From: Bo Pham
To: "Andrew Stuyvenberg" <ALS3@nrc.gov>
Date: 2/29/2008 10:55:36 AM
Subject: Fwd: FW: Materials on Shortnose Sturgeon
cc: "Christopher Chandler" <CCC1.EXPO.Exchange>,<IPNonPublicHearingFile@nrc.gov>

drew,

below is an email from jill with the '79 BO, which we already have, and a summary of their position regarding the contention.

Bo Pham
Sr. Project Manager
Division of License Renewal
U.S. Nuclear Regulatory Commission
301-415-8450
O-11C12
bmp@nrc.gov

>>> "Lagace, Jill" <JBroc94@entergy.com> 2/28/08 4:12 PM >>>

Bo- I am not sure about Drew's email address. Could you also send this along to him? Thank you,
Jill

The attached information relates to the shortnose sturgeon and our arguments in the NRC proceeding relating to compliance with the Endangered Species Act -- they are (1) a copy of the 1979 Biological Opinion issued in the initial EPA proceeding on behalf of NMFS relating to sturgeon and the operation of Indian Point; (2) a copy of Mark Mattson's declaration in the current NRC proceeding; and (3) a copy of the ESA portion of our brief filed in the current NRC proceeding.

Our argument in the NRC proceeding hits essentially four points: (1) compliance of current operations with ESA requirements is beyond the scope of this proceeding (as are all compliance matters); (2) under NRC regulations, Entergy is required only to assess the impacts to sturgeon in the ER, and a sufficient analysis was included in the ER; (3) NY provides only speculation that IP operations will jeopardize the sturgeon, which is contradicted by the evidence provided by IP (including the biological opinion attached); and (4) IP is in compliance with the ESA by virtue of the 1979 biological opinion (attached above).

The issue of compliance comes down to whether Indian Point requires a Section 10 permit to authorize any incidental take of shortnose sturgeon. More specifically, the issue is whether a facility which had been issued a biological opinion under Section 7 of the ESA that concluded that the proposed activity was not likely to jeopardize the species in question (as is the case for Indian Point) needed to take the additional and redundant step of applying for an incidental take permit for the same activity under Section 10 of the ESA. In 1982, Congress clarified that it was not its intention to require both a Section 7 biological opinion and an incidental take permit for the same activity. Congress passed a clarifying amendment to this effect in 1982, and the legislative history cited in the attached excerpt of the brief underscores this point.

In NY's reply brief, they did not address this legal argument. Instead, they characterize the biological opinion as old and suggest that Entergy represented to DEC that it would obtain an incidental take permit. They also point out that Roseton and Bowline did obtain such permits (though that is beside the legal point of whether such a permit is in fact required). The thrust of their response to our ESA argument is that the ER does not provide sufficient information on which an impact assessment can be based, because there is no impingement sampling data after 1990. As set out in paragraph 35 of Mark Mattson's declaration, DEC discontinued the impingement sampling program for sturgeon after the installation of the new fish screens (which occurred in 1992).

****
IRS CIRCULAR 230 DISCLOSURE: To ensure compliance with requirements imposed by the IRS, we inform you that any U.S. tax advice contained in this communication (including any attachments) is not intended or written to be used, and cannot be used, for the purpose of (i) avoiding penalties under the Internal Revenue Code or (ii) promoting, marketing or recommending to another party any transaction or matter addressed herein.
********** **********
This message is intended only for the designated recipient(s). It may contain confidential or proprietary information and may be subject to the attorney-client privilege or other confidentiality protections. If you are not a designated recipient, you may not review, copy or distribute this message. If you receive this in error, please

notify the sender by reply e-mail and delete this message. Thank you.
****

Hearing Identifier: IndianPointUnits2and3NonPublic
Email Number: 429

Mail Envelope Properties (47DE58AE.HQGWDO01.OWGWPO04.200.2000006.1.1789DE.1)

Subject: Fwd: FW: Materials on Shortnose Sturgeon
Creation Date: 2/29/2008 10:55:36 AM
From: Bo Pham

Created By: BMP@nrc.gov

Recipients
"Christopher Chandler" <CCC1.EXPO.Exchange>
<IPNonPublicHearingFile@nrc.gov>
"Andrew Stuyvenberg" <ALS3@nrc.gov>

Post Office	**Route**
OWGWPO04.HQGWDO01	nrc.gov

Files	**Size**	**Date & Time**
MESSAGE	4326	2/29/2008 10:55:36 AM
TEXT.htm	7471	3/17/2008 11:40:30 AM
1979 Biological Opinion.pdf	907166	3/17/2008 11:40:30 AM
FINAL _ Mattson Declaration (1_18_08) (2).PDF	2550777	3/17/2008 11:40:30 AM
Brief Excerpt.pdf	251805	3/17/2008 11:40:30 AM

Options
Priority: Standard
Reply Requested: No
Return Notification: None
None

Concealed Subject: No
Security: Standard

drew,

below is an email from jill with the '79 BO, which we already have, and a summary of their position regarding the contention.

Bo Pham
Sr. Project Manager
Division of License Renewal
U.S. Nuclear Regulatory Commission
301-415-8450
O-11C12
bmp@nrc.gov

>>> "Lagace, Jill" <JBroc94@entergy.com> 2/28/08 4:12 PM >>>

Bo- I am not sure about Drew's email address. Could you also send this along to him? Thank you,

Jill

The attached information relates to the shortnose sturgeon and our arguments in the NRC proceeding relating to compliance with the Endangered Species Act -- they are (1) a copy of the 1979 Biological Opinion issued in the initial EPA proceeding on behalf of NMFS relating to sturgeon and the operation of Indian Point; (2) a copy of Mark Mattson's declaration in the current NRC proceeding; and (3) a copy of the ESA portion of our brief filed in the current NRC proceeding.

Our argument in the NRC proceeding hits essentially four points: (1) compliance of current operations with ESA requirements is beyond the scope of this proceeding (as are all compliance matters); (2) under NRC regulations, Entergy is required only to assess the impacts to sturgeon in the ER, and a sufficient analysis was included in the ER; (3) NY provides only speculation that IP operations will jeopardize the sturgeon, which is contradicted by the evidence provided by IP (including the biological opinion attached); and (4) IP is in compliance with the ESA by virtue of the 1979 biological opinion (attached above).

The issue of compliance comes down to whether Indian Point requires a Section 10 permit to authorize any incidental take of shortnose sturgeon. More specifically, the issue is whether a facility which had been issued a biological opinion under Section 7 of the ESA that concluded that the proposed activity was not likely to jeopardize the species in question (as is the case for Indian Point) needed to take the additional and redundant step of applying for an incidental take permit for the same activity under Section 10 of the ESA. In 1982, Congress clarified that it was not its intention to require both a Section 7 biological opinion and an incidental take permit for the same activity. Congress passed a clarifying amendment to this effect in 1982, and the legislative history cited in the attached excerpt of the brief underscores this point.

In NY's reply brief, they did not address this legal argument. Instead, they characterize the biological opinion as old and suggest that Entergy represented to DEC that it would obtain an incidental take permit. They also point out that Roseton and Bowline did obtain such permits (though that is beside the legal point of whether such a permit is in fact required). The thrust of their response to our ESA argument is that the ER does not provide sufficient information on which an impact assessment can be based, because there is no impingement sampling data after 1990. As set out in paragraph 35 of Mark Mattson's declaration, DEC discontinued the impingement sampling program for sturgeon after the installation of the new fish screens (which occurred in 1992).

****

IRS CIRCULAR 230 DISCLOSURE: To ensure compliance with requirements imposed by the IRS, we inform you that any U.S. tax advice contained in this communication (including any attachments) is not intended or written to be used, and cannot be used, for the purpose of (i) avoiding penalties under the Internal Revenue Code or (ii) promoting, marketing or recommending to another party any transaction or matter addressed herein.

****
****

This message is intended only for the designated recipient(s). It may contain confidential or proprietary information and may be subject to the attorney-client privilege or other confidentiality protections. If you are not a designated recipient, you may not review, copy or distribute this message. If you receive this in error, please notify the sender by reply e-mail and delete this message. Thank you.
****

HEARING-04160.001

Hearings # 4160

Ex. 271

UNITED STATES OF AMERICA
BEFORE THE
U.S. Environmental Protection Agency
Region II

TESTIMONY OF Dr. Michael J. Dadswell
on Behalf of
The National Marine Fisheries Service

Table of Contents

	Page
Introduction	1
Life History of Shortnose Sturgeon	1
The Shortnose Sturgeon In the Hudson River	6
Hudson River Power Plants Involved in This Hearing	9
Impact of Hudson River Power Plants on Shortnose Sturgeon	10
A. Entrainment	10
B. Impingement	10
Conclusion	16
References	i - ii
Attachment 1	iii

UNITED STATES OF AMERICA
BEFORE THE
U.S. Environmental Protection Agency
Region II

TESTIMONY OF Dr. Michael J. Dadswell
on Behalf of
The National Marine Fisheries Service

My name is Dr. Michael J. Dadswell. While I am presently employed at the Biological Station of Fisheries and Oceans Canada, St. Andrews, New Brunswick, as a Fisheries Research Scientist, I am submitting this testimony on behalf of the U.S. National Marine Fisheries Service (NMFS). The testimony has been reviewed and approved by appropriate employees of the NMFS and constitutes the NMFS opinion on the impact of the once-through cooling systems of the relevant utilities on the shortnose sturgeon. This opinion is required by sections 7(a) and (b) of the Endangered Species Act of 1973 as amended. My testimony does not necessarily represent the view of my employer.

The Shortnose Sturgeon

Life History of Shortnose Sturgeon.

The shortnose sturgeon, *Acipenser brevirostrum* LeSueur 1818 occurs in rivers, estuaries and the sea along the east coast of North America from the Indian River,

Florida, north to the Saint John River, New Brunswick, Canada (Scott and Crossman, 1973). In recent years reproducing populations have been studied in the Altamaha River, Georgia, the Hudson River, New York, the upper Connecticut River, Massachusetts, the Kennebec River, Maine, and the Saint John River, New Brunswick, Canada. The status of other populations elsewhere in its range ~~are~~ is poorly understood.

Three species of sturgeons occur in eastern North America. Of these, the shortnose sturgeon attains the smallest maximum size but occurs in the greatest diversity of habitat. Both the lake sturgeon (*Acipenser fulvescens*) and the Atlantic sturgeon (*Acipenser oxyrhynchus*) grow to sizes in excess of 200 cm and 100 kg. The former species is confined to freshwater and the latter spends the majority of its adult life at sea, returning to freshwater only to spawn. The shortnose sturgeon, on the other hand, has a maximum known total length of 143 cm and weight of 23 kg (Dadswell, in press). It lives mainly in estuarine or nearshore marine habitats but some populations migrate annually into fresh water and may remain there for over a year. One partially landlocked population is known (Taubert, pers. comm.) in Holyoke Pool, Connecticut River, Massachusetts.

Shortnose sturgeon, like other species of sturgeons, have an integument of thick, tough skin embedded with small denticles and five rows of large bony plates called scutes (Vladykov and Greeley, 1963). In young specimens the scutes project along their median line in a knife-edge, approximately 1 cm high, terminating in a hook. The scutes become progressively lower and smoother as the sturgeon ages. The sharp scutes of young sturgeon possibly serve as a form of predator defense.

All sturgeon have an effective hydrodynamic design well suited for their bottom-dwelling mode of existence. The body outline is semicircular, with the broad flat surface being ventral. The wide, sharp-nosed , concave snout of the juvenile shortnose sturgeon is possibly an adaptation creating a depressor effect, and allows the sturgeon to utilize currents for holding itself against the substrate, thereby maintaining its river bottom position with only a small expenditure of energy. The mouth is ventral, and protrusible, well suited for benthic feeding.

Habitat preference and migratory behavior of shortnose sturgeon are influenced by latitude and the physical nature of each river system. In northern locations the majority of the populations occur within the influence of estuaries. The populations moves upstream during spring and summer to spawn

and feed and a seaward migration takes place in fall (Dadswell, in press). Southern shortnose sturgeon populations appear to enter rivers only in spring to spawn and then return to coastal waters for the remainder of the year (Heidt and Gilbert, 1978).

Juveniles spend at least their first year in freshwater. In the Saint John River, Canada, they do not begin migratory behavior until reaching about 45 cm fork length.

Growth varies greatly depending on latitude, with the fastest growth occurring among southern populations. In the Saint John River, Canada, shortnose sturgeon attain 50 cm, 90 cm and 100 cm in length after 9,25 and 35 years of age respectively (Dadswell, in press). In the Hudson River it attains 50 cm and 90 cm after 5 and 15 years of age respectively (Greeley, 1937), whereas in the Altamaha River, Georgia it attains 50 cm after 2 years and 90 cm by 10 years of age (Heidt and Gilbert, 1978). Maximum known age is 67 years for females, but males seldom exceed 30 years of age (Dadswell, in press).

Female shortnose sturgeon mature between 50 and 60 cm fork length and spawn for the first time between 55 and 75 cm. Among northern populations 50 percent maturity and age of first spawning correspond with 15 and 18 years of age respectively (Dadswell, in press) but for southern populations the relative

ages are 5 and 8 years old (Heidt and Gilbert, 1978). Males mature between 45 and 50 cm fork length. Among northern populations males mature about age 10 but among southern populations maturity may occur as early as age 2 (Hedit and Gilbert, 1978). The minimum duration between spawnings of individual females is about 3 years but males may spawn yearly or every other year (Dadswell, in press). Fecundity of females is between 40,000 and 200,000 eggs and is directly correlated with total weight. The ratio among young adults is 1:1 but changes to a predominance of females among fish longer than 90 cm fork length.

Shortnose sturgeon spawn during early spring in the freshwater portions of estuaries or in rivers. Spawning is initiated at water temperatures of 10-12°C. Eggs are probably broadcast, and fertilization is external. Upon fertilization the eggs become adhesive and attach to bottom materials. Hatching takes place in thirteen days at 10°C. (Meehan, 1910). On hatching the larvae are about 7 mm in length, grey in color, and demersal (Taubert and Reed, in press). Early life history after yolk sac absorption is poorly known but limited studies indicate larvae and juveniles are demersal, remain in the deeper parts of river channels, and seldom enter the drift component of the river (Tauhert and Reed, in press). Recent studies have shown that mid-stream,

bottom current speeds of 40-65 cm/sec caused few larvae to enter the drift (Taubert and Reed, in press). The morphology and biology of shortnose sturgeon indicate that the species is well adopted to environmental situations characterized by large flow regimes.

The Shortnose Sturgeon in the Hudson River

Present knowledge of the biology of shortnose sturgeon in the Hudson River is based on work done there by the New York Conservation Department during the 1930's (Greeley, 1935, 1937; Currian and Ries, 1937), and by Texas Instruments (Hoff *et al.*, 1977) and the Boyce Thompson Institute (Dovel, 1978) during the 1970's. In general the combined findings support the statement that shortnose sturgeon in the Hudson River behave similarily to other studied populations (Dadswell, in press): spawning occurs in the upper estuary and nursery grounds and juveniles are concentrated there; with age and maturity the shortnose sturgeon exploit the lower estuary and the Atlantic Ocean in the approaches to the river; migration upstream occurs to overwintering sites and for feeding and spawning.

Dovel (1978) found that adult shortnose sturgeon overwinter in the deepwater of the estuary between Tappan Zee (Rm 24) and Kingston (Rm 93). Greeley (1935) reported a ripe shortnose female taken from the Albany region during February and it

seems likely that overwintering sites occur throughout the estuary wherever conditions are right. When water temperatures exceed 9°C in spring, ripe fish move onto spawning grounds in the upper estuary between Kingston (Rm 93) and Coeymans (Rm 132) (Greeley, 1937; Dovel, 1978). Spawning occurs in this region during the last weeks of April and the first weeks of May (Greeley, 1937; Dovel, 1978). Larval and young-of-the-year shortnose sturgeon are found in this region during May, June and July (NALCO, 1977; Dovel, 1978). Juvenile shortnose sturgeon occur seaward as far as Haverstraw Bay but are generally concentrated inland of the salt-freshwater interface (Rm 52-82 seasonally). Seaward migration to brackish and salt water probably occurs at about 45 cm fork length or 4-6 years of age.

Adult shortnose sturgeon are found over the entire estuary throughout the year (Hoff et. al., 1977; NALCO, 1977; Dovel, 1978). During spring and summer adults are commonly found in shallow water (Hoff et. al., 1977), especially at night (Dovel 1978). Adults occur in the sea around the mouth of the Hudson and have been reported in Sandy Hook Bay (Wilk and Silverman, 1976) and off Long Island (Schaefer, 1967).

The population size of shortnose sturgeon in the Hudson is apparently at least 6,000 sub-adults and adults [Dovel, 1978;

Dadswell, independent estimate based on Texas Instruments' (TI) data (Hoff et. al., 1977)]. Further study is likely to reveal that the population is larger than estimated since the majority of collecting effort has been concentrated in regions considered less than optimal shortnose habitat. In addition, a substantial portion of the population may be ocean migratory, reducing the number of individuals in the study area. Finally, recapture levels in both population estimates were insufficient to meet the validity requirements of the Peterson population estimate (i.e. MC >4N; Robson and Regier 1964). There is no evidence the population has or is declining. Comparison of Greeley's 1937 findings and Dovel's early findings (1976-77) indicate the population was probably stable during that forty year period. Both studies used the same method for obtaining shortnose sturgeon (i.e., commercial fishermen gillnet by-catch) and in both cases catches during the shad season averaged about 100 shortnose sturgeon per year.

Comparision of the weight-length data for shortnose sturgeon from the Hudson obtained by Greeley (1937) and Dovel (1978) indicate there has been little or no change in this relationship during the forty-year period (Fig. 1). The two curves are significantly different at the 95% level (Student's t-test) but the difference is probably due largely to the collecting methods used in each study. The 1937 data

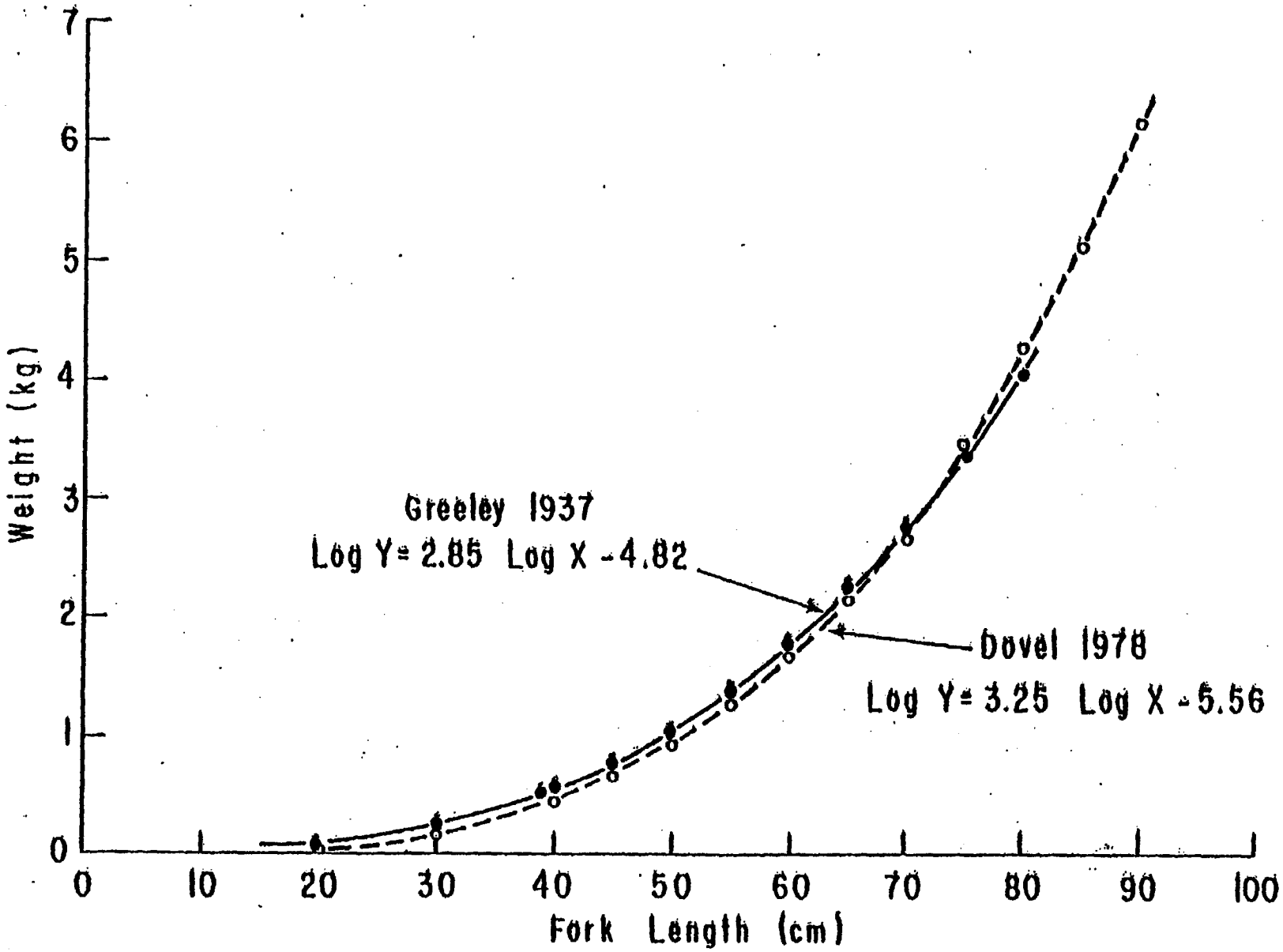

FIGURE 4

HEARING-04160.011

come solely from the commercial fishermen gillnet by-catch and as a result contain a gillnet selectivity bias. The data in the 1978 ~~data~~ report was collected with a greater range of gear and is probably nearer to the true relationship. Similar weight-length relationships mean that physical condition of shortnose sturgeon in the Hudson River has probably not changed during the forty-year period.

Hudson River Plants Involved in this Hearing

A number of power plants use water from the Hudson River as a source of cooling water for steam electric power plant condensers. Of these, the Bowline Point Generating Station (Rm 37.5) the Indian Point nuclear Units 2 and 3 (Rm 43) and Roseton Generating Station (Rm 65.4) are involved in this hearing. The Indian Point Plants are nuclear power plants while the Bowline and Roseton plants use fossil fuel as their fuel stock. All four plants use once-through cooling.

The different impingement rates of shortnose sturgeon for each of the plants (Table 1) is probably based primarily on intake structure location. In both Bowline and Roseton the intake location is situated on a lagoon or at the end of an intake channel away from the main channel and is therefore separated in space from the primary habitat of the juvenile

Orange and Rockland, and Central Hudson, Hudson River power plants, 1972 through 1976.

From Huff, et al, 1977; McFadden et al, 1978 and personal communication with Dr. William Kirk

TABLE I

Date	Plant/Unit	Total Length (mm)	Weight (gm)	RM
1972				
6-7	Danskammer	---	1500	64
6-27	Indian Point/2	174	12	42
7-6	Danskammer	---	1075	64
8-3	Danskammer	---	320	64
8-6	Indian Point/1	248	36	42
8-12	Indian Point/1	98	3	42
8-24	Danskammer	---	910	64
1973				
1-16	Bowline	625	1017	37
3-28	Indian Point/2	310	85	42
5-17	Danskammer	---	---	64
7-20	Indian Point/2	479	407	42
9-5	Danskammer	---	---	64
1974				
3-20	Bowline	254	---	37
4-2	Roseton	---	---	64
5-5	Indian Point/2	493	532	42
6-20	Indian Point/2	805	1702	42
8-8	Indian Point/2	707	1588	42
8-20	Indian Point/1	122	7	42
1975				
6-20	Indian Point/2	---	84	42
1976				
2-16	Indian Point/2	307	253	42
4-30	Indian Point/2	283*	---	42
12-27	Bowline	---	---	37

*Standard Length

RM = river mile

1977 1/23	Indian Point /2	
2/23	Indian Point /2	
4/2 (23)	Indian Point /2	
5/25	Indian Point /2	
9/23	Indian Point /3	
—	Danskammer	
1978		
1/9	Indian Point/2	
1/27	Indian Point/3	
3/2	Indian Point/3	
3/27	Indian Point/3	
11/14	Indian Point/2	

shortnose sturgeon. Indian Point, on the other hand, has its intake location adjacent to a deep channel and this may account for its higher rate and consistency of shortnose sturgeon impingement.

Impact of Hudson River Power Plants on the Shortnose Sturgeon

A. ENTRAINMENT

Spawning grounds for the shortnose sturgeon are found between Kingston (Rm 93) and Coeymans (Rm 132) (Dovel, 1978). The power plants are located to the south of these grounds (Rm 37-65.4). Eggs are demersal and adhesive (Meehan, 1910) and seldom enter river drift (Taubert and Reed, in press). Studies have also shown that very few sturgeon larvae ever enter the river drift in the Hudson River (Dovel, 1978; Hoff et. al., 1977). Finally, shortnose sturgeon larvae grow very rapidly and are only available for entrainment for a limited number of weeks. For these reasons, there is no known entrainment and little, if any, can reasonably be anticipated.

B. IMPINGEMENT

Data from the utilities show that the highest level of recorded impinged shortnose sturgeon in any year since 1972 was 7 (Hoff et al., 1977) although McFadden et al., 1978,

show 1 more shortnose impinged at Indian Point in 1972, which would make this number 8 (Table 14.3-32)). These data, however, must at the very least be corrected for collection efficiencies. Utility data show that the collection efficiencies from these power plants are Indian II - 15%, Indian III - 80% and Roseton and Bowline 100% each. Assuming that this efficiency is correct, and discounting for the time being impingement at Danskammer and Lovett for which we do not have collection efficiencies, during the period 1972-1978, 1977 appears to be the year when the largest number of shortnose (35) were impinged and 1975 the year when the smallest number of shortnose were impinged (7).

EPA has advised us on how its experts would scale up the sample numbers of impinged shortnose sturgeon (Attachment 1). The factors used for Indian Point II & III correspond to the utilities' collection efficiencies. For Bowline & Roseton, EPA recommends, in the absence of data on flow rates, using a crude scaling factor of 7 to account for weekly rather than daily collections ~~in the absence of data on flow rates~~, but ~~EPA~~ cautions that this factor may ~~be an~~ underestimate impingement because sampling ~~frequency~~ was not always as frequent as once per week. EPA then recommends scaling this estimated count by 1.2 at Bowline and 1.4 at Roseton. EPA also cautions, however, that it is not useful to focus of any one year at these two plants because impingement of shortnose is

sufficiently rare that weekly sampling might lead to collection errors. Between 1972 and 1978, 3 shortnose were recorded impinged at Bowline and 1 at Roseton. Using EPA's scaling figures, 25 shortnose or 4 per year can be estimated to have been impinged at Bowline and 9 shortnose or 1 per year were impinged at Roseton between 1972 and 1978.

In McFadden et al. (1978) estimates are made of shortnose impingement at Bowline, Roseton, Danskammer and Lovett between 1973-1977. These estimates apparently are based on flow rates. The estimates are summarized as follows:

		IMPINGEMENT ESTIMATE
Table 14.3-33	Bowline	20
Table 14.3-34	Roseton	16
Table 14.3-35	Lovett	0
Table 14.3-36	Danskammer	31

This impingement averages out to 4/yr. at Bowline, 3/yr. at Roseton, 0 at Lovett and 6/yr. at Danskammer. Assuming the accuracy of all of this data, impingement of shortnose may run as high as 50 fish a year.

The only written evidence of direct mortality from impingement comes from a TI Report submitted as required under its Endangered Species Act permit (Sept. 26, 1978). TI reported that in the first half of 1978 there was 1 shortnose dead when collected at Indian Point II and 2 shortnose dead

when collected at Indian Point III. This TI Report does not indicate the cause of death of any shortnose. Dr. William Kirk of TI has indicated in a personnel communication that none of the three collected dead shortnose exhibited any external injury and that cause of death could not be determined. Evidence presented by the utilities indicates that no shortnose impinged at Bowline or Roseton were dead when collected and I am aware of no contrary evidence. I have no information on the status of impinged shortnose at Danskammer.

On April 10, 1979, Counsel for the NMFS called Dr. William Kirk of TI to inquire about the causes of death of these fish and levels of impingement during the last half of 1978 and 1979 to date. Dr. Kirk indicated in response to a question about why mortality occurred for the first time in 1978 that records he had available showed other mortalities at the Indian Point plants as follows:

1972 2 shortnose sturgeon dead when collected from Indian Point I

1973 2 shortnose sturgeon dead when collected from Indian Point II

1979 1 shortnose sturgeon dead when collected from Indian Point III

Dr. Kirk also indicated that 1978 was the first year that complete records were kept at the Indian Point plants on the status of shortnose sturgeon when collected. Dr. Kirk indicated

that prior to 1977, no notations were recorded whether any shortnose sturgeon collected at the Indian Point plants were dead or alive except for those recorded dead in 1972 and 1973. In 1977, two of the six impinged sturgeon were recorded alive while no record was made of the other four. Dr. Kirk indicated, however, that at least as of April, 1977, TI had a policy of preserving all dead shortnose.

Because of the lack of recorded data on the status of collected impinged shortnose at the Indian Point plants prior to 1978 only 1978 data can be used in evaluating the impact of impingement. Assuming that 1978 was an average year, 60% of collected impinged shortnose are dead when collected. Assuming that all of these shortnose died because of impingement, we can hypothesize that 60% of collected impinged shortnose die as a result of impingement. I lack confidence in this figure, however, because of its potential error from small sample size.

The assumption that 1978 was an average year appears to be reasonable based on the level of impingment of shortnose in other years (Hoff et. al., 1977). However, the assumption that all shortnose that were dead when collected died as a result of impingement may not be entirely reasonable. Sturgeon may be injured and released in a weakened or dying condition from handling during incidental catch in commercial fisheries

and in scientific collecting thus being made more susceptible to impingement. Reports sent to NMFS as a part of Endangered Species permit responsibilities indicate a low level of mortality from handling for scientific research. (NALCO, Dec. 12, 1977; Dovel, 1978; TI Sept. 28, 1978, Dadswell, personnel information).

Taking a worst case scenario, with a 60% death rate from impingement at Indian Point and 35 shortnose impinged at Indian Point per year, 21 shortnose sturgeon die on impingement screens per year. A few more deaths may occur which have gone unreported at the other plants. With an estimated population of adult shortnose in the Hudson River of 6,000, about 0.3-0.4% of the shortnose population in the Hudson die as a result of impingement. Natural mortalities of shortnose sturgeon are between .12-.15 (Dadswell, 1979 in press) or in the case of the Hudson population about 800 adults per year. The level of impingement mortality described above is, therefore, a very small percentage (2%) of the normal level of natural mortality and I do not believe that even this additional impingement mortality will appreciably reduce the likelihood of the survival and recovery of the shortnose sturgeon.

The indirect effect of impingement on shortnose sturgeon is unknown. Sturgeon weakened on the screens may die after release or be more susceptible to predation but data to support these assumptions are lacking. Even assuming,

however, that all impinged shortnose which do not die on screens later die because of being weakened when impinged, the level of mortality is still relatively insignificant (8% of natural levels).

Conclusion

Section 7(a) of the Endangered Species Act requires that all Federal agencies "...insure that any action authorized, funded or carried out by such agency... does not jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species which is determined by the Secretary... to be critical..."

Regulations implementing this section (43 F.R. 870) define "jeopardize the continued existence of" to mean "...to engage in an activity or program which reasonably would be expected to reduce the reproduction, numbers or distribution of a listed species to such an extent as to appreciably reduce the likelihood of the survival and recovery of that species in the wild..."

It is my opinion that the once through cooling system of the power plants involved in this case is not likely to jeopardize the continued existence of the shortnose sturgeon because, even assuming 100% mortality of impinged

fish, its contribution to the natural annual mortality is negligible. In addition, the biology of the shortnose sturgeon effectively isolates the species from most of the effects of power plant intakes.

Because no critical habitat has yet been determined for the shortnose sturgeon, the use of once through cooling systems will not destroy or modify any critical habitat.

On the other hand, there is no evidence that impingement has any positive benefit for the shortnose sturgeons. As previously mentioned, there are mortalities of shortnose from impingement and there may be indirect effects on the shortnose from impingement. Therefore, reducing the level of impingement will aid in the conservation of the shortnose sturgeon.

References

Currian, H.W. and D.T. Ries. 1937. "Fisheries Investigation in the Lower Hudson River." In A Biological Survey of the Lower Watershed. Rep. N.Y. State Conserv. Dep. Suppl. 26: 125-145

Dadswell, M.J. 1979. "Biology and Population Characteristics of Shortnose Sturgeon, Acipenser brevirostrum Lesueur (Osteichthyes: Acipenseridae) in the Saint John River estuary. Canada." Can. J. Zool: (in press).

Dovel, W.L. MS 1978. Biology and Management of Atlantic Sturgeons (Acipenser oxyrphynchus Mitchill), and shortnose sturgeons (Acipenser brevirostrum Lesueur), of the Hudson estuary. WAPORA INC: 165 p (mimeo).

Greeley, N.R. 1935. "Fishes of the Watershed with Annotated List." In A Biological Survey of the Mohawk - Hudson Watershed. Rep. N.Y. State Conserv. Dep., Suppl. 24: 63-101.

_____. 1937. "Fishes of the Area with Annotated List." In. A Biological Survey of the Lower Hudson Watershed. Rep. N.Y. State Conserv. Dep., Supple. 26: 45-103.

Heidt, A.R. and R.J. Gilbert 1978. The Shortnose Sturgeon in the Altamaha River Drainage, Georgia. Manuscript Rept. Contract 03-7-043-35-165 NMFS, 16 p.

Hoff, T.B., R.J. Klauda, and B.S. Belding. 1977. Data on Distribution and Incidental Catch of Shortnose Sturgeon (Acipenser brevirostrum) in the Hudson River estuary. 1969 to present. Texas Instruments Inc., Manu. Rept., 21 p.

Meehan, W.E. 1910. "Experiments in Sturgeon Culture."

Trans. Am Fish. Soc. 39: 85 - 91

McFadden et. al. July, 1978. Influence of the Proposed Cornwall Pumped Storage Project and Steam Electric Generating Plants on the Hudson River Estuary with Emphasis on Striped Bass and Other Fish Population, Revised.

NALCO Environmental Services. 1977. Report to NMFS for endangered species permit No. 176., 2p.

Robson, D.S. and H.A. Regier. 1964. "Sample Size in Petersen Mark-Recapture Experiments." Trans. Am. Fish. Soc. 93: 215-226.

Schaefer, R.H. 1967. "Species Composition, Size and Seasonal Abundance of Fish in the Surf Waters of Long Island." N.Y. Fish Game J. 14: 1-46.

Scott, W.B. and E.J. Crossman. 1973: "Freshwater Fishes of Canada." Bull. Fish. Res. Bd. Can. 184: 80-82.

Taubert, B.D., and R.J. Reid. 1979. "Reproduction of Shortnose Sturgeon (Acipenser brevirostrum) in the Holyoke Pool of the Connecticut River, Massachusetts." Copeia (in press).

Texas Instruments, September 26, 1978. Report to NMFS on its Endangered Species Permit.

Vladykov, V.D. and J.R. Greeley, 1963. "Order Acipenseroidei." In Fishes of the Western North Atlantic. Mem. Sears. Fdn. Mar. Res. 1: 24-60.

Wilk, S.J. and M.J. Silverman, 1976. Summer Benthic Fish Fauna of Sandy Hook Bay, New Jersey. NOAA Tech. Rept. NMFS SSRF - 698, 16 p.

OAK RIDGE NATIONAL LABORATORY
OPERATED BY
UNION CARBIDE CORPORATION
NUCLEAR DIVISION

POST OFFICE BOX X
OAK RIDGE, TENNESSEE 37830

April 25, 1979

Eric Erdheim, Esq.
Staff Attorney
NOAA
3300 White Haven Street, N.W.
Page 2 Building
Washington, D.C. 20235

Dear Mr. Erdheim:

In response to your request regarding the way to treat the raw numbers impinged at Hudson River Power Plants, the following information is provided.

The numbers of short-nose sturgeon impinged at Hudson River Power Plants which are currently available to us were obtained from the regular counts of impinged fish. At Indian Point, an attempt is made to count the fish every day. At Bowline and Roseton, on the other hand, the counts are generally made weekly and were made less often in the early years of operation.

For other species, we apply scaling factors to the counted numbers which are designed to reflect what we believe to be a more accurate estimate of the number impinged. These scaling factors are designed to take account of the inability of the collection procedure to collect and count all fish impinged (collection efficiency) and of the fact that counts were made only on certain days. If survival is not considered, the numbers at all plants should be scaled up to reflect collection efficiency. The following factors should be applied:

Indian Point Unit 2	6.7 x # counted
Indian Point Unit 3	1.4 x # counted

Bowline (factor considers collection efficiency and offsetting reimpingement)	1.2 x # estimated
Roseton	1.4 x # estimated

In addition to application of these collection efficiency factors, the raw values at Bowline and Roseton must be scaled up to reflect the fact that counts occured weekly or less often. Ordinarily, we and the utilities do this scaling by reference to the rate of flow on the days of collection and by assuming that impingement is directly proportional to flow. In the absence of flow data for the days on which short-nose sturgeon were impinged, a very crude scaling of these numbers could be achieved by multiplying by 7. We are inclined to believe this would, if anything, be an underestimate because sampling was not always as frequent as once per week. (Some more frequent than weekly collections at Bowline in 1976 and 1977 do not appear to alter this conclusion.) The collection of zero shortnose sturgeon at Bowline or Roseton during any particular year should not be taken as evidence that none were impinged during that year. The impingement of shortnose sturgeon is sufficiently rare that sampling this infrequently (i.e., weekly) might be expected to lead to the collection of no fish if the actual number impinged in that year was only a few but greater than zero.

Sincerely,

Lawrence W. Barnthouse, Ph.D.
Research Associate

LWB:im

cc: M. Mulkey
W. Van Winkle

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION
BEFORE THE SECRETARY

In the Matter of ENTERGY NUCLEAR INDIAN POINT 2, LLC, ENTERGY NUCLEAR INDIAN POINT 3, LLC, and ENTERGY NUCLEAR OPERATIONS, INC. (Indian Point Nuclear Power Station)	Docket Nos. 50-247, 50-286

DECLARATION OF MARK T. MATTSON, PH.D.
IN OPPOSITION TO RIVERKEEPER CONTENTION EC-1 AND
NEW YORK ATTORNEY GENERAL CONTENTIONS 31-32

I, Mark T. Mattson, Ph.D., declare as follows:

QUALIFICATIONS

1. I am a Vice President and Principal Aquatic Ecologist with Normandeau Associates, Inc. ("Normandeau"), a professional consulting firm that specializes in ecological, environmental, and natural resources management services. My general expertise is in aquatic ecology, particularly fisheries, and the application of field sampling design and analytical methods to evaluate anthropogenic influences on population and community dynamics of aquatic ecosystems.

2. I have particular depth and expertise in assessing the potential aquatic impacts of power-plant operations under Clean Water Act, §316(a) and (b), and equivalent state law. I have supervised at least twelve (12) site-specific assessments of potential impacts from power plant thermal discharges or cooling water intakes on aquatic ecosystems, and have participated in at least thirty (30) such assessments performed by Normandeau, over the past 30 years, mostly in the northeastern United States.

3. I have extensive, first-hand experience assessing the Hudson River ecology. It began with my post-graduate professional career in October 1979, working on the Hudson River Biological Monitoring Program ("HRBMP"). I have continued to remain involved in one or more aspects of this monitoring program in each of the past thirty (30) years from 1979 to present. My three decades of fisheries work on the Hudson River and New York Harbor also includes numerous cooling water intake studies performed for Indian Point, Bowline, Lovett, Danskammer Point, Roseton, and Albany Steam Stations. My 30 years of fisheries work on the Hudson River also includes several studies performed for the New York State Department of Environmental Conservation

("NYSDEC"), including two annual creel surveys, a river herring stock assessment, and a survey of biological samples for tissue contaminants. I am the author or co-author of seventeen (17) peer-reviewed scientific publications on various aspects of Hudson River fish populations, and have been a peer-reviewer for numerous other publications.

4. I have served on the Board of Directors for the Hudson River Environmental Society annually since 2000, including four years as the Vice President (2002-2006). The Hudson River Environmental Society is a non-advocacy environmental group with a mission of disseminating timely technical information for use in decision making about environmental policy in the Hudson River watershed to both the public and research community through conferences, seminars, a newsletter, and peer-reviewed publications.

5. I hold Master of Science and Ph.D. degrees in Zoology from the University of New Hampshire, and a Bachelor of Arts degree in Biology from the University of Connecticut. I am an active member of the American Society of Limnology and Oceanography, the International Limnology Society, and the American Fisheries Society. My current curriculum vitae, including a list of my peer reviewed scientific publications and professional society presentations, is attached hereto as Attachment 1.

THIS PROCEEDING

6. I understand that this proceeding before the Nuclear Regulatory Commission ("NRC" or the "Commission") concerns the May 2007 application by Entergy Nuclear Operations, Inc. ("Entergy") to renew, for a period of 20 years, the operating licenses for Entergy Nuclear Indian Point 2, LLC ("IP2") and Entergy Nuclear Indian Point 3, LLC ("IP3"), nuclear power generating units located in Buchanan, New York. 72 Fed. Reg. 26,850 (May 11, 2007). I understand that Riverkeeper, Inc. ("Riverkeeper") and the New York Attorney General ("NYS") have filed petitions ("Petitions") to intervene in this license renewal proceeding, in which they specifically request a hearing before the NRC with respect to certain issues that they maintain are not adequately addressed in Entergy's license renewal application ("LRA").

7. I have reviewed Riverkeeper Contention EC-1 and NYS Contentions 31-32 (the "EI and ESA Contentions"). I have reviewed the declarations of Dr. Richard Seaby and Dr. Peter Henderson in support of Riverkeeper's Contention EC-1, and accompanying reports co-authored by Drs. Seaby and Henderson entitled *Status of Fish Populations and the Ecology of the Hudson River* ("Pisces Hudson Report") and *Analysis of Entrainment, Impingement, and Thermal Impacts at Indian Point Power Station* ("Pisces EI Report") (together, the "Pisces Reports"). I have also reviewed the declaration of Roy A. Jacobson in support of NYS Contentions 31-32. A list of the scientific documents that I refer to in this Declaration is attached hereto as Attachment 2.

8. This Declaration is submitted in support of Entergy's response to the EI and ESA Contentions.

HUDSON RIVER BIOLOGICAL MONITORING PROGRAM AND THE AEI REPORT

9. Since 1966, a continuing and extensive annual biological monitoring program has been performed to assess potential impacts of cooling water withdrawals from electric power generating stations (including IP2 and IP3) on the Hudson River ecology.

10. These programs have been developed under the oversight, and with the input, of regulators, including the New York State Department of Environmental Conservation ("NYSDEC") and the environmental community, including Riverkeeper. To my knowledge, the HRBMP is the most extensive continuous fisheries monitoring program of its type performed in the United States. This statement is corroborated by Dr. John Waldman, formerly with the Hudson River Foundation for Science and Environmental Research, Inc. (the "Hudson River Foundation"), an independent foundation dedicated to research on the Hudson River ecosystem, and now on the faculty of Queens College, who stated in the introduction to his peer reviewed publication titled "The Hudson River Environment and its Dynamic Fish Community" that "[i]ndeed, the Hudson is one of the most scientifically studied rivers in the world" (Waldman et al. 2006). Presently and historically (since 1974), the core fisheries monitoring program has entailed the following six field and laboratory surveys:

- Ichthyoplankton Survey, often referred to as the Longitudinal River Ichthyoplankton Survey,
- Fall Juvenile Fish Survey, often referred to as the Longitudinal River Fall Shoals Survey,
- Beach Seine Survey for juvenile fish, often referred to as the Longitudinal River Beach Seine Survey,
- Water Quality Survey, often referred to as the Longitudinal River Water Quality Survey,
- Striped Bass Winter Population Survey, often referred to as the Striped Bass Survey, and
- Atlantic Tomcod Spawning Stock Survey, often referred to as the Tomcod Survey.

11. The primary objective of the Longitudinal River Ichthyoplankton Survey is to determine the seasonal occurrence, abundance, and distribution of eggs and larvae of fish found along the 152 mile portion of the Hudson River estuary between Battery Park and the Troy Dam above Albany. This survey is the ichthyoplankton complement of the Longitudinal River Fall Shoals Survey. The present Ichthyoplankton Survey is a massive biological monitoring program that, based on my experience, is unprecedented in the combined within-year temporal, spatial and geographic extent for the number of

consecutive years of sampling. Annually, the Ichthyoplankton Survey collects about 3,650 samples per year; 87,317 samples were collected and 54,516 of these were analyzed in the laboratory during the 1979-2006 period. The ichthyoplankton survey began during 1973 and has continued annually to present, with sampling performed during typically 10 to 20 consecutive weeks beginning in March and continuing through July of each year. The first three surveys are performed during the day, and the remaining surveys are at night, with about 200 samples per week collected at randomly selected tow paths allocated among 13 geographic regions, and three depth strata. The pelagic stratum is sampled with a 1 m^2 x 8 m long Tucker trawl equipped with a 500 micron mesh net. The shoal (river bottom found in 10-20 ft of depth) and bottom (river bottom found at depths >20 ft) are both sampled with a 1 m^2 epibenthic sled equipped with a 1 m^2 x 8 m long net of 500 micron nitex mesh. Sample volumes are determined using flume-calibrated flowmeters, and standard deployment practices for each 5-minute tow insure a sample volume of about 300 m^3 +10%. All field samples are preserved with 10% buffered formalin, and approximately 75% of the samples collected are analyzed in the laboratory. Standardized subsampling and quality control re-inspection of 10% or more of the samples insure consistent laboratory sorting, identification and enumeration. All ichthyoplankton eggs and larvae in the selected samples are identified to the lowest possible taxon (generally species), enumerated, and representative subsamples of several key species of larvae (striped bass, white perch, American shad, Atlantic tomcod, and bay anchovy) are randomly selected and measured for total length. The accuracy of the laboratory methods used to discriminate between two similar and abundant species of Hudson River fish larvae that are often difficult to distinguish (striped bass and white perch) has been validated in a peer reviewed publication (Waldman et al. 1999).

12. The primary objective of the Longitudinal River Fall Shoals Survey is to determine the seasonal occurrence, abundance, and distribution of young of the year fish in the 152 mile portion of the Hudson River estuary between Battery Park at the southern tip of Manhattan and the Troy Dam above Albany. The survey began during 1973 and has continued annually to present, with sampling performed during 8 to 12 alternate weeks spread between early July and late October of each year. Sampling is at night, with about 200 samples per week collected at randomly selected tow paths allocated among 13 geographic regions, and three depth strata. The present Fall Juvenile Fish Survey is a massive biological monitoring program that, based on my experience, is unprecedented in the combined within-year temporal, spatial and geographic extent for the number of consecutive years of sampling. Annually, the Fall Juvenile Fish Survey collects about 2,050 samples per year; 52,543 samples were collected and analyzed during the 1979-2006 period. The pelagic (channel) stratum is sampled with a 1 m^2 Tucker trawl equipped with a 3 mm mesh net. The shoal (river bottom found in 10-20 ft of depth) and bottom (river bottom found at depths >20 ft) were sampled with a 1 m2 epibenthic sled (3 mm mesh net) prior to 1985 and with a 1 m x 3 m beam trawl (1.3 mm stretch mesh cod end) beginning in 1985 and continuing to present. Sample volumes are determined using flume-calibrated flowmeters, and standard deployment practices for each 5-minute tow insure a variation in sample volume of less than 10%. All fish caught are identified to species and enumerated without subsampling into length classes representative of young of the year, yearling and older age categories. Representative subsamples of key species of fish are randomly selected and measured for total length.

13. The primary objective of the Longitudinal River Beach Seine Survey is to determine the seasonal occurrence, abundance, and distribution of young of the year fishes in the shore zone (<10 ft. deep) along the 142 mile portion of the Hudson River estuary between Yonkers (GW Bridge) and the Troy Dam above Albany. The survey began during 1974 and has continued annually to present, with sampling performed during typically 10 alternate weeks spread between early July and late October of each year. All sampling is during the day, with 100 randomly selected beaches sampled per week among 12 geographic regions. The present Beach Seine Survey is a massive biological monitoring program that, based on my experience, is unprecedented in the combined within-year temporal, spatial and geographic extent for the number of consecutive years of sampling. Annually, the Beach Seine Survey collects about 2,000 samples per year; 31,497 samples were collected and analyzed during the 1979-2006 period. A 100 ft x 8 ft. bag seine is fished with 1.9 cm stretch mesh in the wings and 0.9 cm stretch mesh netting in the bag. Standard deployment practices for each seine haul insure a sampling area swept of about 450 m^2 +10%. All fish caught are identified to species and enumerated without subsampling into length classes representative of young of the year, yearling, and older age categories. Water temperature, dissolved oxygen, and conductivity are measured and recorded one foot below the surface of each beach location. All fish caught are identified to species and enumerated without subsampling into length classes representative of young of the year, yearling and older age categories. Representative subsamples of key species of fish are randomly selected and measured for total length.

14. The primary objective of the Longitudinal River Water Quality Survey is to determine from grab-type samples the longitudinal and vertical distribution of water temperature, dissolved oxygen and conductivity measured along the 152 mile portion of the Hudson River estuary between Battery Park and the Troy Dam above Albany. This survey is run concurrently with the Ichthyoplankton and Fall Juvenile Surveys described above. The Water Quality Survey began during 1973 and has continued annually to present. Prior to 1982, water quality measurements were taken at depth associated with each sample, resulting in measurements taken at about 100 to 200 station and depth combinations during each week of sampling. Beginning in 1982, and continuing to present, water quality measurements were disassociated with each sample, and spread among 60 fixed stations at approximately 3 mile intervals along the 152 miles of river, resulting in measurements taken at 182 station and depth combinations during each week of sampling. Water quality measurements were taken from a total of 110,255 depth, station and date combinations for the Longitudinal River Water Quality Survey, and an additional 31,497 water quality samples were collected from the Long River Beach Seine Survey during the 1979-2006 period. At each water quality station, near-surface, mid-depth and near-bottom measurements are taken and recorded, except in shallow (shoal) areas where just near-surface and near bottom measurements are taken. At each location and depth, water temperature is measured and recorded to the nearest 0.1 degrees Celsius (°C), dissolved oxygen is measured and recorded to the nearest 0.1 milligrams per liter (mg/l), and conductivity is measured and recorded in microsiemens per centimeter (μS/cm) to the nearest scaling factor. Water quality instrumentation is subjected to daily calibration and quality control calibration against known standards.

15. The primary objective of the Striped Bass Winter Population Survey is to sample the immature striped bass (typically between 150 mm and 500 mm in total length) by trawling in the lower Hudson River and New York Harbor habitat to obtain mark-recapture estimates of the total number of Age 1 and Age 2 fish in this over-wintering population. The Striped Bass Survey is presently performed from November through April of each year for at least 24 consecutive weeks of field sampling. This survey began in 1984 and has continued annually to present, excluding winters of 1984-85 and 1986-87. Fishing gear, deployment, tagging, and sampling weeks have been standard from the winter survey of 1987-88 to present. The Striped Bass Survey has caught, tagged and released more than 300,000 fish to date (about 10,000 per year), tag recoveries within the survey are typically 50 to 655 fish per year, and all of these recaptured fish are released again after recording the tag data. Tags are also recovered from anglers by a cooperative program run through the Hudson River Foundation at a rate of about 300 to1400 per year and used to make a second mark/recapture population estimate.

16. The primary objectives of the Atlantic Tomcod Spawning Stock Survey is to sample the mid-winter spawning population of Atlantic tomcod in the Hudson River to describe biological characteristics (age, growth, gender, fecundity) and obtain mark-recapture estimates of the total adult population size. Tomcod are caught, marked, and released from box traps fished in the Hudson River at nearshore sites between the George Washington Bridge in upper Manhattan and Mid-Hudson Bridge in Poughkeepsie from December through February (13 weeks) of each year. Marked fish are recaptured in the Striped Bass survey trawling effort described above. The Tomcod Survey has been performed annually from the winter of 1982-83 to present, excluding 1984-85 and 1986-87, using standard gear, deployment and sampling weeks throughout this period. Tomcod were marked by finclips prior to the winter of 1987-88, and were marked with Visual Implant (VI) Tags from 1987-88 to present. More than 400,000 tomcod have been marked, released or recaptured to date.

17. Normandeau has been managing one or more aspects of the HRBMP since 1974 (from 1974-1979, as Texas Instruments, Inc.), except for 1980 and 1981, and continues to do so. I have personally supervised or conducted studies pursuant to the HRBMP annually since October 1979 (except for 1980-1981).

18. In addition to the HRBMP described above, I have supervised and participated in CWA §316(b) cooling water intake structure ("CWIS")-related studies that Normandeau has performed at IP2 and IP3 since October 1979. These CWIS studies include a statistical evaluation of the reliability of impingement sampling designs at IP2 and IP3 based on historical (1976-1979) impingement data, routine impingement monitoring at IP2 and IP3 (1984-1986, and 1989-1991), IP2 and IP3 Ristroph screen and return sluice impingement survival studies (1985-1993), IP3 fish guidance studies using underwater acoustic devices (1986-1990), relative probability of entrainment study at IP2 and IP3 (1989), and IP2 and IP3 entrainment studies (1981-1982; 1986-1987).

19. Normandeau annually prepares and implements a Quality Assurance (QA) Program for each of the six field and laboratory surveys performed for the HRBMP that is based on application of a 10% average outgoing quality limit (AOQL) for all biological

measurement parameters and a 1% AOQL for all data files used in calculations, data tables and figures in the final reports. This QA program is designed to meet or exceed the guidance criteria of the U.S. Environmental Protection Agency and be consistent with the intent of federal regulations (10 CFR 50).

20. I am unaware in my professional experience of any biological monitoring program of this magnitude that applies industrial quality control and quality assurance procedures to the acquisition of fisheries data and has done so consistently and annually since 1974. This QA Program has been the subject of three peer-reviewed publications (Geoghegan et al. 1990; Young et al. 1992; and Geoghegan 1996), and, in my professional opinion, represents the desired environmental consulting industry standard.

21. Normandeau's QA program for the HRBMP comprised two systems: a Quality Control (QC) system and a Quality Assurance (QA) system. The function of the QC system is to continually monitor the reliability and validity (accuracy, precision, and completeness) of data produced on a daily basis. The function of the QA system is to independently verify that the QC system is implemented and is functioning as specified in the program QA Manual. The foundation of the QA and QC system for the HRBMP is the QA Manual, referred to as the Standard Operating Procedures or "SOP." A SOP is prepared annually before the onset of each of the six field and laboratory surveys comprising the HRBMP. Each SOP describes the methods used in the survey for sampling, laboratory analysis, QC, and QA, and is provided to the NYSDEC for their review and acceptance prior to the onset of annual field sampling activities. The principal strengths of this QA Program are the functional independence of the systems and the common collection and interpretation point for quality related information, the Quality Assurance Director. The QC system is managed by the Program Manager and is conducted by program personnel. The QA system is managed by Normandeau's corporate Quality Assurance Director and used project-independent technical personnel during performance and system audits.

22. For the HRBMP performed by Normandeau and its predecessor (Texas Instruments) that generated the data presented in the AEI Report a QC plan was implemented that subjected all sample processing tasks involving the sorting, fish identification, and enumeration to a standard and appropriate quality assurance/quality control review based on a Military Inspection Standard (MIL-STD) inspection plan derived from MIL-STD 1235 Single and Multiple Level Continuous Sampling Procedures (10 December 1981) and Tables for Inspection by Attributes to achieve a 10% AOQL. A 1% AOQL QC lot sampling plan was applied to all data files used in calculations, data tables and figures in the final AEI Report. QC inspection of laboratory samples was accomplished by random re-inspection of at least 10% of the samples independently by a qualified QC biologist to confirm the data generated from sample processing meets the accuracy standards specified in the QA Manual. An AOQL of 10% for sample processing means that 10% or fewer of the samples would be outside of the established measurement error for variables specified in the SOP for each of the six surveys. Similarly, a 1% AOQL means that the data files produced from Normandeau's sampling and sample processing activities and used in calculations, data tables and figures in the AEI Report was certified by statistical inspection to document that less than

one record (line of data) out of every 100 records was outside of the established error specified in the SOP. For both sample processing and data processing tasks, any errors that were discovered during QC inspection were corrected, thus providing a data set with a quality level better than the specified AOQL.

23. A QA Program was also implemented for each of the impingement and entrainment monitoring programs performed by Normandeau at IP2 and IP3 that was consistent with the QA Program for the HRBMP as described above.

24. In short, based upon my work described above:

- I am well-versed in the Hudson River ecology in the vicinity of IP2 and IP3 through my participation in the HRBMP, through other studies performed by Normandeau in the Hudson River, and through my review of the work of other Hudson River researchers.

- I am directly aware of the principles and methods used to obtain biological data for the HRBMP and for the impingement and entrainment studies performed by Normandeau relating to the IP2 and IP3 CWIS.

- I have first-hand knowledge of the quality of the HRBMP and for the impingement and entrainment studies performed by Normandeau relating to the IP2 and IP3 CWIS.

25. I have reviewed the report, entitled *Entrainment and Impingement at IP2 and IP3: A Biological Impact Assessment* (Jan. 2008) ("AEI Report"), attached as Attachment 2 to the Declaration of Lawrence W. Barnthouse, Ph.D.

26. In my professional opinion, the HRBMP dataset on which the AEI Report relies is unique in its breadth, and is robust and validated under a strict QA program.

RESPONSE TO PISCES REPORTS AND JACOBSON DECLARATION

27. I have reviewed the Pisces Reports and the Jacobson Declaration. Below, I reply in part to the Pisces Reports and the Jacobson Declaration. I disagree with many of the opinions offered in these documents. The fact that I do not specifically address a particular opinion or contention in this Declaration does not mean that I agree with such opinions or contentions.

Ristroph Screens and Impingement Holding Mortality

28. The Pisces EI Report asserts that impingement mortality at IP2 and IP3 is in the order of "hundreds of thousands of fish" annually. Pisces EI Report, at 1. The Pisces EI Report acknowledges, however, that "[t]he installation of Ristroph screens and fish return systems at Indian Point between 1990 and 1991 reduced this mortality for some species." *Id.* at 11. Similarly, the Jacobson Declaration asserts that "data demonstrate that impingement figures are significant," Jacobson Decl. ¶ 17, but acknowledges that Ristroph-modified screens play a role in survival, *see id.* ¶¶ 18, 22.

Nevertheless, both the Pisces EI Report and the Jacobson Declaration question whether survival rates from fish return systems using Ristroph screens could be overestimated as a result of the eight hour post-impingement observation period used to represent survival rates. *See* Pisces EI Report, at 12-19; Jacobson Decl. ¶¶ 18, 22.

29. Beginning in January 1985, to address impingement, the IP2 and IP3 CWIS were retrofitted with Ristroph modified traveling screens (referred to as Royce Version 1 or Version 2 traveling screens) manufactured by the Royce Equipment Company of Houston, Texas. Evaluations to optimize the performance of these Ristroph modified traveling screens occurred annually until the present screens and fish return systems were installed at IP3 in 1991 and IP2 in 1992. The customized Ristroph screen technology for Indian Point was developed and designed under the direction of Riverkeeper's then-consultant, Dr. Ian Fletcher, a well-regarded fisheries expert acting as the technical expert for Riverkeeper. At the time it was developed and installed, IP2 and IP3's Ristroph screen technology was considered state of the art, and it is my understanding that this technology is still considered state of the art intake screening technology today.

30. Following the initial installation of one Ristroph screen (Royce Version 1) at IP2, fish survival studies were conducted daily throughout 1985 (beginning on 16 January) by comparing the survival of fish impinged on the Ristroph screen with the survival of fish impinged on the conventional traveling screens simultaneously operating in screenwells 21-25. Ristroph screen evaluations continued annually through November 1994, testing the fish survival, the debris handling characteristics, and the interaction between fish survival and debris handling for various modifications to the Ristroph screen mesh panels, spray headers, spray header alignment, and fish transfer bucket system. Beginning in 1989 and continuing into 1991, a full scale mockup of the fish return sluice system for the IP2 and IP3 CWIS was built near the quarry adjacent to the Indian Point site. This full scale return sluice system was tested to determine the best configuration of pipes and sluice flow to minimize the mortality of impinged fish that would be transferred from the Ristroph screens into this return sluice when both were installed at IP2 and IP3. After the installation of the present Ristroph modified traveling screens at IP3 in 1991 and IP2 in 1992, testing of the installed full scale sluice system continued through 1993 to determine the best configuration to minimize the recirculation and re-impingement of surviving fish that were released back into the Hudson River near the IP2 and IP 3 CWIS.

31. In 1985, Normandeau first performed impingement survival studies for the IP2 and IP3 Ristroph screens. These survival studies determined survival at 0, 6, 12, 24, 36, 48, 60, 72, 84 and 96 hours after impingement. In 1986, additional impingement survival studies were conducted to compare Royce Version 1 and Version 2 screens using mortality observations at time 0 and after eight hours of holding time. The change from a 96-hour holding time to an 8-hour holding time was selected by Riverkeeper's then-technical expert, Dr. Fletcher. Publications by Fletcher (1986; 1990) selected eight hour estimates as the most reliable time period for quantifying survival rates of impinged fish at IP2 and IP3 without the potential confounding effects of control mortality. I understand that the 1985 impingement survival studies for IP2 and IP3 provided the basis

for Dr. Fletcher's selection of eight hours as the appropriate latent mortality holding time, because no mortality was observed in the first 12 hours for control fish that were simultaneously held in aquaria to observe subsequent (i.e., latent) mortality along with test fish collected from the Ristroph screen (Con Edison 1985, Figure 3-1). It should be noted that control fish are those subjected to collection, handling and holding conditions for the initial and all latent survival observations, but were not exposed to impingement from the Ristroph screens. For example, striped bass held as controls during 1985 experienced no handling mortality at the 0, 6 and 12 hour observation periods, however some (about 1%) mortality was observed at 24 hours, and holding mortality continued to increase to about 15% through 96-hours of holding reflecting the stress of conditions in the holding facility. Subsequent morbidity tests of additionally modified Ristroph screens conducted by Dr. Fletcher (Royce Version 2; Fletcher 1986; 1990) were therefore based on mortality observations at initial (time = 0) and after 8-hours (latent) of holding in aquaria with full knowledge of the results of the Royce Version 1 tests.

32. Therefore, to the best of my knowledge and based on personal conversations with Dr. Fletcher at the time, suggestions in the Pisces EI Report and the Jacobson Declaration that survival rates from fish return systems using Ristroph screens could be overestimated as a result of the eight hour post-impingement observation period used to represent survival rates were specifically considered and rejected by Dr. Fletcher in his scientific evaluation of the Ristroph screens and fish return system at IP2 and IP3.

Threatened and Endangered Species

33. In his declaration, Mr. Jacobson argues that IP2 and IP3 "harm" a federally and New York State listed endangered species (shortnose sturgeon) and a candidate threatened species (Atlantic sturgeon) by impinging them on the water intake screens or entraining them through the cooling water systems." Jacobson Decl. ¶ 26; *see also id.* ¶¶ 27-32. This assertion is unfounded based on the biology and status of the populations of these two species in the Hudson River.

Shortnose Sturgeon

34. As NYSDEC is aware, shortnose sturgeon are rarely found in the vicinity of IP2 and IP3, and are therefore not susceptible to impingement or entrainment at the CWIS.

- From late fall to early spring, adult shortnose sturgeon concentrate in a few overwintering areas (Dovel et al. 1992, Geoghegan et al. 1992, Bain 1997). Spawning adults concentrate in deep, channel habitats considerably upstream from IP2 and IP3 near Kingston (RM 94) and another group of juveniles and adults that will not be in reproductive condition the following spring concentrate in brackish water downstream between RM 33-38 in Haverstraw Bay (Bain 1997). In the spring, these non reproductive fish migrate upstream and disperse throughout the tidal portion of the river in deep, channel habitats. When water temperatures reach approximately 8°C, typically in early to mid-April, reproductively active adults begin a rapid migration from their overwintering

areas near Kingston upstream in the channel to spawning grounds from Coxsackie (RM 125) to the Federal Dam in Troy (RM 151) and thus are not exposed to water withdrawal at IP2 and IP3 located at RM 42. Spawning typically occurs in the upstream spawning grounds until water temperatures reach 15°C (late April through May) after which adults disperse down throughout their broad summer range in deep channel habitats from approximately RM 27 to RM 112. The deep channel waters and the turbulent spawning reach just downriver of the Federal Dam in Troy are beyond the sphere of influence of IP2 or IP3.

- Shortnose sturgeon eggs adhere to solid objects on the river bottom and newly hatched embryos remain on the bottom near their upriver spawning grounds and are therefore not typically exposed to entrainment at IP2 or IP3. Larvae gradually disperse downstream and occur in deep water, channel areas with strong currents (Bain 1997) and are therefore not likely to be entrained along the shoreline at IP2 and IP3 because they generally avoid shoreline habitats where the CWIS is located. Figure 1 demonstrates that early life stages of shortnose sturgeon, those most susceptible to entrainment and impingement, are rarely observed in the vicinity of IP2 and IP3, and primarily occur upriver. In fact, only one larval shortnose sturgeon and one unidentified larval sturgeon (probably an Atlantic sturgeon) were observed in the Indian Point nearfield region among 11,051 Long River Ichthyoplankton Survey samples collected there from 1979 through 2006. Age 1 and older shortnose sturgeon are distributed throughout the river in the summer, however their relatively large size and strong swimming ability, and pronounced preference for deep, channel areas considerably reduces their exposure risk to impingement at IP 2 and IP3. Furthermore, the complex migration patterns described above demonstrate that shortnose sturgeon are transient seasonal residents in the vicinity of IP2 and IP3, passing through this portion of the Hudson River only during the late spring through early fall as juveniles and adults disperse from upstream habitat to the lower tidal portions of the River.

35. NYSDEC specifically discontinued the annual impingement monitoring program at IP2 and IP3 as soon as the Ristroph screens and fish return system were installed and operating (i.e., 1992). I recall a conversation with Mr. Edward Radle of NYSDEC on site at Indian Point at that time during which Mr. Radle explained that a reason for stopping annual impingement sampling was that a state of the art fish screening and return system was just installed, which has been demonstrated to provide good survival of impinged fish that are returned to the Hudson River alive. No additional fish would be saved by sampling them, and in fact, many would be killed due to the additional handling required to process them in the impingement samples (e.g., measure, weigh, identify, count). So Mr. Radle's preference was that the fish be returned to the Hudson River and given a chance to survive rather than requiring IP2 and IP3 to continue annual sampling.

36. Lastly, Mr. Jacobson's stated concern about shortnose sturgeon is not well-founded. The Hudson River shortnose sturgeon population has been increasing since the 1990s. Mark-recapture population estimates performed for the National Marine

Fisheries Service (NMFS) indicate a late 1990s shortnose sturgeon population of about 60,000 fish with adults comprising more than 90% of the population (Bain et al. 2007). Compared to population estimates in the late 1970s, the Hudson population has increased by more than 400% (Bain et al. 2007). Independent analysis of data from a mark-recapture program and from the HRBMP (Fall Juvenile Fish Survey) and analyzed by Dr. David Secor and Mr. Ryan Woodland (2005) also indicate more than a four fold increase in abundance over this time period (confirming the usefulness of the HRBMP as an index of shortnose sturgeon abundance in the Hudson River ecosystem). This information indicates that the Hudson River supports by far the largest population of shortnose sturgeon throughout its range, and that the current population is expanding (Bain et al. 2007).

37. Although the shortnose sturgeon currently is listed as a federally endangered species, the National Oceanic and Atmospheric Administration ("NOAA") has concluded that a shortnose sturgeon population composed of 10,000 spawning adults is large enough to be at a low risk of extinction and adequate for delisting under the U.S. Endangered Species Act (NOAA 1996). Following the criteria used by NOAA for shortnose sturgeon, the total and spawning population estimates in the Hudson River exceed the safe level established by NOAA by more than 500%, clearly indicating that this population merits designation as "recovered" and qualifies for delisting from the U.S. Endangered Species Act protection (Bain et al. 2007).

38. Mr. Jacobson is either unaware of or inappropriately omits this more recent and relevant Hudson River specific information regarding the large, stable and healthy population of approximately 60,000 shortnose sturgeon.

39. Atlantic sturgeon is currently under consideration to determine whether listing as threatened or endangered under the federal Endangered Species Act is warranted. It is not presently listed as endangered, threatened, or a species of special concern by New York. Atlantic sturgeon are anadromous; spawning occurs in freshwater, but adults reside for many years in marine waters outside the Hudson River. Spawning females enter the Hudson River in mid-May and migrate along deep channel areas directly to freshwater spawning grounds upriver near Hyde Park (RM 81) and Catskill (RM 113, Bain 1997). Females return to marine waters quickly after spawning. Atlantic sturgeon are unlikely to spawn in the Indian Point region because Atlantic sturgeon eggs, embryos and larvae are intolerant of saline conditions and some significant length of river habitat is needed downstream of a spawning site to accommodate dispersal of embryos and larvae (Bain 1997). This observation is supported by empirical data obtained from the Longitudinal River Surveys (Figure 2) which demonstrates that Atlantic sturgeon eggs, larvae and young of the year rarely occur below the West Point region (RM 47) which is consistent with their limited salinity tolerance. In fact, only one young of the year Atlantic sturgeon and one unidentified larval sturgeon (probably an Atlantic sturgeon) were observed in the Indian Point nearfield region among 11,051 Long River Ichthyoplankton Survey samples collected there from 1979 through 2006.

40. Spawning male Atlantic sturgeon enter the Hudson River starting in April and some may remain as long as November. During their upstream migration, male sturgeon reside in channel areas in water greater than 25 ft (Dovel and Berggren 1983, Bain 1997). Juvenile Atlantic sturgeon are distributed over much of the Hudson River from July through September and they use deep channel habitats as in other life intervals (Bain 1997). The largest numbers of juveniles appears to be located from RM 39 to 87 (Bain 1997) thus there is some overlap with the Indian Point region at the downriver extent of their range. Figure 2 demonstrates that some Atlantic sturgeon juveniles occur from the Tappan Zee (RM 24) to the Indian Point (RM 46) regions, however the greatest numbers occur from the West Point (RM 47) region upriver to Saugerties (RM 106). In the fall, juveniles overwinter in brackish water between RM 12-46, however they remain in deep, channel areas and the majority of the population is therefore not expected to be exposed to impingement at IP2 or IP3.

41. Based on this analysis, the Jacobson Declaration's suggestion that the operation of IP2 and IP3's respective CWIS harms shortnose sturgeon or Atlantic sturgeon populations is contradicted by both the peer-reviewed, published scientific literature and from empirical observations from the HRBMP.

Entrainment and Impingement

42. The Pisces EI Report repeatedly argues that impingement and entrainment at IP2 and IP3 have caused an impact responsible for observed trends in fish populations and changes in the fish community. These arguments are speculative and reflect only a superficial understanding of the Hudson River ecosystem as described by the HRBMP. Moreover, the Pisces EI Report presents its arguments without any clear definition of ecological significance, adverse impact, or the criteria used for assessment, and without establishing testable hypotheses of cause and effect related to impingement or entrainment.

43. The Pisces EI Report examines the numbers of fish impinged and entrained at IP2 and IP3, and states that the annual number of fish entrained during 1981-1987 for American shad, bay anchovy, river herring, striped bass, and white perch were "very large," totaling over 1.2 billion individuals for these species combined. Pisces EI Report, at 3. The terms "large" and "very large" used by the Pisces EI Report are unscientific and meaningless without context or reference point.

44. The Pisces EI Report states that impingement and entrainment mortality due to IP2 and IP3 is typically measured on just a few of the 140 fish species found in the Hudson River, and that the impact on other species is "un-quantified and may be significant." Pisces EI Report, at 4. These statements reveal a lack of understanding about the ecology of north-temperate estuarine systems like the Hudson River, which are controlled primarily by physical processes in which most of the fish community biomass is in relatively few fish species, precisely those species considered by the AEI Report.

45. The Pisces EI Report suggests that CMR estimates of 12.04% for Atlantic tomcod and 10.38% for bay anchovy in the ER support a finding of "large" entrainment

impacts by IP2 and IP3. Pisces EI Report, at 11). Contrary to Pisces' assertions, however, the ER does not support the conclusion that "high" CMR estimates equate to "large" entrainment impacts on the Hudson River populations.

Fish Community Stability

46. The Pisces Hudson Report addresses the larger and general Hudson River ecosystem without regard to IP2 and IP3 (or even any mention of it). Therefore, the Pisces Hudson Report does not permit any inferences to be made regarding the possible effects of Indian Point's operations on the ecosystem.

47. The Pisces Hudson Report attempts to make the case that the fish community in the Hudson River is not stable and appears to be declining in stability over time. Significantly, the Pisces Hudson Report ignores the ecological tenet that species adapted to changing environments that change as a result of dynamic physical conditions like the temperature, salinity and flow regime experienced in north temperate estuaries such as the Hudson River are adapted to wide variations in these environmental parameters and are therefore more robust and less vulnerable to changes.

48. The Pisces Hudson Report refers to a number of multivariate methods besides the principal component analysis ("PCA") that Pisces presents in support of its contention that "apparent stability" in the fish community structure since 1985 "hides" great changes in the Hudson River fish community. However, the Pisces Hudson Report never defines "apparent stability," and it should be recognized that the concept of stability in ecosystems has been one of much controversy and research resulting in little agreement among researchers as to what stability means since 1969. It is cavalier at best, and scientifically flawed at worst, to use this phrase in the context of a scientific discussion of fish community dynamics without defining it. Furthermore, the Pisces Hudson Report only presents the results of one multivariate method, PCA, and no other multivariate method is described or presented.

49. The Pisces Hudson Report states that the PCA analysis reveals a clear pattern of change in the fish community sampled in the 1980s, 1990s, and 2000s. The Pisces Hudson Report supports that contention by examining a linear equation based on PC#1. However, the Report does not point out another apparent pattern in the data revealed by a tight grouping of components that occurs irrespective of years that remains unnoticed and therefore unexplained by the authors of this report. It is unscientific to selectively interpret patterns in the analytical results that support some preconceived notion of how the community is changing while ignoring (not explaining) other patterns apparent in the data.

50. Therefore, in my professional opinion, the Pisces Hudson Report sets forth conclusions that are poorly described, speculative, and reflect a superficial understanding of the Hudson River ecosystem as described by the HRBMP.

CONCLUSIONS

51. Based on my education and training, expertise, first-hand experience and professional judgment:

- the principles and methods used to obtain the data in the AEI Report and to perform the analyses and draw the conclusions presented AEI Report are tested and accepted within the disciplines of aquatic ecology, field sampling design, aquatic ecosystem population and community dynamics, and limnology, and comport with the standards of the environmental consulting industry as I understand them.

- The work undertaken to prepare the AEI Report reliably applied such principles and methods.

- The data and methods used in the AEI Report were evaluated through rigorous and documented quality assurance/quality control assessments that meet or exceed USEPA guidance for environmental programs.

52. Thus, in my professional opinion, the AEI Report is worthy of the highest degree of confidence.

53. In contrast, based on my education and training, expertise, first-hand experience and professional judgment, the principles and methods used to perform the analyses and draw the conclusions presented in the Pisces Reports and the Jacobson Declaration, are poorly described, speculative, and reflect only a marginal understanding of the Hudson River ecosystem as described by the HRBMP. Moreover, the Pisces EI Report presents its arguments without any clear definition of ecological significance, adverse impact, or the criteria used for assessment, and without establishing testable hypotheses of cause and effect related to impingement or entrainment at IP2 and IP3, and therefore do not comport with environmental consulting industry standards.

Signed this 18th day of January, 2008.

Mark T. Mattson

Mark T. Mattson, Ph.D.
Normandeau Associates, Inc.
Vice President & Principal Aquatic Ecologist

FIGURES

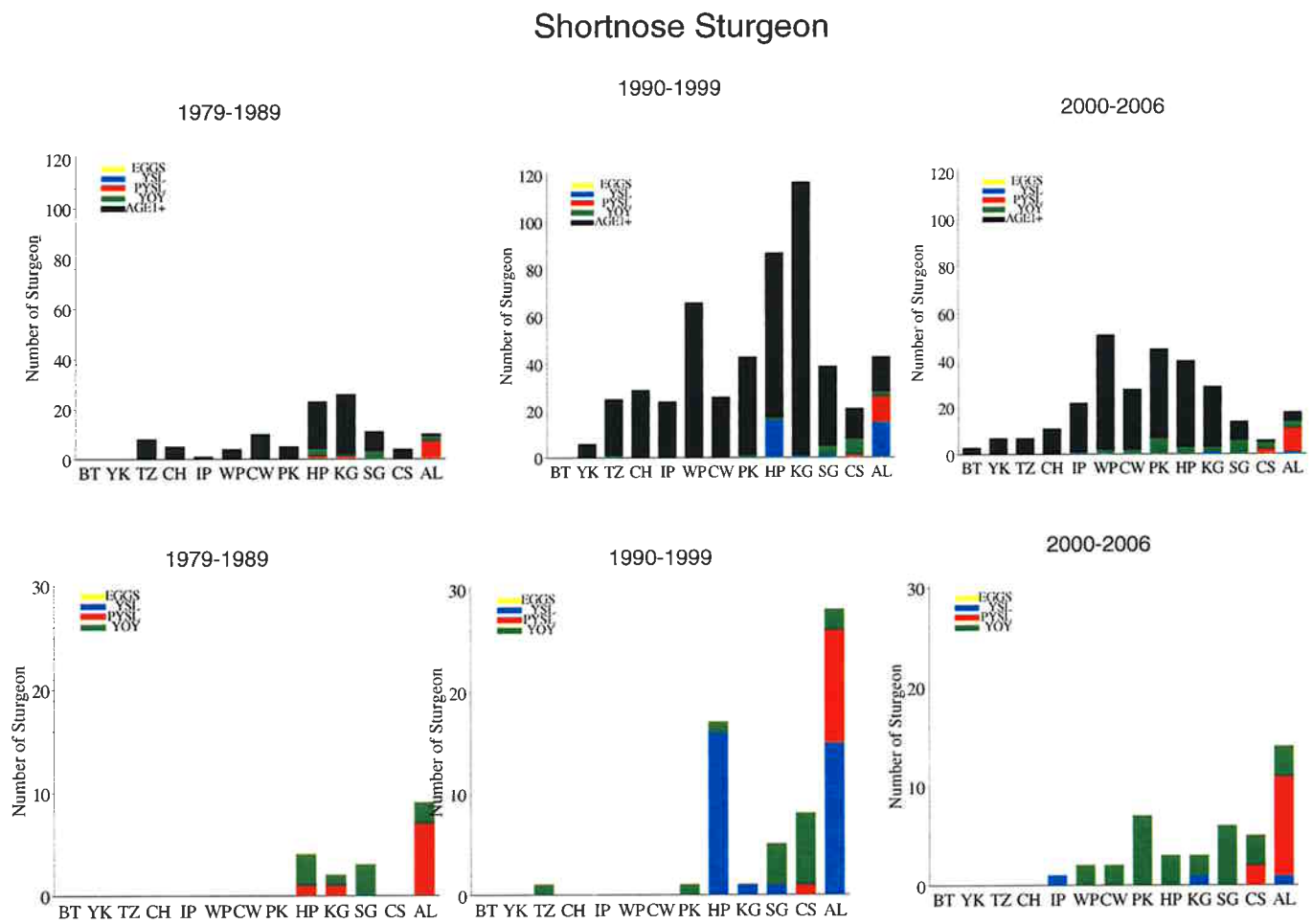

Figure 1. Number of shortnose sturgeon caught in the Hudson River by decade (1979-1989, 1990-1999, 2000-2006) in each of 13 geographic regions sampled between the Battery (BT) at New York City and Albany (AL) by the Hudson River Biological Monitoring Program (171,357 total samples). Note that the Indian Point region where IP2 and IP3 are located is labeled "IP", and is represented by 16,948 samples collected and examined for shortnose sturgeon from 1979 through 2006.

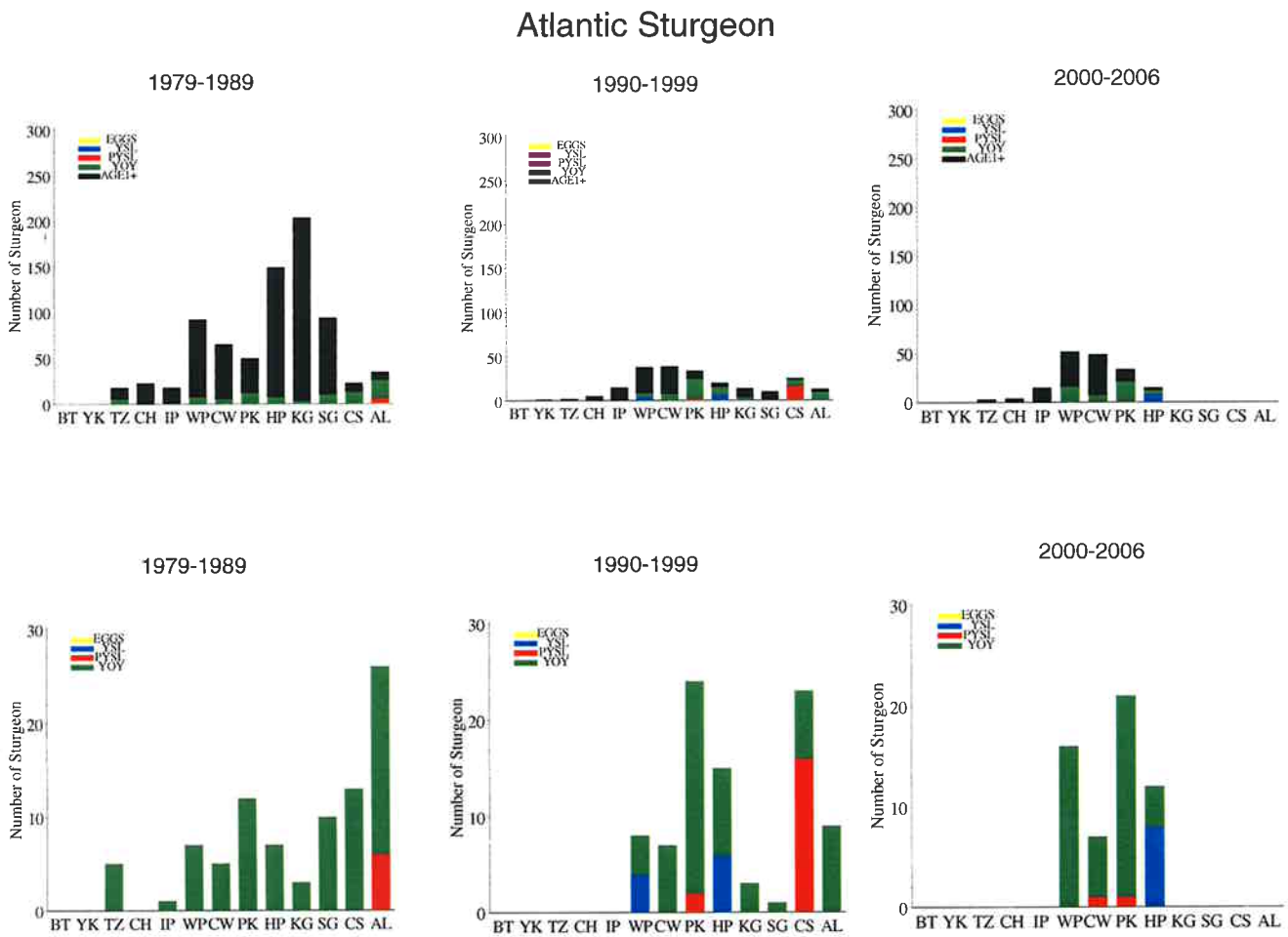

Figure 2. Number of Atlantic sturgeon caught in the Hudson River by decade (1979-1989, 1990-1999, 2000-2006) in each of 13 geographic regions sampled between the Battery (BT) at New York City and Albany (AL) by the Hudson River Biological Monitoring Program (171,357 total samples). Note that the Indian Point region where IP2 and IP3 are located is labeled "IP", and is represented by 16,948 samples collected and examined for Atlantic sturgeon from 1979 through 2006.

ATTACHMENT 1

MARK T. MATTSON, Ph.D.
Vice President/Principal Aquatic Ecologist

Dr. Mattson is a Vice President and Principal Aquatic Ecologist at Normandeau who has supervised or conducted more than 45 fisheries and aquatic ecology projects over the past 28 years. He is a specialist in aquatic ecology/ fisheries field sampling design and in the application of population and community level statistics to measure anthropogenic effects on aquatic ecosystems. Dr. Mattson has also presented testimony on the development and application of periphyton and benthic macroinvertebrate community biocriteria to narrative water quality classification for several projects in Maine and Connecticut.

EDUCATION

Ph.D. 1979, Zoology (Limnology), University of New Hampshire
M.S. 1975, Zoology, University of New Hampshire
B.A. 1973, Biology, University of Connecticut

PROFESSIONAL EMPLOYMENT HISTORY

1981-Present Normandeau Associates, Inc.
1979-1981 Texas Instruments Inc., Ecological Services

PROFESSIONAL AFFILIATIONS

American Society of Limnology and Oceanography
International Limnological Society
American Fisheries Society

SELECTED PROJECT EXPERIENCE

Entergy Nuclear Northeast, Inc. (2006-Present) – Provided technical assistance in the areas of fisheries and aquatic ecology for the Nuclear Regulatory Commission (NRC) Environmental Report and Environmental Site Audit for the re-licensing of the James A. FitzPatrick Nuclear Power Plant located on Lake Ontario (NY). Project Manager.

Entergy Nuclear Northeast, Inc. (2006-Present) – Provided technical assistance in the areas of fisheries and aquatic ecology for the Nuclear Regulatory Commission (NRC) Environmental Report and Environmental Site Audit for the re-licensing of the Indian Point Nuclear Power Plant located on the Hudson River (NY). Project Manager.

Entergy Nuclear Northeast, Inc. (2005-Present) - Preparation of a Clean Water Act Section 316(b) Proposal for Information Collection (PIC) and Comprehensive Demonstration Study (CDS) in compliance with the Phase II Rule regulating the cooling water intake structure at the James A. FitzPatrick Nuclear Power Plant located on Lake Ontario (NY). Project Manager and Report Author.

Entergy Nuclear Vermont Yankee, Inc. (2005-Present) - Preparation of a Clean Water Act Section 316(b) Proposal for Information Collection (PIC) and Comprehensive Demonstration Study (CDS) in compliance with the Phase II Rule regulating the cooling water intake structure at the Vermont Yankee Nuclear Power Generating Station located on the Connecticut River (VT). Project Manager and Report Author.

Entergy Nuclear Northeast, Inc. (2005-Present) - Preparation of a Clean Water Act Section 316(b) Proposal for Information Collection (PIC) and Comprehensive Demonstration Study (CDS) in compliance with the Phase II Rule regulating the cooling water intake structure at the Pilgrim Nuclear Power Station located on the Atlantic Ocean (Cape Cod Bay) (MA). Project Manager and Report Author.

MARK T. MATTSON, Ph.D.
Vice President/Principal Aquatic Ecologist

SELECTED PROJECT EXPERIENCE (Continued)

Public Service Company of New Hampshire, Inc. (2005-Present) - Preparation of a Clean Water Act Section 316(b) Proposal for Information Collection (PIC) and Comprehensive Demonstration Study (CDS) in compliance with the Phase II Rule regulating the cooling water intake structure at Merrimack Station located on the Merrimack River (NH). Report Author.

Public Service Company of New Hampshire, Inc. (2005-Present) - Preparation of a Clean Water Act Section 316(b) Proposal for Information Collection (PIC) and Comprehensive Demonstration Study (CDS) in compliance with the Phase II Rule regulating the cooling water intake structure at Newington Station located on the Piscataqua River (Great Bay Estuary) (NH). Report Author.

Public Service Company of New Hampshire, Inc. (2005-Present) - Preparation of a Clean Water Act Section 316(b) Proposal for Information Collection (PIC) and Comprehensive Demonstration Study (CDS) in compliance with the Phase II Rule regulating the cooling water intake structure at Schiller Station located on the Piscataqua River (Great Bay Estuary) (NH). Report Author.

Public Service Company of New Hampshire (1994-1996; 2003-Present) - Bow Station hydrothermal demonstration in support of NPDES requirements for accessing potential impacts on yellow perch, American shad and Atlantic salmon. Project Biologist.

Entergy Nuclear Vermont Yankee, Inc. (2002-Present) – Preparation of a Clean Water Act Section 316(a) Demonstration in support of a request for increased discharge temperatures at the Vermont Yankee Nuclear Power Generating Station (VT). Project Manager and Report Author.

Entergy Nuclear Vermont Yankee, Inc. (2002-Present) - Environmental support services for NPDES, indirect discharge, solid waste and biological monitoring programs at the Vermont Yankee Nuclear Power Generating Station (VT). Project Manager.

Entergy Nuclear Operations, Inc. (2001-Present) - Hudson River Striped Bass Program (NY). Project Manager.

Entergy Nuclear Operations, Inc. (2001-Present) - Hudson River Atlantic tomcod Program (NY). Project Manager.

Entergy Nuclear Operations, Inc. (2001-Present) - Hudson River Ichthyoplankton and Juvenile Fish Surveys field and laboratory services (NY). Corporate Officer.

New York Department of Environmental Conservation (NY) (1998-2006) - Hudson River Herring Spawning Stock Assessment. Technical Director.

Covanta Mid-Connecticut, Inc. (2003-2005) – Connecticut Resource Recovery Authority generating station evaluation of existing and proposed new Clean Water Act Section 316(b) rules for existing facilities – an entrainment and impingement evaluation (CT). Project Manager.

Somerset Operations (MA) (2001-2004) – Two-year evaluation of impingement, entrainment and the thermal plume at this existing generating station. Corporate Officer.

MARK T. MATTSON, Ph.D.
Vice President/Principal Aquatic Ecologist

SELECTED PROJECT EXPERIENCE (Continued)

New York Power Authority (NY) (2001-2003) – Charles Poletti Power Plant Effects of Entrainment and Impingement Program. Ichthyoplankton, Juvenile Fish Trawl Surveys; Cunner and Tautog Mark-Recapture Program in Long Island Sound, New York Harbor, and the Hudson River. Project Manager and Technical Director.

Pratt and Whitney East Hartford (CT) (2000 - 2003) – Two-year evaluation of impingement, entrainment and the thermal plume at the Wilgoos facility on the Connecticut River (CT). Project Manager.

Bridgeport Energy LLC Facility (CT, Bridgeport Harbor) (2000 - 2003) – Two-year evaluation of impingement, entrainment and the thermal plume at this new generating station. Corporate Officer.

Vermont Yankee Nuclear Power Corporation (VT) (1996-2002) - Environmental support services for NPDES, indirect discharge, solid waste and biological monitoring programs at the Vermont Yankee Nuclear Power Generating Station. Project Manager.

Shering-Plough Corporation (NJ) (1999-2001) - Biological assessment of the endangered Dwarf Wedge Mussel (Alasmidonta heterodon) in the Paulins Kill River (Sussex Co., NJ). Project Manager.

New York Department of Environmental Conservation (NY) (1999-2001) - Aquatic Biological sample collections for contaminants analysis from New York Harbor and the Hudson River. Corporate Officer.

New York Power Authority (1984-1994; 1997-2001) - Hudson River Striped Bass Stock Assessment Program (NY). Project Manager.

New York Power Athority. (1982-1994; 1997-2001) - Hudson River Atlantic Tomcod Spawning Stock Survey (NY). Project Manager.

Consolidated Edison Company of New York, Inc. (1988-1989, 1991-2001) - Hudson River Ichthyoplankton Laboratory Program (NY). Corporate Officer.

Consolidated Edison Company of New York, Inc. (1984-1989, 1991-2001) - Hudson River Ichthyoplankton and Juvenile Surveys (NY). Corporate Officer.

Pratt and Whitney Middletown (CT) (2000) – Cooling water intake screen evaluation to determine applicability of Best Management Practices (BMP) to demonstrate the use of Best Technology Available (BTA) with respect to impingement and entrainment at the Middletown manufacturing facility on the Connecticut River (CT). Project Manager.

Public Service Electric & Gas Company (1996-2000) - Salem Station (NJ) Delaware Bay-wide monitoring fisheries studies for the Estuarine Enhancement Program. Corporate Officer.

Public Service Electric & Gas Company (1996-1998) - Hudson Station (NJ) supplemental 316(a) and 316(b) biological studies. Project Manager.

Eckenfelder, Inc. (1995-1998) - Phase II RFI studies for adjacent surface water sediments AOC for the Ciba-Geigy site located on the Hudson River in Glens Falls (NY). Project Manager.

MARK T. MATTSON, Ph.D.
Vice President/Principal Aquatic Ecologist

SELECTED PROJECT EXPERIENCE (Continued)

Wisconsin Public Service Corporation (1996) - Oconto Electric Hydroelectric Project (WI) Fish Entrainment and Turbine Mortality Study. Project Manager.

Dairyland Power Reservoir Productivity Study (1995-1996) - Reservoir productivity study in support of hydropower relicensing on the Flambeau River (WI). Project Manager.

Wisconsin Public Service Corporation (1994-1995) - Wausau Hydroelectric Project (WI) Fish Entrainment and Turbine Mortality Studies. Project Manager.

Wisconsin Public Service Corporation (1992-1994) - Grand Rapids Hydroelectric Project (WI) Fish Entrainment and Turbine Mortality Studies. Project Manager.

Great Northern Paper Co. (1986-1992) - Penobscot Mills and Ripogenus Dam Hydropower Relicensing Projects (ME). Project Aquatic Ecologist.

Empire State Electric Energy Research Corp. (1990-1991) - Demonstration of an Acoustic Fish Deterrence System at the James A. Fitzpatrick Nuclear Power Plant Cooling Water Intake (NY). Project Manager.

Niagara Mohawk Power Corp. (1990-1991) - Fish Guidance Study at Albany Steam Station (NY). Project Manager/Technical Advisor.

Central Hudson Gas and Electric Corp. (1989-1991) - Roseton and Danskammer Point Stations Impingement Monitoring Program (NY). Project Manager.

Consolidated Edison Company of New York, Inc. (1984-1986, 1989-1991) - Indian Point Impingement Studies (NY). Project Manager.

Consolidated Edison Company of New York, Inc. (1985-1991) - Indian Point Nuclear Generating Station Ristroph Screen Impingement Mitigation Study (NY). Project Manager.

Wisconsin Public Service Corporation (1990) - Nine Hydroelectric Facilities (WI) Fish Turbine Entrainment/Mortality Study Plans. Project Manager.

New York Power Authority (1990) - Indian Point Unit 3 Nuclear Power Plant Zebra Mussel Monitoring Project. Project Manager.

Central Hudson Gas & Electric Corp. (1990) - Zebra Mussel Monitoring at Roseton and Danskammer Point Stations. Project Manager.

Central Hudson Gas & Electric Corp. (1990) - Survey of Hudson River Marinas for the Presence of Zebra Mussels. Project Manager.

The Upjohn Company (1982, 1987-1990) - Quinnipiac River Study (CT). Project Aquatic Ecologist.

New York Power Authority (1986-1990) - Indian Point Fish Deterrence Studies (NY). Corporate Officer/Technical Reviewer.

Consolidated Edison Company of New York, Inc. (1989) - Relative Probability of Entrainment Study for Indian Point Station (NY). Project Manager.

Consolidated Central Hudson Gas and Electric Corp. (1986-1988) - Danskammer Point Station Fine Mesh Fish Impingement Studies (NY). Project Manager.

MARK T. MATTSON, Ph.D.
Vice President/Principal Aquatic Ecologist

SELECTED PROJECT EXPERIENCE (Continued)

Consolidated Edison Company of New York, Inc. (1986-1987) - Special Studies to Examine Fish Abundance in Unsampled Areas of the Hudson River (NY). Project Manager.

Consolidated Edison Company of New York, Inc. (1986-1987) - Indian Point Entrainment Abundance Studies (NY). Technical Advisor.

Consolidated Edison Company of New York, Inc. (1984-1985) - 1982 and 1983 Year Class Reports for the Hudson River Monitoring Program (NY). Technical Reviewer.

Orange and Rockland Utilities, Inc. (1983-1985) - Hudson River White Perch Stock Assessment Study (NY). Project Manager.

Great Northern Paper Company (1981-1985) - Hydroelectric Development Project (ME). Project Aquatic Ecologist.

New York Power Authority (1980-1985) - Hudson River Gear Evaluation Studies (NY). Project Manager.

Bangor Hydro Basin Mills Hydroelectric Project (ME) (1983-1984) - Project Aquatic Ecologist.

Consolidated Edison Company of New York, Inc. (1981-1984) - Sampling Design Evaluation for Indian Point Fish Impingement Programs (NY). Project Manager.

Metropolitan District Commission (1982-1983) - Water Supply Alternatives (MA). Project Aquatic Ecologist.

Bangor Hydro Telos Dam Reconstruction Project (ME) (1982) - Project Aquatic Ecologist.

Consolidated Edison Company of New York, Inc. (1981-1982) - Indian Point Juvenile Fish Entrainment Study (NY). Project Manager.

Chicopee Falls Hydropower Project (MA) (1981) - Project Aquatic Ecologist.

Town of Concord (MA) (1981) - Water Supply Study. Project Aquatic Ecologist.

SPECIAL TRAINING

U.S. Fish and Wildlife Instream Flow Incremental Methodology Negotiations and Strategies, 1981; Conducting Field Studies, 1984
NAUI Certified SCUBA diver

SELECTED PRESENTATIONS AND PUBLICATIONS

Dunning, D.J., J.R. Waldman, Q.E. Ross and M.T. Mattson. 2006. Dispersal of age 2+ striped bass out of the Hudson River. Pages 287-294 in J.R. Waldman, K.E. Limburg, and D.L.Strayer, editors. Hudson River fishes and their environment. American Fisheries Society, Symposium 51. Bethesda, Maryland.

Dunning, D.J., Q.E. Ross, M.T. Mattson, and D.G. Heimbuch. 2006. Distribution and abundance of bay anchovy eggs and larvae in the Hudson River and nearby waterways. Pages 215-226 in J.R. Waldman, K.E. Limburg, and D.L.Strayer, editors. Hudson River fishes and their environment. American Fisheries Society, Symposium 51. Bethesda, Maryland.

MARK T. MATTSON, Ph.D.
Vice President/Principal Aquatic Ecologist

SELECTED PRESENTATIONS AND PUBLICATIONS (Continued)

Smith, J.D., M.T. Mattson, and V. Thompson. 2006. Using computational fluid dynamics to determine the hydraulic zone of influence for ichthyoplankton and juvenile fish sampling areas in the vicinity of the James A. FitzPatrick Plant cooling water intake structure in Lake Ontario. Presentation at the EPRI and UWAG conference on 316(b) issues, to be held in Atlanta, Georgia, 6-7 September 2006.

Mattson, M.T., M.L. Hutchins, P.L. Harmon, and C.J. Swanson. 2004. Probability-based impact assessment for a §316(a) demonstration: an example from Entergy Nuclear Vermont Yankee. Chapter 13 *in* Proceedings from the EPRI Workshop on 316(a) Issues: Technical and Regulatory Considerations: October 16-17 2003, EPRI Palo Alto, CA and American Electric Power Company, Columbus, OH: 2004. 1008476.

Mattson, M.T. and D.J. Dunning. 2004. Mitigation value of a striped bass hatchery in the Hudson River Estuary. Presentation at the Symposium on Ecological Restoration under Section 316(b) of the Clean Water Act: Issues in Implementation. 134th Annual Meeting of the American Fisheries Society, Madison, Wisconsin, 22-26 August 2004.

Mattson, M.T. J.R. Young, K.A. Hattala, and A. Kahnle. 2003. Abundance index trends in alewife and blueback herring populations of the Hudson River Estuary. Presentation at: Hudson River Fishes & Their Environment. Hudson River Environmental Society conference held 20-21 March 2003 at Marist College, Poughkeepsie, NY.

Mattson, M.T. J.R. Young, and Q.E. Ross. 2002. Atlantic tomcod in the Hudson River Estuary. Presentation at the Symposium on Hudson River Fisheries. 132th Annual Meeting of the American Fisheries Society, Baltimore, Maryland, August 2002.

Dunning, D.J., J.R. Waldman, Q.E. Ross and M.T. Mattson. 1997. Use of Atlantic Tomcod and other prey species by striped bass in the lower Hudson River estuary during winter. Trans. Am. Fish, Soc. 236(5): 857-861.

Dunning, D.J., Q.E. Ross, W.L. Kirk, J.R. Waldman, D.G. Heimbuch and M.T. Mattson. 1992. Post juvenile striped bass studies after the settlement agreement. In: C.L. Smith ed., Estuarine Research in the 1980s. State University of New York Press. p.338-347.

Geoghegan, P., M.T. Mattson, J.J. Reichle and R.G. Keppel. 1992. Influence of salt front position on the occurrence of uncommon marine fishes in the Hudson River Estuary. Estuaries 15(2): 251-254.

Geoghegan, P., M. T. Mattson, and R. Keppel. 1992. Distribution of the shortnose sturgeon in the Hudson River Estuary, 1983-1988. In: C.L. Smith ed., In: C.L. Smith ed., Estuarine Research in the 1980s. State University of New York Press. p. 217-227.

Mattson, M.T., P. Geoghegan, D.J. Dunning. 1992. Accuracy of catch per unit effort indices of Atlantic tomcod in the Hudson River. In: C.L. Smith ed., In: C.L. Smith ed., Estuarine Research in the 1980s. State University of New York Press. p. 323-338.

Waldman, J. R., D. J. Dunning, and M. T. Mattson. 1991. Long-term retention of anchor tags and internal anchor tags by striped bass. North American Journal of Fisheries Management, 11: 232-234.

MARK T. MATTSON, Ph.D.
Vice President/Principal Aquatic Ecologist

SELECTED PRESENTATIONS AND PUBLICATIONS (Continued)

Humphreys, M., M. T. Mattson, R.E. Park, J.J. Reichle, D.J. Dunning and Q.E. Ross. 1990. Stocking checks on scales for identifying hatchery striped bass in the Hudson River. American Fisheries Society Symposium 7: 78-83.

Waldman, J. R., D. J. Dunning, Q. E. Ross, and M. T. Mattson. 1990. Range dynamics of Hudson River striped bass along the Atlantic coast. Transactions of the American Fisheries Society 119: 910-919.

Waldman, J. R., D. J. Dunning and M. T. Mattson. 1990. A morphological explanation for size-differential anchor tag loss in Hudson River striped bass. Transactions of the American Fisheries Society 119: 920-923.

Mattson, M.T., J.R. Waldman, D.J. Dunning, and Q.E. Ross. 1989. Abrasion and protrusion of internal anchor tags in Hudson River striped bass. American Fisheries Society Symposium 7:121-126.

Dunning, D.J., Q.E. Ross, M.T. Mattson, P. Geoghegan, and J.R. Waldman. 1989. Reducing mortality of striped bass captured in seines and trawls. North American Journal of Fisheries Management, 9(2): 171-176.

Geoghegan, P., M.T. Mattson, D.J. Dunning and Q.E. Ross. 1989. Improved data through quality control and quality assurance in a large scale striped bass tagging program. American Fisheries Society Symposium 7: Fish Marking Techniques.

Mattson, M.T., D.J. Dunning, Q.E. Ross and B.R. Friedman. 1989. Magnetic tag detection efficiency in a Hudson River striped bass hatchery evaluation program. American Fisheries Society Symposium 7: 267-277.

Mattson, M.T., J.B. Waxman and D.A. Watson. 1988. Reliability of impingement sampling designs: an example from Indian Point Station. American Fisheries Society Monograph 4:161-169.

Dunning, D.J., Q.E. Ross, J.R. Waldman, and M.T. Mattson. 1987. Tag retention and tagging mortality in Hudson river striped bass. North American Journal of Fisheries Management, 8(4): 535-538.

Geoghegan, P., M. T. Mattson, D. J. Dunning and Q. E. Ross. 1986. Effects of water temperature, collection gear, and tag type on handling mortality of striped bass. Presented at the 1986 Northeast Fish and Wildlife Conference, Hershey, Pennsylvania USA.

Mattson, M. T., D. J. Dunning and Q. E. Ross. 1985. Relative catch efficiency of a 3 m beam trawl, 6.2 m high-rise trawl and 1.0 m epibenthic sled for sampling young of the year striped bass and other fishes in the Hudson River Estuary. American Fisheries Society, August 1985.

Mattson, M. T. and J. B. Waxman. 1985. Movements of spawning Atlantic tomcod (Microgadus tomcod) in the Lower Hudson River, Northeast Fish and Wildlife Conference; May 1985.

Mattson, M. T. 1980. Diel and seasonal horizontal movements in a population of the predatory cladocean *Polyphemus pediculus*. American Society of Limnology and Oceanography, December 1980.

MARK T. MATTSON, Ph.D.
Vice President/Principal Aquatic Ecologist

SELECTED PRESENTATIONS AND PUBLICATIONS (Continued)

Mattson, M. T. and J. F. Haney. 1980. Factors influencing intrazooplankton predation by Polyphemus pediculus, Research Report No. 29. Water Resources Research Center, University of New Hampshire, Durham, NH. 149 pp.

In addition, Dr. Mattson has contributed to over 30 technical reports in the areas of aquatic ecology and sampling design.

ATTACHMENT 2

REFERENCES

Bain, M.B. 1997. Atlantic and shortnose sturgeons of the Hudson River: common and divergent life history attributes. Environmental Biology of Fishes 48:347-358.

Bain, M.B., Haley, N., Peterson, D.L., Arend, K.K., Mills, K.E. and P.J. Sullivan. 2007. Recovery of a US endangered fish. PLoS ONE 2(1): e168. doi:10.1371/journal.pone.0000168

Barnthouse, L.W., Heimbuch, D.G., Van Winkle, W., and J.Young. 2008. Entrainment and impingement at IP2 and IP3: A biological impact assessment.

Consolidated Edison Company of New York, Inc. 1985. Biological evaluation of a Ristroph screen at Indian Point unit 2. June 1985. 50 pages plus Appendix A.

Dovel, W.L., and Berggren, T.J. 1983. Atlantic sturgeon of the Hudson Estuary, New York. New York Fish and Game Journal 30(2):142-172.

Dovel, W.L., Pekovitch, A.W. and T.J. Berggren. 1992. Biology of the shortnose sturgeon (*Acipenser brevirostrum*) in the Hudson River estuary, New York. Pp. 187-216. *In*: C.L.

Fletcher, R.I. 1986. On the reconfiguration and empirical evaluation of a prototype screening device at Indian Point Nuclear Unit 2. Final Report to Hudson River fishermen's Association. 1 December 1986. 56 pages.

Fletcher, R.I. 1990. Flow dynamics and fish recovery experiments: water intake systems. Transactions of the American Fisheries Society 119: 393-415.

Geoghegan, P. Mattson, M.T., Dunning, D.J., and Q.E. Ross. 1990. Improved data quality in a tagging program through quality assurance and quality control. American Fisheries Society Symposium 7: 714-719.

Geoghegan, P., Mattson, M.T., and R.G. Keppel. 1992. Distribution of the shortnose sturgeon in the Hudson River Estuary, 1984-1988. Pages 217-227 *in* C.L. Smith, ed. Estuarine research in the 1980's. Hudson River Environmental Society seventh symposium on Hudson River ecology. State University of New York Press, Albany.

Geoghegan, P. 1996. The management of quality control and quality assurance systems in fisheries science. Fisheries 21 (8): 14-18.

NOAA National Marine Fisheries Service. 1996. Status review of shortnose sturgeon in the Androscoggin and Kennebec Rivers. Gloucester (Massachusetts): Northeast Regional Office, National Marine Fisheries Service.

Seaby, R.M. and P.A. Henderson. 2007. Entrainment, Impingement and Thermal Impacts at Indian Nuclear Power Station. Pisces Conservation, Ltd. November 2007. 49 pp.

Seaby, R.M. and P.A. Henderson. 2007. The Status of Fish Populations and the Ecology of the Hudson. Pisces Conservation, Ltd. November 2007. 37 pp.

Secor, D. H. and R.J. Woodland. 2005. Recovery and status of shortnose sturgeon in the Hudson River. Final Report to Hudson River Foundation for Science and Environmental Research, Inc. August 2005. 108 pages.

Waldman, J.R., Young, J.R., Lindsay, B.J., Schmidt, R.E., and H. Andreyko. 2006. A comparison of alternative approaches to discriminate larvae of striped bass and white perch. North American Journal of Fisheries Management 19: 470-481.

Waldman, J.R., Limburg, K.E. and D.L. Strayer. 2006. The Hudson River environment and its dynamic fish community. Pp. 1-7 *In* Hudson River fishes and their environment (Waldman, J.R., Limburg, K., and D. Strayer eds.). American Fisheries Society Symposium 51.

Waldman, J.R., Lake, T.R. and R.E. Schmidt. 2006. Biodiversity and zoogeography of the fishes of the Hudson River watershed and estuary. Pp. 129-150 *In* Hudson River fishes and their environment (Waldman, J.R., Limburg, K., and D. Strayer eds.). American Fisheries Society Symposium 51.

Young, J.R., Keppel, R.G., and R.J. Klauda. 1992. Quality assurance and quality control aspects of the Hudson River utilities environmental studies. Pages 303-322 *in* C.L. Smith, ed. Estuarine research in the 1980's. Hudson River Environmental Society seventh symposium on Hudson River ecology. State University of New York Press, Albany.

The data underlying the ER, however, consists of a nearly forty-year assessment and was characterized by NYSDEC staff as "probably, the best data set on the planet."[850] For Petitioner to state that the impacts caused by impingement and entrainment are "far from small" is far from an assault on the adequacy of the ER under 10 C.F.R. Part 51. Proposed Contention 31 is no more than an impermissible attempt to "fly-speck" the ER by challenging its minor details while ignoring the value of the document in its entirety.[851]

In the final analysis, Proposed Contention 31 is again entirely geared toward the conclusion that Entergy must retrofit with closed-cycle cooling—Petitioner's final statement on this topic is that "the data" (a tacit admission that the data-set provided is sufficient) mandates "closed cycle cooling." This is a conclusion that is impermissible under NEPA, which can compel no outcome.[852] Hence, Proposed Contention 31 is immaterial at its very core, and inadmissible.

32. Proposed Contention 32: Failure to Conform to the Endangered Species Act

Proposed Contention 32 states:

> NEPA REQUIRES THAT THE NRC REVIEW THE ENVIRONMENTAL IMPACTS OF THE OUTMODED ONCE-THROUGH COOLING WATER INTAKE SYSTEM USED AT INDIAN POINT, WHICH HARMS ENDANGERED SPECIES AND CANDIDATE THREATENED SPECIES.[853]

---

850 *See, e.g.*, Letter from William Sarbello (then-NYSDEC staff-person) to Proposed § 316(b) Rule Comment Clerk, United States Environmental Protection Agency, Attachment at 15 (Nov. 9, 2000) (submitted herewith as Entergy Exhibit I to Riverkeeper Answer).

851 *Swanson v. United States Forest Serv.*, 87 F.3d 339, 343 (9th Cir. 1996) (upholding EIS containing adequate discussion of environmental consequences in spite of allegations of specific factual errors).

852 *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 350-51 (1989) ("If the adverse environmental effects of the proposed action are adequately identified and evaluated, the agency is not constrained by NEPA from deciding that other values outweigh the environmental costs.").

853 Petition at 290.

In this contention, Petitioner argues: (1) that NRC's approval of the LRA "might" jeopardize the continued existence of the Hudson River shortnose sturgeon population; and (2) that Entergy is in violation of the Endangered Species Act, 16 U.S.C. § 1531, et. seq. (the "ESA"), because it does not possess an incidental take permit for the impingement of shortnose sturgeon on the intake screens at IPEC.[854]

Entergy opposes the admission of Proposed Contention 32 on the grounds that it is (1) outside the scope of this license renewal proceeding, contrary to 10 C.F.R. § 2.309(f)(1)(iii), (2) not adequately supported in fact or law, contrary to 10 C.F.R. § 2.309(f)(1)(v), and (3) does not show a genuine dispute on a material issue of law or fact contrary to 10 C.F.R. § 2.309(f)(1)(vi). More specifically, Entergy is required in the ER only to assess the impacts of operations during the license renewal period on threatened and endangered species, and any decision as to whether approval of the LRA will jeopardize the continued existence of a species is left to the consultation process between the NRC and the National Marine Fisheries Service ("NMFS"). Moreover, Petitioner provides no basis for its speculation that continued operations during the license renewal period would jeopardize shortnose sturgeon, and the evidence is to the contrary. Second, Entergy is not required to demonstrate compliance with the ESA in the ER and, in any event, Entergy already holds the requisite approvals under the ESA for the operation of IPEC.

a. *The ER Provides the Required Analysis of Impacts to Threatened and Endangered Species*

Entergy's obligation to address endangered and threatened species in the ER is circumscribed as follows: "[T]he applicant shall assess the impacts of the proposed action on

[854] *See* Petition at 32.

threatened or endangered species in accordance with the [ESA]."[855] The ER contains the required assessment of these impacts in §§ 4.10.5 and 4.10.6. As documented in these sections, Entergy corresponded with NMFS to request a listing of all threatened and endangered species in the vicinity of IPEC.[856] Working from this NMFS-supplied list, Entergy proceeded to address each of the species identified by NMFS, in particular the shortnose sturgeon, and the potential for impacts to each.[857] Nowhere in Proposed Contention 32 does Petitioner allege that the ER is incomplete or otherwise lacking in information with regard to its assessment. Thus, contrary to 10 C.F.R. § 2.309(f)(1)(ii), there are simply no bases presented by Petitioner that might warrant admission of this proposed contention.[858]

As discussed in the ER, Entergy acknowledges that the NRC must undertake the consultation process with NMFS under § 7 of the ESA and, as relevant here, ensure that its approval of the LRA is not likely to jeopardize the Hudson River shortnose sturgeon population.[859] Petitioner's assertion that approval of the LRA "*might* jeopardize the continued existence of the shortnose sturgeon, which become impinged on the intake screens at IP2 and IP3,"[860] is unfounded speculation and, indeed, is contradicted by the express findings of NMFS

---

[855] 10 C.F.R. § 51.53(c)(3)(ii)(E).

[856] *See* ER at 4-27, 28.

[857] *See id.* at 4-28 – 4-31. The ER also identified the Atlantic sturgeon as a candidate for listing by the NMFS. *See id.* at 4-28. However, it is not presently a threatened or endangered species under the ESA and, therefore, while potential affects on this species were described in the ER, such a discussion is not required by 10 C.F.R. § 51.53(c)(3)(ii)(E) (requiring assessment of impacts on threatened and endangered species only).

[858] *See also PPL Susquehanna*, 50-387-LR, 65 NRC at 327 (petitioner "identifies no failure of the ER to contain information" and, therefore, the contention is outside the scope of the license renewal proceeding).

[859] *See* ER, at 4-27, 4-31; *see also* 16 U.S.C. § 1536(a)(2) ("Each Federal agency shall, in consultation with and with the assistance of the Secretary, insure that any action authorized . . . by such agency . . . is not likely to jeopardize the continued existence of any endangered or threatened species . . . .").

[860] Petition at 291 (emphasis added).

for IPEC and in other matters involving the Hudson River shortnose sturgeon population.[861] As NYSDEC is aware, shortnose sturgeon are not susceptible to impingement or entrainment,[862] and their number has expanded significantly throughout the prior 30 years of IPEC operations.[863] Contrary to 10 C.F.R. § 2.309(f)(1)(v) and (vi), the Petitioner has failed to provide any expert opinion to bolster its conjecture, or reference to the ER that might support this issue. Thus, it would seem unreasonable to conclude that continued operations would suddenly jeopardize this species. It would also be contrary to established NRC precedent prohibiting contentions based upon speculation to admit Proposed Contention 32.[864] In any event, Entergy and NRC will—as they must—abide by their ESA obligations resulting from the consultation process. Petitioner's speculation as to those obligations is not germane to that process or this proceeding.

b. *Entergy Does Not Require an Incidental Take Permit Under the ESA*

As noted above, Entergy's obligation is to assess in the ER the impacts of the approval of the LRA on threatened and endangered species.[865] Entergy is not obligated to demonstrate compliance with the ESA in the ER and, therefore, Petitioner's allegations of noncompliance with the ESA are outside the scope of this proceeding.[866]

Moreover, and contrary to Petitioner's allegations, Entergy is in compliance with the ESA. As a general rule, the ESA prohibits the taking of an endangered species.[867] However, this

---

[861] *See* ER, at 4-29 (citing NMFS 2000 Environmental Assessment indicating a four-fold increase in the Hudson River shortnose sturgeon population since the 1970's).

[862] Mattson Declaration ¶ 34.

[863] *See id.* ¶ 36 (discussing the 400% increase in Hudson River shortnose sturgeon since the late 1970's).

[864] *See Vogtle*, 52-011-ESP, 65 NRC at 253 (observing that "neither mere speculation nor bare or conclusory assertions, even by an expert, alleging that a matter should be considered will suffice to allow the admission of a proffered contention").

[865] *See* 10 C.F.R. § 51.53(c)(3)(ii)(E).

[866] *See Vogtle*, 52-011-ESP, 65 NRC at 255-56 (dismissing contention because analysis petitioner alleged was "lacking" was not required by NRC regulations).

[867] *See* 16 U.S.C. § 1538(a)(1)(B) (prohibiting the taking of any endangered species).

general rule does not apply to any taking contemplated in a biological opinion issued under § 7(b) of the ESA that concludes that the proposed action will not jeopardize the endangered species.[868] Indeed, Congress' specific intention was to avoid duplicative incidental take permits where a biological opinion had been issued:

> The purpose of Section 7(b)(4) and the amendment to Section 7(o) is to resolve the situation in which a Federal agency or a permit or license applicant has been advised that the proposed action will not violate Section 7(a)(2) of the Act but the proposed action will result in the taking of some species incidental to that action -- a clear violation of Section 9 of the Act which prohibits any taking of a species. The Federal agency or permit or license applicant is then confronted with the dilemma of having a biological opinion which permits the activity to proceed but is, nevertheless, proscribed from incidentally taking any species even though the incidental taking was contemplated in the biological opinion and determined not to be a violation of Section 7(a)(2). The Committee intends that such incidental takings be allowed *provided that the terms and conditions specified by the Secretary to minimize the impact of the taking are complied with.*[869]

As discussed in the ER, but overlooked by Petitioner in Proposed Contention 32, in 1979, Dr. Michael J. Dadswell of NMFS issued a biological opinion under § 7(b) of the ESA on the impact on shortnose sturgeon of once-through cooling at, among other facilities, IPEC.[870] That opinion concluded that:

> the once through cooling system of the power plants involved in this case is not likely to jeopardize the continued existence of the shortnose sturgeon because, even assuming 100% mortality of impinged fish, its contribution to the natural annual mortality is *negligible*. In addition, the biology of the shortnose sturgeon effectively isolates the species from most of the effects of power plant intakes.[871]

---

[868] *See id.* § 1536(o)(2).

[869] H.R. REP. NO. 97-567, at 2826 (1982) (Endangered Species Act of 1982) (emphasis added).

[870] *See* ER at 4-30.

[871] *See* DADSWELL BIOLOGICAL OPINION 16-17 (referenced ER at 4-30) (emphasis supplied). Indeed, NYSDEC has acknowledged that this opinion had been rendered. *See* FEIS, at 26 ("In testimony to the EPA in 1979, NMFS concluded in a Biological Opinion made pursuant to Section 7 of the Endangered Species Act that the

Given these negligible impacts, the Biological Opinion did not require any mitigation or monitoring associated with the operations of IPEC or, for that matter, any of the other power plants addressed in the Biological Opinion. Thus, because the incidental take of shortnose sturgeon due to the operation of IPEC was specifically contemplated in the Biological Opinion, Entergy does not require a separate (and, as Congress has indicated, duplicative) incidental take permit covering the same activity.

Based upon the foregoing, Proposed Contention 32 should be dismissed in its entirety.

once-through cooling system of the power plants did not pose a threat to the shortnose sturgeon population in the Hudson River.").