant to Section 18 of the Federal Power Act (16 U.S.C. §811).

1.25. "Material modification" shall mean a modification that impacts any Party's ability to obtain the benefits of, and/or that impacts any of the obligations imposed under, the agreement that was reached in this Settlement.

1.26. "Modified Run-of-River Operations" shall mean the operational regime developed pursuant to Section 4.1 below which the Parties have determined: (i) most effectively limits fluctuations in the Impoundment in the vicinity of Rainbow Beach and other habitat areas to protect the federally threatened and state endangered Puritan tiger beetle upstream of the Project Dam; (ii) avoids any adverse impacts to the federally and state endangered shortnose sturgeon; (iii) balances the magnitude of fluctuations in the upper and lower sections of the Impoundment; (iv) balances the impact on wetland areas adjacent to the lower and upper sections of the Impoundment; (v) maintains the minimum required Bypass Habitat Flows and Bypass Zone-of-Passage Flows to avoid adverse impacts on fish passage and habitat in the Bypass Reach; and (vi) to the extent possible, reduces fluctuations in River flows downstream from the Project.

1.27. **"NGVD"** shall mean National Geodetic Vertical Datum. For a reference point, Elevation NGVD is equal to Holyoke Datum minus 2.53 feet; Holyoke Datum refers to the local vertical datum based on an assumed elevation of approximately 100-ft. for the crest of the Holyoke Dam (see Figure No. 2, attached hereto).

1.28 **"Order Approving Settlement"** shall mean the order issued by the FERC in response to the Settlement which establishes a modified license for the Project; such Order will be subject to potential rehearing as provided for under Section 313 of the Federal Power Act. As noted above, and explained more fully below in Section 2.4, the Parties request that the FERC defer issuance of such an Order Approving Settlement until NOAA Fisheries issues an anticipated new Biological Opinion, NOAA Fisheries withdraws the August 2000 Biological Opinion, and the procedures set forth in Section 2.4 below are completed.

1.29. **"Party"** or **"Parties"** shall mean a party or all of the parties collectively to this Settlement, as defined above.

1.30. **"Permanent Bypass Habitat Flows"** shall mean the releases from the Holyoke Dam into the Bypass Reach during the period when the Fish Lifts are not operational to provide minimum flows for the protection and enhancement of water quality and aquatic and fisheries resources determined as permanent measures pursuant to Section 4.2 (e) below.

1.31. **"Project"** shall mean the Holyoke Project, FERC Project No. 2004.

1.32. **"Project Boundary"** shall mean the area of land and water included in the License, as specified in the 1999 License Order and as referenced in Condition 19 (a) of the 2001 WQC.

1.33. "Requests for Rehearing" shall mean the pending requests, applications or motions for rehearing filed pursuant to Section 313 of the Federal Power Act (16 U.S.C. §825l) in response to the 1999 License Order, to the extent that such requests, applications or motions have not been withdrawn as a result of the acquisition of the Project by HG&E.

1.34. "Resource Agencies" shall mean FWS, NOAA Fisheries, MADEP and MADFW.

1.35. "Riparian Management Plan" shall mean the part of the CRLMP [filed with the FERC on May 1, 2003 and filed with the MADEP on April 30, 2003] that addresses riparian management and buffer zone issues.

1.36. "Run-of-River Operations" shall mean the operational regime set forth in the License Article 405 of the 1999 License Order and Condition 9 of the 2001 WQC which directs that HG&E shall operate the Project in a run-of-river mode and maintain a minimum impoundment elevation of 100.4 ft. NGVD with an allowable fluctuation of +/- 0.2 ft.

1.37. "Shoreline Erosion Remediation Plan" shall mean the plan approved by FERC on August 1, 2001 (96 FERC ¶ 62,100).

1.38 "Stranding" shall mean fish being caught out of water, in whole or in part, or in pools such that the fish do not have egress into the Connecticut River.

1.39. "Texon Gage" shall mean the benchmark used to measure water surface elevations (NGVD) for the purposes of determining the Bypass Habitat Flows and the Bypass Zone-of-Passage Flows through: (i) the correlation of NGVD elevations to the readings on the existing Texon Staff Gage (located on the Texon Building); (ii) the use of NGVD elevations as confirmed on an electronic gage ("Texon Electronic Gage") to be located

adjacent to the Texon Building; or (iii) the use of an equivalent mechanism for determining NGVD elevations in the future as agreed to by HG&E and the Resource Agencies through consultation pursuant to Section 3.3 below.

1.40. "Threatened and Endangered Species Protection Plan" shall mean the plan approved by FERC on June 6, 2003 (103 FERC ¶ 62,131) and filed with the MADEP January 30, 2003.

1.41. "UFPP" shall mean Upstream Fish Passage Plan modified and approved by FERC on June 24, 2003 (103 FERC ¶ 62,177) and filed with the MADEP November 11, 2002).

1.42. "Upstream Passage Season" shall be the period from April 1 through November 15 each year.

1.43. "Water Quality Monitoring Plan" shall mean the plan approved by FERC on August 10, 2001 (96 FERC ¶ 62,144) and approved by MADEP on October 10, 2003.

Part II – Overview of the Settlement

Section 2.1. Scope of the Settlement. This Settlement is intended to resolve pending issues with respect to the operation and maintenance of the Project sufficient for the Parties to withdraw their respective Requests for Rehearing.

Section 2.2. Relationship between Settlement and 1999 License Order. It is the intent of the Parties to the Settlement that certain of the License Articles in the 1999 License Order are to be amended, pursuant to this provisions of this Settlement, in whole or part to reflect: (1) actions already taken by HG&E pursuant to the 1999 License Order; (2) compliance plans required by the 1999 License Order and the 2001 WQC (which supersedes and replaces the 1999 Water Quality Certification incorporated into

the 1999 License Order), that were approved by, or are pending at, the FERC and the MADEP; and (3) actions to be taken under the Settlement. As noted below in Section 2.7, Appendix A hereto contains Proposed Settlement License Articles to supersede certain of the License Articles in the 1999 License Order for implementing Part IV (and related Appendices) of this Settlement.

Section 2.3. Relationship between Settlement and 2001 WQC. HG&E and the MADEP agree that the provisions of this Settlement are consistent with correlated requirements contained in the 2001 WQC and related documents (as attached hereto in Appendix B). Also attached hereto in Appendix B is a matrix illustrating the correlation between the provisions of the Settlement and the 2001 WQC. The Parties agree that all of the conditions in the 2001 WQC should be incorporated into the Order Approving Settlement and the modified license issued based upon this Settlement through Proposed Settlement License Article 421.

Section 2.4. Coordination with a NOAA Fisheries Biological Opinion. Prior to or upon the filing of this Settlement Agreement, HG&E shall request that the FERC initiate formal consultation with NOAA Fisheries with the intent of NOAA Fisheries issuing a new Biological Opinion. It is the intent of HG&E and NOAA Fisheries that the terms and conditions of this Settlement adequately address concerns by NOAA Fisheries with respect to the federally endangered shortnose sturgeon. However, until the anticipated new Biological Opinion is issued, any reasonable and prudent alternatives, reasonable and prudent measures, and terms and conditions to be contained in that anticipated new Biological Opinion are as yet not known. Therefore, the Parties request that the FERC

not act on this Settlement until the process described below is completed and HG&E so notifies the FERC.

Accordingly, the Parties agree that NOAA Fisheries' signature on this Settlement Agreement is pre-decisional and not pre-determinative with respect to its anticipated new Biological Opinion and that NOAA Fisheries' signature herein does not bind it to any specific recommendations or to any particular action, nor does the Settlement circumscribe the nature of the recommendations or actions available with respect to the anticipated new Biological Opinion or with respect to Endangered Species Act compliance. Further, the Parties acknowledge that NOAA Fisheries expressly reserves its right to take an action or to advance a position, or to not take an action or not take a position before FERC or any other body that is consistent with the terms of its anticipated new Biological Opinion, regardless of whether that action or position might be considered inconsistent with this Settlement Agreement.

To the extent that the anticipated new Biological Opinion is issued that imposes on HG&E requirements that materially exceed or differ from those that are contained in this Settlement, HG&E and/or NOAA Fisheries shall have the right to reopen this Settlement. Therefore, the Parties intend for the FERC not to approve this Settlement until a new Biological Opinion is issued by NOAA Fisheries based on the Settlement, the August 2000 Biological Opinion is withdrawn, and HG&E has notified the FERC whether it and/or NOAA Fisheries will reopen the Settlement under the process described below.

Within 15 days of HG&E's receipt of the new Biological Opinion from NOAA Fisheries based on the Settlement, HG&E shall notify the Parties whether it believes the

new Biological Opinion contains requirements that materially exceed or differ from the provisions of this Settlement, and whether it is willing to accept the additional provisions or will exercise its right to reopen this Settlement. Immediately thereafter, HG&E and the Parties will consult (pursuant to Section 3.3 below) to determine if the Settlement is to be reopened or if a modification to the Settlement is necessary based on HG&E's willingness to accept any additional provisions. Within 45 days of its receipt of the new Biological Opinion, HG&E shall notify the FERC: (i) that the Parties agree the new Biological Opinion does not require modification to this Settlement; (ii) that the new Biological Opinion requirements differ from the provisions of the Settlement, and that a proposed modification to the Settlement will be filed; or (iii) that the Settlement has been reopened, and that the filing of this Settlement Agreement is withdrawn. The Parties request that the FERC not act on this Settlement until HG&E files such notice.

Section 2.5. Integrated Nature of the Settlement. The terms and conditions of this Settlement are a comprehensive and integrated set of indivisible measures to address the issues with respect to the operation and maintenance of the Project. The Parties have incorporated the terms and conditions of Part IV of the Settlement into Proposed Settlement License Articles (as set forth in Appendix A). The Parties believe, subject to issuance of the anticipated new Biological Opinion (discussed above in Section 2.4), that FERC's acceptance of the terms and conditions contained in this Settlement without material modification will sufficiently address the issues presented in the pending Requests for Rehearing and warrant the withdrawal of the Requests for Rehearing.

If in response to the Settlement the FERC does not adopt all of the terms and conditions of the Settlement and the Proposed Settlement License Articles without

material modification, or if the FERC makes a material modification to any term or condition of the Settlement or any Proposed Settlement License Article, then the Parties shall have the option to find that the Settlement (including all terms and conditions herein) is void and has no force and effect under the process described in Section 5.2 below.

The Parties further agree that the record in this proceeding developed at the FERC prior to the filing of this Settlement Agreement, together with this Settlement Agreement (including its Appendices), provide full and adequate support for the proposed terms and conditions as memorialized in the Proposed Settlement License Articles.

Section 2.6. Enforceability of the Settlement Provisions. It is the intent of the Parties that all of the provisions of Part IV of this Settlement shall be included in enforceable modified License Articles. On that basis, as noted above, the Parties have included Proposed Settlement License Articles consistent with the terms and conditions of this Settlement in Appendix A hereto. The Parties request that in its Order Approving Settlement the FERC notify the Parties if any of the Proposed Settlement License Articles (or any portion of such Proposed Settlement License Articles) are deemed by the FERC not to be within its jurisdiction to enforce under the Federal Power Act. The Parties further request that FERC notify the Parties of any limitation on its ability to enforce the Proposed Settlement License Articles.

Section 2.7. Appendices to the Settlement. In support of this Settlement, the Parties submit the following Appendices which are attached hereto and incorporated herein by reference: Appendix A contains the Proposed Settlement License Articles for adoption in the Order Approving Settlement. Appendix B contains a copy of the 2001 WQC and

related documents and a matrix illustrating the correlation between the Settlement provisions and the 2001 WQC. Appendix C contains a matrix correlating the License Articles in the 1999 License Order with the Proposed Settlement License Articles and the Settlement provisions. Appendix D contains the No. 2 Overflow procedures. Appendix E contains the Shortnose Sturgeon Handling Plan. Appendix F contains details on the research to be performed on downstream fish passage under Section 4.7 of the Settlement. Appendix G contains the Downstream Sampling Facility Operating Protocol. Appendix H is a list of contacts for purposes of this Settlement.

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.

Part V – Reservations and Obligations of the Parties

Section 5.1. Support of the Parties. Subject to the provisions of Section 2.4 above, the Parties agree to actively support the approval of this Settlement before the FERC, for the purpose of obtaining an amended License that is consistent with the terms and conditions of this Settlement in any administrative proceeding or appellate review. Subject to the provisions of Section 2.4 above, the Parties agree not to propose or otherwise communicate to the FERC any comments, recommendations, or positions materially inconsistent with the terms and conditions contained in this Settlement. However, this Settlement shall not be interpreted to restrict any Party's participation or comments in proceedings to reopen or amend the License after approval of the Settlement or in future relicensing or amendment of the Project outside the provisions of the Settlement. Each Party reserves the right to withdraw its agreement to the Settlement if any other Party acts significantly contrary to or inconsistent with the Settlement terms and conditions.

Section 5.2. Rehearing of FERC Order Approving Settlement. The Parties agree not to file for rehearing of the Order Approving Settlement so long as the FERC has approved the Settlement and the Proposed Settlement License Articles without material modification. If any Party determines that, in that Party's view, a change made by FERC to any term and condition of the Settlement or to any Proposed Settlement License Article is a material modification, then the aggrieved Party shall notify the other Parties within 15 days of issuance of the Order Approving Settlement and may file a request for rehearing of the Order Approving Settlement. If all Parties agree that the FERC has made a material modification, the Parties agree to support or do nothing to undermine the

request for rehearing; if that material modification is not modified by the FERC in a manner consistent with this Settlement, then the Settlement shall be null and void.

Section 5.3. Post-Approval Procedure. The Parties agree to withdraw their respective Requests for Rehearing filed in response to the 1999 License Order contingent on the Settlement becoming effective pursuant to Section 3.1 hereof. FWS and NOAA Fisheries further agree to withdraw their respective Mandatory Conditions filed pursuant to Section 18 of the Federal Power Act prior to the 1999 License Order, contingent on the Settlement becoming effective pursuant to Section 3.1 hereof.

Section 5.4. Authorities Maintained. Nothing in this Settlement is intended to or shall be construed to affect or limit the authority of any Party to fulfill its statutory or regulatory obligations under applicable law. The Parties with such responsibilities agree that the terms and conditions of this Settlement and the Proposed Settlement License Articles are not inconsistent with their statutory and regulatory responsibilities to the extent that all material provisions are included in the FERC Final Order Approving Settlement and the modified License Articles issued based on the Settlement.

Section 5.5. Department of Interior Reservation of Authority. Pursuant to Section 18 of the Federal Power Act, the Secretary of the Department of Interior, as delegated to FWS, shall reserve its authority to prescribe such fishways as are necessary and appropriate. However, this reservation of authority will only be utilized: (i) consistent with the terms of the Settlement; and/or (ii) under such circumstances as the Settlement is violated, voided, or otherwise breached; and/or (iii) to address fish passage needs that are determined necessary based on changes in fish species or populations or fish management plans, that were not contemplated at the time of this Settlement Agreement.

Section 5.6. Department of Commerce Reservation of Authority. Pursuant to Section 18 of the Federal Power Act, the Secretary of the Department of Commerce, as delegated to NOAA Fisheries, shall reserve its authority to prescribe such fishways as are necessary and appropriate. However, this reservation of authority will only be utilized: (i) consistent with the terms of the Settlement; and/or (ii) under such circumstances as the Settlement is violated, voided, or otherwise breached; and/or (iii) to address fish passage needs that are determined necessary based on changes in fish species or populations or fish management plans, that were not contemplated at the time of this Settlement Agreement; *provided, however*, that nothing in this Section shall preclude NOAA Fisheries from issuing a Biological Opinion (together with any reasonable and prudent alternatives, reasonable and prudent measures, terms and/or conditions thereunder) as discussed in Section 2.4 above.

Section 5.7. MADEP Authority. The MADEP hereby confirms that the provisions of this Settlement are consistent with correlated requirements contained in the 2001 WQC, and the related documents as included in Appendix B hereto. The MADEP shall reserve its authority to require HG&E to take actions required by the 2001 WQC pursuant to the Massachusetts Clean Waters Act (M.G.L. c.21 sec. 26-53) and the Massachusetts Water Quality Standards (314 CMR 4.00), and to ensure compliance with the Massachusetts Endangered Species Act (M.G.L. c. 131A). However, MADEP will not exercise such authority in a manner inconsistent with the terms of this Settlement unless the MADEP determines that the Settlement has been violated, voided or otherwise breached.

Section 5.8. Reopen/Amend License and Settlement.

Section 5.8(a). The Parties agree that, except as provided herein, nothing in the Settlement is intended: (i) to limit or restrict the ability of any Party to request a reopener or an amendment to the License, or (ii) to limit or restrict the ability of HG&E to request an amendment to the License; provided, however, that such request must be materially consistent with the terms and conditions of this Settlement or, if materially inconsistent, the Party demonstrates to the other Parties that the request meets the requirements of Sections 3.2 and/or 5.8(b) of the Settlement. In the event that the Parties request that the FERC reopen this Settlement, the Parties further request that the FERC reinitiate consultation with NOAA Fisheries under the Endangered Species Act (16 U.S.C. §1531, *et seq.*) with respect to the federally endangered shortnose sturgeon.

Section 5.8(b). Except as stated in Sections 2.4 and 3.2 above, a Party may only seek to reopen the Settlement or to amend the License Articles approved in the Final FERC Order Approving the Settlement pursuant to Section 5.8(a) above in a manner that would be materially inconsistent with the terms and conditions of this Settlement if: (1) that Party demonstrates that the proposed modification is based on (a) a material change in the circumstances from those in effect as of the date the Parties executed the Settlement, and/or (b) substantial new evidence that was not known or could not reasonably have been known as of the date of execution of the Settlement; (2) FWS and/or NOAA Fisheries determine that any conditions set forth under 50 CFR §402.16(a)-(d) are triggered; or (3) the MADEP requests that the FERC reopen the License pursuant to Condition 6 of the 2001 WQC. Consistent therewith, the Parties agree that the specific fish passage and monitoring components in this Settlement are elements of a long-term

fish passage program for this Project; if a Resource Agency seeks to reinitiate consultation with the FERC under the Endangered Species Act (16 U.S.C. §1531, *et seq.*) pursuant to (1) and/or (2) above, the Parties encourage the FERC to reinitiate such consultation.

Section 5.8(c). Before any Party takes any such action described in Section 5.8(b) above, such Party must provide at least 60 days prior written notice to the other Parties. If any Party believes that the proposed reopener or amendment is inconsistent with the Settlement, that opposing Party shall respond to all other Parties in writing within 30 days of receipt of the written notice. All interested Parties shall then conduct a settlement conference by telephone, video or in person, within 60 days of the opposing Party's opposition. During the settlement conference, all Parties shall attempt to resolve or narrow the scope of dispute. If HG&E and the Resource Agencies are unable to reach agreement on the proposed reopener or amendment during the settlement conference, then the Party seeking the reopener or amendment shall be permitted to make such filing and all Parties are free to advocate any position they deem appropriate before the FERC or the other regulatory agency.

Section 5.8(d). Any Party that does not timely object to any proposed reopener or amendment under the provisions set forth in this Part shall be bound by the FERC's approval of that request to reopen or amend this Settlement.

Section 5.8(e). The Party filing a request for reopener or amendment under this Part shall demonstrate, in its request to reopen or amend, its compliance with this Section 5.8 of the Settlement.

Part VI – FERC Action on Settlement

Section 6.1. Deadline for FERC Action. This Settlement shall be null and void if, on or before March 1, 2005, the FERC has not issued an Order Approving the Settlement that incorporates the terms and conditions of the Settlement and the Proposed Settlement License Articles as modifications to the 1999 License without material modification.

Section 6.2. Modification by the FERC. If in its Order Approving Settlement the FERC modifies a Proposed Settlement License Article or any other term or condition of the Settlement, but no Party to this Settlement requests rehearing of the Order Approving the Settlement, then the Settlement shall become effective.

Part VII – Enforcement of Settlement and Dispute Resolution

Section 7.1. Enforcement of Settlement Provisions. The amended License Articles included in the Final FERC Order Approving the Settlement shall be enforced by FERC under the Federal Power Act.

Section 7.2. Limitation on Other Relief. No Party shall seek relief from or modification to the Settlement in any other forum or by any other process except as set forth in the Settlement.

Section 7.3. Compliance.

Section 7.3(a). If any Party believes that another Party has failed to perform any of the terms or conditions of the Settlement, the Party shall give written notice of its beliefs to the allegedly non-complying Party and to all other Parties. The allegedly non-complying Party shall then provide a written response to all Parties within 30 days of its receipt of such notice. Thereafter, all Parties must meet telephonically, by video conferencing, or

in person, within 60 days of the response to discuss their beliefs as to: (i) whether noncompliance has occurred; (ii) a deadline for the Party to cure the noncompliance if such noncompliance has occurred; and (iii) whether civil or criminal penalties should be assessed as a result of the alleged noncompliance. If HG&E and the Resource Agencies agree on (i), (ii), and/or (iii) above, then the Party allegedly in noncompliance shall make every reasonable effort to cure, or at least commence activities to cure, the noncompliance within the time period specified by the Parties.

If agreement between HG&E and the Resource Agencies is not achieved on (i), (ii), and/or (iii) above, then HG&E and the Resource Agencies are entitled to advance their respective positions in any manner prescribed by law. However, nothing in this Section shall preclude FWS and/or NOAA Fisheries from seeking to enjoin an action or actions of any Party that could result in a take or immediate and irreparable harm to a resource protected under the Endangered Species Act. In addition, nothing in this Section shall preclude the MADEP or the MADFW from issuing an order or otherwise seeking to enjoin an action or actions that could result in a violation(s) of the Massachusetts Clean Waters Act (M.G.L. c.21 sec. 26-53), the Massachusetts Water Quality Standards (314 CMR 4.00), and the Massachusetts Endangered Species Act (M.G.L. c. 131A).

Section 7.3(b). If the Party determined to be in noncompliance with the Settlement, under Section 7.3(a) above, does not cure or commence to cure and/or remedy the noncompliance within the time period specified by the Parties under Section 7.3(a) above, any other Party may pursue any available remedy including petitioning to FERC to enforce the Settlement term and condition.

Section 7.4. Dispute Resolution. The Parties agree to work constructively among themselves, with best efforts, to reach agreement resolving any disputes that may arise over the implementation of the Settlement, including any desire by a Party to reopen or amend the License Articles pursuant to Section 5.8 above and/or any allegation of noncompliance under Section 7.3 hereof. Upon agreement of all Parties involved in the dispute, the Parties may engage in dispute resolution in addition to the processes set forth in Section 5.8(c) and 7.3(a) above.

Part VIII – Notice

Section 8.1. Written Notice. All written notices to be given pursuant to this Settlement shall be mailed by first class mail postage prepaid, or overnight express service, to each Party at the addresses listed below or such subsequent address as a Party shall identify to all other Parties. Notices shall be deemed to be given three business days after the date of mailing or on the date of receipt if sent by overnight express or other receipt-notification service. If notice is accomplished by fax or electronic mail, written notice shall be made by first class mail or overnight express service as soon as practicable thereafter.

Section 8.2. Contact Persons for Settlement. For the purposes of implementing this Settlement, the Parties agree that the individuals listed in Appendix H shall be the primary contact person and all written notices shall be posted to these persons at the address listed below. Notification of change in the contact person and/or address shall be made in writing and delivered to all other contact persons.

Part IX – General Provisions

Section 9.1. Emergency Situations. If, as a result of an event that is beyond the reasonable control of a Party and without the fault of that Party or any person or entity subject to that Party's control, which event was not reasonably forseeable and could not have been avoided by the exercise of due care by that Party, the Party is unable to comply with a provision under this Settlement as contained in the License Articles approved in the Final FERC Order Approving the Settlement, that non-complying Party shall make all reasonable efforts to promptly re-establish compliance. The non-complying Party shall notify the other Parties (by telephone, fax or e-mail, as soon as it is reasonably possible and practical to do so) but within a time no later than 24 hours of the non-complying Party's knowledge of the circumstances of the event that it believes caused the noncompliance event. If an emergency impacts HG&E's ability to comply with the requirements contained in Condition 9 of the 2001 WQC, HG&E shall also comply with the additional provisions stated in Condition 9.

Section 9.2. Successor and Assigns. The Settlement shall bind the successors and assigns of the Parties. With respect to Parties that are Federal and State governmental agencies, "successors and assigns" shall mean the governmental agency that assumes the statutory mandates involved in this Settlement previously administered by the Party.

Section 9.3. No Precedential Effect. This Settlement represents a negotiated settlement of all issues subject to the Requests for Rehearing. No Party shall be deemed to have approved, accepted, agreed or consented to any concept, theory or principle underlying or supposed to underlie any term or condition in this Settlement.

Section 9.4. Privileged if not approved. This Settlement is being submitted for approval by the FERC pursuant to Rule 602 of the FERC's Rules of Practice and Procedure. If the provisions of this Settlement and the Proposed Settlement License Articles attached hereto in Appendix A which are identified pursuant to Section 2.6 above as within the FERC's jurisdiction to enforce under the Federal Power Act are not incorporated in the License for any reason, it shall be considered privileged and not admissible in evidence or made a part of the record in any proceeding.

Section 9.5. Costs. All Parties shall bear their own costs in implementing the Settlement, except as provided for under Section 4.6(e) hereof with respect to the fishway monitoring scope of work under Condition 15 of the 2001 WQC.

Section 9.6. Federal or State Expenditures. Nothing in this Settlement shall obligate any Federal or State agency that is a Party to expend in any fiscal year in excess of appropriations made by the U.S. Congress or the State legislature as allocated to that agency for the purpose of administering its statutory obligations relating to the Project.

Section 9.7. Terms not Severable. The terms and conditions of this Settlement are not severable. The Settlement is made and executed on the understanding that each term and condition is in consideration and support for each other term and condition, and each term and condition is a necessary part of the Settlement.

Section 9.8. Regulations and Statutes. Reference to regulations and laws in the Settlement is to existing or successor regulations or laws in effect as of date of the action at issue.

Section 9.9. Headings. The headings contained in this Settlement are provided for reference purposes only and shall not affect in any way the meaning or interpretation of the Settlement.

Section 9.10. No Third-Party Beneficiary. This Settlement is for the sole benefit of the Parties and shall not be construed or interpreted to give to any person, other than the Parties hereto, any legal or equitable rights hereunder as a third-party beneficiary. Nothing in this Settlement shall be construed to authorize any such third-party to maintain a suit in law or equity under this Settlement.

Section 9.11. Governing Law. The terms and conditions of this Settlement shall be governed by and construed in accordance with the Federal or State statutory authority referenced and applicable.

Section 9.12. Execution. This Settlement may be executed in one or more counterparts, all of which shall be considered one and the same agreement. Each signatory to this Settlement hereby certifies that he or she is authorized to sign on behalf of the stated Party.

Agreed and accepted to by Holyoke Gas & Electric Department,

By James M. Laurelle

Dated: 3/10/04

Agreed and accepted to by U.S. Department of the Interior,
through the U.S. Fish and Wildlife Service

By _____

Dated: 3/2/04

Agreed and accepted to by U.S. Department of Commerce,
National Oceanic and Atmospheric Administration,
National Marine Fisheries Service,

By _____

Dated: _____

Agreed and accepted to by Commonwealth of Massachusetts,
Department of Environmental Protection,

By _____

Dated: _____

Agreed and accepted to by Commonwealth of Massachusetts,
Department of Fisheries and Wildlife,

By _____

Dated: _____

Agreed and accepted to by U.S. Department of the Interior,
through the U.S. Fish and Wildlife Service

By _____

Dated: _____

Agreed and accepted to by U.S. Department of Commerce,
National Oceanic and Atmospheric Administration,
National Marine Fisheries Service,

By _____

Dated: 3/10/04

Agreed and accepted to by Commonwealth of Massachusetts,
Department of Environmental Protection,

By _____

Dated: _____

Agreed and accepted to by Commonwealth of Massachusetts,
Department of Fisheries and Wildlife,

By _____

Dated: _____

Agreed and accepted to by U.S. Department of the Interior,
through the U.S. Fish and Wildlife Service

By _____

Dated: _____

Agreed and accepted to by U.S. Department of Commerce,
National Oceanic and Atmospheric Administration,
National Marine Fisheries Service,

By _____

Dated: _____

Agreed and accepted to by Commonwealth of Massachusetts,
Department of Environmental Protection,

By _____

Dated: _____

Agreed and accepted to by Commonwealth of Massachusetts,
Department of Fisheries and Wildlife,

By Wayne F. MacCallum, Director

Dated: March 1, 2004

Agreed and accepted to by Trout Unlimited,

By _____

Dated: 3/10/04

Agreed and accepted to by Connecticut River Watershed Council,

By _____

Dated: _____

Agreed and accepted to by The Town of South Hadley, Massachusetts,

By _____

Dated: _____

Agreed and accepted to by Trout Unlimited,

By _____

Dated: _____

Agreed and accepted to by Connecticut River Watershed Council,

By _____

Dated: 3/5/04

Agreed and accepted to by The Town of South Hadley, Massachusetts,

By _____

Dated: _____

Agreed and accepted to by Trout Unlimited,

By _____

Dated: _____

Agreed and accepted to by Connecticut River Watershed Council,

By _____

Dated: _____

Agreed and accepted to by The Town of South Hadley, Massachusetts,

By Barbara L Eckman

Dated: _____

HOLYOKE GAS & ELECTRIC DEPARTMENT
PROJECT NO. 2004
SETTLEMENT AGREEMENT

Appendices

Appendix A Proposed Settlement License Articles

Appendix B 2001 Water Quality Certification documents and matrix

Appendix C Matrix correlating Proposed Settlement License Articles and the Settlement Agreement Provisions with 1999 License Order

Appendix D No. 2 Overflow Procedures

Appendix E Shortnose Sturgeon Handling Plan

Appendix F Detailed Description of HG&E Proposed Settlement Downstream Research and Construction (2004-2009/10)

Appendix G Downstream Sampling Facility Operating Protocol

Appendix H List of Contacts for purposes of the Settlement Agreement

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. [*unchanged from 1999 License Order*] 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. [*unchanged from 1999 License Order*] 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. [*unchanged from 1999 License Order, except for reference to other License Article*] 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. [*unchanged from 1999 License Order*] 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. [*unchanged from 1999 License Order*] 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. The licensee shall operate and maintain the inflatable rubber dam installed in November 2001 at the Project.

Article 402.

(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 (MADEP), 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.

(a) The licensee shall implement the Shoreline Erosion Remediation Plan, as approved by the Commission on August 1, 2001 (96 FERC ¶ 62,100), 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 modified 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.

(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 modified 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.

(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 operations 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 bypass 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 NOAA National Marine Fisheries Service (NOAA Fisheries), the Massachusetts Division of Fisheries and Wildlife (MADFW), the Massachusetts Department of Environmental Protection (MADEP) 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, MADFW, MADEP, Trout Unlimited (TU), and C Connecticut River Watershed Council (CRWC) 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 affected the licensee's ability to achieve flow elevations in the bypass 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, MADFW, MADEP, TU, and CRWC, 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 MADEP 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, MADFW, and MADEP, 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, MADFW, MADEP, TU, and CRWC. 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 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, the FWS, NOAA Fisheries, MADEP, and MADFW. If Project operations are so modified, the licensee shall notify the Commission and FWS, NOAA Fisheries, the MADEP and MADFW 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 the MADEP 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 will distribute all reports to the resource agencies and other parties listed in that Article.

Article 406. The licensee shall release seasonally-adjusted minimum flows into the bypass 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 bypass reach when the fish lifts are not operational shall be of an amount that is determined to ensure an adequate water level in all bypass 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 bypass 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 of the order approving the Settlement and modifying the License Articles, 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 bypass 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 bypass 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 bypass reach sufficient to achieve the water surface elevations in the bypass reach which correspond to the 1997 Barnes & Williams IFIM Study of 1300 cfs flow as measured in the bypass reach. It is agreed that 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 describing that the fish lifts at the Project will be operational for the period April 1 through November 15 of each year, as refined by U.S. Fish and Wildlife Service (FWS), NOAA National Marine Fisheries Service (NOAA Fisheries), Massachusetts Division of Fisheries and Wildlife (MADFW), Massachusetts Department of Environmental Protection (MADEP) on an annual basis; provided, however, that the fish lifts will 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) MADFW 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 NGVD 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 of the order approving the Settlement and modifying the License Articles, 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 bypass 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 bypass 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 bypass 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 bypass reach sufficient to achieve 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. It is agreed that 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 bypass 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 bypass channels in the bypass 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 of the order approving the Settlement and modifying the License Articles, 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 MADEP 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 the MADEP 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 will 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 of the order approving the Settlement and modifying the License Articles, 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 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 for evaluation of the need for additional weirs to keep mussel habitat areas watered.

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

(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, MADEP, MADFW, Trout Unlimited, and 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	Bypass Reach Habitat Flows	Bypass Reach Habitat Flows
3	Fishway Attraction Water up to 440 cfs	Fishway Attraction Water up to 440 cfs
4	Bypass Reach Zone-of-Passage Flows	Bypass 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 bypass reach and canal system minimum flows as required by License Article 407 of this license, and shall monitor compliance with the minimum flows as required by License Article 408.

(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, the MADEP, and the MDFW. If the flows are so modified, the licensee shall notify the Commission and FWS, NOAA Fisheries, the MADEP and MADFW 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 will distribute all reports to the resource agencies and other parties listed in that Article.

Article 407.

(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 modified COFP is 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. 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 will 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 will not be operated and the headgates will be closed to seal flows into the canal. If necessary, at the end of the fish passage season a slow drain of the canal will 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 (MADFW), U.S. Fish and Wildlife Service (FWS), and NOAA 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 addressed in Section 4.3(g) of the Settlement. In consultation [as described in (d) below], the licensee will 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 (MADEP) on or before July 1, 2004. The effectiveness of the full depth louvers will 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, MADFW, MADEP, Trout Unlimited, and Connecticut River Watershed Council, and filed with the Commission and MADEP 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.

(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 bypass reach and the Holyoke canals. The licensee will 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. 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), NOAA

National Marine Fisheries Service (NOAA Fisheries), Massachusetts Division of Fisheries and Wildlife (MADFW), and Massachusetts Department of Environmental Protection (MADEP)] and other parties [Trout Unlimited (TU) and Connecticut River Watershed Council (CRWC)] pursuant to (c) below. If in consultation with the resource agencies the licensee implements Phase 2A, then the complete downstream passage facilities are to be operational by 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 are to be operational by 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 will 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 of the order approving the Settlement and modifying the License Articles (as described in License Article 420), and after consultation [as described in (c) below], the licensee shall file with the Commission and MADEP, 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 will 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 will 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 the MADEP on or before March 1, 2004. The licensee will

implement the plan as approved in writing by the Commission. If, after such modifications, evidence of injury to shortnose sturgeon is found, the licensee will consult with the resource agencies and other parties pursuant to paragraph (c) below to determine if any additional modifications are appropriate. The licensee will operate the Downstream Sampling Facility in accordance with the Downstream Sampling Facility Operating Protocol, attached as Appendix G to the Settlement.

(B) The licensee will 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 the MADEP on or before April 1, 2005 and shall implement the plan as approved in writing by the Commission.

(C) To reduce entrainment, the licensee will 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 the MADEP on or before December 31, 2004, and shall implement the plan as approved in writing by the Commission. The licensee will 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 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.

(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 Bypass 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 will 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. It is the intent that the licensee will implement Phase 2A as set forth in paragraph (b)(3) below if: (i) if 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, MADEP and MADFW pursuant to the process described below, then the licensee shall implement Phase 2B.

The process for determining whether the licensee will implement 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, MADEP and MADFW shall 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, MADEP and MADFW do not all agree with the licensee's recommendation, they will so notify the licensee by December 31, 2005, and the licensee will 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 will 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, 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, MADEP and MADFW) 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, MADEP and MADFW) 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 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.

- 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 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 will 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 the MADEP, 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 Bypass 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 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.

- 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 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 will 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 the MADEP, 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. 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 the order approving the Settlement and modifying the License Articles (as described in License Article 420), and after consultation [as described in (e) below], the licensee shall file with the Commission and Massachusetts Department of Environmental Protection (MADEP), for approval, an amendment to the Upstream Fish Passage Plan [as approved by the Commission on June 24, 2003 (103 FERC ¶ 62,177)] 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 bypass 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 NOAA National Marine Fisheries Service (NOAA Fisheries), the MADEP and the Massachusetts Division of Fisheries & Wildlife (MADFW) 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) MADFW and FWS determine that resident fish passage is necessary. The specific dates and hours of operation of the fish lifts during these periods is to be determined by MADFW in consultation with the licensee in accordance with Condition 14(d) of the Water Quality Certification issued by the MADEP 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 will not interrupt fish lift operations during the Upstream Passage Season; and a functioning trap for salmon and the ability to trap and truck shad will be 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 shall follow the Shortnose Sturgeon Handling Plan (attached as Appendix E to the Settlement);

(6) A provision that the licensee will 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 D to the Settlement);

(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 of the order approving the Settlement and modifying the License Articles (as described in License Article 420), and after consultation [as described in (e) below], the licensee shall file with

the Commission and MADEP, 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 will 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 the MADEP, 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], which 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 the MADEP, MADFW, 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 will 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 the MADEP (for approval consistent with Condition 14(c) of the Water Quality Certification issued by the MADEP 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 will implement the plan as approved by the Commission.

(4) If, based on the effectiveness study results, the MADEP, MADFW, 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 will 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 will 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 will 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 MADFW 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 MADFW, 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 the MADEP 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. 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 Interim Upstream Eel Passage Plan, approved by the Commission on _____ (__ FERC ¶ ____) [*filed December 2003*). As stated in that plan, the licensee shall do the following in furtherance of eel passage at the Project; all activities will 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 (MADEP) on or before March 31, 2006, a permanent upstream eel passage plan that includes the following activities by year; all activities will 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, NOAA National Marine Fisheries Service, Massachusetts Division of Fisheries and Wildlife, MADEP, Trout Unlimited, 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 MADEP 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 plan. Implementation of any provision outlined in the modified 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.

(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.
(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 will 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 construction schedule. The licensee shall implement the construction plan as approved by the Commission, including any changes required by the Commission.

Article 415. 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.

(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.

Article 417.

(a) The licensee shall implement the Invasive Species Monitoring Plan as approved by the Commission on August 20, 2001 (96 FERC ¶ 62,174) 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 (MADFW) 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 the MADFW to undertake reasonable measures to control or eliminate these species in Project waters.

Article 418.

(a) The licensee shall implement the Comprehensive Recreation and Land Management Plan (CRLMP) for the Holyoke Project, as approved by the Commission on _____(__ FERC ¶ ____). 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, 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.
(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. 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), NOAA National Marine Fisheries Service (NOAA Fisheries), Massachusetts Division of Fisheries and Wildlife (MADFW), Massachusetts Department of Environmental Protection (MADEP)] and to the other parties (Trout Unlimited and Connecticut River Watershed Council), 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, 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) 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 Water Quality Certification issued by the MADEP 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 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 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. The licensee shall comply with the Water Quality Certification issued by the Massachusetts Department of Environmental Protection (MADEP) on February 14, 2001 (pursuant to the settlement of the state administrative appeal of the 1999 Water Quality Certification), as extended by MADEP in writing. 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 the License as Appendix ___

Article 422. [*unchanged from 1999 License Order*]

(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.

Holyoke Project, FERC No. 2004
Appendix B to Settlement Agreement
2001 Water Quality Certification
(and letters granting extensions of time
issued by MADEP in writing)

2001 Water Quality Certification:

Commonwealth of Massachusetts, Department of Environmental Protection, Final Water Quality Certification, issued February 14, 2001 (pursuant to settlement of state administrative appeal of the 1999 Water Quality Certification).

Letters from MADEP:

Letter dated January 10, 2003, from Brian D. Harrington, Acting Deputy Regional Director, Bureau of Resource Protection, Massachusetts, Department of Environmental Protection, to Paul S. Ducheney, City of Holyoke Gas & Electric Department.

Letter dated October 6, 2003, from Brian D. Harrington, Acting Deputy Regional Director, Bureau of Resource Protection, Massachusetts, Department of Environmental Protection, to Paul S. Ducheney, City of Holyoke Gas & Electric Department.

Letter dated January 21, 2004, from Brian D. Harrington, Acting Deputy Regional Director, Bureau of Resource Protection, Massachusetts, Department of Environmental Protection, to Paul S. Ducheney, City of Holyoke Gas & Electric Department.

Letters from HG&E, pending at MADEP:

Letter dated December 18, 2003, from Paul S. Ducheney, City of Holyoke Gas & Electric Department, to Brian D. Harrington, Acting Deputy Regional Director, Bureau of Resource Protection, Massachusetts, Department of Environmental Protection (*request pending*).

Letter dated December 26, 2003, from Paul S. Ducheney, City of Holyoke Gas & Electric Department, to Brian D. Harrington, Acting Deputy Regional Director, Bureau of Resource Protection, Massachusetts, Department of Environmental Protection (*request pending*).

COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS
DEPARTMENT OF ENVIRONMENTAL PROTECTION

February 14, 2001

In the Matter of

HOLYOKE WATER POWER CO.

Docket No. 99-131
Water Quality Certification

FINAL DECISION

I have reviewed the attached proposed Settlement Agreement, signed on February 8, 2001 by Arleen O'Donnell, Deputy Commissioner, for the Department of Environmental Protection; by William J. Nadeau, Vice President-Fossil/Hydro Engineering and Operations, for the applicant Holyoke Water Power Co.; by Tom Miner, Executive Director, for the Connecticut River Watershed Council; by Charles Olchowski, attorney for Trout Unlimited; and assented to on February 8, 2001 by Wayne F. MacCallum, Director, for the Massachusetts Division of Fisheries and Wildlife. I have also reviewed the attached Revised 401 Water Quality Certification to which the Settlement Agreement refers.

The Department hereby issues this Final Decision, which approves and incorporates said Settlement Agreement and the Revised 401 Water Quality Certification. In accordance with 310 CMR 1.01(5)(c) and the terms of the Settlement Agreement, the above-captioned appeal is dismissed, with the parties waiving whatever rights they have to further administrative review before the Department as well as appeal to any court.

Lauren A. Liss
Commissioner

SERVICE LIST

In The Matter Of: Holyoke Water Power Company

Docket No. 99-131 File No. Water Quality Certification

Representative	Party
Stephen M. Leonard, Esq. Brown, Rudnick, Freed & Gesmer, P.C. One Financial Center Boston, MA 02111	APPLICANT/PETITIONER Holyoke Water Power Company
Catherine E. Shively c/o Public Service Company of New Hampshire 1000 Elm Street P.O. Box 330 Manchester, NH 03105	APPLICANT/PETITIONER Holyoke Water Power Company
Deirdre C. Desmond, Esq. DEP – Office of General Counsel One Winter Street, 3rd Floor Boston, MA 02108	DEPARTMENT Dept. of Environmental Protection
Tom Miner, Executive Director Connecticut River Watershed Council One Ferry Street Easthampton, MA 01027	INTERVENORS Connecticut River Watershed Council
Elizabeth Wroblicka, Esq. 65 Franklin Street Northampton, MA 01060	INTERVENORS Connecticut River Watershed Council
Charles Olchowski, Esq. 28 Smith Street Greenfield, MA 01301	INTERVENORS Trout Unlimited
cc: Robert McCollum DEP – Western Regional Office 436 Dwight Street – Suite 402 Springfield, MA 01103	DEPARTMENT Dept. of Environmental Protection
Robert D. Kubit DEP – Central Regional Office 627 Main Street, 2nd Floor Worcester, MA 01608	DEPARTMENT Dept. of Environmental Protection

Date: February 14, 2001

COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS
DEPARTMENT OF ENVIRONMENTAL PROTECTION

In the Matter of: Holyoke Water Power Co.	DEP Docket No. 99-131

SETTLEMENT AGREEMENT

The Massachusetts Department of Environmental Protection (Department), Connecticut River Watershed Council (Intervenor), Trout Unlimited (Intervenor), and Holyoke Water Power Co. (Applicant/Petitioner), hereinafter collectively referred to as the "Parties", enter into and submit this Settlement Agreement for approval pursuant to M.G.L. c. 30A and 310 CMR 1.01(8)(c), as a final resolution of the above-referenced adjudicatory proceedings.

BACKGROUND

This adjudicatory proceeding began with Applicant/Petitioner's appeal of the Department's July 28, 1999 401 Water Quality Certification for the Holyoke Dam Hydroelectric Project on the Connecticut River. The two intervenors sought and were granted leave to intervene in the proceeding. Applicant/Petitioner raised a number of legal and factual issues concerning the July 28, 1999 Certification. Each party's decision to enter into this Settlement Agreement represents its judgment that a negotiated resolution of the proceeding makes more sense than continued litigation of those issues. All parties reserve their rights with respect to the assertion of their legal and factual positions in any other proceeding.

CONNECTICUT RIVER WATERSHED COUNCIL
By:

Tom Miner, Executive Director

Dated: 2/5/2001

TROUT UNLIMITED
By Its Attorney:

Charles Olchowski

Dated: _____

ASSENTED TO:
MASSACHUSETTS DIVISION OF FISHERIES AND WILDLIFE
By:

Wayne F. MacCallum, Director

Dated: _____

CONNECTICUT RIVER WATERSHED COUNCIL
By:

_____
Tom Miner, Executive Director

Dated: _____

TROUT UNLIMITED
By Its Attorney:

Charles Olchowski

Dated: 02-08-01

ASSENTED TO:
MASSACHUSETTS DIVISION OF FISHERIES AND WILDLIFE
By:

_____
Wayne F. MacCallum, Director

Dated: _____

CONNECTICUT RIVER WATERSHED COUNCIL
By:

_____
Tom Miner, Executive Director

Dated: _____

TROUT UNLIMITED
By Its Attorney:

_____
Charles Olchowski

Dated: _____

ASSENTED TO:
MASSACHUSETTS DIVISION OF FISHERIES AND WILDLIFE
By:

Wayne F. MacCallum

Wayne F. MacCallum, Director

Dated: Feb 8, 2001

401 Water Quality Certification

Applicant: Northeast Utilities Service Company

As Agent For

Holyoke Water Power Company

BRPWW10

PREAMBLE

The Massachusetts Clean Waters Act (Act), M.G.L. c.21, §§ 26-53, delegates to the Massachusetts Department of Environmental Protection (MADEP) the responsibility for protecting public health and enhancing the quality and value of water resources within the Commonwealth. The Act directs MADEP to take all action necessary or appropriate to secure to the Commonwealth the benefits of 33 U.S.C. 1251, *et seq.* (the federal Clean Water Act). The main objectives of the federal Act are to restore and maintain the chemical, physical and biological integrity of the Nation's waters. In order to meet these objectives, MADEP adopted the Massachusetts Surface Water Quality Standards. 314 CMR 4.00, *et seq.* The Standards classify each body of water; designate the most sensitive uses to be enhanced, maintained and protected for each class; prescribe minimum water quality criteria required to sustain the designated uses; and contain regulations necessary to achieve the designated uses and maintain existing water quality including, where appropriate, the prohibition of discharges into waters of the Commonwealth.

MADEP has designated the Connecticut River as a Class B river for its entire length in Massachusetts. 314 CMR 4.06(3). Class B rivers are assigned the designated uses of habitat for fish, other aquatic life, and wildlife, and for primary and secondary contact recreation. 314 CMR 4.05(3)(b). Class B waters must also have consistently good aesthetic value and meet minimum criteria for numerous water quality indicators to achieve compliance with the standards set forth in the regulations. 314 CMR 4.05(5), 4.06(3). The Antidegradation provisions of 314 CMR 4.04 require protection of all existing and designated uses of water bodies, and maintenance of the level of water quality needed to protect those uses.

The Connecticut River is the longest river in New England. It originates 2,625 feet above sea level in the Fourth Connecticut Lake and accumulates water from several major tributaries as it flows south at a slope of about 6 feet per mile. The waterway serves as the boundary between

New Hampshire and Vermont, then runs through Massachusetts and Connecticut. The river empties into Long Island Sound, over 400 miles from its source.[1]

The Connecticut River watershed is of major importance to the Northeast region. It provides essential habitats and a migratory corridor for numerous species of fish, wildlife, and native plants; recreational opportunities to over two million people; and a major source of water for irrigation, power production, industrial water supply and waste assimilation. Unfortunately, these uses are often in competition with one another. The environment of the 11,250 square-mile drainage basin is variable, exemplifying both highly developed, urbanized areas and rural forested reaches.[2] For most of the mainstem and many of its tributaries, the natural stream gradient is interrupted by artificial impoundments that provide over 3 million acre-feet of storage capacity. These reservoirs are a direct result of the more than 1000 dams located on the mainstem and tributaries. There are 16 dams, most of which are utility-owned, impounding nearly 200 miles of the mainstem river[3].

Additionally, the Connecticut River was a natural highway for commerce in New England prior to the development of the railroad. Several canals were built between 1791 and 1828 to facilitate transportation around natural falls. The combined operation of electrical generating facilities and maintenance of the canal systems has greatly influenced the flow regime, water quality, aquatic habitat, and movement of anadromous[4], catadromous[5] and riverine fish in the Connecticut River.

For many years, the state and federal governments have cooperated in efforts to restore anadromous Atlantic salmon, American shad, blueback herring and other species to the Connecticut River[6]. As the first impassable barrier to upstream migration on Connecticut River,[7] the Holyoke Dam Hydroelectric Project (hereinafter referred to as the "Project") has a significant impact in these restoration efforts. These species require safe and efficient passage past the Project on their upstream spawning migrations. Juveniles of these species require downstream passage measures to guide them safely past the Project turbine intakes on their seaward migrations. The Project currently includes facilities aimed at providing upstream and downstream passage for these species. However, modifications to these facilities are needed to

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[1] Connecticut River Joint Commission. 1997. Connecticut River Corridor Management Plan, Volume 1: River-wide Overview.
[2] Connecticut River Atlantic Salmon Commission. 1998. Strategic Plan for the Restoration of Atlantic Salmon to the Connecticut River.
[3] USFWS. Connecticut River Coordinator's Office. 1996. The status of migratory fish passage and barriers to passage in the Connecticut River watershed.
[4] Anadromous fish start their life in freshwater, mature at sea, and must return to freshwater in order to spawn and complete their life cycle.
[5] Catadromous fish spend the majority of their lives in fresh or brackish waters but must return to the ocean to spawn and complete their life cycle.
[6] Connecticut River Atlantic Salmon Commission. 1998. Strategic Plan for the Restoration of Atlantic Salmon to the Connecticut River.
[7] USFWS. Connecticut River Coordinator's Office. 1996. The status of migratory fish passage and barriers to passage in the Connecticut River watershed.

increase their capacity and efficiency, and adequate bypass flows are needed to provide a safe zone-of-passage through the bypass reach to the dam and spillway fishway.

Upstream and downstream passage for the endangered shortnose sturgeon is a significant issue. Catadromous American eels must negotiate the dam on upstream migration as elvers and yellow eels, and must pass the Project safely on their downstream migrations as adult silver eels. Past fish passage designs and operations have not addressed either of these species. Numerous resident riverine species, such as the white sucker, make in-river migrations and, therefore, also have fish passage needs.

The bypass reach below the dam potentially provides a unique riffle area for quality resident fish and macroinvertebrate habitat. Permanent, year-round flows should be provided in the bypass reach as a part of this relicensing to sustain such valuable habitats. The minimum flows needed to maintain aquatic habitat in the bypass reach were calculated using the Incremental Flow Instream Methodology (IFIM). This is the same methodology MADEP used in reviewing the license application from Northeast Utilities Service Company in 1994 at the Gardner Falls Project (FERC Project No. 2334-001).

INTRODUCTION

MADEP reviewed applications for Water Quality Certification (WQC) for the Holyoke Dam Hydroelectric Project submitted by Northeast Utilities Service Company (NUSCO) as agent for Holyoke Water Power Company (HWP) and the City of Holyoke Gas and Electric Department (HG&E), Ashburnham Municipal Light Plant, and Massachusetts Municipal Wholesale Electric Company. MADEP decided to issue the WQC according to the conditions outlined in the Compliance section below. A chronology of milestones related to the issuance of this certification include:

- A WQC application was submitted to MADEP by the Northeast Utilities Service Company as agent for Holyoke Water Power Company on August 12, 1997.
- A WQC application was submitted to MADEP by the Massachusetts Municipal Wholesale Electric Company and Ashburnham Municipal Light Plant on August 28, 1997.
- The City of Holyoke Gas and Electric Department, Ashburnham Municipal Light Plant and the Massachusetts Municipal Wholesale Electric Company filed for a new license with the Federal Energy Regulatory Commission (FERC) to generate hydropower at the Holyoke Dam site in Holyoke, Massachusetts. Their application (FERC #11607-00) was filed on August 29, 1997.
- Northeast Utilities Service Company, as agent for Holyoke Water Power Company, also filed for a new license with FERC to generate hydropower at the Dam. Their application (FERC #2004-073) was filed on September 2, 1997. Copies of both applications were submitted to MADEP for review as part of the water quality certification process. Information contained in the original applications, subsequent information gathered during the WQC review, and input

from entities involved in the licensing and certification process were incorporated into the water quality certification determination and conditions.

- The WQC application submitted by the City of Holyoke Gas and Electric Department, Ashburnham Municipal Light Plant and the Massachusetts Municipal Wholesale Electric Company was withdrawn and resubmitted to MADEP on July 30, 1998.
- The WQC application submitted by the Northeast Utilities Service Company, as agent for Holyoke Water Power Company was withdrawn and resubmitted to MADEP on August 10, 1998.
- MADEP held a public hearing on the draft certification on June 9, 1999. The period for submittal of final comments on the draft certification ended on July 2, 1999.
- MADEP issued a combined 401 Water Quality Certification to both applicants for the federal license to operate the Holyoke Dam Hydroelectric Project on July 29, 1999.
- On August 18, 1999, Northeast Utilities Service Company as agent for the Holyoke Water Power Company filed an Appeal and Request for Adjudicatory Hearing on the 401 Water Quality Certificate with MADEP. A separate Appeal and Request for Adjudicatory Hearing was filed by the City of Holyoke Gas and Electric Department on the same date.
- On August 20, 1999, FERC issued an Order granting a new license for the Holyoke Hydroelectric Project to the Holyoke Water Power Company and denying the competing license application.
- The City of Holyoke Gas and Electric Department withdrew its Appeal and Request for Adjudicatory Hearing on October 14, 1999.
- On December 15, 2000 and December 30, 2000, respectively, the Connecticut River Watershed Council and Trout Unlimited filed separate Motions to Intervene in the administrative appeal of the 401 Water Quality Certificate. Both motions were granted on January 19, 2000.
- On January 13, 2000, MADEP, the Connecticut River Watershed Council, Trout Unlimited and Holyoke Water Power Company (hereinafter referred to as the "Parties") were granted an extension of time to pursue a negotiated agreement.
- This revised 401 Water Quality Certificate for the Holyoke Hydroelectric Project was issued to Holyoke Water Power Company as a result of negotiations and settlement between the Parties.

PROJECT DESCRIPTION

The Holyoke Dam Hydroelectric Project is an operating, licensed facility located on the Connecticut River at river mile 80, in Hampden, Hampshire and Franklin counties, Massachusetts. The main Project facilities are located in the city of Holyoke and the town of South Hadley, Massachusetts. The Connecticut River drains an area of about 8,309 square miles at the Holyoke dam. The Project's principal features consist of a single dam structure, a three level canal system, an impoundment, upstream and downstream fish passage facilities, six powerhouses and appurtenant facilities. Initial Project construction dates back to 1849. The canal system in the city of Holyoke was completed in 1905. The existing stone masonry dam

was built between 1895 and 1900, and the existing generating facilities were added in the early 1900's to mid 1980's.

CERTIFICATION PROVISIONS

In accordance with the provisions of M.G.L. c. 21, §§26-53, 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 amendments 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 future 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's 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 design 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. Bypass 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 bypass reach, of 340 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.

(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 bypass 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

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- New pneumatic pressure system in the gate control system at Holyoke 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 sunk (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.

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[9]. 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 USFWS 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).

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[9] For the 2002 construction season, these dates will be adjusted to permit the construction described in Condition #14(a).

(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 installed 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 MADEP.

(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, 2002[10] 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

[10] start of Phase 3 construction

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 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 MADFW, 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 bypass 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 bypass 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: CUUR0000SA0). 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 Operating 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.

Submissions under this Certification shall be sent to:

MADEP: Massachusetts Department of Environmental Protection
Division of Watershed Management
Central Regional Office
627 Main Street
Worcester, MA 01608
(508) 767-2854; FAX (508) 791-4131

Massachusetts Department of Environmental Protection
Bureau of Resource Protection
Western Regional Office
436 Dwight Street
Springfield, MA 01103
(413) 755-2138; FAX (413) 784-1149

MADFW: Massachusetts Division of Fisheries and Wildlife
Field Headquarters
Assistant Director of Fisheries
1 Rabbit Hill Road
Westborough, MA 01581
(508) 792-7270; FAX (508) 792-7275

HWP: Holyoke Water Power Company
c/o Northeast Generation Services Company, Agent
273 Dividend Road
Rocky Hill, CT 06067
Attention: James J. Kearns
(860) 665-5936; FAX (860) 665-5771

TU: Trout Unlimited
10 Old Stage Road
Wendell, MA 01379
(978) 544-7438

CRWC: Connecticut River Watershed Council
One Ferry Street
Easthampton, MA 01027
(413) 529-9500; FAX (413) 529-9501

(new address effective June 1, 2001)
15 Bank Row
Greenfield, MA 01301
(413) 772-2884

USFWS: United States Fish and Wildlife Service
New England Field Office
Attention: Supervisor
70 Commercial Street, Suite 300
Concord, NH 03301-5087
(603) 223-2541; FAX (603) 223-0104

NMFS: National Marine Fisheries Service
Assistant Regional Administrator for Protected Resources
Northeast Regional Office
One Blackburn Drive
Gloucester, MA 01930
(978) 281-9388; FAX (978) 281-9394

APPENDIX A

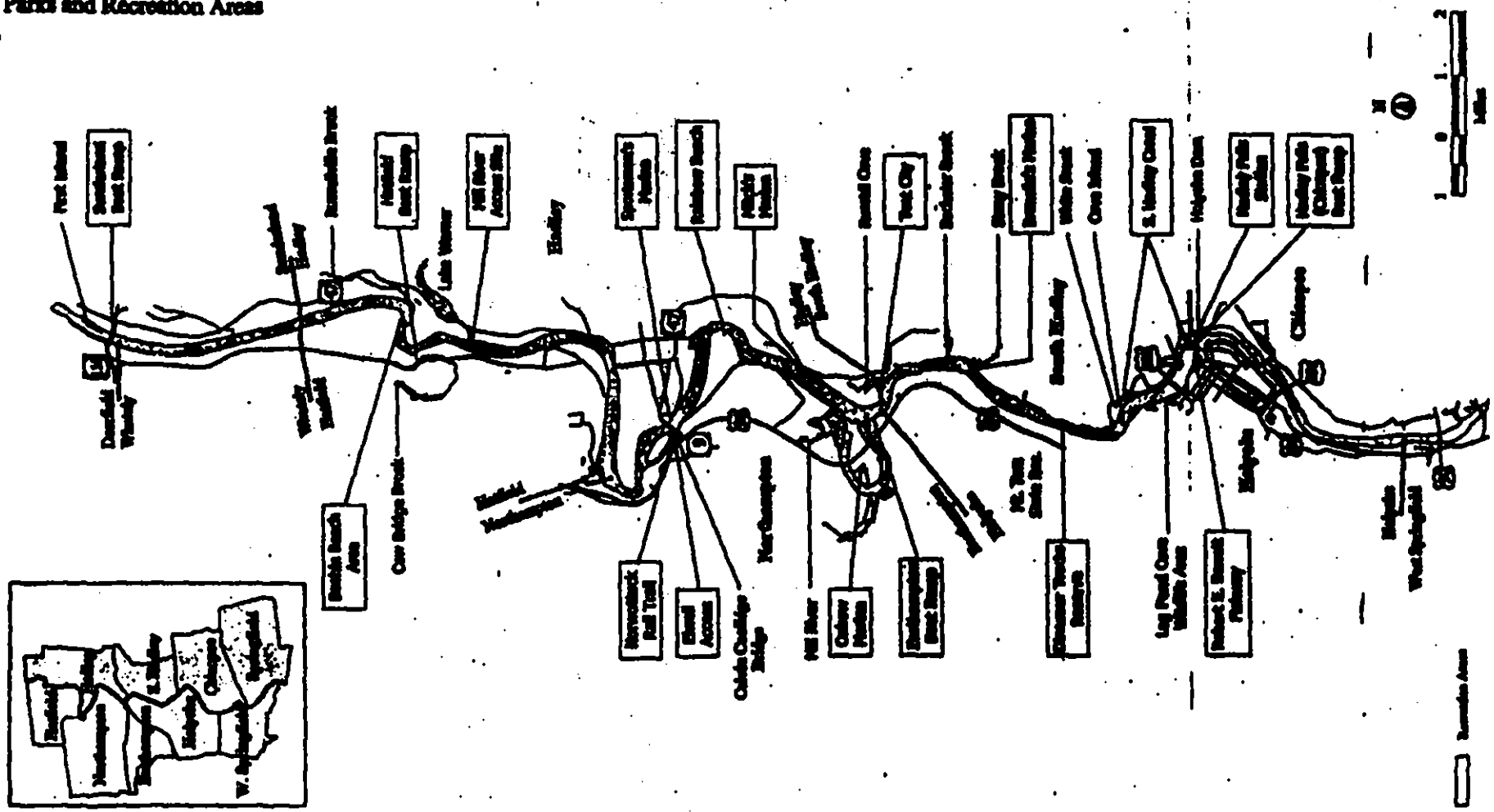
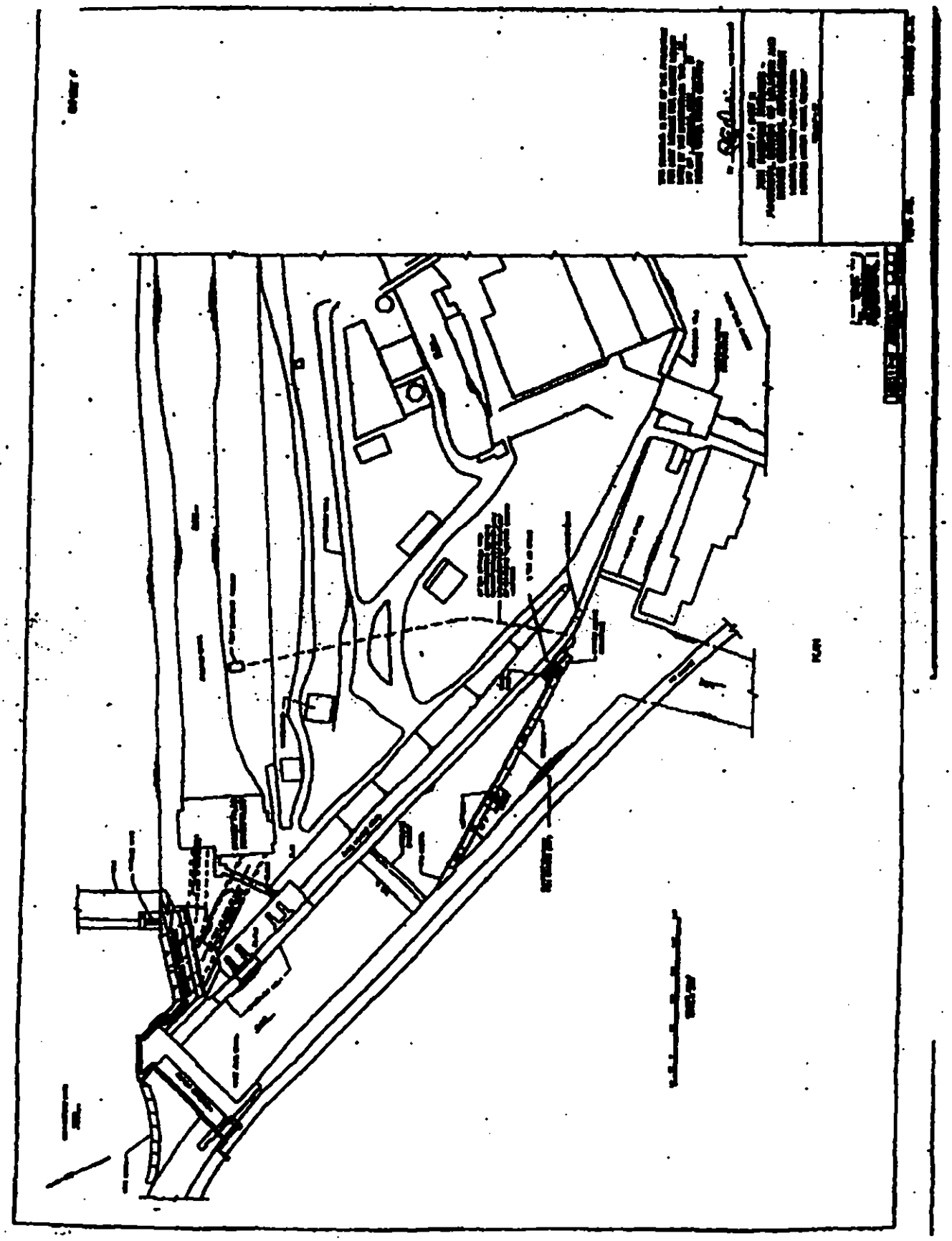
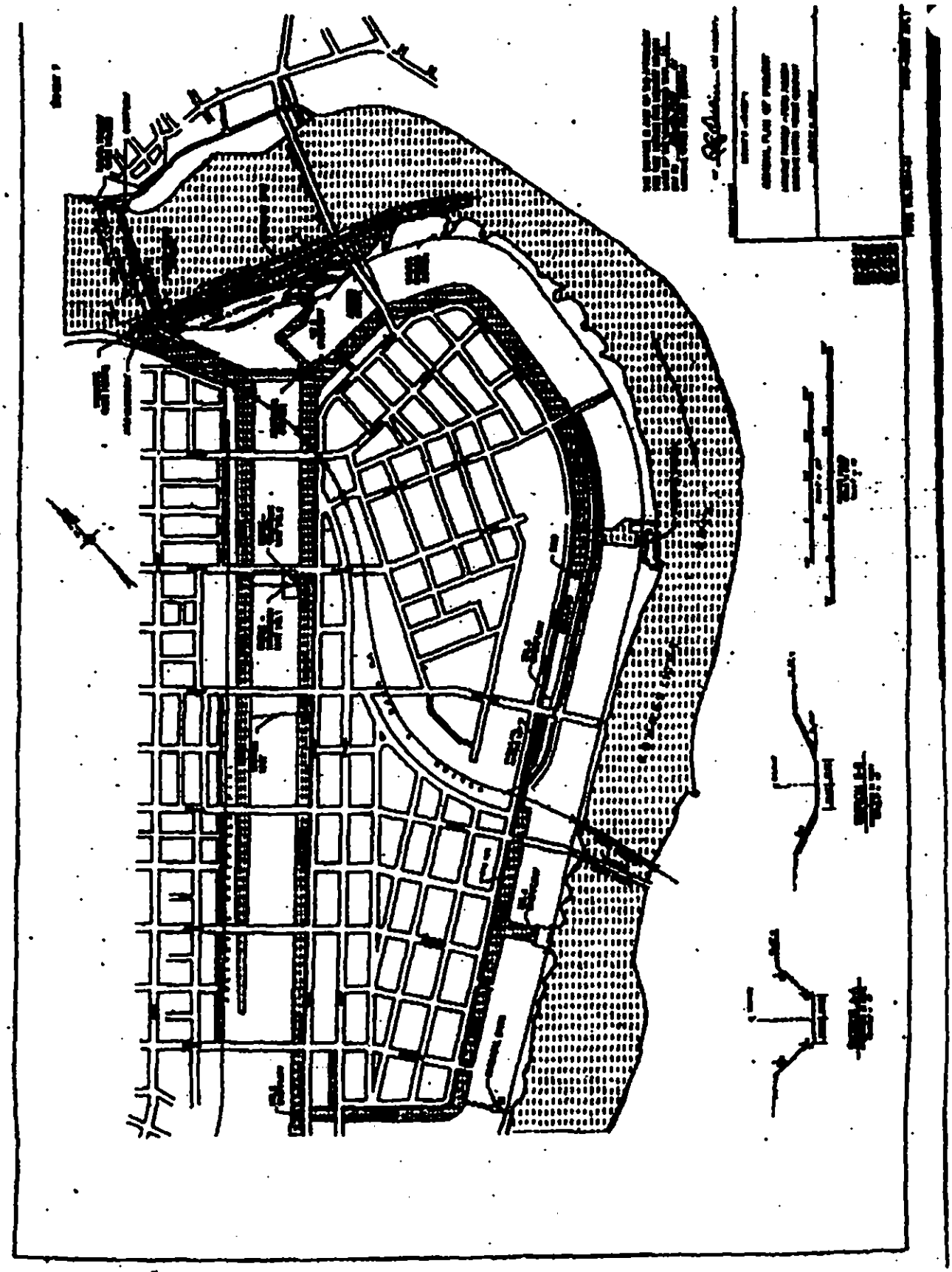


Figure 3-2. Parks and recreation areas along the Connecticut River in the Holyoke Project area (Source: the staff, as adapted from Ashburnham and MDEC,

APPENDIX B





APPENDIX C

APPENDIX C

RESPONSE TO COMMENTS AND EXPLANATION OF DECISION

This appendix provides some indication of MADEP's response to selected comments on the draft 401 Water Quality Certification, as well as an explanation of some of the technical aspects of the conditions.

1. Compliance
As stated.

2. MA Wetlands Protection Act
This condition is needed to be in compliance with state law and regulations.

3. Compliance
This condition is needed to be in compliance with state law and regulations.

4. Compliance
As stated.

5. Compliance
As stated. In response to HWP's comment, this condition pertains to significant modifications to project operations.

6. Compliance
As stated.

7. Compliance
As stated.

8. Compliance
As stated.

9. Instantaneous Run-of-River Operation with Stabilization of the Impoundment to 0.2 Foot.
Instantaneous run-of-river (r-o-r) operation will eliminate the current practice of daily peaking operation. Peaking results in fluctuating pond levels which impact littoral zone, shoreline and wetland communities, adversely affect shallow-water spawning fishes, and may exacerbate the erosion of the sand bar habitat of the federally listed Puritan Tiger Beetle. Peaking operations also cause rapid shifts between high and low flows in the river below the project. These changes in flow-condition undermine stream banks and cause erosion, delay fish passage, and strand fish in shallow stagnant pools. Although a more stable impoundment is known to benefit fisheries resources in general[1], no site specific studies of the effects of r-o-r were undertaken at this project because both applicants agreed to this mode of operation early in the relicensing process. HGE first proposed r-o-r with ± 0.2' during initial consultation[2] and has only recently proposed to return to a peaking mode of operation. HWP also proposed r-o-r with ± 0.2 feet to FERC in its draft license application[3]. Impoundment fluctuation of ±0.2 feet was chosen *by the applicants*, as the technologically most feasible way to approach the stated goal of *instantaneous* run-of-river operation (outflow = inflow, with NO pond fluctuation).

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[1] Rochester, H, Jr., Lloyd, T, and Farr, M. 1984. Physical impacts of small-scale hydroelectric facilities and their effects on fish and wildlife. FWS/OBS-84-19. Office of Biological Services, USFWS, DOI. 191 pp.
[2] HGE, Application for new license, Holyoke Hydroelectric Project, Initial Consultation Package October 1995.
[3] HWP, Draft Application for new license, major project-existing dam, April 1997.

With r-o-r operations, some fluctuations in discharge from the Holyoke Project will result from fluctuating inflows caused by the operation of the upstream Turners Falls Project. Since the relicensing of the Holyoke Project and the upstream peaking projects at Turners Falls (FERC No. 1889), Vernon (FERC No. 1904), Bellows Falls (FERC No. 1855) and Wilder (FERC No. 1892) do not coincide, it is not possible to achieve both a stabilized reservoir and a stabilized and natural flow regime below the project within this licensing proceeding alone. However, the conversion of the Holyoke Project to r-o-r operations is the first step in the process and will result in less dramatic peaking and a more attenuated discharge curve than under current conditions. Upon relicensing of the upstream peaking projects, and their eventual conversion to r-o-r operation, fluctuations are anticipated to be reduced or eliminated as a natural flow regime returns to the river.

In response to comments by Holyoke Water Power, the MADEP agrees that the FERC license is not issued pursuant to the Water Quality Certificate and therefore deletes this reference. The MADEP also agrees with HWP to modify the last clause of the last sentence of the draft water quality certificate to read "...and identifying ways of avoiding future occurrences, if applicable." This change makes it clear that the license holder is not required to identify ways of avoiding future occurrences of natural events over which the license holder has no control, such as extreme runoff events, droughts and floods.

In response to comments from Holyoke Gas & Electric, the MADEP shares the opinion of the FERC and Holyoke Water Power that $\pm$0.2 feet is desirable and feasible.

In response to Connecticut River Watershed Council's (CRWC) comment, end dates for notifying and reporting on operating emergencies have been added.

In response to the Town of South Hadley's comment, by instituting a stable pond flow regime with fluctuations of $\pm$ 0.2 feet, erosion problems should lessen.

10. Run-of-River Operation and Monitoring Plan

This plan is needed to verify flows. In response to HWP comment, the MADEP agrees that final approval of plans required by the Water Quality Certificate should be done by MADEP, and that in order to be consistent with FERC requirements, one year is needed for plan implementation.

11. Replace Wooden Flashboards with Inflatable Rubber Dam.

The existing project configuration includes 3-foot-high wooden flashboards that fail and break away under flood conditions. As a result, flashboards are lost one or more times each year. Once lost, the flashboards need to be replaced and/or re-installed when river flows drop below station capacity. The flashboard installation procedure includes reduction of the impoundment elevation below the dam crest, re-installing and repairing of the flashboards and then refilling the impoundment. This procedure can take a number of days. In addition, a lengthy period of time may elapse with reduced impoundment levels between when the flashboards are lost and when inflows are low enough to permit flashboard repair. Lastly, the upstream fish passage system does not operate efficiently with reduced impoundment levels. Shallow water in the exit flume offers less protection to fish as they are sluiced from the hoppers and leads to crowding in the exit flume and an increase in contact injuries.

The rubber dam will allow for greater control of headpond elevation. Various rubber dam sections can be deflated under high discharges and then re-inflated as river flows decrease, maintaining a virtually constant headpond elevation over most inflow conditions. The rubber dam will, like r-o-r operations, benefit reservoir fisheries[4], wetlands and littoral zone communities by eliminating the severe fluctuations that occur during flashboard installation. The rubber dam system will also allow spill to be directed along

[4] Rochester, H, Jr., Lloyd, T, and Parr, M. 1984. Physical impacts of small-scale hydroelectric facilities and their effects on fish and wildlife. FWS/OBS-84-19. Office of Biological Services, USFWS, DOI. 191 pp.

different portions of the dam face, eliminating interference between spill and fish passage attraction flows, thereby reducing the problem of "false attraction[5]" of migratory fish to the dam apron.

In response to HWP's comment, the MADEP believes a time frame of one year from license issuance is reasonable regardless of who holds the FERC license since it could take years to settle Motions for Rehearing and appeals.

In response to HGE's comment, there is no guarantee that any additional generation (such as the third turbine proposed by HGE) will be built. Operating in a run-of-river mode, restoring aquatic habitat and restoring the ability of fish to migrate in a safe, timely and effective manner are goals that should not be delayed beyond the time needed to prepare for meeting those goals.

In response to Connecticut River Watershed Council's (CRWC) comment, plans shall be developed in consultation with resource agencies.

12. Provide a Continuous Minimum Flow of at Least 849 Cubic Feet per Second (cfs) in the Bypass Reach.

Existing project operations provide flows to the bypass reach only during fish passage seasons and when river flows exceed project hydraulic capacity. During initial consultation, the MADFW, the United States Fish and Wildlife Service (USFWS), and other parties identified the need to establish permanent, year-round flow releases to the bypass reach. These flows are needed to provide year-round habitat for fish and other aquatic life, and to attract and provide a safe and efficient zone-of-passage (ZOP) for upstream and downstream movement of migratory species. The bypass reach represents unique riffle habitat in this section of the Connecticut River. If properly watered, this reach can support both fish and important aquatic macroinvertebrate production[6].

Accordingly, both HGE and HWP conducted evaluations of flow needs for habitat and an effective ZOP in the bypass reach. HWP's assessment consisted of measuring depths and velocities during specific flow releases. HGE conducted an assessment using the Instream Flow Incremental Methodology[7] (IFIM). HWP subsequently adopted the HGE study results and this IFIM data was used by the MADFW in its analysis of minimum flow requirements.

IFIM begins with the development of a hydraulic simulation model of the bypass reach and the selection (or development) of Habitat Suitability Indices (HSI) for specific species and life stages of fish of interest. A computer program then compares the hydraulic simulation of the reach (channel width, depth, velocity, and substrate) with the derived HSI (preference for depth, velocity, and substrate) for the species/life history stage of interest and produces a voluminous set of tables which reflect the weighted usable area (WUA) for each species/life history stage at a number of different flows. Using these tables and the criteria set below, one then determines the appropriate flow required to meet the management objectives.

Species

As part of the assessments, a list of various life stages of some riverine fish species that inhabit this portion of the Connecticut River was compiled and provided to both applicants for incorporation into their habitat studies. Species identified included smallmouth bass, white sucker, yellow perch and channel

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[5] "False attraction" is a situation where upstream migrants are attracted to the downstream conveyance flows at the bascule gate, or to spill through holes in the flashboards, rather than to the attraction flows at the spillway fishlift.
[6] Travnichek, VH, Bain, MB, and Maceina, MJ. 1995 Recovery of a warmwater fish assemblage after the initiation of a minimum-flow release downstream from a hydroelectric dam. Transactions of the American Fisheries Society 124:836-844.
[7] Barnes and Williams Environmental Consultants, LLC. 1997. Bypassed reach habitat assessment using the instream flow incremental methodology for the Holyoke Project, FERC No. 2004, Massachusetts. Binghamton, New York. March 1997.

catfish. IFIM results indicated that little or no habitat existed for channel catfish or yellow perch over the range of bypass flows assessed. These species were subsequently dropped from further consideration in the IFIM report. A substantial amount of habitat, however, was identified for smallmouth bass and white sucker at several life stages. Following the initial analyses of the data, the USFWS requested, and the FERC subsequently required, the recalculation of smallmouth bass habitat using new, more comprehensive, HSI criteria[8].

Although no habitat suitability curves for aquatic invertebrates were included in the IFIM study, bypass flows were targeted to address invertebrate production. In order to do so, FERC assumed that the macroinvertebrate curve would approximate the habitat suitability curve for white sucker spawning. All subsequent FERC analysis of invertebrate habitat at various flows utilized the white sucker spawning habitat results.

The use of white sucker spawning curves to assess macroinvertebrates is not appropriate. Macroinvertebrate habitat criteria would account for greater velocity and depth tolerance than is portrayed in the white sucker spawning curves. Suitability curves specific to macroinvertebrates are available[9] and should have been used to determine available macroinvertebrate habitat.

The Three Channels

During initial consultation, USFWS and MADFW personnel walked the bypass reach and noted that the reach consists of three distinct channels at low to moderate flows. Our *conservative* estimate of the amount of water likely to be available for year-round habitat flows in this reach led to the three-channel concept, rather than an effort to water the entire bypass reach, which would require much higher flows. Therefore, the three channels were modeled separately to allow evaluation of flow needs to each channel, such that final flow requirements could target specific flows for specific channels. It was understood that channel modifications might be needed to assure the appropriate distribution of flows between channels.

At leakage and very low discharges, almost all the discharge at the dam flows from west to east across the spillway pool and down the main East Channel. As discharges increase, flow subsequently begins to enter the Center, and then the West Channel. Studies by HWP indicated that at leakage flow (gauged at 32 cfs) virtually all flow remained in the East Channel. At flows of 334-381 cfs, most of the flow (approximately 85%) remained in the East Channel with equal distribution of the remaining flow to the Center and West Channels. As discharges increase further, an increasing proportion of the additional flow enters the Center and/or West Channels, with the West Channel receiving a higher percentage of this additional flow at the highest gauged flow of 885 cfs.

Management Emphasis

In the IFIM analysis, no specific priorities between species and life history stages or between habitat and ZOP needs were established. The unique channel topography and substrate made predetermination of reasonable management goals impossible. Neither applicant therefore included any such emphasis in its decision-making relative to minimum flow proposals.

Results presented in the Final IFIM report from Beanes-Williams, Environmental Consultants, and in response number 9 in HGE's July 1998 Additional Information filing, indicate that the bypass reach is most suited for management of smallmouth bass and white sucker, as little or no habitat was identified for channel catfish and yellow perch. In IFIM assessments, not all species that would inhabit a river reach are assessed, so these species serve as surrogates for other species that utilize similar habitats.

The study results also indicate that habitat availability for different species/life stages vary between the three channels and that habitat in the three channels respond differently to changes in flow. As such, it is

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[8] Bovee, KD, Newcomb, TI, and Coon, TG. 1994. Relations between habitat variability and population dynamics of bass in the Huron River, Michigan. Biological Report 21. USDOI, National Biological Survey.

[9] Gomez and Sullivan Engineers, PC. 1998. for: Green Mountain Power Company, Exhibit No. 19 IFIM Study, Habitat Suitability Index Curves, Macroinvertebrate Community, March 1998

appropriate to target management priorities separately for each channel and to utilize these management priorities for the purposes of determining flow needs for each channel.

As the bypass reach is generally broad and shallow, added flow tends to spread out, limiting the increase in channel depth. This lack of depth limits the percentage of suitable habitat within the wetted area at any specific site along the reach. However, due to the long length (approx. 2,000') of the channels, a substantial amount of habitat can still be created with adequate bypass discharge.[10] In addition, although not always providing quality habitat for the target fish species, additional shallow wetted area does provide habitat for aquatic macroinvertebrates.[11]

White sucker spawning and incubation habitat occurs in all three channels and is important. However, the seasonal use of this habitat coincides with upstream passage periods. As such, ZOP flows should receive priority.

East Channel

The main East Channel receives the most water of any channel under the range of evaluated flows. IFIM data indicate that habitat for juvenile white sucker exceeds habitat for other evaluated species in the East Channel. However, this reach also has the potential for the most adult smallmouth bass habitat of the three channels. Although not as substantial as juvenile sucker habitat in abundance, the recreational opportunities afforded by smallmouth bass supports management emphasis towards this species. Substantial juvenile smallmouth bass habitat is also available. Management of flows for habitat in this reach, therefore, should focus on these two life stages of smallmouth bass.

Center Channel

The Center Channel is a broad and shallow channel at most evaluated flows. IFIM data indicate that habitat for all sucker life stages is created, but little adult or juvenile habitat smallmouth bass exists at any flow. This channel will support, however, an abundance of smallmouth bass young-of-year (YOY) habitat. Flow releases should, therefore, focus on habitat for juvenile white sucker and YOY smallmouth bass.

West Channel

The West Channel is different in character from the Center Channel, with some finer substrates and a deeper channel configuration. IFIM data indicate that it provides potential habitat for a greater diversity of species and life stages than the Center Channel. The West Channel will support adult, juvenile and YOY smallmouth bass, as well as juvenile white sucker habitat. This reach will also create some smallmouth bass spawning habitat. The IFIM report disregards this life stage due to its relatively low abundance and failure to cover 10% of available wetted area. However, the 5,454 square feet of smallmouth bass spawning habitat created would have substantial value. It is, however, impossible to incorporate bass spawning and incubation into management decisions, since the data on habitat/flow relationships for spawning were not provided.

Given the relative scarcity of juvenile and adult bass habitat elsewhere, emphasis on these life stages is appropriate. Smallmouth bass YOY and white sucker juvenile habitat are generally more abundant throughout the bypass reach, and are emphasized in the other channels. Flow management decisions for the West Channel, therefore, should focus on adult and juvenile bass, with secondary consideration of YOY smallmouth bass and white sucker habitat.

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[10] Barnes and Williams Environmental Consultants, LLC. 1997. Bypassed reach habitat assessment using the instream flow incremental methodology for the Holyoke Project, FERC No. 2004, Massachusetts. Binghamton, New York. March 1997.

[11] Gomez and Sullivan Engineers, PC. 1998. Re: Green Mountain Power Company, Essex No. 19 IFIM Study, Habitat Suitability Index Curves, Macroinvertebrate Community, March 1998

Flow Recommendations

The following represent the MADFW's flow recommendations for habitat in the three channels. These recommendations are based on the individual channel IFIM assessments, reviewed in relation to the individual channel species management emphasis described above, and assume that these specific flows can be achieved in each channel.

CHANNEL	FLOW
East Channel	600 cfs
Center Channel	100 cfs
West Channel	140 cfs
Total Flow	840 cfs

The MADFW recommends a *minimum* sustained release of 840 cfs into the bypass reach. The MADFW's recommended flows would create substantial habitat for the species/life stages of management priority in each channel (based on IFIM data), especially adult and juvenile smallmouth bass habitat in the East and West Channels, and smallmouth bass YOY and juvenile sucker habitat in the Center Channel. Studies at other sites[12] and the IFIM data indicate that increasing flows above the 840 cfs would further restore additional fisheries habitat.

Relation to existing bypass flow

In the Draft Environmental Impact Statement[13] (DEIS), the FERC staff incorrectly cites the current bypass reach flow during the spring fish passage season as 350 cfs (it is *at least* 350 cfs and more realistically 850 cfs- see argument below), and therefore concludes that the applicants' recommended habitat flow of 420 cfs would improve current conditions.

The USFWS, in consultation with the MADFW, has identified a clear discrepancy between the flow releases from the bascule gate as calculated by the applicants using a weir flow formula and the flows in the bypass reach as gauged by stream survey methods. HWP, in its July 1998 Additional Information filing, admitted that the actual bascule gate releases were higher than the figures derived from the weir formula. HWP stated that the actual discharge from the gate was likely between the calculated flow of 350 cfs and the gauged flow of 630 cfs. Further, HGE measured a flow of 700 cfs in Channel 1 (East Channel) when both the spillway flashlift and the bascule gate downstream bypass were being operated with no spill over the dam. Based on the flow distribution information presented in the DEIS in Table 4-6, at a Channel 1 flow of approximately 700 cfs, releases to Channels 2 and 3 would be 71 cfs and 145 cfs respectively, for a total bypass flow of approximately 950 cfs. Given a 950 cfs bypass flow, bascule gate discharge would be 750 cfs (assuming 150 cfs for fish lift flow and 50 cfs leakage). Even if leakage was substantially greater than 50 cfs, the bascule gate discharge must more closely approximate the gauged

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[12] Weisberg, SB and Burton, WH. 1993. Enhancement of fish feeding and growth after an increase in minimum flow below the Conowingo Dam. North American Journal of Fisheries Management. 13:103-109.

[13] Draft Environmental Impact Statement, FERC/DEIS-0122, Holyoke Project, Massachusetts (FERC 2004-073, 11607-000), Federal Energy Regulatory Commission, April 1999

flow of 630 cfs than the calculated flow of 350 cfs. Other evidence supports an actual bascule gate flow of approximately 600 cfs, including the acknowledgment by HGE that the Alden Weir insert at the bascule gate is designed to release 600 cfs at full pond, and that the "flyover" downstream passage device developed by HWP is designed for 600 cfs so as to release the existing downstream passage flow.

Given this information, it is clear that current spring flows in the bypass reach are greater than the 350 cfs cited in the DEIS. Using the gross underestimate of bascule gate flow from the weir formula of 350 cfs, existing bypass reach discharge is at a minimum 550 cfs (350 plus 150 cfs spillway fishlift flow and 50 cfs leakage). A more realistic estimate of current spring flows in the bypass reach is 830 cfs (630 cfs from the bascule gate, 150 cfs from the spillway fishlift and 50 cfs leakage).

In light of this information, the MADFW's request for a bypass flow of 840 cfs will only maintain current seasonal habitat as year-round habitat. The applicants' recommendation of 420 cfs would represent a substantial *loss* of the existing seasonal habitat.

The MADFW's recommended flow is conservative; it does not even come close to restoring the bypass reach to pre-project river conditions. The 7Q10 flow is the benchmark low flow used by the MA Department of Environmental Protection when permitting point source discharges[14], and is defined as the lowest flow likely to occur for 7 consecutive days in any 10 year period. The MADFW's recommended habitat flow of 840 cfs is only 50% of the 7Q10. In fact, the Interim Regional Policy for New England Flow Recommendations[15] (prepared by the USFWS) uses 0.5 cfs/square mile (cfsm) of drainage area (the median August default flow) to set minimum flow recommendations. Using these criteria the MADFW's recommended flow of 840 cfs is only 20% of the 0.5 cfsm flow[16]. Further, the combined wetted area of the three channels in the bypass reach at 840 cfs represents only 16%[17] of the total available area of the bypass reach.

In response to HWP's comments, the MADEP agrees that flexibility in imposing conditions is desirable. If it can be demonstrated to the satisfaction of the resource agencies that during construction activities it is impossible to maintain a minimum flow of 840 cfs in the bypass reach, then the minimum flow may be modified to accommodate the construction activities.

MADEP also agrees that the FERC license is not issued pursuant to the Water Quality Certificate and therefore deletes this reference. MADEP also agrees with HWP to modify the last clause of the last sentence of the draft water quality certificate to read "...and identifying ways of avoiding future occurrences, if applicable." This change makes it clear that the license holder is not required to identify ways of avoiding future occurrences of natural events over which the license holder has no control, such as extreme runoff events, droughts and floods.

In response to USEPA's comment that Center Channel flow should be 122 – 260 cfs and that West Channel flow should be 267 cfs, the MADEP agrees with MADFW and USFWS that flow in the Center Channel should be 100 cfs and flow in the West Channel should be 140 cfs *at a minimum*. Three fisheries resource agencies (MADFW, USFWS, and NMFS) have agreed that 840 cfs total flow is the minimum adequate flow for the bypass reach.

In response to Trout Unlimited's comments, the MADEP believes the decision by the MADFW, the USFWS and the NMFS to base minimum bypass flow recommendations on the IFIM (840 cfs) is appropriate because this is a site specific approach whereas the alternative ABF method (1400 cfs) is a modeled approach.

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[14] 314 CMR 4.03(3)(a)
[15] Interim Regional Policy for New England Streams Flow Recommendations, USFWS, Region 5, 1981.
[16] Recommended flow = 4154 cfs (0.5 cfs times 8,309 square miles of drainage at the project)
[17] The bypass reach is approx. 2,750' x 1,000' or 2,750,000 square ft. The total wetted area of the bypass reach at 840 cfs (with channel 1 receiving 600 cfs, channel 2, 100 cfs, and channel 3, 140 cfs) is 434,231 square feet (derived from the IFIM study results, Table 1.1, HGE Schedule B, Additional Information, July 1998).

In response to Connecticut River Watershed Council's (CRWC) comment, end dates for notifying and reporting on operating emergencies have been added.

13. Adequate Zone of Passage (ZOP) Flows.

Adequate flow for a bypass reach ZOP is critical to assuring safe and efficient passage of anadromous and riverine fish to the spillway fish passage facilities. Passage windows for many anadromous species are limited and both efficient passage facilities and flows to facilitate passage are needed to minimize delays at the dam. Given the location of the Holyoke Dam as the first impassable barrier on the river, and the importance of anadromous fish resources, flows that provide a quality ZOP for these species must be emphasized during the seasons when fish passage is needed. Flow releases for habitat (discussed above) will be emphasized during periods when no ZOP flows are needed. ZOP flows will be critical in the main East Channel (South Hadley side), while flow determinations for the Center and West Channels will be based primarily on habitat considerations.

Barnes and Williams Consultants preformed a ZOP study in the Holyoke project bypass reach in 1998[18]. The study involved measuring water depth and velocity at transects crossing the bypass channel at a wide range of bypass reach flows (100 to 1,500 cfs). The study concentrated on the East Channel, as it is the widest, deepest channel, and it retains the majority of flow at the levels studied. The four transect sites were chosen, in consultation with the MADFW and the USFWS, because they represented the "critical passage points" which were the most likely barriers to migration in the channel. These critical points are bedrock ledges, which feature shallow depth and high velocity at the flows studied.

The calculated depth and velocity profiles of each transect were then compared to size, swimming ability, and known depth and velocity preferences for anadromous fish species. Through this analysis ZOP suitability scores were applied to the channel profiles. The ZOP suitability score is based on a scale where 0.0 is impassible and 1.0 is fully passable ZOP. From these results two classes of ZOP were identified, "fully suitable" (suitability score 1.0) and "functional" (suitability score ≥0.5), and applied to the channel profiles. In consultation with Barnes and Williams, the MADFW and the USFWS agreed that a suitability score of ≥0.5 for at least 25% of the wetted channel area would create an acceptable ZOP in these critical passage areas.

Based on these data, a total bypass reach flow of 1,300 cfs (970 cfs in the East Channel) creates an acceptable ZOP at 3 of the 4 transect sites. At transect #3 the channel area rated as "functional ZOP" never reaches 25% (in fact it never exceeds 16%) at any modeled flow. MADFW and USFWS personnel have walked the bypass reach at transect #3 and have determined that minor channel modifications at that point will create an acceptable ZOP at the 1,300 cfs flow requested. This determination is based on our experience with channel modification to create acceptable ZOP at other hydroelectric projects in MA[19].

ZOP flows of 1,300 cfs will be required from April 1 through July 15 and September 15 to November 15. These are the accepted salmon and shad migration dates at the Holyoke project and is not a change from current operations.

The applicants' recommendation of 800 cfs for spring ZOP flow is inadequate. During the 1999 passage season flashboards on the dam were up, and there was very little spill over the dam, for the entire season. Given these conditions, the flow in the bypass reach is approximately 830 cfs (630 cfs from the bascule gate, 150 cfs from the spillway fishlift and 50 cfs leakage[20]). MADFW personnel at the fishway observed that most of the fish lifted this season approached the dam through the tailrace, not through the bypass

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[18] Barnes and Williams Environmental Consultants, LLC. 1998. Atlantic salmon and American shad zone-of-passage assessment for the Holyoke project, FERC No. 2004, Massachusetts. Binghamton, New York.

[19] Rennie-Dill in West Springfield, MA; Pawtucket Dam, Lowell, MA.

[20] See argument in habitat flow section.

reach. This observation would lead one to believe that 830 cfs in the bypass reach creates an inadequate, or at least unattractive, ZOP.

The applicants' recommendation of 420 cfs for fall ZOP flow is inadequate. The applicants' conclusion that 420 cfs is an adequate ZOP flow for fall (September 15 to November 15) is unsupported. If a minimum flow (either 1,300 cfs or 800 cfs) is required to pass salmon in the spring (April 1 through July 15), it is only logical to assume that the same flow must be necessary to pass salmon in the fall.

In response to HWP's comment, the MADEP believes this time frame from license issuance is reasonable regardless of who holds the FERC license since it could take years to settle Motions for Rehearing and appeals.

14. Redistribute Flow to the Three Channels in the Bypass Reach.

The flow proposal outlined above is predicated on the concept of appropriate flow distribution to the three channels to maximize habitat benefits of bypass flow releases. Installation of the rubber dam and the bascule gate flyover device (see below), will result in a new spill pattern for minimum flow releases which may require channel modifications to allow proper distribution of flow into the three bypass reach channels. Based on our experience with channel modification projects[21] at other hydroelectric facilities, we do not envision these modifications to be significant.

In response to HWP comment, the MADEP agrees that final approval of plans required by the Water Quality Certificate should be done by MADEP. The MADEP also agrees that a rigid construction schedule of 14 months is not desirable and instead specifies the construction for flow redistribution will begin during the construction season following the rubber dam installation. The justification for minimum flows for each channel is presented in condition #5.

MADEP also agrees that the FERC license is not issued pursuant to the Water Quality Certificate and therefore deletes this reference. MADEP also agrees with HWP to modify the last phrase of the last sentence of the draft water quality certificate to read "...and identifying ways of avoiding future occurrences, if applicable." This change makes it clear that the license holder is not required to identify ways of avoiding future occurrences of natural events over which the license holder has no control, such as extreme runoff events, droughts and floods.

In response to Connecticut River Watershed Council's (CRWC) comment, end dates for notifying and reporting on operating emergencies have been added.

15. Bypass Flow Gauging

Gauging is needed to verify and calibrate flows. In response to HWP's and HGE's comments, the MADEP agrees that gauging flow prior to rubber dam installation is not necessary because this information exists and has deleted the reference from the draft certification. The MADEP also agrees that the gauging plan should be implemented within one year after rubber dam installation and channel modifications are complete, not one year after license issuance. Long term gauging is necessary for total flow, not channel specific flow. Gauging each channel will be necessary only once in order to calibrate the flow distribution regime. MADEP also agrees that final approval of plans required by the Water Quality Certificate should be done by MADEP.

16. Flow Allocation Plan

There is a need to have a definite flow priority plan in place at the Holyoke project. With requirements for ZOP flows and habitat flows in the bypass reach, minimum flows to the canal, and flow requirements

[21] Rexnord-DSI in West Springfield, MA; Pawtucket Dam, Lowell, MA

for upstream and downstream fish passage operations, it is possible that flow allocations could exceed inflow during a dry spring. Therefore, the MADFW, the USFWS and the NMFS need to consult with the project operator to prioritize flow to the various fish passage and habitat quality needs during low flow periods. These priorities will change with the time of year, with fish passage being the most important in the spring, and canal and bypass reach habitat flows becoming more important in the summer and fall. Spring priorities would be:

1) Flows sufficient to operate fish passage facilities
2) Zone of passage flows (1,300 cfs)
3) Canal minimum flow (810 cfs)
4) Hadley Falls Station to Unit One capacity (4,200 cfs)
5) Canal operations to capacity[21]
6) Hadley Falls Station to capacity[22]

17. Low Flow Contingency Plan

This plan is needed to protect aquatic habitat during low flow periods. In response to HWP's comment, the MADEP agrees that final approval of plans required by the Water Quality Certificate should be done by MADEP. Also, the MADEP believes a time frame of six months from license issuance is reasonable regardless of who holds the FERC license since it could take years to settle Motions for Rehearing and appeals.

18. Provide Interim Continuous Flow Through the Canal System.

The Holyoke canal system currently operates when river flows are greater than the hydraulic capacity of the large units at the Hadley Falls Station. HWP has an Economic Dispatch agreement with canal water users that allows HWP to maximize generation efficiency by running the Hadley Falls Station with available flows and compensating the canal generators for the power they could have generated. The canal flows therefore fluctuate between leakage and the canal capacity of 6,250 cfs. There are currently no substitution flows provided to the canal system in general or to any section of the canal (first, second, third levels) specifically.

The canal system has in the past supported substantial freshwater mussel populations. Although the abundance of mussels and diversity of mussel species has declined from historic levels, the canal still supports many freshwater mussels, though these are predominantly limited to the most common lentic species. The canal, however, supports one of only two known sites for the yellow lampmussel (*Lampsilis cariosa*) in the Connecticut River in Massachusetts. Many mussel species native to the Connecticut River that now, or have formerly inhabited the canal, require flowing water conditions for survival, and flowing waters are preferred by most species. The current canal operations result in extended periods of stagnation in the canal, which provides the opportunity for the deposition of fine sediments on mussel beds in the canal. These two factors adversely affect mussels and could, in part, explain the decline in mussel abundance and diversity in the canal from historic conditions.

In addition to mussel habitat, canal water quality is a concern. Although water quality data presented in the applications did not indicate water quality violations during the periods sampled, letters of comment in the FERC's record and comments at public meetings conducted by the FERC have indicated that water

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[21] The existing downstream louver bypass system in the canal is more efficient than the bascule gate bypass at the Hadley Falls Station. Therefore, we recommend that the canal be run to capacity before the Hadley Falls Station so as to direct as many downstream migrants as possible to the more efficient canal bypass system.

[22] If other new fish depth screen is in place, and an evaluation shows it to be effective, Hadley Falls Unit 2 could be operated to capacity before the canal.

quality problems do exist in the canal. Some minimum flow to the canal will be required in order for the canals to meet State Class B Water Quality Standards (the standard for the Connecticut River in MA).

Continuous flows are needed in the canal to provide quality habitat conditions for mussels, minimize sedimentation, and maintain water quality. HGE's proposed release of 810 cfs and distribution of those flows throughout the canal system provide a reasonable operation scenario if sufficient priority is given to provide some level of continuous flows at all times. MADFW is not able to propose an alternative minimum flow regime for the canal at this time for a number of reasons. First, in order to prioritize flows adequately, it would need to know what the final ZOP and habitat flows in the bypass reach are. Second, it is not possible, given existing data, to assess what the minimum flow would need to be to keep the canal system from stagnating. Lastly, decisions on minimum canal flows must take into account all the canal operating units, and the MADFW is not in a position to pre-judge how minimum canal discharges should be routed through the canal. Therefore, the canal operating regime proposed by HGE should be established immediately upon relicensing as the *interim* operation regime for the canal, with the requirement that a post-license assessment of canal discharges be conducted to establish a continuous, permanent minimum flow regime throughout the canal system which maintains State Class B Water Quality Standards and protects the freshwater mussel populations.

The MADEP believes that setting a time frame upon license issuance is reasonable regardless of who holds the FERC license since it could take years to settle Motions for Rehearing and appeals.

19. Canal System Permanent Continuous Flow

See Condition 18 above. In response to HWP's comment, the MADEP agrees that final approval of plans required by the Water Quality Certificate should be done by MADEP. The MADEP believes a time frame of three months from license issuance is reasonable regardless of who holds the FERC license since it could take years to settle Motions for Rehearing and appeals.

20. Protect Aquatic Resources During Canal Drawdowns.

For many years, the canal system has had annual drawdowns to allow for intake screen repair and cleaning, penstock repairs, trash removal, and canal maintenance. In addition to the annual drawdowns of approximately a week's duration, shorter drawdown events also occur periodically to address more urgent repair and maintenance needs. The rapid drawdowns that formerly stranded fish were modified in recent years to a slower drawdown that permits the escape of most fish. However, the canal drawdowns result in desiccation of the canal substrates and direct impacts on freshwater mussels and other benthic aquatic invertebrates. Especially of concern is the state-listed yellow lampmussel (*Lampsilis cariosa*). This species was found in one of the only areas of the canal that does not completely dry out during drawdowns.

In response to the concern over impacts to mussels, HWP did agree to, and has already implemented, a change in the canal drawdown period from mid-July to the fall, in order to conduct the drawdowns under less harsh weather conditions with cooler temperatures and greater likelihood of rainfall. This is a preferred time for the drawdowns if they must occur.

The MADFW supports a drawdown scenario under which sandbag weirs would be strategically placed in the canal to confine canal flow to the main canal between the canal gatehouse and Bootlock Station and in the Second Level Canal between Bootlock Station and the Riverside Station. Then, up to two feet of water would be released into this section of the canal for the entire drawdown period without flooding the upper portions of the First Level and Second Level Canals or the entire Third Level Canal. Although the MADEP believes the long-term solution for canal drawdowns should assure continuous wetted conditions throughout the entire canal system, we can endorse this concept with follow-up monitoring and evaluation as a reasonable first step in restoring and enhancing mussel habitat. In this way, the efficacy of this approach can be evaluated. After the evaluation, modifications to this plan, including expansion of the concept to other canal segments, should be implemented as appropriate.

The MADEP believes a time frame of three months from license issuance is reasonable regardless of who holds the FERC license since it could take years to settle Motions for Rehearing and appeals. In response to HWP's comment, the MADEP agrees that final approval of plans required by the Water Quality Certificate should be done by MADEP.

In response to Trout Unlimited's comments, the recommendation of keeping a minimum of 2 feet of water over existing and potential mussel habitat will be presented during plan development to protect aquatic resources during canal drawdowns.

21. Monitor Mussel Populations in the Canal System.

A monitoring plan should be required to assess the changes to the mussel population under the revised canal operation and drawdown requirements. Such an evaluation should occur annually during the canal drawdown for a period of 5 years. The results of this assessment should be used to determine the adequacy of the mitigative measures, whether alternative mitigation is needed, and whether changes should be made to expand the sections of the canal that remain watered during drawdowns.

The MADEP believes a time frame of one year from license issuance is reasonable regardless of who holds the FERC license since it could take years to settle Motions for Rehearing and appeals. In response to HWP's comment, the MADEP agrees that final approval of plans required by the Water Quality Certificate should be done by MADEP.

22(a). Improve the Existing Fishlift Facilities.

The current Holyoke fishlift system is designed to allow for operation at flows up to 40,000 cfs[24], but in reality operation up to this maximum is not possible. During high flow periods (at or approaching 40,000 cfs) portions of the fishway entrance gallery and the crowder mechanisms are overtopped, and fish passage efficiency declines[25]. These flows are often encountered during the early spring[26], and lift operations are often halted, thus impeding fish passage. Early spring passage of shad may represent a small proportion on the entire run, but is biologically important and significant. Shad migrate upstream only until the water temperatures reach 68-72°F at which time they stop their upstream migration and commence spawning. Therefore, shad that pass over Holyoke dam early in the spring will have the greatest amount of time to reach their historic habitat range in southern Vermont (above the Vernon Dam) before they reach the spawning temperature threshold and stop migrating. The MADFW recommends that the current fish lift facility be modified in such a way as to allow operation up to the stated design capacity of 40,000 cfs.

The MADFW also recommends that the existing exit flume be widened from 7' to 14' to the counting room and to 10' from the counting room to exit. These modifications would allow the spillway hopper to empty into the exit flume along the axis of flow, rather than at a right angle as it does now. This right angle delivery of fish to the exit flume throws fish into the far wall and leads to stress and contact injuries. The flume would need to be widened to 10' beyond the counting station in order to accommodate the additional flow, which would be generated by the expanded hoppers. An increase in flume size is also necessary if the system is to safely convey shortnose sturgeon, which grow larger than the salmon and shad that the lift was originally designed for.

The gated spillway entrance and spillway channel should be widened to 8' in order to attain the design standard 1 to 3 foot per second velocity, given an attraction flow of 200 cfs and a depth of 8'.

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[24] 40,00 cfs is consistent with USFWS design standards, whose the upper level of the fishway operation range is 3 to 4 times the mean annual river flow (11,600 cfs at the Holyoke project).

[25] John O'Leary, BOEA Connecticut River Team Leader, personal communication, June 24, 1998.

[26] Examination of the CT River hydrograph at the Montague gauge (1904-1998) indicates that in an average year the flows at the Holyoke Project exceed 40,000 cfs 40% of the time, or for 12 days, and flows are between 30,000 and 39,999 cfs 20% of the time, or for 6 days.

Attraction flows should be 200 cfs at the spillway entrance and 120 cfs at each tailrace entrance. 120 cfs represents 3 percent of the full turbine capacity at Hadley Falls Station. USFWS design guidelines require attraction flows of at least 3% of turbine capacity. While the 200 cfs at the spillway entrance is less than 1% of the total project capacity (canal and Hadley Falls Station), it is similar to the amount provided at spillway fishways at other licensed hydroelectric projects in the Northeast[27], and is likely to be augmented with flows from the bascule gate flyover.

The capacity of the spillway lift hopper should be increased to 460 cu. ft., and the tailrace hopper capacity should be increased to 330 cu. ft. These figures are based on a safe and effective rate of passage of targeted population numbers of Atlantic salmon and American shad, with additional space provided for Gizzard shad and Sea lamprey, which are present in significant numbers. The MADFW strongly disagreed with the applicants' determination that increased fishlift hopper capacity is not warranted because mortality in the fishlift exit channel does not exceed 2%, even though they acknowledge that the maximum design capacities of the fishlifts are "routinely exceeded" during the peak of the upstream migration[28]. The MADFW indicated that percent mortality alone is not a proper indication of the physical effects of an overcrowded fishway. MADFW indicated that its personnel routinely see many injured, but still living, fish for each mortality recorded.

To ameliorate the degree of physical stress that results from overcrowding in the hoppers and flume, and to minimize mechanical, contact-related injuries to upstream migrating fish during the lifting process, the MADFW recommends these modifications to the fish flume and associated trapping facilities and an increase in the capacity of the lift hoppers.

The MADEP agrees with HWP that turbid water during high water periods causes the current fishlift operations to be halted. It is not true, however, that high water is always turbid. When water levels rise, fine material is washed downstream causing turbidity levels to rise. When water levels remain high, less fine material is available to be moved and turbidity levels fall. MADFW estimates, on average, fishway operations are halted during high water periods due to turbidity 2-4 days/year and due to high flows about 7 days/year.

The MADEP also agrees with HWP that the fishway improvements be constructed according to a realistic time schedule, beginning upon licensee issuance. One year is allowed for submission of final design drawings and an additional year for construction to begin. Such a schedule allows time for design, permitting and contracting for construction. The MADEP believes this time frame from license issuance is reasonable regardless of who holds the FERC license since it could take years to settle Motions for Rehearing and appeals. If the license holder plans to add more generation, it can choose to either improve the existing fishlift and necessarily remove it upon third unit construction or build a new fishlift that is compatible with but separate from the new turbine. Both options begin upon license issuance.

In response to HGE's comment, there is no guarantee that the third generating unit will be built. Operating in a run-of-river mode, restoring aquatic habitat and restoring the ability of fish to migrate in a safe, timely and effective manner are goals that should not be delayed beyond the time needed to prepare for meeting these goals.

Also, MADEP disagrees with HGE's comment that this condition should be changed to require the licensee to submit and abide by an approved fish passage plan based on a targeted number of fish passed per year. The goal of fish passage is to pass fish in a safe, timely and efficient manner and not to pass a certain number of fish per year. The idea of trapping and transporting fish rather than using an improved

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[27] John Warner, USFWS, personal communication, draft justifications for section 18 fishway prescriptions, June 4, 1999.

[28] Rideout, SG. 1985. Analysis of the Holyoke dam spillway fishlift in relation to design parameters. Report to the technical committee for the Fisheries Management of the Connecticut River Atlantic Salmon Commission. USFWS. Hadley, MA.

existing fishlift is not practical. Any trap used would have to be located in the flume and use the existing hoppers that are currently overcrowded. In order to safely trap the fish, improvements would still need to be made, including expanding the size of the hoppers.

In response to Trout Unlimited's comments, the MADFW believes upgrading the existing fishlift so that it operates at its stated design capacity is adequate. The MADFW believes performing a major upgrade to increase capacity to a flow of 60,000 cfs will not produce a commensurate benefit.

22(b). Dates of Upstream Fishlift Operations.

The MADFW recommends that the upstream fishlift begin operation as feasible on March 15 to accommodate white sucker passage. White sucker is a native, resident, riverine fish species that undertake a spawning migration in the early spring. The MADFW believes that it is biologically important to reconnect resident fish populations within watersheds that have been fragmented by dams. Thousands of white sucker pass the Holyoke fishlift every year, and begin passing as soon as the fishlifts begin operation (mid-April). Fishway data from the Westfield River in MA (a CT River tributary) clearly demonstrate that the white sucker spawning migration begins *before* mid-April. Starting the fishlift operation earlier would pass this species in a more timely and efficient manner.

The fishlift should remain in operation until July 15 for shad and salmon passage, and should reopen September 15 through November 15 for fall salmon passage. The dates for salmon and shad passage are in agreement with the dates set forth by the Connecticut River Atlantic Salmon Commission (CRASC). The CRASC was created by an act of Congress in 1983 to guide the salmon restoration program on the Connecticut River.

Due to the uncertainty in the market (e.g. deregulation), the MADEP wants assurance that the fishway facilities will be operated over the long term in a manner that protects the resource. Although Holyoke Water Power as the current license holder has historically cooperated with the MADFW in setting adequate hours of operation, there is no guarantee that this will continue. The license holder in future may decide due to project economics to restrict fish passage operations to the detriment of the fish. The MADFW wishes to continue the current hours of operation, which are generally during daylight hours, but also wants the flexibility to operate at night, if needed.

In response to Trout Unlimited's comment, the dates of fishway operation to pass Atlantic salmon were selected based on the recommendation of the Connecticut River Atlantic Salmon Commission.

23(a). Build a Second Salmon Trap and a New Trapping and Handling Facility.

The existing upstream passage facilities include a single fish trap in the fishway exit flume that is used to capture Atlantic salmon for transport to hatchery facilities, capture various species for scientific research to further the restoration efforts, and trap American shad and river herring for transport to restore them to their historic upstream habitat.

As currently configured, passage through the fishway is stopped whenever salmon or other fish are being trapped. Salmon trapping can cause severe problems during high volume passage days for shad and other species. When the gate downstream from the counting window is closed to capture fish, upstream movements by all fish further downstream in the exit flume are delayed. This may be for only a short period of time if shunting of fish into the trap is accomplished quickly and passage gates can be re-opened. However, if salmon or other fish are reluctant to enter the trap (so called "recalcitrant salmon"), passage by other species is held up for a substantial period of time. Another problem occurs when the counting window gates are closed for trapping and a rush of shad and herring crash into the closed gates after being dumped from the fish lift hoppers. The existence of only a single trapping device further hampers passage when fishway monitoring personnel hold back passage while the trap is cleared if a second salmon or other target species is spotted.

MADFW discussed expansion of the existing fish lift facilities and flume to better accommodate the volume of fish passing the project, and targeted to pass the project in the future. Although expansion of the flume will improve hopper discharge configuration and relieve crowding in the fishway exit channel, a second trapping device is needed to minimize delays in passing fish while trapping, and to provide efficient capture of salmon and other target species.

If the license holder plans to add generation, it can choose to either improve the existing fishlift and necessarily remove it upon third unit construction or build a new fishlift that is compatible with but separate from the new turbine. Both options begin upon license issuance.

The MADFW reviewed HWP's proposed design and found it unsuitable due to the fact that HWP's design allows fish to either pass or be trapped, but not both at the same time.

In response to HWP's comment, the MADEP agrees that final approval of plans required by the Water Quality Certificate should be done by MADEP. The MADEP believes this time frame from license issuance is reasonable regardless of who holds the FERC license since it could take years to settle Motions for Rehearing and appeals.

In response to HGE's comment, there is no guarantee that the third generating unit will be built. Operating in a run-of-river mode, restoring aquatic habitat and restoring the ability of fish to migrate in a safe, timely and effective manner are goals that should not be delayed beyond the time needed to prepare for meeting these goals.

23(b). Tailrace Fishway Entrance Gallery Modifications

The MADFW has reevaluated the need for tailrace fishway entrance gallery modifications and rescinds the recommendation for a new third tailrace entrance downstream of the turbine boil as presented in the draft Water Quality Certification.

The turbulence and large volume of water within the tailrace channel, combined with the upstream location of the fishway entrance gallery, result in inefficient passage conditions at the tailrace lift[29]. In order to eliminate these inefficiencies, the MADFW recommends a feasibility study to determine the best design for an entrance to the tailrace lift downstream and outside of the influence of the boil from the turbine discharge. This new entrance should be designed to provide unimpeded, full-depth access. The objective of these modifications is to reduce delay of upstream migrating shad so as to enhance their chances of successfully reaching their historic upstream habitat before water temperatures reach spawning thresholds. Further, this new entrance will improve fishway access to bottom oriented species such as shortnose sturgeon and American eel.

The MADFW also recommends that the bedrock ledge on the west (Holyoke) side of the tailrace in the area immediately downstream of the existing (but non-functional) tailrace entrance be removed to allow operation of this entrance. The objective of this modification is to improve access to the tailrace fishlift. The present configuration allows access only on the east (S. Hadley) side of the tailrace and only passes fish efficiently when Hadley Unit #1 (east side) is generating more than Unit #2 (west side). Whenever Hadley #1 is shut down for maintenance during the fish passage season, attraction flows to the only functional tailrace entrance are lost, and fish passage is severely compromised[30].

The MADFW's recommendations do not call for full depth entrances to be added to the existing tailrace fishway entrances (east and west side), but rather that a feasibility study be conducted to determine the best design for a full depth, third entrance outside of the influence of the turbine boil.

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[29] Buzzy, T. and Kynard, B. 1986. Attraction of American Shad to fishlifts at Holyoke dam, Connecticut River. North American Journal of Fisheries Management. 6:233-241.
[30] Analysis of Hadley Falls hydroelectric generation vs. shad passage for 1999, Caleb Slater, MADFW

In response to HWP's comment, the MADEP agrees that final approval of plans required by the Water Quality Certificate should be done by MADEP. The MADEP believes this time frame from license issuance is reasonable regardless of who holds the FERC license since it could take years to settle Motions for Rehearing and appeals.

23(c). Funding for Staffing of Counting and Trapping Facilities.

Historically, MADFW personnel have monitored the fish passage facilities on a daily basis during lift operations. The crew counts fish and traps salmon and shad for the Connecticut River restoration program, but also provides continuous oversight of the facilities and assurance that any mechanical failures are corrected. These MADFW personnel assure the effective passage of fish by monitoring fish passage conditions and making any necessary adjustments to passage operations. These MADFW personnel also search the pools below the dam for stranded fish, especially shortnose sturgeon, upon reduction in spill. The change from a spill to non-spill condition, if it results in potential fisheries impact, is certainly the licensee's responsibility to monitor and mitigate. If this dam did not exist, the Commonwealth would not be required to expend public resources to staff and monitor these fishways which are integral to the restoration and maintenance of the biological integrity of the Connecticut River.

For these reasons, the licensee alone should be required to bear the cost of fishway operations at this project. This condition requires the licensee to perform all operations necessary to pass fish in a safe, timely and efficient manner under the direction of the MADFW. The licensee may choose to provide salaries, equipment and supplies to support their own operation or to support subcontractors.

23(d). Upstream Passage Studies of Resident Fish Species.

The current operations of fish passage facilities at the project are targeted on passage by anadromous species. However, during initial consultation, the MADFW and the USFWS recommended that studies be undertaken to assess the use of the fishways by resident riverine species. The MADFW believes that it is biologically important to reconnect resident fish populations within watersheds that have been fragmented by dams.

Upon request, the HWP monitored upstream and downstream fish passage during the summer months when fish passage operations are normally suspended. However, only the tailrace lift could be operated since a causeway was constructed across the bypass channel to permit construction of the new Route 116 bridge downstream from the dam. The bypass reach would be the far more likely route taken by resident riverine species. At that time, HWP was notified that a repeat of the monitoring would be needed after completion of the bridge construction project; that evaluation was never done.

Such an evaluation is needed to assess whether the fish lifts should be operated during summer months to pass these resident species. This relatively simple assessment would involve only the operation and counting of fish passing the existing facilities. A plan for this assessment should be developed in consultation with the MADFW and the USFWS.

In response to HWP's comment, the MADEP believes this time frame from license issuance is reasonable regardless of who holds the FERC license since it could take years to settle Motions for Rehearing and appeals.

24(a). New Trapping and Hauling Facilities

For many years, American shad have been captured at the Holyoke Dam for transport to their historic upstream habitat as part of shad restoration efforts within the Connecticut River basin. In addition, efforts are underway to restore river herring to Connecticut River tributaries upstream and downstream of Holyoke.

The existing facilities for trapping and hauling shad and herring from Holyoke are rudimentary at best. The salmon trap is used to trap a number of shad, which are then manually netted and dumped in a water-filled cart. The cart is rolled to a hoist and then the entire cart of fish and water is hoisted over the safety railing and

lowered to a platform. Fish and water are then dumped into a waiting tank truck. The process is slow and subjects fish to substantial physical abrasion and stress.

This issue was noted in consultation with the applicants. In their filing to the FERC dated December 23, 1998, the HGE proposed that as an alternative to the current system, they would redesign the lift system to sluice fish directly from the lift hopper to a sorting and holding tank. From there, targeted fish species could be sluiced directly into a waiting truck. This proposal is a good one. It would vastly improve the effectiveness of shad and herring transfers by speeding up the process, reducing handling and stress on individual fish. It would also reduce interference with both passage and with salmon trapping.

If the license holder plans to add generation, it can choose to either improve the existing fishlift and necessarily remove it upon third unit construction or build a new fishlift that is compatible with but separate from the new turbine. Both options begin upon license issuance.

HWP's proposal was reviewed and found to be unsuitable due to the fact that HWP's design causes excessive stress to the fish and delays in migration. The MADEP recommends that the license be conditioned to require the installation of a new fish trapping and hauling system with operating capabilities at least as effective as depicted in Figure 6-4 of HGE's December 23, 1998 filing.

In response to HWP's comment, the MADFW strongly objects to the assertion that the principal reason for the expansion of the hauling facilities is to facilitate fish restoration in other river systems. MADFW reports that shad and occasionally blueback herring are transported to other river systems but the amount of time spent to perform this work is insignificant. MADFW records show an estimated 20 hours were spent on this activity in 1998.

In response to HWP's comment, the MADEP agrees that final approval of plans required by the Water Quality Certificate should be done by MADEP. The MADEP also agrees with HWP that one year to develop final plans is more realistic and believes this time frame from license issuance is reasonable regardless of who holds the FERC license since it could take years to settle Motions for Rehearing and appeals.

In response to an additional HWP comment, constructing this facility and allowing fish to be trucked upstream compensates for delays in migration due to the dam.

In response to HGE's comment, there is no guarantee that the third generating unit will be built. Operating in a run-of-river mode, restoring aquatic habitat and restoring the ability of fish to migrate in a safe, timely and effective manner are goals that should not be delayed beyond the time needed to prepare for meeting these goals.

24(b). Bascule Gate Modifications - The "Flyover".

In the present configuration, water and downstream migrants run into the training wall at the spillway fishlift entrance. This flow pattern may lead to injury of downstream migrants and often interferes with the ability of upstream migrants to locate and successfully negotiate the spillway lift entrance. Reconfiguration of discharge location for downstream migrant conveyance flows would end these problems. Currently, the bascule gate downstream migrant bypass delivers migrants to the bypass reach, a long, shallow riffle area inhabited by predatory fish and birds, whose numbers will only increase once stable minimum flows are established. By contrast, the tailrace, with its deeper channel and higher flows, is the preferred route for fast, safe, and efficient passage of downstream migrants. Construction of a device to convey downstream migrants to the tailrace rather than to the bypass reach would improve migrant survival. Under terms of a Memorandum of Agreement signed with the Connecticut River Atlantic Salmon Commission (CRASC) in July 1990, HWP has agreed to build a conveyance which will intercept downstream migrating anadromous fish at the bascule gate on the Holyoke Dam and transport them to the Hadley Falls Station tailrace (the "flyway"). Additionally, the spillway will be modified to

eliminate the bascule gate flow interference with spillway fish lift attraction flows. The plans for this fishway are complete (HWP Response to Additional Information Requests, July 1998, figure 5.B), and are being modeled at Alden Research Laboratory in order to determine final engineering design. The MADFW has agreed that the final design need not be modified to include a gated bottom intake for eel and sturgeon passage, but rather that this option be studied after the flyover has been installed as currently designed.

If the license holder plans to add generation, it can choose to either improve the existing fishlift and necessarily remove it upon third unit construction or build a new fishlift that is compatible with but separate from the new turbine. If the licensee chooses to improve the existing fishlift, construction of this conveyance will occur within one year of license issuance. If the licensee chooses to build a new fishlift, an additional year for schedule compatibility is allowed.

In response to HGE's comment, there is no guarantee that the third generating unit will be built. Operating in a run-of-river mode, restoring aquatic habitat and restoring the ability of fish to migrate in a safe, timely and effective manner are goals that should not be delayed beyond the time needed to prepare for meeting these goals.

24(c) Number 2 Overflow Raceway Fish Barrier.

Currently, overflow from the canal system is directed from the first level canal through the Bostlook bypass facility and into the river through the Number 2 overflow raceway which joins the Hadley Falls Station tailrace at the route 116 bridge. This flow attracts migratory fish and leads them up into a waterway that has no upstream passage. This detour can delay passage until they continue up the tailrace, or lead to stranding if raceway flows decrease rapidly. In the past, MADFW personnel have had to use nets to remove Atlantic salmon and Shortnose sturgeon that have become trapped in this channel. HGE has proposed installation of a gabion rockfill barrier in the raceway, just upstream from its confluence with the Hadley Falls Station tailrace to block access to migratory fish (HGE Schedule B, Additional Information, Volume II, July 1998, section B-2, figure 11-B-1). The Division believes that this measure or any other that would deny migratory fish access to the overflow channel should be required. At the same time, whatever measures taken must not act as a barrier to downstream movement as downstream migrants are directed from the canal system by the Bostlook bypass facility into the No. 2 overflow raceway.

24(d) Upstream and Downstream Passage Measures for American Eel

The Atlantic States Marine Fisheries Commission issued a Public Hearing Draft Fishery Management Plan (FMP) for American Eel[8]. The FMP identifies a dramatic reduction in American eel abundance throughout its range, and a pressing need for immediate action. The stated goals of the FMP are to:

> Conserve and protect the American eel resource to ensure its continued role in the ecology of ecosystems while providing the opportunity for its commercial, recreational, scientific, and educational use.
>
> Protect and enhance the abundance of American eel in inland and territorial waters of the United States and jurisdictions and contribute to the viability of the American eel spawning population.

Two of the five primary objectives of this goal are to:

> Protect and enhance American eel abundance in all watersheds where eel now occur.

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[8] Fishery Management Plan for the American Eel, *Anguilla rostrata*, Public Hearing Draft, Atlantic States Marine Fisheries Commission, Washington, DC, April 20, 1999.

and

> Where practical, to restore American eel to those waters where they had historical abundance, but now may be absent, by providing access to inland waters for glass eel, elvers, and yellow eel; and by providing adequate escapement to the ocean for prespawning adult eel.

The MADFW supports these efforts and recommended that preparation and implementation of a downstream eel passage plan be required as a condition of any license granted. Such a plan may require seasonal shutdown and/or full depth screens at the Hadley Falls Station intake and full depth louvers at the canal bypass facility. A study of the effectiveness of these measures, once implemented, should also be a condition of the license.

The use of the existing Holyoke fishlifts by American eel is cited by the FERC in the DEIS along with the inference that since eels are known to navigate past some dams via wet surfaces, American eel effectively inhabit the much of the Connecticut River drainage. This is not true. Although American eels occur in areas upstream from Holyoke, their distribution in the watershed is limited and appears to correlate directly to the number of dams eels must negotiate on their upstream migrations. For example, eels are not known to currently inhabit the upper Westfield River, the entire Swift River system upstream from Windsor Dam, the West River upstream from Ball Mountain Dam, or any waters within the Green Mountain National Forest, or the mainstem Connecticut and its tributaries upstream from Wilder Dam[32].

In light of the current concern about American eel abundance throughout its range, the MADFW recommended that upstream fishways specifically designed for American eel passage be constructed at the Holyoke project. Because eels may approach the dam either through the tailrace or the bypass reach (spillway), ladders for upstream migrating eels will be necessary on both the tailrace and spillway sides of the dam. It should be noted that eels usually move at night, when the current fishway facilities are not operating and therefore do not pass fish. The recommended improvements will allow passage at all hours.

In response to HWP's comment, the MADFP believes this time frame from license issuance is reasonable regardless of who holds the FERC license since it could take years to settle Motions for Rehearing and appeals.

In response to HGE's comment, there is no guarantee that the third generating unit will be built. Operating in a run-of-river mode, restoring aquatic habitat and restoring the ability of fish to migrate in a safe, timely and effective manner are goals that should not be delayed beyond the time needed to prepare for meeting these goals.

25. Downstream American Eel Passage Plan

See response to #31. In response to HGE's comment, there is no guarantee that the third generating unit will be built. Operating in a run-of-river mode, restoring aquatic habitat and restoring the ability of fish to migrate in a safe, timely and effective manner are goals that should not be delayed beyond the time needed to prepare for meeting these goals.

26. Upstream and Downstream Passage Measures for Shortnose Sturgeon.

NMFS indicated to FERC in its prescription under Section 18 of the Federal Power Act that the shortnose sturgeon was listed as an endangered species in 1967 (June 3, 1999 Decision, pg. 5). NMFS also concluded that "continued mortality at the Holyoke Project adversely affects the shortnose sturgeon in the Connecticut River" (*Id.*, pg. 7). Shortnose sturgeons upstream and downstream from the dam were once

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[32] Michelle Belisone, USFWS, Connecticut River Coordinator's Office, Personal communication

thought to be separate populations, but recent research has indicated that only a single population exists[33]. Sturgeon tagged upstream of the dam have been found to have passed downstream of the Project, and sturgeon that have passed upstream via the Holyoke Fish Lifts have joined the sturgeon spawning congregation below the Turners Falls Dam[34]. The Holyoke Dam and project, therefore, affect both the upstream and downstream passage of sturgeon.

The decision regarding sturgeon passage needs, timing, and measures required rests largely with NMFS at this point. In a letter to the FERC, dated May 25, 1999, NMFS has again stated the need for formal consultation, pursuant to Section 7 of the Federal Endangered Species Act, with regard to incidental and unauthorized takes of shortnose sturgeon which have occurred due to project operations. NMFS has reserved its authority "to prescribe the construction, operation, and maintenance of fishways under Section 18 of the Federal Power Act" and asked FERC to include in the license notification of that reservation. (June 3, 1999 Decision, ppg. 42-43)

Because juvenile, yearling, and adult sturgeon will regularly migrate downstream to lower river concentration areas and, in passing the Holyoke Power Project, are susceptible to entrainment through the turbines, the MADFW recommends that preparation and implementation of a downstream sturgeon passage plan be required as a condition of any license granted. Such a plan will require full depth screens at the Hadley Falls Station intake and full depth louvers at the canal bypass facility. A study of the effectiveness of these facilities, once installed, should also be a condition of the license.

The expansion of the existing upstream fishlifts, as discussed above, should meet the upstream migration requirements of shortnose sturgeon at the project.

In response to HGE's comment, there is no guarantee that the third generating unit will be built. Operating in a run-of-river mode, restoring aquatic habitat and restoring the ability of fish to migrate in a safe, timely and effective manner are goals that should not be delayed beyond the time needed to prepare for meeting these goals.

27. Boatlock Station Bypass Operations

The applicants have expressed an interest in eliminating the Boatlock Station downstream bypass facility. The MADFW recommends continued operation and evaluation. Any decision regarding the shutdown of this facility will be based on the outcome of this comprehensive study.

28. Decision Blending Management Plan

The Massachusetts Surface Water Quality Standards specify that "in all cases existing uses and the level of the water quality necessary to protect the existing uses shall be maintained and protected" [314 CMR 4.04 (1)]. Designated uses for the Connecticut River include habitat for fish, other aquatic life, and wildlife, and primary and secondary contact recreation. Activities on lands adjacent to waters also may directly and adversely affect designated uses. Ensuring that adjacent uses and activities do not adversely affect designated uses is within the authority of the 401 certification.

Since the 1970s, the Connecticut River and specifically the Holyoke Pool has become one of the region's most heavily used recreational water bodies. The deep pool created by the Holyoke dam receives heavy boating use. The existence of the project impoundment has created tremendous pressure on shoreline and riparian habitats due to intense recreational activity in the summer months including motor boating, water skiing and swimming. In addition, creation of the project impoundment has resulted in development of shoreline property for homes and marinas, day use of public and private lands and overnight camping on those lands. These activities adversely affect water quality and the suitability of

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[33] Kynard, B. 1997. Life history, latitudinal patterns, and status of shortnose sturgeon. Environmental biology of fishes. 48:319-334.

[34] Kynard, B. 1998. Studies on shortnose sturgeon; Progress report, August 1997-December 1997. Report prepared for Northeast Utilities Service Company, Hartford, CT.

the river and its shorelines as fish and wildlife habitat, impair aesthetic values, and exacerbate public health problems and conflicts among users. Most of this use and development pressure exists only because of the presence of the dam and impoundment – without the dam and impoundment the amount of recreational activity affecting the environment and development on the water and riparian lands around the project would only be a small fraction of what they are today. Further, it is anticipated that the expansion of recreational and development pressure in the impoundment area will continue, placing even more pressure on shoreline properties in the future.

Other Commonwealth of Massachusetts laws and regulations exist which address protection of riparian land resources. However, the incremental review of projects under the Wetlands Protection Act and other state environmental review authorities, and the limits of their jurisdiction, including both the depth of buffer protected and the types of uses controlled, cannot guarantee that the values of the project waters as fish and wildlife habitat will be preserved. Scientific studies have shown riparian buffers ranging from 130 feet to over 500 feet are needed to support wildlife habitat values. The value of this habitat and the use of the river by wildlife could be compromised unless additional protections covering high value resources are implemented.

The Connecticut River has been a focus for state land protection efforts because of the high value of the resources, increasing development pressures and intensified recreational demands along its riparian lands. A total of 3,500 acres of land are currently owned by MADEM in various locations along the 138 miles of the Connecticut River in Massachusetts. In the last 5 years, the MADEM has committed over $2 million in this section of the river on land acquisition, planning and related programs.

A riparian management plan, including defining a buffer around the perimeter of the project on lands owned by the licensee and specification of compatible uses within the buffer zone is necessary to protect and maintain designated uses for the following reasons:

(a) Riparian buffers are a means of controlling nonpoint source pollution to water bodies. Nonpoint source pollution from adjacent land uses directly affects the suitability of the water and associated fish and wildlife habitats. Nonpoint sources are recognized by definition in the Surface Water Quality Standards as "any source of pollutant discharge that is not a point source". Further, use of buffers to protect water quality and fish and wildlife values is promoted by the guidelines developed for administering the Massachusetts Rivers Protection Act, which states:

"Land adjacent to rivers and streams can protect the natural integrity of these water bodies. The riverfront area can prevent degradation of water quality by filtering stormwater and nonpoint discharges of toxins and nutrients, and by providing shade to moderate water temperatures and slow algal growth. Maintaining vegetation along rivers promotes fish cover, increases food and oxygen availability, decreases sedimentation, and provides spawning habitat.... Riverfront areas are important wildlife habitat, providing food, shelter, breeding, and migratory and overwintering areas... Riverfront areas promote biological diversity by providing habitats for an unusually wide variety of species."

The value of riparian forested buffers in protecting water quality is well recognized among resource professionals. The US Forest Service states in their publication "Riparian Forest Buffers, Function and Design for Protection and Enhancement of Water Resources" (1988):

"Streamside forest buffers are crucial to the protection and enhancement of water resources of the eastern United States. They are extremely complex ecosystems that provide optimum food and habitat for stream communities... and in mitigating and controlling nonpoint source pollution.

Streamside forests also ameliorate the effects of some pesticides and directly provide dissolved and particulate organic food needed to maintain high biological productivity and diversity...

The streamside forest removes sediment and sediment-attached phosphorus by filtration and act as a sink for storing nutrients for extended periods of time."

(b) Wildlife habitat can be directly and indirectly affected by activities within the riparian strip adjacent to the water. Waterfowl nesting in shallow emergent wetlands can be affected by activities on adjacent lands; turtles nesting on shorelines; ground nesting waterfowl such as American black duck, Canada goose, mallards, teal, and mergansers, and waterfowl and other bird species which forage for food in project waters and nest in or feed from trees in the riparian strip adjacent to the river, including wood ducks, herons and eagles, are all vulnerable to both disturbance and habitat destruction resulting from activities on adjacent riparian lands (Hobson et al., 1993). The MADFW (1998) notes that:

"A 1997 inventory of floodplain forests identified recreation in unpermitted areas as having a tremendous and widespread impact on riverine communities. For instance, large areas of floodplain forests have been cleared for campsites, and this disturbance has allowed non-native species to invade... Good quality floodplain forests now are limited in distribution, with the best examples occurring along the Connecticut and Housatonic Rivers."

The problem of disturbance to wildlife along rivers from unrestricted access is also noted by the USFWS (1992):

"A review of several thousand journal articles and books revealed that most (wildlife) disturbances are created by water users (chiefly boaters, anglers, hunters). Human activities cause different degrees of disturbance to waterfowl and may be grouped into four main categories. Listed in order of decreasing disturbance:

1. Rapid over-water movement and loud noise (power boating, water skiing and aircraft)
2. Over water movement with little noise (sailing, wind surfing, rowing and canoeing)
3. Little over water movement with little noise (wading, swimming)
4. Activities along shorelines (fishing, birdwatching, hiking and traffic)

Disturbances displaced waterfowl from feeding grounds, increased energetic costs associated with flight, and may have lowered productivity of nesting or brooding waterfowl."

The width of habitat required along river edges for forest dwelling birds has been the subject of a number of studies: Hagar (1999) found riparian buffers provide the most benefit for forest-associated species if they are greater than 40 meters (128 feet) wide and the density of large trees within them is not reduced by harvesting; Keller et al. (1993) found that where the adjacent land is agricultural, a forested riparian strip of 100 meters (320 feet) may be needed for area-sensitive species.

In addition, many wetland or water-dependent wildlife species, particularly amphibians, spend only part of their life history in the water or wetlands, and part in the adjacent upland areas. Protection of upland areas adjacent to project waters and its associated wetlands is needed to assure continuation of these species. Semlitsch (1998) reviewed the literature in an attempt to delineate a terrestrial buffer zone around wetlands that would be protective of salamanders, and estimated that a buffer zone of 164.3 meters (534 feet) would be needed to support 95% of the population.

There are many unprotected areas that have particularly important environmental values immediately around the project. The lands shown are significant habitat for a number of wildlife species, some of which are rare and endangered. They provide perches and staging for wildlife that forage for fish in the river, including the American bald eagle and osprey, as well as habitat for a rich diversity of species. These are listed in an atlas of state-listed rare wetland wildlife compiled by the MA Natural Heritage and Endangered Species program (MADFW, 1998), which shows the Connecticut River corridor from Holyoke to Sunderland as priority habitats. In addition to the bald eagle, rare species found within the riparian areas along the Connecticut River include birds such as the Northern Parula, reptiles such as the Wood turtle, and invertebrates such as the globally rare puritan tiger beetle and the Dwarf Wedgemussel. In addition, these areas also provide habitat for plant species that are endangered, threatened or of special concern, such as green dragon, winged monkey flower, sandbar willow, and roundleaf sundrosh (MADFW, 1998).

The Connecticut River's riparian areas also include floodplain forest, wet meadow and cut bank habitats that are important to whole communities of plants and animals. Such riparian areas are significant for migratory songbirds such as warblers, vireos, orioles, and tanagers, and provide nesting or resting cover for hawks and ospreys.

It is therefore important to protect the continuity of the riparian edge. Fragmentation by human activities such as inappropriately sited camping, shoreline housing and marina operations can have wide ranging detrimental effects, including introduction of invasive non-native species, unintended shoreline erosion and water pollution from nonpoint runoff. A riparian zone specific to the resource sensitivities and level of activity on and adjacent to the river is needed to ensure protection of significant wildlife resources, given the high recreational use pressures and significant development pressures affecting the project shorelands.

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8. U.S. Forest Service, 1988. Riparian Forest Buffers, Function and Design for Protection and Enhancement of Water resources, USFS, Radnor, PA.

At present, there is no mechanism to assure continued appropriate public access to the river for primary and secondary contact recreation along the project's waters, other than lands owned and managed by public agencies, such as MADEM. Primary and secondary contact recreation management as part of the Riparian Management Plan can provide the mechanism to meet the demonstrable high demand for public access to the river for primary and secondary contact recreation.

In response to MADEM comments, the MADEP agrees there is a need to address riparian land protection beyond the project boundary. However this water quality certificate focuses on maintaining water quality standards within the project boundary and, as a result, produces a plan that can be used as part of an expanded plan. The best way to take a watershed approach may be to have the Executive Office of Environmental Affairs (EOEA) Connecticut River team coordinate, produce and help implement such a plan.

In response to the town of South Hadley comments, conservation of key riparian land can be accomplished by helping to develop the riparian management plan.

29(a). Develop Invasive Species Control Plan

By developing an Invasive Species Control Plan now, before invasive species become established (e.g. zebra mussels) multiple benefits are realized versus the cost of inaction. Current efforts by HWP to control water chestnut is a positive example that is encouraged. In response to HWP's and HGE's comments, the MADEP agrees that the license holder is not solely responsible for the development and implementation of a plan to control all invasive species within the project boundary. The intent of this condition is to have the license holder and resource agencies cooperate with a plan of action.

In response to CRWC comments, the MADEP agrees there is a need to address invasive species beyond the project boundary. This water quality certificate must focus on maintaining water quality standards within the project boundary and, as a result, produce a plan that can be used as the basis for an expanded plan. The best way to take a watershed approach may be to have the Executive Office of Environmental Affairs (EOEA) Connecticut River team coordinate, produce and help implement such a plan.

29(b). Develop Endangered Species Management Plan

This plan is needed to be in compliance with state law and regulations. If the FERC license holder creates the opportunities that cause conflicts between state-protected rare species and other uses within the project boundary (e.g. recreational or other uses that would be absent if not for the dam) it is the responsibility of the license holder to develop and implement a plan that protects rare species and their habitat that are harmed because of those activities.

In response to HWP's comment, the MADEP agrees that final approval of plans required by the Water Quality Certificate should be done by MADEP.

In response to CRWC comments, the MADEP agrees there is a need to address endangered species beyond the project boundary. This water quality certificate must focus on maintaining water quality standards within the project boundary and, as a result, produce a plan that can be used as the basis for an expanded plan. The best way to take a watershed approach may be to have the Executive Office of Environmental Affairs (EOEA) Connecticut River team coordinate, produce and help implement such a plan.

30. Water Quality Monitoring Plan

This condition is needed to verify attainment of Class B standards. In response to HWP's comment, the MADEP believes this time frame from license issuance is reasonable regardless of who holds the FERC license since it could take years to settle Motions for Rehearing and appeals.

In response to CRWC comment, the MADEP agrees that water quality testing should also be required at Cove Island. Since enforcement action to require compliance with Title 5 on Cove Island property has already begun, it is not necessary to include such language in this Water Quality Certification.

In response to Trout Unlimited's comment, testing for dissolved nitrogen and dissolved oxygen has been added to the water quality monitoring plan. Collection of this data will help in evaluating gas saturation levels and their effect.

31. Fish Passage During Construction
It is imperative that upstream and downstream fish passage operations during the seasonal migration period not be interrupted during construction of any additional generation. In order to maintain an adequate ZOP and to preserve the aquatic habitat created in the bypass reach the licensee must meet minimum flow requirements in the bypass reach during construction (1,300 cfs during the fish passage seasons and 840 cfs thereafter) unless it can be demonstrated to the MADEP that this action is impossible or inconsistent with the safe and prudent operation of the project.

32. New Tailrace Fishlift
When construction of any additional generation is completed, upstream fish passage from the new tailrace will be required for any migratory fish that are attracted to the turbine discharge. The fishway should be complete with north and south entrances (on either side of the tailrace), attraction flow system with diffusers, a crowder, fish lift (with a hopper capacity of 330 cubic), and connection to the exit flume. The attraction flow from each entrance should be ≥3% of the turbine discharge (USFWS fishway design standards).

33. New Spillway Lift
Because construction of additional generation would displace the current spillway fish lift, a new spillway fishlift would have to be constructed to pass fish that approach the dam through the bypass reach. The new fishway should be complete with an entrance located at the foot of the new forebay spillway, attraction flow system with diffusers, a crowder, fish lift (with a hopper capacity of 330 cubic feet), and connection to exit flume. Attraction flows should be greater than, or equal to, the current spillway fishlift attraction flows of 200 cfs.

34. New Trash Rack/Fish Screen
To address the expected increase in fish entrainment at the Hadley Falls station with operation of third unit, preferred construction should include a new Hadley Falls forebay including a submerged rockfill training wall, new fulldepth trashrack and new downstream bypass facility. Design of the full depth angled guidance device (one-inch clear bar spacing trash rack) should include mathematical and physical hydraulic modeling of said device to guarantee flows which meet USFWS fishway design criteria (maximum approach velocity of 2 feet per second - or 350 cfs) at the new multi-level downstream bypass facility.

35. Construction Start Date
It is imperative that upstream and downstream fish passage operations during the seasonal migration period not be interrupted during construction of a third generating unit. Therefore MADFW recommends that construction not begin until July 15, rather than July 1 as recommended by HGE. HGE has suggested an earlier start date based on the fact that the great majority of fish are passed prior to July 1. This may be true, but a significant number of Atlantic salmon are passed in July, and disruption of this component of the passage season is not acceptable.

36. Construction Dewatering Permit
This condition is needed to maintain compliance with state and federal regulations.

37. Hazardous Waste Site
This condition is needed to maintain compliance with state and federal regulations.

JAN 1

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January 10, 2003

Paul S. Ducheney
Superintendent of Hydro Operations
City of Holyoke Gas & Electric Department
99 Suffolk Street
Holyoke, MA 01040-5082

Re: 401 WQC, Holyoke Dam Hydroelectric Project, Request to Extend Construction Schedule Deadlines

Dear Mr. Ducheney:

This Department of Environmental Protection (Department) writes in response to the City of Holyoke Gas & Electric Department's (HG&E's) September 6 and December 3, 2002 requests for an extension of time to meet various construction schedule deadlines contained in the 401 Water Quality Certification (WQC) for the above-referenced project. The Department understands that HG&E's request to extend compliance schedules is partly due to the transfer of Project ownership from the Holyoke Water Power Company to the City in December of 2001. Additionally, the City has been consulting with the appropriate resource agencies and non-governmental environmental organizations, and these stakeholders are comfortable with some "fine tuning" of construction schedules to further enhance and protect natural resources effected by the Project.

The Department responds to the extension requests contained in Appendix "A" to the City's September 6 and December 3, 2002 letters as follows:

Condition 9(a)- Installation of the rubber dam is complete and there are no outstanding compliance issues associated with this condition.

Condition 9(b)- The Department understands that HG&E is working to develop new operational parameters to measure compliance with the run-of-river operation condition. The Department will extend the deadline for HG&E's submission of a final run-of-river operation and monitoring plan until January 31, 2004. However, the Department states

that the rubber dam deflation program needs adjusting to limit any rise in pond elevation prior to deflation of each section. The Department is consulting with HG&E to determine the most appropriate location to measure the pond elevation and the Department will need to see more data before approving the final plan.

Condition 10- Rubber dam installation was completed in November of 2001.

Condition 11(a) and (b)- The Department states that habitat flows have not been established because the habitat flow demonstration conducted by HG&E in December of 2001 was inadequate. HG&E must demonstrate the measurement of compliance with these conditions to resource agency representatives once again. The resource agencies require a demonstration with Bascule gate fixed and correct water surface elevations. A demonstration of rubber dam #1 (S.Hadley side) as the point of release will also be required.

Condition 11(c)- The Department will extend the deadline for submitting a plan to redistribute flow to the three channels in the bypass reach from November 1, 2001 until January 31, 2003. The Department understands that one modification made in the past to the Holyoke side of the channel has become a barrier to the passage of shad. However, the Department will not extend the deadline for channel modification construction until August 31, 2004 because shad were trapped in the summer of 2002 and this problem must be addressed as soon as possible. The Department requires a plan to address Holyoke channel fish passage modifications by January 31, 2003. The Department states that construction of channel modifications for fish passage must be completed by December 31, 2003. If it is determined that channel modifications for flow redistribution are needed, they will be based on the results of a flow demonstration study that will be conducted upon completion of the fish passage channel modifications.

Condition 11(d)(1)- The Department has not received the Interim Plan for Minimum Flows in Bypass Reach that was originally due for submission on March 1, 2001. HG&E requested an extension until September 15, 2002. The Department will not extend this deadline any further and requires submission of the Plan within one week of the date of this letter. The Department states that the established target water surface elevations for habitat referenced in HG&E's September 6, 2002 extension request letter, Rationale Section of Appendix "A", for this condition were interim targets, not final targets.

Condition 11(d)(2)- The Department will extend the deadline for submission of a final Plan for Minimum Flows in Bypass Reach from December 2002 until September 15, 2003.

Condition 12(a)- The Department states the 401 WQC does not require the submission of an Interim Flow Prioritization Plan. However, the Department reminds HG&E that the 401 WQC requires that all plans submitted to the Department for review and approval must also be submitted to Massachusetts Division of Fisheries and Wildlife (MADFW) and the United States Fish and Wildlife Service (USFWS).

Condition 12(b)- The Department states the 401 WQC does not require the submission of a Final Flow Prioritization Plan and compliance with the provisions of this condition is ongoing.

Condition 12(c)- The Department states the 401 WQC does require the submission of a Low Flow Contingency Plan within three months of issuance of the WQC. The Department will extend this deadline until January 31, 2004 to allow completion of louver effectiveness studies within 1 to 2 years after full depth louver installation.

Condition 13(a)- The Interim Canal System Operation Plan was submitted to and approved by the Department.

Condition 13(b)- The Department requests a copy of the results of the canal leakage study. The Department will not, at this time, allow HG&E to meet canal minimum flow requirements with canal leakage flows alone. At the November 19, 2002 technical meeting in Holyoke, stakeholders discussed the adequacy of allowing leakage plus 100 cfs through the designated Holyoke canal units to satisfy canal minimum flow requirements. The Department requests that the details of this plan be submitted as an addendum to the canal leakage study. The Department will extend the deadline for submitting the canal minimum flow plan from May 14, 2001 until December 31, 2003.

Condition 13(c)- The Interim Canal Drawdown Plan was submitted to and approved by the Department.

Condition 13(d)- The Department states that maintaining some flow through the canal during the draw down period may be needed to protect mussels, but the amount of flow has not yet been established. The Department will extend the deadline for submitting a plan for the protection and monitoring of aquatic resources in the canal system during drawdowns from June 1, 2001 until December 31, 2003.

Condition 13(e)- The Department states the plan to exclude shortnose sturgeon and other fish from the fishlift attraction water must be submitted within one week of the date of this letter to the Department, USFWS, and NMFS, in addition to MADFW, and the Department must approve the plan.

Condition 14(a)- The Department states that an implementation schedule for redesign and reconstruction of upstream and downstream fish passage facilities was required to be submitted to MADEP, MADFW, USFWS, and NMFS for MADEP approval upon certification. The Department will extend this deadline until June 2, 2003.

Condition 14(a)(1) (Phase 1 Construction)- The full depth louvers were installed in October of 2002. The Department will extend the deadline for modifications of both fish lifts for 40,000 cfs operation until November 31, 2003 because HG&E is still consulting with resource agencies on how best to modify the lifts.

Condition 14(a)(2) (Phase 2 Construction)- The Department states that detailed construction plans and schedules for the 2003 construction year must be submitted to the resources agencies listed in Condition 14(b) by January 31, 2003. However, the Department agrees with the plan to combine Phase II and Phase III construction into one season beginning July 1, 2004 and ending March 31, 2005. The three phase construction plan was proposed by the previous project owner. HG&E believes that the construction can be best completed in one long construction season and the stakeholders agree.

Condition 14(a)(3) (Phase 3 Construction)- The Department will extend the December 31, 2003 deadline for completion of items (i), (ii), (iii), (iv), and (v) during Phase III construction until March 31, 2005. The Department understands that the resource agencies believe the angled bar rack (Condition 14(a)(3)(vi)), may not be the most effective structure for downstream fish passage. The Department awaits HG&E's submission of a status report on the Alden Labs Phase 2 research program and activities of the Sturgeon Working Group by January 31, 2003. The Department may require construction of the No. 2 overflow channel barrier. The #2 overflow is known to trap shad and salmon. It appears that the conditions listed to preclude construction of the barrier on page 12 of the 401 WQC are not being met by HG&E. Specifically, HG&E assured the resource agencies that they would not use the #2 overflow during fish passage season because a barrier has not been built. However, Caleb Slater of MADFW observed fish trapped in the #2 overflow sometime in May of 2002 because HG&E released water from the #2 overflow (during fish passage season), despite their previous assertion that this would not happen. Mr. Slater observed hundreds of shad at the head of the #2 drain, where they were most likely trapped when the water was turned off.

Condition 14(b)- The Department reiterates that the detailed construction plans and schedules for the 2003 construction year must be submitted to the resources agencies listed in Condition 14(b) by January 31, 2003.

Condition 14(c)- The Department will extend the deadline for HG&E to file a plan to study the effectiveness of the full depth louvers until January 31, 2003. Interim results of the effectiveness study must be submitted to the Department by January 31, 2004. The Department states that HG&E must also study the effectiveness of the rock removal completed in March of 2001. The study should include provisions for monitoring fish passage at both the East and West tailrace entrances and for assessing entrance use with only Hadley 1 running and with only Hadley 2 running. HG&E must also make modifications to the West Entrance Gate by March 31, 2003 and submit a plan to study the effectiveness of such modifications by December 31, 2002. The results of this effectiveness study must be submitted to the Department by December 31, 2003.

Condition 14(g)- The Department will extend the deadline for compliance with this condition until the end of Phase III construction. The Department states that HG&E must gather study results for one year after the plan is in effect and submit a report of such results to the resource agencies within six months of collecting final results.

Condition 14(i)- The Department awaits HG&E's submission of an update on Phase 2 ongoing research at Alden Labs.

Condition 14(j)- The Department is very concerned that HG&E did not study upstream eel passage facility possibilities during the summer of 2002 as required. The Department states that this requirement must be completed by October 31, 2003.

Condition 14(k)- The Department extends the deadline for submitting a plan for shortnose sturgeon upstream and downstream passage until December 31, 2003 due to ongoing work of the Sturgeon Working Group and awaits HG&E's submission of an update on the Group's activities January 31, 2003.

Condition 19- The Department will extend the deadline for HG&E to submit the riparian management plan from February 14, 2002 until April 30, 2003.

Condition 21(b)- The Department states that the focus of this plan is different from that required by Condition 13(d). 13(d) refers to endangered species specifically affect by canal operations and the plan required by 21(b) is more broad in scope and includes all endangered species possibly affected by activities taking place throughout the project boundary.

This letter is not intended to serve as a modification of the 401 WQC. The 401 WQC remains in effect as originally issued. However, the Department's use of the phrase "extend the deadline" in this letter means that the Department will not pursue civil administrative penalties for HG&E's failure to comply with the original 401 WQC deadlines, as long as HG&E satisfies all the requirements by the specific dates set forth herein. If HG&E fails to complete its obligations by the dates set forth herein (or the dates in the 401 WQC for the obligations that this letter does not extend), the Department reserves its rights and authorities to pursue enforcement, including, but not limited to civil administrative penalties for any one or more violation(s).

Sincerely,

Brian D. Harrington
Acting Deputy Regional Director
Bureau of Resource Protection

cc: Deirdre Desmond, DEP/OGC Boston
Robert Kubit, DEP CERO
Caleb Slater, Mass. Division of Fisheries and Wildlife
Tom Miner, Connecticut River Watershed Council
Don Pugh, Trout Unlimited

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OCT 8 2003

Mr. Paul S. Duchaney
City of Holyoke Gas & Electric Department
99 Suffolk Street
Holyoke MA 01040-5082

October 6, 2003

Subject: Approval of Impoundment Level Study

Dear Mr. Duchaney,

The Massachusetts Department of Environmental Protection (the Department) is in receipt of your September 5, 2003 letter requesting confirmation that the upcoming calibration activities associated with the Impoundment Level Study (Study) are consistent with the approved compliance plans for the Holyoke Project, developed in accordance with the FERC license order and the Water Quality Certificate (WQC).

Evidence has shown that maintaining a stable pond elevation at the dam results in greater water level fluctuations at environmentally sensitive areas upstream. The purpose of the calibration activities is to quantify the relationships between flows at Hatfield, drawdown at the Holyoke Dam, and water levels at Rainbow Beach and refine the preliminary model already developed by your consultant Kleinschmidt Associates.

HG&E will commence activities associated with the Study on October 6, 2003 and continue such activities through November 2004. HG&E must notify the public, including marina owners, of the effects of the calibration activities. HG&E must comply with minimum flow requirements for habitat and zone of passage in the bypass reach established by Condition #11 of the February 14, 2001 401 Water Quality Certification (401 WQC). HG&E must also follow established protocols set forth by the USGS, Biological Survey to prevent sturgeon stranding in the bypass reach downstream of the dam, as required by Condition # 11 of the 401 WQC.

The Department recognizes that strict compliance with Condition #9 of the 401 WQC, requiring a stable pond elevation at the dam and instantaneous run-of-river mode, may not be possible at all times during the course of this study. However the objective of the study is to protect an endangered species, Tiger Beetles at Rainbow Beach as required by Condition #22(b) of the 401 WQC. A modified run-of-river operation and a change in the way a stable pond is measured may result in the increased protection of this endangered species.

The Department further recognizes that, during the course of the Study, minimum flow requirements for the bypass reach contained in Condition #11 may be violated. Accordingly, the Department is requiring HG&E to issue notification of any excursions from minimum flow requirements, on a weekly basis, to the Department, the Connecticut River Watershed Council, Trout Unlimited and the Massachusetts Division of Fisheries and Wildlife (Settlement Parties) at the addresses listed on page 22 of the 401 WQC. Notification must be sent by fax or electronic mail. Consultation among the Settlement Parties may result in a Department decision to require a modification or termination of the Study at any time.

The Department also requires HG&E to protect the safety of workers downstream of the dam by ensuring direct communication and acknowledgement from the downstream contractor before each adjustment of flow. In addition, the Department requires HG&E to provide a representative to weekly coordination meetings (Mondays 8:00 a.m.) at the coal tar site trailer until the coal tar project is complete

This letter is not intended to serve as a modification of the 401 WQC. The 401 WQC remains in effect as originally issued. However, the Department's issuance of this letter means that the Department will not pursue civil administrative penalties for HG&E's failure to comply with the original 401 WQC conditions, as long as HG&E satisfies all the requirements set forth herein. If HG&E fails to meet the conditions set forth herein, the Department reserves its rights and authorities to pursue enforcement, including, but not limited to civil administrative penalties for any one or more violation(s).

Based on the above conditions, The Department agrees that the Impoundment Level Study is consistent with the Water Quality Certificate.

Sincerely,

Brian D. Harrington
Acting Deputy Regional Director
Bureau of Resource Protection

Cc: R. McCollum/WERO
R. Bell/WERO
D. Desmond/OGC/DEP
R. Kubit/DWM/DEP
P. Hogan/DWM/DEP
C. Sinton/DFW
J. Warner/USFWS
D. Pugh/TU
T. Miner/CRWC
P. Vinciusi/South Hadley

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JAN 21 2004

Paul S. Ducheney
Superintendent of Hydro Operations
City of Holyoke Gas & Electric Department
99 Suffolk Street
Holyoke MA 01040-5082

Re: 401 WQC, Holyoke Dam Hydroelectric Project, Request to Extend Construction Schedule Deadlines

Dear Mr. Ducheney,

The Massachusetts Department of Environmental Protection (Department) writes in response to the City of Holyoke Gas & Electric Department's (HG&E's) October 31, 2003 request and the December 18, 2003 amended request for an extension of time to complete installation of new upstream eel passage as required by condition 14(j) of the 401 Water Quality Certificate (WQC) for the Holyoke Project.

The Department understands that HG&E's request to extend compliance schedules is due in part to additional information presented at the November 21-22, 2003 Cooperative Consultation Team meeting. The additional information included details on temporary and permanent eelway structures, the need for proof that upstream migrating eels will use the South Hadley side now that a rubber dam is in place and the impact of construction on eel movement. Both the eel plan submitted to the Department, and the draft settlement agreement contain the qualifier, "if necessary" on the requirement to construct permanent eelways in 2006. The Department's approval of an extension of time to complete conditions 14(j) of the 401 Water Quality Certificate for this project is contingent upon removal of this qualifier from the plan and settlement agreement because it is inconsistent with 401 Condition 14(j) in the WQC.

The Department agrees to extend the deadline for condition 14(j) of the WQC according to the following schedule of activities:

2004

- Construct and implement modified eel collectors on the Holyoke side.
- Construct and install a ramp and an eel collector on the South Hadley side.
- Collect as much data as possible on the movement of eels upstream and how they approach the dam.
- Conduct a marking study to determine if drop back is an issue.

2005

- Continue to collect as much data as possible on the movement of eels upstream and how they approach the dam
- Evaluate where to locate entrance/passage on the Holyoke side.

2006

- Construct permanent measures.
- Perform effectiveness studies.

2007

- Perform additional effectiveness studies, if necessary.

In addition, progress reports on these research efforts shall be filed each year with the Department and other stakeholders including the Massachusetts Division of Fish & Wildlife, Trout Unlimited and the Connecticut River Watershed Council on or before March 1, beginning in 2005.

This letter is not intended to serve as a modification of the 401 WQC. The 401 WQC remains in effect as originally issued. However, the Department's use of the phrase "extend the deadline" in this letter means that the Department will not pursue civil administrative penalties for HG&E's failure to comply with the original 401 WQC deadlines, as long as HG&E satisfies all the requirements by the specific dates set forth herein. If HG&E fails to complete its obligations by the dates set forth herein (or the dates in the 401 WQC for the obligations that this letter does not extend), the Department reserves its rights and authorities to pursue enforcement, including, but not limited to civil administrative penalties for any one or more violation(s).

Sincerely,

Brian D. Harrington
Acting Deputy Regional Director
Bureau of Resource Protection

Cc: Deirdre Desmond/DEP/OGC/Boston
Robert McCollum/DEP/WERO
Robert Kubit/DEP/DWM/CERO
Caleb Slater/MADFW
Tom Miner/Connecticut River Watershed Council
Don Pugh/Trout Unlimited

HGE
electric | steam | telecom

Consultants:
Neil J. Moriarty, Jr.
Francis J. Hoey, III
Robert H. Griffin

Manager:
James M. Lavelle

December 18, 2003

VIA OVERNIGHT DELIVERY

Brian D. Harrington
Acting Deputy Regional Director
Bureau of Resource Protection
Commonwealth of Massachusetts
Department of Environmental Protection
436 Dwight Street
Springfield, MA 01103

Holyoke Dam Hydroelectric Project (FERC No. 2004)
Amendment to 401 WQC Request to Extend Deadlines

Dear Mr. Harrington:

Condition 14(j) of the 401 Water Quality Certificate (WQC) for the Holyoke Project requires the City of Holyoke Gas and Electric Department (HG&E) to file a final design for the installation of new upstream eel passage. In a letter dated October 31, 2003, HG&E requested an extension of time to fulfill this requirement. Subsequently, HG&E held successful settlement discussions on November 21–22 with members of the Cooperative Consultation Team (CCT), including representatives from the Massachusetts Department of Environmental Protection (MADEP).

These discussions have greatly refined HG&E's understanding of the scope and nature of eel passage efforts at the project over the next four years. In light of this new information, HG&E respectfully provides the following proposed amendments to the October 31 request, which reflect the agreements reached at the November 21–22 meeting.

During the settlement discussions, the CCT developed the following draft outline of future activities concerning upstream eel passage at the Holyoke Project:

[redacted]

2004

- Construct and implement modified eel collectors on the Holyoke side.
- Construct and install a ramp and an eel collector on the South Hadley side.
- Collect as much data as possible on the movement of eels upstream and how they approach the dam.
- Conduct a marking study to determine if drop back is an issue.

2005

- Continue to collect as much data as possible on the movement of eels upstream and how they approach the dam
- Evaluate where to locate entrance/passage on the Holyoke side.

2006

- Construct permanent measures (both sides if necessary).
- Perform effectiveness studies.

2007

- Perform additional effectiveness studies, if necessary.

In order to keep MADEP and other stakeholder regularly updated on these research efforts, progress reports will be filed each year on or before March 1, beginning in 2005. If you have any questions regarding this filing, please contact me at (413) 536-9340.

Sincerely,

Paul S. Ducheney

Paul S. Ducheney
Superintendent of Hydro Operations

cc: Robert Kabit, MADEP
Deidre Desmond, MADEP/OG
Robert McCollum, MADEP
Jim Lavelle, HG&E
Fred Szufnarowski, Kleinschmidt
Nancy Skancke, GKRSE

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[redacted]

s | electric | steam | telecom

Commissioners:
Neil J. Moriarty, Jr.
Francis J. Hoey, III
Robert H. Griffin

Manager:
James M. Lavelle

December 26, 2003

VIA OVERNIGHT DELIVERY

Brian D. Harrington
Acting Deputy Regional Director
Bureau of Resource Protection
Commonwealth of Massachusetts
Department of Environmental Protection
436 Dwight Street
Springfield, MA 01103

Holyoke Dam Hydroelectric Project (FERC No. 2004)
401 WQC Request to Extend Deadlines

Dear Mr. Harrington:

The Holyoke Dam Hydroelectric Project is located in the City of Holyoke, Massachusetts, on the Connecticut River. The Commonwealth of Massachusetts, Department of Environmental Protection (MADEP) approved and executed a 401 Water Quality Certificate (WQC) and Settlement on February 14, 2001. The City of Holyoke Gas and Electric Department (HG&E) obtained ownership of the Holyoke Project from Holyoke Water Power (HWP) on December 14, 2001.

Due to several complications associated with the project transfer as well as subsequent settlement discussions, several requirements in the WQC have not been completed within the original deadlines. In a letter dated January 10, 2003, the Massachusetts Department of Environmental Protection (MADEP) graciously extended the deadline for completion of several items.

During 2003 HG&E has been engaged in extensive, ongoing settlement discussions with stakeholders, including representatives from MADEP. During this period several more WQC requirements have been fulfilled. Based on information received during settlement discussions, HG&E requests an extension of time for the few remaining WQC requirements, as detailed below. In order to prepare this filing, HG&E worked closely with MADEP staff member Robert Kubit to review the outstanding WQC items.

[redacted]

WQC Condition 11d(2). Permanent Bypass Flow Plan. This condition requires HG&E to file a permanent plan for estimating flows in the bypass reach. An interim plan was filed with MADEP on January 21, 2003 as part of the Comprehensive Operations and Flow Plan (COFP). In order to develop this permanent plan, HG&E has held two flow demonstrations with stakeholders in December 2001 and again in May 2002. Based on these demonstrations, participants reached consensus on permanent methods for estimating zone-of-passage flows. Additional field work and analysis was required to determine compliance measures for habitat flows. During October HG&E performed a field study but due to high fall flows the flow demonstration was canceled. A draft study report was circulated to stakeholders at the November 21, 2003 settlement meeting in Chelmsford, MA. Comments on the draft plan have not yet been received, and this information is crucial to finalizing the permanent plan for estimating flow in the bypass reach. Because of the possibility that additional field work and/or flow demonstrations may be required to achieve consensus on this issue, HG&E respectfully requests an extension of time for this item to December 31, 2004.

WQC Condition 14a(1). Modify Fishlift for Operation to 40,000 cfs. Interim measures the to operate the fishway for flows up to 40,000 cfs were implemented prior to the start of the spring 2003 passage season. Permanent measures have been incorporated into the design parameters for the expanded fishway. Construction on this expansion will begin in 2004 and be complete by April 1, 2005. Accordingly, HG&E respectfully requests an extension of time for this item to April 1, 2005.

WQC Condition 14c(1). Louver Effectiveness Study Report. During 2003 HG&E collected data on shad passage at the louver facility. A second and critical component of the louver effectiveness study was to measure velocities at the louver. Due to exceptionally high fall flows, HG&E was unable to complete this portion of the study. Accordingly, HG&E respectfully requests an extension of time to July 1, 2004 in order to complete this item.

WQC Condition 14h. Plan for Fish Trapping and Hauling. Provisions for a new trapping and hauling system have been built into the design plans for the upstream fish passage expansion. These designs have been recently finalized in consultation with stakeholders, and bid packages were distributed on December 16, 2003. HG&E will provide MADEP with details of this trapping and hauling system as a separate filing. Accordingly, HG&E respectfully requests an extension of time to February 1, 2004 in order to complete this item.

WQC Condition14k. Plan for Upstream and Downstream Passage of Shortnose Sturgeon. During 2003 HG&E worked closely with the members of the CCT, including the NOAA Fisheries, to develop a plan for shortnose sturgeon at the Project. The comprehensive settlement will provide the basis for a plan to pass sturgeon at the Project. Development of a final Plan hinges on completion of settlement discussions, which are ongoing. Accordingly, HG&E respectfully requests an extension of time to December 3, 2004 to file this final plan.

[redacted]

If you have any questions regarding this filing, please contact me at (413) 536-9340.

Sincerely,

Paul S. Ducheney

Paul S. Ducheney
Superintendent of Hydro Operations

cc: Robert Kubit, MADEP
Deidre Desmond, MADEP/OGC

Jim Lavelle, HG&E
Fred Szufnarowski, Kleinschmidt
Nancy Skancke, GKRSE

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[redacted]

Holyoke Project, FERC No. 2004
Appendix B to Settlement Agreement
Illustrating the Correlation Between the Conditions in 2001 Water Quality Certification and Provisions of the Settlement Agreement

2001 WQC Condition No.	2001 WQC Provision	Parallel Provision in the Settlement Agreement
WQC 1-8	Compliance	No change in Settlement
WQC 9	Run-of-River	Section 4.1
WQC 10	Rubber Dam	Installed 11/01; no change in Settlement
WQC 11	Bypass Reach Flows	Section 4.2
WQC 12	Project Flows	Section 4.4
WQC 13	Canal Operations	Sections 4.3 and 4.6
WQC 14	Fish Passage Facilities	Sections 4.5 and 4.6 [upstream fish passage]; Section 4.7 [downstream fish passage]; Section 4.8 [eel passage]; Section 4.9 [construction plans]; Sections 4.3(f)-(g) [full depth louvers and exclusion racks]
WQC 15	Holyoke Fishway Monitoring Scope of Work	Section 4.6(e)
WQC 16	Access to the Project	Not to be addressed in Settlement
WQC 17	Cooperative Research/Management Activities	Not to be addressed in Settlement
WQC 18	Moratorium	See Sections 4.6 and 4.7, otherwise not to be addressed in Settlement
WQC 19	Riparian Management Plan	Section 4.11(h).
WQC 20	Sale of Land Within Riparian Zone	Not to be addressed in Settlement
WQC 21	Additional Plans	Section 4.11(c) [Threatened and Endangered Species Plan]; Section 4.11(d) [Invasive Species Monitoring Plan]
WQC 22	Water Sampling Standard Operating Procedures	Section 4.11(b) [Water Quality Monitoring Plan]
WQC 23	Force Majeure	See Section 9.1, otherwise not to be addressed in Settlement

Holyoke Project, FERC No. 2004
Appendix C to Settlement Agreement
Comparison of License Articles in 1999 License Order with Proposed Settlement License Articles and with Provisions of the Settlement Agreement

1999 License Articles	Topic covered	Provision in the Settlement Agreement	Proposed Settlement License Article
301	Construction Schedule	Covered in Article IV of Settlement by topic.	Revised 301
302	Design Drawings	Not changed	Unchanged 302
303	As-Built Drawings	Not changed	Unchanged 303
304	Revised Exhibit G for change in land ownership	Not changed	Unchanged 304
305	Headwater benefits	Not changed	Unchanged 305
306	Coffer dam during construction	Not changed	Unchanged 306
401	Rubber Dam	Installed November 2001; not covered by Settlement.	Revised 401
402	Construction erosion plan	Modify consultation to be consistent with Section 3.3 of the Settlement.	Revised 402
403	Shoreline erosion remediation plan	Sections 1.37, 3.3 and 4.11(a) of the Settlement; Shoreline Erosion Remediation Plan filed and approved [96 FERC ¶ 62,100 (2001)].	Revised 403
404	Water quality monitoring	Sections 3.3 and 4.11(b) of the Settlement; Water Quality Monitoring Plan filed and approved.	Revised 404
405	Run-of-River Operations	Sections 3.3 and 4.1 of the Settlement; Evaluation of potential modifications to run-of-river operations.	Revised 405
406	Bypass/Canal minimum flows; Flow prioritization	Sections 3.3, 4.2, 4.3 and 4.4 of the Settlement.	Revised 406
407	Comprehensive operations plan	Section 1.11 of the Settlement; Comprehensive Operations and Flow Plan filed and approved [103 FERC ¶ 62,178 (2003)].	Revised 407
408	Operations monitoring		Deleted – duplicative of revised Article 407
409	Canal operations plan	Sections 1.10 and 3.3 of the Settlement; Comprehensive Canal	Revised, renumbered 408

1999 License Articles	Topic covered	Provision in the Settlement Agreement	Proposed Settlement License Article
		Operations Plan filed and approved [103 FERC ¶ 62,130 (2003)].	
410	Habitat and pollution monitoring	Sections 1.16, 3.3 and 4.11(e) of the Settlement; Fish and Aquatic Habitat Monitoring Plan filed and approved [103 FERC ¶ 62,175 (2003)].	Revised, renumbered 409
411	Downstream fish passage	Sections 1.14, 3.3, 4.3(f) and 4.7 of the Settlement; Downstream Fish Passage Plan filed and approved [103 FERC ¶ 62,165 (2003)].	Revised, renumbered 410
412	Upstream fish passage	Sections 1.41, 3.3, 4.5 and 4.6 of the Settlement; Upstream Fish Passage Plan filed and approved [103 FERC ¶ 62,177 (2003)].	Revised, renumbered 411
413	Eel passage	Sections 3.3 and 4.8 of the Settlement.	Revised, renumbered 412
414	Fishway operations monitoring and effectiveness studies	Sections 3.3, 4.6(d) and 4.7(c) of the Settlement.	Revised, renumbered 413
	Annual construction plans	Section 3.3 and 4.9 of the Settlement.	New 414
415	Section 18 FPA Reservation	Sections 5.5 and 5.6 of the Settlement.	Unchanged 415
416	Threatened and Endangered Species Protection Plan	Sections 1.40, 3.3, and 4.11(c) of the Settlement; Threatened and Endangered Species Protection Plan filed and approved [103 FERC ¶ 62,131 (2003)].	Revised 416
417	Mussel monitoring plan	Sections 1.21, 3.3, and 4.11(d) of the Settlement; Invasive Species Monitoring Plan filed and approved [96 FERC ¶ 62,174 (2001)].	Revised 417
418	Comprehensive Recreation and Land Management Plan	Sections 1.12, 3.3, and 4.11(f).	Revised 418
419	Rubber dam	Installed November 2001.	Deleted
420	Cultural Resources	Sections 1.13 and 4.11(g) of the	Revised,

1999 License Articles	Topic covered	Provision in the Settlement Agreement	Proposed Settlement License Article
	Management Plan; Programmatic Agreement	Settlement; Cultural Resources Management Plan filed and approved [95 FERC ¶ 62,274 (2001)].	renumbered 419
	Incorporation of Article IV of Settlement	Part IV of the Settlement and Section 3.3 of the Settlement (consultation provision).	New 420
	Incorporation of 2001 Water Quality Certification	Sections 2.3 and 5.7 of the Settlement.	New 421
421	Transfers of property interests	Not changed	Unchanged, renumbered 422

Holyoke Project, FERC No. 2004
Appendix D to Settlement Agreement
No. 2 Overflow Procedures

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.

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

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#_____

Comments/other: _____
_____
_____
_____

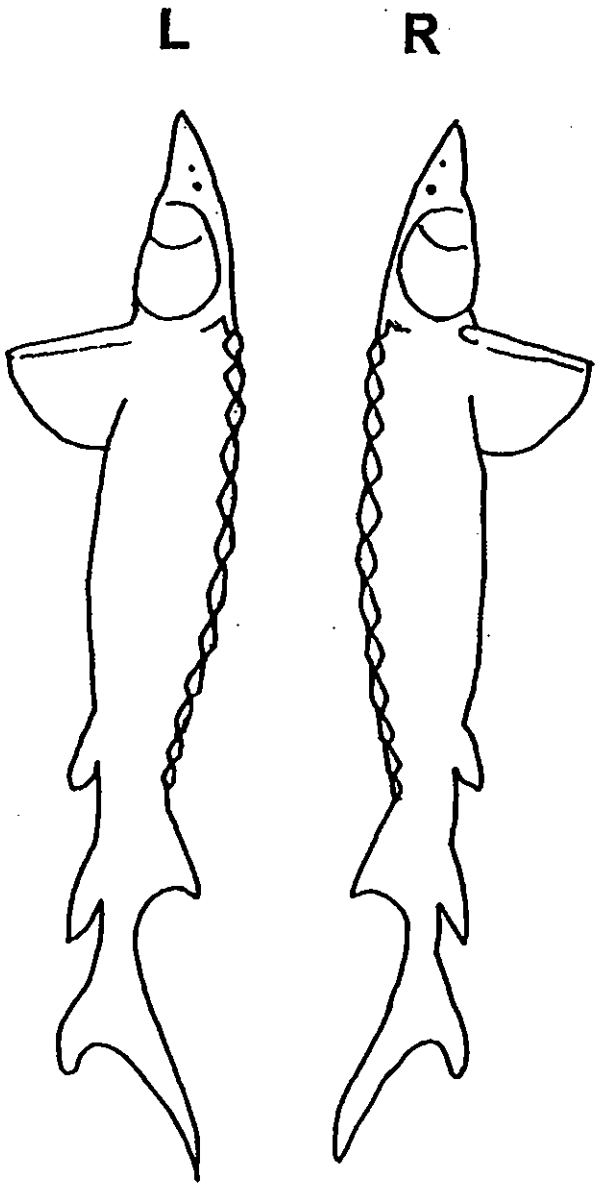
Name of watch observer:_____

Observer's
Signature:_____

Abrasion Codes

None

Light	Whitening or smoothed scutes, Early sign of skin abrasion.
Moderate	Early sign of redness on skin, scutes or fins, Erosion of skin over bony structures, Loss of skin pigment
Heavy	Large portion of skin red, scutes excessively worn, Damaged, or missing; patches of skin missing, Boney structures exposed; flaccid musculature.



Holyoke Project, FERC No. 2004
Appendix F to Settlement Agreement
Detailed Description of HG&E Proposed Settlement
Downstream Research and Construction (2004-2009/10)

This Appendix to the Settlement Agreement[1] 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

[1] Note that all definitions contained in the Settlement Agreement are applicable in this Appendix.

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 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 CEII[2] concurrently with the Settlement).

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

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 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.*, hydroaccoustics, 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 Flume[3] to improve their level of fitness. Previous flume testing of shortnose sturgeon (personal communication, Dr. Kynard) revealed that they prefer to

[3] 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.

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.

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. <u>Eel Migration Timing Study - 2004</u>

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*)[4] 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.

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[4] 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.

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

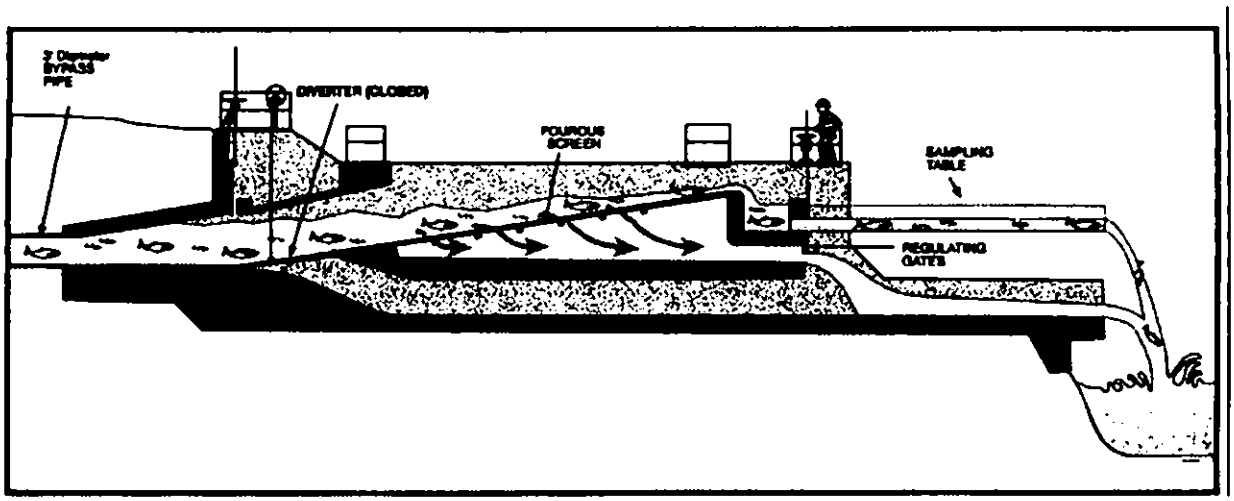

Figure 1. Schematic of the louver bypass system in sampling mode.

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

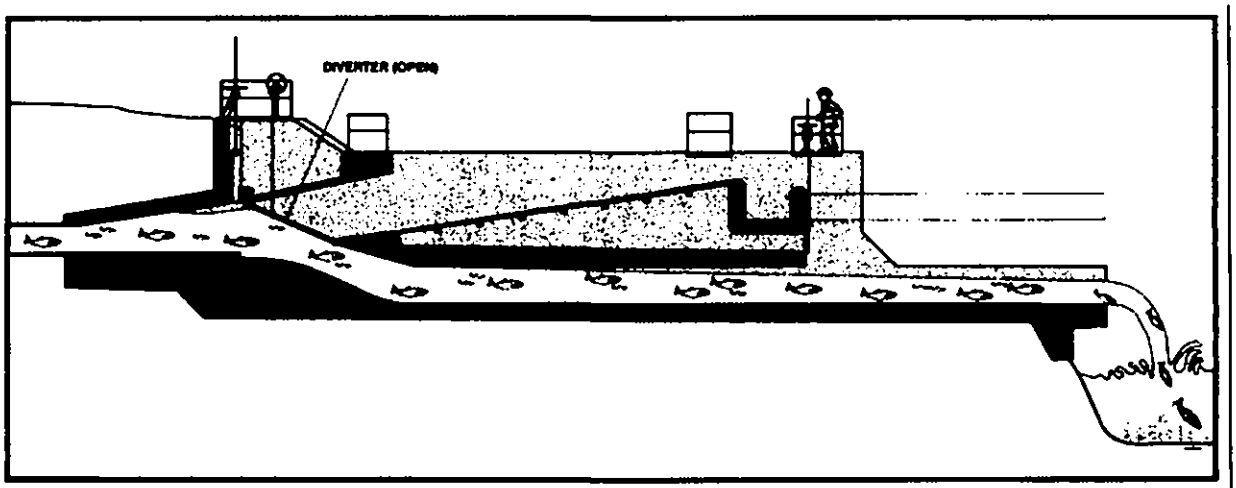

Figure 2. Schematic of the louver bypass system in non-sampling (bypass) mode.

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.

Holyoke Project, FERC No. 2004
Appendix H to Settlement Agreement
List of Contacts

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Holyoke Project, FERC No. 2004
Figures to Settlement Agreement

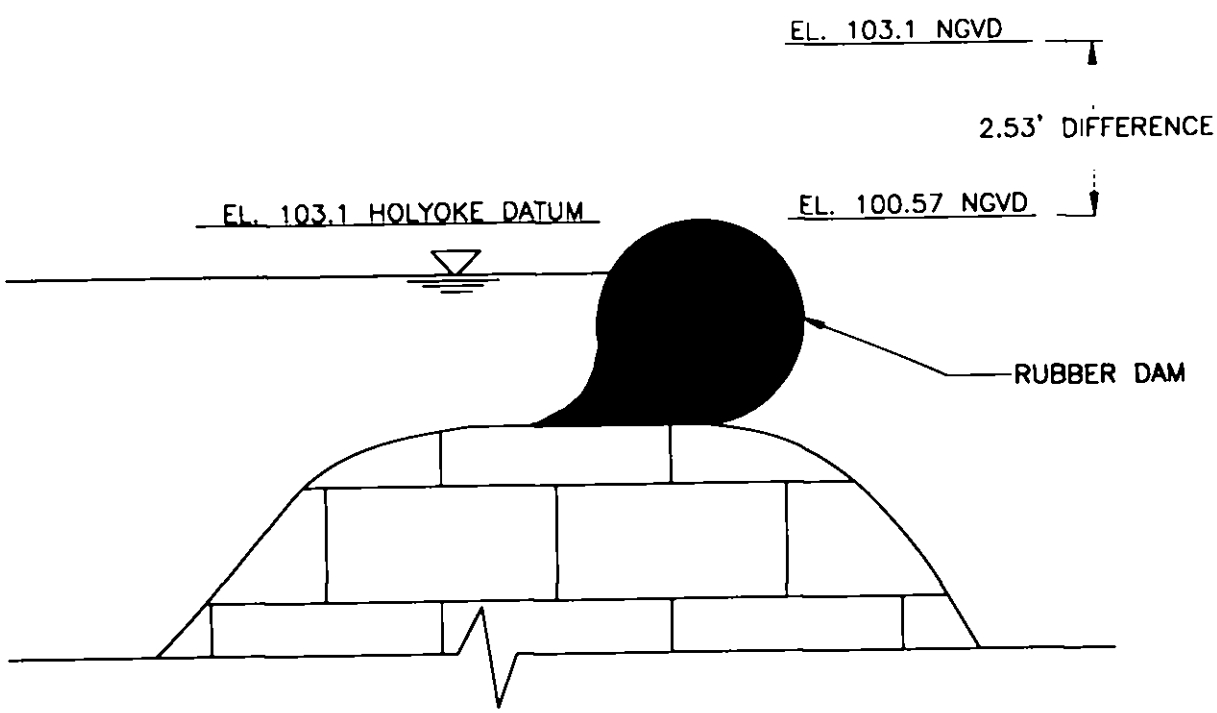
Figure No. 1. Drawing of the Holyoke Project, showing key elements – filed separately as CEII (Critical Energy Infrastructure Information, pursuant to the Commission's Order No. 630).

Figure No. 2. Upstream fish passage facilities elevation datum reference – attached.

Figure No. 3. Drawing of upstream fish passage facilities key dimensions – filed separately as CEII (Critical Energy Infrastructure Information, pursuant to the Commission's Order No. 630).

ELEVATION DATUM REFERENCE TABLE

LOCATION	EL. NGVD	EL. HOLYOKE DATUM
TOP OF RUBBER DAM	100.57	103.10
TOP OF DAM CREST	97.47	100.00
1ST LEVEL CANAL EL.	97.47	100.00
2ND LEVEL CANAL EL.	77.47	80.00
3RD LEVEL CANAL EL.	64.97	67.50



CITY OF HOLYOKE GAS & ELECTRIC DEPARTMENT
HOLYOKE, MASSACHUSETTS

HOLYOKE PROJECT - FERC NO. 2004
HADLEY FALLS STATION

UPSTREAM FISH PASSAGE FACILITIES
ELEVATION DATUM REFERENCE

Kleinschmidt

2

ORIGINAL

UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

Holyoke Gas & Electric Department) Project No. 2004

Explanatory Statement in Support of Uncontested Settlement Agreement

Pursuant to Rule 602 of the Federal Energy Regulatory Commission's (Commission) Rules of Practice and Procedure [18 CFR § 385.602], Holyoke Gas & Electric Department ("HG&E") hereby submits the Explanatory Statement in support of the Settlement Agreement submitted concurrently herewith in Project No. 2004 (referred together as the "Settlement").

The Settlement addresses issues presented in the Commission's August 20, 1999, "Order Issuing New License and Denying Competing Application,"[1] for this Project and is being filed jointly by HG&E, U.S. Department of the Interior, through U.S. Fish and Wildlife Service ("FWS"); U.S. Department of Commerce, National Oceanic & Atmospheric Administration, National Marine Fisheries Service ("NOAA Fisheries"); Commonwealth of Massachusetts, Department of Environmental Protection ("MADEP"); Commonwealth of Massachusetts, Division of Fisheries and Wildlife; Trout Unlimited; Connecticut River Watershed Council; and the Town of South Hadley, Massachusetts (referred to herein jointly as "Settling Parties"). This Settlement is uncontested; all key parties to the relicensing proceeding have signed the Settlement Agreement.

The Settlement is intended to resolve pending issues with respect to the operation and maintenance of the Project sufficient for those Settling Parties that filed requests for rehearing of the 1999 License Order to withdraw their respective requests. As explained

[1] 88 FERC ¶ 61,186 (1999) (referred to herein as "1999 License Order").

in the Settlement, the Settling Parties request that the Commission issue an order approving this Settlement and incorporating the terms and conditions therein into a modified license (with modified license articles) for this Project, without material change or modification. However, the Settling Parties request that the Commission defer issuance of such an order approving the Settlement until: (i) NOAA Fisheries issues a Biological Opinion based on the Settlement, (ii) NOAA Fisheries withdraws the August 2000 Biological Opinion, and (iii) the procedures set forth for notifying the Commission based on that new Biological Opinion have been completed (as explained in detail in Section 2.4 of the Settlement and discussed further below).

I. Background

By its 1999 License Order, the Commission issued to HG&E's predecessor (Holyoke Water Power Company) a new license for the Holyoke Project, which included a Water Quality Certification issued by the MADEP on July 28, 1999 ("1999 WQC").[2] A number of parties to the proceedings in Project No. 2004 (including many of the Settling Parties here) filed requests for rehearing of the 1999 License Order. After issuance of the 1999 License Order, NOAA Fisheries issued a Biological Opinion (dated August 18, 2000) containing reasonable and prudent alternatives and an Incidental Take Statement. In addition, subsequent to issuance of the 1999 License Order, the MADEP issued a final Water Quality Certification on February 14, 2001, (based on a settlement of the state administrative appeal of the 1999 WQC, hereinafter "2001 WQC"). The FERC has taken no action on the 2000 Biological Opinion or the 2001 WQC.

[2] The Water Quality Certification was issued pursuant to Section 401 of the Federal Clean Water Act, 33 U.S.C. 1251, et seq., and the Massachusetts Clean Waters Act, M.G.L. c. 21, §§ 26-53).

In 2000 HG&E acquired the Holyoke Project from Holyoke Water Power Company. The Commission approved the transfer of the 1999 License to HG&E by order issued September 20, 2001,[3] which transfer became effective on December 28, 2001. Based on the transfer of ownership to HG&E, certain of the requests for rehearing were withdrawn; all remaining requests for rehearing are covered by this Settlement.

Through extensive discussion and negotiations, and based on activities undertaken subsequent to the issuance of the 1999 License Order, the Settling Parties have now determined that the Settlement Agreement (including all attached Appendices) resolves all of the issues presented in the pending requests for rehearing. In support of the terms and conditions contained in the Settlement, the Settling Parties have provided proposed license articles (attached as Appendix A to the Settlement Agreement) to implement the technical provisions of the Settlement, as stated in Part IV thereof. The Settling Parties further agree that the Commission should incorporate the 2001 WQC (attached as Appendix B to the Settlement Agreement) into the Order Approving Settlement and the modified license and modified license articles for this Project.

In March 2004 HG&E intends to file a draft Biological Assessment ("BA") at the Commission, consistent with the provisions of the Settlement, and request that the Commission reinitiate formal consultation with NOAA Fisheries with the goal of a new Biological Opinion being issued and the August 2000 Biological Opinion being withdrawn. The Settling Parties agree that this Settlement is subject to issuance of that new Biological Opinion (and the terms and conditions therein) so long as that new Biological Opinion does not contain requirements that materially exceed or differ from

[3] 96 FERC ¶ 62,283.

the provisions of the Settlement Agreement. Accordingly, the Settling Parties request that the Commission defer approval of the Settlement until NOAA Fisheries issues its new Biological Opinion and HG&E notifies the Commission that the Settling Parties do not intend to reopen the Settlement Agreement based on the new Biological Opinion (as set out in Section 2.4 of the Settlement).

II. Description of Settlement Agreement

The Settlement Agreement contains the following Parts:

Part I sets forth the definitions applicable in the Settlement Agreement and all Appendices attached thereto.

Part II contains an overview of the Settlement Agreement (including a listing of all Appendices attached and incorporated by reference), which describes the relationship of the Settlement Agreement provisions to the 1999 License Order and license articles contained therein, to the 2001 WQC (a copy of which is attached in Appendix B), and to the 2000 Biological Opinion. Part II also describes the process by which the Settling Parties contemplate that the new Biological Opinion (issued by NOAA Fisheries) will be acknowledged in the process of approving the Settlement.

Part III includes the Effective Date, and the process for the Settling Parties to amend the Settlement Agreement under limited circumstances. This Part also contains (at Section 3.3) the process for consultation with the resource agencies and the other parties with respect to plans and/or work covered in Part IV of the Settlement Agreement.

Part IV contains the technical agreements of the Settlement Agreement. The technical provisions of the Settlement Agreement are further supported and described in more detail in Appendices D, E, F and G. The terms and conditions of Part IV are

incorporated into the proposed settlement license articles, as set forth in Appendix A. A matrix showing the correlation between the license articles in the 1999 License Order and the proposed settlement license articles (as set forth in Appendix A) is included in Appendix C.

Part V provides the reservations and obligations of the Settling Parties, including the process by which, upon the Settlement Agreement becoming effective (with Commission issuance of an order approving the Settlement without modification): (i) the Settling Parties will withdraw their respective pending requests for rehearing of the 1999 License Order, and (ii) the FWS and NOAA Fisheries will withdraw their respective prescriptions submitted prior to the 1999 License Order under Section 18 of the Federal Power Act. This Part also contains the process by which, under limited circumstances, the Settling Parties may seek to reopen or amend the Settlement or the modified license issued based on the Settlement Agreement. Furthermore, this Part contains the reservations of Federal Power Act Section 18 authority by the Department of Interior and by the Department of Commerce, and the reservation of the authority by the MADEP under its 2001 WQC.

Part VI provides that the Settlement Agreement will be null and void if not approved, without material modification, by the Commission on or before March 1, 2005.

Part VII contains provisions for enforcement of the terms and conditions of the Settlement Agreement, compliance and dispute resolution.

Part VIII contains notice provisions under the Settlement Agreement, as supported by Appendix H with the list of contacts for the Settlement Agreement.

Part IX contains the general provisions relating to the Settlement Agreement, including the emergency provisions.

Three Figures are attached to the Settlement Agreement – (1) a drawing of the Project with key features identified, (2) an upstream fish passage facilities elevation datum reference chart, and (3) a drawing of the upstream fish passage facilities showing certain key dimensions. Only Figure No. 2 is being provided publicly; the other two Figures are being provided to the Commission separately as containing Critical Energy Infrastructure Information (pursuant to the Commission's Order No. 630).

III. Considerations in Support of Approval of the Settlement Without Modification

The Settling Parties seek approval by the Commission of the Settlement without modification. As confirmed in the twelfth *Whereas* clause of the Settlement Agreement, the Settling Parties agree that this Settlement is supported by substantial evidence in the record of this proceeding and is a fair and reasonable resolution of the issues presented in the pending requests for rehearing of the 1999 License Order. Therefore, the Settling Parties request that the Commission: (i) approve the Settlement as in the public interest, and (ii) adopt the proposed settlement license articles as modified license articles for the Project.

IV. Information Relevant to Approval of the Uncontested Settlement

To assist the Commission in its determination of whether the Settlement should be approved, HG&E provides the following information:

1. What are the issues underlying the settlement and what are the major implications?

This Settlement involves issues relating to the terms and conditions appropriate

for the relicensing of the Holyoke Project, No. 2004. This Settlement does not present major implications relative to the hydroelectric industry beyond Project No. 2004.

2. Whether any of the issues raise policy implications.

The Commission consistently supports settlements as a tool for resolving issues presented in a complex matter. The Settling Parties do not believe that this Settlement presents any policy implications other than furthering the broad public interest of favoring settlements.

3. Whether other pending cases may be affected.

No other pending Commission cases are affected by this Settlement.

4. Whether the settlement involves issues of first impression, or if there are any previous reversals on the issues involved.

To the Settling Parties' knowledge, this Settlement does not involve any issues of first impression. Furthermore, there were no previous reversals of law relating to the issues involved in this Settlement.

5. Whether the proceeding is subject to the just and reasonable standard or whether there is *Mobile-Sierra* language making it the standard, *i.e.*, the applicable standards of review.

Rule 602(g) of the Commission's Rules of Practice and Procedure [18 CFR § 385.602(g)] provides that the Commission shall approve a settlement that is fair and reasonable and in the public interest. As noted above, the Settling Parties believe this Settlement meets that standard. Therefore, the Settling Parties request approval of this Settlement without modification.

As set forth in Section 5.8(a) of the Settlement Agreement, the Settling Parties do not intend for this Settlement Agreement to be reopened or amended after it is approved and becomes effective, except under very limited circumstances. Consistent with that

provision, the Settling Parties contemplate that any attempt by the Commission to revise or modify the Settlement Agreement after it becomes effective would be subject to a rigid standard as set forth in the *Mobile-Sierra* doctrine.

V. Conclusion

This Settlement is a reasonable and negotiated resolution of the issues presented in the pending requests for rehearing on the 1999 License Order. The Settlement avoids further protracted litigation and provides certainty with respect to the operations of Project No. 2004. Therefore, the Settling Parties request that the Settlement be approved without modification and that the proposed settlement license articles be adopted as the modified license for the Project, following completion of the Biological Opinion process as described above.

ORIGINAL

Certificate of Service

The undersigned hereby certifies that a copy of the "Settlement Agreement" and "Explanatory Statement in Support of Uncontested Settlement Agreement" filed in Project No. 2004 are being served upon the persons listed on the official service list maintained by the Commission for that Project, pursuant to Rule 2010 of the Commission's Rules of Practice and Procedure [18 C.F.R. §385.2010], either by first-class mail or by overnight delivery service.

Dated this 12th day of March, 2004.

Paul S Ducheney

By _____

Paul S. Ducheney
Superintendent of Hydro Operations