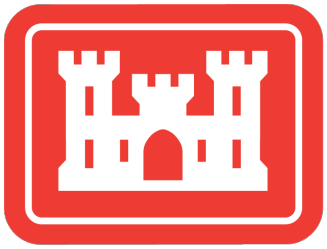
HUDSON RIVER HABITAT RESTORATION

ECOSYSTEM RESTORATION
FINAL INTEGRATED FEASIBILITY REPORT AND ENVIRONMENTAL ASSESSMENT

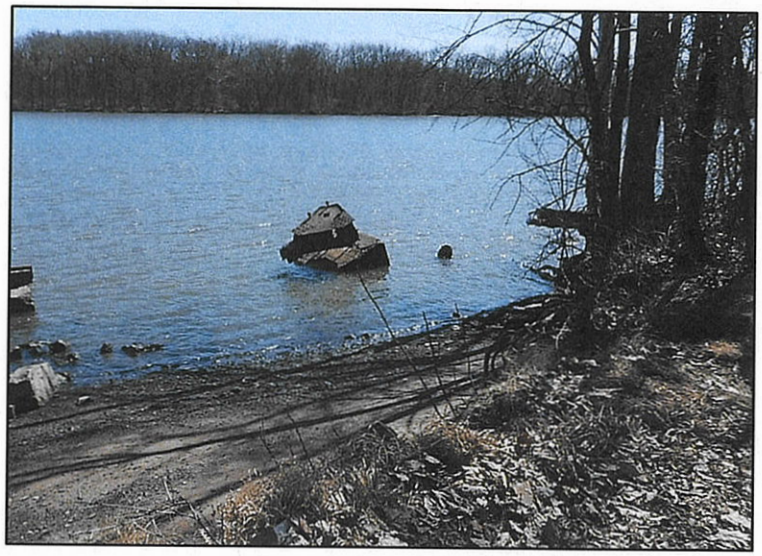
Appendix G6:
U. S. Fish and Wildlife Service Coordination



U.S. ARMY CORPS OF ENGINEERS
NEW YORK DISTRICT

September 2020

FINAL
Fish and Wildlife Coordination Act Report
Hudson River Habitat Restoration



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EXECUTIVE SUMMARY

The U.S. Army Corps of Engineers, New York District (USACE), the New York State Department of Environmental Conservation (NYSDEC), and Department of State are cooperatively planning to implement habitat restoration /enhancement projects at six sites along the Hudson River, New York. The purpose of the project is to analyze measures that would restore aquatic ecosystems, including evaluating eroding shorelines, degraded fish and wildlife habitat, and impediments to fish passage. The project is authorized by Section 103 of the 1962 Rivers and Harbors Act, as amended (P.L. 87-874).

The U.S. Fish and Wildlife Service was asked specifically to identify existing fish and wildlife resources (including threatened and endangered species, designated critical habitat, special concern species, and significant habitat) within the study area; identify fish and wildlife resource concerns relating to the study area; assess project impacts on fish and wildlife resources and potential ecosystem restoration outputs; recommend measures to avoid, minimize, or compensate for project-induced adverse impacts; and recommend fish and wildlife resource enhancement opportunities for maximizing ecosystem restoration outputs in the project area.

The Hudson River watershed encompasses 13,400 square-miles and flows north to south from its headwaters in the Adirondack Mountains to the New York Harbor over 300 miles downstream. The Hudson River is a tidal estuary for 153 miles from Troy to New York Harbor. The study area defined by the USACE extends from the Federal Lock and Dam in Troy, New York, to the Governor Mario M. Cuomo Bridge [Tappan Zee Bridge] in Tarrytown, New York, approximately 140 miles (USACE 2018). The watershed contains a wide variety of ecoregions, including the glacially deepened Hudson River Valley, the Taconic Foothills and portions of the Taconic Mountains, the Ridge and Valley, and sections of the Pocono Highlands and Catskill Mountains. The study area watershed contains significant tidal wetland habitats and habitat complexes located along the Hudson River, as well as unique and varied upland habitats. There are currently two federally listed species under our jurisdiction that are known or have the potential to occur within the study area. The threatened northern long-eared bat (*Myotis septentrionalis*) and the endangered Indiana bat (*M. sodalis*). There is no designated critical habitat for any federally listed species under our jurisdiction at any of the proposed sites. For each project, we provide our current understanding of which species have the potential to occur at that site and then provide a recommendation for the species under our jurisdiction. In addition, there is potential for the endangered Atlantic (*Acipenser oxyrhynchus oxyrhynchus*) and shortnose sturgeon (*A. brevirostrum*), which are under the jurisdiction of the National Oceanic and Atmospheric Administration (NOAA). We recommend coordinating directly with NOAA once project sites have been selected.

The USACE and the NYSDEC had proposed restoration at six sites comprised of three major categories of project: ***Mosaic Sites*** (Schodack Island and Binnen Kill), ***Shoreline Restoration Sites*** (Henry Hudson Park and Charles Rider Park), and ***Aquatic Organism Passage Sites,*** (Moodna Creek and Rondout Creek). Schodack Island and Binnen Kill are characterized by side channel restoration, wetlands restoration, and stream bank softening and restoration

measures. Since the writing of the draft Hudson River Habitat Restoration FWCAR, Binnen Kill, Rondout Creek and Charles Rider Park have been dropped from consideration due to lack of community and landowner support.

Additional coordination among the project sponsor and regulatory agencies is recommended prior to project approval and construction.

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I. PROJECT PURPOSE, SCOPE, AND AUTHORITY

The U.S. Army Corps of Engineers, New York District (USACE), and the New York State Department of Environmental Conservation (NYSDEC) are conducting a feasibility study of ecosystem restoration opportunities under the Hudson River Habitat Restoration Feasibility Study. The study area is bounded by the Governor Mario M. Cuomo Bridge (South) and the Federal Lock and Dam at Troy, New York (North), and generally encompasses 125 miles of Hudson River, as well as the immediate tributaries and land east and west of the Hudson River between these two boundaries. The purpose of the project is to analyze measures that would restore aquatic ecosystems, including evaluating eroding shorelines, degraded fish and wildlife habitat, and impediments to fish passage (USACE 2018).

The USACE, NYSDEC, and other partners identified six sites that were selected for further evaluation and development of alternatives, including restoration of side-channels, wetlands, aquatic organism passage (AOP), and stream banks. This document constitutes the Fish and Wildlife Coordination Act Report (FWCAR) prepared by the U.S. Fish and Wildlife Service (USFWS) to assess existing fish and wildlife resources associated with the six proposed projects, recommend measures to reduce project impacts, and recommend restoration measures to enhance fish and wildlife resources. The USACE provided documents that describe the existing project area resources, as well as the various rehabilitation alternatives under consideration (Partners Restoring the Hudson 2018). These documents are cited herein and are included in the "References Cited" section. Since the writing of the Draft FWCAR, three of the projects have been dropped from consideration due to lack of community and landowner support. However, the comments provided by the Service to the USACE on those projects are included as Appendix A in this document.

This FWCAR has been prepared under the authority of, and in accordance with, Section 2(b) of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.), the Endangered Species Act (ESA) (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.), the Migratory Bird Treaty Act (16 U.S.C. 703-712; Ch. 128; July 13, 1918; Stat. 755), and the Bald and Golden Eagle Protection Act (BGEPA) (16 U.S.C. 668-668d).

For each identified project area, as outlined in the Scope of Work, the USFWS will:

Provide data and information on:

- Existing significant fish and wildlife resources (including threatened and endangered species and their habitats) within the project area.
- Fish and wildlife resource concerns within the project area.
- Potential impacts of proposed measures on fish and wildlife resources.
- Recommendations to avoid, minimize, or compensate for impacts resulting from the proposed alternative.
- Fish and wildlife enhancement opportunities in the project area.

Accomplish the following:

- Prepare Draft FWCAR providing information requested in section A, above.
- Provide cost estimates for any conceptual restoration proposals. Note that the USFWS is unable to provide cost estimates at this time due to lack of project details.
- Provide name(s) and qualifications of report preparer(s).
- Prepare and submit Final FWCAR.

Project Background

The Hudson River watershed encompasses 13,400 square-miles, approximately 93% of which lies in New York State, but also includes portions of Vermont, Massachusetts, New Jersey, and Connecticut (Freeman 1991). The Hudson River flows north to south from its headwaters in the Adirondack Mountains to the New York Harbor, over 300 miles downstream (Figure 1). The Hudson River is a tidal estuary for 153 miles from Troy to New York Harbor. The study area defined by the USACE extends from the Federal Lock and Dam in Troy, New York, to the Governor Mario M. Cuomo Bridge [Tappan Zee Bridge] in Tarrytown, New York, approximately 140 miles (USACE 2018). A stakeholder group of non-governmental agencies, federal and state agencies, and research institutions, termed "Partners Restoring the Hudson" (PRH), was organized in 2013. The PRH published the Hudson River Comprehensive Management Plan (Hudson River CRP) in 2018 (Partners Restoring the Hudson 2018). The Hudson River CRP includes an assessment of current conditions, a methodology to quantify ecosystem restoration potential, a collection of potential projects, and a management strategy.

The study area of the Hudson River watershed extends from the Battery at the southern end of Manhattan to the Federal Lock and Dam at Troy. The watershed contains a wide variety of ecoregions, including the glacially deepened Hudson River Valley, the Taconic Foothills and portions of the Taconic Mountains, the Ridge and Valley, and sections of the Pocono Highlands and Catskill Mountains. Local relief ranges from 25-300 feet in areas dominated by large rivers and lowlands up to 2,000 feet in mountainous areas.

The study area watershed contains significant tidal wetland habitats and habitat complexes located along the Hudson River, as well as unique and varied upland habitats.

The productive estuary area of the Hudson River is a regionally significant nursery and wintering habitat for a number of anadromous, estuarine, and marine fish species, including the American eel (*Anguilla rostrata*), and is a migratory, feeding and nesting area for birds, including the bald eagle (*Haliaeetus leucocephalus*).

Existing Conditions

The Hudson River below the Federal Lock and Dam at Troy is an estuary, where fresh waters meet salt waters. Tides in the Lower Hudson River occur twice each day. The mean water elevation at Troy is 2 feet above sea level and the average tide is approximately 4 feet (Freeman 1991). The tidal portion of the river consists of two zones: deep water with depths greater than 6 feet, and a shallow zone with depths less than 6 feet at low tide (Edinger, et al. 2014). The

freshwater tidal communities found along the Hudson River are regionally rare, but provide important habitat for anadromous spawning fish and for all life stages of resident freshwater fish species (USFWS 1997) (Figure 1).

Intertidal mudflats provide important foraging areas for migrating shorebirds and waterfowl. Species that use these areas year-round include American black duck (*Anas rubripes*), mallard (*A. platyrhynchos*), Canada goose (*Branta canadensis*), herring gull (*Larus argentatus*), ring-billed gull (*L. delawarensis*), great blue heron (*Ardea herodias*), and fish crow (*Corvus ossifragus*).

Freshwater tidal marshes are flooded twice daily, are typically shallower than 6 feet, and are usually fresh water (salinity less than 0.5 parts per thousand) (Edinger, et al. 2014). Freshwater tidal swamps are found in low-lying areas adjacent to the river, and these are flooded twice daily with each high tide. Freshwater subtidal shallows and aquatic beds include species such as broad-leaved spatterdock (*Nuphar advena* ssp. *advena*), pickerelweed (*Pontederia cordata*), and arrowleaf (*Peltandra virginica*), and introduced invasive species such as water chestnut (*Trapa natans*) (NYIS.info 2014). The plants and animals found in freshwater tidal swamps are very similar to those which use the hardwood swamps found further upriver and can include green ash (*Fraxinus pennsylvanica*), black ash (*F. nigra*), red maple (*Acer rubrum*), and slippery elm (*Ulmus rubra*) (Edinger, et al. 2014).

There are about 10 species of diadromous fish that use the Lower Hudson River and its tributaries (Waldman 2005). Only the American eel (*Anguilla rostrata*) is catadromous, the others being anadromous, including Atlantic sturgeon, striped bass (*Morone saxatilis*), river herring [*Alosa* spp.: collectively; alewife (*A. pseudoharengus*), blueback herring (*A. aestivalis*), hickory shad (*A. mediocris*), American shad (*A. sapidissima*)], and rainbow smelt (*Osmerus mordax*).

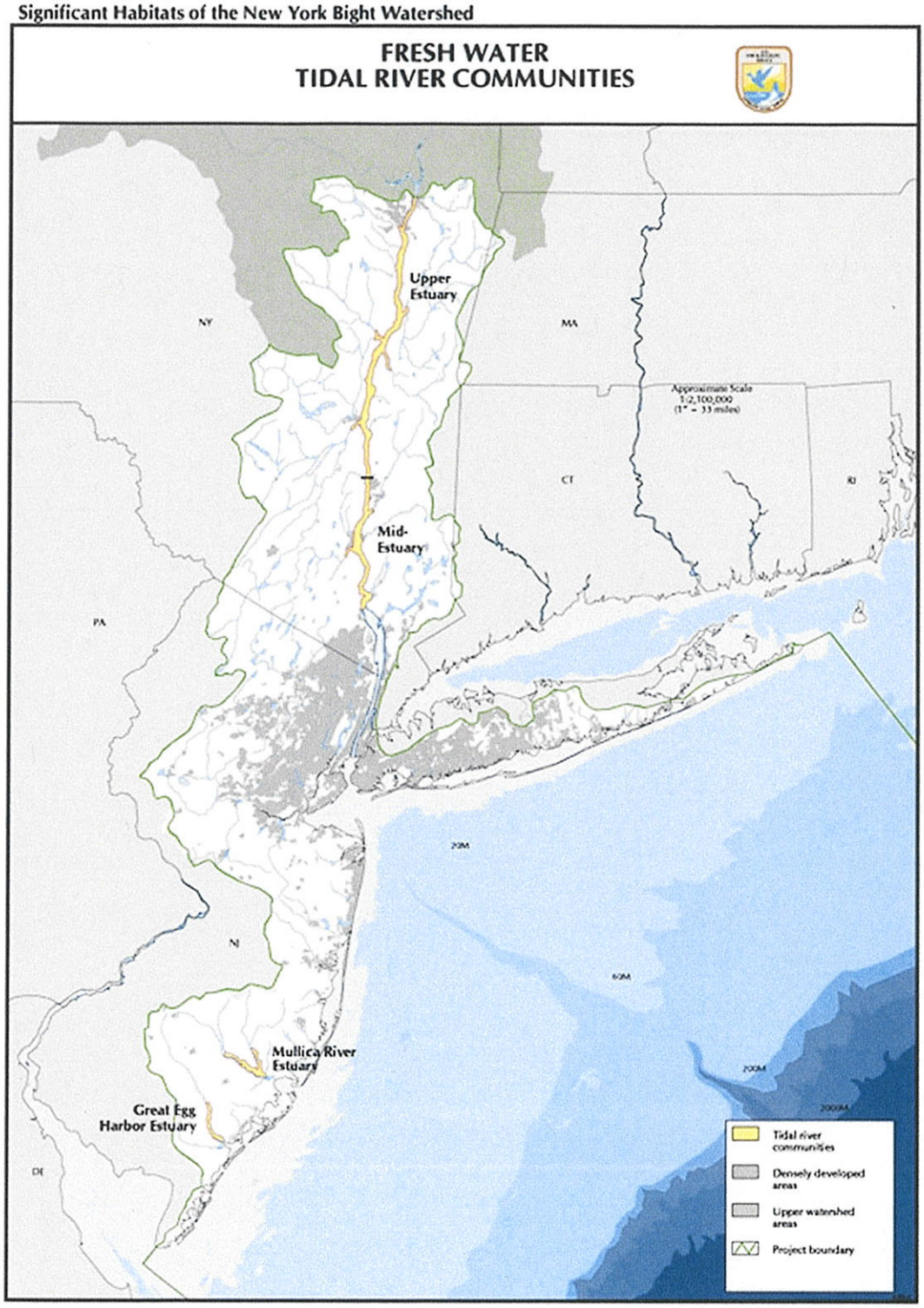

Figure 1. Freshwater Tidal Communities of the New York Bight.

A. STUDY AREA ASSESSMENTS

The USFWS has conducted site visits, reviewed pertinent literature, and performed interviews with persons knowledgeable about the project area and the species involved, including the USACE and the NYSDEC. Information collected and reviewed included the identification of wildlife and fish communities, potential impacts to fish and wildlife, and potential restoration opportunities. The proposed project activities would help restore and enhance freshwater tidal wetland, forested wetland, scrub shrub wetland habitats, and access to riverine habitat for the benefit of many fish and wildlife species.

The USACE and the NYSDEC had proposed restoration at six sites comprised of three major categories of project: ***Mosaic Sites*** (Schodack Island and Binnen Kill), ***Shoreline Restoration Sites*** (Henry Hudson Park and Charles Rider Park), and ***Aquatic Organism Passage (AOP) Sites,*** (Moodna Creek and Rondout Creek). However, since the writing of the Draft FWCAR, three of the projects have been dropped from consideration due to lack of community and landowner support: Binnen Kill, Charles Rider Park, and Rondout Creek.

The Schodack Island and Binnen Kill restoration projects are characterized by side channel restoration, wetlands restoration, and stream bank softening and restoration measures. The Henry Hudson Park and Rider Park restoration projects are characterized by stream bank softening and stabilization. The Moodna Creek and Rondout Creek restoration projects are characterized by mitigating impediments to organism passage up and downstream. Within these project categories, several restorations methodologies would be implemented, including: wetland enhancement through vegetation management, wetland restoration through excavation, shoreline restoration, and AOP.

B. RESTORATION/ENHANCEMENT METHODS PROPOSED

1. WETLAND ENHANCEMENT – INVASIVE SPECIES MANAGEMENT

Habitat dominated by invasive species such as common reed (*Phragmites australis*) or reed canary grass (*Phalaris arundinacea*) would be treated and replanted with native plant species. The negative effects of common reed and reed canary grass on native plants and wildlife are well documented (Lavoie, et al. 2003; Meyerson, et al. 2000; Galatowitsch, et al., 1999; Schaumburg, et al., 2011; Greenberg and Green 2013). Although some control of these species can be achieved (Breen, et al., 2014; Adams and Galatowitsch 2006), it is easier to control small colonies than large well-established populations (Moody and Mack, 1988; Martin and Blossey 2013; Quirion et al. 2018). Quirion et al. (2018) quantify the likelihood for eradicating populations of *Phragmites* and found that for stands greater than 300 meters squared (0.07 acres) the probability of success drops to below 10%. At sites where control is attempted, it is necessary to implement an adaptive management strategy, often requiring multiple years of treatment (Quirion, et al. 2018; Breen, et al., 2014; Adams and Galatowitsch 2006).

Herbicides kill or suppress plants by interfering with essential plant processes such as photosynthesis. The goal is to enhance native plant communities by removing undesirable species and increasing native species, but herbicides may have unintended consequences for

nontarget plant species. Herbicides have been designed to target biochemical processes, such as photosynthesis, that are unique to plants, therefore, they typically are not acutely toxic to animals (Tatum 2004). However, herbicides, such as Roundup® (a mixture of glyphosate and a surfactant), may adversely impact amphibians (Moore, et al. 2012). These impacts can be reduced by avoiding herbicide application when larval stages are likely and by using glyphosate without a surfactant (typically marketed as Rodeo®) in areas that support aquatic habitat. Herbicides can also have indirect effects on wildlife by altering vegetative cover and structure, at least temporarily.

Invasive species treatment practices should be implemented late in the summer to avoid impacts, such as trampling nests and vegetation, to nesting birds. Standard control practices for both species involve herbicide (normally glyphosate) application late in the growing season (before the first hard frost), with follow up treatment in subsequent years. In dense stands, it is often beneficial to mow the area in late summer prior to herbicide application. Large monotypic stands can be treated with a foliar spray of herbicide (typically approved for aquatic use). Treating isolated plants involves a wick application of herbicide onto individual plants in order to minimize impacts to non-target plant species.

Best management practices should be utilized for any invasive species treatment including, but not limited to:

- Filling and emptying of herbicide containers (e.g., spray bottles, backpack sprayers) should occur in upland areas, to reduce the risk of spills within the wetland. All applicators will have available a spill kit with absorbent pads.
- Open containers of herbicide will not be used in the wetland.
- Herbicide would only be sprayed where there is a dense stand of the target plants. Herbicide would be applied when wind speed at treatment height is < 5 m.p.h. to reduce the risk of drift impacting non-target plants.
- Any mowing or other vegetation control methods, including herbicide application, would be implemented using low ground pressure equipment.

Areas that contain rare and/or state listed species should be identified, isolated, and avoided.

2. WETLAND RESTORATION

The goal of wetland restoration should be to physically alter an impaired wetland site to return its physical, physiochemical, and/or biological function to a pre-disturbance condition (USEPA 2018). A primary objective of many wetland restoration efforts is the restoration of on-site hydrology. Techniques to achieve this vary depending on the original impact to the wetland. In cases where wetlands have been filled by past activities, restoration can be implemented by excavating material to a depth sufficient to restore hydrology to the site (NRCS 2008, 2010).

3. SHORELINE RESTORATION

Shoreline stabilization is commonly implemented as a response to shoreline erosion. Shoreline stabilization can be implemented in numerous ways which typically fall into two major

categories - structure based, and nature based. Structural measures include bulkheads, breakwaters, revetments, and groins (NRC 2007). Nature based methods utilize natural process to achieve the desired outcome, either by managing land use using vegetation, or using other native material to control erosion (NRC 2007). Hardened shorelines result in the loss of shoreline ecological function (Gittman, et al. 2015) and provide less complex habitat compared with natural shorelines (Seitz, et al. 2006) (Gittman, et al. 2015).

4. AQUATIC ORGANISM PASSAGE

Longitudinal habitat connectivity is an important component of many fishes' life history. Fish move through riverine systems for many reasons, including feeding, spawning, and dispersing. Natural and man-made barriers can restrict movement within a riverine system, which can lead to genetic isolation. Recolonization or genetic exchange within a population of fishes can only occur in the absence of barriers (Radinger and Wolter 2013).

There is a long history of attempting to allow fish to "pass" around manmade structures such as dams that impede their journeys upstream (NOAA 2015). Traditional approaches to fish passage at dams involved installing fish ladders, often made from concrete or aluminum, which allowed target fish species to swim through them. These often highly engineered structures have primarily targeted anadromous species (NOAA 2015).

Mimicking natural systems by using nature-like fishways may also be used in river restoration, and are gaining favor globally as an alternative to fish ladders (Aadland 2010; Newbury and Gaboury 1994; Rosgen 1996; Harman, et al. 2012; Wildman, et al. 2000). Nature-like fishways attempt to mimic natural riverine systems with the intent of passing a higher diversity of fishes, especially compared to traditional fish ladders (Wildman, et al. 2000).

Most fish passage practitioners have the goal of restoring hydraulic and geomorphological function of the channel through the area once occupied by a dam. Often this is accomplished by creating a channel of appropriate dimension, pattern, and profile which effectively transports sediment so that, over time, the stream neither aggrades nor degrades.

One drawback to complete dam removal, if sediment is released in an unregulated manner, is the potential for smothering habitat as the sediment is transported downstream (Bednarek 2001). The adverse impacts may be greater if sediments trapped in a dam's impoundment are contaminated (Evans 2015). One strategy to reduce the adverse impacts of downstream sediment releases is to remove the dam while stabilizing the material in the impoundment through the use of structures.

C. ENDANGERED AND THREATENED SPECIES

There are currently two federally listed species under our jurisdiction that are known or have the potential to occur within the study area. The threatened northern long-eared bat and the endangered Indiana bat. There is no designated critical habitat for any federally listed species under our jurisdiction at any of the proposed sites. For each project, we provide our current understanding of which species have the potential to occur at that site and then provide a

recommendation for the species under our jurisdiction. In addition, there is potential for the endangered Atlantic and shortnose sturgeon, which are under the jurisdiction of the National Oceanic and Atmospheric Administration (NOAA). We recommend coordinating directly with NOAA once project sites have been selected.

The most recent compilation of federally listed and proposed endangered and threatened species in New York is available for your information and may be found the USFWS's New York Field Office (NYFO) website at http://www.fws.gov/northeast/nyfo/es/section7.htm. Until the proposed project is complete, we recommend that you check the NYFO website regularly from the date of this report to ensure that listed species presence/absence information for the proposed project is current.

II. SELECTED PROJECTS

Staff from The Nature Conservancy, Historic Hudson River Towns, Scenic Hudson, Hudson River Watershed Alliance, and the NYSDEC Hudson River Estuary Program, with input from numerous stakeholders, identified an initial list of 1,800 potential restoration sites within the study area. Of these, 212 sites met the USACE's ecosystem restoration mission and aligned with USACE and NYSDEC's priority restoration objectives (USACE 2019). Six sites located throughout the Hudson River watershed were selected for restoration and include Binnen Kill, Schodack Island, Henry Hudson Park, Charles Rider Park, Rondout Creek, and Moodna Creek. Due to a lack of landowner and public support, three of these projects have been removed from consideration: Charles Rider Park, Rondout Creek, and Binnen Kill. Figure 2 shows the location of the three selected projects.

A. SCHODACK ISLAND

DESCRIPTION OF PROJECT

Schodack-Houghtaling Island Complex (Complex) is a 1,800-acre area containing a diverse combination of ecological communities that includes floodplain forest, brushlands, cultivated fields, tidal creeks, and mudflats. The proposed project is located in the towns of Schodack, and Stuyvesant in Rensselaer and Columbia Counties. Located on the eastern shore of the Hudson River, 1 mile south of the Village of Castleton-on-Hudson at river mile 132, the Complex includes relic islands and side channels of the Hudson River that have been altered by the placement of dikes and dredged material, resulting in a peninsula and backwater area connected to the Hudson River only at the south end. The aquatic habitat of Schodack Creek, a relic side channel of the Hudson River, is a spawning and nursery area for anadromous and resident fish (USFWS 1997).

Dredge spoil disposal operations associated with Federal navigation channel maintenance filled areas of shallow channel habitat, connecting islands to each other and to the mainland (NYSDOS 2012). The USACE and NYSDEC propose to modify the existing shoreline to enhance tidal wetlands through invasive species management, creating new tidal wetland habitat through excavation and re-establishing a tidal connection between the Hudson River and Schodack Creek by removing historic dredge fill that severed the connection.

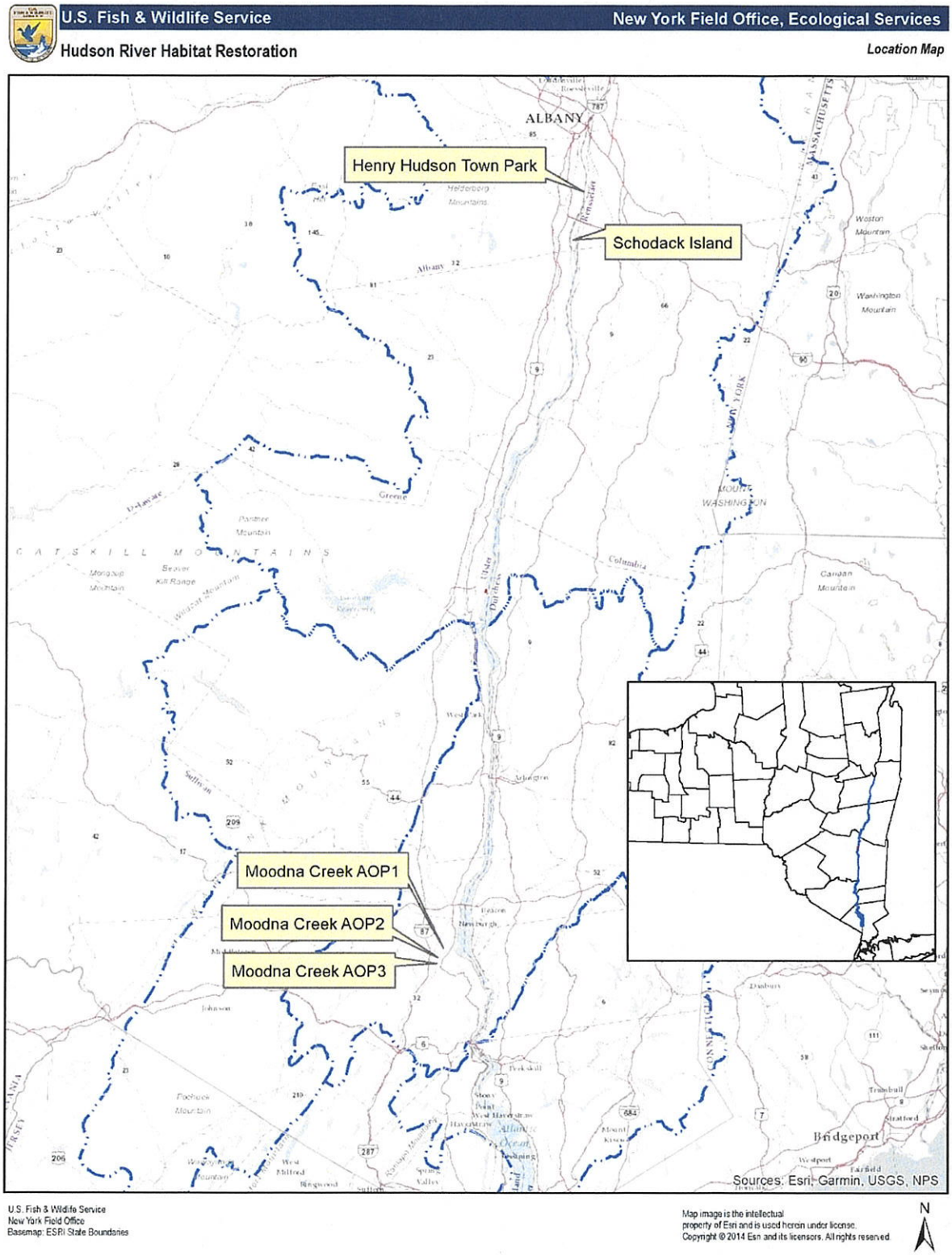

Figure 2. Selected Projects Location Map

Ecological Communities

The Complex is the northern extent for shad spawning in the Hudson River. The extensive wetlands support nesting habitat for a variety of bird species, and during the peak migration times of spring and fall, the area is used by thousands of waterfowl, shorebirds, and passerine species. Small tidal marshes occur along the shoreline of Schodack Creek (USFWS 1997). The northern portion of the Complex comprises Schodack Island State Park, which contains two significant natural communities, three rare plant populations, and a significant great blue heron rookery. Furthermore, Schodack Island State Park is an area evaluated in the Hudson River Estuary Action Plan, is within a Department of State (DOS) Significant Coastal Fish and Wildlife Habitat, and is designated a DOS Significant Scenic Area (Feldmann, et al. 2003).

Plants

The Complex hosts two significant natural communities: floodplain forest and freshwater tidal marsh, three extant rare plant populations, and three historical rare plant populations (Feldmann, et al. 2003). Extant rare plants include the State listed threatened golden club (*Orontium aquaticum*), Delmarva beggar-ticks (*Bidens bidentoides*), and heartleaf plantain (Feldmann, et al. 2003).

Fisheries

Schodack Creek is a significant spawning, nursery, and feeding area for American shad, white perch (*Morone americana*), alewife, blueback herring, largemouth bass (*Micropterus salmoides*), smallmouth bass (*M. dolomieu*), and other freshwater fish species (USFWS 1997, NYSDOS 2012). Additionally, the shortnose sturgeon and American eel have been located in the Complex area (NYSDOS 2012).

Birds

The Complex has a wide diversity of habitat types, including successional old field, successional shrubland, freshwater intertidal mudflat, freshwater tidal marsh, freshwater tidal swamp, and floodplain forest, which support a myriad of bird species. The site is a New York State designated Bird Conservation Area and an Audubon listed Important Bird Area. The area has supported nesting bald eagles since the early 2000s. Floodplain forest supports nesting cerulean warblers and wood thrush, and hosts a great blue heron rookery which contains upwards of 50 nests (NYSDEC 2019). The wetlands provide nesting habitat for many birds, including green heron (*Butorides virescens*), mallard, black duck, spotted sandpiper (*Actitis macularius*), American woodcock (*Scolopax minor*), marsh wren (*Cistothorus palustris*), and swamp sparrow (*Melospiza georgiana*). The area is also an important stopover during spring and fall migration, used by several New York State listed species including American bittern (*Botaurus lentiginosus*) (SC), king rail (*Rallus elegans*) (T), and least bittern (*Ixobrychus exilis*) (T) (NYSDOS 2012).

Endangered and Threatened Species

The site contains shallow subtidal areas, intertidal mudflats, tidal marsh, and floodplain forest. The Indiana bat and northern long-eared bat have the potential to occur within the vicinity of the project site.

STUDY AREA ASSESSMENT

Future Conditions Without Project

In the absence of restoration and enhancement work at the Schodack site, the USACE and the NYSDEC would not meet project objectives to:

1. Restore a mosaic of interconnected large river habitats.
2. Restore lost connectivity between the Hudson River and adjacent habitats.

Alternative Plans

The preferred alternative for restoration/enhancement work at the Complex involves invasive species management, tidal wetland creation, and side channel and tidal wetland restoration. The USACE and NYSDEC are proposing to restore a historic channel that allowed water to flow from the Hudson River on the west side of Schodack Island into Schodack Creek on the east side of the Island.

Invasive Species Treatment

Over 20 acres of invasive species (primarily reed canary grass and common reed) would be treated and the area revegetated with native vegetation. Presumably, the control would be carried out with the use of herbicide.

Excavation

The act of excavating channels and wetlands would have an immediate impact on the flora in the area to be disturbed. Any potential impact to fauna would be dependent on the timing of construction. Additionally, the excavated material would need to be either transported off site or disposed of in situ, normally on adjacent upland area. As the proposed restoration sites are abandoned fill disposal sites, excavated material is likely Hudson River dredge spoil.

USFWS Recommendations

Restoring the connection between the Hudson River and Schodack Creek would re-establish flow through the north end of an embayment to Schodack Creek that is currently an emergent marsh dominated by invasive species (USACE, 2019). The USFWS recommends that the project be implemented in a manner that results in heterogeneous marsh surface elevations to maximize vegetative response. Additionally, large wood should be incorporated into the design to mimic the natural deposition of wood during high water events (Figure 3). Large wood adds

to habitat complexity, provides a foundation for re-establishing a diverse food web, and provides loafing areas for reptiles and birds.

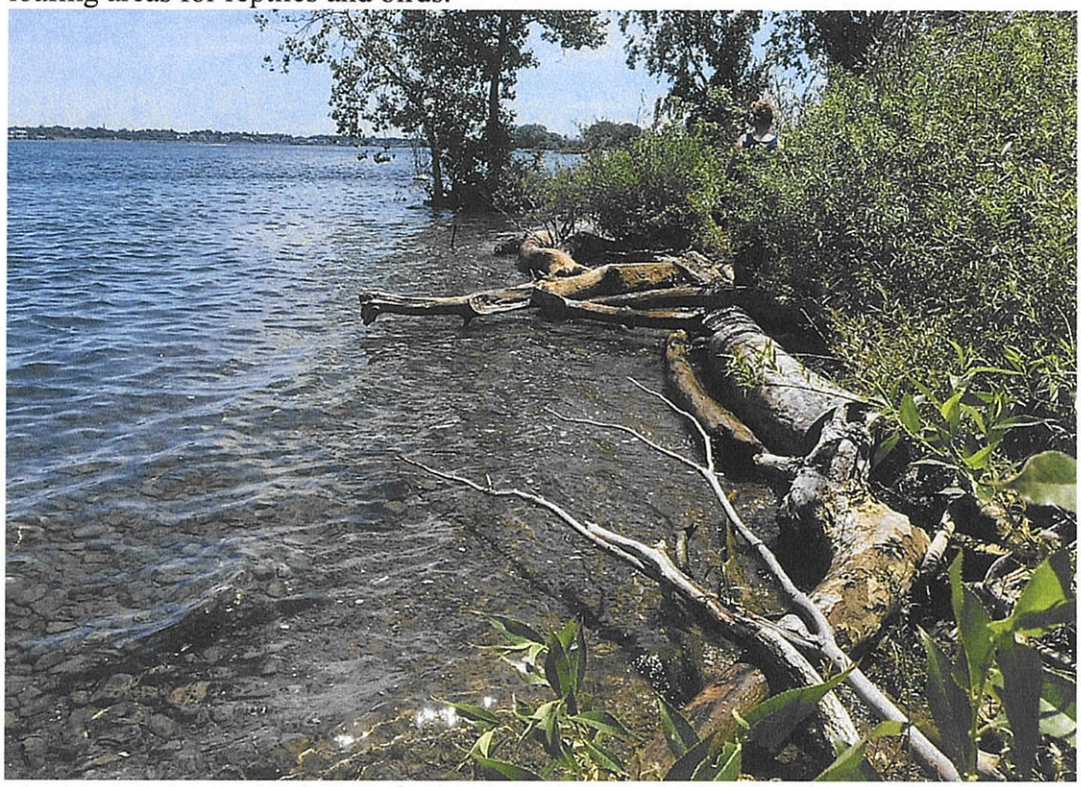

Figure 3. Large wood along shoreline.

Invasive Species Treatment

As mentioned earlier, complete eradication may not be achievable for large patches of invasive species, so adaptive management using an IPM approach is recommended to maximize invasive species management. Methods could include mechanical removal (e.g., hand-pulling and/or mowing), judicious use of pesticides, or release of biological control agents (if available for target species). Please refer to Section I (B) (1) for recommendations on herbicide use.

Excavation

Adverse impacts associated with channel and wetland excavation tend to be short-term and non-significant. Adverse impacts can be minimized by implementing construction during the winter when impacts to migratory birds would be minimized. Additionally, the excavated material would need to be either transported off site or disposed of in situ, normally on an adjacent upland area. As the proposed restoration sites are abandoned fill disposal sites, excavated material is likely Hudson River dredge spoil, and may contain hazardous substances, such as polychlorinated biphenyls (PCBs). Soil to be excavated should be tested for hazardous substances, including PCBs, metals, and polycyclic aromatic hydrocarbons, to ensure that environmentally appropriate excavation and disposal methods are used. We recommend that the USACE comply with guidance provided in the NYSDEC guidance for "In-Water and Riparian Management of Sediment and Dredged Material" (NYSDEC 2004).

Endangered and Threatened Species

Currently there is not enough information available on the scope of the project to determine potential effect on bats. For example, it is unclear as to the extent of the project and how many trees would have to be removed in order to implement the proposed activities. If the proposed project may affect the northern long-eared bat or Indiana bat, the USACE will need to consult with the NYFO and, if so, discuss avoidance and minimization efforts to reduce impacts. For example, if tree cutting is proposed, we generally recommend that it be conducted between October 1 or 31 (depending on location) and March 31[1].

B. HENRY HUDSON PARK

DESCRIPTION OF PROJECT

Henry Hudson Park is a 51 acre park located in the Town of Bethlehem, Albany County, New York. The shoreline was built up as a dredge disposal site in the 1860's (Ocean and Coastal Consultants 2011). Originally, timber cribbing formed a mid channel dike used to constrict water flow into the navigation channel (Dan Miller, NYSDEC, personal communication). The cribbing was then used to contain spoil material when the channel was dredged, but as this failed, it was capped with concrete in the 1900s (Ocean and Coastal Consultants 2011). The majority of the original structures have failed, and in some areas, there is evidence of active erosion (USACE 2018). The southern edge of the parcel borders the Vloman Kill at its mouth at the Hudson River. The lower portion of the Vloman Kill is tidal up to a natural waterfall, approximately 0.75 miles from the Hudson River, with more than half of this reach bordering the park.

Two alternatives were presented by the USACE and NYSDEC. Alternative 1 proposes to create 3.6 acres of tidal wetland on the western portion of the park, install vegetated riprap (0.4 acres); and, create a tidal cove wetland (0.2 acres). Alternative 2 proposes to create 3.6 acres of tidal wetland on the western portion of the park, create 0.4 acres of tidal wetland in the northern portion of the park, create 0.1 acres of "pocket" wetland, and create 1.3 acres of tidal wetland at the southern portion of the park.

Ecological Communities

Because of the highly developed nature of the Henry Hudson Park project area, there are no significant ecological communities within the project area. However, significant ecological communities are located within the Hudson River, adjacent to the park. These include the deepwater tidal zone offshore at depths between 6 to 10 feet, and the intertidal shore community (USFWS 1997).
Plants

[1] For more information on both species, please visit https://www.fws.gov/midwest/endangered/mammals/

The New York State listed threatened Davis' sedge occurred historically at the park. The dominant tree species at the park are cottonwood, white ash (*Fraxinus americana*), and black locust, with some willows and elms. There are also several non-native species including tree-of-heaven and common reed.

Fisheries

The freshwater tidal communities found along the Hudson River are regionally rare but provide important habitat for anadromous spawning fish and for all life stages of resident freshwater fish species (USFWS 1997). Shortnose sturgeon, river herring, American eels, and striped bass all use the Hudson River adjacent to Henry Hudson Park. The Vloman Kill outlet provides additional aquatic habitat relatively sheltered from the high energies common on the Hudson River and likely hosts a number of resident fish.

Mammals

Mammals found within or near the project area are commensal species capable of adapting to or tolerating human disturbance, and may include eastern American red fox (*Vulpes vulpes fulvus*), raccoon, Virginia opossum, striped skunk, gray squirrel, and eastern cottontail.

Birds

The Henry Hudson Park shoreline does provide foraging habitat for migratory birds during spring and fall migration. Migratory waterfowl that forage in the area include dabbling ducks, such as American black duck, northern pintail (*A. acuta*), and mallards, diving ducks such as, ring-neck ducks, greater scaup, lesser scaup, and long-tailed ducks. Other waterbirds that utilize the park during migration include horned grebes and pied-billed grebes. Over 80 species of birds have been documented at Henry Hudson Park during the breeding season (June and July), including Canada goose, killdeer (*Charadrius vociferus*), Eastern phoebe (*Sayornis phoebe*), great crested flycatcher (*Myiarchus crinitus*), American robin, gray catbird, song sparrow, red-winged blackbird (*Agelaius phoeniceus*), and common yellow throat (eBird 2019). Additionally, bald eagles nest on Cow Island, directly across the River from Henry Hudson Park.

Endangered and Threatened Species

The northern long-eared bat, Atlantic sturgeon, and shortnose sturgeon have the potential to occur within the vicinity of the project site.

Future Conditions Without Project

In the absence of restoration and enhancement work at the Hudson River Park site, the USACE and the NYSDEC would not meet project objectives to:

1. Restore a mosaic of interconnected large river habitats.
2. Restore lost connectivity between the Hudson River and adjacent habitats.

Alternative Plans

The preferred alternative for the site is to create 3.6 acres of tidal wetland on the western portion of the park, install vegetated riprap (0.4 acres), and create a tidal cove wetland (0.2 acres).

In its Hudson River Habitat Restoration Ecosystem Restoration Fesibility Study Report, the USACE (2019) states:

Western Tidal Wetland Creation

The USACE is proposing to convert approximately 3.6 acres of existing upland to tidal wetland by excavating below existing grade to achieve tidal wetland hydrology. Elevations would be set to allow daily tidal flow. Additionally, the USACE is proposing stabilizing shorelines with rock.

Vegetated Riprap Creation

The USACE is proposing to reinforce existing existing timber cribbing with riprap and replace an existing concrete cap with riprap. Areas landward of existing cribbing would be regraded and vegetated and stabilization boulders would be placed at the wetland/upland interface.

Cove Tidal Wetland Creation

The USACE is proposing to create tidal wetland habitat by excavating material from an area dominated by invasive species. Shorelines would be stabilized with 20-inch coir log toe protection at the toe of the slope around the existing mudflat. Additionally, 36-inch boulders would be installed at the top of the slope to stabilize existing scour. These boulders would be embedded a minimum of 6 inches into the ground. Native wetland vegetation would be planted within the intertidal area.

Potential Impacts of Proposed Measures on Fish and Wildlife Resources

The act of excavating upland would have an immediate impact on the flora in the area to be disturbed. The area being proposed for excavation is predominantly common reed or mowed grass interspersed with large trees. Additionally, the excavated material would need to be either transported off site or disposed of in situ, normally on adjacent upland area. As the proposed restoration sites are abandoned fill disposal sites, excavated material is likely Hudson River dredge spoil. Any potential impact to fauna would be dependent on the timing of construction.

Stream bank armoring with riprap has been the standard techniques for stabilizing banks for more than a century (Fischenich 2003). Riprap impairs vegetative diversity and shoreline habitat for terrestrial wildlife and eliminates or reduces shading of aquatic habitat. The effect of riprap on fish is equivocal. For example, Gidley et al. (2011) showed little difference in fish assemblages between stabilized and unstabilized sites. However, Quigley and Harper (2004)

report that sites with less than 15% vegetative bank cover still provide better habitat than riprapped sites. Typically, stream bank armoring involves the placement of large material (stone, boulders, concrete blocks, etc.) to reduce stream bank erosion rates. This is often done in instances where excessive erosion is threatening property, infrastructure, or sites of ecological importance. Although armoring can reduce stream bank erosion locally, it alters the local characteristics of natural habitat (Sargeant *et al.* 2004) and often results in scour at its toe or immediately downstream (Fischenich 2003).

USFWS Recommendations

Western Tidal Wetland Creation

The USFWS is unclear about the the extent of the excavation for creating tidal wetlands at the western edge of the Henry Hudson Park. Currently, the left bank of the Vloman Kill is well vegetated with a riparian buffer of mature trees between 30-50 feet wide. Removing these trees and excavating 5 feet deep would essentially widen Vloman Kill through that reach and would adversely impact sediment transport through the reach by altering the channel hydraulics. The USFWS would recommend leaving a 50-75 foot riparian buffer along the left bank of Vloman Kill and excavating on the upland side of the preserved stream bank. Two or three smaller channels could be excavated to allow for tidal flow into the newly created wetland. This site is well protected from the Hudson River and should not experience high enough erosive forces to warrant installing riprap. Furthermore, the proposed site is on the inside of a meander so it should be a depositional area. If it is determined that flows in Vloman Kill are severe enough to warrant armoring the stream banks, the USFWS would recommend using woody material to do so.

So as to minimize disturbance to wildlife, project implementation should occur in late fall or winter.

Vegetated Riprap Creation

The USFWS has concerns about the wildlife benefit of the proposed vegetated riprap along approximately 2,500 linear feet of shoreline. The proposed plantings would be limited to an area between the top elevation of the existing cribbing and the current park grounds. Currently, most of the shoreline is either maintained lawn or other manmade surface. Wildlife buffers of >50 feet are generally recommended (Wenger 1999; Fischer and Fischenich 2000) and the USACE guidelines for wildlife buffers are 30-300 feet (Fischenich and Allen 2000), so the proposed relatively narrow vegetated buffer (<20 feet) would provide minimal wildlife benefit. The USFWS recommends the USACE consider installing an offshore low profile breakwall constructed of large wood and stone. This would attenuate wave energy but allow for the development of wetland habitat on the landward side. Log breakwalls have been installed successfully (Figure 4) on the Niagara River (Tim DePriest, NYSDEC, personal communication). These breakwalls would be installed such that they do not interfere with the adjacent federal navigation channel. Existing cribbing could be removed and replaced with a combination of boulders and vegetated soil encapsulated lifts.

Figure 4. Log Breakwall Installation. Photo by Tim DePriest, NYSDEC.

Cove Tidal Wetland Creation

The area proposed for tidal wetland creation already appears to be a tidally influenced wetland at the mouth of Vloman Kill. If adding coir logs at the toe of the slope would retain sediment and, presumably, enable vegetation to become established, the USACE should consider extending the proposed practice upstream along the north bank of Vloman Kill.

Endangered and Threatened Species

We provide the following comments on federally listed species under our jurisdiction. Currently there is not enough information available on the scope of the project to determine potential effect on northern long-eared bats. For example, it is unclear as to the extent of the project and how many trees would have to be removed in order to implement the proposed activities. If the proposed project may affect the northern long-eared bat, the USACE will need to consult with the NYFO and, if so, discuss avoidance and minimization efforts to reduce impacts. For example, if tree cutting is proposed, we generally recommend that it be conducted between October 1 or 31 (depending on location) and March 31[2].

[2] For more information please visit https://www.fws.gov/midwest/endangered/mammals/nleb/

C. MOODNA CREEK

DESCRIPTION OF PROJECT

The proposed projects on Moodna Creek are located in the towns of Cornwall and New Windsor, Orange County. Moodna Creek flows approximately 15.5 miles from the confluence of Cromline Creek and Otter Creek to its mouth at the Hudson River at river mile 57; the watershed drains almost 180 miles squared (mi^2) entirely within Orange County (OCWA 2010). The tidally influenced portion of the creek, the lower 1 mile, provides rare natural brackish communities, including tidal marsh and intertidal mudflats (USFWS 1997).

Above the tidal influence, Moodna Creek is a relatively low gradient (~1% slope) cobble dominated warm water stream dominated by riffle and pool sequences, and would be classified as a Rosgen C3 stream type. Above Forge Hill Road (County Route (CR) 74), the valley through which the creek travels is quite narrow, which confines the creek to a relatively narrow corridor (Figure 5). Meander width ratio (MWR) is a measure of confinement and is equal to the belt width divided by bankfull width (Rosgen 1996). Belt width is defined as the farthest lateral extent of a stream in its valley. Streams that have low MWRs often exhibit channel enlargement, high bank erosion rates, and sediment transport problems. The low end of MWR for C stream types is 4 (Rosgen 1996). Moodna Creek between CR 72 and New York State Route 32 has a mean MWR of 3.1, indicating that it may be prone to instability.

Figure 5. Moodna Creek Upstream of AOP 1.

There are three barriers to aquatic organisms in the lower reach of Moodna Creek. The first barrier is an exposed abandoned utility line that crosses Moodna Creek approximately 1.8 miles from its mouth. The next barrier, the Firth Cliff Dam, is another 1.2 miles upstream. The final barrier is an old mill dam named Orrs Mills that is another half mile upstream. The USACE and NYSDEC are proposing to remove the lower two barriers and partially breach Orrs Mills Dam.

Ecological Communities

The lower 3.5 miles, encompassing approximately 300 acres of Moodna Creek, is designated as a Significant Coastal Fish and Wildlife Habitat, from its mouth to the Orrs Mills Dam. (NYSDOS 2012).

Fisheries

Moodna Creek is an important spawning area for anadromous fish, including alewife, blueback herring, rainbow smelt, tomcod (*Microgadus tomcod*), and striped bass; the creek mouth provides nursery habitat. Various warm water freshwater resident fish use the lower creek year-round, including largemouth bass, introduced bluegill (*Lepomis macrochirus*), indigenous pumpkinseed (*L. gibbosus*), and brown bullhead (*Ameiurus nebulosus*), as well as the catadromous American eel. Marine species such as bluefish (*Pomatomus saltatrix*), bay anchovy (*Anchoa mitchilli*), and blue crab (*Callinectes sapidus*) use this area when the salt front moves north in the dry season. (Heady 2008; USFWS 1997).

Birds

There are extensive flats at the creek mouth and bay area that form a productive breeding habitat for least bittern, green heron, Canada goose, mallard, wood duck (*Aix sponsa*), black duck, Virginia rail (*Rallus limicola*), spotted sandpiper, belted kingfisher (*Megaceryle alcyon*), marsh wren, fish crow, common yellowthroat (*Geothlypis trichas*), hooded warbler (*Setophaga citrina*), red-winged blackbird, downy woodpecker (*Picoides pubescens*), northern flicker (*Colaptes auratus*), Eastern kingbird, and swamp sparrow. This area is a known migration corridor along the north slope of the Hudson Highlands for raptors, including bald eagles, which are consistently observed in the summer and winter (USFWS 1997).

Endangered and Threatened Species

The sites are riverine within a mostly forested riparian corridor. The Indiana bat and northern long-eared bat have the potential to occur within the vicinity of the project site.

STUDY AREA ASSESSMENT

Future Conditions Without Project

In the absence of restoration and enhancement work at the Moodna Creek sites, the USACE and the NYSDEC would not meet project objectives to:

1. Restore a mosaic of interconnected large river habitats.
2. Restore lost connectivity between the Hudson River and adjacent habitats.

Alternative Plans

The stated goal of all three Moodna Creek projects is achieving AOP. The preferred alternatives for Moodna Creek includes removal of a sewer utility line (AOP 1), removal of Firth Cliff Dam (AOP 2), and breach of Orrs Mills Dam (AOP 3).

AOP 1. The USACE preferred alternative involves the decommissioning of a sanitary sewer line and removal of the section that crosses Moodna Creek.

AOP 2. The USACE preferred alternative at the Firth Cliff Dam involves demolition and removal of the concrete spillway to the full vertical extent and subsequent passive release of the impounded sediment. The abutments attached to the valley wall on river left and the building foundations on river right may be left in place.

AOP 3. The USACE preferred alternative involves breaking through the spillway concrete crest, and underlying cobble/boulder-filled timber crib structure, removing the vertical extent of a central portion of the spillway, and leaving the side portions in place. The ends of the spillway would be stabilized at their base with placed boulders, while the upper portions could be left open for visibility of the spillway's interior construction.

USFWS Recommendations

The USFWS agrees that utility line removal is the most appropriate alternative at AOP 1, and that the abandoned sewer line should be removed. The USFWS recommends that in addition to removing the pipe, the USACE should design and implement a grade control structure as construction activities associated with removing the infrastructure would likely result in a head-cut that would work upstream. Two types of structures that are effective for grade control are Newbury riffles (Newbury and Gaboury 1994; Newbury 2015) and cross vanes (Rosgen 1996; Johnson, et al. 2002).

For AOP 2, the USFWS agrees that dam removal is the most appropriate alternative; however, there is some concern about the methods to be implemented. The USACE indicated that the concrete dam would be completely removed "pending favorable results of impounded sediment analysis and subsequent passive release of the impounded sediment." The USFWS recommends breaching the dam and constructing a stable "nature like fishway" through the existing impoundment. This would allow for the primary objective of AOP, but also stabilize sediment in situ, reducing the potential negative impacts associated with adding excessive bedload to the system.

For AOP 3, the USFWS agrees that removing the spillway while leaving the abutments in place would meet the objective of potentially allowing AOP and further agrees that, given the current uncertainty about what is upstream of the dam, simply removing the concrete dam at its spillway would not necessarily allow for AOP. However, the USFWS would recommend a different

approach that could be implemented in order to allow passage of certain species (Figure 6). This would incorporate the use of a nature-like fishway through the breached dam implemented in a phased approach. Given the size of the watershed at this location (161 mi^2), an appropriate bankfull channel cross-section area would be approximately 500 $foot^2$ with a bankfull width of around 110 feet (Mulvihill, et al. 2009). The existing spillway is approximately 145 feet wide. Phase one would involve cutting a bankfull notch to design elevations in early spring, which would drain the impoundment to an appropriate elevation. Allowing a full growing season after notching the dam would allow for vegetation to become re-established on the exposed ground upstream. During periods of low flow late in the summer, any instream work could be done upstream of the breach, including the installation of instream structures to provide grade control and prevent undermining of structures and stabilization of the mouth of the tributary that comes into the impoundment from the west. Finally, the rest of the structure would be removed and replaced with grade control structures at appropriate elevations to allow for target species passage.

Figure 6. Step pool structures installed after dam removal allow fish passage but retain sediment in old impoundment.

Endangered and Threatened Species

We provide the following comments on federally listed species under our jurisdiction. Currently there is not enough information available on the scope of the project to determine the potential effect on bats. For example, it is unclear as to the extent of the project and how many trees would have to be removed in order to implement the proposed activities. If the proposed project may affect the northern long-eared bat or Indiana bat, the USACE will need to consult with the NYFO and, if so, discuss avoidance and minimization efforts to reduce impacts. For example, if

tree cutting is proposed, we generally recommend that it be conducted between October 1 or 31 (depending on location) and March 31[3].

SUMMARY

The Hudson River is a diverse and complex ecological system that has been altered by extensive human use. The USACE and the NYSDEC are proposing restoration at three sites to address some of these impacts, utilizing a range of habitat restoration techniques including; side channel restoration, wetlands restoration, stream bank softening and restoration measures, and restoring AOP. The USFWS generally supports the methods being proposed but recognizes that plans are currently only conceptual. As project designs are finalized, the USFWS would appreciate the opportunity to provide project specific comments.

AUTHOR QUALIFICATIONS

This report was written by Gian Dodici, a Fish and Wildlife Biologist with the USFWS. He has over 20 years of experience in habitat restoration work. Gian routinely provides technical assistance on stream related issues to NYSDOT personnel, NYSDEC personnel, county Soil and Water Conservation Districts, municipalities, and private landowners. He has designed and overseen the removal of dams, numerous culvert replacements, has restored many miles of instream habitat, and implemented hundreds of acres of wetland restoration projects throughout New York State.

[3] For more information on both species, please visit https://www.fws.gov/midwest/endangered/mammals/

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APPENDIX A

PROJECTS NO LONGER UNDER CONSIDERATION IN THE HUDSON RIVER HABITAT RESTORATION PROJECT

Staff from The Nature Conservancy, Historic Hudson River Towns, Scenic Hudson, Hudson River Watershed Alliance, and the NYSDEC Hudson River Estuary Program, with input from numerous stakeholders, identified an initial list of 1,800 potential restoration sites within the study area. Of these, 212 sites met the USACE's ecosystem restoration mission and aligned with USACE and NYSDEC's priority restoration objectives (USACE 2019). Six sites located throughout the Hudson River watershed were selected for restoration and include Binnen Kill, Schodack Island, Henry Hudson Park, Charles Rider Park, Rondout Creek, and Moodna Creek. Due to a lack of landowner and public support, three of these projects have been removed from consideration: Charles Rider Park, Rondout Creek and Binnen Kill. These three projects (Figure A1) are described below

D. BINNEN KILL

DESCRIPTION OF PROJECT

The Binnen Kill site encompasses approximately 1,000 acres on the western shore of the Hudson River and extends from river mile 134 to 137, in the Towns of Bethlehem and Coeymans, New York. The USACE proposed a preferred alternative after considering six alternatives for restoration at Binnen Kill (USACE 2018). The Binnen Kill site includes a variety of habitats that have been impacted by activities such as dredged material placement and farming. The preferred alternative proposes restoration in a northern and southern section and involves 43.8 acres of wetland restoration, 15.5 acres of forested wetland creation, 4.3 acres of emergent wetland creation, 41.9 acres of emergent wetland creation and channel creation, 27 acres of side channel and wetland corridor creation, and 21.3 acres of tidal wetland restoration (USACE 2018). Project components are described more fully below.

Wetland Restoration Habitat dominated by invasive species such as common reed or reed canary grass would be treated and replanted with native plant species.

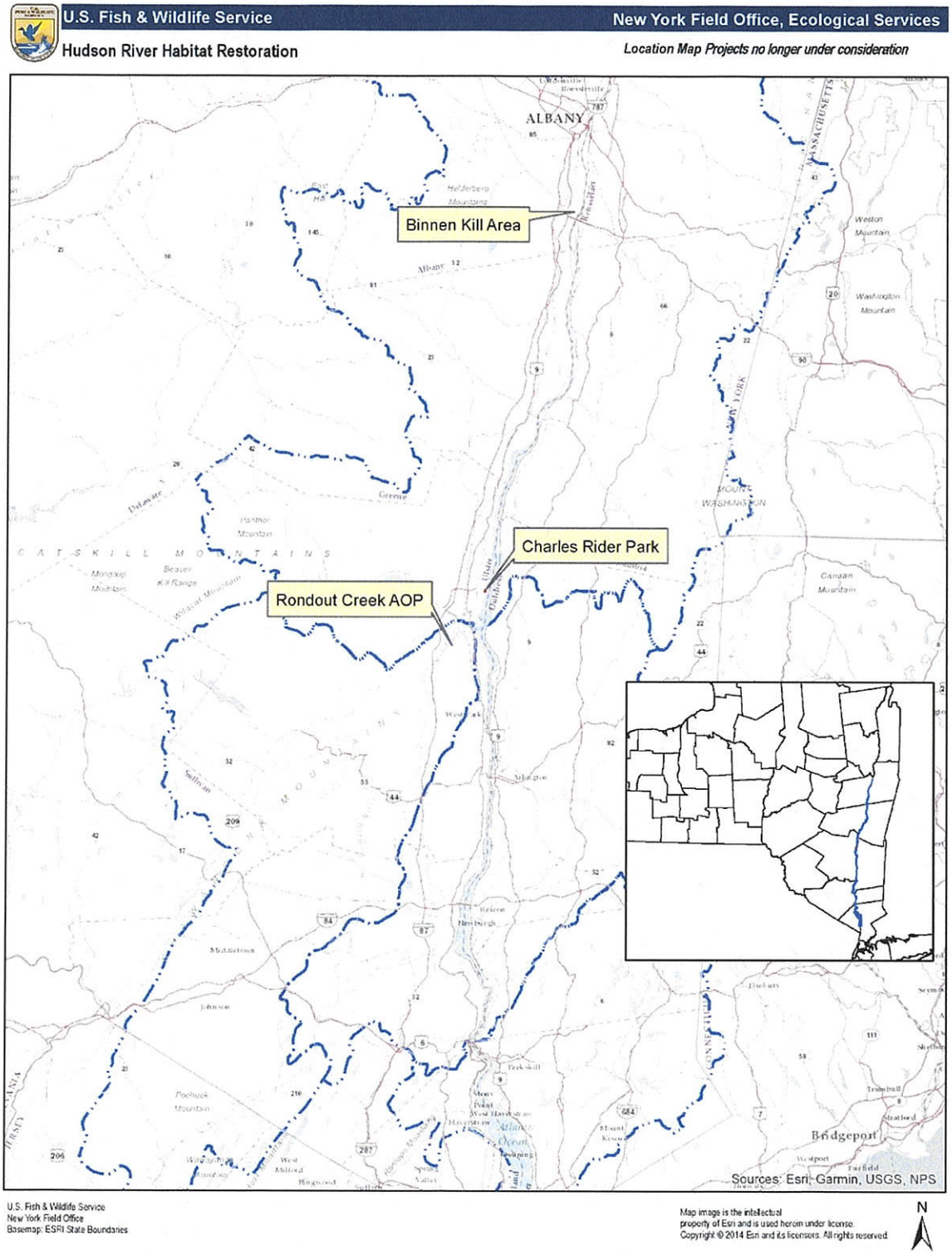

Figure A1. Hudson River Habitat Restoration Location Map.

Forested Wetland Creation

Existing hay field would be converted to forested wetland through the excavation of soil to appropriate elevations to ensure that wetland hydrology is achieved. Substrate grading would include the construction of hummocks and hollows. The area would be planted with native woody vegetation.

Emergent Wetland Creation

Emergent wetland would be created through the treatment of invasive plant species and excavation of soil to within several inches of the groundwater table to achieve ponded water for at least 2 weeks during the growing season to ensure wetland hydrology is achieved. After soil excavation, the area would be planted with native vegetation.

Emergent Wetland Restoration and Channel Creation

Degraded wetland habitat would be restored/enhanced through treatment of invasive plant species and the creation of four connected pools along approximately 3,700 linear feet of new channel.

Tidal Restoration

Invasive species would be treated and the existing tidal channel would be expanded to accommodate increased flows with the proposed side channel connection. Additionally, fringe wetlands would be stabilized and planted with native vegetation.

Side Channel and Tidal Wetland Corridor Creation

A side channel would be created in areas of historic fill to connect the Binnen Kill with tidal waters. A 300-foot tidal wetland corridor would be established adjacent to the channel.

Ecological Communities

The Binnen Kill project site is located with the Shad and Schermerhorn Islands focus area within the Upper Hudson River Estuary, a USFWS designated significant habitat (USFWS 1997). Shad and Schermerhorn Islands constitute a 1,000-acre upland and wetland habitat complex on the western shore of the Hudson at river mile 136 that contains shallow subtidal areas, intertidal mudflats, tidal marsh, floodplain forest, cliffs, and agricultural fields. Dredged material disposal in the 1800s connected Shad Island to the mainland. The two sizeable tributaries in this complex, the Binnen Kill and Vloman Kill, provide quality spawning and nursery habitat for resident freshwater and anadromous species.

Plants

The wetlands at the Binnen Kill site support a number of New York State listed plants: Northern estuary beggar-ticks (*Bidens hyperborea* var. *hyperborea*) (E), Hudson River water nymph

(*Najas guadalupensis* ssp. *muenscheri*) (E), heartleaf plantain (*Plantago cordata*) (T), and Davis' sedge (*Carex davisii*) (T) (USFWS 1997, NYSDOS 2012). There are also several invasive plants: purple loosestrife (*Lythrum salicaria*), common reed, and water chestnut (NYSDOS 2012).

Fisheries

The Binnen Kill project site provides a diverse array of fish habitat that provides spawning and nursery habitat. The Binnen Kill provides spawning habitat for American shad, blueback herring (*Alosa aestivalis*), alewife, and the tidal wetlands at the site provide nursery habitat for these species, as well as striped bass.

Amphibians

A number of river/stream amphibians and reptiles may occur at the Binnen Kill project site, (NYSDOS 2012) including map turtles (*Graptemys geographica*), painted turtles (*Chrysemys picta*), mudpuppies (*Necturus maculosus*), American toads (*Bufo americanas*), bullfrogs (*Rana catesbeiana*), and green frogs (*Rana clamitans*) (NYSDOS 2012).

Mammals

The diverse habitats of the Binnen Kill site support diverse mammal groups including canids, mustelids, rodents, and chiropterans. Riparian and wetland areas support mink (*Mustela vison*), river otter (*Lotra canadensis*), muskrats (*Ondatra zibethicus*), and beaver (*Castor canadensis*). Terrestrial portions of the area provide quality habitat for a variety of upland wildlife species, including white-tailed deer (*Odocoileus virginianus*) and Eastern cottontail (*Sylvilagus floridanus*).

Birds

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern list (https://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php) or warrant special attention in your project location. These species may occur in the Binnen Kill project area: bald eagle, black-billed cuckoo (*Coccyzus erythropthalmus*), Canada warbler (*Cardellina canadensis*), cerulean warbler (*Setophaga cerulea*), dunlin (*Calidris alpina*), Eastern whip-poor-will (*Antrostomus vociferous*), lesser yellowlegs (*Tringa flavipes*), prairie warbler (*Setophaga discolor*), semipalmated sandpiper (*Calidris pusilla*), short-billed dowitcher (*Limnodromus griseus*), and wood thrush (*Hylocichla mustelina*).

Bald eagles may nest, forage, or over-winter in the study area. Under the BGEPA, take of bald eagles is prohibited unless otherwise permitted by the USFWS. The BGEPA defines take to include "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb." If bald eagles are determined to occur in the vicinity of a USACE FRM project proposed for implementation, we recommend that the USACE visit the USFWS NYFO's project review page and determine if a permit is required under BGEPA. The USFWS 2007 National Bald Eagle

Management Guidelines can be found at:
https://www.fws.gov/northeast/ecologicalUSFWSs/eaglenationalguide.html. The guidelines provide recommendations for avoiding disturbance at nest sites, including activity-specific guidelines (i.e., development). The guidelines recommend that no activities be conducted within 330 feet of the nest site; however, activities can be conducted between 330 feet and 660 feet of a nest site outside the breeding season (January-August).

In addition to the species mentioned above, the Binnen Kill uplands support ruffed grouse (*Bonasa umbellus*) and numerous passerine birds, including Eastern kingbird (*Tyrannus tyrannus*), American crow (*Corvus brachyrhynchos*), and fish crow (*C. ossifragus*).

Endangered and Threatened Species

The site contains shallow subtidal areas, intertidal mudflats, tidal marsh, floodplain forest, and agricultural fields. The northern long-eared bat, Atlantic sturgeon, and shortnose sturgeon have the potential to occur in the vicinity of the project site.

STUDY AREA ASSESSMENT

Future Conditions Without Project

In the absence of restoration and enhancement work at the Binnen Kill site, the USACE and the NYSDEC would not meet project objectives to:

1. Restore a mosaic of interconnected large river habitats.
2. Restore lost connectivity between the Hudson River and adjacent habitats.

Alternative Plans

The preferred alternative for the site involves wetland enhancement, forested wetland creation, emergent wetland creation, and channel creation (USACE 2018).

Potential Impacts of Proposed Measures on Fish and Wildlife Resources

Invasive Species Treatment

Forty-four acres of invasive species (primarily reed canary grass and common reed) would be treated and the area revegetated with native vegetation. Presumably, the control would be carried out with the use of herbicide. Please refer to Section I (B) (1) for recommendations on herbicide use.

Excavation

The act of excavating channels and wetlands would have an immediate impact on the flora in the area to be disturbed. Any potential impact to fauna would be dependent on the timing of construction. Excavation may contribute to soil erosion and transport of sediment into adjacent

wetland and aquatic habitats, contributing to reduced water quality and disruption of fish spawning and sediment dwelling organisms. Additionally, the excavated material would need to be either transported off site or disposed of in situ, normally on an adjacent upland area. As the proposed restoration sites are abandoned fill disposal sites, excavated material is likely Hudson River dredge spoil, and may contain hazardous substances, such as polychlorinated biphenyls (PCBs).

USFWS Recommendations

Invasive Species Treatment

As mentioned earlier, complete eradication may not be achievable for large patches of invasive species, so adaptive management using an integrated pest management (IPM) approach is recommended. Methods could include mechanical removal (e.g., hand-pulling and/or mowing), judicious use of pesticides, or release of biological control agents (if available for target species). Please refer to Section I (B) (1) for recommendations on herbicide use.

Excavation

Adverse impacts associated with channel and wetland excavation tend to be short-term and non-significant. Adverse impacts can be minimized by implementing construction during the winter when impacts to migratory birds would be minimized. Best management practices should be implemented to ensure appropriate sediment and erosion control to minimize adverse impacts to constructed and existing wetland habitats.

Soil to be excavated should be tested for hazardous substances, including PCBs, metals, and polycyclic aromatic hydrocarbons, to ensure that environmentally appropriate excavation and disposal methods are used. We recommend that the USACE comply with guidance provided in the NYSDEC guidance for "In-Water and Riparian Management of Sediment and Dredged Material" (NYSDEC 2004).

Endangered and Threatened Species

Currently there is not enough information available on the scope of the project to determine potential effect on northern long-eared bats. For example, it is unclear as to the extent of the project and how many trees would have to be removed in order to implement the proposed activities. If the proposed project may affect the northern long-eared bat, the USACE will need to consult with the NYFO and, if so, discuss avoidance and minimization efforts to reduce impacts. For example, if tree cutting is proposed, we generally recommend that it be conducted between October 1 or 31 (depending on location) and March 31[4].

[4] For more information please visit https://www.fws.gov/midwest/endangered/mammals/nleb/

E. CHARLES RIDER PARK

DESCRIPTION OF PROJECT

Charles Rider Park is approximately 30 acres of public open space, on the western shore of the Hudson River at River mile 95, owned by the Town of Ulster, in Ulster County. Most of the park is forested, but approximately 6 acres adjacent to the Hudson River is actively managed. Parking areas and internal roadways run close to the shoreline, separated from the shoreline edge by 15 to 50 feet of mown grass. Much of the shoreline has been modified with timber cribbing, other riprap, and large boulders, possibly added for shoreline stabilization.

Only one alternative was developed for Charles Rider Park. The USACE and NYSDEC propose to modify the existing shoreline to re-establish tidal wetlands. Along the eastern shoreline a remnant boat launch would be removed. Existing timber cribbing would be reinforced, particularly along the northern portion, and a riprap toe would be installed where necessary. The top of the bank would be graded back to the edge of the existing gravel or paved surface and large boulders would be placed to stabilize the shoreline. Suitable substrate would be backfilled between the top of the bank and reinforced timber cribbing. The substrate would be graded to allow for intertidal flow and tidal wetland creation. Native wetland vegetation would be planted within the intertidal area. Additionally, existing rock stabilization would be reinforced with appropriately sized rock, and rock interstices would be filled with soil and planted with native vegetation.

Ecological Communities

Because of the highly developed nature of the Charles Rider Park project area, there are no significant ecological communities directly within the project area. However, significant ecological communities are located within the Hudson River, adjacent to the park. These include the deepwater tidal zone offshore at depths between 6 to 10 feet, and the intertidal shore community (USFWS 1997).

Plants

There are no identified state or federally listed plants at Charles Rider Park. The dominant tree species at the park are cottonwood (*Populus deltoids*), box elder (*Acer negundo*), gray birch (*Betula populifolia*), pin oak (*Quercus palustris*), black locust (*Robinia pseudoacacia*), willows (*Salix* sp.), and elms (*Ulmus* sp.). The understory shrub layer is comprised of dogwoods (*Cornus* sp.) and sumacs (*Rhus* sp.). There are also several non-native species, including tree-of-heaven (*Ailanthus altissima*), multiflora rose (*Rosa multiflora*), wild grape (*Vitis* sp.), common reed, and common mugwort (*Artemisia vulgaris*) (Cooney 2004).

Fisheries

The freshwater tidal communities found along the Hudson River are regionally rare but provide important habitat for anadromous spawning fish and for all life stages of resident freshwater fish species (USFWS 1997). Atlantic and shortnose sturgeon, river herring, American eels, and

striped bass all use the Hudson River adjacent to Charles Rider Park, but the park currently offers little aquatic habitat for these species.

Mammals

Mammals found within or near the project area are commensal species capable of adapting to or tolerating human disturbance and may include raccoon (*Procyon lotor*), Virginia opossum (*Didelphis virginiana*), striped skunk (*Mephitis mephitis*), gray squirrel (*Sciurus carolinensis*), and eastern cottontail.

Birds

Charles Rider Park shoreline provides foraging habitat for migratory birds during spring and fall migration, although it is limited due to the shoreline hardening that has occurred. Additionally, there are several bird species that likely breed at the Park. Ring-billed gull and herring gull are common at Charles Rider Park. Migratory waterbirds that forage in the Hudson River adjacent to the Park include ring-neck ducks (*Aythya collaris*), greater scaup (*A. marila*), lesser scaup (*A. affinis*), long-tailed ducks (*Clangula hyemalis*), horned grebes (*Podiceps auritus*), red-necked grebes (*P. grisegena*), and pied-billed grebes (*Podilymbus podiceps*). Nesting birds likely include Canada goose, blue jay (*Cyanocitta cristata*), American robin (*Turdus migratorius*), gray catbird (*Dumetella carolinensis*), song sparrow (*Melospiza melodia*), Baltimore oriole (*Icterus galbula*), and common yellow throat (*Geothlypis trichas*).

Endangered and Threatened Species

The site is predominantly forested uplands. The Indiana bat and northern long-eared bat have the potential to occur within the vicinity of the project site.

Future Conditions Without Project

In the absence of restoration and enhancement work at the Charles Rider Park site, the USACE and the NYSDEC would not meet project objectives to:

1. Restore a mosaic of interconnected large river habitats.
2. Restore lost connectivity between the Hudson River and adjacent habitats.

Alternative Plans

The preferred alternative for the site involves interstitial rock plantings in areas that are currently stabilized with rock and tidal wetland creation.

Potential Impacts of Proposed Measures on Fish and Wildlife Resources

Interstitial Rock Plantings

The USACE and NYSDEC propose rehabilitating existing riprap, and in the process adding soil and native plants in the spaces between the rocks. The area being proposed for interstitial rock planting is on the northern end of the park. The current hardened nature of the existing shoreline provides little habitat benefit.

Northern and Southern Tidal Wetland Creation

Along the eastern shoreline, the remains of a boat launch would be removed. Existing timber cribbing would be reinforced, and a riprap toe would be installed. The top of the bank would be graded back to the edge of the existing gravel or paved surface and large boulders would be placed to stabilize the shoreline. Suitable substrate would be backfilled between the top of the bank and reinforced timber cribbing. The substrate would be graded to allow for intertidal flow and tidal wetland creation. Native wetland vegetation would be planted within the intertidal area. The hardened and degraded nature of the existing shoreline provides little habitat benefit.

USFWS Recommendations

Charles Rider Park is exposed to daily tidal water level fluctuations and the area is also impacted by boat wake action. A limited boat wake study carried out by Stevens Institute of Technology (LaPann-Johannessen, et al. 2015) documented maximum wake heights in excess of 3 feet. The USFWS recognizes that the Hudson River shoreline is a high energy system and standard non-structural or nature-based stabilization techniques would likely not be successful at this location. Although rock may provide benefits for shoreline stability, its placement can affect the biological function of the site. For example, it is beneficial to place large rock with large gaps to allow wildlife passage from land to water. The USFWS agrees that interstitial plantings would be beneficial to wildlife, and encourages the planting of native shrubs such as dogwoods, willow, or viburnum (*Viburnum* spp.) that would provide wildlife benefit and are more resilient to wave action than forbs or grasses.

Another strategy to consider is offshore low profile berms that act as breakwalls. These energy dissipating berms can either be constructed with angular stone or ballasted logs. Logs could be embedded in the riprap to provide additional habitat diversity, support the food web, and when submerged permanently would last indefinitely. Log breakwalls have been installed successfully on the Niagara River (Figure A2. Tim DePriest, NYSDEC, personal communication).

Figure A2. Log Breakwall in Niagara River. Photo by Tim DePriest, NYSDEC.

Endangered and Threatened Species

Currently there is not enough information available on the scope of the project to determine potential effect on bats. For example, it is unclear as to the extent of the project and how many trees would have to be removed in order to implement the proposed activities. If the proposed project may affect the northern long-eared bat or Indiana bat, the USACE will need to consult with the NYFO and, if so, discuss avoidance and minimization efforts to reduce impacts. For example, if tree cutting is proposed, we generally recommend that it be conducted between October 1 or 31 (depending on location) and March 31[5].

F. RONDOUT CREEK

DESCRIPTION OF PROJECT

General Description

Rondout Creek runs approximately 63 miles from its headwaters in Shandaken in the eastern Catskills to its mouth at the Hudson River at river mile 91. The watershed includes Rondout Reservoir (part of the New York City water supply) and the Wallkill River and drains almost 1,200 mi^2, making it one of the largest drainages to the Hudson River (Milone & MacBroom,

[5] For more information on both species, please visit https://www.fws.gov/midwest/endangered/mammals/

Inc. 2015). The tidally influenced portion of the creek, the lower 3.6 miles below Eddyville Dam (Rondout Creek Watershed Council 2010; Milone & MacBroom, Inc. 2015), provides rare natural brackish communities, including tidal marsh and intertidal mudflats (USFWS 1997). The proposed project on Rondout Creek is located in the towns of Ulster and Esopus, Ulster County.

Ecological Communities

Rondout Creek habitat includes the lower portion of this freshwater tributary on the west side of the Hudson River at river mile 91, from the mouth 6.4 kilometers (4 miles) upriver to the first dam located just upstream of the New York State Route 213 bridge. The watersheds of Rondout Creek and of the Wallkill River, which feeds into Rondout Creek, make up the largest tributary watershed in the Hudson River estuary; Rondout Creek is one of the largest freshwater tributaries of the Hudson in terms of flow (USFWS 1997). Rondout Creek is an important spawning area for alewife, rainbow smelt, blueback herring, and white perch in the spring (Mickelson 2018, USFWS 1997). There are also substantial populations of resident species such as brown bullhead, yellow perch (*Perca flavescens*), sunfish species (Centrarchidae family), and largemouth and smallmouth bass (USFWS 1997). Several rare plants occur in the marsh or shoreline habitat, including smooth bur-marigold (*Bidens laevis*) (T), southern estuary beggar-ticks (*B. bidentoides*) (R), kidneyleaf mud-plantain (*Heteranthera reniformis*), spongy arrowhead (*Sagittaria calycina* var. *spongiosa*) (T), heart-leaf plantain (*Plantago cordata*) (T), and Frank's sedge (*Carex frankii*) (E) (USFWS 1997).

Plants

Several New York State listed threatened, endangered and rare plants occur in the tidal marsh habitat, including Frank's sedge, heart-leaf plantain, smooth bur-marigold, spongy arrowhead, swamp cottonwood (*Populus heterophila*) (T), winged monkey flower (*Mimulus alatus*) (R), and Southern estuary ticks (NYSDOS 2012). Invasive species include common reed, purple loosestrife, and water chestnut (NYSDOS 2012).
Fisheries

The tidal portion of Rondout Creek provides important spawning habitat for fish, including alewife, rainbow smelt, blueback herring, white perch, yellow perch, tomcod, and striped bass (NYSDOS 2012).

Birds

The fringing wetlands at the mouth of the Creek provide productive feeding sites for migrating waterfowl, shorebirds, and wading birds (USFWS 1997, NYSDOS 2012). The New York State listed American bittern (SC) and least bittern (T) use the clear waters of the tidal marsh (NYSDOS 2012); bald eagles (T) and osprey (*Pandion haliaetus*) (SC) forage in the shallow waters of Rondout Creek (USFWS 1997, NYSDOS 2012).

Herptiles

Rondout Creek and its associated wetlands support numerous herptiles including common snapping turtles (*Chelydra serpentina*), common map turtles, water snake (*Nerodia s. sipedon*), red-spotted newt (*Notophthalmus v. viridescens*), redback salamander (*Plethodon cinereus*), common mudpuppy (*Necturus maculosus*), American toad, gray treefrog (*Hyla versicolor*), spring peeper (*Pseudoacris crucifer*), bullfrog (*Rana catesbeiana*), green frog, and wood frog (*R. sylvatica*) (NYSDOS 2012).

Endangered and Threatened Species

The sites are riverine within a mostly forested riparian corridor. The Indiana bat and northern long-eared bat have the potential to occur within the vicinity of the project site.

STUDY AREA ASSESSMENT

Future Conditions Without Project

In the absence of restoration and enhancement work at the Rondout Creek site the USACE and the NYSDEC would not meet project objectives to:

1. Restore a mosaic of interconnected large river habitats.
2. Restore lost connectivity between the Hudson River and adjacent habitats.

Alternative Plan

The USACE is proposing the removal of Eddyville Dam as the preferred alternative, which entails removal of the entire concrete spillway down to the elevation of the underlying bedrock. The free-standing masonry training wall may remain, pending more detailed site investigation and survey. Normal water surface elevation would drop approximately 10 feet in the upstream vicinity of the dam and tidal fluctuation would extend upstream into the impoundment.

USFWS Recommendations

The USFWS agrees that dam removal is the best approach to restore lower Rondout Creek. Removal would restore tidal influence further upstream and open up significant areas to spawning fish, restore foraging habitat for shorebirds and wading birds, and open approximately 9 miles of upstream habitat (USACE 2019).

Endangered and Threatened Species

We provide the following comments on federally listed species under our jurisdiction. Currently there is not enough information available on the scope of the project to determine potential effect on bats. For example, it is unclear as to the extent of the project and how many trees would have to be removed in order to implement the proposed activities. If the proposed project may affect the northern long-eared or Indiana bat, the USACE will need to consult with the NYFO and, if

so, discuss avoidance and minimization efforts to reduce impacts. For example, if tree cutting is proposed, we generally recommend that it be conducted between October 1 or 31 (depending on location) and March 31[6].

[6] For more information on both species, please visit https://www.fws.gov/midwest/endangered/mammals/

APPENDIX B

USACE and NYSDEC Comments on the Draft FWCAR

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, NEW YORK DISTRICT
JACOB K. JAVITS FEDERAL BUILDING
26 FEDERAL PLAZA
NEW YORK NEW YORK 10278-0090

Environmental Analysis Branch

September 18, 2019

Mr. David Stilwell
Field Office Supervisor
U.S. Fish and Wildlife Service
New York Field Office
3817 Luker Rd
Cortland, NY 13045

Dear Mr. Stilwell:

The U.S. Army Corps of Engineers, New York District (District) received your July 22, 2019 draft Section 2(b) Fish and Wildlife Coordination Act Report (FWCAR) for the Hudson River Habitat Restoration (HRHR) Integrated Feasibility Study and Environmental Assessment (FR/EA)

The District and the non-federal sponsor, New York State Department of Environmental Conservation (NYSDEC) are now proposing the restoration of four sites (originally six) that broadly fall into one of three categories. The sites may have multiple restoration areas (known as components) and measures. The components within a site are considered separable elements that represent specific problems and solutions. The sites and categories include:

1. Mosaic Sites: Schodack Island is characterized by side channel restoration, wetlands restoration and streambank softening and restoration measures;
2. Shoreline Restoration Site: Henry Hudson Park is characterized by streambank softening and stabilization; and
3. Aquatic Organism Passage Sites: Moodna Creek and Rondout Creek are characterized by impediments to organism passage up and down stream.

Restoration actions include (but are not necessarily limited to) the restoration of historic side channels directly adjacent to the Hudson River, wetlands restoration, streambank softening and restoration, vegetative buffering, dredging, sediment load reduction measures, and aquatic organism passage restoration (e.g., dam removal and fish ladders).

The draft FWCAR provided a comprehensive description of pertinent environmental resources in the project area, which will be helpful in the preparation of the final HRHR FR/EA.

so, discuss avoidance and minimization efforts to reduce impacts. For example, if tree cutting is proposed, we generally recommend that it be conducted between October 1 or 31 (depending on location) and March 31.

District Response
The design of the side channel will incorporate sea level change in order to maximize life of the vegetation. The designs will incorporate nature-based features to all extents practicable. The District will utilize an adaptive management strategy in the treatment of invasive plants. Strategies will include but not limited to mechanical removal, pesticides, and replanting. The District will not implement construction during the bird-breeding season and best management practices will be implemented for sediment and erosion control. Soils will be tested for containments prior to construction and the District will comply with all NYSDEC permits. Tree clearing will occur outside the June 1 – July 31 period to avoid any impacts to northern long-eared bats.

4. USFWS Recommendations related to Charles Rider Park (Draft FWCAR page 20)

District Response
Charles Rider Park is no longer a selected plan and no action will occur at the site.

5. Henry Hudson Park USFWS Recommendations (abridged from Draft FWCAR page 24)

Western Tidal Wetland Creation
The USFWS would recommend leaving a 50-75 foot riparian buffer along the left bank of Vloman Kill and excavating on the upland side of the preserved stream bank. Two or three smaller channels could be excavated to allow for tidal flow into the newly created wetland. So as to minimize disturbance to wildlife, project implementation should occur in late fall or winter.

Vegetated Riprap Creation
The USFWS has concerns about the wildlife benefit of the proposed vegetated riprap along approximately 2,500 linear feet of shoreline. The proposed plantings would be limited to an area between the top elevation of the existing cribbing and the current park grounds. Wildlife buffers of >50 feet are generally recommended (Wenger 1999; Fischer and Fischenich 2000) and the USACE guidelines for wildlife buffers are 30-300 feet (Fischenich and Allen 2000), so the proposed relatively narrow vegetated buffer (<20 feet) would provide minimal wildlife benefit. The USFWS recommends the USACE consider installing an offshore low profile breakwall constructed of large wood and stone.

Cove Tidal Wetland Creation
The area proposed for tidal wetland creation already appears to be a tidally influenced wetland at the mouth of Vloman Kill. If adding coir logs at the toe of the slope would retain sediment and, presumably, enable vegetation to become established, the USACE should consider extending the proposed practice upstream along the north bank of Vloman Kill.

Endangered and Threatened Species
If the proposed project may affect the northern long-eared bat, the USACE will need to consult with the NYFO and, if so, discuss avoidance and minimization efforts to reduce impacts. For example, if tree cutting is proposed, we generally recommend that it be conducted between October 1 or 31 (depending on location) and March 31.

District Response
The District will maintain the tree line on the western tidal measure along the Vloman Kill. Construction is anticipated to take 12-months. The District will attempt to implement construction in the fall to minimize impacts to long-eared bat associated with tree cutting. Tree cutting will not occur within 150 feet of a known occupied maternity roost tree during the pup season (June 1 through July 31) or within a 0.25 miles of a hibernation site, year round. The District will conduct hydrological modeling to determine flow and any necessary channels into the site. The plan will be designed to remove and keep out invasive species. The District has a limited extend (due to benefits and costs) of construction along the Vloman Kill and cannot extend the construction along the Vloman Kill. The District will consult with the NYFO for northern long-eared bats during the Pre-Engineering and Design (PED) phase of the project.

6. Moodna Creek USFWS Recommendations (abridged from Draft FWCAR page 28)

The USFWS agrees that utility line removal is the most appropriate alternative at AOP 1, and that the abandoned sewer line should be removed. The USFWS recommends that in addition to removing the pipe, the USACE should design and implement a grade control structure as construction activities associated with removing the infrastructure would likely result in a head- cut that would work upstream.

For AOP 2, the USFWS agrees that dam removal is the most appropriate alternative; however, there is some concern about the methods to be implemented. The USACE indicated that the concrete dam would be completely removed "pending favorable results of impounded sediment analysis and subsequent passive release of the impounded sediment." The USFWS recommends breaching the dam and constructing a stable "nature like fishway" through the existing impoundment. This would allow for the primary objective of AOP, but also stabilize sediment in situ,

reducing the potential negative impacts associated with adding excessive bedload to the system.

For AOP 3, the USFWS agrees that removing the spillway while leaving the abutments. However, the USFWS would recommend a different approach that could be implemented in order to allow passage of certain species. This would incorporate the use of a nature-like fishway through the breached dam implemented in a phased approach.

Endangered and Threatened Species

If the proposed project may affect the northern long-eared bat or Indiana bat, the USACE will need to consult with the NYFO and, if so, discuss avoidance and minimization efforts to reduce impact s. For example, if tree cutting is proposed, we generally recommend that it be conducted between October 1 or 31 (depending on location) and March 31.

District Response
The District will regrade the substrate upstream of AOP 1 to tie into the downstream riverbed elevation. For AOP 2, during the Pre-Construction Engineering and Design phase the District will investigate the best way minimize excessive sediment bedload on the creek system with the removal of the dam. For AOP 3, during PED, the District will investigate a phased approach to the removal of the dam. Grade structures are planned to be installed after the removal.

7. Rondout USFWS Recommendations (abridged from Draft FWCAR page 32)
The USFWS agrees that dam removal is the best approach to restore lower Rondout Creek. Removal would restore tidal influence further upstream and open up significant areas to spawning fish, restore foraging habitat for shorebirds and wading birds, and open approximately 9 miles of upstream habitat (USACE 2019).

Endangered and Threatened Species

If the proposed project may affect the northern long-eared or Indiana bat, the USACE will need to consult with the NYFO and, if so, discuss avoidance and minimization efforts to reduce impacts. For example, if tree cutting is proposed, we generally recommend that it be conducted between October 1 or 31 (depending on location) and March 31.

District Response
The removal of the Eddyville Dam is no longer a selected plan. There was a lack of public and landowner support for the removal action. The action at the dam will be a fish ladder. A fish ladder will still support the objective of aquatic organism passage allow fish to move upstream of the dam. The District is currently working on plans for

the fish ladder and will be ready for the final FR/EA. The District can provide the plans to the USFWS prior to the final FR/EA for your recommendations.

If you have any questions or comments please contact Mr. Matthew Voisine, Biologist at (917)-790-8718. The District looks forward to continued coordination with you on this project.

Sincerely,

WEPPLER.PETER.M.1228647353 Digitally signed by WEPPLER.PETER.M.1228647353 Date: 2019.09.18 13:18:37 -04'00'

Peter Weppler
Chief, Environmental Analysis Branch

EXECUTIVE SUMMARY

The U.S. Army Corps of Engineers, New York District (USACE), the New York State Department of Environmental Conservation (NYSDEC), and Department of State are cooperatively planning to implement habitat restoration /enhancement projects at six sites along the Hudson River, New York. The purpose of the project is to analyze measures that would restore aquatic ecosystems, including evaluating eroding shorelines, degraded fish and wildlife habitat, and impediments to fish passage. The project is authorized by Section 103 of the 1962 Rivers and Harbors Act, as amended (P.L. 87-874).

The U.S. Fish and Wildlife Service was asked specifically to identify existing fish and wildlife resources (including threatened and endangered species, designated critical habitat, special concern species, and significant habitat) within the study area; identify fish and wildlife resource concerns relating to the study area; assess project impacts on fish and wildlife resources and potential ecosystem restoration outputs; recommend measures to avoid, minimize, or compensate for project-induced adverse impacts; and recommend fish and wildlife resource enhancement opportunities for maximizing ecosystem restoration outputs in the project area.

The Hudson River watershed encompasses 13,400 square-miles and flows north to south from its headwaters in the Adirondack Mountains to the New York Harbor estuary over 300 miles downstream. The Hudson River is a tidal estuary for 153 miles from Troy to New York Harbor. The study area defined by the USACE extends from the Federal Lock and Dam in Troy, New York, to the Governor Mario M. Cuomo Bridge [Tappan Zee Bridge] in Tarrytown, New York, approximately 140 miles (USACE 2018). The watershed contains a wide variety of ecoregions, including the glacially deepened Hudson River Valley, the Taconic Foothills and portions of the Taconic Mountains, the Ridge and Valley, and sections of the Pocono Highlands and Catskill Mountains. The study area watershed contains significant tidal wetland habitats and habitat complexes located along the Hudson River, as well as unique and varied upland habitats. There are currently two federally listed species that are known or have the potential to occur within the study area. The threatened northern long-eared bat (*Myotis septentrionalis*) and the endangered Indiana bat (*M. sodalis*). There is no designated critical habitat for any federally listed species under our jurisdiction at any of the proposed sites. For each project, we provide our current understanding of which species have the potential to occur at that site and then provide a recommendation for the species under our jurisdiction. In addition, there is potential for the endangered Atlantic (*Acipenser oxyrhynchus oxyrhynchus*) and shortnose sturgeon (*A. brevirostrum*), which are under the jurisdiction of the National Oceanic and Atmospheric Administration (NOAA). We recommend coordinating directly with NOAA once project sites have been selected.

The USACE and the NYSDEC are proposing restoration at six sites comprised of three major categories of project: ***Mosaic Sites*** (Schodack Island and Binnen Kill), ***Shoreline Restoration Sites*** (Henry Hudson Park and Charles Rider Park), and ***Aquatic Organism Passage***

Summary of Comments on Hudson Ri. Habitat Restoration DFWCAR_DMrev.pdf

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Binnen Kill, Rondout Creek and Charles Rider Park have been dropped due to lack of community and landowner support. This should be acknowledged here or throughout the text when those sites appear or dropped from this document.

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I. PROJECT PURPOSE, SCOPE, AND AUTHORITY

The U.S. Army Corps of Engineers, New York District (USACE), and the New York State Department of Environmental Conservation (NYSDEC) are conducting a feasibility study of ecosystem restoration opportunities under the Hudson River Habitat Restoration Feasibility Study. The study area is bounded by the Governor Mario M. Cuomo Bridge (South) and the Federal Lock and Dam at Troy, New York (North), and generally encompasses 125 miles of Hudson River, as well as the immediate tributaries and land east and west of the Hudson River between these two boundaries. The purpose of the project is to analyze measures that would restore aquatic ecosystems, including evaluating eroding shorelines, degraded fish and wildlife habitat, and impediments to fish passage (USACE 2018).

The USACE, NYSDEC, and other partners identified six sites that were selected for further evaluation and development of alternatives, including restoration of side-channels, wetlands, aquatic organism passage (AOP), and stream banks. This document constitutes the Draft Fish and Wildlife Coordination Act Report (FWCAR) prepared by the U.S. Fish and Wildlife Service (USFWS) to assess existing fish and wildlife resources associated with the six proposed projects, recommend measures to reduce project impacts, and recommend restoration measures to enhance fish and wildlife resources. The USACE provided documents that describe the existing project area resources, as well as the various rehabilitation alternatives under consideration (Partners Restoring the Hudson 2018). These documents are cited herein and are included in the "References Cited" section.

This Draft FWCAR has been prepared under the authority of, and in accordance with, Section 2(b) of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.), the Endangered Species Act (ESA) (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.), the Migratory Bird Treaty Act (16 U.S.C. 703-712; Ch. 128; July 13, 1918; Stat. 755), and the Bald and Golden Eagle Protection Act (BGEPA) (16 U.S.C. 668-668d).

For each identified project area, as outlined in the Scope of Work, the USFWS will:

Provide data and information on:

- Existing significant fish and wildlife resources (including threatened and endangered species and their habitats) within the project area.
- Fish and wildlife resource concerns within the project area.
- Potential impacts of proposed measures on fish and wildlife resources.
- Recommendations to avoid, minimize, or compensate for impacts resulting from the proposed alternative.
- Fish and wildlife enhancement opportunities in the project area.

Accomplish the following:

- Prepare Draft FWCA Report providing information requested in section A, above.

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now three.

- Provide cost estimates for any conceptual restoration proposals. Note that S is unable to provide cost estimates at this time due to lack of project details.
- Provide name(s) and qualifications of report preparer(s).
- Prepare and submit Final FWCAR.

Project Background

The Hudson River watershed encompasses 13,400 square-miles, approximately 93% of which lies in New York State, but also includes portions of Vermont, Massachusetts, New Jersey, and Connecticut (Freeman 1991). The Hudson River flows north to south from its headwaters in the Adirondack Mountains to the New York Harbor estuary over 300 miles downstream (Figure 1). The Hudson River is a tidal estuary for 153 miles from Troy to New York Harbor. The study area defined by the USACE extends from the Federal Lock and Dam in Troy, New York, to the Governor Mario M. Cuomo Bridge [Tappan Zee Bridge] in Tarrytown, New York, approximately 140 miles (USACE 2018). A stakeholder group of non-governmental agencies, federal and state agencies, and research institutions, termed PRH, was organized in 2013. The PRH published the Hudson River Comprehensive Management Plan (Hudson River CRP) in 2018 (Partners Restoring the Hudson 2018). The Hudson River CRP includes an assessment of current conditions, a methodology to quantify ecosystem restoration potential, a collection of potential projects, and a management strategy.

The study area of the Hudson River watershed extends from the Battery at the southern end of Manhattan to the Rensselaer-Columbia county line (Federal Lock and Dam at Troy). The watershed contains a wide variety of ecoregions, including the glacially deepened Hudson River Valley, the Taconic Foothills and portions of the Taconic Mountains, the Ridge and Valley, and sections of the Pocono Highlands and Catskill Mountains. Local relief ranges from 25-300 feet in areas dominated by large rivers and lowlands up to 2,000 feet in mountainous areas.

The study area watershed contains significant tidal wetland habitats and habitat complexes located along the Hudson River, as well as unique and varied upland habitats.

The productive estuary area of the Hudson River is a regionally significant nursery and wintering habitat for a number of anadromous, estuarine, and marine fish species, including the American eel (*Anguilla rostrata*), and is a migratory and feeding area for birds, including the bald eagle eagle (*Haliaeetus leucocephalus*).

Existing Conditions

The Hudson River below the Federal Lock and Dam at Troy is an estuary, where fresh waters meet salt waters. Tides in the Lower Hudson River occur twice each day. The mean water elevation at Troy is 2 feet above sea level and the average tide is approximately 4 feet (Freeman 1991). The tidal portion of the river consists of two zones: deep water with depths greater than 6 feet, and a shallow zone with depths less than 6 feet at low tide (Edinger, et al. 2014). The freshwater tidal communities found along the Hudson River are regionally rare, but provide important habitat for anadromous spawning fish and for all life stages of resident freshwater fish species (USFWS 1997) (Figure 2).

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Incorrect. The county line is further south, closer to the Schodack Island site. The Troy dam is in Rensselaer County east of the river and Albany County west of the river.

Intertidal mudflats provide important foraging areas for migrating shorebirds and waterfowl. Species that use these areas year-round include American black duck (*Anas rubripes*), mallard (*A. platyrhynchos*), Canada goose (*Branta canadensis*), herring gull (*Larus argentatus*), ring-billed gull (*L. delawarensis*), great blue heron (*Ardea herodias*), and fish crow (*Corvus ossifragus*).

Freshwater tidal marshes are flooded for at least a portion of the growing season, are typically shallower than 6 feet, and are usually fresh water (salinity less than 0.5 parts per thousand) (Edinger, et al. 2014). Freshwater tidal swamps are found in low-lying areas adjacent to the river, and these are flooded seasonally or by the highest storm tides. Freshwater subtidal shallows and aquatic beds include species such as broad-leaved spatterdock (*Nuphar advena* ssp. *advena*), pickerelweed (*Pontederia cordata*), and arrowleaf (*Peltandra virginica*), and introduced invasive species such as water chestnut (*Trapa natans*) (NYIS.info 2014).

Freshwater tidal swamps occupy low-lying areas adjacent to the main stem of the Hudson River or major tributaries that are inundated seasonally or by the highest storm tides. The plants and animals found here are very similar to those which use the hardwood swamps found further upriver and can include green ash (*Fraxinus pennsylvanica*), black ash (*F. nigra*), red maple (*Acer rubrum*), and slippery elm (*Ulmus rubra*) (Edinger, et al. 2014).

There are about 10 species of diadromous fish that use the Lower Hudson River and its tributaries (Waldman 2005). Only the American eel (*Acipenser oxyrinchus oxyrinchus*) is catadromous, the others being anadromous, including Atlantic sturgeon, striped bass (*Morone saxatilis*), river herring (*Alosa* spp.: collectively; alewife (*A. pseudoharengus*), river herring (*A. aestivalis*), hickory shad (*A. mediocris*), American shad (*A. sapidissima*), and rainbow smelt (*Osmerus mordax*).

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"tidal" marshes- they are inundated (flooded) with each high tide, twice daily.

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at high tide, meaning that they are far less, if not drained at low tide. These are vegetated intertidal habitats.

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Flooded twice daily with each high tide.

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Repeat from paragraph above. Flooded twice daily at high tide.

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Anguilla rostrata

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blueback herring

A. STUDY AREA ASSESSMENTS

The USFWS has conducted site visits, reviewed pertinent literature, and performed interviews with persons knowledgeable about the project area and the species involved, including the USACE and the NYSDEC. Information collected and reviewed included the identification of wildlife and fish communities, potential impacts to fish and wildlife, and potential restoration opportunities. The proposed project activities would help restore and enhance freshwater tidal wetland, forested wetland, scrub shrub wetland habitats, and access to riverine habitat for the benefit of many fish and wildlife species.

The USACE and the NYSDEC are proposing restoration at six sites comprised of three major categories of project: ***Mosaic Sites*** (Schodack Island and Binnen Kill), ***Shoreline Restoration Sites*** (Henry Hudson Park and Charles Rider Park), and ***Aquatic Organism Passage (AOP) Sites,*** (Moodna Creek and Rondout Creek). The Schodack Island and Binnen Kill restoration projects are characterized by side channel restoration, wetlands restoration, and stream bank softening and restoration measures. The Henry Hudson Park and Rider Park restoration projects are characterized by stream bank softening and stabilization. The Moodna Creek and Rondout Creek restoration projects are characterized by mitigating impediments to organism passage up and downstream. Within these project categories, several restorations methodologies would be implemented, including: wetland enhancement through vegetation management, wetland restoration through excavation, shoreline restoration, and AOP.

B. RESTORATION/ENHANCEMENT METHODS PROPOSED

1. WETLAND ENHANCEMENT – INVASIVE SPECIES MANAGEMENT

Habitat dominated by invasive species such as common reed (*Phragmites australis*) or reed canary grass (*Phalaris arundinacea*) would be treated and replanted with native plant species. The negative effects of common reed and reed canary grass on native plants and wildlife are well documented (Lavoie, et al. 2003; Meyerson, et al. 2000; Galatowitsch, et al., 1999; Schaumburg, et al., 2011; Greenberg and Green 2013). Although these species can be managed effectively (Breen, et al., 2014; Adams and Galatowitsch 2006), it is easier to control small colonies than large well-established populations (Moody and Mack, 1988; Martin and Blossey 2013; Quirion et al. 2018). Quirion et al. (2018) quantify the likelihood for eradicating populations of *Phragmites* and found that for stands greater than 300 meters squared (0.07 acres) the probability of success drops to below 10%. At sites where control is attempted, it is necessary to implement an adaptive management strategy, often requiring multiple years of treatment (Quirion, et al. 2018; Breen, et al., 2014; Adams and Galatowitsch 2006).

Herbicides kill or suppress plants by interfering with essential plant processes such as photosynthesis. The goal is to enhance native plant communities by removing undesirable species and increasing native species, but herbicides may have unintended consequences for nontarget plant species. Herbicides have been designed to target biochemical processes, such as photosynthesis, that are unique to plants, therefore, they typically are not acutely toxic to animals (Tatum 2004). However, herbicides, such as Roundup® (a mixture of glyphosate and a surfactant), may adversely impact amphibians (Moore, et al. 2012). These impacts can be

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Roundup is not approved for use in wetlands in NYS. It would not be used.

reduced by avoiding herbicide application when larval stages are likely and by using glyphosate without a surfactant (typically marketed as Rodeo®) in areas that support aquatic habitat. Herbicides can also have indirect effects on wildlife by altering vegetative cover and structure, at least temporarily.

Invasive species treatment practices should be implemented late in the summer to avoid impacts, such as trampling nests and vegetation, to nesting birds. Standard control practices for both species involve herbicide (normally glyphosate) application late in the growing season (before the first hard frost), with follow up treatment in subsequent years. In dense stands, it is often beneficial to mow the area in late summer prior to herbicide application. Large monotypic stands can be treated with a foliar spray of herbicide (typically approved for aquatic use). Treating isolated plants involves a wick application of herbicide onto individual plants in order to minimize impacts to non-target plant species.

Best management practices should be utilized for any invasive species treatment including, but not limited to:

- Filling and emptying of herbicide containers (e.g., spray bottles, backpack sprayers) should occur in upland areas, to reduce the risk of spills within the wetland. All applicators will have available a spill kit with absorbent pads.
- Open containers of herbicide will not be used in the wetland.
- Herbicide would only be sprayed where there is a dense stand of the target plants. Herbicide would be applied when wind speed at treatment height is < 5 m.p.h. to reduce the risk of drift impacting non-target plants.
- Any mowing or other vegetation control methods would be implemented using low ground pressure equipment.

Areas that contain rare and/or state listed species should be identified, isolated, and avoided.

2. WETLAND RESTORATION

The goal of wetland restoration should be to physically alter an impaired wetland site to return its physical, physiochemical, and/or biological function to a predisturbance condition (USEPA 2018). A primary objective of many wetland restoration efforts is the restoration of on-site hydrology. Techniques to achieve this vary depending on the original impact to the wetland. In cases where wetlands have been filled by past activities, restoration can be implemented by excavating material to a depth sufficient to restore hydrology to the site (NRCS 2008, 2010).

3. SHORELINE RESTORATION

Shoreline stabilization is commonly implemented as a response to shoreline erosion. Shoreline stabilization can be implemented in numerous ways which typically fall into two major categories - structure based, and nature based. Structural measures include bulkheads, breakwaters, revetments, and groins (NRC 2007). Nature based methods utilize natural process to achieve the desired outcome, either by managing land use using vegetation, or using other native material to control erosion (NRC 2007). Hardened shorelines result in the loss of

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including application of herbicides

shoreline ecological function (Gittman, et al. 2015) and provide less complex habitat compared with natural shorelines (Seitz, et al. 2006) (Gittman, et al. 2015).

4. AQUATIC ORGANISM PASSAGE

1 Habitat connectivity is an important component of population genetics and recolonization or genetic exchange within a population of fishes can only occur in the absence of barriers (Radinger and Wolter 2013).

There is a long history of attempting to allow fish to "pass" around manmade structures such as dams that impede their journeys upstream (NOAA 2015). Traditional approaches to fish passage at dams involved installing fish ladders, often made from concrete or aluminum, which allowed target fish species to swim through them. These often highly engineered structures have primarily targeted anadromous species (NOAA 2015).

Mimicking natural systems by using nature-like fishways may also be used in river restoration, and are gaining favor globally as an alternative to fish ladders (Aadland 2010; Newbury and Gaboury 1994; Rosgen 1996; Harman, et al. 2012; Wildman, et al. 2000). Nature-like fishways attempt to mimic natural riverine systems with the intent of passing a higher diversity of fishes, especially compared to traditional fish ladders (Wildman, et al. 2000).

Most fish passage practitioners have the goal of restoring hydraulic and geomorphological function of the channel through the area once occupied by a dam. Often this is accomplished by creating a channel of appropriate dimension, pattern, and profile which effectively transports sediment so that, over time, the stream neither aggrades nor degrades.

One drawback to complete dam removal, if sediment is released in an unregulated manner, is the potential for smothering habitat as the sediment is transported downstream (Bednarek 2001). The adverse impacts may be greater if sediments trapped in a dam's impoundment are contaminated (Evans 2015). One strategy to reduce the adverse impacts of downstream sediment releases is to remove the dam while stabilizing the material in the impoundment through the use of structures.

C. ENDANGERED AND THREATENED SPECIES

There are currently two federally listed species that are known or have the potential to occur within the study area. The threatened northern long-eared bat (*Myotis septentrionalis*) and the endangered Indiana bat (*M. sodalis*). There is no designated critical habitat for any federally listed species under our jurisdiction at any of the proposed sites. For each project, we provide our current understanding of which species have the potential to occur at that site and then provide a recommendation for the species under our jurisdiction. In addition, there is potential for the endangered Atlantic and shortnose sturgeon (*A. brevirostrum*), which are under the jurisdiction of the National Oceanic and Atmospheric Administration (NOAA). We recommend coordinating directly with NOAA once project sites have been selected.

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The most recent compilation of federally listed and proposed endangered and threatened species in New York is available for your information and may be found the USFWS's New York Field Office (NYFO) website at http://www.fws.gov/northeast/nyfo/es/section7.htm. Until the proposed project is complete, we recommend that you check the NYFO website regularly from the date of this report to ensure that listed species presence/absence information for the proposed project is current.

II. SELECTED PROJECTS

Staff from The Nature Conservancy, Historic Hudson River Towns, Scenic Hudson, Hudson River Watershed Alliance, and the NYSDEC Hudson River Estuary Program, with input from numerous stakeholders, identified an initial list of 1,800 potential restoration sites within the study area. Of these, 212 sites met the USACE's ecosystem restoration mission and aligned with USACE and NYSDEC's priority restoration objectives (USACE 2019). Six sites located throughout the Hudson River watershed were selected for restoration and include Binnen Kill, Schodack Island, Henry Hudson Park, Charles Rider Park, Rondout Creek, and Moodna Creek. Figure 2 shows the location of the six selected projects.

A. BINNEN KILL

DESCRIPTION OF PROJECT

The Binnen Kill site encompasses approximately 1,000 acres on the western shore of the Hudson River and extends from river mile 134 to 137, in the Towns of Bethlehem and Coeymans, New York. The USACE proposed a preferred alternative after considering six alternatives for restoration at Binnen Kill (USACE 2018). The Binnen Kill site includes a variety of habitats that have been impacted by activities such as dredged material placement and farming. The preferred alternative proposes restoration in a northern and southern section and involves 43.8 acres of wetland restoration, 15.5 acres of forested wetland creation, 4.3 acres of emergent wetland creation, 41.9 acres of emergent wetland creation and channel creation, 27 acres of side channel and wetland corridor creation, and 21.3 acres of tidal wetland restoration (USACE 2018). Project components are described more fully below.

Wetland Restoration Habitat dominated by invasive species such as common reed or reed canary grass would be treated and replanted with native plant species.

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B. SCHODACK ISLAND

DESCRIPTION OF PROJECT

Schodack-Houghtaling Island Complex (Complex) is a 1,800-acre area containing a diverse combination of ecological communities that includes floodplain forest, brushlands, cultivated fields, tidal creeks, and mudflats. The proposed project is located in the towns of Schodack, Stuyvesant, and New Baltimore in Rensselaer, Columbia, and Greene Counties. Located on the eastern shore of the Hudson River, 1 mile south of the Village of Castleton-on-Hudson at river mile 132, the Complex includes relic islands and side channels of the Hudson River that have been altered by the placement of dikes and dredged material, resulting in a peninsula and backwater area connected to the Hudson River only at the south end. The aquatic habitat of Schodack Creek, a relic side channel of the Hudson River, is a spawning and nursery area for anadromous and resident fish (USFWS 1997).

Dredge spoil disposal operations associated with Federal navigation channel maintenance filled areas of shallow channel habitat, connecting islands to each other and to the mainland (NYSDOS 2012). The USACE and NYSDEC propose to modify the existing shoreline to enhance tidal wetlands through invasive species management, creating new tidal wetland habitat through excavation and re-establishing a tidal connection between the Hudson River and Schodack Creek by removing historic dredge fill that severed the connection.

Ecological Communities

The Complex is the northern extent for shad spawning in the Hudson River. The extensive wetlands support nesting habitat for a variety of bird species, and during the peak migration times of spring and fall, the area is used by thousands of waterfowl, shorebirds, and passerine species. Small tidal marshes occur along the shoreline of Schodack Creek (USFWS 1997). The northern portion of the Complex comprises Schodack Island State Park, which contains two significant natural communities, three rare plant populations, and a significant great blue heron rookery. It is also within a Department of State (DOS) Significant Coastal Fish and Wildlife Habitat, a DOS Significant Scenic Area, and it is an area evaluated in the Hudson River Estuary Action Plan (Feldmann, et al. 2003).

Plants

The Complex hosts two significant natural communities: floodplain forest and freshwater tidal marsh, three extant rare plant populations, and three historical rare plant populations (Feldmann, et al. 2003). Extant rare plants include the State listed threatened golden club (*Orontium aquaticum*), Delmarva beggar-ticks (*Bidens bidentoides*), and heartleaf plantain (Feldmann, et al. 2003).

Fisheries

Schodack Creek is a significant spawning, nursery, and feeding area for American shad, white perch (*Morone americana*), alewife, blueback herring, largemouth bass (*Micropterus salmoides*),

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dont think you need to include Green County or New Baltimore.

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dont know what 'evaluated' means. Is this the Hudson River Estuary Program document? If so, it has been updated since the reference (2005, 2010, and 2015)

Invasive Species Treatment

As mentioned earlier, complete eradication is not generally achievable for large patches of invasive species so adaptive management using an IPM approach is recommended. Methods could include mechanical removal (e.g., hand-pulling and/or mowing), judicious use of pesticides, or release of biological control agents (if available for target species). Please refer to Section I (B) (1) for recommendations on herbicide use.

Excavation

Adverse impacts associated with channel and wetland excavation tend to be short-term and non-significant. Adverse impacts can be minimized by implementing construction during the winter when impacts to migratory birds would be minimized. As discussed above, the USACE should consider that sediments and soil may be contaminated with PCBs and other hazardous substances.

Endangered and Threatened Species

Currently there is not enough information available on the scope of the project to determine potential effect on bats. For example, it is unclear as to the extent of the project and how many trees would have to be removed in order to implement the proposed activities. If the proposed project may affect the northern long-eared bat or Indiana bat, the USACE will need to consult with the NYFO and, if so, discuss avoidance and minimization efforts to reduce impacts. For example, if tree cutting is proposed, we generally recommend that it be conducted between October 1 or 31 (depending on location) and March 31[2].

E. CHARLES RIDER PARK

DESCRIPTION OF PROJECT

Charles Rider Park is approximately 30 acres of public open space, on the western shore of the Hudson River at River mile 95, owned by the Town of Ulster, in Ulster County. Most of the park is forested, but approximately 6 acres adjacent to the Hudson River is actively managed. Parking areas and internal roadways run close to the shoreline, separated from the shoreline edge by 15 to 50 feet of mown grass. Much of the shoreline has been modified with timber cribbing, other riprap, and large boulders, possibly added for shoreline stabilization.

Only one alternative was developed for Charles Rider Park. The USACE and NYSDEC propose to modify the existing shoreline to re-establish tidal wetlands. Along the eastern shoreline a remnant boat launch would be removed. Existing timber cribbing would be reinforced, particularly along the northern portion, and a riprap toe would be installed where necessary. The top of the bank would be graded back to the edge of the existing gravel or paved surface and large boulders would be placed to stabilize the shoreline. Suitable substrate would be backfilled

[2] For more information on both species, please visit https://www.fws.gov/midwest/endangered/mammals/

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Endangered and Threatened Species

Currently there is not enough information available on the scope of the project to determine potential effect on bats. For example, it is unclear as to the extent of the project and how many trees would have to be removed in order to implement the proposed activities. If the proposed project may affect the northern long-eared bat or Indiana bat, the USACE will need to consult with the NYFO and, if so, discuss avoidance and minimization efforts to reduce impacts. For example, if tree cutting is proposed, we generally recommend that it be conducted between October 1 or 31 (depending on location) and March 31[3].

D. HENRY HUDSON PARK

DESCRIPTION OF PROJECT

Henry Hudson Park is a 51 acre park located in the Town of Bethlehem, Albany County, New York. The shoreline was built up as a dredge disposal site in the 1860's (Ocean and Coastal Consultants 2011). Originally, timber cribbing was used to contain the spoil material, but as this failed, it was capped with concrete in the 1900s (Ocean and Coastal Consultants 2011). The majority of the original structures have failed, and in some areas, there is evidence of active erosion (USACE 2018). The southern edge of the parcel borders the Vloman Kill at its mouth at the Hudson River. The lower portion of the Vloman Kill is tidal up to a natural waterfall, approximately 0.75 miles from the Hudson River, with more than half of this reach bordering the park.

Two alternatives were presented by the USACE and NYSDEC. Alternative 1 proposes to create 3.6 acres of tidal wetland on the western portion of the park, install vegetated riprap (0.4 acres); and, create a tidal cove wetland (0.2 acres). Alternative 2 proposes to create 3.6 acres of tidal wetland on the western portion of the park, create 0.4 acres of tidal wetland in the northern portion of the park, create 0.1 acres of "pocket" wetland, and create 1.3 acres of tidal wetland at the southern portion of the park.

Ecological Communities

Because of the highly developed nature of the Henry Hudson Park project area, there are no significant ecological communities within the project area. However, significant ecological communities are located within the Hudson River, adjacent to the park. These include the deepwater tidal zone offshore at depths between 6 to 10 feet, and the intertidal shore community (USFWS 1997).

Plants

The New York State listed threatened Davis' sedge occurred historically at the park. The dominant tree species at the park are cottonwood, white ash (*Fraxinus americana*), and black

[3] For more information on both species, please visit https://www.fws.gov/midwest/endangered/mammals/

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Origionally, the cribbing was a mid channel dike used to constrict water flow into the navigation channel. It was then used to contain spoil material when the channel was dredged.

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armoring involves the placement of large material (stone, boulders, concrete blocks, etc.) to reduce stream bank erosion rates. This is often done in instances where excessive erosion is threatening property, infrastructure, or sites of ecological importance. Although armoring can reduce stream bank erosion locally, it alters the local characteristics of natural habitat (Sargeant *et al.* 2004) and often results in scour at its toe or immediately downstream (Fischenich 2003).

USFWS Recommendations

Western Tidal Wetland Creation

The USFWS is unclear about the the extent of the excavation for creating tidal wetlands at the western edge of the Henry Hudson Park. Currently, the left bank of the Vloman Kill is well vegetated with a riparian buffer of mature trees between 30-50 feet wide. Removing these trees and excavating 5 feet deep would essentially widen Vloman Kill through that reach and would adversly impact sediment transport through the reach by altering the channel hydraulics. The USFWS would recommend leaving a 50-75 foot riparian buffer along the left bank of Vloman Kill and excating on the upland side of the preserved stream bank. Two or three smaller channels could be excavated to allow for tidal flow into the newly created wetland. This site is well protected from the Hudson River and should not experience high enough erosive forces to warrant installing riprap. Furthermore, the proposed site is on the inside of a meander so it should be a depositional area. If it is determined that flows in Vloman Kill are severe enough to warrant armoring the stream banks, the USFWS would recommend using woody material to do so.

So as to minimize disturbance to wildlife, project implementation should occur in late fall or winter.

Vegetated Riprap Creation

The USFWS has concerns about the wildlife benefit of the proposed vegetated riprap along approximately 2,500 linear feet of shoreline. The proposed plantings would be limited to an area between the top elevation of the existing cribbing and the current park grounds. Currently, most of the shoreline is either maintained lawn or other manmade surface. Wildlife buffers of >50 feet are generally recommended (Wenger 1999; Fischer and Fischenich 2000) and the USACE guidelines for wildlife buffers are 30-300 feet (Fischenich and Allen 2000), so the proposed relatively narrow vegetated buffer (<20 feet) would provide minimal wildlife benefit. The USFWS recommends the USACE consider installing an offshore low profile breakwall constructed of large wood and stone. This would attenuate wave energy but allow for the development of wetland habitat on the landward side. Log breakwalls have been installed successfully (Figure and 5) on the Niagara River (Tim DePriest, NYSDEC, personal communication). Existing cribbing could be removed and replaced with a combination of boulders and vegetated soil encapsulated lifts.

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This would be problematic from a regulatory point of view (State protection of in-water habitats) as well as a hazard to navigation as it is immediatly adjacent to the federal nav channel and is navigable waters.

There are three barriers to aquatic organisms in the lower reach of Moodna Creek. The first barrier is an exposed abandoned utility line that crosses Moodna Creek approximately 1.8 miles from its mouth. The next barrier, the Firth Cliff Dam, is another 1.2 miles upstream. The final barrier is an old mill dam named Orrs Mills that is another half mile upstream. The USACE and NYSDEC are proposing to remove the lower two barriers and partially breach Orrs Mills Dam.

Ecological Communities

The lower 3.5 miles, encompassing approximately 300 acres of Moodna Creek, is designated as a Significant Coastal Fish and Wildlife Habitat, from its mouth to the Orrs Mills Dam. (NYSDOS 2012).

Fisheries

Moodna Creek is an important spawning area for anadromous fish, including alewife, blueback herring, rainbow smelt, tomcod (*Microgadus tomcod*), and striped bass; the creek mouth provides nursery habitat. Various warm water freshwater resident fish use the lower creek year-round, including American eel, largemouth bass, introduced bluegill (*Lepomis macrochirus*), indigenous pumpkinseed (*L. gibbosus*), and brown bullhead (*Ameiurus nebulosus*). Marine species such as bluefish (*Pomatomus saltatrix*), bay anchovy (*Anchoa mitchilli*), and blue crab (*Callinectes sapidus*) associate within this area when the salt front moves north in the dry season. (Heady 2008; USFWS 1997).

Birds

There are extensive flats at the creek mouth and bay area that form a productive breeding habitat for least bittern, green heron, Canada goose, mallard, wood duck (*Aix sponsa*), black duck, Virginia rail (*Rallus limicola*), spotted sandpiper, belted kingfisher (*Megaceryle alcyon*), marsh wren, fish crow, common yellowthroat (*Geothlypis trichas*), hooded warbler (*Setophaga citrina*), red-winged blackbird, downy woodpecker (*Picoides pubescens*), northern flicker (*Colaptes auratus*), Eastern kingbird, and swamp sparrow. This area is a known migration corridor along the north slope of the Hudson Highlands for raptors, including bald eagles, which are consistently observed in the summer and winter (USFWS 1997).

Endangered and Threatened Species

The sites are riverine within a mostly forested riparian corridor. The Indiana bat and northern long-eared bat have the potential to occur within the vicinity of the project site.

STUDY AREA ASSESSMENT

Future Conditions Without Project

In the absence of restoration and enhancement work at the Moodna Creek sites the USACE and the NYSDEC would not meet project objectives to:

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these migrate up the creek and should be identified as catadromous.

is proposed, we generally recommend that it be conducted between October 1 or 31 (depending on location) and March 31[5].

F. RONDOUT CREEK

DESCRIPTION OF PROJECT

General Description

Rondout Creek runs approximately 63 miles from its headwaters in Shandaken in the eastern Catskills to its mouth at the Hudson River at river mile 91. The watershed includes Rondout Reservoir (part of the New York City water supply) and the Wallkill River and drains almost 1,200 mi^2, making it one of the largest drainages to the Hudson River (Milone & MacBroom, Inc. 2015). The tidally influenced portion of the creek, the lower 3.6 miles below Eddyville Dam (Rondout Creek Watershed Council 2010; Milone & MacBroom, Inc. 2015), provides rare natural brackish communities, including tidal marsh and intertidal mudflats (USFWS 1997). The proposed project on Rondout Creek is located in the towns of Ulster and Esopus, Ulster County.

Ecological Communities

Rondout Creek habitat includes the lower portion of this freshwater tributary on the west side of the Hudson River at river mile 91, from the mouth 6.4 kilometers (4 miles) upriver to the first dam located just upstream of the New York State Route 213 bridge. The watersheds of Rondout Creek and of the Wallkill River, which feeds into Rondout Creek, make up the largest tributary watershed in the Hudson River estuary; Rondout Creek is one of the largest freshwater tributaries of the Hudson in terms of flow (USFWS 1997). Rondout Creek is an important spawning area for alewife, rainbow smelt, blueback herring, and white perch in the spring (Mickelson 2018, USFWS 1997). There are also substantial populations of resident species such as brown bullhead, yellow perch (*Perca flavescens*), sunfish species (Centrarchidae family), and largemouth and smallmouth bass (USFWS 1997). Several rare plants occur in the marsh or shoreline habitat, including smooth bur-marigold (*Bidens laevis*) (T), southern estuary beggar-ticks (*B. bidentoides*) (R), kidneyleaf mud-plantain (*Heteranthera reniformis*), spongy arrowhead (*Sagittaria calycina* var. *spongiosa*) (T), heart-leaf plantain (*Plantago cordata*) (T), and Frank's sedge (*Carex frankii*) (E) (USFWS 1997).

Plants

Several New York State listed threatened, endangered and rare plants occur in the tidal marsh habitat, including Frank's sedge, heart-leaf plantain, smooth bur-marigold, spongy arrowhead, swamp cottonwood (*Populus heterophila*) (T), winged monkey flower (*Mimulus alatus*) (R), and Southern estuary ticks (NYSDOS 2012). Invasive species include common reed, purple loosestrife, and water chestnut (NYSDOS 2012).

[5] For more information on both species, please visit https://www.fws.gov/midwest/endangered/mammals/

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DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, NEW YORK DISTRICT
JACOB K. JAVITS FEDERAL BUILDING
26 FEDERAL PLAZA
NEW YORK NEW YORK 10278-0090

May 29, 2020

REPLY TO
ATTENTION OF
Environmental Analysis Branch

Mr. David Stilwell, Field Office Supervisor
U.S. Fish and Wildlife Service
New York Ecological Services Field Office
3817 Luker Road
Cortland, NY 13045-9385

Dear Mr. Stilwell,

The U.S. Army Corps of Engineers, New York District (District), and the non-federal sponsor, New York State Department of Environmental Conservation are conducting a feasibility study of ecosystem restoration opportunities under the Hudson River Habitat Restoration Feasibility Study. This letter is transmitting the District's request for informal consultation under the Endangered Species Act (ESA) of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq*) on the above referenced project. The District prepared the attached ESA determination and assessment for the following species: threatened northern long-eared bat (*Myotis septentrionalis*), endangered Indiana Bat (*Myotis sodalis*), endangered dwarf wedgemussel (*Alasmidonta heterodon*), and threatened small whorled pogonia (*Isotria medeoloides*).

The District requested information on the presence of the referenced species on December 18, 2018. The District received a response via the draft Fish and Wildlife Coordination Act Report (FWCAR) dated July 22, 2019 and the final FWCAR in October 2019.

Please find attached the District's determination and the project description, which consists of the restoration of one mosaic site, the restoration of one shoreline site, and the removal of two dams and one sewage pipeline along one creek.

The District determined that the project is "not likely to adversely affect" the federally threatened northern long-eared bat, endangered Indiana bat, and endangered dwarf wedgemussel, and will have "no affect" on the threatened small whorled pogonia. The District requests that your office concur with the above determinations. We thank you for your coordination and cooperation on this action. Additional information about the project, including the draft Feasibility Report, is located on the Districts website: https://www.nan.usace.army.mil/.

If you have any questions or require additional information, please contact Matthew Voisine, Project Biologist at 917.790.8718 or matthew.voisine@usace,army.mil.

Sincerely,

Peter Weppler
Chief, Environmental Analysis Branch

Endangered Species Act (ESA) determination and assessment for Northern Long-Eared Bat (*Myotis septentrionalis*), Indiana Bat (*Myotis* sodalis), Dwarf Wedgemussel (*Alasmidonta heterodon*), and Small Whorled Pogonia (*Isotria medeoloides*)

Northern Long-Eared Bat (*Myotis septentrionalis*)

Species Information

The Northern long-eared bat is a medium-sized bat with a body length of 3 to 3.7 inches and a wingspan of 9 to 10 inches. Their fur color can be medium to dark brown on the back and tawny to pale-brown on the underside. Its long ears, particularly as compared to other bats in its genus, distinguish this bat.

Northern long-eared bats spend winter hibernating in caves and mines, called hibernacula. They use areas in various sized caves or mines with constant temperatures, high humidity, and no air currents. Within hibernacula, bats are found hibernating most often in small crevices or cracks, often with only the nose and ears visible. During the summer, northern long-eared bats roost singly or in colonies underneath bark, in cavities or in crevices of both live trees and snags (dead trees) greater than 3 inches in diameter.

Northern long-eared bats emerge at dusk to feed. They primarily fly through the understory of forested areas feeding on moths, flies, leafhoppers, caddisflies, and beetles, which they catch while in flight using echolocation or by gleaning motionless insects from vegetation.

The northern long-eared bat's range includes much of the eastern and north central United States and all Canadian provinces from the Atlantic Ocean west to the southern Yukon Territory and eastern British Columbia. The species' range includes 37 States (including New York) and the District of Columbia.

Species Observations within Hudson River Habitat Restoration Project Area

The U. S. Fish and Wildlife Service (USFWS) did not report any northern long-eared bats within the project area. A literature search yielded no reports of northern long-eared bats within the project area.

Site Specific Observations and Project Actions; Henry Hudson Park, Schodack Island State Park, Moodna Creek, New York Project

There are no known caves or mines within the specific project areas. To avoid impacts to bats at the Henry Hudson Park and Schodack Island State Park sites, the District will remove trees greater than 3 inches density at breast height (dbh), October 1 – March 31 or survey for bats prior to tree removal. If bats are observed during the surveys, removal will be deferred to October 1 – March 31 or the District will reinitiate consultation with USFWS. The District will not remove any trees at the Moodna Creek site.

New York District Determination
After a full evaluation of the northern long-eared bat life history, habitats in the project area, and proposed project activities, the District determined that the implementation of the proposed activities are “not likely to adversely affect” northern long-eared bats.

Indiana Bat (*Myotis* sodalis)
Species Information
The Indiana bat is a medium-sized bat, that closely resembles the little brown bat (*Myotis lucifugus*) but differing in coloration. Its fur is a dull grayish chestnut rather than bronze, with the basal portion of the hairs on the back a dull-lead color. The northern long-eared bat's underparts are pinkish to cinnamon, and its hind feet are smaller and more delicate than in the little brown bat. The historic range included New York and New Jersey south to Georgia and west to Oklahoma.

The Indiana bat typically hibernates in caves and mines in the winter, and roosts under bark or in tree crevices in the spring, summer, and fall. Trees (dead, dying, or alive) with exfoliating or defoliating bark, or containing cracks or crevices that could potentially be used by Indiana bats as a roost characterize summer roosting habitat for the Indiana bat.

The most significant threat to the Indiana bat is white-nose syndrome, a fungal disease that has infected many bat species.

Species Observations within Hudson River Habitat Restoration Project Area
The USFWS did not report any Indiana bats within the project area. A literature search yielded no reports of Indiana bats within the project area.

Site Specific Observations and Project Actions; Henry Hudson Park, Schodack Island State Park, and Moodna Creek New York Project
There are no known caves or mines within the specific project areas. To avoid impacts to bats at the Henry Hudson Park and Schodack Island State Park, the District will remove trees greater than 3 inches dbh October 1 – March 31 or survey for bats prior to tree removal. If bats are observed during the surveys, removal will be deferred to October 1 – March 31 or the District will reinitiate consultation with USFWS. The District will not remove any trees at the Moodna Creek site.

After a full evaluation of the Indiana bat life history, habitats in the project area, and proposed project activities, the District determined that the implementation of the proposed activities are “not likely to adversely affect” Indiana bats.

Dwarf Wedgemussel (*Alasmidonta heterodon*)
Species Information
The dwarf wedgemussel is a small, freshwater mussel that rarely exceeds 1.5 inches in length. The dwarf wedgemussel is the only freshwater bivalve mussel in North America that has two lateral teeth on the right valve, but only one tooth on the left. The outer

shell is dark brown or yellowish brown and often exhibits greenish rays in young mussels. The inner shell is bluish or silvery white. Dwarf wedgemussels feed by filtering small particles from the water.

The dwarf wedgemussel occurs on muddy sand, sand, and gravel bottoms in creeks and rivers of various sizes. In parts of the range, dwarf wedgemussels also occur in clay banks and small riffle areas. This species requires areas with a slow to moderate current, little silt deposition, and well-oxygenated, unpolluted water. Regionally, the dwarf wedgemussel is found in the Neversink River in the New York, New Jersey, and Pennsylvania border.

Threats to the dwarf wedgemussel include direct habitat destruction from damming and channelizing of rivers, and indirect degradation of habitat due to pollution, sedimentation, invasion by exotic species, and fluctuations in water level or temperature. Freshwater mussels, including the dwarf wedgemussel, are sensitive to potassium, zinc, copper, cadmium, and other elements associated with industrial pollution. Industrial, agricultural, and domestic pollution are largely responsible for the disappearance of the dwarf wedgemussel from much of the species' historic range.

Species Observations within Hudson River Habitat Restoration Project Area
The USFWS did not report any dwarf wedgemussels within the project area. A literature search yielded no reports of dwarf wedgemussels within the project area.

Site Specific Observations and Project Actions; Moodna Creek, New York Project
After a full evaluation of the dwarf wedgemussel life history, habitats in the project area and proposed project activities, the District determined that the implementation of the proposed activities are "not likely to adversely affect" dwarf wedgemussels.

Small Whorled Pogonia (*Isotria medeoloides*)
Species Information
The small whorled pogonia is a member of the orchid family. It usually has a single grayish-green stem that grows about 10 inches tall when in flower and about 14 inches when bearing fruit. The plant is named for the whorl of five or six leaves near the top of the stem and beneath the flower. The leaves are grayish-green, oblong, and 1 to 3.5 inches long. The single or paired greenish-yellow flowers are about 0.5 to 1 inch long and appear in May or June. The fruit, an upright ellipsoid capsule, appears later in the year (USFWS 2016).

Although widely distributed, the small whorled pogonia is rare. It is found in 18 eastern states and Ontario, Canada. Populations are typically small with less than 20 plants (USFWS 2016).

The small whorled pogonia grows in older hardwood stands of beech, birch, maple, oak, and hickory that have an open understory. Sometimes it grows in stands of softwoods such as hemlock. It prefers acidic soils with a thick layer of dead leaves, often on slopes near small streams (USFWS 2016).

Species Observations within Hudson River Habitat Restoration Project Area
The USFWS did not report any small whorled pogonia within the project area. A literature search yielded no reports of small whorled pogonia within the project area. The project will be removing dams and not working in small whorled pogonia habitat

Site Specific Observations and Project Actions; Moodna Creek, New York Project
After a full evaluation of the small whorled pogonia life history, habitats in the project area, and proposed project activities, the District determined that the implementation of the proposed activities would have “no affect” on small whorled pogonia.