UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	Docket Nos. 50-247-LR and 50-286-LR
ENTERGY NUCLEAR OPERATIONS, INC.	)	
(Indian Point Nuclear Generating Units 2 and 3)	)	
	)	October 1, 2013

ENTERGY'S ANSWER TO RIVERKEEPER, INC.'S CONSOLIDATED MOTION FOR LEAVE TO FILE AMENDED CONTENTION RK-EC-8A AND AMENDED CONTENTION RK-EC-8A (ENDANGERED AQUATIC SPECIES)

William B. Glew, Jr., Esq.
William C. Dennis, Esq.
Entergy Nuclear Operations, Inc.
440 Hamilton Avenue
White Plains, NY 10601
Phone: (914) 272-3202
E-mail: wglew@entergy.com
E-mail: wdennis@entergy.com

Kathryn M. Sutton, Esq.
Paul M. Bessette, Esq.
Jonathan M. Rund, Esq.
MORGAN, LEWIS & BOCKIUS LLP
1111 Pennsylvania Avenue, N.W.
Washington, D.C. 20004
Phone: (202) 739-5738
E-mail: ksutton@morganlewis.com
E-mail: pbessette@morganlewis.com
E-mail: jrund@morganlewis.com

COUNSEL FOR ENTERGY NUCLEAR OPERATIONS, INC.

TABLE OF CONTENTS

Page

I. INTRODUCTION 1

II. LEGAL STANDARDS 4

A. Legal Standards Governing Admission of Amended Contentions 4

B. Legal Standards Governing Endangered Species Reviews 5

1. Endangered Species Act Requirements 5

2. An Agency's Reliance on a NMFS Biological Opinion Is Reviewed Under the Arbitrary and Capricious Standard 8

3. NEPA Requirements 9

4. Summary of Riverkeeper's Burden to Admit RK-EC-8A 10

III. AMENDED CONTENTION RK-EC-8A DOES NOT MEET THE NRC'S CONTENTION ADMISSIBILITY CRITERIA 11

A. Summary of ESA Section 7 Consultation Process 12

1. Initial ESA Section 7 Consultations and December 2010 FSEIS Conclusions 12

2. Continued Section 7 Consultations and NMFS' Final January 2013 Biological Opinion 15

a. Continued ESA Consultations and NMFS' October 2011 BiOp 15

b. NMFS' Atlantic Sturgeon Listing and the Reinitiation of Consultations 20

c. NRC Staff Draft FSEIS Supplement 21

d. NMFS' New Draft Biological Opinion and Final Biological Opinion 23

e. The NRC Staff's Incorporation of NMFS' Biological Opinion in the June 2013 FSEIS Supplement 26

3. Amended Contention RK-EC-8 29

B. Amended Contention RK-EC-8A Is Immaterial, Lacks Sufficient Factual Support and Legal Basis, and Fails to Establish a Genuine Dispute on a Material Issue of Law or Fact 30

1. RK-EC-8A, Basis 1, Is Immaterial, Insufficient to Establish a Genuine Dispute, and Inadequately Supported 30

a. Riverkeeper Fails to Provide Sufficient Information Demonstrating that the Staff's Reliance on NMFS' BiOp Was Arbitrary and Capricious 30

b. Riverkeeper Fails to Establish that the NRC Staff and NMFS Improperly Ignored Comments Received on the Draft FSEIS Supplement and Draft BiOp 32

2. RK-EC-8A, Basis 2 Is Immaterial, Insufficient to Establish a Genuine Dispute, and Inadequately Supported 46

IV. CONCLUSION 49

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	Docket Nos. 50-247-LR and 50-286-LR
ENTERGY NUCLEAR OPERATIONS, INC.	)	
(Indian Point Nuclear Generating Units 2 and 3)	)	
	)	October 1, 2013

ENTERGY'S ANSWER TO RIVERKEEPER, INC.'S CONSOLIDATED MOTION FOR LEAVE TO FILE AMENDED CONTENTION RK-EC-8A AND AMENDED CONTENTION RK-EC-8A (ENDANGERED AQUATIC SPECIES)

I. INTRODUCTION

Pursuant to 10 C.F.R. § 2.309(h)(1) and the Atomic Safety and Licensing Board's ("Board") September 13, 2013 Order,[1] Entergy Nuclear Operations, Inc. ("Entergy") submits this Answer opposing the "Consolidated Motion for Leave to File Amended Contention RK-EC-8A and Amended Contention RK-EC-8A," filed by Riverkeeper, Inc. ("Riverkeeper") on August 20, 2013.[2] In response to the U.S. Nuclear Regulatory Commission ("NRC" or "Commission") Staff's issuance of the Volume 4 supplement to its Final Supplemental Environmental Impact Statement ("FSEIS"),[3] Riverkeeper proposes amended Contention RK-EC-8A. That amended contention asserts that this FSEIS Supplement is inadequate because it: (1) fails to consider or address Riverkeeper's comments regarding various alleged deficiencies in the January 2013

---

1 Licensing Board Order (Granting Staff's Motion for an Extension of Time) (Sept. 13, 2013) (unpublished).

2 Riverkeeper, Inc. Consolidated Motion for Leave to File Amended Contention RK-EC-8A and Amended Contention RK-EC-8A (Aug. 20, 2013) ("Riverkeeper Motion"), *available at* ADAMS Accession No. ML13232A390.

3 NUREG-1437, Supp. 38, Vol. 4, Generic Environmental Impact Statement for License Renewal of Nuclear Plants, Regarding Indian Point Nuclear Generating Unit Nos. 2 and 3, Final Report, Supplemental Report and Comment Responses (June 2013) ("FSEIS Supplement"), *available at* ADAMS Accession No. ML13162A616.

Biological Opinion ("2013 BiOp")[4] of the U.S. National Marine Fisheries Service ("NMFS"), and in turn, fails to adequately assess impacts to endangered species; and (2) fails to explain how the purportedly new and significant information assessed by the Staff in the FSEIS Supplement affects the Staff's recommendation to the Commission regarding the appropriateness of renewing the Indian Point Nuclear Generating Unit 2 and 3 ("IP2" and "IP3," respectively) licenses.[5]

For the reasons discussed below, RK-EC-8A is inadmissible, in that it is immaterial to the NRC Staff's National Environmental Policy Act ("NEPA") findings, insufficient to establish a genuine dispute on a material issue of law or fact, and inadequately supported by factual information or expert opinion, as required by 10 C.F.R. § 2.309(f)(1)(iv), (v), and (vi). Contrary to Riverkeeper's claim that the Staff "relies blindly" on NMFS' conclusions,[6] the Staff's FSEIS Supplement conclusions were the culmination of an extensive, back-and-forth consultation process, throughout which the Staff conducted its own independent analyses of the best available information and developed its own findings and conclusions, in parallel with NMFS' review. The Staff memorialized its independent findings in four detailed biological assessments ("BA") submitted to NMFS. NMFS itself issued two lengthy BiOps of 80 and 163 pages.[7] The conclusions reached by NMFS in its final BiOp were consistent with and supported the conclusions reached by the Staff in its BAs and Draft FSEIS Supplement. Aside from its conclusory claims of alleged deficiencies, Riverkeeper has presented nothing demonstrating that

---

4 Endangered Species Act Section 7 Consultation Biological Opinion (Jan. 30, 2013) ("2013 BiOp"), *available at* ADAMS Accession No. ML13032A569 (previously provided as Riverkeeper Motion, Attach. 6).

5 Riverkeeper Motion at 7.

6 *Id*.

7 As discussed below, NMFS issued an initial BiOp in October 2011 pertaining to shortnose sturgeon. It issued a second BiOp in January 2013 pertaining to both shortnose and Atlantic sturgeon that superseded the initial October 2011 BiOp.

the NRC Staff was unreasonable –let alone arbitrary and capricious—in relying on NMFS' expert conclusions in the 2013 BiOp.

With regard to Riverkeeper's assertion that the FSEIS Supplement failed to consider or address its various comments on the Draft FSEIS Supplement and 2013 BiOp, the record is clear that, putting aside the question of whether the Staff and NMFS have a legal obligation to respond to each and every one of Riverkeeper's comments (which they do not), both the Staff and NMFS[8] were aware of the issues raised in Riverkeeper's comments and reasonably considered and addressed them during the consultation process.

Finally, Riverkeeper has not shown that the NRC Staff's conclusions in the FSEIS Supplement regarding endangered sturgeon constituted "new" and "significant" information that was so different from the Staff's conclusions in the FSEIS that the Staff was required to repeat or confirm its prior recommendation to the Commission that the environmental impacts of license renewal are not so great that preserving the license renewal option would be unreasonable. As shown below, the FSEIS Supplement was limited to updating the Staff's analysis of certain potential environmental impacts to aquatic species. It did not supersede the FSEIS in its entirety, as evidenced by the Staff's revisions shown in redline. Thus, any portions not affected by the information discussed in the FSEIS Supplement—including the Staff's overall recommendation to the Commission—remain in effect and part of the FSEIS. As relevant to the amended contention, the Staff's conclusion in the FSEIS Supplement regarding the overall impact of continued operation on endangered aquatic species is consistent with the conclusion reached in

[8] While this Answer focuses primarily on data and conclusions contained in the 2013 BiOp and the FSEIS Supplement, a document very recently made available by the NRC Staff and NMFS confirms that NMFS did in fact consider Riverkeeper's comments during the preparation of the 2013 BiOp. *See* Memorandum from M. Colligan, NMFS, to J. Bullard, NMFS, Biological Opinion to be Issued to the Nuclear Regulatory Commission (NRC) for the Continued Operation of Indian Point Unit 2 and Unit 3 – Transmittal Memorandum (Jan. 29, 2013) ("NMFS Memorandum"), *available at* ADAMS Accession No. ML13268A463 (Attachment 1).

the FSEIS. Therefore, the Staff confirmed its conclusion by not amending it in the FSEIS Supplement. For these reasons, RK-EC-8A fails to meet the NRC's contention admissibility requirements in 10 C.F.R. § 2.309(f)(1) and should be rejected.

II. LEGAL STANDARDS

A. Legal Standards Governing Admission of Amended Contentions

An intervenor may file amended contentions only with leave of the presiding officer upon a showing of good cause, by demonstrating that the amended contention is: (1) based on information that was not previously available; (2) based on information materially different from information previously available; and (3) submitted in a timely manner based on the availability of the subsequent information.[9] A proposed contention also "must satisfy, without exception, each of the criteria set out in 10 C.F.R. § 2.309(f)(1)(i) through (vi)."[10] Failure to meet each of the criteria is grounds for dismissal of a proposed new or amended contention.[11] Among other things, the intervenor must demonstrate that the issue raised in the contention is adequately supported by factual information or expert opinion, is *material* to the findings the NRC must make to support the action that is involved in the proceeding, and provide sufficient information to show that a genuine dispute exists with the applicant/licensee on a *material* issue of law or

---

[9] *See* 10 C.F.R. §§ 2.309(f)(2), 2.309(c)(1). Entergy has previously described the contention admissibility standards in some detail in its prior pleadings and, for the sake of efficiency, will not repeat those standards here. *See, e.g.*, Applicant's Answer to Riverkeeper, Inc.'s Motion For Leave and New Contention Concerning the Consideration of Endangered and Threatened Aquatic Species at 7-9 (Mar. 7, 2011), *available at* ADAMS Accession No. ML110770579. Rather, the standards most relevant to this amended contention are highlighted here.

[10] *S.C. Elec. & Gas Co.* (Virgil C. Summer Nuclear Station, Units 2 & 3), LBP-10-6, 71 NRC 350, 359 (2010).

[11] *See* Final Rule, Changes to Adjudicatory Process, 69 Fed. Reg. 2182, 2221 (Jan. 14, 2004). *See also Private Fuel Storage, L.L.C.* (Indep. Spent Fuel Storage Installation), CLI-99-10, 49 NRC 318, 325 (1999).

fact.[12] "A dispute is material 'if its resolution would make a difference in the outcome of the licensing proceeding.'"[13]

B. Legal Standards Governing Endangered Species Reviews

Although the stated bases for RK-EC-8A focus on the FSEIS Supplement, the amended contention challenges how the NRC Staff implemented and participated in the Endangered Species Act ("ESA") consultation process.[14] As a result, the legal requirements governing the NRC's review of potential impacts to endangered species are set forth below. These standards define the framework by which to analyze the claims set forth in the amended contention—and ultimately provide the basis for their rejection as a matter of law and fact.

1. Endangered Species Act Requirements

Section 7(a)(2) of the ESA requires that the NRC, in consultation with NMFS or the U.S. Fish and Wildlife Service ("FWS") (depending on the species involved[15]), "insure that any action authorized, funded, or carried out by such agency . . . is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species."[16] Pursuant to joint NMFS and FWS implementing regulations, an action will jeopardize continued existence of a species only if it appreciably

---

12 *See* 10 C.F.R. § 2.309(f)(1)(iv), (v), and (vi).

13 *See Summer,* LBP-10-6, 71 NRC at 360 (quoting *Duke Energy Corp.* (Oconee Nuclear Station, Units 1, 2 & 3), CLI-99-11, 49 NRC 328, 333-34 (1999)).

14 *See* Riverkeeper Motion at 8.

15 NMFS is part of the U.S. Department of Commerce's National Oceanic and Atmospheric Administration. NMFS and FWS share responsibilities for administering the ESA. *See* 50 C.F.R. § 402.01(b). Generally speaking, FWS is responsible for land and freshwater species, while NMFS is responsible for marine and anadromous species.

16 16 U.S.C. § 1536(a)(2). Section 7(a)(4) of the ESA also requires that NRC confer (not consult) with NMFS on any action that is likely to jeopardize the continued existence of a species *proposed* for listing. *Id.* § 1536(a)(4); 50 C.F.R. § 402.10(a). Conferences are conducted on an informal basis between NRC and NMFS. *See* 50 C.F.R. § 402.10(c).

diminishes or reduces the likelihood of "both the survival and recovery" of the species.[17] As the Appeal Board in *Hartsville* held, Section 7(a)(2) of the ESA does not prohibit the NRC from issuing a license for a nuclear power plant because the plant may have a small adverse impact on an endangered or threatened species.[18]

To ensure compliance with these requirements, the NRC Staff must request information from NMFS regarding whether any listed or proposed species are present in the proposed action area.[19] If NMFS determines that listed species may be present in the affected area, the Staff typically will prepare a BA. If the BA concludes that the proposed action "may affect" listed species or critical habitat, then "formal consultation" is necessary unless an exception from the formal consultation requirement is applicable.[20]

The Staff must provide the applicant an opportunity to submit information during the consultation period.[21] Additionally, if requested, NMFS must provide a draft BiOp, to the Staff and the applicant, who are then permitted to comment on the draft BiOp.[22] Notably—and in contrast to NEPA requirements discussed below—the ESA does not authorize an opportunity for the public to comment on a draft BiOp or otherwise require public participation in the Section 7 consultation between federal agencies.[23]

---

17 50 C.F.R. § 402.02.

18 *See Tenn. Valley Auth.* (Hartsville Nuclear Plant, Units 1A, 2A, 1B, & 2B), ALAB-463, 7 NRC 341, 360 (1978).

19 16 U.S.C. § 1536(c)(1); 50 C.F.R. § 402.12(c).

20 50 C.F.R. § 402.14(a). One such exception applies if the Staff determines, with the written concurrence of NMFS, "that the proposed action is not likely to *adversely* affect any listed species or critical habitat." *Id.* § 402.14(b)(1) (emphasis added).

21 50 C.F.R. § 402.14(d).

22 *See id.* § 402.14(g)(5).

23 *See, e.g.*, *Nat'l Ass'n of Home Builders v. Defenders of Wildlife*, 551 U.S. 644, 660 n.6 (2007) ("Nor is there any independent right to public comment with regard to consultations conducted under § 7(a)(2)."); *San Luis & Delta-Mendota Water Auth. v. Salazar*, 760 F. Supp. 2d 855, 957 (E.D. Cal. 2010) ("Neither the ESA nor its implementing regulations require an opportunity for public comment or that FWS respond to any comments

After concluding formal consultation with the NRC Staff, NMFS must deliver its final BiOp,[24] which evaluates the nature and extent of the proposed action's effect on the listed species and presents NMFS' opinion on whether the action is likely to jeopardize the continued existence of such listed species.[25] The BiOp may include an incidental take statement ("ITS") if NMFS determines that the proposed action results in the incidental "take" of a listed species, but does not jeopardize the continued existence of that species.[26]

Following the issuance of the BiOp, the NRC Staff must determine whether and in what manner to move forward with the proposed action in light of its Section 7 obligations.[27] If NMFS issues a "no jeopardy" BiOp, then the requirements of Section 7(a)(2) are met, the Staff may proceed with the proposed action.[28] As discussed more fully in Section III.A below, NRC and NMFS complied fully with each step of this legal process.

---

received [on a draft BiOp]. Plaintiffs' suggestion that FWS violated the ESA by 'ignoring' comments on the draft BiOp is legally unsustainable.") (citations omitted); *Fund for Animals v. Hall*, 488 F. Supp. 2d 127, 136 (D.D.C. 2006) ("ESA's Section 7 consultation process fails to provide for public comment in the same way that NEPA does."); *see also* Final Rule, Interagency Cooperation—Endangered Species Act of 1973, as Amended, 51 Fed. Reg. 19,926, 19,928 (June 3, 1986) ("Nothing in section 7 authorizes or requires [NMFS or FWS] to provide for public involvement (other than that of the applicant) in the 'interagency' consultation process."). As discussed below, although NMFS was not required to consider public comments, it nonetheless considered and addressed Riverkeeper's comments on the draft 2013 BiOp. *See* NMFS Memorandum at 9 ("While neither the ESA nor the Section 7 regulations, or any other law, requires NMFS to consider Riverkeeper's comments, we chose to consider them.").

[24] 50 C.F.R. § 402.14(e)(3).

[25] *See id.* § 402.14(h)(3).

[26] *See id.* § 402.14(i)(1).

[27] *Id.* § 402.15(a).

[28] *See* Final Rule, Interagency Cooperation – Endangered Species Act of 1973, as Amended, 51 Fed. Reg. at 19,940. Alternatively, if NMFS issues a "jeopardy" BiOp, but NRC disagrees with this opinion or chooses an alternative not recommended by NMFS, then NRC may move forward based on its own analysis. *See id.*

2. An Agency's Reliance on a NMFS Biological Opinion Is Reviewed Under the Arbitrary and Capricious Standard

The ESA Section 7 interagency consultation process "reflects Congress's awareness that expert agencies [such as FWS and NMFS] are *far more knowledgeable* than other federal agencies about the precise conditions that pose a threat to listed species, and that *those expert agencies are in the best position* to make discretionary factual determinations about whether a proposed agency action will create a problem for a listed species and what measures might be appropriate to protect the species."[29] "Congress's recognition of this expertise suggests that Congress intended the action agency [*i.e.*, NRC] to defer, at least to some extent, to the determinations of the consultant agency [*i.e.*, NMFS]."[30] As such, the NRC "'need not undertake a separate, independent analysis' of the issues addressed in the BiOp."[31] Indeed, if such an analysis were required, "the expertise of the consultant agency would be seriously undermined."[32]

When courts review the decision of an action agency, such as the NRC, to rely on a BiOp, "the critical question is whether the action agency's reliance was *arbitrary and capricious*, not whether the BiOp itself is somehow flawed."[33] To show that an action agency acted arbitrarily and capriciously in relying on a consultant agency's BiOp, a party must point to "new" information that the consultant agency did not take into account that calls into question the BiOp's factual conclusions.[34] Significantly, "[i]t does not suffice, when urging an action

---

29 *City of Tacoma v. FERC*, 460 F.3d 53, 75 (D.C. Cir. 2006) (emphasis added).

30 *Id*. (citing *Bennett v. Spear*, 520 U.S. 154, 169-170 (1997)).

31 *Id*. at 75-76 (quoting *Aluminum Co. of Am.*, 175 F.3d at 1161).

32 *Id.* at 76.

33 *Id*. (citing *Aluminum Co. of Am. v. Adm'r, Bonneville Power Admin*., 175 F.3d 1156, 1160 (9th Cir. 1999); *Pyramid Lake Paiute Tribe v. U.S. Dep't of Navy*, 898 F.2d 1410, 1415 (9th Cir. 1990); *Stop H-3 Ass'n v. Dole*, 740 F.2d 1442, 1460 (9th Cr. 1984) (emphasis added)).

34 *Id*. (citing *Pyramid Lake*, 898 F.2d at 1415; *Stop H-3 Ass'n*, 740 F.2d at 1459-60).

agency to reject the BiOp of a consultant agency, *simply to reargue factual issues the consultant agency already took into consideration*."[35]

When NMFS prepares a BiOp in the course of another agency's administrative proceeding, the only means of challenging the substantive validity of the BiOp is on review of the NRC's decision in the courts of appeals.[36] Thus, to the extent Riverkeeper challenges the substance of NMFS' BiOp, as opposed to the NRC Staff's reliance on the BiOp, such a challenge may not be considered in this license renewal proceeding.

3. NEPA Requirements

Separate from the requirements of the ESA, NEPA requires that the NRC consider the environmental consequences of its licensing actions more generally. NEPA, however, does not prohibit adverse environmental effects, but instead, imposes procedural requirements on agencies, requiring them to take a "hard look" at the environmental impact of the proposed action.[37] This hard look is subject to a "rule of reason."[38]

Unlike the ESA, which does not afford an opportunity for the public to participate during the interagency consultation process, NEPA requires the NRC to consider and address opposing

---

35 *Id*. (citing *Pyramid Lake*, 898 F.2d at 1415-16; *Stop H-3 Ass'n*, 740 F.2d at 1459-60) (emphasis added).

36 *Id*. When prepared in the course of another agency's administrative proceeding, a NMFS BiOp has no legal significance when separated from the action agency's decision and order. *City of Tacoma v. National Marine Fisheries Service*, 383 F.Supp.2d 89, 92 (D.D.C. 2005). The Hobbs Act confers jurisdiction in courts of appeals to review final orders of the NRC that involve the granting, suspension, revocation or amendment of any license or construction permit. *See* 28 U.S.C. § 2342(4). Thus, the only avenue for challenging the merits of a NMFS BiOp prepared in the course of an NRC licensing proceeding is before the courts of appeals. Given the amended contention's focus on the NRC Staff's alleged failure to respond to Riverkeeper's comments, rather than on the merits of NMFS' BiOp, Riverkeeper appears to understand this legal principle.

37 *See La. Energy Servs., L.P.* (Claiborne Enrichment Ctr.), CLI-98-3, 47 NRC 77, 87-88 (1998). *See also Natural Res. Def. Council v. Morton*, 458 F.2d 827, 838 (D.C. Cir. 1972); *La. Energy Servs., L.P.* (Nat'l Enrichment Facility), CLI-05-28, 62 NRC 721, 726 (2005).

38 *La. Energy Servs., L.P.* (Nat'l Enrichment Facility), LBP-06-8, 63 NRC 241, 258-59 (2006) (citing *Long Island Lighting Co.* (Shoreham Nuclear Power Station), ALAB-156, 6 AEC 831, 836 (1973)).

viewpoints expressed in public comments during the agency's environmental review process.[39] Like other agency responsibilities under NEPA, however, the duty to respond to comments is governed by the rule of reason. In particular, "an agency's obligation to respond to public comment is limited."[40] Thus, "[n]ot every comment need be published in the final EIS [environmental impact statement]."[41] Nor does NEPA require an agency to "set forth at full length the views with which it disagrees."[42] NEPA also does not obligate an agency "to conduct new studies in response to issues raised in the comments" or "to resolve conflicts raised by opposing viewpoints."[43]

The NRC's environmental regulations also address the potential need to supplement an FSEIS before the agency takes the proposed action. Specifically, pursuant to 10 C.F.R. §51.92(a), the NRC Staff must supplement an FSEIS if there are (1) substantial changes in the proposed action that are relevant to environmental concerns, or (2) significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts. In order to be significant, new information must present a "seriously different picture" of the environmental impact of the proposed project from what was previously considered.[44]

4. Summary of Riverkeeper's Burden to Admit RK-EC-8A

Riverkeeper's challenges to the adequacy of the NRC Staff's FSEIS Supplement fall into two major categories: (1) those that implicate the Staff's implementation of the ESA

---

[39] *See, e.g., California v. Block*, 690 F.2d 753, 773 (9th Cir. 1982) (Agencies "are obliged to provide a meaningful reference to all responsible opposing viewpoints concerning the agency's proposed decision.") (internal quotation marks and citations omitted).

[40] *Id*.

[41] *Id*. (citing *Conservation Law Found., Inc. v. Andrus*, 623 F.2d 712, 717 (1st Cir. 1979)).

[42] *Id*. (citing *Comm. for Nuclear Responsibility, Inc. v. Seaborg*, 463 F.2d 783, 787 (D.C. Cir. 1971)).

[43] *Id*. (citing *Warm Springs Dam Task Force v. Gribble*, 565 F.2d 549, 554 (9th Cir. 1977)).

[44] *Hydro Res., Inc.* (2929 Coors Road, Suite 101, Albuquerque, N.M. 87120), CLI-99-22, 50 NRC 3, 14 (1999) (citing *Sierra Club v. Froehlke*, 816 F.2d 205, 210 (5th Cir. 1987)); *accord Wisconsin v. Weinberger*, 745 F.2d 412, 420 (7th Cir. 1984)).

consultation process; and (2) those that implicate the Staff's duty under NEPA to respond to comments and update its ultimate license renewal recommendation. To demonstrate the existence of a material dispute with regard to the ESA-based challenges, Riverkeeper must establish that the Staff's reliance on NMFS' conclusions was arbitrary and capricious. With regard to the NEPA-based challenges, Riverkeeper must provide specific facts showing that: (1) the Staff inappropriately ignored Riverkeeper's comments on the Draft FSEIS Supplement and NMFS BiOp; and (2) the Staff's FSEIS Supplement conclusions regarding endangered sturgeon constituted "new" and "significant" information that was so different from the previous FSEIS conclusions that the Staff was required to update its prior ultimate FSEIS recommendation to the Commission regarding Indian Point Energy Center's ("IPEC") license renewal. As discussed below in Section III, Riverkeeper has failed to carry its burden.

III. AMENDED CONTENTION RK-EC-8A DOES NOT MEET THE NRC'S CONTENTION ADMISSIBILITY CRITERIA

As shown below, NMFS and the NRC engaged in an extensive, lengthy consultation process that fully complied with all applicable statutory and regulatory requirements, and the NRC Staff reasonably relied on the expert conclusions reached in the NMFS BiOp, which were consistent with its own assessments, in preparing the FSEIS Supplement. During the consultation process and the preparation of the FSEIS Supplement, the NRC Staff and NMFS satisfactorily and reasonably considered and addressed all issues identified by Riverkeeper.

Moreover, the FSEIS Supplement did not supersede the FSEIS in its entirety, as evidenced by the Staff's revisions shown in redline. As relevant to the amended contention, the conclusions in the FSEIS Supplement regarding the overall impact of continued operation on endangered aquatic species is consistent with the conclusion reached in the FSEIS. Any portions of the FSEIS not affected by the information discussed in the FSEIS Supplement—including the

Staff's overall recommendation to the Commission that the adverse environmental impacts of license renewal for IP2 and IP3 are not so great that preserving the option of license renewal for decisionmakers would be unreasonable[45]—remain in effect and part of the FSEIS.

For these reasons and as discussed in detail below, RK-EC-8A is inadmissible, in that it is immaterial to the Staff's NEPA findings, insufficient to establish a genuine dispute on a material issue of law or fact, and inadequately supported by factual information or expert opinion, as required by 10 C.F.R. § 2.309(f)(1)(iv), (v), and (vi).

A. Summary of ESA Section 7 Consultation Process

Although the stated bases for RK-EC-8A focus on the NRC Staff's FSEIS Supplement, the amended contention fundamentally challenges whether the NRC Staff adequately implemented and participated in the ESA consultation process.[46] Because the details of that substantial consultation process have not been fully briefed in this proceeding, a description of the process is presented below.

1. Initial ESA Section 7 Consultations and December 2010 FSEIS Conclusions

Approximately six years ago, as required by statute and regulation,[47] and in support of its review of the license renewal application ("LRA") for IP2 and IP3, the NRC Staff requested that NMFS provide information on federally-listed endangered or threatened species, as well as proposed candidate species.[48] In October 2007, NMFS responded that the federally-listed endangered shortnose sturgeon and the then-candidate species Atlantic sturgeon are present in

---

45 NUREG-1437, Supp. 38, Vol. 1, Generic Environmental Impact Statement for License Renewal of Nuclear Plants, Regarding Indian Point Nuclear Generating Unit Nos. 2 and 3, Final Report, Main Report and Comment Responses at 9-8 (Dec. 2013) ("FSEIS") (NYS00133B).

46 *See* Riverkeeper Motion at 8.

47 16 U.S.C. § 1536(c)(1); 50 C.F.R. § 402.12(c).

48 FSEIS at 4-57 (NYS00133B).

the Hudson River.[49] Consistent with 50 C.F.R. § 402.14(a), the NRC Staff then initiated ESA consultations with NMFS in December 2008 on the shortnose sturgeon, upon publication of the draft supplemental environmental impact statement and the Staff's original BA.[50]

The BA evaluated the impacts of continued IPEC operation to shortnose sturgeon through entrainment, impingement, and thermal impacts.[51] Based on the life history of the shortnose sturgeon, the location of spawning grounds within the Hudson River, the patterns of movement for eggs and larvae, and available data from past entrainment monitoring, the Staff concluded that IPEC's continued operation is not likely to adversely affect the population of shortnose sturgeon in the Hudson River through entrainment.[52] The Staff also concluded that license renewal could adversely affect the population of shortnose sturgeon in the Hudson River through impingement and thermal impacts, although it could not, at that time, quantify the extent to which the population could be affected based on available data.[53] The Staff provided its BA and conclusions to NMFS in December 2008, requesting NMFS' review and concurrence.[54]

During 2009, NRC and NMFS continued to correspond as part of the ongoing consultation process.[55] The Staff also provided Entergy an opportunity to submit information on

---

49 *Id.* at App. E at E-77 to -79 (NYS00133I) (Letter from M. Colligan, NMFS, to NRC, 72 FR 45075-6 (August 10, 2007) (Oct. 4, 2007). A "candidate species" is a "species being considered by [NMFS] for listing as endangered or threatened species but not yet the subject of a proposed rule." 50 C.F.R. § 402.12(d).

50 FSEIS Supplement at 25. Given that the Atlantic sturgeon was not listed as an endangered or threatened species at the time the NRC Staff initially contacted NMFS in 2007, the two agencies did not engage in ESA Section 7 consultations on that species at that time.

51 NUREG-1437, Supp. 38, Vol. 1, Generic Environmental Impact Statement for License Renewal of Nuclear Plants Regarding Indian Point Nuclear Generating Unit Nos. 2 and 3, Draft Report for Comment and Main Report at App. E (Dec. 2008) (NYS00132C).

52 *Id*. at E-96.

53 *Id*. at E-100.

54 *See, e.g*., Letter from D. Wrona, NRC, to M. Colligan, NMFS, Biological Assessment for License Renewal of the Indian Point Generating Unit Nos. 2 and 3 at 2 (Dec. 22, 2008), *available at* ADAMS Accession No. ML083450723.

55 *See*, *e.g*., Email from A. Stuyvenberg, NRC, to J. Crocker, NMFS (Mar. 26, 2009), *available at* ADAMS Accession No. ML090850187 (discussing additional information requested by NMFS).

shortnose sturgeon impingement, as required by 50 C.F.R. § 402.14(d). In response, Entergy provided additional actual and estimated shortnose sturgeon impingement data for the years 1974 to 1990 to the NRC.[56]

In December 2010, the NRC Staff issued its FSEIS and a Revised BA, which addressed questions submitted by NMFS regarding the status of the shortnose sturgeon and incorporated the additional data provided by Entergy on shortnose sturgeon impingement.[57] In the Revised BA, the NRC Staff stated, based on the best available information, that impingement and entrainment resulting from continued operation of IP2 and IP3 "are not likely to jeopardize the continued existence of the endangered shortnose sturgeon in the Hudson River."[58] The Staff also concluded that continued operations could potentially adversely affect the population of shortnose sturgeon in the Hudson River due to the thermal effects of once-through cooling.[59] By letter dated December 10, 2010, the NRC transmitted its Revised BA to NMFS and requested NMFS' concurrence with its conclusions.[60]

---

56 Summary of Telephone Conference Call Held on May 11, 2009, Between the U.S. Nuclear Regulatory Commission and Entergy Nuclear Operations, Inc., Concerning Endangered Species Act Consultation Data (June 11, 2009), *available at* ADAMS Accession No. ML091420036; Letter from F. Dacimo, Entergy, to NRC, Request for Additional Information Related to License Renewal Indian Point Nuclear Application Environmental Report – Impingement Data (Nov. 24, 2009), *available at* ADAMS Accession No. ML093420528; Letter from F. Dacimo, Entergy, to NRC, Transmission of Additional Requested Information Regarding Sturgeon Impingement Data (July 1, 2009), *available at* ADAMS Accession No. ML091950345.

57 *See* FSEIS at 4-57 to 4-60 (NYS00133B); *see also* NRC Biological Assessment, Indian Point Nuclear Generating Plant, Units 2 and 3, License Renewal (Dec. 2010), *available at* ADAMS Accession No. ML102990046 ("Revised BA") (Attachment 2). At the time the FSEIS was published in December 2010, the NRC and NMFS had not yet completed the consultation for the shortnose sturgeon.

58 Revised BA at 13.

59 *Id*. at 14-15.

60 Letter from D. Wrona, NRC, to M. Colligan, NMFS, Revised Biological Assessment for License Renewal of the Indian Point Nuclear Generating Plant, Unit Nos. 2 and 3 (Dec. 10, 2010), available at ADAMS Accession No. ML102990043. Consistent with its conclusions in the Revised BA, the FSEIS found that the impacts of IPEC's continued operation on the shortnose sturgeon and the Atlantic sturgeon would be SMALL. FSEIS at 4-60 (NYS00133B). The FSEIS also noted that ESA Section 7 consultations with NMFS were ongoing and that NMFS would issue a BiOp if it concluded that continued operations could adversely affect the shortnose sturgeon. *Id*.

After the Staff published the FSEIS, in February 2011, Riverkeeper moved to admit a new contention (RK-EC-8).[61] Entergy and the NRC Staff opposed the admission of RK-EC-8 on timeliness and substantive grounds.[62] In a July 6, 2011 Order, the Board admitted RK-EC-8 as proposed by Riverkeeper.[63]

2. Continued Section 7 Consultations and NMFS' Final January 2013 Biological Opinion

a. Continued ESA Consultations and NMFS' October 2011 BiOp

In July 2011, the Staff transmitted to NMFS a supplement to its Revised BA, as a result of more recent thermal studies and modeling completed by Entergy in 2008 and 2011.[64] Based on the more recent data, the NRC Staff revised its conclusion on thermal impacts and found that heated discharge during IPEC's license renewal term "is not likely to adversely affect shortnose sturgeon."[65] The Staff also revised its conclusion regarding the overall potential for adverse impacts on sturgeon resulting from license renewal (including impingement, entrainment, and

---

61 Riverkeeper Inc. Consolidated Motion for Leave to File a New Contention and New Contention Concerning NRC Staff's Final Supplemental Environmental Impact Statement (Feb. 3, 2011), *available at* ADAMS Accession No. ML110410362. The scope of the original contention is fully discussed in Entergy Motion to Dismiss Riverkeeper Contention RK-EC-8 (Endangered and Threatened Aquatic Species) as Moot (July 17, 2013), *available at* ADAMS Accession No. ML13198A353 ("Entergy Motion to Dismiss").

62 Applicant's Answer to Riverkeeper, Inc.'s Motion for Leave and New Contention Concerning the Consideration of Endangered and Threatened Aquatic Species (Mar. 7, 2011) ("Entergy Answer"); NRC Staff's Answer to Riverkeeper, Inc.'s Motion for Leave to File a New Contention, and New Contention EC-8 Concerning NRC Staff's Final Supplemental Environmental Impact Statement (Mar. 7, 2011) ("NRC Staff Answer"), *available at* ADAMS Accession No. ML110670290. Among other things, Entergy and NRC asserted that the ESA did not require that the consultation process be complete at the time the FSEIS was issued, the NRC Staff need not supplement the FSEIS once the ESA consultation process is complete, and the NRC Staff did not violate any time restrictions in the preparation of its BA. Entergy Answer at 14-20; NRC Staff Answer at 12-15, 17-19.

63 Licensing Board Memorandum and Order (Ruling on Pending Motions for Leave to File New and Amended Contentions) at 71 (July 6, 2011) (unpublished).

64 NRC Supplement to Revised Biological Assessment, Indian Point Nuclear Generating Plant Units 2 and 3, License Renewal (July 2011), *available at* ADAMS Accession No. ML11203A100 (Attachment 3).

65 *Id*. at 6.

thermal impacts): "[T]he NRC staff now finds that license renewal [of IP2] and [IP3] is not likely to adversely affect the Hudson River population of shortnose sturgeon."[66]

Consistent with 50 C.F.R. § 402.14(g)(5), NMFS issued a 72-page draft BiOp on August 26, 2011. In its transmittal letter to the NRC Staff, and in response to certain concerns raised to NMFS by the New York State Department of Environmental Conservation ("NYSDEC"),[67] NMFS questioned whether initiating formal consultations were appropriate at that time, given the pending proceeding before NYSDEC regarding IPEC's request for a Clean Water Act Section 401 Water Quality Certification.[68] The draft BiOp noted that NMFS based its findings on a number of sources, including information provided in the Staff's December 2010 Revised BA, the December 2010 FSEIS, State Pollutant Discharge Elimination System ("SPDES") permits and Water Quality Certifications issued by New York State, and recent thermal plume information submitted to NMFS by Entergy.[69]

The draft BiOp included an extensive discussion of IPEC's cooling water intake system,[70] the life history and current status of the shortnose sturgeon,[71] the "environmental

---

66 *Id*.

67 Letter from C. Amato, NYSDEC, to P. Kurkul, NMFS, Biological Opinion Under Section 7 of the Federal Endangered Species Act for License Renewal of Indian Point Nuclear Generating Plant, Units 2 and 3 (Aug. 26, 2011), *available at* ADAMS Accession No. ML11263A168.

68 Letter from P. Kurkul, NMFS, to D. Wrona, NRC, Draft Biological Opinion for License Renewal of the Indian Point Nuclear Generating Unit Nos. 2 and 3 at 1 (Aug. 26, 2011), *available at* ADAMS Accession No. ML11249A012 (previously provided as Riverkeeper Motion, Attach. 1).

69 NMFS Endangered Species Act Section 7 Consultation Draft Biological Opinion at 4 (the original document is not paginated; page citations for this document refer to the .pdf file page number in the ADAMS version) (Aug. 26, 2011), *available at* ADAMS Accession No. ML11249A012 (previously provided as Riverkeeper Motion, Attach. 1). NMFS also referenced conference calls with Entergy on June 20, June 22, and June 29, 2011 to discuss shortnose sturgeon intakes and emails from Entergy responding to NMFS inquiries regarding the thermal plume on July 8, July 25, and August 5, 2011. *Id*.

70 *Id*. at 6-14.

71 *Id*. at 14-26.

baseline,"[72] the potential effects of license renewal (through impingement, entrainment, thermal discharge, and availability of prey) on shortnose sturgeon,[73] the cumulative effects of fishing activities, pollution, climate change, research activities, and coastal development.[74] Ultimately, NMFS concluded, "[a]fter reviewing the best available information . . . the proposed action may adversely affect but is not likely to jeopardize the continued existence of shortnose sturgeon."[75]

As permitted by 50 C.F.R. § 402.14(g)(5), both Entergy and the NRC Staff submitted comments on the draft BiOp to NMFS in September 2011.[76] Among other comments, Entergy stated that NRC's proposed action is to renew the operating licenses for IP2 and IP3 as set forth in Entergy's LRA, which represents Indian Point's "current operating configuration," and therefore, consultation must proceed on the assumption that IP2 and IP3 would continue to operate under the terms of their existing authorizations, including those relating to the operation of their cooling water intake structures and cooling systems.[77] The Staff took a similar position, explaining that, notwithstanding the uncertain outcomes in New York State proceedings related to IPEC's Water Quality Certification and SPDES permit, the Staff was required to move

---

72 *Id*. at 26-35. The environmental baseline includes the past and present impacts of all state, federal or private actions and other human activities in the action area, the anticipated impacts of all proposed federal projects in the action area that have already undergone formal or early Section 7 consultation, and the impact of state or private actions that are contemporaneous with the consultation in process. *Id*. at 26.

73 *Id*. at 35-49.

74 *Id*. at 49-50.

75 *Id*. at 55.

76 *See* Letter from E. Zoli, Counsel for Entergy, to D. Wrona, NRC, Draft Biological Opinion for License Renewal for Indian Point Units 2 and 3, (Sept. 6, 2011), *available at* ADAMS Accession No. ML11257A103 ("Entergy Sept. 6, 2011 Comments"); NRC Staff Comments on NMFS's August 26, 2011 Draft Biological Opinion for License Renewal of the Indian Point Nuclear Generating Unit Nos. 2 and 3 (Sept. 6, 2011), *available at* ADAMS Accession No. ML11249A211; Letter from D. Wrona, NRC, to P. Kurkul, NMFS, National Marine Fisheries Service Letter Dated August 26, 2011, Regarding the Endangered Species Act, Section 7 Consultation for the Proposed License Renewal of Indian Point Nuclear Generating Plant Units 2 and 3, (Sept. 20, 2011), *available at* ADAMS Accession No. ML11298A102 ("NRC Staff Sept. 20, 2011 Comments").

77 Entergy Sept. 6, 2011 Comments at 2.

forward with its review of Entergy's LRA as presented.[78] The Staff assured NMFS that when the state proceedings are resolved, the Staff would consider the effect of those outcomes on IPEC's license renewal, including reinitiating consultations with NMFS if required.[79]

Although NMFS did not solicit comments from the public (and the Section 7 consultation procedures do not authorize such comments), Riverkeeper submitted comments to NMFS on the draft BiOp.[80] In particular, Riverkeeper asserted that: (1) NMFS should wait to issue a final BiOp, pending the final outcome of the proceeding before NYSDEC regarding IPEC's Water Quality Certification; (2) NMFS failed to assess the cumulative impacts to shortnose sturgeon from all power plants (not just IPEC) in the Hudson River; (3) NMFS failed to consider the impacts of radioactive groundwater contamination from IPEC on shortnose sturgeon; (4) NMFS failed to consider the potential impacts of the IPEC Unit 1 water intake structure on shortnose sturgeon; and (5) NMFS failed to assess the efficacy of closed-cycle cooling as a "reasonable and prudent measure" at IPEC.[81] As discussed below, NMFS addressed several of the issues raised in Riverkeeper's comments in the final 2011 BiOp.

On October 14, 2011, NMFS issued a final, 80-page BiOp in accordance with 50 C.F.R. § 402.14, concluding the ESA Section 7 consultation process for shortnose sturgeon.[82] Based on information from the Staff's Revised BA, FSEIS, New York State permits, and information submitted to NMFS by Entergy and other sources, and consistent with the conclusion reached in its draft BiOp, NMFS concluded in the final 2011 BiOp that the continued operation of IP2 and

---

78 NRC Staff Sept. 20, 2011 Comments at 2.

79 *Id*.

80 Letter from D. Brancato, Riverkeeper, to NMFS, Draft Biological Opinion for License Renewal of the Indian Point Nuclear Generating Unit Nos. 2 and 3 (Sept. 15, 2011), *available at* ADAMS Accession No. ML13232A391 (previously provided as Riverkeeper Motion, Attach. 2).

81 *Id*. at 2-9.

82 FSEIS Supplement at 26.

IP3 during the renewal period "may adversely affect but is not likely to jeopardize the continued existence of shortnose sturgeon."[83]

In its transmittal letter to NRC, NMFS addressed Riverkeeper's comment regarding the pending state proceedings.[84] NMFS explained that the Staff would reinitiate consultation with NMFS if there were a change in IPEC operations resulting from the hearings on the SPDES permit and Water Quality Certification or the pending hearings before this Board.[85]

In its final 2011 BiOp, NMFS addressed several other issues raised in Riverkeeper's comments, including an analysis of post-2000 data regarding the cumulative impact of the three other power plants operating on the Hudson River on the shortnose sturgeon.[86] NMFS noted that the number of shortnose sturgeon impinged at those plants has been very low since 2000 and that no sturgeon larvae have been observed in entrainment samples from those facilities since 2000.[87] NMFS also considered the potential impact of radionuclides discharged from IPEC on the shortnose sturgeon—another issue raised by Riverkeeper. Citing a 2009 NYSDEC report and data from Entergy's Radiological Environmental Monitoring Program, NMFS concluded that the effects to shortnose sturgeon from radionuclides would be "insignificant and discountable."[88] NMFS also discussed the potential impact that the Unit 1 intake structure would have on shortnose sturgeon.[89] NMFS noted that there was a potential for up to six shortnose sturgeon to

---

83 Letter from P. Kurkul, NMFS, to D. Wrona, NRC, Biological Opinion for License Renewal of the Indian Point Generating Unit Nos. 2 and 3 at 61 (Oct. 14, 2011), *available at* ADAMS Accession No. ML11287A313 (previously provided as Riverkeeper Motion, Attach. 3).

84 *Id.* at 1.

85 *Id.* NMFS also acknowledged receiving comments from the NRC, Entergy, New York State, and Riverkeeper. *Id*. at 2.

86 *Id*. at 24-25.

87 *Id*.

88 *Id*. at 51.

89 *Id*. at 62.

be impinged at the Unit 1 intakes during the renewal period and factored that into its impact assessment and ITS.[90]

b. NMFS' Atlantic Sturgeon Listing and the Reinitiation of Consultations

Given the Atlantic sturgeon's status as a candidate (*i.e.*, not formally listed) for endangered or threatened status in December 2008, the Staff and NMFS did not engage in formal consultations on that species at that time. In February 2012, however, NMFS listed five distinct population segments ("DPS") of the Atlantic sturgeon as endangered.[91]

Consequently, pursuant to 50 C.F.R. § 402.14(a), in May 2012, the NRC Staff submitted a new BA to NMFS, along with a request to reinitiate Section 7 consultations for the newly-listed Atlantic sturgeon.[92] Based on impingement data from 1975 to 1990, the Staff found that, although some impingement of juvenile Atlantic sturgeon occurs, migrating adults should be able to avoid IPEC's low intake velocities, and the installation of modified Ristroph screens installed in the early 1990s should reduce impingement damage and mortality.[93] The Staff also considered Entergy's 2011 thermal plume study in concluding that the thermal effluent from IPEC is not likely to have any observable adverse effects on Atlantic sturgeon.[94] With regard to the impact on Atlantic sturgeon of potential radionuclide discharges to the Hudson River (an issue raised by Riverkeeper), the Staff concluded that such impacts would, as with the shortnose

---

90 *Id*.

91 FSEIS Supplement at 27. In the Hudson River near IPEC, Atlantic sturgeon primarily belong to the New York Bight DPS. *Id.*

92 *Id.*

93 NRC Biological Assessment for Reinitiation of Section 7 Consultation for the Indian Point Nuclear Generating Plant, Unit Nos. 2 and 3 Due to Listing of Atlantic Sturgeon at 3-5, 6 (May 2012), *available at* ADAMS Accession No. ML12138A388 (Attachment 4).

94 *Id*. at 5.

sturgeon, be insignificant.[95] Ultimately, the Staff's 2012 new BA concluded that, if approved, the continued operation of IP2 and IP3 during the renewal period "may affect, but is not likely to adversely affect, the Atlantic sturgeon."[96]

c. NRC Staff Draft FSEIS Supplement

On June 26, 2012, the NRC Staff issued a Draft FSEIS Supplement for public comment.[97] The Draft FSEIS Supplement included the Staff's revised conclusion regarding thermal impacts to shortnose sturgeon, based on the Staff's own analysis of Entergy's 2011 thermal plume study and NMFS' 2011 BiOp.[98] The Staff concluded that the discharge resulting from the proposed IP2 and IP3 license renewal would have "SMALL" impacts on the shortnose sturgeon.[99] The Staff's overall conclusion from the FSEIS that the impacts of continued IPEC operations on shortnose sturgeon would be SMALL remained unchanged.[100] The Draft FSEIS Supplement also noted that the Staff had reinitiated consultations with NMFS on the Atlantic sturgeon and that the Staff would consider the results of that consultation as appropriate.[101]

Eight organizations, including Riverkeeper, NYSDEC, and NMFS submitted comments on the Draft FSEIS Supplement during the public comment period, which closed on August 20, 2012.[102] As relevant to RK-EC-8A, Riverkeeper criticized the Draft FSEIS Supplement on the

---

95 *Id*. at 5.

96 *Id.* at 6.

97 NUREG-1437, Generic Environmental Impact Statement for License Renewal of Nuclear Plants, Supp. 38, Regarding Indian Point Nuclear Generating Unit Nos. 2 and 3, Draft Report for Comment (June 2012) ("Draft FSEIS Supplement"), *available at* ADAMS Accession No. ML12174A244.

98 *Id*. at 23-24. In the FSEIS, the Staff had initially indicated that it could not determine the potential impacts of thermal discharges on shortnose and Atlantic sturgeon without additional studies. FSEIS at 4-58 (NYS00133B).

99 Draft FSEIS Supplement at 24.

100 FSEIS at 4-60 (NYS00133B)

101 Draft FSEIS Supplement at 26.

102 *Id*., App. A at A-1 to A-2.

grounds that the Staff merely summarized the sequence and outcome of the consultation process for the shortnose sturgeon, without any "meaningful consideration" of NMFS' opinions and conclusions.[103] Riverkeeper also challenged the Staff's apparent decision to conclude its NEPA review of the IPEC LRA without the benefit of NMFS' "independent" and "highly critical" final assessment on the potential impacts to Atlantic sturgeon.[104] In support of its comments, Riverkeeper submitted a memorandum from its biologist consultants, Pisces Conservation Ltd. Notably, Pisces acknowledged that the NRC Staff's opinion that the potential impact of extended operation on the shortnose sturgeon would be SMALL "does not seem unreasonable."[105] Thus, Riverkeeper's own consultants expressed agreement with the Staff's ultimate conclusion regarding potential impacts on the shortnose sturgeon.

As relevant to the amended contention, NYSDEC's comments criticized the "out of date" entrainment and impingement data relied on by the Staff,[106] an issue which the Staff had previously addressed in the FSEIS but which was not challenged.[107]

NMFS also submitted comments on the Draft FSEIS Supplement.[108] NMFS indicated that it had "no substantive comments" on the Draft FSEIS Supplement and that the Staff's description of the information that has become available since the FSEIS was published in

---

103 Letter from D. Brancato, Riverkeeper, to NRC, Riverkeeper, Inc.'s Comments on the U.S. Nuclear Regulatory Commission's Generic Environmental Impact Statement for License Renewal of Nuclear Plants, Supplement 38, Vol. 4, Regarding Indian Point Nuclear Generating Unit Nos. 2 and 3, Draft Report for Comment, Docket Nos. 50-247 and 50-286 (June 2012) at 7 (Aug. 20, 2012), *available at* ADAMS Accession No. ML12236A207 ("Riverkeeper Aug. 20, 2012 Comments") (previously provided as Riverkeeper Motion, Attach. 8).

104 *Id*. at 11.

105 *Id*., Attach. A, § 4.

106 FSEIS Supplement, App. A at A-21 to A-23.

107 *See, e.g.,* FSEIS at A-62.

108 *Id*., App. A at A-16.

December 2010 was "consistent with our understanding of the available information."[109] NMFS further noted that the Staff's description of the consultation process was "complete and accurate."[110]

d. NMFS' New Draft Biological Opinion and Final Biological Opinion

In parallel with the NRC's efforts to supplement the FSEIS, NMFS issued a 144-page new draft BiOp in accordance with 50 C.F.R. § 402.14(g)(5), addressing the impacts of license renewal on both the shortnose and Atlantic sturgeon on October 26, 2012.[111] The draft BiOp analyzed information from a variety of sources, including a report regarding impingement of Atlantic and shortnose sturgeon submitted by Entergy to NMFS in July 2012.[112] The new draft BiOp concluded that extended operation "may adversely affect but is not likely to jeopardize the continued existence of shortnose sturgeon or the New York Bight DPS of Atlantic sturgeon."[113]

The NRC Staff and Entergy again submitted comments on the draft BiOp, as permitted by 50 C.F.R. § 402.14(g)(5).[114] The Staff's comments did not question NMFS' substantive conclusions and were primarily editorial in nature.[115] Entergy submitted some clarifying comments, and expressed its overall agreement with NMFS' conclusions.[116]

---

109 *Id*.

110 *Id*.

111 NMFS Endangered Species Act Section 7 Consultation Draft Biological Opinion (Oct. 26, 2012), *available at* ADAMS Accession No. ML12300A408 (previously provided as Riverkeeper Motion, Attach. 4).

112 *Id*. at 6.

113 *Id*. at 117.

114 Email from D. Logan, NRC, to J. Crocker, NMFS, transmitting the NRC's and Entergy's comments on the Draft biological opinion (Nov. 9, 2012), *available at* ADAMS Accession No. ML12314A415.

115 *Id*.

116 In particular, Entergy agreed that IPEC's continued operation, as it is currently operated under existing approvals: (1) is not likely to jeopardize the continued existence of shortnose sturgeon or the New York Bight DPS of Atlantic sturgeon; (2) is not likely to adversely affect the Gulf of Maine or Chesapeake Bay DPS of Atlantic sturgeon; and (3) will have no effect on critical habitats for either species. Letter from E. Zoli,

Riverkeeper also submitted comments to NMFS on November 23, 2012.[117] In addition to reiterating many of the comments raised in its September 15, 2011 letter to NMFS, Riverkeeper raised two additional comments. Riverkeeper claimed: (1) there was no basis for NMFS to exempt the take of shortnose and Atlantic sturgeon, because *any* impacts on these species "may" have noticeable affects; and (2) the efficacy and sufficiency of NMFS' "Conservation Recommendations" related to the impact of IPEC on sturgeon were questionable.[118]

Consistent with 50 C.F.R. § 402.14, NMFS submitted its final BiOp to the NRC on January 30, 2013. The 2013 BiOp included 163 pages of NMFS' detailed analysis of the potential impacts on both the shortnose sturgeon and Atlantic sturgeon and superseded NMFS' earlier October 2011 BiOp.[119] In terms of process, NMFS confirmed that its BiOp was based on the plant's current configuration and that if a new SPDES permit or Water Quality Certification were issued, NRC and NMFS would evaluate the need to reinitiate consultations.[120]

In terms of substance, NMFS again discussed entrainment and impingement impacts from other Hudson River plants on the shortnose and Atlantic sturgeon. Specifically, consistent with its 2011 BiOp, NMFS concluded that no sturgeon larvae had been observed in entrainment samples from those facilities since 2000 and that the number of impinged shortnose sturgeon has been very low since 2000.[121] NMFS also indicated that the Hudson River power plants had

---

Counsel for Entergy, to D. Wrona, NRC, Draft Biological Opinion for Indian Point Units 2 and 3 at 1 (Nov. 9, 2012), *available at* ADAMS Accession No. ML12347A085.

117 Letter from D. Brancato, Riverkeeper, to NMFS, Riverkeeper Comments on Draft Biological Opinion for License Renewal of the Indian Point Nuclear Generating Unit Nos. 2 and 3 (Nov. 23, 2012), *available at* ADAMS Accession No. ML13122A370 (previously provided as Riverkeeper Motion, Attach. 5).

118 *Id*. at 2-14.

119 2013 BiOp at 8.

120 *Id*.

121 *Id*. at 43-44.

reported very few interactions with Atlantic sturgeon since 2000.[122] With regard to potential exposure to radionuclides, NMFS found that, while shortnose and Atlantic sturgeon may be exposed to radionuclides originating from IPEC and other sources, any exposure is "not likely to be at levels that would affect the health or fitness of any individual shortnose or Atlantic sturgeon."[123] NMFS concluded that the effects on shortnose and Atlantic sturgeon from radionuclides would be "insignificant and discountable."[124]

NMFS' issuance of its 2013 BiOp concluded the formal consultation for both species.[125] Ultimately, NMFS confirmed its initial conclusion, stating that:

> [T]he continued operation of Indian Point Unit 2 is likely to adversely affect but is not likely to jeopardize the continued existence of shortnose sturgeon or the New York Bight, Gulf of Maine or Chesapeake Bay DPS of Atlantic sturgeon. It is also NMFS' biological opinion that the continued operation of Indian Point Unit 3 is likely to adversely affect but is not likely to jeopardize the continued existence of shortnose sturgeon or the New York Bight, Gulf of Maine or Chesapeake Bay DPS of Atlantic sturgeon. No critical habitat is designated in the action area; therefore, none will be affected by the proposed actions.[126]

The 2013 BiOp also includes an ITS that applies to both IP2 and IP3, which exempts the impingement of a certain number of shortnose and New York Bight DPS Atlantic sturgeon from January 30, 2013 through the proposed period of extended operation.[127] It further identifies five discretionary "reasonable and prudent measures" that NMFS believes are appropriate to minimize or monitor impacts of incidental take of shortnose and Atlantic sturgeon.[128] In

---

122 *Id*. at 44.

123 *Id*. at 108.

124 *Id*.

125 Letter from J. K. Bullard, to A. Hull, Biological Opinion for Continued Operations of Indian Point Nuclear Generating Unit Nos. 2 and 3 at 3 (Jan. 30, 2013), *available at* ADAMS Accession No. ML13032A569 (previously provided as Entergy Motion to Dismiss, Attach. 1).

126 2013 BiOp at 126.

127 *Id.* at 127-32.

128 *Id.* at 132-33.

addition, the 2013 BiOp lists eight "terms and conditions" that the NRC Staff must ensure that Entergy complies with in order to be exempt from the prohibitions of the ESA.[129]

e. The NRC Staff's Incorporation of NMFS' Biological Opinion in the June 2013 FSEIS Supplement

In February 2013, the NRC Staff notified the Board and the parties of its intention to issue a final FSEIS Supplement on or before April 30, 2013.[130] Notwithstanding the Staff's notification—and the closure of the public comment period eight months earlier in August 2012—three months later, Riverkeeper submitted supplemental comments on the Staff's Draft FSEIS Supplement.[131] Its supplemental comments were, however, limited to summarizing and attaching the November 23, 2012 comments it had submitted to NMFS on the October 2012 draft BiOp.[132] In other words, Riverkeeper provided no new information in its April 2013 submission. Riverkeeper acknowledged that the Draft FSEIS Supplement comment period was "no longer open" and that "in fact, NRC expects to issue a finalized FSEIS supplement imminently."[133]

At around the same time, in March 2013, NYSDEC submitted a letter to the NRC requesting that NMFS' 2013 BiOp and ITS "be remanded to NMFS for further analysis and evaluation."[134] NYSDEC criticized the 2013 BiOp on the grounds that: (1) IPEC's continued

---

129 *Id.* at 133-37.

130 NRC Staff's Twelfth Status Report in Response to the Atomic Safety and Licensing Board's Order of February 16, 2012 at 1 (Feb. 1, 2013); *available at* ADAMS Accession No. ML13032A568.

131 Letter from D. Brancato, Riverkeeper, to C. Bladey, NRC, Riverkeeper, Inc.'s Supplemental Letter Regarding the U.S. Nuclear Regulatory Commission's Generic Environmental Impact Statement for License Renewal of Nuclear Plants (Apr. 29, 2013), *available at* ADAMS Accession No. ML13122A370 ("Riverkeeper April 29, 2013 Comments") (previously provided as Riverkeeper Motion, Attach. 8).

132 *Id*. at 2.

133 *Id*.

134 Letter from K. Moser, NYSDEC, to A. Hull, NRC, NMFS's January 30, 2013 Biological Opinion for Continued Operation of Indian Point Nuclear Generating Units 2 and 3 (Mar. 25, 2013), *available at* ADAMS Accession No. ML13095A493 (previously provided as Riverkeeper Motion, Attach. 9) ("NYSDEC Comments"). Because the State of New York did not join or sponsor this contention, this Answer addresses NYSDEC's comments for completeness only and to note that to the extent Riverkeeper raised the same issues, they are addressed by NMFS.

operation in once-through cooling mode does not meet New York water quality requirements; (2) NMFS did not consult with NYSDEC prior to issuing the 2013 BiOp and ITS; (3) the total take exempted at IPEC was inflated by an unsupported assumption; (4) NMFS had previously recommended that NRC require closed-cycle cooling for continued operations; (5) the BiOp neither requires nor recommends any effort to reduce IPEC's take of endangered sturgeon; and (6) Atlantic sturgeon take was exempted despite the lack of supporting data.[135]

Entergy responded to NYSDEC's letter in April 2013, pointing out that NYSDEC's concerns lacked technical support and were based on a "misapprehension of important facts."[136] As discussed further below, NMFS also responded directly to each of NYSDEC's concerns in a May 2013 letter, explaining how it had addressed NYSDEC's concerns in the final BiOp or why the concern was not well-founded.[137]

In June 2013, the NRC Staff issued the FSEIS Supplement.[138] The FSEIS Supplement updates certain of the Staff's FSEIS analyses and conclusions with regard to impingement, entrainment, and thermal impacts to non-endangered aquatic species.[139] The FSEIS Supplement also describes the lengthy, five-year long consultation process, documents the completion of the Staff's ESA Section 7 consultations with NMFS, and summarizes NMFS' 2013 BiOp and ITS.[140] In particular, the FSEIS Supplement summarizes NMFS' conclusion that the continued operation

---

135 *Id*. at 6.

136 Letter from E. Zoli, to K. Moser, Correspondence to Dr. Amy Hull at the Nuclear Regulatory Commission at 6 (Apr. 26, 2013), *available at* ADAMS Accession No. ML13120A006.

137 Letter from J. Bullard, NMFS, to K. Moser, NYSDEC at 4 (May 31, 2013), *available at* ADAMS Accession No. ML13155A475 ("NMFS May 31, 2013 Response") (previously provided as Entergy Motion to Dismiss, Attach. 3).

138 Letter from S. Turk, Counsel for NRC Staff, to Board (June 21, 2013), *available at* ADAMS Accession No. ML13172A239.

139 FSEIS Supplement at 1.

140 *Id*. at 25-28.

of IP2 and IP3 is not likely to jeopardize the continued existence of shortnose sturgeon or certain DPSs of Atlantic sturgeon.[141]

As explained in the FSEIS Supplement, the Staff examined the weight of impingement and entrainment information for shortnose and Atlantic sturgeon and new information from the consultation process to determine the level of impact resulting from license renewal. The Staff concludes that the level of impact resulting from IPEC's license renewal for shortnose sturgeon would be "SMALL," given NMFS' finding that license renewal would not change the status or trend of the Hudson River population of shortnose sturgeon or the species as a whole.[142] Similarly, the Staff concludes that the level of impact resulting from extended operation would be "SMALL" for Atlantic sturgeon.[143]

The FSEIS Supplement further finds that development and implementation of an appropriate monitoring plan for both species would help ensure their protection.[144] It also explains that license renewal for IP2 and IP3 would be subject to the terms and conditions of the ITS as stated by NMFS.[145] Ultimately, "[a]fter assessing this new information" from NMFS—

---

141 *Id.* at 28.

142 *Id.* at 30.

143 *Id.* As defined in Table B-1, Appendix B to Subpart A of 10 C.F.R. Part 51 ("Table B-1"), a "SMALL" significance level means: "Environmental effects are *not detectable* or are so minor that they will *neither destabilize nor noticeably alter* any important attribute of the resource." (Emphasis added). Thus, the Staff's conclusion that extended operation would "neither destabilize nor noticeably alter" shortnose and Atlantic sturgeon populations is entirely consistent with NMFS' finding that extended operation would "not change the status or trend" of shortnose and Atlantic sturgeon Hudson River populations or of either the species as a whole. *Cf.* Table B-1 and 2013 BiOp at 122, 128.

144 *Id.* In accordance with the ITS, on March 29, 2013 Entergy submitted a biological monitoring plan to NMFS. *See* Proposed Draft Monitoring Plan for Indian Point Energy Center Take of Atlantic and Shortnose Sturgeons by Impingement at Cooling Water Intakes (Mar. 29, 2013), *available at* ADAMS Accession No. ML13088A370. NMFS' review of the biological monitoring plan is ongoing, but NMFS recently confirmed in recent correspondence to New York State that the ESA consultation process for IPEC is complete. *See* NMFS May 31, 2013 Response at 1.

145 *Id.*

and consistent with the findings in NMFS' 2013 BiOp—the FSEIS Supplement concludes "that the level of impact for aquatic special status species would be SMALL."[146]

3. Amended Contention RK-EC-8

Following the Staff's issuance of the FSEIS Supplement, Entergy moved to dismiss RK-EC-8 as moot, on the grounds that all three alleged deficiencies raised in the original contention had been cured.[147] On August 20, 2013, Riverkeeper filed a response opposing Entergy's motion to dismiss,[148] as well as a motion requesting that the Board admit the amended contention.[149]

In its Motion, Riverkeeper identifies two bases for its amended contention. Basis 1 asserts that the FSEIS Supplement "relies blindly on the analyses and conclusions contained in NMFS' final BiOp and fails to address or consider comments regarding numerous deficiencies in NMFS' analysis."[150] Basis 2 avers that the FSEIS Supplement does not include a Staff "integrated and fully informed recommendation to the Commission regarding the 'environmental acceptability' of renewing the operating licenses of Indian Point."[151] As shown below, Riverkeeper does not present sufficient legal or factual grounds to support admission of the amended contention on either basis.

---

146 *Id.*

147 *See* Entergy Motion to Dismiss. Specifically, Entergy argued that the Staff: (1) completed and documented its ESA Section 7 consultation with NMFS; (2) included and considered in the FSEIS Supplement NMFS' assessment of impacts to endangered species; and (3) prepared a supplement to the FSEIS that considers the outcome of the consultation process, including NMFS' final BiOp. *Id*. at 1-2.

148 Riverkeeper, Inc. Response to Entergy Motion to Dismiss Riverkeeper Contention RK-EC-8 at 9 (Aug. 20, 2013), *available at* ADAMS Accession No. ML13232A391.

149 Riverkeeper Motion.

150 *Id*. at 7.

151 *Id*. at 16.

B. Amended Contention RK-EC-8A Is Immaterial, Lacks Sufficient Factual Support and Legal Basis, and Fails to Establish a Genuine Dispute on a Material Issue of Law or Fact

For the reasons discussed below, Riverkeeper provides insufficient legal and factual basis to support the admission of RK-EC-8A. In particular, Riverkeeper has not shown that the Staff's reliance on NMFS' BiOp was arbitrary and capricious. Rather, the record shows that, consistent with Congress's intent, the Staff appropriately relied on NMFS' expert conclusions in confirming its own findings as set forth in four separate BAs. Riverkeeper also has not shown that the NRC Staff and NMFS improperly ignored comments received on the Staff's Draft FSEIS Supplement and NMFS' Draft BiOp. To the contrary, the record is clear that the Staff and NMFS were aware of the issues raised in Riverkeeper's comments and did address them during the consultation process. Finally, Riverkeeper has not shown that the Staff's conclusions related to endangered sturgeon in the FSEIS Supplement constituted new and significant information that would require a revision or restatement of the Staff's overall recommendation to the Commission regarding IPEC's LRA. The Staff's FSEIS recommendation to the Commission that the environmental impacts of license renewal are not so great that preserving the license renewal option would be unreasonable remains in effect and part of the FSEIS, and therefore, there was no need to restate this conclusion in the FSEIS Supplement.

1. RK-EC-8A, Basis 1, Is Immaterial, Insufficient to Establish a Genuine Dispute, and Inadequately Supported

a. Riverkeeper Fails to Provide Sufficient Information Demonstrating that the Staff's Reliance on NMFS' BiOp Was Arbitrary and Capricious

In support of its amended contention, Riverkeeper claims that the FSEIS Supplement is inadequate in that it "relies blindly" on NMFS' BiOp.[152] As noted above, the Section 7

[152] Riverkeeper Motion at 7.

interagency consultation process reflects Congress's understanding that NMFS is "*far more knowledgeable* than other federal agencies about the precise conditions that pose a threat to listed species," and that, as the expert agency, NMFS is in the "'best position' to make discretionary factual determinations about whether a proposed agency action will create a problem for a listed species and what measures might be appropriate to protect the species."[153] Courts will overturn an action agency's reliance on a BiOp only where the reliance was "arbitrary and capricious."[154] To show that the NRC Staff acted arbitrarily and capriciously in relying on NMFS' BiOp, Riverkeeper must do more than just reargue factual issues that NMFS already took into consideration.[155] Rather, it must point to new information that NMFS did not take into account that calls the BiOp's factual conclusions into question.[156]

Riverkeeper's characterization of the FSEIS Supplement conclusions as blind reliance on NMFS' BiOp is simply incorrect.[157] Rather, the record shows that the FSEIS Supplement's conclusions were the culmination of an extensive, five-year long back-and-forth consultation process that fully complied with all applicable statutory and regulatory requirements. Throughout that process, the Staff conducted its own independent analyses of the available information and developed its own findings and conclusions, which were memorialized in four BAs (issued in December 2008, December 2010, July 2011, and May 2012). The conclusions reached by NMFS in its final 2013 BiOp were consistent with and supported the conclusions reached by the Staff in its BAs and FSEIS Supplement.

---

153 *City of Tacoma*, 460 F.3d at 75 (emphasis added).

154 *Id*. (emphasis added) (citing *Aluminum Co. of Am.*, 175 F.3d at 1160 ; *Pyramid Lake*, 898 F.2d at 1415 (9th Cir. 1990); *Stop H-3 Ass'n*, 740 F.2d at 1460).

155 *Id*. (citing *Pyramid Lake*, 898 F.2d at 1415-16; *Stop H-3 Ass'n*, 740 F.2d at 1459-60) (emphasis added).

156 *Id*. (citing *Pyramid Lake*, 898 F.2d at 1415; *Stop H-3 Ass'n*, 740 F.2d at 1459-60).

157 Riverkeeper Motion at 7.

Despite Riverkeeper's claim that the NRC Staff failed to consider comments critical of the Staff's and NMFS' conclusions, as discussed below, the issues raised in Riverkeeper's comments were addressed by both agencies during the consultation process. Riverkeeper has provided no "new" information that would give the Staff a basis for doubting or departing from the expert conclusions in NMFS' BiOp.[158]

b. Riverkeeper Fails to Establish that the NRC Staff and NMFS Improperly Ignored Comments Received on the Draft FSEIS Supplement and Draft BiOp

Riverkeeper further claims that, although various concerns were raised to the NRC Staff regarding "the validity and adequacy" of NMFS' 2013 BiOp, the FSEIS Supplement fails to address them.[159] Specifically, Riverkeeper points to the August 20, 2012 and April 29, 2013 comments it submitted on the Draft FSEIS Supplement, as well as NYSDEC's March 25, 2013 letter to the NRC regarding NMFS' 2013 BiOp.[160] Riverkeeper further asserts that the Staff's failure to address its and NYSDEC's comments renders the Staff's environmental review process inadequate.[161] Thus, RK-EC-8A focuses on the Staff's alleged "failure to acknowledge, address, or consider" comments, but notably does not assert that any responses that the Staff did provide were insufficient in some way.[162]

As an initial matter, and as noted above, an agency's obligation to respond to public comments is "limited" under NEPA.[163] NEPA does not require the NRC Staff to publish every

158 *City of Tacoma*, 460 F.3d at 76 (citing *Pyramid Lake*, 898 F.2d at 1415; *Stop H-3 Ass'n*, 740 F.2d at 1459-60).

159 Riverkeeper Motion at 12.

160 *Id*. at 8-12.

161 *Id*. at 15.

162 *Id*. at 16.

163 *Block*, 690 F.2d at 773.

comment it receives or to discuss "at full length" comments expressing opposing views.[164] Moreover, under the ESA, there is no opportunity for the public to comment on a draft NMFS BiOp, much less an obligation on NMFS' part to respond to public comments received.[165]

Even putting aside the question of whether the Staff and NMFS have a legal obligation to respond to each and every one of Riverkeeper's comments, as Riverkeeper seems to believe, RK-EC-8A nonetheless fails to satisfy the contention admissibility requirements of 10 C.F.R. § 2.309(f)(1)(iv), (v), and (vi). As a factual matter, and contrary to Riverkeeper's claims, both the NRC Staff and NMFS addressed the issues raised in Riverkeeper's comments on the Draft FSEIS Supplement, Riverkeeper's comments on the draft 2013 BiOp, and NYSDEC's comments on the final 2013 BiOp, as shown below. Therefore, because Riverkeeper only challenges whether the Staff addressed its comments—and not whether it appropriately addressed their substance—Basis 1 of RK-EC-8A fails to raise a material dispute.

(i) Alleged Use of Old Data

In its comments on the Draft FSEIS Supplement, Riverkeeper complained about the Staff's reliance on "decades-old data that is not necessarily reflective of current conditions."[166] In direct response to this comment, the Staff explained that it based its analyses on the most recent data available at the time.[167] Specifically, the Staff relied on impingement data from 1975 through 1990, entrainment data from the 1980s, and thermal plume data from a 2011 Entergy

---

164 *Id*.

165 *See, e.g.*, *San Luis & Delta-Mendota Water Auth. v. Salazar*, 760 F. Supp. 2d at 957 ("Neither the ESA nor its implementing regulations require an opportunity for public comment or that FWS respond to any comments received [on a draft BiOp]. Plaintiffs' suggestion that FWS violated the ESA by 'ignoring' comments on the draft BiOp is legally unsustainable.") (citations omitted).

166 FSEIS Supplement, App. A at A-6; *see also* Riverkeeper Motion at 9. In its comment letter on the Draft FSEIS Supplement, NYSDEC also commented about the use of "out of date" data. *See* FSEIS Supplement, App. A at A-21. The Staff addressed NYSDEC's comment with a response similar to the response provided to Riverkeeper. *Id*.

167 FSEIS Supplement, App. A at A-6.

study.[168] It further noted that its analyses took into account any changes to the fish populations in the Hudson River that have occurred over the years from 1974 through 2005.[169] The Staff also pointed out that it had "no reason to believe that the conditional impingement and entrainment mortality rate estimates based on those data would be different today," and importantly, that Riverkeeper "presents no information to suggest that such rates have changed."[170]

Contrary to Riverkeeper's claim, the Staff fully addressed this issue by explaining in the FSEIS Supplement that it used the most recent information available.[171] Likewise, NMFS based its analysis in the 2013 BiOp on the best available information.[172] Riverkeeper does not point to any newer or better data that were available to, but not used by, the Staff or NMFS. Instead, Riverkeeper simply attempts to reargue a factual issue that NMFS already considered in its BiOp. Therefore, Riverkeeper has failed to provide sufficient information to support its contention or establish a genuine dispute, contrary to 10 C.F.R. § 2.309(f)(1)(v) and (vi).

(ii) Resolution of Pisces Questions Regarding Impacts to Shortnose Sturgeon

In its August 2012 comments, Riverkeeper also submitted a report by its biologist consultants, Pisces. According to Riverkeeper, although Pisces "called into question" the Staff's

---

168 *Id*.

169 *Id*.

170 *Id*. at A-7.

171 See also FSEIS at A-62. As noted above, NEPA's rule of reason does not require an agency to conduct or require new studies in response to issues raised in the comments. *Block*, 690 F.2d at 773 (citing *Warm Springs Dam Task Force v. Gribble*, 565 F.2d 549, 554 (9th Cir. 1977)).

172 *See, e.g.,* 2013 BiOp at 99, 126. In response to a similar Riverkeeper comment submitted to NMFS on the draft 2013 BiOp, NMFS noted that the impingement data collected from 1974 to 1990 was the only impingement data available for IPEC, but "Riverkeeper offers no alternative method for calculating impingement estimates and does not refer us to any additional data sources." NMFS Memorandum at 24.

conclusion that continued IPEC operations would have SMALL impacts on the shortnose sturgeon, the Staff failed to address Pisces' concern.[173]

Contrary to Riverkeeper's characterization of the Pisces report, Pisces did not call into question the Staff's conclusion or call for more study. Rather, Pisces *agreed* that the NRC Staff's opinion that the impacts on shortnose sturgeon would be SMALL "*does not seem unreasonable*, but should be checked with someone with local knowledge of the populations."[174] The Staff indicated that it had addressed this issue in Section 4.0 of the FSEIS Supplement, which was revised to reflect the results of the Staff's consultation with NMFS on the potential impacts to endangered sturgeon.[175] In other words, as Pisces suggested, the NRC Staff "checked with someone with local knowledge" (*i.e.,* NMFS) before concluding the potential impacts to shortnose sturgeon would be SMALL. Moreover, the Pisces report did not present any data or scientific analysis that the Staff should have, but did not, consider.

Consequently, the Staff fully addressed this comment, and Riverkeeper has failed to explain how the Staff's resolution of this comment was arbitrary or capricious. Accordingly, Riverkeeper has failed to provide sufficient information to establish a genuine dispute, as required by 10 C.F.R. § 2.309(f)(1)(vi).

(iii) Usefulness of Issuing a Final BiOp Prior to Resolution of SPDES Permit and Water Quality Certification Proceedings

Despite the closure of the public comment period on the Draft FSEIS Supplement in August 2012, Riverkeeper submitted supplemental comments on the Staff's Draft Supplemental

---

173 Riverkeeper Motion at 8-9.

174 Riverkeeper Aug. 20, 2012 Comments, Attach. A at 3 (emphasis added).

175 FSEIS Supplement, App. A, at A-8.

FSEIS on April 29, 2013—more than eight months after the comment period had closed.[176] Riverkeeper, however, simply repeated and attached the November 23, 2012 comments it had submitted to NMFS on the October 2012 draft BiOp.[177]

In particular, Riverkeeper asserted that NMFS should wait to issue a final BiOp, pending the final outcomes of IPEC's Water Quality Certification and SPDES permit proceedings before NYSDEC.[178] According to Riverkeeper, the eventual outcomes of the ongoing state proceedings would determine if and how IPEC will continue to operate, and issuing a BiOp prior to the resolution of those proceedings is "neither appropriate nor useful."[179]

NMFS previously addressed this issue in its 2013 BiOp.[180] Specifically, NMFS noted that its BiOp was based on the plant's current configuration and that if a new SPDES permit or Water Quality Certification were issued, NRC and NMFS would evaluate the need to reinitiate consultations at that time.[181] The Staff also addressed this issue in the FSEIS Supplement, indicating that, if and when NYSDEC made a decision regarding the cooling water intake structures for the period of extended operation, then the Staff would consider whether Section 7 consultations should be reinitiated.[182]

---

176 Riverkeeper Apr. 29, 2013 Comments.

177 *Id*. at 2; *id*., Attach. 1. In its comment letter, Riverkeeper acknowledged that its supplemental comments were filed well beyond the comment period closed and just before the Staff finalized the FSEIS Supplement. *Id*. at 2. Given Riverkeeper's eleventh-hour filing of its comments, the Staff had no legal obligation to address these comments. *See* 10 C.F.R. §51.73.

178 *Id*., Attach. 1 at 2-5.

179 *Id*., Attach. 1 at 4.

180 2013 BiOp at 12-13.

181 *Id*.; *see also* NMFS Memorandum at 23 ("operation [of IPEC] with closed cycle cooling or wedge wire screens is not the proposed action and considering either of those alternatives in the effects analysis or jeopardy determination would be inappropriate").

182 FSEIS Supplement at A-6. Despite their lateness, Riverkeeper claims that "it was entirely appropriate, [and] indeed necessary, for the NRC Staff to consider and address the issues raised in these comments." Riverkeeper Motion at 14. In its Motion, Riverkeeper does not identify any legal authority (and Entergy is aware of none) to support its position that NEPA requires the NRC Staff to consider and address comments received well beyond the comment period—even those comments that were late-filed because of circumstances that occurred

In RK-EC-8A, Riverkeeper provides no support for its conclusory assertion that its comment to NMFS remains "unaddressed."[183] Nor does Riverkeeper provide information demonstrating that the NRC Staff unreasonably addressed this issue in the FSEIS Supplement. To the contrary, Riverkeeper attempts to reargue an issue that NMFS already considered in its 2013 BiOp. Accordingly, for this issue, Riverkeeper has likewise failed to provide sufficient information to support its contention or establish a genuine dispute, contrary to 10 C.F.R. § 2.309(f)(1)(v) and (vi).

(iv) Disagreement with NMFS' Incidental Take Statement

In its April 23, 2013 comments, Riverkeeper claimed that there was no basis for NMFS' findings exempting the take of shortnose and Atlantic sturgeon, because *any* impacts on these species "may have noticeable affects and it is critical that such impacts are kept to a minimum."[184] Riverkeeper again questioned NMFS' findings because they allegedly are based on data that were collected over 20 years ago.[185]

First, to the extent Riverkeeper argues that "*any* impacts" should be considered significant and that the anticipated losses of Atlantic and shortnose sturgeon are not "appropriate or acceptable,"[186] Riverkeeper fails to raise a material issue as required by 10 C.F.R. § 2.309(f)(1)(iv). Contrary to Riverkeeper's suggestion, the ESA does not prohibit the NRC

---

after the comment period closure. Indeed, the D.C. Circuit has rejected challenges to an FEIS based on the "sequencing of environmental analyses" (*i.e.*, new information that became available after the DEIS comment period closed) where the challenger "has not shown that omissions in the DEIS left the public unable to make known its environmental concerns about the project's impact." *Nat'l Comm. for the New River, Inc. v. FERC*, 373 F.3d 1323, 1329-30 (D.C. Cir. 2004).

183 Riverkeeper Motion at 8 n.27.

184 April 29, 2013 Comments, Attach. 1 at 6-8.

185 *Id*., Attach. 1 at 8.

186 April 29, 2013 Comments, Attach. 1 at 7.

from issuing a license for a nuclear power plant because the plant may have a small adverse impact on an endangered or threatened species.[187]

Second, contrary to Riverkeeper's claims, NMFS thoroughly addressed this issue in Section 9.0 of the 2013 BiOp, which provides NMFS' detailed analysis of the likelihood of IPEC's continued operation appreciably reducing the survival and recovery of endangered shortnose and Atlantic sturgeon, despite potential impingement of both species.[188] For example, the BiOp notes that, while the loss of a small number of individuals from a subpopulation or species can have an appreciable effect on the likelihood of survival and recovery of the species, this situation is not likely in the case of shortnose sturgeon because: (1) the species has a wide geographic distribution; (2) it is not known to have low levels of genetic diversity; and (3) there are thousands of shortnose sturgeon spawning each year.[189] NMFS also concluded that the number of Atlantic sturgeon potentially impinged during extended operation was unlikely to "change the status of this species, as this loss represents a very small percentage of the Hudson River population of juveniles and an even smaller percentage of the overall Hudson River population."[190]

As a result of this detailed analysis, NMFS concluded that IPEC's continued operation is not likely to jeopardize the continued existence of any endangered sturgeon.[191] In reaching this conclusion, NMFS emphasized that it reviewed "the best available information on the status of endangered and threatened species under NMFS jurisdiction, the environmental baseline for the

---

187 *See Hartsville* ALAB-463, 7 NRC at 360. Moreover, as noted by NMFS, the appropriate standard under ESA Section 7 is not whether the level of incidental take is "appropriate" or "acceptable," but rather, whether license renewal is "reasonably expected to reduce appreciably the likelihood of both survival and recovery of the species in the wild." NMFS Memorandum at 23.

188 2013 BiOp at 113-26.

189 *Id*. at 118.

190 *Id*. at 123.

191 *Id*.

action area, the effects of the proposed action, interdependent and interrelated actions and the cumulative effects."[192]

Riverkeeper fails to set forth any relevant facts, references, or expert opinion indicating how or why NMFS could have conducted its evaluation differently.[193] Nor does Riverkeeper present any technical analysis addressing the specific rationale NMFS provided in the 2013 BiOp when it concluded that continued operation of IP2 and IP3 would not likely jeopardize the continued existence of shortnose or Atlantic sturgeon. Although Riverkeeper notes that its consultant stated that any impact to sturgeon "cannot be considered trivial,"[194] it is well-settled that conclusory statements, even by an expert, are not sufficient to support a contention.[195] Here, Riverkeeper's consultant provided only assertions that impingement at IPEC will contribute to sturgeon losses, but provided no reasoned basis or explanation to question NMFS' numeric estimate of those potential losses or their insignificance. Accordingly, Riverkeeper has failed to provide sufficient information to support its contention or establish a genuine dispute, contrary to 10 C.F.R. § 2.309(f)(1)(v) and (vi).

(v) Cumulative Impacts from Other Hudson River Power Plants

Riverkeeper commented that NMFS failed to assess the cumulative impacts to Atlantic sturgeon from all power plants (not just IPEC) in the Hudson River.[196] NMFS also addressed this issue in the 2013 BiOp, in which it discussed entrainment and impingement impacts from

---

192 *Id*. at 126.

193 In response to comments made by Riverkeeper's consultant, NMFS noted that, "[w]hile Dr. Henderson makes numerous comments about the [draft 2013 BiOp], he provides no scientific analysis or citations to support any of his statements." NMFS Memorandum at 23, 24.

194 April 29, 2013 Comments, Attach. 1 at 7.

195 *USEC, Inc*. (Am. Centrifuge Plant), CLI-06-10, 63 NRC 451, 472 (2006).

196 Riverkeeper April 29, 2013 Comments, Attach. 1 at 8-10.

other Hudson River plants on the shortnose and Atlantic sturgeon.[197] Riverkeeper does not challenge this data. Rather, it offers only conclusory statements that call for additional analysis by NMFS. Consequently, contrary to 10 C.F.R. § 2.309(f)(1)(v) and (vi), Riverkeeper has failed to provide sufficient information to support its contention or establish a genuine dispute.

(vi) Impacts of Radiological Releases from IPEC

Riverkeeper further criticized the 2013 BiOp for its failure to consider the impacts of radiological discharges from IPEC on endangered sturgeon.[198] This issue was also fully considered and addressed in NMFS' 2013 BiOp. Specifically, NMFS found that, while shortnose and Atlantic sturgeon may be exposed to radionuclides originating from IPEC (as well as other sources), any radiological exposure is "not likely to be at levels that would affect the health or fitness of any individual shortnose or Atlantic sturgeon."[199] Moreover, in response to Riverkeeper's comments, NMFS "modified the description of sources of radionuclides to more fully describe the sources of radionuclides to the environment" in the final 2013 BiOp.[200] Riverkeeper offers nothing but conclusory statements disputing NMFS' findings. Accordingly, Riverkeeper has failed to provide sufficient information to support its contention or establish a genuine dispute, as required by 10 C.F.R. § 2.309(f)(1)(v) and (vi).

---

197 2013 BiOp at 43-44. *See also* NMFS Memorandum at 24, 25 (the 2013 BiOp "appropriately considers other anthropogenic impacts to Atlantic sturgeon, including other power plant intakes," and "Riverkeeper presents no information or analysis in their letter regarding the impacts of these other facilities . . . on shortnose or Atlantic sturgeon.").

198 *See* Riverkeeper April 29, 2013 Comments, Attach. 1 at 10-12.

199 2013 BiOp at 108.

200 NMFS Memorandum at 26.

(vii) Failure to Assess All Reasonable and Prudent Measures

In addition, Riverkeeper commented that NMFS had failed to assess the efficacy of closed-cycle cooling as a "reasonable and prudent measure" at IPEC.[201] NYSDEC submitted similar comments to the NRC.[202]

As noted above, the 2013 BiOp identifies five "reasonable and prudent measures" that NMFS believes are necessary or appropriate to minimize or monitor impacts of incidental take of shortnose and Atlantic sturgeon.[203] Moreover, in response to NYSDEC's March 25, 2013 letter, NMFS directly addressed the issue of closed-cycle cooling as a possible additional reasonable and prudent measure. Specifically, NMFS cited 50 C.F.R. § 402.14(i)(2), which states that reasonable and prudent measures "cannot alter the basic design, location, scope, duration, or timing of the action and may involve only *minor* changes."[204] NMFS noted that requiring the conversion of IPEC's cooling water system to a closed cycle "would not fit within the allowable scope" of a reasonable and prudent measure, as it "would involve more than a minor change to the proposed action."[205] NMFS further observed that it was unaware of any other reasonable and prudent measures that could be implemented at IPEC that would minimize take at IPEC.[206]

As NMFS' May 31, 2013 Response makes clear, NMFS squarely addressed this issue. Riverkeeper has not cited to that response or provided any reason to question NMFS'

---

201 *See* Riverkeeper April 29, 2013 Comments, Attach. 1 at 13-14.

202 NYSDEC Comments at 4-5.

203 2013 BiOp at 132-33.

204 NMFS May 31, 2013 Response at 4; 50 C.F.R. § 402.14(i)(2) (emphasis added).

205 NMFS May 31, 2013 Response at 4.

206 *Id*. *See also* NMFS Memorandum at 26-27 ("we cannot require that Indian Point convert to closed-cycle cooling or install cooling towers as [a reasonable and prudent measure], because such a modification to the facility would be more than a minor change to the basic design of the proposed action.").

assessment.[207] Accordingly, Riverkeeper has failed to establish a genuine dispute on a material issue, contrary to 10 C.F.R. § 2.309(f)(1)(vi).

(viii) Efficacy of Conservation Recommendations

Riverkeeper also questioned the efficacy and sufficiency of NMFS' Conservation Recommendations related to the impact of IPEC on sturgeon in the Hudson River.[208] Although Riverkeeper acknowledged that the recommendations "are important and will result in the existence of better information," it alleged—without citing any factual or expert support—that the recommendations are discretionary and "fail to achieve a net conservation benefit to the endangered sturgeon populations in the Hudson River."[209]

In its 2013 BiOp, NMFS identified seven conservation recommendations for the NRC's consideration.[210] Notwithstanding Riverkeeper's unsupported, conclusory statements, NMFS concluded—in its expert opinion—that the recommendations would "minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information."[211] Moreover, contrary to Riverkeeper's interpretation, the purpose of the conservation recommendations is not to mitigate impacts on endangered sturgeon or to result in a net conservation benefit to those species; rather, the recommendations are intended to be "activities that NRC could carry out that would provide [NMFS] with important information on listed sturgeon."[212] Accordingly, Riverkeeper has failed to provide proper

---

207 Riverkeeper also fails to acknowledge that, for NEPA purposes, FSEIS Section 8.1 already fully evaluates the environmental impacts of the closed-cycle cooling alternative. Again, Riverkeeper fails to controvert that evaluation.

208 Riverkeeper April 29, 2013 Comments, Attach. 1 at 14.

209 *Id*.

210 2013 BiOp at 138-39.

211 *Id*.

212 NMFS Memorandum at 27.

support for its contention and to establish a genuine dispute on a material issue, as required by 10 C.F.R. § 2.309(f)(1)(v) and (vi).

(ix) IPEC's Once-Through Cooling System Does Not Meet State Water Quality Requirements

In its Motion, Riverkeeper also faults the NRC Staff for failing to address NYSDEC's concerns related to NMFS' 2013 BiOp.[213] As an initial matter, NYSDEC submitted its concerns on the final (already issued) BiOp by letter dated March 25, 2013; the March 2013 letter was not intended to comment on the Staff's Draft FSEIS Supplement. Thus, the Staff had no obligation to consider or address NYSDEC's concerns in the final FSEIS Supplement. Nonetheless, as noted above, both NMFS and Entergy appropriately responded to the issues raised in NYSDEC's comments.

As discussed previously, NYSDEC criticized the 2013 BiOp, because in its view, IPEC's continued operation in once-through cooling mode does not meet New York water quality requirements, and NMFS should not have issued an ITS with its BiOp.[214] NMFS responded that it must issue an ITS when it determines, as it did in this case, that the proposed action and any incidental takings are not likely to jeopardize an endangered specie's continued existence.[215] NMFS further explained that, in issuing an ITS, it is not required to determine the lawfulness of the proposed action, and it made no such finding in the 2013 BiOp or accompanying ITS.[216]

Riverkeeper has not cited to or provided any basis to challenge NMFS' response to this NYSDEC issue. Therefore, NMFS fully addressed this issue, which fails to raise a genuine dispute as required by 10 C.F.R. § 2.309(f)(vi).

---

213 Riverkeeper Motion at 13-14. As noted earlier, although New York State did not join or sponsor this contention, this Answer addresses NYSDEC's comments for completeness only.

214 NYSDEC Comments at 2.

215 NMFS May 31, 2013 Response at 1.

216 *Id*.

(x) Failure to Consult with NYSDEC

NYSDEC also commented that NMFS did not consult with NYSDEC prior to issuing the 2013 BiOp and ITS as required by the Cooperative Agreement between NMFS and NYSDEC.[217] NMFS responded that NYSDEC had incorrectly interpreted the ESA, asserting that "[n]owhere in the ESA is there a requirement to consult with a state prior to issuance of a Biological Opinion."[218] NMFS further pointed out that, although it was not required to consult with the State, it did offer NYSDEC an opportunity to comment on the 2011 BiOp.[219] NMFS also assured NYSDEC that it intended to confer with and involve NYSDEC in the development of an impingement monitoring plan at IPEC.[220] Accordingly, this NYSDEC issue has also been fully addressed by NMFS and raises no material dispute.

(xi) Unsupported Inflated Take Exemptions

NYSDEC expressed disagreement with the method NMFS used to determine the number of shortnose and Atlantic sturgeon likely to be taken at IPEC.[221] In particular, it disagreed with NMFS' application of a "water use correction factor," which resulted in a "greater number of sturgeon to be taken rather than protected."[222]

In its May 31, 2013 Response, NMFS justified the use of a water correction factor. Notably, NMFS also explained that its conservative evaluation of the maximum potential take reduced the risk of an incorrect conclusion as to whether the proposed action was likely to jeopardize the species. In other words, if NMFS had assumed a lower level of incidental take (as

---

217 NYSDEC Comments at 2-3.

218 NMFS May 31, 2013 Response at 2.

219 *Id*.

220 *Id*.

221 NYSDEC Comments at 3-4.

222 *Id*.

NYSDEC was apparently advocating), then NMFS necessarily would have found that continued IP2 and IP3 operation resulted in even lower potential risk to the species.[223] Riverkeeper has not alleged that NMFS' response was insufficient or offered any information disputing NMFS' response to this issue. Nor has Riverkeeper established the materiality of the 2013 BiOp potentially conservatively overstating the impact to sturgeon. Thus, the issue is immaterial, inadequately supported, and does not raise a genuine dispute, as required by 10 C.F.R. § 2.309(f)(iv), (v), and (vi).

(xii) Failure to Require Closed-Cycle Cooling to Reduce Impacts to Essential Fish Habitats

NYSDEC commented that NMFS had previously recommended that NRC require closed-cycle cooling for IPEC's continued operations as a conservation measure to minimize the impacts on essential fish habitats ("EFH") but that Entergy had not committed to implementing closed-cycle cooling.[224] In response to this comment, NMFS pointed out that neither the shortnose nor Atlantic sturgeon have designated EFH, and therefore, NMFS' EFH consultation with NRC did not consider habitat for those species.[225] Because Riverkeeper has not offered any information to dispute NMFS' determination on this issue, this issue is inadequately supported and does not raise a genuine dispute, as required by 10 C.F.R. § 2.309(f)(v) and (vi).

(xiii) Insufficient Data to Support Exempting Atlantic Sturgeon Take

Finally, NYSDEC criticized NMFS' decision to exempt certain take of Atlantic sturgeon even though it lacks recent abundance or impingement data.[226] In its response, NMFS stated that it had considered the "best available scientific information" in issuing its BiOp, as required by

223 NMFS May 31, 2013 Response at 3-4.

224 NYSDEC Comments at 4.

225 NMFS May 31, 2013 Response at 4.

226 NYSDEC Comments at 5.

the ESA.[227] Again, Riverkeeper has failed to point to any other information that was available to NMFS but was not considered. Accordingly, this issue is inadequately supported and does not raise a genuine dispute, contrary to 10 C.F.R. § 2.309(f)(v) and (vi).

* * * *

As shown in this section, contrary to Riverkeeper's assertion that its August 20, 2012 and (late-filed) April 23, 2013 comments, and NYSDEC's March 25, 2013 letter to the NRC went unaddressed or unacknowledged, both the NRC Staff and NMFS directly addressed the issues raised in each of those comments. Moreover, RK-EC-8A, Basis 1 fails to provide sufficient information or support establishing a genuine material dispute with the FSEIS Supplement. Accordingly, it fails to satisfy the contention admissibility requirements of 10 C.F.R. § 2.309(f)(1)(iv), (v), and (vi). As a result, Riverkeeper's first asserted basis for RK-EC-8A is insufficient to support its admission.

2. RK-EC-8A, Basis 2 Is Immaterial, Insufficient to Establish a Genuine Dispute, and Inadequately Supported

In the December 2010 FSEIS, the NRC Staff made the recommendation that "the Commission determine that the adverse environmental impacts of license renewals for IP2 and IP3 are not so great that preserving the option of license renewal for energy planning decision makers would be unreasonable."[228] Riverkeeper asserts as a second basis for its amended contention that the FSEIS Supplement is legally deficient because it does not update the Staff's "integrated" recommendation to the Commission regarding renewal of the IPEC operating

[227] NMFS May 31, 2013 Response at 5.

[228] FSEIS, Vol. 1 at iv (NYS00133A).

licenses.[229] For the reasons described below, this basis is also insufficient to support the admission of the amended contention, based on the lack of any new and significant information.

As an initial matter, the FSEIS Supplement is just that—a supplement. It does not entirely supersede the Staff's December 2010 FSEIS. The scope of the supplement is limited to a discussion of new information regarding impacts of IPEC's continued operations to aquatic species.[230] Any portions of the FSEIS that were altered were marked up in the FSEIS Supplement; any portions not affected by the new information—including the Staff's overall recommendation to the Commission—remain in effect and part of the FSEIS.

To the extent that Riverkeeper faults the FSEIS Supplement for not repeating information that remained in effect and part of the FSEIS, such a claim is immaterial to the NRC Staff's NEPA findings. As the Commission has instructed, "NRC adjudicatory hearings are not EIS editing sessions. Our busy boards do not sit to parse and fine-tune EISs."[231]

As relevant to RK-EC-8A, the FSEIS Supplement's conclusion regarding the overall impact of continued operation on endangered aquatic species is consistent with the conclusion reached in the FSEIS. In particular, the Staff concluded that the level of impact on shortnose and Atlantic sturgeon would be SMALL, which reflects no change from the level of impact assigned to these species in the FSEIS.[232]

---

229 Riverkeeper Motion at 16.

230 FSEIS Supplement at 1-2.

231 *Duke Energy Corp*. (McGuire Nuclear Station, Units 1 & 2; Catawba Nuclear Station, Units 1 & 2), CLI-03-17, 58 NRC 419, 431 (2003). *See also Exelon Generating Co., LLC* (Early Site Permit for Clinton ESP Site), CLI-05-29, 62 NRC 801, 811 (2005) ("There may, of course, be mistakes in the [EIS], but in an NRC adjudication, it is Intervenors' burden to show their significance and materiality. Our boards do not sit to flyspeck environmental documents or to add details or nuances." (internal quotes omitted)); *Private Fuel Storage, L.L.C.* (Indep. Spent Fuel Storage Installation), CLI-02-25, 56 NRC 340, 349 (2002) ("NEPA does not call for examination of every conceivable aspect of federally licensed projects.") (internal quotes omitted).

232 FSEIS Supplement at 24, 25.

Moreover, as the Commission has observed, a dispute "is 'material' if its resolution would 'make a difference in the outcome of the licensing proceeding.'"[233] Given that the assessments reached by the Staff in the FSEIS Supplement reflect the same impacts to "special status" aquatic species, there is no reason or need for the Staff to alter or reiterate its original FSEIS recommendation regarding IPEC license renewal. Thus, Riverkeeper has failed to show that Basis 2 "is material to the findings the NRC must make to support the action that is involved in the proceeding."[234]

Basis 2 also must be dismissed because it fails to comply with 10 C.F.R. § 2.309(f)(1)(v), which requires a concise statement of "the alleged facts or expert opinions" and "the specific sources and documents" on which the petitioner intends to rely to support its position on the issue. In particular, Riverkeeper is required to "provide documents or other factual information or expert opinion that set forth the *necessary technical analysis* to show *why* the proffered bases support its contention." [235] Riverkeeper falls far short of meeting these requirements. In fact, rather than dispute the SMALL impact finding in the FSEIS Supplement, Riverkeeper provides a consultant report that agrees that this conclusion "does not seem unreasonable."[236] Thus, Riverkeeper's own consultant expressed agreement with the Staff's conclusions.

At best, Riverkeeper's criticisms of the FSEIS Supplement are vague and conclusory. For instance, although Riverkeeper claims that its expert supported concerns about "deficiencies"

---

233 *Oconee*, CLI-99-11, 49 NRC at 333-34 (citing Final Rule, Rules of Practice for Domestic Licensing Proceedings – Procedural Changes in the Hearing Process, 54 Fed. Reg. 33,168, 33,172 (Aug. 11, 1989)).

234 10 C.F.R. § 2.309(f)(1)(iv).

235 *Private Fuel Storage* (Indep. Spent Fuel Storage Installation), LBP-98-7, 47 NRC 142, 180 (emphasis added) (citing *Ga. Inst. of Tech.* (Ga. Tech Research Reactor, Atlanta, Ga.), LBP-95-6, 41 NRC 281, 305), *aff'd*, CLI-98-13, 48 NRC 26 (1998).

236 Riverkeeper Aug. 20, 2012 Comments, Attach. A § 4.

in the NMFS BiOp,[237] it fails to set forth any relevant facts, references, or expert opinion indicating how or why this evaluation should have been conducted differently. It is well-settled that conclusory statements, even by an expert, are not sufficient to support a contention.[238]

In summary, Riverkeeper's second basis for RK-EC-8A is immaterial, insufficient to establish a genuine dispute, and insufficient to support its admission. Because RK-EC-8A as a whole lacks legal and factual basis, the amended contention is inadmissible in its entirety.

IV. CONCLUSION

For the reasons set forth above, Riverkeeper has failed to provide sufficient information to establish a genuine dispute on a material issue of law or fact concerning compliance with the mandates of the ESA or NEPA, as required by 10 C.F.R. § 2.309(f)(1)(iv), (v), and (vi). Accordingly, RK-EC-8A is inadmissible and should be rejected in its entirety, and Riverkeeper's Motion should be denied.

Respectfully submitted,

Executed in accord with 10 C.F.R. § 2.304(d)

William B. Glew, Jr., Esq.
William C. Dennis, Esq.
Entergy Nuclear Operations, Inc.
440 Hamilton Avenue
White Plains, NY 10601
Phone: (914) 272-3202
E-mail: wglew@entergy.com
E-mail: wdennis@entergy.com

Kathryn M. Sutton, Esq.
Paul M. Bessette, Esq.
Jonathan M. Rund, Esq.
MORGAN, LEWIS & BOCKIUS LLP
1111 Pennsylvania Avenue, N.W.
Washington, D.C. 20004
Phone: (202) 739-5738
E-mail: ksutton@morganlewis.com
E-mail: pbessette@morganlewis.com
E-mail: jrund@morganlewis.com

Counsel for Entergy Nuclear Operations, Inc.

Dated in Washington, D.C.
this 1st day of October 2013

---

237 Riverkeeper Motion at 21.

238 *USEC, Inc*. (Am. Centrifuge Plant), CLI-06-10, 63 NRC at 472.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	Docket Nos. 50-247-LR and 50-286-LR
ENTERGY NUCLEAR OPERATIONS, INC.	)	
(Indian Point Nuclear Generating Units 2 and 3)	)	
	)	October 1, 2013

MOTION CERTIFICATION

Counsel for Entergy certifies that he has made a sincere effort to make himself available to listen and respond to the moving party, and to resolve the factual and legal issues raised in the motion, and that his efforts to resolve the issues have been unsuccessful.

Executed in accord with 10 C.F.R. § 2.304(d)

Paul M. Bessette, Esq.
MORGAN, LEWIS & BOCKIUS LLP
1111 Pennsylvania Ave. NW
Washington, DC 20004
Phone: (202) 739-5796
Fax: (202) 739-3001
E-mail: pbessette@morganlewis.com

Counsel for Entergy Nuclear Operations, Inc.

Attachment 1

January 29, 2013 NMFS Memorandum

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
NORTHEAST REGION
55 Great Republic Drive
Gloucester, MA 01930-2276

JAN 29 2013

MEMORANDUM FOR: John K. Bullard
Regional Administrator

FROM: Mary A. Colligan
Assistant Regional Administrator for Protected Resources

SUBJECT: Biological Opinion to be Issued to the Nuclear Regulatory Commission (NRC) for the Continued Operation of Indian Point Unit 2 and Unit 3 -- **TRANSMITTAL MEMORANDUM**

The Protected Resources Division (PRD) has prepared a Biological Opinion (Opinion) pursuant to Section 7 of the Endangered Species Act (ESA) on the effects of the continued operation of Entergy's Indian Point Units 2 and 3 (IP2 and IP3) at the Indian Point Nuclear Generating Station in Buchanan, New York. The facilities are operated pursuant to two separate licenses issued by the NRC.

BACKGROUND INFORMATION

IP2 and IP3 are located on the eastern bank of the Hudson River in the Village of Buchanan in upper Westchester County, New York. Both IP2 and IP3 have a single nuclear reactor and have once-through cooling water intake systems that withdraw water from the Hudson River. IP2 operates pursuant to a license issued on September 28, 1973; it was set to expire on September 28, 2013. IP3 operates pursuant to a license issued on December 12, 1975; it was set to expire on December 12, 2015. NRC is proposing to issue extended operating licenses, which would authorize an additional 20 years of operation. NRC indicates that it received timely applications for renewing the licenses; therefore, the facilities may continue to operate under their existing license until action is taken on the proposed extended operating licenses.

We completed section 7 consultation with NRC on the effects of the proposed relicensing in 2011. As explained in the "Effects of the Action" section of the 2011 Opinion, we determined then that an average of 5 shortnose sturgeon per year are likely to be impinged at Unit 2 during the extended operating period, with a total of no more than 104 shortnose sturgeon over the 20 year period (dead or alive). Additionally, over the 20-year operating period, we estimated that an additional 6 shortnose sturgeon (dead or alive) were likely to be impinged at the Unit 1 intakes which will provide service water for the operation of Unit 2. We estimated that at Unit 3, an average of 3 shortnose sturgeon are likely to be impinged per year during the extended operating period, with a total of no more than 58 shortnose sturgeon (dead or alive) taken as a result of the operation of Unit 3 over the 20 year period. This level of take was exempted through an Incidental Take Statement (ITS) that applied only to the period when the facility operates under a

new operating license (September 28, 2013 through September 28, 2033 for Units 1 and 2; December 12, 2015 through December 12, 2035 for Unit 3). The 2011 Opinion was to become effective once new operating licenses were issued by NRC. The NRC has not yet made a decision on whether to issue the extended operating licenses.

Following the listing of five Distinct Population Segments (DPS) of Atlantic sturgeon in February 2012, NRC requested reinitiation of the 2011 Opinion. They requested that the new Opinion consider effects of operations during the remaining term of the existing licenses as well as the 20-year proposed extended operating period. Consultation was initiated on May 17, 2012. On July 23, 2012, Entergy submitted additional information to us and NRC regarding impingement of shortnose and Atlantic sturgeon (Entergy 2012). Subsequently, by mutual agreement of NRC and NMFS, we extended the consultation period by 60 days to allow time for review and incorporation of this new information, as appropriate. On a November 26, 2012, conference call, NRC requested the consultation period be extended by seven days to allow them to suggest revised language in the Incidental Take Statement. On December 5, 2012, NRC requested the consultation period be extended to January 9, 2013. Entergy agreed to that extension. One day before the new due date, however, Entergy indicated in a conference call that it wanted to submit additional comments on the draft ITS it received and commented on in October-November 2012. NMFS received those comments on January 9. To allow NMFS time to consider the additional comments, NRC and Entergy requested an extension until January 30, 2013, the new due date. Between January 9 and January 30, Entergy repeatedly sought to discuss the comments with us. However, we did not have any questions about them or otherwise see a need to discuss them further.

Draft Biological Opinion

We determined that the action being considered in this Opinion may affect endangered shortnose sturgeon (*Acipsenser brevirostrum*) and three DPSs of Atlantic sturgeon (New York Bight, Gulf of Maine and Chesapeake Bay). The proposed action has the potential to affect shortnose and Atlantic sturgeon in several ways: impingement of individual shortnose sturgeon at the intakes; altering the abundance or availability of potential prey items; and, altering the riverine environment through the discharge of effluent. The action being considered in the Opinion is actually two separate actions: (1) continued operation of IP2 under its existing license and under a proposed renewed license, and (2) operation of IP3 under its existing license and under a proposed renewed license. Given the two Units currently operate under separate licenses, NRC could consider renewing one and not the other. Additionally, the proposed extended operating periods are different (Unit 2's ends over two years before Unit 3's). Each Unit also has separate intake and discharge structures, as well as fish return systems, and each Unit could be operated differently than the other. We predicted the effects of each Unit separately, then combined the effects projections in the Effects of the Action section and for the jeopardy analysis so that the anticipated aggregate effects of the two Units operating at the same time are considered.

In the Opinion, we analyze the effects of the following: impingement and entrainment of shortnose and Atlantic sturgeon; impingement and entrainment of shortnose sturgeon prey; discharge of effluent, including heat; and effects of the discharge on shortnose and Atlantic sturgeon prey. We determined that entrainment of shortnose and Atlantic sturgeon was

extremely unlikely. We also determined that effects of the discharge of effluent, including heat, on shortnose and Atlantic sturgeon would be insignificant and discountable as would effects to shortnose and Atlantic sturgeon prey. We considered the potential exposure of shortnose and Atlantic sturgeon to radionuclides, which may be introduced into the action area from the operation of IP2 and IP3, and we determined that any effects to shortnose and Atlantic sturgeon from exposure to radionuclides would be insignificant and discountable, given available information.

Impingement of shortnose and Atlantic sturgeon has been documented at IP2 and IP3 in the past and is likely to continue over the current and extended operating periods. As explained in the "Effects of the Action" section of the Opinion, we anticipate the impingement of: 395 shortnose sturgeon (dead or alive) at the Unit 1[1] and 2 intake (screens, as well as 167 at the Unit 3 intake screens, and 269 New York Bight DPS Atlantic sturgeon (dead or alive) impinged at the Unit 1 and 2 intake screens, as well as 145 at the Unit 3 intake screens. These figures for Unit 1 and 2 intakes apply from now until September 28, 2033. The figures for Unit 3 intakes apply from now until December 12, 2035. This level of impingement associated with the operation of IP2 and IP3 equals a total of 562 shortnose sturgeon (dead or alive) at the Unit 1, 2, or 3 intake screens and, a total of 414 New York Bight DPS Atlantic sturgeon (dead or alive) impinged at Unit 1, 2 or 3 intake screens from now until the IP3 proposed renewed operating license would expire on December 12, 2035. Additionally, we expect that dead or stressed adult shortnose sturgeon and dead or stressed subadult and adult NYB, GOM and CB DPS Atlantic sturgeon will be impinged at the trash racks. There has been no past monitoring of impingement of any species at the trash racks. Therefore, there is no information from which to predict a future impingement estimate. However, we know sturgeon are present at the trash racks (also called "trash bars") and that they have become impinged on trash racks at least one other facility. We considered estimating impingement based on impingement of shortnose sturgeon at other power plants; however, there are no comparable facilities. We also do not have sufficient information to compute the number of adult dead or stressed fish that are likely to be in the area and affected by the intake currents. We considered the use of a surrogate measure of incidental take. However, because we do not have estimates of the number or percentage of dead or stressed sturgeon that would be in the area and susceptible to impingement on the trash racks, we are unable to identify a surrogate. Therefore, we are unable to predict the amount or extent of dead or stressed shortnose or Atlantic sturgeon impinged at IP1, IP2 or IP3 during the continued operation of IP2 and IP3.

As explained in the Opinion, the information available for us to determine the number of shortnose and Atlantic sturgeon likely to be impinged as a result of future operations is limited. During a hearing regarding Hudson River power plants in the 1970s, NOAA submitted the testimony of Dr. Mike Dadswell to the US EPA (in a filing dated May 14, 1979), as constituting NMFS "Biological Opinion on the impacts of the utilities' once through cooling system on the shortnose sturgeon." The filing notes that this opinion is required by Section 7 of the ESA of 1973, as amended. Based on available information regarding impingement at IP2 and IP3, Dadswell estimated a worst-case scenario of 35 shortnose sturgeon impingements per year,

[1] As explained in the Opinion, water withdrawn through the Unit 1 intakes is used for service water for the operation of Unit 2.

including 21 mortalities (assuming a 60% impingement mortality). In 1979, only Section 10 permit provisions, and not Section 7 consultation, provided the means to exempt incidental take from the Section 9 prohibition. As a result, the 1979 document did not contain an ITS or a monitoring plan. No additional ESA consultation occurred between NRC and NMFS on the operation of IP2 and IP3 and the effects on shortnose sturgeon until the 2011 Opinion was completed; incidental take associated with IP2 or IP3 had never been exempted before the 2011 Opinion and ITS were issued. The 2011 ITS applied only to operations under any renewed operating licenses, not to operations under the existing licenses.

Impingement monitoring, described fully in the Opinion, occurred at Indian Point from 1974-1990. No monitoring has taken place since 1990. From 1974-1990, 21 shortnose sturgeon were observed impinged at IP2. Condition, reported as either dead or alive, is also only available for 6 fish, with 5 of the 6 fish reported dead. However, no information on the condition of these fish (e.g., any injuries, level of decomposition, etc.) is available. For Unit 3, 11 impinged shortnose sturgeon were recorded between 1974 and 1990. Condition is available for 3 fish, with two of the three dead. Of the 601 Atlantic sturgeon collected during impingement sampling at IP2 and IP3 from 1974-1990, condition (alive or dead) is reported for 37 fish (NRC BA 2012); of these, 22 are reported as dead (59% mortality rate). There is no information to indicate whether alive meant alive and not injured, or alive and injured. There is also no additional information to assess whether these fish reported as dead were likely killed prior to impingement and drifted into the intake or whether being in the intake bays and/or impingement was the sole cause of death or a contributing cause of death.

We considered using impingement rates for other power plants (i.e., number of sturgeon impinged as a function of the amount of water withdrawn or similar measure); however, no such rates are available, and sturgeon population levels vary from river to river. NMFS also considered using impingement data from the Salem Nuclear Power Plant, located along the Delaware River in New Jersey, to predict impingement at Indian Point. However, impingement rates appeared to be much lower at the Salem facility than what the historic information suggests for Indian Point. Also, the Salem plant is located near the downstream extent of shortnose sturgeon habitat in the Delaware River and the area may not be frequented by shortnose sturgeon as often as the areas near Indian Point are used. As such, NMFS does not consider the data available from the Salem facility to be an appropriate surrogate for the Indian Point facilities, despite there being a current monitoring plan in place at Salem to document takes of shortnose sturgeon. Salem did not begin reporting impingements of Atlantic sturgeon until the species was proposed for listing in 2011. We also considered using information on impingement rates for other species at Indian Point to assess whether any of those species could be an appropriate surrogate for predicting take at Indian Point; however, since all monitoring ceased in 1990 (not just monitoring for shortnose and Atlantic sturgeon), none of the data for other species would provide NMFS with better information than what was available for shortnose and Atlantic sturgeon.

As there were no other reasonable sources of information on impingement rates for shortnose and Atlantic sturgeon, or any other surrogate species, that could be used to predict impingement at Indian Point, we relied on the monitoring data from 1974-1990 to predict impingement during the extended operating period. While this is the best available information on impingements of

shortnose and Atlantic sturgeon at IP, there have been significant changes in the distribution and abundance of shortnose and Atlantic sturgeon in the Hudson River since the time monitoring ceased, and there have been changes in the intakes. No monitoring has taken place since the modified Ristroph screens were installed. We believe that if a robust monitoring plan had been in place, we would have had a more robust dataset on which to base our predictions of future impingement rates. The monitoring program required by the RPMs seeks to improve monitoring and information collection at Indian Point so that we are able to check the assumptions and conclusions made in the analysis, as well as know when the authorized incidental take level has been exceeded.

The Opinion concludes that the proposed action is likely to adversely affect but is not likely to jeopardize the continued existence of shortnose sturgeon and the New York Bight DPS of Atlantic sturgeon; and is not likely to adversely affect the Gulf of Maine and Chesapeake Bay DPSs of Atlantic sturgeon. Because no critical habitat is designated in the action area, none will be affected by the proposed action. An ITS is included with the Opinion. The ITS exempts the take of a number of shortnose sturgeon and New York Bight DPS Atlantic sturgeon by both capture and mortality. The incidental take levels exempted are separate for IP2 and IP3 because the operation of each facility is a separate action given they operate under separate licenses for different timeframes, and NRC may renew one license and not the other. The ITS includes five Reasonable and Prudent Measures (RPMs) and eight implementing Terms and Conditions that apply to the operation of both IP2 (including the IP1 intakes servicing IP2) and IP3 (see below).

DIFFERENCES IN 2013 OPINION AND 2011 OPINION

There are four major differences in the 2011 and 2013 Opinions: the action under consideration, the species under consideration, and the estimates of incidental take.

The 2011 Opinion only considered effects to shortnose sturgeon during the proposed extended operating period; therefore, it only considered 20 years of operations of IP2 and IP3. The 2012 Opinion considers that time period as well as the time remaining before NRC issues new operating licenses. As a result, the 2013 Opinion considers a longer time period.

The 2011 Opinion did not consider effects to Atlantic sturgeon because they were not listed at the time the consultation was initiated or the Opinion was completed. The 2013 Opinion considers effects to the three DPSs that are likely to occur in the action area.

The take estimate for shortnose sturgeon is higher in the 2013 Opinion than in the 2011 Opinion. This is partly because of the longer time period considered but also due to the use of a different method for calculating take. This change is explained in the "Effects of the Action" section of the Opinion and summarized here.

In the 2011 Opinion, we estimated that over the 20-year extended operating period, 168 shortnose sturgeon would be impinged at IP1, IP2 and IP3, collectively. We calculated this estimate by first determining the average annual impingement rate at IP2 from 1974-1990 and the average annual impingement rate at IP3 from 1976-1990, which we stated was 1.3 and 0.73, respectively. To account for the 400% increase in the shortnose sturgeon population between the late 1970s and the late 1990s, we adjusted those annual impingement rates by a factor of 4 to

arrive at estimates of 5.2 and 2.9 shortnose sturgeon per year, respectively. We then multiplied those annual estimates by the number of years each unit would be operational (20) to get a total estimate for IP2 of 104 and a total estimate for IP3 of 58. Because no monitoring has occurred at IP1, we used flow information to estimate the number of sturgeon that would be impinged at IP1. We then used the flow information (IP1 withdraws 0.34% of the volume of water withdrawn by IP2 and IP3), to estimate the amount of impingement at IP1. In 2011, we estimated the impingement of six additional shortnose sturgeon at IP1. However, it appears that we made a mathematical error (multiplying 162 by 0.034 instead of 0.0034) and that number should have been one, not six.

In reviewing the methodology used in 2011, we now recognize two ways that this resulted in an underestimate of future impingement. First, we relied on the actual observed number of impingements of shortnose sturgeon, not the estimated number of impingements based on collection efficiency. Collection efficiency (CE) takes into account the fraction of fish that enter the intake structure but do not make it into impingement collections. According to NRC, currents may sweep some fish around the traveling screens because screens do not form a perfectly water tight seal against the intake structure. NRC has stated that the CE adjusted estimates should be more accurate. We also have new information on the volume of water Entergy is likely to withdraw through the IP2 and IP3 intakes in the future (Entergy 2012). The information provided by Entergy indicates that water withdrawal will range from 1.2-1.6 mgd depending on the month. They report water usage from 1974-1990 as ranging from 0.6-1.2 mgd depending on the month. We expect a relationship between water usage and impingement; the more water that is withdrawn the higher the risk for impingement. Therefore, by not adjusting the historic impingement numbers to account for current and future increases in water use, our 2011 estimate likely underestimates future impingement of shortnose sturgeon. We believe the methodology described above, which avoids that underestimation, and results in a total estimate of 562 shortnose sturgeon impinged at Indian Point is a better approach. The methodology used for Atlantic sturgeon is similar.

Additionally, we now recognize that the methodology used in the 2011 Opinion and in the October 26, 2012, draft Opinion transmitted to NRC and Entergy did not account for sturgeon impinged at the trash bars; it only estimated the number of sturgeon impinged at the intake screens. As explained in the Effects of the Action section of the final Opinion, and in this memorandum, we are unable to estimate the number of shortnose or Atlantic sturgeon likely to be impinged at the IP1, IP2 or IP3 trash bars. However, based on what we know about the size of sturgeon that could be impinged (body widths greater than 3 inches, which corresponds to the reported distance between bars) and the intake velocity (1.0 fps or less) outside of the trash bars, we expect that all sturgeon impinged at the trash bars will be dead or stressed, with the cause of death/stressor currently unknown.

After the draft Opinion was transmitted to NRC, we determined that we had made a mathematical error when calculating the number of Atlantic sturgeon likely to be impinged at the intake screens. This error (using an average of 6 Atlantic sturgeon impinged at the screens from 1985-1990 instead of 12) accounts for the difference in the number of Atlantic sturgeon expected

to be impinged in the draft and final Opinions. This error did not change the no jeopardy conclusions reached in the Opinion.

Finally, in this Opinion, we identified an incidental take level for each Unit separately. This approach is different from that taken in the previous Opinion. In that Opinion, we exempted the combined take at the two Units, which could have been interpreted to mean that one Unit could take sturgeon up to the total combined level if the other Unit did not cause any takes. That is not how we believe the ITS should work given the Opinion batches two separate actions given that: the two Units currently operate under separate licenses; NRC could consider renewing one license and not the other; the proposed extended operating periods are different (Unit 2's ends over two years before Unit 3's); each Unit has separate intake and discharge structures, as well as fish return systems; each Unit has had different levels of effects than the other; and each Unit could be operated differently than the other. We predicted the effects of each Unit separately, then combined the effects projections in the Effects of the Action Section and for the jeopardy analysis so that the anticipated aggregate effects of the two Units operating at the same time are considered. Providing separate incidental take levels associated with each Unit rather than providing one combined level for both Units also better supports the reinitiation provision.

JUSTIFICATION FOR PROPOSED REASONABLE AND PRUDENT MEASURES

An ITS serves two important functions: (1) it provides an exemption from the Section 9 prohibitions for any taking incidental to the proposed action that is in compliance with the terms and conditions; and (2) it provides the means to insure the action as it is carried out is not jeopardizing the continued existence of affected species by monitoring and reporting the progress of the action and its impact on the species such that the analysis and conclusions in the Opinion can be verified and consultation can be reinitiated if any of the criteria in 50 CFR §402.16 are met.

The Reasonable and Prudent Measures (RPMs), with their implementing Terms and Conditions, are designed to minimize and monitor the impact of incidental take that results from the proposed action. Specifically, these RPMs and Terms and Conditions will ensure that Entergy monitors the intakes in a way that allows for the detection of all impinged shortnose and Atlantic sturgeon and implements measures to reduce the potential of mortality for all shortnose and Atlantic sturgeon impinged at Indian Point, to report all interactions to NMFS and NRC and to provide information on the likely cause of death of any shortnose and Atlantic sturgeon impinged at the facilities. The discussion below explains why each of these RPMs and Terms and Conditions are necessary or appropriate to minimize or monitor the level of incidental take associated with the proposed action. The RPMs and Terms and Conditions involve only a minor change to the proposed actions, the continued operation of IP2 and/or IP3.

RPM #1 and Term and Condition #1 and 2 require Entergy to design and implement a monitoring plan that will allow for the detection and collection of all shortnose and Atlantic sturgeon at the Indian Point intakes, whether impinged at the trash bars, impinged on the intake screen system (which includes collection in the fish buckets), or in the intake embayment behind the trash bars prior to impingement on the intake screen system. Removing sturgeon from the intake embayment before they interact with the screen system minimizes incidental take caused

by impingement on the screens. An effective monitoring plan is essential to ensure NRC and Entergy monitor the level of incidental take that occurs during the license periods and to enable NMFS and NRC to determine whether the incidental take level in this ITS is exceeded, thereby triggering reinitiation of consultation. These requirements are necessary and appropriate because they are specifically designed to ensure that all appropriate measures are carried out to monitor the incidental take of sturgeon at Indian Point, which by definition includes the capture or collection of live sturgeon as well as the injury or mortality of impinged sturgeon. These requirements are also essential for confirming the cause of death of any sturgeon that are dead when collected These conditions ensure that the potential for detection of shortnose and Atlantic sturgeon at the intakes is maximized and that any sturgeon removed from the water are removed in a manner that minimizes the potential for further injury. Monitoring actual collection efficiency is necessary or appropriate to determine how many sturgeon enter the intake structure but do not make it into impingement collections. We do not believe that the handling of impinged sturgeon will result in an increased risk of injury or mortality if proper handling procedures are implemented, which the monitoring plan will include. For example, both shortnose and Atlantic sturgeon are routinely captured in a trawl survey in the Hudson River that the applicant participates in. Captured sturgeon are brought into the boat, removed from the trawl gear, weighed, measured and tagged. There have been no reported instances of injury or mortality to any of the hundreds of Atlantic or shortnose sturgeon captured during this survey in over twenty years. Similarly, sturgeon that enter the fish lift at the Holyoke Hydroelectric facility on the Connecticut River are netted, removed from the water, weighed, measured and tagged. There have been no reports of any injuries or mortalities to sturgeon caused by these handling procedures. The RPMs and Terms and Conditions related to monitoring do not dictate the details of the plan (i.e., how Entergy must monitor the trash racks or intake screens) to allow Entergy the flexibility to design the monitoring plan in a way that minimizes impacts to project operations and results in no more than a minor change to the operations of Indian Point 2 and 3. While we believe the enumerated, specific components are sufficient to monitor incidental take, review of Entergy's draft monitoring plan and/or other information may lead NMFS to believe that additional or different monitoring plan components may be necessary or appropriate. Therefore, NMFS may design or have Entergy propose, additional or different monitoring components that NMFS determines are necessary or appropriate to monitor incidental take.

RPM#2 and Term and Condition #3 are necessary and appropriate to ensure that any shortnose or Atlantic sturgeon that survive impingement is given the maximum probability of remaining alive and not suffering additional injury or subsequent mortality through inappropriate handling or release near the intakes. This RPM and Term and Condition serve to minimize lethal take.

RPM #3 and Term and Condition #4 are necessary and appropriate to ensure the proper handling and documentation of any shortnose and Atlantic sturgeon removed from the intakes that are dead or die while in Entergy possession. This is essential for monitoring the level of incidental take associated with the proposed action, confirming cause of death and ensuring proper disposal.

RPM #4 and Term and Condition #5 are necessary and appropriate to ensure the proper documentation of species and/or DPS of origin for any impinged sturgeon collected at Indian

Point. Sampling of fin tissue is used for genetic sampling. This procedure does not harm shortnose or Atlantic sturgeon and is common practice in fisheries science. Tissue sampling does not appear to impair the sturgeon's ability to swim and is not thought to have any long-term adverse impact. NMFS has received no reports of injury or mortality to any shortnose or Atlantic sturgeon sampled in this way.

RPM#5 and Term and Condition #6-8 are necessary and appropriate to ensure the proper handling and documentation of any interactions with listed species as well as the prompt reporting of these interactions to NMFS. This is necessary to allow NMFS to monitor the level of take and to determine if take is exceeded or if any other triggers for reinitiation have been met. This RPM and Term and Condition also ensure that NMFS, NRC and Entergy will continue to monitor the effectiveness of the monitoring program and make any changes that may be necessary to the monitoring program in the future.

COMMENTS RECEIVED

We transmitted a draft Opinion to NRC on October 26, 2012. The Opinion was subsequently transmitted by NRC to Entergy. In response to a Freedom of Information Act (FOIA) request for the draft, NMFS then made it available to the Hudson Riverkeeper. The ESA Section 7 regulations provide for the action agency and applicant to submit comments on a draft Opinion. We received comments from NRC and Entergy on November 9 (Enclosure 1 and 2). NRC and Entergy raised additional comments related to the ITS on a January 8, 2013 conference call. Entergy submitted suggested changes to the Terms and Conditions on January 9, 2013. We have considered those comments in the development of the final Opinion. Riverkeeper transmitted their comments to us in a letter dated November 23, 2012 (Enclosure 3). While neither the ESA nor the Section 7 regulations, or any other law, requires NMFS to consider Riverkeeper's comments, we chose to consider them.

Comments Received from NRC

NRC noted several typographical errors or minor editorial suggestions; these have been addressed as appropriate. (NRC comments 1, 2, 4, 5, 6, 7, 10, 11, 14, and 15)

NRC states that the date of initiation of the consultation that resulted in the 2011 Opinion is in error. While we recognize that they sent the original Biological Assessment to us on December 22, 2008, we did not receive the final BA until December 10, 2010 and consider formal consultation to have been initiated on that date.

NRC states that the operating license does not require compliance with the SPDES permit and that we must remove this statement from the Opinion wherever it occurs. We have modified the text of the Opinion to remove this statement and to clarify that we consider the intake and discharge of water to be effects of the proposed action (i.e., the continued operation of IP2 and IP3). As currently configured, IP2 and IP3 cannot operate without withdrawing water from and discharging water to the Hudson River. Therefore, the withdrawal and discharge of water is an effect of the proposed action.

NRC states that if a new SPDES permit is issued, EPA would be the agency responsible for initiating consultation. However, the NPDES permit program was delegated to New York Department of Environmental Conservation (NYDEC) in 1975. The issuance of a new SPDES permit for either or both IP facilities by NYDEC would not be considered a federal action, and EPA would not necessarily be involved in a way that federalizes the state's action such that consultation with EPA would be required. Reinitiation of consultation would be necessary if compliance with the SPDES permit and/or §401 certification resulted in changes in the withdrawal or discharge of water (or any change in the proposed actions) that caused effects to listed species not considered in the Opinion. NRC stated in their September 20, 2011, letter to us regarding Indian Point, that "the NRC retains legal authority to enforce the license requirements or to take such other actions as it may deem to be appropriate. Thus, should any of the criteria for the reinitiation of consultation occur, the staff would reinitiate consultation, as it has done for other nuclear facilities in the past." The September 20 letter also states, "the staff retains the authority to reinitiate consultation should a change to the SPDES permit meet the criteria for ESA Section 7 reinitiation." Therefore, despite the comments on the draft Opinion, we expect that if a new SPDES permit and/or §401 certification is issued and one of the criteria for reinitiation is met, NRC would reinitiate consultation.

NRC requests that we clarify two seemingly conflicting statements, one that says "all impinged sturgeon are expected to die…" and another that states that some sturgeon will be impinged and returned to the river "without significant injury or mortality." We agree that this text is unclear and appears contradictory. The text in the Opinion has been clarified to explain that while we expect sturgeon impinged at the intake screens to fall into several categories (e.g., alive, alive but injured, , previously killed, died due to impingement), we do not have sufficient information to estimate how many impinged sturgeon will fall into each category. Due to a lack of data we are assuming the worst case, that all impinged sturgeon will be killed. We recognize the possibility that this assumption is overly conservative and that because the modified Ristroph screens at IP2 and IP3 are designed to minimize mortality of impinged fish, some of the impinged sturgeon may survive and be returned to the River. However, we are assuming a worst case scenario, because we do not have data on sturgeon survival rates on modified Ristroph screens, and no monitoring to develop such important information has ever been required or, apparently, conducted. While some have argued that, generally speaking, sturgeon are "more hardy" than other species of fish and, thus, less susceptible to injury at the screens, there have never been any studies on sturgeon survival at Ristroph screens or any other screening which would demonstrate whether sturgeon do have higher survival rates than other species (which is what we interpret "more hardy" to mean). The species studied in the impingement studies reported in Fletcher (1990) are not morphologically similar to sturgeon (i.e., none have scutes or other similar characteristics to sturgeon) and were considerably smaller than the size of sturgeon that may be impinged at the Ristroph screens. Therefore, it is not reasonable to rely on information collected on other species to predict mortality rates for sturgeon. The only impingement mortality information we have is from prior to installation of the Ristroph screens and even that is limited (see above, 80% mortality for shortnose sturgeon and 59% for Atlantic sturgeon) and may underestimate mortality because the reports merely indicate if the fish were alive or dead. We assume that "alive" meant alive and healthy with no apparent injuries as well as alive with injuries, or alive but dying.

NRC requests that we remove or change the sentence that states, "[w]ithin 60 days of issuance of this Opinion, NRC must add a condition(s) to the existing licenses and to the proposed renewed licenses that requires Entergy to adhere to the terms and conditions of this Opinion." We discussed this comment with NRC staff and an attorney from their General Counsel's Office. The objection was based on two factors: first, there was concern the 60 day timeline could be too short to allow processing of a license amendment; and second, there was concern that the specification of a particular process to make the terms and conditions binding on Entergy unreasonably usurped NRC discretion regarding how to make the terms and conditions binding. NRC staff explained that NRC has more than one way to ensure through enforceable terms of the existing license that Entergy will comply with the ITS. While NMFS continues to take the position that, in order for NRC to benefit from the ITS's exemption from the Section 9 prohibitions, NRC must take prompt and effective action that is enforceable by NRC and binds Entergy to the ITS's terms and conditions, we revised the text so that it did not specify a 60-day timeframe or only one particular method of modifying the existing licenses under which Entergy currently operates the facilities. We consider the resulting language includes, but is not limited to, issuance of a license amendment to the existing licenses.

Comments Received from Entergy in their November 9, 2012 letter

Entergy organized their comments along four topics. In the draft sent to NRC, we asked several questions in the margins. Entergy answered these questions in their November 9, 2012 letter. We have incorporated the answers to those questions into the final Opinion as appropriate. Entergy also commented on the estimates of incidental take, provided clarifications/corrections on various sections of the Opinion, and commented on the proposed monitoring program.

Incidental Take

Entergy raises no objections to our calculated incidental take level. However, Entergy states that "the incidental take limits should apply only to injury or mortality caused by the operation of IP2 and IP3" and the "take limits should apply only to the impingement of healthy, live fish." Entergy also seems to claim that, because the Ristroph screens are designed to minimize impingement mortality, that the impingement of live, healthy sturgeon and subsequent transport back to the river, without injury or mortality, should not be considered as "take." Entergy raised similar comments on the draft of the 2010 Opinion. Language was added to the final 2010 Opinion and retained in this draft to explain that the prohibitions on take apply not only to injury or mortality but also to capture and collect, among other things (see definition of "take" in ESA Section 3). All sturgeon that are impinged at the Indian Point intakes and/or transported back to the river through the Ristroph screen system meet the definition of "take" in ESA Section 9. At a minimum the type of take is capture or collection; injury and mortality are also other types of take that are anticipated to occur. All of this take is incidental to the operations of IP2 and IP3 under separate licenses and their proposed renewals, which are the federal actions under consultation. That is, sturgeon would not be impinged at the trash racks or the intake screens or captured in the fish buckets and travel through the fish return if Indian Point were not operating. We recognize in the Opinion and in the ITS that some of these fish are likely to be alive and uninjured, some will be dead, and some will be alive but injured. However, as noted above, all

of these fish are taken incidentally to the operations of Indian Point. Thus, all of this take must be included in the ITS.

As noted in Entergy's comments and in our draft (and final) Opinion, it is also possible that some fish that are impinged suffer from previous illness, injury or other stress that may make them more susceptible to impingement; however, it is impossible from the information that we have available on past impingements to make any assessment of this. Further, even in this instance, the collection or capture, and further injury or mortality of any individual impinged, even if previously ill or injured, would have been caused by the facility (that is, regardless of the fish's health, its impingement was caused by the operations of Indian Point 2 or 3 and the existence of the trash bars or intake screens). Therefore, it would be appropriate to consider the impingement of such a fish a "take." Entergy states that sturgeon that are impinged at the modified Ristroph screens and travel through the sluice and are returned back to the river should not count towards the ITS; however, as these fish would be "collected," take would have occurred and the effect of that collection must be considered in the Opinion and exempted by the ITS subject to compliance with RPMs and Terms and Conditions. Thus, it is appropriate that the ITS identify and enumerate all sturgeon that are expected to interact with the intakes. In the final Opinion we have clarified that the ITS exempts take as capture/collect as well as injury and/or mortality. We have refined the text in the Effects of the Action section of the Opinion and the ITS to better distinguish between the types of take expected to result from operation of the facilities (i.e., capture, collect, injure, kill).

If we had more information, we could distinguish between sturgeon that are expected to be impinged post-mortem and fish whose death is a result of impingement at the facilities, and we could therefore divide the total take estimate into the number of fish captured and returned alive to the river, the number captured alive but injured due to impingement, the number impinged that were dead and just "collected" at IP2 or IP3, etc. However, as explained in the Opinion, because Entergy stopped monitoring for impingement in 1990 and the information on the condition of impinged sturgeon was not recorded consistently or completely, we are unable to further refine our estimate of take.

Entergy states that we "appear to agree" with Entergy that sturgeon impinged at the trash bars were dead or dying due to causes other than operation of Indian Point before encountering the trash bars. That is not quite the case. We agree that, given the reported 3-inch spacing of the trash bars, the only sturgeon that we would expect to be impinged at the trash bars are subadults or adults. As explained in the Opinion, given the low intake velocity (1.0 fps or less), it is extremely unlikely that any healthy subadult or adult shortnose or Atlantic sturgeon would be impinged at the trash bars. Entergy states that because of this, the "impingement of sturgeon at the trash bars would not be the result of Indian Point operations." While we agree that these sturgeon would most likely not be impinged if they weren't already dead or stressed in a way that reduces their swimming ability, they would not be impinged at all if the trash bars did not exist and the intakes did not take in water, which they only do for the purposes of the operation of IP2 and IP3, the federal actions under consideration in this Opinion. In the draft Opinion, we used the phrase "dead or dying;" however, after considering Entergy's comments, we realized that using the word "dying" is confusing and inaccurate given the only way one would know

whether a fish is "dying" is if it ultimately died. Plus, a fish's swimming ability can be impaired by a condition that does not necessarily lead to death. It is possible the fish could be stressed, which we use to mean in compromised condition due to any number of factors such as disease, injury, heat shock, pollution, etc. For these reasons, we substituted the phrase "dead or stressed" for the phrase "dead or dying."

If NMFS concludes that the taking of an endangered or threatened species incidental to the agency action will not violate Section 7(a)(2) (i.e., it is not likely to jeopardize the continued existence of the species), then the statute requires NMFS to provide the Federal agency and the applicant with a written statement that specifies the impact of such incidental taking on the species, reasonable and prudent measures to minimize such impact, and terms and conditions (including, but not limited to, reporting requirements) to implement them. (ESA §7(b)(4)). The Section 7 consultation regulations define "incidental take" as a "takings that result from, but are not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or applicant." (50 CFR §402.02). "Take" means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, to attempt to engage in any such conduct." (ESA §3(19)). The definition of "species" refers to "fish and wildlife," which means "any member of the animal kingdom, including without limitation any … fish … and includes any part … or dead body or parts thereof." (ESA Section 3(16), (8)). We consider impingement of previously killed or stressed fish to be "capture" or "collect" in the definition of "take." The impingement, regardless of the condition of the fish, is incidental to the operation of IP2 and IP3. If impingement on the trash bars causes a previously injured fish to die, then the death would be attributed to the operation of the relevant facility. As noted above, if we had the information to refine the take estimate to account for sturgeon that were dead or stressed due to Indian Point versus causes other than Indian Point prior to impingement, we would have refined the take estimate in that way. However, we do not have the information to parse out cause(s) of death or injury, or when death or injury occurred. Entergy suggests that the collections of dead or dying sturgeon at the IP trash bars should not count toward Indian Point's incidental take limits and should be exempt from the "provisions of Sections 9 and 10 of the ESA." Entergy did not explain why it believes the prohibitions of Section 9 do not apply to fish that are at least captured or collected at the facilities due to the intake of cooling water without which the facilities cannot operate. Nor did it explain why Section 10 is relevant. Impingement of any shortnose sturgeon, live or dead, at the trash racks is take that is incidental to the operations of Indian Point. Therefore, following Section 7(b)(4), it is necessary to include this take in the ITS and to require RPMs and terms and conditions associated with this take. By doing so, this take will be exempted from the prohibitions of Section 9, as long as the ITS is complied with. If the take is exempted through Section 7, Entergy need not obtain a Section 10 permit authorizing incidental take.

Entergy's comments do note that the take estimates we generated in the October 2012 draft Opinion are based solely on the impingement of sturgeon at the Ristroph screens, not the trash bars. We have refined the discussion in the Effects of the Action and ITS to explain that while we anticipate impingement at the IP1, IP2 and IP3 trash bars, we are unable to estimate the number of subadult or adult sturgeon likely to be impinged at the trash bars but that this impingement (and take) is in addition to the impingement estimated at the Ristroph screens.

Entergy comments that in a draft Biological Opinion issued by NMFS' Office of Protected Resources regarding authorization of research activities by the NYDEC, NMFS discusses the capture of 2,340 shortnose sturgeon and the "unintentional" mortality of nine shortnose sturgeon. However, this situation is very different. In that example, the action under consideration was the carrying out of a scientific research program targeting the capture of shortnose sturgeon. The take would be authorized under Section 10 of the ESA, not section 7. The mortality of shortnose sturgeon in certain research gear is not planned (unlike the capture of early life stages which are known to be lethal), but is anticipated at a low level. Therefore, NMFS characterizes that unplanned mortality as "unintentional" to differentiate it from mortality that is planned (lethal sampling). In the case of this Opinion, all of the take of shortnose and Atlantic sturgeon is considered to be "incidental." Incidental take is by definition take "that results from, but is not the purpose of carrying out an otherwise lawful activity..." Thus, in the case of the research permit, the exemption provided is not for incidental take, but for directed take. In the case of Indian Point, all of the take of shortnose and Atlantic sturgeon is incidental.

Entergy states that any healthy sturgeon impinged at the Ristroph screens has a very high likelihood of returning to the river unharmed and the return of an uninjured sturgeon to the river should not count toward the incidental take limit and should be exempt from the provisions of Sections 9 and 10 of the ESA. As with the response to their argument above regarding dead or dying fish, Section 9 of the ESA prohibits the take of listed species. Section 7 of the ESA exempt the action agency and applicant from this prohibition if they are in compliance with the terms and conditions of an Incidental Take Statement issued with a Biological Opinion. Section 10 of the ESA allows actions that would otherwise be prohibited by Section 9 for purposes of scientific research, enhancement, or incidental take. Section 10 is not relevant to this consultation, given the consultation results in an ITS that exempts the take from the prohibitions of Section 9—a Section 10 permit is not necessary as long as terms and conditions are complied with. As discussed above, impingement at the intakes, regardless if it is at the trash bars or the Ristroph screens, is take that is incidental to the continued operation of IP2 and IP3. The definition of take is not limited to injury and mortality, therefore, impingement and return or even live, uninjured sturgeon is considered incidental take and must be included in the ITS. Because the definition of take in Section 9 of the ESA includes "capture" and "collect" and is not limited to death or injury, the take of live fish is considered incidental take. Therefore it is necessary to include this take in the ITS and to require terms and conditions associated with this take. Our ability to refine the ITS to estimate the number of impinged sturgeon that are likely to be dead, dying, injured or live and healthy is hindered by the lack of monitoring that has occurred since 1990 when the modified Ristroph screens were installed. While we agree that information available on other species indicates that survival through the modified Ristroph screen system can be high, we have no monitoring of sturgeon impingement at Indian Point to rely on to support that determination or to indicate that sturgeon are "as hardy" as other species of fish that are impinged and sent down the 12-inch diameter fish return system. Therefore, we have taken the conservative position that all Atlantic and shortnose sturgeon impinged at the modified Ristroph screens may die as a result of interactions with the Indian Point facility. As explained above, we have modified the statement that "all impinged sturgeon are expected to die..." to "we assume that all impinged sturgeon will die...".

We do not have any further information on the dead fish that would allow us to assess whether any of these individuals were dead prior to when they were impinged. Without this information, we have made the conservative assumption that all of these fish died as a result of impingement at the intakes. In the Opinion, NMFS has estimated that up to 100% of impinged shortnose and Atlantic sturgeon will die. We have condition information for 9 shortnose sturgeon impinged at IP (7 dead) and 37 Atlantic sturgeon (22 dead). This information indicates a mortality rate of approximately 78% for shortnose sturgeon and 59% for Atlantic sturgeon, this could be an underestimate if the fish noted as "alive" were actually alive but suffering injuries. Therefore, we believe that, while conservative, it is reasonable to estimate that up to 100% of impinged shortnose and Atlantic sturgeon will die.

Entergy seems to suggest that, because the intake screens are "state-of-the-art," and EPA has in several cases determined that modified Ristroph screens are the best technology available for minimizing adverse environmental impacts for purposes of the Clean Water Act, NMFS is not justified in presuming that impingement at the Ristroph screens causes injury and mortality. There are a number of reasons why NMFS is justified. First, EPA's best technology available determination allows consideration of other factors in addition to biological impacts such that "best technology available" may reflect a cost-effectiveness judgment that does not necessarily mean that there are no biological impacts or that there is no "take" as defined under the ESA. Further, Entergy states that the systems "minimize impingement mortality," but that does not mean that they eliminate injury or eliminate mortality. In fact, the tests that were completed at Indian Point show a significant amount of injury and mortality of studied fish still occurs when the screens are used (see Fletcher 1990; mortality rates ranged from 9-62% (striped bass, weakfish, and hogchoker, and highest for alewife, white catfish, and American shad)). It is important to note that these studies did not involve shortnose or Atlantic sturgeon or any species that is morphologically similar to sturgeon.). Since impingement monitoring stopped following the installation of the modified Ristroph screens in 1990, there has never been any information collected to verify that the screens at Indian Point actually achieve the results obtained during testing conducted in the late 1980s. Further, that testing did not involve shortnose or Atlantic sturgeon, occurred at only one intake bay and occurred at only one time of year (August-October) of one year (1986). Similarly, those tests were not repeated once modified Ristroph screens were installed at all intake bays or over a range of operating conditions or times of year to confirm their accuracy. The monitoring information that has been provided to us recorded 78% of shortnose sturgeon impinged on the Ristroph screens as dead and 59% of the Atlantic sturgeon impinged on the Ristroph screens as dead. However, because we were provided only with a determination of whether a subset of impinged sturgeon were dead or alive, with no additional information, we are unable to determine if the fish recorded as "alive" were suffering from any injuries caused by impingement that would lead to their eventual death; if this were the case, it would mean that the 78% and 59% mortality rates were underestimates of mortality. Based on all of the information available to us, it is not reasonable to expect that injury or mortality will not occur upon impingement on the Ristroph screens.

Additionally, it is important to note that at different times in its operational history, the NRC (known as the Atomic Energy Commission (AEC) at the time), the EPA and the NYDEC have

determined that cooling towers, not modified Ristroph screens, were the best technology available for reducing impingement and entrainment at Indian Point. The license for IP2 was amended by the NRC in 1975, and the license for IP3 was amended by the NRC in 1976 to include requirements for the installation and operation of wet closed-cycle cooling systems at the facilities. In 1975, the EPA issued separate NPDES permits for Units 2 and 3 that required both facilities to discontinue discharging heated effluent from the main condensers. The NPDES permits provided that "heat may be discharged in blowdown from a re-circulated cooling water system." The intent of these conditions was to require the facilities to install closed-cycle cooling systems in order to reduce the thermal and other adverse environmental impacts from the operation of Indian Point's CWISs upon aquatic organisms in the Hudson River. However, pursuant to the terms of a settlement agreement, Indian Point was allowed to continue to operate with a once-through cooling system. As recently as 2003, NYDEC staff determined that a closed cycle cooling system is the site-specific best technology available to minimize the adverse environmental impact of the cooling water intake structures with respect to entrainment and impingement. Regardless, whether the modified Ristroph screens are the best technology available for minimizing impacts of impingement and entrainment at Indian Point is not relevant to estimating the number of Atlantic and shortnose sturgeon likely to be killed as a result of the continued operation of Indian Point.

We believe that the monitoring program to be implemented per the RPMs of this Opinion is tied to anticipated take and will help NMFS, NRC and Entergy to better assess in the future the injury and mortality rates of impinged fish and the percentage of impinged fish that were dead prior to exposure to the impacts of the facility's operations. It is important to note that the collection of a previously killed fish or parts thereof is still a "take" under the ESA and thus, it is necessary to include such take in the ITS. Additionally, the capture or collection of live fish and subsequent return to the river would be a take under the ESA, even if the fish were returned to the river unharmed, and it is also necessary to include such take in the ITS. Because NMFS is not able to further refine the take estimate to parse out those fish that were either: (a) alive when impinged but died as a result of their impingement; (b) alive when impinged but suffered injury as a result of their impingement but did not die; (c) alive when impinged and suffered no injury and were released back into the river unharmed; or, (d) dead when impinged at the intakes, the number of shortnose sturgeon exempted in the ITS is inclusive of all these categories.

General Comments

Entergy states that much of Section 4 of the Opinion (Status of the Species) is irrelevant. Entergy specifically states that section 4.1 (Status of Shortnose Sturgeon) should be modified to eliminate text about shortnose sturgeon not in the Hudson River. However, as described in the Section 7 handbook, the Status of the Species section must include information on species' life history, population dynamics, status and distribution and an analysis of the species likely to be affected by the proposed action. While there are nineteen populations of shortnose sturgeon that show little evidence of interbreeding, the species is listed throughout its range. Therefore, a discussion of the species as a whole, not just the Hudson River population, is necessary and appropriate. Entergy also requests that we eliminate discussions about general life history of Atlantic sturgeon, the Gulf of Maine DPS and the Chesapeake Bay DPS; however, to do so would be inappropriate. As established above, information on population dynamics, life history

and status and distribution is essential for the Biological Opinion. While we determine in the Opinion that only NYB DPS origin Atlantic sturgeon are likely to be impinged, because Gulf of Maine DPS and Chesapeake Bay DPS origin Atlantic sturgeon are likely to be present in the action area, these individuals may be exposed to other effects of the project operation. Thus, we must include background information on all three DPSs in the Opinion.

Entergy provided a table highlighting typographical corrections. These have been addressed in the final Opinion as appropriate.

Entergy provides a correction to the description of the fish return system to clarify that fish contained in the water-filled buckets are washed onto a fiberglass sluice and not a "mesh". This is corrected in the final Opinion.

Entergy suggests that the description of permittees for ESA Section 10(a)(1)(A) is inaccurate. The draft Opinion correctly states that permit #1580 was issued to Dynegy in 2007 on behalf of other generators including Entergy and Marine Bowline. The draft Opinion also correctly states that this permit was recently reissued to Entergy as Permit #17095. There are no modifications to the language necessary, although we will clarify that the permit was originally issued in 2001 (the draft lists the original permit number but not the date).

Monitoring and Reporting

Entergy requests that they have 60 days for developing a monitoring plan as opposed to 30 days as required by Term and Condition #1 of the draft Opinion. This request was reiterated in the January 8, 2013 conference call and the January 9, 2013 e-mail from Entergy. We agree that developing the monitoring plan is a substantial task and will adjust this date for development and submittal to NMFS within 60 days rather than 30 days.

In the October 2012 letter, Entergy requests that we do not specify a time period for when the monitoring plan must be implemented but that an implementation schedule be determined based upon the scope and extent of the plan. In their January 2013 comments, Entergy requests that we change the requirement to implement the monitoring plan within 120 days of issuance of the Opinion to within 120 days of NMFS final approval of the monitoring plan. We are concerned that if we do not state when the monitoring must begin that Entergy will delay implementation of the monitoring program. While we recognize that certain elements of the plan could take longer to implement, because there has been no monitoring for more than 20 years, it is critical that monitoring begin as soon as possible. Also, the take exemption will not apply unless all terms and conditions, including monitoring, are complied with, so if there is a delay in implementation of the monitoring plan, both NRC and Entergy will be liable for any take that occurs. The term and condition now states that the monitoring plan must be fully implemented within 120 days of NMFS approval of the monitoring plan. However, it also states that Entergy must provide a draft monitoring plan and a component-by-component implementation schedule to identify the time needed to obtain any approvals from NRC and/or NYSDEC that may be required, or to carry out any necessary changes to the physical plant.

Entergy requests that NMFS acknowledge that the handling of fish per the requirements of the monitoring plan to be implemented pursuant to the RPMs may increase the potential for post-impingement mortality. While NMFS recognizes that any handling of fish may have a risk of injury or mortality, we expect that the potential for injury or mortality following proper handling procedures, consistent with NMFS guidelines on research on sturgeon species, will be minimal or non-existent. While any additional injury and/or mortality following handling would be unfortunate, the alternative of not monitoring incidental take is not acceptable. Entergy made this same comment on the draft of the 2010 Opinion. There is text in the Opinion that reflects our understanding; this discussion was expanded in the final Opinion. As we note in the Opinion, we do not believe that the handling of impinged sturgeon will result in an increased risk of injury or mortality if proper handling procedures are implemented, which the monitoring plan will include. For example, both shortnose and Atlantic sturgeon are routinely captured in a trawl survey in the Hudson River that the applicant participates in. Captured sturgeon are brought into the boat, removed from the trawl gear, weighed, measured and tagged. There have been no instances of injury or mortality to any of the hundreds of Atlantic or shortnose sturgeon captured during this survey in over twenty-years. Similarly, sturgeon that enter the fish lift at the Holyoke Hydroelectric facility on the Connecticut River are netted, removed from the water, weighed, measured and tagged. There have been no reports of any injuries or mortalities to sturgeon caused by these handling procedures. This issue was raised again by Entergy in the comments they submitted by e-mail in January 2013. We do not believe any changes to the language in the RPMs or Terms and Conditions is necessary. Review of the monitoring plan by Protected Resources staff will ensure that the measures implemented by Entergy will not result in any increased risk of injury or mortality due to capture and handling.

Entergy states that we agree with them that any sturgeon impinged at the trash racks will have been dead or dying prior to impingement there. Given the low intake velocity at the racks (1.0 fps or less) and the spacing between the racks, it is likely that all sturgeon impinged at the trash racks will be dead, injured or stressed in some way that impairs their swimming ability. Entergy requests, therefore, that we remove the requirement for monitoring at the trash racks. While it is likely that these fish were dead, injured, ill or otherwise stressed prior to impingement on the racks, because there has never been any monitoring at the trash racks, we can not establish to what degree the impingement contributed to their death (i.e., could the individual have recovered from the injury or illness if it had not been impinged). Additionally, we consider impingement to fall within "capture" or "collect" under the definition of take. Therefore, this take must be monitored. As such, we are not removing this requirement that the monitoring plan also include monitoring at the trash racks. It is also worth noting that other nuclear power plants, including the Oyster Creek facility in New Jersey and the Salem nuclear facility in New Jersey, implement monitoring plans at their trash bars so requiring this of Entergy is consistent with RPMs in other Biological Opinions issued by our office. This issue is discussed more fully above.

Entergy states that they already monitor, on a continuous basis, the intake water temperature at a location just downstream of the intake pumps and does not expect that temperature in the intake forebay would be materially different. Thus, Entergy seems to be requesting that we remove a requirement for additional water temperature monitoring. We have modified the description of the monitoring plan to state that if Entergy can demonstrate that water temperature at existing

monitoring locations accurately reflects water temperatures at the intake forebay for IP1, IP2 and IP3, then additional water temperature monitoring locations would not be necessary.

Entergy requests that the reporting requirements in the Draft BiOp in Term and Condition 7 (requiring 24 hour reporting) and 8 (notification when impingement is at 50% of the estimated annual total) be combined. Entergy also requests that we clarify whether the "take limit" applies on an annual basis (i.e., if the annual estimate is exceeded in a given year) or is for the entire operational period. As noted in section 12.1 of the Opinion, the ITS exempts a significant amount of take of shortnose sturgeon and New York Bight DPS Atlantic sturgeon between the time the Opinion is issued and the time any renewed IP2 and IP3 operating licenses expire. We have included a statement in the final Opinion clarifying when we would consider the ITS to be exceeded and clarified that we will consider take to be exceeded if any single Unit's total take level is exceeded at any time or certain take levels are exceeded annually or over two consecutive years. We have eliminated the requirement for Entergy to notify us when take exceeds 50% of the average estimated annual total. Because we will be receiving notification within 24 hours for each take, we determined that this additional notification was unnecessary.

Other Issues

Entergy states that the Opinion contains inaccuracies in its discussion of the status of IP2 and IP3's NRC license renewal applications, historic NRC authorizations for IP2 and IP3, our so-called "historic authorization of IP2 and IP3's current operations relative to shortnose sturgeon", the application of 316(b) of the CWA, the history of the NPDES/SPDES permits and WQC issuance, and the status of the SPDES and WQC Proceedings pending before NYSDEC Administrative Law Judges. Entergy does not provide any specific examples and further states that these "inaccuracies" have no effect on our underlying determination. Because Entergy has not provided any specific examples, we are unable to make any clarifications or corrections that might be appropriate. The information in the Opinion is accurate to the best of our knowledge. It is also important to note that NRC did not point out any inaccuracies in our description of the licensing or relicensing process. We also disagree that any statements regarding past section 7 consultation and incidental take exemptions or authorizations are inaccurate. Entergy appears to be implying that the 1979 testimony provided by Dadswell and characterized as a "Biological Opinion" authorized take of shortnose sturgeon. As explained above, there was no means under Section 7 of the ESA by which to exempt incidental take at the time of that testimony and thereby no means by which NMFS could have exempted take at that time through the testimony or through a biological opinion. NMFS has not authorized any part of IP2 or IP3's past operations, nor has it exempted any past take of ESA-listed species at IP1, IP2, or IP3.

Comments Raised by NRC and Entergy on January 8, 2013

On January 7, NRC requested that NMFS participate in a conference call with attorneys and staff of both NRC and Entergy to discuss concerns related to Term and Condition 1 and 2 in the October 2012 draft Opinion. Julie Crocker of my staff participated in this call, held on the morning of January 8.

On this call, Entergy reiterated their request that the requirement to submit the proposed draft monitoring plan be changed from 30 days after the Opinion is signed to 60 days. We informed NRC and Entergy that we had made this change as requested in Entergy's written comments.

NRC and Entergy requested that the implementation date for the monitoring plan be tied to NMFS approval of the monitoring plan rather than the issuance of the Opinion. As mentioned above, we agreed that this was reasonable and have made the requested change.

Prior to the call, NRC submitted a proposed change to Term and Condition #2 which related to the timing of approval of the monitoring plan that would be implemented during the time IP2 an IP3 operated pursuant to the proposed renewed operating licenses. On the call, NRC and Entergy requested that rather than make the suggested changes, we consider eliminating the requirement for submittal and our subsequent approval of a second monitoring plan. We have agreed to make this change and have modified the language in the RPMs and Terms and Conditions to require the implementation of a NMFS-approved monitoring plan during the period of time IP2 and IP3 operate pursuant to the existing licenses and any time they operate under the proposed renewed operating licenses.

Entergy raised new comments regarding the contents of the monitoring plan. Specifically, they requested that we rewrite the statement in Term and Condition #1 that states the monitoring plan "must contain…" certain components. Entergy requests that we change this to language that would be more flexible and less prescriptive. They suggested it state, "NMFS expects the monitoring plan to consider the following components" or "NMFS anticipates the monitoring plan will contain the following components." We disagree that this change is necessary or appropriate. We have specifically outlined the components of the monitoring plan that are required to monitor various aspects of the incidental take we have identified (i.e., impingement on the trash bars and impingement on the intake screens, including capture in the fish buckets).

On January 9, 2013, we informed NRC and Entergy that we would not change the wording of the Term and Condition from "must require." When we discussed our determination to not change this language with NRC staff (Dennis Logan), NRC staff did not raise any objections. Entergy stated that there were components of the plan that they would not be able to implement. We requested that they submit, in writing, their concerns about feasibility of implementation. On January 9, 2013, Entergy and NRC requested that the consultation period be extended until January 30, 2013 to allow time to resolve comments related to the requirements of the monitoring plan. Also on January 9, 2013, we received an email from Entergy that contained suggested changes to Term and Condition 1. These changes related to timing of implementation of the monitoring plan and specific components of the monitoring plan.

In their comments, Entergy requests that the implementation of the monitoring plan be tied not only to NMFS approval of the plan (see above) but also any additional time necessary to obtain any approvals from NRC or NYDEC or to undertake any necessary physical plant alterations. We agree that additional regulatory approvals may be required before certain components of the plan may be fully implemented and we also agree that it is possible that Entergy may determine that physical plant alterations may be necessary in order to carry out their proposed monitoring

plan. Either of those situations may require more than 120 days. As such, we have modified the language in the term and condition to address this issue.

Entergy proposed numerous changes to the language in Term and Condition #1. Entergy removed the word "all" from nearly every instance where we required detection or collection of "all" shortnose or Atlantic sturgeon. Removing "all" is not appropriate because a purpose of monitoring is to be able to determine when the incidental take level has been exceeded. Therefore, it is necessary and appropriate for the Terms and Conditions to require Entergy to implement a monitoring plan designed to detect and collect all impinged sturgeon. Similarly, Entergy proposes modifying text requiring that the monitoring plan ensure detection of sturgeon so that it merely "facilitate" detection of sturgeon. Making this change is not reasonable because of the requirement to monitor take so that we know when the incidental take level has been exceeded. A monitoring plan that merely facilitates detection is not sufficient. Detection must occur and to such a degree to provide a high level of certainty that all sturgeon have been counted . Detecting and collecting all impinged sturgeon is particularly important because our take estimates are based on data that is more than 20 years old, as well as several assumptions, and the information we have on impinged sturgeon is extremely limited.

Entergy proposes that we modify the term and condition to remove the requirement that the monitoring plan allow for the detection and observation of all sturgeon that are impinged or that contact the screens to remove the words "observation" and "contact." We have removed those words because the word "observation" is not necessary and a fish that merely makes contact with the trash racks or screens, but does not become impinged, and thus would not be captured or collected, does not meet the definition of "take." It is not necessary or appropriate to require monitoring of sturgeon that merely contact the racks or screens, but are not impinged.

Entergy proposes that we remove the requirement for "timely release" of sturgeon impinged at the trash bars. They state that this is "consistent with the language in the Opinion which states that most, if not all, sturgeon impinged are already moribund or dead." We have modified the requirement to require timely collection and release of all live sturgeon that are impinged on the trash racks and timely collection of all dead sturgeon. This is necessary and appropriate because we expect that some sturgeon impinged at the trash racks may not be dead and it is important to remove those fish from the trash racks before they die. Also, necropsy of dead sturgeon must occur before they experience significant decomposition that would impair the ability to identify the cause of death.

Entergy proposes that we add "through visual intake trash rack inspection by walkover" after the requirement that the monitoring plan include methods and procedure for monitoring the trash bars and Ristroph screens. We are not making this change for several reasons. First, we specifically designed the terms and conditions to allow NRC and Entergy flexibility to determine the best means to achieve the required monitoring. Therefore, we identify the components of the monitoring plan but not the specific means to achieve them. Further, if Entergy determines that walk over visual inspection will meet the requirements of the term and condition we expect that this will be included in the monitoring plan to be submitted for our approval. Entergy has provided no explanation of how visual inspection by walkover will fulfill the requirements of the

term and condition. It is difficult to envision how a person walking along the length of the trash racks could detect sturgeon impinged on the rack, which extends several feet down into the Hudson River. However, if this is what Entergy proposes in the draft monitoring plan, we will consider it at that time.

Entergy again raised the issue of the monitoring plan requiring handling of sturgeon and that they object to "unnecessary mortality." This issue has been addressed above. All of the available information indicates that the required monitoring and handling will not result in any injury or mortality. Therefore, we are not modifying the requirement for detection and collection of all sturgeon impinged at the Ristroph screens.

Entergy proposes that we change the requirement to "monitor" water temperature and water velocity to "calculate." We believe that in-water measurement of actual water temperature and actual water velocity are necessary to validate information we relied on in our Opinion and to determine how these factors may have affected sturgeon. We have changed the word "monitor" to "measure" to provide additional clarification. Entergy also proposes removing the requirement to monitor water temperature at the surface, mid-water and bottom. However, the thermal models presented by NRC and Entergy indicate that significant stratification of water temperature is present in the area near Indian Point; therefore, measuring water temperature at various depths is necessary and appropriate to establish the water temperature at the point in the water column where sturgeon were present. It is important to know water temperature and water velocity to help determine the degree to which the operations of the facilities cause an observed take.

We expect that we will continue to work with Entergy and NRC regarding the contents and implementation of the monitoring plan after the Opinion is issued. If during the development of the monitoring plan Entergy or NRC demonstrate that any of the required components of the plan can not be implemented in the time we have allowed or their implementation is not feasible, or an alternative method for monitoring is appropriate, we will discuss that then and can make any amendments to the ITS that are necessary at that time. However, without receiving Entergy's draft monitoring plan, it is premature to make any determinations about what may or may not be feasible, particularly since neither Entergy or NRC have indicated what components of the monitoring plan may be difficult to implement at all or difficult to implement in a timely manner. We believe that by identifying the necessary components of the monitoring plan and not prescribing how exactly Entergy must carry them out, we have provided sufficient flexibility.

Comments from Riverkeeper

Riverkeeper's comments are largely related to 1) the scope of the consultation; 2) the ITS; 3) Cumulative Impacts; 4) Radiological Releases; 5) RPMs and, 6) Conservation Recommendations.

Scope of the Consultation

Riverkeeper states in their comment letter that they believe that NMFS should not issue an Opinion on the effects of the proposed action as defined by NRC. Riverkeeper states their assessment that it is unlikely that Indian Point will operate during the extended operating period in a manner consistent with the description of the action provided to us by NRC (i.e., pursuant to

the terms of the 1987 SPDES permit). Riverkeeper states that NRC should either withdraw their request for consultation until the outcomes of the State proceedings have been resolved or request section 7 consultation on a proposed action that considers the potential outcomes of the State proceedings. These outcomes are defined by Riverkeeper as, (1) Indian Point will no longer continue to operate; (2) Entergy will install and operate a closed cycle cooling system and potentially other measures related to the water intakes at Indian Point, or (3) Indian Point will continue to operate for 20 years with a once-through cooling water system and cylindrical wedge wire screens.

NRC has stated to us that the scope of the proposed action considered in this Opinion is appropriate, even in light of the uncertainty surrounding any outcome of the State proceedings regarding the SPDES permit and 401 Certification (see NRC's September 20, 2011 letter to us). NRC has agreed that they will reinitiate consultation with us should there be a change proposed in Entergy's operations that would cause effects to shortnose or Atlantic sturgeon not considered in this Opinion. While we see the benefits in waiting to complete consultation on the relicensing until these issues are resolved, we defer to the action agency's description of the proposed action and have completed the consultation. Additionally, Riverkeeper does not seem to understand that this Opinion considers not only the operations of Indian Point pursuant to proposed renewed licenses but also continued operations under the existing licenses until such time that NRC makes licensing decisions for each Unit. Additionally, we agree with Riverkeeper that if closed-cycle cooling or wedge wire screens are implemented at Indian Point, the effects to shortnose and Atlantic sturgeon are likely to be different than those considered in this Opinion. We recognize this in the reinitiation section of the Opinion. However, operation with closed cycle cooling or wedge wire screens is not the proposed action and considering either of those alternatives in the effects analysis or jeopardy determination would be inappropriate.

Incidental Take Statement

Throughout this section of the comment letter, Riverkeeper repeatedly mischaracterizes our conclusions. For example, they say that we conclude that the anticipated losses of Atlantic and shortnose sturgeon "are not significant." This is not true. In our Opinion, we conclude, that the proposed action is not likely to jeopardize the continued existence of shortnose sturgeon or any DPS of Atlantic sturgeon. Riverkeeper states that they "do not agree that such losses are appropriate or acceptable." Again, the standard by which they are judging our determination is wrong. We are required to determine if the proposed action is reasonably expected to reduce appreciably the likelihood of both survival and recovery of the species in the wild by reducing numbers, reproduction or distribution. Our Opinion makes no determination of whether the level of incidental take is "appropriate" or "acceptable" as these are not the standards considered under Section 7.

Riverkeeper refers to the determinations made by Dr. Peter Henderson of Pisces Conservation, with whom they apparently shared the draft Opinion. Dr. Henderson's comments are attached to their letter. While Dr. Henderson makes numerous comments about the Opinion, he provides no scientific analysis or citations to support any of his statements. For example, Dr. Henderson states that there is a lack of scientific support for the claim that the population of shortnose sturgeon in the Hudson River is stable. However, he provides no information to the contrary and

no citations to support his claim that it is not stable. Further, he claims that climate change may impact favorable recruitment of shortnose sturgeon but does not support this claim with any analysis, information or citations. In this section of the letter, Riverkeeper continues to mischaracterize the conclusions of our Opinion. They state that Dr. Henderson "disagrees with NMFS' conclusion that the proposed relicensing...will not necessarily affect the population of shortnose sturgeon." We make no such claim in the Opinion and clearly state that the continued operation of IP2 and IP3 will result in a reduction in numbers of shortnose sturgeon in the Hudson River but that the reduction in numbers will not appreciably reduce the likelihood of both survival and recovery, which is the "jeopardy" standard. Similarly, Riverkeeper states the disagreement with our apparent "conclusion that the losses attributable to Indian Point are not significant" (for Atlantic sturgeon). Again, we make no such determination regarding significance because this is not the ESA section 7 standard.

Riverkeeper makes numerous statements indicating that other threats to sturgeon, including potential losses at other power facilities in the Hudson River are "not well-quantified." However, there is no requirement in the ESA or the Section 7 regulations requiring us to quantify all anthropogenic impacts to listed species. Our Opinion contains a thorough and complete discussion of known threats to all of the species considered. When we were able to quantify impacts, we did; otherwise, we provided qualitative descriptions.

Riverkeeper's letter contains a discussion of the differences between power plants and fishermen. This discussion is irrelevant to the analysis completed by us. Even if Indian Point continues to operate as it is now over the period considered in the Opinion, we are still able to reinitiate consultation if take is exceeded or there is new information on the status of the species or any of the reinitiation triggers are met.

Riverkeeper claims that our conclusions "are not well-founded" because they are "based on data that was collected over twenty years ago." We do not disagree that the impingement data we used as the basis for calculating our expected level of impingement during the continued operating period was based on impingement data collected from 1974-1990. However, that is because it is the only impingement data available for Indian Point. As explained in the Opinion, we considered if there was other available information from which to development an impingement estimate and determined there was not. Riverkeeper offers no alternative method for calculating impingement estimates and does not refer us to any additional data sources.

Cumulative Impacts

Riverkeeper questions NMFS cumulative effects assessment and has comments about the effects of the Indian Point facility in light of other Hudson River power plants (Roseton, Danskammer, and Mirant Bowline). Riverkeeper states that NMFS has failed to assess the losses of Atlantic sturgeon in the Hudson River in view of the loss of Atlantic sturgeon in the river from all sources of impingement and entrainment. We disagree with this statement; the Opinion appropriately considers other anthropogenic impacts to Atlantic sturgeon, including other power plant intakes. Riverkeeper notes that all of the intakes together (Roseton 1&2, Bowline 1&2, and Indian Point 2&3) together withdraw more than 1.69 trillion gallons of cooling water each year. Our Opinion is on the effects of the continued operation of the Indian Point facility. In the jeopardy analysis,

we consider the effects of the continued operation of this facility on Atlantic sturgeon in the context of all the other impacts to Atlantic sturgeon in the Hudson River, as summarized in the Status of the Species, Environmental Baseline, and Cumulative Effects sections of the Opinion. Available information on known sources of impingement and entrainment of Atlantic sturgeon in the Hudson River is included in the Opinion. Additionally, while these other power plants also discharge heated effluent, the triaxial thermal plume study prepared by Entergy and included in NMFS Opinion, indicates that none of the other thermal plumes overlap with the Indian Point thermal plume. Riverkeeper presents no information or analysis in their letter regarding the impact of these other facilities or other sources of anthropogenic mortality on shortnose or Atlantic sturgeon.

Riverkeeper's comments suggest that they anticipate the "Cumulative Effects" section of the Opinion to be consistent with "cumulative impacts" as defined by the National Environmental Policy Act (NEPA) at 40CFR §1508.7 . However, these definitions are different and the "Cumulative Effects" section in the Opinion is a different scope than would be seen in a NEPA document regarding the relicensing (e.g., NRC's FSEIS). For reference, "cumulative effects" is defined under NEPA as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time." The ESA defines "cumulative effects" more narrowly as "those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur with the action area of the Federal action subject to consultation" (50 CFR §402.02).

Riverkeeper states in their letter that NMFS has "concluded that this loss [the 162 takes predicted in the draft Opinion] would be acceptable because it would not have an appreciable effect on the total population of shortnose sturgeon in the Hudson River." This statement mischaracterizes the conclusions reached in our Opinion. Our Opinion concludes that the proposed action will not reduce appreciably the likelihood of both the survival and recovery of shortnose sturgeon in the wild (i.e., throughout their range) by reducing the reproduction, numbers, or distribution of shortnose sturgeon. NMFS makes no claim in the Opinion that the loss is "acceptable," only that the death of these individuals is not likely to jeopardize the continued existence of the species rangewide, when viewed in the context in which those deaths will occur, which is the appropriate standard to use in an Opinion.

The Opinion does discuss other Hudson River power plants. Impacts of the operations of these facilities are included in the Status of the Species and Environmental Baseline section of the Opinion as well as the Integration and Synthesis section of this Opinion explaining our current understanding of the future impacts of these facilities on shortnose and Atlantic sturgeon in the Hudson River.

Radiological Impacts

Riverkeeper states that we have failed to adequately consider impacts of radiological releases from Indian Point on listed sturgeon. We disagree; our Opinion presents the available

information and an assessment of effects to shortnose and Atlantic sturgeon is included in the final Opinion. We have, however, modified the description of sources of radionuclides to more fully describe the sources of radionuclides to the environment, including known leaks from IP2's spent fuel pool. In summary, the available information indicates that there is no evidence of higher than normal levels of radionuclides in fish sampled in the Hudson River or in sediments near Indian Point; thus, we have determined that effects to shortnose and Atlantic sturgeon are insignificant and discountable. While Riverkeeper states that they are concerned that Hudson River sturgeon are being exposed to elevated levels of strontium-90, Riverkeeper presents no information on levels of strontium-90 in sturgeon prey or evidence of strontium-90 in shortnose or Atlantic sturgeon. The potential for exposure to strontium-90 is discussed in our Opinion. The most recent REMP (2011) states that none of the fish samples indicated any detectable levels of strontium-90. Riverkeeper's comments imply that we have only considered the 2007 report on radionuclides. However, we have relied not only on that, but also on NRC's assessment in their NEPA documents (as the subject matter expert), and multiple years of REMP and NYDEC's 2009 report on radionuclides and fish (Skinner and Sinnott 2009). To provide more information on this potential source of impact, we have included a Conservation Recommendation in the final Opinion to recommend that any contaminant analysis of dead sturgeon should include radionuclide sampling. This information would help to validate any assumptions made in our analysis regarding effects of radionuclides on shortnose and Atlantic sturgeon.

Reasonable and Prudent Measures

In the discussion of RPMs in their letter, Riverkeeper again mischaracterizes NMFS conclusions by stating that NMFS concludes that "potential losses of Atlantic sturgeon caused by Indian Point over a proposed 20 year operating period are not significant." Our Opinion concludes that the proposed action will not reduce appreciably the likelihood of the survival and recovery of any DPS of Atlantic sturgeon in the wild (i.e., throughout their range, not just in the Hudson River) by reducing the reproduction, numbers, or distribution of shortnose sturgeon.

Riverkeeper questions why we do not assess the efficacy of closed-cycle cooling as an RPM or include closed cycle cooling as an RPM. While we agree based on our general understanding of cooling towers (that a facility operating with cooling towers typically withdraws approximately 95% less water than a facility with a once through cooling system), the installation of cooling towers at IP2 and IP3 would result in a large reduction in the amount of water withdrawn and a potentially significant reduction in the number of shortnose and Atlantic sturgeon impinged, and may similarly result in a significant reduction in the amount of prey impinged or entrained, closed-cycle cooling does not meet the definition of an RPM. As stated in 50 CFR 402.14, "reasonable and prudent measures, along with the terms and conditions that implement them, cannot alter the basic design, location, scope, duration or timing of the action and may involve only minor changes." While closed-cycle cooling would likely minimize take, we cannot require that Indian Point convert to closed-cycle cooling or install cooling towers as an RPM, because such a modification to the facility would be more than a minor change to the basic design of the proposed action. Estimates of the total cost of installation of cooling towers at IP are as high as 1.5 billion dollars and would be a major construction project. Thus, while we agree with Riverkeeper that requiring the conversion of the facility from once through cooling to closed-

cycle cooling would have environmental benefits, it is not reasonable to include as an RPM. As noted in the Section 7 handbook (page 4-49), an RPM cannot be considered reasonable if it would result in more than a minor change to the proposed action.

Riverkeeper states that there is no reason that NMFS should not examine closed-cycle cooling. In fact, there are two. One is that closed-cycle cooling is not part of the proposed action and second is that, as explained above, conversion to closed-cycle cooling does not meet the definition of an RPM.

Riverkeeper states that our RPMs "fail to result in a net benefit to the endangered sturgeon populations in the Hudson River and NYB DPS." Riverkeeper appears to misunderstand the purpose of the RPMs. RPMs are those measures that are necessary or appropriate to minimize the impact of the incidental take. As noted above, RPMs must not result in more than a minor change. As noted in the consultation handbook, RPMs "serve to minimize impacts on the specific individuals or habitats affected by the action." The RPMs are not designed to result in a "net benefit" to shortnose sturgeon or any DPS of Atlantic sturgeon.

Conservation Recommendations

As stated in 50 CFR 402.02, conservation recommendations are "suggestions of the Service regarding discretionary measures to minimize or avoid adverse effects of a proposed action on listed species or critical habitat or regarding the development of information." Riverkeeper appears to misunderstand the purpose of conservation recommendations and criticizes the fact that these will be "discretionary agency activities." The purpose of this section of the Opinion is in fact, to do just that, provide measures that the action agency can implement to assist in species conservation, further minimize or avoid adverse effects of the proposed action, or recommend studies improving an understanding of the listed species biology or ecology (Section 7 Handbook, p. 4-58). As stated in 50CFR 402.14(j), conservation recommendations are "advisory and are not intended to carry any binding legal force." Riverkeeper states that our conservation recommendations "fail to achieve a net conservation benefit"; however, this is the wrong standard to use when assessing these recommendations. These conservation recommendations are not designed to mitigate the impact of Indian Point on shortnose or Atlantic sturgeon and are not designed to result in a net conservation benefit to these species. Rather, they are activities that NRC could carry out that would provide us with important information on listed sturgeon.

CONTROVERSIALITY

The relicensing of the facility is controversial in New York, with public concern heightened regarding safety and evacuation issues. The controversy of the relicensing increased even more after the Japan nuclear disaster. In addition, Hudson Riverkeeper and other environmental organizations are also opposed to the relicensing based on concerns over environmental impacts from the once-through cooling system. The State of New York (Governor Cuomo and Attorney General Schneiderman) is opposed to the once-through cooling system and wants a closed system. The State denied the issuance of a Clean Water Act Section 401 water quality certification. The 401 denial and the draft SPDES permit are both under adjudication.. In March 2011, New York Governor Cuomo expressed concerns regarding the safety of the facility and called for the facility to be shut down. The proposed relicensing is currently the subject of a

series of hearings that began in October. Our 2011 Opinion resulted in little media interest and no congressional interest.

REINITIATION

Reinitiation of formal consultation is required is any of the four triggers outlined in 50 CFR 402.16 are met. These include the listing of a new species as well as the modification of the identified action in a manner that causes an effect to the listed species that was not considered in the Opinion. Given the uncertainty associated with the proposed action, NMFS expects that consultation may need to be reinitiated to consider changes related to water withdrawals and discharges. In the 2003 draft SPDES permit, which is currently under adjudication, NYDEC determined that the best technology available was a closed cycle cooling system with cooling towers. The 2003 draft SPDES permit, if finalized, would require the installation of cooling towers at IP2 and IP3. If cooling towers were required at IP2 and IP3, the effects of plant operations on aquatic life, including shortnose and Atlantic sturgeon, would likely be significantly different than the impacts examined in the Opinion and NMFS expects that such a change in plant operations would require reinitiation of consultation. Entergy has proposed to NYDEC that instead of cooling towers, NYDEC should approve the use of a series of wedge wire screens, with reduced intake velocity and reduced mesh size. NMFS has no information to make any preliminary assessment of the potential effects of the construction and operation of this system on shortnose or Atlantic sturgeon but anticipates that if this technology was deployed at IP2 and IP3, consultation would need to be reinitiated. In the summer of 2013 EPA will be publishing a final rule related to section 316(b) of the Clean Water Act. The final rule is expected to contain performance standards for impingement and entrainment at intakes that withdraw a certain amount of water. IP2 and IP3 are currently expected to be subject to the rule. Modifications to the intakes may be required in order for Entergy to comply with the rule. This is likely to require reinitiation of consultation as there would likely be effects to listed species different than those considered in the Opinion. At this time, we do not have any information on how the IP intakes may be modified so we are not able to make any preliminary assessment of the potential effects of modified operations. Finally, the ITS also emphasizes that if NRC and/or Entergy do not comply with any of the terms and conditions in the ITS, we expect consultation to be reinitiated to determine, at a minimum, what the reasons are for noncompliance and whether any changes in the terms and conditions are appropriate to improve compliance.

Enclosures (3)

EC: Crocker, F/NER3
Williams, GCNE

File Code: Sec 7 NRC – Indian Point Continued Operations (2012)
PCTS: NER-2012-02252

enclosure 1

NRC Comments on Indian Point 10-26-12 Draft Biological Opinion

Page 3, paragraph 4: The correct expiration date of IP2 is Sept. 28, 2013 (not Sept. 29). Also, the IP3 expiration date is only specified by month—the expiration date is December 12, 2015.

Page 5, Line 1: NMFS states that the previous consultation started in 2010. However, NRC considers the consultation to have started when the NRC sent a letter dated 8/16/07 requesting information on listed species that could be affected by the proposed license renewal. This request is in accordance with 50 CFR 402.12(c). Such requests are included in the definition of informal consultation at 50 CFR 402.13.

Page 5, end of paragraph 2: NMFS states that consultation was initiated on December 10, 2010. See above comment. Additionally, if this statement is referring specifically to formal consultation, the NRC considers consultation to have started on 12/22/08 when NRC sent its first biological assessment and requested consultation in accordance with 50 CFR 402.14(c).

Page 6, first line of paragraph 4: The letter referred to is actually dated May 16, 2012 (not May 17). This needs to be changed later in the paragraph as well in the sentence that says, "Consultation was initiated on May 17, 2012."

Page 6, paragraph 4: The beginning of this paragraph insinuates that the NRC only requested consultation for Atlantic sturgeon during the proposed renewed operating period and that the NRC later requested to add on the current operating period. However, NRC requested both time periods to be included from its initial consultation request. See the fourth paragraph on page 2 of the May 16, 2012, letter and Section 2.0 of the biological assessment transmitted with that letter.

Page 7, full paragraph 3, line 6: "NRC staff state" should be "NRC staff states".

Page 7, full paragraph 3, line 14: Add "(WQC)" after "Water Quality Certification" to define acronym that you use later.

Page 9, end of paragraph 1: The NRC license does not require compliance with the SPDES permit. This needs to be changed here and in other sections of the document that incorrectly state this (page 89, paragraph 2; and possibly others).

Page 11, end of paragraph 1: NMFS states that NRC would need to reinitiate consultation if a new SPDES permit is issued. However, it is NRC's understanding that the EPA would be the responsible federal agency for such a consultation. This is in keeping with the January 2010 MOA between the EPA, FWS, and NMFS regarding enhanced coordination under the CWA and ESA: http://www.nmfs.noaa.gov/op/pds/documents/02/301/02-301-22.pdf. In such a case, NRC would expect that we might be involved in the consultation, but we would not be the agency responsible for initiating consultation. If this is the case, the language in the biological opinion should reflect this here and in other sections of the document (page 12, end of paragraph 1; page 126, paragraph 2; and possibly others).

Page 15, paragraph 2, line 4: Do you mean "Male and female shortnose sturgeon have similar lengths at maturity ..."?

Page 87, paragraph 3, sentence 2: Apparently something is missing in the middle of this sentence.

Page 118. In paragraph 1, starting on line 9, NMFS states: "All impinged sturgeon are expected to die, immediately or later, as a result of interactions with the facility". In the last paragraph, NMFS states that it expects that some shortnose and Atlantic sturgeon will be impinged and returned back to the river "without significant injury or mortality." These two positions are contradictory, and the NRC staff urges NMFS to be consistent in its conclusions.

Page 118, paragraph 3: The NRC-issued operating licenses for IP2 and IP3 contain environmental technical specifications that require the plants to maintain consistency with local, state and federal regulations. The NRC interprets this to include the Endangered Species Act and the biological opinion. The language requiring NRC to add additional license conditions should be removed or changed here and in other sections (page 120, paragraph 2; page 121, 1st paragraph under "terms and conditions"; and possibly others).

Page 123, Reasonable and Prudent Measures: An address should be specified when NMFS asks for something in writing. Also, specify if it is acceptable to transmit letters and reports electronically, and, if so, to what email address. If electronic mail is acceptable to NMFS, please add NRC's email (endangeredspecies@nrc.gov) as well.

Page 123, Reasonable and Prudent Measure #8: Specify how NMFS expects to receive the annual report (in writing or electronically).

enclosure 2

GOODWIN | PROCTER

Elise N. Zoli
617.570.1612
ezoli@
goodwinprocter.com

Goodwin Procter LLP
Counselors at Law
Exchange Place
Boston, MA 02109
T: 617.570.1000
F: 617.523.1231

November 9, 2012

David J. Wrona, Branch Chief
Projects Branch 2
Division of License Renewal
Office of Nuclear Reactor Program
US Nuclear Regulatory Commission
Washington, DC 20555-0001

Re: Draft Biological Opinion for Indian Point Units 2 and 3

Dear Mr. Wrona:

We write on behalf of Entergy Nuclear Operations, Inc., Entergy Nuclear Indian Point 2, LLC and Entergy Nuclear Indian Point 3, LLC (collectively, "Entergy") to provide Entergy's comments on the Draft Biological Opinion issued by the National Marine Fisheries Service ("NMFS") on October 26, 2012 ("Draft Biological Opinion"). Entergy agrees with NMFS's conclusions in the Draft Biological Opinion that the operation of Indian Point Units 2 and 3 ("IP2" and "IP3," respectively), as currently configured and operated under existing approvals, as well as under renewed Nuclear Regulatory Commission ("NRC") licenses, (a) is not likely to jeopardize the continued existence of shortnose sturgeon or the New York Bight Distinct Population Segment ("DPS") of Atlantic sturgeon, (b) is not likely to adversely affect the Gulf of Maine or Chesapeake Bay DPS of Atlantic sturgeon, and (c) will have no effect on critical habitats for either species. To that end, Entergy provides these comments, consistent with the consensus consultation schedule developed in conjunction with NRC and NMFS staff, to clarify certain aspects of the Draft Biological Opinion in a manner consistent with NMFS's conclusion.

Entergy's comments are divided into four sections. The first addresses the marginal questions/comments included in the Draft Biological Opinion by NMFS. The second addresses the application of the incidental take limits to sturgeon collected at the trash bars or the Ristroph screens. The third provides some suggested clarifications for/corrections to certain items discussed in the Draft Biological Opinion. Finally, the fourth section provides comments designed to facilitate the future discussion between Entergy and NMFS with regard to the required monitoring program. To reiterate, the Draft Biological Opinion properly concludes – based upon the best information available – that continued operation of IP2 and IP3, both during their current and prospective NRC license periods, is not likely to jeopardize the continued

existence of shortnose sturgeon or Atlantic sturgeon in the Hudson River.[1] This conclusion is soundly supported in the record and, in Entergy's view, is the only reasonable conclusion to be drawn from that record. Thus, the following comments are targeted at specific aspects of the Draft Biological Opinion, none of which changes its conclusion.

A. Response to Comments/Questions Posed by NMFS

In the Draft Biological Opinion, NMFS included eight separate questions or requests for clarifying information from NRC and/or Entergy. Each item is repeated here, with Entergy's response immediately following:

1. *Page 12: Questions to NRC and Entergy – What enforceable instrument, if any, requires such speed adjustments? For example, is this speed adjustment a condition for the NRC license and/or a requirement of the NYPDES permit? What factors determine whether a pump is run at full speed versus reduced speed?*

The 1980 Hudson River Settlement Agreement ("HRSA") required Indian Point to be retrofitted with dual speed (at IP2) and variable speed (at IP3) pumps to allow for the reduction of cooling water intake flows to the minimum necessary for efficient plant operations. The HRSA expired in 1991, but the requirement regarding the minimization of intake flows was continued in a series of judicially approved Consent Orders, the last of which expired on February 1, 1998. Since then, Indian Point has committed to continue to operate both Units in the manner set forth in the final Consent Order until a new SPDES permit is issued. *See* New York State Department of Environmental Conservation, Final Environmental Impact Statement, June 2003, p. 10 ("The generators agreed to continue the mitigative measures included in the continuing SPDES permit and provisions of the Fourth Amended Consent Order until new SPDES permits were issued to them."). The Fourth Amended Consent Order required the owners of Indian Point to "use their best reasonable efforts to operate Indian Point dual/variable speed pumps in a manner as will keep the volumes of river water drawn into the plants at the minimum required for their efficient operation, giving due regard to ambient river water temperature, plant operating status, and the need to meet water quality standards or other permit conditions." Thus, the factors affecting

---

[1] *See* Draft Biological Opinion, pp. 5-7 (discussing scope of consultation to include existing operations); p. 117 (reflecting conclusion that "[a]fter reviewing the best available information on the status of endangered and threatened species under NMFS jurisdiction, the environmental baseline for the action area, the effects of the proposed action, interdependent and interrelated actions and the cumulative effects, it is NMFS' biological opinion that the proposed action may adversely affect but is not likely to jeopardize the continued existence of shortnose sturgeon or the New York Bight DPS of Atlantic sturgeon. We have determined that the proposed action is not likely to adversely affect the Gulf of Maine or Chesapeake Bay DPS of Atlantic sturgeon. No critical habitat is designated in the action area; therefore, none will be affected by the proposed action.").

pump speed are river water temperature, plant operating status, and the need to manage flow rates to comply with water quality standards or other SPDES permit conditions.

2. *Page 13: Question to NRC and/or Entergy – Where does material that is removed by the high pressure spray go? Down the sluice?*

There are three different washwater sluices each associated with the Ristroph screens at IP2 and IP3: a fish return sluice and two debris return sluices. The fish return sluice is located on the east (descending) side of the screens near the top of the sprocket wheel and receives fish as the screen mesh rotates from the west (ascending) to the east side of each screen. The main debris sluice is located on the west side of each Ristroph screen and the auxiliary debris sluice is located on the east side of each screen below the fish return sluice. The two debris sluices join into one, and discharges the contents into the Hudson River at the north (IP2) or south (IP3) end of the CWIS bulkhead in locations that minimize re-circulation of debris toward the intakes.

3. *Page 14: Question to NRC/Entergy – is this screen a Ristroph screen, modified Ristroph screen, or other type of screen? If the latter, please describe it.*

The IP1 intake structure has two redundant forebays, each with a maximum or design flow of 10,000 gallons per minute (gpm), *employing a dual flow traveling screen equipped with fine mesh screen (1/8 inch; 3.2 mm) panels*. Each dual flow traveling screen at IP1's intake has an estimated design through-screen velocity of less than the 0.50 feet per second ("fps").

4. *Page 65: Question to NRC – how far outside the trash bars is this velocity [1 fps] reported? The reports state "approximately" – what is the range of velocities that are experienced? What is the "through-rack" velocity? What is the range of water velocity between the trash rack and the Ristroph screens (Fletcher 1990 reports an average of 30 cm/s)?*

The intake water approach velocity 3 inches to 12 inches upstream from the bar racks at IP2 and IP3 was estimated at mean low water to be 1.0 fps for 100% circulating water flow rate (840,000 gpm) and 0.6 fps for 60% reduced circulating water flow rate (504,000 gpm). *See* Entergy 2007b (*citing* Central Hudson Gas and Electric Corporation, Consolidated Edison Company of New York, Inc., New York Power Authority, and Southern Energy New York. Draft Environmental Impact Statement for State Pollutant Discharge Elimination System Permits for Bowline Point, Indian Point 2 and 3, and Roseton Steam Electric Generating Stations, 1999). Measurements have not been taken to determine the observed variation in approach velocity through the IPEC bar racks under full flow or reduced flow operations. The velocity through the Ristroph traveling screens at mean low water has been calculated to be 1.6 fps for 100% circulating water flow rate and 1.0 fps for 60% circulating water flow rate. Thus, the range in

velocities from a location just upstream (*i.e.*, 3 to 12 inches) from the bar racks to the through-screen velocity is 0.6 - 1.0 fps at 60% circulating water flow rate and 1.0 – 1.6 fps at 100% circulating water flow rate. Entergy notes that this range of velocities should not be interpreted as a linear increase in flow rates between these two locations, as there is likely a drop in flow rate after the water passes through the bar racks and before it approaches the Ristroph screens.

5. *Page 65: Question to NRC: What are these assumptions [regarding through-screen velocities] based on? What is the data that resulted in flow estimates of 1 ft/sec for full flow and 0.6 for reduced flow? To get those figures, was there a field study across a range of conditions or are these based on pump specifications or something else?*

Please see response to #4 above.

6. *Page 96: Question to NRC/Entergy – in the context [discussing rapid changes in water temperature], please describe the characteristics of the discharge during (1) routine operations, (2) during times when a unit is shut down and restarted and (3) at times when generation is increasing. For example, is the discharge always at a steady flow and temperature or are there fluctuations? What is the time frame associated with these fluctuations (seconds, minutes, hours?)? How quickly can temperatures change near the intakes? What documentation supports your answers?*

Under routine operations, IPEC discharge flow follows the same seasonal pattern as intake flow, which is governed by the HRSA/Consent Orders, as described in the reply to Comment A1 above. IP2 and IP3 do not typically vary their generation by more than a few percent of full capacity when operating. The temperature rise between intake and discharge, measured at the condenser inlet boxes at a location just upstream from the intake, is reported to the New York State Department of Environmental Conservation ("NYSDEC") in quarterly discharge monitoring reports ("DMRs") for IP2 and IP3 showing the hourly minimum, maximum and average intake and discharge temperatures for each day, and the associated intake flows represented by the combined flow for all circulating water pumps and service water pumps. An examination of intake and discharge temperatures from the quarterly DMR applicable to the most recent refueling outage beginning on 5 March 2012 at IP2 revealed no discernible change in the pattern of hourly intake or discharge temperatures in relation to the shutdown of IP2. It should be noted that the IP2 and IP3 discharge flows are combined into one discharge canal before entering the discharge bulkhead. Also, during start-ups and shut downs, there are no measurable changes in discharge flow. That is because IPEC is required to maintain the water level within the discharge canal at 1.75 feet above the river height, to ensure that the subsurface discharge is maintained at 10 cubic feet per second, thereby ensuring sufficient mixing to minimize any potential changes in temperature. If an event such as start-up, shut down, or pump speed adjustment caused this height differential to be less, the IPEC SPDES Permit requires that

the adjustable subsurface ports at the discharge be adjusted to meet the 1.75 feet height differential, within 4 hours.

7. *Page 98: Question for NRC – What is it about the model that results in findings that bottom waters never exceeded 28C while this information indicates that water temperatures at the bottom can be higher than 28C?*

There appears to be some confusion over what information is discussed in Swanson et al. 2011a (the "ASA response") and its origins, *i.e.*, whether field measurements or model results were used. As requested by the NYSDEC, ASA prepared graphics (presented in Swanson et al. 2011a) that used *actual measured temperature* data collected during the extensive field program conducted during the summer of 2010, *not a model*. The data that underpins the ASA response were obtained from 66 deployed moorings in the vicinity of Indian Point, each of which contained three to six thermistors mounted at different depths throughout the water column along the mooring lines. Numerical interpolation techniques were used to create the requested plan and vertical section views of temperature contours during a tidal cycle spanning 11 and 12 July at different tidal current regimes (maximum ebb, slack before flood and slack before ebb) that were provided to NYSDEC staff in the ASA response. The vertical sections displayed in the ASA response showed that there were no bottom water temperatures exceeding 28C even though the July – August 2010 period was the second warmest (after 2005) during the twenty-year period 1991 through 2010, based on the temperature record obtained from the USGS West Point Station.

We likewise believe NMFS has misunderstood the purpose, quality of data and findings of the additional thermal review performed. Following the thermal analysis provided to NYSDEC and in response to NMFS inquiries, ASA reviewed other data not designed or collected for assessment or monitoring of Indian Point's thermal discharge, but rather collected incidental to the Hudson River Biological Monitoring Program to assess the natural river characteristics (temperature, salinity, dissolved oxygen) without regard to Indian Point. This assessment showed that temperatures exceeding 28C at the bottom occur throughout the Hudson River at 46 of 54 stations, including at locations 100 miles north and 39 miles south of Indian Point, as a function of natural River conditions. Stated another way, this information reflects the thermal structure of the River as having 28C bottom temperatures throughout its length due to natural conditions. Thus, this supplemental analysis merely reflects natural thermal regimes in the Hudson River.

8. *Page 100: Question for NRC and Entergy – It is our understanding you will be undertaking new fish sampling in Haverstraw Bay in 2013. Will you be applying for a modification to your ESA Section 10 permit for this work? If not, why not?*

Radiological Environmental Monitoring Program ("REMP") fish and blue crab samples for IPEC are collected opportunistically as part of ongoing sampling for the Hudson River Biological Monitoring Program ("HRBMP"). The procedures used to collect samples for the REMP are specified in Section 8 and Appendix 3 of the current (2012) Hudson River Fall Juvenile and Beach Seine Surveys Standard Operating Procedures (Revision 1, September 2012), a copy of which is approved by NYSDEC and supplied annually to Ms. Kim Damon-Randall and Ms. Julie Carter of NOAA/NMFS. The additional fish sampling in Haverstraw Bay will rely on sampling programs already in place. Atlantic and shortnose sturgeon are not among the fish species sacrificed for edible tissue samples, and any Atlantic and shortnose sturgeon caught while sampling are handled as specified in Permit to Take Protected Species for Scientific Purposes No. 17095 issued 28 August 2012.

B. The incidental take limits should apply only to injury or mortality caused by the operation of IP2 and IP3.

The proposed Incidental Take Statement exempts the taking of 562 shortnose sturgeon and 219 New York Bight DPS Atlantic sturgeon by impingement at IP1, IP2 and IP3, from the date of issuance through the twenty-year license renewal periods for IP2 and IP3. Entergy agrees to these limits. However, the comments below address how impinged sturgeon are tallied with respect to these limits.

The proposed incidental take limits apply to sturgeon, whether they are dead or alive *before* they are impinged at IP2 or IP3.[2] As detailed below, Entergy respectfully asserts that these take limits should apply only to the impingement of healthy, live fish (as opposed to dead or moribund fish). These totals also apply whether or not sturgeon are harmed or killed by IP2 or IP3 – that is, they are related to the event of impingement, not outcome, despite the existence of state-of-the-art impingement and fish return systems at IP2 and IP3. These systems have been determined by the United States Environmental Protection Agency ("USEPA") to minimize impingement mortality, and are expected to facilitate the non-injurious transport of impinged sturgeon to the Hudson River. As such, a presumption of mortality or injury is not scientifically justified. Stated simply: takings should be attributable to IP2 or IP3 only when they actually have been caused by IP2 or IP3, and result in demonstrable injury or mortality.

---

[2] *See* Draft Biological Opinion, pp. 119.

Takings regulated under Incidental Take Statements or Incidental Take Permits are those which are incidental to the carrying out of an otherwise lawful activity – in this case, incidental to the operation of IP2 and IP3.[3] NMFS addresses the locations where these impingement events might occur at IP2 and IP3 – the trash bars and the modified Ristroph screens, each of which is addressed below separately.

1. Impingement at Trash Bars

With respect to sturgeon that may be impinged at the trash bars, NMFS appears to agree with Entergy that it is virtually certain that any sturgeon found at the trash bars was dead or moribund in the Hudson River before encountering the trash bars (*i.e.*, their injury or mortality was not incidental to IP2 and IP3 operations). As noted in the Draft Biological Opinion:

> healthy Atlantic sturgeon (yearlings and older) are expected to be able to readily avoid an intake with an approach velocity of 1.0 fps or less. Therefore, any Atlantic sturgeon impinged at the trash bars, where the velocity is 1.0 fps or less depending on operating condition, are likely to already be suffering from injury, or illness which has impaired their swimming ability.[4]

Similar findings are made with respect to shortnose sturgeon. *See* Draft Biological Opinion, p. 75 ("healthy shortnose sturgeon (yearlings and older) are expected to be able to readily avoid an intake with an approach velocity of 1.0 fps or less").

In other words, sturgeon of both species large enough to be impinged at the trash bars would also be capable of swimming away from the bars, if alive and healthy. Thus, the impingement of sturgeon at the trash bars would not be the result of Indian Point operations, but rather the dead or moribund condition of the sturgeon in the intake flow from other causes such as recreational fishing mortality, boat propeller strikes, or predation. Because the purpose of the incidental take limit is to limit the impact *of the facility* on the sturgeon population, and/or because the impingement of a dead or moribund fish has no impact on the population, the impingement of dead or moribund fish should not be limited as though it does have such an impact. Furthermore, the sturgeon impingement data used to estimate the take limits were based on those fish impinged on the traveling screens at IP2 and IP3 during 1974 through 1990 (*see* Tables 2 and 3 of the Draft Biological Opinion) and not on the sum of fish collected from the bar racks and in the impingement samples from the traveling screens, so take limits based on these data relate

---

[3] *See* 16 U.S.C. §1536(b)(4)(B) (addressing takings "incidental to the agency action"); §1539(a)(1)(B) (authorizing permits for a "taking which is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity").

[4] Draft Biological Opinion, p. 88.

exclusively to impingement on the traveling screens. Certainly, Entergy can agree to the requirements of the Draft Biological Opinion with respect to the collection and processing of sturgeon observed to be impinged at the trash bars as a means of advancing the scientific knowledge of the species generally and in the Hudson River, but such collections of dead or moribund sturgeon to advance scientific understanding of these species should not count toward Indian Point's incidental take limits and should be exempt from the provisions of Sections 9 and 10 of the Endangered Species Act.[5]

Entergy notes that NMFS has provided a similar context for incidental take limits in another authorization with respect to sturgeon in the Hudson River, where unintentional mortality is described as substantially less than the number of takes authorized. *See, e.g.*, Draft Biological Opinion, p. 43 (NYSDEC scientific authorization which appears to allow up to 2,340 sturgeon to be caught over no more than five years, but contemplates the "unintentional" mortality of nine (9) sturgeon other than that subset for which mortality apparently is part of the study program). Thus, while the incidental take limits for IP2 and IP3 track the number of estimated impingement events, it should be recognized that the estimated mortality (and, therefore, adverse effect on sturgeon) caused by these authorized impingement events is likely to be quite small.

2. Impingement at the Optimized Ristroph Screens

Both IP2 and IP3 are equipped with state-of-the-art, optimized Ristroph screens and fish return systems that operate continuously whenever cooling water is withdrawn from the Hudson River and are designed to automatically and effectively return impinged fish to the Hudson River in a continuous stream of flowing river water at locations found to minimize re-impingement. As indicated in prior submissions to NRC and NMFS, these screens and fish returns have reduced impingement mortality by approximately 90% for species with a hardiness similar to shortnose sturgeon.[6] Indeed, the USEPA has determined that systems of the type installed at IP2 and IP3 constitute the best technology available for minimizing impingement mortality, ascribing to them an average impingement survival rate of 88% across species, many far less hardy than sturgeon.[7] Thus, any healthy sturgeon impinged at the optimized Ristroph screens has a very high likelihood of returning to the river unharmed. The return of an uninjured sturgeon to the river in this fashion should not count toward the incidental take limits, which are based on the

---

[5] Entergy understand that neither the Roseton nor the Danskammer facilities on the Hudson River include trash bar/rack impingement in their incidental take numbers.

[6] *See Shortnose Sturgeon: A Technical Assessment Pursuant to the Endangered Species Act* (April 2011) (enclosed with correspondence from Fred R. Dacimo (Entergy) to Mr. Andrew Stuyvenberg (NRC) and Ms. Patricia A. Kurkul (NMFS), dated April 28, 2011), p. 20.

[7] *See National Pollutant Discharge Elimination System—Cooling Water Intake Structures at Existing Facilities and Phase I Facilities*, 76 Fed. Reg. 22174, 22282 (April 20, 2011).

assumption that every impinged sturgeon will die, and should be exempt from the provisions of Sections 9 and 10 of the Endangered Species Act.[8]

Of course, it could also be the case that a smaller sturgeon capable of passing through the trash bars and being impinged at the modified Ristroph screens was dead or moribund before it was impinged. As with sturgeon impinged at the trash bars, the impingement of such sturgeon, or at least the vast majority of them, at the optimized Ristroph screens also should not count toward Indian Point's incidental take limits, because their mortality or injury was not incidental to IP2's and IP3's operation.

Accordingly, the monitoring program to be developed in conjunction with NMFS should include procedures for evaluating whether sturgeon impinged at the optimized Ristroph screens were (a) dead or moribund before impingement, or (b) injured or killed as a result of being impinged. Those in the former category should not count toward the impingement limit, while those in the later category should count toward the limit.

For these reasons, Entergy respectfully requests that NMFS clarify that the incidental take limits established in the proposed Incidental Take Statement apply to impingement of live, non-moribund sturgeon at the modified Ristroph screens resulting in injury or mortality. Indeed, the Draft Biological Opinion's Reasonable and Prudent Measure ("RPM") #3 requires that "[a]ny shortnose or Atlantic sturgeon [ ] be transferred to NMFS or an appropriately permitted research facility NMFS will identify so that a necropsy can be undertaken to attempt *to determine the cause of death*."[9] Entergy agrees with this focus on takes incidental to its operations and believes the incidental take limits should have a similar focus.

C. Comments Related to Clarifications/Corrections

1. Section 4 of the Biological Opinion

Much of the content of Section 4 of the Draft Biological Opinion, although accurate, is irrelevant to the purpose of this document and may be confusing to readers. Section 4.1 contains lengthy discussions of region-wide aspects of the life history, status, trends, and threats to recovery for shortnose sturgeon. Nearly all of this information pertains to shortnose sturgeon populations in river systems other than the Hudson. Since the 19 known populations of shortnose sturgeon are believed to be reproductively isolated (Draft Biological Opinion, p. 20), this information is

---

[8] *See* Draft Biological Opinion, p. 119 ("All impinged sturgeon are expected to die, immediately or later, as a result of interactions with the facility.").

[9] Draft Biological Opinion, p. 121 (emphasis supplied). *See also* Draft Biological Opinion, p. 123, Term and Condition #4 (discussing necropsy for dead specimens).

irrelevant to the Draft Biological Opinion. Similarly, Sections 4.2, 4.3, and 4.4 contain lengthy discussions of the life history, status, trends, and threats to recovery for the Gulf of Maine, New York Bight, and Chesapeake Bay Distinct Population Segments ("DPS") of Atlantic sturgeon. Since the NMFS concludes elsewhere (Section 7.1.2.2) that only Atlantic sturgeon spawned in the Hudson River are subject to impingement at IPEC, Sections 4.2, 4.3, and 4.4 are irrelevant to the objectives of the Draft Biological Opinion. The presence of this extraneous content is potentially misleading, because readers may inappropriately conclude that threats such as chemical exposures, boat strikes, or elevated temperatures that have been found to affect sturgeon in other river systems are applicable to the Hudson River as well.

The relevant characteristics of the Hudson River population of shortnose sturgeon are adequately discussed in Section 4.5. The relevant characteristics of the Hudson River spawning population of Atlantic sturgeon are discussed in Section 4.6. Sections 4.1-4.4 are not necessary and could be deleted without compromising the objectives of the Draft Biological Opinion.

2. Typographical/Stenographic Corrections

Entergy noted a series of instances in which numbers used in the Draft Biological Opinion appeared to be in error, although none of these impacts the final incidental take limits which Entergy believes have been appropriately calculated. These suggested corrections are for internal consistency within the document:

Page	Paragraph	Line	Existing Text	Corrected Text
88	4	3	265 Atlantic	219 Atlantic
89	3	4	24 shortnose	26 shortnose
110	2	4	20 shortnose	26 shortnose
110	2	4	444 shortnose	562 shortnose
110	2	10	444 shortnose	562 shortnose
110	2	14	0.8%	1.0%
110	2	16	0.2%	0.05%
111	3	5	0.8%	1.0%
112	1	1	24 shortnose	26 shortnose
115	4	3	12 juveniles	10 juveniles
116	3	1	102 juvenile	10 juvenile
123	4	3	(12 and 5	(13 and 5

3. The description of the operation of the modified Ristroph screens and fish returns is inaccurate.

On page 13, the Draft Biological Opinion describes the operation of the modified Ristroph screens and fish return systems at Indian Point. That description indicates that fish contained in the water-filled buckets on the screen are washed onto a "mesh," which is not correct. Any fish contained in the water-filled buckets is washed out by the low-pressure spray of ambient river water into a fiberglass sluice which carries the fish in flowing water of sufficient depth through the fish return system to the Hudson River. The screens themselves consist of fine mesh to reduce the potential for abrasion, but the fish are not washed onto a mesh after exiting the water-filled fish bucket.

4. The list of permittees under scientific research permit #1580 is incomplete.

On page 43, the Draft Biological Opinion refers to scientific research permit #1580 (originally issued as #1254, for the Hudson River Biological Monitoring Program) as "issued to Dynegy." Entergy notes that (1) by letter dated September 14, 2001, NMFS added Entergy and Mirant Bowline to this permit as additional permitted agents, and (2) the current permit is issued to Entergy, not Dynegy.

D. Comments Related to Monitoring and Reporting

Entergy agrees, as NMFS has suggested, that an appropriate monitoring program should be developed with NMFS's input and oversight for documenting incidental takes, and looks forward to that process. *See* Draft Biological Opinion, pp. 120-121. Entergy respectfully requests sixty (60) days from the date of finalizing the Draft Biological Opinion to develop such a plan, and that the implementation schedule for that plan be determined based upon the scope and extent of the plan that actually is developed. Entergy also notes that any implementation schedule may need to account for authorizations of other regulators, including NRC.

At this time, however, Entergy would simply like to note several points for purposes of advancing the discussion of the monitoring and reporting program. First, as discussed above, both IP2 and IP3 are equipped with modified Ristroph screens and fish return systems that are continuously operated whenever cooling water is withdrawn from the Hudson River and designed to automatically return impinged fish to the Hudson River at locations found to minimize re-impingement with little or no adverse effect, particularly with respect to hardy species such as sturgeon. Additional handling of these fish for the purpose of monitoring (*e.g.*, diverting the fish into a sampling device for subsequent length, weight and tissue sampling for genetic testing) will increase the potential for injury and could result in inadvertent mortality, thereby frustrating the very purpose of the installation and operation of the screens and fish

returns. As such, Entergy looks forward to developing a monitoring program that is sensitive to the potential for additional handling stress on individual fish – one that reduces mortality.

Second, Entergy and NMFS agree that any sturgeon impinged at the trash racks will have been dead or moribund prior to impingement there:

> If through-rack velocity at the trash racks in front of IP1, IP2 and IP3 is 1.0 fps, as reported by Entergy, we would not anticipate any impingement of shortnose sturgeon at the trash racks. That is because sturgeon that are big enough to not be able to pass through the racks (*i.e.*, those that have body widths greater than three inches) would be adults. These fish are able to avoid impingement at velocities of up to 3 feet per second and should be able to readily avoid getting stuck on the trash racks.

Draft Biological Opinion, p. 65. Because velocities through the trash rack are certainly less than 3.0 fps, Entergy respectfully questions the need for any monitoring of the trash racks, and requests that it be omitted from the final Biological Opinion. Any impingement event occurring at the trash racks will not be the result of Indian Point operations, but, instead, will be the result of the moribund or deceased condition of the sturgeon prior to impingement. Thus, monitoring will not advance an understanding of impingement events related to Indian Point's operation. Should sturgeon be collected from the trash bars, Entergy would be amenable to delivering such specimens to appropriate locations for further study.

Third, the monitoring program described in the Draft Biological Opinion also calls for monitoring of river water at the trash racks and/or Ristroph screens. Entergy already monitors, on a continuous basis, the intake water temperature at a location just downstream of the intake pumps and does not expect there to be any reason that the temperature measured at this location would be materially different from the temperature in the intake forebay, located just a few feet away. Thus, Entergy anticipates making use of existing temperature measuring devices – and perhaps other in-place equipment – as it develops its monitoring program.

Finally, Entergy believes that terms and conditions numbers 7 and 8 (related to reporting of monitored impingement events) should be combined into a single notification requirement. Given the low numbers of shortnose and Atlantic sturgeon expected to be impinged annually, and the likelihood that impingement will vary substantially from month to month and year to year due to natural environmental variability, the reporting requirements prescribed by NMFS would not be biologically meaningful. Historically, most impingement of shortnose sturgeon has occurred between January and May, and most impingement of Atlantic sturgeon has occurred between January and June. NMFS' own projections of expected future impingement (Figure 3, page 64, and Figure 8, page 84) are consistent with this pattern. Hence, in a typical year, the

50% thresholds for both species are likely to be reached during the spring. Since impingement is expected to be low for the remainder of the year, there is no scientific justification for NMFS to consider whether additional mitigation or monitoring is warranted after the 50% threshold has been reached. Moreover, the annual take levels specified by NMFS (25 shortnose sturgeon and 10 Atlantic sturgeon) are expected values calculated from the overall take limits for the licensing periods of IP2 and IP3. On average, it would be expected that these levels would be exceeded in 50% of years through chance alone. Accordingly, Entergy requests that NMFS clarify that these take limits apply to the entire period covered by the final Biological Opinion and not to single years within that period, and that the take of more than 1/20th of the limit in a single year does not constitute a violation.

Entergy believes that re-initiation of consultation is warranted only if sturgeon impingement exceeds the annual take level by a significant amount during several consecutive years. Entergy proposes to notify NMFS and NRC in writing if impingement mortality of either shortnose or Atlantic sturgeon exceeds 1/20th of the total limit for three consecutive years (*i.e.* 30 or more shortnose sturgeon each year for three consecutive years or 12 Atlantic sturgeon each year for three consecutive years). This notification would be provided as part of the annual incidental take report for the third year in which the take level has been exceeded by 20%.

****

As a final point, Entergy notes that the Draft Biological Opinion provides summaries of various matters outside of the scope of NMFS's Draft Biological Opinion and/or NMFS's authority. These include the status of IP2 and IP3's NRC license renewal applications, historic NRC authorizations for IP2 and IP3, NMFS's historic authorization of IP2 and IP3's current operations relative to shortnose sturgeon, the application of §316(b) of the Clean Water Act, the history of the NPDES/SPDES permitting and WQC issuance for IP2 and IP3, and the status of the SPDES and WQC Proceedings pending before NYSDEC Administrative Law Judges ("ALJs"). *See* Section 1.0 through 3.3, and elsewhere where statements from these sections are echoed or repeated.

Entergy respectfully states that these matters are irrelevant to the issue to be addressed – *i.e.*, whether the proposed federal action is likely to jeopardize the continued existence of the shortnose sturgeon or Atlantic sturgeon in the Hudson River – and outside of NMFS' authority, expertise or knowledge. Although there are numerous misstatements or errors in the Draft Biological Opinion's discussion of these matters, providing comments in these areas would unnecessarily complicate the important process of providing comments on the matters *within* NMFS's authority in the Draft Biological Opinion. Examples include incorrect statements that NRC licenses for IP2 and IP3 "will expire," *see* Draft Biological Opinion, p. 3, when in fact the licenses are subject to timely renewal, as NMFS elsewhere acknowledges. They also include the

incorrect assertion that NYSDEC's 1982 WQC did not address all applicable water quality standards ("WQS"), when New York law requires that a WQC reach a determination on all WQS. *See* Draft Biological Opinion, p. 9. These statements, and others, while inaccurate, have no effect on the underlying determination NMFS has made. Thus, Entergy is not commenting on NMFS' recitation of any of these irrelevant or inaccurate matters, but expressly reserves its rights to do so in the future, including by taking any legal or factual position in any ongoing or future administrative or judicial proceeding related to IP2 or IP3 to establish any errors in NMFS's Draft Biological Opinion.

Entergy appreciates this opportunity to provide these comments on the Draft Biological Opinion, and looks forward to the completion of consultation and the issuance of the Final Biological Opinion on the schedule agreed to by NMFS, NRC and Entergy. Entergy likewise looks forward to final resolution of the monitoring program, as proposed in the Draft Biological Opinion. If you have any questions regarding these comments, please do not hesitate to contact me.

Sincerely,

RHF

Elise N. Zoli

Elise N. Zoli

enclosure 3

RIVERKEEPER.
NY's clean water advocate

November 23, 2012

VIA U.S. MAIL AND ELECTRONIC MAIL

John K. Bullard
Regional Administrator
National Marine Fisheries Service
Northeast Region
55 Great Republic Drive
Gloucester, MA 01930
john.bullard@noaa.gov

Julie Crocker
Fisheries Biologist
National Marine Fisheries Service
Northeast Region
55 Great Republic Drive
Gloucester, MA 01930
julie.crocker@noaa.gov

Julie Williams
Attorney-Advisor
National Marine Fisheries Service
Northeast Region
55 Great Republic Drive
Gloucester, MA 01930
julie.williams@noaa.gov

Re: NMFS' 10/26/12 Draft Biological Opinion for Continued Operations of the Indian Point Nuclear Generating Station, F/NER/2012/02252

Dear Ms. Kurkul, Ms. Crocker, & Ms. Williams:

Please accept the following comments on behalf of Riverkeeper, Inc. ("Riverkeeper") regarding National Marine Fisheries Service's ("NMFS") draft Biological Opinion ("draft BiOp") on the effects of the proposed continued operation of Indian Point Nuclear Generating Station ("Indian Point") Units 2 and 3 on endangered aquatic resources in the significant and historic Hudson River, dated October 26, 2012. While initial Endangered Species Act ("ESA") § 7 consultations regarding the proposed relicensing of Indian Point commenced in December 2010, considered the impacts of the operation of Indian Point on endangered shortnose sturgeon, and resulted in the issuance of a final Biological Opinion on October 14, 2011, formal consultation was reinitiated in May 2012 in light of the recent listing of Atlantic sturgeon as endangered on February 6, 2012. NMFS' new draft BiOp considers the impact of Indian Point on the Atlantic sturgeon, which occur in the Hudson River and are known to be affected by the operation of the plant, and, when finalized, will amend and supersede the agency's previous final BiOp relating to this matter.

Riverkeeper is a non-profit environmental watchdog organization that is committed to the protection of the aquatic ecology of the Hudson River, including endangered shortnose sturgeon and Atlantic sturgeon that reside in the river. To this end, Riverkeeper has historically been engaged in advocacy activities and legal actions involving Indian Point, and, as you are likely aware, is currently a party to the Indian Point operating license renewal proceeding pending before the U.S. Nuclear Regulatory Commission ("NRC"), the Indian Point State Pollutant Discharge Elimination System ("SPDES") permit renewal proceeding, and the Indian Point Clean Water Act ("CWA") § 401 Water Quality Certification ("WQC") appeal proceeding, all of which implicate and involve endangered species issues. Moreover, Riverkeeper retains and regularly consults with the renowned expert fisheries biologists of Pisces Conservation Ltd., on issues pertaining to the aquatic ecology of the Hudson River, and impacts of power plant cooling water intake structures thereto. Riverkeeper is, therefore, well situated to provide feedback on the draft BiOp. Furthermore, consideration of Riverkeeper's comments on NMFS' draft BiOp is both necessary and appropriate pursuant to basic tenets of fairness, due process, and the Federal government's commitment to openness, transparency, and public participation.[1] Notably, during NRC and NMFS' initial ESA § 7 consultation relating to the proposed relicensing of Indian Point, upon Riverkeeper's request, NMFS provided a copy of the draft BiOp, and Riverkeeper greatly appreciated the opportunity to review it and provide NMFS with relevant and important comments.[2] Riverkeeper thanks NMFS in advance for once again accepting and considering the comments submitted herein prior to any issuance of a final Biological Opinion ("final BiOp").

In particular, Riverkeeper respectfully submits the following comments and concerns relating to NMFS' new draft BiOp:

The Usefulness of Issuing a Final BiOp at this Time

As discussed in Riverkeeper's comments on NMFS' previous draft BiOp, Riverkeeper continues to question the appropriateness and efficacy of issuing a final BiOp at this time, in light of the uncertain status of ongoing State legal proceedings involving Indian Point.

[1] The opportunity to review and comment on the draft BiOp would facilitate Riverkeeper's ability to meaningfully participate in the aforementioned ongoing legal proceedings involving Indian Point and to act as a public advocate, as well as foster an open process that Federal agencies are obligated to strive for. Moreover, given that Riverkeeper's position in various Indian Point proceedings is adverse to that of the owner of Indian Point, Entergy Nuclear Operations, Inc. ("Entergy"), and the NRC, it is patently unfair to allow a one-sided external review of the draft BiOp by only Entergy and the NRC.

[2] *See* Letter from D. Brancato (Riverkeeper) to P. Kurkul (NMFS), J. Williams (NMFS), and J. Crocker (NMFS) re: Draft Biological Opinion for License Renewal of the Indian Point Nuclear Generating Unit Nos. 2 and 3 (Sept. 15, 2011). Indeed, Riverkeeper's comments raised issues that NMFS considered (albeit, not entirely) prior to finalizing its BiOp concerning shortnose sturgeon, including whether accidental radiological leaks from Indian Point had impacted the endangered species in the Hudson River as well as the impact of the Indian Point Unit 1 cooling water intake on shortnose sturgeon – issues for which NMFS' initial draft BiOp was completely silent. *See id.* at 7-9; *see generally* Endangered Species Act Section 7 Consultation DRAFT Biological Opinion - Relicensing - Indian Point Nuclear Generating Station, F/NER/2009/00619; endangered Species Act Section 7 Consultation Biological Opinion - Relicensing - Indian Point Nuclear Generating Station, F/NER/2009t00619, at 49-51, 62.

During NMFS' earlier consultations, NMFS asked NRC to consider withdrawing its request for ESA § 7 consultation until the uncertainties related to the continued operations of Indian Point were resolved.[3] However, per NRC's request, NMFS "completed consultation, considering effects of the proposed action, as defined by NRC staff in the FEIS and BA,"[4] i.e., in relation to existing operations of the plant pursuant to 1987 SPDES permits. NMFS' new, October 26, 2012 draft BiOp take the same approach: while legal proceedings that will determine what new technology will be required to modify the operation of Indian Point's cooling water intake structures remain ongoing, NMFS again only considered "the effects of the operation of IP2 and IP3 pursuant to the . . . [1987] SPDES permits issued by NYDEC that are already in effect" since "NRC requested consultation on the operation of the facilities under the . . . existing [1987] SPDES permits, even though a new SPDES permit might be issued in the future."[5] Thus, while NMFS recognized that the implementation of technology that Entergy has proposed, cylindrical wedge wire screens, "will affect shortnose and/or Atlantic sturgeon in a manner and to a degree that is very different from the effects"[6] of existing operations, the draft BiOp once again only narrowly considers impacts of the current operations of the plant on endangered species in the Hudson River.

Riverkeeper continues to question the utility of the instant ESA § 7 consultation process. To begin with, because NYDEC has unequivocally denied Entergy a necessary CWA § 401 WQC, it is not clear that Indian Point will even continue to operate, in which case §7 consultation regarding the impact of 20 additional years of operating the plant on endangered species would be unnecessary. Without a new, valid CWA § 401 WQC, Indian Point cannot continue to operate.[7] While NYSDEC's determination to deny Entergy this necessary certification was definitive, and made within the statutory one-year timeframe contemplated by the CWA, Entergy chose to avail itself of an optional hearing process on the decision, and that process is currently ongoing. The likelihood that Indian Point may not continue to operate in the absence of a new WQC renders the usefulness of the instant ESA § 7 consultation process questionable.

Moreover, NMFS' analysis in the draft BiOp considering only *existing* operations pursuant to a 25-year old, outdated, administratively extended SPDES permit, is less than useful. The "current" SPDES permit is presently the subject of a renewal proceeding that will result in the modification of the current permit (since it will require the implementation of the best technology available for minimizing the adverse environmental impacts caused by the current operation of Indian Point's environmentally destructive once-through-cooling water intakes). The analysis and determinations required in NMFS' BiOp necessarily hinge and depend upon the

---

[3] *See* Letter from P. Kurkul (Regional Administrator, NMFS) to D. Wrona (Branch Chief, NRC), Re: Biological Opinion for License Renewal of the Indian Point Nuclear Generating Unit Nos. 2 and 3 (Oct. 14, 2011), at 1.

[4] *Id.*

[5] Endangered Species Act Section 7 Consultation, Draft Biological Opinion, Continued Operations of the Indian Point Nuclear Generating Station, F/NER/2012/02252 (NMFS Draft 10-26-12), at 7, 11.

[6] *Id.* at 11.

[7] *See generally* Letter from D. Brancato (Riverkeeper) to NRC Commissioners, Re: Entergy Nuclear Operations, Inc. (Indian Point Nuclear Generating Units 2 and 3), Docket Nos. 50-247-LR 50-286-LR (July 26, 2012), NRC ADAMS Accession No. ML12208A392.

outcome of that proceeding. It is simply unhelpful (as well as a waste of resources) to issue a final BiOp before the final outcome of the SPDES permit renewal proceeding is known.

The eventual outcomes of the ongoing State proceedings will determine if and how Indian Point might continue to operate, and, thus, more precisely, how the plant would impact endangered species in the Hudson River. NRC's continued request for § 7 consultation regarding a "proposed action" defined as the operation of Indian Point for 20 additional years pursuant to its *existing* (i.e., 1987 administratively extended) SPDES permit remains inappropriate and largely ineffective. As such, Riverkeeper once again opines that issuing a final BiOp at this time that is based on completely inaccurate and irrelevant assumptions is neither appropriate nor useful.

It is advisable and necessary for NRC to either withdraw and hold in abeyance its request for §7 consultation pending the outcome of the State proceedings, *or*, request §7 consultation for a "proposed action" that includes and fully accounts for the reasonably foreseeable differing outcomes of these proceedings, and which will result in a thorough analysis of the respective impacts of such differing outcomes. The State proceedings are indisputably at a point where reasonably foreseeable outcomes are discernible; the likely outcomes of the State proceedings are as follows: (1) Indian Point will no longer continue to operate, (2) Entergy will install and operate a closed-cycle cooling system and potentially various other measures related to the water intakes at Indian Point, or (3) Indian Point will continue to operate for 20 years with a once-through cooling water system and cylindrical wedge wire screens.[8]

For example, Entergy's proposal that Indian Point be allowed to continue to operate with the installation of cylindrical wedge wire screens,[9] clearly requires additional analysis, as such screens would undoubtedly impact the benthic environment and shortnose and Atlantic sturgeon in the Hudson River: these screens would require an enormous set of underwater structures -- 144 screens each of 72 inches in diameter, made of a metal alloy with toxicity implications -- that would rest on the floor of the river, where, as NMFS' draft BiOp discusses at length, sturgeon are present for foraging, migrating, avoiding unsuitable thermal temperatures occurring at higher elevations, etc.[10]

---

[8] NRC has and may continue to argue that it would not be appropriate to speculate as to the outcome of the pending State proceedings, especially since, as NRC has repeatedly acknowledged, it does not have jurisdiction over issues related to Indian Point's state water permits. *See* In re Entergy Nuclear Operations, Inc. (Indian Point, Units 2 and 3), 68 NRC 43, *156-57 (2008) ("NRC is prohibited from determining whether nuclear facilities are in compliance with CWA limitations, assessing discharge limitations, or imposing additional alternatives to further minimize impacts on aquatic ecology that are subject to the CWA. . . [T]he NRC has promulgated regulations, specifically 10 C.F.R. § 51.53(c)(3)(ii)(B), to implement these specific CWA requirements that help assure that the Commission does not second-guess the conclusions in CWA-equivalent state permits, or impose its own effluent limitations . . . . It would be futile for the Board to review any of the CWA determinations, given that it is not possible for the Commission to implement any changes that might be deemed appropriate"). However, asking NMFS to perform a relevant analysis (as opposed to a completely irrelevant and useless one) would clearly not conflict with NRC's lack of authority to substantively opine on Indian Point's CWA-related permits. Moreover, as stated above, the State proceedings are clearly at a point where reasonably foreseeable outcomes are apparent.

[9] Riverkeeper maintains that such an outcome would not be in compliance with federal and state law.

[10] Notably, in the state CWA § 401 and SPDES proceedings, Entergy has failed to provide any analysis of the adverse environmental impacts associated with the construction and operation of a 144-screen array in the Hudson River.

In any event, it is axiomatic that NMFS' *relevant* analysis and conclusions must be taken into account in the Indian Point operating license renewal proceeding, and in NRC's ultimate licensing decision. The relicensing proceeding, from which the ESA §7 consultation obligation stems, and associated review processes are occurring now. The ESA §7 consultation is a critical aspect to these reviews. In particular, NMFS' analysis is a critical and necessary component of the National Environmental Policy Act ("NEPA") process in the Indian Point license renewal proceeding. Indeed, the Atomic Safety and Licensing Board ("ASLB") presiding over the Indian Point relicensing case had ruled that "NMFS's BiOp will aid the agency [i.e., NRC] in making its licensing decision in this [relicensing] proceeding. Without receipt and consideration of that input from NMFS, the NRC Staff arguably has not taken the requisite hard look at this issue."[11] As a result, the final environmental impact statement that NRC Staff has already issued in the Indian Point license renewal proceeding, in conjunction with a pending supplement to the final environmental impact statement that has yet to be finalized, will be inadequate without review and consideration of a final BiOp that analyzes all *relevant* issues.

Therefore, whether or not NRC's §7 consultation request is withdrawn until the State proceedings conclude, or whether or not NRC redefines the relevant "proposed action" to ensure an accurate and adequate analysis by NMFS, it is clear that NRC must factor NMFS' ultimate analysis and conclusions into the environmental review process concerning the proposed license renewal of Indian Point, and in the final decision regarding whether to grant renewed licenses for the plant.[12]

---

[11] In the Matter of Entergy Nuclear Operations, Inc. (Indian Point Nuclear Generating Units 2 and 3, Docket Nos. 50-0247-LR and 50-286-LR, ASLBP No. 07-858-03-LR-BD01, Memorandum and Order (Ruling on Pending Motions for Leave to File New and Amended Contentions (July 6, 2011), at 69-70.

[12] In the event NRC does not choose either of these options, and proceeds with consultation under the faulty assumption regarding how Indian Point would continue to operate, as NMFS has made clear, re-initiation of consultation will be necessary once the outcome of the State proceedings is known, to account for the inevitable new information and circumstances that will arise. Under such a scenario, NRC, at that time would be obliged to consider NMFS' new/additional analysis and conclusions in the Federal environmental review process concerning the proposed license renewal of Indian Point, and in the final decision regarding whether to grant renewed operating licenses to the facility. For example, as discussed above, should Entergy's proposal to implement cylindrical wedge wire screens at Indian Point ultimately prevail, a new assessment by NMFS would clearly be necessary, as such screens would impact shortnose and Atlantic sturgeon in the Hudson River, which will have to be accounted for in the Federal relicensing case.

Notably, given NRC's noted lack of jurisdiction over CWA-related issues, NRC may choose to not await the outcome of the Indian Point SPDES permit renewal proceeding before attempting to conclude the license renewal proceeding; additionally, while NRC may not issue renewed operating licenses for Indian Point unless the plant receives a valid CWA § 401 WQC, this does not prevent NRC from attempting to finalize and conclude all otherwise required analyses and review processes, or from reaching a determination about the appropriateness of relicensing Indian Point from a safety and environmental perspective, which could be executed in the event a valid §401 certification is issued. However, under no circumstances would it be legal for NRC to in any way preclude consideration of the ESA §7 consultation process in the relicensing proceeding: consideration of NMFS's assessment on endangered species impacts is necessary pursuant to NEPA. *See generally*, Riverkeeper, Inc. Consolidated Motion for Leave to File a New Contention and New Contention Concerning NRC Staff's Final Supplemental Environmental Impact Statement (Feb. 3, 2011), *accessible at*, http://www.nrc.gov/reading-rm/adams.html#web-based-adams, ADAMS Accession No. ML110410362 (proffering a legal contention asserting the insufficiency of NRC's final environmental impact statement for failure to account for the ESA §7 consultation process, which was later deemed a valid and adjudicable issue by presiding ASLB). Therefore, when, in the future,

In the event that NRC does not either withdraw and hold in abeyance its request for ESA §7 consultation pending the outcome of the State proceedings, or, request ESA §7 consultation for a redefined "proposed action" to ensure an accurate and adequate analysis by NMFS, and NMFS intends to issue a Final BiOp, Riverkeeper submits the following comments on the new draft BiOp.[13]

NMFS' Incidental Take Statement

NMFS' draft BiOp includes an Incidental Take Statement ("ITS") which exempts the take of 562 shortnose sturgeon impinged by Indian Point Units 1, 2, or 3 intakes throughout the proposed relicensing period, and 219 New York Bight ("NYB") Distinct Population Segment ("DPS") Atlantic sturgeon impinged by Indian Point Units 1, 2, or 3 intakes throughout the proposed relicensing period.[14] NMFS concludes that such losses of sturgeon caused by Indian Point over a proposed 20 period of extended operation are not significant.

Riverkeeper does not agree that such losses are appropriate or acceptable. Notably, sturgeon are an aspect of the designated use assigned to the Hudson River pursuant to the CWA; this designated use dictates that the Hudson River "shall be suitable for fish, shellfish, and wildlife propagation and survival."[15] Moreover, the historical existing use of the Hudson River as a sturgeon fishery is an established fact. The degree and appropriateness of the impact of Indian Point on endangered sturgeon in the Hudson River must be considered in view of these circumstances.[16]

In addition, due to the slow maturation process and intermittent spawning of shortnose and Atlantic sturgeon, (which NMFS' draft BiOp recognizes[17]), *any* impacts on this species may

---

NMFS assesses new, previously unanalyzed information arising out of the ultimate decisions in the now pending State proceedings, this will necessitate a supplemental review and analysis by the NRC in the license renewal proceeding pursuant to NEPA.

[13] Riverkeeper does not repeat, but incorporates by reference the comments previously submitted related to shortnose sturgeon (Letter from D. Brancato (Riverkeeper) to P. Kukul (NMFS), J. Williams (NMFS), and J. Crocker (NMFS) re: Draft Biological Opinion for License Renewal of the Indian Point Nuclear Generating Unit Nos. 2 and 3 (Sept. 15, 2011)), to the extent they were not adequately addressed or considered in NMFS' previous final BiOp, and, in turn, NMFS' current draft BiOp.

[14] Endangered Species Act Section 7 Consultation, Draft Biological Opinion, Continued Operations of the Indian Point Nuclear Generating Station, F/NER/2012/02252 (NMFS Draft 10-26-12), at 119.

[15] 6 NYCRR § 864.6; 6 NYCRR § 701.11.

[16] *See generally* Riverkeeper, Natural Resources Defense Council, and Scenic Hudson Petition for Full Party Status and Adjudicatory Hearing, (July 10, 2010), *accessible at*, http://www.riverkeeper.org/wp-content/uploads/2010/07/RK-NRDC-SH-Petition-for-Full-Party-Status-Indian-Point-401-WQC-scanned.pdf (last visited Nov. 20, 2012) at 31-34. Riverkeeper appreciates and understands the difference between the ESA and the CWA, but respectfully submits that the protections afforded to endangered resources pursuant to the CWA are relevant and important.

[17] Endangered Species Act Section 7 Consultation, Draft Biological Opinion, Continued Operations of the Indian Point Nuclear Generating Station, F/NER/2012/02252 (NMFS Draft 10-26-12), at 15, 24, 26.

have noticeable affects, and it is critical that such impacts are kept to a minimum. Fisheries Biologist Dr. Peter Henderson of Pisces Conservation Ltd has provided his expert opinion that these numbers are appreciable, and for "endangered long-lived species," "cannot be considered trivial."[18]

In relation to shortnose sturgeon, as Dr. Henderson explains, the special significance of the Hudson River to the species warrants particular protection.[19] Dr. Henderson points out that favorable recruitment of shortnose sturgeon may not persist given potential climate change impacts and explains the lack of scientific support for the claim that the population of shortnose sturgeon in the Hudson River is stable and at carrying capacity; Dr. Henderson further disagrees with NMFS' conclusion that the proposed relicensing of Indian Point will not necessarily affect the population of shortnose sturgeon in the Hudson River, since Indian Point will undoubtedly contribute to the reduction of the likelihood that individual sturgeons will reach old age; Moreover, Dr. Henderson explains that the lack of information on the range of mortality rates attributable to man and their combined impact on the Hudson River population of shortnose sturgeon is unclear.[20]

In relation to Atlantic sturgeon, Dr. Henderson explains that fate of Atlantic sturgeon in the Hudson River is important since recent spawning information is only known from the Hudson and Delaware rivers.[21] Dr. Henderson does not agree that the impingement of a small proportion of the juvenile population of Atlantic sturgeon will not necessarily jeopardize the continued existence of the species, since impingement mortality and habitat degradation hinder recovery.[22] Dr. Henderson explains that the indication that the population of Atlantic sturgeon is increasing is poor and does not properly ground NMFS' conclusion that the losses attributable to Indian Point are not significant, as well as the fact that, similar to shortnose sturgeon, combined effects related to Atlantic sturgeon are not well-quantified.[23]

Dr. Henderson has further explained to Riverkeeper that it is important to distinguish the impacts of power plant operations from other impacts such as fishing. For example, while there is a tendency to view power stations as another exploiter of a population like fishermen, this is not the case because if the population has a couple of poor recruitment years, it is possible for environmental managers to reduce the hunting take. That is, fishing activity can be actively managed and a response made quickly if a population gets into trouble. On the other hand, nuclear power plants, once given permission to operate, will continue to operate and do harm for many years. It is effectively impossible for the license of such a plant to be revoked or for the output and water use of a plant to be quickly changed because a population is getting into trouble. To the contrary, they are inflexible, and, as a result, cannot contribute to population management. Dr. Henderson has advised Riverkeeper that over long periods of 10-25 years, this

---

[18] Attachment 1 – Memorandum from Pisces Conservation Ltd, "Sturgeon and Indian Point," (Nov. 21, 2012) at 1.

[19] *Id.* at 1-2.

[20] *Id.*

[21] *Id.* at 2.

[22] *Id.*

[23] *Id.*

inflexibility is likely to become important and harmful as all populations will occasionally have hard times. Because of the particularly inflexible and detrimental impacts of power plants, care and caution must be taken over decisions involving such plants.

The expert assessment of Pisces Conservation Ltd clearly reveals that NMFS' conclusions exempting the take of endangered sturgeon in the Hudson River are not adequately founded.

In addition, NMFS' conclusions regarding the prospective impacts to endangered sturgeon from the ongoing, i.e., future, operation of Indian Point are not well-founded due to the fact that they are based on data that was collected over twenty years ago. That is, NMFS drew conclusions without any knowledge about the current *actual* impacts of Indian Point. As a result, NMFS' findings are arbitrary and inherently unreliable. As Dr. Henderson explains, the populations of both shortnose and Atlantic sturgeon have changed since data was collected, as well as plant operations and technical specifications; a notable example is that no sampling has been undertaken since Ristroph screens were installed, resulting in no relevant data on sturgeon survival.[24]

NMFS' Assessment of the Cumulative Impacts to Atlantic Sturgeon[25]

NMFS recognizes that Indian Point has had and (with the continued use of the existing once-through cooling water intake structure) will continue to have adverse impingement impacts on endangered Atlantic sturgeon in the Hudson River.[26] NMFS has concluded the loss of Atlantic sturgeon from the ongoing (existing) operation of Indian Point would "not appreciably reduce the likelihood that the NYB DPS of Atlantic Sturgeon will survive in the wild."[27]

However, it remains questionable whether NMFS has adequately assessed the losses of Atlantic sturgeon in the Hudson River in view of all Atlantic sturgeon entrainment- and impingement-related losses over *all* intakes of all the power plants in the Hudson River and other relevant waters. All of these intakes taken together are authorized to withdraw trillions of gallons of water every year.[28] While NMFS' draft BiOp makes cursory reference to the existence of other

[24] *Id.* at 1-2.

[25] Riverkeeper submitted concerns related to the inadequate consideration of cumulative impacts on shortnose sturgeon, which are incorporated by reference into the instant comments. *See* Letter from D. Brancato (Riverkeeper) to P. Kukul (NMFS), J. Williams (NMFS), and J. Crocker (NMFS) re: Draft Biological Opinion for License Renewal of the Indian Point Nuclear Generating Unit Nos. 2 and 3 (Sept. 15, 2011), at 5-7; *see also* Attachment 1 – Memorandum from Pisces Conservation Ltd, "Sturgeon and Indian Point," (Nov. 21, 2012) at 1-2.

[26] Endangered Species Act Section 7 Consultation, Draft Biological Opinion, Continued Operations of the Indian Point Nuclear Generating Station, F/NER/2012/02252 (NMFS Draft 10-26-12), at 14.

[27] *Id.* at 116.

[28] *See, e.g.*, NYSDEC Final Environmental Impact Statement Concerning the Applications to Renew New York State Pollutant Discharge Elimination System Permits for the Roseton 1 & 2, Bowline 1 & 2 and Indian Point 2 & 3 Steam Electric Generating Stations, Orange, Rockland and Westchester Counties, Hudson River Power Plants FEIS (June 25, 2003) (hereinafter "2003 DEC Hudson River Power Plants FEIS"), at 71 (Responses to Comments), *available at*, http://www.dec.ny.gov/docs/permits_ej_operations_pdf/FEISHRPP6.pdf (indicating in 2003 that "[t]he sheer volumes of water necessary to meet the HRSA [Hudson River Settlement Agreement] plants' cooling requirements are enormous. Together, Indian Point, Roseton, and Bowline are authorized to withdraw *1.69 trillion* gallons per year for cooling water . . . ") (emphasis added).

impingement related impacts to Atlantic sturgeon in the Hudson River, NMFS presents no analysis of the combined, total cumulative impacts to shortnose sturgeon, and no assessment of whether, *in light of such overall impacts*, the losses caused by Indian Point would appreciably affect the species in the river. As Dr. Henderson of Pisces Conservation Ltd has previously advised, a BiOp without such an analysis is deficient.[29]

In particular, if Indian Point might allegedly kill 219 individual Atlantic sturgeon over the proposed 20 year license renewal period for Indian Point, such losses must be considered as part of an overall loss from *all* water extraction activities. That is, NMFS must assess what losses all power plants combined inflict on Atlantic sturgeon.[30] NMFS' draft BiOp reveals an inadequate sense of the spatial extent of the Hudson River Atlantic sturgeon population or threats facing it.[31] There is a dearth of analysis of the cumulative impacts over the geographical range of this population. In addition, a cumulative impact assessment must also appropriately consider the combined impacts of other projects that affect endangered sturgeon in the Hudson River and NYB DPS, including the Tappan Zee Bridge Replacement Project; as NMFS' draft BiOp indicates, this transportation infrastructure project will result in impacts to endangered sturgeon.[32]

An adequate cumulative impact analysis is necessary in order to arrive at any ultimate conclusions regarding the impact of Indian Point on this endangered species, and, if appropriate, to determine further reasonable and prudent measures necessary to minimize impacts to Atlantic sturgeon. For example, if the combined impacts to Atlantic sturgeon are significant, then each plant must reduce its impact, even if each is not responsible for an appreciable number. NMFS cannot deem the losses caused by Indian Point acceptable in a vacuum, i.e., without putting such

---

[29] *See* Letter from D. Brancato (Riverkeeper) to P. Kukul (NMFS), J. Williams (NMFS), and J. Crocker (NMFS) re: Draft Biological Opinion for License Renewal of the Indian Point Nuclear Generating Unit Nos. 2 and 3 (Sept. 15, 2011),at 5-7; *see also* 2003 DEC Hudson River Power Plants FEIS, at 16, *available at*, http://www.dec.ny.gov/docs/permits_ej_operations_pdf/FEISHRPP3.pdf ("In addition to impingement and entrainment losses associated with the operation of CWIS, *another concern is the cumulative degradation* of the aquatic environment as a result of: (1) multiple intake structures operating in the same watershed or in the same or nearby reaches; and (2) intakes located within or adjacent to an impaired waterbody. . . . [T]here is concern about the effects of multiple intakes on fishery stocks") (emphasis added); *see also id.* at 54 (Responses to Public Comments), *available at*, http://www.dec.ny.gov/docs/permits_ej_operations_pdf/FEISHRPP5.pdf ("The actual draw-down [i.e., "[t]he direct reduction of the quantity of organisms within the water column by water intakes"] is likely even greater because the three HRSA generating plants (combined with other facilities in the same river reaches) *act cumulatively on the entire aquatic community*") (emphasis added).

[30] It is well known that other power plants impinge and entrain sturgeon, which the draft BiOp acknowledges and describes in part. *See also* NMFS Sturgeon Recovery Plan, at 55 ("The operation of power plants in the upper portions of rivers has the greatest potential for directly affecting sturgeon populations because of the increased incidence of entraining younger and more vulnerable life stages. Documented mortalities of sturgeon have occurred in the Delaware, Hudson, Connecticut, Savannah and Santee rivers. Between 1969 and 1979, 39 shortnose sturgeon were impinged at power plants in the Hudson River (Hoff and Klauda 1979).").

[31] For example, does the population extend into Long Island Sound and other areas of adjacent coast where it is impacted by other intakes?

[32] Endangered Species Act Section 7 Consultation, Draft Biological Opinion, Continued Operations of the Indian Point Nuclear Generating Station, F/NER/2012/02252 (NMFS Draft 10-26-12) at 44.

losses into proper context, and determining whether such losses are significant in light of all other relevant impacts to the species.

Similarly, while NMFS has concluded that the thermal plume at Indian Point is not likely to negatively affect Atlantic sturgeon in the vicinity of the plant, NMFS has failed to adequately assess the cumulative impacts of power plant thermal plumes on Atlantic sturgeon.[33] While it may be correct that Atlantic sturgeon will avoid water that is too warm for them, if there are numerous regions with plumes that are being avoided, NMFS must assess what total loss of habitat may be occurring and whether such loss is appreciable for the species in the Hudson River. This is especially important in light of global climate change, which NMFS recognizes will cause the water temperature of the Hudson River to rise over time. NMFS must view the thermal impacts of Indian Point with regard for the broader range of thermal impacts faced (and to be faced) by the species in the river.[34]

NMFS' overall conclusion is that the continued operation of Indian Point during Entergy's proposed 20 year period of extended operation "is not likely to jeopardize the continued existence of" NYB DPS of Atlantic sturgeon.[35] However, given NMFS' failure to properly view the losses of Atlantic sturgeon caused by the operation of Indian Point in light of total impacts to this species in the Hudson River, these conclusions are, as yet, dubious.

NMFS' Failure to Adequately Consider Impacts of Radiological Releases from Indian Point on Endangered Sturgeon

In contrast to NMFS' previous draft BiOp (which omitted any mention, let alone discussion and analysis of radiological discharges from Indian Point), NMFS' new draft BiOp does include a discussion of the potential impact of radionuclides from Indian Point on endangered sturgeon in the Hudson River. However, NMFS' analysis is not adequate to resolve all concerns related to the potential effects on shortnose and Atlantic sturgeon caused by the regular release of radionuclides directly to the Hudson River from Indian Point, as well as the toxic radionuclide laden contamination plumes that underlie the site, which undeniably migrate and release to the Hudson River.

NMFS discusses Entergy's REMP program, as well as a one-time enhanced radiological monitoring study conducted in 2007 (i.e., 5 years ago), and based on this information, concludes that "while shortnose and Atlantic sturgeon may be exposed to radionuclides originating from

[33] Riverkeeper has offered comments on the illegality of NYSDEC's proposed issuance of a 75-acre mixing zone to allow the facility to discharge heated effluent to the Hudson and expects that issues related to thermal considerations will be advanced to adjudication.

[34] *See* 2003 DEC Hudson River Power Plants FEIS at 71 (Public Comment Summary), *available at*, http://www.dec.ny.gov/docs/permits_ej_operations_pdf/FEISHRPP6.pdf (indicating in 2003 that "[t]ogether, Indian Point, Roseton, and Bowline are authorized to withdraw 1.69 trillion gallons per year for cooling water, and they discharge 220 trillion BTU of waste heat per year. The volume of once-through cooling water is raised between 15°F and 18°F, depending on the plant, or an average of 16.2°F"); *see also supra* Note 9 (discussing concerns relating to cumulative impacts to aquatic ecology of the Hudson River).

[35] Endangered Species Act Section 7 Consultation, Draft Biological Opinion, Continued Operations of the Indian Point Nuclear Generating Station, F/NER/2012/02252 (NMFS Draft 10-26-12), at 117.

Indian Point . . . any exposure is not likely to be at levels that would affect the health or fitness of any individual shortnose or Atlantic sturgeon. . . . Thus, NMFS considers the effects to shortnose and Atlantic sturgeon from radionuclides to be insignificant and discountable."[36] However, NMFS' limited review does not warrant such definitive and sweeping conclusions.

To begin with, it is necessary to clarify that the radiological contamination at Indian Point is not simply the result of past spent fuel pool leaks, which NMFS' draft BiOp seems to imply. In fact, decades of leaks from a variety of components, including the Unit 1 and Unit 2 spent fuel pools, but also underground pipes and structures, and other components, has resulted in extensive plumes of contamination (which contain, *inter alia*, highly toxic strontium-90 and cesium-137, as well as tritium) in the groundwater beneath the Indian Point plant. It is undisputed that this contamination leaches through the bedrock beneath Indian Point, and discharges to the Hudson River.[37] Other critical overlooked and unmentioned facts are that active current radiological leaks occur, future additional leaks are highly likely, and that any such leaks at Indian Point will add to the existing contamination plumes.[38] Entergy's current "remediation" methodology is Monitored Natural Attenuation,[39] and, thus, this contamination will persist in the groundwater and continually be discharged to the Hudson River throughout the proposed period of extended operation, and beyond.

In light of these circumstances, NMFS' assessment of the potential impact of radiological releases from Indian Point on endangered species in the Hudson River in its draft BiOp is wanting. In particular, NMFS has failed to consider cumulative impacts on endangered species due to ongoing and future radiological releases from Indian Point *throughout* the proposed relicensing period. It is undisputed that past fish samples have showed elevated levels of radionuclides, and there is every reason to believe, absent any enhanced and regular fish sampling scheme, that because the groundwater contamination at Indian Point directly discharges to the Hudson River, it may impact fish in the river during the proposed relicensing terms. Even if endangered species in the Hudson River are being exposed to "small" levels of radionuclides, NMFS has demonstrably failed to conduct the assessment necessary to found the sweeping conclusion that any such impacts are "insignificant and discountable." Relying on a *one-time* study that was conducted 5-years ago for an apparent assurance that the radionuclides attributable to Indian Point will not impact endangered resources through 2035 belies logic and science. Moreover, NMFS' reliance on Entergy's REMP program, which involves a relatively limited set of opportunistic sampling that does not involve sampling of bone, where Strontium-

---

[36] *Id.* at 102.

[37] *See* Groundwater Investigation Executive Summary (Indian Point Entergy Center, Buchanan, N.Y., Jan. 2008), at 1 ("The plumes ultimately discharge to the Hudson River to the West").

[38] *See generally*, Riverkeeper, Natural Resources Defense Council, and Scenic Hudson Petition for Full Party Status and Adjudicatory Hearing, (July 10, 2010), *accessible at*, http://www.riverkeeper.org/wp-content/uploads/2010/07/RK-NRDC-SH-Petition-for-Full-Party-Status-Indian-Point-401-WQC-scanned.pdf (last visited Nov. 20, 2012), at 39-48; Post-Hearing Closing Brief of Intervenors Riverkeeper, Natural Resources Defense Council, and Scenic Hudson Regarding Issue for Adjudication No. 3 – Radiological Materials (April 27, 2012), at 24-66.

[39] *See, e.g.*, GZA GeoEnvironmental, Inc., Hydrogeologic Site Investigation Report, Indian Point Energy Center (Jan. 7, 2008) ("The proposed remediation technology is source elimination/control . . . with subsequent Monitored Natural Attenuation, or MNA.")

90 is known to concentrate, is clearly inadequate to support an overall conclusion that radionuclides from Indian Point pose no danger to shortnose and Atlantic sturgeon in the Hudson River for the next 20+ years. Notably, Riverkeeper has questioned the legality of the accidental radiological releases from Indian Point to waters of NYS in State proceedings that are still pending. Those proceeding revealed Entergy's failure to demonstrate that radiological leaks will not adversely impact the aquatic ecology of the Hudson River, which includes endangered sturgeon species, during the proposed relicensing terms.[40]

The lack of adequate analysis by NMFS is particularly troubling given the known dangers of exposure to radioactive substances such as strontium-90 and tritium: Strontium-90 imitates calcium by concentrating in fish bones and shells of clams and blue crab. Clams are a major part of the diet of sturgeon found in the Hudson River. Riverkeeper, therefore, continues to be concerned that Hudson sturgeon are being exposed to elevated levels of this dangerous substance, opine that NMFS' assessment does not resolve these concerns.

In addition, Entergy has indicated that cesium contamination is present in Hudson River sediments in front of Indian Point and that this contamination is attributable in part to releases from Indian Point.[41] Entergy's plans to dredge such sediments in order to install cylindrical wedge wire screens on the river-bottom poses a clear risk to endangered sturgeon from radionuclides from Indian Point. Yet, NMFS has failed to consider such impacts. Notably, Entergy's lack of adequate information on the what levels of contaminants attributable to Indian Point are in the river sediments or how sediment discharges can and should be controlled[42] highlights the potential risks posed to endangered sturgeon species in the river that have not been accounted for.

NMFS' BiOp must properly analyze the potential effects of radiological releases and groundwater contamination at Indian Point on shortnose and Atlantic sturgeon. Assessing this issue is a critical aspect of NMFS' overall assessment of impacts to these endangered species, and should certainly be considered in terms of further necessary and appropriate reasonable and prudent measures that should be implemented at Indian Point. For example, appropriate measures include remediation and mitigation measures to assure that radiological contamination attributable to Indian Point does not discharge to the Hudson River in the first instance, which, according to representations from Entergy, is entirely possible.[43]

---

[40] *See generally* Post-Hearing Closing Brief of Intervenors Riverkeeper, Natural Resources Defense Council, and Scenic Hudson Regarding Issue for Adjudication No. 3 – Radiological Materials (April 27, 2012).

[41] IPEC CWW Dredging Step 1 – Draft White Paper Postulated Contamination Characterization (Nov. 2011). Notably, Riverkeeper filed a motion to reopen the record in the State adjudicatory proceedings to allow meaningful consideration of the information in this report, which came to light after hearings on the relevant issue concluded, in relation to how radiological leaks at Indian Point have impacted, or will impact, the Hudson River. While this motion was denied, the time to appeal the denial is still ongoing; moreover, the State tribunal has indicated that concerns related to the sediment issue can appropriately be raised in the context of hearings related to Entergy's cylindrical wedge wire screen proposal.

[42] *See id.*

[43] In the Matter of: Entergy Nuclear Indian Point 2, LLC, and Entergy Indian Point 3, LLC, For a State Pollution Discharge Elimination System Permit Renewal and Modification, DEC No.: 3-5522-00011/00004, SPDES No.: NY-0004472; Entergy Nuclear Indian Point 2, LLC, Entergy Nuclear Indian Point 3, LLC, and Entergy Nuclear

NMFS' Failure to Assess all Reasonable and Prudent Measures

NMFS concludes that potential losses of Atlantic sturgeon caused by Indian Point over a proposed 20 year period of extended operation are not significant, and therefore, exempts a certain level of impingement. As discussed above, NMFS' conclusions are, at a minimum, uncertain, given the extent of the take, and due to NMFS' failure to properly assess the cumulative impacts to sturgeon in the Hudson River. Moreover, Riverkeeper once again respectfully submits that, because of the slow maturation process and intermittent spawning of Atlantic sturgeon, (which NMFS' draft BiOp recognizes[44]), *any* impacts on this species may have noticeable affects, and that it is critical that impacts on Atlantic sturgeon are kept to a minimum.

In any event (that is, whether NMFS' overall conclusions are supportable or whether the impacts may be more significant than the draft BiOp concludes), due to the availability of a technology that would substantially reduce the impacts to Atlantic sturgeon caused by Indian Point, i.e., closed-cycle cooling,[45] Riverkeeper fails to understand why the draft BiOp does not assess the efficacy of this technology as a "reasonable and prudent measure"[46] to be implemented at the plant.

While Riverkeeper understands that the outcome of the NYDEC SPDES permit modification proceeding will ultimately determine whether closed-cycle cooling will be required at Indian Point, [47] there is no reason this should preclude NMFS from examining this technology, and

---

Operations, Inc. Joint Application for CWA § 401 Water Quality Certification, DEC App. Nos. 3-5522-00011/00030 (IP2), 3-5522-00105/00031, Transcript of Arbitration before Daniel P. O'Connell, ALJ, Maria E. Villa, ALJ, Reporter: Alan H. Brock, RDR, CRR, Farmer Arsenault Brock LLC (January 11, 2012, pages 3071-3344; January 23, 2012, pages 3895-4125), at 4041:2-6, 11-14, 4094:1-2, 18-21.

[44] Endangered Species Act Section 7 Consultation, Draft Biological Opinion, Continued Operations of the Indian Point Nuclear Generating Station, F/NER/2012/02252 (NMFS Draft 10-26-12), at 24, 26.

[45] Closed-cycle cooling systems require only a small fraction of the water which is required by once-through cooling systems, and since aquatic mortality is directly related to the amount of water use, a retrofit to a closed-cycle cooling system results in substantial reductions in aquatic mortality. *See* DEC Fact Sheet, New York State Pollutant Discharge Elimination System (SPDES) Draft Permit Renewal With Modification, Indian Point Electric Generating Station, Buchanan, NY – November 2003, at Attachment B, p.3, *available at* http://www.dec.ny.gov/docs/permits_ej_operations_pdf/IndianPointFS.pdf (last accessed Nov. 20, 2012) ("Closed-cycle cooling recirculates cooling water in a closed system that substantially reduces the need for taking cooling water from the River."); *see also, e.g.*, Network for New Energy Choices, *The Truth About Closed-Cycle Cooling* (2010), *available at*, http://www.newenergychoices.org/uploads/fishkill_truth.pdf (last accessed Nov. 20, 2012).

[46] *See* 50 C.F.R. § 402.02 ("*Reasonable and prudent measures* refer to those actions the Director believes necessary or appropriate to minimize the impacts, *i.e.*, amount or extent, of incidental take."); *see id.* § 402.14(g)(8) ("In formulating its biological opinion, . . . and any reasonable and prudent measures, the Service will use the best scientific and commercial data available. . ."); *see also id.* § 402.14(i)(ii) ("the Service will provide with the biological opinion a statement concerning incidental take that: . . . (ii) Specifies those reasonable and prudent measures that the Director considers necessary or appropriate to minimize such impact").

[47] As discussed at length above, in order for the consultation process to be meaningful and useful, NRC should request consultation regarding the reasonably foreseeable outcomes of the ongoing State proceedings, or, in the alternative, withdraw its request for consultation and initiate such consultation in the future after the State proceedings conclude. However, if NRC does not do this, and NMFS and NRC continue the consultation process

reaching independent conclusions about whether instituting this technology would be beneficial for endangered aquatic resources in the Hudson River.

Overall, NMFS' "Reasonable and Prudent Measures" fail to result in a net benefit to the endangered sturgeon populations in the Hudson River and NYB DPS. NMFS' "Reasonable and Prudent Measures" require monitoring of impingement, releasing any live sturgeon back to the river, performing necropsy's on any dead sturgeon, conducting genetic sampling of all impinged sturgeon, and reporting any sturgeon sightings near Indian Point.[48] While these measures are certainly important, altogether they fail to reduce the likely non-trivial impact Indian Point will have on endangered sturgeon in the Hudson River.

NMFS' Conservation Recommendations

Riverkeeper questions the efficacy and sufficiency of NMFS' "Conservation Recommendations" related to the impact of Indian Point on endangered sturgeon in the Hudson River. NMFS recommends that NRC ensure and/or require tissue analysis, impingement/entrainment/heat shock studies, thermal plume model studies, REMP samples of forage species, mortality studies, in-water assessments and abundance/distribution surveys in the Hudson River and Haverstraw Bay in particular, and studies to assess sturgeon interaction with Indian Point's thermal plume.[49]

To begin with, while these recommendations are important and will result in the existence of better information about the impact of Indian Point on endangered aquatic resources, as NMFS explains, such recommendations from NMFS to the NRC are "discretionary agency activities."[50] Riverkeeper questions the degree to which NRC will undertake *any* of NMFS' suggestions, given NRC's historical disinclination to "require" licensees to undertake any activities beyond what is specifically dictated by statutes and regulations. NRC has a noted history of ignoring important environmental considerations related to the operation of Indian Point, while taking the stance that the plant is in compliance with applicable laws and regulations. A level of assurance or plan to ensure that NRC meaningfully considers NMFS' Conservation Recommendations, is, therefore, advisable.

In any event, NMFS' Conservation Recommendations fail to achieve a net conservation benefit to the endangered sturgeon populations in the Hudson River.[51] That is, they demonstrably fail to mitigate the significant impact that Indian Point will have on endangered sturgeon during the proposed relicensing period. There is simply no mitigation plan articulated to ensure that endangered sturgeon are adequately protected during the proposed 20 additional years of operation Entergy is seeking for Indian Point.

---

based on the existing draft BiOp, the efficacy of a closed-cycle cooling system should still be analyzed before finalizing the BiOp.

[48] Endangered Species Act Section 7 Consultation, Draft Biological Opinion, Continued Operations of the Indian Point Nuclear Generating Station, F/NER/2012/02252 (NMFS Draft 10-26-12), at 120-21.

[49] *Id.* at 125.

[50] *Id.*

[51] *Id.*

Thank you for your consideration of the foregoing comments. Please do not hesitate to contact me at 914-478-4501, or via e-mail at dbrancato@riverkeeper.org, to discuss anything further.

Sincerely,

Deborah Brancato

Deborah Brancato
Staff Attorney

cc: Sherwin Turk
Office of General Counsel
Mail Stop: 0-15D21
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001
Sherwin.Turk@nrc.gov

ATTACHMENT 1

Memo: Pisces Conservation Ltd

To: Deborah Brancato (Riverkeeper)

From: Peter Henderson

Date: Wednesday, 21 November 2012

Re: Sturgeon and Indian Point

Summary Comments on NMFS' Draft BiOp

The first point to note is that it is recognised that impingement will kill appreciable numbers of sturgeon: "the continued operation of IP2 and IP3 . . . through the proposed extended license period . . . will result in the impingement and mortality of 562 shortnose sturgeon and 219 juvenile New York Bight DPS Atlantic sturgeon" (Draft BiOp at p.108). For endangered long-lived species, these numbers cannot be considered trivial. Imagine the concern if wind turbines were predicted to kill the same numbers of protected bird species.

A second key point is that all the calculations and predictions are based on data collected prior to 1991. Not only have the populations of both species likely changed since this period, but plant operation and technical specification has also changed. For example, no sampling has been undertaken since the Ristroph screens were installed. There is, therefore, no relevant data on sturgeon survival.

The species are considered in turn below.

Shortnose Sturgeon

The first point to note is the importance of the Hudson to this species. "The Hudson River population of shortnose sturgeon is the largest in the United States." (Draft BiOp at p.108). Given the poor health of many other populations, the Hudson is of special significance and merits particular protection.

Recruitment of this species varies appreciably through time and seems to be linked to conditions in the fall. Recruitment was particularly favourable 1986-1992 and this explains the increased population observed in the late 1990s. However, care must be taken not to assume such favourable recruitment will persist, particularly given potential climate change impacts.

To summarise the Draft BiOp, it concludes that the proposed action will not affect the shortnose sturgeon population because the number killed is a small proportion of the total population. It is claimed that the population is stable and possibly at carrying capacity, however, there is no evidence presented to scientifically support this finding.

The size and age structure of sturgeon populations must be considered in conjunction with numerical abundance. Historically populations of long-lived fish such as sturgeon held some old and very large individuals. Human interference has reduced the average age of the populations. Indian Point will contribute to this reduction as impingement losses effectively reduce the likelihood that an individual will reach old age.

While in-combination effect arguments are recognised, the lack of information on the range of mortality rates attributable to man and their combined impact on the Hudson population is unclear.

Atlantic Sturgeon

Recent spawning is only known from the Hudson and Delaware rivers; therefore, the fate of Atlantic sturgeon in the Hudson is of considerable importance.

The present information available on Atlantic sturgeon impingement and juvenile abundance is poor as it comes from pre-1991 studies. It is estimated that impingement will kill a small proportion of the juvenile population and, therefore, will not likely jeopardise the continued existence of the Atlantic Sturgeon. However, we seek a recovery of this species to levels where the population is sustainable and able to take the inevitable setbacks. Impingement mortality and habitat degradation do not contribute to, but hinder, recovery.

There is some indication that the population is presently increasing, but this is poor and gives no grounds to claim that power plant losses are of no import.

As with the shortnose sturgeon, in-combination effects are not well quantified.

Attachment 2

December 2010 NRC Revised Biological Assessment

Biological Assessment

Indian Point Nuclear Generating Plant, Unit Nos. 2 and 3
License Renewal

December 2010

Docket Nos. 50-247 and 50-286

U.S. Nuclear Regulatory Commission
Rockville, Maryland

Revised Biological Assessment of the Potential Effects on Federally Listed Endangered or Threatened Species from the Proposed Renewal of Indian Point Nuclear Generating Plant, Unit Nos. 2 and 3

Introduction and Purpose

The U.S. Nuclear Regulatory Commission (NRC) staff prepared this biological assessment (BA) to support the supplemental environmental impact statement (SEIS) for the renewal of the operating licenses for Indian Point Nuclear Generating Unit Nos. 2 and 3 (IP2 and IP3), located on the shore of the Hudson River in the village of Buchanan, in upper Westchester County, New York. The current 40-year licenses expire in 2013 (IP2) and 2015 (IP3). The proposed license renewal for which this BA has been prepared would extend the operating licenses to 2033 and 2035 for IP2 and IP3, respectively.

The NRC is required to prepare the SEIS as part of its review of a license renewal application. The SEIS supplements NUREG-1437, Volumes 1 and 2, "Generic Environmental Impact Statement for License Renewal of Nuclear Plants (GEIS)," (NRC 1996, 1999)[1] for the license renewal of commercial nuclear power plants. The SEIS covers specific issues, such as the potential impact on endangered and threatened species, that are of concern at IP2 and IP3 and that could not be addressed on a generic basis in the GEIS. The NRC staff published the draft SEIS in December 2008 (NRC 2008) and published the final SEIS on December 3, 2010 (NRC 2010).

Pursuant to Section 7 of the Endangered Species Act of 1973 (ESA), as amended, the NRC staff requested, in a letter dated August 16, 2007 (NRC 2007), that the National Marine Fisheries Service (NMFS) provide information on Federally listed endangered or threatened species, as well as on proposed or candidate species, and on any designated critical habitats that may occur in the vicinity of IP2 and IP3. In its response, dated October 4, 2007 (NMFS 2007), NMFS expressed concern that the continued operation of IP2 and IP3 could have an impact on the shortnose sturgeon (*Acipenser brevirostrum*), an endangered species that occurs in the Hudson River. NMFS also noted that a related species that also occurs in the Hudson River, the Atlantic sturgeon (*Acipenser oxyrinchus*), is a candidate species for which NMFS has proposed listing as endangered. The NRC staff has corresponded with NMFS regarding the Atlantic sturgeon, and requests that NMFS address Atlantic sturgeon to the extent appropriate (NMFS 2010).

Under Section 7, the NRC is responsible for providing information on the potential impact that the continued operation of IP2 and IP3 could have on the Federally listed species, the shortnose sturgeon. In addition, the NRC has prepared information regarding the potential impact on important species, including the Atlantic sturgeon; this information can be found in Chapters 2 and 4 of the SEIS (NRC 2010).

The NRC staff relied on data originally supplied by the applicant, Entergy Nuclear Operations, Inc. (Entergy) in preparing the BA for IP2 and IP3 in the draft SEIS (Entergy 2007b) but

[a] The GEIS was originally issued in 1996. Addendum 1 to the GEIS was issued in 1999. Hereafter, all references to the "GEIS" include the GEIS and its Addendum 1.

subsequently questioned the impingement data supplied by Entergy. The NRC staff sought, and Entergy later submitted revised impingement data (Entergy 2009). Mathematical errors in the original data submitted to the NRC (Entergy 2007b) apparently resulted in overestimates of the take of shortnose sturgeon that the NRC staff presented in the previous BA. The NRC staff found that the differences in the original (Entergy 2007b) and revised (Entergy 2009) data were of sufficient magnitude to possibly affect the staff's conclusions and has issued this revised biological assessment based on the revised data.

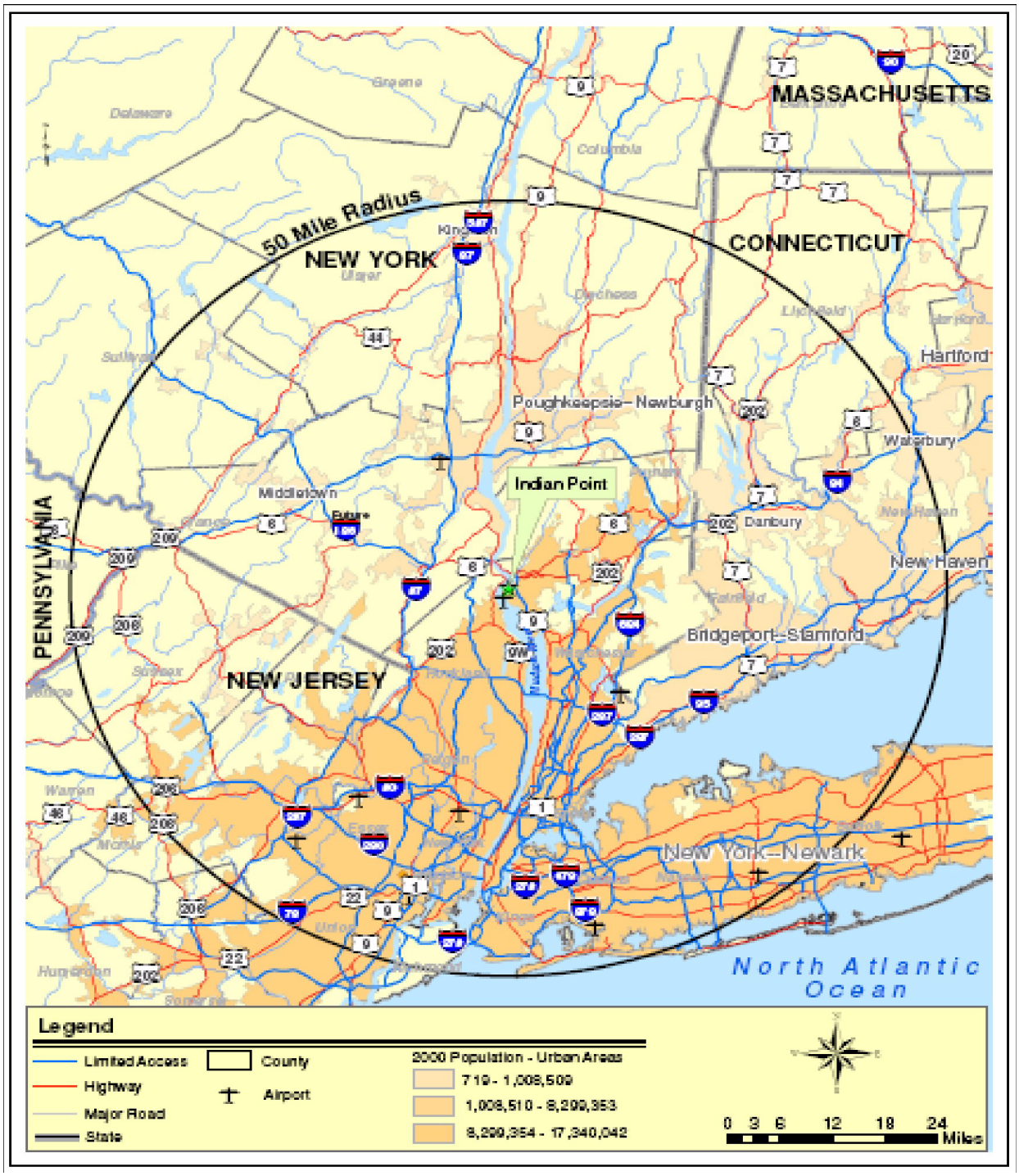
Proposed Action

The current proposed action considered in the SEIS is the renewal of the operating licenses for IP2 and IP3 for an additional 20-year term beyond the period of the existing licenses. The applicant has indicated that it may replace reactor vessel heads and control rod drive mechanisms during the period of extended operation. (For a description of these activities and potential environmental effects, see Chapter 3 of the SEIS.) If the NRC grants the operating license renewals, the applicant can operate and maintain the nuclear units, the cooling systems, and the transmission lines and corridors as they are now until 2033 and 2035.

Site Description

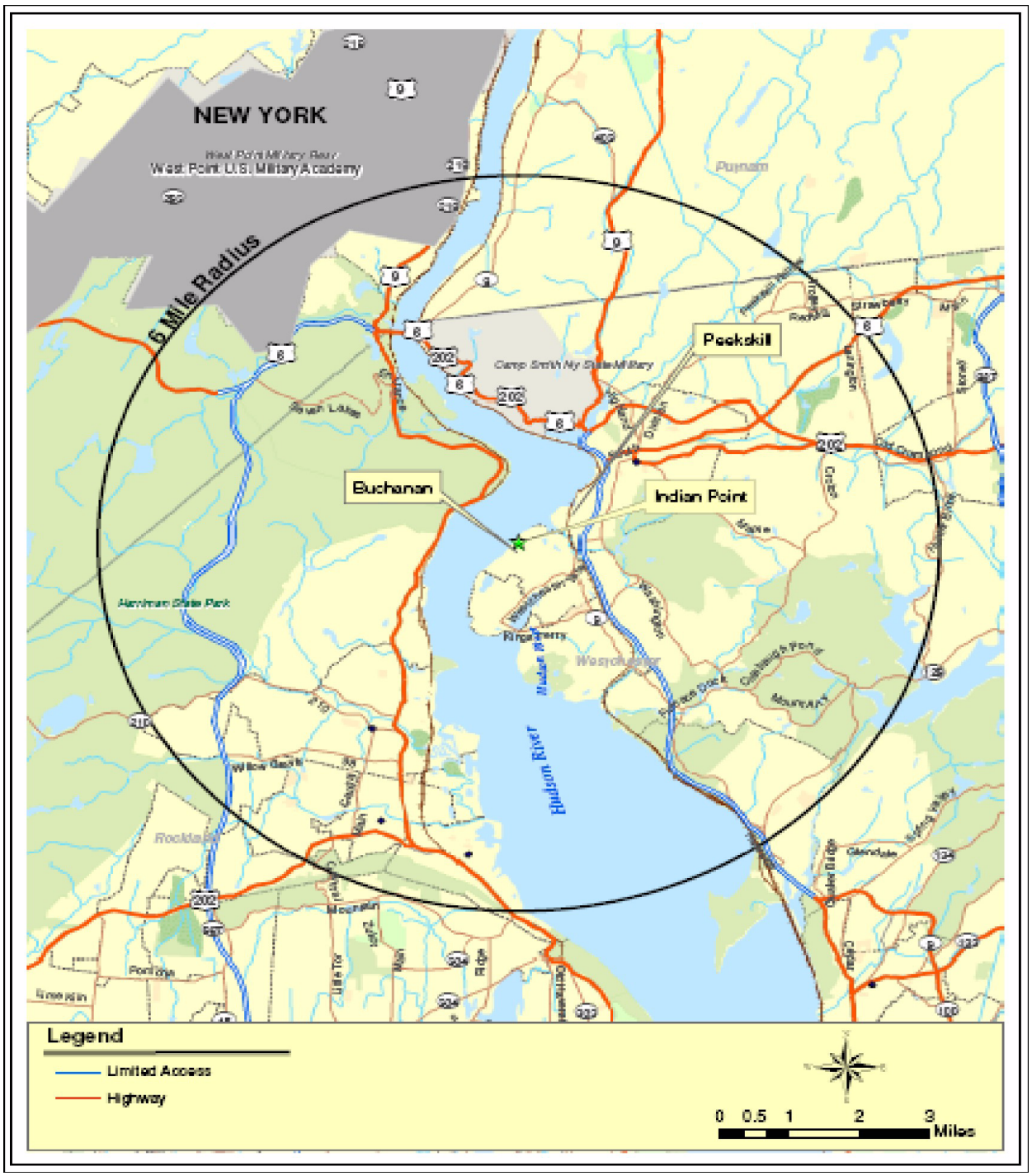
IP2 and IP3 are located on a 239-acre (97-hectare) site on the eastern bank of the Hudson River in the village of Buchanan, Westchester County, New York, about 24 miles (mi) (39 kilometers [km]) north of New York City, New York (Figures 1 and 2). Privately owned land bounds the north, south, and east sides of the property (Figure 3). The area is generally described as an eastern deciduous forest, dominated by oak (*Quercus*), maple (*Acer*), and beech (*Fagus*) species. The lower Hudson River is a tidal estuary, flowing 152 miles (244 km) from the Federal Dam at Troy, New York, to the Battery in New York City. IP2 and IP3 are located at River Mile (RM) 43 (RKM 69), where the average water depth is 40 feet (ft) (12 meters [m]), and the average width of the river is 4500 ft (1370 m). The Hudson River is tidal all the way to the Federal Dam, and the salinity zone in the vicinity of the facility is oligohaline (low salinity, ranging from 0.5 to 5 parts per thousand (ppt)), with the salinity changing with the level of freshwater flow. Water temperature ranges from a winter minimum of 34 degrees Fahrenheit (F) (1 degree Celsius (C)) to a summer maximum of 77 degrees F (25 degrees C) (Entergy 2007a).

The mid-Hudson River provided the cooling water for four other power plants: Roseton Generating Station, Danskammer Point Generating Station, Bowline Point Generating Station, and Lovett Generating Station; all four stations are fossil-fueled steam electric stations, located on the western shore of the river, and all use once-through cooling. Roseton consists of two units and is located at RM 66 (RKM 106), 23 mi (37 km) north of IP2 and IP3. Just 0.5 mi (0.9 km) north of Roseton is Danskammer, with four units. Bowline lies about five mi (eight km) south of IP2 and IP3 and consists of two units (Entergy 2007a; CHGEC 1999). Lovett, almost directly across the river from IP2 and IP3, is no longer operating.



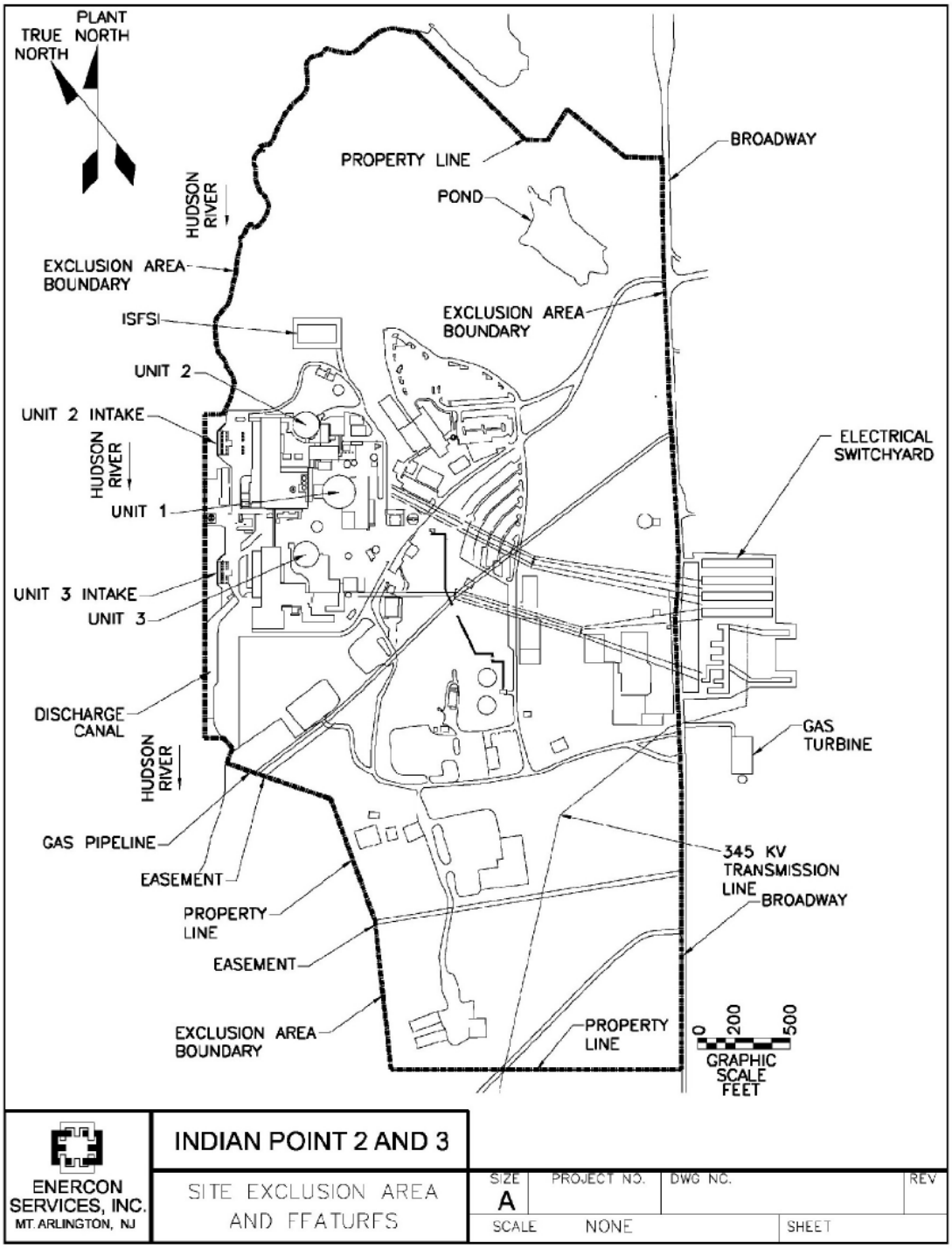
Source: Entergy 2007a

Figure 1: Location of IP2 and IP3, 50-mile (80-km) radius



Source: Entergy 2007a

Figure 2: Location of IP2 and IP3, 6-mile (10-km) radius

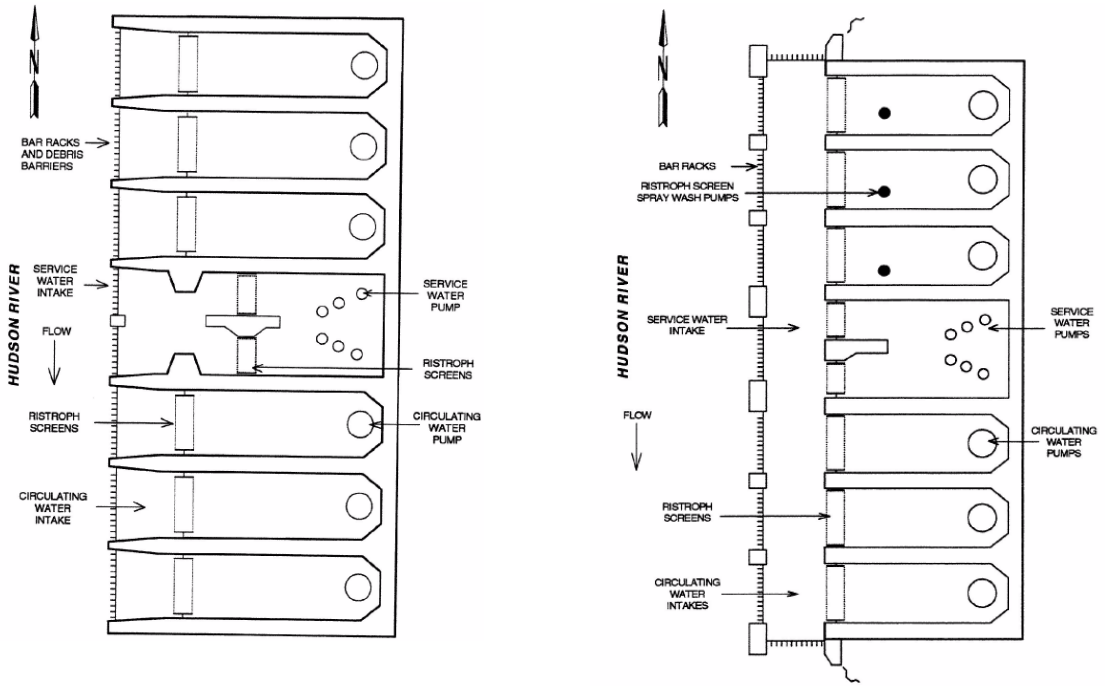


Source: Entergy 2007a

Figure 3: IP2 and IP3 property boundaries and environs

Description of Plants and Cooling Systems

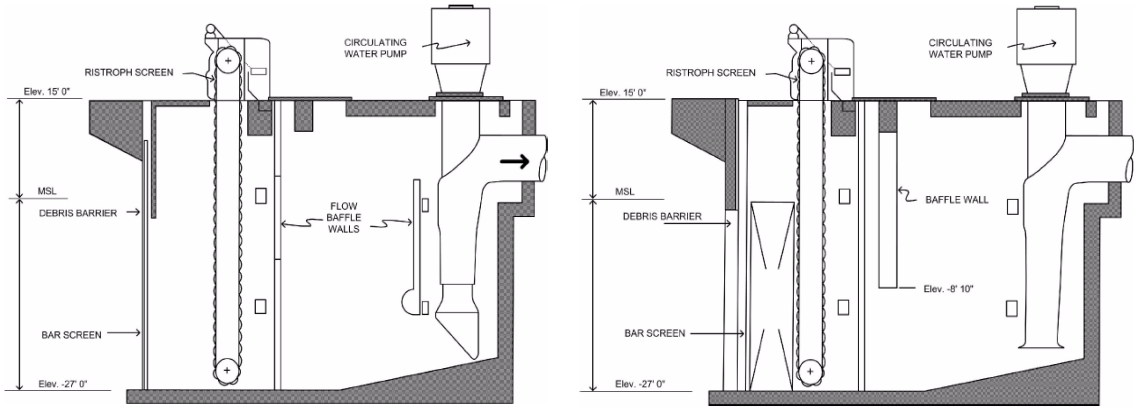
IP2 and IP3 are pressurized-water reactors with turbine generators that produce a net output of 6432 megawatts-thermal and approximately 2158 megawatts-electrical. Both IP2 and IP3 use water from the Hudson River for their once-through condensers and auxiliary cooling systems. Each unit has seven intake bays (Figure 4), into which the river water flows, passing under the floating debris skimmer wall and through Ristroph traveling screens (Figure 5). IP2 has six dual-speed circulating water pumps that can each pump 140,000 gallons per minute (gpm) (8.83 cubic meters per second [m^3/s]) at full speed and 84,000 gpm (5.30 m^3/s) at reduced speed; at full speed, the approach velocity is approximately 1 foot per second (fps) (0.30 meters per second [m/s]) and at reduced speed, the approach velocity is 0.6 fps (0.2 m/s). IP3 also has six dual-speed circulating water pumps. The full speed flow rate of each of these pumps is 140,000 gpm (8.83 m^3/s), with a 1 fps (0.30 m/s) approach velocity; the reduced speed is 64,000 gpm (4.04 m^3/s), with a 0.6 fps (0.2 m/s) approach velocity (Entergy 2007a).



Source: Entergy 2007a

Figure 4: IP2 intake structure (left) and IP3 intake structure (right)

The traveling screens employed by IP2 and IP3 are modified vertical Ristroph-type traveling screens installed in 1990 and 1991 at IP3 and IP2, respectively. The screens were designed in concert with the Hudson River Fishermen's Association, with screen basket lip troughs to retain water and minimize vortex stress (CHGEC 1999). Studies indicated that, assuming the screens continued to operate as they had during laboratory and field testing, the screens were "the screening device most likely to impose the least mortalities in the rescue of entrapped fish by mechanical means" (Fletcher 1990). The same study concluded that refinements to the screens would be unlikely to greatly reduce fish kills.



Source: Entergy 2007a

Figure 5: IP2 intake system (left) and IP3 intake system (right)

There are two spray-wash systems—the high-pressure spray wash removes debris from the front of the traveling screen mechanism; the low-pressure spray washes fish from the rear of the mechanism into a fish sluice system to return them to the river. A 0.25 x 0.5-inch (in.) (0.635 x 1.27-centimeter (cm)) clear opening slot mesh on the screen basket panels was included to minimize abrasion as the fish were washed into the collection sluice. The sluice system is a 12-in.-diameter (30.5-cm–diameter) pipe that discharges fish into the river at a depth of 35 ft (10.7 m), 200 ft (61 m) from shore (CHGEC 1999).

Status Review of Shortnose Sturgeon

Life History

The shortnose sturgeon (*Acipenser brevirostrum*, family Acipenseridae) is amphidromous, with a range extending from the St. Johns River, FL, to the St. John River, Canada. Unlike anadromous species, shortnose sturgeon spend the majority of their lives in freshwater and move into salt water periodically without relation to spawning (Collette and Klein-MacPhee, 2002). From colonial times, shortnose sturgeon have rarely been the target of commercial fisheries but have frequently been taken as incidental bycatch in Atlantic sturgeon and shad gillnet fisheries (NEFSC 2006; Dadswell et al. 1984). The shortnose sturgeon was listed on March 11, 1967, as endangered under the ESA. In 1998, NMFS completed a recovery plan for the shortnose sturgeon (NMFS 1998).

Shortnose sturgeon can grow up to 143 cm (56 in.) in total length and can weigh up to 23 kilograms (kg) (51 pounds [lb]). Females are known to live up to 67 years, while males typically do not live beyond 30 years. As young adults, the sex ratio is 1:1; however, among fish larger than 90 cm (35 in.), measured from nose to the fork of the tail, the ratio of females to males increases to 4:1. Throughout the range of the shortnose sturgeon, males and females mature at 45 to 55 cm (18 to 22 in.) fork length, but the age at which this length is achieved varies by geography. At the southern extent of the sturgeon's range, in Florida, males reach maturity at age two, and females reach maturity at six years or younger; in Canada, males can reach maturity as late as 11 years, and females, 13 years. In one to two years after reaching

maturity, males begin to spawn at two-year intervals, while females may not spawn for the first time until five years after maturing and, thereafter, spawn at three- to five-year intervals (Dadswell et al. 1984).

In the Hudson River, shortnose sturgeon migrate into freshwater to spawn during late winter or early summer when water temperatures are between 8 and 15 degrees C (NMFS 2009). Eggs sink and adhere to the hard surfaces on the river bottom, hatching after 4 to 6 days. Larvae consume their yolk sac and begin feeding in 8 to 12 days, as they migrate downstream away from the spawning site, remaining close to the river bottom (Kynard 1997; Collette and Klein-MacPhee 2002). The juveniles, which feed on benthic insects and crustaceans, do not migrate to the estuaries until the following winter, where they remain for three to five years. As adults, they migrate to the near-shore marine environment, where their diet consists of mollusks and large crustaceans (Dadswell 1984).

Status of Shortnose Sturgeon in Hudson River

Shortnose sturgeon inhabit the lower Hudson River; the Federal Dam creates a physical barrier preventing the species from swimming farther north. They are found dispersed throughout the river-estuary from late spring to early fall and then congregate to winter near Sturgeon Point (RM 86). Spawning occurs in the spring, just downstream of the Federal Dam at Troy, between RM 118 and 148 (between Coxsackie and Troy) (Bain et al. 2007; NMFS 2000). According to the NMFS environmental assessment (2000) for a permit for the incidental take of shortnose sturgeon at the nearby power plants, Roseton and Danskammer, larvae are typically found upstream of the intakes of all five power plants along the mid-Hudson River.

The Hudson River population of the shortnose sturgeon was estimated to be approximately 13,000 adults in 1979–1980. Based on population studies done in the mid-1990s, the population has apparently increased as much as 400 percent since then, up to almost 57,000 adult fish. Bain et al. (2007) suggested that the total population of the shortnose sturgeon in the Hudson River is approximately 61,000, including juveniles and nonspawning adults, although NMFS (2009) indicates that the adult population may be less than half that size (approximately 30,000 individuals). Woodland and Secor (2007) ascribed the population growth to several strong year-classes and two decades of sustained annual recruitment. Bain et al. (2007) maintained that the annual trawl surveys conducted by the electric utilities (CHGEC 1999) show an increase in abundance between the mid-1980s and mid-1990s, supporting the finding that the Hudson River population has increased. The NRC staff assessed the population trend for yearling and older shortnose sturgeon in the fall juvenile survey data provided by the applicant and found a small but statistically significant increase in the catch-per-unit-effort from 1975 to 2005.

Impact Assessment of Indian Point on the Shortnose Sturgeon Population Entrainment

The southern extent of the shortnose sturgeon spawning area in the Hudson River is approximately RM 118 (RKM 190), about 75 RM (121 RKM) upstream of the intake of IP2 and IP3 (NMFS 2000). The eggs of shortnose sturgeon are demersal, sinking and adhering to the bottom of the river, and, upon hatching, the larvae in both yolk-sac and post-yolk-sac stages remain on the bottom of the river, primarily upstream of RM 110 (RKM 177) (NMFS 2000). Shortnose sturgeon larvae grow rapidly, and, after a few weeks, they are too large to be

entrained by the cooling intake (Dadswell 1979). Because the egg and larval life stages of the shortnose sturgeon (the life stages susceptible to entrainment) are not found near the intake for IP2 and IP3, the probability of their entrainment at IP2 and IP3 is low.

IP2 and IP3 monitored entrainment from 1972 through 1987. Entrainment monitoring became more intensive at Indian Point from 1981 through 1987, and sampling was conducted for nearly 24 hours per day, four to seven days per week, during the spawning season in the spring (NMFS 2000). Entrainment monitoring reports list no shortnose sturgeon eggs or larvae at IP2 and IP3. NMFS (2000) lists only eight sturgeon larvae collected at any of the mid-Hudson River power plants (all eight were collected at Danskammer, and four of the eight may have been Atlantic sturgeon). Entrainment sampling data supplied by the applicant (Entergy 2007b) include large numbers of larvae for which the species could not be determined, although sturgeon larvae are distinctive and most likely were identified when they occurred. Entergy currently conducts no monitoring program to record entrainment at IP2 and IP3, and any entrainable life stages of the shortnose sturgeon taken in recent years would go unrecorded.

Based on the life history of the shortnose sturgeon, the location of spawning grounds within the Hudson River, and the patterns of movement for eggs and larvae, the number of shortnose sturgeon in early life stages entrained at IP2 and IP3 is probably low or zero. The available data from past entrainment monitoring do not indicate that entrainment was occurring. Therefore, the NRC staff concludes that the continued operation of Indian Point for an additional 20 years is not likely to adversely affect the population of shortnose sturgeon in the Hudson River through entrainment.

Impingement

IP2 and IP3 monitored impingement of most fish species daily until 1981, reduced collections to a randomly selected schedule of 110 days per year until 1991, and then ceased monitoring in 1991 with the installation of the modified Ristroph traveling screens. IP2 and IP3 monitored the impingement of sturgeon species daily from 1974 through 1990 (Entergy 2009). As described in Section 2.2.5.3 of the 2008 draft SEIS (NRC 2008) and the final SEIS (NRC 2010), the Ristroph screens, installed in 1990 and 1991, were designed in a collaborative effort with the Hudson River Fishermen's Association to minimize the mortality of impinged fish.

In 2000, NMFS prepared an environmental assessment (EA) for the incidental take of shortnose sturgeon at Roseton and Danskammer (NMFS 2000). The EA included the estimated total number (Table 1) of shortnose sturgeon impinged at Roseton, Danskammer, Bowline Point, Lovett, and IP2 and IP3, with adjustments to include the periods when sampling was not conducted.

Table 1: Estimated Total and Average Shortnose Sturgeon Impinged by Mid-Hudson River Power Plants, Adjusted for Periods Without Sampling

	1972–1998		1989–1998	
Power Plant	**Total**	**Average No. Impinged/Year**	**Total**	**Average No. Impinged/Year**
Bowline Point	23	0.9	0	0
Lovett	0	0	0	0
IP2	37	1.4	8	0.8
IP3	26	1.0	8	0.8
Roseton	49	1.8	15	1.5
Danskammer Point	140	5.2	44	4.4
Total	275	10.2	75	7.5

Source: Adapted from NMFS 2000.

Entergy (2009) provided revised shortnose sturgeon impingement data (Table 2), which are available through the NRC's online Agencywide Documents Access and Management System (ADAMS). The average impingement rate of shortnose sturgeon at IP2 and IP3 combined from 1975 through 1990 is about four fish per year. Appendix 1 to this BA reproduces detailed information from Entergy (2009) on the impinged fish. These data are the most recent and complete available.

An increase in the population of shortnose sturgeon in the Hudson River would most likely result in an increase in impinged shortnose sturgeon at IP2 and IP3. If the population data presented by Bain et al. (2007) and Woodland and Secor (2007) are accurate, then a four-fold increase in population between the mid-1980s and mid-1990s could result in a similar increase in impingement rates. Impingement data (Table 2), however, do not increase concomitantly with population through 1990. A population increase would mean that the population-level effect of taking an individual shortnose sturgeon would decrease.

When considering the effects of impingement, it is important to consider the affected species' impingement mortality rate. For IP2 and IP3, however, there are few data regarding the survival of the shortnose sturgeon after impingement. In 1979, NMFS issued a biological opinion (BO) relating to the take of shortnose sturgeon at Indian Point (Dadswell 1979). At the time, there was only one year in which records describing the status of impinged shortnose sturgeon were kept. In that year, 60 percent of collected impinged shortnose sturgeon were dead when collected. The BO assumed both that all dead sturgeon died as a result of the impingement and that no impingement-related mortality occurred after the impinged sturgeon were released.

Table 2: Estimated* Numbers of Impinged Shortnose Sturgeon from Impingement Monitoring at Indian Point Units 2 and 3

Year	Unit 2	Unit 3
1975	3	NA
1976	2	0
1977	11	2
1978	5	5
1979	4	3
1980	0	2
1981	0	0
1982	0	0
1983	0	0
1984	3	2
1985	0	0
1986	0	0
1987	0	2
1988	7	2
1989	0	2
1990	3	0
Yearly Mean	2.8	1.2
Sum of Unit Yearly Means	4.0	

*Numbers are corrected for collection efficiency and then rounded to whole numbers.
NA means data not available.
Source: Entergy 2009, ML091950345

The BO estimated that, in a worst-case scenario, 35 shortnose sturgeon would be impinged at IP2 and IP3 per year, and that 60 percent (21 individuals) would die on the intake screens. At the time, the population of adult shortnose sturgeon in the Hudson River was estimated to be 6,000, and this level of mortality would result in a 0.3 to 0.4 percent death rate caused by impingement at IP2 and IP3 (Dadswell 1979). The average yearly impingement rate from 1975 through 1990 based on revised data (Entergy 2009) is about four shortnose sturgeon, a rate almost an order of magnitude lower than Dadswell's (1979) worst-case assumption of 35 fish per year in the BO. Also, as stated above, the population of shortnose sturgeon in the Hudson River has increased and the population-level effect of IP2/IP3 impingement is thus lower than was previously estimated by NMFS in its BO.

Because all monitoring of impingement ceased after the Ristroph screens were installed in 1991, no updated mortality rate estimates for impinged shortnose sturgeon exist at IP2 and IP3. The NRC staff does not know the current level of impingement or the level of mortality. Although the laboratory and field tests (Fletcher 1990) performed on the modified Ristroph screens were not conducted using the shortnose sturgeon, the tests did show that injury and death were reduced for most species when compared to the first version of screens that were proposed (and rejected, based on their "unexceptional performance") (Fletcher 1990). If the NRC staff assumes that the modified Ristroph screens performed as well as the Fletcher's 1990 results indicated, then mortality and injury from impingement would be lower than reported by the NMFS in its BO (Dadswell 1979), and the impact to the species would be less. Without current monitoring, however, the NRC staff cannot confirm this.

In its BO, NMFS (Dadswell 1979) found that that operation of IP2 and IP3 is "not likely to jeopardize the continued existence of the shortnose sturgeon because, even assuming 100% mortality of the impinged fish, its contribution to the natural annual mortality is negligible." The NRC staff finds that the best estimate of takes of shortnose sturgeon by IP2 and IP3 based on revised data (Entergy 2009) is much less than that assumed by Dadswell (1979) in the NMFS BO, that installation of Ristroph screens since the original BO was prepared may have decreased the mortality rate of shortnose sturgeon that are impinged, and that the population of shortnose sturgeon in the Hudson River is increasing although impingement rates appear not to have increased concomitantly through 1990. The NRC staff recognizes the difficulties in drawing conclusions from two-decade old impingement data and incomplete impingement mortality data, but concludes that, based on the best available information, impingement and entrainment resulting from operation of IP2 and IP3 for an additional 20 years beyond the original license term are not likely to jeopardize the continued existence of the endangered shortnose sturgeon in the Hudson River.

Thermal Impacts

The discharge of heated water into the Hudson River can cause lethal or sublethal effects on resident fish, influence food web characteristics and structure, and create barriers to migratory fish moving from marine to freshwater environments.

State Pollution Discharge Elimination System (SPDES) permit NY-0004472 regulates thermal discharges associated with the operation of IP2 and IP3. This permit imposes effluent limitations, monitoring requirements, and other conditions to ensure that all discharges are in compliance with Article 17 of the Environmental Conservation Law of New York State, Part 704 of the Official Compilation of the Rules and Regulations of the State of New York, and the Clean Water Act. Specific conditions of the SPDES permit related to thermal discharges from IP2 and IP3 are specified by NYSDEC (2003) and include the following:

> The maximum discharge temperature is not to exceed 110 degrees F (43 degrees C).
>
> The daily average discharge temperature between April 15 and June 30 is not to exceed 93.2 degrees F (34 degrees C) for an average of more than 10 days per year during the term of the permit, beginning in 1981, provided that it not exceed 93.2 degrees F (34 degrees C) on more than 15 days during that period in any year.

The final environmental impact statement (FEIS) associated with the SPDES permit for IP2 and IP3 (NYSDEC 2003) concludes that "Thermal modeling indicates that the thermal discharge from Indian Point causes water temperatures to rise more than allowed." The thermal modeling referred to in the FEIS appears to represent a worst-case scenario; the modeling indicates the potential for the discharges from IP2 and IP3 to violate the conditions of the IP2 and IP3 SPDES permit, which could result in a negative impact on the shortnose sturgeon. IP2 and IP3 have not yet completed triaxial thermal studies, to completely assess the size and nature of the thermal plume created by the discharge from IP2 and IP3 and the possible impact on the sturgeon. The NRC staff understands, however, that Entergy has collected triaxial thermal data, and will submit a final, verified thermal model to NYSDEC in the next year.

According to the NMFS Final Recovery Plan for the Shortnose Sturgeon (NMFS 1998), "During summer months, especially in southern rivers, shortnose sturgeon must cope with the physiological stress of water temperatures that often exceed 82 degrees F (28 degrees C)." Although the area closest to the discharge from IP2 and IP3 can exceed these temperatures, the summer maximum temperature of the Hudson River in the area of IP2 and IP3 is 77 degrees F (25 degrees C) (Entergy 2007a). The combined discharge from both Indian Point units is about 1.75 million gpm (110 m^3/s), including the service water (Entergy 2007a). Table 3 presents the net downstream flow (controlling for the influence of tides) of the Hudson River at Indian Point. These data suggest that discharges from IP2 and IP3 equal, at most, 15% of the river flow 20% of the time, while up to 2% of the time, IP2 and IP3 discharges equal 97% or more of the downstream river flow. This variation – due to differences in seasonal precipitation, tidal influence, and other factors – suggests that discharges may mix in very different ways under different conditions.

Table 3: Cumulative Frequency Distribution of Net Downstream Flows of Hudson River

Million gallons per minute (gpm)	Cumulative percentile
11.7	20
6.8	40
4.71	60
3.1	80
1.8	98

Adapted from Entergy 2007a

The NRC staff cannot determine, based on available information, whether a shortnose sturgeon in the Hudson River would experience any prolonged physiological stress from the thermal plume caused by the discharge from IP2 and IP3. Shortnose sturgeon could be forced to seek refuge from elevated water temperatures as they are forced to do in southern rivers, and this could limit their available habitat. If studies reveal that the plume is buoyant, shortnose sturgeon could pass underneath the plume on their passage past the facility, but there are no data to indicate that this is the case.

As noted earlier, the NYSDEC thermal modeling of the Hudson River suggests that the discharge from IP2 and IP3 could exceed the limits specified in the SPDES permit, but without a triaxial thermal study, the exact size and nature of the thermal plume is unknown. Information about the species, based on the NMFS recovery plan, suggests that increased temperatures can have a significant effect on the shortnose sturgeon. Therefore, the NRC staff concludes that the continued thermal effects from operation of IP2 and IP3 for an additional 20 years could potentially adversely affect the population of shortnose sturgeon in the Hudson River through thermal discharge, but the staff is unable to determine the extent to which the population would be affected.

Conclusion

Renewal of the operating licenses of IP2 and IP3 to include another 20 years of operation could potentially adversely affect the population of shortnose sturgeon in the Hudson River due to the

thermal effects of once-through cooling. An analysis of the revised impingement data recently submitted by Entergy indicates that impingement and entrainment would not adversely affect the population of shortnose sturgeon. Sufficient information is not available at this time for the NRC staff to quantify the extent to which the shortnose sturgeon population could be affected by thermal effects, though forthcoming data is likely to provide additional information.

References

Bain, M.B., Haley, N., Peterson, D.L., Arend, K.K., Mills, K.E., and Sullivan, P.J. 2007. "Recovery of a US Endangered Fish," *PLoS ONE* 2(1): e168. Accessed at: http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0000168#s3 on December 11, 2007.

Central Hudson Gas and Electric Corporation (CHGEC), Consolidated Edison Company of New York, Inc., New York Power Authority, and Southern Energy New York. 1999. "Draft Environmental Impact Statement for State Pollutant Discharge Elimination System Permits for Bowline Point, Indian Point 2 and 3, and Roseton Steam Electric Generating Stations." ADAMS Accession No. ML083400128.

Collette, B.B. and Klein-MacPhee, G., eds. 2002. "Short-nosed sturgeon," *Bigelow and Schroeder's Fishes of the Gulf of Maine*, Third Edition, Smithsonian Institution Press: Washington, DC.

Dadswell, M.J. 1979. Testimony on behalf of the National Marine Fisheries Service, presented before the U.S. Environmental Protection Agency, Region II, May 14, 1979. ADAMS Accession No. ML083430546.

Dadswell, M.J., Taubert, B.D., Squiers, T.S., Marchette, D., and Buckley, J. 1984. "Synopsis of Biological Data on Shortnose Sturgeon, *Acipenser brevirostrum* LeSueur 1818," NOAA Technical Report NMFS-14, FAO Fisheries Synopsis No. 140. Accessed at: http://www.nmfs.noaa.gov/pr/pdfs/species/shortnosesturgeon_biological_data.pdf on December 11, 2007.

Entergy Nuclear Operations, Inc. (Entergy). 2007a. "Applicant's Environmental Report, Operating License Renewal Stage (Appendix E to Indian Point, Units 2 & 3, License Renewal Application)," April 23, 2007. ADAMS Accession No. ML071210530.

Entergy Nuclear Northeast (Entergy). 2007b. Letter from F. Dacimo, Vice President, Entergy Nuclear Northeast, to U.S. Nuclear Regulatory Commission Document Control Desk. Reference NL-07-156. Subject: Entergy Nuclear Operations, Inc., Indian Point Nuclear Generating Unit Nos. 2 & 3, Docket Nos. 50-247 and 50-286, Supplement to License Renewal Application (LRA)—Environmental Report References. December 20, 2007. ADAMS Accession Nos. ML080080205, ML080080209, ML080080213, ML080080214, ML080080216, ML080080291, ML080080298, ML080080306.

Entergy Nuclear Northeast (Entergy). 2009. Letter from F. Dacimo, Vice President, Entergy Nuclear Northeast, to U.S. Nuclear Regulatory Commission Document Control Desk. Reference NL-09-091. Subject: Transmission of Additional Requested Information Regarding Sturgeon Impingement Data Indian Point Nuclear Generating Unit Nos. 2 & 3 Docket Nos. 50-247 and 50-286 License Nos. DPR-26 and DPR-64. July 1, 2009. ADAMS Accession No. ML091950345.

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

Kynard, B. 1997. "Life history, latitudinal patterns, and status of the shortnose sturgeon *Acipenser brevirostrum*," *Environmental Biology of Fishes* 48: 319–334.

National Marine Fisheries Service (NMFS). No date. "Shortnose Sturgeon (*Acipenser brevirostrum*)," Office of Protected Resources (OPR). Accessed at: http://www.nmfs.noaa.gov/pr/species/fish/shortnosesturgeon.htm on December 11, 2007. ADAMS Accession No. ML083430566.

National Marine Fisheries Service (NMFS). 1998. "Recovery Plan for the Shortnose Sturgeon (*Acipenser brevirostrum*)," prepared by the Shortnose Sturgeon Recovery Team for the National Marine Fisheries Service, Silver Spring, Maryland. Accessed at: http://www.nmfs.noaa.gov/pr/pdfs/recovery/sturgeon_shortnose.pdf on December 11, 2007.

National Marine Fisheries Service (NMFS). 2000. "Environmental Assessment of a Permit for the Incidental Take of Shortnose Sturgeon at the Roseton and Danskammer Point Generating Stations." ADAMS Accession No. ML083430553.

National Marine Fisheries Service (NMFS). 2007. Letter from M. Colligan, Assistant Regional Administrator for Protected Resources, National Marine Fisheries Service to Chief, Rules and Directives Branch, U. S. Nuclear Regulatory Commission. Subject: Response to request for information regarding threatened and endangered species in the vicinity of Indian Point. October 4, 2007. ADAMS Accession No. ML073340068.

National Marine Fisheries Service (NMFS). 2009. Letter from M. Colligan, Assistant Regional Administrator for Protected Resources, National Marine Fisheries Service to Chief, Rules and Directives Branch, U. S. Nuclear Regulatory Commission. Subject: Biological Assessment for License Renewal of the Indian Point Nuclear Generating Unit Nos. 2 and 3. February 24, 2009. ADAMS Accession No. ML090820316.

National Marine Fisheries Service (NMFS). 2010. E-mail correspondence from J. Crocker to D. Logan, NRC. November 10, 2010. ADAMS Accession No. ML103400027.

New York State Department of Environmental Conservation (NYSDEC). 2003. "Final Environmental Impact Statement Concerning the Applications to Renew New York State Pollutant Discharge Elimination System (SPDES) Permits for the Roseton 1 and 2 Bowline 1 and 2 and IP2 and IP3 2 and 3 Steam Electric Generating Stations, Orange, Rockland and Westchester Counties," Hudson River Power Plants FEIS, June 25, 2003. ADAMS Accession No. ML083360752.

Nuclear Regulatory Commission (NRC). 1996. "Generic Environmental Impact Statement for License Renewal of Nuclear Power Plants," NUREG-1437, Volumes 1 and 2, Washington, DC.

Nuclear Regulatory Commission (NRC). 1999. "Generic Environmental Impact Statement for License Renewal of Nuclear Plants, Main Report," Section 6.3, "Transportation," Table 9.1, "Summary of Findings on NEPA Issues for License Renewal of Nuclear Power Plants," NUREG-1437, Volume 1, Addendum 1, Washington, DC.

Nuclear Regulatory Commission (NRC). 2007. Letter from R. Franovich to Mr. Peter Colosi, National Marine Fisheries Service, Gloucester, Massachusetts, "Re: Request for List of Protected Species and Essential Fish Habitat Within the Area under Evaluation for the Indian Point Nuclear Generating Unit Nos. 2 and 3 License Renewal Application Review," August 16, 2007. ADAMS Accession No. ML072130388.

Nuclear Regulatory Commission (NRC). 2008. "Generic Environmental Impact Statement for License Renewal of Nuclear Power Plants: Supplement 38, Regarding Indian Point Nuclear Generating Unit Nos. 2 and 3, Draft Report for Comment." NUREG-1437, Supplement 38, Volumes 1 & 2. December 22, 2008. Washington, DC. ADAMS Accession No. ML083540594.

Nuclear Regulatory Commission (NRC). 2010. "Generic Environmental Impact Statement for License Renewal of Nuclear Plants: Supplement 38, Regarding Indian Point Nuclear Generating Unit Nos. 2 and 3, Final Report." Final NUREG-1437, Supplement 38, Volumes 1, 2, and 3. December 3, 2010. Washington, DC. ADAMS Accession Nos. ML103350405, ML103350438, ML103360209, ML103360212, and ML103350442.

Shepherd, G. 2006. "Shortnose Sturgeon (*Acipenser brevirostrum*)," National Marine Fisheries Service (NOAA), Office of Protected Resources (OPR). Last updated in December 2006. Accessed at: http://www.nefsc.noaa.gov/sos/spsyn/af/sturgeon/archives/42_Atlantic_ShortnoseSturgeon_2006.pdf on December 11, 2007. ADAMS Accession No. ML083430573.

Woodland, R.J. and Secor, D.H. 2007. "Year-class strength and recovery of endangered shortnose sturgeon in the Hudson River, New York," *Transactions of the American Fisheries Society* 136:72–81.

Appendix 1 to Biological Opinion

This appendix presents a reproduction of Tables 2a, 2b and 4 from Entergy (2009) showing detailed information on shortnose sturgeon impinged at IP2 and IP3 for the years 1974 through 1990. The Entergy submittal is available at ADAMS Accession No. ML091950345.

Table 2a. Individual Data File Records of Shortnose Sturgeon Collected by Impingement at Indian Point Unit No. 2 in Each Year, 1974 through 1990.

Unit	Year	Taxon	Date	Sample Number	Total Weight (g)	Length (mmtl)	Condition (alive or dead)	H2O Temp (deg C)	Total Count	Table V-36 DEIS 1999	DSEIS 2008 Table 4-11	Coll. Eff. Adj_Cnt	Comments
2	1974	Shortnose Sturgeon	5-May-74	212508	532			7.0	1			2.19	
2	1974	Shortnose Sturgeon	20-Jun-74	217109	1702			21.5	1			3.02	
2	1974	Shortnose Sturgeon	8-Aug-74	222009	1588			25.7	1			3.39	
2	**Total 1974**	**Shortnose Sturgeon**							**3**	**3**	**NR**	**8.60**	**1974 not reported in DESIS Table 4-11**
2	1975	Shortnose Sturgeon	20-Jun-75	217109	84			23.0	1			3.14	
2	**Total 1975**	**Shortnose Sturgeon**							**1**	**1**	**3**	**3.14**	
2	1976	Shortnose Sturgeon	16-Feb-76	204708	253			2.5	1			2.01	
2	**Total 1976**	**Shortnose Sturgeon**							**1**	**2**	**2**	**2.01**	
2	1977	Shortnose Sturgeon	23-Jan-77	202309	516			0.5	1			1.94	
2	1977	Shortnose Sturgeon	23-Feb-77	205409	1800			3.0	1			2.03	
2	1977	Shortnose Sturgeon	2-Apr-77	209209	67			5.3	2			4.23	two fish combined; no individual records
2	1977	Shortnose Sturgeon	25-May-77	214509	73			19.2	1			2.85	
2	**Total 1977**	**Shortnose Sturgeon**							**5**	**6**	**11**	**11.06**	
2	1978	Shortnose Sturgeon	9-Jan-78	200904	27			1.7	1			1.98	
2	1978	Shortnose Sturgeon	14-Nov-78	231808	940			14.5	1			2.55	
2	**Total 1978**	**Shortnose Sturgeon**							**2**	**2**	**5**	**4.53**	
2	1979	Shortnose Sturgeon	28-Feb-79	205909	567			0.7	1			1.95	
2	1979	Shortnose Sturgeon	29-Apr-79	211908	625			10.9	1			2.36	
2	**Total 1979**	**Shortnose Sturgeon**							**2**	**2**	**4**	**4.31**	
2	**Total 1980**	**Shortnose Sturgeon**							**0**	**0**	**NR**	**0.00**	
2	**Total 1981**	**Shortnose Sturgeon**							**0**	**0**	**NR**	**0.00**	
2	**Total 1982**	**Shortnose Sturgeon**							**0**	**0**	**NR**	**0.00**	
2	**Total 1983**	**Shortnose Sturgeon**							**0**	**0**	**NR**	**0.00**	
2	1984	Shortnose Sturgeon	30-May-84	215108	673			17.8	1			2.75	
2	**Total 1984**	**Shortnose Sturgeon**							**1**	**1**	**176**	**2.75**	
2	**Total 1985**	**Shortnose Sturgeon**							**0**		**NR**	**0.00**	
2	**Total 1986**	**Shortnose Sturgeon**							**0**	**0**	**NR**	**0.00**	
2	1987	Shortnose Sturgeon	8-Mar-87	206707	127	320	D	3.0	1			2.03	
2	1987	Shortnose Sturgeon	27-Feb-87	NS	1845	710	A	4.3	1			2.08	
2	**Total 1987**	**Shortnose Sturgeon**							**2**	**1(1)**	**116**	**4.11**	
2	1988	Shortnose Sturgeon	1-Feb-88	NS	637	580	D	1.6	1			1.98	
2	1988	Shortnose Sturgeon	27-Apr-88	NS	1160	605	D	14.1	1			2.52	
2	1988	Shortnose Sturgeon	4-Nov-88	NS	1785	672	D	13.9	1			2.52	
2	**Total 1988**	**Shortnose Sturgeon**							**3**	**0(3)**	**NR**	**7.02**	
2	**Total 1989**	**Shortnose Sturgeon**							**0**	**0**	**NR**	**0.00**	
2	1989	Shortnose Sturgeon	18-Sep-90	NS	687	443	D	25.5	1			3.37	
2	**Total 1990**	**Shortnose Sturgeon**							**1**	**0(1)**	**NR**	**3.37**	
2	**1975-1990**	**Shortnose Sturgeon**							**18**	**18(5)**	**317**	**42.31**	

NS Collected on a non-scheduled sampling date
NR Not reported
na Not available
1.7 Water temperature estimated from weekly average
Blank space = no data in the SAS Impingement Data Files
(1) Numbers in parentheses indicate number of shortnose sturgeon taken on non-sample days.

Table 2b. Individual Data File Records of Shortnose Sturgeon Collected by Impingement at Indian Point Unit No. 3 in Each Year, 1974 through 1990.

Unit	Year	Taxon	Date	Sample Number	Total Weight (g)	Length (mmtl)	Condition (alive or dead)	H2O Temp (deg C)	Total Count	V-36 DEIS 1999	DSEIS 2008 Table 4-11	Coll. Eff. Adj_Cnt	Comments
3	**Total 1974**	**Shortnose Sturgeon**							**0**	**NR**	**NR**	**0.00**	
3	**Total 1975**	**Shortnose Sturgeon**							**NR**	**NR**	**NR**	**NR**	
3	**Total 1976**	**Shortnose Sturgeon**							**0**	**0**	**NR**	**0.00**	
3	1977	Shortnose Sturgeon	23-Sep-77	326609	99			23.0	1			1.87	
3	**Total 1977**	**Shortnose Sturgeon**							**1**	**1**	**2**	**1.87**	
3	1978	Shortnose Sturgeon	27-Jan-78	302709	65			3.8	1			1.46	
3	1978	Shortnose Sturgeon	2-Mar-78	306109	54			2.9	1			1.44	
3	1978	Shortnose Sturgeon	27-May-78	314709	62			16.9	1			1.72	
3	**Total 1978**	**Shortnose Sturgeon**							**3**	**3**	**5**	**4.62**	
3	1979	Shortnose Sturgeon	3-Apr-79	309309	450			8.0	1			1.53	
3	1979	Shortnose Sturgeon	4-May-79	312407	595			12.2	1			1.61	
3	**Total 1979**	**Shortnose Sturgeon**							**2**	**2**	**3**	**3.14**	
3	1980	Shortnose Sturgeon	29-Apr-80	312004	525			13.3	1			1.64	
3	**Total 1980**	**Shortnose Sturgeon**							**1**	**1**	**2**	**1.64**	
3	**Total 1981**	**Shortnose Sturgeon**							**0**	**0**	**NR**	**0.00**	
3	**Total 1982**	**Shortnose Sturgeon**							**0**	**0**	**NR**	**0.00**	
3	**Total 1983**	**Shortnose Sturgeon**							**0**	**0**	**NR**	**0.00**	
3	1984	Shortnose Sturgeon	19-May-84	314010	598			15.8	1			1.69	
3	**Total 1984**	**Shortnose Sturgeon**							**1**	**1**	**154**	**1.69**	
3	**Total 1985**	**Shortnose Sturgeon**							**0**	**0**	**NR**	**0.00**	
3	**Total 1986**	**Shortnose Sturgeon**							**0**	**0**	**NR**	**0.00**	
3	1987	Shortnose Sturgeon	29-Apr-87	311908	325	433	D	13.0	1			1.63	
3	**Total 1987**	**Shortnose Sturgeon**							**1**	**1**	**55**	**1.63**	
3	1988	Shortnose Sturgeon	19-Aug-88	323210	479	434	D	28.0	1			2.02	
3	**Total 1988**	**Shortnose Sturgeon**							**1**	**1**	**186**	**2.02**	
3	19899	Shortnose Sturgeon	6-Oct-89	NS	600	530	A	21.0	1			1.82	
3	**Total 1989**	**Shortnose Sturgeon**							**1**	**0(1)**	**NR**	**1.82**	
3	**Total 1990**	**Shortnose Sturgeon**							**0**	**0**	**NR**	**0.00**	
3	**1975-1990**	**Shortnose Sturgeon**							**11**	**10(1)**	**407**	**18.43**	

NS Collected on a non-scheduled sampling date
NR Not reported
na Not available
1.7 Water temperature estimated from weekly average
[ ] Blank space = no data in the SAS Impingement Data Files
(1) Numbers in parentheses indicate number of shortnose sturgeon taken on non-sample days.

Table 4. Impingement Data File Level 5 Actual Counts and Level 5 Counts Adjusted for Collection Efficiency for Shortnose and Atlantic Sturgeon Collected in Impingement Samples, Indian Point, 1975 through 199(

	IP2						IP3						IP2 & IP3	
	Shortnose Sturgeon		Atlantic Sturgeon		Total IP2		Shortnose Sturgeon		Atlantic Sturgeon		Total IP3			
Study Year	Level 5 Count	Level 5 Count Adjusted for Collection Efficiency[a]	Level 5 Count	Level 5 Count Adjusted for Collection Efficiency	Level 5 Count	Level 5 Count Adjusted for Collection Efficiency	Level 5 Count	Level 5 Count Adjusted for Collection Efficiency	Level 5 Count	Level 5 Count Adjusted for Collection Efficiency	Level 5 Count	Level 5 Count Adjusted for Collection Efficiency	Grand Total Level 5 Count	Grand Total Level 5 Collection Efficiency Adjusted Count
1975	1	3.14	118	301.81	119	304.95	NR	NR	NR	NR	NR	NR	119	304.95
1976	1	2.01	8	16.64	9	18.65	0	0.00	8	14.09	8	14.09	17	32.74
1977	5	11.06	44	104.85	49	115.91	1	1.87	153	252.20	154	254.07	203	369.98
1978	2	4.53	16	38.28	18	42.81	3	4.62	21	31.43	24	36.05	42	78.86
1979	2	4.31	32	74.75	34	79.06	2	3.14	38	60.97	40	64.11	74	143.17
1980	0	0.00	9	23.72	9	23.72	1	1.64	10	16.58	11	18.22	20	41.94
1981	0	0.00	3	8.01	3	8.01	0	0.00	5	7.46	5	7.46	8	15.47
1982	0	0.00	1	2.39	1	2.39	0	0.00	1	1.41	1	1.41	2	3.80
1983	0	0.00	3	6.11	3	6.11	0	0.00	0	0.00	0	0.00	3	6.11
1984	1	2.75	3	6.43	4	9.18	1	1.69	5	9.75	6	11.44	10	20.62
1985	0	0.00	9	19.23	9	19.23	0	0.00	17	25.00	17	25.00	26	44.23
1986	0	0.00	2	5.54	2	5.54	0	0.00	5	5.79	5	5.79	7	11.33
1987	2	4.11	2	6.01	4	10.12	1	1.63	1	1.79	2	3.42	6	13.54
1988	3	7.02	1	2.11	4	9.13	1	2.02	0	0.00	1	2.02	5	11.15
1989	0	0.00	0	0	0	0.00	1	1.82	0	0.00	1	1.82	1	1.82
1990	1	3.37	0	0	1	3.37	0	0.00	2	3.07	2	3.07	3	6.44
Grand Total	**18**	**42.30**	**251**	**615.88**	**269**	**658.18**	**11**	**18.43**	**266**	**429.54**	**277**	**447.97**	**546**	**1,106.15**

NR - Not reported

[a] Unit specific collection efficiency coefficients calculated according to the equations presented in the 1990 Indian Point Annual Report and applied to the Level 5 raw count.

Attachment 3

July 2011 NRC Supplement to Revised Biological Assessment

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

July 26, 2011

Ms. Mary A. Colligan
Assistant Regional Administrator for Protected
Resources
U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Northeast Region
One Blackburn Drive
Gloucester, MA 01930-2298

SUBJECT: SUPPLEMENT TO REVISED BIOLOGICAL ASSESSMENT FOR LICENSE RENEWAL OF INDIAN POINT NUCLEAR GENERATING UNIT NOS. 2 AND 3

Dear Ms. Colligan:

The U.S. Nuclear Regulatory Commission (NRC) staff has prepared a supplement to its December 2010 revised Biological Assessment for the proposed license renewal of Indian Point Nuclear Generating Unit Nos. 2 and 3 (IP2 and IP3). The supplement is included as the enclosure to this letter. The NRC staff is conveying this supplement to address updated thermal information as part of formal consultations under Section 7 of the Endangered Species Act.

If you have any questions regarding this supplement to the revised Biological Assessment, please contact Mr. Andrew Stuyvenberg, Environmental Project Manager, at 301-415-4006 or by e-mail at Andrew.Stuyvenberg@nrc.gov.

Sincerely,

Laurel M. Bauer

Laurel M. Bauer, Acting Chief
Environmental Review and
Guidance Update Branch
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket Nos. 50-247 and 50-286

cc w/encl: Listserv

Supplement to Revised Biological Assessment

Indian Point Nuclear Generating Unit Nos. 2 and 3
License Renewal

July 2011

Docket Nos. 50-247-LR and 50-286-LR

U.S. Nuclear Regulatory Commission
Rockville, Maryland

Introduction

In April 2007, Entergy Nuclear Operations, Inc. (Entergy) submitted an application to renew the licenses of Indian Point Nuclear Generating Unit Nos. 2 and 3 (Indian Point), to extend the licensed period of operations for an additional 20 years. The U.S. Nuclear Regulatory Commission (NRC) staff issued a Biological Assessment concerning that application in December 2008, and issued a revised Biological Assessment in December 2010 (NRC 2010). The NRC staff has developed this supplement to its December 2010 revised Biological Assessment in order to address new information the staff has received from Entergy concerning the potential effects of heated discharges from Indian Point Units 2 and 3 on the endangered shortnose sturgeon.

At the time the NRC staff developed its December 2010 revised Biological Assessment, Entergy had not yet released a final, verified model of Indian Point's heated discharges. As noted in the NRC staff's December 2010 revised Biological Assessment (NRC 2010), previous modeling of the Hudson River (cited in the New York State Department of Environmental Conservation's (NYSDEC's) final environmental impact statement (NYSDEC 2003) associated with the State Pollutant Discharge Elimination System (SPDES) permit for Indian Point) indicated that "the thermal discharge from Indian Point causes water temperatures to rise more than allowed," but did not provide specific information about how the rise occurred or whether the conditions would affect the shortnose sturgeon. As a result, the NRC staff was unable to provide a specific assessment of thermal effects on the shortnose sturgeon for purposes of NRC's Endangered Species Act consultation with the National Marine Fisheries Service (NMFS).

On June 16, 2011, the NRC staff learned that Entergy had submitted a final, verified triaxial thermal model to NYSDEC concerning aquatic conditions at the Indian Point Energy Center (IPEC), and that NYSDEC had relied on that model and Entergy's associated information to reach conclusions about thermal conditions at Indian Point for inclusion in a draft SPDES permit; (NYSDEC 2011). The NRC staff communicated its awareness of this information to NMFS on June 16, 2011 (NRC 2011). On June 22, 2011, the NRC staff requested that Entergy provide this information to the staff. By letter dated June 29, 2011, Entergy formally submitted to the NRC documents related to the thermal studies it had conducted (Dacimo 2011).

Thermal Assessment in the NRC Staff's 2010 Revised Biological Assessment

In the NRC staff's December 2010 revised Biological Assessment (NRC 2010), the staff provided the following assessment of thermal impacts on the shortnose sturgeon:

> The NRC staff cannot determine, based on available information, whether a shortnose sturgeon in the Hudson River would experience any prolonged physiological stress from the thermal plume caused by the discharge from IP2 and IP3. Shortnose sturgeon could be forced to seek refuge from elevated water temperatures as they are forced to do in southern rivers, and this could limit their available habitat. If studies reveal that the plume is buoyant, shortnose sturgeon could pass underneath the plume on their passage past the facility, but there are no data to indicate that this is the case.

> As noted earlier, the NYSDEC thermal modeling of the Hudson River suggests that the discharge from IP2 and IP3 could exceed the limits specified in the SPDES permit, but without a triaxial thermal study, the exact size and nature of the thermal plume is unknown. Information about the species, based on the NMFS recovery plan, suggests that increased temperatures can have a significant effect on the shortnose sturgeon. Therefore, the NRC staff concludes that the continued thermal effects from operation of IP2 and IP3 for an additional 20 years could potentially adversely affect the population of shortnose sturgeon in the Hudson River through thermal discharge, but the staff is unable to determine the extent to which the population would be affected.

The NRC staff concluded that "Sufficient information is not available at this time for the NRC staff to quantify the extent to which the shortnose sturgeon population could be affected by thermal effects, though forthcoming data is likely to provide additional information."

The NRC staff's review of the information provided by Entergy to the NRC on June 29, 2011, leads it to conclude that an update to the revised Biological Assessment is appropriate. Further, the NRC staff finds that Entergy's submission of June 29, 2011, provides the additional information necessary to determine, for purposes of this consultation, whether shortnose sturgeon are likely to be adversely affected by Indian Point's heated discharge.

NRC Staff's Assessment of Thermal Information

In response to information provided by Entergy in its letter of June 29, 2011, the NRC staff supplements the December 2010 revised Biological Assessment in three respects:

1. The NRC staff provides additional information regarding shortnose sturgeon responses to the thermal characteristics of its environment. Specifically, the NRC staff analysis addresses the sturgeon's temperature tolerances. This portion of the staff's evaluation supplements the "Life History" sections on pages 8 and 9 of the December 2010 revised Biological Assessment.

2. The NRC staff considers Entergy's data from its recent thermal studies and monitoring efforts in the Hudson River. The NRC staff further compares Entergy's thermal data to the sturgeon's temperature tolerances. This portion of the staff's evaluation supplements the "Thermal Impacts" discussion on pages 13 and 14 of the December 2010 revised Biological Assessment.

3. The NRC staff assigns a potential level of impact from Indian Point's thermal plume on the shortnose sturgeon. This portion of the staff's evaluation supplements the "Conclusion" on pages 14 and 15 of the December 2010 revised Biological Assessment.

Life History Supplement

The preferred temperature of fish and temperatures associated with the highest growth rates in laboratory settings are often close to avoidance temperatures and temperatures that are unsafe for survival. This is true of sturgeon, for which optimum growth temperatures are close to their upper thermal survival limits (Mayfield and Cech 2004; Allen et al. 2006; Ziegeweid et al. 2008).

Crance (1986, p. 5) noted that while adult sturgeon have been found in water temperatures ranging from as low as 2° to 3°C (36° to 37°F) to as high as 34°C (93°F), young shortnose sturgeon may experience distress or rapid mortality at temperatures over 25°C (77°F). Crance concluded that for the purpose of habitat suitability modeling the optimal summer water temperature range for adult foraging was 11° to 22°C (52° to 72°F) and that temperatures equal to or below 8°C (47°F) or equal to or above 35°C (95°F) were unsuitable.

Thermal limits can be estimated based on the endpoints of death, typically called lethal thermal maxima, or other observable characteristics, typically called critical thermal maxima, that would affect survival in the wild. Researchers have derived upper limits of safe temperatures for fish from lethal and critical thermal maxima by subtracting a safety factor of 5°C (Young and Cech 1996; Ziegeweid et al. 2007).

The safety factor provides conservatism to address the uncertainty that results from using laboratory-derived benchmarks to develop standards that protect wild populations. Optimal temperatures for fish survival and growth depend on a variety of individual and environmental factors, such as age and life stage, photoperiod and light intensity, food availability and quality, acclimation temperature, patterns of variation in acclimation and test temperature, rate of temperature change between acclimation and test temperatures, salinity, dissolved oxygen levels, presence of parasites and disease organisms, pollutants, biotic interactions, and natural variability among individuals. Because of the uncertainty that results from having these uncontrolled variables in the wild, and because interactions among environmental variables affect responses such as fish survival and growth, the upper limit of safe temperatures for fish in the wild should be less than critical temperatures determined in the laboratory.

Ziegeweid et al. (2008) studied lethal and behavioral responses (loss of equilibrium) of juvenile shortnose sturgeon to temperature change after being acclimated to different temperatures. Acclimation temperature and body weight significantly affect thermal tolerances. Final thermal preferences (Table 1) ranged from 26.2°C (79.2°F) to 28.3°C (82.9°F) and upper limits of safe temperatures based on loss of equilibrium ranged from 28.7°C (83.7°F) to 30.1°C (86.2°F).

Table 1. Temperature* maxima and related endpoints for juvenile shortnose sturgeon acclimated to different temperatures (data from Ziegeweid et al. 2008).

Acclimation temperature	Death as endpoint		Disequilibrium as endpoint		Final thermal preference	Thermal growth optimum
	Lethal thermal maximum	Upper limit of safe temperature	Critical thermal maximum	Upper limit of safe temperature		
19.5 (67.1)	34.8 (94.6)	29.8 (85.6)	33.7 (92.7)	28.7 (83.7)	26.2 (79.2)	26.2 (79.2)
24.1 (75.4)	36.1 (97.0)	31.1 (88.0)	35.1 (95.2)	30.1 (86.2)	28.3 (82.9)	28.0 (82.4)

*Temperature in °C (°F)

To understand the degree to which the thermal plume may affect the Hudson River shortnose sturgeon population, the NRC staff compared summer water temperatures reported for an IPEC study (Swanson et al. 2011b) to temperature limits reported by Ziegeweid et al. (2008) and NMFS (1998). Specifically, the staff used the upper limit of safe temperatures based on loss of equilibrium at the higher of two acclimation temperatures (24.1°C or 75.4°F) reported by Ziegeweid et al. (2008), resulting in an upper safe temperature limit of 30.1°C (86.2°F), rounded

to 30°C (86°F). Although shortnose sturgeon that would be near Indian Point would likely be much larger and older than those tested by Ziegeweid et al. (2008), the NRC staff assumed that Ziegeweid et al.'s upper safe limit would be protective because it includes a safety factor.

The staff also used 28°C (82°F), as reported in NMFS (1998) and cited in the revised Biological Assessment (NRC 2010) as a temperature that, when exceeded, may cause physiological stress to juvenile shortnose sturgeon and "may severely limit available juvenile-rearing habitat in some southern rivers" (NMFS 1998). This temperature is close to both the final thermal preference and thermal growth optimum temperatures (Table 1) that Ziegewald et al. (2008) reported for juvenile fish acclimated to 24.1°C (75.4°F), and thus is consistent with observations that optimum growth temperatures are often near the maximum temperatures fish can endure without experiencing physiological stress.

Thermal Impacts Supplement

In this section, the NRC staff considers how Indian Point's heated discharges may affect the shortnose sturgeon.

Swanson et al. (2011b) conducted thermal sampling and modeling of the cooling water discharge at Indian Point and reported that the extent and shape of the thermal plume varied greatly, primarily in response to tidal currents. For example, the plume (illustrated as a 4°F temperature increase or ΔT isotherm, Figure 5-6 in Swanson et al. 2011b) generally followed the eastern shore of the Hudson River and extended northward from Indian Point during flood tide and southward from Indian Point during ebb tide. Depending on tides, the plume can be well-defined and reach a portion of the near-shore bottom or be largely confined to the surface.

Temperature measurements reported by Swanson et al. (2011b) generally show that the warmest water in the thermal plume is close to the surface and plume temperatures tend to decrease with depth. Because shortnose sturgeon tend to swim close to the river bottom, the conditions most likely to affect them occur when the thermal plume extends deeply rather than across the surface. A cross-river survey conducted in front of Indian Point captured one such incident during spring tide on July 13, 2010 (Figure 3-28 in Swanson et al. 2011b). Across most of the river, water temperatures were close to 82°F (28°C), often with warmer temperatures near the surface and cooler temperatures near the bottom. The Indian Point thermal plume at that point was clearly defined and extended about 1000 ft (300 m) from shore. Surface water temperatures reached about 85°F (29°C). At 23-ft to about 25-ft (7-m to 8-m) depths, observed plume temperatures of 83° to 84°F (28° to 29°C) were about 2° to 3°F (about 1° to 2°C) below the upper safe temperatures for shortnose sturgeon reported by Ziegeweid et al. (2008) and 1° to 2°F (about 0.5° to 1°C) above the temperature that NMFS (1998) indicated could cause physiological stress for juvenile sturgeon. Maximum river depth along the measured transect is approximately 50 ft (15 m).

A temperature contour plot of a cross-river transect at Indian Point prepared in response to a NYSDEC review illustrates a similar condition on July 11, 2010 during slack before flood tide (Swanson et al. 2011a, Figure 1-10). Here the thermal plume is evident to about 2000 ft (600 m) from the eastern shore (the location of the Indian Point discharge) and extends to a depth of about 35 ft (11 m) along the eastern shore. Bottom temperatures above 82°F (28°C), the temperature at which juvenile sturgeon might experience physiological stress, were confined

to about the first 250 ft (76 m) from shore. The river here is over 4500 ft (1400 m) wide. In that small area, bottom water temperatures might also exceed 30°C (86°F) and might not be safe for shortnose sturgeon; elsewhere, bottom water temperatures were about 80°F (27°C) and within safe limits. These limited-area unsafe conditions would not last long, however, as they would change with the tidal cycle. Further, any sturgeon in this location would be able to retreat to adjacent deeper and cooler water. (As noted in the 2010 revised Biological Assessment, sturgeon eggs and larvae, both of which may be relatively immobile, have rarely been identified in this portion of the river and therefore are unlikely to be affected.) Under other conditions, when the thermal plume is close to the surface, the shortnose sturgeon population should remain unaffected. Under no conditions did interpolated temperatures in Entergy's modeled results exceed the sturgeon's safe limits (either 28°C (82°F) or 30°C (86°F)) in the deep reaches of the river channel (Swanson 2011a).

In response to the NYSDEC's review of the Indian Point thermal studies (Swanson et al. 2011b), Mendelsohn et al. (2011) modeled the maximum area and width of the thermal plume (defined by the 4°F (2°C) ΔT isotherms) in the Hudson River. Mendelsohn, et al. reported that for four cross-river transects near IP2 and IP3, the maximum cross-river area of the plume would not exceed 12.3 percent and the maximum cross-river width of the plume would not exceed 28.6 percent of the river (Mendelsohn, et al.'s Table 3-1). These findings, along with the observations that the plume generally tends to rise toward the surface and that bottom temperatures do not appear to exceed safe temperature limits for shortnose sturgeon, suggest that a migration of shortnose sturgeon would not be affected by the thermal plume. Additionally, inasmuch as temperatures above the safe temperature limit only rarely reach even an isolated portion of the near-shore river bottom, the NRC staff finds it unlikely that individual sturgeon will experience deleterious effects from the thermal plume.

Conclusion Supplement

Entergy has now conducted a triaxial thermal study program that includes modeling and verification, and that provides previously unavailable information concerning the size and nature of the thermal plume arising from operation of Indian Point Units 2 and 3. Based on the results of Entergy's thermal studies and modeling, the NRC staff finds that Indian Point's heated discharge during the license renewal term is not likely to adversely affect shortnose sturgeon. In the December 2010 revised Biological Assessment (NRC 2010), the NRC staff found that ". . . impingement and entrainment would not adversely affect the population of shortnose sturgeon." Therefore, having considered the potential for adverse impacts resulting from license renewal (including impingement, entrainment, and thermal impacts), the NRC staff now finds that license renewal of Indian Point Units 2 and 3 is not likely to adversely affect the Hudson River population of shortnose sturgeon.

Literature Cited

Allen, P.J., M. Nicholl, S. Cole, A. Vlazny, and J.J. Cech Jr. 2006. Growth of larval to juvenile green sturgeon in elevated temperature regimes. Transactions of the American Fisheries Society 135(1):89-96.

Crance, J.H. 1986. Habitat Suitability Index Models and Instream Flow Suitability Curves: Shortnose Sturgeon. U.S. Fish and Wildlife Service Biological Report 82(10.129). 31 pp.

Dacimo, F. 2011. Letter from F. Dacimo to NRC Document Control Desk, "License Renewal Thermal Study Documents." June 29, 2011. ADAMS Accession No. ML11189A026.

Mayfield, R.B. and J.J. Cech Jr. 2004. Temperature effects on green sturgeon bioenergetics. Transactions of the American Fisheries Society 133(4):961-970.

Mendelsohn, D. C. Swanson, and D. Crowley. 2011. Part 1 of Response to the NYSDEC Staff Review of the 2010 Field Program and Modeling Analysis of the Cooling Water Discharge from the Indian Point Energy Center. Prepared for Indian Point Energy Center, Buchanan, New York. ADAMS Accession No. ML11189A026. Available URL: http://www.dec.ny.gov/permits/57609.html.

NMFS (National Marine Fisheries Service). 1998. "Recovery Plan for the Shortnose Sturgeon (*Acipenser brevirostrum*)," prepared by the Shortnose Sturgeon Recovery Team for the National Marine Fisheries Service, Silver Spring, Maryland. Accessed at: http://www.nmfs.noaa.gov/pr/pdfs/recovery/sturgeon_shortnose.pdf on December 11, 2007.

NRC (U.S. Nuclear Regulatory Commission). 2010. Biological Assessment, Indian Point Nuclear Generating Plant, Unit Nos. 2 and 3, License Renewal. December 2010. Docket Nos. 50-247 and 50-286. ADAMS No. ML102990043.

NRC (U.S. Nuclear Regulatory Commission). 2011. E-mail from A. Stuyvenberg, NRC, to J. Crocker, NMFS. June 16, 2011. ADAMS Accession No. ML11167A108.

NYSDEC (New York State Department of Environmental Conservation). 2011. Letter from M.D. Sanza, Assistant Counsel, to Administrative law Judges M.E. Villa and D.P. O'Connell, NYSDEC Office of Hearings and Mediation Services. Subject: Entergy Indian Point Nuclear Units 2 and 3, SPDES Permit Renewal / § 401 WQC Application Proceedings, DEC Staff's Review of Thermal Information. Available URL: http://www.dec.ny.gov/permits/57609.html. Accessed on July 18, 2011.

NYSDEC (New York State Department of Environmental Conservation). 2003. "Final Environmental Impact Statement Concerning the Applications to Renew New York State Pollutant Discharge Elimination System (SPDES) Permits for the Roseton 1 and 2 Bowline 1 and 2 and IP2 and IP3 2 and 3 Steam Electric Generating Stations, Orange, Rockland and Westchester Counties" (Hudson River Power Plants FEIS). June 25, 2003. ADAMS Accession No. ML083360752.

Swanson, C., D. Crowley, Y. Kim, N. Cohn, and D. Mendelsohn. 2011a. Part 2 of Response to the NYSDEC Staff Review of the 2010 Field Program and Modeling Analyis of the Cooling Water Discharge from the Indian Point Energy Center. Prepared for Indian Point Energy Center, Buchanan, New York. ADAMS Accession No. ML11189A026. Available URL: http://www.dec.ny.gov/permits/57609.html.

Swanson, C., D. Mendelsohn, N. Cohn, D. Crowley, Y. Kim, L. Decker, and L. Miller. 2011b. Final Report: 2010 Field Program and Modeling Analysis of the Cooling Water Discharge from the Indian Point Entergy Center. Prepared for Indian Point Energy Center, Buchanan, New York. ADAMS Accession No. ML11189A026. Available URL: http://www.dec.ny.gov/permits/57609.html.

Young, P.S. and J.J. Cech Jr. 1996. Environmental tolerances and requirements of spottail. Transactions of the American Fisheries Society 125:664-678.

J.R. Ziegeweid, C.A. Jennings, and D.L. Peterson. 2008. Thermal maxima for juvenile shortnose sturgeon acclimated to different temperatures. Environmental Biology of Fishes 82:299–307.

July 26, 2011

Ms. Mary A. Colligan
Assistant Regional Administrator for Protected
Resources
U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Northeast Region
One Blackburn Drive
Gloucester, MA 01930-2298

SUBJECT: SUPPLEMENT TO REVISED BIOLOGICAL ASSESSMENT FOR LICENSE RENEWAL OF INDIAN POINT NUCLEAR GENERATING UNIT NOS. 2 AND 3

Dear Ms. Colligan:

The U.S. Nuclear Regulatory Commission (NRC) staff has prepared a supplement to its December 2010 revised Biological Assessment for the proposed license renewal of Indian Point Nuclear Generating Unit Nos. 2 and 3 (IP2 and IP3). The supplement is included as the enclosure to this letter. The NRC staff is conveying this supplement to address updated thermal information as part of formal consultations under Section 7 of the Endangered Species Act.

If you have any questions regarding this supplement to the revised Biological Assessment, please contact Mr. Andrew Stuyvenberg, Environmental Project Manager, at 301-415-4006 or by e-mail at Andrew.Stuyvenberg@nrc.gov.

Sincerely,

/RA/

Laurel M. Bauer, Acting Chief
Environmental Review and
Guidance Update Branch
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket Nos. 50-247 and 50-286

cc w/encl: Listserv

DISTRIBUTION:
See next page

ADAMS Accession No. ML11203A100 *via e-mail

OFFICE	LA:RPOB:DLR	GS: RERB:DLR	PM:RPB2:DLR	OGC*	BC:RERB:DLR
NAME	YEdmonds	DLogan	AStuyvenberg	STurk	LBauer
DATE	07/25/11	07/25/11	07/21/11	07/22/11	07/26/11

OFFICIAL RECORD COPY

Letter to Mary A. Colligan from Laurel M. Bauer dated July 26, 2011

SUBJECT: SUPPLEMENT TO REVISED BIOLOGICAL ASSESSMENT FOR LICENSE RENEWAL OF INDIAN POINT NUCLEAR GENERATING UNIT NOS. 2 AND 3

DISTRIBUTION:

E-MAIL:
PUBLIC
RidsNrrDlr Resource
RidsNrrDlrRpb1 Resource
RidsNrrDlrRpb2 Resource
RidsNrrDlrRerb Resource
RidsNrrDlrRpob Resource
RidsOgcMailCenter Resource

DWrona
BPham
RKuntz
AStuyvenberg
RAuluck
JBoska
NSalgado
GBowman
STurk, OGC
BHarris, OGC
AJones, OGC
DRoth, OGC
ICouret, OPA
SBurnell, OPA
EDacus, OCA
GMeyer, RI
RConte, RI
MGray, RI
NMcNamara, RI
DScrenci, RI OPA
PCataldo, RI
MCatts, RI
BBickett, RI
AAyegbusi, RI
MHalter, RI
NSheehan, RI OPA

Attachment 4

May 2012 NRC Biological Assessment

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

May 16, 2012

Ms. Patricia A. Kurkul
Northeast Regional Administrator
National Marine Fisheries Service
55 Great Republic Dr.
Gloucester, MA 01930-2276

SUBJECT: REQUEST TO REINITIATE SECTION 7 CONSULTATION FOR THE INDIAN POINT NUCLEAR GENERATING UNIT NOS. 2 AND 3 DUE TO LISTING OF ATLANTIC STURGEON

Dear Ms. Kurkul:

The staff of the U.S. Nuclear Regulatory Commission (NRC, the staff) hereby requests reinitiation of section 7 consultation under the Endangered Species Act of 1973, as amended (ESA), for Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*), which was recently listed under the ESA, at Indian Point Nuclear Generating Unit Nos. 2 and 3 (Indian Point, IP2 and IP3). IP2 and IP3 have once-through cooling systems with intake structures located on the eastern shore of the Hudson River at approximately river mile 43.

In December 2008, previous to this request, the NRC submitted a biological assessment for the endangered shortnose sturgeon (*Acipenser brevirostrum*) along with the draft supplemental environmental impact statement for license renewal for IP2 and IP3 (draft IP SEIS). For that assessment, the proposed Federal action was the renewal of the operating licenses of IP2 and IP3 for an additional 20-year period beyond the period of the existing licenses, which expire on September 28, 2013, and December 12, 2015, respectively.

On February 24, 2009, the National Marine Fisheries Service (NMFS) requested additional information on shortnose sturgeon. In response, the NRC submitted a revised biological assessment for the endangered shortnose sturgeon, with some information on the Atlantic sturgeon (a candidate species at the time), to your office via letter dated December 10, 2010. The revised biological assessment included, among other things, the numbers of both Atlantic and shortnose sturgeon impinged at IP2 and IP3 and a summary of individual collection records for shortnose sturgeon. The final IP SEIS, which NRC transmitted to NMFS on December 10, 2010, contains life history information for both sturgeon species. The final IP SEIS, the NRC's 2010 revised biological assessment for shortnose sturgeon, and Barnthouse et al.'s 2011 technical assessment for shortnose sturgeon provide descriptions of the cooling water system in relation to effects on biota. The NRC has previously submitted each of these documents to NMFS. No entrainment of sturgeon species has been reported at IP2 and IP3.

At the time the NRC staff developed its December 2010 revised biological assessment, Entergy Nuclear Operations, Inc. (Entergy) had not yet completed its survey of Indian Point's heated discharges, and the staff was unable to provide a specific assessment of thermal effects. In June 2011, the NRC staff learned that Entergy had submitted a final, verified triaxial thermal model to the New York State Department of Environmental Conservation (NYSDEC) concerning aquatic conditions at Indian Point and that NYSDEC had accepted and relied on that model and Entergy's associated information to reach its conclusions about thermal conditions at Indian Point for inclusion in a draft State Pollutant Discharge Elimination System permit. With the new information, the NRC provided an additional and updated assessment of the thermal effects on operation of IP2 and IP3 on the shortnose and Atlantic sturgeon species in a supplement to its 2010 revised biological assessment on July 26, 2011. On October 14, 2011, NMFS issued its biological opinion on the effects of IP2 and IP3 operation on the endangered shortnose sturgeon for the proposed period of continued operation, under the scenario that NRC decides to renew the operating licenses for an additional 20 years each. The biological opinion concluded the formal consultation process and provided an incidental take statement that specifies non-discretionary reasonable and prudent measures necessary to minimize and monitor incidental take of shortnose sturgeon.

On February 6, 2012, NMFS listed five distinct population segments of the Atlantic sturgeon as threatened or endangered species under the ESA. Atlantic sturgeon in the Hudson River near Indian Point are part of the New York Bight distinct population segment (DPS), which is listed as endangered. In response to this recent listing of the Atlantic sturgeon New York Bight DPS, the NRC requests reinitiation of section 7 consultation for the remaining period of the existing licenses for IP2 and IP3 and the additional 20-year license renewal period, if granted.

In addition to the information already submitted to NMFS, the attached biological assessment for reinitiation contains information on individual impingement samples of Atlantic sturgeon. The NMFS had previously requested, and NRC had provided, the same type of specific information for shortnose sturgeon for NMFS's preparation of the biological opinion during the previous consultation. In addition, the attached biological assessment provides information on the degree to which the number of impinged Atalntic sturgeon tracks the population size of young sturgeon. The NMFS used such information in its shortnose sturgeon biological opinion.

In the enclosed biological assessment for reinitiation of section 7 consultation, the NRC staff concludes that operation of IP2 and IP3 **may affect, but is not likely to adversely affect,** the Atlantic sturgeon during the remainder of the current operating license period and the 20-year license renewal term (through September 28, 2033, and December 12, 2035, respectively), if granted.

The NRC requests that NRC and NMFS conclude section 7 consultation within 90 days and that the NMFS issue its biological opinion 45 days thereafter per 50 CFR 402.14(e) (135 days total). If your office requires more time to complete the biological opinion, the NRC requests that you provide NRC with a request for such an extension in order that the NRC may appropriately consider that request and coordinate with Entergy. The NRC would also like to have the opportunity to review a draft biological opinion prior to NMFS's issuance of a final biological opinion. As you may know, the licensee, Entergy, has requested that consultations be conducted expeditiously and would like to participate in this consultation.

Please contact Dr. Dennis Logan, Aquatic Biologist, of my staff to advise of any additional information you might need to assess the potential impacts to the Atlantic sturgeon at Indian Point. You can reach him at 301-415-0490 or by e-mail at Dennis.Logan@nrc.gov.

I have also forwarded a copy of this letter to Ms. Julie Crocker of your office. Ms. Crocker has been NRC's main point of contact for section 7 consultations related to operating nuclear power plants within the NMFS's northeast region.

Sincerely,

Jeremy J. Susco, Acting Chief
Environmental Review and
Guidance Update Branch
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket Nos. 50-247 and 50-286

Enclosure:
As stated

cc w/encl: Listserv

BIOLOGICAL ASSESSMENT FOR REINITIATION OF SECTION 7 CONSULTATION FOR THE INDIAN POINT NUCLEAR GENERATING PLANT, UNIT NOS. 2 AND 3 DUE TO LISTING OF ATLANTIC STURGEON

May 2012

Docket Numbers 50-247, 50-286

U.S. Nuclear Regulatory Commission
Rockville, Maryland

Prepared by:

Dennis Logan
Division of License Renewal
Office of Nuclear Reactor Regulation

Valerie Cullinan
Pacific Northwest National laboratory

Table of Contents

1.0 Introduction 1
2.0 Description of the Action 1
3.0 Federally Listed Species Considered 1
3.1 Listed Species Previously Considered 1
3.2 Atlantic Sturgeon 2
3.2.1 Life History 2
3.2.2 Distribution 2
3.2.3 Population Status 2
3.2.4 Listing History 3
4.0 Action Effects Analysis 3
5.0 Conclusion and Determination of Effects 6
6.0 References 6

Abbreviations, Acronyms, and Symbols

°C	degrees Celsius
°F	degrees Fahrenheit
ASMFC	Atlantic States Marine Fisheries Commission
BSS	Beach Seine Survey
cm	centimeter
CPUE	catch per unit effort
DPS	distinct population segment
Entergy	Entergy Nuclear Operations, Inc.
ESA	Endangered Species Act of 1973, as amended
FR	Federal Register
FSS	Fall Shoals Survey
ft	foot
in.	inch
kg	kilogram
lb	pound
LRS	Longitudinal River Ichthyoplankton Survey
m	meter
m^3	cubic meters
NMFS	National Marine Fisheries Service
NRC	U.S. Nuclear Regulatory Commission
NRDC	Natural Resources Defense Council
SEIS	supplemental environmental impact statement
SPDES	State Pollutant Discharge Elimination System
YOY	young-of-the-year

Biological Assessment for Reinitiation of Section 7 Consultation for the Indian Point Nuclear Generating Plant, Unit Nos. 2 and 3 Due to Listing of Atlantic Sturgeon

1.0 Introduction

On February 6, 2012, the National Marine Fisheries Service (NMFS) listed five distinct population segments (DPSs) of the Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) under the Endangered Species Act of 1973, as amended (ESA) (77 FR 5880; 77 FR 5914). As a result of the Atlantic sturgeon's listing, the U.S. Nuclear Regulatory Commission (NRC or the staff) has reviewed the potential for each NRC-licensed operating reactor to adversely affect the Atlantic sturgeon. The NRC staff identified Indian Point Nuclear Generating Unit Nos. 2 and 3 (Indian Point or IP2 and IP3), operated by Entergy Nuclear Operations, Inc. (Entergy), as a facility that has the potential to adversely affect Atlantic sturgeon. In the Hudson River near Indian Point, Atlantic sturgeon would belong to the New York Bight DPS, which is endangered.

The NMFS (2011a, 2011b) recently issued a biological opinion for shortnose sturgeon (*Acipenser brevirostrum*) at IP2 and IP3. As a result of NMFS's recent listing of the New York Bight DPS as endangered, the NRC staff prepared this biological assessment in connection with its request to reinitiate section 7 consultation for the newly listed Atlantic sturgeon. The NRC provided much of the information needed for this biological assessment in its final supplemental environmental impact statement for IP2 and IP3 (IP SEIS) (NRC 2010a) and the revised biological assessment for shortnose sturgeon (NRC 2010b) and its supplement (NRC 2011). Entergy (2011a) and its consultants (Barnthouse et al. 2011) provided additional information to NMFS on shortnose and Atlantic sturgeon in the Hudson River, the characteristics of IP2 and IP3, and the facility's effects on the two sturgeon species. Entergy (2012) listed and reviewed some of the reports with information on the effects of IP2 and IP3 on Atlantic sturgeon. This biological assessment provides additional information pertinent to reinitiation of section 7 consultation and the NRC's assessment of the effects of IP2 and IP3 on Atlantic sturgeon.

2.0 Description of the Action

The action that this biological assessment considers is the continued operation of IP2 and IP3 through the end of the current licenses and the potentially renewed license terms. Entergy owns and operates IP2 and IP3 and has submitted an application to NRC to renew the operating licenses of IP2 and IP3 for an additional 20 years. The NRC is presently reviewing that application. The NRC's (2010a) IP SEIS and supplemental biological assessment (NRC 2010b) describe the facility, the site location, the cooling water system and its operation, and the action area (the Hudson River). That discussion is incorporated by reference here. The action area for Atlantic sturgeon is the same as the action area that NMFS (2011a) describes in its biological opinion for shortnose sturgeon and includes the intake areas of IP1 (for service water), IP2, and IP3, and the region where the thermal plume extends into the Hudson River from IP2 and IP3.

3.0 Federally Listed Species Considered

3.1 Listed Species Previously Considered

As part of the NRC's review of the license renewal application for IP2 and IP3, the staff prepared the IP SEIS (NRC 2010a) that considered the potential effects of license renewal on Federally listed species. The SEIS, the revised biological assessment of December 10, 2010,

and its supplement of July 26, 2011, analyzed the effects of license renewal on the shortnose sturgeon and the Atlantic sturgeon, which was a candidate for Federal listing at the time.

3.2 Atlantic Sturgeon

3.2.1 Life History

The Atlantic sturgeon is an anadromous bony fish that can grow to 14 ft (4.3 m) and weigh up to 800 lbs (370 kg) (Gilbert 1989; NMFS 2012). Atlantic sturgeon are similar in appearance to shortnose sturgeon—bluish-black to olive brown dorsally with pale sides and underbelly—but are larger in size and have a smaller and differently shaped mouth (NMFS 2012). Females reach maturity at 7 to 30 years of age, and males reach maturity at 5 to 24 years of age, with fish inhabiting the southern range maturing earlier (ASMFC 2007). Females return to natal freshwater rivers to spawn between April and May. Females lay 400,000 to 4 million highly adhesive eggs, which fall to the bottom of the water column and adhere to cobble or other hard bottom substrate. Eggs hatch to yolk-sac larvae in 94 to 140 hours at temperatures of 20°C (68°F) and 18°C (64.4°F), respectively (ASSRT 2007). The larvae absorb their yolk in 8 to 12 days, during which time the post yolk-sac larvae migrate downstream into brackish water, where they live for a few months (ASSRT 2007). Larvae are demersal and use benthic structures as refugia; thus, they are typically not found in the water column (ASSRT 2007). When juveniles reach a size of 30 to 36 in. (76 to 92 cm), they migrate to nearshore coastal waters, where they feed on benthic invertebrates, including crustaceans, worms, and mollusks (NMFS 2012). Juveniles and non-spawning adults inhabit estuaries and coastal marine waters dominated by gravel and sand substrates (NMFS 2012).

3.2.2 Distribution

Historically, the Atlantic sturgeon has inhabited riverine, estuarine, and coastal ocean waters from St. Lawrence River, Canada to St. John's River, Florida (ASMFC 2007). Within the U.S., the species was present in approximately 38 rivers from St. Croix, Maine to Saint John's River, Florida. Currently, the species resides in 36 U.S. rivers and spawns in at least 20 of these rivers (ASSRT 2007). Barnthouse et al. (2011) describe temporal and spatial distribution of young Atlantic sturgeon in the Hudson River based on the Hudson River utilities' fish sampling programs.

3.2.3 Population Status

Atlantic sturgeon have been commercially fished from as early as 1628, though a substantial Atlantic sturgeon fishery did not appear until the late 1800s (Shepard 2006). Overfishing and habitat degradation caused a decline in landings beginning in the early 1900s; however, landings increased from 1950 to 1980 (Shepard 2006). In 1998, the Atlantic States Marine Fisheries Commission (ASMFC), which manages the commercial harvest of the species, instituted a moratorium on Atlantic sturgeon harvest in U.S. waters (NMFS 2012). Today, the species is still caught as bycatch. Based on data from 2001 to 2006, the ASMFC (2007) estimated that in U.S. waters, between 2,752 and 7,904 individuals per year are caught as bycatch in sink gillnets, and 2,167 to 7,210 individuals per year are caught as bycatch in trawls.

In the U.S., population estimates exist for only the Hudson River, New York (approximately 870 spawning adults/year) and the Atlamaha River, Georgia (approximately 343 spawning adults/year), and these two rivers are thought to have the healthiest subpopulations within the U.S. (75 FR 61872, ASSRT 2007). The population in the Hudson River has been conservatively estimated to be 6,000 to 6,800 spawning females in the late 1800s, and the population decreased from then until perhaps 1990. Low population levels in the 1990s began

to increase in the late 1990s (ASSRT 2007). A catch per unit effort (CPUE) index based on density data from the Hudson River utilities' Fall Shoals Survey (FSS) from 1985 through 2007 shows that the abundance of juvenile Atlantic sturgeon in the Hudson River declined sharply in 1989 and has not recovered (Figure 2 in Barnthouse et al. 2011)

North of the Hudson River in Connecticut, Atlantic sturgeon historically spawned in the Thames, Connecticut, and Housatonic Rivers, but spawning populations are unlikely today. South of the Hudson River in New Jersey, Delaware, and Pennsylvania, the Delaware River may have once supported the largest spawning stock of any Atlantic coast river (more than 180,000 spawning females), but numbers have fallen and the reproducing population is now small (ASSRT 2007).

3.2.4 Listing History

In 2007, the NMFS considered listing the Atlantic sturgeon under the ESA but concluded that listing was not warranted at that time. The Natural Resources Defense Council (NRDC 2009) petitioned for the NMFS to reconsider the listing of the species (NRDC 2009). The NMFS accepted the NRDC's petition in a 90-Day Finding on January 6, 2010 (75 FR 838). On October 6, 2010, the NMFS published Proposed Listing Determinations for five Atlantic sturgeon DPSs (75 FR 61872; 75 FR 61904). On February 6, 2012, the NMFS listed the five Atlantic sturgeon DPSs under the ESA (77 FR 5880; 77 FR 5914). Atlantic sturgeon in the Hudson River belong to the New York Bight DPS, which is listed as endangered. The NMFS has not designated critical habitat for Atlantic sturgeon.

4.0 Action Effects Analysis

Indian Point has the potential to entrain or impinge Atlantic sturgeon when the facility withdraws Hudson River water for cooling. The heated water effluent has the potential to cause heat shock in the facility's heated water discharge. Indian Point Unit 1 operated from 1962 through October 1974. IP2 and IP3 have been operational since 1973 and 1975, respectively. The Atlantic sturgeon population in the Hudson River has been exposed to the effects of Indian Point since 1962. The NRC is presently reviewing Entergy's application for license renewals for IP2 and IP3, and, if granted, the renewed licenses could extend the exposure of Atlantic sturgeon to operation of IP2 and IP3 for an additional 20 years (i.e., through September 28, 2033 and December 12, 2035, for IP2 and IP3, respectively).

Entrainment

Entrainment occurs when aquatic organisms (usually eggs, larvae, and other small organisms) are drawn into the cooling water system and are subjected to thermal, physical, and chemical stress. Because Atlantic sturgeon spawn in freshwater upstream of Indian Point and the eggs adhere to hard substrate material, the occurrence of eggs in the water column near IP2 and IP3 is unlikely, and entrainment studies at IP2 and IP3 do not report finding Atlantic sturgeon eggs or larvae in entrainment samples.

Impingement

Impingement occurs when aquatic organisms are pinned against intake screens or other parts of the cooling water system intake structure. Impingement of juvenile Atlantic sturgeon can occur when juveniles migrate downstream to estuarine waters and then to near shore coastal waters when they reach larger sizes. Impingement of juvenile Atlantic sturgeon at IP2 and IP3 has been reported. Impingement of migrating adults is unlikely because adults travel up fast-flowing rivers to spawn and should be capable of avoiding impingement. Because of the large volume of water withdrawn daily when IP2 and IP3 are operating, Indian Point can impinge

the bodies of Atlantic sturgeon killed by causes unrelated to plant operation (e.g., strikes by boat propellers or hulls, disease, parasites, starvation, etc.).

Impingement of Atlantic sturgeon (Table 1) was recorded at IP2 and IP3 from 1975 through 1990 and is presented in Table 4-11 of the IP SEIS (NRC 2010a). Annual numbers impinged in the 1970s were much higher than in subsequent years. Appendix A provides more detailed information on the individual sturgeon impinged at IP2 and IP3. This information was provided by Entergy (2009) and is the similar to information NMFS requested for shortnose sturgeon during the consultation for that species.

The NRC staff performed an analysis of data supplied by Entergy (NAI 2008) to elucidate the degree to which numbers impinged might reflect numbers of young Atlantic sturgeon in the Hudson River subject to impingement. To examine the relationship, the staff compared the CPUEs of Atlantic sturgeon captured in the two Hudson River sampling programs—the Hudson River utilities' FSS and Longitudinal River Ichthyoplankton Survey (LRS)—with the annual numbers impinged at IP2 and IP3 after all numbers were standardized by subtracting the mean and dividing by the standard deviation for those programs. Staff used data supplied by Entergy (Entergy 2008, NAI 2008). All regions of the Hudson River were not sampled each year (Tables 2 and 3). To account for sampling design changes over time, the CPUE was calculated for each year and then standardized by subtracting the mean river-wide CPUE from 1979 through 1983 and dividing by the standard deviation of river-wide CPUE using years 1979 through 2005. The total number of Atlantic sturgeon impinged annually (Table 1) was standardized by subtracting the mean number impinged between 1979 and 1983 and dividing by the standard deviation of the annual number impinged using all years (1975-1990).

For young-of-the-year (YOY) and older Atlantic sturgeon, which are the age groups subject to impingement, the CPUEs for the FSS and LRS were calculated annually as the total number caught divided by the volume sampled (m^3) during the surveys for 1974 through 2005. The standardized number impinged was then plotted with the standardized river-wide CPUE of the two programs by year (Figure 1). Numbers impinged appear to track the CPUE of Hudson River sampling programs, and all sampling programs indicate a decreasing population of Atlantic sturgeon. To the degree that the number impinged tracks the population size of young sturgeon, the NRC staff expects that if the Hudson River population of Atlantic sturgeon recovers, impingement at IP2 and IP3 would also increase.

Following the period of impingement monitoring through 1990, modified Ristroph screens were installed at IP2 and IP3 in 1990 and 1991 to reduce impingement mortality. Barnthouse et al. (2011) discuss likely survival of sturgeon impinged at IP2 and IP3 and predict a high degree of survival. The NMFS (2011a) found in its biological opinion for shortnose sturgeon that installation of the modified Ristroph screens is expected to have reduced impingement mortality for shortnose sturgeon, although the degree to which these screens may have reduced impingement mortality as compared to pre-1991 levels cannot be firmly established because no monitoring occurred after the installation of the Ristroph screens and more recent data are not available. These conclusions would also apply to Atlantic sturgeon.

The staff examined the susceptibility of young Atlantic sturgeon to impingement by IP2 and IP3 in terms of the river region where the FSS caught most of the Atlantic sturgeon. The percentage of the average annual (1979 through 2005) CPUE (number/1000 m^3) for the LRS and FSS in each river region (Figure 2) was calculated as the percent of the total of the number caught divided by the total volume sampled. The FSS caught most fish in the West Point through Saugerties regions of the river. A third program, the Beach Seine Survey (BSS), caught seven Atlantic sturgeon in the Tappan Zee Region and three in the Cornwall Region of the river between 1974 and 2005. The LRS caught a total of 276 YOY and older Atlantic sturgeon

between 1974 and 2005. Figure 2 supplements those submitted to NMFS in Figure 4 of Barnthouse et al. (2011) that show the numbers of sturgeon of all age groups caught in the LRS, BSS, and FSS combined by decade (1979-1989, 1990-1999, 2000-2006) and indicates that young Atlantic sturgeon susceptible impingement tend to be concentrated north of Indian Point. The presence of young Atlantic sturgeon in impingement samples confirms their presence in the river near Indian Point.

The numbers of Atlantic sturgeon impinged at IP2 and IP3 are higher than the numbers of shortnose sturgeon impinged (Table 1). This difference may partially reflect the relative population sizes, as the total catch of Atlantic sturgeon in the FSS from 1979 through 1990 was 694 fish compared to 88 shortnose. Besides difference in population sizes, other factors, such as differences in distribution in the river or behavior, can affect numbers impinged.

Heat Shock

Heat shock is acute thermal stress caused by exposure to a sudden elevation of water temperature that adversely affects the metabolism and behavior of fish and other aquatic organisms. The NRC's (2011) supplement to the revised biological assessment discusses Entergy's recent triaxial survey of the IP2 and IP3 thermal effluent and its effects on shortnose sturgeon. The NRC staff concluded that continued operation of IP2 and IP3 through the license renewal terms is not likely to adversely affect the Hudson River population of shortnose sturgeon. NMFS's (2011a) biological opinion also concluded that the thermal effluent was not likely to have any observable adverse effects on shortnose sturgeon. Given these findings and the similarities in behavior and physiological requirements of shortnose and Atlantic sturgeon, the NRC staff expects that the thermal effluent is not likely to have any observable adverse effects on Atlantic sturgeon.

Atlantic Sturgeon Prey

The food and migratory patterns of Atlantic sturgeon are generally similar to those of shortnose sturgeon, so the staff expects that the effect of operating IP2 and IP3 would be similar for the prey of both species. In its biological opinion, NMFS (2011a) stated that "it appears that the prey of shortnose sturgeon, would be impacted insignificantly, if at all, by the thermal discharge from IP." The NRC staff expects that any effect on Atlantic sturgeon prey due to operation of IP2 and IP3, including entrainment and thermal effects, would also be insignificant.

Potential Discharge of Radionuclides to the Hudson River

The IP SEIS (NRC 2010a) discusses the potential discharge and monitoring of radionuclides to the Hudson River. The NMFS (2011a) considers this possible stressor in its biological opinion for shortnose sturgeon at IP2 and IP3 and concludes, "NMFS considers the effects to shortnose sturgeon from radionuclides to be insignificant and discountable." The NRC staff finds that these conclusions would also apply to Atlantic sturgeon.

Other Pollutants Discharged from IP2 and IP3

The 1987 State Pollutant Discharge Elimination System (SPDES) permit contains effluent limits related to an on-site sewage treatment plant, as well as cooling water discharges. The IP SEIS (NRC 2010a) discusses potential discharge and monitoring of other pollutants to the Hudson River. Because IP2 and IP3 must have a SPDES permit to operate and must operate within the terms of that permit, the staff assumes for this assessment that the plant will operate in compliance with permit limits. Therefore, the staff believes that the effects of exposure of Atlantic sturgeon to any contaminants at or below permit levels will be insignificant.

Cumulative Effects

The NMFS (2011a) biological opinion for shortnose sturgeon considered cumulative effects and found that the effects of state water fisheries, pollution, and contaminants would be similar to the effects in the past. It also found that the degree to which effects of global climate change will increase Hudson River water temperatures are not reasonably certain but that any temperature changes are not likely to cause adverse effects over the proposed roughly 20-year period of extended operation for IP2 and IP3. The NRC staff believes NMFS's assessment and conclusions for shortnose sturgeon would also apply to Atlantic sturgeon. Any adverse effects from IP2 and IP3 on adult Atlantic sturgeon would be smaller than those for shortnose sturgeon, as Atlantic sturgeon adults spend less time in estuaries and more time at sea than adult shortnose sturgeon.

5.0 Conclusion and Determination of Effects

The life history of the species and lack of evidence of entrainment indicates that eggs and larvae are unlikely to be found near Indian Point and are not affected by entrainment at IP2 and IP3. Juveniles can be found near IP2 and IP3 because they migrate downstream to estuarine waters. Though the sturgeon tend to stay in deeper channels, IP2 and IP3 do impinge some juvenile Atlantic sturgeon. Migrating adults should be able to avoid the low intake velocities of the IP2 and IP3 intake during their migrations. Installation of modified Ristroph screens in 1990 and 1991 should reduce impingement damage and mortality. A comparison of the spatial distribution of elevated water temperatures in the thermal plume with the known thermal requirements of sturgeon indicates that Atlantic sturgeon are not likely to be adversely affected by the IP2 and IP3 thermal discharge. The NRC staff believes that if the population of Atlantic sturgeon in the Hudson River begins to recover, impingement rates at IP2 andIP3 will increase with the increasing population size.

The NRC staff concludes that operation of IP2 and IP3 is **may affect, but is not likely to adversely affect,** the Atlantic sturgeon during the remainder of the current operating license period and the 20-year license renewal term (through September 28, 2033 and December 12, 2035, respectively), if license renewal is approved.

6.0 References

References that appear with an Agencywide Documents Access and Management System (ADAMS) accession number can be accessed through NRC's web-based ADAMS at the following URL: http://adams.nrc.gov/wba/.

75 FR 838. National Oceanic and Atmospheric Administration. "Endangered and Threatened Wildlife; Notice of 90-Day Finding on a Petition to List Atlantic Sturgeon as Threatened or Endangered under the Endangered Species Act (ESA)." *Federal Register* 75(3):838-841. January 6, 2010.

75 FR 61872. National Oceanic and Atmospheric Administration. "Endangered and Threatened and Plants; Proposed Listing Determinations for Three Distinct Population Segments of Atlantic Sturgeon in the Northeast Region." *Federal Register* 75(193):61872-61904. October 6, 2010.

75 FR 61904. National Oceanic and Atmospheric Administration. "Endangered and Threatened Wildlife and Plants; Proposed Listing Determinations for Two Distinct Population Segments of Atlantic Sturgeon in the Southeast Region." *Federal Register* 75(193):61904-61929. October 6, 2010.

77 FR 5880. National Oceanic and Atmospheric Administration. “Endangered and Threatened Wildlife and Plants; Final Listing Determinations for Two Distinct Population Segments of Atlantic Sturgeon (*Acipenser oxyrinchus oxyrinchus*) in the Northeast.” *Federal Register* 77(24):5880-5912. February 6, 2012.

77 FR 5914. National Oceanic and Atmospheric Administration. “Endangered and Threatened Wildlife and Plants; Final Listing Determinations for Two Distinct Population Segments of Atlantic Sturgeon (*Acipenser oxyrinchus oxyrinchus*) in the Southeast.” *Federal Register* 77(24):5914-5982. February 6, 2012.

[ASMFC] Atlantic States Marine Fisheries Commission. 2007. *Estimation of Atlantic Sturgeon Bycatch in Coastal Atlantic Commercial Fisheries of New England and the Mid-Atlantic*. Special Report to the ASMFC Atlantic Sturgeon Management Board. August 2007. Available at <http://www.asmfc.org/speciesDocuments/sturgeon/bycatchReportAug07.pdf> (accessed 14 February 2012).

[ASSRT] Atlantic Sturgeon Status Review Team. 2007. *Status Review of Atlantic Sturgeon (Acipenser oxyrinchus oxyrinchus)*. Report to National Marine Fisheries Service, Northeast Regional Office. February 23, 2007. Available at <http://www.nmfs.noaa.gov/pr/pdfs/statusreviews/atlanticsturgeon2007.pdf> (accessed 14 February 2012).

Barnthouse, L.W., D.G. Heimbuch, M. Mattson, and J.R. Young. 2009. Review of NRC’s Impingement and Entrainment Assessment for IP2 and IP3. (Data from Table A-1). March 16, 2009. Enclosure 6 *in Entergy Nuclear Northeast (Entergy). 2009. Letter from F. Dacimo, Vice* President, Entergy Nuclear Northeast, to U.S. Nuclear Regulatory Commission, Chief, Rulemaking, Directives and Editing Branch. Reference NL-09-036. Subject: Comments on NUREG-1437, Draft Supplement 38. March 18, 2009. ADAMS Accession No. ML091040133.

Barnthouse, L., M. Mattson, and J. Young. 2011. *Shortnose Sturgeon: A Technical Assessment Pursuant to the Endangered Species Act*. Prepared for Entergy Nuclear Operations, Inc.; Entergy Nuclear Indian Point 2, LLC; and Entergy Nuclear Indian Point 3, LLC. April 2011. ADAMS No. ML11126A202.

Endangered Species Act of 1973. 16 U.S.C. 1531, et seq.

[Entergy] Entergy Nuclear Northeast. 2008. Letter from Robert Walpole, Manager, Licensing, Entergy to USNRC, Document Control Desk. Subject: Document Request for Additional Information Regarding Environmental Review for License Renewal Application - Hudson River Fisheries Program Data (Year Class Report). NL-08-049. March 7, 2008. ADAMS No. ML080770457.

[Entergy] Entergy Nuclear Northeast. 2009. Letter from Fred Dacimo, Vice President, License Renewal, Entergy to USNRC, Document Control Desk. Subject: Transmission of Additional Requested Information Regarding Sturgeon Impingement Data, Indian Point Nuclear Generating Unit Nos. 2 & 3, Docket Nos. 50-247 and 50-286, License Nos. DPR-26 and DPR-64. Enclosure 1 to NL-09-091, Sturgeon Impingement at Indian Point 1974-1990. July 1, 2009. ADAMS No. ML091950345.

[Entergy] Entergy Nuclear Northeast. 2011a. Letter from Fred Dacimo, Vice President, License Renewal to Andrew Stuyvenberg, NRC Environmental Project Manager, NRC and Patricia Kurkul, Regional Administrator, National Marine Fisheries Service - Northeast Region. Subject: Endangered Species Act Consultation, Indian Point Nuclear Generating Unit Nos. 2 & 3, Docket Nos. 50-247 and 50-286, License Nos. DPR-26 and DPR-64. April 28, 2011. ADAMS No. ML11126A202.

[Entergy] Entergy Nuclear Northeast. 2012. Letter from Fred Dacimo, Vice President, License Renewal to David Wrona, Branch Chief, Projects Branch 2, Division of License Renewal, NRC. Subject: Endangered Species Act Consultation, Indian Point Nuclear Generating Unit Nos. 2 & 3, Docket Nos. 50-247 and 50-286, License Nos. DPR-26 and DPR-64. NL-12-043. March 7, 2012. ADAMS No. ML1207A116.

Gilbert CR. 1989. *Species Profiles: Life Histories and Environmental Requirements of Coastal Fishes and Invertebrates (Mid-Atlantic)—Atlantic and Shortnose Sturgeons*. U.S. Fish and Wildlife Service Biological Report 82(11.122). U.S. Army Corps of Engineers TR EL-82-4. December 1989. Available at <http://www.nwrc.usgs.gov/wdb/pub/species_profiles/82_11-122.pdf> (accessed 14 February 2012).

[NAI] Normandeau Associates Inc. 2008. NRC Request for Sampling Effort and Abundance Data from Three Hudson River Sampling Programs for 16 Selected Fish Species During 1974 through 2005. February 25, 2008. Bedford, NH. ADAMS No. ML080780288. Data displayed in ADAMS Nos. ML080770458, ML080770459, ML080770463, ML080770464, ML080770465, ML080770466, ML080770467.

[NMFS] National Marine Fisheries Service. 2011a. *Endangered Species Act Section 7 Consultation, Biological Opinion. Northeast Regional Office*. October 14, 2011. ADAMS No. ML11290A232.

[NMFS] National Marine Fisheries Service. 2011b. Letter from Patricia Kurkul, Regional Administrator, Northeast Regional Office, NMFS to David Wrona, Branch chief, Projects Branch 2, division of License Renewal, NRC. Re: Biological Opinion for License Renewal of the Indian Point Nuclear Generating Unit Nos. 2 and 3. October 14, 2011. ADAMS No. ML11290A232.

[NMFS] National Marine Fisheries Service. 2012. "Atlantic Sturgeon (*Acipenser oxyrinchus oxyrinchus*)." Available at <http://www.nmfs.noaa.gov/pr/species/fish/atlanticsturgeon.htm> (accessed 14 February 2012).

[NRC] U.S. Nuclear Regulatory Commission . 2010a. *Generic Environmental Impact Statement for License Renewal of Nuclear Plants, Supplement 38, Regarding Indian Point Nuclear Generating Unit Nos. 2 and 3, Final Report, Main Report and Comment Responses.* NUREG-1437, Supplement 38, 3 volumes. Washington, DC. ADAMS No. ML103270072.

[NRC] U.S. Nuclear Regulatory Commission. 2010b. Letter from David J. Wrona, Chief, Projects Branch 2, Division of License Renewal, NRC to Mary A. Colligan, Assistant Regional Administrator for Protected Resources, National Marine Fisheries Service. Subject: Revised biological assessment for license renewal of the Indian Point Nuclear Generating Plant, Unit Nos. 2 and 3. December 10, 2010. ADAMS No. ML102990043.

[NRC] U.S. Nuclear Regulatory Commission. 2011. Letter from Laurel M. Bauer, Acting Chief, Environmental Review and Guidance Update Branch, Division of License Renewal, NRC to Mary A. Colligan, Assistant Regional Administrator for Protected Resources, National Marine Fisheries Service. Subject: Supplement to revised biological assessment for license renewal of the Indian Point Nuclear Generating Plant, Unit Nos. 2 and 3. July 26, 2011. ADAMS No. ML11203A100.

[NRDC] Natural Resources Defense Council. 2009. *Before the Secretary of Commerce, Petition to List Atlantic Sturgeon (Acipenser oxyrinchus oxyrinchus) as an Endangered Species, or List Specified Atlantic Sturgeon DPSs as Threatened and Endangered Species, and to Designate Critical Habitat*. September 30, 2009. Available at <http://www.nmfs.noaa.gov/pr/pdfs/species/petition_atlanticsturgeon_nrdc.pdf> (accessed 14 February 2012).

Shepard G. 2006. “Status of Fishery Resources off the Northeastern U.S.: Atlantic and Shortnose Sturgeons.” December 2006. Available at <http://www.nefsc.noaa.gov/sos/spsyn/af/sturgeon/archives/42_Atlantic_ShortnoseSturgeons_2006.pdf> (accessed 14 February 2012).

Table 1. Impingement of Shortnose and Atlantic Sturgeon at IP2 and IP3 from 1975 through 1990 from IP SEIS Table 4-11 (NRC 2010a, data from Barnthouse et al. 2009 in Entergy 2009).

Year	Shortnose Sturgeon			Atlantic Sturgeon			Grand Total
	IP2	IP3	Total	IP2	IP3	Total	
1975	1	NS[(a)]	1	118	NS	118	119
1976	2	0	2	8	8	16	18
1977	6	1	7	44	153	197	204
1978	2	3	5	16	21	37	42
1979	2	2	4	32	38	70	74
1980	0	1	1	9	10	19	20
1981	0	0	0	3	5	8	8
1982	0	0	0	1	1	2	2
1983	0	0	0	3	0	3	3
1984	1	1	2	3	5	8	10
1985	0	0	0	8	17	25	25
1986	0	0	0	2	4	6	6
1987	2	1	3	2	1	3	6
1988	3	1	4	1	0	1	5
1989	0	1	1	0	0	0	1
1990	1	0	1	0	2	2	3
Total	20	11	31	250	265	515	546

[(a)] Not Sampled, unit not in operation

Table 2. Total Atlantic Sturgeon Caught during the Hudson River Fall Shoals Survey, 1974-2005, by Region. The numbers of Young of the Year (YOY) are indicated in parentheses where appropriate (NAI 2008).

Year	Battery	Yonkers	Tappan Zee	Croton-Haverstraw	Indian Point	West Point	Cornwall	Poughkeepsie	Hyde Park	Kingston	Saugerties	Catskill	Albany	Grand Total
1974	--	0	3	7	17	24	12	5	--	--	--	--	--	68
1975	--	0	2	2	1	1	1	0	--	--	--	--	--	7
1976	--	0	3	2	6	0	1	0	--	--	--	--	--	12
1977	--	0	3	1	2	0	2	3	--	--	--	--	--	11
1978	--	0	1	3	1	1	3	2	--	--	--	--	--	11
1979	--	0	3	3	1	1	0	0	1	1	1	0	1	12
1980	--	0	2	0	1	1	0	0	1 (1)	0	0	0	1	6 (1)
1981	--	0	0	0	0	1	4	0	1	3	1	2	2	14
1982	--	0	1	0	0	2	0	0	1	0	0	0	0	4
1983	--	0	0	0	0	0	0	6	3	0	2	5	12	28
1984	--	0	0	2	0	2	2	0	1	3	4	0	1	15
1985	--	0	3	1	2	6	11	10	15	29	11	3	5	96
1986	--	0	2	7	6	17	19	12	39	52	23	6	1	184
1987	--	0	1	5	4	15	7	6	26	59	25 (1)	1	0	149 (1)
1988	--	0	0	1	2	11	8	2	36	35	15	3	4 (1)	117 (1)
1989	--	0	2	3	0	12	7	6	12	16	4	1	0	63
1990	--	0	0	1	0	0	1	0	0	0	4	0	0	6
1991	--	0	0	0	0	3	0	1	1	0	0	1	4	10
1992	--	0	0	0	2	2	4	0	2	0	0	1	0	11
1993	--	0	0	0	1	0	2	0	1	2	0	0	1	7
1994	--	0	0	1	1	3	1	0	1	4	1	3	0	15
1995	--	0	0	1	1	0	4	1	0	4	4	0	0	15
1996	0	0	0	0	0	2	2	1	0	0	1	0	2	8
1997	0	0	0	0	1	5	3	20	7 (1)	3	0	1	0	40 (1)
1998	0	1	0	1	0	8	16	3	1	0	0	0	0	30
1999	0	0	1	1	3	6	3	4	0	0	0	0	0	18
2000	0	0	0	0	0	3 (1)	1	1	0	0	0	0	0	5 (1)
2001	0	0	0	0	0	2	2	14 (1)	5	0	0	0	0	23 (1)
2002	0	0	0	1	0	14	10	11 (1)	1	0	0	0	0	37 (1)
2003	0	0	1	1	5	11	20	1	0	0	0	0	0	39
2004	0	0	1	1	6	8	3	3	0	0	0	0	0	22
2005	0	0	0	0	2	4	4	2	0	0	0	0	0	12
Grand Total	0	1	29	45	65	165 (1)	153	114 (2)	155 (2)	211	96 (1)	27	34 (1)	1095 (7)

Shading and -- means not sampled.

Table 3. Young of the Year (YOY) and Older Atlantic Sturgeon Caught during the Hudson River Long River Survey from 1974 through 2005 by Region. The numbers of young of the year are indicated in parentheses where appropriate (NAI 2008).

Year	Battery	Yonkers	Tappan Zee	Croton-Haverstraw	Indian Point	West Point	Cornwall	Poughkeepsie	Hyde Park	Kingston	Saugerties	Catskill	Albany	Grand Total
1974	--	0	10	1	17	6	6	14	7 (1)	2	0	0	0	63 (1)
1975	--	0	4	3	10	23	0	4	0	1	1	0	0	46
1976	--	0	3	1	7	9	3	2 (1)	0	0	1	1	0	27 (1)
1977	--	0	1	1	1	3	1	1	1	0	0	0	0	9
1978	--	0	1	0	2	4	2	1 (1)	0	0	0	0	0	10 (1)
1979	--	0	0	2	5	4	4	0	1	0	0	0	1	17
1980	--	0	1	3	0	1	0	1	0	0	0	0	0	6
1981	--	0	0	0	0	0	2	0	0	1	0	0	0	3
1982	--	0	0	0	0	4	1	0	0	0	0	0	0	5
1983	--	0	0	0	0	9	0	0	0	0	0	0	0	9
1984	--	0	0	1	0	1	2	3	9	1	0	1	1	19
1985	--	0	0	0	0	1	0	0	3	2	2	0	0	8
1986	--	0	0	0	0	1	0	1	1	0	2	0	0	5
1987	--	0	0	0	2	5	0	2	1	2	0	0	0	12
1988	--	0	0	0	1	0	0	0	0	1	3	0	0	5
1989	0	0	0	0	0	0	1	1	0	0	0	0	0	2
1990	0	0	0	0	0	0	1	0	0	0	0	1	3	5
1991	0	0	0	0	2	0	0	0	1	1	0	2	2 (1)	8 (1)
1992	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1993	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1994	0	0	0	0	2	1	0	0	0	0	0	0	0	3
1995	0	0	0	0	0	1	0	0	0	0	0	0	0	1
1996	0	0	0	0	0	0	0	1	0	0	0	0	0	1
1997	0	0	0	0	0	0	0	1	0	0	0	0	0	1
1998	0	0	0	0	0	2	0	0	0	0	0	0	0	2
1999	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2001	0	0	0	0	0	0	1	0	0	0	0	0	0	1
2002	0	0	0	0	0	0	2	0	0	0	0	0	0	2
2003	0	0	1	0	0	0	1	0	0	0	0	0	0	2
2004	0	0	0	0	1	1	2	0	0	0	0	0	0	4
2005	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	21	12	50	76	29	32 (2)	24 (1)	11	9	5	7 (1)	276 (4)

Shading and -- means not sampled.

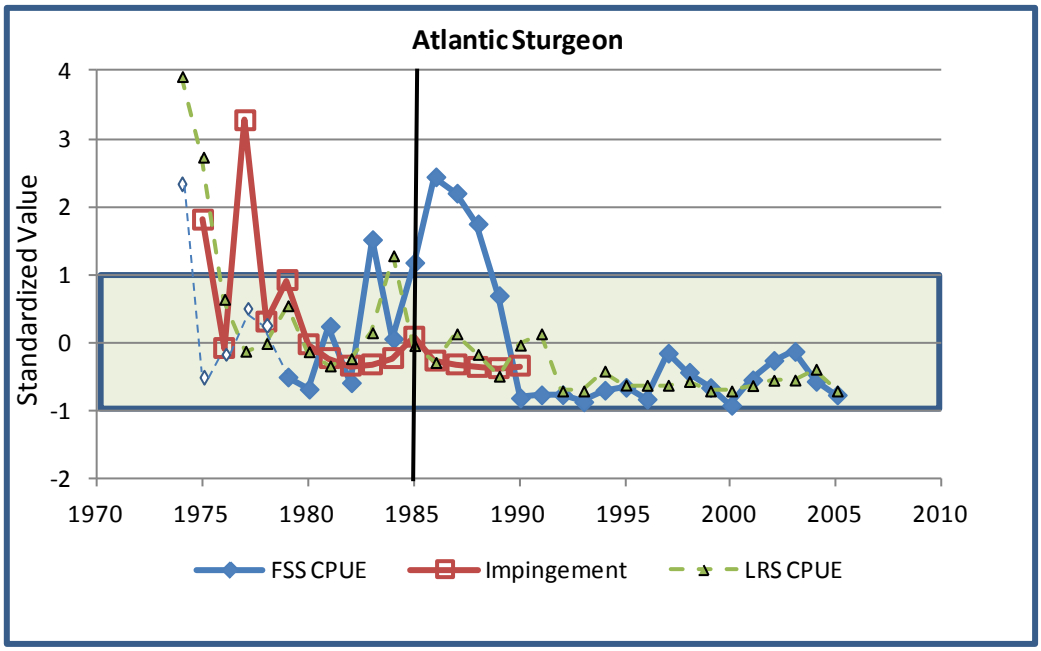


Figure 1. Standardized annual river-wide catch per unit effort (CPUE) and impingement by year. The dashed blue line and open blue triangle indicate years with no samples from Hyde Park to Albany during the FSS. The vertical line indicates a change in the sampling gear.

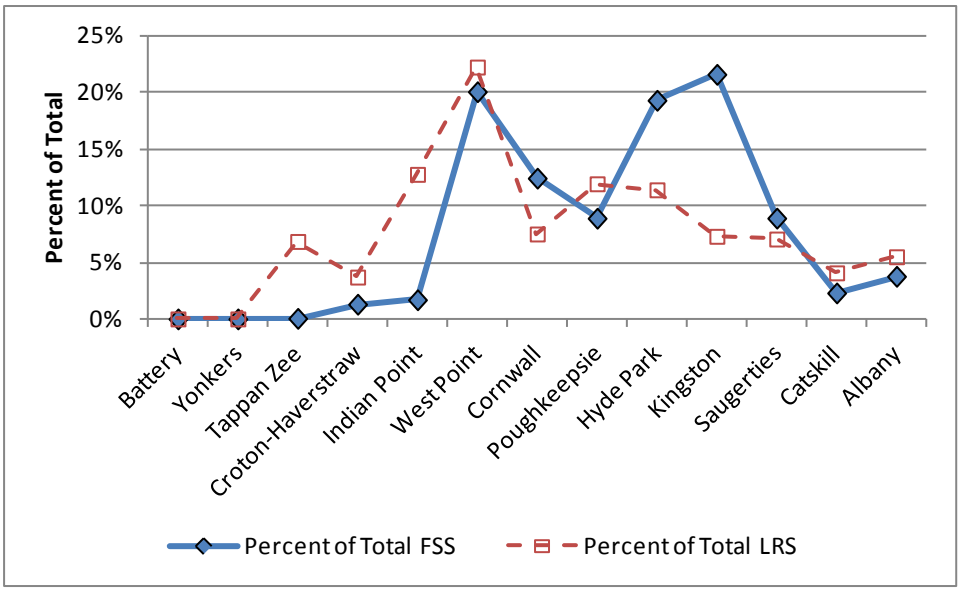


Figure 2. The percent of the total average annual young of the year and older Atlantic sturgeon catch per unit effort (CPUE, number/1000 m3) by region for the FSS and LRS in 1979 through 2005.

APPENDIX A

ADDITIONAL INFORMATION ON IMPINGEMENT OF ATLANTIC STURGEON AT INDIAN POINT NUCLEAR GENERATING STATION UNIT NOS. 2 AND 3 PROVIDED BY ENTERGY (2009)

Table 2c. Individual Data File Records of Atlantic Sturgeon Collected by Impingement at Indian Point Unit No. 2 in Each Year, 1974 through 1990.

Unit	Year	Taxon	Date	Sample Number	Total Weight (g)	Length (mmtl)	Condition (alive or dead)	H2O Temp (deg C)	Total Count V-35 DEIS 1999	DSEIS 2008 Table 4-11	Coll. Eff. Adj_Cnt	Comments
2	1974	Atlantic Sturgeon	25-Jan-74	202508	31			0.5	1		1.94	
2	1974	Atlantic Sturgeon	26-Jan-74	202616	34			0.4	1		1.94	
2	1974	Atlantic Sturgeon	28-Jan-74	202809	33			1.0	1		1.96	
2	1974	Atlantic Sturgeon	19-Feb-74	205009	58			0.2	1		1.93	
2	1974	Atlantic Sturgeon	23-Mar-74	208212	31			5.0	1		2.11	
2	1974	Atlantic Sturgeon	6-Apr-74	209610	20			4.5	1		2.09	
2	1974	Atlantic Sturgeon	8-Apr-74	209807	77			4.9	2		4.20	two fish combined; no individual records
2	1974	Atlantic Sturgeon	9-Apr-74	209909	138			5.0	3		6.32	three fish combined; no individual records
2	1974	Atlantic Sturgeon	9-Apr-74	209917	36			5.0	1		2.11	
2	1974	Atlantic Sturgeon	10-Apr-74	210016	582			4.5	1		2.09	
2	1974	Atlantic Sturgeon	28-Apr-74	211808	40			8.0	1		2.23	
2	1974	Atlantic Sturgeon	30-Apr-74	212008	103			5.3	2		4.23	two fish combined; no individual records
2	1974	Atlantic Sturgeon	1-May-74	212108	218			9.0	3		6.82	three fish combined; no individual records
2	1974	Atlantic Sturgeon	6-May-74	212608	129			11.0	1		2.37	
2	1974	Atlantic Sturgeon	8-May-74	212807	108			10.1	2		4.64	two fish combined; no individual records
2	1974	Atlantic Sturgeon	8-May-74	212815	75			10.1	1		2.32	
2	1974	Atlantic Sturgeon	10-May-74	213008	227			10.5	3		7.02	three fish combined; no individual records
2	1974	Atlantic Sturgeon	12-May-74	213208	39			10.0	1		2.32	
2	1974	Atlantic Sturgeon	20-May-74	214009	83			17.3	1		2.71	
2	1974	Atlantic Sturgeon	22-May-74	214208	207			18.0	2		5.53	two fish combined; no individual records
2	1974	Atlantic Sturgeon	24-May-74	214408	224			17.5	3		8.19	three fish combined; no individual records
2	1974	Atlantic Sturgeon	25-May-74	214508	2142			18.0	6		16.58	six fish combined; no individual records
2	1974	Atlantic Sturgeon	26-May-74	214608	117			17.5	2		5.46	two fish combined; no individual records
2	1974	Atlantic Sturgeon	27-May-74	214708	75			16.0	1		2.64	
2	1974	Atlantic Sturgeon	28-May-74	214808	120			18.0	1		2.76	
2	1974	Atlantic Sturgeon	30-May-74	215008	104			18.0	1		2.76	
2	1974	Atlantic Sturgeon	31-May-74	215108	224			17.0	3		8.10	three fish combined; no individual records
2	1974	Atlantic Sturgeon	1-Jun-74	215208	114			18.1	1		2.77	
2	1974	Atlantic Sturgeon	2-Jun-74	215308	124			17.9	1		2.76	
2	1974	Atlantic Sturgeon	3-Jun-74	215409	107			18.0	1		2.76	
2	1974	Atlantic Sturgeon	4-Jun-74	215508	259			18.0	1		2.76	
2	1974	Atlantic Sturgeon	14-Jun-74	216508	47			19.2	1		2.85	
2	1974	Atlantic Sturgeon	17-Jun-74	216808	45			21.5	1		3.02	
2	1974	Atlantic Sturgeon	24-Jun-74	217508	255			19.0	1		2.83	
2	1974	Atlantic Sturgeon	25-Jun-74	217609	48			21.0	1		2.98	
2	1974	Atlantic Sturgeon	27-Jun-74	217809	168			21.0	1		2.98	
2	1974	Atlantic Sturgeon	30-Jun-74	218109	2			21.5	2		6.04	two fish combined; no individual records
2	1974	Atlantic Sturgeon	1-Jul-74	218209	1			23.0	1		3.14	
2	1974	Atlantic Sturgeon	2-Jul-74	218314	4			23.0	3		9.43	three fish combined; no individual records

Table 2c. Individual Data File Records of Atlantic Sturgeon Collected by Impingement at Indian Point Unit No. 2 in Each Year, 1974 through 1990.

Unit	Year	Taxon	Date	Sample Number	Total Weight (g)	Length (mmtl)	Condition (alive or dead)	H2O Temp (deg C)	Total Count	V-35 DEIS 1999	DSEIS 2008 Table 4-11	Coll. Eff. Adj_Cnt	Comments
2	1974	Atlantic Sturgeon	3-Jul-74	218409	3			24.0	2			6.46	two fish combined; no individual records
2	1974	Atlantic Sturgeon	8-Jul-74	218909	361			24.0	3			9.69	three fish combined; no individual records
2	1974	Atlantic Sturgeon	10-Jul-74	219109	225			25.1	1			3.33	
2	1974	Atlantic Sturgeon	11-Jul-74	219209	215			24.2	1			3.25	
2	1974	Atlantic Sturgeon	12-Jul-74	219309	1			24.0	1			3.23	
2	1974	Atlantic Sturgeon	13-Jul-74	219409	49			24.0	3			9.69	three fish combined; no individual records
2	1974	Atlantic Sturgeon	14-Jul-74	219509	2			23.8	1			3.21	
2	1974	Atlantic Sturgeon	15-Jul-74	219608	2			24.9	1			3.31	
2	1974	Atlantic Sturgeon	16-Jul-74	219708	36			24.8	1			3.31	
2	1974	Atlantic Sturgeon	19-Jul-74	220010	13			25.0	3			9.97	three fish combined; no individual records
2	1974	Atlantic Sturgeon	20-Jul-74	220109	97			25.3	1			3.35	
2	1974	Atlantic Sturgeon	21-Jul-74	220209	51			30.2	1			3.91	
2	1974	Atlantic Sturgeon	24-Jul-74	220509	154			25.0	1			3.32	
2	1974	Atlantic Sturgeon	29-Jul-74	221009	160			24.5	1			3.28	
2	1974	Atlantic Sturgeon	16-Aug-74	222809	56			26.0	1			3.42	
2	1974	Atlantic Sturgeon	17-Aug-74	222909	118			26.0	2			6.85	two fish combined; no individual records
2	1974	Atlantic Sturgeon	21-Aug-74	223309	15			23.0	1			3.14	
2	1974	Atlantic Sturgeon	22-Aug-74	223409	337			27.2	2			7.10	two fish combined; no individual records
2	1974	Atlantic Sturgeon	23-Aug-74	223509	177			26.5	1			3.48	
2	1974	Atlantic Sturgeon	1-Sep-74	224409	12			28.0	1			3.64	
2	1974	Atlantic Sturgeon	3-Sep-74	224609	13			24.9	1			3.31	
2	1974	Atlantic Sturgeon	6-Sep-74	224909	9			24.8	1			3.31	
2	1974	Atlantic Sturgeon	8-Sep-74	225109	6			24.3	1			3.26	
2	1974	Atlantic Sturgeon	13-Oct-74	228609	18			16.5	1			2.67	
2	1974	Atlantic Sturgeon	16-Oct-74	228922	25			17.0	1			2.70	
2	1974	Atlantic Sturgeon	3-Nov-74	230717	604			13.7	1			2.50	
2	1974	Atlantic Sturgeon	6-Nov-74	231006	139			15.0	1			2.58	
2	1974	Atlantic Sturgeon	21-Nov-74	232509	33			10.0	1			2.32	
2	1974	Atlantic Sturgeon	10-Dec-74	234408	127			5.7	1			2.13	
2	1974	Atlantic Sturgeon	13-Dec-74	234718	76			5.0	1			2.11	
2	**Total 1974**	**Atlantic Sturgeon**							**101**	**100**	**NR**	**281.53**	**1974 not reported in DSEIS Table 4-11**
2	1975	Atlantic Sturgeon	9-Jan-75	200922	27			5.0	1			2.11	
2	1975	Atlantic Sturgeon	17-Apr-75	210709	93			7.0	1			2.19	
2	1975	Atlantic Sturgeon	18-Apr-75	210809	71			7.0	1			2.19	
2	1975	Atlantic Sturgeon	19-Apr-75	210902	116			6.0	2			4.29	two fish combined; no individual records
2	1975	Atlantic Sturgeon	19-Apr-75	210913	232			6.0	1			2.14	
2	1975	Atlantic Sturgeon	21-Apr-75	211109	184			7.0	2			4.37	two fish combined; no individual records
2	1975	Atlantic Sturgeon	23-Apr-75	211309	380			7.5	4			8.83	four fish combined; no individual records
2	1975	Atlantic Sturgeon	23-Apr-75	211315	109			7.5	2			4.41	two fish combined; no individual records

Table 2c. Individual Data File Records of Atlantic Sturgeon Collected by Impingement at Indian Point Unit No. 2 in Each Year, 1974 through 1990.

Unit	Year	Taxon	Date	Sample Number	Total Weight (g)	Length (mmtl)	Condition (alive or dead)	H2O Temp (deg C)	Total Count	V-35 DEIS 1999	DSEIS 2008 Table 4-11	Coll. Eff. Adj_Cnt	Comments
2	1975	Atlantic Sturgeon	23-Apr-75	211324	136			7.5	2			4.41	two fish combined; no individual records
2	1975	Atlantic Sturgeon	24-Apr-75	211409	492			8.0	6			13.37	six fish combined; no individual records
2	1975	Atlantic Sturgeon	24-Apr-75	211422	458			8.0	7			15.59	seven fish combined; no individual records
2	1975	Atlantic Sturgeon	25-Apr-75	211505	257			8.3	4			8.96	four fish combined; no individual records
2	1975	Atlantic Sturgeon	26-Apr-75	211609	576			5.5	6			12.75	
2	1975	Atlantic Sturgeon	27-Apr-75	211708	396			7.2	3			6.58	three fish combined; no individual records
2	1975	Atlantic Sturgeon	28-Apr-75	211809	415			10.0	5			11.59	five fish combined; no individual records
2	1975	Atlantic Sturgeon	28-Apr-75	211820	42			10.0	1			2.32	
2	1975	Atlantic Sturgeon	29-Apr-75	211906	193			10.0	3			6.95	
2	1975	Atlantic Sturgeon	29-Apr-75	211909	209			10.0	2			4.64	two fish combined; no individual records
2	1975	Atlantic Sturgeon	29-Apr-75	211912	317			10.0	3			6.95	three fish combined; no individual records
2	1975	Atlantic Sturgeon	29-Apr-75	211920	153			10.0	2			4.64	two fish combined; no individual records
2	1975	Atlantic Sturgeon	30-Apr-75	212009	293			9.2	4			9.12	four fish combined; no individual records
2	1975	Atlantic Sturgeon	30-Apr-75	212020	131			9.2	2			4.56	two fish combined; no individual records
2	1975	Atlantic Sturgeon	1-May-75	212109	289			11.0	3			7.10	three fish combined; no individual records
2	1975	Atlantic Sturgeon	2-May-75	212209	167			11.3	3			7.14	three fish combined; no individual records
2	1975	Atlantic Sturgeon	3-May-75	212309	177			10.5	1			2.34	
2	1975	Atlantic Sturgeon	7-May-75	212709	375			14.0	1			2.52	
2	1975	Atlantic Sturgeon	9-May-75	212909	401			14.0	3			7.56	three fish combined; no individual records
2	1975	Atlantic Sturgeon	10-May-75	213009	68			13.0	1			2.47	
2	1975	Atlantic Sturgeon	18-May-75	213809	137			15.0	2			5.16	two fish combined; no individual records
2	1975	Atlantic Sturgeon	20-May-75	214009	54			16.5	1			2.67	
2	1975	Atlantic Sturgeon	23-May-75	214309	166			17.0	2			5.40	two fish combined; no individual records
2	1975	Atlantic Sturgeon	6-Jun-75	215709	87			21.0	1			2.98	
2	1975	Atlantic Sturgeon	7-Jun-75	215809	655			21.2	1			2.99	
2	1975	Atlantic Sturgeon	10-Jun-75	216109	174			21.3	1			3.00	
2	1975	Atlantic Sturgeon	12-Jun-75	216309	89			21.0	1			2.98	
2	1975	Atlantic Sturgeon	15-Jun-75	216609	143			21.8	1			3.04	
2	1975	Atlantic Sturgeon	16-Jun-75	216709	41			21.0	1			2.98	
2	1975	Atlantic Sturgeon	20-Jun-75	217109	215			23.0	1			3.14	
2	1975	Atlantic Sturgeon	21-Jun-75	217209	45			24.0	1			3.23	
2	1975	Atlantic Sturgeon	22-Jun-75	217309	101			24.5	1			3.28	
2	1975	Atlantic Sturgeon	25-Jun-75	217609	71			25.0	1			3.32	
2	1975	Atlantic Sturgeon	26-Jun-75	217709	122			24.0	1			3.23	
2	1975	Atlantic Sturgeon	1-Jul-75	218209	112			24.5	1			3.28	
2	1975	Atlantic Sturgeon	2-Jul-75	218309	89			25.0	1			3.32	
2	1975	Atlantic Sturgeon	2-Jul-75	218314	107			25.0	1			3.32	
2	1975	Atlantic Sturgeon	3-Jul-75	218409	559			25.0	3			9.97	three fish combined; no individual records
2	1975	Atlantic Sturgeon	5-Jul-75	218609	104			26.5	1			3.48	

Table 2c. Individual Data File Records of Atlantic Sturgeon Collected by Impingement at Indian Point Unit No. 2 in Each Year, 1974 through 1990.

Unit	Year	Taxon	Date	Sample Number	Total Weight (g)	Length (mmtl)	Condition (alive or dead)	H2O Temp (deg C)	Total Count	V-35 DEIS 1999	DSEIS 2008 Table 4-11	Coll. Eff. Adj_Cnt	Comments
2	1975	Atlantic Sturgeon	6-Jul-75	218709	116			27.0	1			3.53	
2	1975	Atlantic Sturgeon	7-Jul-75	218809	396			27.0	1			3.53	
2	1975	Atlantic Sturgeon	8-Jul-75	218909	117			25.0	1			3.32	
2	1975	Atlantic Sturgeon	10-Jul-75	219109	114			27.0	1			3.53	
2	1975	Atlantic Sturgeon	18-Jul-75	219909	124			26.0	1			3.42	
2	1975	Atlantic Sturgeon	22-Jul-75	220309	14			27.0	1			3.53	
2	1975	Atlantic Sturgeon	24-Jul-75	220509	2			27.0	1			3.53	
2	1975	Atlantic Sturgeon	27-Jul-75	220809	3			26.5	1			3.48	
2	1975	Atlantic Sturgeon	20-Aug-75	223208	472			26.0	1			3.42	
2	1975	Atlantic Sturgeon	21-Aug-75	223308	106			26.0	1			3.42	
2	1975	Atlantic Sturgeon	3-Sep-75	224608	566			24.0	1			3.23	
2	1975	Atlantic Sturgeon	5-Sep-75	224814	77			24.2	1			3.25	
2	1975	Atlantic Sturgeon	15-Sep-75	225808	585			22.0	1			3.06	
2	1975	Atlantic Sturgeon	11-Oct-75	228408	42			17.0	1			2.70	
2	1975	Atlantic Sturgeon	13-Oct-75	228608	105			16.9	1			2.69	
2	1975	Atlantic Sturgeon	11-Nov-75	231508	194			13.0	1			2.47	
2	1975	Atlantic Sturgeon	12-Nov-75	231608	81			12.6	1			2.45	
2	1975	Atlantic Sturgeon	16-Nov-75	232009	88			11.5	1			2.39	
2	1975	Atlantic Sturgeon	28-Dec-75	236208	265			2.6	1			2.02	
2	**Total 1975**	**Atlantic Sturgeon**							**118**	**118**	**302**	**301.81**	
2	1976	Atlantic Sturgeon	21-Jan-76	202109	814			0.5	2			3.89	
2	1976	Atlantic Sturgeon	22-Jan-76	202209	305			1.0	1			1.96	
2	1976	Atlantic Sturgeon	28-Jan-76	202808	162			1.0	1			1.96	
2	1976	Atlantic Sturgeon	12-Feb-76	204309	80			1.6	1			1.98	
2	1976	Atlantic Sturgeon	23-Mar-76	208309	419			5.0	1			2.11	
2	1976	Atlantic Sturgeon	14-Oct-76	228809	99			18.2	1			2.78	
2	1976	Atlantic Sturgeon	31-Dec-76	236614	66			1.0	1			1.96	
2	**Total 1976**	**Atlantic Sturgeon**							**8**	**8**	**17**	**16.64**	
2	1977	Atlantic Sturgeon	5-Jan-77	200509	724			1.9	1			1.99	
2	1977	Atlantic Sturgeon	12-Jan-77	201209	318			2.0	2			3.99	two fish combined; no individual records
2	1977	Atlantic Sturgeon	24-Jan-77	202409	404			1.7	1			1.99	
2	1977	Atlantic Sturgeon	25-Jan-77	202509	64			3.1	1			2.03	
2	1977	Atlantic Sturgeon	31-Jan-77	203109	373			1.0	1			1.96	
2	1977	Atlantic Sturgeon	23-Feb-77	205409	310			3.0	1			2.03	
2	1977	Atlantic Sturgeon	16-Mar-77	207509	62			5.2	1			2.11	
2	1977	Atlantic Sturgeon	28-Mar-77	208709	103			5.0	1			2.11	
2	1977	Atlantic Sturgeon	30-Mar-77	208909	67			5.5	1			2.12	
2	1977	Atlantic Sturgeon	31-Mar-77	209009	153			5.4	2			4.24	two fish combined; no individual records
2	1977	Atlantic Sturgeon	1-Apr-77	209109	32			6.3	1			2.16	

Table 2c. Individual Data File Records of Atlantic Sturgeon Collected by Impingement at Indian Point Unit No. 2 in Each Year, 1974 through 1990.

Unit	Year	Taxon	Date	Sample Number	Total Weight (g)	Length (mmtl)	Condition (alive or dead)	H2O Temp (deg C)	Total Count	V-35 DEIS 1999	DSEIS 2008 Table 4-11	Coll. Eff. Adj_Cnt	Comments
2	1977	Atlantic Sturgeon	6-Apr-77	209608	108			8.0	2			4.46	two fish combined; no individual records
2	1977	Atlantic Sturgeon	7-Apr-77	209710	55			7.1	1			2.19	
2	1977	Atlantic Sturgeon	8-Apr-77	209809	42			10.0	1			2.32	
2	1977	Atlantic Sturgeon	9-Apr-77	209909	43			7.5	1			2.21	
2	1977	Atlantic Sturgeon	10-Apr-77	210009	182			6.8	3			6.53	three fish combined; no individual records
2	1977	Atlantic Sturgeon	11-Apr-77	210109	216			8.9	3			6.80	three fish combined; no individual records
2	1977	Atlantic Sturgeon	12-Apr-77	210208	228			8.0	3			6.68	three fish combined; no individual records
2	1977	Atlantic Sturgeon	13-Apr-77	210308	101			10.0	2			4.64	two fish combined; no individual records
2	1977	Atlantic Sturgeon	8-Jun-77	215909	1047			19.2	2			5.69	two fish combined; no individual records
2	1977	Atlantic Sturgeon	15-Jun-77	216609	75			20.2	1			2.92	
2	1977	Atlantic Sturgeon	9-Aug-77	222109	244			27.0	1			3.53	
2	1977	Atlantic Sturgeon	20-Aug-77	223209	28			27.2	1			3.55	
2	1977	Atlantic Sturgeon	29-Aug-77	224109	13			26.0	1			3.42	
2	1977	Atlantic Sturgeon	14-Sep-77	225722	267			24.8	1			3.31	
2	1977	Atlantic Sturgeon	15-Sep-77	225809	173			25.6	1			3.38	
2	1977	Atlantic Sturgeon	26-Sep-77	226909	119			21.8	1			3.04	
2	1977	Atlantic Sturgeon	31-Oct-77	230409	364			11.5	1			2.39	
2	1977	Atlantic Sturgeon	4-Nov-77	230809	12			11.1	1			2.37	
2	1977	Atlantic Sturgeon	6-Nov-77	231009	300			12.1	1			2.42	
2	1977	Atlantic Sturgeon	30-Nov-77	233404	54			7.0	1			2.19	
2	1977	Atlantic Sturgeon	5-Dec-77	233909	252			4.3	1			2.08	
2	1977	Atlantic Sturgeon	22-Dec-77	235624	168			2.5	1			2.01	
2	**Total 1977**	**Atlantic Sturgeon**							**44**	**44**	**105**	**104.85**	
2	1978	Atlantic Sturgeon	7-Jan-78	200704	96			1.5	1			1.98	
2	1978	Atlantic Sturgeon	7-Jan-78	200709	56			1.5	1			1.98	
2	1978	Atlantic Sturgeon	8-Jan-78	200809	79			2.5	1			2.01	
2	1978	Atlantic Sturgeon	20-Jan-78	202024	54			0.6	1			1.95	
2	1978	Atlantic Sturgeon	22-Jan-78	202209	67			1.2	2			3.94	two fish combined; no individual records
2	1978	Atlantic Sturgeon	23-Jan-78	202324	80			1.0	1			1.96	
2	1978	Atlantic Sturgeon	27-Jan-78	202709	94			0.5	1			1.94	
2	1978	Atlantic Sturgeon	29-Jun-78	218010	80			23.0	1			3.14	
2	1978	Atlantic Sturgeon	19-Jul-78	220009	3			24.5	1			3.28	
2	1978	Atlantic Sturgeon	27-Jul-78	220809	219			24.9	1			3.31	
2	1978	Atlantic Sturgeon	14-Sep-78	225705	329			24.5	1			3.28	
2	1978	Atlantic Sturgeon	7-Nov-78	231108	32			16.4	1			2.66	
2	1978	Atlantic Sturgeon	8-Nov-78	231208	135			15.0	1			2.58	
2	1978	Atlantic Sturgeon	15-Dec-78	234908	99			6.5	1			2.16	
2	1978	Atlantic Sturgeon	20-Dec-78	235408	15			5.1	1			2.11	
2	**Total 1978**	**Atlantic Sturgeon**							**16**	**16**	**38**	**38.28**	

Table 2c. Individual Data File Records of Atlantic Sturgeon Collected by Impingement at Indian Point Unit No. 2 in Each Year, 1974 through 1990.

Unit	Year	Taxon	Date	Sample Number	Total Weight (g)	Length (mmtl)	Condition (alive or dead)	H2O Temp (deg C)	Total Count	V-35 DEIS 1999	DSEIS 2008 Table 4-11	Coll. Eff. Adj_Cnt	Comments
2	1979	Atlantic Sturgeon	7-Jan-79	200708	27			1.7	1			1.99	
2	1979	Atlantic Sturgeon	22-Jan-79	202208	80			0.5	1			1.94	
2	1979	Atlantic Sturgeon	26-Jan-79	202608	60			0.0	1			1.93	
2	1979	Atlantic Sturgeon	30-Jan-79	203008	72			0.5	1			1.94	
2	1979	Atlantic Sturgeon	2-Feb-79	203309	110			2.2	1			2.00	
2	1979	Atlantic Sturgeon	9-Feb-79	204008	44			1.2	1			1.97	
2	1979	Atlantic Sturgeon	10-Feb-79	204108	132			0.1	1			1.93	
2	1979	Atlantic Sturgeon	13-Feb-79	204408	174			3.0	1			2.03	
2	1979	Atlantic Sturgeon	22-Feb-79	205308	195			0.0	1			1.93	
2	1979	Atlantic Sturgeon	24-Feb-79	205509	250			2.9	1			2.03	
2	1979	Atlantic Sturgeon	26-Feb-79	205708	207			3.0	1			2.03	
2	1979	Atlantic Sturgeon	2-Apr-79	209206	136			8.2	1			2.24	
2	1979	Atlantic Sturgeon	15-Apr-79	210508	180			7.0	1			2.19	
2	1979	Atlantic Sturgeon	19-Apr-79	210908	71			6.4	1			2.16	
2	1979	Atlantic Sturgeon	23-Apr-79	211305	165			8.1	1			2.23	
2	1979	Atlantic Sturgeon	25-Apr-79	211508	165			9.0	1			2.27	
2	1979	Atlantic Sturgeon	28-Apr-79	211808	295			10.5	2			4.68	two fish combined; no individual records
2	1979	Atlantic Sturgeon	17-Sep-79	226008	24			24.0	1			3.23	
2	1979	Atlantic Sturgeon	23-Sep-79	226608	265			20.5	2			5.88	two fish combined; no individual records
2	1979	Atlantic Sturgeon	28-Sep-79	227108	244			21.1	1			2.99	
2	1979	Atlantic Sturgeon	29-Sep-79	227207	114			21.2	1			2.99	
2	1979	Atlantic Sturgeon	11-Oct-79	228418	210			17.0	1			2.70	
2	1979	Atlantic Sturgeon	16-Oct-79	228908	160			15.5	1			2.61	
2	1979	Atlantic Sturgeon	20-Oct-79	229318	39			17.2	1			2.71	
2	1979	Atlantic Sturgeon	28-Oct-79	230108	200			13.5	1			2.49	
2	1979	Atlantic Sturgeon	5-Nov-79	230908	282			13.5	1			2.49	
2	1979	Atlantic Sturgeon	19-Nov-79	232308	685			10.5	1			2.34	
2	1979	Atlantic Sturgeon	20-Nov-79	232418				10.5	1			2.34	
2	1979	Atlantic Sturgeon	21-Nov-79	232518	685			10.4	1			2.34	
2	1979	Atlantic Sturgeon	14-Dec-79	234808				6.0	1			2.14	
2	**Total 1979**	**Atlantic Sturgeon**							**32**	**32**	**75**	**74.75**	
2	1980	Atlantic Sturgeon	1-Jan-80	200108	38			5.1	1			2.11	
2	1980	Atlantic Sturgeon	4-Jan-80	200408	575			3.0	1			2.03	
2	1980	Atlantic Sturgeon	6-Mar-80	206611	905			1.9	1			1.99	
2	1980	Atlantic Sturgeon	24-Mar-80	208408	101			5.2	1			2.11	
2	1980	Atlantic Sturgeon	1-Apr-80	209208	109			6.8	1			2.18	
2	1980	Atlantic Sturgeon	19-Apr-80	211014	360			10.6	1			2.35	
2	1980	Atlantic Sturgeon	27-Aug-80	224008	515			26.0	1			3.42	
2	1980	Atlantic Sturgeon	30-Aug-80	224309	228			30.0	1			3.89	

Table 2c. Individual Data File Records of Atlantic Sturgeon Collected by Impingement at Indian Point Unit No. 2 in Each Year, 1974 through 1990.

Unit	Year	Taxon	Date	Sample Number	Total Weight (g)	Length (mmtl)	Condition (alive or dead)	H2O Temp (deg C)	Total Count	V-35 DEIS 1999	DSEIS 2008 Table 4-11	Coll. Eff. Adj_Cnt	Comments
2	1980	Atlantic Sturgeon	4-Sep-80	224808	210			28.0	1			3.64	
2	**Total 1980**	**Atlantic Sturgeon**							**9**	**9**	**24**	**23.72**	
2	1981	Atlantic Sturgeon	19-Oct-81	229207	434			17.0	1			2.70	
2	1981	Atlantic Sturgeon	20-Oct-81	229308	434			17.0	1			2.70	
2	1981	Atlantic Sturgeon	30-Oct-81	230308	223			15.5	1			2.61	
2	**Total 1981**	**Atlantic Sturgeon**							**3**	**3**	**221**	**8.01**	
2	1982	Atlantic Sturgeon	27-Apr-82	211708	34			11.4	1			2.39	
2	**Total 1982**	**Atlantic Sturgeon**							**1**	**1**	**217**	**2.39**	
2	1983	Atlantic Sturgeon	17-Dec-83	235107.94	69			3.0	1			2.03	
2	1983	Atlantic Sturgeon	19-Dec-83	235307.94	24			2.5	1			2.01	
2	1983	Atlantic Sturgeon	22-Dec-83	235609.94	48			4.0	1			2.07	
2	**Total 1983**	**Atlantic Sturgeon**							**3**	**3**	**149**	**6.11**	
2	1984	Atlantic Sturgeon	25-Jan-84	202508	32			2.0	1			2.00	
2	1984	Atlantic Sturgeon	22-Mar-84	208208	884			4.0	1			2.07	
2	**1984**	**Atlantic Sturgeon**	**29-Nov-84**	**233408**	**27**			**11.0**	**1**			**2.37**	
2	**Total 1984**	**Atlantic Sturgeon**							**3**	**3**	**363**	**6.43**	
2	1985	Atlantic Sturgeon	11-Jan-85	2002	83	268	D	4.0	1			2.07	
2	1985	Atlantic Sturgeon	15-Jan-85	2006	95	302	D	1.2	1			1.97	
2	1985	Atlantic Sturgeon	30-Jan-85	2070	80	250	A	2.0	1			2.00	
2	1985	Atlantic Sturgeon	5-Feb-85	2097	57	na	na	3.0	1			2.03	Not in report table; record in LV5
2	1985	Atlantic Sturgeon	28-Feb-85	2211	105	351	A	2.5	1			2.01	
2	1985	Atlantic Sturgeon	28-Feb-85	2211	130	326	A	2.5	1			2.01	
2	1985	Atlantic Sturgeon	29-Oct-85	2889	210	354	D	16.1	1			2.64	
2	1985	Atlantic Sturgeon	19-Mar-85	2302	25	189	D	7.1	1			2.19	In report table; no record in LV5
2	1985	Atlantic Sturgeon	13-Apr-85	NS	168	403	D	9.9	1			2.31	
2	**Total 1985**	**Atlantic Sturgeon**							**9**	**7(1)**	**460**	**19.23**	
2	1986	Atlantic Sturgeon	6-Jul-86	218710	380	466	A	25.0	1			3.32	
2	1986	Atlantic Sturgeon	5-Dec-86	233908	525	474	A	7.8	1			2.22	
2	**Total 1986**	**Atlantic Sturgeon**							**2**	**2**	**696**	**5.54**	
2	1987	Atlantic Sturgeon	2-May-87	NS	181	326	D	14.6	1			2.55	
2	1987	Atlantic Sturgeon	8-Aug-87	NS	251	432	D	26.3	1			3.46	
2	**Total 1987**	**Atlantic Sturgeon**							**2**	**(2)**	**NR**	**6.01**	
2	1988	Atlantic Sturgeon	4-Mar-88	NS	325	462	A	5.1	1			2.11	
2	**Total 1988**	**Atlantic Sturgeon**							**1**	**(1)**	**NR**	**2.11**	
2	**Total 1989**	**Atlantic Sturgeon**							**0**	**0**	**NR**	**0.00**	
2	**Total 1990**	**Atlantic Sturgeon**							**0**	**0**	**NR**	**0.00**	
2	**1975-1990**	**Atlantic Sturgeon**							**251**	**346(4)**	**2667**	**615.88**	

Table 2c. Individual Data File Records of Atlantic Sturgeon Collected by Impingement at Indian Point Unit No. 2 in Each Year, 1974 through 1990.

Unit	Year	Taxon	Date	Sample Number	Total Weight (g)	Length (mmtl)	Condition (alive or dead)	H2O Temp (deg C)	Total Count	V-35 DEIS 1999	DSEIS 2008 Table 4-11	Coll. Eff. Adj_Cnt	Comments

NS	Collected on a non-scheduled sampling date
NR	Not reported
na	Not available
1.7	Water temperature estimated from weekly average
	Blank space = no data in the SAS Impingement Data Files
(1)	Numbers in parentheses indicate number of shortnose sturgeon taken on non-sample days.

Table 2d. Individual Data File Records of Atlantic Sturgeon Collected by Impingement at Indian Point Unit No. 3 in Each Year, 1974 through 1990.

Unit	Year	Taxon	Date	Sample Number	Total Weight (g)	Length (mmtl)	Condition (alive or dead)	H2O Temp (deg C)	Total Count	V-35 DEIS 1999	DSEIS 2008 Table 4-11	Coll. Eff. Adj_Cnt	Comments
3	1974	Atlantic Sturgeon	18-Apr-74	310809	40			4.5	1			1.47	
3	1974	Atlantic Sturgeon	19-Apr-74	310902	52			5.0	1			1.48	
3	1974	Atlantic Sturgeon	22-Apr-74	311201	73			4.5	1			1.47	
3	1974	Atlantic Sturgeon	12-Jun-74	316318	51			19.8	1			1.79	
3	1974	Atlantic Sturgeon	21-Jun-74	317202	226			23.8	1			1.89	
3	1974	Atlantic Sturgeon	24-Jun-74	317506	57			22.0	1			1.84	
3	1974	Atlantic Sturgeon	19-Jul-74	320002	4			25.5	1			1.94	
3	1974	Atlantic Sturgeon	19-Jul-74	320006	10			25.5	1			1.94	
3	1974	Atlantic Sturgeon	11-Aug-74	322306	140			25.7	1			1.95	
3	1974	Atlantic Sturgeon	29-Dec-74	336310	76			4.0	1			1.46	
3	**Total 1974**	**Atlantic Sturgeon**							**10**	**12**	**NR**	**17.24**	
3	**Total 1975**	**Atlantic Sturgeon**							**NR**	**NR**	**NR**	**NR**	
3	1976	Atlantic Sturgeon	28-Apr-76	311910	35			11.0	1			1.59	
3	1976	Atlantic Sturgeon	12-Jun-76	316410	672			17.8	1			1.74	
3	1976	Atlantic Sturgeon	11-Jul-76	319310	31			26.2	1			1.97	
3	1976	Atlantic Sturgeon	13-Aug-76	322610	70			24.5	1			1.91	
3	1976	Atlantic Sturgeon	4-Sep-76	324810	727			23.5	1			1.89	
3	1976	Atlantic Sturgeon	9-Oct-76	328310	132			20.1	1			1.79	
3	1976	Atlantic Sturgeon	24-Oct-76	329813	35			13.0	1			1.63	
3	1976	Atlantic Sturgeon	2-Nov-76	330710	30			10.0	1			1.57	
3	**Total 1976**	**Atlantic Sturgeon**							**8**	**8**	**14**	**14.09**	
3	1977	Atlantic Sturgeon	16-Mar-77	307510	84			5.9	1			1.49	
3	1977	Atlantic Sturgeon	18-Mar-77	307709	490			4.8	1			1.47	
3	1977	Atlantic Sturgeon	24-Mar-77	308309	116			4.5	2			2.94	two fish combined; no individual records
3	1977	Atlantic Sturgeon	26-Mar-77	308509	107			7.2	2			3.03	two fish combined; no individual records
3	1977	Atlantic Sturgeon	28-Mar-77	308709	162			6.2	3			4.50	three fish combined; no individual records
3	1977	Atlantic Sturgeon	29-Mar-77	308809	40			6.2	1			1.50	
3	1977	Atlantic Sturgeon	30-Mar-77	308909	285			6.3	5			7.50	five fish combined; no individual records
3	1977	Atlantic Sturgeon	31-Mar-77	309009	187			5.4	3			4.45	three fish combined; no individual records
3	1977	Atlantic Sturgeon	1-Apr-77	309109	114			6.8	2			3.02	two fish combined; no individual records
3	1977	Atlantic Sturgeon	2-Apr-77	309209	94			6.0	1			1.50	
3	1977	Atlantic Sturgeon	4-Apr-77	309409	91			6.9	2			3.02	two fish combined; no individual records
3	1977	Atlantic Sturgeon	5-Apr-77	309509	41			7.9	1			1.53	
3	1977	Atlantic Sturgeon	5-Apr-77	309519	200			7.9	3			4.59	three fish combined; no individual records
3	1977	Atlantic Sturgeon	5-Apr-77	309599	91			7.9	1			1.53	
3	1977	Atlantic Sturgeon	14-Apr-77	310409	304			9.5	5			7.80	five fish combined; no individual records
3	1977	Atlantic Sturgeon	15-Apr-77	310509	894			10.0	6			9.42	six fish combined; no individual records
3	1977	Atlantic Sturgeon	15-Apr-77	310514	129			10.0	1			1.57	

Table 2d. Individual Data File Records of Atlantic Sturgeon Collected by Impingement at Indian Point Unit No. 3 in Each Year, 1974 through 1990.

Unit	Year	Taxon	Date	Sample Number	Total Weight (g)	Length (mmtl)	Condition (alive or dead)	H2O Temp (deg C)	Total Count	V-35 DEIS 1999	DSEIS 2008 Table 4-11	Coll. Eff. Adj_Cnt	Comments
3	1977	Atlantic Sturgeon	16-Apr-77	310610	49			11.2	1			1.59	
3	1977	Atlantic Sturgeon	17-Apr-77	310710	328			9.5	5			7.80	five fish combined; no individual records
3	1977	Atlantic Sturgeon	18-Apr-77	310809	475			11.5	7			11.19	seven fish combined; no individual records
3	1977	Atlantic Sturgeon	19-Apr-77	310909	145			11.0	2			3.18	two fish combined; no individual records
3	1977	Atlantic Sturgeon	19-Apr-77	310912	84			11.0	1			1.59	
3	1977	Atlantic Sturgeon	19-Apr-77	310913	75			11.0	1			1.59	
3	1977	Atlantic Sturgeon	19-Apr-77	310920	76			11.0	1			1.59	
3	1977	Atlantic Sturgeon	19-Apr-77	310921	223			11.0	1			1.59	
3	1977	Atlantic Sturgeon	19-Apr-77	310999	114			11.0	2			3.18	two fish combined; no individual records
3	1977	Atlantic Sturgeon	20-Apr-77	311000	727			10.0	4			6.28	four fish combined; no individual records
3	1977	Atlantic Sturgeon	20-Apr-77	311005	127			10.0	2			3.14	two fish combined; no individual records
3	1977	Atlantic Sturgeon	20-Apr-77	311009	297			10.0	5			7.85	five fish combined; no individual records
3	1977	Atlantic Sturgeon	20-Apr-77	311024	255			10.0	3			4.71	three fish combined; no individual records
3	1977	Atlantic Sturgeon	21-Apr-77	311109	282			10.1	4			6.29	four fish combined; no individual records
3	1977	Atlantic Sturgeon	22-Apr-77	311201	145			11.0	2			3.18	two fish combined; no individual records
3	1977	Atlantic Sturgeon	22-Apr-77	311209	157			11.0	2			3.18	two fish combined; no individual records
3	1977	Atlantic Sturgeon	23-Apr-77	311300	115			11.0	2			3.18	two fish combined; no individual records
3	1977	Atlantic Sturgeon	23-Apr-77	311310	354			11.0	4			6.36	four fish combined; no individual records
3	1977	Atlantic Sturgeon	24-Apr-77	311406	123			12.2	2			3.23	two fish combined; no individual records
3	1977	Atlantic Sturgeon	24-Apr-77	311410	341			12.2	3			4.84	three fish combined; no individual records
3	1977	Atlantic Sturgeon	25-Apr-77	311509	255			11.3	3			4.79	three fish combined; no individual records
3	1977	Atlantic Sturgeon	26-Apr-77	311609	247			11.0	3			4.77	three fish combined; no individual records
3	1977	Atlantic Sturgeon	27-Apr-77	311709	145			14.5	2			3.32	two fish combined; no individual records
3	1977	Atlantic Sturgeon	28-Apr-77	311809	86			13.1	1			1.63	
3	1977	Atlantic Sturgeon	2-May-77	312209	65			14.0	1			1.65	
3	1977	Atlantic Sturgeon	4-May-77	312409	83			14.5	1			1.66	
3	1977	Atlantic Sturgeon	5-May-77	312509	65			14.4	1			1.66	
3	1977	Atlantic Sturgeon	6-May-77	312613	68			13.2	1			1.63	
3	1977	Atlantic Sturgeon	7-May-77	312708	101			15.0	1			1.67	
3	1977	Atlantic Sturgeon	8-May-77	312808	182			15.0	2			3.35	two fish combined; no individual records
3	1977	Atlantic Sturgeon	12-May-77	313209	50			14.0	1			1.65	
3	1977	Atlantic Sturgeon	13-May-77	313309	92			14.0	1			1.65	
3	1977	Atlantic Sturgeon	16-May-77	313609	83			14.9	1			1.67	
3	1977	Atlantic Sturgeon	17-May-77	313709	121			14.5	1			1.66	
3	1977	Atlantic Sturgeon	18-May-77	313809	301			17.1	1			1.72	
3	1977	Atlantic Sturgeon	21-May-77	314109	105			18.0	1			1.74	
3	1977	Atlantic Sturgeon	28-May-77	314810	25			20.1	1			1.79	
3	1977	Atlantic Sturgeon	1-Jun-77	315209	623			19.6	2			3.56	two fish combined; no individual records

Table 2d. Individual Data File Records of Atlantic Sturgeon Collected by Impingement at Indian Point Unit No. 3 in Each Year, 1974 through 1990.

Unit	Year	Taxon	Date	Sample Number	Total Weight (g)	Length (mmtl)	Condition (alive or dead)	H2O Temp (deg C)	Total Count	V-35 DEIS 1999	DSEIS 2008 Table 4-11	Coll. Eff. Adj_Cnt	Comments
3	1977	Atlantic Sturgeon	2-Jun-77	315309	142			21.2	1			1.82	
3	1977	Atlantic Sturgeon	3-Jun-77	315409	111			21.6	2			3.67	two fish combined; no individual records
3	1977	Atlantic Sturgeon	6-Jun-77	315709	141			21.0	1			1.82	
3	1977	Atlantic Sturgeon	8-Jun-77	315909	690			19.1	1			1.77	
3	1977	Atlantic Sturgeon	9-Jun-77	316009	150			18.6	1			1.76	
3	1977	Atlantic Sturgeon	10-Jun-77	316109	109			18.9	2			3.53	two fish combined; no individual records
3	1977	Atlantic Sturgeon	14-Jun-77	316509	153			20.8	1			1.81	
3	1977	Atlantic Sturgeon	23-Jun-77	317409	32			23.0	1			1.87	
3	1977	Atlantic Sturgeon	2-Jul-77	318309	200			24.6	1			1.92	
3	1977	Atlantic Sturgeon	3-Jul-77	318409	90			22.7	1			1.86	
3	1977	Atlantic Sturgeon	4-Jul-77	318509	176			23.3	1			1.88	
3	1977	Atlantic Sturgeon	5-Jul-77	318609	164			26.9	1			1.99	
3	1977	Atlantic Sturgeon	6-Jul-77	318709	346			25.5	1			1.94	
3	1977	Atlantic Sturgeon	7-Jul-77	318809	708			24.5	3			5.74	three fish combined; no individual records
3	1977	Atlantic Sturgeon	11-Jul-77	319209	276			24.8	2			3.85	two fish combined; no individual records
3	1977	Atlantic Sturgeon	15-Jul-77	319609	36			26.0	1			1.96	
3	1977	Atlantic Sturgeon	19-Jul-77	320009	152			26.6	1			1.98	
3	1977	Atlantic Sturgeon	21-Jul-77	320209	5			26.1	1			1.96	
3	1977	Atlantic Sturgeon	23-Jul-77	320406	105			26.2	1			1.97	
3	1977	Atlantic Sturgeon	23-Jul-77	320409	219			26.6	3			5.90	three fish combined; no individual records
3	1977	Atlantic Sturgeon	29-Jul-77	321009	135			25.1	1			1.93	
3	1977	Atlantic Sturgeon	14-Aug-77	322609	129			27.3	1			2.00	
3	1977	Atlantic Sturgeon	8-Sep-77	325109	82			25.9	1			1.96	
3	1977	Atlantic Sturgeon	21-Sep-77	326409	253			23.2	1			1.88	
3	1977	Atlantic Sturgeon	25-Sep-77	326809	192			21.0	1			1.82	
3	1977	Atlantic Sturgeon	27-Sep-77	327001	154			21.5	1			1.83	
3	1977	Atlantic Sturgeon	27-Sep-77	327009	13			21.5	1			1.83	
3	**Total 1977**	**Atlantic Sturgeon**							**153**	**153**	**252**	**252.20**	
3	1978	Atlantic Sturgeon	3-Jan-78	300309	55			0.0	1			1.40	
3	1978	Atlantic Sturgeon	4-Jan-78	300409	45			0.0	1			1.40	
3	1978	Atlantic Sturgeon	7-Jan-78	300709	82			1.9	1			1.43	
3	1978	Atlantic Sturgeon	10-Jan-78	301009	410			0.2	2			2.80	two fish combined; no individual records
3	1978	Atlantic Sturgeon	11-Jan-78	301109	610			2.0	1			1.43	
3	1978	Atlantic Sturgeon	13-Jan-78	301309	54			3.2	1			1.45	
3	1978	Atlantic Sturgeon	25-Jan-78	302510	106			1.9	1			1.43	
3	1978	Atlantic Sturgeon	28-Jan-78	302809	161			0.1	2			2.79	two fish combined; no individual records
3	1978	Atlantic Sturgeon	30-Jan-78	303014	100			2.0	1			1.43	
3	1978	Atlantic Sturgeon	31-Jan-78	303109	85			3.8	1			1.46	

Table 2d. Individual Data File Records of Atlantic Sturgeon Collected by Impingement at Indian Point Unit No. 3 in Each Year, 1974 through 1990.

Unit	Year	Taxon	Date	Sample Number	Total Weight (g)	Length (mmtl)	Condition (alive or dead)	H2O Temp (deg C)	Total Count	V-35 DEIS 1999	DSEIS 2008 Table 4-11	Coll. Eff. Adj_Cnt	Comments
3	1978	Atlantic Sturgeon	14-Mar-78	307309	311			3.8	1			1.46	
3	1978	Atlantic Sturgeon	11-Apr-78	310109	227			6.9	2			3.02	two fish combined; no individual records
3	1978	Atlantic Sturgeon	1-May-78	312109	185			9.9	1			1.57	
3	1978	Atlantic Sturgeon	23-May-78	314309	158			15.5	1			1.68	
3	1978	Atlantic Sturgeon	5-Jun-78	315609	27			19.5	1			1.78	
3	1978	Atlantic Sturgeon	16-Sep-78	325909	352			25.0	1			1.93	
3	1978	Atlantic Sturgeon	16-Dec-78	335009	30			7.0	1			1.51	
3	1978	Atlantic Sturgeon	21-Dec-78	335509	16			5.5	1			1.49	
3	**Total 1978**	**Atlantic Sturgeon**							**21**	**21**	**31**	**31.43**	
3	1979	Atlantic Sturgeon	13-Jan-79	301308	145			2.8	1			1.44	
3	1979	Atlantic Sturgeon	21-Jan-79	302108	116			0.2	1			1.40	
3	1979	Atlantic Sturgeon	24-Jan-79	302408	85			0.1	1			1.40	
3	1979	Atlantic Sturgeon	27-Jan-79	302708	90			2.3	1			1.43	
3	1979	Atlantic Sturgeon	8-Feb-79	303908	110			3.0	1			1.44	
3	1979	Atlantic Sturgeon	11-Feb-79	304208	95			3.2	1			1.45	
3	1979	Atlantic Sturgeon	15-Feb-79	304608	89			0.0	1			1.40	
3	1979	Atlantic Sturgeon	21-Feb-79	305208	82			1.0	1			1.41	
3	1979	Atlantic Sturgeon	29-Mar-79	308808	77			6.0	1			1.50	
3	1979	Atlantic Sturgeon	30-Mar-79	308908	145			6.0	1			1.50	
3	1979	Atlantic Sturgeon	31-Mar-79	309008	175			7.1	2			3.03	two fish combined; no individual records
3	1979	Atlantic Sturgeon	12-Apr-79	310207	275			7.0	1			1.51	
3	1979	Atlantic Sturgeon	13-Apr-79	310308	209			6.0	2			2.99	two fish combined; no individual records
3	1979	Atlantic Sturgeon	14-Apr-79	310401	33			7.0	1			1.51	
3	1979	Atlantic Sturgeon	14-Apr-79	310409	140			7.0	1			1.51	
3	1979	Atlantic Sturgeon	21-Apr-79	311109	310			7.0	2			3.03	two fish combined; no individual records
3	1979	Atlantic Sturgeon	23-Apr-79	311308	130			8.1	1			1.53	
3	1979	Atlantic Sturgeon	26-Apr-79	311608	135			9.5	1			1.56	
3	1979	Atlantic Sturgeon	27-Apr-79	311708	420			10.0	2			3.14	two fish combined; no individual records
3	1979	Atlantic Sturgeon	29-Apr-79	311909	175			11.0	1			1.59	
3	1979	Atlantic Sturgeon	30-Apr-79	312007	90			11.0	1			1.59	
3	1979	Atlantic Sturgeon	3-May-79	312307	145			11.9	1			1.61	
3	1979	Atlantic Sturgeon	6-May-79	312608	92			13.2	1			1.63	
3	1979	Atlantic Sturgeon	26-May-79	314607	140			17.6	1			1.73	
3	1979	Atlantic Sturgeon	30-May-79	315007	190			17.1	1			1.72	
3	1979	Atlantic Sturgeon	11-Jun-79	316207	205			21.4	1			1.83	
3	1979	Atlantic Sturgeon	13-Jun-79	316407	180			21.0	1			1.82	
3	1979	Atlantic Sturgeon	19-Jun-79	317008	165			22.1	1			1.85	
3	1979	Atlantic Sturgeon	24-Jun-79	317509	85			23.0	1			1.87	

Table 2d. Individual Data File Records of Atlantic Sturgeon Collected by Impingement at Indian Point Unit No. 3 in Each Year, 1974 through 1990.

Unit	Year	Taxon	Date	Sample Number	Total Weight (g)	Length (mmtl)	Condition (alive or dead)	H2O Temp (deg C)	Total Count	V-35 DEIS 1999	DSEIS 2008 Table 4-11	Coll. Eff. Adj_Cnt	Comments
3	1979	Atlantic Sturgeon	25-Jun-79	317610				22.8	1			1.87	
3	1979	Atlantic Sturgeon	27-Jun-79	317809	60			22.2	1			1.85	
3	1979	Atlantic Sturgeon	8-Jul-79	318909	153			22.0	1			1.84	
3	1979	Atlantic Sturgeon	6-Aug-79	321808	435			28.9	1			2.05	
3	1979	Atlantic Sturgeon	10-Sep-79	325308	285			25.5	1			1.94	
3	**Total 1979**	**Atlantic Sturgeon**							**38**	**38**	**61**	**60.97**	
3	1980	Atlantic Sturgeon	12-Feb-80	304309	70			0.3	1			1.40	
3	1980	Atlantic Sturgeon	22-Feb-80	305309				1.1	1			1.41	
3	1980	Atlantic Sturgeon	23-Feb-80	305409	150			1.1	1			1.41	
3	1980	Atlantic Sturgeon	24-Feb-80	305509	235			1.8	1			1.42	
3	1980	Atlantic Sturgeon	7-Mar-80	306708	900			2.8	1			1.44	
3	1980	Atlantic Sturgeon	4-Jun-80	315609	150			21.5	1			1.83	
3	1980	Atlantic Sturgeon	6-Jun-80	315809	105			21.5	1			1.83	
3	1980	Atlantic Sturgeon	7-Jun-80	315909	100			21.5	1			1.83	
3	1980	Atlantic Sturgeon	12-Jul-80	319409	204			27.0	1			1.99	
3	1980	Atlantic Sturgeon	23-Aug-80	323611	240			27.8	1			2.01	
3	**Total 1980**	**Atlantic Sturgeon**							**10**	**10**	**17**	**16.58**	
3	1981	Atlantic Sturgeon	14-Jan-81	301400	93			4.2	1			1.46	
3	1981	Atlantic Sturgeon	15-Jan-81	301504	91			4.2	1			1.46	
3	1981	Atlantic Sturgeon	20-Jan-81	302012	108			4.1	1			1.46	
3	1981	Atlantic Sturgeon	3-Dec-81	333708	110			8.2	1			1.54	
3	1981	Atlantic Sturgeon	5-Dec-81	333909	741			8.2	1			1.54	
3	**Total 1981**	**Atlantic Sturgeon**							**5**	**5**	**73**	**7.46**	
3	1982	Atlantic Sturgeon	17-Feb-82	304813	155			1.2	1			1.41	
3	**Total 1982**	**Atlantic Sturgeon**							**1**	**1**	**127**	**1.41**	
3	**Total 1983**	**Atlantic Sturgeon**							**0**	**0**	**NR**		
3	1984	Atlantic Sturgeon	26-Jul-84	320809	51			26.3	1			1.97	
3	1984	Atlantic Sturgeon	5-Aug-84	321809	225			27.6	1			2.01	
3	1984	Atlantic Sturgeon	16-Aug-84	322909	220			26.5	1			1.97	
3	1984	Atlantic Sturgeon	24-Aug-84	323709	115			26.0	1			1.96	
3	1984	Atlantic Sturgeon	21-Sep-84	326508	412			22.0	1			1.84	
3	**Total 1984**	**Atlantic Sturgeon**							**5**	**5**	**179**	**9.75**	
3	1985	Atlantic Sturgeon	1-Feb-85	3004	85	280	A	0.0	1			1.40	
3	1985	Atlantic Sturgeon	3-Feb-85	3005	320	398	A	0.0	1			1.40	
3	1985	Atlantic Sturgeon	3-Feb-85	3005	55	240	A	0.0	1			1.40	
3	1985	Atlantic Sturgeon	3-Apr-85	3036	90	na	na	9.5	1			1.56	
3	1985	Atlantic Sturgeon	28-Apr-85	3040	41	240	A	14.0	1			1.65	
3	1985	Atlantic Sturgeon	2-Feb-85	NS	55	140	A	2.0	1			1.43	

Table 2d. Individual Data File Records of Atlantic Sturgeon Collected by Impingement at Indian Point Unit No. 3 in Each Year, 1974 through 1990.

Unit	Year	Taxon	Date	Sample Number	Total Weight (g)	Length (mmtl)	Condition (alive or dead)	H2O Temp (deg C)	Total Count	V-35 DEIS 1999	DSEIS 2008 Table 4-11	Coll. Eff. Adj_Cnt	Comments
3	1985	Atlantic Sturgeon	4-Feb-85	NS	315	402	A	2.4	1			1.43	
3	1985	Atlantic Sturgeon	4-Feb-85	NS	54	238	A	2.4	1			1.43	
3	1985	Atlantic Sturgeon	5-Feb-85	NS	50	235	D	2.4	1			1.43	
3	1985	Atlantic Sturgeon	6-Feb-85	NS	310	401	D	2.4	1			1.43	
3	1985	Atlantic Sturgeon	8-Mar-85	NS	135	344	D	5.7	1			1.49	
3	1985	Atlantic Sturgeon	8-Mar-85	NS	145	344	D	5.6	1			1.49	
3	1985	Atlantic Sturgeon	11-Mar-85	NS	345	410	A	4.9	1			1.48	
3	1985	Atlantic Sturgeon	12-Mar-85	NS	330	412	D	4.9	1			1.48	
3	1985	Atlantic Sturgeon	12-Mar-85	NS	180	363	D	4.9	1			1.48	
3	1985	Atlantic Sturgeon	18-Mar-85	NS	146	343	D	7.1	1			1.51	
3	1985	Atlantic Sturgeon	18-Mar-85	NS	200	380	D	7.1	1			1.51	
3	**Total 1985**	**Atlantic Sturgeon**							**17**	**5(12)**	**300**	**25.00**	
3	1986	Atlantic Sturgeon	14-Feb-86	304510	775	775	D	-0.5	1			1.39	
3	1986	Atlantic Sturgeon	28-Feb-86	NS	274	274	A	2.2	1			1.43	
3	1986	Atlantic Sturgeon	13-Mar-86	NS	1795	788	D	3.8	1			1.46	
3	1986	Atlantic Sturgeon	30-Nov-86	NS	409	445	D	6.9	1			1.51	
na	1986	Atlantic Sturgeon	21-Apr-86	na	454	455	D	10.3	1			1.58	Not included in DSEIS table. Source of data is Table 4-9 of Annual Report
3	**Total 1986**	**Atlantic Sturgeon**							**5**	**1(3)**	**126**	**5.79**	
3	1987	Atlantic Sturgeon	27-Sep-87	327008	94	na	D	20.0	1			1.79	
3	**Total 1987**	**Atlantic Sturgeon**							**1**	**1**	**88**	**1.79**	
3	**Total 1988**	**Atlantic Sturgeon**							**0**	**0**	**NR**		
3	**Total 1989**	**Atlantic Sturgeon**							**0**	**0**	**NR**		
3	1990	Atlantic Sturgeon	26-Feb-90	3021	83	271	D	5.5	1			1.49	
3	1990	Atlantic Sturgeon	27-Apr-90	NS	750	575	D	10.9	1			1.59	
3	**Total 1990**	**Atlantic Sturgeon**							**2**	**0(2)**	**NR**	**3.07**	
3	**1975-1990**	**Atlantic Sturgeon**							**266**	**260(17)**	**1268**	**429.55**	

NS Collected on a non-scheduled sampling date
NR Not reported
na Not available
1.7 Water temperature estimated from weekly average
Blank space = no data in the SAS Impingement Data Files
(1) Numbers in parentheses indicate number of shortnose sturgeon taken on non-sample days.

Table 3a. Estimates of the Annual Total Number of Shortnose Sturgeon Collected by Impingement at Indian Point Unit 2, 1974 through 1990.

	Shortnose Sturgeon Unit 2			
Year	Level 5 Count	Table V-36 DEIS 1999	CE Adjusted Level 5 Count	Table 4-11 DSEIS 2008
1974	3	3	9	NR
1975	1	1	3	3
1976	1	2	2	2
1977	5	6	11	11
1978	2	2	5	5
1979	2	2	4	4
1980	0	0	0	NR
1981	0	0	0	NR
1982	0	0	0	NR
1983	0	0	0	NR
1984	1	1	3	176
1985	0	0	0	NR
1986	0	0	0	NR
1987	2	2	4	116
1988	3	3	7	NR
1989	0	0	0	NR
1990	1	1	3	NR
Total	21	23	51	317

NR Not Reported

Table 3b. Estimates of the Annual Total Number of Shortnose Sturgeon Collected by Impingement at Indian Point Unit 3, 1974 through 1990.

Shortnose Sturgeon Unit 3				
Year	Level 5 Count	Table V-36 DEIS 1999	CE Adjusted Level 5 Count	Table 4-11 DSEIS 2008
1974	0	NR	0	NR
1975	NR	NR	NR	NR
1976	0	0	0	NR
1977	1	1	2	2
1978	3	3	5	5
1979	2	2	3	3
1980	1	1	2	2
1981	0	0	0	NR
1982	0	0	0	NR
1983	0	0	0	NR
1984	1	1	2	154
1985	0	0	0	NR
1986	0	0	0	NR
1987	1	1	2	55
1988	1	1	2	186
1989	1	1	2	NR
1990	0	0	0	NR
Total	**11**	**11**	**18**	**407**

NR Not Reported

Table 3c. Estimates of the Annual Total Number of Atlantic Sturgeon Collected by Impingement at Indian Point Unit 2, 1974 through 1990.

Atlantic Sturgeon - Unit 2

Year	Level 5 Count	Table V-35 DEIS 1999	CE Adjusted Level 5 Count	Table 4-11 DSEIS 2008
1974	101	100	282	NR
1975	118	118	302	302
1976	8	8	17	17
1977	44	44	105	105
1978	16	16	38	38
1979	32	32	75	75
1980	9	9	24	24
1981	3	3	8	221
1982	1	1	2	217
1983	3	3	6	149
1984	3	3	6	363
1985	9	8	19	460
1986	2	2	6	696
1987	2	2	6	NR
1988	1	1	2	NR
1989	0	0	0	NR
1990	0	0	0	NR
Total	**352**	**350**	**897**	**2667**

NR Not Reported

Table 3d. Estimates of the Annual Total Number of Atlantic Sturgeon Collected by Impingement at Indian Point Unit 3, 1974 through 1990.

Atlantic sturgeon - Unit 3				
Year	Level 5 Count	Table V-35 DEIS 1999	CE Adjusted Level 5 Count	Table 4-11 DSEIS 2008
1974	10	12	17	NR
1975	NR	NR	NR	NR
1976	8	8	14	14
1977	153	153	252	254
1978	21	21	31	36
1979	38	38	61	64
1980	10	10	17	18
1981	5	5	7	73
1982	1	1	1	127
1983	0	0	0	NR
1984	5	5	10	333
1985	17	17	25	300
1986	4	4	6	126
1987	1	1	2	143
1988	0	0	0	186
1989	0	0	0	NR
1990	2	2	3	NR
Total	275	277	447	1674

NR Not Reported

Table 4. Impingement Data File Level 5 Actual Counts and Level 5 Counts Adjusted for Collection Efficiency for Shortnose and Atlantic Sturgeon Collected in Impingement Samples, Indian Point, 1975 through 199(

	IP2						IP3						IP2 & IP3	
	Shortnose Sturgeon		Atlantic Sturgeon		Total IP2		Shortnose Sturgeon		Atlantic Sturgeon		Total IP3			
Study Year	Level 5 Count	Level 5 Count Adjusted for Collection Efficiency[a]	Level 5 Count	Level 5 Count Adjusted for Collection Efficiency	Level 5 Count	Level 5 Count Adjusted for Collection Efficiency	Level 5 Count	Level 5 Count Adjusted for Collection Efficiency	Level 5 Count	Level 5 Count Adjusted for Collection Efficiency	Level 5 Count	Level 5 Count Adjusted for Collection Efficiency	Grand Total Level 5 Count	Grand Total Level 5 Collection Efficiency Adjusted Count
1975	1	3.14	118	301.81	119	304.95	NR	NR	NR	NR	NR	NR	119	304.95
1976	1	2.01	8	16.64	9	18.65	0	0.00	8	14.09	8	14.09	17	32.74
1977	5	11.06	44	104.85	49	115.91	1	1.87	153	252.20	154	254.07	203	369.98
1978	2	4.53	16	38.28	18	42.81	3	4.62	21	31.43	24	36.05	42	78.86
1979	2	4.31	32	74.75	34	79.06	2	3.14	38	60.97	40	64.11	74	143.17
1980	0	0.00	9	23.72	9	23.72	1	1.64	10	16.58	11	18.22	20	41.94
1981	0	0.00	3	8.01	3	8.01	0	0.00	5	7.46	5	7.46	8	15.47
1982	0	0.00	1	2.39	1	2.39	0	0.00	1	1.41	1	1.41	2	3.80
1983	0	0.00	3	6.11	3	6.11	0	0.00	0	0.00	0	0.00	3	6.11
1984	1	2.75	3	6.43	4	9.18	1	1.69	5	9.75	6	11.44	10	20.62
1985	0	0.00	9	19.23	9	19.23	0	0.00	17	25.00	17	25.00	26	44.23
1986	0	0.00	2	5.54	2	5.54	0	0.00	5	5.79	5	5.79	7	11.33
1987	2	4.11	2	6.01	4	10.12	1	1.63	1	1.79	2	3.42	6	13.54
1988	3	7.02	1	2.11	4	9.13	1	2.02	0	0.00	1	2.02	5	11.15
1989	0	0.00	0	0	0	0.00	1	1.82	0	0.00	1	1.82	1	1.82
1990	1	3.37	0	0	1	3.37	0	0.00	2	3.07	2	3.07	3	6.44
Grand Total	**18**	**42.30**	**251**	**615.88**	**269**	**658.18**	**11**	**18.43**	**266**	**429.54**	**277**	**447.97**	**546**	**1,106.15**

NR - Not reported

[a] Unit specific collection efficiency coefficients calculated according to the equations presented in the 1990 Indian Point Annual Report and applied to the Level 5 raw count.

Please contact Dr. Dennis Logan, Aquatic Biologist, of my staff to advise of any additional information you might need to assess the potential impacts to the Atlantic sturgeon at Indian Point. You can reach him at 301-415-0490 or by e-mail at Dennis.Logan@nrc.gov.

I have also forwarded a copy of this letter to Ms. Julie Crocker of your office. Ms. Crocker has been NRC's main point of contact for section 7 consultations related to operating nuclear power plants within the NMFS's northeast region.

Sincerely,
/RA/
Jeremy J. Susco, Acting Chief
Environmental Review and
Guidance Update Branch
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket Nos. 50-247 and 50-286

Enclosure:
As stated

cc w/encl: Listserv

DISTRIBUTION:
See next page

ADAMS Accession No: ML12100A082

OFFICE	LA:RPB2:DLR	PM:RERB:DLR	AB:RERB:DLR	OGC	BC:RERB:DLR
NAME	IKing	DLogan	BBalsam	STurk	JSusco
DATE	04/12/12	04/16/12	04/16/12	05/11/12	05/16/12

OFFICIAL RECORD COPY

Letter to P. Kurkul from J. Susco dated May 16, 2012

SUBJECT: REQUEST TO REINITIATE SECTION 7 CONSULTATION FOR THE INDIAN POINT NUCLEAR GENERATING UNIT NOS. 2 AND 3 DUE TO LISTING OF ATLANTIC STURGEON

DISTRIBUTION:

E-MAIL:
PUBLIC
RidsNrrDlr Resource
RidsNrrDlrRpb1 Resource
RidsNrrDlrRpb2 Resource
RidsNrrDlrRarb Resource
RidsNrrDlrRasb Resource
RidsNrrDlrRapb Resource
RidsOgcMailCenter Resource
RidsNrrPMIndianPoint Resource

JSusco
DLogan
BBalsam
KGreen
STurk

julie.crocker@noaa.gov
dgray@entergy.com

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	Docket Nos. 50-247-LR and 50-286-LR
ENTERGY NUCLEAR OPERATIONS, INC.	)	
(Indian Point Nuclear Generating Units 2 and 3)	)	
	)	October 1, 2013

CERTIFICATE OF SERVICE

Pursuant to 10 C.F.R. § 2.305 (as revised), I certify that, on this date, copies of "Entergy's Answer To Riverkeeper, Inc.'s Consolidated Motion For Leave To File Amended Contention RK-EC-8A and Amended Contention RK-EC-8A (Endangered Aquatic Species)" were served upon the Electronic Information Exchange (the NRC's E-Filing System), in the above-captioned proceeding.

Signed (electronically) by Lance A. Escher

Lance A. Escher, Esq.
MORGAN, LEWIS & BOCKIUS LLP
1111 Pennsylvania Ave. NW
Washington, DC 20004
Phone: (202) 739-5080
Fax: (202) 739-3001
E-mail: lescher@morganlewis.com