RESPONSIVENESS SUMMARY FOR STUDY PLAN FOR AVIAN INJURY STUDY

AVIAN EGG INJECTION STUDY - AMENDMENT FOR YEAR 2 (2007)

HUDSON RIVER NATURAL RESOURCE DAMAGE ASSESSMENT

HUDSON RIVER NATURAL RESOURCE TRUSTEES

STATE OF NEW YORK

U.S. DEPARTMENT OF COMMERCE

U.S. DEPARTMENT OF THE INTERIOR

FINAL

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This *Responsiveness Summary for the Study Plan for an Avian Injury Study, Avian Egg Injection Study - Amendment for Year 2 (2007)* was prepared by the Hudson River Natural Resource Trustees (Trustees) — New York State (NYS), the U.S. Department of Commerce, and the U.S. Department of the Interior. The Trustees are working cooperatively to conduct a Natural Resource Damage Assessment (NRDA) for the Hudson River. This Responsiveness Summary provides Trustee agency responses to public comments on and questions about the Trustees' *Study Plan for Avian Injury Study - Amendment for Year 2 (2007), Draft for PublicReview and Comment*, dated February 28, 2007, released by the Trustees for public review and comment.

INTRODUCTION

Pursuant to the Hudson River Natural Resource Damage Assessment (NRDA) Plan (Hudson River Natural Resource Trustees 2002), the Trustees developed a *Study Plan for Avian Injury Study - Amendment for Year 2 (2007), Draft for Public Review and Comment* (Draft Avian Egg Injection Study Plan) (Hudson River Natural Resource Trustees 2007a), and engaged in public review of that Draft Avian Egg Injection Study Plan.

On February 28, 2007, the Draft Avian Egg Injection Study Plan was released by the Trustees to the public. In that Draft Avian Egg Injection Study Plan, the Trustees asked the public and the party(ies) responsible for the contamination to review the Draft Avian Egg Injection Study Plan and provide feedback on the proposed approach. The Draft Avian Egg Injection Study Plan noted that the Trustees sought public input to help them in planning and conducting an assessment that is scientifically valid, cost effective, and that incorporates a broad array of perspectives. Peer review of the work proposed by the Principal Investigators (PIs) selected by the Trustees was conducted simultaneously with the public review and comment period.

A Public Notice of the availability of the Draft Avian Egg Injection Study Plan for public review and comment was announced in the NYS Department of Environmental Conservation's Environmental Notice Bulletin on February 28, 2007. Availability of the Draft Avian Egg Injection Study Plan was also announced by the Trustees on the Hudson River NRDA web site maintained by the U.S. Fish and Wildlife Service (FWS). A one month public review period was provided.

All comments received on the Draft Avian Egg Injection Study Plan, as part of the peer and public review process, were considered. The Trustees appreciate the input represented by these comments and the effort by commentors to provide this level of review.

The Trustees evaluated peer and public comments and, where warranted, incorporated these comments in the Draft Avian Egg Injeciton Study Plan to produce the *Avian Injury Study, Avian Egg Injection Study Plan, Amendment for Year 2 (2007), Final, Public Release Version,* dated June 1, 2007 (Final Avian Egg Injection Study Plan) (Hudson River Natural Resource Trustees 2007b). In the remaining instances, public comments on the Draft Avian Egg Injection Study Plan were addressed by letter to the commentor, acknowledging receipt of comments and providing an initial response and noting that a more detailed Responsiveness Summary (this document) would be provided by the Trustees in the near future.

PUBLIC COMMENTS RECEIVED

Two letters from the public were received in response to the Draft Avian Egg Injection Study Plan: a letter from The General Electric Company (GE), the Potentially Responsible Party, dated March 29, 2007; and a letter from Scenic Hudson, Inc., dated March 30, 2007.

The text of the GE and Scenic Hudson comment letters is provided below, along with the Trustee response (in italicized text) to comments.

Accordingly, this Responsiveness Summary documents comments that were received, that those comments were considered by the Trustees, and how the Trustees addressed those comments.

LETTER FROM GENERAL ELECTRIC, DATED MARCH 29, 2007

General Comments:

On March 2, 2007, the Hudson River Natural Resource Trustees (New York State, U.S. Department of Commerce, and U.S. Department of Interior) released the Study Plan for Avian Injury Study, Amendment for Year 2 (2007) ("2007 Avian Injury Study Plan Amendment") for public feedback on the proposed approach to conducting a tree swallow egg injection and field study as part of the Hudson River Natural Resource Damage Assessment (NRDA). The comments of the General Electric Company (GE) on the Avian Injury Study Plan Amendment are enclosed with this letter.

Consistent with GE's comments on the trustees' 2006 Study Plan for Avian Egg Injection Study, by providing comments on the 2007 Avian Injury Study Plan Amendment, GE does not necessarily agree that the results of the study will have any relevance to the determination of injury to the natural resources of the Hudson River Valley.

The DOI regulations at 43 CFR Section 11.62 (f)(4)(i)(E) explicitly approve the use of laboratory experiments – such as that described in the Final Avian Egg Injection Study Plan – as acceptable proof of biological injury in the field.

The 2007 Avian Injury Study Plan Amendment provides a general overview of the trustees' design for the continuation of a portion of the avian egg injection work initiated in 2006. However, similar to the trustees' 2002 NRDA Plan and 2004 Avian Investigations for the Hudson River Study Plan, the 2007 Avian Injury Study Plan Amendment does not provide the level of detail on the work to be conducted needed to provide meaningful feedback on the Plan Amendment in its current form. Further, there is no detail concerning results or knowledge gained from Year 1 (2006) of the avian egg injection study. The 2006 Study Plan noted that the 2006 studies were projected to continue into a second year (2007) to allow further development of injection and incubation protocols for eggs from wild species and in some instances to produce larger sample sizes, and that the 2007 work would be conducted pursuant to a 2007 Study Plan Amendment. The lack of detail on the results of the 2006 work related to the work proposed for 2007 prevents an understanding of whether the proposed work will satisfy the purported goals of the study and is inconsistent with the trustees' commitment in the NRDA Plan concerning study plans (page 39) to ensure that study plans will include detailed information, consistent with Department of the Interior (DOI) regulations concerning the general content and level of detail of an NRDA Plan or modifications to that plan (43 CFR 11.31), and with the trustees' assurance in the Responsiveness Summary for the NRDA Plan (July 2003, page 2) that study plans that supplement the NRDA Plan will provide the level of specificity needed to satisfy the DOI requirements.

As a result of the peer and public review process, the Final Avian Egg Injection Study Plan includes additional details and clarification beyond those provided in the Draft Study Plan. For example, the experimental design has been clarified, and a Work Plan with Standard Operating Procedures (SOPs) has been incorporated into the Study Plan. The Final Avian Egg Injection Study Plan provides details regarding the species to be studied and the PCBs to be tested. The SOPs include additional information regarding recording and handling of data, the egg injection and incubation procedures, and the necropsy of birds and analysis of tissue samples.

The Quality Assurance/Quality Control section (Quality Assurance Plan) of the Final Avian Egg Injection Study Plan has been expanded to provide additional details that address the four general elements identified by U.S. Environmental Protection Agency quality assurance guidance (project management, data generation and acquisition, assessment and oversight, and data validation and usability), as well as to provide information regarding study documentation and chain of custody procedures. The Final Avian Egg Injection Study Plan also includes additional information regarding study design, sample collection, and analyses to be performed. A section regarding hypotheses and statistical tests has been added to the Final Avian Egg Injection Study Plan. That section describes the comparisons the Principal Investigators plan to conduct, providing null and alternative hypotheses, and statistical tests.

Regarding a lack of detail in the Draft Avian Egg Injection Study Plan on results of the 2006 work related to the work proposed for 2007, for injury determination studies, the Trustees committed, in the Hudson River NRDA Plan, to peer review the results of studies conducted pursuant to injury determination study plans, such as the 2006 avian injury study plan. As peer review of the results of the 2006 avian injury study has not yet been completed, the Trustees are not in a position to release those data (including discuss them in the Draft Avian Egg Injection Study Plan).

The basic information requested in the attached comments would allow a thorough evaluation of the proposed study approach and we ask that this information be provided so that GE and the public have the opportunity to provide meaningful feedback on the 2007 Avian Injury Study Plan Amendment. We look forward to your response to our comments and receipt of the requested information.

None of the public comments received on the Draft Avian Egg Injection Study Plan warrants revision of that study plan to the extent that a new public notice and comment period is needed. Nor are the revisions and additional detail that are part of the Final Avian Egg Injection Study Plan so significantly different from the Draft Avian Egg Injection Study Plan that a second public review process is justified.

Specific Comments:

A. The Introduction notes that embryos and hatchlings from the 2006 investigations are being analyzed for a variety of histological and biochemical endpoints. If these analyses are still ongoing, what information was used as the basis for selecting endpoints for measurement in tree swallow hatchlings and nestlings to be collected in 2007?

Analysis of tissues and results from the Year 1 avian egg injection study is ongoing. The Trustees have been guided by preliminary information from that work, and from the published literature on avian life history and toxicology, in selection of endpoints for work in 2007.

B. Section 4.1, Egg Injection with Tree Swallow Eggs from Patuxent NWR, notes that tree swallow eggs will be injected in situ with a mixture of PCB congeners and that the eggs will be naturally incubated for the first two-thirds of incubation (i.e., at 10 days based on a 15-day incubation) by the parents and then the eggs will be brought into the lab for artificial incubation in the last one-third of the incubation period. However, the experimental design provided in the May 12, 2006 Study Plan seems to indicate that following injection at 2.5 days into incubation, eggs will be maintained in an incubator. Please clarify the methodology to be used. If the methodology deviates from that described in the 2006 Study Plan, what information was used as the basis for the change?

In 2007, tree swallow eggs from Patuxent Research Refuge were injected on embryonic day 2.5 and then returned to the nests for incubation; on day ten of incubation the injected eggs were collected from the nest and transported to the laboratory for completion of incubation. This is a change from 2006. The change in protocol from 2006 to 2007 for tree swallow eggs from Patuxent Refuge was based on analysis of hatching data from tree swallow eggs collected in 2006 from nests on the Upper Hudson River at mid-late incubation with subsequent incubation to hatching in the laboratory.

C. The 2007 Study Plan proposes an in situ evaluation of PCB exposure in Upper Hudson River tree swallows that will examine birds exposed over a broad spectrum of environmentally relevant PCB concentrations and congener mixtures via ecologically relevant exposure routes (maternal transfer and diet) and will examine the same endpoints as proposed in the follow-on egg injection study. As such, what additional information can likely be gained from conducting the laboratory egg injection study that cannot be gained from studying the exposed population?

The avian egg injection study allows evaluation of the toxicity and adverse effects of embryonic exposure of birds to a known (a priori) dose range of PCBs; in a field study, the dose of PCBs to which an organism is exposed cannot be known beforehand.

D. In conjunction with the in situ field study, the Trustees should consider collecting data on reproductive performance (clutch size, hatching success, fledging success, etc.) of non-manipulated tree swallow broods from the same locations where nestlings and/or hatchlings are collected. While data on reproductive performance of co-located, non-manipulated broods may not be directly transferable to manipulated broods, these data will provide information on ecologically relevant endpoints that can be compared both to the reference population and to immune, biochemical and histological endpoints to be assessed in 2007.

Due to time and logistical constraints, the Trustees have decided not to proceed at this time with the assessment of nestling and adult tree swallows detailed in the Draft Avian Egg Injection Study Plan in section 4.2 (Upper Hudson River Field Study of Tree Swallows) of that document.

E. The Avian Injury Study Plan Amendment does not indicate that egg injection studies will continue for the chicken or American kestrel. What is the rationale for not conducting parallel studies on these species using the same methods and endpoints proposed for tree swallows? What was the purpose of conducting scoping studies on these species in 2006; do the trustees intend to perform definitive experiments for these species?

Egg injection studies in 2007 will not include the chicken or American kestrel. The purpose of the 2006 chicken egg injection study was to provide a point of reference for impacts observed in other species and in relation to effects levels identified in the toxicology literature for PCBs, dioxins, and other chemicals. The purpose of the 2006 American kestrel egg injection study was to evaluate whether avian species in the vicinity of the Hudson River are injured due to exposure to PCBs. These evaluations are ongoing by the Trustees.

LETTER FROM SCENIC HUDSON, DATED MARCH 30, 2007

Thank you for the opportunity to provide comments on the Hudson River Natural Resource Trustees Draft Study Plan for Year 2 of the Avian Injury Study for the Hudson River. We appreciate the Trustees' efforts to adequately identify, assess and quantify the injuries caused by PCBs in the Hudson River.

We concur with the Trustees that past and continuing discharges of polychlorinated biphenyls (PCBs) have contaminated the natural resources of the Hudson River, as stated in the Study Plan. It is extremely important that the past and continuing injuries be well documented and GE be held accountable for such damages.

As reflected in the Hudson River NRDA Plan, there is clear evidence of injury to birds in the Hudson Valley due to exposure to PCBs.

PCBs have been shown to cause a range of adverse impacts in birds, including disease, behavioral abnormalities, genetic mutations, physical deformities, changes in brain chemistry, reduced hatching rates, embryo mortality, and death. The levels of PCBs found in birds in the Hudson River watershed are greater than PCB concentrations known to initiate these responses in birds. For example, levels of 8 to 25 ppm PCB in eggs are associated with decreased hatching success for terns, cormorants, doves, and eagles. (p. 45-Hudson River NRDA Plan)

The Hudson River NRDA plan also indicates "PCB concentration of approximately 310 ppm in the brain has been associated with death in a number of bird species." (p. 20-Hudson River NRDA Plan)

EXTENT OF STUDY

We would request clarification as to why the second year of study will only look at one wild species (tree swallow) when the first study year included two species of wild birds (tree swallow and American kestrel) and a reference species (domestic chicken).

Analysis of tissues and results from the Year 1 egg injection study is ongoing. The Trustees have been guided by preliminary information from that work in the design of the Study Plan for 2007. Although no work is proposed on American kestrel or chickens in 2007, evaluation of the results of work on those species is ongoing and will inform future work. For 2007, in addition to work on tree swallows, a pilot study of egg injection in Eastern bluebirds was accomplished.

As we mentioned in our comments on the first study, we are concerned with the limited scope of the species analyzed. There are other species that would presumably be a part of this analysis, such as specific waterfowl species, terns, cormorants, doves and certain threatened species such as the bald eagle.

In addition to tree swallows, both mallards and eagles have increased concentrations of PCBs – (20-62 ppm in non-viable bald eagles eggs). (p. 24-Hudson River NRDA Plan)

PCB concentrations in the breast muscle and fat of Hudson River mallards ranged from less than 0.01 to 1.1 ppm and from less than 0.1 to 26 ppm, respectively. Non-viable bald eagle eggs collected along the Lower Hudson River contained between 20 and 62 ppm PCBs and the plasma of nestling and adult bald eagles contained between 0.2 and 14.0 ppm PCBs). (p. 45-Hudson River NRDA Plan)

In the Lower Fox River NRD assessment, it has been found that bald eagles have suffered reduced productivity in the assessment area. PCBs are likely to have caused or contributed to the reduced productivity in assessment area bald eagles. (p. 7-19 - Injuries to Avian Resources, Lower Fox River/ Green Bay Natural Resource Damage Assessment May 1999)

As previously stated, the Trustees would be encouraged to expand the scope of the bird injury assessment and to make sure that there is a thorough and extensive investigation of the injury to species such as mallards and the bald eagle, as briefly outlined in the NRDA Plan.

While bald eagle sitings along the river appear to be increasing, we would re-iterate that the injury to the bald eagle should be assessed in terms of the value of the loss of the public's ability to enjoy sighting this magnificent creature along the Hudson River for a number of years. While perhaps seeing a bald eagle along the Hudson River is difficult to put into a dollar figure, certainly such sitings hold tremendous social, spiritual, cultural and ecological value, which should be considered as part of this assessment. The Hudson River Valley is an important migratory bird pathway. To what extent will injury to migratory birds be assessed?

The Trustees are assessing injury to migratory birds in full. Pathway and specific injuries to birds from PCBs will be identified, causation will be determined and restoration will be scaled, as defined in the DOI NRDA Regulations.

Will the information learned from these studies be used to extrapolate the impact of other avian species or will they be examined more closely at other stages of the assessment?

The Trustees will determine whether injury exists in accordance with applicable regulations.

ENDANGERED, THREATENED, SPECIAL CONCERN BIRD SPECIES

Endangered, Threatened, Special Concern bird species are identified in the September 2002 Hudson River NRDA Plan. They are: Peregrine falcon, short-eared owl, least bittern, bald eagle, northern harrier, king rail, upland sandpiper, osprey, cooper's hawk, red-shouldered hawk, common nighthawk, vesper sparrow, grasshopper sparrow. We want to re-iterate the need to assess PCB injury to these species.

Other avian species may be examined more closely at other stages of the NRDA and may be the subject of other Study Plans. Such work may focus on species including endangered, threatened, and special concern bird species.

GEOGRAPHIC SCOPE OF STUDY

We re-iterate our concern that the extent of injury to birds along the entire 200 miles of this site is not being adequately assessed by the geographic scope of this study.

Birds in the mid and lower Hudson have elevated levels of PCBs. Will findings from bird studies in the upper Hudson be extrapolated to draw conclusions about bird injury along all 200 miles of this site? Will there be additional bird injury studies for the mid and lower Hudson region? More importantly, will restoration address such injury for the entire site and look to restore birds on a larger ecological or watershed basis?

The National Audubon has identified the following areas along the Hudson River as Important Bird areas. Will Trustee assessment and restoration consider these important bird areas?

National Audubon Important Bird Area Program
Stockport Flats
Tivoli Marshes
Hudson Highlands State Park
Constitution Marsh Sanctuary
Doodletown and Iona Island Fahnestock State Park Hook Mountain
http://ny.audubon.org/iba/index.html

There are also a number of other important birding areas in the lower and mid-Hudson region that are not identified on this list, including but not limited to, Croton Point, Norrie Point and Ramshorn-Livingston Wildlife Sanctuary.

The Trustees will determine whether injury exists in accordance with applicable regulations. Restoration will be situated and scaled to be appropriate to the injuries identified and quantified, the availability of restorable habitat, and the practicality and cost effectiveness of restoration, among other factors. The Trustees will consider all appropriate areas for restoration.

REFERENCE AREA

The draft study plan indicates that tree swallow eggs will be obtained from the Patuxent NWR Maryland. How was this reference area chosen? Are these eggs presumed "clean"?

Based upon available information, Patuxent Refuge is a historically uncontaminated site. Concentrations of PCBs and other contaminants at PNWR have been low or non-detectable. Yorks (1999) found an average of 0.7 +/- 0.25 (SD, N=6)) μg/g PCBs in tree swallow eggs collected at Patuxent in 1995 compared to the substantially higher PCB levels in tree swallow eggs collected in 1994-5 from colonies along the Hudson River (Secord et al. 1999).

In addition, the draft plan states: Endpoints in nestlings and adults will be compared both (1) within birds exposed to a broad spectrum of PCB concentrations at the Upper Hudson River site and (2) between the Upper Hudson River site and reference sites. What reference sites? What criteria are used to select a reference location? It would appear a reference river would be helpful to assess injury.

As noted above, due to time and logistical constraints, the Trustees have decided not to proceed at this time with the assessment of nestling and adult tree swallows detailed in the Draft Avian Egg Injection Study Plan.

INJURY ASSESSMENT AT OTHER SITES

As the Trustees are aware, injury assessments at other sites, particularly the Fox River, have clearly documented injury to birds that would support documentation to bird injuries in the Hudson River Valley.

Injuries to Avian Resources, Lower Fox River/Green Bay Natural Resource Damage Assessment (May 1999) concluded that PCBs cause a number of adverse effects in birds that meet the NRDA definitions of injury. PCB-caused adverse changes in viability in birds can include death, disease, behavioral abnormalities, physiological malfunctions, and physical deformities. (p. 3-22)

PCBs in eggs cause toxicity at low parts-per-million concentrations of total PCBs. (p. 3-23)

PCBs in eggs cause toxicity at low, or sub parts per billion, concentrations as TCDD eq in eggs. (p. 3-23)

How is this documentation applied to proving injury in and along the Hudson River?

The Trustees will determine whether injury exists in accordance with applicable regulations.

PEER REVIEW

This draft study indicates that the work done pursuant to this study will be peer reviewed. Please provide clarification on the peer review process to be used, the publics, and the responsible parties' opportunities participate as well as the anticipated timing of such peer review.

Pursuant to the Hudson River NRDA Plan, the results of the work conducted according to the Final Avian Egg Injection Study Plan will be peer reviewed upon completion of the study, and the results then released to the public.

Peer review is addressed in the Trustees' Responsiveness Summary for the NRDA Plan. In that document it is noted that, "The Trustees expect to select peer reviewers and to allow those reviewers to conduct the reviews without direct public participation, in part because the costs of carrying out a fully expansive public participation process would be prohibitive. The Trustees expect that the peer reviews will generally be conducted similarly to those done at scientific journals, and that reviewers will be independent external experts, qualified in the particular field and not involved in the study or the case. In appropriate circumstances, the Trustees may forgo peer review. The Trustees may modify study plans or reports to reflect the recommendations by peer review panels."

The Trustees may conduct peer review of the results of study at the completion of the entire study or as its individual components are completed.

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