



April 6, 2012

Mary Colligan
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Northeast Regional Office
NOAA Fisheries Service
55 Great Republic Drive
Gloucester, MA 01930-2276

Re: Critical Habitat Designation, ESA Section 7 Consultation on the Deepening Project, and
Monitoring on the Atlantic Sturgeon in the Delaware River

Dear Ms. Colligan:

We submit these comments and documents for your consideration regarding the impacts of the Delaware River Main Navigation Channel Deepening Project on the critically imperiled Atlantic sturgeon. As we stated last summer in our detailed comment letter on the U.S. Army Corps of Engineers' Draft Environmental Assessment and Biological Assessment, a copy of which with supporting documents was sent to your office, the Deepening Project poses numerous grave risks to the Atlantic sturgeon and its habitat in the Delaware River that the Corps has failed to acknowledge, let alone analyze. We urge you to recognize that the Atlantic sturgeon in the Delaware is already at the jeopardy stage and cannot withstand the direct and indirect take that the Deepening Project will cause. We also ask you to recognize that the Deepening Project compounds other harms and threats that the Atlantic sturgeon are already going to experience in the coming years (e.g., sea level rise and changes to the reservoir release program of the Upper Delaware), and so paying special attention to the Deepening Project is of increasing value and importance.

As NMFS has acknowledged, there were once 180,000 spawning female Atlantic sturgeon in the Delaware River. NMFS' latest population estimate based on fisheries bycatch data¹ is that there is a mean of 87 spawning adult Atlantic sturgeon annually in the Delaware River. (NOAA Fisheries Presentation on Distribution of Fishing Effort and Sturgeon Takes, "Effort by gear type and mesh size, with NEFOP and ASM sturgeon records," Ad Hoc Atlantic Sturgeon Committee March 19,

¹ Erickson et al. (2011) observe that the "use of fishery-dependent data (including research fishing) typically underestimates the extent of the habitats occupied by fishes . . . which will ultimately underestimate impacts of potential threats (e.g. fishing) to Atlantic Sturgeon stocks."

2012). This number is even lower than the ASSRT's previous estimate of 300 spawning adults², and highlights the absolute imperative of preventing the Deepening Project's further diminution of this tiny population.

The significant impacts to Atlantic sturgeon that experts believe will result from the Deepening Project have not been adequately considered or addressed by the Army Corps in its NEPA or ESA documents. Many of the assertions made by the Army Corps in its 2011 Environmental Assessment and Biological Assessment have been specifically contradicted, challenged, and corrected by Atlantic sturgeon experts because these documents are not based on the best available scientific information. And there continues to be a number of threats and harms that the Army Corps has failed to consider in whole or in part that are of significance, particularly as we are talking about an average population of only 87 in the River each year. Prior to the initiation of formal consultation, the Army Corps, as the action agency, was required, but failed, to provide the NMFS with a biological assessment based upon the best scientific and commercial data available in accordance with 50 C.F.R. § 402.12. Its failure to do so does not excuse NMFS from its independent statutory obligation to base its consultation on the best scientific and commercial data available. 16 U.S.C. § 1536(a)(2); 50 C.F.R. § 402.14(g) and does not open any opportunity for NMFS to delay taking needed and timely action on the listing decision and the impacts of the Deepening Project.

Within the context of an ESA Section 7 Consultation, NMFS must rely on the best scientific and commercial data available. 16 U.S.C. § 1536(a)(2); 50 C.F.R. § 402.14(g)(8). A failure to do so renders a Biological Opinion arbitrary and capricious. See Pac. Coast Fed'n on Fishermen's Ass'ns v. Bureau of Reclamation, 426 F.3d 1082, 1094-95 (9th Cir. 2005); cf. Selkirk Conservation Alliance v. Forsgren, 336 F.3d 944, 956-58 (9th Cir. 2003). An agency must consider the lifecycle of a species when determining jeopardy and crafting measures designed to protect a species. See Pac. Coast Fed'n of Fishermen's Assocs. v. Bureau of Reclamation, 426 F.3d 1082, 1094 (9th Cir. 2005). Other pertinent life history factors include: "longevity; age distribution; age to maturity; reproductive strategy . . . recruitment; seasonal distribution patterns; biogeography; food habits; niche; . . . hosts and symbionts; predators and competitors; and disease factors." FWS & NMFS, Final ESA Section 7 Consultation Handbook 4-20 (1998). Population dynamics (i.e. size, variability, and stability) must also be considered. Id. at 4-20 – 4-21. Even short-term effects may potentially jeopardize fish. Pac. Coast Fed'n of Fishermen's Assocs v. NMFS, 265 F.3d 1028, 1038 (9th Cir. 2001).

Numerous recent studies have shed further light on the Atlantic sturgeon in the Delaware River, and as a result there now exists a wealth of scientific data available that was neither considered nor addressed in the Corps' already deficient EA and BA. To ensure that its own determination is based on the best scientific and commercial data available, NMFS must consider all such studies in developing its Biological Opinion—including the studies and reports attached to this comment letter as well as other information that may be in the possession or awareness of NMFS regarding the

² Brown and Murphy (2010) note that the ASSRT's estimate of a spawning adult population of 300 in the Delaware was not based on any empirical data but was speculation based on the size of the river system compared to those of the Hudson and Altamaha rivers for which approximate population sizes of spawning adults were available.

Atlantic Sturgeon. See 50 C.F.R. § 402.14(g)(1) (indicating the Service must review “all relevant information provided by the Federal agency or otherwise available”). See attached bibliography.

Although Critical Habitat Designation is Needed Immediately to Protect Habitat for Atlantic Sturgeon’s Survival and Recovery, NMFS’ Biological Opinion on the Delaware Deepening Project Must Fully Consider the Massive Impacts to Atlantic Sturgeon Habitat Irrespective of Critical Habitat Designation:

In the final rule listing three distinct population segments (DPS) of Atlantic sturgeon in the Northeast Region, NMFS made a “not determinable” finding for critical habitat, extending the mandatory statutory deadline for critical habitat designation by one year. The Delaware River Atlantic sturgeon do not have the luxury of a year for you to delay critical habitat designation. The next phase of the Delaware River Deepening Project, Reach B, will be dredged starting in August 2012. Reach B and the Marcus Hook ledge, which will be the subject of significant blasting and/or other invasive and destructive action by the Army Corps, are known to be critical habitat for the Delaware River’s Atlantic sturgeon. Researchers have demonstrated that “the Marcus Hook Anchorage, Range and Bar area is a high use area for Atlantic sturgeon juveniles, year round.” See Comment Letter on Draft Environmental Assessment Delaware River Main Channel Deepening, Delaware DNREC Division of Fish and Wildlife, June 2011. See also Fox and Brece 2010, Wirgin June 29, 2011 Comment Letter, USFWS July 6, 2011 Comment Letter, DRBC July 6, 2011 Comment Letter, Delaware DNREC Semi-Annual Progress Reports, June and December 2011.

In fact, all of the reaches of the Delaware River that will be affected by the Deepening Project are vitally important to the various life stages of Atlantic sturgeon (and also shortnose sturgeon). The attached maps created as part of the Delaware River Basin Priority Conservation Areas and Recommended Conservation Strategies Final Report prepared by The Nature Conservancy, the Partnership for the Delaware Estuary and the Natural Lands Trust identifies that the entire estuary is used by the Atlantic sturgeon (and shortnose sturgeon) and highlights those areas for which there is data to show areas of particular importance; those identified areas coincide with the major areas to be dredged and/or blasted by the Deepening Project. The Nature Conservancy et al., Delaware River Basin Priority Conservation Areas and Recommended Conservation Strategies, Final Report, September 2011, at Appendix II (maps).

Given the extremely precarious status of the Delaware River Atlantic sturgeon, and those threats facing this unique component of the New York Bight DPS within the Delaware River from the Deepening Project, within other rivers and estuaries, and in the Atlantic Ocean where each fish faces a 38% chance of becoming fisheries bycatch each year, NMFS must move immediately to designate critical habitat to ensure that the species’ habitat needs for both survival and recovery are fully considered in ESA Section 7 consultations on the dozens of federal actions likely to jeopardize the species and/or destroy or adversely modify its critical habitat.

Nevertheless, even in the absence of designated critical habitat, NMFS must fully consider habitat impacts in its Section 7 consultation process on the Deepening Project and on all other federal actions. Impacts to habitat (designated as critical habitat or not) must be considered as part of the

jeopardy analysis, because habitat impacts in turn affect species and thus may contribute to jeopardy. See Miccosukee Tribe of Indians of Florida v. FWS, 566 F.3d 1257, 1262-63 (11th Cir. 2009) (describing biological opinion which found that continued flooding of non-designated Cape Sable seaside sparrow habitat would lead to species extinction); 50 C.F.R. § 222.102 (“Harm in the definition of ‘take’ in the Act means an act which actually kills or injures fish or wildlife. Such an act may include significant habitat modification or degradation which actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including, breeding, spawning, rearing, migrating, feeding or sheltering.”); cf. 16 U.S.C. § 1533(a)(1)(A) (listing “destruction, modification, or curtailment of [] habitat” as one rationale for listing species as endangered or threatened). Thus, because habitat alteration both directly and indirectly affects species, analysis of the Deepening’s impacts on Atlantic sturgeon habitat is fundamental to the Section 7 consultation process.

Epecially Given the Significant Threats to Delaware River Atlantic Sturgeon Occurring in the Atlantic Ocean through Fisheries Bycatch, NMFS’ Biological Opinions Must Include an Appropriate Baseline Analysis that Defines the Action Area to Include the Species’ Entire Range Affected by Federal Actions:

It is our understanding that NMFS has identified twenty “high priority” biological opinions that will require re-initiation of ESA Section 7 consultation with respect to the Atlantic sturgeon. Of these, eleven are for federal Fishery Management Plans, and we assume that the Delaware Deepening Project falls into the remainder. NOAA Fisheries, “Atlantic Sturgeon – Listing under the Endangered Species Act,” Mar. 15, 2012 (PowerPoint presentation given at MAFMC meeting, March 19, 2012) at pp. 23-24. If the Deepening Project is not yet among the high priority biological opinions requiring re-initiation, we ask that you reconsider and include it as #21. And we urge that NMFS determine an appropriate large-scale “action area” for these biological opinions in order to analyze accurately the environmental baseline for this wide-ranging anadromous species.

NMFS may not conduct “the bulk of its jeopardy analysis in a vacuum.” NWF v. NMFS, 524 F.3d 917, 929 (9th Cir. 2007). NMFS must consider the effects of the action ‘within the context of other existing human activities that impact the listed species.’ Id. (quoting Aluminum Co. of America v. Bonneville Power Admin., 175 F.3d 1156, 1162 n.6 (9th Cir. 1999)). Thus, NMFS must determine the status of the species and the scope of preexisting and ongoing impacts to the subject species (“the environmental baseline”) and evaluate the additional impacts of the proposed action against that baseline.³ The joint implementing regulations define the environmental baseline to include “the

³ The effects of an action include “the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline.” 50 C.F.R. § 402.02. These effects, as well as all cumulative effects are compared against the baseline to determine whether the proposed action will jeopardize the continued existence of a species under 16 U.S.C. § 1536(a)(2). Cumulative effects include “those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation.” 50 C.F.R. § 402.02.

past and present impacts of all Federal, State, 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 which are contemporaneous with the consultation in process.” 50 C.F.R. § 402.02. Although the joint regulations define the baseline narrowly to include only impacts within the action area, overly narrow “action area” determinations are not tolerated. Defenders of Wildlife v. Babbitt, 130 F. Supp. 2d 121, 128-30 (D.D.C. 2001). “Action area” is defined to include “all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action. 50 C.F.R. § 402.02.

In Defenders of Wildlife v. Babbitt, the court found arbitrary and capricious several biological opinions that improperly restricted the action area to federal lands under the control of the action agency and/or the immediate area in which the proposed action would take place. 130 F. Supp. 2d 121, 128-30 (D.D.C. 2001). The court held that the biological opinions “failed to define the ‘action area’ to include areas where pronghorn may be directly or indirectly affected by the agency action, and in turn to address the impacts that constitute the environmental baseline in that larger area.” Id. at 130. Pronghorn move across land “without regard to which federal agency is responsible for administering a particular area,” id. at 129, and if pronghorn presently in one area may be affected by federal activity in another area, then the impacts of other activities where those pronghorn presently are “must [also] be included as part of the environmental baseline,” id. at 128-29. A narrow interpretation of action area to exclude such impacts “would undermine the [Endangered Species Act’s] requirement that agencies ‘insure’ that their actions do not jeopardize the continued existence of endangered species.” Id. at 129.

Accordingly, NMFS here must consider not only past and present impacts to Atlantic sturgeon within the Delaware River, but also past and present impacts to Atlantic sturgeon occurring in the Atlantic where this anadromous species spends a good portion of its lifecycle. Atlantic sturgeon presently found in the Atlantic Ocean but which spend parts of their lifecycle in the Delaware River will be affected by the proposed action. The Deepening Project will reduce and degrade available feeding, resting, and spawning habitat, release contaminants and lower oxygen levels within the River, and increase the risk of vessel strikes to fish returning to the River. Though Atlantic sturgeon in the ocean at the time the Deepening Project is actually constructed may not be immediately affected, the effects of the Deepening Project will impact those Atlantic sturgeon when they return to the Delaware River. Thus, the direct and indirect effects of the proposed action—and therefore the action area itself—extend into the Atlantic Ocean where Atlantic sturgeon spend a significant portion of their life.⁴ Consequently, impacts to Atlantic sturgeon while at sea, including the significant take of sturgeon as fishery bycatch, must be incorporated within the Deepening Project baseline.

The critical need for a full and adequate baseline analysis is underscored by the best available scientific and commercial data recently released by NMFS demonstrating a 38% intercept rate for Atlantic sturgeon in Northeast fisheries with an average mortality rate of 20% in sink gillnets (27% in monkfish fisheries) and 5% in otter trawls. (NOAA Fisheries Presentation on Distribution of

⁴ Erickson et al. (2011) demonstrated that some adults from the Hudson River population of the New York Bight DPS migrated as far north as Nova Scotia and as far south as Georgia, although the majority spent most of their time in the Mid-Atlantic Bight. See also Fox and Breece (2010).

Fishing Effort and Sturgeon Takes, “Effort by gear type and mesh size, with NEFOP and ASM sturgeon records,” Ad Hoc Atlantic Sturgeon Committee March 19, 2012; NOAA Fisheries, “Considering Effects of NER FMPs on Atlantic Sturgeon, February 22, 2012). NMFS’ Biological Opinion on the Deepening Project must therefore calculate, and address, the impacts of federally regulated fisheries as part of the environmental baseline for the New York Bight DPS and the Delaware River Atlantic sturgeon that will be affected by the Deepening Project.

We particularly note the conclusions of Dunton et al. (2012) with respect to fisheries bycatch impacts on Atlantic sturgeon, especially on the critically important juvenile life stage: “Currently, NOAA . . . recommends that [Atlantic sturgeon] be managed as five DPS areas. This fairly rigid division of genetic structure, based on the freshwater portion of the species life history, does not translate into marine habitat where substantial mixing occurs and local factors far removed from natal rivers can affect populations. Further, improvements or protection in freshwater habitat may not achieve restoration targets while marine juveniles experience by-catch mortality in distant jurisdictions. There is an immediate need to limit by-catch of [Atlantic sturgeon] in nearshore waters where aggregations commonly form.” See also Dunton et al. (2010) (identifying importance of marine habitats, especially to aggregations of overwintering juveniles).

We also note that the baseline must include consideration of the impacts of the open water intake cooling systems at Hope Creek Generating Station and the Salem Nuclear Generating Stations on the Delaware River that are likely to result in the impingement and entrainment of various life stages of Atlantic sturgeon. PSEG Nuclear, LLC found a dead Atlantic sturgeon on the Salem facility’s intake structure trash bars on March 18, 2011. See NRC Letter dated March 13, 2012.

The Delaware River Main Channel Navigation Project Will Jeopardize the Continued Existence of the NYB DPS of the Atlantic Sturgeon:

Under the ESA’s implementing regulations, “jeopardize the continued existence of means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species.” 50 C.F.R. § 402.02. As detailed below, the direct and indirect effects of the Deepening Project will, through directly harming and/or killing Atlantic sturgeon and degrading the species’ habitat, reduce appreciably the likelihood that this species, with only 87 spawning adults remaining, will survive and recover in the wild.⁵

The Delaware Riverkeeper Network questions whether the Delaware River Deepening Project may lawfully be permitted to move forward considering the very low numbers of Atlantic sturgeon left in

⁵ Notably, “the jeopardy regulation requires NMFS to consider both recovery and survival impacts.” NWF v. NMFS, 524 F.3d 917, 931 (9th Cir. 2007). “[I]n exceptional circumstances, injury to recovery prospects alone could result in a jeopardy finding.” Id. at 932 (quoting 51 Fed. Reg. 19,934 (June 3, 1986)). “[S]ignificant impairment of recovery efforts or other adverse effects which rise to the level of ‘jeopardizing’ the ‘continued existence’ of a listed species can also be the basis for issuing a ‘jeopardy’ opinion.” 51 Fed. Reg. 19,934 (June 3, 1986).

the Delaware River and the extraordinarily high likelihood that the Deepening will jeopardize their continued existence. This is all the more urgent since take of the Atlantic sturgeon in the Delaware River will likely diminish if not eliminate individual fish bearing the unique Delaware River haplotype. NMFS has already determined in the Final Rule that dredging, vessel strikes, and water quality impacts – all of which are implicated in the Deepening Project – are factors warranting the species’ listing and putting it at risk of extinction in the foreseeable future. See generally 77 Fed. Reg. 5880 (Feb. 6, 2012).

Based on the existing and emerging science we believe NMFS cannot issue a no jeopardy opinion, or any opinion that allows even a minimal level of take, given that NMFS estimates only 87 spawning adults are left in the entire Delaware River population. NOAA Fisheries Presentation on Distribution of Fishing Effort and Sturgeon Takes, “Effort by gear type and mesh size, with NEFOP and ASM sturgeon records,” MAMFC Ad Hoc Atlantic Sturgeon Committee March 19, 2012. The Delaware River population of Atlantic sturgeon, a stock that includes a genetically distinct haplotype found nowhere else in the Atlantic sturgeon population as a whole, is in the worst shape nationally. Despite a decades-long moratorium on fishing, the Delaware River population of Atlantic sturgeon has been unable to recover largely “due to habitat loss primarily due to dredging, saltwater intrusion, water quality degradation, harvest pressure and bycatch mortality.” See Simpson and Fox 2006. NMFS’ allowing the Deepening Project to move forward anticipating any level of direct or indirect take of Atlantic sturgeon cannot be scientifically or legally justified given current conditions as well as the demonstrated lack of need and the demonstrated existence of viable alternatives to the Deepening Project including as documented by the U.S. Army Corps of Engineers in its May 2011 “Delaware River Main Channel Deepening Project, Updated Economic Assessment of Relevant Market and Industry Trends”, in which continued small vessel shipping lines would more economically serve the shipping needs of the region.

Deepening is a Direct, Immediate, and Wide-Ranging Source of Short- and Long-Harms to Atlantic Sturgeon

According to NMFS’ proposed and final listing rules, the Deepening Project poses a threat of both direct take and “the potential for indirect effects as well, such as changes in hydrology of the river, which may affect possible spawning habitat (e.g., salt water intruding further into the river).” According to the listing proposal, and as acknowledged in the Final Rule, the Atlantic sturgeon range is threatened and adversely affected by dredging and effects to water quality including dissolved oxygen (DO) levels, water temperature, and contaminants. The proposed Deepening Project will entail significant levels of dredging as well as significant water quality effects, movement of the salt line and salinity changes, and dramatic changes in important habitats including juvenile habitat and spawning grounds.

There is a significant and growing body of knowledge in recent years regarding Atlantic sturgeon’s needs and habitats and the ramifications of impacts that will result from the Deepening Project. This significant new information is readily available but has not yet been fully analyzed or considered with regards to Deepening and the species. We urge NMFS to take full review and consideration of all scientific documentation regarding the Delaware River Atlantic sturgeon and the harms of the Deepening Project if allowed to proceed – including direct take from blasting, dredging contact and vessel strikes, as well as indirect take from loss of critical spawning, sheltering, and feeding habitat in the near term and long term, as well as the water quality impacts from re-suspending pollutants such

as PCBs to which Atlantic sturgeon are particularly vulnerable, the harm to submerged aquatic vegetation necessary for supporting oxygen at levels supportive of Atlantic sturgeon, and from further moving the salt wedge upstream diminishing critical habitat for the species.

Dredging of river systems significantly affects aquatic ecosystems in a number of ways that harm species such as the Atlantic sturgeon. Among the effects that the Deepening Project will have on the Delaware River population of Atlantic sturgeon are:

- ✓ The Deepening Project will remove, disturb, dispose of and re-suspend river sediments, modifying the river bottom substrate and impacting the community of benthic microfauna;
- ✓ The Deepening Project will remove or bury organisms and destroy benthic feeding areas – experts are saying that the benthic organisms needed to support the juvenile sturgeon would be harmed by the proposed Marcus Hook activities, and as such is likely to have impacts for a population in such significant decline;
- ✓ The Deepening Project will introduce contaminants that are directly harmful to the Atlantic sturgeon and/or that could affect oxygen levels in the River; the Philadelphia reach already continues to experience an oxygen sag with summer levels reaching the 3.5 mg/l criteria, a level too low for fully supporting the Atlantic sturgeon’s life cycles;
- ✓ The dredging operations can create noise and disturbance, and can disrupt spawning migrations;
- ✓ The Deepening Project will re-suspend contaminants to which Atlantic sturgeon are vulnerable (such as PCBs), can affect turbidity and siltation, and can deposit fine sediments in spawning habitats;
- ✓ The dredging and blasting activities will alter the hydrodynamic regime, alter physical habitats, and create a loss of riparian habitat;
- ✓ Reach B of the Deepening Project is likely to have particularly significant impacts on the Atlantic sturgeon through both direct take and indirect take. Reach B is located near Marcus Hook, PA. The Deepening Project’s activities proposed for Reach B, namely rock blasting approximately 77,000 cubic yards, hydraulic and hopper dredging, and constructing a two-space anchorage pose significant threats of killing Atlantic sturgeon directly, inflicting physical harm that results in later death, destroying essential habitat, including spawning habitat, and degrading water quality;
- ✓ The Army Corps has not provided the necessary recommended assurances regarding the protection of Atlantic sturgeon during construction of the Deepening Project. Specifically, the Army Corps has said that when working in the Delaware Bay (mouth to River mile 32) [“Reach E”], the Army Corps would not follow the recommendation to restrict hopper dredging between 1 June and 30 November in order to protect Atlantic sturgeon;
- ✓ The Deepening Project will increase the significant risks of vessel strikes either through increasing the number of large vessels navigating the River or through increasing their draft and thus making it more likely that sturgeon spawning, foraging or resting in the main navigation channel will be entrained through the vessel’s propellers;

- ✓ The Deepening Project will move the salt line further upriver. The increased saltwater intrusion resulting from deepening the River will continue to reduce the amount of spawning habitat available to the Atlantic sturgeon; it will decrease those spawning grounds both in length and also width because as the salt line moves north, it will remove from effective spawning support the now-wider freshwater reaches sometimes available. The moving salt line could potentially have other habitat impacts. The impacts of climate change and sea level rise may intensify or exacerbate the Deepening Project's effects on the salt line.

Because the Deepening Project will: cause the physical alteration of Atlantic sturgeon habitat at Marcus Hook and along its range; harm the benthic organisms needed to support the species for 1 to 2 years; further move the salt line upriver, thus affecting and reducing the spawning grounds and decreasing the likelihood of successful spawning; result in direct take from dredging and blasting; degrade water quality including adding pollutants and affecting oxygen levels; contribute to additional vessel strikes; and have combined and cumulative effects magnified by other projects related to the Deepening Project (such as Southport) and in the vicinity of the Deepening Project, the Deepening Project poses a significant, substantial, immediate and long-range threat of irreparable harm to the Atlantic sturgeon of the Delaware River.

1. Direct Take of Atlantic Sturgeon by Dredging Operations Poses Significant Risks of Harm:

Dredging can entrain Atlantic sturgeon, taking them up into the dredge drag-arms and impeller pumps resulting in death. Atlantic sturgeon spend a good deal of time in the navigation channel, according to experts, during the summer and fall months when dredging is to occur and so there is concern about direct take during dredging. See Comment Letter on Draft Environmental Assessment Delaware River Main Channel Deepening, Delaware DNREC Division of Fish and Wildlife, June 2011. As stated below, the planned monitoring of direct harm to Atlantic sturgeon through dredging is entirely inadequate and will likely result in significant under-reporting of actual take numbers.

2. Blasting Poses Significant Risks of Direct Take of Atlantic Sturgeon:

The construction schedule included with the 2011 Draft EA plans for blasting and rock removal in the months of December, January and February 2012/2013 and again in the berth areas in January, February and July of 2015. Science and monitoring demonstrate that Atlantic sturgeon are in this region of the River during the time of proposed blasting and clamshell dredging. Tracking and capture efforts by sturgeon researchers indicate that the Marcus Hook Anchorage is a gathering point for Atlantic sturgeon – so much so that a recent research study team modified their efforts to focus on Marcus Hook as one area of “sturgeon concentration” in order to increase their catch rate success. See Fisher (2011). 2010 tagging data for Atlantic sturgeon confirm the preference for this reach of the River by Atlantic sturgeon during these very months of proposed blasting and dredging activity. See Fox Figure 1 regarding winter locations of juvenile Atlantic sturgeon, June 15, 2011. 2011 telemetry data “indicate juvenile Atlantic sturgeon presence in the federal channel (Marcus Hook Range) during the blasting window over rock and large cobble substrate in the area to be blasted.” See Comment Letter on Draft Environmental Assessment Delaware River Main Channel Deepening, Delaware DNREC Division of Fish and Wildlife, June 2011; see also Delaware DNREC Sturgeons in the Mid-Atlantic Region Progress Reports for June 2011 and December 2011.

Studies and data demonstrate the rock blasting required for the proposed Delaware River Deepening Project would jeopardize the population of endangered shortnose sturgeon as well as the Atlantic sturgeon in the Delaware River. After years of asserting that sturgeon would not be present at Marcus Hook during blasting, the Army Corps has finally been forced to admit that, in fact, sturgeon are in this precise area during the time of proposed blasting, dredging and associated activities. See Response Letter U.S. Army Corps of Engineers to Delaware DNREC, May 21, 2010.

The September 2005 Corps-commissioned study titled “Delaware River Adult and Juvenile Sturgeon Survey, Winter 2005,” referenced in the EA and the BA, acknowledges that:

[L]ittle is known regarding the occurrence and distribution of juvenile Shortnose sturgeon in the Delaware River. . . . While blasting in the winter months should protect most fish species that use the Delaware River in the spring and warmer months, Atlantic sturgeon (*Acipenser oxyrinchus*) and Shortnose sturgeon (*Acipenser brevirostrum*) may be susceptible to blasting mortality if they use the Marcus Hook area during winter.

In fact, during the 2005 Army Corps Sturgeon Survey, sturgeon were observed near the Marcus Hook area during the winter time frame when they would be at risk from planned Deepening Project activities including blasting.

The Delaware River Basin Commission (DRBC) wrote of this research:

Specifically, the 2005 study suggests that sturgeon are present at Marcus Hook and Trenton during winter months, as opposed to being present only during migration, and that sturgeon may be less likely to avoid a working dredge or blasting than previously believed.⁶

While the 2005 Army Corps Sturgeon Survey did find more sturgeon located upriver than down, sturgeon were observed near the Marcus Hook area during the winter time frame at issue; the study determined that the relative sturgeon density in the Marcus Hook area was .005 fish per 100 meters thereby suggesting “that sturgeons are more dispersed in the Marcus Hook region of the Delaware River” than upstream. The report included among its conclusions:

Although the video survey data suggests that large aggregations of sturgeon do not exist in the blasting area, impacts to even a small number of shortnose or Atlantic sturgeon may not be acceptable to fisheries agencies.

It is important to note that the 2005 Army Corps Sturgeon Survey was based on one winter’s data and so the language attempting to minimize use of this reach of the River by Atlantic sturgeon, in light of the significant body of subsequent research and expert opinion not considered by the Army Corps in its 2011 EA and BA, does not hold great weight. What is most important is that it was proven Atlantic sturgeon will be found in the blast zone when blasting happens, thereby posing a

⁶ A copy of this comment letter was submitted with our comment letter to the Corps on the Draft EA and BA, dated July 6, 2011, a copy of which was provided to your office.

direct risk of death, injury, and harm. The information about the presence of sturgeon in the blasting/dredging zones during the time of that work is now well agreed to by the experts.

If Atlantic sturgeon are present during blasting, they could be significantly harmed – either through direct death or severe injury. It is known that “... blasting does have an adverse impact on fish.” In its 2009 biological opinion on shortnose sturgeon, NMFS stated: “... it is apparent from the study results that blasting may injure the species both internally and externally.”

The impacts for the species of the Army Corps’ proposed deterrence measures and their ability to avoid injuring or killing sturgeon is questionable at best. The Army Corps is well aware, and yet seems intent on ignoring, that deterrence is not a sound mechanism for protecting sturgeon in the area from harm. While the Army Corps is proposing a series of efforts to dissuade sturgeon out of the blast zone prior to blasting, its own commissioned studies concluded:

[T]here is no ‘out-of-the box’ behavioral deterrent system for excluding sturgeon from an underwater blasting area.

And, of course, deterrence does nothing to avoid the habitat destruction that the Deepening Project will inflict on Atlantic sturgeon as a result of the blasting, dredging, and deepening-induced salt line migration upstream.

The Army Corps’ NEPA and ESA assessments to date have failed to consider the ineffectiveness and the environmental harms of a scare charge strategy to keep sturgeon out of the blast zone. “The Alaska Department of Fish and Game considered repelling charges to be ineffective and potentially harmful to piscivorous fishes, marine mammals, and birds which are attracted to feed on fish that are stunned or wounded by the repelling charge.” In some instances, scare blasts have been known themselves to cause fish mortality. Radio telemetry and scientific observation and study have shown that blasting is simply not effective at keeping fish away. See “Environmental Effects of Underwater Explosions with Methods to Mitigate Impacts,” US Army Corps of Engineers, August 1997.

Researchers of Delaware River Atlantic sturgeon are on record questioning the success of the scare charge strategy being proposed, particularly given that it will be during the cold water temperatures when sturgeon activity levels are known to be lower and slower. Comment Letter on Draft Environmental Assessment Delaware River Main Channel Deepening, Delaware DNREC Division of Fish and Wildlife, June 2011.

The plan to use sinking gillnets around the blast zones to help keep fish away has been removed from Deepening Project plans since the 2009 EA. This change in procedure for trying to protect sturgeon is not discussed in the 2011 EA or BA and yet it was a prominent part of the 2009 EA and should continue as part of any protective strategy for the Atlantic sturgeon as it has the greatest likelihood of success.

Considering the very small number of adult Atlantic sturgeon now known to be left in the Delaware River population--only 87--the known and anticipated take to be caused by the Marcus Hook range activities will itself jeopardize the population, and will particularly do so when coupled with the other short term and long term ramifications of the Deepening Project for the Atlantic sturgeon of the Delaware River.

Green Break Technology Will Not Solve the Problem:

While the Delaware scientists have asked the Army Corps to consider Green Break technology, the vast majority of the harms to the Atlantic sturgeon are not solved by avoiding blasting, if in fact that does become an option. We also note that not only is this an unproven technology with respect to sturgeon, but also there are no indications that the Army Corps has considered using it.

3. The Army Corps Plans to Ignore Biological Windows Important for Atlantic Sturgeon Protection:

The Army Corps is proposing to ignore biological windows necessary to protect Atlantic sturgeon from direct and indirect take and harm. The 2009 EA stated that when working in the Delaware Bay (mouth to River mile 32) [“Reach E”], the Army Corps would not be following the recommendation to restrict hopper dredging between 1 June and 30 November in order to protect Atlantic sturgeon.

The Army Corps’ project schedule released with the 2011 Draft and Final EAs clearly articulates its continuing plan to ignore biological windows for Atlantic sturgeon. The 2011 Draft and Final EA project schedule documents that in 2014, in Reach E, for Broadkill Beach, there will be hopper dredging in September, October and November; and in year 2015 for Kelly Island there will be hopper dredging during the months of April through August.

As a result of the failure to implement even this most basic level of protection, following the recommended biological windows for a portion of the Deepening Project’s work, the harms to the Atlantic sturgeon resulting from the Deepening Project will be further maximized. The Army Corps has not adequately considered or responded to the effects of ignoring biological windows, nor considered viable alternatives to the Project that exist, including the existing process of lightering that allows oil and goods to transport up the River without the need for any deepening and the continuing use of smaller shipping lines for the Delaware River as articulated as both a feasible and cost efficient option in the Army Corps’ May 2011 updated economic analysis (See Stearns Analysis of Army Corps’ May 2011 Report, January 2012. See also Delaware Riverkeeper Network et al., supplemental report documenting the viability of other alternatives to the Deepening Project and documenting the ongoing pitfalls of the “need” justification provided by the Army Corps).

NMFS expressed concerns about impacts to Atlantic sturgeon in its April 16, 2009 letter to the Army Corps (submitted after the 2009 EA was completed and publicly issued) resulting from the Kelly Island and Broadkill Beach elements of the Deepening Project:

We are concerned that the deepening of the channel below river mile (RM) 32, and the construction of the Kelly Island and Broadkill Beach projects are scheduled during months that Atlantic sturgeon may be present in the project area and when the Delaware River Fish and Wildlife Management Cooperative has recommended that hopper dredges not be used. ... given the critically low population of Atlantic sturgeon in the Delaware River and the potential for the species to be listed as threatened or endangered in the near future, the ACOE should adhere to the recommended seasonable dredging restriction for hopper dredging below RM 32, and not dredge from June 1 to November 30.

See Comment Letter NOAA Fisheries, April 16, 2009.

The Army Corps' response, that it will have observers who will monitor when Atlantic sturgeon are "taken" during the work of the Deepening Project, does not in any way minimize or avoid harm. Such monitoring will do nothing to protect the Atlantic sturgeon; it simply documents the impacts that are observed. It is not an appropriate response.

"For small remnant populations of Atlantic sturgeon, such as that in the Delaware River, the loss of just a few individuals per year due to anthropogenic sources of mortality [] may continue to hamper restoration efforts." Brown and Murphy (2010). The magnitude and variety of impacts that the Deepening Project will cause -- from immediate harm to habitat harm to impeding spawning abilities of the species -- challenges to the very core the Army Corps' suggestion that its primary response is monitoring rather than avoidance of harm.

4. Dumping of Dredge Spoils at Buoy 10 and Dredging/Blasting at Marcus Hook May Disrupt Atlantic Sturgeon Habitat and Food Resources:

The disturbance of benthic fauna, elimination of deep holes and alteration of rock substrates have been identified as of particular concern for Atlantic sturgeon. Atlantic sturgeon are substrate-dependent and as such have been shown to avoid soil-dumping grounds. The spoil disposal planned for Buoy 10 is therefore a threat and concern for Atlantic sturgeon that has not been addressed for the Deepening Project.

Delaware sturgeon experts have communicated that blasting is likely to impact the food sources of the Atlantic sturgeon and that this temporary reduction in food supply "...may have an effect on growth and survival of Atlantic sturgeon. ... A review of Atlantic sturgeon locations ... and the plan to deepen the federal channel as well as the Marcus Hook anchorage may impact a significant amount of food available for juvenile sturgeon in documented high use areas." Comment Letter on Draft Environmental Assessment Delaware River Main Channel Deepening, Delaware DNREC Division of Fish and Wildlife, June 2011.

5. Deepening will Result in Diminished Spawning and Young of Year Habitat:

The Deepening Project threatens spawning habitat for the Delaware River Atlantic sturgeon in a number of ways, including by blasting in areas and on habitats where spawning is believed to take place, by decreasing the reaches of the River available for spawning as the result of salt water intrusion and migration of the salt wedge upriver, and by damaging spawning habitat.

Data demonstrates that Atlantic sturgeon spawning is occurring in the Delaware River. Atlantic sturgeon, in general, are believed to spawn in the flow water between the salt front and the fall line of the major river systems they spawn in. Spawning requires freshwater and a hardbottom substrate. Research indicates that suitable spawning habitat exists between Marcus Hook (rkm 125) and Tinicum Island as well as between Tinicum Island (rkm 136) and the mouth of the Schuylkill River (rkm 148). Because of the availability of freshwater and hard-bottom substrates, spawning habitat is also believed to exist all the way up to Trenton (rkm 211). See Simpson and Fox (2006); Fox and Breece (2010); Delaware DNREC Sturgeons in the Mid-Atlantic Region Progress Reports for June 2011 and December 2011.

Whether or not direct take of Atlantic sturgeon during blasting can be avoided or minimized, the impacts to the likely spawning and/or nursery habitat in the Marcus Hook area will be permanent. According to the NJ Division of Fish & Wildlife, “The spawning area for Atlantic sturgeon . . . may well be the rock outcropping at Marcus Hook that will have to be blasted.”⁷ According to Dr. Isaac Wirgin, “Of great concern for the potential impact of the proposed project is that all the YOY fish collected in 2009 were caught in the vicinity of Marcus Hook. . . . Although several precautions to minimize disturbances to sturgeons during these operations were outlined in the Draft EA, it is likely that these operations will still alter the habitat of this area that may be critical as a nursery area for this unique and highly threatened population of Atlantic sturgeon.” Wirgin Comment Letter June 29, 2011. See also Delaware DNREC Division of Fish and Wildlife, Sturgeons in the Mid-Atlantic Region, June 2011 Progress Report (Marcus Hook provides winter habitat for juvenile Atlantic sturgeon) and December 2011 Progress Report (Marcus Hook anchorage was only site that produced early stage juvenile Atlantic sturgeon during the sampling survey; stretch of the river with cobble/gravel substrates between Marcus Hook and Tinicum Island is a likely site of any attempted or completed Atlantic sturgeon spawning during 2011).

The effects from the blasting, therefore, will be two-fold: (1) the direct impact from the blasting on sturgeon in the vicinity and (2) the consequences of physically altering this spawning and nursery habitat area, e.g., changing the rock outcrop in a way that affects the sturgeon’s ability or willingness to use this area for future spawning or as juvenile nursery habitat.

Dredging in the portions of the River near Philadelphia is also likely to be detrimental to the successful reproduction of the Atlantic sturgeon in the Delaware – not just because of direct take from dredging but also because of the degradation of spawning and nursery habitat.

Of great concern is that the Deepening Project will move the salt line further upriver, further reducing available spawning grounds for the Atlantic sturgeon. Increased saltwater intrusion upriver diminishes the available freshwater habitat needed for successful Atlantic sturgeon spawning. Researchers believe that some of the spawning areas:

are located much further upriver than historically reported spawning grounds (rkm75-130; Ryder 1890, Cobb 1899) which may, in part, be due to increased saltwater intrusion. The effects of increased saltwater intrusion on Atlantic sturgeon in the Delaware River although not well understood, may continue to play a role in the slow recovery of this population especially with the political and socio-economic pressure to expand dredging efforts in the river potentially furthering the saltwater intrusion and reducing available habitat.

See Simpson and Fox (2006).⁸

⁷ NJ Dept. of Environmental Protection Briefing, Delaware River Main Channel Deepening Project, SEIS Information, January 2007 (submitted as Misc 1 attachment to DRN Comment Letter to Army Corps on Draft EA and BA, July 6, 2011, copy provided to NMFS).

⁸ We understand that there has been more recent work as well in 2011 by researchers Simpson, Fox, and Breece on Atlantic sturgeon spawning habitat in the Delaware and its loss to salt water intrusion, and refer you to these researchers for more information if it is not already in your

Previous deepening of the Delaware River main channel and its maintenance dredging has already increased the tidal range of the Delaware Estuary and moved the salt line upriver. See DiLorenzo et al. (1993) and Walsh (2004). A briefing paper provided by experts to the Delaware Estuary Program's Science and Technical Advisory Committee (DELEP STAC) also discusses and cites resources to document that past dredging practices have affected morphology, hydraulics and sediment transport in the estuary and notes "[t]hese impacts are significant and have not been adequately addressed by the U.S. Army Corps of Engineers' environmental impact statements (1) and modeling studies (2) designed to assess potential effects of the 45-foot deep shipping channel." See DiLorenzo et al. (1993).

Since the release of this DELEP STAC briefing document the Army Corps has still failed to properly address the emerging science on these issues and the implications of the Deepening Project for them and sturgeon. In commenting on the Draft EA in 2011, the Partnership for the Delaware Estuary re-submitted its comments from December 2008, as neither the 2009 EA nor the 2011 Draft EA responded to the information needs the Partnership identified regarding the Deepening Project's impacts on the salt line, tidal movements, and the estuary's sediment budget. Partnership Letter July 6, 2011.

Consumptive use and water diversions upriver have reduced freshwater flows. The combination of increased tidal fluctuation and reduced freshwater flows has caused saltwater to intrude further into the freshwater-tidal reach of the estuary, depriving the Atlantic sturgeon of freshwater habitat important for spawning. Ongoing dredging continues to change salinity and bottom habitats in ways that adversely affect the Atlantic sturgeon and its habits. It is already believed that there may be a move upriver by the sturgeon as the result of increased saltwater intrusion. The proposal to deepen the Delaware River's main channel from 40 to 45 feet will exacerbate these conditions – moving the salt line even further up river and so further shrinking the available spawning grounds for the Atlantic sturgeon. See Simpson and Fox (2006). The fact that past practices and upriver water consumption have already begun to take a toll in reducing habitat does not make the similar effects of the Deepening Project to be of less concern; to the contrary, it makes them of greater impact and greater concern.

Scientists researching the Delaware River Atlantic sturgeon have specifically discussed the consequences of dredging and deepening of the River for the species, including the effect it has had on habitats, changed tidal flows and specifically that past deepening has resulted in "saltwater intrusion in the freshwater-tidal reach of the estuary. This displacement of freshwater habitat may have negatively affected any potential success for the contemporary spawning population." See Simpson and Fox (2006). The increased saltwater intrusion resulting from deepening the River would continue to reduce the amount of spawning habitat available to the Atlantic sturgeon.

Experts from Delaware State University are on record with the Army Corps years ago urging that they "consider how small changes in salinity" could impact the suitability of important areas of the river as spawning habitat and for larval rearing. According to these experts, changes as small as less than one part per thousand (<1ppt) "can effectively close [] regions to spawning during period of salt water intrusion...." See Fox Comment Letter December 31, 2008. The loss of freshwater habitat

possession. See references in: Delaware DNREC Sturgeons in the Mid-Atlantic Region Progress Reports, December 2011 at p. 11.

due to past dredging practices and water withdrawals that together caused increased saltwater intrusion resulted in a loss of freshwater habitat for Atlantic sturgeon that may already “have negatively affected recovery despite fishing moratoriums for the Delaware River Atlantic sturgeon population.” See Simpson (2008).

Other ways the Deepening Project could impact spawning habitat is by increasing the level of suspended sediments and contaminants in the water. An increase in suspended sediments could be detrimental to egg survival of Atlantic sturgeon – increasing the probability that eggs adhere to suspended solids and suffocate. Increasing contaminant loads can alter growth and reproductive performance. See Simpson (2008).

NMFS must also consider the effects of climate change and sea level rise on the Atlantic sturgeon, both independently and in conjunction with potentially exacerbating the impacts of the Deepening Project. “Courts have required that agencies evaluate climate change impacts in BiOps, even where the available studies are based on predictions.” Center for Biological Diversity v. Salazar 804 F. Supp. 2d 987, 1008 (D. Ariz. 2011) (citing cases).

Fox and Breece (2010) state: “Alterations of flow and thermal regimes may impact the recovery of New York Bight Atlantic sturgeon. Changing weather patterns may ultimately lead to an uncoupling of moderately increasing temperatures and spring freshets that have been linked to spawning in the closely related Gulf of Mexico sturgeon (*A. o. desotoi*).” “A 0.10 to 0.25 ppt increase in salinity is not negligible when considering the habitat requirements for larval and juvenile Atlantic sturgeon. This increase represents significant habitat loss for larval and early stage juveniles. The effects of which are compounded when considered along with the effects of sea level rise.” Comment Letter on Draft Environmental Assessment Delaware River Main Channel Deepening, Delaware DNREC Division of Fish and Wildlife, June 2011.

As discussed extensively in our comment letter to the Corps on the Draft EA, the Corps has entirely failed to account for the impacts of climate change and rising sea levels on salinity levels, and thus has failed accurately to describe the salinity changes that the Deepening Project will cause. See DRN Comment Letter, July 6, 2011 at pp. 83-87, 97-101. Given the proven linkages between salt water intrusion and the diminishment of available Atlantic sturgeon spawning habitat and decreased rates of survival and recruitment, NMFS’ biological opinion on the Deepening Project must address the best available scientific data to determine the extent to which climate change and sea level rise will exacerbate the upriver movement of the salt line that the Deepening Project will cause and the effects on Atlantic sturgeon spawning.

6. The Deepening Project will Cause Damage, Degradation, and Loss to Other Life Stage Habitats of Atlantic Sturgeon:

The ESA proposed and final listings rules specifically identify dredging as a factor in the destruction, modification, or curtailment of the Atlantic sturgeon’s habitat and range. “Environmental impacts of dredging include direct removal or burial of organisms, elevated turbidity or siltation, contaminant re-suspension, noise or disturbance, alterations to hydrodynamic regime and physical habitat, and loss of riparian habitat.” NMFS further found:

Dredging and filling operations can impact important features of Atlantic sturgeon habitat because they disturb benthic fauna, eliminate deep holes, and alter rock substrates necessary for spawning. Deposition of dredge sediment has been shown to affect the distribution of Atlantic sturgeon. Dredging can also result in direct takes (killing and injuring) of Atlantic sturgeon. Such takes have the potential to affect the range of Atlantic sturgeon.

During the summer months, experts believe that juveniles concentrate in three main areas: Artificial Island (RM 89), Cherry Island Flats (RM 110) and the Marcus Hook Anchorage (RM 125).

The Marcus Hook Anchorage, according to ongoing tracking and tagging research, is highly used by the Atlantic sturgeon. In addition, science continues to emerge about the use of this reach of the River for spawning, young of year and other life stages. See Fisher (2011). Marcus Hook has been found to be a favored spot of summering juveniles. Tagging and tracking research has shown that in summers of high salinity and high water temperature the Marcus Hook Anchorage is highly utilized by late stage juveniles. See Fisher (2011); see also Delaware DNREC Sturgeons in the Mid-Atlantic Region Progress Reports, June 2011 and December 2011.

Recent tagging data increasingly document the importance of the Marcus Hook Anchorage and Range to Atlantic sturgeon in the winter months, particularly December through March, precisely the months when the 2011 Draft EA schedule says blasting is to occur. See Fox Figure 1 June 15 2011.

At a May 13, 2010 meeting with the Army Corps that included sturgeon experts it was stated, “The most recent data suggest that the Marcus Hook anchorage is high use area for YOY and subadults.” See U.S. Army Corps of Engineers Meeting Summary, May 13, 2010.

It is not just about the direct effect of the blasting, but the impacts of physically altering this area of year-round high importance to many life stages of Atlantic sturgeon. These indirect effects of altering the key habitats of the Atlantic sturgeon have not been discussed in the Army Corps EA and BA.

Additionally, there are specific areas in the Delaware River that are shown to

serve as concentration areas for subadult Atlantic sturgeon, therefore providing valuable nursery habitat during the growth phase of the life cycle. Abundance of subadult Atlantic sturgeon (800-1300 mm total length) may potentially be greater in the Delaware River than other estuaries, and therefore it likely serves as valuable nursery habitat for not only Delaware River population but subadults from other estuaries as well.

See Simpson (2008); see also Delaware DNREC Sturgeons in the Mid-Atlantic Region Progress Reports, June 2011 and December 2011; This fact increases the importance of protecting the habitats of the Delaware River for Atlantic sturgeon as habitat degradation will have broad-ranging impacts for Atlantic sturgeon.

Habitat selection by subadults is likely driven by a combination of salinity, water temperature, dissolved oxygen, depth, substrate type and prey resources. Specifically, there is growing evidence

about the importance of salinity levels for subadult habitat selection. See Simpson (2008). To the extent the Deepening Project will decrease oxygen levels and alter salinity levels in the Estuary, it will adversely affect the habitats used and needed by subadults.

The freshwater reaches of River have become increasingly important for juveniles and the availability of these areas will reduce with salt water incursions caused by deepening. “Any increase in salinity due to deepening will increase salt water incursion ... and shift available habitat further upstream. The issue with this is that due to the shape of the estuary there is less deepwater habitat further upstream which represents a decrease in the available tidal freshwater habitat for Atlantic sturgeon juveniles. Decreased habitat is a decrease in the production capacity of the system.” The loss of habitat is becoming increasingly significant “due to the increased use of habitat at the freshwater interface below Philadelphia.... Preferred present day nursery grounds are near the freshwater interface and saltwater incursion represents a loss of habitat.” Comment Letter on Draft Environmental Assessment Delaware River Main Channel Deepening, Delaware DNREC Division of Fish and Wildlife, June 2011.

Experts have gone on record with data commenting on the shift of upstream by late stage juveniles in recent past years when there has been increased salinity in the estuary. This demonstrates that an increase in salinity in the estuary would result in a loss of habitat. Comment Letter on Draft Environmental Assessment Delaware River Main Channel Deepening, Delaware DNREC Division of Fish and Wildlife, June 2011.

Challenging claims by the Army Corps that deepening would have negligible effect on saltwater intrusion within the Delaware Estuary, experts stated: “A 0.10 to 0.25 ppt increase in salinity is not negligible when considering the habitat requirements for larval and juvenile Atlantic sturgeon. This increase represents significant habitat loss for larval and early stage juveniles. The effects of which are compounded when considered along with the effects of sea level rise.” Comment Letter on Draft Environmental Assessment Delaware River Main Channel Deepening, Delaware DNREC Division of Fish and Wildlife, June 2011.

Scientific studies on the Delaware River population of Atlantic sturgeon show that the entire Delaware Estuary provides critical habitat, with the upper reaches of the estuary providing important spawning grounds and lower reaches important habitat for a mix of life stages. The Deepening Project adversely affects every critical habitat area of Atlantic sturgeon – directly and/or indirectly.

7. Deepening Will Contribute to Water Quality Degradation Harmful to Atlantic Sturgeon:

a) Oxygen levels:

Atlantic sturgeon are vulnerable to situations of high temperature and low oxygen. Reduced oxygen levels have been found to reduce growth rates, respiration rates and survival in Atlantic sturgeon. Science has shown a correlation between decreasing sturgeon populations and decreasing water quality due to increased nutrient loadings and an increase in hypoxic (low oxygen) conditions and locations. See, e.g., Secor and Niklitschek (2001) (available at <http://aquaticcommons.org/3023/1/314-01.pdf>).

“[D]issolved oxygen concentrations below 2 mg/l can be lethal to sturgeons.” See Simpson 2008. In one study, all Atlantic sturgeon exposed to oxygen levels of 3 mg/l at a temperature of 26C, when unable to otherwise access air, died. The DO criteria currently set by the DRBC for the Delaware Estuary is 3.5 mg/l. In the Philadelphia reach of the River, even this low oxygen level is not always achieved; and the oxygen levels are frequently in the lower ranges of 3.5 to 5 mg/l. See DRBC Draft Water Quality Assessment, March 2012. Research has shown that a combination of low dissolved oxygen, water temperature, and salinity can restrict available Atlantic sturgeon habitat and that by increasing oxygen levels the amount of habitat available can be significantly increased (13% in the Chesapeake Bay). See Secor et al. (1998). Other fish also need and thrive on higher dissolved oxygen levels, those higher than 3.5 mg/l.

NMFS is on record, post the 2009 EA, expressing its concern about the potential for both direct and indirect effects from the Deepening Project on Submerged Aquatic Vegetation (SAV). EFH Comment Letter NOAA Fisheries, April 16, 2009. SAV is important for oxygen levels in the River, which is an important water quality issue for Atlantic sturgeon and other fish species. The Deepening Project’s effects on SAV in the Delaware River, and the resulting impacts to Atlantic sturgeon, has not been covered by the Army Corps’ NEPA documentation and analysis despite concerns expressed and data provided by NJDEP, NMFS, and the USFWS as well as information resulting from other projects that are currently under consideration by the Army Corps.

According to a Normandeau Associates report, Normandeau March 2004, SAV found in the proposed project area for the Southport Berthing Area, an area that includes habitat to be affected by the Deepening Project, “is important for its function as a substrate for macroinvertebrates and as cover for small fish **as well as a source of dissolved oxygen for the water**. Vegetated intertidal and shallow subtidal habitat is not common along the Delaware River Philadelphia waterfront and should be considered ecologically important along this shoreline.” (emphasis added).

The Philadelphia/Camden reach of the Delaware River is known to still suffer from an oxygen sag that can affect fish species, including their ability to reproduce and propagate. See DRBC Draft Water Quality Assessment, March 2012. The oxygen sag is of such a concern that the DRBC is considering revising its regulatory requirements as they pertain to oxygen levels in the Estuary. Accordingly, removal/destruction of an area of submerged aquatic vegetation that is an important contributor of oxygen in this reach of the River is of heightened concern.

b) Contaminants:

Because Atlantic sturgeon forage for and eat food that lives on the bottom of the River, because they have long life spans, and because they are subjected to contaminants in all of the habitats they use throughout their life cycle, they are believed to be particularly susceptible to environmental contamination.⁹ Toxic metals, PAHs (polychlorinated aromatic hydrocarbons), organophosphate

⁹ We also submit for your analysis the report “Wasting Our Waterways: Industrial Toxic Pollution and the Unfulfilled Promise of the Clean Water Act” (2012), which finds that the Delaware River is ranked fifth in the nation for the highest amount of total toxic discharges, with 6.7 million pounds of toxics discharged in 2010. DuPont Chambers Works in Salem County accounts for the lion’s share of these discharges, dumping 5.4 million pounds of toxic discharges into waters used by the Atlantic sturgeon every year.

and organochlorine pesticides, PCBs (polychlorinated biphenyls) and other chlorinated hydrocarbon compounds have been found to harm fish by causing production of acute lesions, growth retardation, reproductive impairment, reduced egg viability, reduced survival of larval fish, delayed maturity and posterior malformations. Exposure to pesticides harms anti-predator and homing behavior in fish, as well as harming reproductive function, physiological development, swimming speed, and swimming distances. Deformities and ulcerations found in Atlantic sturgeon in the Brunswick River may be due to poor water quality as well as boat propeller injuries. See ASSRT/NMFS Status Review 2007.

Fish exposure to PCBs causes a higher incidence of fin erosion, epidermal lesions, blood anemia and altered immune response. PCB exposure in fish has also been found to cause reproductive failure and mortality. Metals, including mercury, cadmium, selenium and lead (also referred to as inorganic contaminants) may cause death or sub-lethal effects in fish. Loss of the ability to reproduce, body malformation, the inability to avoid predation, and increased susceptibility to infectious organisms may result from the chronic toxicity of some metals. Heavy metal exposure, depending on the metal and the fish, can cause brain lesions, altered behavior, degraded vertebrae, and reduced survival and abundance of larvae. Heavy metals and organochlorine compounds accumulate in sturgeon tissue. See ASSRT/NMFS Status Review 2007.

While there has not been much research on the implications of these toxins for Atlantic sturgeon specifically, it has been found that pesticides, heavy metals, and other contaminants have been found in other sturgeon species at high enough levels to cause concern and to cause harm. See ASSRT/NMFS Status Review 2007. Delaware River shortnose sturgeon have been shown to have a wide range of toxins in their tissues, including PCBs, PCDDs, PCDFs, DDE, and a variety of heavy metals (including aluminum, cadmium, copper) above adverse effect concentration levels. Dioxin, mercury, PCBs and chlorinated pesticides are considered to be contaminants of particular concern for Atlantic sturgeon populations in the Delaware River. See ASSRT/NMFS Status Review 2007.

Early life stages of Atlantic sturgeon have been found to be more susceptible to some contaminants than a variety of other threatened and endangered fish species, and more susceptible than fish species that are more typically used to test for the aquatic toxicity of contaminants (i.e. fathead minnow, sheepshead minnow, rainbow trout). See ASSRT/NMFS Status Review, February 23, 2007. Increasing contaminant loads can alter growth and reproductive performance of Atlantic sturgeon. See Simpson (2008). See also Wirgin Comment Letter, June 29, 2011 citing Roy et al. (2011) (“Finally, the potential impacts of dredging and resulting re-suspended contaminated sediments and the re-introduction of contaminants into the river from dredge spoil disposal plans associated with the project was not addressed. . . . Many of the toxicities that we observed at these contaminant levels in Atlantic sturgeon embryos and larvae were incompatible with survivorship or recruitment of larvae to natural populations. Thus, it is likely that elevation of bioavailable levels of these pollutants by habitat alteration will challenge young life-stages with toxic levels of these contaminants.”).

NJDEP’s recent study regarding the discharges from the Killcohook Confined Disposal Facility (CDF) associated with Reach C Deepening Spoils concluded:

Despite the limitations of the available data, analyses have identified potential adverse impacts to water quality resulting from the discharge of dredged material dewatering effluent

from the Killcohook Upland CDF with elevated concentrations of selenium, copper (dissolved), mercury, aluminum and cyanide.

See NJ DEP CDF Letter, April 11, 2011. NJDEP's finding that CDFs are a source of heavy metals and toxins confirms earlier findings by Dr. Tom Fikslin regarding Army Corps CDFs. See Fikslin (1998). NJDEP's research confirms that, in fact, CDFs still are a source of toxic and heavy metal pollution to the River. As NJDEP commented in its July 5, 2011 letter to the Corps on the Draft EA and BA, its review found:

- Exceedances of the applicable Delaware River Basin Commission Stream Quality Objectives (*i.e.* water quality criteria) for a number of contaminants were frequently observed in the dredged material dewatering effluent discharges from the Killcohook Upland CDF. It appears that the discharge of dredged material dewatering effluent with elevated concentrations of selenium, copper (dissolved), mercury, aluminum, and cyanide may have impacted the surface water quality of the Delaware River.
- Additional potential adverse impacts to the Delaware River may have occurred due to discharges of PCBs, pesticides, and PAHs, but Quality Assurance issues with the available data for these contaminants limit the data's usability.

With respect to the data quality, NJDEP pointed out in its July 5, 2011 letter to the Corps (as it has done on numerous previous occasions) that the Corps' water quality monitoring program, including its sampling, testing, and evaluation protocols, do not conform to the requirements of its own technical manual.¹⁰

The ramifications of CDF heavy metal and toxin inputs for Atlantic sturgeon were not fully and adequately addressed by the Army Corps in its EA or BA, as it continues to deny that the CDFs are a source of pollution to the River and refuses to implement a water quality monitoring program consistent with its own technical manual's requirements. The Corps' data and analysis cannot be accepted as the best available in light of the many known technical issues with its testing protocols that do not conform to its own prescribed standards.

We also note with concern that the Corps significantly underestimated the volume of dredged spoil disposal that will result from the Deepening Project, and thus cannot be said to have accurately estimated the impacts of effluent discharge from dewatering. For example, in Reach C of the Project, dredged in 2010, the volume of dredged spoils deposited into the Killcohook CDF was 38% greater than anticipated: the Corps had originally estimated this Reach would generate 2.6 million cubic yards of material, but an additional 1 million cubic yards of material were dredged and deposited. See DRN July 6, 2011 Comment Letter, at pp. 45-47.

8. Deepening Will Increase the Risk of Vessel Strikes:

¹⁰ U.S. Army Corps of Engineers, Evaluation of Dredged Material Proposed for Disposal at Island, Nearshore, or Upland Confined Disposal Facilities – Testing Manual. Technical Report ERDD/EL TR-03-1. Engineer Research and Development Center. January 2003. Available at [http://yosemite.epa.gov/r10/cleanup.nsf/0/fa0745084bfac55688256e5d000a382f/\\$FILE/trel03-1.pdf](http://yosemite.epa.gov/r10/cleanup.nsf/0/fa0745084bfac55688256e5d000a382f/$FILE/trel03-1.pdf)

NMFS has repeatedly determined vessel strikes to be a “significant threat” to the New York Bight DPS of which the Delaware population is a part. See ASSRT/NMFS Status Review, Proposed Rule, Final Rule. The Army Corps’ 2011 NEPA and ESA documents failed to consider the degree to which the Deepening Project will perpetuate or further increase the risk of vessel strikes.

Brown and Murphy concluded that “For small remnant populations of Atlantic sturgeon, such as that in the Delaware River, the loss of just a few individuals per year due to anthropogenic sources of mortality, such as vessel strikes, may continue to hamper restoration efforts.” See Brown and Murphy (2010). “[T]he number of sturgeon being killed by vessel strikes may be detrimental to the long-term viability of the population. . . . Both the dredging to deepen the channel and the subsequent increase in large vessel traffic may further hamper the recovery of the Delaware River Atlantic sturgeon population.” Id.

The Brown and Murphy study, done in response to the proposed listing of Atlantic sturgeon, examined the issue of vessel strikes. 50% of the mortalities of Atlantic sturgeon in the Delaware River between 2005 and 2008 were the result of vessel strikes. The remaining 50% were too decomposed to determine if they were caused by vessel strikes but it is likely that most were. The data from Fisher, Fox, and Breece, “The Horrors of Sturgeon Matrimony in the Delaware Estuary: Scutes of Death,” (2012 PowerPoint) show that 62% of detected sturgeon carcasses were killed by vessel strikes, with 38% dying of unknown causes. Importantly, as Brown and Murphy note, “only some fraction of the total vessel-strike mortalities that have occurred probably are reported,” and thus the reported numbers are likely underestimates of actual numbers.

Data from 2009, 2010 and 2011 are now available and show a greatly increased number of carcasses reported in 2010 and 2011 as compared to 2005 through 2008. From 2005 to 2009, the mean number of carcass reports was 8.2 per year, which more than doubled in 2010 and 2011, with a mean number of 17.5 carcass reports per year. The data also shows that May and June, when the Atlantic sturgeon are spawning, have by far the greatest numbers of carcass reports. Fisher, Fox, and Breece, “The Horrors of Sturgeon Matrimony in the Delaware Estuary: Scutes of Death,” (2012 PowerPoint).

Of critical importance, the Brown and Murphy study is concerned about the size of the vessels resulting from Deepening as opposed to any increase in the number of vessels. “The majority of vessel strikes appeared to result from interactions with large vessels, such as tankers Large vessels that transit the shipping channel typically draft close to the bottom of the channel, thereby posing a threat to sturgeon positioned close to the bottom of the channel.” Delaware Division of Fish and Wildlife scientists have specifically challenged the Corps’ assertion that vessel strikes for Atlantic sturgeon will not increase with deepening. They stated that:

Increased speeds due to the widening of bends and the increase in vessel size (i.e. propeller size) and vessels with increased loads (which require more thrust) will strain larger volumes of water at an increased rate which is likely to increase the number of ship strikes. A reduction in lightering may reduce the number of vessels but not the number of deep draft vessels which are believed to be the primary cause of vessel strikes.

Delaware DNREC Division of Fish and Wildlife, June 2011. Fisher, Fox and Breece (2012) state that over 3000 deep draft vessels transit the Delaware annually, and that “fully loaded deep draft vessels are known to drag [the] bottom in depositional areas at low tide.”

NMFS’ biological opinion on the Deepening Project must also consider the impacts of vessel strikes on Atlantic sturgeon from distinct population segments other than the New York Bight. Atlantic sturgeon from both the Delaware River and other subpopulations are known to aggregate in coastal waters near the mouth of the Delaware Bay. “Observations of jumping Atlantic sturgeon in regions coinciding with heavy vessel traffic suggest the possibility of increased vessel strikes [Simpson and Fox 2009]. Researchers at Delaware State University and DNREC have documented several Atlantic sturgeon mortalities in this area contributing to this body of evidence that harmful interactions are taking place.” Fox and Breece (2010).

Monitoring Needs to Be Significantly Enhanced if Deepening is Allowed to Occur:

The Delaware Riverkeeper Network is also concerned about the monitoring that will be required for the Deepening Project. We have learned from people who have witnessed the monitoring that takes place at confined disposal facilities that the monitors are not appropriately placed and/or vigilant when it comes to monitoring fish being blown with spoils into a CDF. Monitors are known to assert they have spotted no dead fish when observers who take a quick look can witness multiple fish in the CDF spoil site. Therefore, we believe that within the CDF there need to be more monitors and they need to be more appropriately placed so as to witness dead fish entering the CDF with dredge spoils from the River. Considering the very serious condition of the Atlantic sturgeon population in the Delaware River, we think it might also be appropriate to complement human monitoring with video monitoring.

The blasting action to take place at Reach B is very likely to kill a number of fish that will suffer bladder damage and as a result will sink to the bottom of the River where their death cannot be witnessed by appointed observers. (This point also made by Delaware researchers in their comments; see Comment Letter on Draft Environmental Assessment Delaware River Main Channel Deepening, Delaware DNREC Division of Fish and Wildlife June 2011). Therefore, we urge additional monitoring steps particularly for the Reach B portion of the project.

We do not believe the scare charges will be an effective means for preventing Atlantic sturgeon from being in proximity to proposed blasting, for all the reasons articulated in our previous submission shared with you and discussed earlier in this comment letter. To protect the fish and to monitor deaths caused by blasting and dredging in Reach B we urge that trawling be undertaken in advance of blasting and dredging in Reach B to physically remove fish from the area of activity. We also urge that just before blasting and dredging in Reach B that gill nets be set down stream, that they be attached to the bottom of the River bed with tie downs so they can collect sturgeon that die in the process. In addition, we urge that after the activity is undertaken that professionals come in to trawl in this reach of the River to search for killed Atlantic sturgeon. As we understand it, scientists with the University of Delaware have developed the kind of gill net needed to undertake what we are suggesting. And there are already fisherfolks who can do the trawling portion of this monitoring effort. Considering the very low number of Atlantic sturgeon in the Delaware River, with only 87

spawning adults left, just a few deaths can have a dramatic effect on the population. Therefore, should NMFS allow any take whatsoever of Atlantic sturgeon for the Deepening Project, it must accurately monitor for every kill so that project construction can be immediately halted when any permitted takes are exceeded.

Thank you for considering these comments and attached documents.

Sincerely,

A handwritten signature in blue ink that reads "Maya K. van Rossum" followed by a long horizontal flourish.

Maya K. van Rossum
the Delaware Riverkeeper