From: Gray, Dara F <DGray@entergy.com>
Sent: Monday, October 17, 2016 10:20 AM
To: Wentzel, Michael
Subject: [External_Sender] Comments
Attachments: 10.14.2016 Letter comments on Critical Hab.pdf

Hi Mike
I just wanted to let you know that Goodwin Procter submitted comments on the NMFS Proposed Critical Habitat assignment, on Entergy's behalf, on Friday.
As the files exceed our limits, I am just enclosing the cover letter here.
If you need more information, please let me know.

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Hearing Identifier: IndianPointUnits2and3NonPublic_EX
Email Number: 8048

Mail Envelope Properties (DA94DFACF1201C4A91A21BD336C2520A35EA5BBD)

Subject: [External_Sender] Comments
Sent Date: 10/17/2016 10:20:16 AM
Received Date: 10/17/2016 10:20:48 AM
From: Gray, Dara F

Created By: DGray@entergy.com

Recipients:
"Wentzel, Michael" <Michael.Wentzel@nrc.gov>
Tracking Status: None

Post Office: LITXMETSP003.etrsouth.corp.entergy.com

Files	Size	Date & Time
MESSAGE	434	10/17/2016 10:20:48 AM
10.14.2016 Letter comments on Critical Hab.pdf	695000	

Options
Priority: Standard
Return Notification: No
Reply Requested: No
Sensitivity: Normal
Expiration Date:
Recipients Received:

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October 14, 2016

BY FEDERAL EXPRESS

Kevin T. Folk, Acting Chief
Environmental Review and Project Branch
Division of License Renewal
Office of Nuclear Reactor Regulation
United States Nuclear Regulatory Commission
One White Flint North
11555 Rockville Pike
Rockville, MD 20852-2738

Re: Request to the National Marine Fisheries Service for Section 7 Conference for Indian Point Nuclear Generating Units Nos. 2 and 3 Due to Proposed Rule to List Atlantic Sturgeon Critical Habitat in the Hudson River, dated September 13, 2016

Dear Mr. Folk:

On behalf of Entergy Nuclear Indian Point 2, LLC, Entergy Nuclear Indian Point 3, LLC and Entergy Nuclear Operations, Inc. (collectively, "Entergy"), this correspondence addresses the above-referenced request (the "Request") submitted by the Nuclear Regulatory Commission ("NRC") staff to the National Marine Fisheries Service ("NMFS") for a conference pursuant to Section 7 of the Endangered Species Act. NRC's Request, and its attached technical document titled "Impacts to Proposed Critical Habitat for the Atlantic Sturgeon (*Acipenser oxyrinchus oxyrinchus*), Indian Point Nuclear Generating Units 2 and 3 (collectively, "Indian Point" or "IPEC"), Proposed License Renewal" (the "Evaluation"), address NMFS's pending proposal to designate the Hudson River (among other areas) as critical habitat for the Atlantic sturgeon (the "Proposed Rule").

To facilitate continued informed discussion of the Request, and consistent with 50 C.F.R. § 402.10(c), Entergy respectfully requests the opportunity to participate in that conference process, and hereby submits these comments on the Request to facilitate that discussion.[1] Briefly, Entergy identifies two considerations with respect to the Request:

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[1] To that end, this correspondence is also provided to NMFS. Entergy has done so prior to the close of the public comment period on the Proposed Rule (October 14, 2016), so that this correspondence can be treated as supplemental to Entergy's initial September 1, 2016 comments on the Proposed Rule.

- First, as detailed in Entergy's written comments on the Proposed Rule ("Entergy's Comments"), the limited area of the Hudson River within the Indian Point Safety and Security Zone (the "IPEC SSZ") does not contain the necessary characteristics or conditions to support its inclusion in a science-based, critical habitat designation for Atlantic sturgeon. (A copy of Entergy's Comments is attached for your convenience and consideration.) As detailed in Entergy's Comments, extensive, validated Hudson River Biological Monitoring Program ("HRBMP") data and recent New York State Department of Environmental Conservation ("NYSDEC") sturgeon tracking information obtained under applicable freedom of information act law ("FOIL") demonstrate that sturgeon are not present, or likely to be present as a result of unfavorable natural conditions, in the IPEC SSZ. Entergy respectfully submits that the Request should reflect this best available scientific information, which supports exclusion of the IPEC SSZ from the critical habitat designation.

- Second, Mark T. Mattson, Ph.D. of Normandeau Associates, Inc. and John Young, Ph.D. of ASA Analysis & Communication, Inc. reviewed the technical aspects of the Evaluation, and in the process identified certain incorrect statements or assumptions by NMFS regarding various aspects of the Hudson River environment and potential impacts of operations at Indian Point. The following paragraphs provide the mistaken excerpted statement or passage from the Evaluation and our clarification or explanation of the contrary best available scientific information. Entergy further respectfully submits that the Request should reflect this best available scientific information, which supports exclusion of the IPEC SSZ from the critical habitat designation.

Finally, on October 12, 2016, Entergy received an additional response from NYSDEC to its FOIL consisting of more than 500 NYSDEC documents relating to Hudson River sturgeon distribution and habitat. Entergy will be reviewing that information, and expects to provide additional comments to NRC and NMFS on this matter within 30 days. To that end, we respectfully request that the conference or consultation schedule in the NRC Request be lengthened to allow us to do so.

1. The IP2 and IP3 action area could also support larvae in late summer during years where the river's salt wedge is downstream of the IP2 and IP3 intakes (NMFS 2013) (Evaluation at 8).

In fact, the IPEC area does not and could not support larvae in the late summer, even in those increasingly infrequent years when the salt wedge is downstream of IPEC at that time. This is because (1) saline, not freshwater conditions occur in the IPEC region at that time, (2) spawning and nursery habitat are considerably upstream from IPEC with the result that larval distribution is not near IPEC, and (3) late summer post-dates the larval development period in the Hudson River.

First, the salt wedge is typically at or upstream from Indian Point and creates a barrier to Atlantic sturgeon larvae which inhabit freshwater (Geyer and Chant 2006; ASA 2010a (data from 2000-2009); USGS 2001).

Second, Atlantic sturgeon eggs and larvae are both demersal and remain proximate to known spawning grounds located a substantial distance upstream from the IPEC region (ASMFC 2012). Specifically, Entergy had provided NRC with HRBMP data from 1974-2005 at the beginning of the relicensing process in 2007 and 2008. As shown in Table 1, HRBMP data reflects no known Atlantic sturgeon spawning areas, and therefore no likely presence of larvae, in the vicinity of Indian Point. Rather and consistent with the peer-reviewed, published science, Atlantic sturgeon spawn primarily in Hyde Park to Catskill regions (Bain 1997; NMFS 2013 at 42). Indeed, 31 of 45 Atlantic sturgeon larvae (approximately 70%) captured were from these known, discrete spawning areas. Conversely, no Atlantic sturgeon larvae were captured at IPEC in entrainment monitoring from 1980 through 1987, or in that portion of the extensive, river-wide HRBMP surveys conducted within a mile of Indian Point over the last more than four decades. Of the one (1) Atlantic sturgeon and two (2) unidentified sturgeon larvae observed over the forty plus year period of HRBMP monitoring of the seven mile reach of region 4 between Grassy Point and the Bear Mountain Bridge, none was located within the mile occupied by Indian Point (at river mile 42). A single identified Atlantic sturgeon larva was captured at river mile 43. Only four (4) other Atlantic sturgeon larva were even observed downstream of region 7, whose southern boundary is river mile 62, approximately 20 miles north of Indian Point, and these likely arrived there after being transported out of the upstream spawning grounds during a rainfall event.

Third, the temporal distribution of sturgeon larvae (summarized in Table 2) underscores that they could not occupy the IPEC vicinity in late summer. Of the 235 sturgeon larvae collected in HRBMP monitoring from 1974-2005 that continues each year from March through October, only six (6) Atlantic sturgeon -- or less than 3% -- occurred after the end of June (typically week 26), with the latest observation of an Atlantic sturgeon larvae on July 17, 1974 (week 28). Thus, larvae would not be expected to be present in the Hudson in late summer.

For this submission, we have updated the NRC submissions discussed above to reflect HRBMP sampling through 2015. A review of these more recent data underscores that Atlantic sturgeon larvae are present far north of IPEC, and only through the month of June. Specifically, of 14 Atlantic sturgeon larvae collected, all except one (1) were collected in regions 6-11 at least 14 miles north of Indian Point, and all were collected on or before June 11. The only Atlantic sturgeon larva outside these spatial and temporal bounds was a single post-yolk sac larvae ("PYSL") collected at river mile 53, some 11 miles north of Indian Point, on June 13, 2013.

In sum, and consistent with salinity dynamics that continue to exclude sturgeon larvae from the IPEC vicinity, the HRBMP data provided to NRC and updated here demonstrate that over the last four decades Atlantic sturgeon larvae have not occupied, and therefore are not likely to occupy, the Indian Point vicinity, and particularly the IPEC SSZ, in late summer.

Table 1 Spatial distribution of Atlantic and shortnose sturgeon larvae collected in LRS sampling from 1974-2005 from data provided to NRC in 2007 and 2008. Additional unidentified sturgeon larvae not previously provided to NRC.

Region	River miles	Atlantic Sturgeon	Shortnose Sturgeon	Unidentified Sturgeon	Total
12 –Albany	125-152	6	42	37	85
11-Catskill	107-124	16	3	7	26
10-Saugerties	94-106	0	1	2	3
9-Kingston	86-93	1	2	6	9
8-Hyde Park	77-85	14	17	15	46
7-Poughkeepsie	62-76	3	0	46	49
6-Cornwall	56-61	0	0	6	6
5-West Point	47-55	4	0	4	8
4-Indian Point	39-46	1	0	2	3
Total		45	65	125	235

Table 2 Temporal distribution of Atlantic and shortnose sturgeon larvae collected in LRS sampling from 1974-2005 from data provided to NRC in 2007 and 2008. Additional unidentified sturgeon larvae not previously provided to NRC.

Week	Atlantic Sturgeon	Shortnose Sturgeon	Unidentified Sturgeon	Total
17	0	0	1	1
18	0	0	0	0
19	0	27	24	51
20	6	8	17	31
21	1	5	12	18
22	10	7	32	49
23	24	17	12	53
24	1	1	8	10
25	2	0	12	14
26	0	0	2	2
27	0	0	2	2
28	1	0	3	4
Total	45	65	125	235

2. Impingement and entrainment can affect critical habitat by removing prey from the habitat. Atlantic sturgeon adults and migrant subadults prey on mollusks, gastropods, amphipods, annelids, decapods, isopods, and fish such as sand lance (Family Ammodytidae) (NMFS 2013). Although specific impingement and entrainment information is not available for Atlantic sturgeon prey, the NRC (2015) assessed impingement and entrainment on representative important species in its draft second supplement to the IP2 and IP3 FSEIS and concluded that impingement and entrainment effects would vary from small to large depending on the specific species. The NMFS (2013) addressed effects specifically to Atlantic sturgeon prey species from the continued operation of IP2 and IP3 in its biological opinion and concluded that effects would be insignificant and discountable. Therefore, the NRC concludes that impingement and entrainment would not affect Atlantic sturgeon prey species to a degree that would inhibit the growth, development, recruitment, or survival or juveniles, subadults, or adult Atlantic sturgeon or otherwise appreciably diminish the value of the proposed critical habitat for the New York Bight DPS of Atlantic sturgeon (Evaluation at 9).

The focus on potential prey impacts of impingement and entrainment reflects a series of mistaken assumptions that warrant correction.

There is no credible scientific evidence that Atlantic sturgeon will not consume prey that is impinged or entrained and returned to the ecosystem, even if damaged by that process, which is unlikely for the organisms that constitute the majority of the Hudson River Atlantic sturgeon's diet. Assuming that NMFS' seven (7) prey categories, replicated in Table 3, are correct, six (6) of these prey categories are either epibenthic or infaunal, and as such are too small to be impinged, not entrained in substantial numbers and known to experience entrainment survival. Specifically, by way of example, Haley (1999) reported the food items of juvenile Atlantic (n=24) sturgeon collected in the Hudson River in 1995-1996. She found that the diet of these juvenile Atlantic sturgeon was dominated by Crustacea (49%), which survive entrainment well, and Polychaeta (46%), a group that lives in the bottom sediment and is not susceptible to entrainment.

Table 3 Sturgeon prey groups, as listed by NMFS (2013), their primary habitats, and susceptibility to entrainment, impingement, and thermal plume effects due to IPEC operation.

Prey Group	Habitat	Entrainment	Impingement	Thermal Plume
Mollusks	Early larval stages pelagic, benthic once settled	Only prior to settlement, if in vicinity of intake	Not subject to	Plume not in contact with bottom
Gastropods	Benthic	Not present in water column.	Not present in water column. Too small to be impinged.	Plume not in contact with bottom
Amphipods	Most epibenthic and burrowing	Some entrainment when move into	Too small to be impinged.	Plume temperatures

		water column at night. Have been demonstrated to survive entrainment at IPEC.		not high enough to cause mortality.
Annelids	Benthic infauna.	Not present in water column.	Not present in water column. Too small to be impinged.	Plume not in contact with bottom
Decapods	Larval stages pelagic, then epibenthic. Common species at IPEC (blue crab) capable swimmer.	Pelagic stages typically not in IPEC vicinity.	Juveniles and adults only. Blue crabs common at times. High survival rate.	Plume not in contact with bottom
Isopods	Epibenthic and burrowing	Some entrainment when move into water column.	Too small to be impinged.	Plume not in contact with bottom
Fish	Benthic forms only	Could be entrained.	Could be impinged.	Plume not in contact with bottom

Table 4 Diet of juvenile Atlantic and shortnose sturgeon in the Hudson River. Data from Haley (1999).

		Atlantic sturgeon		Shortnose sturgeon	
Taxon	NMFS Prey Group	N	% Composition	N	% Composition
Nematoda	Not included	2	1%	0	0%
Nemertea	Not included	4	2%	119	3%
Gastropoda	Gastropod	0	0%	164	4%
Bivalvia	Mollusc	1	1%	162	4%
Polychaeta	Annelid	92	46%	3	0%
Oligochaeta	Annelid	0	0%	349	9%
Crustacea	Includes Amphipods	98	49%	2857	77%
Gammeridae	Amphipods	25	13%	2717	73%
Mysidae	Not included	1	1%	0	0%
Chelicerata	Not included	0	0%	2	0%
Insecta	Not included	1	1%	65	2%
Total		198	100%	3721	100%

Another source cited by NMFS (2013), Guilbard et al. (2007), showed results similar to Haley (1999), with Oligochaetes and Gammerids as key portions of the diet. Even if certain of these were subject to entrainment mortality, which is unlikely, there is no scientific support for the proposition that Atlantic sturgeon do not consume morbid or dead epibenthic or infaunal organisms. Thus, and because Indian Point returns its intake water to the Hudson, with the result that there is no net loss of biomass from the use of its circulating water, there is no demonstrated scientific basis for concern regarding a loss of prey.

Even assuming amphipods and blue crab were required to be live, which has not been shown as a scientific matter, there is no reasonable concern about IPEC impingement or entrainment of amphipods and blue crab. To the contrary, amphipod entrainment and blue crab impingement have both been examined at IPEC, and these groups have been shown to have excellent survival following encounters with Indian Point's intake structure and system. Specifically, Ginn (1977) found no significant difference in survival of entrained *Gammarus*, in comparison to unentrained control organisms, during two years of studies at IPEC Unit 2. Prior to the installation of the current intake technology (continuously rotated Ristroph-type traveling screens), studies of survival of impinged blue crab resulted in an average survival rate between 1983 and 1990 of 83% (EA 1991). With the current technology, survival would be expected to be even higher.

Of the seven (7) prey categories identified as relevant by NMFS, only one (1) category, fish, would be potentially susceptible to entrainment effects (Table 3). Specifically, Atlantic sturgeon are known to consume sand lance (Bigelow and Schroeder 1953) and Atlantic tomcod (Guilbard et al. 2007). Sand lance was not present in any entrainment sampling conducted from 1983-1987 at Indian Point, and Atlantic tomcod have high rates of entrainment and impingement survival (EA 1981, Fletcher 1990).

In sum, there is no credible evidence that operation of IPEC's CWIS would have any, let alone deleterious effects, on the vast majority of Atlantic sturgeon prey or that any such effects would impair their value as prey.

3. *Regarding water use, IP2 and IP3 could physically remove roughly 16 to 27 percent of the habitat from the Hudson River aquatic environment based on average annual river flow data from the past five water years and assuming operation at 100 percent of the licensed thermal power level (Evaluation at 10).*

This statement misunderstands the nature of IPEC's intake and discharge, which are effectively simultaneous, and therefore involves no loss of Hudson River water and, therefore, habitat.

Even if NRC were to insist on assuming that circulating water that is actually returned to the Hudson can be treated as removed from the habitat, NRC greatly overstates the actual proportion of that water that IPEC withdraws, and therefore returns, to the Hudson River.

Specifically, as stated by NRC for this calculation, the water (which in turn equated to "habitat") is considered to be the freshwater input to the estuary that is measured solely as water flowing over the Federal Dam at Green Island, approximately 110 miles upstream from IPEC. This calculation ignores two major important categories of inputs to actual Hudson River flow necessary to an accurate statement of the physical habitat:

First, there are many other sources of freshwater input to the estuary in addition to the Federal Dam at Green Island, which accounts for only approximately 2/3 of the total freshwater input (Darmer 1987). Thus, based on this consideration alone, NRC's estimate of freshwater flow is substantially understated.

Second, and even more importantly, as clearly spelled out in NMFS' description of Critical Habitat, the entire estuary represents a "salinity gradient," which means that the water or flow passing Indian Point (which NRC equates conceptually to "habitat") actually consists of fresh water mixed with saline water.

Therefore, for the calculation of IPEC's fraction of theoretically removed water to have a credible empirical basis, the denominator of the calculation needs to be the entire volume of water flowing through the action area – that is, not only by the correct (more complete) net downstream flow, but also the tidal movement of water upstream and then downstream.

Applying this conceptual framework, Entergy offers the following suggested clarification to the Request. Darmer (1987), citing Stedfast (1982), indicates that tidal flow below Poughkeepsie is usually more than 200,000 cubic feet per second ("cfs"). More recent information from the United States Geological Survey ("USGS"), available at http://waterdata.usgs.gov/usa/nwis/uv?site_no=01372058, indicates a peak tidal flow for this region of 240,000 cfs. Conservatively using the 200,000 cfs figure for a peak tidal flow near Indian Point, the maximum design flow for IPEC's circulating water system, all of which is discharged back to the Hudson (measured as 1,680,000 gallons per minute, which equals 3,744 cfs) represents no more than 1.9% of the maximum peak tidal flow past the Stations. Enercon (2010) provides a similar value of 1.7% based upon the average tidal flow near Indian Point and historic actual intake flows at IPEC from 2001-2008 (note that Enercon's average tidal flow value of 80,000,000 gallons per minute equates to 178,240 cfs).

Finally, equating incremental percentages of flows of complex tidal systems with diverse populations that simply do not use the entire water column or depend on an incremental portion of it is a questionable approach to measuring "habitat."

4. *Thermal impacts on sturgeon can include heat shock, which can result in direct mortality; sublethal effects, such as stunning or disorientation, which can alter predator-prey interactions by increasing susceptibility of affected individuals to predation; and an increase in susceptibility to disease or parasitism (NRC 2013). Additionally, discharge of heated water has*

the potential to create barriers that prevent or delay access to other areas within the river (NMFS 2013) (Evaluation at 10).

The Evaluation recites potential effects of a thermal discharge on Atlantic sturgeon as characterized by NMFS. However, although Indian Point has operated for more than 40 years, none of these potential effects has been observed, and based on state of the art, NYSDEC-validated thermal assessments, none would be expected to occur. Indeed, IPEC's thermal discharge, which complies with New York State water quality standards (ASA 2011), occurs primarily in the upper portion of the water column (ASA 2010) and therefore is highly unlikely to have an adverse effect on benthic species, such as Atlantic sturgeon. Indeed, NRC (2013) and NMFS (2013) have correctly reached the conclusion that IPEC's thermal discharge will not threaten either sturgeon species.

Moreover, from May through July of 1982 through 2015, a standardized HRBMP data set comprising 17,990 measurements of temperature, dissolved oxygen concentrations, and salinity have been taken from within 0.5 m of the bottom substrate of the Hudson River estuary from Yonkers to Albany (River Miles 12-152), with 1,836 measurements in the seven-mile reach of region 4 (where Indian Point is located). These data demonstrate that water temperatures measured in the near bottom habitat occupied by Atlantic sturgeon have consistently been less than 30°C, except in the Yonkers region just upstream from New York City. In the Indian Point region, 95% of the bottom water temperatures were less than 25.4°C during this period, with a single maximum water temperature over that more than 30-year period of 28.1°C.

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Thank you for your consideration of this submission. We look forward to discussing our perspectives on the Request and to participating in any conference process that arises from your Request. In the interim, if you have any questions regarding Entergy's Comments on the Proposed Rule or this correspondence, please do not hesitate to contact Dara Gray at Indian Point (914.254.8414 or DGray@entergy.com) or me.

Sincerely,

Elise N. Zoli

ENZ
Enclosures

cc: Ms. Kimberly Damon-Randall, National Marine Fisheries Service
Mr. Fred Dacimo
Mr. Robert Walpole
Ms. Bill Glew, Esq.
Ms. Kelli M. Dowell, Esq.
Ms. Dara Gray

References

Applied Science Associates, Inc. (ASA). 2010. Hydrothermal modeling of the cooling water discharge from the Indian Point Energy Center to the Hudson River. ASA Project 09-167. 22 March 2010. Prepared for Indian Point Energy Center, Buchanan, NY.

Applied Science Associates, Inc. (ASA). 2010a. Estimate of Salinity in the Hudson River at Indian Point Energy Center.

Applied Science Associates, Inc. (ASA). 2011. Final Report. 2010 field program and modeling analysis of the cooling water discharge from the Indian Point Energy Center. ASA Project 2009-167. 31 January 2011. Prepared for Indian Point Energy Center, Buchanan, NY.

Atlantic States Marine Fisheries Commission. 2012. Habitat Addendum IV to Amendment 1 to the Interstate Fishery Management Plan for Atlantic Sturgeon.

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

EA (Ecological Analysts). 1981. Indian Point Generating Station Entrainment Survival and Related Studies 1979 Annual Report. Prepared for Consolidated Edison Company of New York, Inc. and New York Power Authority.

EA Engineering, Science, and Technology. 1991. Hudson River Ecological Study in the Area of Indian Point 1990 Annual Report. Prepared for Consolidated Edison Company of New York, Inc. and New York Power Authority.

Enercon Services, Inc. (Enercon). 2010. Evaluation of alternative intake technologies at Indian Point Units 2 &3. Prepared for Entergy Nuclear Indian Point 2, LLC and Entergy Nuclear Indian Point 3, LLC. February 12, 2010.

Fletcher, R.I. 1990. Flow dynamics and fish recovery experiments: water intake systems. Trans. Am. Fish Soc. 119(3): 393-415.

Geyer, W.R. and R. Chant. 2006. The physical oceanographic processes in the Hudson River Estuary. Pages 24-38 in: Levinton, J. S. and J.R. Waldman. 2006. The Hudson River Estuary. Cambridge University Press. New York. 471 p.

Ginn, T. C. 1977. An Ecological Investigation of Hudson River Macrozooplankton in the Vicinity of a Nuclear Power Plant. Ph.D. Dissertation. New York University.

Guilbard, F. J. Munro, P. Dumont, D. Hatin, and R. Fortin. 2007. Feeding ecology of Atlantic sturgeon and lake sturgeon co-occurring in the St. Lawrence Estuarine transition zone. American Fisheries Society Symposium 56:85-104.

Haley, N. J. 1999. Habitat Characteristics and Resource Use Patterns of Sympatric Sturgeons in the Hudson River Estuary. Master of Science Thesis. University of Massachusetts Amherst.

National Marine Fisheries Service. 2013. Biological Opinion/Incidental Take Statement, Indian Point.

Nuclear Regulatory Commission. 2013. Generic Environmental Impact Statement for License Renewal of Nuclear Plants: Supplement 38 Regarding Indian Point Nuclear Generating Unit Nos. 2 and 3 – Final Report Supplemental Report and Comment Responses (NUREG-1437, Supplement 38, Volume 4).

United States Geological Survey. 2001. Salt-front Movement in the Hudson River Estuary, New York – Simulations by One-Dimensional Flow and Solute-Transport Models.