

UNITED STATES OF AMERICA 69 FERC 62, 068  
FEDERAL ENERGY REGULATORY COMMISSION

Decorative Specialties International, Inc. Project No. 2608-001- MA

ORDER ISSUING SUBSEQUENT LICENSE  
(MINOR PROJECT)  
OCTOBER 24, 1994

## INTRODUCTION

Decorative Specialties International, Inc. (DSI or applicant), filed an application under Part I of the Federal Power Act (FPA) for a subsequent license to continue to operate and maintain the 1.4-megawatt (MW) West Springfield Hydroelectric Project No. 2608, located on the Westfield River in the towns of West Springfield and Agawam, in Hampden County, Massachusetts.<sup>1</sup> The Federal Power Commission issued the original license for the project to the Hammermill Paper Company in 1968.<sup>2</sup> The current license expired on December 1, 1993, and since then, DSI has operated the project under an annual license.

DSI does not propose to increase the project's capacity. DSI, a specialty paper manufacturer, would continue to operate the project to provide power for its papermaking operations. For the reasons discussed below, I will issue a subsequent license to DSI.

## BACKGROUND

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<sup>1</sup> The project is located on a tributary of the Connecticut River, a navigable waterway. Power produced from the project can be fed into Western Massachusetts Electric's system and then into an interstate grid. However, because it was constructed prior to 1935, it is not required to be licensed. A license is authorized under Section 4(e) of FPA, and the project was previously licensed under this section.

<sup>2</sup> In 1976, the License was transferred to the Premoid Corporation and the Agawam Canal Company, Inc. The James River Company acquired the Premoid Corporation and the Agawam Canal Company in January 1986. On April 15, 1991, a transfer and license application was filed with the Federal Energy Regulatory Commission to transfer the License from the James River Corporation to DSI.

Notice of the application was published on February 23, 1993. Five parties filed timely motions to intervene in this proceeding: the U.S. Department of the Interior (Interior), Pioneer Valley Planning Commission (PVPC), the Westfield River Watershed Association (WRWA), the Commonwealth of Massachusetts (Massachusetts), and a joint motion filed by Trout Unlimited et al. (TU).

Most of the motions to intervene were unopposed and therefore granted automatically under Rule 214(c)(1) of the Commission's Rules of Practice and Procedure.<sup>3</sup> TU filed a Motion to Intervene in Opposition to the project on April 26, 1993. TU later filed a motion to conditionally withdraw its opposition to the licensing of the West Springfield Hydroelectric Project based on the understanding that (1) this license would include the terms of a Memorandum of Agreement (MOA) between the applicant, the Massachusetts Division of Fisheries and Wildlife (MDFW), and the U.S. Fish and Wildlife Service (FWS) regarding fish passage facilities and protection of aquatic resources; and (2) the Commission would issue a final National Environmental Policy Act (NEPA) document that does not substantively differ from the draft NEPA document.

Comments on the application were filed by Interior and the MDFW.

The Commission's staff issued the West Springfield Hydroelectric Project draft environmental assessment (DEA) for public comment on May 13, 1994. In response, we received comment letters from Interior and Gomez & Sullivan Engineers. Commission staff considered these comments in preparing the final Environmental Assessment (EA). The EA is attached to this license.

The Commission's staff also prepared a safety and design assessment (S&DA), which is available in the Commission's public file associated with this project.

I have fully considered the motions and comments of the above-named organizations in determining to issue the subsequent license for Project No. 2608.

PROJECT DESCRIPTION

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<sup>3</sup> 18 C.F.R. 385.214(c)(1)

The existing project facilities include: an 18-foot-high, 447.5-foot-long timber crib dam with a dam crest elevation of 92.80 feet above mean sea level (msl) that creates a 20-acre impoundment; a 2,610-foot-long, 50-foot-wide power canal with concrete headworks containing six gates; a concrete and brick powerhouse about 60 feet long, 54 feet wide, and 63 feet high containing two vertical Francis turbines connected to two 480-volt generators; and a tailrace approximately 157 feet in length and having a width varying from 30 to 48 feet. There are no primary transmission lines included in the project. The project is more fully described in Ordering paragraph B(2).

Unit One is rated at 900 kilowatts (kW) and Unit Two is rated at 466 kW. However, due to flow restriction in the power canal, the combined capacity is 1,200 kW (Unit One at 800 kW and Unit Two at 400 kW). The project's average annual generation is 6.76 gigawatt-hours (GWh).

The project currently operates as a run-of-river facility (inflow equals outflow instantaneously). The hydraulic capacity of the project is 622 cubic feet per second (cfs) (400 cfs for Unit One and 222 cfs for Unit Two). The adjacent Southworth Company also draws water from the power canal to operate their own generating facility. When DSI's facility is not operating and inflows are below the hydraulic capacity of the turbines used by the Southworth Company, all inflow is spilled at the dam.

#### APPLICANT'S PLANS AND CAPABILITIES

In accordance with Section 10(a)(2)(C) of the FPA, staff evaluated DSI's record as a licensee in the area of conservation efforts. I accept the staff's findings, discussed below, pertaining to Section 10.

##### 1. Section 10(a)(2)(C): Conservation Efforts:

DSI is not an electric utility and has no end-use customers for the power generated by the West Springfield Project. Since the paper products industry is both highly energy intensive and highly competitive at the marketplace, DSI's principal interests are maintaining a competitive position in the market that will enable it to remain in business and make an acceptable profit. As a result, DSI needs no other incentives and no regulatory mandates to conserve energy and to obtain low-cost electric energy whenever an opportunity presents itself.

## WATER QUALITY CERTIFICATION

On December 20, 1991, DSI applied to the Massachusetts Department of Environmental Protection (MDEP) for Section 401 Water Quality Certification (WQC), as required by the Clean Water Act. By letter dated December 2, 1992, DSI withdrew its initial request and refiled a new request for WQC. MDEP acknowledged receipt of the new WQC request on December 8, 1992, but has not acted on it.

Section 4.38(f)(7)(ii) of the Commission's regulations stipulate that agencies must act on a pending 401 WQC request within 1 year from the date of receipt of the application, or the certification is deemed waived. Since MDEP did not act on DSI's request within 1 year, I deem the certification to be waived.

## SECTION 18 FISHWAY PRESCRIPTION

Section 18 of the FPA provides the Secretary of Interior the authority to prescribe fishways at Commission-licensed projects.<sup>4/</sup> Interior filed measures pursuant to Section 18 by letter dated April 21, 1993. Subsequently, FWS became a party to the MOA (dated February 2, 1994) with DSI and MDFW. As a result of the MOA, Interior filed a revised Section 18 prescription by letter dated February 22, 1994. In these circumstances, we have elected to waive the filing date for submitting Section 18 prescriptions required by Section 4.34(e) of our regulations and accept Interior's revised Section 18 prescriptions, which include the following measures.

1. The licensee shall construct an upstream fishway at the project that includes a Denil fish ladder system as depicted in Figures VIII-1 and VI-3 and guidance screens at the Southworth and West Springfield discharges as depicted in Figure VIII-2 of the December 1992 additional information filing, and instream structures in the north channel of the bypass reach to create an adequate zone of passage (ZOP). Interior's letter requires that final designs be developed in consultation with the FWS, that the upstream passage facilities be in operation by April 1, 1996, and that this schedule may be modified by the FWS as necessary and appropriate. The prescription also states that the licensee shall provide as-built drawings to the FWS.

According to Interior's prescription, the upstream passage facilities shall be operated from April 1 through July 15 and from September 1 through October 31 for the passage of Atlantic salmon, American shad, and other anadromous species. This schedule can be modified by the FWS, as appropriate, based on available information and on-site conditions.

2. The licensee shall construct permanent downstream fish

passage facilities as depicted in Figure VIII-1 with hinged inclined screens as detailed in Section B-B of Figure VII-3 of DSI's December 1992 additional information filing. Final designs shall be developed in consultation with and meet the approval of the FWS. The permanent downstream passage facilities shall be in

4/ Section 18 of the FPA provides: "The Commission shall require the construction, maintenance, and operation by a licensee at its own expense of....such fishways as may be prescribed by the Secretary of Commerce or the Secretary of Interior, as appropriate."

operation by April 1, 1996. The licensee shall provide as-built drawings to the FWS.

The downstream passage facilities shall be operated from April 1 through July 15 and from September 1 through October 31 for the passage of Atlantic salmon smolts, adult and juvenile American shad, and other anadromous species. This schedule can be modified by the FWS, as appropriate, based on available information and on-site conditions.

3. The licensee shall provide sufficient flows and shall implement channel modifications to achieve an adequate ZOP between the project tailrace and the upstream and downstream fishways. The licensee shall pass 85 cfs or inflow, whichever is less, in the bypass reach between the West Springfield dam and powerhouse in combination with instream structures during the April 1 through July 15 and September 1 through October 31 fish passage seasons.

The FWS, in consultation with the MDFW and the licensee, will evaluate the effectiveness of these flows and channel modification designs, through visual observation, in the first year of project operation. If flow or structure location is found to be an impediment to anadromous fish passage, the licensee shall modify the structures and/or increase the minimum flow up to a maximum continuous flow of 125 cfs or inflow, whichever is less. If, after exhausting all practical, structural, behavioral, or minimum flow options, it is found that anadromous fish do not seek out a passage route to the fishway, but rather remain in the area of the tailrace, the licensee will adjust its project operation such that up to 50 percent of the usable inflow (usable inflow is defined as the combined hydraulic capacity of each of the project's units, 622

cfs) is provided in the bypass upstream of the project tailrace during the passage season. This release will occur throughout the April 1 through July 15 period, beginning at sunrise for 4 hours. The operational schedule (number of days in the April 1 through July 15 period and hours in a specific day) for these releases will be adjusted by the FWS in consultation with on-site representatives of the MDFW and the licensee as needed to accomplish effective passage.

4. As an interim downstream measure for salmon smolts until permanent measures are complete, from April 1 through July 15, the licensee shall operate the trash sluice adjacent to the powerhouse intake with a minimum flow of 25 cfs.



5. Interior reserves the right to modify its Section 18 fishway prescription as needed to facilitate fish passage.

As discussed in Section V.C.3 of the EA, not all of the items referred to in Interior's letter come within the scope of Section 18. However, I conclude that the measures are consistent with the public interest, and they have been included in the license.

Interior, in its February 22, 1994, letter, provides four additional recommendations under Section 10(j) of the FPA. Sections V.C.3 and VIII of the EA discuss which of these are appropriate under Section 10(j) and which are considered under the public interest standard of Section 10(a) of the FPA. These sections of the EA also discuss our disposition of these measures.

#### RECOMMENDATIONS OF FEDERAL AND STATE FISH AND WILDLIFE AGENCIES AND SECTION 10(j) PROCESS

Section 10(j) of the FPA requires the Commission to include license conditions, based on recommendations of federal and state fish and wildlife agencies for the protection, mitigation of adverse impacts to, and enhancement of fish and wildlife resources. Section 10(j) of the FPA states that whenever the Commission believes that any fish and wildlife agency recommendation is inconsistent with the purposes and the requirements of the FPA, or other applicable law, the Commission and the agency shall attempt to resolve any such inconsistency, giving due weight to the recommendations, expertise, and statutory responsibilities of each agency.

Pursuant to Section 10(j) of the FPA, I evaluated each recommendation of the federal and state fish and wildlife agencies for consistency with the purpose and requirements of

Part I of the FPA or other applicable law. I have adopted all the measures to protect and enhance fish and wildlife resources recommended by the FWS and MDFW.

#### COMPREHENSIVE PLANS

Section 10(a)(2) of the FPA requires the Commission to consider the extent to which a project is consistent with federal or state comprehensive plans for improving, developing, or conserving a waterway or waterways affected by the project. Under Section 10(a)(2), federal and state agencies filed a total of 19 plans of which we identified as applicable four Massachusetts and five United States comprehensive plans. No conflicts were found. Section XI of the EA lists the comprehensive plans relevant to this project.

## INTERVENOR ISSUES

WRWA, PVPC, TU, and MDFW all request that DSI provide some form of downstream river access for angling and canoeing.

As discussed in the EA, the applicant proposes to construct a parking area for 20 vehicles, a 400-foot-long trail from the new parking area to the north bank of the Westfield River, and a canoe launch area at the end of the trail to be located downstream of the powerhouse. These facilities would expand public use of that area, would increase angling opportunities, and would establish a 4-mile-long canoe run downstream to the Connecticut River. I conclude that there is a need for enhanced access to the Westfield River in the vicinity of the West Springfield Project. I, therefore, have included Article 411 in the license, requiring DSI to implement its proposed recreation enhancement measures within 1 year of license issuance and to file as-built drawings of the constructed facilities.

PVPC states that since the West Springfield Project blocks a recreational canoe run in a densely populated urban area, DSI should develop an upstream canoe access site. MDFW also recommends that, if suitable upstream angler access points can be identified, DSI should secure free public access to these properties.

Staff's analysis indicates that additional impoundment access would produce increased recreational use of the river by both canoeists and anglers. The level of fishing on the river will increase after the construction of the planned upstream fish passage facilities allow American shad and Atlantic salmon to reach the project impoundment. An impoundment access trail would enable anglers to fish on the impoundment and also would provide canoeists a take-out point from which to car portage to the proposed downstream access facility.

Based on its site visit and review of the design drawings

provided by PVPC, staff concludes that an impoundment access site adequate to meet the needs of area residents could be constructed for \$10,000. Therefore, I am including Article 412, requiring DSI either (1) to provide \$10,000 in financial assistance to the town of West Springfield for development of a canoe access site at Mittineague Park, or (2) to develop its own canoe access site at another location. We have conditioned the license requiring DSI to consult with PVPC, WRWA, and MDFW before submitting a plan for a canoe access site.

PVPC, WRWA, Massachusetts, and TU advocate up- and downstream fish passage at the project. I conclude that upstream passage facilities at the West Springfield Project will allow American shad and other anadromous species access to an additional 14 miles of river between the project and the next dam

upstream at Woronco, thereby increasing recreational fishing for American shad, and possibly Atlantic salmon, in this stretch of river.

These agencies are also concerned about downstream passage at the project. I conclude that the downstream fish passage at the West Springfield dam will contribute to attainment of anadromous fish management goals in the Westfield River and Connecticut River Basin.

I concur with the FWS' proposed fishway operation schedule (April 1 through July 15 and from September 1 through October 31), which is based on known migratory periods for target species in the project area. In addition, I am requiring in Article 407 that DSI consult with FWS and MDFW on an annual basis to determine the need for schedule adjustments to account for variability in fish passage seasons.

TU is concerned that DSI provide sufficient flows in the project bypass reach to allow upstream and downstream passage of Atlantic salmon and American shad. DSI, Interior, and MDFW have reached agreement on fish passage flow requirements and signed an MOA which includes specifications of these flows. The MOA also calls for DSI to monitor the effectiveness of the flows and facilities, and provides for modifications, if required. These flows are required by Article 403 of this license.

#### ADDITIONAL STAFF CONCERNS

As noted in Section V.C.1 of the EA, during construction of the fish passage and recreational facilities, there will be some disturbance of the shoreline and localized erosion when the vegetation near the dam is cleared and the channel is disturbed. Given the high erodibility of the area's soils, there would be some erosion and sedimentation during construction. However, impacts from runoff could be minimized through: careful planning; timing of construction (construction during the driest

period of the year when river flows and precipitation are at their lowest); and the use of proper erosion and sediment control devices, such as hay bales, filter fences, and sediment booms, to reduce potential transport of material to areas beyond the construction zone.

Based on the aforementioned discussion, I am requiring in Article 401 that DSI develop and implement site-specific procedures during construction activities that will minimize bank erosion and sediment transport and control spoil disposal.

#### COMPREHENSIVE DEVELOPMENT

Sections 4(e) and 10(a)(1) of the FPA, 16 U.S.C. 797(e) and 803(a)(1) require the Commission, in acting on applications

for license, to give equal consideration to the power and development purposes and to the purposes of energy conservation, the protection, mitigation of damage to, and enhancement of fish and wildlife, the protection of recreational opportunities, and the preservation of other aspects of environmental quality. Any license issued shall be best adapted to a comprehensive plan for improving or developing a waterway or waterways for all beneficial public uses. The decision to license this project, and the terms and conditions included herein, reflect such consideration. For the reasons discussed below, I conclude that the West Springfield Project No. 2608 does not conflict with any planned or authorized development and is best adapted to comprehensive development of the waterway for beneficial public uses.

I have considered the proposed project, including measures agreed upon in the MOA, staff-recommended enhancement measures, and the no-action alternative. From my independent analysis of the environmental and economic effects of the alternatives, I selected the applicant's proposed project, as conditioned by the MOA, plus staff's recommended additional measures, as the preferred alternative.

DSI's proposed or agreed upon measures consist of:

- ù maintaining run-of-river operations;
- ù constructing upstream and downstream fish passage facilities and associated structures;
- ù installing with the Denil fish ladder a trap with sorting and holding facilities;
- ù releasing a minimum flow of 85 cfs into the bypass reach year-round to enhance resident fisheries;
- ù installing tailrace screens at the DSI and Southworth

powerhouses;

- ù creating a weir in the dam near the north abutment;
- ù building instream structures, as needed, in the north channel of the bypass reach to achieve an adequate ZOP for anadromous fish;
- ù implementing a monitoring plan to assess the effectiveness of all fishway facilities and associated structures;
- ù placing a headwater monitoring gage in the West Springfield impoundment;



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- ù giving PVPC \$4,000 to study the availability of access sites for boating and fishing upstream of the project dam; and

- ù constructing, operating, and maintaining a parking area, trail, and canoe launch downstream of the project dam on DSI property.

In addition, my additional required enhancement measures include:

- ù developing a management plan for the operation and maintenance of fishways;

- ù contributing to the financing of a canoe launch and fishing access trail in Mittineague Park (or developing and implementing a plan to construct, operate, and maintain canoe and fishing access to the project impoundment at an alternative site); and

- ù developing procedures to minimize bank erosion during the construction of fishways and recreational facilities.

Implementation of the measures described above would enhance fishery resources in the impoundment, bypass reach, and Westfield River below the project and recreational resources and river access in the project area.

In determining whether a proposed project will be best adapted to a comprehensive plan for developing a waterway for beneficial purposes, pursuant to Section 10(a)(1) of the FPA, the Commission considers, among other things, whether the project will provide economic benefits and be financially feasible. In determining whether this project will provide economic benefits and be financially feasible, I considered the project with the Commission's mitigative proposals and Interior's Section 18

prescription.

DSI's proposed project with staff-recommended enhancement measures includes three measures with large impacts on the project's economics: (1) recreational access, (2) instream flows in the bypass reach, and (3) fish passage facilities and associated structures. The rationale for and the economic effects of these measures are discussed below.

#### A. Recreational Access

Based on the potential for increased angling for American shad resulting from the construction and operation of fish passage facilities at the project, DSI's proposed parking area, trail, and canoe launch to be located downstream of the

powerhouse will provide recreational benefits to the surrounding communities that equals or exceeds their \$5,000 annual cost. Therefore, I am requiring that DSI complete construction of these facilities within 1 year of license issuance.

Based on the anticipated movement of shad into the project reservoir and the stated interest of local canoeing groups, an impoundment access trail in Mittineague Park will be used by at least 100 canoeists per year. Therefore, I am requiring in Article 412 that DSI provide the town of West Springfield with \$10,000 for the design and construction of an impoundment access trail to serve canoeists and anglers in Mittineague Park.

Because this trail will be situated on land owned by the Town of West Springfield, DSI will not be responsible for its operation and maintenance. DSI must file with the Commission either a copy of a draft agreement with the Town of West Springfield for a trail in Mittineague Park or DSI's plans to develop impoundment access at an alternative site.

Any agreement between DSI and the Town will be subject to the Commission's review and approval. If DSI chooses to develop access at an alternative site, it must consult with PVPC, WRWA, and MDFW before filing its plans with the Commission.

#### B. Instream Flows in the Bypass Reach

Releasing a year-round minimum flow into the project's 2,600-foot-long bypass channel will protect and enhance resident fisheries and aquatic resources there as well as improve aesthetics at the project site. A minimum flow of 85 cfs in the bypass reach will provide 88 percent and 99 percent of the potential weighted usable area (WUA) for juvenile and adult smallmouth bass, respectively. This flow is greater than the 7Q10 and approaches the estimated aquatic base flow (ABF) of 108 cfs at the site. Furthermore, the habitat analysis indicates that habitat for all life stages of smallmouth bass is maximized

at 85 cfs. The estimated annual cost for providing a year-round minimum flow of 85 cfs in the bypass reach is \$56,000, levelized over 40 years.

I conclude that the increased biological enhancements provided by a flow of 85 cfs, versus the 65 cfs originally proposed by DSI, outweigh the \$12,000 additional annual cost required to provide this higher flow. The economic cost is justified by the expected increased shad and bass populations and the resulting increase in angling. Based on staff's analysis in Section V.C.3 of the EA, a minimum bypass flow between 80 and 108 cfs is best for resident fisheries.

Releasing a total of 85 cfs through the rectangular weir cut near the north dam abutment and the Denil fish ladder will serve

as attraction flow for the upstream passage facilities and will contribute to the ZOP for anadromous fish. Therefore, I am requiring in Articles 403 and 404 that DSI implement the following measures to protect and enhance environmental resources at the project:

- ù provide a year-round minimum flow of 85 cfs in the bypass reach to protect resident fish habitat, to serve as attraction flow for the upstream passage of anadromous fish species, and to enhance area aesthetics; and

- ù file and implement a streamflow gaging plan to verify the provision of required minimum flows (and run-of-river operations) (costs for the plan and gage placement are included as maintenance costs under fish passage).

The demand for water access and angling opportunities at the West Springfield site can only be met effectively if I ensure an adequate flow in the bypass reach that protects and enhances resident fisheries and maintains aesthetic values associated with Robinson State Park, located adjacent to the project. The resultant \$56,000 annual cost of the resultant lost generation to provide an 85 cfs year-round bypass flow, therefore, will be offset by the resultant social benefits -- larger populations of resident fish species, additional recreational use at Robinson State Park and in the project area, and the movement of anadromous fish species in the bypass reach.

### C. Fish Passage Facilities and Associated Structures

The West Springfield dam represents the only blockage to fish migration into or out of the upstream portions of the Westfield River. Under Section 18 of the FPA, Interior prescribes both upstream and downstream fish passage for the project. Installation of the upstream fishway and downstream

facilities there will provide the opportunity for upstream and downstream anadromous fish movement in the Westfield River.

Increased flows and channel modifications, required to provide a ZOP, and tailrace screens are necessary to ensure efficient functioning of the prescribed fishways. The objective of fish passage facilities is to minimize the effect that a stream barrier has on the normal behavior and physiological status of migratory fish. A ZOP that provides unobstructed and easy access to upstream passage facilities allows fish to conserve energy needed to rapidly ascend the passage facilities.

Tailrace screens at the DSI and Southworth powerhouses will divert fish from entering and holding in the tailraces. Without such screens, fish would be attracted to these areas and,

consequently, delayed in their upstream migration. Migratory delays affect the reproductive success of anadromous fish by desynchronizing their rate of reproductive maturity and the time at which they reach their normal spawning grounds.

DSI agrees to construct trap and transport facilities at the project, and the agencies agree to operate them. Trap and truck facilities are needed to provide broodstock for hatchery operations that supply salmon smolts for stocking in the Westfield River as part of salmon restoration efforts. Trap and truck operations also will allow those salmon in excess of the number required for broodstock to be transported and released into upstream production waters presently inaccessible due to intervening dams without fish passage facilities. This will further enhance the potential growth rate of the Westfield River salmon stock.

Therefore, I am requiring in Articles 401, 405, 406, and 407 that DSI implement the following measures to protect and enhance anadromous fisheries resources in the Westfield River:

- ù construct, operate, and maintain upstream and downstream fish passage facilities and related facilities;

- ù construct trap and truck facilities for Atlantic salmon;

- ù conduct monitoring studies to evaluate the effectiveness of (1) the fishways in passing fish, (2) fish screening structures at the Southworth and DSI tailraces, and (3) ZOP flows and instream structures;

- ù file and implement operation and maintenance plans for the fishways; and

- ù file and implement an erosion and sediment control plan

to minimize erosion and sedimentation during construction of the new facilities.

As discussed in staff's EA (section VII.C), the total capital cost of constructing all our required fish passage facilities and associated structures will be \$1,332,000. Based on a 40-year term of license, the combined annual cost of constructing, operating, and maintaining, and monitoring the effectiveness of these facilities will be \$191,000. (This amount excludes the cost of operating the proposed fish trap facility, which will be the responsibility of the MDFW.)

Operation of the fish passage facilities will require a year-round flow of at least 85 cfs. Since 85 cfs is already accounted for as the instream flow, there is no added cost for



lost generation associated with fish passage flows provided that monitoring reveals that the 85 cfs instream flow is sufficient for migrating anadromous species. If a higher flow is needed, the licensee must provide the designated additional flows, which would result in further reductions in project generation. As discussed in the EA (section VII.C), these additional flows would cost from \$4,000 to \$6,700 per year (based on a 40-year license).

#### D. Conclusion

In conclusion, I am requiring DSI's proposal, modified according to the MOA and by staff recommendations. Staff estimates that it would cost DSI a total of \$253,000 per year over a 40-year license period to implement the preferred alternative, which is feasible given the project economics. I concur.

As a general rule, a proposed project is economically beneficial so long as its projected levelized cost is less than the long-term levelized cost of alternative energy in the region. Based upon a cost of financing of 10 percent, the cost of the West Springfield Project will be about 98.13 mills per kilowatt hour (mills/kWh) with my proposed enhancement and Interior's Section 18 prescription. The long-term levelized cost of alternative energy will be about 112.67 mills/kWh. The levelized cost of the project under the proposal with the Commission's enhancement and Interior's prescription is less than the levelized cost of the alternative energy, and thus the project is economically beneficial.

#### OTHER FINDINGS

##### A. Headwater Monitoring Gage

DSI intends to place a headwater monitoring gage in the West Springfield impoundment to monitor compliance with the required run-of-river operation. I am requiring in Article 404 that DSI

design and install the gage within 6 months of license issuance. In this regard, DSI, in consultation with FWS, USGS, and MDFW, must prepare a monitoring plan for the installation and operation of the gage in conjunction with flow metering below the dam.

For the considered range of minimum flows, the level of spillage over the entire dam face would be on the order of 2 to 3 inches. Present technologies do not allow for accurate headwater monitoring given this level of flow over the dam. DSI, therefore, proposes to pass the minimum bypass flows through a rectangular weir cut along the crest of the dam adjacent to the north dam abutment to increase precision of the monitoring gage and enhance fish passage. DSI also proposes to construct a weir on the south abutment of the spillway, if water flow in the south channel becomes inadequate to protect aquatic resources. When it

is in operation, part of the flow also will be released through the fish ladder.

I agree that the rectangular weir is an acceptable hydraulic means of metering flow. The weir will also contribute flow to the ZOP. I, therefore, am requiring in Article 404 that DSI consult with the MDFW, the United States Geological Service (USGS), and the FWS on final design plans for the spillway weir(s) and the distribution of flow releases from the spillway, if two weirs are constructed.

The final design plans must include, but not be limited to, the following: (1) a description of the location and operation of streamflow gaging measures to monitor compliance with run-of-river operations and minimum flow releases; (2) the location(s) of spillway weir(s); and (3) the methods for recording data and providing these data to the agencies.

DSI proposes to provide the data obtained from the headwater monitoring gage to MDFW, FWS, and USGS upon request, and the agencies agree on the proposed procedure for providing these data. I concur that providing access to project records for the purpose of reviewing project operations related to fish and wildlife protective measures will provide the Commission, DSI, and the resource agencies with valuable information on the adequacy of enhancement measures. I, therefore, am requiring DSI to provide records obtained from the headwater monitoring gage after an agency's written request for such data.

#### B. Post-Construction Monitoring of Fish Passage

The FWS and MDFW want DSI to conduct monitoring studies, and DSI agrees to conduct them, to determine the effectiveness of the upstream and downstream fish passage facilities, including the ZOP. During the first 2 years of fishway operation, DSI, in consultation with FWS and MDFW, would assess the effectiveness of the upstream passage facilities using observation and adjustment.

DSI agrees that the resource agencies can request DSI to conduct a formal year-long study of the effectiveness of upstream passage anytime within the first 5 years of fishway operation.

DSI also agrees that, during the first 2 years of fishway operation, it would assess the effectiveness of downstream passage facilities through observation. The MOA states that DSI would not be required to perform any formal studies of downstream passage.

I concur that post-construction monitoring studies are necessary to evaluate the effectiveness of fish passage. I, therefore, am requiring in Article 407 that DSI prepare a monitoring plan to assess the effectiveness of upstream and

downstream passage facilities. This plan also must incorporate measures to determine the adequacy of ZOP flows and channel modifications in facilitating upstream movement of anadromous fish to the ladder.

DSI's evaluation of downstream passage must assess: (1) the effectiveness of the fish screen/bypass facilities, (2) the extent of fish injury or mortality associated with their use, and (3) the adequacy of bypass flows to convey fish downstream of the project.

I am requiring DSI to develop its monitoring plan in consultation with FWS and MDFW before filing the plan with the Commission.

In addition, I am requiring in Article 407 that DSI submit annual status reports that document the results of its monitoring and any request for adjustments to the required minimum flows, fishways, and ZOP. These annual reports also must include a summary of the costs incurred during the previous year as well as the cumulative costs of fishway structural modifications. DSI must develop these annual status reports in consultation with the MDFW and FWS before filing them with the Commission.

### C. Field Studies

Construction of the upstream and downstream fish passage and recreational facilities at the West Springfield dam will remove small amounts of vegetation and disturb wildlife in the project area. Impacts on local fauna and flora will be minimal, because construction generally will occur in previously disturbed areas. Construction activities, however, will result in the loss of some wildlife habitat.

Staff concludes in the EA (Section V.C.4) that, for the majority of the endangered, threatened, or species of special concern that have been identified by the Massachusetts Natural

Heritage Endangered Species Program (MNHESP) as potentially present within the project vicinity, construction of the upstream and downstream fish passage and recreational facilities would have minimal impact. I concur with staff that, before construction, DSI must perform site-specific surveys to identify habitats within the proposed construction areas that are capable of supporting populations of spotted turtle, eastern spadefoot toad, and northern spring salamander.

If these surveys identify these or other endangered, threatened, or species of special concern within the construction area, then DSI must develop, in consultation with MNHESP, and for the Commission's approval, specific measures to minimize impacts on these species and their habitats during project-related construction activities.

With respect to federally listed species, construction activities at the project and its continued operation under subsequent license will have no effect on any occasional use of the area by bald eagles and peregrine falcons.

Construction of the required access trail in Mittineague Park will impact some wetland or adjacent buffer zones. Such impacts will result from the placement of stones in the banks of Block Creek and the placement of gravel backfill in the vicinity of the existing railroad culvert.

The National Wetlands Inventory (NWI) identifies limited areas of wetlands in the vicinity of the trail. An area of about 2,700 square feet that may include wetlands could be affected. This represents a worst-case impact estimate. More precise quantification of potential impacts is not possible, since DSI has not performed field delineation of wetlands there.

To properly address wetland impacts, I suggest that the Town of West Springfield delineate all jurisdictional wetlands in the area of the proposed trail using the 1987 U.S. Army Corps of Engineers (COE) Wetland Delineation Manual and Massachusetts wetland delineation methods.

Impacts on wetlands should be avoided or minimized to the greatest extent practicable. The Town should obtain all necessary permits for work in wetlands and their buffer zones from the New England Division COE (Section 404) and the towns of West Springfield and/or Agawam.

#### D. Cultural Resources Management Plan

No known sites listed on the National Register of Historic Places will be affected by the required construction activities or project operation. Undiscovered sites, such as buried or inundated archeological sites, however, could be affected by new construction. Therefore, I am requiring in Article 410 that, if

any sites are discovered, DSI must: (1) consult with the State Historic Preservation Officer (SHPO); (2) prepare and implement a cultural resources management plan to evaluate the significance of the sites and to avoid or minimize any impacts on Register-eligible sites; (3) base the plan on recommendations of the SHPO and the Secretary of the Interior's Guidelines for Archaeology and Historic Preservation; (4) file the plan for Commission approval, together with the written comments of the SHPO; and (5) take the necessary steps to protect the discovered archeological or historic sites from further impact until notified by the Commission that all of these requirements have been satisfied.

DSI will not be allowed to begin any land-clearing or land-disturbing activities in the vicinity of any discovered sites



until informed by the Commission that the aforementioned requirements have been fulfilled.

#### E. Recreational Enhancement

The recreation improvements required by this license will enhance public use of the area. The trail, canoe launch, and associated parking area to be constructed downstream of the powerhouse will provide access to the Westfield River for American shad and Atlantic salmon anglers and canoeists. The proposed facilities are consistent with the recommendation of the Massachusetts Outdoors for Our Common Good: Open Space and Outdoor Recreation in Massachusetts (Massachusetts Department of Environmental Management 1988) for increased access to inland waterways. River access will increase angling opportunities and establish a 4-mile canoe run downstream to the Connecticut River.

#### LICENSE TERM

In 1986, the Electric Consumers Protection Act modified Section 15 of the FPA to specify that any license issued under Section 15 shall be for a term which the Commission determines to be in the public interest, but not less than 30 years, nor more than 50 years. I am following this same guideline in issuing subsequent licenses.<sup>5/</sup>

Generally, we issue subsequent 30-year licenses for projects that include no substantial new construction or power generating expansion. We issue subsequent licenses for 40 years or more for projects that include substantial new construction or capacity increases.

We issue licenses of longer duration to ease the economic impact of the new costs and to encourage better comprehensive development of the renewable power generating resource. For the same reason, we may issue longer duration licenses for projects that include substantial or costly environmental mitigation and

enhancement measures. Licenses of longer duration in these instances encourage license applicants (1) to be better environmental stewards, and (2) to propose more balanced and comprehensive development of our river basins.

DSI does not propose new hydropower development at the project. However, in light of the significant environmental mitigation and enhancement measures I am requiring and their costs, the subsequent license for the West Springfield Project

5/ A subsequent license is issued for a minor project whenever Sections 14 and 15 were waived in the original license.

will be for a term of 40 years, effective the first day of the month in which this license is issued.

### PROJECT RETIREMENT

The Commission has issued a Notice of Inquiry (NOI), dated September 15, 1993, requesting comments that address numerous issues involving the potential decommissioning of licensed hydropower projects at some future time, based on project-specific circumstances.<sup>6/</sup> The NOI states that the Commission is not proposing new regulations at this time, but is inviting comments on whether new regulations may be appropriate. Alternatively, the Commission may consider issuing a statement of policy addressing the decommissioning of licensed hydropower projects, or take other measures.

The West Springfield Project may be affected by future actions that the Commission takes with respect to issues raised in the NOI. Therefore, the license includes Article 203, which reserves authority to the Commission to require the licensee to conduct studies, make financial provisions, or otherwise make reasonable provisions for decommissioning of the project in appropriate circumstances.

By including Article 203, I do not intend to prejudge the outcome of the NOI. I am simply including the article so that the Commission will be in a position to make any lawful and appropriate changes in the terms and conditions of this license, which is being issued during the pendency of the NOI, based on the final outcome of that proceeding.

### SUMMARY OF FINDINGS

The EA issued for this project includes background information, analysis of impacts, support for related license articles, and the basis for a finding of no significant impact on the environment. Issuance of this license is not a major federal

action significantly affecting the quality of the human environment.

The design of this project is consistent with the engineering standards governing dam safety. The project will be safe if operated and maintained in accordance with the requirements of this license. Analysis of related issues is provided in the S&DA prepared for the West Springfield Project and available in the Commission's public file for this project.

6/ Notice of Inquiry, Project Decommissioning at Relicensing, Docket No. RM93-23-000, September 15, 1993, 58 FR 48,991 (1993).

I conclude that the project will not conflict with any planned or authorized development, and it will be best adapted to comprehensive development of the waterway for beneficial public uses.

#### THE DIRECTOR ORDERS

(A) This license is issued to Decorative Specialties International, Inc. (Licensee), for a period of 40 years, effective the first day of the month in which this order is issued, to operate and maintain the West Springfield Hydroelectric Project. This license is subject to the terms and conditions of the FPA, which is incorporated by reference as part of this license, and subject to the regulations the Commission issues under the provisions of the FPA.

(B) The project consists of:

(1) All lands, to the extent of the Licensee's interests in those lands, shown in the following exhibits:

Exhibit No. Showing

|     |                              |
|-----|------------------------------|
| A   | Project facilities           |
| F-1 | Plan, elevation, and section |
| F-2 | South elevation - powerhouse |
| F-3 | East elevation - powerhouse  |
| F-4 | Section - powerhouse         |
| F-5 | North elevation - powerhouse |
| F-6 | Plan - hydro station         |
| G-1 | Property map                 |

(2) Project works consisting of: (1) an 18-foot-high, 447.5-foot-long, rock-filled, timber crib dam with stone work abutments on both the north and south banks; (2) a 2,610-foot-long power canal, with natural ground on the left bank (portions are lined with a fieldstone

wall) and an earth dike on the right bank; (3) a headworks structure with six manually operated timber slide gates; (4) a 60-foot-long, 54-foot-wide, by 63-foot-high powerhouse containing two vertical Francis turbines connected to two 480-volt generators with a total installed capability of 1.4 MW (maximum plant capability is 1.2 MW due to power canal and tailrace flow limitations); and (5) a 111-foot-long by 30-foot-wide tailrace; and (6) appurtenant facilities.

The project works generally described above are more specifically shown and described by those portions of exhibits A, F, and G recommended for approval in the S&DA.

(3) All of the structures, fixtures, equipment, or facilities used to operate or maintain the project and located at the project; all portable property that may be employed in connection with the project and located near the project; and all riparian or other rights that are necessary or appropriate in the operation or maintenance of the project.

(C) The Exhibits A, F, and G described above are approved and made part of the license.

(D) The following sections of the FPA are waived and excluded from the license for this minor project:

4(b), except the second sentence; 4(e), insofar as it relates to approval of plans by the Chief of Engineers and the Secretary of the Army; 6, insofar as it relates to public notice and to the acceptance and expression in the license of terms and conditions of the Act that are waived here; 10(c), insofar as it relates to depreciation reserves; 10(d); 10(f); 14, except insofar as the power of condemnation is reserved; 15; 16; 19; 20; and 22.

(E) This license is subject to the articles set forth in Form L-12 (October 1975), entitled "Terms and Conditions of License for Constructed Minor Project Affecting the Interests of Interstate or Foreign Commerce," and the following articles:

Article 201. The Licensee shall pay the United States the following annual charge, effective the first day of the month in which this license is issued:

For the purpose of reimbursing the United States for the cost of administration of Part I of the Act, a reasonable amount as determined in accordance with the provisions of the Commission's regulations in effect from time to time. The authorized installed capacity for that purpose is 1,877

horsepower.

Article 202. The Commission reserves authority, in the context of a rulemaking proceeding or a proceeding specific to this license, to require the Licensee at any time to conduct studies, make financial provisions, or otherwise make reasonable provisions for decommissioning of the project. The terms of this article shall be effective unless the Commission, in Docket No. RM93-23, finds that the Commission lacks statutory authority to require such actions, or otherwise determines that the article should be rescinded.

Article 203. (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 water 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 insure 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.

Article 301. The Licensee shall, at least 60 days prior to start of construction, submit one copy to the Commission's Regional Director and two copies to the Director, Division of Dam Safety and Inspections, of the final contract drawings and specifications for pertinent features of the project, such as fishways. The Director, Division of Dam Safety and Inspections, may require changes in the plans and specifications to ensure a safe and adequate project.

Article 302. The Licensee shall, within 90 days of completion of construction, file for approval by the Commission, revised Exhibits A, F, and G, to describe and show the project as-built, including all facilities determined, by the Commission, to be necessary and convenient for transmission of all of the project power to the interconnected transmission system.

Article 303. The design and construction of those permanent and temporary facilities, including the fishways, impounding

cofferdams, and deep excavations, that would be an integral part of, or that could affect the structural integrity or operation of the project, shall be done in consultation with and subject to the review and approval of the Commission's NYRO. Within 90 days from the issuance date of the license, the Licensee shall furnish the Commission's Regional Director, for his review, a schedule for submission of design documents and plans and specification for the project. If the schedule does not afford sufficient review and approval time, the Licensee, upon request of the Commission shall meet with the Commission staff to revise the schedule accordingly.

Article 401. Within 6 months of the date of issuance of this license, the Licensee shall file with the Commission, for approval, a plan to control erosion, to control slope

instability, and to minimize the quantity of sediment resulting from fishway and recreational facility construction and operation.

The plan shall be based on actual-site geological and soil conditions and on project design, and shall include, at a minimum, the following four items:

- (1) a description of the actual site conditions at laydown/mobilization areas and any other areas that the proposed construction would affect;
- (2) measures proposed to control erosion, to prevent slope instability, and to minimize the quantity of sediment resulting from project construction and operation;
- (3) detailed descriptions, functional design drawings, and specific topographic locations of all control measures;  
and
- (4) a specific implementation schedule and details for monitoring and maintenance programs for fishway and recreational facility construction and operation.

The Licensee shall prepare the plan after consultation with the Soil Conservation Service, the Massachusetts Department of Environmental Protection, and the Town of West Springfield.

The Licensee shall include with the plan documentation of consultation, copies of comments and recommendations on the completed plan after it has been prepared and provided to the entities, and specific descriptions of how the entities' comments are accommodated by the plan. The Licensee shall allow a minimum of 30 days for the entities to comment and to make recommendations before filing the plan with the Commission. If the Licensee does not adopt a recommendation, the filing shall include the Licensee's reasons, based on geological and soil

conditions at the site.

The Commission reserves the right to require changes to the plan. No land-disturbing or land-clearing activities related to the fishways or recreational facilities shall begin until the Licensee is notified by the Commission that the plan is approved. Upon Commission approval, the Licensee shall implement the plan, including any changes required by the Commission.

Article 402. The Licensee shall operate the project in a run-of-river mode for the protection and enhancement of water quality and aquatic resources in the Westfield River. The Licensee shall at all times act to minimize fluctuations in the surface elevation of the West Springfield impoundment by maintaining a discharge from the project such that, at any point

in time, flows, as measured immediately downstream from the project tailrace and bypass reach, approximate the sum of the flows to the project reservoir.

Run-of-river operation may be temporarily modified if required by operating emergencies beyond the control of the Licensee, or for short periods upon mutual agreement between the Licensee and the Massachusetts Department of Environmental Protection. If the flow is so modified, the Licensee shall notify the Commission as soon as possible, but no later than 10 days after each such incident.

Article 403. The Licensee shall release from the West Springfield dam into the Westfield River a continuous minimum instream flow of 85 cubic feet per second (cfs) or inflow, whichever is less, for the enhancement of aquatic resources in the bypassed reach and the provision of a zone of passage for anadromous fish during the fish passage seasons (April 1 through July 15 and September 1 through October 31).

Article 407 requires the Licensee, in consultation with Massachusetts Division of Fisheries and Wildlife (MDFW) and the U.S. Fish and Wildlife Service (FWS), to conduct monitoring to assess the effectiveness of the flows provided during the fish passage seasons to pass Atlantic salmon and American shad. Should the MDFW and the FWS deem that higher flows are necessary, then these agencies or the Licensee may submit, for Commission review, a request that instream flows during the fish passage seasons be increased to a maximum of 125 cfs or inflow, whichever is less.

If further monitoring indicates that the 125 cfs flow is not adequate to effectively pass Atlantic salmon and American shad, then the agencies or the Licensee may submit, for Commission approval, a request that instream flow during the April 1 to July 15 fish passage season be revised to require a release of no more than 311 cfs or inflow, whichever is less, during four hours of

each day beginning at sunrise, and then 85 cfs or inflow, whichever is less, until the following sunrise. This operational schedule may be adjusted by the Commission, as needed, to accomplish effective passage.

These instream flows may be temporarily modified if required by operating emergencies beyond the control of the Licensee or for short periods upon mutual agreement between the Licensee and the MDFW. If a flow is so modified, the Licensee shall notify the Commission as soon as possible, but no later than 10 days after each such incident.

Article 404. Within 6 months of license issuance, the Licensee shall file with the Commission, for approval, a plan to install and operate a headwater monitoring gage in the West

Springfield impoundment to monitor compliance with the run-of-river operation required by Article 402 and the provision of minimum flow required by Article 403.

The plan shall include, at a minimum, the following information: a schedule for installing the monitoring gage, the planned location of the gage, the design of the gage, the location of the spillway weir, the method of flow data collection, and the method for providing flow data to the agencies within 30 days after the agencies request such data.

The Licensee shall prepare the plan after consultation with the U.S. Geological Survey, U.S. Fish and Wildlife Service, and the Massachusetts Division of Fisheries and Wildlife. The Licensee shall include with the plan documentation of consultation, copies of comments and recommendations on the completed plan after it has been prepared and provided to the agencies, and specific descriptions of how the agencies' comments are accommodated by the plan. The Licensee shall allow a minimum of 30 days for the agencies to comment and to make recommendations before filing the plan with the Commission. If the Licensee does not adopt a recommendation, the filing shall include the Licensee's reasons, based on project-specific information.

The Commission reserves the right to require changes to the plan. No construction of monitoring gages shall begin until the Licensee is notified by the Commission that the plan is approved. Upon Commission approval, the Licensee shall implement the plan, including any changes required by the Commission.

Article 405. Within 9 months of the date of license issuance, the Licensee shall file, for Commission approval, detailed design drawings of the Licensee's proposed permanent downstream fish passage facilities.

This filing shall include but not be limited to: (1) the

location and design specifications of the passage facilities; (2) a schedule for installing the facilities; and (3) procedures for operating and maintaining the facilities.

The Licensee shall prepare the aforementioned drawings, schedule, and plans after consultation with the U.S. Fish and Wildlife Service, the Massachusetts Division of Fisheries and Wildlife, and the Connecticut River Atlantic Salmon Commission. The Licensee shall include with the filing documentation of consultation, copies of agency comments and recommendations on the drawings, plans, and schedule after they have been prepared and provided to the agencies, and specific descriptions of how the agencies' comments are accommodated by the Licensee's facilities. The Licensee shall allow a minimum of 30 days for the agencies to comment and to make recommendations before filing



the drawings, plans, and schedule with the Commission. If the Licensee does not adopt a recommendation, the filing shall include the Licensee's reasons, based on project-specific information.

The Commission reserves the right to require changes to the proposed facilities and schedule. No construction of downstream fish passage facilities shall begin until the Licensee is notified by the Commission that the plan is approved. Upon Commission approval, the Licensee shall implement the proposal, including any changes required by the Commission.

Article 406. Within 9 months of the date of license issuance, the Licensee shall file, for Commission approval, detailed design drawings of the upstream passage facilities delineated in the February 2, 1994, Memorandum of Agreement for Development of Fish Passage Facilities and for Protection of Aquatic Resources at the West Springfield Hydroelectric Project on the Westfield River signed by Decorative Specialties International, Inc., the Massachusetts Division of Fisheries and Wildlife, and the U.S. Fish and Wildlife Service.

This filing shall include, but not be limited to: (1) design specifications of the passage facilities; (2) provisions for attraction flows; (3) specifications of the channel modifications to achieve a zone of passage for fish; (4) provisions for zone of passage maintenance; (5) a description of guidance screens at DSI and Southworth tailraces; (6) a description of the fish trapping and holding facility; (7) a schedule for installing the passage facilities; and (8) procedures for operating and maintaining the facilities.

The Licensee shall prepare the aforementioned filing after consultation with the U.S. Fish and Wildlife Service, the Massachusetts Division of Fisheries and Wildlife, and the Connecticut River Atlantic Salmon Commission. The Licensee shall include with the filing documentation of consultation, copies of

agency comments and recommendations on the filing after it has been prepared and provided to the agencies, and specific descriptions of how the agencies' comments are accommodated by the Licensee's facilities. The Licensee shall allow a minimum of 30 days for the agencies to comment and to make recommendations before submitting the filing to the Commission. If the Licensee does not adopt a recommendation, the filing shall include the Licensee's reasons, based on project-specific information.

The Commission reserves the right to require changes to the proposed facilities and schedule. No land-disturbing or land-clearing activities related to upstream fish passage shall begin until the Licensee is notified by the Commission that the plan is approved. Upon Commission approval, the Licensee shall implement the proposal, including any changes required by the Commission.

Article 407. Within 18 months of license issuance, the Licensee shall file with the Commission, for approval, a plan to monitor the effectiveness of all the facilities and flows provided pursuant to Articles 403, 405, and 406 of this license, that will enable the efficient and safe passage of anadromous fish migrating upstream and downstream. The results of these monitoring studies shall be submitted to the agencies listed below and shall provide a basis for recommending future structural or operational changes at the project.

The monitoring plan shall include the following elements:

- (1) an assessment of the efficiency of the Denil fish ladder and entrance facilities;
- (2) an assessment of the effectiveness of the tailrace screening at the Southworth and DSI tailraces;
- (3) an evaluation of the adequacy of zone of passage flow (85 cfs) and channel modifications in facilitating anadromous fish passage to the base of the Denil ladder;
- (4) an assessment of the effectiveness of downstream fish passage facilities, including documentation of any observed fish mortality associated with these facilities;
- (5) a schedule for implementing each element of the plan; and
- (6) a schedule for preparing and filing an annual report summarizing monitoring results and other pertinent information.

The Licensee shall prepare the monitoring plan after consultation with the U.S. Fish and Wildlife Service, the

Massachusetts Division of Fisheries and Wildlife, and the Connecticut River Atlantic Salmon Commission. The Licensee shall include with the plan documentation of agency consultation, copies of agency comments and recommendations on the plan after it has been prepared and provided to them, and specific descriptions of how the agencies' comments are accommodated by the Licensee's plan. The Licensee shall allow a minimum of 30 days for the agencies to comment and to make recommendations before filing the plan with the Commission. If the Licensee does not adopt a recommendation, the filing shall include the Licensee's reasons, based on project-specific information.

The Commission reserves the right to require changes to the proposed plan. Upon Commission approval, the Licensee shall

implement the plan, including any changes required by the Commission.

If the results of the monitoring indicate that changes in project structures or operations, including alternative flow releases, are necessary to protect fish resources, the Licensee shall first consult with the agencies listed above to develop recommended measures for amelioration and then file its proposal with the Commission, for approval. The Commission reserves its authority to require the Licensee to modify project structures or operations to protect and enhance aquatic resources.

Article 408. If DSI does not reach agreement within 6 months of the License issuance date to have the Town of West Springfield provide for impoundment access and the responsibility reverts to DSI, the Licensee shall conduct habitat surveys for endangered, threatened, or species of special concern prior to any clearing for construction within the area to be disturbed. If the licensee must conduct these surveys, it should file the survey results for Commission approval within 1 year of License issuance. Surveys shall be designed in consultation with the Massachusetts Natural Heritage and Endangered Species Program (MNHESP) and the U.S. Fish and Wildlife Service (FWS) and be performed by a qualified biologist at the appropriate time of year.

Should surveys identify the presence of any of the 12 species listed by the MNHESP, the Licensee shall develop, in consultation with MNHESP and the FWS, specific mitigation plans to be used during construction to minimize impacts to these species or their habitats.

Article 409. If DSI does not reach agreement within 6 months of the license issuance date to have the Town of West Springfield provide for impoundment access and the responsibility reverts to DSI, the Licensee shall conduct wetland delineation surveys prior to construction in order to avoid or minimize

impacts to these areas. If the Licensee must conduct these surveys, it should file the survey results for Commission approval within 1 year of license issuance. The filing shall include a plan to replace, in the vicinity of the project, wetland habitat lost as a result of the construction and operation of the impoundment access.

If wetlands will be affected, the plan, at a minimum, shall include:

- (1) details of the final design measures to protect the wetlands affected;
- (2) a plan for monitoring the effectiveness of the measures to protect wetlands affected, which includes steps to

be taken in the event the measures are not effective in protecting the wetlands, including, but not necessarily limited to, modifying the protective measures or establishing or enhancing additional wetlands;

(3) a proposal to provide recommendations to the agencies and the Commission for alternative wetland mitigation due to construction and operation, if monitoring indicates that the implemented wetland establishment or enhancement is not successful; and

(4) schedules for establishing or enhancing of wetlands, for filing the results of the monitoring program, and for filing recommendations for alternative wetland mitigation.

The Licensee shall prepare the plan after consultation with the U.S. Fish and Wildlife Service (FWS), the U.S. Army Corps of Engineers, the Massachusetts Department of Environmental Protection, and the West Springfield Conservation Commission. The Licensee shall include with the plan documentation of consultation, copies of comments and recommendations on the completed plan after it has been prepared and provided to the agencies, and specific descriptions of how the agencies' comments are accommodated by the plan. The Licensee shall allow a minimum of 30 days for the agencies to comment and to make recommendations before filing the plan with the Commission. If the Licensee does not adopt a recommendation, the filing shall include the Licensee's reasons, based on project-specific information.

The Commission reserves the right to require changes to the plan. No land-disturbing or land-clearing activities shall begin until the Licensee is notified by the Commission that the plan is approved. Upon Commission approval, the Licensee shall implement the plan, including any change required by the Commission.

Article 410. If archeological or historic sites are

discovered during construction of proposed recreational or fish passage facilities or during project operation, the Licensee shall: (1) consult with the Massachusetts State Historic Preservation Officer (SHPO); (2) prepare and implement a cultural resources management plan to evaluate the significance of the sites and to avoid or mitigate any impacts to any sites found eligible for inclusion in the National Register of Historic Places; (3) base the plan on the recommendations of the SHPO and the Secretary of the Interior's Guidelines for Archeology and Historic Preservation; (4) file the plan for Commission approval, together with the written comments of the SHPO on the plan; and (5) take the necessary steps to protect the discovered sites from further impact until notified by the Commission that all of these requirements have been satisfied.



The Commission may require a cultural resources survey and changes to the cultural resources management plan based on the filings. The Licensee shall not implement a cultural resources management plan or begin any land-clearing or land-disturbing activities in the vicinity of any discovered sites until informed by the Commission that the requirements of this article have been fulfilled.

Article 411. Within one year of license issuance, the Licensee shall implement the recreation enhancement measures filed on December 20, 1991 (exhibit E, section 4.61.f.7) and December 21, 1992 (additional information response to item number 5 and item number 6).

The recreation enhancements shall include the following facilities to be located on DSI property on the north bank of the Westfield River downstream of the Mittineague Bridge: (1) a parking area for 20 vehicles; (2) signs to inform the public of access opportunities; (3) a surfaced and graded trail from the parking area to the river that meets disabled access Challenge Level 2 specifications; (4) a canoe launch and fishing access site; and (5) a plan for controlling river bank slumping and erosion that could result from the construction and operation of these facilities.

The Licensee's design of recreational facilities shall conform to the national standards established by the Architectural and Transportation Barriers Compliance Board pursuant to the Americans with Disabilities Act of 1990.

Further, within 90 days after completing construction, the Licensee shall file revised exhibits A, F, and G describing the recreational facilities as-built.

Article 412. The Licensee shall attempt to reach an agreement with the Town of West Springfield obligating the Licensee to provide up to \$10,000 for the design and construction

of an impoundment canoe and fishing access trail in Mittineague Park.

Within six months of license issuance, the Licensee shall file with the Commission, for approval, a proposed agreement with the Town of West Springfield that indicates that the Licensee's financial assistance will be used to construct the access trail in Mittineague Park.

If during this period an agreement cannot be reached with the Town of West Springfield, the Licensee shall develop and implement a plan to construct, operate, and maintain canoe and fishing access to the project impoundment at an alternative site. This plan shall be filed with the Commission, for approval, within 1 year from the issuance date of this license. The

Licensee shall file the plan after consultation with Pioneer Valley Planning Commission (PVPC), the Westfield River Watershed Association (WRWA), and the Massachusetts Division of Fisheries and Wildlife (MDFW). The Licensee shall include with the plan documentation of consultation, copies of comments and recommendations on the completed plan after it has been prepared and provided to the entities, and specific descriptions of how their comments are accommodated by the plan. The Licensee shall allow a minimum of 30 days for the entities to comment and make recommendations prior to filing the plan with the Commission. If the Licensee does not adopt a recommendation, the filing shall include the Licensee's reasons, based on project-specific information.

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

(G) This order is final unless a request for rehearing is filed within 30 days of the date of issuance of this order, pursuant to Section 313 of the FPA. The filing of a request for rehearing does not operate as a stay of the effective date of this order or of any other date specified in this order, except as specifically ordered by the Commission. The licensee's failure to file a request for rehearing shall constitute acceptance of this order.

Fred E. Springer  
Director, Office of  
Hydropower Licensing

ENVIRONMENTAL ASSESSMENT  
FOR HYDROPOWER LICENSE

West Springfield Hydroelectric Project  
FERC Project No. 2608  
Massachusetts

Federal Energy Regulatory Commission  
Office of Hydropower Licensing  
Division of Project Review  
825 North Capitol Street, N.E.  
Washington, DC 20426

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## SUMMARY

Decorative Specialties International, Inc. (DSI) proposes to continue operating its 1.4-megawatt (MW) hydroelectric facility, which provides power for its papermaking operation. DSI's manufacturing facilities, dam, and powerhouse are located on the Westfield River in the towns of West Springfield and Agawam in Hampden County, Massachusetts. DSI's current license expired on December 31, 1993. No new capacity is proposed at the existing project.

On February 7, 1994, DSI submitted to the Commission for its information a Memorandum of Agreement (MOA) with the Massachusetts Division of Fisheries and Wildlife (MDFW) and the U.S. Fish and Wildlife Service (FWS) concerning measures for fish passage and protection at the project. We consider the terms contained in the MOA as a possible alternative. In addition to the terms contained in the MOA, we consider two other alternative actions: (1) DSI's proposal and our recommended enhancement measures, and (2) no action.

This environmental assessment (EA) prepared for the West Springfield Project analyzes and evaluates the effects associated with the issuance of a subsequent license for the existing hydropower development and recommends terms and conditions to become a part of any license issued. For any license issued, the Commission must determine that the project adopted will be best adapted to a comprehensive plan for improving or developing a waterway. In addition to the power and development purposes for which licenses are issued, the Commission must give equal consideration to the following purposes: energy conservation; the protection and enhancement of fish and wildlife; aesthetics; cultural resources; and the protection of recreational opportunities. This EA for the West Springfield Project reflects the Commission's consideration of these factors.

Based on our consideration of all developmental and nondevelopmental resource interests related to the project, the following measures to protect and enhance environmental resource values should be included in any license issued for the West Springfield Project: (1) construct upstream and downstream fish passage facilities as prescribed by the U.S. Department of the

Interior (Interior) pursuant to Section 18 of the Federal Power Act (FPA); (2) develop a plan to operate, maintain, and assess the effectiveness of the upstream and downstream fishway facilities; (3) release and monitor a year-round minimum flow of 85 cfs or inflow, whichever is less, into the bypass reach; (4) implement the proposed recreation plan and build a canoe and fishing access trail in Mittineague Park or develop and implement a plan to construct, operate, and maintain canoe and fishing access to the project impoundment at an alternative site; (5) develop procedures to minimize bank erosion during the construction of fishways and recreational facilities; and (6) conduct wetland delineations and rare species surveys.

We estimate that it would cost DSI about \$253,000 per year over a 40-year license period to implement these enhancement measures. Adopting these measures would provide substantial benefits to the environment and the public that justify the cost of the measures.

These environmental measures would protect or enhance fishery resources, water quality, and recreational and aesthetic resources. In addition, the electricity generated from the project would be beneficial because it would: continue to reduce the use of fossil-fueled, electric generating plants; conserve nonrenewable energy resources; and continue to reduce atmospheric pollution.

No reasonable action alternatives to the project have been identified for assessment. The no-action and decommissioning alternatives have been considered and are addressed in the environmental analysis and the comprehensive development sections of this EA. Denial of the license would mean that about 6,763 megawatt-hours (MWh) of electric energy generation per year at the project would be lost, and no measures would be implemented to protect and enhance existing environmental resources.

DSI filed an application for Water Quality Certification from the Massachusetts Department of Environmental Protection (MDEP) for the West Springfield Project. MDEP did not act on DSI's request within the period specified; thus, we deem the certification waived.

Pursuant to Section 10(j) of the FPA, we make a determination that the recommendations of the Federal and state fish and wildlife agencies are consistent with the purposes and requirements of Part I of the FPA and applicable law. Section 10(j) of the FPA requires the Commission to include license conditions, based on recommendations of Federal and state fish and wildlife agencies, for the protection and enhancement of fish and wildlife resources. We have addressed the concerns of the Federal and state fish and wildlife agencies and made recommendations consistent with those agencies.

Under Section 18 of the FPA, Interior has prescribed the construction, operation, and maintenance of upstream and

downstream fishways at the project.

Based on our independent analysis, including our consideration of all relevant economic and environmental concerns, we conclude in this EA that: (1) the West Springfield Project, with our recommended environmental measures, would be best adapted to a comprehensive plan for the proper use, conservation, and development of the Westfield River and other project-related resources; and (2) issuance of a subsequent license for the project would not constitute a major Federal action significantly affecting the quality of the human environment.

## ENVIRONMENTAL ASSESSMENT

### FEDERAL ENERGY REGULATORY COMMISSION OFFICE OF HYDROPOWER LICENSING DIVISION OF PROJECT REVIEW

West Springfield Hydroelectric Project  
FERC No. 2608  
Massachusetts

## INTRODUCTION

The Federal Energy Regulatory Commission issued the West Springfield Hydroelectric Project Draft Environmental Assessment (EA) for comment on May 13, 1994. In response, we received two comment letters. Those commentors are listed in Section IV.C., Comments on the Draft EA. All timely-filed comment letters were reviewed by staff. The sections of the EA that have been modified as a result of comments received are identified in the staff responses to the right of the letters of comments, in Appendix A.

## I. APPLICATION

On December 20, 1991, Decorative Specialties International, Inc. (DSI or applicant), filed an application with the Federal Energy Regulatory Commission (Commission or FERC) for a subsequent license for the West Springfield Hydroelectric Project. The 1.4-megawatt (MW) project is located on the Westfield River in the towns of West Springfield and Agawam, in Hampden County, Massachusetts (Figure 1). The project does not occupy any United States lands.

## II. PURPOSE AND NEED FOR ACTION

### A. Purpose of Action

This environmental assessment (EA) analyzes the impacts



associated with continued operation of the constructed project, evaluates alternatives to the proposed project, and makes recommendations to the Commission on whether to issue a license, and, if so, recommends terms and conditions to become part of any license issued. The Federal Power Act (FPA) provides the Commission with the exclusive authority to license nonfederal water power projects on navigable waterways or on Federal lands.

In deciding whether to issue any license, the Commission must determine that the project adopted will be best adapted to a comprehensive plan for improving or developing a waterway. In addition to the power and developmental purposes for which licenses are issued, the Commission must give equal consideration

Figure 1. Project Location Map, West Springfield Hydroelectric Project



to: (1) energy conservation; (2) protecting and enhancing fish and wildlife (including related spawning grounds and habitat); (3) protecting recreational opportunities; and (4) preserving other aspects of environmental quality.

#### B. Need for Power

The West Springfield Project is located in the New England Power Pool (NEPOOL) area of the Northeast Power Coordinating Council (NPCC) Regional Electric Reliability Council region. As reported in the June 1992 Supply and Demand report by the North American Electric Reliability Council (NERC), NEPOOL forecasts an average increase in peak energy demand of 1.9 percent during the summer and 1.7 percent during the winter for the 1992 to 2001 planning period. During the same period, NEPOOL forecasts no net increase in capacity primarily because retirement of existing facilities will offset any planned facilities.

The West Springfield Project, if relicensed, would generate an estimated 5,800 megawatt-hours (MWh) of electricity per year, which would be used by DSI to produce paper. Excess energy would be sold to Western Massachusetts Electric Company. The excess power would help meet the need for power projected by the NPCC, Regional Electric Reliability Council. The project would continue to displace fossil-fueled power generation in the NPCC region, thereby conserving nonrenewable fossil fuels and continuing to prevent additional emissions of noxious by-products caused by burning fossil fuels.

### III. PROPOSED ACTION AND ALTERNATIVES

#### A. Proposed Action

##### 1. Project Description

The existing facilities consist of: an 18-foot-high, 447.5-foot-long timber crib dam with a dam crest elevation of 92.80 feet above mean sea level (msl) that creates a 20-acre impoundment; a 2,610-foot-long power canal with concrete

headworks containing six gates; a powerhouse about 60 feet long, 54 feet wide, and 63 feet high with an adjacent sluice; and a tailrace. There are no primary transmission lines included in the project.

Built in 1931, the powerhouse is on the left bank of the river in the Town of West Springfield. The powerhouse was originally constructed to house three units, only two of which are installed. Unit One is rated at 900 kilowatts (kW) and Unit Two is rated at 466 kW. However, due to flow restriction in the power canal, the combined capacity is 1,200 kW (Unit One at 800 kW and Unit Two at 400 kW). The project's average annual generation is 6.76 gigawatt-hours (GWh). The hydraulic capacity

of the project is 622 cubic feet per second (cfs) (400 cfs for Unit One and 222 cfs for Unit Two). The project currently operates as a run-of-river facility (inflow equals outflow instantaneously).

DSI proposes to maintain the existing installed capacity of the project and to continue run-of-river operation. With our recommended minimum flow requirements for fisheries enhancement, however, the project's annual generation would be reduced to 5.8 GWh.

## 2. Proposed Environmental Measures

In the original license application and subsequent submittals, DSI proposes a number of environmental enhancement measures. On February 2, 1994, DSI completed a Memorandum of Agreement (MOA) with the Massachusetts Division of Fisheries and Wildlife (MDFW) and the U.S. Fish and Wildlife Service (FWS) concerning the development and operation of fish passage facilities at the project. Based on its earlier filings and measures included in the MOA, DSI proposes to implement the following enhancement measures at the West Springfield Project:

- ù install a headwater monitoring gage in the West Springfield impoundment;

- ù monitor flows hourly and provide data to MDFW and FWS and the U.S. Geological Survey (USGS) upon request [as originally proposed];

- ù construct a Denil fish ladder adjacent to the north abutment of the existing spillway; a rectangular weir cut adjacent to the north dam abutment to provide downstream passage and attraction flows; a fish trap, with sorting and holding facilities and truck access at the upstream end of the Denil fish ladder; an inclined screen and associated flume in the power canal immediately downstream of the Denil fishway exit for downstream fish passage; and screens across DSI and

Southworth company tailraces [some fish passage originally proposed];

- ù evaluate the effectiveness of upstream and downstream fish passage facilities;

- ù release a year-round minimum flow of 85 cfs or inflow, whichever is less, through one or possibly two weirs, and the Denil fish ladder when it is operating, into the 2,500-foot-long bypass reach [65 cfs originally proposed];

ù if monitoring indicates that 85 cfs, together with structural modifications, are inadequate for creating a zone of passage (ZOP) for anadromous fish, release a minimum flow of up to 125 cfs or inflow, whichever is less, into the bypass reach during fish passage seasons (April 1 through July 15, and September 1 through October 31).

If monitoring shows that a flow of 125 cfs together with other measures, are inadequate to create an anadromous fish ZOP, release flows up to 50 percent of usable inflow (311 cfs) during April 1 through July 15, beginning at sunrise for 4 hours and then 85 cfs or inflow, whichever is less, until the following sunrise (adjusting this schedule in consultation with FWS and MDFW) [no monitoring originally proposed];

ù construct select instream structures in the north channel of the bypass reach to create a ZOP for all lifestages of American shad and Atlantic salmon [as originally proposed];

ù develop a parking area, trail, and canoe launch downstream of the project near the Mittineague bridge [as originally proposed]; and

ù provide Pioneer Valley Planning Commission (PVPC) with \$4,000 to study the availability of access sites for boating and fishing upstream of the project dam [as originally proposed].

## B. Alternatives to the Proposed Action

### 1. Staff's Alternative

After evaluating DSI's proposal and reviewing the recommendations from resource agencies and other interested parties, we considered what, if any, additional enhancement measures would be necessary and appropriate to include in the



subsequent license. Based on our assessment of how the project would affect the environment, our alternative consists of DSI's latest proposal with the additions or modifications presented below:

- ù minimize bank erosion during construction of fishways and recreational facilities;

- ù provide a plan to evaluate the effectiveness of the upstream and downstream fish passage facilities and the ZOP; and

ù provide \$10,000 to the Town of West Springfield for the design and construction of a canoe and fishing access trail in Mittineague Park or develop and implement a plan to construct, operate, and maintain canoe and fishing access to the project impoundment at an alternative site.

We discuss each measure in the individual resource sections included in Section V of this EA.

## 2. No-Action Alternative

Under the no-action alternative, the project would continue to operate under the terms and conditions of the existing license, and no new environmental protection, mitigation, or enhancement measures would be implemented. We use this alternative to establish baseline environmental conditions for comparison with other alternatives. The alternative of license denial and project decommissioning is discussed below in Section III.B.3.

## 3. Alternatives Considered but Eliminated from Detailed Study

We considered two decommissioning alternatives to the applicant's relicensing proposal, but eliminated them from detailed study because they are not reasonable in the circumstances of this case. Project decommissioning could be accomplished with or without dam removal. Either alternative would involve denial of the subsequent license application and surrender or termination of the existing license with appropriate conditions.

No participant has suggested that decommissioning with dam removal would be appropriate in this case, and we have no basis for recommending it. Dam removal would preclude operation of Southworth's powerhouse as well as DSI's, because water diverted through the power canal serves both facilities. Information is not available to assess the impact of this lost generation on

Southworth. Dam removal would also alter the recreational usage of the river and the aspect of Mittineague Park, since the park would no longer be adjacent to an impoundment. Angling, boating, and swimming would be altered with replacement of lake habitat by river habitat. Thus, dam removal is not a reasonable alternative to relicensing the project with appropriate mitigation and enhancement measures.

The second decommissioning alternative would involve retaining the dam and disabling or removing equipment used to generate power. Project works would remain in place and could be used for historic or other purposes. This would require us to identify another government agency willing and able to assume

regulatory control and supervision of the remaining facilities. No agency has stepped forward, no participant has advocated this alternative, nor do we have any basis for recommending it. Because the power supplied by the project is needed, a source of replacement power would have to be identified. In these circumstances, we do not consider removal of the electric generating equipment to be a reasonable alternative.

#### IV. CONSULTATION AND COMPLIANCE

##### A. Agency Consultation

The Commission's regulations require all prospective applicants to consult with the appropriate resource agencies before filing an application for license. This consultation is the first step in complying with the Fish and Wildlife Coordination Act, the Endangered Species Act, the National Historic Preservation Act, and other Federal statutes. Prefiling consultation must be complete and documented in accordance with the Commission's regulations before the application is submitted.

Once an application is submitted, the Commission requests comments on it during a public notice period. The Commission issued a public notice for this project on February 23, 1993. The following entities commented:

| Commenting Entity                                | Date of Letter        |
|--|-----------------------|
| Department of the Interior                       | April 13 and 21, 1993 |
| Massachusetts Division of Fisheries and Wildlife | April 23, 1993        |

On February 2, 1994, DSI signed an MOA with MDFW and FWS regarding fish passage facilities and protection of aquatic resources at the West Springfield Project. MDFW and FWS subsequently submitted comment letters on February 14 and 22, 1994, respectively, confirming items agreed to in the MOA.

##### B. Interventions

In addition to providing comments, organizations and individuals may petition to intervene and become a party to any subsequent proceedings. The following parties filed Motions to Intervene in the West Springfield Project:

Department of the Interior    March 2, 1993  
Pioneer Valley Planning Commission    April 20, 1993  
Westfield River Watershed Association    April 22, 1993  
Commonwealth of Massachusetts    April 23, 1993  
Trout Unlimited, et al.    April 26, 1993

ù Interior's motion to intervene is for party status in the proceedings only, and does not address any specific areas of concern.

ù PVPC intervened for party status and identified recreational boating, river access, and fish passage as areas of concern. PVPC also wants to review and approve recreational design plans.

ù The Westfield River Watershed Association (WRWA) intervened for party status and identified river access, fish passage, and support for continued implementation of the Greenway Strategy as areas of concern.

ù The Commonwealth of Massachusetts intervened for party status and identified water quality, fish passage and restoration, and recreation as areas of concern.

ù Trout Unlimited, Atlantic Salmon Federation/U.S., and Connecticut River Atlantic Salmon Association (CRASA) intervened in opposition and identified flow levels, water quality, fish habitat, fish passage, and recreational access as areas of concern.

We address the intervenors' areas of concern in the environmental analysis section (Section V) of this EA.

#### C. Comments on the Draft Environmental Assessment

The respondents commenting on the EA are as follows:

|                                |              |
|--------------------------------|--------------|
| U.S. Fish and Wildlife Service | May 31, 1994 |
| Gomez & Sullivan Engineers     | June 9, 1994 |

#### D. Water Quality Certification

On December 20, 1991, DSI applied to MDEP for Section 401 Water Quality Certification, as required by the Clean Water Act.

By letter dated December 2, 1992, DSI withdrew its initial request for water quality certification (Stetson-Harza 1992) and refiled a new request for water quality certification. MDEP acknowledged receipt of the new WQC request on December 8, 1992, but has not acted on it.

Section 4.38(f)(7)(ii) of the Commission's regulations stipulate that agencies must act on a pending 401 request within 1 year from the date of receipt of the application or the certification is deemed waived. Since MDEP did not act on DSI's request within 1 year, we deem the certification waived.

#### E. Section 18 Fishway Prescriptions

Section 18 of the FPA provides the Secretary of the U.S. Department of the Interior (Interior) the authority to prescribe fishways at Commission-licensed projects.<sup>7/</sup> Interior (1993) filed measures pursuant to Section 18. Subsequently, FWS became a party to the MOA (dated February 2, 1994) with DSI and MDFW. As a result of the MOA, Interior filed a revised Section 18 prescription on February 22, 1994. The Commission has elected to waive its regulations that such prescriptions be timely filed and accept Interior's late-filed letter with the revised Section 18 prescriptions, which include the following measures.

1. The licensee shall construct an upstream fishway at the project that includes a Denil fish ladder system as depicted in Figures VIII-1 and VI-3 and guidance screens at the Southworth and West Springfield discharges as depicted in Figure VIII-2 of the December 1992 additional information filing (DSI 1992), and instream structures in the north channel of the bypass reach to create an adequate zone of passage. Interior's letter requires that final designs be developed in consultation with FWS, that the upstream passage facilities be in operation by April 1, 1996, and that this schedule may be modified by FWS as necessary and appropriate. The letter also states that the licensee shall provide as-built drawings to FWS.

According to Interior's letter, the upstream passage facilities shall be operated from April 1 through July 15 and from September 1 through October 31 for the passage of Atlantic salmon, American shad, and other anadromous species. This schedule can be modified by FWS, as appropriate, based on available information and on-site conditions.

2. The licensee shall construct permanent downstream fish passage facilities as depicted in Figure VIII-1 with hinged inclined screens as detailed in Section B-B of



Figure VII-3 (DSI 1992). Final designs should be developed in consultation with and meet the approval of FWS. The permanent downstream passage facilities shall be in operation by April 1, 1996. The licensee shall provide as-built drawings to FWS.

7/ Section 18 of the FPA provides: "The Commission shall require the construction, maintenance, and operation by a licensee at its own expense of....such fishways as may be prescribed by the Secretary of Commerce or the Secretary of Interior, as appropriate."

The downstream passage facilities shall be operated from April 1 through July 15 and September 1 through October 31 for the passage of Atlantic salmon smolts, adult and juvenile American shad, and other anadromous species. This schedule can be modified by FWS as appropriate based on available information and on-site conditions.

3. The licensee shall provide sufficient flows and implement channel modifications to achieve an adequate zone of passage between the project tailrace and the upstream and downstream fishways. The licensee shall pass 85 cfs or inflow, whichever is less, in the bypass reach between the West Springfield Dam and powerhouse in combination with instream structures during the April 1 through July 15 and September 1 through October 31 fish passage seasons.

FWS, in consultation with the MDFW and the licensee, will evaluate the effectiveness of these flows and channel modification designs, through visual observation, in the first year of project operation. If flow or structure location is found to be an impediment to anadromous fish passage, the licensee shall modify the structures and/or increase the minimum flow up to a maximum continuous flow of 125 cfs or inflow, whichever is less. If, after exhausting all practical, structural, behavioral, or minimum flow options, it is found that anadromous fish do not seek out a passage route to the fishway, but rather remain in the area of the tailrace, the licensee will adjust its project operation such that up to 50 percent of the usable inflow (usable inflow is defined as the combined hydraulic capacity of each of the project's units, 622 cfs) is provided in the bypass upstream of project tailrace during the passage season. This release will occur throughout the April 1 through July 15 period, beginning at sunrise for 4 hours. The operational schedule (number of days in the April 1 through July 15

period and hours in a specific day) for these releases will be adjusted by FWS in consultation with on-site representatives of the MDFW and the licensee as needed to accomplish effective passage.

4. As an interim downstream measure for salmon smolts until permanent measures are complete, from April 1 through July 15 the licensee shall operate the trash sluice adjacent to the powerhouse intake with a minimum flow of 25 cfs.

5. Interior reserves the right to modify its Section 18 fishway prescription as needed to facilitate fish passage.

As discussed below, in Section V.C.3, not all of the items referred to in Interior's letter come within the scope of Section 18. However, for the main part, we determine that the measures are consistent with the public interest and we recommend that the conditions be included in any license issued for the West Springfield Project.

Interior, in its February 22, 1994, letter, provides four additional recommendations under Section 10(j) of the FPA. Sections V.C.3 and VIII of this EA address disposition of Section 10(a) and 10(j) recommendations.

#### F. Dredge and Fill Permit Conditions

Pursuant to Section 404 of the Clean Water Act, the U.S. Corps of Engineers issues dredge and fill permits for specified types of construction in wetlands. These permits generally include conditions applicable to project construction activities. Since relicensing of the West Springfield Project may involve some construction activities that would affect wetlands in Mittineague Park, a Section 404 permit is likely to be required. Construction procedures will have to conform to standards and permit-specific conditions.

#### G. Coastal Zone Management Program

The project is not located within any state-designated coastal zone management area (CZM 1987).

### V. ENVIRONMENTAL ANALYSIS<sup>8/</sup>

This chapter presents a general description of the river basin, describes existing and proposed hydropower projects in the basin, and summarizes the potential for cumulative impacts on environmental resources.

In our environmental resources section, we discuss each environmental resource that may be affected by the project. For each we first describe the affected environment, which serves as the baseline for measuring and comparing the effects of the proposed project and any alternative actions. We summarize the applicant's proposal, the position of the various agencies, and then describe the potential environmental impacts of the project,

8/ Unless otherwise indicated, the source of our information is DSI's application (1991).

including proposed enhancement measures. This EA includes only the resources that would be affected.

#### A. General Description of the Locale

##### 1. General Setting -- Connecticut River Basin

The West Springfield Project is located in the Connecticut River Basin. The Connecticut River is the largest river in the New England states. It extends about 400 miles from its origin in Fourth Connecticut Lake, New Hampshire, at an elevation of 2,625 feet, to Saybrook, Connecticut, where it empties into Long Island Sound (FWS 1989). The tidal portion of the river extends from Long Island Sound to a point 60 miles upstream (Enfield Rapids).

The Connecticut River is a highly developed resource with many projects in the smaller tributaries of northern Massachusetts, Vermont, and New Hampshire. At present, there are 109 existing hydroelectric developments and 9 pending license applications in the Connecticut River Basin. Because of their upstream location and remoteness, however, these projects have no effect on the West Springfield Project.

In 1635 the English first settled in the Connecticut River watershed. They used small boats, as Native Americans did before them, for transportation on the extensive river system. They were limited, however, by numerous falls and cascades. In the late 1700s settlers started to develop dams and canals as aids to navigation. The wing dam and canal to bypass South Hadley Falls were constructed in 1795. The first dam across the Connecticut River was built in 1800 at Turners Falls, and the dam at Enfield Rapids was completed in 1829. Development based on use of the river for cheap transportation continued until about 1850 when railroad development began in the area.

About the same time, the Connecticut River began to be developed for industry. In 1849 the first large industrial dam was built at Holyoke. The first hydroelectric dam was

constructed on the Farmington River near Hartford, Connecticut. As industries were attracted to the water power, towns grew up around them. Their prosperity grew as the New England textile industry grew and then waned as economic conditions drove the industry from New England. With development also came industrial pollution. The years of abuse were only recently addressed by Federal and state Clean Water laws.

Until the end of the eighteenth century the Connecticut River supported large runs of Atlantic salmon and American shad. With the development of high dams, however, fish were no longer able to reach spawning and nursery areas, and the runs ceased. As long as pollutants made conditions unsuitable for the fish, no

restoration was warranted. Beginning in the 1970s, however, with increased pollution controls and steadily increasing water quality, efforts to restore fish runs began, and they are now beginning to show results. As this effort expands, resource managers are evaluating the need for upstream and downstream fish passage at more and more dams.

The Westfield River is a major tributary of the Connecticut River. The confluence of the Westfield and Connecticut Rivers is about 7 miles north of the Massachusetts/Connecticut border. Ground elevation at the confluence of the Westfield and Connecticut Rivers is about 48 feet msl.

## 2. Westfield River Sub Basin

State and Federal resource managers consider the unobstructed stretch of the Westfield River above the West Springfield Dam as valuable habitat for the restoration of Atlantic salmon and American shad (MDFW 1991). Smaller areas above the Woronco Dam, however, are less valuable, at least for shad, and may not be worth the investment in additional, future passage facilities at the upstream dams that would be required to adequately use these areas as habitat.

The Westfield River drainage basin (Figure 2) encompasses an area of about 517 square miles and is contained almost totally within the state of Massachusetts. One small area near the Congamond Lakes is in northern Connecticut. At the West Springfield Dam, the drainage basin area is 513 square miles. The highest point in the basin is Borden Mountain, elevation 2,505 feet msl, in the Town of Savoy, Massachusetts. The main channel of the Westfield River is approximately 62.1 miles long, and approximately 78 percent of the drainage basin is forested. The mean annual precipitation is 47.8 inches with an average annual snowfall of 62 inches. Average monthly precipitation is highest in December and lowest in February.

The upper Westfield River drainage basin includes three principal branches (west, middle, and main), which constitute 60



percent of the drainage area. The main branch originates in the Town of Savoy, north Berkshire County, Massachusetts, on the slopes of Borden Mountain. The source of the middle branch is north of Peru, in the central portion of Berkshire County, and the west branch begins west of Washington, also in central Berkshire County.

The drainage area of the upper branches is generally steep sloped, mountainous terrain. Above the confluence point of the three branches near Huntington, Massachusetts, the river drops over 1,000 feet in its first 14 miles. The river slope decreases as it approaches the Town of Westfield. Eleven miles above its

Figure 2. Location of Dams in the Westfield River Basin



mouth, the Westfield River is joined by the Little River just as the Westfield reaches the floodplain of the Connecticut River.

The upstream drainage of the Westfield River has few dams. The Littleville Dam on the Middle Branch was built in 1965 and provides flood control, water supply, and recreation. The Knightsville Dam on the Main Branch was built in 1941 for flood control. There are two dams on the Little River tributary that provide water supply: the Borden Brook Dam (1909) and the Cobble Mountain Dam (1931).

There are four dams on the mainstem of the Westfield River that provide hydroelectric generation (Table 1). The West Springfield Dam is at river mile (RM) 3.7 (Figure 3). Water power resources at the project site were originally developed during 1836 to 1840 with the construction of the dam and power canal by the Agawam Canal Company. The existing powerhouse turbines were installed by the Strathmore Paper Company in 1931 to provide energy for paper production. In 1955 a portion of the dam was washed out and subsequently rebuilt. The dam controls small boat access up- and downstream and prevents anadromous fish from moving further up the Westfield River. As a result of fish restoration attempts in the Connecticut River system, both shad and salmon have reached the base of the West Springfield Dam.

The Woronco Dam is located at RM 18.5, more than 14 miles upstream of the West Springfield Dam. The generating capacity at Woronco is 2,690 kW and the project operates as run-of-river. The Russell Dam at RM 21.2 also operates as run-of-river and has a generating capacity of 700 kW. The Texon Dam (Crescent Mills) is at RM 24.1, operates as run-of-river, and has a capacity of 1,650 kW. These projects have no direct effect on the West Springfield Project because they are relatively small, have run-of-river operation, and are located some distance upstream. Environmental enhancements such as fish passage or a canoe portage around West Springfield, however, will open access to about 14 river miles upstream of the dam. Thus, we determine that resource issues are best evaluated in the context of the Westfield River Basin, in particular the mainstem.

We evaluate anadromous fish resources in the broad context of the Connecticut River Basin to include consideration of the extensive restoration effort involving Federal and state agencies. The restoration effort is significant because fish restored to the Connecticut River have no barriers to movement between Long Island Sound and the West Springfield Dam. The only dam south of the Westfield River on the Connecticut (Enfield Dam) has been breached and presents no obstacle. Other dams upstream, such as Holyoke and Turners Falls, provide fish passage, and more dams will be modified as restoration proceeds.

Figure 3. Location of West Springfield Project and Mainstem Dams within the Connecticut River Basin



Table 1. Dams on the Mainstem of the Westfield River (Source: Stetson-Harza 1992)

| River Facility               | FERC Town       | Status of Passage Mile No.                                | Facilities  |
|------------------------------|-----------------|---|---|
| West Springfield Dam         | 3.7 Springfield | 2608 None in place; upstream and downstream are proposed. |   |
| Woronco Dam                  | Russell         | 18.5 2611   | Project license has planned amendment for downstream passage.   |
| Russell Dam                  | Russell         | 21.2 Non-jurisdictional                                   | FWS and MDFW are attempting to have voluntary installation of downstream passage.   |
| Texon Mills (Crescent Mills) | Russell         | 24.1 2986   | Has re-opener clause for fish passage. MDFW has worked with the licensee to start temporary downstream passage in 1993 and permanent passage in 1994. |

## B. Cumulative Impact Summary

An action may cause cumulative impacts on the environment if it overlaps in space and/or time with the impacts of other past,



present, and reasonably foreseeable future actions. The individually minor impacts of multiple actions, when added together, may amount to collectively significant cumulative impacts. The existing environment shows the effects of past and present actions and provides the context for determining the cumulative impacts of future actions.

We reviewed the project's potential to cause cumulative impacts and conclude that the project's location and the nature of the affected resources may impact two resources: anadromous fish and recreational canoeing.

The Westfield River is the first major Connecticut River tributary upstream from the ocean. State and Federal agencies identify portions of the river as significant habitat for production of both American shad and Atlantic salmon. The only Connecticut River mainstem dam located between the West Springfield Dam and the ocean is the breached Enfield Dam (Figure 3), which poses no obstacle to free passage of anadromous fish. Thus, the West Springfield Dam represents the only major migration blockage to fish migrating into or out of the upstream portions of the Westfield River. While some shad production habitat exists below the West Springfield Dam, upstream passage facilities would open up a substantial additional portion of the river for both shad and Atlantic salmon production. Downstream passage facilities would ensure minimal mortality for juvenile fish produced upstream when passing downstream of the project. We describe impacts on and enhancements to anadromous fish stocks in detail in the Fishery Resources section of this EA (Section V.C.3).

The Westfield River offers over 14 miles of opportunity for recreational canoeing on unobstructed river between the West Springfield Dam and the Woronco Dam (at RM 17.5). The West Springfield Dam is the only obstacle to canoeing the final stretch of the Westfield and into the Connecticut River.

The Woronco is the only dam upstream of West Springfield that does not have a canoe portage trail. However, there is an established put-in just below Woronco. Although the portage trails at the Russell and Texon dams are informal, they are very well known because of an annual canoe race which takes place on the stretch of river that includes the dams and which uses the portage trails (Ferman 1994). The race, which is held in April each year, begins in the Town of Huntington just below the Knightsville Dam and ends at Strathmore Park just above the Woronco Dam. This stretch is popular with recreational canoeists.

Provision for canoe portage at the West Springfield Project would not only make the impoundment accessible but also would

expand canoeing options. Section V.C.7 of this EA describes the potential impacts on and enhancements to the recreational resources.

### C. Proposed Action and Action Alternatives

#### 1. Geological Resources

a. Affected environment: Soils in the project area tend to be shallow and thinly cover the bedrock. The upstream and downstream banks of the river and the downstream islands contain abundant vegetation and soil cover, although rock outcroppings are common.

b. Environmental impacts and recommendations:  
Unprotected soils in the project area are considered highly erodible. However, because of the protective dense vegetation and often armored river banks, significant erosion is not considered a problem in undisturbed areas.

#### Applicant's Proposal

DSI proposes to construct upstream and downstream fish passage facilities and a parking area, trail, and canoe launch downstream of the project near the Mittineague Bridge to increase recreational access to the area.

#### Our Analysis

During construction of the fish passage and recreational facilities, there would be some disturbance of the shoreline and localized erosion when the vegetation near the dam is cleared and the channel is disturbed. Given the high erodibility of the soils, there would probably be some erosion and sedimentation during construction. Impacts from runoff could be minimized through careful planning; timing of construction (construction during the driest period of the year when river flows and precipitation are at their lowest); and the use of proper erosion and sediment control devices, such as hay bales, filter fences, and sediment booms, to reduce potential transport of material to areas beyond the construction zone.

Site-specific procedures should be developed before construction to minimize bank erosion and sediment transport and to control spoil disposal during construction. Therefore, we recommend that DSI prepare a plan for erosion and sediment control, for Commission approval, after consultation with appropriate state and Federal agencies (MDFW, the Soil Conservation Service (SCS), and FWS).

c. Unavoidable adverse impacts: During construction clearing activities, there could be some minor short-term erosion and sedimentation. There would likely be some

increased turbidity affecting water quality, but it would be of short duration and localized.

## 2. Water Resources

### a. Affected environment: Streamflow

The nearest USGS streamflow gaging station (No. 01183500) is approximately 4.75 miles upstream of the West Springfield Dam near Westfield, Massachusetts. The flows at the gage represent a drainage area of 497 square miles and reflect regulation by

Borden Brook Reservoir, Cobble Mountain Reservoir, Knightsville Reservoir, and Littleville Lake.

From 1966 to 1984 (a period encompassing the most recent regulation of the Westfield River), the average flow at the gaging station was 1,027 cfs. Extrapolating from these data, DSI estimates the streamflow at the project dam (Table 2). Estimated mean monthly flows in the project area range from a low of 381 cfs in September to a high of 2,572 in April. The 7Q10 flow (the lowest flow that can be expected to occur in any given 10-year period for a duration of 7 days) at the West Springfield Project is 80 cfs for the period of record, 1966 to 1984.

Table 2. Annual and Monthly Median, Mean, Maximum, and Minimum Flows at the West Springfield Project for the Period 1966 through 1984 (DSI 1992).

| Month     | Median Flow<br>(cfs) | Mean Flow<br>Flow (cfs) | Maximum<br>Flow (cfs) | Minimum |
|-----------|----------------------|-------------------------|-----------------------|---------|
| October   | 280557               | 5,925                   | 87                    |         |
| November  | 548796               | 4,365                   | 150                   |         |
| December  | 747                  | 1,025                   | 6,367                 | 190     |
| January   | 653930               | 7,234                   | 134                   |         |
| February  | 759                  | 1,100                   | 6,894                 | 145     |
| March     | 1,259                | 1,864                   | 14,964                | 227     |
| April     | 2,260                | 2,572                   | 10,732                | 445     |
| May       | 1,063                | 1,364                   | 6,440                 | 292     |
| June      | 530925               | 13,726                  | 131                   |         |
| July      | 292503               | 8,153                   | 56                    |         |
| August    | 252410               | 5,624                   | 62                    |         |
| September | 217381               | 8,524                   | 70                    |         |

Annual 614 1,037 14,964 56

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The project currently operates run-of-river (outflow from the project at any one time is equal to inflow to the project). Currently, during periods of low river flow, only leakage flows enter the bypass reach. Leakage flows have not been monitored, but DSI estimates them to be about 10 cfs.

Given median monthly flow values and the combined hydraulic capacity of DSI's and Southworth's generating turbines, spillage

into the bypass reach usually occurs during winter and spring months (December through May).

### Water Quality Conditions

The Massachusetts Department of Environmental Protection, Division of Water Pollution Control (MDEP-DWPC), in its Massachusetts Water Quality Criteria for Inland Waters, designates the Westfield River in the project area as Class B waters. Class B waters are designated for protection and propagation of fish, other aquatic life, and wildlife and for primary and secondary contact recreation.

According to MDEP-DWPC's Criteria, dissolved oxygen (DO) levels in Class B waters "shall be a minimum of 5.0 milligrams per liter (mg/l) in warmwater fisheries and percent saturation shall not be lowered below 60 percent due to a discharge." Water temperatures "shall not exceed 83oF (28.3oC) in warmwater fisheries, nor shall the rise in temperature resulting from artificial origin exceed 5oF (2.8oC)." The portion of the Westfield River in the vicinity of the West Springfield Project is designated as a warmwater fishery.

In 1979 and 1985 MDEP-DWPC conducted water quality studies in the Westfield River Basin. DO concentrations of surface waters in the project area (upstream and downstream of the dam and in the bypass reach) were consistently well above 5.0 mg/l (ranging from 7.2 to 9.7 mg/l).

DSI conducted water quality studies upstream of the West Springfield Dam, in the bypass reach, and immediately below the project's tailrace during August and September, 1990. The sampling effort coincided with summer low-flow conditions with no spillage over the dam. During this sampling, the only flow (about 10 cfs) in the bypass reach came from leakage of the dam and power canal sluice gates. All DO measurements were above the required 5.0 mg/l; the lowest reading was 7.0 mg/l in the bypass reach just below the dam. Water temperatures at all sample locations ranged from 11 to 24oC, well below the 28.3oC



criterion.

### Water Rights

Water diverted into the power canal is used for hydropower generation and processing by Southworth and DSI and then returned to the Westfield River. Therefore, the project would not affect any existing upstream or downstream water rights.

b. Environmental impacts and recommendations:

1. Water Quality Below the Project - There are no water quality problems below the project under the current operating regime.

Applicant's Proposal

DSI proposes to continue to operate the project as run-of-river. The agencies concur with this proposal but have raised concerns about reliable monitoring to ensure that run-of-river operations are accurately maintained.

Our Analysis

Under run-of-river conditions (part of all alternatives evaluated including the no-action alternative), water quality conditions would not be altered. DO and temperature levels currently meet water quality criteria for Class B waters. We recommend continued run-of-river operation to ensure that water quality conditions in the Westfield River downstream of the project continue to meet or exceed Class B criteria.

2. Water Quality in the Bypass Reach - Water quality in the bypass reach currently meets the criteria for Class B waters.

Applicant's Proposal

In the MOA, DSI agrees to install and operate a headwater monitoring gage in the West Springfield impoundment to monitor compliance with run-of-river operation and minimum flow provisions. DSI proposes to install a rectangular weir, cut adjacent to the north abutment to spill 85 cfs or inflow, whichever is less, as minimum flow into the bypass reach year-round. Part of the flow will be released through the operating fish ladder, and a second weir may be constructed to distribute the flow. The agencies concur with this enhancement measure.

Our Analysis

Since the only water to enter the bypass reach during low flows has historically been leakage flows of about 10 cfs, water quality in the bypass reach would likely be improved by DSI's proposed 85 cfs minimum flow. Adding any magnitude of flow into this reach would increase aeration and flushing through that portion of the river. Thus, we conclude that any flow greater than existing leakage, including DSI's proposed 85 cfs, would enhance water quality and would provide additional protection against potential water quality degradation under extreme low-flow conditions. We present our recommendation for bypass minimum flow in our evaluation of flow requirements for fisheries resources (see Section V.C.3).

We agree that use of a rectangular weir cut into the north abutment to monitor minimum bypass flow is an acceptable method of metering spillage and is appropriate for use at the West Springfield Project. We recommend that DSI develop and implement a plan, in consultation with the appropriate agencies (FWS, USGS, and MDFW) to install and operate the gage to monitor compliance with run-of-river and minimum bypass flow provisions.

Agencies identified the need for increased flows into the bypass reach. This issue is related to protection and enhancement of fisheries resources rather than to maintenance or enhancement of water quality and is addressed under Fishery Resources (Section V.C.3).

### 3. Monitoring Minimum Flows and Run-of-River Operation

#### Applicant's Proposal

DSI intends to place a headwater monitoring gage in the West Springfield impoundment to monitor compliance with run-of-river operation. The applicant proposes to design and install the gage within 9 months of license issuance. DSI would develop and implement a monitoring plan, in consultation with FWS, USGS, and MDFW, to design, install, and operate the gage in conjunction with flow metering below the dam.

For the considered range of minimum flows, the level of spillage over the entire dam face would be on the order of 2 to 3 inches. Present technologies do not allow for accurate headwater monitoring given this level of flow over the dam (DSI 1992). DSI, therefore, proposes to pass the minimum bypass flows through a rectangular weir cut along the crest of the dam adjacent to the north dam abutment to increase precision of the monitoring gage and enhance fish passage. DSI also proposes to construct a weir on the south abutment of the spillway, if water flow in the south channel becomes inadequate to protect aquatic resources. When it is in operation, part of the flow also will be released through the fish ladder.

#### Agencies' Position

FWS recommends a flexible distribution of releases from the north and south ends of the spillway to allow modifications for fish passage, if necessary. As a post-license requirement, FWS recommends that, after consultation with FWS and MDFW, DSI submit design plans for the notch (weir) sizes and locations to the Commission.

#### Our Analysis

Given the level of spillage, which would be 85 cfs (2 to 3 inches), it would be difficult to monitor spillage closely enough

to assure that the minimum flow is being passed. DSI agrees to pass 85 cfs year-round through a rectangular weir cut into the north abutment. We agree that the rectangular weir is an acceptable hydraulic means of metering flow. The weir would also contribute flow to the ZOP. DSI should consult with MDFW, USGS, and FWS on final design plans for the spillway weir(s) and the distribution of flow releases from the spillway if two weirs are constructed.

The final design plans should include, but not be limited to, the following: (1) a description of the location and operation of streamflow gaging measures to monitor compliance with run-of-river operations and minimum flow releases; (2) the location(s) of spillway weir(s); and (3) the methods for recording data and providing these data to the agencies.

#### Access to Project Records

DSI proposes to provide the data obtained from the headwater monitoring gage to MDFW, FWS, and USGS upon request, and the agencies agree on the proposed procedure for providing these data. We concur that providing access to project records for the purpose of reviewing project operations related to fish and wildlife protective measures would provide the Commission, DSI, and the resource agencies with valuable information on the adequacy of recommended enhancement measures. We recommend that the agencies be allowed access to records obtained from the headwater monitoring gage, and that these records be provided after an agency's written request for such data.

c. Unavoidable adverse impacts: None.

### 3. Fishery Resources

a. Affected environment:

#### Resident Fish

There are about 25 resident fish species inhabiting the

Westfield River drainage basin (Halliwell 1977). Species in the lower portion of the mainstem include: American eel, white sucker, common shiner, and spottail shiner. Warmwater game fish species include: smallmouth bass, chain pickerel, rock bass, brown bullhead, and pumpkinseed (Halliwell 1977). The most important resident game fish species in the West Springfield Project area is the smallmouth bass.

Some species of trout inhabit the Westfield River Basin above the project site. These are primarily brown and native brook trout; however, in 1989 and 1990, MDFW stocked the area from the West Springfield Dam upstream to Russell with rainbow

trout. In 1990, a local sporting goods outlet also stocked about 1,000 rainbow trout in that area.

### Anadromous Fish

The Connecticut River Basin once supported large numbers of anadromous fish species, including: Atlantic salmon, American shad, blueback herring, sea lamprey, and striped bass. Numerous dams were constructed in the basin, however, which significantly reduced these species' access to upstream spawning and nursery habitat. Recently, fish passage facilities have been constructed on the mainstem of the Connecticut River at Holyoke Dam (the lowermost blockage to upstream passage), Turners Falls, and Vernon Dam, which has restored anadromous species' access to most of the mainstem. However, there are still numerous barriers to fish passage on the Connecticut's tributaries. Increasingly, upstream fish passage facilities are being added where barriers existed. Passage facilities are carefully designed to provide effective passage. In addition to design considerations, the timing of operation is also critical. The ultimate success of fish reproduction is adversely impacted by delays in migration caused by inoperable or poorly operating facilities.

Since construction of fish passage facilities at Holyoke Dam, the Connecticut River American shad population has ranged from 386,000 to as high as 1,600,000 fish (Connecticut River Atlantic Salmon Commission [CRASC] 1992). In 1992 over 700,000 shad were passed over Holyoke Dam (Interior 1993). Fish passage facilities at Turners Falls and Vernon Dam have restored American shad to their historical range at Bellows Falls, Vermont.

In 1840 construction of the West Springfield Dam (the lowermost dam on the river) limited the upstream migration of anadromous fish to the lower 3.7 miles of river. Presently, anadromous fish migrating from the ocean to spawning habitat in the Westfield River pass one breached dam on the Connecticut River (Enfield) before encountering the West Springfield Dam.

During upriver migrations, a number of anadromous fish reach



the base of the West Springfield Dam. During the spring of 1992, MDFW reported that thousands of American shad and several Atlantic salmon were observed at the base of the West Springfield Dam (MDFW 1993). Recreational fishing surveys in the area between the West Springfield Dam and the Connecticut River indicated that anglers captured about 3,000 American shad in this portion of the Westfield River during 1991 (DSI 1992; Stetson-Harza 1992).

## Plans to Restore Anadromous Species in the Connecticut River Basin

A number of state and Federal fishery agencies have developed management plans for the restoration of anadromous fish in the Westfield River and the Connecticut River Basin. CRASC published a Strategic Plan for Restoration of Atlantic Salmon in the Connecticut River Basin (Strategic Plan)(CRASC 1982) to "provide and maintain a sport fishery for Atlantic salmon in the Connecticut River Basin and to restore and maintain a spawning population in selected tributaries." The Strategic Plan lists the Westfield River from its confluence with the Connecticut upstream to the Strathmore Paper Company dam (at Woronco) as a reach that is considered critical to the success of the restoration effort. However, the plan does not include specific provisions for upstream or downstream passage facilities on the Westfield River.

CRASC also produced A Management Plan for American Shad in the Connecticut River Basin (CRASC 1992). The goal of the plan is to restore and maintain a spawning American shad population to its historic range in the Connecticut River Basin and to provide and maintain sport and traditional in-river commercial fisheries for the species.

FWS published a Final Environmental Impact Statement for Atlantic Salmon Restoration in New England; 1989-2021 (FWS 1989). This document indicates that the Connecticut River and some of its tributaries have been selected for salmon restoration. FWS proposes downstream passage facilities at the West Springfield Dam.

MDFW developed an Anadromous Fish Management Plan for the Westfield River, 1991-2000 (MDFW 1991). The overall goal of this plan is to establish spawning populations of 15,000 American shad and 500 Atlantic salmon in the Westfield River drainage basin. This plan includes provisions for upstream and downstream fish passage and trapping facilities for Atlantic salmon at West Springfield. Other anadromous fish, such as blueback herring,

also will benefit from implementation of these plans by having access to additional spawning and nursery habitat; however, no specific management goals were developed for these species (MDFW 1991).

The Westfield River and its tributaries upstream of the West Springfield Dam include 33,000 square yard units of Atlantic salmon rearing habitat (Interior 1993). Two-thirds of this habitat exists above two large dams (Littleville and Knightsville) on branches of the Westfield River. There are no plans to develop upstream passage facilities at either of these dams in the near future. Therefore, trapping and trucking will

be required to provide access to habitat upstream of these dams (MDFW 1993).

MDFW's fishery management plan for Atlantic salmon calls for: (1) the collection and transport of up to 200 adult Atlantic salmon annually for broodstock purposes; and (2) the collection and transport of adults above mainstem dams for spawning purposes once hatchery broodstock needs are met. The West Springfield Project is the site designated for the trapping system.

MDFW annually stocks juvenile Atlantic salmon in the Westfield River drainage upriver of the West Springfield Project. Juvenile salmon are stocked above the West Springfield Dam near the City of Westfield (RM 10) and in the tributaries above Woronco Falls (RM 18.3). The number of fry stocked annually has increased from about 6,000 fish in 1987 to 643,000 in 1993. Although very little information exists on the success of these stockings, some salmon stocked as smolts in the Westfield River were captured by commercial fisherman in 1991 (DSI 1992; Stetson-Harza 1992).

b. Environmental impacts:

1. Run-of-River Operations

Applicant's Proposal

DSI proposes to continue to operate the West Springfield Project as run-of-river. MDFW and FWS agree that the project should continue to operate as run-of-river to protect existing fisheries resources.

Our Analysis

Fisheries Impacts in the West Springfield Impoundment

Common warmwater game fish present in the West Springfield Project area include smallmouth bass, pickerel, and pumpkinseed.

These species spawn in shallow waters such as those found along the shoreline of the West Springfield impoundment. Forage fish, fry and juvenile stages of game fish, and aquatic invertebrates and insects that serve as fish forage also occupy such habitats. Impoundment level fluctuation may adversely impact fisheries resources above the dam. Although fish are mobile and not generally susceptible to stranding, drawdowns may expose bottom habitats and lead to desiccation of early lifestages of fish and other aquatic organisms in these areas. Water level fluctuations also may expose spawning areas.

Continuation of current run-of-river operations would minimize the magnitude of impoundment water level fluctuations

and, thus, provide substantial protection against stranding and desiccation of early life stages of fish and other aquatic organisms. Therefore, we recommend run-of-river operations to protect fisheries resources in the West Springfield impoundment.

#### Fisheries Impacts Downstream of the West Springfield Project

The proposed run-of-river operation of the project would prevent potential fisheries impacts in the Westfield River downstream of the project. Fish species in that area would experience natural, unmodified river flow conditions. The uninterrupted flow would ensure that water quality (e.g., DO and temperature) below the project does not become degraded, particularly during periods of extreme low-flow, thus enhancing fisheries habitat. Therefore, we recommend run-of-river operations for continued protection of resident fish species downstream of the West Springfield Project.

#### Anadromous Fish

As previously noted, there are no obstacles to anadromous fish migrating upstream from the ocean to spawning habitat in the Westfield River before the West Springfield Dam. Atlantic salmon and American shad currently make it to the base of the West Springfield Dam. Continued run-of-river operation would ensure sufficient flows and water quality for anadromous species such as shad and Atlantic salmon, as well as the warmwater species noted above.

#### 2. Minimum Bypass Flows for Resident Fisheries

The bypass reach, which extends from the base of the dam to the DSI tailrace, is approximately 2,500 feet long and 400 feet wide. The bypass is separated into a north and a south channel by an island that is part of Robinson State Park.

The original license does not require any minimum flow in the bypass reach; consequently, during periods without dam spillage, the bypass reach receives only leakage flows of about

10 cfs. Spillage into the bypass is expected from December through May, as noted in Section V.C.2.a. Providing a continuous year-round minimum flow in the bypass reach would enhance resident fishery resources.

In addition, flows in the bypass reach would provide a ZOP to facilitate upstream and downstream migration of anadromous fish for 5-1/2 months of the year. Flows needed for ZOP may differ from flow levels that provide maximum habitat for resident smallmouth bass. Consultation correspondence suggests that management agencies place higher priority on the restoration of anadromous fish than on the enhancement of resident species.

Potential impacts of ZOP flows on resident fish enhancement is addressed in detail in the ZOP section below.

DSI examined appropriate instream flows in the bypass reach needed to protect and enhance habitat for resident fish. One study involved determination of the Aquatic Base Flow (ABF) for the bypass reach. FWS, which developed the ABF concept, defines ABF as the median August flow rates within a river. These flows typically represent the lowest flows capable of sustaining populations of aquatic organisms.

For rivers with inadequate flow records (less than 25 years), or for rivers regulated by dams or upstream diversions, FWS recommends an ABF release of 0.5 cubic feet per second per square mile (cfsm) of drainage area, as derived from the average of the median August monthly flow records for representative New England streams (FWS 1981). Based on a watershed area of 513 square miles, an ABF of 0.5 cfsm is equivalent to 257 cfs at the West Springfield Dam.

FWS also uses an alternative to the 0.5 cfsm median value, which is based on measured values for unregulated rivers similar to the Westfield River. DSI elected to develop an ABF using this alternative approach. Results of these studies indicate that unregulated ABF at the West Springfield Dam is 0.21 cfsm, which is equivalent to 108 cfs (FWS 1990).

DSI also conducted demonstration flows intended to represent bypass reach conditions at the calculated ABF of 108 cfs, and an Instream Flow Incremental Methodology (IFIM) study to assess variations in Weighted Usable Area (WUA) in the bypass reach for smallmouth bass (the most important recreational species in the project area) that would result from a range of flows in the bypass reach. Table 3 contains a summary of the IFIM results.

#### Applicant's Proposal

DSI initially proposed to provide a minimum flow of 65 cfs in the bypass reach during non-passage seasons (July 16 through



August 31 and November 1 through March 31) to protect resident fisheries. IFIM study results suggest that 93 percent (9,688 square feet) of adult smallmouth bass habitat is available at 65 cfs. Suitability of 65 cfs for various other life stages ranges from 86 to 100 percent.

In the MOA between DSI and the agencies, DSI agrees to release 85 cfs rather than the 65 cfs to the bypass reach. At 85 cfs, almost 100 percent of adult smallmouth bass habitat is available, and the suitability for other life stages ranges from 89 to 98 percent.

### Agencies' Position

Interior and MDFW recommend a minimum flow of 85 cfs in the bypass reach during non-passage seasons. Their proposed flow rate is based on the following:

- one IFIM analysis run using an uncalibrated model, which indicates that habitat for all life stages of smallmouth bass is best protected at 108 cfs, a flow rate substantially higher than DSI's originally proposed 65 cfs;

Table 3.

Uncalibrated Instream Flow Incremental Methodology and Weighted Usable Area Results for Smallmouth Bass in the West Springfield Project Bypass Reach (DSI 1992).

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| NORTH CHANNEL                                   |              | SOUTH CHANNEL |                | TOTAL       |
|---|--------------|---------------|----------------|-------------|
| Flow (cfs)                                      | Area (sq ft) | Flow Area     | Flow Area      |             |
| 21.1  | 105,340      | 43.9          | 112,175        | 65 217,515  |
| 30.1  | 111,919      | 54.9          | 118,052        | 85 229,971  |
| 41.9  | 121,774      | 66.1          | 123,308        | 108 245,083 |
| 67.5  | 128,480      | 82.5          | 128,468        | 150 256,948 |
| NORTH CHANNEL                                   |              |               |                |             |
| WEIGHTED USABLE AREA (SQ FT/1,000 FT OF STREAM) |              |               |                |             |
| Flow Smallmouth Life Stage                      |              |               |                |             |
| (cfs)   | Spawning     | Fry Y-O-Y     | Juvenile Adult |             |
| 21.1  | 4,712        | 16,330        | 23,656         | 13,095 950  |
| 30.1  | 4,720        | 15,707        | 23,062         | 13,369 904  |
| 41.9  | 4,605        | 16,250        | 26,499         | 15,791 881  |
| 67.5  | 1,733        | 9,427         | 14,739         | 8,652 237   |
| SOUTH CHANNEL                                   |              |               |                |             |

WEIGHTED USABLE AREA (SQ FT/1,000FT OF STREAM)

| Flow (cfs) | Smallmouth Spawning | Life Stage Fry | Y-O-Y | Juvenile Adult |
|------------|---------------------|----------------|-------|----------------|
| 43.9       | 10,536,159          | 9,372          | 5,043 | 3,394          |
| 54.9       | 10,198,327          | 9,766          | 5,356 | 3,738          |
| 66.1       | 10,022,327          | 9,895          | 5,462 | 3,778          |
| 82.5       | 9,778,141           | 9,734          | 5,513 | 3,811          |

TOTAL NORTH AND SOUTH CHANNEL - SMALLMOUTH BASS HABITAT

| Flow (cfs) | Spawning WUA (ft2) | % of Fry Max WUA | % of Y-O-Y Max WUA | % of Juvenile Max WUA | % of Adult Max WUA |
|------------|--------------------|------------------|--------------------|-----------------------|--------------------|
| 65         | 33,423             | 100.0%           | 42,996             | 99.4%                 | 66,693             |
| 85         | 32,653             | 97.7%            | 42,202             | 97.6%                 | 66,482             |
| 108        | 32,025             | 95.8%            | 43,234             | 100.0%                | 73,307             |
| 150        | 26,005             | 77.8%            | 29,843             | 69.0%                 | 50,601             |

Flow Selection Criteria: a) 65 cfs - approximate demonstration flow; b) 85 cfs - intermediate value; c) 108 cfs - DSI's calculated ABF; d) 150 cfs - upper range of flows selected in ZOP study.

- ù an IFIM analysis run using an alternative Manning's N9/ value, which indicates that habitat for all life stages is maximized at 85 cfs;
- ù 85 cfs is closer than 65 cfs to DSI's calculated ABF of 108 cfs; and
- ù a minimum flow of 85 cfs exceeds the 7Q10 of 80 cfs.

Our Analysis

Potential minimum flows range from 65 cfs to 257 cfs. These were calculated using five different methods (IFIM with two different Manning's N values, two ABF calculations, and the 7Q10), and each method has its own limitations.

9/ Manning's N is a model parameter that represents stream bottom roughness. Changes in Manning's N impact computed depth and velocity and thus the computed WUA curves.



The IFIM analyses were specific for smallmouth bass, which is the most important resident species in the project area. Optimal flows for this one species, however, are not necessarily the optimal flows for other biological components of the ecosystem in the bypass reach, such as forage fish species and invertebrates.

IFIM model runs using two different Manning's N values yield substantially different flows at which habitat for smallmouth bass is maximized (85 cfs and 108 cfs). No calibration was conducted to provide a rigorous basis for establishing the validity of either of the Manning's N values.

As Table 3 shows, the results indicate that the habitat was less suitable at 150 cfs, and that even when habitat is optimized at a 108 cfs flow, a 65 cfs flow yields between 85.7 and 100 percent of the maximum WUA. Any value between 65 and 108 cfs may be acceptable. Results of one of the ABF calculations favor the upper end of this range.

The 7Q10 flow (80 cfs), while not habitat-based, does provide an indication of low-flow conditions that resident fish now experience. The continued existence of a resident population suggests that flow is at least sufficient, although not optimal, for the fish. Selecting a minimum flow below this value would not result in an enhancement of habitat. Thus, a flow of between 80 to 108 cfs is appropriate.

Project economics obviously favor a lower flow. Some IFIM-based evidence is available to support 85 cfs and both Federal and state resource agencies have agreed to an initial minimum flow of 85 cfs. We conclude that the best flow for resident fish is between 80 and 108 cfs and that 85 cfs is an acceptable compromise flow.

We consider the effect of the proposed 85 cfs spillage flow on project economics in Section VI and give our recommendation in Section VII of this EA.

### 3. Fish Passage

DSI, in its application for subsequent license, proposed plans

and design criteria for installing upstream and downstream fishways at the West Springfield Project. Interior and MDFW did not agree on all elements, and Interior, under Section 18 of the FPA, prescribed solutions that differed from DSI's proposal. Subsequently, DSI, Interior, and MDFW reached agreement on passage facilities and signed an MOA, which included specifications of these facilities. As part of the agreement, Interior filed revised Section 18 prescriptions on February 22, 1994.

#### Interior's Revised Prescription

Interior prescribed:

- (1) an upstream fishway consisting of: (a) a Denil fish ladder; (b) screens at the Southworth and West Springfield discharges; (c) and a zone of passage in the north channel of the bypass reach;
- (2) permanent downstream fish passage facilities consisting of: (a) a 2-foot by 3-foot rectangular weir cut adjacent to the north dam abutment, and (b) an inclined screen and associated flume located in the power canal immediately downstream of the Denil fishway exit;
- (3) sufficient flows and channel modifications to achieve an adequate zone of passage between the project tailrace and the upstream and downstream fishways;
- (4) operation of the trash sluice adjacent to the powerhouse intake with a minimum flow of 25 cfs from April 1 to July 15 to provide interim downstream passage for salmon smolts until permanent facilities are in place;
- (5) schedules for completion of construction; and
- (6) reservation of the right to modify Section 18 prescriptions as needed to facilitate fish passage.

Some of these items may not qualify as fishway prescriptions under Section 18. In our preliminary view, items 1(a), 2(a), 2(b), and 6 are within the scope of Section 18. Items 1(b), 1(c), 3, 4, and 5 are not Section 18 prescriptions. Nevertheless, we analyzed the technical propriety of all the items.

#### Upstream Fishway

As noted above, Interior prescribed a Denil fish ladder. DSI has agreed to build and maintain it.

#### Our Analysis

A Denil fish ladder at West Springfield would support management



goals for Atlantic salmon and American shad in the Westfield River and the Connecticut River Basin. Denil ladders are used extensively in the restoration of Atlantic salmon and American shad along the northeast coast of the United States (FWS 1992). A Denil ladder would be an effective method for facilitating upriver passage of Atlantic salmon and American shad at the project site. Both species, once they successfully negotiate the fish ladder, would represent a highly attractive, potential fishery. The shad, based on their re-establishment at other locations downstream on the Connecticut River and on their relatively large numbers, are more likely to yield short-term benefits. These benefits would include direct benefits to the anglers and indirect benefits to businesses supporting recreational fishing.

We conclude that upstream passage facilities at the West Springfield Project would allow American shad and other anadromous species access to an additional 14 miles of river between the project and the next dam upstream at Woronco, thereby increasing recreational fishing for American shad, and possibly Atlantic salmon, in this stretch of river.

We consider the effect of the prescribed upstream fishway on project economics and give our recommendation in Sections VI and VII of this EA.

#### Downstream Fishways

Fish moving downstream at the West Springfield Project must pass over the dam or through the project turbines. Fish can suffer injury or death when passing through turbines at hydroelectric plants (Eicher Associates 1987). Installing downstream passage facilities would allow anadromous fish to migrate downstream of the West Springfield Dam without having to pass through the project turbines.

Interior prescribed two facilities for downstream fish passage:

- (1) an inclined screen and associated fish flume in the power canal, just below the Denil fishway exit; and
- (2) a rectangular weir cut adjacent to the north dam abutment. DSI has agreed to construct them.

#### Our Analysis

Estimated mortality to Atlantic salmon smolts passing through the West Springfield Project turbines ranges from 10 to 20 percent (MDFW 1991; DSI 1992). The proposed and prescribed downstream fish passage facilities would greatly reduce or eliminate passage of anadromous fish through the project turbines.

No information was presented on potential injury or mortalities associated with the proposed and prescribed downstream passage facilities; however, because they represent state-of-the-art design, consistent with management agency recommendations, we believe that they would provide safe and effective downstream passage. Therefore, we conclude that the downstream fish passage at the West Springfield

Dam would contribute to attainment of anadromous fish management goals in the Westfield River and Connecticut River Basin.

We consider the effect of these downstream fishways on project economics and give our recommendation in Sections VI and VII of this EA.

## Design Plans and Construction Schedule for Upstream and Downstream Fishways

DSI has drafted design plans for the prescribed upstream and downstream fishways. Final design plans for the fishways should be developed in consultation with FWS and MDFW. DSI should file, for Commission approval, a final design plan for fish passage facilities that conforms to Interior's FPA Section 18 prescriptions and FPA Section 10(j) recommendations.

Interior prefers that all passage facilities be completed and operational by April 1, 1996. MDFW agrees with this time frame.

As noted above, the applicant's draft designs for the fish passage facilities have already been drawn up; final designs would be filed after license issuance. Since it appears that the license could be issued by fall 1994, DSI would be able to begin construction of fish passage facilities during fall 1995 and begin operation of these facilities during spring 1996.

## Periods of Operation

DSI proposes to operate the fish passage facilities from April 1 through July 15 and from September 1 through October 31. Interior requests the same time frames for the operation of fish passage facilities. (Interior also proposes adjustment of the operations schedule on an annual basis to account for variability in fish passage seasons.)

## Our Analysis

We concur with the proposed schedule, which is based on known migratory periods for target species in the project area. In addition, we recommend that DSI consult with FWS and MDFW on an annual basis to determine the need for schedule adjustments to account for variability in fish passage seasons.

## Operation and Maintenance of Fishways

DSI proposes to fund all costs associated with: (1) operation of

the passage facilities; (2) maintenance of all their mechanical and electrical components; (3) their energy requirements; and (4) any special studies to determine the effectiveness of the upstream passage facilities (but not the downstream passage facilities). MDFW would be responsible for and assume the costs associated with operating the trapping and trucking operations. Specifically, MDFW would supply the labor to trap Atlantic salmon adults at the facility and would provide a truck to transport them to the hatchery. DSI would reimburse MDFW up to \$1,000 annually for the labor associated with nonsupervisory personnel trapping Atlantic salmon adults in 1994 and 1995. Interior states that DSI should develop a plan for the operation and

maintenance of the project's upstream and downstream fishways in consultation with MDFW, CRASC, and FWS.

### Our Analysis

We agree that DSI should develop a fishway operation and maintenance plan that describes its proposed personnel commitments and identifies backup equipment and supplies for fishway operations. We recommend that DSI be required to file this plan after license issuance.

### Zone of Passage

During low-flow periods (primarily June through November) when very little or no flow passes over the spillway at the West Springfield Project, anadromous fish attempting to migrate through the bypass reach would have great difficulty navigating through its shallow waters and numerous obstructions. Thus, in addition to the proposed bypass flows recommended to enhance resident fishery resources, flows are required in the bypass for: (1) in-migrating anadromous species to reach the prescribed fishway at the base of the dam; and (2) emigrating adult and juvenile shad and salmon smolts to have a safe and efficient route from the downstream passage facility to the river downstream of the project.

### Applicant's Proposal

DSI originally proposed to release a minimum flow of 125 cfs into the bypass reach during passage seasons to ensure successful upstream and downstream passage for Atlantic salmon and American shad. DSI estimated this flow rate could provide, without any channel improvements, a minimum ZOP depth of 0.66 feet in the north channel. Bovee (1982) identified this depth as the minimum needed for upstream passage of large trout and steelhead trout, which DSI suggests are similar in size to American shad and Atlantic salmon and, therefore, would have similar fish passage requirements.

According to FWS design criteria, a ZOP must be 2-feet deep and 2- to 3-feet wide in order for upstream migration to be successful

(DSI 1992). DSI used a hydraulic model (Army Corps of Engineers: HEC-2) which predicted that a 2-foot ZOP could not be achieved even with flow rates in excess of 150 cfs in the north channel. Therefore, DSI also proposes to build channel enhancements (spur dikes) in the north channel to achieve an adequate ZOP depth.

#### Agencies' Position

Interior, using a 2-foot-depth criterion, originally mandated that DSI either release a 125 cfs or higher flow or implement sufficient channel modifications to achieve an adequate ZOP between the project tailrace and the upstream and downstream fishways.

Interior also recommended that the applicant should submit a plan and schedule to achieve an adequate ZOP and ensure that channel modifications and flow releases are available when upstream and downstream fish passage operations are initiated. MDFW agreed with these provisions.

During consultation, DSI and FWS disagreed about the depth of water necessary to provide adequate ZOP for successful upstream movement of anadromous fish. In the MOA, DSI and the agencies resolved this disagreement by agreeing to evaluate the adequacy of ZOP flows according to the ability of fish to reach the base of the fish passage facility.

The MOA calls for a minimum flow of 85 cfs (or inflow, whichever is less) to be provided through the established migration period (April 1 through July 15 and September 1 through October 31) together with channel modifications using instream structures. MDFW and FWS, in consultation with DSI, would make visual evaluations of the effectiveness of these flows and channel modifications during the first year of their implementation. If the parties find that channel modifications with 85 cfs do not provide an adequate ZOP, DSI would seek Commission approval to increase flows up to a maximum of 125 cfs (or inflow, whichever is less).

If flows as high as 125 cfs and all feasible channel modifications still prove to be inadequate for ZOP (e.g., if anadromous fish remain in the DSI and Southworth tailrace areas rather than move upstream to fish passage facilities), DSI would again seek to adjust its project operation so that up to half of the usable inflow (defined as the combined hydraulic capacity of DSI's two turbines, 622 cfs) is provided in the bypass reach from April 1 to July 15, for 4 hours per day beginning at sunrise. In consultation with MDFW and DSI, FWS could modify the number of days and the specific hours of each day during which spills would be provided to accomplish effective passage. However, FWS suggests that the 4 hours of 311 cfs spill would be the maximum volume of water that DSI would be required to spill under this option.

Our Analysis



Downstream migrating fish, particularly juveniles, require less flow than upstream migrating fish for successful migration. The downstream migration period identified by the agencies overlaps and includes the fall upstream migration period. Therefore, we conclude that any flow sufficient to provide for adequate upstream passage would also be adequate for downstream passage.

The construction and maintenance of a ZOP would enhance the ability of in-migrating anadromous fish to reach the prescribed fish passage facility at the base of the dam with minimal delay. With an adequate ZOP, there would be sufficient velocities to attract fish

upstream and sufficient channel depth and width to provide safe and unimpeded upstream movement.

Inquiries to FWS indicate that for more than 15 years the 2-foot criterion has been successfully applied throughout the northeastern United States to establish effective upstream passage for Atlantic salmon and American shad. From field observation, FWS determined that upstream migrating adults of these species are easily frightened and vulnerable to predation when required to pass through the shallow, spatially restricted waters that often occur downstream of the entrances to upstream fish passage facilities. "Skittish" behavior can, therefore, delay the rate of upstream migration and reduce the overall success of migration.

Bovee (1982), as cited by DSI to justify a ZOP depth of 0.66 feet, did not specifically address Atlantic salmon or American shad, and the study was not based on data or field observations of those species in the northeastern United States. The technical basis for a 2-foot depth criterion appears much stronger than the basis for the 0.66-foot depth criterion suggested by DSI. However, the empirical nature of this depth criterion also suggests that there is likely to be a range of depths around that single point criterion that would be sufficient to provide relatively unimpeded upstream passage for salmon and shad.

HEC-2 ZOP model results presented by DSI show that flows of 108 cfs to 150 cfs are sufficient to produce water depths of 2 feet or more at 5 of 15 transects in the north channel of the bypass, the principal access route to fish passage facilities. Eight of the remaining 10 transects achieve water depths of more than 1 foot with that same flow level. It appears reasonable to assume that water depths approaching 2 feet could be reached at these eight transects with fairly limited channel modifications. At 2 of the 15 transects, depths at those flows are substantially less than 1 foot. At those two transects, the channel may need to be significantly modified to increase water depth.

However, the basis for determining adequate ZOP is the success of fish migration through the bypass, not a specific water depth. Thus,

monitoring to determine the most effective flow and channel modifications is appropriate for the West Springfield Project.

The 85 cfs minimum flow for resident species would also provide a passage flow so long as testing results are acceptable. Given the obvious value to project economics of releasing a smaller flow, we recommend 85 cfs as the passage flow during fish passage seasons. We also recommend testing to determine necessary channel modifications and the effectiveness of the overall ZOP system. If, based on consultation with FWS and MDFW, the migration results are not satisfactory, DSI would request to increase the flow, as discussed above.

FWS initially recommended studies to assess the impacts of ZOP flows and channel enhancements on resident fish habitat. FWS's letter dated February 22, 1994, eliminated this recommendation. IFIM analyses of the unmodified bypass channel indicate that WUA is lower at 150 cfs than at either 85 cfs or 108 cfs. Compared to 108 cfs, the decline in WUA ranges from 10.5 percent for adult smallmouth bass to 31.5 percent for young-of-the-year of that species. In contrast, a flow of 65 cfs results in small declines in WUA, ranging from 0.3 percent to 6.8 percent. This suggests that enhancing channel flow at the expense of flow elsewhere in the bypass reach would be acceptable, to a point.

As discussed above, the ZOP to be provided in the north channel could alter the nature of the habitat in the bypass reach; however, since modifications would be limited to only a portion of the north channel, there would be at most only a small decrease in smallmouth bass habitat value in the project area. In addition, consultation between FWS, MDFW, and DSI suggest that the agencies place a higher priority on restoration of anadromous fish in the Westfield River than on enhancement of resident species. For these reasons, we conclude that studies of the effect of ZOP flows and channel enhancements on resident fish habitat are not necessary.

#### Tailrace Screens

Hydroelectric project tailraces may falsely attract and delay migrating adult salmonids (EA Engineering 1991). At this project, fish also could move up the two lengthy tailraces to the Southworth and DSI powerhouses and be significantly delayed there. As noted above, Interior recommends that DSI install fish screens at both the DSI and Southworth tailraces to prevent fish from moving up to the turbine discharge area.<sup>10/</sup> The applicant concurs. These devices would be flush to the shoreline, thereby allowing fish to move past the tailrace discharges upstream to the fishway.

#### Our Analysis

There are no data in the project record to indicate the extent to which fish are presently attracted to the project tailrace areas.

There are also no data to suggest the extent to which the proposed screens would reduce any delay. However, the screens appear to have a high potential for reducing migration delay and diverting fish to the location of fish passage facilities at the dam as long as attraction flows in the bypass reach are adequate. We consider the effect of the

10/ In order to install fish screens across the DSI and Southworth tailraces, the existing tailrace walls would have to be extended to the shoreline to allow the screens to be mounted flush with the shoreline and to avoid creation of an embayment area.

proposed tailrace screens on project economics and give our recommendation in Sections VI and VII of this EA.

#### Post-Construction Monitoring Studies

The agencies want DSI to conduct studies, and DSI agrees to conduct them to determine the effectiveness of the upstream and downstream fish passage facilities, including the ZOP. During the first 2 years of fishway operation, DSI, in consultation with FWS and MDFW, would assess the effectiveness of the upstream passage facilities using observation and adjustment. DSI agrees that the resource agencies can request DSI to conduct a formal year-long study of the effectiveness of upstream passage anytime within the first 5 years of fishway operation.

DSI also agrees that, during the first 2 years of fishway operation, it would assess the effectiveness of downstream passage facilities through observation. The MOA states that DSI would not be required to perform any formal studies of downstream passage.

#### Our Analysis

We concur that post-construction monitoring studies are necessary to evaluate the effectiveness of fish passage. We, therefore, recommend that DSI prepare a monitoring plan to assess the effectiveness of upstream and downstream passage facilities. This plan also should incorporate measures to determine the adequacy of ZOP flows and channel modifications in facilitating upstream movement to the ladder.

Evaluation of downstream passage should assess: (1) the effectiveness of the fish screen/bypass facility; (2) the extent of fish injury or mortality associated with their use; and (3) the adequacy of bypass flows to convey fish downstream of the project.

DSI should develop its monitoring plan in consultation with FWS, MDFW, and CRASC prior to filing the plan with the Commission.

In addition, we recommend that DSI submit annual status reports

that document the results of its monitoring and include any requests for adjustments to the required minimum flows, fishways, and ZOP. These annual reports also should include a summary of the costs incurred during the previous year as well as the cumulative costs of fishway structural modifications.

DSI should develop these annual status reports in consultation with the MDFW and the FWS prior to filing them with the Commission.

#### Fish Trapping and Holding Facility

DSI's original proposal for fish passage and associated structures did not include provisions for fish trapping and holding

facilities for Atlantic salmon. Interior proposed, and MDFW recommended, building a fish trapping and holding facility at the dam for capturing Atlantic salmon broodstock and monitoring the efficiency of the upstream fishway. In the MOA, DSI agrees to include the trapping and holding facility in its fish passage design. This facility would provide for the capture of Atlantic salmon and their transport to either hatcheries for broodstock purposes or to areas above mainstem dams on the Westfield River to access spawning habitat.

#### Our Analysis

The proposed fish trapping and holding facility would enable the agencies to meet management goals for Atlantic salmon in the Westfield River, as specified in the Anadromous Fish Management Plan for the Westfield River. We agree with this proposal.

We consider the effects of the proposed trapping and holding facilities on project economics and make our recommendations in Sections VI and VII of this EA.

#### Interim Fish Passage and Trapping

In 1994 and 1995, prior to the construction of permanent fish passage facilities at the West Springfield Project, DSI and MDFW would work cooperatively toward successful downstream passage and trapping of Atlantic salmon adults. DSI would operate the trash sluice at the powerhouse with a minimum flow of 25 cfs when the turbines are operational during April 1 through July 15 to provide for the downstream passage of Atlantic salmon smolts.

MDFW agrees to supply the labor and equipment to trap Atlantic salmon adults at the facility and transport them to the hatchery. In support of the effort to trap Atlantic salmon adults during 1994 and 1995, DSI agrees to reimburse MDFW up to \$1,000 per year for the labor associated with nonsupervisory personnel. MDFW agrees to supply DSI with monthly invoices documenting labor charges.

#### Our Analysis

Previous sections of this EA discuss the ecological benefits of



the agreed upon downstream passage facilities and fish trap-ping and holding facilities. To protect and enhance Atlantic salmon resources in the Westfield River and meet management goals for Atlantic salmon, as specified in the Anadromous Fish Management Plan for the Westfield River, fish passage and trapping should be conducted during the period between the date of license issuance and construction of the agreed upon fishways and trap-ping facilities. Therefore, we recommend that DSI work cooperatively with MDFW toward establishing successful downstream passage and trapping of adult Atlantic salmon during 1994 and 1995.

- c. Unavoidable adverse impacts: Upstream and downstream passage facilities would not be 100 percent effective; consequently, a small percentage of upstream migrants would not ascend the Denil ladder, and some downstream migrants would be entrained in the turbines.

#### 4. Terrestrial Resources

- a. Affected environment: Vegetation in the project area has been largely influenced by industrial activity that has occurred since the mid-1800s. The original vegetative cover in the area was largely destroyed by construction of the various mill facilities that occupied the site, nearby railroads, the dam, and the power canal. Currently, the vegetation that grows at the site consists largely of opportunistic plant species and emergent wetland species.

Tree species that grow along the power canal are predominantly oak, sugar maple, locust, and red maple. Robinson Island, which lies in the Westfield River between the West Springfield Dam and the tailrace, is vegetated by mature white pine, oak, and locust on the north and east (9.9 acres); the south shoreline (1.8 acres) is a mosaic of scrub/shrub vegetation dominated by red maple, Ribes, Joe pye-weed, cinnamon fern, and forest vegetation. The shoreline along the island's south shore is characterized as a wetland, 30- to 50-foot wide.

The area along the west shore also includes wetland vegetation; however, due to thin layers of soil overlying the bedrock, the vegetation is not firmly established and washes away during floods.

Adjacent to Block Creek in Mittineague Park are areas of freshwater wetlands. These were identified using National Wetland Inventory (NWI) maps for the area (FWS 1975). The wetland is of limited extent and, due to steep banks, has no bordering vegetated wetland along much of the creek.

Birds and mammals within the project area are representative of species from the transitional zone between the mountain regions of

central Massachusetts and the lowlands of the Connecticut River Valley. Common conspicuous mammals include: eastern chipmunk, woodchuck, grey squirrel, beaver, red fox, and white-tailed deer.

FWS reports that no federally listed or proposed threatened or endangered species are known to occur in the project area with the exception of an occasional transient endangered bald eagle, *Haliaeetus leucocephalus*, or peregrine falcon, *Falco peregrinus anatum* (FWS 1991). There were historic occurrences of the federally endangered dwarf wedge mussel, *Alasmidonta heterodon*, and the brook floater mussel, *Alasmidonta varicosa*, a Federal candidate species in the Westfield River; however, both species are apparently extirpated in the project area (FWS 1991).

The Massachusetts National Heritage and Endangered Species Program (MNHESP) identifies 16 plant species on the Massachusetts Rare Plant List that could be located in the Westfield River drainage basin (MNHESP, 1989; personal communication from Patricia Swain to DSI regarding threatened and endangered species near the project site). None of these 16 plant species is on the Federal threatened or endangered species list.

Of the 16 species, seven are wetland plants that could be located in the wetland areas along the south shore and west end of Robinson Island. However, during a recent (September 27, 1990) site survey of plants in the project area, none of these species was identified.

MNHESP also identifies 12 species of animals that are endangered, threatened, or of special concern in Massachusetts, which could be present in the vicinity of the West Springfield Project (Table 4). None of the 12 species is federally listed. Since a site-specific field survey for these species was not performed, no data are available to verify the presence of these species or their habitat at the West Springfield Project.

- b. Environmental impacts and recommendations:  
Construction of the upstream and downstream fish passage and recreational facilities at the West Springfield Dam would remove small amounts of vegetation and disturb wildlife in the project area. Impacts to local fauna and flora would be minimal, because construction generally would occur in previously disturbed areas. Construction activities, however, would result in the loss of some wildlife habitat. Slow-moving species such as small mammals, reptiles, and amphibians would be most affected by clearing activities and the movement of personnel, equipment, and supplies. Mobile species such as birds and medium-to large-size mammals would be disturbed or displaced; however, these species would be expected to return to the project area once construction activities cease.

#### Endangered, Threatened, and Species of Special Concern

In general, the project area does not appear to provide appropriate habitat for the majority of the 12 species of animals

listed by MNHESP. Both the Jefferson and Marbled Salamanders (*Ambystoma jeffersonianum* and *A. opacum*) require temporary ponds or vernal pools for breeding. No temporary ponds or vernal pools have been identified in the project area. The Northern Spring salamander (*Gyrinophilus P. porphyriticus*) is a semiaquatic species which prefers cold, clear, alkaline or slightly acidic streams and brooks found at higher elevations, although it has also been found to inhabit forest seepages.

Table 4. State-Listed Threatened and Endangered Species Possibly Present in the Vicinity of the West Springfield Project.

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| SPECIES | STATUS |
|---------|--------|
|---------|--------|

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## AMPHIBIANS

Jefferson Salamander    *Ambystoma jeffersonianum*    SC  
Marbled Salamander    *Ambystoma opacum*    T  
Northern Spring  
Salamander    *Gyrinophilus P. porphyriticus*    SC  
Eastern Spadefoot Toad    *Scaphiopus holbrookii*    T

## BIRDS

Cooper's Hawk    *Accipiter cooperii*    SC  
Sharp-shinned Hawk    *Accipiter striatus*    SC  
Grasshopper Sparrow    *Ammodramus savannarum*    SC  
American Bittern    *Botaurus lentiginosus*    SC

## MAMMALS

Eastern Small-Footed Bat    *Myotis leibii*    SC

## FISH

Lake Chub    *Couesius plumbeus*    E

## REPTILES

Spotted Turtle    *Clemmys guttata*    SC  
Timber Rattlesnake    *Crotalus horridus*    E

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Source: Massachusetts Natural Heritage and Endangered Species Program.  
1989. Patricia Swain, Program Ecologist. Personal Communication.

Status: SC = Species of Special Concern

E = Endangered

T = Threatened

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The Spadefoot toad (*Scaphiopus holbrookii*) is a burrowing species which prefers sand and sandy loam soils such as those found in pitch

pine barrens. It also requires temporary ponds or vernal pools for breeding; however, it is sometimes found within the floodplains of major river systems, and, therefore, it may be present within the project area.

Of the birds listed by MNHESP, Cooper's hawk (*Accipiter cooperii*) and the Sharp-shinned hawk (*A. striatus*) are both expected to be present in the project area. Given the large home-ranges of both of these species and the relatively small areas to be affected by construction of the proposed upstream and downstream fish passage and recreational access facilities, it is unlikely that either of these species would be adversely affected by the project.

The grasshopper sparrow (*Ammodramus savannarum*) requires expanses of open, grassy fields with short vegetation (e.g., savannas), while the American bittern (*Botaurus lentiginosus*) inhabits freshwater wetlands dominated by tall marsh plants such as cattails, bulrushes, sedges, and grasses. Neither of these habitats are present to any great extent within the project area.

Little is known about the habits of the Eastern Small-Footed Bat (*Myotis leibii*). It typically hibernates in caves, but also roosts in buildings, man-made structures, and under rock slabs during the summer. Neither caves nor rock slabs are present within the affected areas of the project; thus, there is minimal potential for upsetting hibernacula for this species.

Appropriate habitat exists within the project area for the lake chub (*Couesius plumbeus*); however, none was collected during the 1977 surveys of the tributaries to the West Branch of the Westfield River conducted by MDFW. The fact sheet for this species prepared by MNHESP indicates that historically, the lake chub was found in the West, East, and Middle Branches of the Westfield River in Hampshire County, but that it is currently only found in the East Branch. Since 1978, only one occurrence has been verified.

Habitat also appears to be lacking for the timber rattlesnake (*Crotalus horridus*). The rattlesnake has been extirpated from much of its range in the United States. It requires fairly large stands of second growth forest interspersed with open rocky ledges, such as that found in the more mountainous areas of central Massachusetts. Optimal habitat for this species does not exist in the project area.

The spotted turtle (*Clemmys guttata*) inhabits bogs, swamps, small ponds, and other shallow bodies of water; however, it can be found in a variety of habitats that are considered to be marginally suitable. Spotted turtles may, therefore, be present in the project area, particularly in those areas with emergent vegetation and/or streams such as Block Creek in Mittineague Park upstream of the project dam.

We conclude that, for the majority of the endangered, threatened, or species of special concern that have been identified by MNHESP as



potentially present within the project vicinity, construction of the upstream and downstream fish passage and recreational facilities would have minimal impact. However, we believe that, before construction, DSI should perform site-specific surveys to identify habitats within the proposed construction areas that are capable of supporting populations of spotted turtle, eastern spadefoot toad, and northern spring salamander. If these surveys identify these or other endangered, threatened, or species of special concern within the construction area, then DSI should develop, in consultation with MNHESP, and for the Commission's approval, specific measures to minimize impacts to these species and their habitats during construction activities.

With respect to federally listed species, construction activities at the project and its continued operation under subsequent license would have no effect on any occasional use of the area by bald eagles and peregrine falcons.

#### Wetlands

Construction of our recommended access trail in Mittineague Park could impact some wetland or adjacent buffer zones. Such impacts would result from the proposed placement of stones in the banks of Block Creek and the placement of gravel backfill in the vicinity of the existing railroad culvert.

The NWI identifies limited areas of wetlands (FWS 1975) in the vicinity of the trail. An area of about 2,700 square feet that may include wetlands could be affected. This represents a worst-case impact estimate. More precise quantification of potential impacts is not possible, since the applicant has not performed field delineation of wetlands there.

To properly address wetland impacts, the Town of West Springfield or DSI should delineate all jurisdictional wetlands in the area of the proposed trail using the 1987 U.S. Army Corps of Engineers (COE) Wetland Delineation Manual and Massachusetts wetland delineation methods. Impacts to wetlands should be avoided or minimized to the greatest extent practicable. The Town or DSI should obtain all necessary permits for work in wetlands and their buffer zones from the New England Division COE (Section 404) and the towns of West Springfield and/or Agawam (Orders of Conditions).

- c. Unavoidable adverse impacts: There would be minor, short-term disturbance of some vegetation and wildlife during construction of the fish passage facilities and recreational access sites.

#### 5. Aesthetic Resources

- a. Affected environment: The project is located along a steeply banked portion of the Westfield River. Public views of the

project powerhouse, tailrace, and bypass reaches are available from Mittineague Bridge downstream of the project and from Robinson State Park on the southern bank of the river. Because of the location of the DSI and Southworth facilities, the project power canal, and the Conrail tracks that run parallel to the river's north bank, the northern bank of the river is largely inaccessible.

The southern bank of the river within Robinson State Park is quite steep and heavily vegetated with trees and underbrush; consequently, views from the park are limited. Several small trails provide access to the banks of the impoundment and the river below the dam. Access points at the dam provide views of the impoundment, dam, and the south branch of the channel downstream of the dam.

- b. Environmental impacts and recommendations: Lack of access to project lands and waters limits potential aesthetic value of the project features. At present, there are no required minimum flows at the dam or in the bypass reach and little or no flow below the dam. Proposed minimum flows to the bypass reach would be provided at the dam through a rectangular weir, resulting in an area of falling water. Most of the water spilled would pass through the north channel of the bypass reach. The minimum flow release would provide a constant flow in the bypass riffle area, thereby enhancing the aesthetic character of the project area and views from Robinson State Park.

The flow recommended to enhance fisheries and water quality would also provide a visual and aural resource for the limited number of viewers at the West Springfield Project Dam. The minimum flow would provide visual interest by creating an area of falling water at the dam (through the weir) and constant movement in the bypass riffle and pool areas. Therefore, we concur with the proposed minimum flow requirements and recommend that they be implemented.

- c. Unavoidable adverse impacts: None.

## 6. Cultural Resources

- a. Affected environment: In 1836 development of water power at the project site began, and it has continued to the present under various company names. In 1931 the Strathmore Paper Company installed the existing powerhouse and turbines.

The Massachusetts State Historic Preservation Office (SHPO) (Massachusetts Historical Commission 1991) noted in its comments on the draft application that the paper mill complex is included in the Inventory of Historic and Archaeological Assets of the Commonwealth, and is eligible for inclusion on the National Register of Historic Places (NRHP). The proposed project would not involve any new construction within the area of the existing mill buildings. The SHPO (Massachusetts Historical Commission 1991) determined, and we concur, that the relicensing of the project as proposed would have no adverse effect on the historical and architectural significance of the National Register-eligible mill complex.

Only two properties listed on the NRHP are located near the project: the Josiah Day House, located approximately 2 miles southeast of the project in the Town of West Springfield; and the Captain Charles Leonard House, located approximately 0.75 miles east of the project in the Town of Agawam. The properties would not be affected by the project.

- b. Environmental impacts and recommendations: No known NRHP sites would be affected by the proposed construction activities or project operation. Undiscovered sites, such as buried or inundated archaeological sites, however, could be affected by new construction. Therefore, we recommend that, if any sites are

discovered, DSI should: (1) consult with the SHPO; (2) prepare and implement a cultural resources management plan to evaluate the significance of the sites and to avoid or minimize any impacts to Register-eligible sites; (3) base the plan on recommendations of the SHPO and the Secretary of the Interior's Guidelines for Archaeology and Historic Preservation; (4) file the plan for Commission approval, together with the written comments of the SHPO; and (5) take the necessary steps to protect the discovered archaeological or historic sites from further impact until notified by the Commission that all of these requirements have been satisfied.

DSI would not be allowed to begin any land-clearing or land-disturbing activities in the vicinity of any discovered sites until informed by the Commission that the aforementioned requirements have been fulfilled.

c. Unavoidable adverse impacts: None.

## 7. Recreation and Land Use

a. Affected environment: Recreation at or near the West Springfield Project includes fishing, canoeing, picnicking, hiking, and swimming. Recreational facilities in the area include Robinson State Park and Mittineague Park.

Robinson State Park is located along the south shore of the Westfield River. It begins above the project powerhouse and extends 6 miles upstream. Robinson State Park receives approximately 20,000 visitors per year. About 15,000 visitors come to swim in Robinson Pond and picnic in the park, while 5,000 hike in the park and fish along the Westfield River (Verville 1993).

Mittineague Park, which is owned and operated by the Town of West Springfield, is located on the north shore of the Westfield River. It stretches 0.25 mile along the river starting 1,000 feet upstream of the West Springfield Dam (see Figure 1).

The primary recreational activity in the project area is fishing. Anglers access the south bank of the Westfield River from trails in

Robinson State Park; they reach the north bank upstream of the dam from Mittineague Park, and they reach the north bank downstream of the powerhouse on land owned by DSI. Atlantic salmon and American shad are caught below the project dam, and rock bass and smallmouth bass are caught throughout the project area.

The Massachusetts Cooperative Fisheries Unit (MCFU) conducted creel surveys for the American shad fishery in 1991 and 1992. Based on the field data collected, MCFU estimated that downstream of the West Springfield Dam there were 150 user-days of American shad angling in 1991 and 365 user-days in 1992 (DSI 1992).

Canoeists use the project impoundment during the summer months, but use is limited by the lack of boat access in the project area. The closest canoe launch is 4.75 miles upstream of the project dam at the Big Y Supermarket in West Springfield.

Clubs and recreational canoeists boat the Westfield River upstream of the project area. Competitors in the Wildwater Races, which run from below the Knightsville Dam to the Woronco Dam, average 700 to 800 each year. Recreational canoeists average about 1,000 to 1,500 per year on this reach above the project area (PVPC 1993). In addition, the Appalachian Mountain Club runs 5 to 10 trips per year on this reach of the river with 10 to 20 canoeists in each trip.

The West Springfield Dam prevents a continuous canoe route from the Woronco Dam at RM 17.5 to the Connecticut River. Because of land ownership, topography, and industrial hazards, canoe portage at the West Springfield Dam is limited.

There is no suitable take-out area for canoes upstream of the dam on land owned by DSI. The only property DSI owns is a small parcel at the south abutment of the dam. This land is steep and too close to the dam to be suitable for a canoe portage.

There is no safe and convenient portage route around the West Springfield Dam without using a vehicle. Steep banks upstream and downstream of the dam and low flows in the bypass reach restrict canoe portage on the river's south bank; and the industrial character of the power canal area and the Conrail

tracks bordering the river preclude safe canoe portage development on the north bank.

Land use in the project area is undeveloped woodland, residential, and industrial. Robinson State Park and Mittineague Park are primarily undeveloped woodlands. Industrial land use includes the DSI and Southworth paper mills and power plant facilities on the north bank of the river. Across from the DSI facilities there is a small residential area on the south bank.

b. Environmental impacts and recommendations:



1. Downstream Access

Applicant's Proposal

DSI proposes to construct, operate, and maintain the following recreational enhancements at the West Springfield Project:

- ù a parking area for 20 vehicles downstream of the project facilities near the Mittineague bridge;

- ù a 400-foot-long trail from the parking area to the north bank of the Westfield River; and
- ù a canoe launch at the end of the trail to provide river access for boating and fishing.

#### Commentors' Position

Commenting entities and intervenors identified improved river access as the primary recreation need on the river. WRWA (1993), PVPC (1993), Trout Unlimited et al. (TU) (1993), and MDFW (1993) all requested that DSI provide some form of downstream river access for angling and canoeing. MDFW (1993) stated that, based on information from creel surveys, downstream access would be heavily utilized by anglers who currently have limited access to the stretch of river below the West Springfield Dam. PVPC (1993) stated that a downstream access site would complement ongoing efforts to develop an urban recreational canoe run along the Westfield River.

#### Our Analysis

The applicant's proposed recreation improvements would enhance public use of the area. The trail, canoe launch, and associated parking area would provide access to the Westfield River for American shad and Atlantic salmon anglers and canoeists. The proposed facilities are consistent with the recommendation of the Massachusetts Outdoors for Our Common Good: Open Space and Outdoor Recreation in Massachusetts (Massachusetts Department of Environmental Management 1988) for increased access to inland waterways. River access would increase angling opportunities and establish a 4-mile canoe run downstream to the Connecticut River.

DSI should construct the proposed recreation improvements. In addition, DSI should install signs to inform the public of access opportunities and develop a plan for controlling river bank slumping and erosion that could result from the construction and operation of the recreation facilities (see V.C.1 Geological Resources).

#### 2. Impoundment Access

## Applicant's Proposal

DSI provided \$4,000 to PVPC to study the availability of access sites for boating and fishing upstream of the project dam. The study concludes that Mittineague Park is the best location for developing additional boating and fishing access upstream of the West Springfield Dam and recommends that a trail be constructed in Mittineague Park from an existing parking area, under the Conrail tracks through a 12-foot-high culvert, to the impoundment (Matuszko 1993). DSI has not proposed to build the access trail.

## Agencies' Position

PVPC (1993) stated that the West Springfield Project blocks an otherwise pleasurable recreational canoe run in a densely populated urban area. PVPC (1993) requested that DSI develop a practical upstream canoe access site. Further, they recommend that DSI should provide up to \$10,000 (including manpower, equipment, materials, etc.) in support of the canoe access site.

MDFW (1993) also recommends that if suitable upstream angler access points are identified, DSI should develop an implementation schedule to secure free public access to these properties.

## Our Analysis

Impoundment access would provide increased access for recreational use of the river by both canoeists and anglers. The level of fishing on the river is likely to increase once the project's upstream fish passage facilities would allow American shad and Atlantic salmon to reach the project impoundment. An impoundment access trail would enable anglers to reach and fish on the impoundment and also would provide canoeists a take-out point from which to car portage to the proposed downstream access facility.

Based on the comment letters received and on our site visit, we conclude that greater recreational access to the impoundment above the West Springfield Dam is needed and, if built, would enhance recreational opportunities on the river. Based on our site visit and review of the design drawings in the study provided by PVPC (1993), we believe an impoundment access site that would be adequate to meet the needs of the area could be constructed for \$10,000. Therefore, we recommend that DSI either (1) provide \$10,000 in financial assistance to the town for development of a canoe access site at Mittineague Park, or (2) develop its own canoe access site at another location.

In conclusion, DSI should file with the Commission a copy of a draft agreement to provide financial assistance to the Town of West Springfield or a plan to develop access at an alternative site.

### 3. Access for the Disabled

Currently, there are no developed recreation facilities at the West Springfield Project that allow access for the disabled. DSI proposes to build a trail from a parking area near the Mittineague Bridge on the north bank of the Westfield River that would provide fishing and canoeing access for the disabled. DSI did not receive any comments from the public or from agencies about disabled access at the West Springfield Project. DSI's proposal would provide fishing and canoeing access to the Westfield River for the disabled. We recommend DSI construct the proposed trail to conform to the requirements of the Americans with Disabilities Act of 1990.

- c. Unavoidable adverse impacts: The West Springfield Dam would continue to restrict canoe travel on the Westfield River. Even with implementation of the proposed upstream and downstream river access sites, canoeists still would be required to portage over 1 mile around the dam.

#### D. No-Action Alternative

Under the no-action alternative, none of the environmental recommendations discussed above would be implemented to protect or enhance existing environmental resources.

### VI. DEVELOPMENTAL ANALYSIS

In this section we analyze the project's use of the Westfield River's water resources to generate hydropower, estimate the economic benefits of the proposed project, and address the economic effects on the project of the various measures considered in this EA for protection or enhancement of nondevelopmental resources at the project.

#### A. Existing Project

The main purpose of the project is to provide power for DSI's paper production facility. Excess energy generated is sold to Western Massachusetts Electric Company (WMECo). DSI also purchases a similar amount of energy from WMECo when its generation is less than the energy needed for paper production. With an installed capacity of 1.4 MW, the project generates about 6,763 MWh annually.<sup>11/</sup>

DSI requested a 50-year license; however, DSI is not proposing to increase installed capacity at the project. We did not consider a 50-year license because the Commission only issues relicenses for 50 years when the applicant proposes to develop a significant amount of new capacity or when required environmental enhancements would make a 30- or 40-year license uneconomic. The Commission normally issues a 30-year license for relicenses that do not involve new capacity. However, we looked at the effect of the proposed enhancements over both 30-year and 40-year license periods, since enhancements in this

instance include the installation, operation, and maintenance of costly fish passage facilities.

We reviewed DSI's replacement energy costs, which are based on a demand charge of \$12/kW/month and an energy charge of \$0.04/kWh, both in 1992 dollars. DSI calculates a power value of \$77/MWh, using a demand of 1,750 kW and an average annual generation of 6,763 MWh. We calculate the power value to be \$65.60/MWh, in 1992 dollars, based on DSI's demand and energy charges, and on a demand of 1,200 kW, which is equivalent to the effective capacity of the project.

11/ Average annual generation for the period 1966 through 1990.

We based our analysis of the net benefits for the existing West Springfield Project on the following:

One Time Costs: Application Preparation \$300,000

Annual Costs: Operation and Maintenance\$ 70,000

Payment to Southworth \$ 25,000<sup>12/</sup>

Buy/Sell Energy\$ 30,000<sup>13/</sup>

Power Value: 70.9 mills per kilowatt-hour  
(mills/kWh) in 1994 dollars

Escalation Rate: 4 percent

Term of Financing: 3 years<sup>14/</sup>

Discount and Interest Rates: 10 percent

Based on the above values, the existing project has positive net annual levelized benefits of about \$317,000 or 46.9 mills/kWh for a 30-year license period and \$340,000 or 50.3 mills/kWh for a 40-year license period.

#### B. Environmental Enhancement Measures

In our environmental analysis (Section V), we analyze recommendations made by the applicant, agencies, and others for protecting or enhancing nondevelopmental resources in the project area. Measures considered would affect the project in a variety of ways including: (1) increasing the project's cost by requiring additional facilities or conducting studies, and (b) reducing project generation by diverting flows for other purposes.

In this section, we consider four enhancement measures that could reduce the economic benefits of the project: (1) increasing instream flows for resident fisheries, (2) installing fish passage facilities

<sup>12/</sup> The Southworth Company has water rights of 61 cfs taken from the power canal. However, DSI controls Southworth's generating unit. Whenever flow is in the range of 61 cfs to 84 cfs, Southworth's unit generates. For flow above 84 cfs, Southworth's



unit is shut down and DSI's units generate. DSI compensates Southworth at the rate of \$25,000 annually for the energy that Southworth would have generated if DSI did not shut Southworth's unit down.

13/ DSI usually can use all the energy it generates. However, when energy requirements for paper production are less than energy generated, DSI sells the excess to WMECo. When generation is less than DSI's demand, DSI buys energy from WMECo. Since DSI buys at a higher rate than it sells at, DSI's annual cost is about \$30,000.

14/ Source: Application (DSI 1992).

and providing passage flows, (3) expanding recreational access, and (4) conducting terrestrial resource studies.

### Instream Flows

We consider year-round instream flow rates of 65 cfs, 85 cfs, and 108 cfs in the bypassed channel. Table 5 shows the lost generation and the resultant decrease in project benefits of these instream flows.

Table 5. Levelized Annual Costs of Alternative Instream Flows  
(Source: Staff)

| Levelized Annual Costs                                  |  |   |  |  |  |
|---|--|---|--|--|--|
| 30-year License<br>Period<br>(cfs)<br>Dollars<br>kWh15/ | License<br>Period<br>(MWh)<br>mills/<br>kWh9 | 40-year License<br>Period<br>(cfs)<br>Dollars<br>kWh15/ | License<br>Period<br>(MWh)<br>mills/<br>kWh9 | Flow<br>Lost<br>Generation<br>(cfs)<br>Dollars<br>kWh15/ | Flow<br>Lost<br>Generation<br>(cfs)<br>Dollars<br>kWh15/ |
| 65  | 11   | \$41,000  | 6.1  | \$44,000   | 6.4  |
| 85  | 781  | \$53,000  | 7.8  | \$56,000   | 8.2  |
| 108   | 976  | \$66,000  | 9.7  | \$70,000   | 10.3   |

### Fish Passage Facilities and Associated Structures

The fish passage facilities and associated structures would consist of:

- ù a Denil ladder for upstream passage at the dam;
- ù a rectangular weir cut adjacent to the north dam abutment;
- ù a fish trap with sorting and holding facilities;
- ù an inclined screen with associated flume for downstream

passage at the dam;

ù tailrace screens at Southworth and DSI powerhouses; and

ù instream structures in the north channel to provide a zone of passage.

Table 6 shows the capital cost of these facilities.

15/ Based on existing project's annual generation.

The proposed year-round minimum flow is 85 cfs; if monitoring studies indicate that 85 cfs is inadequate for creating a ZOP for anadromous fish passage, DSI would be required to provide a higher flow.

The estimated yearly cost to operate and maintain the aforementioned fish passage facilities excluding the fish trap, which would be operated by the MDFW, would be \$25,000. This

Table 6. Capital Costs of Fish Passage Facilities and Associated Structures (Source: Applicant)

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| Facility  | Cost (1992\$)                  |
|---|--------------------------------|
| Denil ladder for upstream passage                 | 627,000                        |
| Rectangular weir                                  | 700                            |
| Fish trap with sorting and holding facilities     | 286,300                        |
| Inclined screen with flume for downstream passage | 303,000                        |
| Tailrace screens at Southworth and DSI            | 86,000                         |
| Instream structures in north channel              | 29,000 <sup>16/</sup>          |
| <b>TOTAL COSTS</b>                                | <b>1,332,000<sup>17/</sup></b> |

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amount includes the labor cost for mechanics/electricians. Modifications to the fish passage facilities and the ZOP during the first 10 years of operation would cost a maximum of \$100,000. A 2-year study (one year of observation and one year of formal study) to determine the effectiveness of upstream fish passage would cost an

16/ Spur dikes need to be replaced every 10 years. This is the cost for the first set. For future replacements, the cost is found by escalating \$29,000 at 4 percent and then discounting at 10 percent to 1992 dollars.

17/ The total discounted capital cost (for a 30-year license) would be \$1,348,000, which includes two replacements of the spur dikes. The total discounted capital cost for a 40-year license would be \$1,350,000, which includes a total of three replacements of the spur dikes.

additional \$200,000. No lost power generation would result from implementing this alternative, since the 85 cfs is already accounted for as a minimum flow.

We evaluated the economics of the fish passage facilities for both 30-year and 40-year license periods. In each case, the capital and operating costs were converted to levelized annual costs. In addition, we evaluated the levelized annual costs of providing higher passage flows (125 cfs and 311 cfs). Table 7

summarizes the results for each of the components. Table 8 summarizes the total annual cost using each of the three flows (85, 125, 311 cfs).

#### Recreational Access

Recreational enhancements would include a parking area, trail, and canoe launch on DSI property downstream of the project facilities, near the Mittineague Bridge. The estimated capital cost of these downstream facilities is \$30,000.

DSI has given \$4,000 to PVPC to study the availability of access sites for boating and fishing upstream of the project dam. We estimate that it would cost \$10,000 to design and construct the proposed canoe and fishing access trail in Mittineague Park.

The total estimated construction costs for recreational enhancements are \$44,000 in 1993 dollars. We estimate that the cost of these recreational enhancements would decrease project benefits by about \$5,000 annually or about 0.7 mills/kWh, for either 30-year or 40-year license periods.

#### Terrestrial Resource Studies

In this EA, we recommend two terrestrial resource studies. For the first study, the Town of West Springfield or DSI would delineate all wetlands in the area proposed for impoundment access to quantify the impacts to these resources from new construction. For the second study, the Town of West Springfield or DSI would conduct site-specific

surveys of species that are endangered, threatened, or of special concern, and then develop, in consultation with the resource agencies, appropriate construction mitigation plans, as necessary.

We estimate the cost of each of these studies to be \$5,000 in 1994 dollars. If DSI needed to conduct both studies, the cost would decrease project benefits by \$1,100 annually, or about 0.16 mills/kWh, for the 30-year license period, and \$1,000 annually or about 0.15 mills/kWh, for the 40-year license period.

C. No-Action Alternative

We have also evaluated the no-action alternative in the EA.

Under the no-action alternative, the project would continue to operate under the terms and conditions of the existing license; there would be no change to the existing environmental setting or project operation. Therefore, there would be no incremental costs for this alternative. Costs associated with the project's operation and maintenance would continue to be incurred, but the projects net benefits would remain essentially unchanged compared to the project's current operation.

Table 7. Levelized Net Annual Costs of Fish Passage Facilities, Associated Structures, and Incremental Flows for Fish Passage (Source: Staff)

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| Enhancement Measure<br>Period  | 30-year License |                | 40-year License |                |
|--|-----------------|----------------|-----------------|----------------|
|  | Dollars<br>kWh* | mills/<br>kWh* | Dollars<br>kWh* | mills/<br>kWh* |
| Upstream and downstream fish passage facilities<br>including all structures listed in Table 6 and<br>O&M costs.  | \$159,700       | 23.61          | \$157,900       | 23.35          |
| DSI payment of \$2,000 to MDFW and interim flow of<br>25 cfs through trash sluice from April 1 through<br>July 15 in 1994 and 1995 prior to fish passage<br>construction and operation.  | \$1,100         | 0.16           | \$1,100         | 0.16           |
| Zone of passage:<br>Passage operation from April 1 through July 15<br>and September 1 through October 31 with a minimum<br>flow of 85 cfs plus 40 cfs for Denil fish<br>passage. Lost generation due to additional 40<br>cfs is 0.094 GWh. | \$6,000         | 0.89           | \$6,700         | 0.99           |



|  |          |      |          |      |
|--|----------|------|----------|------|
| Passage operation from April 1 through July 15 for 4 hours each day with a minimum flow of 85 cfs plus 226 cfs for Denil fish passage. Lost generation due to additional 226 cfs is 0.056 GWH. | \$3,600  | 0.53 | \$4,000  | 0.59 |
| Study to determine effectiveness of upstream fish passage  | \$21,200 | 3.14 | \$20,500 | 3.03 |
| Fishway and ZOP modifications in first 10 years of operation   | \$11,400 | 1.69 | \$11,100 | 1.64 |

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\*Based on existing project's annual generation.

Table 8. Summary of Project Costs Resulting from the Construction and Operation of Fish

Passage Facilities and Associated Structures and the Provision of Incremental Flows for Fish Passage (Source: Staff)

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Levelized Annual Costs

|   | 30-year License<br>Period<br>Dollars<br>kWh* | 40-year License<br>Period<br>Dollars<br>kWh* | Facilities and Flows<br>mills/<br>kWh* | mills/<br>kWh* |
|---|--|--|--|----------------|
| Fish passage facilities with 85 cfs flow, zone of passage modifications, and upstream passage study.  | \$193,400                                    | 28.61  | \$190,600                              | 28.18          |
| Fish passage facilities with 125 cfs flow, zone of passage modifications, and upstream passage study. | \$199,400                                    | 29.50  | \$197,300                              | 29.17          |
| Fish passage facilities with 311 cfs flow, zone of passage modifications, and upstream passage study. | \$197,000                                    | 29.13  | \$194,600                              | 28.77          |

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\*Based on existing project's annual generation.

## VII. COMPREHENSIVE DEVELOPMENT AND RECOMMENDED ALTERNATIVE

We have considered the proposed project, agency mandated and recommended conditions, staff recommended enhancement measures, and the no-action alternative under sections 4(e) and 10(a) of the FPA. From our independent analysis of the environmental and economic effects of the alternatives, we have selected the applicant's proposed enhancements, fish passage facilities, and flows, plus our own recommended additional measures, as the preferred alternative.

DSI's proposed measures consist of:

- ù maintaining run-of-river operations;
- ù releasing a minimum flow of 85 cfs into the bypass reach year-round to enhance resident fisheries;
- ù installing tailrace screens;
- ù creating a rectangular weir in the north abutment;
- ù building instream structures in the north channel of the bypass reach to achieve an adequate ZOP for anadromous fish;
- ù placing a headwater monitoring gage in the West Springfield impoundment;
- ù giving PVPC \$4,000 to study the availability of access sites for boating and fishing upstream of the project dam; and
- ù constructing, operating, and maintaining a parking area, trail, and canoe launch downstream of the project dam on DSI property.

In addition, our recommended enhancement measures include:

- ù constructing upstream and downstream fish passage facilities and associated structures;
- ù installing with the Denil fish ladder a trap with sorting

and holding facilities;

- ù developing a plan for the operation and maintenance of fishways;
- ù implementing a monitoring plan to assess the effectiveness of all fishway facilities and associated structures;
- ù contributing to the financing of a canoe launch and fishing access trail in Mittineague Park (or developing and implementing a plan to construct, operate, and maintain

canoe and fishing access to the project impoundment at an alternative site);

- ù developing procedures to minimize bank erosion during the construction of fishways and recreational facilities;
- ù performing field delineations of all jurisdictional wetlands in the project area in order to quantify potential impacts to these resources; and
- ù conducting site-specific surveys for endangered, threatened, or species of special concern and their habitats within the project area and developing, as necessary, construction mitigation plans.

We recommend this alternative because implementation of these measures would enhance fishery resources in the impoundment, bypass reach, and Westfield River below the project and recreational resources and river access in the project area.

Though the cost of these recommended measures would reduce the existing power benefits of the project, the project licensed for 30 or 40 years would still have net benefits over the new license term greater than the least-cost alternative (Tables 9 and 10). Based on the greater annual benefit, we recommend a 40-year license term.

DSI's proposed project with staff recommended enhancement measures includes three measures that would directly affect the project's economics: (1) recreational access, (2) minimum flow releases, and (3) fish passage facilities and passage flows.

#### A. Recreational Access

Based on the potential for increased angling for American shad resulting from the construction and operation of fish passage facilities at the project, the parking area, trail, and canoe launch proposed by DSI downstream of the powerhouse would provide recreational benefits to the surrounding communities that

would equal or exceed their \$5,000 annual cost. Therefore, we recommend that DSI complete construction of these facilities within 1 year of any license issued by the Commission.

Table 9. 30-Year Annual Levelized Project Benefits and Costs (in \$1,000's)

| Category                     | Cost         | Power      | Value     | Net Benefit |
|------------------------------|--------------|------------|-----------|-------------|
| Current Project              | (373)        | 690        | 317       |             |
| 85 cfs Instream Flow         | 0            | (53)       | (53)      |             |
| Recreational Enhancements    | (5)          | 0          | (5)       |             |
| Fish Passage Facilities      | (193)        | 0          | (193)     |             |
| Terrestrial Resource Studies | (1)          | 0          | (1)       |             |
| <b>Total</b>                 | <b>(572)</b> | <b>637</b> | <b>65</b> |             |

Note: Numbers in parentheses are negative.

Table 10. 40-Year Annual Levelized Project Benefits and Costs (in \$1,000's)

| Category                  | Cost  | Power | Value | Net Benefit |
|---------------------------|-------|-------|-------|-------------|
| Current Project           | (390) | 730   | 340   |             |
| 85 cfs Instream Flow      | 0     | (56)  | (56)  |             |
| Recreational Enhancements | (5)   | 0     | (5)   |             |
| Fish Passage Facilities   | (191) | 0     | (191) |             |
| Terrestrial Resource      | (1)   | 0     | (1)   |             |

Studies

Total (587) 674 87

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Note: Numbers in parentheses are negative.

Here's how we support our recommendation to adopt these enhancement measures.

Based on the anticipated movement of shad into the project reservoir and the stated interest of local canoeing groups, an



impoundment access trail in Mittineague Park would be used by at least 100 canoeists per year. Therefore, we recommend that DSI provide the Town of West Springfield with \$10,000 to support design and construction of an impoundment access trail for canoeists and anglers in Mittineague Park. DSI, however, should not be responsible for the operation and maintenance of the trail.

Regarding this trail, within 6 months of license issuance, DSI should file with the Commission either a copy of a draft agreement with the Town of West Springfield for a trail in Mittineague Park or DSI's plans to develop impoundment access at an alternative site. Any agreement between DSI and the town should be subject to the Commission's review and approval. If DSI chooses to develop access at an alternative site, it should consult with PVPC, WRWA, and MDFW.

#### B. Instream Flows in the Bypass Reach

Releasing a year-round minimum flow into the bypass channel would protect and enhance resident fisheries and aquatic resources and improve aesthetic resources at the project site. A minimum flow of 85 cfs in the bypass reach would provide 88 percent and 99 percent of the potential WUA for juvenile and adult smallmouth bass, respectively. This flow is greater than the 7Q10 and approaches the estimated ABF of 108 cfs at the site. Furthermore, the IFIM analysis indicates that habitat for all life stages of smallmouth bass is maximized at 85 cfs. The estimated annual cost for providing a year-round minimum flow of 85 cfs in the bypass reach is \$56,000, levelized over 40 years.

We conclude that the increased biological enhancements provided by a flow of 85 cfs, versus the 65 cfs originally proposed by DSI, outweigh the \$12,000 additional annual cost required to provide these flows. The cost is offset by increased shad and bass populations and the resulting increase in angling. Based on our analysis, we conclude that a minimum bypass flow between 80 and 108 cfs is best for resident fisheries.

Releasing 85 cfs, both through the rectangular weir cut near the north dam abutment and the Denil fish ladder would serve as attraction flow for the upstream passage facilities and contribute to the ZOP for

anadromous fish. As discussed in Section V.C.5, release of minimum flow through the weir also would improve the aesthetic character of the area. Therefore, we recommend the following measures to protect and enhance environmental conditions:

- ù provide a minimum year-round flow of 85 cfs in the bypass reach to protect resident fish habitat, to serve as attraction flow for the upstream passage of anadromous fish species, and to enhance area aesthetics; and
- ù file and implement a streamflow gaging plan to verify specified minimum flows (and run-of-river operations) (costs

for the plan and gage placement are included as maintenance costs under fish passage).

The demand for water access and angling opportunities at the West Springfield site can only be met effectively if we ensure an adequate flow in the bypass reach to protect and enhance resident fish and maintain aesthetic values associated with Robinson State Park. The lost generation and resultant annual cost of \$56,000 to provide an 85 cfs year-round bypass flow, therefore, would be offset by the resultant social benefits -- larger populations of resident fish species, additional recreational use at Robinson State Park and in the project area, and the movement of anadromous fish species in the bypass reach.

#### C. Fish Passage Facilities and Associated Structures

Under Section 18 of the FPA, Interior prescribes both upstream and downstream fish passage. Installation of the upstream fishway and downstream facilities at the project would provide opportunity for upstream and downstream anadromous fish movement in the Westfield River. As previously noted, the West Springfield Dam represents the only blockage to fish migration into or out of the upstream portions of the Westfield River.

Increased flows and channel modifications, required to provide a ZOP, and tailrace screens are necessary to ensure efficient functioning of the prescribed fishways. The objective of fish passage facilities is to minimize the effect that a stream barrier has on the normal behavior and physiological status of migratory fish. A ZOP that provides unobstructed and easy access to upstream passage facilities allows fish to conserve energy needed to rapidly ascend the passage facilities.

Tailrace screens would divert fish from entering and holding in the tailraces. Without such screens, fish would be attracted to these areas and, consequently, delayed in their upstream migration. Migratory delays would affect the reproductive success of anadromous fish by desynchronizing their rate of reproductive maturity and the time at which they reach their normal spawning grounds.

DSI agrees to construct trap and transport facilities at the project, and the agencies agree to operate them. Trap and truck facilities are needed to provide broodstock for hatchery operations that supply salmon smolts for stocking in the Westfield River as part of salmon restoration efforts. Trap and truck operations would also allow those salmon in excess of the number required for broodstock to be transported and released into upstream production waters presently inaccessible due to intervening dams without fish passage facilities. This would further enhance the potential growth rate of the Westfield River salmon stock.

Therefore, we recommend the following measures to protect and enhance fisheries resources:

- ù construct upstream and downstream fish passage facilities and related facilities;
- ù construct trap and truck facilities for Atlantic salmon;
- ù conduct monitoring studies to evaluate the effectiveness of (1) the fishways in passing fish, (2) fish screening structures at the Southworth and DSI tailraces, and (3) ZOP flows and instream structures;
- ù file and implement operation and maintenance plans for the fishways; and
- ù file and implement an erosion and sediment control plan to minimize erosion and sedimentation during construction of the new facilities.

Operation of the fish passage facilities would require a year-round flow of 85 cfs. If this flow is inadequate, DSI should request a higher flow. Since 85 cfs is already accounted for as the instream flow, there is no added cost for lost generation associated with fish passage. This would not be the case with other alternatives (see Table 7).

We calculate that the combined annual cost to DSI for the fish passage facilities during a 40-year license period would be about \$191,000 (Table 10).

#### D. Terrestrial Resource Studies

##### 1. Endangered, Threatened, and Species of Special Concern

MNHESP identifies 12 species of animals that may occur within the project area. DSI has not conducted any field surveys of the project area to determine the presence of these species or habitat capable of supporting them. A review of MNHESP fact sheets suggests that habitat

may be available in the project area for a number of species. In order to adequately address potential impacts to endangered, threatened, or species of special concern, qualified biologists should conduct appropriately timed, site-specific surveys of areas likely to be affected by construction of the fish passage and recreational facilities.

If these surveys identify the presence of these species or other endangered, threatened, or species of special concern within the construction areas, DSI should develop a plan, outlining specific measures to be used during construction to minimize impacts to these species. We conclude that these studies are necessary for the protection of endangered, threatened, or species of special concern,

and that the cost associated with these studies is justifiable. We estimate that the wildlife survey would cost \$500 per year, levelized over 40 years.

## 2. Wetlands

If DSI, rather than the Town of West Springfield, must provide impoundment access, we recommend it delineate all jurisdictional wetlands within the area in order to quantify the potential impacts associated with construction of the proposed access. Impacts to wetlands should be avoided or minimized to the greatest extent practicable. We estimate the cost of the wetland survey to be \$500 per year, levelized over 40 years.

## E. Conclusion

In conclusion, we recommend DSI's proposal, modified according to the MOA and by staff recommendations. We estimate that it would cost DSI a total of \$253,000 per year over a 40-year license period to implement the preferred alternative, which is feasible given the project economics.

From our evaluation of the environmental and the economic effects of the project and the alternatives, we conclude that issuing a 40-year license to DSI for the continued operation of the West Springfield Project, with staff-recommended enhancement measures, would best adapt the project to the comprehensive plan for developing the Connecticut River Basin.

## VIII. RECOMMENDATIONS OF FISH AND WILDLIFE AGENCIES

Under the provisions of the FPA, as amended by the Electric Consumers Protection Act of 1986, each hydroelectric license issued by the Commission should include conditions based on recommendations provided by Federal and state fish and wildlife agencies for the protection and enhancement of such resources affected by the project. Section 10(j) of the FPA states that whenever the Commission believes that any fish and wildlife agency recommendation is inconsistent with the purposes and the requirements of the FPA, or other applicable law,

the Commission and the agency shall attempt to resolve any such inconsistency, giving due weight to the recommendations, expertise, and statutory responsibilities of each agency.

Pursuant to Section 10(j) of the FPA, we have evaluated each recommendation of the Federal and state fish and wildlife agencies for consistency with the purpose and requirements of Part I of the FPA or other applicable law. As shown in Table 11, we have adopted all the measures to protect and enhance fish and wildlife resources recommended by FWS and MDFW.



Table 11. Analysis of Fish and Wildlife Agency Recommendations

| Within the scope of Recommendations Agency Section 10(j)                | FPA               | Action      |
|---|-------------------|-------------|
| Run-of-river operation  | Interior          | yes adopted |
| Monitoring plan for run-of-river operation                              | Interior          | yes adopted |
| Minimum flow of 85 cfs MDFW   | Interior          | yes adopted |
| Adequate flows and channel enhancements for ZOP                         | Interior*<br>MDFW | yes adopted |
| Plan for monitoring minimum flow releases                               | Interior*         | yes adopted |
| Construction of trapping and holding facilities                         | Interior*<br>MDFW | yes adopted |
| Operation and maintenance plan for upstream and downstream fishways     | Interior          | yes adopted |
| Monitoring plan for upstream and downstream fishways and ZOP            | Interior<br>MDFW  | yes adopted |
| Construction of tailrace screens at DSI and MDPW Southworth Powerhouses | Interior*         | yes adopted |
| Interim operation of the trash sluice                                   | Interior*         | yes adopted |

\*Interior included this item in its revised Section 18 fishway

prescription. As discussed in Section IV.D, this item may not qualify as a fishway; consequently, we have considered it as a fish and wildlife agency recommendation covered under Section 10(j) of the FPA.

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## IX. CONSISTENCY WITH COMPREHENSIVE PLANS

Section 10(a)(2) of the FPA also requires the Commission to consider the extent to which a project is consistent with Federal or state comprehensive plans for improving, developing, or conserving a waterway or waterways affected by the project. Under Section 10(a)(2), Federal and state agencies filed a total of 19 comprehensive

plans of which we identified as applicable 4 Massachusetts and 5 United States comprehensive plans. No conflicts were found. Section XI lists comprehensive plans relevant to this project.

## X. FINDING OF NO SIGNIFICANT IMPACT

In this EA, we identify the environmental resources the Commission's licensing action would affect. Unavoidable impacts to these resources would be as follows:

- ù minor short-term erosion and sedimentation in the Westfield River;
- ù turbine mortality of a small percentage of downstream migrants;
- ù failure to use upstream passage facilities by a small percentage of upstream migrants;
- ù short-term disturbance of vegetation and wildlife during construction of fishway and recreational facilities; and
- ù need for an extended portage around the project dam.

We find that implementation of our recommended alternative, consisting of the proposed project with staff-recommended enhancements, would ensure that the environmental effects of the project would remain insignificant.

In accordance with the National Environmental Policy Act of 1969, we prepared this EA for the West Springfield Hydroelectric Project. On the basis of this independent environmental analysis, issuance of a license for the project would not constitute a major Federal action significantly affecting the quality of the human environment.

## XI. LITERATURE CITED

Americans with Disabilities Act (ADA). 1990. 42 USC, Subsections 12111, 12112, 12209.

Bovee. 1982. A guide to stream habitat analysis using the instream flow incremental methodology. (Cited in DSI, 1992.)

Connecticut River Atlantic Salmon Commission (CRASC). 1982. Strategic Plan for the Restoration of Atlantic Salmon to the Connecticut River.

CRASC. 1992. A Management Plan for American Shad in the Connecticut River Basin.

Decorative Specialties International (DSI). 1991. Application for a Subsequent License for a Minor Water Power Project, December 1991. Volumes 1 and 2.

DSI. 1992. Application for a Subsequent License for a Minor Water Power Project, November 1992. Response to Schedule A Deficiencies.

DSI. 1992. Application for a Subsequent License for a Minor Water Power Project, December 1992. Response to FERC Additional Information Request.

EA Engineering, Science, and Technology. 1991. Radio-tracking studies of adult spring chinook salmon migration behavior in the McKenzie River, Oregon. Prepared for Eugene Water and Electric Board, Eugene, Oregon.

Eicher Associates, Inc. 1987. Turbine-related fish mortality: Review and evaluation of studies. EPRI AP-54580. Prepared for Electric Power Research Institute, Palo Alto, California. November.

Ferman, John. 1994. Personal communication with John Ferman of Littleville Power Co. (owners of Texon Dam) on March 3, 1994, with D. Hewett, Stone & Webster.

Fish and Wildlife Service (FWS). 1975. National Wetland Inventory Map overlay to the West Springfield Mass-Conn Topographic Quadrangle. St. Petersburg, FL. 1 sheet.

FWS. 1981. Interim Regional Policy for New England Stream Flow Recommendations.

FWS. 1989. Atlantic Salmon Restoration in New England, Final Environmental Impact Statement, 1989-2021.

FWS. 1991. Letter dated August 14, 1991, from Beckett to Garwood.

FWS. 1992. American Shad Restoration in the Northeast. 1992 Annual Report.

Halliwell. 1977. (Survey cited in DSI, 1991.)

Lynchburg Hydro Associates. 1987, 39 FERC 61,079.

Massachusetts Coastal Zone Management (CZM). 1987. Map. Boston, MA. June.

Massachusetts Department of Environmental Management. 1988.  
Massachusetts Outdoors for Our Common Good: Open Space and Outdoor Recreation in Massachusetts.

Massachusetts Division of Fisheries and Wildlife (MDFW). 1991.  
Anadromous Fish Management Plan for the Westfield River 1991-2000.

MDFW. 1993. Letter from John O'Leary to Lois D. Cashell, April 23, 1993.

Massachusetts Historical Commission, 1991. Comment letter on DSI Application for Subsequent License dated August 27, 1991.

Matuszko, Thomas. 1993. Senior Planner, Pioneer Valley Planning Commission. Personal communication. June 14.

Pioneer Valley Planning Commission (PVPC), 1993. Letter from Timothy W. Brennan to Lois Cashell, April 20, 1993.

PVPC. 1993. "Westfield River Greenway Plan". June.

PVPC. 1993. "Impoundment Access Study". July 8.

Stetson-Harza. 1992. Meeting notes from December 4, 1991. (cited in DSI, 1992.)

Trout Unlimited et al. 1993. Joint Motion in Opposition to Licensing of Trout Unlimited, Pioneer Valley Chapter of Trout Unlimited, Massachusetts/Rhode Island Council of Trout Unlimited, Atlantic Salmon Federation, U.S. and Connecticut River Atlantic Salmon Association; Comments regarding Environmental Analysis; Request for Preparation of Environmental Impact Statement; and Request for Adjudicatory Hearing. April 26.

U.S. Department of Interior (Interior). 1993. Letter from William Patterson to Lois D. Cashell, April 21.

Verville, Ron. 1993. Supervisor, Robinson State Park. Personal communication. June 14.

Westfield River Watershed Association (WRWA). 1993. Motion to Intervene. Letter from Daniel Call to Lois Cashell, April 22.

## Comprehensive Plans

(1) Massachusetts Department of Environmental Management. Division

of Planning and Development. 1988. Massachusetts Outdoors for our Common Good: Open Space and Outdoor Recreation in Massachusetts. Boston, Massachusetts.

(2) Massachusetts Department of Environmental Quality Engineering. Division of Water Pollution Control. 1983. Connecticut River Basin Water Quality Management Plan. Westborough, Massachusetts.

(3) Policy Committee for Fisheries Management of the Connecticut River. 1982. A Strategic Plan for the Restoration of Atlantic salmon to the Connecticut River Basin. Laconia, New Hampshire.



- (4) Technical Committee for Fisheries Management of the Connecticut River. 1981. Connecticut River Basin Fish Passage, Flow, and Habitat Alteration Considerations in Relation to Anadromous Fish Restoration. Hadley, Massachusetts.
- (5) Fish and Wildlife Service. Canadian Wildlife Service. 1986. North American Wildlife Management Plan. Department of the Interior, Twin Cities, Minnesota.
- (6) Fish and Wildlife Service. Canadian Wildlife Service. 1986. North American Waterfowl Management Plan. Department of the Interior.
- (7) Fish and Wildlife Service. 1989. Final Environmental Impact Statement - Restoration of Atlantic Salmon to New England Rivers. Department of Interior, Newton Corner, Massachusetts.
- (8) Fish and Wildlife Service. Undated. Fisheries USA: The Recreational Fisheries Policy of the U.S. Fish and Wildlife Service. Washington, D.C.
- (9) National Park Service. 1982. The Nationwide Rivers Inventory. Department of the Interior, Washington, D.C.

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