THE COMMONWEALTH OF MASSACHUSETTS

ENERGY FACILITIES SITING COUNCIL

MICHAEL S. DUKAKIS
GOVERNOR

CHRISTINE B. SULLIVAN
CHAIRMAN

RELATED CORRESPONDENCE

10/6/78

DOCKETED USNRC OCT 6 1978 Office of the Secretary Docketing & Service Section

50-496, 497

Ladies and Gentlemen:

Enclosed is the final Errata Sheet with the List of References submitted to the Energy Facilities Siting Council by Environmental Research and Technology, Inc. for their report entitled "Potential Impacts on the Connecticut River of the Proposed Montague Nuclear Power Plant."

A copy of ERT's transmittal letter to the Energy Facilities Siting Council is also provided.

If you have questions or comments on these documents, feel free to contact me.

Most sincerely,

Lillian Morgenstern

Lillian Morgenstern, Ph.D.
Environmental Planner

Enclosure

7810300257 A

ERT

ENVIRONMENTAL RESEARCH & TECHNOLOGY, INC.

696 VIRGINIA ROAD, CONCORD, MASSACHUSETTS 01742, (617) 369-8910, 489-3750, TELEX 923 335 ENVIRORES CNCM CABLE: ERTCON

RECEIVED

JUL 24 1978

Energy Facilities Siting Council

Document P 3267 RELATED CORRESPONDENCE

July 21, 1978

DOCKETED USNRC OCT 6 1978 Office of the Secretary Docketing & Service

Mr. Daniel Peaco
Massachusetts Energy Facilities Siting Council
One Ashburton Place
Boston, Mass. 02108

Dear Mr. Peaco:

Please find enclosed the final Errata Sheet and List of References for ERT's Montague Report. The section of the report and Errata on shortnose sturgeon have been reviewed by Mr. Bruce Taubert of the Department of Forestry and Wildlife Management, University of Massachusetts.

As is evident in the Errata Sheet, the major changes in the final report is the entire replacement of Section 8.3.2, Critique of Additional Studies Provided by the Applicant. Section 8.3.2.2, Additional Study of Shortnose Sturgeon, (Acipenser brevirostrum) in particular was revised because after ERT's Final Report was submitted, Mr. Bruce Taubert informed ERT that he felt the data from the 1977 Shortnose Sturgeon Conference Proceedings were confidential and that he was misquoted in some instances. Therefore, ERT has eliminated all data and references from the conference and based its findings upon the report submitted by Taubert and Reed (1978, see List of References) to NUSCO. Changes were also made in Section 8.3.2.2 because some personal communications were revised by the source upon review of the Final Report.

It is our understanding that once this material has been reviewed by Don Hunt, our contract with the Siting Council will be complete.

If you have any additional comments or questions, please do not hesitate to contact me. It has been a pleasure working with the Council.

Sincerely yours,

Paul H. Kirshen

Paul H. Kirshen, Ph.D.
Project Manager

June 1978

RECEIVED

JUL 24 1978

Energy Facilities Siting Council

Errata Sheet
for
POTENTIAL IMPACTS ON THE CONNECTICUT RIVER
OF THE PROPOSED MONTAGUE NUCLEAR POWER PLANT

ERT REPORT NUMBER P3267

November, 1977

RELATED CORRES...

DOCKETED USNRC OCT 6 1978 Office of the Secretary Docketing & Service Branch

Pg. xiv	Line 10	Insert the following sentences "In particular, preliminary studies of shortnose sturgeon in the Holyoke Pool indicate that this species may spawn in close proximity to the proposed intake-discharge structure (Taubert and Reed 1978). ERT scientists believe, however, that the evidence is strong that in May 1977 spawning of the shortnose sturgeon (a rare and endangered species) occurred at or above rkm 189.0, the site of the proposed intake-discharge structure. Taubert and Reed (1978) also suggest this possibility. Since shortnose sturgeon larvae drift downstream as they mature, a strong potential larvae entrainment problem exists. Further studies should be conducted to estimate this potential impact."
Pg. xiv	Line 19-21	Delete "It is possible, ...(Reed 1977a, Taubert 1977)" Insert "It is possible that shortnose sturgeon may ascend to Turners Falls Pool since other sturgeon species have ascended fish ladders in California and Russia (U.S. Army Corps of Engineers, 1969-1976; Kipper and Mileiko, 1962).
Pg. 2-3	Line 16	Turners Falls Reservoir, Year Constructed or in Operation insert "1798"
Pg. 2-3	Line 18	Holyoke Reservoir, Year Constructed or in Operation "1900" replace with "1855"
Pg. 2-38	Line 21	Replace "1965" with "1955"

Pg. 2-40	Lines 2 & 7	Creeco (1977)	instead of	Greco (1977)
Pg. 6-18	Line 21	will not change substantially	instead of	will change substantially
Pg. 6-28	Lines 5 & 6	mg/l	instead of	ug/l
Pg. 6-30	Lines 7 & 28	NUSCO, 1977	instead of	Northeast Utilities 1974

Pg. 6-30	Lines 25 & 26	Delete "Since shad tend to actively avoid a plume by swimming directly beneath it." (Reed 1977)
Pg. 6-31	Line 11	Stira, undated instead of Reed 1977
Pg. 6-31	Line 13	"Preliminary studies of shortnose sturgeon in the Holyoke Pool indicate that this species may spawn in close proximity to the proposed intake-discharge structure (Taubert and Reed 1978). ERT scientists believe, however, that the evidence is strong that in May 1977 spawning of the shortnose sturgeon (a rare and endangered species) occurred at or above rkm 139.0, the site of the proposed intake-discharge structure. Taubert and Reed (1978) also suggest this possibility. Since shortnose sturgeon larvae drift downstream as they mature, a strong potential larvae entrainment problem exists. Further studies should be conducted to estimate this potential impact." instead of "Preliminary studies. . . .power plant entrainment."
Pg. 6-31	Line 20	NUSCO, 1977 instead of Northeast Utilities 1974
Pg. 6-31	Line 23	unsatisfactory instead of unsupported
Pg. 8-3	Line 23	Stira undated instead of Reed 1976
Pg. 8-4	Line 2	NUSCO, 1977 instead of Northeast Utilities 1974
Pg. 8-4	Lines 27-30	Delete "It is likely . . .sites (Reed 1977)" Replace with "It is possible that shad may ascend the river to its highest attainable point and that Turners Falls Pool may provide numerous spawning sites."
Pg. 8-6	Lines 23-29	Delete "The presence of shortnose sturgeon eggs and . . .approximately 450 fish." Insert "The presence of shortnose sturgeon larvae and adults in the Holyoke Pool indicates that this endangered species may spawn in the area. The applicants ER has paid little attention to this possibility."
Pg. 8-7	Line 21	NUSCO, 1977 instead of Northeast Utilities 1974
Pg. 8-7	Line 32	not only instead of not
Pg. 8-8	Section 8.3.2	DELETE ENTIRE SECTION. REPLACE WITH ATTACHMENT
Pg. 8-13	Line 13	NUSCO (1977) instead of NUSCO (1974)
Pg. 8-13	Line 22	not substantially instead of not
Pg. 8-20	Para. 8.4.3	Replace with the following insert

"8.4.3 Water Quality

Even if the water quality at the Turners Falls intake site is of poorer quality than the Holyoke Pool intake location, the fully-mixed concentrations downstream of the confluence of the Deerfield and Connecticut Rivers should be the same. The only effect that would occur if the quality of the Turners Falls intake water was poorer is that the concentrations of pollutants would be greater in the effluent, in the mixing zone, and Turners Falls Pool, but not downstream of the confluence."

Pg. 8-20 Line 13	Environmental Report instead of Environmental Report (NUSCO, 1977)
Pg. 8-20 Line 16	spawn demersal eggs which are not adhesive, and therefore may be subject to entrainment. instead of spawn demersal eggs which would not be subject to entrainment.
Pg. 8-20 Lines 22-23	Sturgeon may ascend to Turners Falls Pool (U.S. Army Corps of Engineers 1969-1976; Kipper and Mileiko 1962). instead of "Sturgeon may ascend to Turners Falls Pool and remain there (Reed 1977a and Taubert 1977)"
Pg. 8-20 Lines 23-27	Delete "This possibility . . .by sturgeon."
Pg. 8-20 Line 30	NUSCO 1977 instead of Northeast Utilities 1974
Pg. 8-21 Lines 1-3	Delete "Dr. Roger Reed (1977) of the . . . . point to spawn." Insert "After construction of the new fish ladder in 1981, shad may ascend the river to its maximum attainable point to spawn."
Pg. 8-30 Table 8.7.1	Title should read "Observed Mean Monthly and Annual Flows in cfs"
Pg. 8-33 Line 13	not only instead of not
Pg. 8-33 Line 27	The Holyoke Pool appears instead of "The upper portion of the Holyoke Pool"
Pg. 8-33 Line 33 - end of page	Taubert and Reed (1978) indicate that shortnose sturgeon may spawn in close proximity to the proposed intake-discharge structure. instead of "Yet the preliminary conclusion reached by Taubert and Reed (1977) . . . sturgeon"
Pg. 8-34 Lines 1-6	delete and replace with "ERT scientists believe that the evidence is strong that in May 1977 spawning

of the shortnose sturgeon (a rare and endangered species) occurred at or above rkm 189.0, the site of the proposed intake-discharge structure. Taubert and Reed (1978) also suggest this possibility. Since shortnose sturgeon larvae drift downstream as they mature, a strong potential larvae entrainment problem exists. Further studies should be conducted to estimate the potential impact."

Pg. 8-34	Lines 9-10	Replace "Reed (1977) . . . .Russia." by "Other sturgeon species have ascended fish ladders in California and Russia (U.S. Army Corps of Engineers, 1969-1976, Kipper and Mileiko, 1962).
Pg. 8-34	Line 13	Delete Taubert 1977 and Reed 1977
Pg. 9-2	Lines 4-5	Delete "and establish a breeding population (Reed 1977a and Taubert 1977)" Replace with (US Army Corps of Engineers 1969-1976, Kipper and Mileiko, 1962)
Pg. 9-7	Line 20	not only instead of not
Pg. 9-8	Lines 7-17	replace "The number of eggs. . . .potential entrainment." by "The preliminary conclusion reached by Taubert and Reed (1978) indicates that shortnose sturgeon may spawn in close proximity to the proposed intake-discharge structure. ERT scientists believe, however, that the evidence is strong that in May 1977 spawning of the shortnose sturgeon (a rare and endangered species) occurred at or above rkm 189.0, the site of the proposed intake-discharge structure. Since shortnose sturgeon larvae drift downstream as they mature, a strong potential larvae entrainment problem exists. Further studies should be conducted to estimate the potential impact."
Pg. 9-8	Lines 20-21	Delete "Reed. . .Russia".
Pg. 9-8	Lines 23-24	Delete "in the favorable habitat (Taubert 1977 and Reed 1977)" Replace with (U.S. Army Corps of Engineers, 1969-1976, Kipper and Mileiko, 1962)

Section 8.3.2 ATTACHMENT

8.3.2 Critique of Additional Studies Provided by the Applicant

In the summary and conclusion section of the Final EIS (NRC 1977), the staff of the Nuclear Regulatory Commission instructed the applicant to provide further studies "of the distribution and relative abundances of shad and shortnose sturgeon larvae and young juveniles in the Holyoke Pond . . ." (page iii). In response to this request, the applicant has contracted for and made available several additional studies of American shad and one of shortnose sturgeon. These studies are reviewed below and the potential impact of Montague upon resident game species is addressed.

8.3.2.1 American Shad (Alosa sapidissima) Studies

A number of studies on the American shad in the Holyoke Pool have become available since publication of Supplement Nine to the Montague ER. Study programs conducted by the University of Massachusetts Cooperative Fishery Research Unit (MCFRU) (Gilmore 1975; Foote 1976; Stira undated; Kuzmeskus 1977 and Reed and Cave 1977) and the New England Aquarium (Barker, Partain and Germane 1977) address various aspects of American shad reproduction, survival, distribution and life history in the Holyoke Pool. A report written by Stone and Webster Engineering Corporation (1977) uses data presented in the above studies in analyzing the impact of shad egg entrainment by Montague Power Plant on the adult shad population. The Stone and Webster report (S&W 1977) in many respects revises the impact analysis found in the ER through addition of the field sampling data collected in 1974 and 1975 by Gilmore (1975) and Kuzmeskus (1977), respectively.

The following discussions will review the impact analysis found in the S&W report with respect to an independent analysis of the MCFRU data and conclusions and will discuss the overall adequacy of these analyses for predicting the impact of Montague Power Plant on Connecticut River shad.

Entrainment Analyses - Overview

The S&W (1977) entrainment report presents two separate impact analyses. One analysis uses the Horst (1975) model for translation of the number of entrained eggs into the number of adults potentially resulting from those eggs. This is a density-independent analysis, because it assumes no factors operate to compensate for the additional mortality of eggs caused by the power station. The other method of analysis provided by S&W (1977) involves use of a density-dependent model that relates survival of each year-class to the density of spawning adults (and, therefore, egg production) in that year.

These methods of analysis differ in the type of result produced. The density-independent model deals only with loss in a single year and does not directly relate loss of adults in one year-class to effects on subsequent year-classes. The density-dependent model allows consideration of the effects of loss in one year in relation to subsequent years, thus providing an indication of the cumulative impact of the plant.

The major inadequacy in the analysis presented in the S&W (1977) report is its failure to consider data for the shad runs of 1976 and 1977. Improvements of the Holyoke Dam fishlift prior to the 1975 shad run (Foote 1976) and, again, prior to the 1976 run (Leggett 1977) have resulted in increased passage of fish above the dam. This was obvious in 1975 when over 115,000 fish were lifted as opposed to a previous high of 65,527 shad in 1970. In 1976 the number of shad lifted was three times the 1975 figure (350,000 fish, Leggett 1977). In 1977 the number of shad lifted was nearly 200,000. These data indicate that the bases of the S&W report are obsolete and not representative of the situation if Montague were in operation at present. This is further illustrated by the fact that in 1974 approximately 53,000 shad entered the Holyoke Pool of which, assuming a 2.7:1 sex ratio (Foote 1976), 14,000 were female. In 1975 approximately 25,000 females entered the Holyoke Pool (S & W 1977). However, S&W (1977) estimated that in 1975, nearly three times as many eggs drifted past the intake site as in 1974, indicating that nearly twice as many eggs per female were spawned above the intake in 1975.

Although the change in upstream-downstream spawning intensity may have been temperature-related (Layzer 1974), it could also have been the result of increased population pressure in the lower Holyoke Pool "forcing" more spawning above the intake. With the increased population sizes in 1976 and 1977, proportionally more eggs may have been spawned above the intake. Data to support or refute such an hypothesis were not collected in 1976-77; however, the possibility that increased Holyoke Pool population densities may initiate greater use of upstream spawning sites should be considered.

Another factor that could contribute to the inappropriateness of the analysis in the S&W (1977) report is the planned construction of fish ladders at the Turners Falls Dam in 1981. This will extend the shad runs into new areas of the river upstream of Montague Power Plant resulting in another shift in distribution of spawning activity. Increased spawning above Turners Falls is likely to result in the exposure of larger numbers of shad larvae and downstream migrant juveniles to possible entrainment or impingement at Montague Nuclear Power Plant.

Density-Independent Analysis - Critical Review

The results of the S&W (1977) density-independent entrainment analyses rely on a number of assumptions, but the data available at present would not seem to support several of these assumptions. The analyses provided may underestimate the potential loss of fish attributable to the power station. Several of the key assumptions are discussed below.

Larval Entrainment. The S&W (1977) report does not consider shad larval entrainment, because of the collection of very few larvae in plankton net tows. Reed and Cave (1976) have established that shad larvae concentrate in shallow areas along river banks and are therefore not available to plankton tow net; however, they are likely to be entrained by the shoreline intake as they drift past. Thus, the S&W (1977) report fails to consider a potentially large source of entrainment impact on the shad population.

Number of Eggs Entrained. Because of the way in which shad egg data were collected in 1975, the density of eggs passing the power plant (and thus the number of eggs entrained) was calculated by S&W (1977) based on integration of densities over a 6-hour period. However, the 24-hour data collected by Kusmeskus (1977) indicate that eggs were present in the water column throughout the day. Although daytime egg densities were substantially lower than those observed at night, omission of day-time egg densities from entrainment calculation may represent an under-estimate of the effects of entrainment. However, the S&W (1977) entrainment calculation was also based on density data for that portion of the sampling grid that would probably be affected by the intake. The exact zone of influence of the intake is not known. Since egg densities on the sampling transect were highest for the two stations for which entrainment was calculated, the S&W (1977) entrainment calculation, in this respect, does maintain conservatism.

Sex Ratio. The use of a 3.9:1 male-to-female sex ratio in the density-independent analysis will, to some extent, offset the tendency to underestimate loss in the previous two assumptions. The ratio of males to females has historically varied from 1.5:1 to 3.9:1 (Foote 1976). Use of the 3.9:1 ratio, therefore, constitutes use of the historical maximum. In the equivalent adults model (Horst 1975) this will result in calculation of a higher egg-to-adult survival and, as a result, a higher estimate of potential adult loss due to the power plant.

Density-Dependent Analysis - Critical Review

The density-dependent analysis provided by S&W (1977) relies on several additional assumptions. In general, the comments on larval entrainment and the number of eggs entrained as stated above are also applicable to this case. The assumptions involved in the density-dependent analysis are discussed below.

Lift Ratio. In order to extend the data base for Holyoke Pool shad runs, the S&W (1977) report calculated an average lift ratio of 0.1718 shad lifted for each shad entering the Connecticut River. Since this is an average using lift ratio data from prior to the 1975 and 1976 modifications, it probably represents a low estimate of the present and future lift ratio. The effects of this on the density-dependent model are undefinable.

Use of the lift ratio to extend the data base in Figure 6.2-1 (S & W 1977) for the stock-recruitment function of the density-dependent model is of questionable value. It assumes a situation that did not exist (shad passage over the dam in large numbers), and that, had it existed, would have potentially altered the stock-recruitment relationship. However, its use is understandable since it provides the only means by which a sufficient number of data points could be generated for parameterizing the model.

Sex Ratio. As stated previously, the historical range in sex ratio has been reported at 1.5:1 to 3.9:1 (Foote 1976). Use of the 3.9:1 ratio in determining the number of females lifted over the dam for all years tends to produce low estimates of the number of spawning females for most years. This could result in a significant departure of the S&W stock-recruitment function from the most realistic case.

Issues

The analysis of American shad egg entrainment at Montague Nuclear Power Plant provided by S&W (1977) has incorporated several assumptions that can result in underestimation of the impact of the power station.

The most notable omission in the S&W (1977) analyses was the consideration of larval entrainment. In light of conclusions reached by Reed and Cave (1976) that shad larvae are more abundant in eddies and along the river bank, the potential larval entrainment of shad should be addressed.

The greatest flaw in the additional study produced by S&W (1977) was the use of the pre-1976 data throughout the analyses. The 1976 and 1977 MCFRU data will be presented to NUSCO in final report form in December, 1977. The data for these two years represent the present and future shad densities in the pool since the lift improvements were made in 1976. When the lift at Turners Falls Dam is installed in 1981, another change in shad densities will occur and pre-1981 data will incorrectly represent the situation.

Because of the use of pre-1976 data and many assumptions, the entrainment estimate in the additional S&W (1977) study does not adequately demonstrate that entrainment of shad eggs and larvae will be negligible.

8.3.2.2 Additional Study of Shortnose Sturgeon (*Acipenser brevirostrum*)

The United States Department of the Interior and the Commonwealth of Massachusetts list the shortnose sturgeon as an endangered species. This status requires that the "critical habitat" for the species be protected from further alteration by man (see Appendix B) and that the entrainment impact of the proposed Montague facility upon the species be considered.

State of Knowledge

Relatively little is known of the life history and biology of the shortnose sturgeon, particularly of the population in the Connecticut River. In the United States, a permit is required to study and handle the shortnose sturgeon and dissection of live specimens is not allowed.

The major contribution to knowledge of the species has been made by M. D. Dadswell of the Canadian Fisheries and Marine Services, studying a population in the St. John River, Canada (Dadswell 1976). The shortnose sturgeon is an anadromous, benthic-feeding carnivore. In the St. John River and most United States rivers in which it is found, the shortnose sturgeon co-occurs with the Atlantic sturgeon (Acipenser oxyrhynchus oxyrhynchus). The adult shortnose sturgeon is taxonomically distinguished from the Atlantic sturgeon by several observable traits. However, young sturgeon are only reliably distinguished by gut color, requiring dissection (Gorham and McAllister 1977).

The diet of the juvenile shortnose sturgeon consists mainly of insect larvae and small cru[illegible]ans. Mature shortnose sturgeon convert to a diet of mainly mollusc[illegible], du[illegible] development of a gizzard in later years. Shortnose sturgeon are benthic feeders at all ages (Dadswell 1976).

The species is slow growing and long-lived; the maximum age attained is probably 70 years. Sexual maturation in the St. John River population does not occur until age eight and females spawn a minimum of once every three years thereafter. Shortnose sturgeon appear to choose spawning sites in the upper estuary of the St. John River located adjacent to deep turbulent sections of the river or over mud bottoms on flooded land (Dadswell 1976). Dadswell (1976) observed that ripe fish move to areas of turbulence and spawning takes place at the peak of the flood when temperatures average 10°C and the water is extremely turbid.

Shortnose Sturgeon in the Holyoke Pool

A preliminary study of the biology of the shortnose sturgeon in the Connecticut River was conducted by the MCFRU in 1976 and 1977 and funded by NUSCO in 1977 (Taubert and Reed 1978). The Connecticut River population is different from the St. John River population in that it is restricted for the most part to a 26-mile segment of the river between Holyoke Dam and Turners Falls Dam. Thus, shortnose sturgeon in the Holyoke Pool are considered to be nonanadromous by Taubert and Reed (1978). There is some movement of shortnose sturgeon between the Holyoke Dam and the mouth of the Connecticut River. Since construction of the first effective fish passage facility in 1955, 26 shortnose sturgeon have been lifted above Holyoke Dam (Taubert and Reed 1978). In addition, it is possible that larvae and juveniles wash over the Holyoke Dam and migrate downstream.

Another difference between the Holyoke Pool and St. John River populations is that the shortnose sturgeon in the Holyoke Pool are found without the Atlantic sturgeon. This may be important for scientific study of the species, especially early life history.

Taubert and Reed (1978) presented a brief history of the shortnose sturgeon. A 1942 M.S. thesis by McGabe indicated that gill netting operations in the early 1900's removed 100 shortnose sturgeon from the river in one day. Shortnose sturgeon are among the specimens in the University of Massachusetts fish collection, and miscellaneous catches of shortnose sturgeon have been made by MCFRU (Taubert and Reed 1978).

The 1977 field studies conducted by the MCFRU included gill netting, seining and radio tagging to determine the distribution of shortnose sturgeon adults in the Holyoke Pool. In addition, egg and larvae sampling was conducted by bottom set plankton nets, artificial substrates and by benthic pump to investigate ichthyoplankton distribution and possible spawning locations in the Holyoke Pool. The results of these field studies as reported by Taubert and Reed (1978) are presented below.

A total of 115 shortnose sturgeon were caught by gill nets between 13 April and 20 May 1977. Among these were 11 reproductively mature males and 4 reproductively mature females. The males were caught within 0.5 km of rkm 190.3 on 4, 7 and 9 May and the females were all caught above rkm 177.0, from rkm 179.7 to rkm 194, on 24 and 30 April and 1 May. One spent female was also caught on 8 May at rkm 168.0. Taubert and Reed (1978) concluded that these catches indicate the potential for spawning from at least 24 April to 9 May.

A total of 5 shortnose sturgeon were radio tagged by MCFRU for 13-66 days. However, because of the large number of radio malfunctions results were not utilized. No shortnose sturgeon eggs were caught in 1977 and only the bottom set plankton net was successful in obtaining shortnose sturgeon larvae. A total of seven larvae were caught; 3 at rkm 190.0 (21 May), 1 at rkm 189.0 (19 May), 2 at rkm 184.0 (21 May) and 1 at rkm 179.2 (23 May). Taubert and Reed (1978) used yolk sac size, eye diameter and development, and amount of connection between the head and yolk sac to estimate the age of each larva. The last larva captured was older than all the others and from a different hatch date. Thus this larva was discarded from the analyses. Then they backcalculated 13 days from the catch dates of the 6 freshly hatched larvae to arrive at a probable spawning period of 6 to 10 May 1977. The use of 13 days for backcalculating was based on literature values and on the river temperature recorded during the supposed spawning period.

Based on the capture of reproductively mature male shortnose sturgeon at rkm 189.9 to 190.8 and the calculated fertilization dates of larvae, Taubert and Reed (1978) reached the conclusion that at least one shortnose sturgeon spawning was above rkm 184.0 between 6 and 10 May 1977 "where the substrate is a mixture of gravel, rubble, and boulders; there are several deep holes, and the current is relatively fast." They also pointed out the possibility of a major spawning ground above rkm 189.0 but did not dismiss the possibility of shortnose sturgeon spawning at other locations in the Holyoke Pool.

Issues

A number of issues are raised by the MCFRU studies of the shortnose sturgeon population. The Holyoke Pool may be considered a "critical habitat" for the shortnose sturgeon (see Appendix B) and, therefore, should not be disturbed according to the United States Endangered Species Act of 1973 (PL 93-205). The preliminary conclusion reached by Taubert and Reed (1978) based upon the 1977 field studies is that "the only known spawning of shortnose sturgeon during 1977 took place above rkm 184.0 with the possibility of a major spawning ground above rkm 189.0". ERT scientists feel that this conclusion is overly conservative based upon the following factors reported by Taubert and Reed (1978): 1) Four of the six (67%) freshly hatched shortnose sturgeon larvae were captured at or above rkm 189.0; 2) 11 reproductively mature males were found within 0.5 km of rkm 190.3 on 4, 7 and 9 May 1977; 3) Backcalculations place the larvae fertilization dates between 6 and 10 May 1977; and 4) Average river temperatures and flows during that period agree with spawning conditions reported in the literature for shortnose sturgeon and other species of North American sturgeon.

ERT scientists believe the evidence is strong that in May 1977 spawning of shortnose sturgeon occurred at or above rkm 189.0, which is the site of the proposed intake discharge structure. Taubert and Reed (1978) also suggest this possibility.

The shortnose sturgeon spawn demersal eggs which are not adhesive, and therefore could pose a potential egg entrainment problem. Since shortnose sturgeon larvae drift downstream as they mature, a potential larval entrainment problem exists. Further studies should be conducted to expand the ichthyoplankton data base and to estimate the extent of this potential entrainment.

After the new fish ladder is constructed at Turners Falls Dam in 1981, shortnose sturgeon may ascend to Turners Falls Pool and remain there. This possibility is based upon two facts: (1) Studies show that other sturgeon species have ascended fish ladders in California and in Russia (U.S. Army Corps of Engineers 1969-1976; Kipper and Mileiko 1962); and (2) Turners Falls Pool may or may not provide the necessary habitat for shortnose sturgeon.

8.3.2.3 Other Resident Species

A major omission from the impact assessments in the ER (NUSCO 1977) and the several additional studies was the impact of Montague Nuclear Power Plant on resident species other than American shad and shortnose sturgeon. Resident game species are of special concern because of their economic value. Some game species are the objects of costly state and federal hatcheries and stocking programs. Forage species are of concern as the basis of the food chain for other major species.

Relatively few studies of other resident species in the Holyoke Pool have been conducted. Four studies have been reviewed for this discussion: Leonard 1968, Belusz 1968, Armour 1966, and Jonasch and Shapiro 1975.

Eggs of most other resident species are demersel or spawned directly into the substrate and therefore may or may not be subjectto entrainment.

Larvae of the same species are buoyant and may be subject to entrainment if spawned upstream of the proposed intake location. Further study of resident fish spawning areas should be conducted to address these problems.

Stocking programs for trout and salmon represent large investments of state and federal money (see Section 2.4.3). The interference of the proposed Montague Station with these programs has not been addressed, but merits consideration.

The potential entrainment of yellow perch, walleye, white perch, and northern pike larvae should be considered. The potential entrainment of white sucker, fallfish, spottail shiner and various minnow larvae should also be considered because these species are valuable forage for other resident species. If entrainment of these forage species is found to be substantial, the effect might be felt throughout the food chain.

Finally, the combined effects of the Northfield Pumped Storage facility and the Montague Nuclear Power Plant upon aquatic ecology have not been adequately addressed. If a major entrainment problem exists at the Northfield intake already, the additional impact of Montague operations might be harmful to some species.

RECEIVED

RELATED CORRESPONDENCE

JUL 24 1978

Energy Facilities Siting Council

DOCKETED USNRC OCT 6 1978

LIST OF REFERENCES

Algren, J., Attorney, Office of the New Hampshire Attorney General. 26 July 1977. Personal Communication.

Armour, C. L. 1966. Some Aspects of Bottom Types and Benthos of 32-mile Segment of the Connecticut River. M.S. Thesis. U. Mass. 50 p.

Ball, B., Vermont Yankee Nuclear Power Corporation. 21 October 1977. Personal Communication.

Barker, A., Partain, S. and F. Germano. 1977. The Collecting, Culturing and Swimming Ability of Larval American Shad (Alosa sapidissima). New England Aquarium. Final Report to Northeast Utilities, P.O. Box 270, Hartford, Connecticut 06101

Belusz, L. C. 1968. The Relationship of Bottom Organisms to the Food Chain of Five Fish Species in the Connecticut River above the Holyoke Dam, Massachusetts. M.S. Thesis. U. Mass. 64 p.

Brenner, P., Manager, Connecticut Valley District, Massachusetts Department of Fish and Wildlife. 2 August, 1977. Personal Communication.

Brezosky, P. E., Supervisor, Fisheries Management, New Hampshire Fish and Game Department. 1 August 1977. Personal Communication.

Carlson, J., New England River Basins Commission. August 1977. Personal Communication, Boston.

Chandler, E., Attorney, Massachusetts Department of Water Resources. 8 August 1977. Personal Communication.

Center for Environment and Man, Inc., December 1975. A Framework for Environmental Impact Evaluation for Electric Power Systems in a River Basin. Report to the Federal Power Commission.

Connecticut River Basin Coordinating Committee (CRBCC), June 1970. Comprehensive Water and Related Land Resources Investigation, Connecticut River Basin. Prepared by the U.S. Army Corps of Engineers, New England Division. Vols. I-IX.

Cooper, S., Engineer, Reservoir Regulation, U.S. Army Corps of Engineers, New England Division. 1977. Personal Communication.

Cooperman, A. Mass. Division of Water Pollution Control. 1977. Personal Communication.

Corey, N., Chief System Dispatcher, NEPCO, 1977. Personal Communication.

Crecco, V., Fishery Biologist, Connecticut Department of Environmental Protection. 1 August 1977. Personal Communication.

Dadswell, N. J. 1976. Biology of the Shortnose Sturgeon (Acipenser brevirostrum) in the Saint John River Estuary, New Brunswick, Canada. Unpublished manuscript. Fisheries and Environment Biological Station, St. Andrews, New Brunswick, Canada. 77p.

Ferreira, T., 1977. NUSCO. Personal Communication.

Foote, P. S. 1976. Blood Lactic Acid Levels and Age Structure of American Shad (Alosa sapidissima) Utilizing the Holyoke Dam Fishlift, Massachusetts, 1974 and 1975. M.S. Thesis, U. Mass.

Gilmore, K. S. 1975. Spawning Areas and Egg Distribution of American Shad (Alosa sapidissima) in the Connecticut River between Holyoke and Turners Falls, Mass. M.S. Thesis, U. Mass.

Gorham, S. W. and D. C. McAllister. 1974. The Shortnose Sturgeon (Acipenser brevirostrum) in the Saint John River, New Brunswick, Canada, a Rare and Possibly Endangered Species. Syllogeus No. 5. National Museums of Canada.

Isaacs, R., Engineer, Massachusetts Division of Water Pollution Control. 1977. Personal Communication.

Jonasch, J. J. and S. M. Shapiro, 1975. Northfield Mountain Pumped Storage Hydroelectric Project. Resident Fish Study. Progress Report No. 4 to Northeast Utilities, P.O. Box 270, Hartford, Connecticut 06101

Kipper, Z. M. and I. V. Mileiko. 1962. Fishways and Hydroelectric Developments of the USSR (not translated). Published in Moscow. Available from U.S. Library of Congress (#SH153.K5)

Kusmeskus, D. M. 1977. Egg Production and Spawning Site Distribution of the American Shad (Alosa sapidissima) in the Holyoke Pool, Connecticut River, Massachusetts. M.S. Thesi , U. Mass.

Lance, R., Coordinator, Atlantic Salmon Program, U.S. Fish & Wildlife Service. 1 August 1977, Personal Communication.

LaRosa, T., Attorney, Vermont Department of Environmental Protection. 10 August 1977, Personal Communication.

Layzer, J. B. 1974a. Spawning Sites and Behavior of American Shad (Alosa sapidissima) in the Connecticut River Between Holyoke and Turners Falls, Massachusetts, 1972. M.S. Thesis, University of Massachusetts.

Layzer, J. B. 1974b. Northfield Mountain Pumped Storage Hydroelectric Project Anadromous Fish Study. Progress Report No. 2 to Northeast Utilities, P.O. Box 270, Hartford, Connecticut 06101

Leggett, W. C. 1976. Migration and Population Dynamics of Shad in Merriman, D. and L. M. Thorpe (eds), The Connecticut River Ecological Study. 1976. American Fisheries Society, Washington, D.C.

Leggett, W. C., 1977. Density Dependence, Density Independence, and Recruitment in the American Shad (*Alosa sapidissima*) Population of the Connecticut River, from *Proceedings of the Conference on Assessing the Effects of Power-Plant Induced Mortality on Fish Populations* (Webster Van Winkle, ed.) Oak Ridge National Laboratory Gatlinberg, Tennessee. 3-6 May 1977, Pergamon Press.

Leonard, J. B. 1968. The Composition and Distribution of Fish in a 32-mile Segment of the Connecticut River, Massachusetts in 1965. M.S. Thesis. U. Mass. 69 p.

Lesch, P. Federal Power Commission. 1977. Personal Communication.

Marcy, C., Jr. 1976. Fishes of the Lower Connecticut River and the Effects of the Connecticut Yankee Plant, from *Connecticut River Ecological Study: The Impact of a Nuclear Power Plant*, D. Merriman and L. M. Thorpe (eds.), American Fisheries Society, Washington, D.C.

Mass. Executive Office of Environmental Affairs. 1977. Massachusetts Water Supply Policy Study.

Mass. Division of Water Pollution Control. 1973. Water Quality Survey, Connecticut River. Massachusetts Water Resources Commission.

Mass. Division of Water Pollution Control. 1974. Rules and Regulations for the Establishment of Minimum Water Quality Standards and for the Protection of the Quality and Value of Water Resources. Mass. Water Resources Commission.

Mass. Division of Water Pollution Control. 1975. The Connecticut River Basin, Water Quality Management Plan. Massachusetts Water Resources Commission.

McKee, J. E., and H. W. Wolf (ed.) 1963. Water Quality Criteria. The Resources Agency of California, State Water Quality Control Board, Sacramento, CA. Pub. #3A.

Merriman, D., and L. M. Thorpe (eds.) 1976. *Connecticut River Ecological Study: The Impact of a Nuclear Power Plant*. Washington, D.C. American Fisheries Society.

Millette, A., Engineer, NEPCO. 1977. Personal Communication.

New England River Basins Commission. July, 1973. An Environmental Reconnaissance of Alternative Pumped Storage Sites in New England.

Nichols, D., Engineer, NEPCO. 1977. Personal Communication.

Northeast Utilities Service Company. 1977. Environmental Report, Construction Permit Stage, Montague Nuclear Power Station, Units 1 and 2, Vols. 1-3, Appendices Vol. 1 and 2.

Process Research, Inc. 1976. Environmental Impact Assessment, Piscataway Regional Wastewater Management Facility, Draft. Prepared for the Washington Suburban Sanitary Commission.

U.S. Geological Survey. 1976. Water Resources Data for Massachusetts and Rhode Island. Water Data Report MA-RI-76-1.

U.S. Nuclear Regulatory Commission. February, 1977. Final Environmental Statement Related to Construction of Montague Nuclear Power Station Units 1 and 2.

Reed, R. and J. Cave. 1976. 1976 American Shad Research - Connecticut River, Massachusetts II. American Shad Larval Distribution and Relative Abundance. Massachusetts Cooperative Fishery Research Unit, Amherst, Massachusetts.

Scott, W. B., and E. J. Crossman. 1973. Freshwater Fishes of Canada, Bulletin 184 Fisheries Research Board of Canada. 966p.

Shapiro, S. M. and Jonasch, J. J. 1975. Northfield Mountain Pumped Storage Hydroelectric Project Resident Fish Study, 1 March 1974 - 28 February 1975. Report to Northeast Utilities, PO Box 270, Hartford, Connecticut 06101.

Smith, J., Engineering Planning Branch, U.S. Army Corps of Engineers, New England Division, 1977.

Stira, R. J. No date. Sinking Rate and Drift Distance of Eggs of American Shad (*Alosa sapidissima*) in the Connecticut River, Massachusetts. Special Project, Massachusetts Cooperative Fishery Research Unit, Amherst, Massachusetts.

Stone & Webster Engineering Corporation. 1977. Entrainment Analyses of Shad Eggs in the Connecticut River, Boston, Mass.

Taubert, B. D. and R. J. Reed. 1978. Observations of Shortnose Sturgeon (*Acipenser brevirostrum*) in the Holyoke Pool, Connecticut River, Massachusetts. Final Report to Northeast Utilities, PO Box 270, Hartford, Connecticut 06101

Thomann, R. V. 1972. Systems Analysis and Water Quality Management. McGraw-Hill, N.Y.

U.S. Army Corps of Engineers, 1969-1976. Annual Fish Passage Reports - Columbia River Project.

U.S. Army Corps of Engineers, New England Division. 1976. Northeastern United States Water Supply Study Final Environmental Statement; Northfield Mountain and Millers River Diversion.

U.S. Environmental Protection Agency. 1976. Quality Criteria for Water. Pre-publication copy.

U.S. Federal Power Commission. 1976. Connecticut River Basin, Office of Energy Systems Report.

U.S. Geological Survey. 1965. Water Resources Data for Massachusetts, New Hampshire, Rhode Island, Vermont.

U.S. Geological Survey. 1975. Water Resources Data for New Hampshire and Vermont. Water Data Report NH-VT-75-1.

U.S. Geological Survey. 1975. Water Resources Data for Massachusetts and Rhode Island. Water Data Report MA-RI-75-1.

THE COMMONWEALTH OF MASSACHUSETTS

ENERGY FACILITIES SITING COUNCIL

NRC PUBLIC DOCUMENT ROOM

MICHAEL S. DUKAKIS
GOVERNOR

CHRISTINE B. SULLIVAN
CHAIRMAN

DOCKET NUMBER
PROD. & UTIL. FAC. 50-496,497

RELATED CORRESPONDENCE

USNRC
SEP 22 1978

William G. Gordon
Regional Director
National Marine Fisheries Service
Federal Building
14 Elm Street
Gloucester, Massachusetts 01930

18 September 1978

Re: Montague Nuclear Power Station, Biological Opinion on Shortnose Sturgeon

Mr. Gordon:

I am writing to object to Northeast Utilities' request for suspension of your work on shortnose sturgeon. It is, of course, ironic that the company, which has so freely chastised federal and state agencies for regulatory delay, is now the proponent of delay. More importantly, however, we believe that there is no justification whatsoever for a hault in efforts to resolve questions concerning the impact of the Montague station upon an unique and endangered species. The experience of the Tellico Dam underscores the need for early action on these questions.

We hope that you will continue with scheduled work on shortnose sturgeon, and that you will render the findings and opinions as requested by the Nuclear Regulatory Commission.

EDWARD J. DAILEY
Director

EJD:hrm

782500125

NORTHEAST UTILITIES
THE CONNECTICUT LIGHT AND POWER COMPANY
THE HARTFORD ELECTRIC LIGHT COMPANY
WESTERN MASSACHUSETTS ELECTRIC COMPANY
HOLYOKE WATER POWER COMPANY
NORTHEAST UTILITIES SERVICE COMPANY
NORTHEAST NUCLEAR ENERGY COMPANY

P.O. BOX 270
HARTFORD, CONNECTICUT 06101
(203) 666-6911

September 13, 1978

Docket Nos. 50-496
50-497

Director of Nuclear Reactor Regulation
Attn: Mr. R. S. Boyd, Director
Division of Project Management
U. S. Nuclear Regulatory Commission
Washington,,D. C. 20555

Reference: (1) Letter, R. S. Boyd to W. G. Counsil dated August 11, 1978.

Gentlemen:

Montague Nuclear Power Station, Unit Nos. 1 and 2
Reactor Protection System Power Supplies

This letter is our response to Reference (1) which requested a commitment to install voltage and frequency protection systems for the reactor protection system power supplies. We have reviewed the postulated scenario regarding scram capability. This subject will be addressed by the Applicants with respect to NRC licensing criteria when the NRC Safety Evaluation is reassessed by the Staff's update review which is expected to be one year prior to the issuance of a construction permit for the Montague Units.

Should you have further questions, please contact us.

Very truly yours,

NORTHEAST NUCLEAR ENERGY COMPANY, ET AL

By: Northeast Nuclear Energy Company
Their Agent

W. G. Counsil

W. G. Counsil
Vice President

780880320

B001
SE
1/0