DECISION DOCUMENT
NATIONWIDE PERMIT 3

This document discusses the factors considered by the Corps of Engineers (Corps) during the issuance process for this Nationwide Permit (NWP). This document contains: (1) the public interest review required by Corps regulations at 33 CFR 320.4(a)(1) and (2); (2) a discussion of the environmental considerations necessary to comply with the National Environmental Policy Act; and (3) the impact analysis specified in Subparts C through F of the 404(b)(1) Guidelines (40 CFR Part 230). This evaluation of the NWP includes a discussion of compliance with applicable laws, consideration of public comments, an alternatives analysis, and a general assessment of individual and cumulative environmental effects, including the general potential effects on each of the public interest factors specified at 33 CFR 320.4(a).

1.0 Text of the Nationwide Permit

Maintenance. (a) The repair, rehabilitation, or replacement of any previously authorized, currently serviceable structure or fill, or of any currently serviceable structure or fill authorized by 33 CFR 330.3, provided that the structure or fill is not to be put to uses differing from those uses specified or contemplated for it in the original permit or the most recently authorized modification. Minor deviations in the structure's configuration or filled area, including those due to changes in materials, construction techniques, requirements of other regulatory agencies, or current construction codes or safety standards that are necessary to make the repair, rehabilitation, or replacement are authorized. This NWP also authorizes the removal of previously authorized structures or fills. Any stream channel modification is limited to the minimum necessary for the repair, rehabilitation, or replacement of the structure or fill; such modifications, including the removal of material from the stream channel, must be immediately adjacent to the project. This NWP also authorizes the removal of accumulated sediment and debris within, and in the immediate vicinity of, the structure or fill. This NWP also authorizes the repair, rehabilitation, or replacement of those structures or fills destroyed or damaged by storms, floods, fire or other discrete events, provided the repair, rehabilitation, or replacement is commenced, or is under contract to commence, within two years of the date of their destruction or damage. In cases of catastrophic events, such as hurricanes or tornadoes, this two-year limit may be waived by the district engineer, provided the permittee can demonstrate funding, contract, or other similar delays.

(b) This NWP also authorizes the removal of accumulated sediments and debris outside the immediate vicinity of existing structures (e.g., bridges, culverted road crossings, water intake structures, etc.). The removal of sediment is limited to the minimum necessary to restore the waterway in the vicinity of the structure to the approximate dimensions that existed when the structure was built, but cannot extend farther than 200 feet in any direction from the structure. This 200 foot limit does not apply to maintenance dredging to remove accumulated sediments blocking or restricting outfall and intake structures or to maintenance dredging to remove accumulated sediments from canals associated with outfall and intake structures. All dredged or excavated materials must be deposited and retained in an area that has no waters of the United States unless otherwise specifically approved by the district engineer under separate authorization.

(c) This NWP also authorizes temporary structures, fills, and work, including the use of temporary mats, necessary to conduct the maintenance activity. Appropriate measures must be taken to maintain normal downstream flows and minimize flooding to the maximum extent practicable, when temporary structures, work, and discharges of dredged or fill material, including cofferdams, are necessary for construction activities, access fills, or dewatering of construction sites. Temporary fills must consist of materials, and be placed in a manner, that will not be eroded by expected high flows. After conducting the maintenance activity, temporary fills must be removed in their entirety and the affected areas returned to pre-construction elevations. The areas affected by temporary fills must be revegetated, as appropriate.

(d) This NWP does not authorize maintenance dredging for the primary purpose of navigation. This NWP does not authorize beach restoration. This NWP does not authorize new stream channelization or stream relocation projects.

Notification: For activities authorized by paragraph (b) of this NWP, the permittee must submit a pre-construction notification to the district engineer prior to commencing the activity (see general condition 32). The pre-construction notification must include information regarding the original design capacities and configurations of the outfalls, intakes, small impoundments, and canals. (Authorities: Section 10 of the Rivers and Harbors Act of 1899 and Section 404 of the Clean Water Act (Sections 10 and 404))

Note: This NWP authorizes the repair, rehabilitation, or replacement of any previously authorized structure or fill that does not qualify for the Clean Water Act Section 404(f) exemption for maintenance.

1.1 Requirements

General conditions of the NWPs are in the Federal Register notice announcing the issuance of this NWP. Pre-construction notification requirements, additional conditions, limitations, and restrictions are in 33 CFR part 330.

1.2 Statutory Authorities

- Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403)
- Section 404 of the Clean Water Act (33 U.S.C. 1344)

1.3 Compliance with Related Laws (33 CFR 320.3)

1.3.1 General

Nationwide permits are a type of general permit designed to authorize certain activities that have no more than minimal individual and cumulative adverse environmental effects and generally comply with the related laws cited in 33 CFR 320.3. Activities that result in more than minimal individual and cumulative adverse environmental effects cannot be authorized by NWPs. Individual review of each activity authorized by an NWP will not normally be performed, except when pre-construction notification to the Corps is required or when an applicant requests verification that an activity complies with an NWP. Potential adverse impacts and compliance with the laws cited in 33 CFR 320.3 are controlled by the terms and conditions of each NWP, regional and case-specific conditions, and the review process that is undertaken prior to the issuance of NWPs.

The evaluation of this NWP, and related documentation, considers compliance with each of the following laws, where applicable: Section 10 of the Rivers and Harbors Act of 1899; Sections 401, 402, and 404 of the Clean Water Act; Section 307(c) of the Coastal Zone Management Act of 1972, as amended; Section 302 of the Marine Protection, Research and Sanctuaries Act of 1972, as amended; the National Environmental Policy Act of 1969; the Fish and Wildlife Act of 1956; the Migratory Marine Game-Fish Act; the Fish and Wildlife Coordination Act, the Federal Power Act of 1920, as amended; the National Historic Preservation Act of 1966; the Interstate Land Sales Full Disclosure Act; the Endangered Species Act; the Deepwater Port Act of 1974; the Marine Mammal Protection Act of 1972; Section 7(a) of the Wild and Scenic Rivers Act; the Ocean Thermal Energy Act of 1980; the National Fishing Enhancement Act of 1984; the Magnuson-Stevens Fishery and Conservation and Management Act, the Bald and Golden Eagle Protection Act; and the Migratory Bird Treaty Act. In addition, compliance of the NWP with other Federal requirements, such as Executive Orders and Federal regulations addressing issues such as floodplains, essential fish habitat, and critical resource waters is considered.

1.3.2 Terms and Conditions

Many NWPs have pre-construction notification requirements that trigger case-by-case review of certain activities. Two NWP general conditions require case-by-case review of all activities that might affect federally-listed endangered or threatened species or historic properties (i.e., general conditions 18 and 20, respectively). General condition 16 restricts the use of NWPs for activities that are located in federally-designated wild and scenic rivers. None of the NWPs the construction of authorize artificial reefs. General condition 28 addresses the use of an NWP with other NWPs to authorize a single and complete project, to ensure that the acreage limits of each of the NWPs used to authorize that project are not exceeded.

In some cases, activities authorized by an NWP may require other federal, state, or local authorizations. Examples of such cases include, but are not limited to: activities that are in marine sanctuaries or affect marine sanctuaries or marine mammals; the ownership, construction, location, and operation of ocean thermal conversion facilities or deep water ports beyond the territorial seas; activities that may result in discharges into waters of the United States and require Clean Water Act Section 401 water quality certification; or activities in a state operating under a coastal zone management program approved by the Secretary of Commerce under the Coastal Zone Management Act. In such cases, a provision of the NWPs states that an NWP does not obviate the need to obtain other authorizations required by law. [33 CFR 330.4(b)(2)]

Additional safeguards include provisions that allow the Chief of Engineers, division engineers, and/or district engineers to: assert discretionary authority and require an individual permit for a specific activity; modify NWPs for specific activities by adding special conditions on a case-by-case basis; add conditions on a regional or nationwide basis to certain NWPs; or take action to suspend or revoke an NWP or NWP authorization for activities within a region or state. Regional conditions are imposed to protect important regional resources and concerns. [33 CFR 330.4(e) and 330.5]

1.3.3 Review Process

The analyses in this document and the coordination that was undertaken prior to the issuance of the NWP fulfill the requirements of the National Environmental Policy Act (NEPA), the Fish and Wildlife Coordination Act, and other acts promulgated to protect the quality of the environment.

All NWPs that authorize activities that may result in discharges into waters of the United States require compliance with the water quality certification requirements of Section 401 of the Clean Water Act. Nationwide permits that authorize activities within, or affecting land or water uses within a state that has a federally-approved coastal zone management program, must also be certified as consistent with the state's program, unless a presumption of concurrence occurs. The procedures to ensure that the NWPs comply with these laws are described in 33 CFR 330.4(c) and (d), respectively.

2.0 Purpose and Need for the Proposed Action

The proposed action is the issuance of this NWP to authorize discharges of dredged or fill material into waters of the United States under Section 404 of the Clean Water Act and structures and work in navigable waters of the United States under Section 10 of the Rivers and Harbors Act of 1899 for maintenance activities that result in no more than minimal individual and cumulative adverse environmental effects. This proposed action is needed for effective implementation of the Corps' Regulatory Program, by authorizing with little, if any, delay or paperwork this category of activities, when those activities have no more than minimal individual and cumulative adverse environmental effects. This NWP also provides an incentive to project proponents to reduce impacts to jurisdictional waters and wetlands to receive the required authorization under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act of 1899 in less time than it takes to obtain individual permits for those activities. Issuing an NWP to authorize activities that have no more than minimal adverse environmental effects instead of processing individual permit applications for these activities reduces regulatory burdens on the public, provides environmental benefits through avoidance and minimization of impacts to jurisdictional waters and wetlands in exchange for an expedited DA authorization for regulated activities. The issuance of this NWP also allows the Corps to allocate more of its resources towards evaluating proposed activities requiring Department of the Army authorization under that have the potential to cause more substantial adverse environmental effects.

3.0 Alternatives

This evaluation includes an analysis of alternatives based on the requirements of NEPA, which requires a more expansive review than the Clean Water Act Section 404(b)(1) Guidelines. The alternatives discussed below are based on an analysis of the potential environmental impacts and impacts to the Corps, federal, tribal, and state resource agencies, general public, and prospective permittees. Since the consideration of off-site alternatives under the 404(b)(1) Guidelines does not apply to specific projects authorized by general permits, the alternatives analysis discussed below consists of a general NEPA alternatives analysis for the NWP.

3.1 No Action Alternative (Do Not Reissue the Nationwide Permit)

The no action alternative would be to allow this NWP to continue to authorize activities until it expires on March 18, 2022, and not reissue the NWP. After the NWP expires, under the no action alternative activities that were authorized by this NWP would require individual permits, unless Corps districts issued regional general permits to authorize a similar category of activities that the NWP authorized.

3.2 Reissue the Nationwide Permit With Modifications

This alternative consists of reissuing the NWP with modifications while considering additional changes to the NWP after evaluating the comments received in response to the proposal to reissue this NWP. This alternative includes changes to the terms and conditions of this NWP, including quantitative limits for this NWP, pre-construction notification thresholds and requirements, and other provisions of this NWP. Under this alternative, division and district engineers have the authority under 33 CFR 330.5(c) and (d) to modify, suspend, or revoke NWP authorizations on a regional or case-by-case basis to ensure that the NWP authorizes only those activities that result in no more than minimal individual and cumulative adverse environmental effects.

In the September 15, 2020, Federal Register notice, the Corps requested comments on the proposed reissuance of this NWP. The Corps proposed to modify this NWP to authorize the repair, replacement, or rehabilitation of or of any currently serviceable structure or fill that did not require a permit at the time it was constructed. The Corps also proposed to modify this NWP to authorize the placement of new or additional riprap to protect the structure or fill, provided the placement of riprap is the minimum necessary to protect the structure or fill or to ensure the safety of the structure or fill.

Since the Corps' NWP program began in 1977, the Corps has continuously strived to develop NWPs that only authorize activities that result in no more than minimal individual and cumulative adverse environmental effects. Every five years the Corps reevaluates the NWPs during the reissuance process, and may modify an NWP to address concerns for the aquatic environment. Utilizing collected data and institutional knowledge concerning activities authorized by the Corps regulatory program, the Corps reevaluates the potential impacts of activities authorized by NWPs. The Corps also uses substantive public comments on proposed NWPs to assess the expected impacts.

3.3 Reissue the Nationwide Permit Without Modifications

This alternative consists of reissuing the NWP without any modifications before it expires on March 18, 2022. Under this alternative, division and district engineers have the authority under 33 CFR 330.5(c) and (d) to modify, suspend, or revoke NWP authorizations on a regional or case-by-case basis to ensure that the NWP authorizes only those activities that result in no more than minimal individual and cumulative adverse environmental effects.

4.0 Affected Environment

The geographic scope of this environmental assessment covers the United States and its territories because this NWP may be used across the country, unless the NWP is revoked or suspended by a division or district engineer under the procedures in 33 CFR 330.5(c) and (d), respectively. The affected environment consists of the present condition (i.e., structure and function) of aquatic and terrestrial ecosystems in the United States, which have been directly and indirectly affected by past and present federal, non-federal, and private activities, as well as natural events such as storms, earthquakes, and wildfires. The past and present activities that have affected aquatic and terrestrial ecosystems include activities authorized by the various NWPs issued from 1977 to 2017, activities authorized by other types of Department of the Army (DA) permits, as well as other federal, tribal, state, local, and private activities that are not regulated by the Corps. The structure and function of aquatic ecosystems are also influenced by past and present activities in uplands, because land use/land cover changes in uplands and other activities in uplands have indirect effects on aquatic ecosystems (e.g., MEA 2005a, Reid 1993). Due to the large geographic scale of the affected environment (i.e., the United States and its territories), as well as the many past and present human activities that have shaped the affected environment, the affected environment can only be practicably described in general terms. In addition, for this environmental assessment it is not possible to describe the environmental conditions for specific sites where the NWPs may be used to authorize eligible activities because those sites will be identified after this NWP is issued and goes into effect.

The total land area in the United States is approximately 2,260,000,000 acres, and the total land area in the contiguous United States is approximately 1,891,000,000 acres (Bigelow and Borchers 2017). Land uses in the United States as of 2012 is provided in Table 4.1 (Bigelow and Borchers 2017). Of the land area in the entire United States, approximately 60 percent (1,370,000,000 acres) is privately owned (Bigelow and Borchers 2017). Of the remaining lands in the United States, the federal government hold 28 percent (644,000,000 acres), state and local governments own 8 percent (189,000,000 acres), and 3 percent (63,000,000 acres) is held in trust by the Bureau of Indian Affairs (Bigelow and Borchers 2017).

Table 4.1. Major land uses in the United States – 2012 (Bigelow and Borchers 2017).

Land Use	Acres	Percent of Total
Agriculture	1,186,000,000	52.5
Forest land	502,000,000	22.2
Transportation use	27,000,000	1.2
Recreation and wildlife areas	254,000,000	11.2
National defense areas	27,000,000	1.2
Urban land	70,000,000	3.1
Miscellaneous use	196,000,000	8.5
Total land area	2,260,000,000	100.0

4.1 Quantity of Aquatic Ecosystems in the United States

There are approximately 283.1 million acres of wetlands in the United States; 107.7 million acres are in the conterminous United States and the remaining 175.4 million acres are in Alaska (Mitsch and Hernandez 2013). Wetlands occupy less than 9 percent of the global land area (Zedler and Kercher 2005). According to Dahl (2011), wetlands and deepwater habitats cover approximately 8 percent of the land area in the conterminous United States. Rivers and streams comprise approximately 0.52 percent of the total land area of the continental United States (Butman and Raymond 2011). Therefore, the wetlands, streams, rivers, and other aquatic habitats that are potentially waters of the United States and subject to regulation by the Corps under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act of 1899 comprise a minor proportion of the land area of the United States. The remaining land area of the United States (more than 92 percent, depending on the proportion of wetlands, streams, rivers, and other aquatic habitats that are subject to regulation under those two statutes) is outside the Corps regulatory authority.

Dahl (1990) estimated that approximately 53 percent of the wetlands in the conterminous United States were lost in the 200-year period from the 1780s to 1980s, while Alaska lost less than one percent of its wetlands and Hawaii lost approximately 12 percent of its original wetland acreage. In the 1780s, there were approximately 221 million acres of wetlands in the conterminous United States (Dahl 1990). California lost the largest percentage of its wetlands (91 percent), whereas Florida lost the largest acreage (9.3 million acres) (Dahl 1990). During that 200-year period, 22 states lost more than 50 percent of their wetland acreage, and 10 states have lost more than 70 percent of their original wetland acreage (Dahl 1990).

Frayer et al. (1983) evaluated wetland status and trends in the United States during the period of the mid-1950s to the mid-1970s. During that 20-year period, approximately 7.9 million acres of wetlands (4.2 percent) were lost in the conterminous United States. Much of the loss of estuarine emergent wetlands was due to changes to estuarine subtidal deepwater habitat, and some loss of estuarine emergent wetlands was due to urban development. For palustrine vegetated wetlands, nearly all of the losses of those wetlands were due to agricultural activities (e.g., conversion to agricultural production).

The U.S. Fish and Wildlife Service also examined the status and trends of wetlands in the United States during the period of the mid-1970s to the 1980s, and found that there was a net loss of more than 2.6 million acres of wetlands (2.5 percent) during that time period (Dahl and Johnson 1991). Freshwater wetlands comprised 98 percent of those wetland losses (Dahl and Johnson 1991). During that time period, losses of estuarine wetlands were estimated to be 71,000 acres, with most of that loss due to changes of emergent estuarine wetlands to open waters caused by shifting sediments (Dahl and Johnson 1991). Conversions of wetlands to agricultural use were responsible for 54 percent of the wetland losses, and conversion to other land uses resulted in the loss of 41 percent of wetlands (Dahl and Johnson 1991). Urban development was responsible for five percent of the wetland loss (Dahl and Johnson 1991). The annual rate of wetland loss has decreased substantially since the 1970s (Dahl 2011), when wetland regulation became more prevalent (Brinson and Malvárez 2002).

Between 2004 and 2009, there was no statistically significant difference in wetland acreage in the conterminous United States (Dahl 2011). According to the 2011 wetland status and trends report, during the period of 2004 to 2009 urban development accounted for 11 percent of wetland losses (61,630 acres), rural development resulted in 12 percent of wetland losses (66,940 acres), silviculture accounted for 56 percent of wetland losses (307,340 acres), and wetland conversion to deepwater habitats caused 21 percent of the loss in wetland area (115,960 acres) (Dahl 2011). Some of the losses occurred to wetlands that are not subject to Clean Water Act jurisdiction and some losses are due to activities not regulated under Section 404 of the Clean Water Act, such as unregulated drainage activities, exempt forestry activities, or water withdrawals. From 2004 to 2009, approximately 100,020 acres of wetlands were gained as a result of wetland restoration and conservation programs on agricultural land (Dahl 2011). Another source of wetland gain is conversion of other uplands to wetlands, resulting in a gain of 389,600 acres during the period of 2004 to 2009 (Dahl 2011). Inventories of wetlands, streams, and other aquatic resources are incomplete because the techniques used for those studies cannot identify some of those resources (e.g., Dahl (2011) for wetlands; Meyer and Wallace (2001) for streams).

Losses of vegetated estuarine wetlands due to the direct effects of human activities have decreased significantly due to the requirements of Section 404 of the Clean Water Act and other laws and regulations (Dahl 2011). During the period of 2004 to

2009, less than one percent of estuarine emergent wetlands were lost as a direct result of human activities, while other factors such as sea level rise, land subsidence, storm events, erosion, and other ocean processes caused substantial losses of estuarine wetlands (Dahl 2011). The indirect effects of other human activities, such as oil and gas development, water extraction, development of the upper portions of watersheds, and levees, have also resulted in coastal wetland losses (Dahl 2011). Eutrophication of coastal waters can also cause losses of emergent estuarine wetlands, through changes in growth patterns of marsh plants and decreases in the stability of the wetland substrate, which changes those marshes to mud flats (Deegan et al. 2012).

The Emergency Wetlands Resources Act of 1986 (Public Law 99-645) requires the USFWS to submit wetland status and trends reports to Congress (Dahl 2011). The latest status and trends report, which covers the period of 2004 to 2009, is summarized in Table 4.2. The USFWS status and trends report only provides information on acreage of the various aquatic habitat categories and does not assess the quality or condition of those aquatic habitats (Dahl 2011).

Table 4.2. Estimated aquatic resource acreages in the conterminous United States in 2009 (Dahl 2011).

Aquatic Habitat Category	Estimated Area in 2009 (acres)
Marine intertidal	227,800
Estuarine intertidal non-vegetated	1,017,700
Estuarine intertidal vegetated	4,539,700
All intertidal waters and wetlands	5,785,200
Freshwater ponds	6,709,300
Freshwater vegetated	97,565,300
• Freshwater emergent wetlands	27,430,500
• Freshwater shrub wetlands	18,511,500
• Freshwater forested wetlands	51,623,300
All freshwater wetlands	104,274,600
Lacustrine deepwater habitats	16,859,600
Riverine deepwater habitats	7,510,500
Estuarine subtidal habitats	18,776,500
All wetlands and deepwater habitats	153,206,400

The acreage of lacustrine deepwater habitats does not include the open waters of Great Lakes (Dahl 2011).

The Federal Geographic Data Committee has established the Cowardin system developed by the U.S. Fish and Wildlife Service (USFWS) (Cowardin et al. 1979) as the national standard for wetland mapping, monitoring, and data reporting (Dahl 2011) (see Federal Geographic Data Committee (2013)). The Cowardin system is a hierarchical system which describes various wetland and deepwater habitats, using structural characteristics such as vegetation, substrate, and water regime as defining characteristics. Wetlands are defined by plant communities, soils, or inundation or flooding frequency. Deepwater habitats are permanently flooded areas located below the wetland boundary. In rivers and lakes, deepwater habitats are usually more than two meters deep. The Cowardin et al. (1979) definition of "wetland" differs from the definition used by the Corps for the purposes of implementing Section 404 of the Clean Water Act. The Corps' regulations define the term "wetlands" as "those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas." [33 CFR 328.3] The Cowardin et al. (1979) requires only one factor (i.e., wetland vegetation, soils, hydrology) to be present for an area to be a wetland, while the Corps' wetland definition requires all three factors to be present under normal circumstances (Tiner 2017, Mitsch and Gosselink 2015). The NWI produced by applying the Cowardin et al. (1979) definition is the only national scale wetland inventory available. There is no national inventory of wetland acreage based on the Corps' wetland definition at 33 CFR 328.3.

There are five major systems in the Cowardin classification scheme: marine, estuarine, riverine, lacustrine, and palustrine (Cowardin et al. 1979). The marine system consists of open ocean on the continental shelf and its high energy coastlines. The estuarine system consists of tidal deepwater habitats and adjacent tidal wetlands that are usually partially enclosed by land, but may have open connections to open ocean waters. The riverine system generally consists of all wetland and deepwater habitats located within a river channel. The lacustrine system generally consists of wetland and deepwater habitats located within a topographic depression or dammed river channel, with a total area greater than 20 acres. The palustrine system generally includes all non-tidal wetlands and wetlands located in tidal areas with salinities less than 0.5 parts per thousand; it also includes ponds less than 20 acres in size. Approximately 95 percent of wetlands in the conterminous United States are freshwater wetlands, and the remaining 5 percent are estuarine or marine wetlands (Dahl 2011).

According to Hall et al. (1994), there are more than 204 million acres of wetlands and deepwater habitats in the State of Alaska, including approximately 174.7 million acres of wetlands. Wetlands and deepwater habitats comprise approximately 50.7 percent of the surface area in Alaska (Hall et al. 1994).

The National Resources Inventory (NRI) is a statistical survey conducted by the

Natural Resources Conservation Service (NRCS) (USDA 2018) of natural resources on non-federal land in the United States. The NRCS defines non-federal land as privately owned lands, tribal and trust lands, and lands under the control of local and state governments. Acreages of palustrine and estuarine wetlands and the land uses those wetlands are subjected to are summarized in Table 4.3. The 2015 NRI estimates that there are 110,638,500 acres of palustrine and estuarine wetlands on non-Federal land and water areas in the United States (USDA 2018). The 2015 NRI estimates that there are 49,598,800 acres of open waters on non-federal land in the United States, including lacustrine, riverine, and marine habitats, as well as estuarine deepwater habitats.

Table 4.3. The 2015 National Resources Inventory acreages for palustrine and estuarine wetlands on non-federal land, by land cover/use category (USDA 2018).

National Resources Inventory Land Cover/Use Category	Area of Palustrine and Estuarine Wetlands (acres)
cropland, pastureland, and Conservation Reserve Program land	17,300,000
forest land	65,800,000
rangeland	7,800,000
other rural land	14,600,000
developed land	1,500,000
water area	3,600,000
Total	111,000,000

The land cover/use categories used by the 2015 NRI are defined below (USDA 2018). Croplands are areas used to produce crops grown for harvest. Pastureland is land managed for livestock grazing, through the production of introduced forage plants. Conservation Reserve Program land is under a Conservation Reserve Program contract. Forest land is comprised of at least 10 percent single stem woody plant species that will be at least 13 feet tall at maturity. Rangeland is land on which plant cover consists mostly of native grasses, herbaceous plants, or shrubs suitable for grazing or browsing, and introduced forage plant species. Other rural land consists of farmsteads and other farm structures, field windbreaks, marshland, and barren land. Developed land is comprised of large urban and built-up areas (i.e., urban and built-up areas 10 acres or more in size), small built-up areas (i.e., developed lands 0.25 to 10 acres in size), and rural transportation land (e.g., roads, railroads, and associated rights-of-way outside urban and built-up areas). Water areas are comprised of waterbodies and streams that are permanent open waters.

The wetlands data from the Fish and Wildlife Service's Status and Trends study and the Natural Resources Conservation Service's National Resources Inventory should not be compared, because they use different methods and analyses to produce their results (Dahl 2011).

Leopold, Wolman, and Miller (1964) estimated that there are approximately 3,250,000 miles of river and stream channels in the United States. This estimate is based on an analysis of 1:24,000 scale topographic maps. Their estimate does not include many small streams. Many small streams, especially headwater streams, are not mapped on 1:24,000 scale U.S. Geological Survey (USGS) topographic maps (Leopold 1994) or included in other inventories (Meyer and Wallace 2001), including the National Hydrography Dataset (Elmore et al. 2013). Many small streams and rivers are not identified through maps produced by aerial photography or satellite imagery because of inadequate image resolution or trees or other vegetation obscuring the visibility of those streams from above (Benstead and Leigh 2012). In a study of stream mapping in the southeastern United States, only 20 percent of the stream network was mapped on 1:24,000 scale topographic maps, and nearly none of the observed intermittent or ephemeral streams were indicated on those maps (Hansen 2001). Another study in Massachusetts showed that 1:25,000 metric scale topographic maps exclude over 27 percent of stream miles in a watershed (Brooks and Colburn 2011). For a 1:24,000 scale topographic map, the smallest tributary found by using 10-foot contour interval has a drainage area of 0.7 square mile and length of 1,500 feet, and smaller stream channels are common throughout the United States (Leopold 1994). Benstead and Leigh (2012) found that the density of stream channels (length of stream channels per unit area) identified by digital elevation models was three times greater than the drainage density calculated by using USGS maps. Elmore et al. (2013) made similar findings in watersheds in the mid-Atlantic, where they determined that the stream density was 2.5 times greater than the stream density calculated with the National Hydrography Dataset. Due to the difficulty in mapping small streams, there are no accurate estimates of the total number of river or stream miles in the conterminous United States that might be considered as "waters of the United States."

The quantity of the Nation's aquatic resources presented by studies that estimate the length or number of stream channels (see above) or the acreage of wetlands (e.g., USFWS status and trends studies, National Wetlands Inventory (NWI), and Natural Resources Inventory (NRI)) are underestimates, because those inventories do not include many small wetlands and streams. The USFWS status and trends studies do not include Alaska, Hawaii, or the territories. The underestimate of national wetland acreage by the USFWS status and trends study and the NWI is primarily the result of the minimum size of wetlands detected through remote sensing techniques and the difficulty of identifying certain wetland types through those remote sensing techniques. The remote sensing approaches used by the USFWS for its NWI maps and its status and trends reports result in errors of omission that exclude wetlands that are difficult to identify through photointerpretation (Tiner 2017). These errors of omission are due to wetland type and the size of target mapping units (Tiner 2017). Therefore, it is important to understand the limitations of the source data when describing the environmental baseline for wetlands using maps and studies produced by remote sensing, especially in terms of wetland quantity.

Factors affecting the accuracy of wetland maps made by remote sensing include: the degree of ease or difficulty in identifying a particular wetland type, map scale, the quality and scale of the source information (e.g., aerial or satellite photos), the environmental conditions when the imagery was obtained, the time of year the imagery was obtained (e.g., leaf-off versus leaf on), the quality of the images, the minimum mapping unit (or target mapping unit), the mapping equipment, and the skills of the people drawing the maps (Tiner 2017). In general, wetland types that are difficult to identify through field investigations are likely to be underrepresented in maps made by remote sensing (Tiner 2017). Wetlands difficult to identify through remote sensing include evergreen forested wetlands, wetlands and the drier end of the wetland hydrology continuum, and significantly drained wetlands (Tiner 2017). Wetland types that are more readily identified and delineated through remote sensing techniques include ponds, marshes, bogs, and fens, (Tiner 2017). In the most recent wetland status and trends report published by the U.S. Fish and Wildlife Service, the target minimum wetland mapping unit was 1 acre, although some easily identified wetlands as small as 1/10-acre were identified in that effort (Dahl 2011). The National Wetlands Inventory identifies wetlands regardless of their jurisdictional status under the Clean Water Act (Tiner 2017).

Activities authorized by NWPs will adversely affect a smaller proportion of the Nation’s wetland base than indicated by the wetlands acreage estimates provided in the most recent status and trends report, or the NWI maps for a particular region.

Not all wetlands, streams, and other types of aquatic resources are subject to federal jurisdiction under the Clean Water Act (Mitsch and Gosselink 2015). Two U.S. Supreme Court decisions have identified limits to Clean Water Act jurisdiction. In 2001, in *Solid Waste Agency of Northern Cook County v. Army Corps of Engineers* (531 U.S. 159) the U.S. Supreme Court held that the use of isolated, non-navigable, intrastate waters by migratory birds is not, by itself a sufficient basis for exercising federal regulatory authority under the Clean Water Act (see 80 FR 37056). In the Supreme Court’s 2006 decision in *Rapanos* v. *United States,* (547 U.S. 715), one justice stated that waters and wetlands regulated under the Clean Water Act must have a “significant nexus” to downstream traditional navigable waters. Four justices (the plurality) concluded that Clean Water Act jurisdiction applies only to relatively permanent waters connected to traditional navigable waters and to wetlands that have a continuous surface connection to those relatively permanent waters. The remaining justices in *Rapanos* stated that Clean Water Act jurisdiction applies to waters and wetlands that meet either the significant nexus test or the Plurality’s test.

There are 94,133 miles of shoreline in the United States (NOAA 1975). Of that shoreline, 88,633 miles are tidal shoreline and 5,500 miles are shoreline along the Great Lakes and rivers that connect those lakes to the Atlantic Ocean. More recently, Gittman et al. (2015) estimated that there are 99,524 miles of tidal shoreline in the conterminous United States.

4.2 Quality of Aquatic Ecosystems in the United States

The USFWS status and trends study does not assess the condition or quality of wetlands and deepwater habitats (Dahl 2011). Information on water quality in waters and wetlands, as well as the causes of water quality impairment, is collected by the U.S. EPA under Sections 305(b) and 303(d) of the Clean Water Act. Table 4.4 provides U.S. EPA's most recent national summary of water quality in the Nation's waters and wetlands.

Table 4.4. National summary of water quality data (U.S. EPA, https://iaspub.epa.gov/waters10/attains_nation_cy.control accessed 11/27/2020).

Category of water	Total waters	Total waters assessed	Percent of waters assessed	Good waters	Threatened waters	Impaired waters
Rivers and streams	3,533,205 miles	1,110,961 miles	31.4	518,293 miles	4,495 miles	588,173 miles
Lakes, reservoirs and ponds	41,666,049 acres	18,629,795 acres	44.7	5,390,570 acres	30,309 acres	13,208,917 acres
Bays and estuaries	87,791 square miles	56,141 square miles	63.9	11,516 square miles	0 square miles	44,625 square miles
Coastal shoreline	58,618 miles	4,627 miles	7.9	1,298 miles	0 miles	3,329 miles
Ocean and near coastal waters	54,120 square miles	6,944 square miles	12.8	726 square miles	0 square miles	6,218 square miles
Wetlands	107,700,000 acres	1,242,252 acres	1.2	569,328 acres	0 acres	672,924 Acres
Great Lakes shoreline	5,202 miles	4,460 miles	85.7	106 miles	0 miles	4,354 miles
Great Lakes open waters	196,343 square miles	39,231 square miles	20.0	1 square mile	0 square miles	39,230 square miles

Waters and wetlands classified by states as “good” meets all their designated uses. Waters classified as “threatened” currently support all of their designated uses, but if pollution control measures are not taken one or more of those uses may become impaired in the future. A water or wetland is classified by the state as “impaired” if any one of its designated uses is not met. The definitions of “good,” “threatened,” and “impaired” are applied by states to describe the quality of their waters (the above definitions were found in the metadata in U.S. EPA (2015)). Designated uses include the “protection and propagation of fish, shellfish and wildlife,” “recreation in and on the water,” the use of waters for “public water supplies, propagation of fish, shellfish, wildlife, recreation in and on the water,” and “agricultural, industrial and other purposes including navigation.” (40 CFR 130.3). These designated uses are assessed by states in a variety of ways, by examining various physical, chemical and biological characteristics, so it is not possible to use the categories of “good,” “threatened,” and “impaired” to infer the level of ecological functions and services these waters perform.

According to the latest U.S. EPA national summary data, 52.9 percent of assessed rivers and streams, 70.9 percent of assessed lakes, reservoirs, and ponds, 79.5 percent of assessed bays and estuaries, 71.9 percent of assessed coastal shoreline, 89.5 percent of assessed ocean and near coastal waters, 54.2 percent of assessed wetlands, 97.6 percent of assessed Great Lakes shoreline, and 100 percent of Great Lakes open water are impaired.

For rivers and streams, 34 causes of impairment were identified, and the top 10 causes are pathogens, sediment, nutrients, organic enrichment/oxygen depletion, temperature, metals (other than mercury), polychlorinated biphenyls, mercury, habitat alterations, and turbidity. The top 10 primary sources of impairment for the assessed rivers and streams are: unknown sources, agriculture, hydromodification, atmospheric deposition, habitat alterations not directly related to hydromodification, unspecified non-point source, municipal discharges/sewage, natural/wildlife, urban-related runoff/stormwater, and silviculture (forestry).

Thirty-three causes of impairment were identified for lakes, reservoirs, and ponds. The top 10 causes of impairment for these waters are: mercury, nutrients, polychlorinated biphenyls, turbidity, organic enrichment/oxygen depletion, metals (other than mercury), pH/acidity/caustic conditions, salinity/total dissolved solids/chlorides/sulfates, algal growth, and nuisance exotic species. For lakes, reservoirs, and ponds, the top 10 sources of impairment are: atmospheric deposition, unknown sources, agriculture, natural/wildlife, unspecified non-point source, other sources, urban-related runoff/stormwater, legacy/historic pollutants, municipal discharges/sewage, and hydromodification.

Twenty-eight causes of impairment were identified for bays and estuaries. The top 10 causes of impairment for these waters are: polychlorinated biphenyls, nutrients, mercury, turbidity, dioxins, toxic organics, metals (other than mercury), pesticides, pathogens, and organic enrichment/oxygen depletion. For bays and estuaries, the top 10 sources of impairment are: legacy/historic pollutants, urban-related runoff/stormwater, unknown sources, atmospheric deposition, municipal discharges/sewage, unspecified non-point sources, other sources, natural/wildlife, agriculture, and industrial.

Coastal shorelines were impaired by 16 identified causes, the top 10 of which are: mercury, pathogens, turbidity, organic enrichment/oxygen depletion, pH/acidity/caustic conditions, nutrients, oil and grease, temperature, cause unknown – impaired biota, and algal growth. The top 10 sources of impairment of coastal shorelines are municipal discharges/sewage, urban-related runoff/stormwater, unknown sources, recreational boating and marinas, hydromodification, industrial, unspecified non-point sources, agriculture, legacy/historic pollutants, and land application/waste sites/tanks.

Ocean and near coastal waters were impaired by 16 identified causes, the top 10 of which are: mercury, organic enrichment/oxygen depletion, pathogens, metals (other than mercury), pesticides, turbidity, nuisance exotic species, total toxics, pH/acidity/caustic conditions, and polychlorinated biphenyls. The top 10 sources of impairment of ocean and near coastal waters are: atmospheric deposition, unknown sources, unspecified non-point sources, other sources, recreation and tourism (non-boating), recreational boating and marinas, urban-related runoff/stormwater, hydromodification, municipal discharges/sewage, and construction.

For wetlands, 23 causes of impairment were identified, and the top 10 causes are: organic enrichment/oxygen depletion, mercury, metals (other than mercury), salinity/total dissolved solids/chlorides/sulfates, pathogens, nutrients, toxic inorganics, temperature, pH/acidity/caustic conditions, and turbidity. The 10 primary sources for wetland impairment are: unknown sources, natural/wildlife, agriculture, atmospheric deposition, resource extraction, hydromodification, unspecified non-point sources, other, land application/waste sites/tanks, and groundwater loadings/withdrawals.

For Great Lakes shorelines, 12 causes of impairment were identified, and the top 10 causes are: polychlorinated biphenyls, dioxins, mercury, pesticides, toxic organics, pathogens, nutrients, nuisance exotic species, sediment, and habitat alterations. The 10 primary sources for Great Lakes shoreline impairment are: atmospheric deposition, unknown sources, legacy/historic pollutants, agriculture, municipal discharges/sewage, hydromodification, urban-related runoff/stormwater, habitat alterations (not directly related to hydromodifications), industrial, and unspecified non-point sources.

For Great Lakes open waters, 8 causes of impairment were identified, and those causes are: polychlorinated biphenyls, mercury, dioxins, pesticides, toxic organics, nutrients, metals (other than mercury), and sediment. The 8 sources for Great

Lakes open water impairment are: atmospheric deposition, unknown sources, agriculture, municipal discharges/sewage, unspecified non-point sources, industrial, urban-related runoff/stormwater, and legacy/historic pollutants.

Water quality standards are established by states, with review and approval by the U.S. EPA (see Section 303(c) of the Clean Water Act and the implementing regulations at 40 CFR part 131). Under Section 401 of the Clean Water Act, state and tribal certification authorities, and in certain areas EPA, review proposed discharges into waters of the United States to determine compliance with applicable water quality requirements.

Most causes and sources of impairment identified by states in the water quality summary discussed above are not due to activities regulated under Section 404 of the Clean Water Act or Section 10 of the Rivers and Harbors Act of 1899. Inputs of sediments into aquatic ecosystems can result from erosion occurring within a watershed (Beechie et al. 2013, Gosselink and Lee 1989). As water moves through a watershed it carries sediments and pollutants to streams (e.g., Allan 2004, Dudgeon et al. 2005, Paul and Meyer 2001) and wetlands (e.g., Zedler and Kercher 2005, Wright et al. 2006). Non-point sources of pollution (i.e., pollutants carried in runoff from farms, roads, and urban areas) are largely uncontrolled (Brown and Froemke 2012) because the Clean Water Act only requires permits for point sources discharges of pollutants (i.e., discharges of dredged or fill material regulated under section 404 and point source discharges of other pollutants regulated under section 402). Habitat alterations as a cause or source of impairment may be the result of activities regulated under section 404 and section 10 because they involve discharges of dredged or fill material or structures or work in navigable waters, but habitat alterations may also occur as a result of activities not regulated under those two statutes, such as the removal of vegetation from upland riparian areas. Hydrologic modifications may or may not be regulated under section 404 or section 10.

The indirect effects of changes in upland land use (which are highly likely not to be subject to federal control and responsibility, at least in terms of the Corps Regulatory Program), including the construction and expansion of upland developments, have substantial adverse effects on the quality (i.e.. the ability to perform hydrologic, biogeochemical, and habitat functions) of jurisdictional waters and wetlands because those upland activities alter watershed-scale processes. Those watershed-scale processes include water movement and storage, erosion and sediment transport, and the transport of nutrients and other pollutants.

Habitat alterations as a cause or source of impairment may be the result of activities regulated under section 404 and section 10 because they involve discharges of dredged or fill material into jurisdictional waters or structures or work in navigable waters, but habitat alterations may also occur as a result of activities not regulated under those two statutes, such as the removal of vegetation from upland riparian areas. Hydrologic modifications may or may not be regulated under section 404 or section 10, depending on whether those hydrologic modifications are the result of discharges of dredged or fill material into waters of the United States regulated under Section 404 of the Clean Water Act or structures or work in navigable waters of the United States regulated under Section 10 of the Rivers and Harbors Act of 1899. When states, tribes, or the U.S. EPA establish total maximum daily loads (TMDLs) for pollutants and other impairments for specific waters, there may be variations in how these TMDLs are defined (see 40 CFR part 130).

As discussed below, many anthropogenic activities and natural processes affect the ability of jurisdictional waters and wetlands to perform ecological functions. Stream and river functions are affected by activities occurring in their watersheds, including the indirect effects of land uses changes (Beechie et al. 2013, Allan 2004, Paul and Meyer 2001). Booth at al. (2004) found riparian land use in residential areas also strongly affects stream condition because many landowners clear vegetation up to the edge of the stream bank. The removal of vegetation from upland riparian areas and other activities in those non-jurisdictional areas do not require DA authorization. Wetland functions are also affected by indirect effects of land use activities in the land area that drains to the wetland (Zedler and Kercher 2005, Wright et al. 2006). Human activities within a watershed or catchment that have direct or indirect adverse effects on rivers, streams, wetlands, and other aquatic ecosystems are not limited to discharges of dredged or fill material into waters of the United States or structures or work in a navigable waters. Human activities in uplands have substantial indirect effects on the structure and function of aquatic ecosystems, including streams and wetlands, and their ability to sustain populations of listed species. It is extremely difficult to distinguish between degradation of water quality caused by upland activities and degradation of water quality caused by the filling or alteration of wetlands (Gosselink and Lee 1989).

The U.S. Environmental Protection Agency (U.S. EPA) has undertaken the National Wetland Condition Assessment (NWCA), which is a statistical survey of wetland condition in the United States (U.S. EPA 2016). The NWCA assesses the ambient conditions of wetlands at the national and regional scales. The national scale encompasses the conterminous United States. The regional scale consists of four aggregated ecoregions: Coastal Plains, Eastern Mountains and Upper Midwest, Interior Plains, and West. In May 2016, U.S. EPA issued a final report on the results of its 2011 NWCA (U.S. EPA 2016).

The 2011 NWCA determined that, across the conterminous United States, 48 percent of wetland area (39.8 million acres) is in good condition, 20 percent of the wetland area (12.4 million acres) is in fair condition, and 32 percent (19.9 million acres) is in poor condition (U.S. EPA 2016). The 2011 NWCA also examined indicators of stress for the wetlands that were evaluated. The most prevalent physical stressors were vegetation removal, surface hardening via conversion to pavement or soil compaction, and ditching (U.S. EPA 2016). In terms of chemical stressors, most wetlands were subject to low exposure to heavy metals and soil phosphorous, but substantial percentages of wetland area in the West and Eastern Mountains and Upper Midwest ecoregions were found to have moderate stressor levels for heavy metals (U.S. EPA 2016). For soil phosphorous concentrations, stressor levels were high for 13 percent of the wetland area in the Eastern Mountains and Upper Midwest ecoregion (U.S. EPA 2016). Across the conterminous United States, for biological stressors indicated by non-native plants, 61 percent of the wetland area exhibited low stressor levels (U.S. EPA 2016). When examined on an ecoregion basis, the Eastern Mountains and Upper Midwest and Coastal Plains ecoregions had high percentages of wetland area with low non-native plant stressor levels, but the West and Interior Plains ecoregions had small percentages of areas with low non-native plant stressor levels (U.S. EPA 2016).

4.3 Aquatic resource functions and services

Functions are the physical, chemical, and biological processes that occur in ecosystems (33 CFR 332.2). Human communities are tightly interconnected to ecosystems, and depend on those ecosystems for the functions and services that sustain their health and well-being (Cronon 1996). Wetland functions occur through interactions of their physical, chemical, and biological features (Smith et al. 1995). Wetland functions depend on a number of factors, such as the movement of water through the wetland, landscape position, surrounding land uses, vegetation density within the wetland, geology, soils, water source, and wetland size (NRC 1995). In its evaluation of wetland compensatory mitigation in the Clean Water Act Section 404 permit program, the National Research Council (2001) recognized five general categories of wetland functions:

- Hydrologic functions
- Water quality improvement
- Vegetation support
- Habitat support for animals
- Soil functions

Hydrologic functions include short- and long-term water storage and the maintenance of wetland hydrology (NRC 1995). Water quality improvement functions encompass the transformation or cycling of nutrients, the retention, transformation, or removal of pollutants, and the retention of sediments (NRC 1995). Vegetation support functions include the maintenance of plant communities, which support various species of animals as well as economically important plants. Wetland soils support diverse communities of bacteria and fungi which are critical for biogeochemical processes, including nutrient cycling and pollutant removal and transformation (NRC 2001). Wetland soils also provide rooting media for plants, as well as nutrients and water for those plants. These various functions generally interact with each other, to influence overall wetland functioning, or ecological integrity (Smith et al. 1995; Fennessy et al. 2007). As discussed earlier in this report, the Corps regulations at 33 CFR 320.4(b) list wetland functions that are important for the public interest review during evaluations of applications for DA permits, and for the issuance of general permits.

Not all wetlands perform the same functions, nor do they provide functions to the same degree (Smith et al. 1995). Therefore, it is necessary to account for individual and regional variation when evaluating wetlands and the functions and services they provide. The types and levels of functions performed by a wetland are dependent on its hydrologic regime, the plant species inhabiting the wetland, soil type, and the surrounding landscape, including the degree of human disturbance of the landscape (Smith et al. 1995).

Streams also provide a variety of functions, which differ from wetland functions. Streams also provide hydrologic functions, nutrient cycling functions, food web support, and corridors for movement of aquatic organisms (Allan and Castillo 2007). When considering stream functions, the stream channel should not be examined in isolation. The riparian corridor next to the stream channel is an integral part of the stream ecosystem and has critical roles in stream functions (NRC 2002). Riparian areas provide many of the same general functions as wetlands (NRC 1995, 2002). Fischenich (2006) conducted a review of stream and riparian corridor functions, and through a committee, identified five broad categories of stream functions:

- Stream system dynamics
- Hydrologic balance
- Sediment processes and character
- Biological support
- Chemical processes and landscape pathways

Stream system dynamics refers to the processes that affect the development and maintenance of stream channels, floodplains, and riparian areas over time, as well as energy management by streams, floodplains, and riparian areas. Hydrologic balance includes surface water storage processes, the exchange of surface and subsurface water, and the movement of water through the stream corridor. Sediment processes and character functions relate to processes for establishing and maintaining stream substrate and structure. Biological support functions include the biological communities inhabiting streams, floodplains, and riparian areas. Chemical processes and pathway functions influence water and soil quality, as well as the chemical processes and nutrient cycles that occur in streams, floodplains, and riparian areas. Rivers and streams perform functions to different degrees, depending on watershed condition (Hynes 1975), the severity of direct and indirect impacts to streams caused by human activities, and their interactions with other environmental components, such as floodplains and riparian areas (Allan 2004, Gergel et al. 2002).

Ecosystem services are the benefits that humans derive from ecosystem functions (33 CFR 332.2). The Millennium Ecosystem Assessment (2005a) describes four categories of ecosystem services: provisioning services, regulating services, cultural services, and supporting services. For wetlands and open waters, provisioning services include the production of food (e.g., fish, fruits, game), fresh water storage, food and fiber production, production of chemicals that can be used for medicine and other purposes, and supporting genetic diversity for resistance to disease. Regulating services relating to open waters and wetlands consist of climate regulation, control of hydrologic flows, water quality through the removal, retention, and recovery of nutrients and pollutants, erosion control, mitigating natural hazards such as floods, and providing habitat for pollinators. Cultural services that come from wetlands and open waters include spiritual and religious values, recreational opportunities, aesthetics, and education. Wetlands and open waters contribute supporting services such as soil formation, sediment retention, and nutrient cycling.

Aquatic ecosystems in the current affected environment provide a wide variety of ecological functions and services to differing degrees (MEA 2005a) to human communities. When natural ecosystems are converted to human-dominated ecosystems, there are tradeoffs between the losses in ecosystem services provided by natural ecosystems and the gains in goods and services provided by land use changes (e.g., conversion to agricultural lands, urban and suburban areas), resource extraction, harvesting, and other activities (MEA 2005c). For thousands of years, human communities have altered landscapes and ecosystems to provide goods and services that contribute to their well-being and needs, such as food, safety, and commerce, and made trade-offs by increasing certain ecosystem functions and services while reducing other ecosystem functions and services (Karieva et al. 2007). Degraded ecosystems can provide ecological functions and services that continue to contribute to conservation values (Weins and Hobbs 2015).

Examples of services provided by wetland functions include flood damage reduction, maintenance of populations of economically important fish and wildlife species, maintenance of water quality (NRC 1995, MEA 2005a) and the production of populations of wetland plant species that are economically important commodities, such as timber, fiber, and fuel (MEA 2005a). Wetlands can also provide important climate regulation and storm protection services (MEA 2005a).

Stream functions also result in ecosystem services that benefit society. Streams and their riparian areas store water, which can reduce downstream flooding and subsequent flood damage (NRC 2002, MEA 2005a). These ecosystems also maintain populations of economically important fish, wildlife, and plant species, including valuable fisheries (MEA 2005a, NRC 2002). The nutrient cycling and pollutant removal functions help maintain or improve water quality for surface waters (NRC 2002, MEA 2005a). Streams and riparian areas also provide important recreational opportunities. Rivers and streams also provide water for agricultural, industrial, and residential use (MEA 2005a).

Freshwater ecosystems provide services such as water for drinking, household uses, manufacturing, thermoelectric power generation, irrigation, and aquaculture; production of finfish, waterfowl, and shellfish; and non-extractive services, such as flood control, transportation, recreation (e.g., swimming and boating), pollution dilution, hydroelectric generation, wildlife habitat, soil fertilization, and enhancement of property values (Postel and Carpenter 1997).

Marine ecosystems provide a number of ecosystem services, including fish production; materials cycling (e.g., nitrogen, carbon, oxygen, phosphorous, and sulfur); transformation, detoxification, and sequestration of pollutants and wastes produced by humans; support of ocean-based recreation, tourism, and retirement industries; and coastal land development and valuation, including aesthetics related to living near the ocean (Peterson and Lubchenco 1997).

Costanza et al. (2014) estimated the value of ecosystem services, by general categories of ecosystem type. Their estimates, based on data analysis conducted in 2011 and using the 2007 value of the U.S. dollar, are provided in Table 4.5. The ecosystem categories providing the highest values of ecosystem services by acre per year were coral reefs ($142,661 per acre per year), followed by tidal marshes and mangrove wetlands ($78,506 per acre per year). Forested and floodplain wetlands had a value of $10,401 per acre per year.

Table 4.5 – Estimates of the value of ecosystem services, by ecosystem category (Costanza et al. 2014)

Ecosystem category	2007$ per acre per year
Marine	554
open ocean	24
coastal	3,622
• estuaries	11,711
• seagrass/algae beds	11,711
• coral reefs	142,661
• coastal shelf	900
Terrestrial	1,985
forest	1,539
• tropical	2,180
• temperate/boreal	1,270
grass/rangelands	1,687
wetlands	56,770
• tidal marsh/mangroves	78,506
• swamps/floodplains	10,401
lakes/rivers	5,067
desert	-
tundra	-
ice/rock	-
cropland	2,255
urban	2,698

Ecosystem resilience (i.e., the ability of ecosystems to sustain their structure and function and continue to provide ecosystem services), is affected by anthropogenic disturbances and environmental changes (Biggs et al. 2012, Folke et al. 2004). Climate change may affect how ecosystems function, and the services that arise from those ecological functions (Grimm et al. 2013b). Those effects may be positive, negative, or neutral, depending on context-specific circumstances. Climate change may also affect the ability of ecosystems to perform functions, and how those functions are performed with respect to timing and location within landscapes (Nelson et al. 2013). Ecosystem services that may be affected by climate change include: land-based food production, wildfire regulation, the reductions of hazards in coastal areas (e.g., erosion, flooding), marine fisheries production, water supplies, and nature-dependent tourism and outdoor recreation (Nelson et al. 2013). Climate change has had, and is likely to continue to have, adverse impacts on food production and terrestrial ecosystems, in part because of changing precipitation patterns and temperatures, as well as increases in the frequency and intensity of extreme events, such as droughts, floods, heatwaves, and other events. (IPCC 2019).

The adverse effects of climate change, such as sea level rise, coral bleaching, and changes in hydrology and water temperatures, are likely to cause reductions in the services provided by waters and wetlands (MEA 2005a). Management actions that help sustain or expand the services provided by ecosystems can help communities adapt to climate change, and improve human well-being in those communities (NAS 2019). Examples of such management actions include: improving carbon sequestration by plants and soils, protecting coastal areas from erosion by restoring or establishing wetlands that can adjust to sea level rise, improving fisheries that sustain human livelihoods, and planting trees and other vegetation in urban areas where they can help support biodiversity, moderate temperatures, and provide health and social benefits to people (NAS 2019).

This NWP authorizes structures or work in navigable waters of the United States, as well as discharges of dredged or fill material into all waters of the United States, for maintenance activities. These waters include in the marine, estuarine, palustrine, lacustrine, and riverine systems of the Cowardin classification system.

Activities authorized by this NWP will help sustain existing structures, fills, and other work that provide services that are valued by society, including buildings and infrastructure. For example, maintenance activities are conducted to repair existing structures. This NWP may also be used to authorize the removal of accumulated sediments in the vicinity of existing structures, which will help those structures and their associated facilities continue to function efficiently and serve their intended project purposes.

4.4 Human Activities and Natural Factors that Affect the Quantity and Quality of Aquatic Ecosystems in the United States

The affected environment is the current environmental setting (i.e., environmental baseline) against which the environmental effects of the proposed action (i.e., the issuance of an NWP that authorizes activities with no more than minimal individual and cumulative adverse environmental effects for a period of no more than five years) are evaluated, to determine whether the issuance of this NWP will have a significant impact on the quality of the human environment. The affected environment is also used as a basis for comparison to determine whether activities authorized by this NWP during the period it is in effect will result in no more than minimal individual and cumulative adverse environmental effects.

Ecosystems are combinations of animals, plants, people, fungi, and other living organisms that interact with the physical environment (NAS 2019). Ecosystems are open systems that are constantly changing because disturbances a normal component of ecosystem dynamics (Wallington et al. 2005). Ecosystems perform a variety of physical, chemical, and biological processes. All of the Earth's ecosystems have been affected either directly or indirectly by human activities (Radeloff et al. 2015, Vitousek et al. 1997). In most areas of the world, there are no pristine ecosystems because of the widespread effects that human activities (e.g., overharvesting of species for food and other purposes, use of fire to control plant communities at a landscape scale) have had on ecosystems since the last Ice Age (Geist and Hawkins 2016). Ecosystems are rapidly changing because of climate change and various categories of human activities, such as pollution, changes in land use, species introductions, and the exploitation of natural resources (NAS 2019). For thousands of years, human activities have caused substantial amounts of cumulative environmental change, including alterations of ecosystem structure and function and the services those ecosystems provide (Evans and Davis 2018, Geist and Hawkins 2016, Ellis et al. 2010, Cronon 1996, Denevan 1992). The impacts of human activities on the environment occur in cycles, as civilizations and communities rise and fall, and as ecosystems recover after civilizations and communities collapse (Denevan 1992).

Ecosystems are not separate from human communities; they are interdependent with each other and comprise social-ecological systems (Folke et al. 2011). The concept of social-ecological systems has similarities to the definition of "human environment" in CEQ's NEPA regulations at 40 CFR 1508.1(m), which recognizes the relationship between the natural, physical environment and people. Social-ecological systems are dynamic, not static, and can exhibit multiple states (i.e., differences in structure and function) that are separated by thresholds (Walker and Salt 2006). Social-ecological systems exist at a number of scales, ranging from local to regional to global (Folke et al. 2010). Social-ecological systems are affected by human activities, as well as natural perturbations and changing environmental conditions, but they possess resilience and adaptive capacities that allow them to continue to provide ecological functions and services when properly managed (Chapin et al. 2010). From the perspective of social-ecological systems, resilience is defined by Folke et al. (2010) as the capacity of a social-ecological system to withstand disturbance and undergo changes, with little or no change in structure, functions, and interactions (i.e., feedbacks among system components).

People have managed landscapes and ecosystems to provide ecosystems services such as food production; lessening risks from storms, other natural events, and predation; and the production of various goods (Karieva et al. 2007). Human alteration of ecosystems results in trade-offs where some ecosystem services increase, other ecosystem services decrease, and some ecosystem services may be unchanged. Some human alterations of ecosystems benefit humans and other species, some alterations benefit humans and adversely affect other species, and other alterations result in degradation of ecosystems that provides no benefits to humans and other species (Karieva et al. 2007).

Over 75 percent of the ice-free land on Earth has been altered by human activities (IPCC 2019, Ellis and Ramankutty 2008). Approximately 33 percent of the Earth's ice-free land consists of lands heavily used by people: urban areas, villages, lands used to produce crops, and occupied rangelands (Ellis and Ramankutty 2008). For marine ecosystems, Halpern et al. (2008) determined that there are no marine waters that are unaffected by human activities, and that 41 percent of the area of ocean waters is affected by multiple anthropogenic disturbances (e.g., land use activities that generate pollution that reaches coastal waters, marine habitat destruction or modification, and the extraction of resources). The marine waters most highly impacted by human activities are located on the continental shelf and slope areas, which are affected by both land-based and ocean-based human activities (Halpern et al. 2008).

Human population density is a good indicator of the relative effect that people have had on local ecosystems, with lower population densities generally being associated with smaller impacts to ecosystems and higher population densities generally being associated with larger impacts on ecosystems (Ellis and Ramankutty 2008). Human activities such as urbanization, agriculture, and forestry alter ecosystem structure and function by changing their interactions with other ecosystems, their biogeochemical cycles, and their species composition (Vitousek et al. 1997). Changes in land use reduce the ability of ecosystems to produce ecosystem services, such as food production, reducing infectious diseases, and regulating climate and air quality (IPCC 2019, Foley et al. 2005).

Around the beginning of the 19th century, the degree of impacts of human activities on the Earth's ecosystems began to exceed the degree of impacts to ecosystems caused by natural disturbances and natural variability (Steffen et al. 2007). Aquatic ecosystems have been altered by a number of disturbances that have increased as the human population has increased, especially the removal or reduction of top predators, the removal or reduction of species that are ecosystem engineers, overfishing, habitat degradation and loss, inputs of chemical pollutants such as nutrients and contaminants, changes in connectivity among ecosystem components, changes in ecosystem dynamics, and the homogenization of biological communities (Geist and Hawkins 2016).

Despite the prevalence of human activities that have altered landscapes and seascapes and the ecosystems within those landscapes and seascapes over long periods of time, many of those ecosystems continue to provide ecological functions and services to varying degrees (Clewell and Aronson 2013). Disturbances to ecosystems, landscapes, and seascapes may result in those systems recovering to their original structure and function through biotic and abiotic processes that provide resilience, or those ecosystems may be transformed to a different ecological structure and function (i.e., an alternative state) (van Andel and Aronson 2012). If the ecosystem, landscape, or seascape changes to an alternative structure and function, that alternative state may be considered an improvement or degradation, depending on the perspective of the person evaluating the change (Backstrom et al. 2018, van Andel and Aronson 2012).

Human activities have contributed to warming of the atmosphere, oceans, and land areas through emissions of greenhouse gases (e.g., carbon dioxide, methane, nitrous oxide) (IPCC 2021). Greenhouse gases that are produced by human activities change the Earth’s energy balance, as well as its climate (NRC 2020). Since 1900, the Earth’s average surface temperature has increased by approximately 1.8 degrees Fahrenheit (NRC 2020). Land plays an important role in the Earth’s climate system because it is a source of greenhouse gas emissions, as well as a sink for greenhouse gases (IPCC 2019).

Climate change has been one of the major drivers of ecosystem change (Hughes et al. 2013, MEA 2005a). Climate change due to both anthropogenic and natural causes is a major driving force for changes in ecosystem structure and function (Millar and Brubaker 2006). However, aquatic and terrestrial ecosystems are subjected to other significant drivers of change. In addition to climate change, aquatic and terrestrial ecosystems are also adversely affected by land use and land cover changes, natural resource extraction (including water withdrawals), pollution, species introductions, and removals of species (NAS 2019, Staudt et al. 2013, Bodkin 2012, MEA 2005a) and changes in nutrient cycling (Julius et al. 2013). Climate change interacts with other human activities that cause changes to ecosystem structure and function, to exacerbate those changes (Grimm et al. 2013b).

Climate change affects ecosystem structure and function through: increases in water temperature; increases in air temperature; changes in precipitation patterns; increases in the intensity of natural disturbances (e.g., storms); changes in species distributions and survival; changes in ocean chemistry; and other impacts (IPCC

2021, NAS 2019). Climate change can increase amounts of rainfall and snowfall because warmer air can hold more water that becomes precipitation, and these larger precipitation events can increase the frequency and intensity of flooding (NRC 2020), which can affect the structure and function of aquatic and terrestrial ecosystems. In addition, climate change can increase the intensity of droughts and the risks of wildfire (NRC 2020), which can also affect the structure and function of aquatic and terrestrial ecosystems. The effects of climate change on ecosystems are dependent on context, and those effects can be positive, negative, or neutral (NAS 2019). As the Earth's climate changes, some ecosystems may become more productive while other ecosystems may become less productive (Grimm et al. 2013a). In the next 50 years, global climate change and nutrient loading are anticipated to become important causes of change in wetlands and waters (MEA 2005a).

Climate change is occurring at a global scale, and is likely to cause complex interactions among ecosystem processes, the species that inhabit ecosystems, and the drivers of ecosystem dynamics (NAS 2019). Climate change affects ecosystem productivity, biogeochemical cycling processes, species ranges, and the distribution of ecosystems (Grimm et al. 2013a) in landscapes and seascapes. Climate change is causing shifts in climate zones in many areas of the Earth, which is resulting in changes in the ranges, behaviors, and populations of various species of plants and animals. (IPCC 2019). Climate change is likely to alter the distributions of some species, because under a changing climate some species may no longer be able to survive in their current habitats while other species may thrive in the changing climate conditions (NRC 2020, Grimm et al. 2013a). Some species may benefit from changes in in their range, distribution, and phenology, while other species may be adversely affected by these changes (Grimm et al. 2013b).

Climate change is occurring more quickly than the ability of ecosystems to adapt to the altered climate (NAS 2019). For those ecosystems that exhibit non-linear dynamics (i.e., thresholds that, when crossed, cause the ecosystem to exhibit a substantial change in structure and function), climate change can affect their resilience to environmental changes caused by human activities and natural disturbances (NAS 2019). Global climate change is expected to increase the loss and degradation of waters and wetlands, and contribute to the loss or decline of species that inhabit waters and wetlands (MEA 2005a).

In coastal areas, increases in sea level caused by climate change amplifies interactions between coastal waters and the coasts, which can produce more flooding and larger storm surges (IPCC 2021, NRC 2020). Climate change is causing increases in coastal erosion, which is also driving changes in coastal land use (IPCC 2019). Sea level rise and increases in storm surges associated with climate change are likely to cause increases in the erosion of shorelines and their associated habitat, increases in the salinity of estuaries and freshwater aquifers, changes in tidal ranges in rivers and bays, alterations in sediment and nutrient transport, and increases in coastal flooding, which will likely affect the functions and services provided by coastal wetlands, including the vulnerability of some coastal populations to the adverse effects of these changes (MEA 2005a).

In summary, the affected environment (i.e., the current environmental setting, or environmental baseline) has been shaped by a wide variety of human activities and natural factors or disturbances. Those human activities and natural disturbances include land use changes, species invasions, climate change, changes in nutrient cycling (e.g., nitrogen), and others (NAS 2019, Radeloff et al. 2015), with anthropogenic disturbances being the major driver of change. Wetlands, streams, and other aquatic resources and the ecological functions and services they provide are directly and indirectly affected by changes in land use and land cover, species introductions, species overexploitation, pollution, eutrophication, resource extraction (including water withdrawals), climate change, and various natural disturbances (MEA 2005a). A more detailed list of human activities and natural factors that affect aquatic ecosystems and the functions and services they furnish is provided in Table 4.6. Activities regulated by the Corps under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act of 1899 through the NWPs, individual permits, letters of permission, and regional general permits comprise a small subset of those human activities. Other federal, non-federal, and private activities also contribute to the many categories of human activities that alter the quantity and quality of aquatic resources and the ecological functions and services they provide. Human activities that have occurred in the past often have legacy effects on ecosystems, landscapes, and seascapes that continue under the current environmental setting and affect the quantity of those aquatic ecosystems and the ecological functions and services they provide.

Table 4.6 – Human activities and natural factors that cause changes in aquatic ecosystems and the functions and services they perform

Resource type(s)	Human activities and natural factors that drive ecosystem change	Reference(s)
wetlands and waters (generally)	• land use/land cover changes • alien species introductions • species overexploitation • pollution • eutrophication • resource extraction (e.g., water withdrawals) • climate change • natural disturbances	MEA (2005a)

Resource type(s)	Human activities and natural factors that drive ecosystem change	Reference(s)
rivers and streams	• agriculture • urban development • industrial development • deforestation • mining • water removal • flow alteration • invasive species • point source and non-point source pollution • dams (hydroelectric, water supply) and navigational aids such as locks • dredging • erosion • filling • overfishing • road construction • drainage and channelization • sediment deposition • boating	Palmer et al. (2010) Carpenter et al. (2011) Allan (2004) NRC (1992)
wetlands	• wetland conversion through drainage, dredging, and filling • hydrologic modifications that change wetland hydrology and hydrodynamics • pollutants (point source and non-point source), including nutrients and contaminants • waterfowl and wildlife management activities • agriculture and aquaculture activities • flood control and stormwater protection (e.g., severing hydrologic connections between rivers and floodplain wetlands) • silvicultural activities • agricultural activities • urban development • mining activities • water withdrawals, aquifer depletion • river management (e.g., channelization, navigation improvements, dams, locks, weirs) • altered sediment transport • introductions of non-native species • land subsidence, erosion	Mitsch and Gosselink (2015) Mitsch and Hernandez (2013) Wright et al. (2006) Zedler and Kercher (2005) Brinson and Malvárez (2002)

Resource type(s)	Human activities and natural factors that drive ecosystem change	Reference(s)
seagrass beds	• dredging • coastal development activities • degradation of water quality • sediment and nutrient runoff from adjacent lands • physical disturbances • natural processes, such as herbivore grazing, physical disturbances caused by waves and tidal currents • invasive species • diseases • commercial fishing activities • aquaculture • algal blooms • low light availability • nutrient limitations global climate change	Borum et al. (2013) Waycott et al. (2009) Orth et al. (2006)
coral reefs	• overexploitation/overfishing • destructive fishing practices • nutrients, sediments, pesticides, and other pollutants (point source and non-point source) • nutrient loading • changes in storm frequency and intensity • increasing ocean surface temperatures • ocean acidification • coastal land uses, including development and agriculture • coral mining • sea level rise • invasive species • diseases • bleaching • global climate change	Sheppard (2014) MEA (2005a) Hughes et al. (2003)

Resource type(s)	Human activities and natural factors that drive ecosystem change	Reference(s)
coastal areas	• development activities, including the construction of residences, commercial buildings, industrial facilities, resorts, and port developments • agricultural and forestry activities • point source and non-point source pollution (nutrients, organic matter, other pollutants) • aquaculture • fishing activities • overharvesting of species • intentional and unintentional introductions of non-native species • dredging • reclamation • shore protection and other structures • habitat modifications • changes to hydrology and hydrodynamics • global climate change • shoreline erosion • pathogens and toxins • debris and litter	Korpinen and Andersen (2016) Robb (2014) Day et al. (2013) Lotze et al. (2006) MEA (2005b) NRC (1994)
Oceans	• pollution (point and non-point source) • fishing activities • aquaculture/mariculture • changes in sea temperatures • ultraviolet light • ocean acidification • species invasions • commercial activities, including industrial activities • tourism • marine transportation • land-based activities, including urban and suburban development, agriculture, forestry, power generation, and mining • ports/marinas • other human activities • benthic structures • offshore energy infrastructure and power generation (e.g., wind farms, pipelines) • global climate change • storms	Korpinen and Andersen (2016) Halpern et al. (2015) Clarke Murray et al. (2014) Halpern et al. (2008)

Wetlands, streams, and other aquatic resources and the functions and services they provide are directly and indirectly affected by changes in land use and land cover, alien species introductions, overexploitation of species, pollution, eutrophication due to excess nutrients, resource extraction including water withdrawals, climate change, and various natural disturbances (MEA 2005a). Freshwater ecosystems such as lakes, rivers, and streams are altered by changes to water flow, climate change, land use changes, additions of chemicals, resource extraction, and aquatic invasive species (Carpenter et al. 2011). Cumulative effects to wetlands, streams, and other aquatic resources that form the current environmental setting are the result of landscape-level processes (Gosselink and Lee 1989). As discussed in more detail below, cumulative or aggregate effects to aquatic resources are caused by a variety of activities (including activities that occur entirely in uplands) that take place within a landscape unit, such as the watershed for a river or stream (e.g., Allan 2004, Paul and Meyer 2001, Leopold 1968) or the contributing drainage area for a wetland (e.g., Wright et al. 2006, Brinson and Malvárez 2002, Zedler and Kercher 2005).

There is little national-level information on the current ecological state of the Nation's wetlands, streams, and other aquatic resources, or the general degree to which they perform various ecological functions, although reviews have acknowledged that most of these aquatic resources are degraded to some degree (Zedler and Kercher 2005, Allan 2004) or impaired (U.S. EPA 2015) because of various activities, disturbances, and other stressors. Therefore, the analysis in this environmental assessment is a qualitative analysis.

There is a wide variety of causes and sources of impairment of the Nation's rivers, streams, wetlands, lakes, estuarine waters, and marine waters (U.S. EPA 2015), which also contribute to cumulative effects to these aquatic resources. Many of those causes of impairment are point and non-point sources of pollutants that are not regulated under Section 404 of the Clean Water Act or Section 10 of the Rivers and Harbors Act of 1899. Two common causes of impairment for rivers and streams, habitat alterations and flow alterations, may be due in part to activities regulated by the Corps under Section 404 of the Clean Water Act and/or Section 10 of the Rivers and Harbors Act of 1899. Habitat and flow alterations may also be the caused by activities that do not involve discharges of dredged or fill material or structures or work in navigable waters. For wetlands, impairment due to habitat alterations, flow alterations, and hydrology modifications may involve activities regulated under section 404, but these causes of impairment may also be due to unregulated activities, such as changes in upland land use that affects the movement of water through a watershed or contributing drainage area or the removal of vegetation.

The Millennium Ecosystem Assessment (MEA 2005a) broadly defines wetlands as inland wetlands (e.g., swamps, marshes, lakes, rivers, peatlands, and underground water habitats), coastal and near-shore marine wetlands (e.g., coral reefs, mangroves, seagrass beds, and estuaries), and human-made wetlands (e.g., rice fields, dams, reservoirs, and fish ponds). According to the MEA (2005a), the principal drivers of direct change to estuarine and marine wetlands include the conversion of saltwater marshes, mangroves, seagrass meadows, and coral reefs to other land uses, diversions of freshwater flows, increased inputs of nitrogen, overharvesting various species, water temperature changes, and species introductions. These changes are indirectly driven by increases in human populations in coastal areas (MEA 2005a). Robb (2014) identified a number of threats to estuaries and estuarine habitats such as salt marshes, seagrass beds, and sand flats. Those threats include land-based activities in surrounding watersheds, such as development activities, agricultural activities, forestry activities, pollution, freshwater diversions, shoreline stabilization, waterway impairments, and inputs of debris and litter. With respect to activities occurring directly in coastal waters, Robb (2014) identified the following threats: shoreline development, the construction and operation of port facilities, dredging, marine pollution, aquaculture activities, resource extraction activities, species introductions, and recreational activities. Changing climate conditions also pose threats to estuaries through sea level rise, changing water temperatures, ocean acidification, and changing precipitation patterns (Robb 2014).

Marine and coastal waters are affected by human activities in the ocean, coastal areas, and watersheds that drain to those marine and coastal waters (Korpinen and Andersen 2016). In marine and coastal environments, human activities and other disturbances that affect resources in those waters can come from a variety of sources, including water-based activities (e.g., transportation, fishing, mariculture, power generation, and tourism) and land-based activities (e.g., urban and suburban development, agriculture, non-point source pollution, forestry activities, power generation, and mining activities) (Clark Murray et al. 2014).

Activities that affect wetland quantity and quality include: land use changes that alter local hydrology (including water withdrawal), clearing and draining wetlands, constructing levees that sever hydrologic connections between rivers and floodplain wetlands, constructing other obstructions to water flow (e.g., dams, locks), constructing water diversions, inputs of nutrients and contaminants, and fire suppression (Brinson and Malvárez 2002). Wetland loss and degradation is caused by hydrologic modifications of watersheds, drainage activities, logging, agricultural runoff, urban development, conversion to agriculture, aquifer depletion, river management, (e.g., channelization, navigation improvements, dams, weirs), oil and gas development activities, levee construction, peat mining, and wetland management activities (Mitsch and Hernandez 2013). Upland development adversely affects wetlands and reduces wetland functionality because those activities change surface water flows and alter wetland hydrology, contribute stormwater and associated sediments, nutrients, and pollutants, cause increases in invasive plant species abundance, and decrease the diversity of native plants and animals (Wright et al. 2006). Many of the remaining wetlands in the United States are degraded (Zedler and Kercher 2005). Wetland degradation and losses are caused by changes in water movement and volume within a watershed or contributing drainage area, altered sediment transport, drainage, inputs of nutrients from non-point sources, water diversions, fill activities, excavation activities, invasion by non-native species, land subsidence, and pollutants (Zedler and Kercher 2005). According to Mitsch and Gosselink (2015), categories of activities that alter wetlands include: wetland conversion through drainage, dredging, and filling; hydrologic modifications that change wetland hydrology and hydrodynamics; highway construction and its effects on wetland hydrology; peat mining; waterfowl and wildlife management; agriculture and aquaculture activities; water quality enhancement activities; and flood control and stormwater protection.

The ecological condition of rivers and streams is dependent on the state of their watersheds (NRC 1992), because they are affected by activities that occur in those watersheds, including agriculture, urban development, deforestation, mining, water removal, flow alteration, and invasive species (Palmer et al. 2010, Allan 2004). Land use changes affect rivers and streams through increased sedimentation, larger inputs of nutrients (e.g., nitrogen, phosphorous) and pollutants (e.g., heavy metals, synthetic chemicals, toxic organics), altered stream hydrology, the alteration or removal of riparian vegetation, and the reduction or elimination of inputs of large woody debris (Allan 2004). Agriculture is the primary cause of stream impairment, followed by urbanization (Foley et al. 2005, Paul and Meyer 2001). Agricultural land use adversely affects stream water quality, habitat, and biological communities (Allan 2004). Urbanization causes changes to stream hydrology (e.g., higher flood peaks, lower base flows), sediment supply and transport, water chemistry, and aquatic organisms (Paul and Meyer 2001). Leopold (1968) found that land use changes affect the hydrology of an area by altering stream flow patterns, total runoff, water quality, and stream structure. Changes in peak flow patterns and runoff affect stream channel stability. Stream water quality is adversely affected by increased inputs of sediments, nutrients, and pollutants, many of which come from non-point sources (Paul and Meyer 2001, Allan and Castillo 2007).

The construction and operation of water-powered mills in the 17th to 19th centuries substantially altered the structure and function of streams in the eastern United States (Walter and Merritts 2008) and those effects have persisted to the present time. In urbanized and agricultural watersheds, the number of small streams has been substantially reduced, in part by activities that occurred between the 19th and mid-20th centuries (Meyer and Wallace 2001). Activities that affect the quantity and quality of small streams include residential, commercial, and industrial development, mining, agricultural activities, forestry activities, and road construction (Meyer and Wallace 2001), even if those activities are located entirely in uplands.

Waycott et al. (2009) estimated that the areal extent of seagrass beds across the world has declined by nearly 30 percent since the late 19th century. They identified two main categories of causes for that decline: direct impacts from dredging and coastal development activities, and indirect impacts from degradation of water quality. Submersed aquatic vegetation is affected by a wide variety of human activities such as dredging in seagrass meadows, anchoring vessels in seagrass beds, coastal development activities, increased sediment inputs from a variety of sources including land development activities, habitat conversions resulting from mariculture activities, increased nutrient inputs to coastal waters, and climate change (MEA 2005a). According to Orth et al. (2006), seagrasses are threatened by numerous stressors, such as sediment and nutrient runoff from adjacent lands, physical disturbances, overgrazing, invasive species, diseases, commercial fishing activities, aquaculture, algal blooms, and global climate change. Human activities that contribute to cumulative effects to submerged aquatic vegetation include coastal development, hard shore stabilization structures, land uses changes in surrounding watersheds that increase inputs of sediments, nutrients, and pollutants to waters inhabited (or could be inhabited) by seagrasses, discharges of pollutants directly into waters, aquaculture activities, and boating activities (Orth et al. 2017, Orth et al. 2006). Orth et al. (2017, 2006) did not quantify how frequently each of these stressors pose threats to seagrasses. the relative contributions of each of the identified human activities that affect seagrasses. Submersed aquatic vegetation may be affected by natural processes, such as herbivore grazing, physical disturbances caused by waves and tidal currents, and other stressors such as low light availability, higher temperatures, or nutrient limitations (Borum et al. 2013). Boating activities (e.g., mooring, use of propellers) and fish and shellfish harvesting activities can also contribute to cumulative impacts to submersed aquatic vegetation beds (Fonseca et al. 1998). The recovery of submersed aquatic vegetation from anthropogenic and natural disturbances can vary by species, and is dependent in part on the reproductive mechanisms of those species (Borum et al. 2013, Fonseca et al. 1998). At the meadow or landscape scale, seagrass beds can fully recover after disturbance within 5 years, but recovery can take longer if there are persistent environmental changes persist or seagrass seeds or other propagules are not available to reestablish seagrasses in the affected area (O’Brien et al. 2018).

A variety of human activities have caused, and are continuing to cause declines in corals and coral reefs. Coral reefs are adversely affected by pollution, including sedimentation, excess nutrients, oil discharges, pesticides, and sewage (Sheppard 2014; MEA 2005a; Hughes et al. 2003). Shoreline development activities, development activities in watersheds draining to coastal waters, and agriculture activities in coastal watersheds also contribute to declines in corals and coral reefs (Sheppard 2014; MEA 2005a; Hughes et al. 2003). The pollution may be in runoff from nearby lands or discharged directly into waters inhabited by corals. Corals and coral reefs are also harmed by overexploitation, including overfishing, as well as destructive fishing practices (MEA 2005a) and anchors used by boats (Sheppard 2014). Climate change and associated increases in storm frequency and intensity, diseases, water temperatures, and coral bleaching also contribute to declines in corals and coral reefs (Sheppard 2014; MEA 2005a; Hughes et al. 2003). Invasive species have also affected corals and coral reefs (Sheppard 2014).

For aquatic ecosystems, climate change affects water quality, biogeochemical cycling, and water storage (Julius et al. 2013). Climate change will also affect the abundance and distribution of wetlands across the United States, as well as the functions they provide (Mitsch and Gosselink 2015). Climate change results in increases in stream temperatures, more waterbodies with anoxic conditions, degradation of water quality, and increases in flood and drought frequencies (Julius et al. 2013). The increasing carbon dioxide concentration in the atmosphere also lowers the pH of the oceans, resulting in ocean acidification (NRC 2020), which adversely affects marine organisms such as corals and some shellfish species.

In the United States, approximately 39 percent of its population lives in counties that are next to coastal waters, the territorial seas, or the Great Lakes (NOAA 2013). Those counties comprise less than 10 percent of the land area of the United States (NOAA 2013). Humans have been altering estuarine waters and coastal areas for millennia, but those changes have rapidly accelerated over the past 150 to 300 years (Lotze et al. 2006). Coastal waters are also affected by a wide variety of activities. Day et al. (2013) identified the following general categories of human activities that impact estuaries: physical alterations (e.g., habitat modifications and changes in hydrology and hydrodynamics), increases in inputs of nutrients and organic matter (enrichment), releases of toxins, and changes in biological communities as a result of harvesting activities and intentional and unintentional introductions of new species. The major drivers of changes to coastal areas are: development activities that alter coastal forests, wetlands, and coral reef habitats for aquaculture and the construction of urban areas, industrial facilities, and resort and port developments (MEA 2005b). Dredging, reclamation, shore protection and other structures (e.g., causeways and bridges), and some types of fishing activities also cause substantial changes to coastal areas (MEA 2005b). Nitrogen pollution to coastal zones change coral reef communities (MEA 2005b). Adverse effects to coastal waters are caused by habitat modifications, point source pollution, non-point source pollution, changes to hydrology and hydrodynamics, exploitation of coastal resources, introduction of non-native species, global climate change, shoreline erosion, and pathogens and toxins (NRC 1994). Over the course of history, in estuarine waters human activities caused declines of greater than 90 percent of important species, losses of more than 65 percent of seagrasses and wetland habitat, substantially degraded water quality, and facilitated introductions of new species (Lotze et al. 2006).

Substantial alterations of coastal hydrology and hydrodynamics are caused by land use changes in watersheds draining to coastal waters, the channelization or damming of streams and rivers, water consumption, and water diversions (NRC 1994). Approximately 52 percent of the population of the United States lives in coastal watersheds (NOAA 2013). Eutrophication of coastal waters is caused by nutrients contributed by waste treatment systems, non-point sources, and the atmosphere, and may cause hypoxia or anoxia in coastal waters (NRC 1994). Changes in water movement through watersheds may also alter sediment delivery to coastal areas, which affects the sustainability of wetlands and intertidal habitats and the functions they provide (NRC 1994). Most inland waters in the United States drain to coastal areas, and therefore activities that occur in inland watersheds affect coastal waters (NRC 1994). Inland land uses, such as agriculture, urban development, and forestry, adversely affect coastal waters by diverting fresh water from estuaries and by acting as sources of nutrients and pollutants to coastal waters (MEA 2005b).

Coastal wetlands have been substantially altered by urban development and changes to the watersheds that drain to those wetlands (Mitsch and Hernandez 2013). Coastal habitat modifications are the result of dredging or filling coastal waters, inputs of sediment via non-point sources, changes in water quality, or alteration of coastal hydrodynamics (NRC 1994). Coastal development activities, including those that occur in uplands, affect marine and estuarine habitats (MEA 2005a). The introduction of non-native species may change the functions and structure of coastal wetlands and other habitats (MEA 2005a). Fishing activities may also modify coastal habitats by changing habitat structure and the biological communities that inhabit those areas (NRC 1994).

In order to effectively understand and manage ecosystems, including aquatic ecosystems, it is necessary to take into account how people and societies have reshaped aquatic and terrestrial resources over time (Ellis 2015), through the effects of human activities on those ecosystems. This includes permitting programs that regulate activities in aquatic resources and other types of natural resources. The current state of an ecosystem (e.g., a wetland or an estuary) can range from “near natural” (i.e., minimally disturbed) to semi-natural to production systems such as agricultural lands to overexploited (i.e., severely impaired) (van Andel and Aronson 2012). Degradation occurs when an ecosystem is subjected to a prolonged disturbance (Clewell and Aronson 2013), and the degree of degradation can be dependent, in part, on the severity of disturbance. Disturbances can be caused by human activities or by natural events, such as changes to ecosystems caused by ecosystem engineers (e.g., beavers) and other organisms, storms, fires, or earthquakes. Two important factors that affect how aquatic ecosystems and other ecosystems respond to disturbances are resistance and resilience.

For ecosystems, stability is the ability of an ecosystem to return its starting state after one or more disturbances cause a significant change in environmental conditions (van Andel et al. 2012). Resistance is the ability of an ecosystem to exhibit little or no change in structure or function when exposed to a disturbance (van Andel et al. 2012). Resilience is the ability of an ecosystem to regain its structural and functional characteristics in a relatively short amount of time after it has been exposed to a disturbance (van Andel et al. 2012). Human activities can change the resilience of ecosystems (Gunderson 2000). In some situations, resilience can be a positive attribute (e.g., the ability to withstand disturbances), and in other situations, resilience can be a negative attribute (e.g., when it is not possible to restore ecosystem because it has changed to the degree where it is resistant to being restored) (Walker et al. 2004). The concept of ecological resilience presumes the existence of multiple stable states, and the ability of ecosystems to tolerate some degree of disturbance before transitioning to an alternative (different) stable state (Gunderson 2000). A regime shift (i.e., a change from one stable state to an alternative stable state) can occur when human activities reduce the resilience of an ecosystem, or functional groups of species within that ecosystem, or when there are changes in the magnitude, frequency, and duration of disturbances (Folke et al. 2004). Folke et al. (2004) and Gunderson (2000) provide examples of aquatic ecosystems that can exist in multiple stable states.

An example of a regime change in an estuary is a shift from an estuary with clear waters and benthic communities dominated by seagrasses, to an estuary with turbid waters dominated by phytoplankton that has insufficient light for seagrasses to grow and persist (Folke et al. 2004). Another example of a regime shift is where an increase in nutrients to a wetland (likely from many sources in the area draining to that wetland) causes a wetland's plant community from a diverse plant community dependent on low nutrient levels to a monotypic plant community dominated by an invasive species that can persist under the higher nutrient levels (Gunderson 2000).

Determining whether an ecosystem altered by human activities is degraded or in an alternative stable state depends on the perspective of the person making that judgment (Hobbs 2016). That judgment is dependent in part on the ecological functions and services currently being provided by the alternative stable state and the value local stakeholders place on those ecosystem functions and services. In other words, different people may have different views on the current ecological state of a particular ecosystem (Hobbs 2016, Walker et al. 2004): some people may think it is degraded and other people may think it continues to provide important ecological functions and services. It is also important to understand that degradation falls along a continuum, ranging from minimally degraded to severely degraded, since all ecosystems have been directly or indirectly altered by human activities to some degree. Degraded ecosystems can continue to provide important ecological functions and services, although they may be different from what they provided historically. In summary, the affected environment or current environmental setting consists of a variety of aquatic and terrestrial resources that have been subjected to varying degrees of disturbance by human activities, and provide different degrees of aquatic resource functions and services.

5.0 Environmental Consequences

5.1 General Evaluation Criteria

This document contains a general assessment of the reasonably foreseeable effects of the individual activities authorized by this NWP and the potential cumulative effects of the activities authorized by this NWP during the period (up to five years) it is anticipated to be in effect. In this assessment of individual and cumulative effects, any quantitative or qualitative limits of the NWP, pre-construction notification requirements, the NWP general conditions, and compliance with applicable laws are considered. The NWP general conditions include mitigation measures that reduce individual and cumulative adverse environmental effects of activities authorized by this NWP. The supplemental documentation prepared by division engineers addresses whether regional conditions, including regional suspension or revocation of the NWP, are necessary to help ensure that activities authorized by NWPs with a particular geographic area (e.g., watershed, seascape, county, state) result in no more than minimal individual and cumulative adverse environmental effects in that geographic area (see 33 CFR 330.5(c)). In addition, district engineers may add conditions to site-specific NWP activities to ensure that those activities will result in no more than minimal individual and cumulative adverse environmental effects (see 33 CFR 330.5(d)).

The Council on Environmental Quality's NEPA regulations at 40 CFR 1508.1(g) defines "effects or impacts' as "changes to the human environment from the proposed action or alternatives that are reasonably foreseeable and have a reasonably close causal relationship to the proposed action or alternatives, including those effects that occur at the same time and place as the proposed action or alternatives and may include effects that are later in time or farther removed in distance from the proposed action or alternatives." Furthermore, 40 CFR 1508.1(g)(2) states that:

> [a] "but for" causal relationship is insufficient to make an agency responsible for a particular effect under NEPA. Effects should generally not be considered if they are remote in time, geographically remote, or the product of a lengthy causal chain. Effects do not include those effects that the agency has no ability to prevent due to its limited statutory authority or would occur regardless of the proposed action.

Therefore, the impact analysis in this environmental assessment focuses on the impacts or effects that are reasonably foreseeable and have a reasonably close causal relationship to the activities authorized by this NWP under the Corps' permitting authorities (i.e., discharges of dredged or fill material into waters of the United States regulated under Section 404 of the Clean Water Act and/or structures and work in navigable waters regulated under Section 10 of the Rivers and Harbors Act of 1899).

The environmental effects of proposed NWP activities are evaluated by assessing the direct and indirect effects that those NWP activities have on the current environmental setting (Canter 1996). The current environmental setting is the product of the cumulative or aggregated effects of human activities that have persisted over time, as well as the natural processes that have influenced, and continue to influence, the structure and function of aquatic ecosystems and other ecosystems. The current environmental setting includes the present effects of past activities authorized by previously issued versions of this NWP and other NWPs. The current environmental setting can vary substantially in different areas of the country and in different waterbodies. The current environmental setting is dependent in part on the degree to which past and present human activities have altered aquatic and terrestrial ecosystems in a particular geographic area over time. For a particular site in which an NWP activity may take place, the current environmental setting can range from highly developed/altered areas (e.g., urban and suburban areas, where human impacts to ecosystems are highest) to production areas (e.g., agricultural lands) to seminatural areas (e.g., parks) to near natural areas (e.g., wilderness where human impacts to ecosystems are lowest) (van Andel and Aronson 2012). Human impacts on semi-natural ecosystems are lower than human impacts to production ecosystems (van Andel and Aronson 2012). Because humans have altered aquatic and terrestrial environments in numerous, substantial ways for thousands of years (e.g., Evans and Davis 2018, Ellis 2015), the current environmental setting takes into account how human activities, natural disturbances, and changing biotic and abiotic conditions have modified existing aquatic and terrestrial resources.

In the context of the Corps' public interest review (33 CFR 320.4(a)(1)), which requires the Corps to consider the cumulative impacts of activities it authorizes, cumulative impacts are the direct and indirect environmental impacts collectively caused by individual activities authorized by this NWP during the period (up to five years) it is anticipated to be in effect. The cumulative environmental impacts caused by activities authorized by this NWP are evaluated against the current environmental setting. The current environmental setting is the affected environment that described, in general terms, at a national scale in section 4.0 of this document, because that is the scale at which this NWP is issued by Corps Headquarters. When determining whether to modify, suspend, or revoke this NWP on a regional basis to ensure that it authorizes only those activities that have no more than minimal individual and cumulative adverse environmental effects, division engineers will evaluate the cumulative impacts of this NWP within a waterbody, watershed, county, state, Corps district, or other appropriate geographic area (see 86 FR 2746).

Under the Clean Water Act Section 404(b)(1) Guidelines, which are the substantive environmental criteria for evaluating discharges of dredged or fill material into waters of the United States, permitting authorities are required to evaluate cumulative impacts for the issuance of a general permit by estimating the number of individual discharge activities likely to be regulated under the general permit until its expiration, including repetitions of individual discharge activities at a single location (see 40 CFR 230.7(b)(3)) In section A.2.2 of Appendix A this document, the Corps estimates the number of times this NWP may be used during the period (up to five years) it is anticipated to be in effect, as well as estimates of the acreage of permanent and temporary impacts, and the acreage of compensatory mitigation required by district engineers to offset losses of jurisdictional waters and wetlands.

Consistent with the definitions cited above, the cumulative impacts of this NWP are the product of how many times this NWP is used to authorize discharges of dredged or fill material into waters of the United States and structures and work in navigable waters of the United States across the country during the period this NWP is anticipated to be in effect. The individual and cumulative impacts of activities authorized by this NWP are evaluated against the current environmental setting. The estimated use of this NWP, as well as the estimated authorized impacts and estimated required compensatory mitigation, during the period this NWP is anticipated to be in effect (up to five years) are reasonably foreseeable and have a reasonably close causal relationship to the reissuance of this NWP.

The evaluation in this document comprises the analysis required by NEPA and the public interest review specified in 33 CFR 320.4(a)(1) and (2). Appendix A of this document provides the impact analysis specified in Subparts C through F of the 404(b)(1) Guidelines (40 CFR Part 230). The issuance of an NWP is based on a general assessment of the effects on public interest and environmental factors that are likely to occur as a result of using this NWP to authorize activities in waters of the United States. As such, this assessment must be speculative or predictive in general terms. Because the NWPs authorize activities across the nation, projects eligible for NWP authorization may be constructed in a wide variety of environmental settings, and affect waters and wetlands of varying quality, from severely degraded (i.e., performing ecological functions and services to a low degree, or not performing one or more ecological functions and services) to performing some or all ecological functions and services to a high degree. Nationwide permit activities may result in permanent or temporary losses of aquatic resources, or partial or complete losses of aquatic resources. Therefore, it is difficult to predict all of the direct and indirect impacts that may be caused by each activity authorized by an NWP. For example, the NWP that authorizes 25 cubic yard discharges of dredged or fill material into various types of waters of the United States may be used to fulfill a variety of project purposes, and the direct and indirect effects may vary depending on the specific activity and the environmental characteristics of the site in which the activity takes place. Therefore, certain NWPs require pre-construction notification for certain activities to provide district engineers the opportunity to review proposed activities on a case-by-case basis and determine whether they will result in no more than minimal individual and cumulative adverse environmental effects.

Under the Corps' public interest review, indication that a factor is not relevant to a particular NWP does not necessarily mean that the NWP would never have an effect on that factor, but that it is a factor not readily identified with the authorized activity. Factors may be relevant, but the adverse effects on the aquatic environment are negligible, such as the impacts of a boat ramp on water level fluctuations or flood hazards. Consistent with 40 CFR 1501.8(g), only the reasonably foreseeable effects or impacts that have a reasonably close causal relationship to the activities authorized as a result of the reissuance of this NWP are evaluated in detail in the environmental assessment for this NWP. Division and district engineers will impose, as necessary, additional conditions on the NWP authorization or exercise discretionary authority to address regionally or locally important factors or to ensure that the authorized activity results in no more than minimal individual and cumulative adverse environmental effects. In any case, adverse effects will be controlled by the terms, conditions, and additional provisions of the NWP. For example, Endangered Species Act Section 7 consultation will be required for all activities that may affect endangered or threatened species or designated critical habitat (see 33 CFR 330.4(f) and NWP general condition 18).

In a specific watershed, division or district engineers may determine that the cumulative adverse environmental effects of activities authorized by this NWP during the period it is in effect (5 years or less) are more than minimal. Division and district engineers will conduct more detailed assessments for geographic areas that are determined to be potentially subject to more than minimal cumulative adverse environmental effects. Division and district engineers have the authority to require individual permits in watersheds or other geographic areas where the cumulative adverse environmental effects are determined to be more than minimal, or add conditions to the NWP either on a case-by-case or regional basis to require mitigation measures to ensure that the cumulative adverse environmental effects of these activities are no more than minimal. When a division or district engineer determines, using local or regional information, that a watershed or other geographic area is subject to more than minimal cumulative adverse environmental effects due to the use of this NWP, they will use the revocation and modification procedure at 33 CFR 330.5. In reaching the final decision, the division or district engineer will compile information on the cumulative adverse effects and supplement the information in this document.

The Corps expects that the convenience and time savings associated with the use of this NWP will encourage applicants to design their projects within the scope of the NWP rather than request individual permits for activities which could result in greater adverse impacts to the aquatic environment. The avoidance and minimization encouraged by the issuance of this NWP, as well as compensatory mitigation that may be required for specific activities authorized by this NWP, is likely to help reduce cumulative effects to the Nation’s wetlands, streams, and other aquatic resources caused by activities authorized by this NWP during the period (up to 5 years) it is anticipated to be in effect.

5.2 Impact Analysis

This NWP authorizes structures and work in navigable waters of the United States, as well as discharges of dredged or fill material into all waters of the United States, for the repair, rehabilitation, or replacement of any currently serviceable structure or fill. This NWP authorizes minor deviations in the structure's configuration or filled area, to account for changes in materials, construction techniques, or current construction codes or safety standards. This NWP also authorizes the removal of accumulated sediments in the vicinity of existing structures, as well as the placement of new or additional rip rap to protect the structure. See section 1.0 of this document for a more complete description of the activities authorized by this NWP, as well as limitations on those activities. The general conditions that apply to this NWP also impose further limitations on authorized activities.

Pre-construction notification is required for certain activities authorized by this NWP. The pre-construction notification requirement allows district engineers to review proposed activities on a case-by-case basis to ensure that the individual and cumulative adverse environmental effects of those activities are no more than minimal. If the district engineer determines that the adverse environmental effects of a particular project are more than minimal after considering mitigation, then discretionary authority will be asserted and the applicant will be notified that another form of DA authorization, such as a regional general permit or individual permit, is required (see 33 CFR 330.4(e) and 330.5).

The potential impacts of activities authorized by this NWP on the Corps' public interest review factors listed in 33 CFR 320.4(a)(1) are discussed in more detail in section 6.0 of this document. The potential impacts on the aquatic environment that could be caused by discharges of dredged or fill material into waters of the United States authorized by this NWP are discussed, in general terms, in the Clean Water Act Section 404(b)(1) Guidelines analysis in Appendix A of this document.

In this environmental assessment, the analysis of environmental consequences is a qualitative analysis because of the scarcity of quantitative data at a national scale on the quantity and quality of aquatic ecosystems and other ecosystems that comprise the affected environment and the various human activities and natural factors that may directly or indirectly affect those ecosystems and the functions and services they provide. As discussed in section 4.4 of this document, the activities authorized by this NWP are just one category among many categories of human activities and natural factors that directly and indirectly affect ocean waters, estuarine waters, lakes, wetlands, streams, and other aquatic resources, and the ecological functions and services they provide. This environmental assessment focuses on the potential impacts on jurisdictional waters and wetlands that are reasonably foreseeable and may occur after this NWP is issued and goes into effect.

The terms of this NWP, including any acreage limits or any other quantitative limits in the text of the NWP, the protections provided by the NWP general conditions, plus any regional conditions imposed by division engineers and activity-specific conditions imposed by district engineers, will help ensure that the activities authorized by this NWP result in no more than minimal individual and cumulative adverse environmental effects. An additional safeguard in the NWP program is the ability of district engineers to exercise discretionary authority and require project proponents to obtain individual permits for proposed activities whenever a district engineer determines that a proposed activity will result in more than minimal individual or cumulative adverse environmental effects after considering any mitigation proposed by the project proponent (see 33 CFR 330.1(e)(3)).

In high value waters, division and district engineers can: 1) prohibit the use of the NWP in those waters and require an individual permit or regional general permit; 2) impose an acreage limit on the NWP; 3) require pre-construction notification for some or all NWP activities in those waters; 4) add regional conditions to the NWP to ensure that the individual and cumulative adverse environmental effects are no more than minimal; or 5) for those NWP activities that require pre-construction notification, add special conditions to NWP authorizations, such as compensatory mitigation requirements, to ensure that the individual and cumulative adverse environmental effects are no more than minimal. Nationwide permits can authorize activities in high value waters as long as the individual and cumulative adverse environmental effects are no more than minimal.

The construction and use of fills for temporary access for construction may be authorized by NWP 33 or regional general permits. The related activity must meet the terms and conditions of the specified permit(s). If the activity is dependent on portions of a larger project that require an individual permit, this NWP will not apply. [See 33 CFR 330.6(c) and (d)]

Corps divisions and districts also monitor the use of this NWP and the authorized impacts identified in NWP verification letters. At a later time, if warranted, a division engineer may add regional conditions to further restrict or prohibit the use of this NWP to ensure that it does not authorize activities that result in more than minimal cumulative adverse environmental effects in a particular geographic region (e.g., a watershed, landscape unit, or seascape unit). To the extent practicable, division and district engineers will use regulatory automated information systems and institutional knowledge about the typical adverse effects of activities authorized by this NWP, as well as substantive public comments, to assess the individual and cumulative adverse environmental effects caused by regulated activities authorized by this NWP.

5.2.1 Individual impacts

The individual environmental impacts are the direct and indirect impacts to ecosystems caused by a specific activity authorized by this NWP (i.e., discharges of dredged or fill material into waters of the United States and/or structures and work in navigable waters of the United States) at a project site. The types of activities generally considered to be “discharges of dredged or fill material into waters of the United States” and “structures and work in navigable waters of the United States” are discussed below.

This NWP authorizes discharges of dredged or fill material into waters of the United States. The Corps’ regulations define “dredged material” as “material that is excavated or dredged from waters of the United States.” [33 CFR 323.2(c)] The term “discharge of dredged material” means “any addition of dredged material into, including redeposit of dredged material other than incidental fallback within, the waters of the United States.” [33 CFR 323.2(d)(1)] The term “discharge of dredged material” includes, but is not limited to, (1) the addition of dredged material to a specified discharge site located in waters of the United States; (2) the runoff or overflow from a contained land or water disposal area; and (3) any addition, including redeposit other than incidental fallback, of dredged material, including excavated material, into waters of the United States which is incidental to any activity, including mechanized land clearing, ditching, channelization, or other excavation. [33 CFR 323.2(d)(1)]

Under 33 CFR 323.2(d)(2), the term “discharge of dredged material” does not include any of the following:

> (1) discharges of pollutants into waters of the United States resulting from the onshore subsequent processing of dredged material that is extracted for any commercial use (other than fill). These discharges are subject to section 402 of the Clean Water Act even though the extraction and deposit of such material may require a permit from the Corps or applicable State section 404 program.
>
> (2) Activities that involve only the cutting or removing of vegetation above the ground (e.g., mowing, rotary cutting, and chainsawing) where the activity neither substantially disturbs the root system nor involves mechanized pushing, dragging, or other similar activities that redeposit excavated soil material.
>
> (3) Incidental fallback.

The term “fill material” is defined at 33 CFR 323.2(e)(1) as meaning “material placed in waters of the United States where the material has the effect of: (1) replacing any portion of a water of the United States with dry land; or (2) changing the bottom elevation of any portion of a water of the United States. Examples of fill material include: “rock, sand, soil, clay, plastics, construction debris, wood chips, overburden from mining or other excavation activities, and materials used to create any structure or infrastructure in the waters of the United States.” [33 CFR 323.2(e)(2)] “Fill material” does not include trash or garbage (see 33 CFR 323.2(e)(3)). Discharges of trash or garbage may be regulated under Section 402 of the Clean

Water Act or other federal, state, or local laws and regulations.

The Corps' regulations define the term "discharge of fill material" as meaning "the addition of fill material into waters of the United States." [33 CFR 323.2(f)] Examples of discharges of fill material provided in section 323.2(f) include, but are not limited to, the following activities: (1) the placement of fill that is necessary for the construction of any structure or infrastructure in a water of the United States; (2) the building of any structure, infrastructure, or impoundment requiring rock, sand, dirt, or other material for its construction; (3) site-development fills for recreational, industrial, commercial, residential, or other uses; (4) causeways or road fills; (5) dams and dikes; (6) artificial islands; (7) property protection and/or reclamation devices such as riprap, groins, seawalls, breakwaters, and revetments; (8) beach nourishment; (9) levees; (10) fill for structures such as sewage treatment facilities, intake and outfall pipes associated with power plants and subaqueous utility lines; (11) placement of fill material for construction or maintenance of any liner, berm, or other infrastructure associated with solid waste landfills; (12) placement of overburden, slurry, or tailings or similar mining-related materials; and (13) artificial reefs. Under 33 CFR 323.2(f), the term "discharge of fill material" does not include plowing, cultivating, seeding and harvesting for the production of food, fiber, and forest products.

Discharges of dredged or fill material into a jurisdictional water or wetland authorized under Section 404 of the Clean Water Act may result in the complete or partial loss of stream bed, wetland area, or area of another type of aquatic resource. That complete or partial loss of aquatic ecosystem area may result in a complete or partial loss of aquatic resource functions and services. The direct effects to jurisdictional waters and wetlands caused by activities authorized by this NWP may change those waters and wetlands to components of the built environment or uplands, convert an aquatic resource type to another aquatic resource type, or alter the functions and services provided by those waters and wetlands. The direct effects to jurisdictional waters and wetlands caused by activities authorized by this NWP may be permanent or temporary. The indirect effects to jurisdictional waters and wetlands caused by activities authorized by this NWP may also convert an aquatic resource type to another aquatic resource type. The indirect effects to jurisdictional waters and wetlands caused by activities authorized by this NWP may be permanent or temporary. The contribution of activities authorized by this NWP to cumulative or aggregate effects to ocean waters, estuarine waters, lakes, wetlands, streams, and other aquatic resources is also dependent on the degree or magnitude to which the potentially affected aquatic resources perform ecological functions and services. Nearly all ocean waters, estuaries, lakes, wetlands, streams, and other aquatic resources have been directly and indirectly affected by human activities over time (e.g., Halpern et al. 2008 for oceans, Lotze et al. 2006 for estuaries, Zedler and Kercher (2005) for wetlands, Allan 2004 for streams), including land uses in areas that drain to these aquatic resources.

This NWP authorizes structures and work in navigable waters of the United States. Structures or work in navigable waters of the United States may alter the ecological functions and services performed by those navigable waters. The Corps' regulations for Section 10 of the Rivers and Harbors Act of 1899 in 33 CFR part 322 define the term "structure" as including, "without limitation, any pier, boat dock, boat ramp, wharf, dolphin, weir, boom, breakwater, bulkhead, revetment, riprap, jetty, artificial island, artificial reef, permanent mooring structure, power transmission line, permanently moored floating vessel, piling, aid to navigation, or any other obstacle or obstruction." [33 CFR 322.2(b)] The Corps' section 10 regulations define the term "work" as including, "without limitation, any dredging or disposal of dredged material, excavation, filling, or other modification of a navigable water of the United States." [33 CFR 322.2(c)] Under this NWP, the section 10 authorization applies to discharges of dredged or fill material into waters of the United States that are also navigable waters under Section 10 of the Rivers and Harbors Act of 1899.

Structures and work in navigable waters of the United States do not typically result in losses of navigable waters, but they may change the ecological functions and services performed by those waters. Examples of exceptions would include fills in navigable waters to create fast land along the shoreline, or artificial islands. Structures and work in navigable waters may alter the physical, chemical, and biological characteristics of those waters, but they generally do not result in a loss in the quantity of navigable waters. Structures and work in navigable waters may alter the ecological functions and services provided by those waters. Those alterations will vary, depending on the specific characteristics of the specific activity authorized by this NWP and the environmental setting in which the NWP activity may occur. The environmental setting will vary from site to site, and from region to region across the country.

As discussed above, the individual impacts of activities authorized by this NWP include the direct and indirect effects caused by discharges of dredged or fill material into waters of the United States and structures and work in navigable waters of the United States at a specific site. Whether the individual adverse environmental effects of an NWP activity are no more than minimal are dependent on activity-specific and site-specific factors. The activity-specific factors include the size and configuration of the NWP, the timing of the NWP activity, the extent that aquatic resource functions will be lost as a result of the NWP activity (e.g., partial or complete loss), the duration of the adverse effects (temporary or permanent), whether any best management practices or other mitigation measures are used to reduce direct and indirect impacts, and how the project proponent conducts the NWP activity (e.g., what equipment is used to conduct the discharge dredged or fill material or to install structures or do work in navigable waters). The site-specific factors include the environmental setting in the vicinity of the NWP activity, the type of resource that will be affected by the NWP activity, the functions provided by the aquatic resources that will be affected by the NWP activity, the degree or magnitude to which the aquatic resources perform those functions, and the importance of the aquatic resource functions to the region (e.g., watershed or ecoregion).

Ecosystems are heterogeneous, open systems that interact with other ecosystems that occur in a landscape (Wallington et al. 2005) or a seascape. Ecosystems are subjected to multiple categories of disturbances over a variety of spatial (local, regional, global) and temporal scales (Foley et al. 2015, Elmqvist et al. 2003). A disturbance is an anthropogenic or natural event that alters or disrupts the structure and function of an ecosystem, often to a substantial degree (Clewell and Aronson 2013). Disturbances are often caused by external influences, such as human activities (e.g., land use changes) and storms (Clewell and Aronson 2013). Activities authorized by this NWP are likely to be disturbances that have the potential to temporarily or permanently change the structure and function of aquatic ecosystems.

Effects are changes in ecosystem structure and function over time (Spaling and Smit 1993) that are caused by anthropogenic and natural disturbances. How an ecosystem responds to disturbances is dependent on context, connections at various scales (e.g., local, regional, global) between ecosystems and ecosystem components, and the ecosystem’s current structure and function (Walker and Salt 2006). Disturbances to ecosystems are not always harmful, and disturbances may be an important component of the ecosystem’s dynamics (Wallington et al. 2005) that help maintain its structure and function, as well as the ecological services it provides. Some ecosystems require management by people to retain their structure and function, as well as their resilience to disturbances (Lui et al. 2007).

The environmental effects or impacts that are likely to be caused by individual activities authorized by this NWP during the period (up to five years) it is anticipated to be in effect are evaluated against the current environmental setting (i.e., the affected environment). The affected environment is described at a national scale in section 4.0 of this document because if the NWP is issued, that is the scale at which the NWP can be used for activities that require DA authorization. As discussed in section 4.0 of this document, all ecosystems have been affected by human activities to some degree. Because historical baselines (i.e., the structure and function of ecosystems in the absence of modifications caused by human activities) no longer exist in most areas, ecosystem management decisions should be made by using contemporary baselines that acknowledge how humans have dominated and changed ecosystems over long periods of time (Kopf et al. 2015). The current environmental setting is the result of human activities altering ecosystems over thousands of years (e.g., Evans and Davis 2019, Perring and Ellis 2013, Cronon 1996, Denevan 1992), as well as natural changes in environmental conditions that have occurred over time.

Human-mediated and natural disturbances are important factors in ecosystem dynamics, and it is important for natural resource managers to understand how ecosystems have changed over time, what interactions at a landscape scale occur among ecosystem components, and what are the internal dynamics of these ecosystems (Wallington et al. 2005). Anthropogenic and natural disturbances to ecosystems can be placed into three categories: (1) disturbances that maintain ecosystem integrity; (2) moderate disturbances where the ecosystem can recover in time through natural processes; and (3) disturbances that result in ecosystem impairment, which may require human intervention (e.g., restoration) to prevent the ecosystem from changing into a different, and potentially less functional ecological state (Clewell and Aronson 2013). Discharges of dredged or fill material into waters of the United States and structures and work in navigable waters of the United States are human-mediated disturbances that can affect the structure and function of aquatic ecosystems, but they are just two categories of anthropogenic disturbances among many categories of anthropogenic and natural disturbances that can affect the structure and function of jurisdictional waters and wetlands and other aquatic ecosystems. Many of the categories of human activities and natural factors that can affect the structure and function of aquatic ecosystems are identified in section 4.4 of the document.

Among the various regions and individual sites in the United States and its territories where this NWP may be used for activities that require DA authorization, there is substantial variability in the current environmental setting. In some areas of the country and at specific sites, the current environmental setting is the result of substantial alteration of waterbodies and other ecosystems by various human activities and natural disturbances that have occurred over time (Clewell and Aronson 2013). However, in other areas of the country, the current environmental setting has been less affected by various human activities and natural disturbances that have occurred over time, and those alterations are more subtle and more difficult to discern (Clewell and Aronson 2013).

The types of ecological functions and services provided by aquatic ecosystems vary considerably by region and by specific aquatic ecosystems, with some aquatic ecosystems performing ecological functions and services to a high degree, and other aquatic ecosystems performing ecological functions and services to a lesser degree. Given the geographic scope in which this NWP can be used to authorize activities under Section 404 of the Clean Water Act and/or Section 10 of the Rivers and Harbors Act of 1899, the wide variability in aquatic resource structure and function from site to site and from region to region, and the limited quantitative data available at a national scale on functions and services provided by various types of aquatic ecosystems, the analysis of potential environmental consequences of the issuance of this NWP is a qualitative analysis. In addition, if this NWP is reissued, it will be reissued before specific sites for proposed NWP activities are identified. Therefore, the impact analysis in this environmental assessment is a general, qualitative analysis and cannot consider site-specific characteristics associated with a particular NWP activity.

The individual activities authorized by this NWP are likely to affect, to some degree, the ecological functions and services provided by jurisdictional waters and wetlands. In addition, individual activities authorized by this NWP may indirectly affect non-aquatic ecosystems, such as upland forests and grasslands, as well as cultural or production ecosystems (e.g., parks or agricultural areas) that are heavily managed by human actions. The severity of potential impacts to aquatic resources caused by NWP activities is dependent on a variety of factors. Impacts to aquatic resources caused by NWP activities may result in a partial, total, or no loss of aquatic resource functions and services, depending on the specific characteristics of the NWP activity and the environmental setting in which the NWP activity occurs. In addition, the duration of those impacts may vary by activity, with some NWP activities causing permanent impacts, some NWP activities causing temporary impacts, and other NWP activities causing both permanent and temporary impacts. In addition, the duration of permanent or temporary impacts caused by an NWP activity may also be influenced by the resilience and resistance of the affected aquatic resource(s) to disturbances caused by that NWP activity.

Because there is considerable variation across the country in terms of the types of aquatic resources, the ecological functions and services they provide, and their resilience and resistances to various anthropogenic and natural disturbances, including disturbances caused by NWP activities, the environmental consequences of the issuance of this NWP will vary by site and by region.

The impacts of individual activities authorized by this NWP are also likely to vary by the biotic and abiotic characteristics of the activity site and the surrounding area. Some NWP activities may result in losses of most or all aquatic resource functions and services at the site of an NWP activity. For example, an NWP activity may convert an aquatic ecosystem or a part of an aquatic ecosystem to dry land or a building or other type of engineered feature, and eliminate all or most of the aquatic ecosystem functions and services that were provided by that site. Some NWP activities may cause losses of some ecosystem functions and services while retaining or enhancing other ecosystem functions and services at the project site (e.g., an NWP activity that converts an aquatic ecosystem to a different type of aquatic or terrestrial ecosystem that provides some ecological functions and services). Some NWP activities may result in no long-term changes in ecological functions and services performed by the affected waters and wetlands because the NWP activity caused only temporary impacts and either the site recovered or was restored after that NWP activity was completed.

When determining whether a proposed NWP activity will cause no more than minimal individual and cumulative adverse environmental effects, the district engineer will consider the direct and indirect effects caused by the NWP activity. The district engineer will also consider the cumulative adverse environmental effects caused by activities authorized by the NWP and whether those cumulative adverse environmental effects are no more than minimal. The district engineer will also consider site specific factors, such as the environmental setting in the vicinity of the NWP activity, the type of resource that will be affected by the NWP activity, the functions provided by the aquatic resources that will be affected by the NWP activity, the degree or magnitude to which the aquatic resources perform those functions, the extent that aquatic resource functions will be lost as a result of the NWP activity (e.g., partial or complete loss), the duration of the adverse effects (temporary or permanent), the importance of the aquatic resource functions to the region (e.g., watershed or ecoregion), and mitigation required by the district engineer. If an appropriate functional or condition assessment method is available and practicable to use, that assessment method may be used by the district engineer to assist in the minimal adverse environmental effects determination. These criteria are listed in the NWPs in Section D, “District Engineer’s Decision.” The district engineer may add case-specific special conditions to the NWP authorization to address site-specific environmental concerns.

For proposed NWP activities that may result in more than minimal individual adverse environmental effects, the district engineer will provide the applicant the opportunity to submit a mitigation proposal to reduce the adverse environmental effects so that they are no more than minimal (33 CFR 330.1(e)(3)). If the applicant cannot or will not submit an acceptable mitigation proposal to reduce the adverse environmental effects of the proposed NWP activity so that they are no more than minimal, the district engineer will exercise discretionary authority and require an individual permit for that activity (33 CFR 330.1(d)).

Compensatory mitigation required by district engineers for specific activities authorized by this NWP may help reduce the contribution of those activities to cumulative impacts to the Nation’s wetlands, streams, and other aquatic resources, by providing ecological functions that partially or fully replace some or all of the aquatic resource functions lost as a result of those activities. Mitigation requirements, including compensatory mitigation requirements for the NWPs, are described in NWP general condition 23. In addition, compensatory mitigation projects for activities authorized by this NWP must comply with the applicable provisions of the Corps’ regulations at 33 CFR part 332. District engineers will establish compensatory mitigation requirements on a case-by-case basis during their evaluations of pre-construction notifications. Compensatory mitigation requirements for individual NWP activities will be specified through permit conditions added to NWP authorizations. When compensatory mitigation is required, the permittee is required to submit a mitigation plan prepared in accordance with the requirements of 33 CFR 332.4(c). Credits from approved mitigation banks or in-lieu fee programs may also be used to satisfy compensatory mitigation requirements for NWP activities. Monitoring is required to demonstrate whether the permittee-responsible mitigation project, mitigation bank, or in-lieu fee project is meeting its objectives and providing the intended aquatic ecosystem structure and functions. If the compensatory mitigation project is not meeting its objectives, adaptive management will be required by the district engineer. Adaptive management may involve taking actions such as site modifications, remediation, or design changes, to ensure the compensatory mitigation project meets its objectives (see 33 CFR 332.7(c)).

Additional conditions can be placed on NWP authorizations on a regional or activity-specific basis by division or district engineers to comply with applicable laws (e.g., Section 7 of the Endangered Species Act and Section 106 of the National Historic Preservation Act) and ensure that the authorized activities have no more than minimal individual and cumulative adverse environmental effects. Regional conditions added to this NWP by division engineers will be used to account for differences in aquatic resource functions, services, and values across the country, ensure that the NWP authorizes only those activities with no more than minimal individual and cumulative adverse environmental effects. Regional conditions also allow each Corps district to prioritize its workload based on where its efforts will best serve to protect the aquatic environment and other relevant public interest review factors. Regional conditions can restrict or prohibit the use of an NWP in certain waters (e.g., high value waters or specific types of wetlands or waters. Specific NWPs can also be revoked on a geographic or watershed basis where the individual and cumulative adverse environmental effects resulting from the use of those NWPs are more than minimal.

Under 33 CFR 330.4(f)(2), for an NWP activity proposed by a non-federal permittee, the district engineer will review the pre-construction notification to determine if ESA section 7 consultation is required for that activity. If the district engineer determines that the proposed NWP activity may affect listed species or designated critical habitat, ESA section 7 consultation will be conducted with the U.S. Fish and Wildlife Service (U.S. FWS) or National Marine Fisheries Service (NMFS) depending on which species the district engineer determined may be affected by the proposed NWP activity. During the ESA section 7 consultation process the U.S. FWS or NMFS will evaluate the effects caused by the proposed NWP activity, the environmental baseline, the status of the species and critical habitat, and the effects of any future state or private activities that are reasonably certain to occur within the action area. For formal ESA section 7 consultations, the U.S. FWS or NMFS will formulate their opinion as to whether the proposed NWP activity is likely to jeopardize the continued existence of listed species (or species proposed for listing) or result in the destruction or adverse modification of critical habitat (or critical habitat proposed for such designation) (see 50 CFR 402.14(g)). The ESA section 7 consultation requirements may also be fulfilled through informal consultation, when the U.S. FWS or NMFS provide their written concurrence that a proposed NWP activity is not likely to adversely affect endangered or threatened species or their designated critical habitat (see 50 CFR 402.13(c)).

5.2.2 Cumulative impacts

As discussed in section 5.1, the cumulative impacts caused by the issuance of this NWP are dependent on the number of times the NWP is used to authorize regulated activities during the period (up to five years) it is anticipated to be in effect. The estimated use of this NWP during the period it is anticipated to be in effect, the estimated impacts to wetlands, streams, and other waters in the United States, and the estimated acreage of compensatory mitigation required by district engineers to offset permitted impacts, are provided in section A.2.2 of Appendix A of this document. Because the activities authorized by this NWP constitute only a small proportion of the categories of human activities across the country that directly and indirectly affect ocean waters, estuarine waters, lakes, wetlands, streams, and other aquatic resources, the activities authorized by this NWP during the period it is anticipated to be in effect are likely to result in only a minor incremental change to the jurisdictional waters and wetlands in the affected environment (i.e., the current environmental setting in the United States and its territories), and the ecological functions and services those waters and wetlands provide. Division and district engineers will monitor the use of this NWP on a regional and activity-specific basis, and under their authorities in 33 CFR 330.5(c) and (d), will modify, suspend, or revoke NWP authorizations in situations where those activities will result in more than minimal cumulative adverse environmental effects in a waterbody, watershed, or other geographic region.

For the purposes of considering environmental change that occurs in response to multiple human activities over time in a particular geographic area, "cumulative impacts" have been defined from an ecological perspective in various ways (Duinker et al. 2013). An ecological approach to considering cumulative impacts differs from the regulatory approaches under NEPA, the Corps' public interest review, and for those activities that involve discharges of dredged or fill material into waters of the United States, the Clean Water Act Section 404(b)(1) Guidelines at 40 CFR part 230. The regulatory approaches to considering cumulative effects are not effective in addressing the causes of cumulative environmental change because they fail to take into account all relevant drivers of cumulative environmental change, especially those drivers that fall outside of the Corps' jurisdiction.

In an ecological context, cumulative impacts to aquatic ecosystems and other ecosystems include all human activities that can affect those ecosystems, and are not limited to activities authorized by this NWP. Cumulative impacts to aquatic ecosystems are caused by a variety of human activities (see section 4.4 for a list of those activities). As one example of defining cumulative impacts in an ecological context, the National Research Council (NRC) (1986) defined "cumulative impacts" as the on-going degradation of ecological systems caused by repeated perturbations or disturbances. MacDonald (2000) defined "cumulative impacts" as the result of the combined effects of multiple activities that occur in a particular area that persist over time. "Cumulative effects" are caused by the interaction of multiple activities in a landscape unit, such as a watershed or ecoregion (Clarke Murray et al. 2014, Crain et al. 2008, Gosselink and Lee 1989). According to Gosselink and others (1990), cumulative impacts are a landscape-scale phenomenon because ecosystems within a landscape interact with each other and the direct and indirect effects of disturbances caused by human activities can reach throughout that landscape.

All ecosystems are subjected to multiple disturbances that cause cumulative impacts to those ecosystems (Hodgson et al. 2019, Hodgson and Halpern 2018, Suding and Hobbs 2009). Cumulative impacts have gained a substantial human component because of the numerous activities conducted by people as they interact with their environment (Crain et al. 2008). Cumulative impacts are evaluated against the current environmental setting, and the current environmental setting is the product of cumulative environmental change (Cocklin et al. 1992) that has occurred over many years over broad geographic areas as a result of a variety of human activities and natural disturbances. For a particular ecosystem, the severity of cumulative impacts may be dependent on the current condition of that ecosystem (Clarke Murray et al. 2014), which may not be well understood with currently available information. Ecological thresholds, which are discussed below, can provide useful, science-based targets for environmental regulation (Kelly et al. 2014), including the evaluation of the cumulative impacts to ecosystems caused by multiple human activities and natural disturbances.

Cumulative impacts are not limited to activities that are regulated by a single agency, but they also include activities that are not regulated by that agency (Gosselink et al. 1990). Therefore, cumulative impact assessment should consider the impacts of multiple projects that occur in a region, as well as other human activities that are not considered “projects” per se, such as on-going agricultural activities, forestry activities, urbanization, and fossil fuel consumption (Spaling 1992) that are not subjected to environmental review by any entity (Hunsicker et al. 2016) but are likely to directly or indirectly affect the structure and function of ecosystems. Some “non-project” contributors to cumulative impacts may be identified in a cumulative impact analysis but there may be other non-project contributors to cumulative impacts that cannot be identified (Spaling 1992) by the entity conducting the assessment.

Cumulative impact assessment is a complex task because of the need to understand: (1) how multiple disturbances that contribute to cumulative impacts interact with each other, (2) the connectivity among ecosystem components, (3) the pathways by which ecosystems can have linear or non-linear responses to multiple disturbances, and (4) the indirect or higher order interactions among multiple disturbances (Hodgson and Halpern 2018, Spaling 1992). Cumulative effects analysis should take into account the complexity, uncertainty, and natural variation of ecosystems (Clarke Murray et al. 2014). Cumulative impact assessment requires an understanding of how ecosystems, including aquatic ecosystems, withstand and recover from anthropogenic and natural disturbances, as well as their limitations to withstanding and recovering from those disturbances (Noble 2010). Cumulative impact analysis involves uncertainty because of our limited understanding of ecosystems, including aquatic ecosystems, and how various human activities and natural disturbances affect the structure and function of those ecosystems (Clarke Murray et al. 2014). An additional challenge to assessing cumulative impacts is the difficulty of quantifying the response of an ecosystem to a specific disturbance, including the degree to which that disturbance affects the structure and function of that ecosystem (Clarke Murray et al. 2014). Furthermore, if ecosystem response to a particular disturbance is difficult to quantify, then it is likely to be even more difficult to quantify how an ecosystem responds to the cumulative impacts of multiple disturbances. These complexities and challenges point to the challenges and difficulties in quantifying cumulative impacts.

Cumulative impact analysis can utilize either a stressor-based approach or an effects-based approach (e.g., Duinker et al. 2013, Dubé 2003, Cocklin et al. 1992). A stressor-based approach evaluates the cumulative effects caused by a specific type of disturbance or cause of environmental change (Cocklin et al. 1992). A stressor-based approach to cumulative impact assessment does not take into account other potential anthropogenic or natural disturbances that may also cause changes in ecosystem structure and function (Duinker et al. 2013, Noble 2010). If substantial changes in aquatic ecosystem structure and function occur, then under a stressor-based approach to cumulative impact analysis there will be uncertainty as to whether the specific disturbances considered in the cumulative impact analysis (such as activities authorized by an NWP) are the cause of those substantial changes in aquatic ecosystem structure and function.

A stressor-based approach to cumulative impact assessment would likely not be effective in identifying and implementing management actions that could reduce or reverse those cumulative impacts because it might not identify the primary driver(s) of change in aquatic ecosystem structure. With respect to the activities authorized by this NWP, under a stressor-based approach to cumulative impact analysis, those NWP activities might not be a substantive driver of changes in aquatic ecosystem structure and function in a waterbody, watershed, or other geographic region. Other anthropogenic or natural disturbances that may or may not have been considered during a stressor-based cumulative impact analysis may be primarily responsible for those changes in ecosystem structure and function.

In contrast to a stressor-based approach, an effects-based approach to cumulative effects analysis uses a broader definition of “cumulative impact” and thus takes into account the various categories of human activities (including NWP activities) and natural disturbances that contribute to cumulative environmental change. An effects-based approach to cumulative impact assessment is likely to be more robust than a stressor-based approach (Duinker et al. 2013, Duinker and Greig 2006). The complexity associated with those various categories of anthropogenic and natural disturbances and how they interact with each other present challenges with decision-making and management of cumulative impacts for a particular category of anthropogenic disturbance, such as activities authorized by this NWP. That challenge arises because other anthropogenic disturbances, not activities authorized by the NWP, may be the primary drivers of substantial changes in ecosystem structure and function in the region where the NWP is used. An effects-based approach to cumulative impact analysis may help point managers and decision-makers to broader courses of actions to address cumulative impacts and help ensure the sustainability of ecosystems in a region and their ability to provide ecological functions and services (e.g., Duinker and Greig 2006, Gosselink et al. 1990).

Activities authorized by this NWP do not occur in isolation from other human activities and natural disturbances that can cause changes to the structure and function of aquatic ecosystems and other ecosystems. Because activities not regulated by the Corps under its permitting authorities may contribute to substantial changes in the structure and function of aquatic ecosystems in a region, a broader definition of cumulative impacts should be considered when evaluating substantial changes in aquatic ecosystem structure and function in a waterbody, watershed, seascape, or other regional geographic area. As discussed below and in section 4.4 of this document, there are numerous other categories of human activities and natural disturbances (e.g., storms, wildfires) that can also alter the structure and function of jurisdictional waters and wetlands, as well as other ecosystems, and contribute to cumulative impacts. These other categories of human activities and natural disturbances that contribute to cumulative effects to aquatic ecosystems and other ecosystems occur concurrently with the activities authorized by this NWP during the period it is in effect. The various human activities and natural disturbances are likely to interact with each other and may affect the structure and function of jurisdictional waters and wetlands. The activities authorized by this NWP are likely to comprise a small fraction of the human activities that alter or cause losses of aquatic ecosystems and other natural resources. The likelihood that activities authorized by this NWP will cause aquatic ecosystems in a region assessed for cumulative impacts to undergo more than minimal changes in structure and function is likely to be small, given the variety and number of human activities and natural disturbances that directly and indirectly affect aquatic ecosystems that are likely to occur concurrently with the activities authorized by this NWP.

There are a number of ecological considerations that should be taken into consideration when evaluating cumulative impacts, including the cumulative impacts of one category of activities (e.g., activities authorized by this NWP), that can alter or disrupt ecological processes and affect the structure and function of jurisdictional waters and wetlands and other aquatic ecosystems and the services they provide. Those ecological considerations include: (1) the difficulties of establishing cause-and-effect relationships between a specific category of anthropogenic or natural disturbance and changes in ecosystem structure and function; (2) evaluating how various types of anthropogenic and natural disturbances interact with each other; (3) ecosystem dynamics; (4) and ecological thresholds in ecosystems that exhibit non-linear dynamics. Another challenge with cumulative impact assessment in practice is that there are currently substantial gaps in our ecological understanding of how multiple anthropogenic and natural disturbances interact with each other to cause changes to ecosystems and the ecological functions and services they provide (Hodgson et al. 2019, Côté et al. 2016, Clarke Murray et al. 2014).

There are also challenges associated with managing cumulative impacts to ecosystems, including aquatic ecosystems, that are affected by multiple categories of disturbances in a waterbody, watershed, or other geographic region. Some activities that cause disturbances to aquatic ecosystems and other ecosystems may be regulated by federal, tribal, state, or local government agencies but many sources of anthropogenic disturbances might not be regulated under any federal, tribal, state, or local government laws or regulations (Dubé 2003, Gosselink and Lee 1989), that is, the problem of fragmented jurisdiction in large-scale ecological systems.

Substantial changes in ecosystem structure and function are usually the result of the cumulative impacts of multiple disturbances (Hughes et al. 2013, Levin and Mollman 2008, Scheffer and Carpenter 2003). An ecosystem's response to cumulative impacts is dependent on the complexity of the ecosystem and its ability to respond to various types of disturbance and degrees of disturbance, as well as its dynamic variability and its capacity to absorb disturbance (Spaling 1992). When considering cumulative impacts to aquatic ecosystems caused by a specific category of anthropogenic disturbances, firmly establishing a cause-and-effect relationship between that disturbance category and subsequent environmental change is difficult because of the complexity of these ecosystems, their dynamic nature, and the many categories of human activities and natural disturbances that can affect their structure and function (e.g., Korpinen and Andersen 2016, Clarke Murray et al. 2014, Cocklin et al. 1992). Cause-and-effect relationships between ecosystems and the disturbances that can affect their structure and function are complex because the number of potential disturbances, the various feedback mechanisms that affect how ecosystems respond to those disturbances, and the variability in how ecosystems respond to multiple disturbances and the variability in feedback mechanisms (Spaling 1992).

When the capacity of a waterbody to perform ecological functions decreases substantially, it is usually difficult to identify one specific activity that is responsible for that degradation, because that degradation is usually the result of multiple anthropogenic disturbances that caused cumulative environmental change in that waterbody (Dubé 2003). The difficulties in establishing cause-and-effect relationships and cumulative environmental change in waterbodies, watersheds, and other geographic regions are pertinent to decision-making by division and district engineers for NWP activities because of the numerous other drivers of cumulative environmental change in jurisdictional waters and wetlands. Natural disturbances may also be responsible, to some degree, for contributing to that cumulative environmental change in aquatic ecosystems. Slowly-occurring changes to ecosystem structure and function can also make it difficult to identify cause-and-effect linkages between disturbances and changes in ecosystem structure and function, making decision-making for regulatory and resource agencies more challenging (Hughes et al. 2013, Kelly et al. 2015).

Establishing a decisive cause-and-effect relationship between the use of the NWP in a region and substantial changes in the structure and function of aquatic ecosystems in that region is difficult because of the greater likelihood that those substantial changes were caused by a combination of human activities and natural disturbances that affect the structure and function of those aquatic ecosystems. NWP activities occur concurrently with other human activities and natural disturbances, and the collective disturbances caused by human activities are the causes of cumulative change in aquatic ecosystems. Attempting to manage cumulative effects requires an understanding all of the various anthropogenic and natural disturbances that can affect the ecosystem(s) being evaluated, not just the disturbances caused by a specific category of activities (Noble 2010). Therefore, all of those human activities and natural disturbances should be considered when assessing cumulative effects and determining whether there are appropriate management actions that could be required under the Corps' permitting authorities (and any other applicable federal, tribal, state, and local regulatory authorities) to address substantial cumulative adverse environmental effects. Because of the variety of human activities and natural disturbances that contribute to cumulative environmental change, resource managers should also understand that cumulative impacts are likely to continue to occur even if one particular of category of activities (e.g., the activities authorized by this NWP) is prohibited from occurring in that region for the foreseeable future.

Disturbances from various anthropogenic sources interact with each other to cause additional indirect or higher order effects to ecosystems (Hodgson and Halpern 2018). Therefore, when assessing cumulative impacts, it is important to consider not only the multitude of human activities and natural disturbances that contribute to cumulative impacts to aquatic ecosystems and other ecosystems, but how those disturbances interact with each other. Because of the complexity of ecological systems and potential higher order interactions among disturbances that are likely to affect ecosystem components, it is difficult to predict how cumulative impacts will change ecosystem structure and function (Crain et al. 2008). There is substantial uncertainty in determining the severity of cumulative impacts because we do not fully understand how various disturbances interact with each other, and with ecosystem components, over space and time (Clarke Murray et al. 2014), and how those interactions control or influence ecological processes (Groffman et al. 2006).

Interactions among human and natural disturbances to ecosystems may by additive, synergistic, or antagonistic (Côté et al. 2016, Kelly et al. 2014, Crain et al. 2008). Under an additive interaction, an ecosystem's response to two or more disturbances is the sum of those disturbances (Côté et al. 2016). Under a synergistic interaction, an ecosystem's response to two or more disturbances is greater than the response from each disturbance (Côté et al. 2016). That is, for synergistic interactions the collective effects are more severe than they would be if they were added together. Under an antagonistic interaction, an ecosystem's response to two or more disturbances is smaller than the response from each disturbance (Côté et al. 2016). In other words, for antagonistic interactions the collective effects are less than they would be if they were added together. As the number of anthropogenic and natural disturbances affecting an ecosystem increases, the likelihood of more complex interactions among those disturbances increases (Crain et al. 2008). When there are multiple disturbances acting on an ecosystem at the same time, it is difficult to identify which types of disturbance interactions are occurring (Côté et al. 2016).

Many cumulative impact assessment methods assume additive interactions between disturbances and ecosystem components, but broader ecological studies show that synergistic and antagonistic interactions among disturbances are common (Korpinen and Andersen 2016). Some cumulative impact assessments assume that synergistic interactions are the most common form of disturbance interaction, and more consideration needs to be given to antagonistic and additive interactions (Côté et al. 2016). Assuming that all or most interactions among disturbances are synergistic interactions can lead to a false conclusion that ecosystem structure and function has become more degraded than it really is. To avoid such false conclusions, it is important to consider antagonistic and additive disturbance interactions (Côté et al. 2016) when evaluating cumulative impacts and whether it is necessary to respond to those cumulative impacts. Côté and others (2016) recommend that natural resource managers consider that synergistic, antagonistic, and additive interactions among disturbances are equally likely to occur.

For activities authorized by this NWP, the contribution of those activities to cumulative impacts on the structure and function of jurisdictional waters and wetlands is dependent in part on how the disturbances cause by NWP activities interact with the disturbances caused by other human activities and natural events that occur during the period this NWP is in effect. Those interactions may be additive, synergistic, and/or antagonistic. The specific types of interactions that occur among NWP activities and other anthropogenic disturbances may vary by aquatic resource category and geographic region. The type of interaction that occurs may also depend on the degree to which the affected jurisdictional waters and wetlands perform ecological functions and services, the types of other categories of human activities and natural disturbances that also affect the structure and function of jurisdictional waters and wetlands in that region, and other factors. The complexity of aquatic ecosystems, the potential types of disturbance interactions that can occur, and other factors make it difficult to predict how aquatic ecosystems in a particular region will respond to cumulative impacts. Because of this uncertainty, a monitoring and reactive approach to addressing cumulative impacts through the division and district engineer's authority to modify, suspend, or revoke NWP authorization on a regional or activity-specific basis is likely to be the most effective approach for ensuring in a particular region that this NWP authorizes only those activities that have no more than minimal cumulative adverse environmental effects.

Cumulative impact assessment should also take into account ecosystem dynamics, which are driven in part by how anthropogenic and natural disturbances interact with each other, feedback mechanisms that influence ecosystem structure and function, as well as other factors such as the presence of ecological thresholds and resilience. All ecosystems are dynamic and are subject to disturbances, and it is the type, magnitude, and frequency of disturbances that causes an ecosystem to either: (1) maintain its structure and function, (2) improve its structure and function, or (3) exhibit a decline in its structure and function (Spaling 1992). All ecosystems have some capacity to assimilate various amounts of disturbances without degrading ecosystem components or processes (Spaling 1992).

Ecological science has altered its understanding of how ecosystems change over time, from static models based on equilibrium and predictable behavior to complex, dynamic models that are based on non-equilibrium and unpredictable behavior that accounts for the complexity and non-linearity of ecosystem dynamics (Wallington et al. 2005). Some ecosystems may exhibit gradual, continuous overall responses to multiple disturbances, while other ecosystems exhibit more complex dynamics, expressing little or no change in structure and function in response to multiple disturbances until a threshold is reached where those ecosystems undergo abrupt, discontinuous (i.e., non-linear) changes in structure and function (Wallington et al. 2005, Scheffer et al. 2001). Most ecosystems exhibit complex dynamics, especially as human activities have had increasing cumulative impacts on these systems (Suding and Hobbs 2009).

Some ecosystems exhibit gradual or linear ecosystem dynamics, where they undergo incremental changes in ecosystem structure and function as they are subjected to an anthropogenic or natural disturbance (Hunsicker et al. 2016, Kelly et al. 2014) over. Ecosystems with linear dynamics do not have resilience and as they are exposed to subsequent disturbances, they respond with gradual changes in their structure and function.

Most ecosystems can tolerate disturbances and continue to provide ecological functions and services until they reach an ecological threshold that when crossed, causes the ecosystem to change to an alternative state with a substantially different structure and function (Selkoe et al. 2015, Hunsicker et al. 2016, Suding and Hobbs 2009, Groffman et al. 2006, Scheffer et al. 2001). For many ecosystems it generally takes a substantial amount of collective disturbance (i.e., cumulative impacts) to cause the ecosystem to cross a threshold and abruptly change to a different structure and function (Scheffer et al. 2001, Selkoe et al. 2015). However, some ecosystems may have a lower capacity to absorb disturbances and resist change because they are currently near an ecological threshold where a small amount of additional disturbance may cause the ecosystem to change to a different structure and function (Selkoe et al. 2015). An ecological threshold is a point where a small change in environmental conditions caused by one or more disturbances results in an ecosystem undergoing a large, non-linear change in its structure and function (Kelly et al. 2015, Suding and Hobbs 2009, Groffman et al. 2006). Abrupt changes in ecosystem structure and function caused by crossing a threshold may occur when human activities reduce the resilience of those ecosystems (Folke et al. 2004).

Non-linear ecosystem dynamics can occur in two ways: threshold dynamics or hysteresis (Suding and Hobbs 2009). Under threshold dynamics, ecosystem structure and function change abruptly after one or more disturbances cause a threshold or tipping point to be reached, and the pathway by which ecosystem recovery can occur is similar to the pathway that resulted in the abrupt change in ecosystem structure and function (Suding and Hobbs 2009). Under hysteresis, ecosystem structure and function change abruptly as an ecological threshold is crossed, but the pathway by which ecosystem recovery can occur (if it can occur through restoration or other means) is not the same as the pathway that caused the abrupt change in ecosystem structure and function (Suding and Hobbs 2009). Non-linear threshold dynamics in ecosystems are more difficult to predict than linear ecosystem responses to disturbances (Foley et al. 2015).

Non-linear ecosystems dynamics and thresholds apply to a wide variety of ecosystems, but not all ecosystems (Foley et al. 2015, Groffman et al. 2006, Suding and Hobbs 2009). Non-linear ecosystem dynamics and threshold responses are common in marine ecosystems (Hunsicker et 2016). Numerous aquatic ecosystems (e.g., lakes, coral reefs, oyster reefs, fish communities) can shift between alternative states instead of exhibiting gradual responses to disturbances and changing environmental conditions (Scheffer et al. 2001). Ecological thresholds associated with shifts to alternative states have been observed in marine ecosystems (Hunsicker et al. 2016), as well as terrestrial ecosystems (Groffman et al. 2006). Ecological thresholds are more difficult to identify in terrestrial ecosystems because those ecosystems change more slowly (Groffman et al. 2006). It is also more challenging to identify thresholds in ecosystems that respond more slowly to disturbances, and to develop effective management responses when those ecosystems change to an alternative state (Hughes et al. 2013). Threshold dynamics in ecosystems are strongly influenced by human activities (Suding and Hobbs 2009).

Resilience is the ability of ecosystems to withstand or absorb disturbance while maintaining their basic structure and function (Suding and Hobbs 2009, Walker and Salt 2006, Folke et al. 2004). An ecosystem with greater resilience can absorb more disturbances than an ecosystem with lower resilience (Kelly et al. 2014). Resilience is linked to non-linear dynamics, where an ecosystem can absorb disturbances to some degree before approaching an ecological threshold where an additional amount of disturbance causes that ecosystem to abruptly change to a different structure and function (Kelly et al. 2014). Loss of resilience can increase an ecosystem's susceptibility to changing to a different structure and function, and some changes to alternative states may be irreversible (Folke et al. 2004). Human activities affect the resilience of ecosystems by changing the biotic composition and how those ecosystems respond to disturbances (Suding and Hobbs 2009). Human activities that reduce the resilience of ecosystems, and the ability of those ecosystems to sustain their structure and function, include land use changes, pollution, resource exploitation, changes in disturbance regimes, and climate change (Folke et al. 2004). Activities authorized by this NWP may also contribute to decreases in aquatic ecosystem resilience.

Jurisdictional waters and wetlands may exhibit linear or non-linear ecosystem dynamics in response to direct and indirect impacts caused by activities authorized by this NWP and other anthropogenic and natural disturbances. Therefore, there is uncertainty in how these aquatic ecosystems will respond to activities authorized by this NWP and other disturbances. Depending on the degree to which jurisdictional waters and wetlands are resilient to disturbances caused by activities authorized by this NWP and to other anthropogenic and natural disturbances, some jurisdictional waters and wetlands in a region may exhibit little or no change in ecosystem structure and function during the period this NWP is in effect. Under these circumstances, the use of this NWP during the period it is in effect could be considered as resulting in no more than minimal cumulative adverse environmental effects. There may be waterbodies, watersheds, or other regions where jurisdictional waters and wetlands are at or near ecological thresholds that where additional disturbances, including disturbances caused by activities authorized by this NWP, may cause those aquatic ecosystems to shift to an alternative state (i.e., a substantially different structure and function). In those situations, division and district engineers will determine whether activities authorized by this NWP were responsible for the substantial change in the structure and function the of jurisdictional waters and wetlands in that region, and may take action to modify, suspend, or revoke the NWP in that region.

Current environmental laws (e.g., the Clean Water Act, the National Environmental Policy Act) were passed in the late 1960s and early 1970s, before ecological science began to understand that many ecosystems exhibit non-linear responses to disturbances (Kelly et al. 2014). Therefore, those environmental laws assume that ecosystems exhibit linear responses to disturbances. Activities authorized by this NWP are likely to contribute to the cumulative impacts that affect the dynamics of aquatic ecosystems, and those dynamics may be linear or non-linear. In most cases, our current understanding of aquatic ecosystems or other ecosystems is not sufficient for predicting how they are likely to respond to single disturbances or multiple disturbances (Clarke Murray et al. 2014, Kelly et al. 2014, Suding and

Hobbs 2009, Cocklin et al. 1992).

The use of thresholds for determining the significance or severity of cumulative impacts should focus on the use of ecological thresholds, rather than regulatory thresholds, because regulatory thresholds are typically not based on ecological concepts (Duinker et al. 2013), such as ecosystems dynamics in response to multiple disturbances and other drivers. In addition, some regulatory thresholds, especially qualitative thresholds (e.g., an environmental change that is "no more than minimal"), are subjective, and present challenges in defining that regulatory threshold and how to apply it to decision-making. Compared to regulatory thresholds, one advantage that ecological thresholds have as an environmental decision-making tool is that ecological thresholds are not arbitrary because they are based on observable biophysical ecosystem responses (Kelly et al. 2015).

Ecological thresholds can guide decision-making for regulatory programs (Kelly et al. 2014) for ecosystems with non-linear dynamics. Ecological thresholds are less useful for decision-making for ecosystems that have linear dynamics, because they change gradually in response to multiple disturbances over time, with no discernable threshold. Duinker and others (2013) stated that thresholds are a critical tool for evaluating the significance of cumulative impacts. However, it is difficult to predict where these thresholds are, and ecosystems may exhibit little change before a threshold is reached (Scheffer et al. 2009).

If an ecological threshold exists, it may be difficult to identify because many thresholds are not known to exist until after an ecosystem has changed to an alternative state, especially if the ecosystem has resisted change after being exposed to multiple disturbances (Selkoe et al. 2015). Identifying ecological thresholds requires gathering sufficient information to better understand ecosystem dynamics and reduce uncertainty about where ecological thresholds may occur and under what circumstances they may be reached (Kelly et al. 2014) and cause the ecosystem to exhibit a substantial change in structure and function. In addition, ecological thresholds are likely to change as ecosystems change over time, and it may be difficult to predict where an ecological threshold will exist in the future (Standish et al. 2014). Another factor to consider regarding the use of ecological thresholds in decision-making is that slower transitions to alternative states (i.e., substantial changes in ecosystem structure and function) can be more difficult to identify and manage than sudden transitions to alternative states (Hughes et al. 2013). In some ecosystems, these transitions can take decades, centuries, or longer to occur (Hughes et al. 2013). Therefore, the utility of ecological thresholds in decision-making by Corps divisions and districts, as well as natural resource managers, is dependent on how quickly these transitions shifts are likely to occur in a particular ecosystem.

The aquatic ecosystems that may be affected by activities authorized by this NWP and other Department of the Army permits may respond to multiple disturbances under any of the three models described above, and we likely do not know which model may apply to a particular aquatic ecosystem, watershed, or other geographic area over which cumulative impacts are assessed. This includes aquatic ecosystems that are subject to regulation by the Corps under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act of 1899. The type of dynamics an aquatic ecosystem exhibits may also depend on how various disturbances (including disturbances caused by activities authorized by this NWP) will interact with each other and cause gradual or abrupt changes in aquatic ecosystem structure and function. Natural resource managers often do not have sufficient information as to whether an ecological threshold exists in a particular ecosystem, under what conditions that threshold might be crossed, and whether hysteresis may prevent the ecosystem from returning to its previous state (Foley et al. 2015). We are not currently capable of developing accurate, predictive models for complex systems (Scheffer et al. 2012), such as aquatic ecosystems that may be affected by the activities authorized by this NWP, that could be consistently relied upon for decision-making and management for cumulative adverse environmental effects.

Implementing an approach to use ecological thresholds to make decisions regarding cumulative environmental change and shifts to alternative states has a number of challenges, such as the difficulty of identifying useful thresholds and the possibility that some for ecosystems it might not be possible to identify practical thresholds (Duinker and Greig 2006). The identification of ecological thresholds is also complicated by the complexity of interactions between ecosystems, geography, local environmental factors, and large-scale environmental factors, and how ecosystems respond to disturbance (Standish et al. 2014). In addition, thresholds are likely to vary by specific ecosystems, with individual ecosystems having different thresholds, depending on site-specific and regional characteristics, including the types of disturbances a particular ecosystem is subjected (Groffman et al. 2006). Because of the difficulty in identifying thresholds in advance of an ecosystem shifting to a substantially different structure and function, the most certain way to identify thresholds in ecosystems is to observe when a change to a substantially different structure and function occurs (Kelly et al. 2014, Selkoe et al. 2015).

For jurisdictional waters and wetlands that exhibit non-linear responses to multiple disturbances, including disturbances caused by NWP activities, the “more than minimal cumulative adverse environmental effects” threshold could be interpreted as the occurrence of a substantial change in structure and function after an ecological threshold is crossed. In other words, cumulative effects caused by activities authorized by this NWP during the period it is in effect would be no more than minimal if the aquatic ecosystems within the regional spatial scale at which cumulative effects are assessed (e.g., a waterbody, watershed, county, state, or Corps district) exhibit little or no change in aquatic ecosystem structure and function during that time period.

Some jurisdictional waters and wetlands may exhibit gradual, continuous responses to disturbances caused by activities authorized by this NWP and other anthropogenic and natural disturbances. For jurisdictional waters and wetlands that exhibit linear (additive or gradual) responses to multiple disturbances, including disturbances caused by NWP activities, the “more than minimal cumulative adverse environmental effects” threshold is more difficult to define ecologically because each disturbance causes an incremental change in the structure and function of that aquatic ecosystem. For jurisdictional waters and wetlands that exhibit linear responses to multiple disturbances, division and district engineers would have to exercise their judgment as to when the “more than minimal cumulative adverse environmental effects” threshold is exceeded in a particular region.

Because of differences between linear and non-linear ecosystem responses to cumulative impacts, and other variables such as aquatic ecosystem resilience, the degree to which aquatic ecosystems have been affected by past human activities and natural disturbances, and gaps in understanding how aquatic ecosystems respond to multiple, interacting disturbances, a reactive approach by division and district engineers to address the potential cumulative adverse environmental effects caused by activities authorized by this NWP during the period it is in effect is warranted. If division and district engineers observe that jurisdictional waters and wetlands in a region are undergoing substantial changes in structure and function, they can take actions under 33 CFR 330.5(c) and (d) to modify, suspend, or revoke that NWP in that geographic area.

For the purposes of this environmental assessment, which is prepared at the national scale because the NWP would authorize activities across the country, the activities authorized by this NWP during the period it is in effect are anticipated to result in no more than minimal cumulative adverse environmental effects. If, during the period the NWP is in effect, Corps Headquarters determines that this NWP is resulting in more than minimal cumulative adverse environmental effects across the country, it will take action under 33 CFR 330.5(b) to modify, suspend, or revoke this NWP. At a regional scale, division and district engineers will take actions under 33 CFR 330.5(c) and (d) respectively, to modify, suspend, or revoke this NWP when they determine that the use of this NWP in a region or for a specific activity will result in more than minimal cumulative adverse environmental effects.

To conduct the discharges of dredged or fill material into waters of the United States and/or the structures or work in navigable waters of the United States authorized by this NWP, permittees or their contractors may use construction equipment and other equipment that utilizes fossil fuels that emit greenhouse gases during their operation. The quantities of greenhouse gases emitted by the use of construction equipment varies, and the variation in emissions is dependent in part on the types of activities (e.g., hauling, digging, dumping) for which that construction equipment is used and how much that equipment is idling (Heidari and Marr 2015). Emissions of greenhouse gases from construction equipment used to conduct activities authorized by this NWP are likely to be an extremely small fraction of the overall global greenhouse gas emissions that are likely to occur during the construction period. The Corps does not have authority to regulate emissions of greenhouse gases. The emissions of greenhouse gases may be regulated by the U.S. EPA under its authorities under the Clean Air Act, or by states with approved programs under the Clean Air Act.

5.3 Impact Analysis for Alternatives to the Proposed Action

5.3.1 No Action Alternative (Do Not Reissue the Nationwide Permit)

The no action alternative would not achieve one of the goals of the Corps' Nationwide Permit Program, which is to regulate with little, if any, delay or paperwork certain activities having minimal impacts (33 CFR 330.1(b)). The no action alternative would also reduce the Corps' ability to pursue the current level of review for other activities that have greater adverse effects on the aquatic environment, including activities that require standard individual permits as a result of division or district engineers exercising their discretionary authority under the NWP program. The no action alternative would also reduce the Corps' ability to conduct compliance actions.

If this NWP is not available, substantial additional resources would be required for the Corps to evaluate these minor activities through the standard individual permit process, and for the public and federal, tribal, and state resource agencies to review and comment on the large number of public notices for these activities. In a considerable majority of cases, when the Corps publishes public notices for proposed activities that result in no more than minimal adverse environmental effects, the Corps typically does not receive responses to these public notices from either the public or federal, tribal, and state resource agencies. Therefore, processing standard individual permits for these minimal impact activities is not likely to result in substantive changes to those activities. Another important benefit of the NWP program that would not be achieved through the no action alternative is the incentive for project proponents to design their projects so that those activities meet the terms and conditions of an NWP. The Corps believes the NWPs have significantly reduced adverse effects to the aquatic environment because most applicants modify their activities that require DA authorization to comply with the NWPs and avoid the longer permit application review times and larger costs typically associated with the individual permit process.

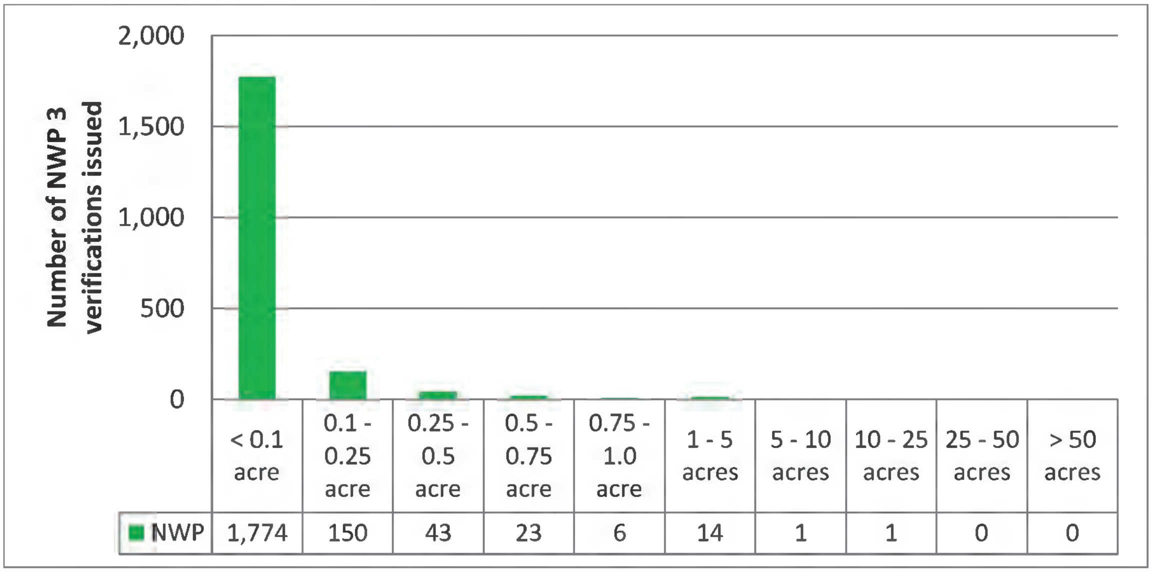
The NWP program has been effective in reducing losses of jurisdictional waters and wetlands, with a substantial majority of losses of waters of the United States authorized by NWP being 1/10-acre or less. For example, Figure 5.3-1 shows that for NWP verifications issued by Corps districts in FY2020, 76 percent of the authorized impacts (permanent and temporary) to waters of the United States were less than 1/10-acre.

Figure 5.3-1. Authorized permanent and temporary impacts to jurisdictional waters and wetlands, including rivers and streams, in acreage range categories, for NWP verifications during FY 2020. 76% of verified impacts were to less than 1/10-acre of jurisdictional waters and wetlands.

	< 0.1 acre	0.1 - 0.25 acre	0.25 - 0.5 acre	0.5 - 0.75 acre	0.75 - 1.0 acre	1 - 5 acres	5 - 10 acres	10 - 25 acres	25 - 50 acres	> 50 acres
NWP	21,593	3,147	1,814	494	263	870	144	82	23	33

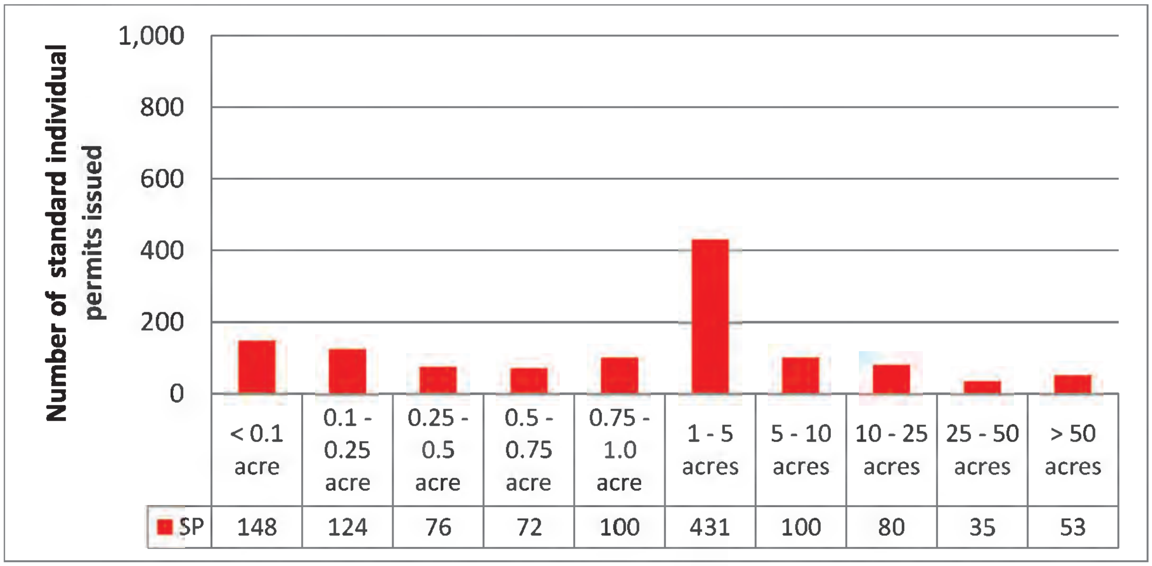
The verified acreage impacts in FY 2020 for NWP 3 activities that received written verifications from the Corps are shown in Figure 5.3.2. NWP 3 exhibits a similar pattern, where 88 percent of the acreage impacts verified in FY 2020 were less than 1/10-arce.

Figure 5.3-2. Authorized permanent and temporary impacts to jurisdictional waters and wetlands, including rivers and streams, in acreage range categories, for NWP 3 verifications issued during FY 2020. 88% of verified impacts were to less than 1/10-acre of jurisdictional waters and wetlands.



For standard individual permits issued in FY2020, the most frequently authorized impacts to waters of the United States were between 1 acre and 5 acres (431 activities) (see Figure 5.3-3). These data show the larger impacts to jurisdictional waters and wetlands that are often authorized by standard individual permits compared to the smaller impacts to jurisdictional waters and wetlands authorized by NWPs, and the avoidance and minimization conducted by project proponents to obtain NWP authorization. If the NWPs are allowed to expire without being reissued, and if project proponents seek individual permits for activities that require DA authorization, those standard individual permits may result in larger amounts of permanent and temporary impacts to waters of the United States because standard individual permits do not have any acreage limits or other quantitative limits. Therefore, the no action alternative could have more severe adverse environmental impacts than the other two alternatives.

Figure 5.3-3. Authorized permanent and temporary impacts to jurisdictional waters and wetlands for standard individual permits issued during FY 2020, by acreage range categories.



Under the no action alternative, district engineers may issue regional general permits or programmatic general permits to authorize similar categories of activities that would have no more than minimal adverse environmental effects that could have been authorized by this NWP. However, those regional general permits or programmatic general permits may have different quantitative limits, different restrictions, and other permit conditions, and those quantitative limits, restrictions, and permit conditions may result in the authorization of activities that have greater, similar, or lesser adverse environmental effects than the activities that would have been authorized by this NWP. Under the no action alternative, there may be differences in consistency in implementation of the Corps Regulatory Program among Corps districts. District engineers can tailor their regional general permits and programmatic general permits to effectively address the specific categories of aquatic resources found in their geographic areas of responsibility, the specific categories of activities that occur in those geographic areas, and the ecological functions and services those categories of aquatic resources provide. The environmental consequences of this aspect of the no action alternative are more difficult to predict because of the potential variability of regional general permits and programmatic general permits among Corps districts across the country when such general permits are available to authorize a similar category of activities as this NWP authorizes.

If this NWP is not reissued, districts would have to draft, propose, and issue regional general permits or programmatic general permits through the public notice and comment process and prepare applicable environmental documentation to support their decisions on whether to issue those regional general permits or programmatic general permits. It would take a substantial amount of time to issue those regional general permits and programmatic general permits, and in the interim proposed activities would have to be authorized through the individual permit process.

5.3.2 Reissue the Nationwide Permit With Modifications

This NWP was developed to authorize discharges of dredged or fill material into waters of the United States and structures and work in navigable waters of the United States for maintenance activities that have no more than minimal individual and cumulative adverse environmental effects. The Corps has considered changes to the terms and conditions of this NWP suggested by comments received in response to the proposed rule, as well as modifying or adding NWP general conditions, as discussed in Appendix C of this document and the preamble of the Federal Register notice announcing the reissuance of this NWP.

Changing the terms and conditions of this NWP would likely result in changes in the number of activities authorized by this NWP, and the environmental impacts of the authorized activities. The environmental consequences of changing the terms and conditions of this NWP may vary, depending on whether modifications for the reissued NWP are more restrictive, less restrictive, or is similarly restrictive compared to previously issued versions of this NWP. The environmental consequences of changing the terms and conditions of this NWP are also dependent on the application of existing tools used to ensure that activities authorized by this NWP will only have no more than minimal adverse environmental effects. Those tools include the quantitative limits of the NWP, the pre-construction notification process, the availability of mitigation measures to minimize the adverse environmental effects caused by activities authorized by this NWP, and the ability of division and district engineers to modify, suspend, or revoke this NWP on a regional or case-by-case basis.

Changing the national terms and conditions of this NWP may change the incentives for project proponents to reduce their proposed impacts to jurisdictional waters and wetlands to qualify for NWP authorization, and receive the required DA authorization for regulated activities in less time than it would take to receive individual permits for those activities. Under the individual permit process, the project proponent may request authorization for activities that have greater impacts on jurisdictional waters and wetlands, and may result in larger losses of aquatic resource functions and services. The NWP program has been effective in reducing losses of jurisdictional waters and wetlands, with a substantial majority of losses of waters of the United States authorized by this NWP being 1/10-acre or less (see Figure 5.3-2).

The environmental consequences of division engineers exercising their discretionary authority to modify, suspend, or revoke this NWP on a regional basis may be a reduction in the number of activities that could be authorized by this NWP in a region or more NWP activities requiring pre-construction notification through regional changes in the PCN requirements for this NWP. The environmental consequences are likely to include reduced losses of waters of the United States because regional conditions can only further condition or restrict the applicability of an NWP (see 33 CFR 330.1(d)). The modification, suspension, or revocation of this NWP on a regional basis by division engineers may also reduce the number of activities authorized by this NWP, which may increase the number of activities that require standard individual permits. If more activities require standard individual permits, permitted losses of jurisdictional waters and wetlands may increase because standard individual permits have no quantitative limits.

An environmental consequence of regional conditions added to this NWP by division engineers is the enhanced ability to address differences in aquatic resource functions, services, and values among different regions across the nation. Corps divisions may add regional conditions to the NWPs to enhance protection of the aquatic environment in a region (e.g., a Corps district, state, or watershed) and address regional concerns regarding jurisdictional waters and wetlands and other resources (e.g., listed species or cultural resources) that may be affected or impacted by the activities authorized by this NWP. Division engineers can also revoke an NWP in a region if the use of that NWP results in more than minimal adverse environmental effects, especially in high value or rare waters or wetlands. When an NWP is issued or reissued by the Corps, division engineers issue supplemental documents that evaluate potential impacts of the NWP at a regional level, and assess cumulative impacts caused by this NWP on a regional basis during the period this NWP is in effect. [33 CFR 330.5(c)]

An environmental consequence of district engineers modify, suspending, or revoking this NWP on a case-by-case basis is the ability of district engineers to address site-specific conditions, including the degree to which aquatic resources on the project site provide ecological functions and services. Activity-specific modifications may also address site-specific resources (e.g., listed species or cultural resources) that may be affected by NWP activities. The environmental consequences of modification of this NWP on an activity-specific basis by district engineers may be further reductions in losses of waters of the United States for specific activities authorized by NWP because of mitigation required by district engineers during their reviews of PCNs to ensure that those activities result in no more than minimal individual and cumulative adverse environmental effects (see 33 CFR 330.1(e)(3)). Examples of mitigation that may be required by district engineers include permit conditions requiring compensatory mitigation to offset losses of waters of the United States or conditions added to the NWP authorization to prohibit the permittee from conducting the activity during specific times of the year to protect spawning fish and shellfish. If a proposed NWP activity will result in more than minimal adverse environmental effects, then the district engineer will exercise discretionary authority and require an individual permit. The individual permit review process requires a project-specific alternatives analysis, including the consideration of off-site alternatives, and a public interest review.

5.3.3 Reissue the Nationwide Permit Without Modifications

Retaining the current terms and conditions of this NWP would likely result in little or no changes in the number of activities authorized by this NWP, and the environmental impacts of authorized activities. Project proponents would likely continue to design their project to qualify for NWP authorization. Retaining the current national terms and conditions of this NWP would likely continue to provide incentives for project proponents to reduce their proposed impacts to jurisdictional waters and wetlands to qualify for NWP authorization, and receive the required DA authorization for regulated activities in less time than it would take to receive individual permits for those activities. Under this alternative, for those activities that require individual permits project proponents may request authorization for activities that have greater impacts on jurisdictional waters and wetlands, and may result in larger losses of aquatic resource functions and services. The NWP program has been effective in reducing losses of jurisdictional waters and wetlands, with a substantial majority of losses of waters of the United States authorized by NWP being 1/10-acre or less. For example, Figure 5.3-2 shows that for NWP 3 verifications issued by Corps districts in FY2020, 92 percent of the authorized impacts (permanent and temporary) to waters of the United States were less than 1/10-acre. For standard individual permits issued in FY2020, the most frequent authorized impacts to waters of the United States were between 1 acre and 5 acres (see Figure 5.3-2).

Under this alternative, the environmental consequences of division engineers exercising their discretionary authority to modify, suspend, or revoke this NWP on a regional basis would be similar to the environmental consequences discussed in section 5.3.2 of this document for the alternative identified in section 3.2 of this document. Corps divisions may add regional conditions to the NWPs to enhance protection of the aquatic environment in a region (e.g., a Corps district, state, or watershed) and address regional concerns regarding jurisdictional waters and wetlands and other resources (e.g., listed species or cultural resources) that may be affected or impacted by the activities authorized by this NWP. Division engineers can also revoke an NWP in a region if the use of that NWP results in more than minimal adverse environmental effects, especially in high value or rare waters or wetlands. When an NWP is issued or reissued by the Corps, division engineers issue supplemental documents that evaluate potential impacts of the NWP at a regional level, and assess cumulative impacts caused by this NWP on a regional basis during the period this NWP is in effect. [33 CFR 330.5(c)]

Under this alternative, the ability of district engineers to modify, suspended, or revoke this NWP on a case-by-case to address site-specific conditions, including the degree to which aquatic resources on the project site provide ecological functions and services, is likely to have environmental consequences similar to the environmental consequences of the alternative identified in section 3.2 of this document. Activity-specific modifications under this alternative may also address site-specific resources (e.g., listed species or cultural resources) that may be affected by NWP activities. Activity-specific modifications may also include mitigation requirements similar to the potential mitigation requirements discussed in section 5.3.2 of this document.

The reissuance of this NWP adopts the alternative identified in section 3.3 of this document. The Corps has considered the comments received in response to the proposed rule, and made changes to the NWPs, general conditions, and definitions to address those comments. Division engineers may add regional conditions to this NWP to help ensure that the use of the NWPs in a particular geographic area will result in no more than minimal individual and cumulative adverse environmental effects. District engineers may also add regional conditions to this NWP to help ensure compliance with other applicable laws, such as Section 7 of the Endangered Species Act, Section 106 of the National Historic Preservation Act, and the essential fish habitat provisions of the Magnuson-Stevens Fishery Conservation and Management Act. Division engineers may also add regional conditions to this NWP to fulfill the Corps' tribal trust responsibilities.

6.0 Public Interest Review

6.1 Public Interest Review Factors (33 CFR 320.4(a)(1))

For each of the 20 public interest review factors, the extent of the Corps consideration of expected impacts resulting from the use of this NWP is discussed, as well as the reasonably foreseeable cumulative adverse effects that are expected to occur. The Corps decision-making process involves consideration of the benefits and detriments that may result from the activities authorized by this NWP.

(a) Conservation: The activities authorized by this NWP may have adverse effects on the natural resource characteristics of the project area, but those adverse effects are likely to be minor because this NWP is limited to authorizing maintenance activities. The adverse effects of activities authorized by this NWP on conservation are likely to be minor because the maintenance activities are limited to minor deviations to the existing structure or fill, and to the removal of accumulated sediments near the structure or fill. The existing structure or fill being maintained is currently a component of the contemporary environmental setting (i.e., the affected environment or environmental baseline), and may exhibit some conservation values.

(b) Economics: The maintenance of existing, currently serviceable structures or fills are likely to have positive impacts on the local economy. During construction, these activities may generate jobs and revenue for local contractors as well as revenue to building supply companies that sell construction materials. The removal of accumulated sediments in the vicinity of existing structures is likely to sustain effective functioning of those structures, and may help minimize operational costs.

(c) Aesthetics: Maintenance activities are likely to cause negligible changes to the visual character of the waters of the United States where the existing structures or fills are located. Minor modifications to repair, rehabilitate, or replace the existing structure or fill may affect the visual character of the waterbody, but these effects are likely to be minor. The extent and perception of these changes are likely to vary, depending on the extent of the maintenance activity, the nature of the surrounding area, and the public and private uses of the area. During construction, maintenance activities authorized by this NWP can also modify other aesthetic characteristics, such as air quality and noise levels.

(d) General environmental concerns: Activities authorized by this NWP may affect general environmental concerns, such as water, air, noise, and land pollution, especially during construction. The authorized activities may also affect the physical, chemical, and biological characteristics of the environment. The adverse effects of the activities authorized by this NWP on general environmental concerns are likely to be minor because the NWP authorizes only maintenance activities. Adverse effects to the chemical composition of the aquatic environment will be controlled by general condition 6, which states that the material used for construction must be free from toxic pollutants in toxic amounts. General condition 23 requires mitigation to minimize adverse effects to the aquatic environment through on-site avoidance and minimization. Compensatory mitigation may be required by district engineers to ensure that the adverse environmental effects are no more than minimal. Specific environmental concerns are addressed in other sections of this document.

Executive Order 12898, “Federal Actions To Address Environmental Justice in Minority Populations and Low-Income Populations,” requires, to the greatest extent practicable and permitted by law, that each federal agency make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the United States and its territories and possessions, the District of Columbia, the Commonwealth of Puerto Rico,
and the Commonwealth of the Mariana islands. Guidance issued by U.S. EPA (U.S. EPA 1998) suggests three steps for considering environmental justice: (1) determine the existence of minority and low-income populations; (2) determine if resource impacts are high and adverse; and (3) determine if the impacts fall

disproportionately on minority and low-income populations.

Applying these three steps to the reissuance of this NWP, the Corps finds that this NWP can be used to authorize discharges of dredged or fill material into waters of the United States and structures and work in navigable waters of the United States in areas with minority populations and low-income populations. In addition, this NWP can be used to authorize discharges of dredged or fill material into waters of the United States and structures and work in navigable waters of the United States in areas with majority populations and high-income populations. This NWP is issued by Corps Headquarters to be used anywhere in the United States, its territories, and possessions to authorize discharges of dredged or fill material into waters of the United States and structures and work in navigable waters of the United States that have no more than minimal individual and cumulative adverse environmental effects. Because this NWP authorizes only those activities involving discharges of dredged or fill material into waters of the United States and structures and work in navigable waters of the United States that have no more than minimal individual and cumulative adverse environmental effects, the reissuance of this NWP will not result in high and adverse resource impacts to areas with minority and low-income populations. Because this NWP can be used to authorize discharges of dredged or fill material into waters of the United States and structures and work in navigable waters of the United States across the United States, its territories, and possessions that have no more than minimal adverse environmental effects, the activities authorized by this NWP and their associated impacts will not fall disproportionately on minority and low-income populations. The reissuance of this NWP is not expected to negatively impact any community, and therefore is not expected to cause any disproportionately high and adverse impacts to minority or low-income communities (i.e., environmental justice communities).

Division engineers have discretionary authority to modify, suspend, or revoke NWP authorizations for any specific geographic area, class of activities, or class of waters within a Corps division because of concerns regarding the environment or the other relevant factors of the public interest (33 CFR 330.5(c)(1)). District engineers have discretionary authority to review any activity authorized by NWP to determine whether the activity complies with the NWP, including whether the proposed activity would have more than minimal individual or cumulative net adverse effects on the environment or otherwise may be contrary to the public interest (33 CFR 330.1(d). Environmental justice considerations may be identified by division and district engineers assessing the potential impacts of NWP activities on the Corps' public interest review factors. The discretionary authority of division and district engineers can be used to address environmental justice considerations on a regional or activity-specific basis, when environmental justice considerations in a region or for a particular NWP activity are determined by a division or district engineer to be contrary to the public interest.

(e) Wetlands: Activities authorized by this NWP may result in the loss or modification of small amounts of wetlands. Repair, rehabilitation, and replacement activities may result in minor losses of wetlands because of minor deviations due to construction techniques or changes in materials. Maintenance activities may also alter some characteristics of existing wetlands, such as the wetland plant community, in the vicinity through the direct and indirect effects caused by authorized activities. The removal of accumulated sediments in the vicinity of existing structures may result in losses of wetlands. Wetlands located in temporary access roads or staging areas may be impacted by the activity, but these wetlands are likely to be restored, unless the district engineer authorizes another use for the area.

Wetlands provide habitat, including foraging, nesting, spawning, rearing, and resting sites for aquatic and terrestrial species. The loss or alteration of wetlands may alter natural drainage patterns. Wetlands reduce erosion by stabilizing the substrate. Wetlands also act as storage areas for stormwater and flood waters. Wetlands may act as groundwater discharge or recharge areas. The loss of wetland vegetation may adversely affect water quality because these plants trap sediments, pollutants, and nutrients and transform chemical compounds. Wetland vegetation also provides habitat for microorganisms that remove nutrients and pollutants from water. Wetlands, through the accumulation of organic matter, act as sinks for some nutrients and other chemical compounds, reducing the amounts of these substances in the water.

General condition 23 requires avoidance and minimization of impacts to waters of the United States, including wetlands, at the project site. Compensatory mitigation may be required to offset losses of wetlands caused by activities authorized by this NWP so that the net adverse environmental effects are no more than minimal. General condition 22 requires submittal of a pre-construction notification prior to use of this NWP in designated critical resource waters and adjacent wetlands, which may include high value wetlands. Division engineers can add regional conditions to this NWP to restrict or prohibit its use in high value waters. District engineers will also exercise discretionary authority to require individual permits if the wetlands to be filled by maintenance activities are high value and the regulated activities will result in more than minimal adverse environmental effects. District engineers can add case-specific special conditions to the NWP authorization to reduce impacts to wetlands or require compensatory mitigation to offset wetland losses.

(f) Historic properties: General condition 20 states that in cases where the district engineer determines that the activity may affect properties listed, or eligible for listing, in the National Register of Historic Places, the activity is not authorized until the requirements of Section 106 of the National Historic Preservation Act have been satisfied. Paragraph (c) of general condition 20 requires non-federal permittees to submit a pre-construction notification to the district engineer if the NWP activity might have the potential to cause effects to any historic properties listed on, determined to be eligible for listing on, or potentially eligible for listing on the

National Register of Historic Places, including previously unidentified properties. Effects to historic properties will be addressed through the section 106 process.

(g) Fish and wildlife values: This NWP authorizes activities in all waters of the United States, which provide habitat to many species of fish and wildlife. Activities authorized by this NWP may cause minor changes to the habitat characteristics of streams and wetlands, but adverse effects to fish and wildlife habitat are likely to be negligible since this NWP only authorizes maintenance activities. The existing structures and fills being maintained through the activities authorized by this NWP are currently part of the environmental baseline.

Activities authorized by paragraph (b) of this NWP may improve fish passage by authorizing the removal of accumulated sediments in the vicinity of existing structures that impede the movement of fish and other aquatic organisms. Wetland and riparian vegetation provides food and habitat for many species, including foraging areas, resting areas, corridors for wildlife movement, and nesting and breeding grounds. Streams and their riparian areas provide habitat for many species, and may act as corridors for movement through a watershed. Open waters provide habitat for fish and other aquatic organisms. Fish and other motile animals are likely to avoid the project site while maintenance activities authorized by this NWP are being conducted. Woody riparian vegetation shades streams, which reduces water temperature fluctuations and provides habitat for fish and other aquatic animals. Riparian vegetation provides organic matter that is consumed by fish and aquatic invertebrates. Woody riparian vegetation creates habitat diversity in streams when trees and large shrubs fall into the channel, forming snags that provide habitat and shade for fish. The morphology of a stream channel may be altered by activities authorized by this NWP, which can affect fish populations, but these changes are likely to be minor. Pre-construction notification is required for all activities authorized by paragraph (b) of this NWP, which provides district engineers with an opportunity to review activities authorized by that paragraph, assess the potential impacts of those activities on fish and wildlife values, and ensure that the authorized activities result in no more than minimal adverse environmental effects.

General condition 2 will reduce the adverse effects to fish and other aquatic species by prohibiting activities that substantially disrupt the movement of indigenous aquatic species. Compliance with general conditions 3 and 5 will help ensure that the authorized activity has no more than minimal adverse effects on spawning areas and shellfish beds, respectively. The authorized activity cannot have more than minimal adverse effects on breeding areas for migratory birds, due to the requirements of general condition 4.

For an NWP activity, compliance with the Bald and Golden Eagle Protection Act (16 U.S.C. 668(a)-(d)), the Migratory Bird Treaty Act (16 U.S.C. 703; 16 U.S.C. 712), and the Marine Mammal Protection Act (16 U.S.C. 1361 et seq.) is the responsibility of the project proponent. General condition 19 states that the permittee is responsible for contacting appropriate local office of the U.S. Fish and Wildlife Service to determine applicable measures to reduce impacts to migratory birds or eagles, including whether “incidental take” permits are necessary and available under the Migratory Bird Treaty Act or Bald and Golden Eagle Protection Act for a particular activity.

Consultation pursuant to the essential fish habitat provisions of the Magnuson-Stevens Fishery Conservation and Management Act will occur as necessary for proposed NWP activities that may affect essential fish habitat. Essential fish habitat consultation may occur on a case-by-case or programmatic basis. Division and district engineers can impose regional and activity-specific conditions on the NWP authorization to ensure that authorized activities will result in no more than minimal adverse effects on essential fish habitat.

(h) Flood hazards: The activities authorized by this NWP are likely to have negligible adverse effects the flood-holding capacity of the 100-year floodplain, because the NWP is limited to maintenance activities. The removal of accumulated sediments in the vicinity of existing structures is likely to reduce flood hazards by restoring the water-holding capacity of the waterbody and reducing hazards to human health, safety, and welfare.

(i) Floodplain values: Activities authorized by NWP 3 are likely to have minor effects on the flood-holding capacity of the floodplain, as well as other floodplain values, because it is limited to maintenance activities.

(j) Land use: Activities authorized by this NWP are not expected to have adverse effects on land use, because the maintenance of existing structures and fills are not likely to change the existing land use. The removal of accumulated sediments in the vicinity of existing structures will also help maintain existing land uses.

(k) Navigation: Activities authorized by this NWP are likely to have minor adverse effects on navigation, because these activities must comply with general condition 1. This NWP authorizes the maintenance, repair, and rehabilitation of structures or fills that may be located in navigable waters. Since the NWP authorizes only minor deviations from the original dimensions or configuration, any adverse effects on navigation should be no more than minimal. The removal of accumulated sediments from the vicinity of existing structures will likely have no adverse effects on navigation, and may help to improve navigation to some degree.

(l) Shore erosion and accretion: The activities authorized by this NWP are likely to have minor adverse effects on shore erosion and accretion processes because it is limited to maintenance activities. Repair of bank stabilization activities may be authorized by this NWP, provided the structure or fill is currently serviceable. The removal of accumulated sediments in the vicinity of existing structures is anticipated to have negligible adverse effects on shore erosion and accretion.

(m) Recreation: Activities authorized by this NWP are not likely to affect the recreational uses of the area, since it is limited to maintenance of existing structures and fills. Maintenance of existing structures and fills used for recreation is likely to provide for safety of users of those recreational features and to allow those structures and fills to be continued to be used for recreation.

(n) Water supply and conservation: Activities authorized by this NWP are likely to have negligible effects on surface water and groundwater supplies because this NWP authorizes only maintenance activities.

(o) Water quality: Maintenance activities in wetlands and waterbodies are likely to have minor adverse effects on water quality. Some maintenance activities may have beneficial effects on water quality by reducing erosion or the release of materials to the waterbody. During maintenance activities, small amounts of oil and grease from construction equipment may be discharged into the waterway. Because most of these maintenance activities are anticipated to occur during a relatively short time period, the frequency and concentration of these discharges are not expected to have more than minimal adverse effects on water quality. The removal of accumulated sediments in the vicinity of existing structures may result in temporary increases in turbidity. If the proposed activity involves a discharge into waters of the United States, Clean Water Act Section 401 water quality certification will be required. The water quality certification will ensure that the authorized activity does not violate applicable water quality requirements.

(p) Energy needs: The activities authorized by this NWP are not likely to permanently increase energy consumption in the area because the NWP only authorizes the maintenance of existing structures and fills.

(q) Safety: The maintenance of existing structures and fills is likely to help improve safety in the vicinity of those structures and fills because those maintenance activities will help prevent or reduce degradation of those structures and fills that could reduce safety. The activities authorized by this NWP will be subject to federal, state, and local safety laws and regulations. Therefore, the activities authorized by this NWP are not likely to adversely affect the safety of the project area.

(r) Food and fiber production: Activities authorized by this NWP are likely to have only minor adverse effects on food and fiber production, since the NWP is limited to maintenance activities. Maintenance activities for structures and fills used for food and fiber production activities will help those structures and fills continue to be used for those purposes.

(s) Mineral needs: Activities authorized by this NWP may increase demand for aggregates and stone, which are used to repair structures or fills. Maintenance activities authorized by this NWP may utilize other building materials, such as steel, aluminum, and copper, which are made from mineral ores. The repair, replacement, and rehabilitation activities authorized by this NWP may also utilize stone and other minerals.

(t) Considerations of property ownership: The NWP complies with 33 CFR 320.4(g), which states that an inherent aspect of property ownership is a right to reasonable private use. The NWP provides expedited DA authorization for the maintenance of existing structures and fills in waters of the United States that result in no more than minimal adverse environmental effects.

6.2 Additional Public Interest Review Factors (33 CFR 320.4(a)(2))

6.2.1 Relative extent of the public and private need for the proposed structure or work

This NWP authorizes structures and work in navigable waters of the United States, as well as discharges of dredged or fill material into all waters of the United States, for maintenance activities that have no more than minimal individual and cumulative adverse environmental effects. These activities satisfy public and private needs for continued operation and use of existing structures and/or fills. The need for this NWP is based upon the number of these activities that occur annually with no more than minimal individual and cumulative adverse environmental effects.

6.2.2 Where there are unresolved conflicts as to resource use, the practicability of using reasonable alternative locations and methods to accomplish the objective of the proposed structure or work

Most situations in which there are unresolved conflicts concerning resource use arise when environmentally sensitive areas are involved (e.g., special aquatic sites, including wetlands) or where there are competing uses of a resource. The nature and scope of the activity, when planned and constructed in accordance with the terms and conditions of this NWP, reduce the likelihood of such conflict. In the event that there is a conflict, the NWP contains provisions that are capable of resolving the matter (see section 1.2 of this document).

General condition 23 requires permittees to avoid and minimize adverse effects to waters of the United States to the maximum extent practicable on the project site. Consideration of off-site alternative locations is not required for activities that are authorized by general permits. General permits authorize activities that have no more than minimal individual and cumulative adverse effects on the environment and the overall public interest. The district engineer will exercise discretionary authority and require an individual permit if the proposed activity will result in more than minimal adverse environmental effects on the project site. The consideration of off-site alternatives can be required during the individual permit process.

6.2.3 The extent and permanence of the beneficial and/or detrimental effects which the proposed structure or work is likely to have on the public and private uses to which the area is suited

The nature and scope of the activities authorized by the NWP will most likely restrict the extent of the beneficial and detrimental effects to the area immediately surrounding the maintenance activity. Activities authorized by this NWP must have no more than minimal individual and cumulative adverse environmental effects, or they will require individual permits from the Corps.

The terms, conditions, and provisions of the NWP were developed to ensure that individual and cumulative adverse environmental effects are no more than minimal. Specifically, NWPs do not obviate the need for the permittee to obtain other Federal, state, or local authorizations required by law. The NWPs do not grant any property rights or exclusive privileges (see 33 CFR 330.4(b) for further information). Additional conditions, limitations, restrictions, and provisions for discretionary authority, as well as the ability to add activity-specific or regional conditions to this NWP, will provide further safeguards to the aquatic environment and the overall public interest. There are also provisions to allow suspension, modification, or revocation of the NWP.

7.0 Determinations

7.1 Finding of No Significant Impact

Based on the information in this document, the Corps has determined that the discharges of dredged or fill material into waters of the United States and the structures and work in navigable waters of the United States authorized by the issuance of this NWP will not have a significant impact on the quality of the human environment. During the period this NWP will be in effect, the activities authorized by this NWP will result in only minor changes to the affected environment described in section 4.0 of this environmental assessment. Therefore, the preparation of an environmental impact statement is not required for the issuance of this NWP.

7.2 Public Interest Determination

In accordance with the requirements of 33 CFR 320.4, the Corps has determined, based on the information in this document, that the issuance of this NWP to authorize discharges of dredged or fill material into waters of the United States and structures and work in navigable waters of the United States for maintenance activities is not contrary to the public interest.

7.3 Section 404(b)(1) Guidelines Compliance

In Appendix A of this document, this NWP has been evaluated for compliance with the 404(b)(1) Guidelines, including Subparts C through G. Based on the information in this document, the Corps has determined that the discharges authorized by this NWP comply with the 404(b)(1) Guidelines, with the inclusion of appropriate and practicable conditions, including mitigation measures required by the NWP general conditions, that minimize adverse effects on affected aquatic ecosystems. The discharges of dredged or fill material into waters of the United States authorized by this NWP will result in only minor changes to the current environmental setting described in section 4.0 of this document, and will have no more than minimal individual and cumulative adverse effects on the aquatic environment during the period this NWP is in effect.

7.4 Section 176(c) of the Clean Air Act General Conformity Rule Review

This issuance of this NWP has been analyzed for conformity applicability pursuant to regulations implementing Section 176(c) of the Clean Air Act. It has been determined that the activities authorized by this permit will not exceed *de minimis* levels of direct emissions of a criteria pollutant or its precursors and are exempted by 40 CFR 93.153. Any later indirect emissions are generally not within the Corps continuing program responsibility and generally cannot be practicably controlled by the Corps. For these reasons, a conformity determination is not required for this NWP.

FOR THE COMMANDER

Dated:

DEC 10 2021

William H. Graham, Jr.
Major General, U.S. Army
Deputy Commanding General for
Civil and Emergency Operations

Appendix A – Clean Water Act Section 404(b)(1) Guidelines Analysis

The 404(b)(1) Guidelines compliance criteria for general permits are provided at 40 CFR 230.7. This 404(b)(1) Guidelines compliance analysis includes analyses of the direct, secondary, and cumulative effects on the aquatic environment caused by discharges of dredged or fill material into waters of the United States authorized by this NWP.

For discharges of dredged of fill material into waters of the United States authorized by general permits, the analysis and documentation required by the 404(b)(1) Guidelines are to be performed at the time of issuance of a general permit, such as an NWP. The analysis and documentation will not be repeated when activities are conducted under the NWP. The 404(b)(1) Guidelines do not require reporting or formal written communication at the time individual discharges of dredged or fill material into waters of the United States are conducted under an NWP, but a particular NWP may require appropriate reporting. [40 CFR 230.6(d) and 230.7(b)]

A.1 Evaluation Process (40 CFR 230.7(b))

A.1.1 Alternatives (40 CFR 230.10(a))

General condition 23 requires permittees to avoid and minimize discharges of dredged or fill material into waters of the United States to the maximum extent practicable on the project site. The consideration of off-site alternatives is not directly applicable to general permits (see 40 CFR 230.7(b)(1)).

A.1.2 Prohibitions (40 CFR 230.10(b))

This NWP authorizes discharges of dredged or fill material into waters of the United States, which require water quality certification. Water quality certification requirements will be met in accordance with the procedures at 33 CFR 330.4(c) and 40 CFR part 121.

No toxic discharges will be authorized by this NWP. General condition 6 states that the material must be free from toxic pollutants in toxic amounts.

This NWP does not authorize discharges of dredged or fill material into waters of the United States that are likely to jeopardize the continued existence of any listed threatened or endangered species (or species proposed for listing) or result in the destruction or adverse modification of critical habitat (or critical habitat proposed for such designation). Reviews of pre-construction notifications, regional conditions, and local operating procedures for endangered species will ensure compliance with the Endangered Species Act. Refer to general condition 18 and to 33 CFR 330.4(f) for information and procedures.

This NWP does not authorize discharges of dredged or fill material into waters of the United States that violate any requirement to protect any marine sanctuary. Refer to section A.2.3(j)(1) of this Appendix for further information.

A.1.3 Findings of Significant Degradation (40 CFR 230.10(c))

Potential impact analysis (Subparts C through F): The potential impact analysis specified in Subparts C through F is discussed in section A.2.3 of this Appendix. Mitigation required by the district engineer will help ensure that the adverse effects on the aquatic environment caused by discharges of dredged or fill material into waters of the United States are no more than minimal.

Evaluation and testing (Subpart G): Because the terms and conditions of the NWP specify the types of discharges of dredged or fill material into waters of the United States that are authorized, as well as those that are prohibited, individual evaluation and testing for the presence of contaminants will normally not be required. If a situation warrants, provisions of the NWP allow division or district engineers to further specify authorized or prohibited discharges of dredged or fill material into waters of the United States and/or require testing. General condition 6 requires that materials used for construction be free from toxic pollutants in toxic amounts.

Based upon Subparts B and G, after consideration of Subparts C through F, the discharges of dredged or fill material into waters of the United States authorized by this NWP will not cause or contribute to significant degradation of waters of the United States.

A.1.4 Factual determinations (40 CFR 230.11)

The factual determinations required in 40 CFR 230.11 are discussed in section A.2.3 of this Appendix.

A.1.5 Appropriate and practicable steps to minimize potential adverse impacts (40 CFR 230.10(d))

As demonstrated by the information in this document, as well as the terms, conditions, and provisions of this NWP, actions to minimize adverse effects (Subpart H) have been thoroughly considered and incorporated into the NWP. General condition 23 requires permittees to avoid and minimize discharges of dredged or fill material into waters of the United States to the maximum extent practicable on the project site. Compensatory mitigation may be required by the district engineer to ensure that the net adverse effects on the aquatic environment caused by discharges of dredged or fill material into waters of the United States are no more than minimal.

A.2 Evaluation Process (40 CFR 230.7(b))

A.2.1 Description of permitted activities (40 CFR 230.7(b)(2))

As indicated by the text of this NWP in section 1.0 of this document, and the discussion of potential impacts in section 5.0 of this document, the activities authorized by this NWP are sufficiently similar in nature and environmental impact to warrant authorization under a single general permit. Specifically, the purpose of the NWP is to authorize structures or work, including discharges of dredged or fill material, for maintenance activities. The nature and scope of the impacts are controlled by the terms and conditions of the NWP.

The activities authorized by this NWP are sufficiently similar in nature and environmental impact to warrant authorization by a general permit. The terms of the NWP authorize a specific category of activity (i.e., structures or work, including discharges of dredged or fill material for maintenance activities) in a specific category of waters (i.e., waters of the United States, including navigable waters). The restrictions imposed by the terms and conditions of this NWP will result in the authorization of discharges of dredged or fill material into waters of the United States that have similar impacts on the aquatic environment, namely the replacement of aquatic habitats, such as wetlands and open waters, with structures or fills that are part of maintaining existing, currently serviceable, structures or fills, as well as the removal of accumulated sediment from canals associated with intake and outfall structures.

If a situation arises in which a proposed discharge of dredged or fill material into waters of the United States requires further review, or is more appropriately reviewed under the individual permit process, provisions of the NWPs allow division and/or district engineers to take such action.

A.2.2 Cumulative effects (40 CFR 230.7(b)(3))

The 404(b)(1) Guidelines at 40 CFR 230.11(a) define cumulative effects as "…the changes in an aquatic ecosystem that are attributable to the collective effect of a number of individual discharges of dredged or fill material." For the issuance of general permits, such as this NWP, the 404(b)(1) Guidelines require the permitting authority to "set forth in writing an evaluation of the potential individual and cumulative impacts of the categories of activities to be regulated under the general permit." [40 CFR 230.7(b)] More specifically, the 404(b)(1) Guidelines cumulative effects assessment for the issuance or reissuance of a general permit is to include an evaluation of "the number of individual discharge activities likely to be regulated under a general permit until its expiration, including repetitions of individual discharge activities at a single location." [40 CFR 230.7(b)(3)] If a situation arises in which cumulative effects are likely to be more than minimal and the proposed discharge of dredged or fill material into waters of the United States requires further review, or is more appropriately reviewed under the individual permit process, provisions of the NWPs allow division and/or district engineers to take such action.

Based on reported use of this NWP during the period of March 19, 2017, to March 18, 2019, the Corps estimates that this NWP will be used approximately 4,350 times per year on a national basis, resulting in permanent or temporary impacts to approximately 1,800 acres of waters of the United States, including jurisdictional wetlands. The reported use includes pre-construction notifications submitted to Corps districts, as required by the terms and conditions of the NWP as well as regional conditions imposed by division engineers. The reported use also includes voluntary notifications to submitted to Corps districts where the applicants request written verification in cases when pre-construction notification is not required. The reported use does not include activities that do not require pre-construction notification and were not voluntarily reported to Corps districts. The Corps estimates that 1,000 NWP 3 activities will occur each year that do not require pre-construction notification, and that these activities will impact 15 acres of jurisdictional waters each year.

Based on reported use of this NWP during that time period, the Corps estimates that one percent of the NWP 3 verifications will require compensatory mitigation to offset the authorized impacts to waters of the United States and ensure that the authorized activities result in only minimal adverse effects on the aquatic environment. The verified activities that do not require compensatory mitigation will have been determined by Corps district engineers to result in no more than minimal individual and cumulative adverse effects on the aquatic environment without compensatory mitigation. During the period of 2022-2026, the Corps expects little change to the percentage of NWP 3 verifications requiring compensatory mitigation, because there have been no substantial changes in the mitigation general condition or the NWP regulations for determining when compensatory mitigation is to be required for NWP activities. The Corps estimates that approximately 45 acres of compensatory mitigation will be required each year to offset authorized impacts. The demand for these types of activities could increase or decrease during the period this NWP is anticipated to be in effect.

Based on these annual estimates, the Corps estimates that approximately 21,400 activities could be authorized until this NWP expires, resulting in impacts to approximately 7,260 acres of waters of the United States, including jurisdictional wetlands. Approximately 180 acres of compensatory mitigation would be required to offset those impacts. The authorized impacts are expected to result in only minor changes to the affected environment (i.e., the current environmental setting), which is described in section 4.0 of this document.

Compensatory mitigation is the restoration (re-establishment or rehabilitation), establishment (creation), enhancement, and/or in certain circumstances preservation of aquatic resources for the purposes of offsetting unavoidable adverse impacts which remain after all appropriate and practicable avoidance and minimization has been achieved (33 CFR 332.2). For discharges of dredged or fill material into waters of the United States authorized by NWPs, compensatory mitigation and other forms of mitigation may be used to ensure that the adverse environmental effects are no more than minimal, individually and cumulatively (33 CFR 330.1(e)(3); NWP general condition 23). Restoration is usually the first compensatory mitigation option considered because the likelihood of ecological success is greater (33 CFR 332.3(a)(2)). As discussed below, restoration of wetlands and streams can increase the ecological functions and services provided by those aquatic resources. However, restoration typically cannot return a degraded wetland or stream to a prior historic condition because of changes in environmental conditions at various scales over time (e.g., Moreno-Mateos et al. 2016, Higgs et al. 2014, Jackson and Hobbs 2009, Zedler and Kercher 2005; Palmer et al. 2014), and many of those environmental changes are beyond the control of the mitigation provider. Therefore, it is important to establish realistic goals and objectives for wetland and stream restoration projects (e.g., Hobbs 2007, Ehrenfeld 2000).

Rey Banayas et al. (2009) concluded that restoration activities can increase biodiversity and the level of ecosystem services provided. However, such increases do not approach the amounts of biodiversity and ecosystem services performed by undisturbed reference sites. The ability to restore ecosystems to provide levels of ecological functions and services similar to historic conditions or reference standard conditions is affected by human impacts (e.g., urbanization, agriculture) to watersheds or other landscape units and to the processes that sustain those ecosystems (Zedler et al. 2012, Hobbs et al. 2014). Those changes need to be taken into account when establishing goals and objectives for restoration projects (Zedler et al. 2012), including compensatory mitigation projects. The ability to reverse ecosystem degradation to restore ecological functions and services is dependent on the degree of degradation of that ecosystem and the surrounding landscape, and whether that degradation is reversible (Hobbs et al. 2014). Most studies of the ecological performance of compensatory mitigation projects have focused solely on the ecological attributes of the compensatory mitigation projects, and few studies have also evaluated the aquatic resources impacted by permitted activities (Kettlewell et al. 2008), so it is difficult to assess whether compensatory mitigation projects have fully or partially offset the lost functions provided by the aquatic resources that are impacted by permitted activities.

Wetland restoration, enhancement, and establishment projects can provide wetland functions, as long as the wetland compensatory mitigation project is placed in an appropriate landscape position, has appropriate hydrology for the desired wetland type, and the watershed condition will support the desired wetland type (NRC 2001). Site selection is critical to find a site with appropriate hydrologic conditions and soils to support a replacement wetland that will provide the desired wetland functions and services (Mitsch and Gosselink 2015). In a meta-analysis of 70 wetland restoration studies, Meli et al. (2014) concluded that wetland restoration activities increase biodiversity and ecosystem service provision in degraded wetlands, but the degree of recovery is context dependent. They identified the following factors as influencing wetland restoration outcomes: wetland type, the main cause of degradation, the type of restoration action conducted, and the assessment protocol used to evaluate restoration outcomes. Moreno-Mateos et al. (2015) reviewed the recovery trajectories of 628 wetland restoration and creation projects and concluded that restoring or establishing wetland hydrology is of primary importance, and is more likely to be ecologically successful if wetland hydrology can be achieved by re-establishing water flows instead of extensive earthwork. In addition, they determined that, with respect to the plant community, natural revegetation is sufficient for recovery and development of most wetland types after wetland hydrology is restored or established.

The ecological performance of wetland restoration, enhancement, and establishment is dependent on practitioner's understanding of wetland functions, allowing sufficient time for wetland functions to develop, and allowing natural processes of ecosystem development (self-design or self-organization) to take place, instead of over-designing and over-engineering the replacement wetland (Mitsch and Gosselink 2015). The likelihood of ecological success in wetland restoration varies by wetland type, with the higher rates of success for coastal, estuarine, and freshwater marshes, and lower rates of success for forested wetlands and seagrass beds (Lewis et al. 1995). In its review, the NRC (2001) concluded that some wetland types can be restored or established (e.g., non-tidal emergent wetlands, some forested and scrub-shrub wetlands, seagrasses, and coastal marshes), while other wetland types (e.g., vernal pools, bogs, and fens) are difficult to restore and should be avoided where possible. Restored riverine and tidal wetlands achieved wetland structure and function more rapidly than depressional wetlands (Moreno-Mateos et al. 2012). Because of its greater potential to provide wetland functions, restoration is the preferred compensatory mitigation mechanism (33 CFR 332.3(a)(2)). Bogs, fens, and springs are considered to be difficult-to-replace resources and compensatory mitigation should be provided through in-kind rehabilitation, enhancement, or preservation of these wetlands types (33 CFR 332.3(e)(3)).

In its review of outcomes of wetland compensatory mitigation activities, the NRC (2001) stated that wetland functions can be replaced by wetland restoration and establishment activities. They discussed five categories of wetland functions: hydrology, water quality, maintenance of plant communities, maintenance of animal communities, and soil functions. It is difficult to restore or establish natural wetland hydrology, and water quality functions are likely to be different than the functions provided at wetland impact sites (NRC 2001). Reestablishing or establishing the desired plant community may be difficult because of invasive species colonizing the mitigation project site (NRC 2001). The committee also found that establishing and maintaining animal communities depends on the surrounding landscape. Soil functions can take a substantial amount of time to develop, because they are dependent on soil organic matter and other soil properties (NRC 2001). The NRC (2001) concluded that the ecological performance in replacing wetland functions depends on the particular function of interest, the restoration or establishment techniques used, and the extent of degradation of the compensatory mitigation project site and its watershed.

The ecological performance of wetland restoration and enhancement activities is affected by the amount of changes to hydrology and inputs of pollutants, nutrients, and sediments within the watershed or contributing drainage area (Wright et al. 2006). Wetland restoration is becoming more effective at replacing or improving wetland functions, especially in cases where monitoring and adaptive management are used to correct deficiencies in these efforts (Zedler and Kercher 2005). Wetland functions take time to develop after the restoration or enhancement activity takes place (Mitsch and Gosselink 2015, Gebo and Brooks 2012), and different functions develop at different rates (Moreno-Mateos 2012, NRC 2001). Irreversible changes to landscapes, especially those that affect hydrology within contributing drainage areas or watersheds, cause wetland degradation and impede the ecological performance of wetland restoration efforts (Zedler and Kercher 2005). Gebo and Brooks (2012) evaluated wetland compensatory mitigation projects in Pennsylvania and compared them to reference standards (i.e., the highest functioning wetlands in the study area) and natural reference wetlands that showed the range of variation due to human disturbances. They concluded that most of the wetland mitigation sites were functioning at levels within with the range of functionality of the reference wetlands in the region, and therefore were functioning at levels similar to some naturally occurring wetlands. The ecological performance of mitigation wetlands is affected by on the landscape context (e.g., urbanization) of the replacement wetland and varies with wetland type (e.g., riverine or depressional) (Gebo and Brooks 2012). Moreno-Mateos et al. (2012) conducted a meta-analysis of wetland restoration studies and concluded that while wetland structure and function can be restored to a large degree, the ecological performance of wetland restoration projects is dependent on wetland size and local environmental setting. They found that wetland restoration projects that are larger in size and in less disturbed landscape settings achieve structure and function more quickly.

Under the Corps' regulations, streams considered to be are difficult-to-replace resources and compensatory mitigation should be provided through stream rehabilitation, enhancement, and preservation since those techniques are most likely to be ecologically successful (see 33 CFR 332.3(e)(3)). For the purposes of this section, the term "stream restoration" is used to cover river and stream rehabilitation and enhancement activities. Restoration can be done on large rivers and small streams, and sometimes entire stream networks (Wohl et al. 2015), in a variety of watershed land use settings, including urban and agricultural areas.

River and stream restoration activities can improve the functions performed by these aquatic ecosystems, and the ecosystem services they provide (Wohl et al.

2015, Beechie et al. 2010). Because of changes in land use and other changes in the watershed that have occurred over time, stream restoration can improve stream functions but cannot return a stream to a historic state (Wohl et al. 2015, Roni et al. 2008). Improvements in ecological performance of stream restoration projects is dependent on the restoration method and how outcomes are assessed (Palmer et al. 2014). The ability to restore the ecological functions of streams is dependent on the condition of the watershed draining to the stream being restored because human land uses and other activities in the watershed affect how that stream functions (Palmer et al. 2014). Ecologically successful stream restoration activities depend on addressing the factors that most strongly affect stream functions, such as water quality, water flow, and riparian area quality, rather than focusing solely on restoring the physical habitat of streams (Palmer et al. 2010, Roni et al. 2008), especially the stream channel.

To be effective, stream restoration activities need to address the causes of stream degradation, which are often within the watershed and outside of the stream channel (Palmer et al. 2014). Actions that focus on restoring processes and connectivity are more likely to be successful that channel reconfiguration efforts (Hawley 2018). Stream rehabilitation and enhancement projects, including the restoration and preservation of riparian areas, provide riverine functions (e.g., Allan and Castillo (2007) for rivers and streams, NRC (2002) for riparian areas). Ecologically effective stream restoration can be conducted by enhancing riparian areas, removing dams, reforestation, and implementing watershed best management practices that reduce storm water and agricultural runoff to streams (Palmer et al. 2014). Process-based stream restoration is intended to address the causes of stream degradation, and should be conducted at the appropriate scale for the cause of stream degradation, such as the watershed or stream reach (Beechie et al. 2010). Process-based stream restoration has substantial potential to re-establish the physical, chemical, and biological processes that sustain riverine ecosystems, including their floodplains (Beechie et al. 2010). Process-based stream restoration can also reduce long-term restoration costs (Beechie et al. 2013, Hawley 2018).

Restoration of incised streams can be accomplished allowing beavers to construct dams in these streams, or by placing structures in the stream channel that mimic the effects that beaver dams have on these steams (DeVries et al. 2012). Examples of stream restoration and enhancement techniques include: dam removal and modification, culvert replacement or modification, fish passage structures when connectivity cannot be restored or improved by dam removal or culvert replacement, levee removal or setbacks, reconnecting floodplains and other riparian habitats, road removal, road modifications, reducing sediment and pollution inputs to streams, replacing impervious surfaces with pervious surfaces, restoring adequate in-stream or base flows, restoring riparian areas, fencing streams and their riparian areas to exclude livestock, improving in-stream habitat, recreating meanders, and replacing hard bank stabilization structures with bioengineering bank stabilization measures (Roni et al. 2013). Miller and Kochel (2010) recommend that stream restoration projects allow the stream channel to self-adjust in response to changing hydrologic and sediment regimes in the watershed, and include other restoration actions such as re-establishing riparian areas next to the stream channel and excluding livestock from the riparian area and stream channel. Large and medium sized rivers can be restored through various approaches, including levee setbacks, levee removal, or creating openings in levees, to restore or improve connectivity between the river and the floodplain, as well as other ecological and geomorphic processes (Wohl et al. 2015). Dam removal, as well as changes in dam operations that provide environmentally-beneficial flows of water and sediment, can also restore functions of rivers and larger streams (Wohl et al. 2015).

Hydrologic restoration can be more effective than in-stream habitat restoration projects (Hawley 2018) because they can help address alterations in watershed hydrology through land use and other watershed changes. Examples of hydrologic restoration approaches include reforestation, floodplain restoration, bankfull wetlands, detention basins, beaver reintroduction, and placement of large woody debris into the stream channel. Restoration actions outside of the stream channel, such as constructed wetlands, storm water management ponds, and revegetating riparian areas, can result in significant improvements in the biodiversity, community structure, and nutrient cycling processes of downstream waters (Smucker and Detenbeck 2014). Non-structural and structural techniques can be used to rehabilitate and enhance streams, and restore riparian areas (NRC 1992). Examples of non-structural stream restoration practices include removing disturbances to allow recovery of stream and riparian area structure and function, restoring natural stream flows by reducing or eliminating activities that have altered stream flows, preserving or restoring floodplains, and restoring and protecting riparian areas, including fencing to exclude livestock and people that can degrade riparian areas (NRC 1992).

Form based restoration efforts, such as channel reconfiguration, can cause substantial adverse impacts to riverine systems through earthmoving activities (which can cause substantial increases in sediment loads) and the removal of riparian trees and other vegetation, with little demonstrable improvements in stream functions (Palmer et al. 2014). In-stream habitat enhancement activities, such as channel reconfiguration and adding in-stream structures, have resulted in limited effectiveness in improving biodiversity in streams (Palmer et al. 2010). In an evaluation of 644 stream restoration projects, Palmer et al. (2014) concluded that stream channel reconfiguration does not promote ecological recovery of degraded streams, but actions taken within the watershed and in riparian areas to restore hydrological processes and reduce pollutant inputs to streams can improve stream functions and ecological integrity. Stream restoration activities should also include consideration of social factors, especially the people that live in the floodplain or near the river or stream (Wohl et al. 2015). These social factors may also impose constraints on what restoration actions can be taken.

Seagrass beds are dynamic ecosystems that can persist for long periods of time or change from season to season (Fonseca et al. 1998). Seagrass beds can be restored, but these restoration activities generally have lower rates of ecological success than the restoration of other wetland types, such as estuarine and freshwater marshes (Lewis et al. 1995). The restoration and natural recovery of seagrasses requires consideration of addressing impediments that occur at various scales, including larger scale problems such as water quality and land use practices (Orth et al. 2006). The ecological success of seagrass restoration can be influenced by the dynamics of coastal environments and various stressors (e.g., reduced water quality/eutrophication, construction activities, dredging, other direct impact, natural disturbances) that affect seagrasses (van Katwijk et al. 2016). Realistic expectations should be established for seagrass restoration activities because of our limited understanding of seagrasses and the challenges of controlling conditions in open coastal waters (Fonseca 2011).

Site selection is critical for successful restoration of seagrasses (Fonseca 2011, Fonseca et al. 1998). Ecologically successful seagrass restoration is dependent on finding sites where seagrass beds recently existed (Fonseca et al. 1998). The ecological outcomes of seagrass restoration activities is also affected by the size of the restoration project, with larger restoration efforts more likely to be ecologically successful and sustainable because larger projects can produce positive feedbacks that facilitate the establishment and persistence of seagrasses (van Katwijk et al. 2016). At some proposed seagrass restoration sites, it may be infeasible to change the site from a stable unvegetated state to a stable vegetated state through seagrass planting efforts (Fonseca 2011). Small scale restoration activities may be overwhelmed by natural processes that prevent seagrasses from becoming reestablished (Fonseca 2011). Another impediment to ecologically successful seagrass restoration is bioturbation, which can impede natural seagrass recruitment (Fonseca 2011) or disturb plantings. Bioturbation can be caused by animals such as shrimp, crabs, ducks, fish, and urchins, and result in stable, unvegetated benthic habitats (Fonseca 2011).

Fonseca (2011) recommends locating seagrass restoration activities in areas with water depths similar to nearby natural seagrass beds, at a sufficient size to achieve restoration goals, with characteristics that are similar to those at other ecologically successful seagrass restoration projects, and where anthropogenic disturbances can be reduced or removed. Restoration of submersed aquatic vegetation beds requires taking actions to reduce inputs of sediment, nutrients, and organic matter into estuarine waters and avoiding physical damage from boating activities and fishing gear (Waycott et al. 2009). Controlling these stressors has been more effective at restoring seagrass beds than seagrass transplantation efforts (Waycott et al. 2009). Potential restoration sites need to have sufficient light, moderate nutrient loads, suitable salinity and water temperatures, available seeds and other propagules, and an absence of mechanical disturbances that will destroy or degrade plants (Fonseca et al. 1998). Seagrass recovery is affected by numerous factors, such as the characteristics of the target seagrass species, disturbance intensity, disturbance characteristic(s), environmental conditions, disturbance history, the condition of existing seagrass beds, population structure, reproductive capacity, timing, and feedbacks between biotic and abiotic components at the site (O'Brien et al. 2018).

As discussed in section 4.0 of this document, the status of waters and wetlands in the United States as reported under the provisions of Sections 303(d) and 305(b) of the Clean Water Act exhibits considerable variation, ranging from "good" to "threatened" to "impaired." One of the criteria that district engineers consider when they evaluate proposed NWP activities is the "degree or magnitude to which the aquatic resources perform these functions" (see paragraph 2 of Section D, "District Engineer's Decision." The quality of the affected waters is considered by district engineers when making decisions on whether to require compensatory mitigation for proposed NWP activities to ensure no more than minimal adverse environmental effects (see 33 CFR 330.1(e)(3)), and amount of compensatory mitigation required (see 33 CFR 332.3(f)). The quality of the affected waters also factors into the determination of whether the required compensatory mitigation offsets the losses of aquatic functions caused by the NWP activity.

The compensatory mitigation required by district engineers in accordance with general condition 23 and through activity-specific conditions added to the NWP authorization is expected to provide aquatic resource functions and services to offset some or all of the losses of aquatic resource functions caused by the activities authorized by this NWP, and reduce the incremental contribution of those activities to the cumulative effects on the Nation's wetlands, streams, and other aquatic resources. The required compensatory mitigation must be conducted in accordance with the applicable provisions of 33 CFR part 332, which requires development and implementation of approved mitigation plans, as well as monitoring to assess ecological success in accordance with ecological performance standards established for the compensatory mitigation project. The district engineer will evaluate monitoring reports to determine if the compensatory mitigation project has fulfilled its objectives, is ecological successful, and offsets the permitted impacts. If the monitoring efforts indicate that the compensatory mitigation project is failing to meet its objectives, the district engineer may require additional measures, such as adaptive management or alternative compensatory mitigation, to address the compensatory mitigation project's deficiencies. [33 CFR 332.7(c)]

According to Dahl (2011), during the period of 2004 to 2009 approximately 489,620 acres of former upland were converted to wetlands as a result of wetland reestablishment and establishment activities. Efforts to reestablish or establish wetlands have increased wetland acreage in the United States.

The individual and cumulative adverse effects on the aquatic environment resulting from the discharges of dredged or fill material authorized by this NWP, including compliance with all applicable NWP general conditions as well as regional conditions imposed by division engineers and activity-specific conditions imposed by district engineers, are expected to be no more than minimal. The Corps expects that the convenience and time savings associated with the use of this NWP will encourage applicants to design their projects within the scope of the NWP, including its limits, rather than request individual permits for projects that could result in greater adverse impacts to the aquatic environment. Division and district engineers will restrict or prohibit this NWP on a regional or case-specific basis if they determine that these activities will result in more than minimal individual and cumulative adverse effects on the aquatic environment.

A.2.3 Section 404(b)(1) Guidelines Impact Analysis, Subparts C through F

(a) Substrate: Discharges of dredged or fill material into waters of the United States may alter the substrate of those waters, usually replacing the aquatic area with dry land, and changing the physical, chemical, and biological characteristics of the substrate. The original substrate may be removed or covered by other material, such as concrete, asphalt, soil, gravel, etc. Temporary fills may be placed upon the substrate, but must be removed upon completion of the activity (see general condition 13). Higher rates of erosion may result during construction, but general condition 12 requires the use of appropriate measures to control soil erosion and sediment.

(b) Suspended particulates/turbidity: Depending on the method of construction, soil erosion and sediment control measures, equipment, composition of the bottom substrate, and wind and current conditions during construction, dredged or fill material placed in open waters may temporarily increase water turbidity. Pre-construction notification is required for all NWP activities involving the removal of accumulated sediments from the vicinity of existing structures, or the removal of accumulated sediments from canals associated with outfall and intake structures. The pre-construction notification required by paragraph (b) of this NWP will allow the district engineer to review each proposed discharge of dredged or fill material into waters of the United States and ensure that adverse effects on the aquatic environment are no more than minimal. Particulates may be resuspended in the water column during removal of temporary fills. The turbidity plume will normally be limited to the immediate vicinity of the disturbance and should dissipate shortly after each phase of the construction activity. General condition 12 requires the permittee to stabilize exposed soils and other fills, which will help reduce turbidity. In many localities, developers are required to develop and implement sediment and erosion control plans to minimize the entry of soil into the aquatic environment. Discharges of dredged or fill material into waters of the United States cannot create turbidity plumes that smother important spawning areas downstream (see general condition 3).

(c) Water: Maintenance activities involving discharges of dredged or fill material into waters of the United States can affect some characteristics of water, such as water clarity, chemical content, dissolved gas concentrations, pH, and temperature. In addition, maintenance activities may change the chemical and physical characteristics of the waterbody by introducing suspended or dissolved chemical compounds or sediments into the water. Changes in water quality can affect the species and quantities of organisms inhabiting the aquatic area. Water quality certification is required for activities authorized by this NWP that result in discharges into waters of the United States, which will help ensure that the discharge does not violate applicable water quality requirements. Permittees may be required to implement water quality management measures to ensure that the authorized activity does not result in more than minimal degradation of water quality. Storm water management facilities may be required to prevent or reduce the input of harmful chemical compounds into the waterbody, or to slow the movement of water to streams and other waterbodies. The district engineer may require the establishment and maintenance of riparian areas next to open waters, such as streams. Riparian areas help improve or maintain water quality, by removing nutrients, moderating water temperature changes, and trapping sediments.

(d) Current patterns and water circulation: Discharges of dredged or fill material into waters of the United States authorized by this NWP may adversely affect the movement of water in the aquatic environment. All activities authorized by paragraph (b) of this NWP require pre-construction notification to the district engineer. The district engineer will review pre-construction notifications and ensure that adverse effects to current patterns and water circulation are no more than minimal. General condition 9 requires the authorized activity to be designed to withstand expected high flows and to maintain the course, condition, capacity, and location of open waters to the maximum extent practicable. General condition 10 requires activities to comply with applicable FEMA-approved state or local floodplain management requirements, which will help reduce adverse effects to surface water flows.

(e) Normal water level fluctuations: The discharges of dredged or fill material into waters of the United States authorized by this NWP are not likely to adversely affect normal patterns of water level fluctuations due to tides and flooding, since it is limited to maintenance activities. To ensure that the NWP does not authorize discharges of dredged or fill material into waters of the United States that adversely affect normal flooding patterns, general condition 10 requires NWP activities to comply with applicable FEMA-approved state or local floodplain management requirements. General condition 9 requires the permittee to maintain the pre-construction course, condition, capacity, and location of open waters, to the maximum extent practicable.

(f) Salinity gradients: The discharges of dredged or fill material into waters of the

United States authorized by this NWP are unlikely to cause substantial adverse effects to salinity gradients because the NWP is restricted to maintenance activities and only minor modifications to the existing structure or fill are authorized.

(g) Threatened and endangered species: No discharge of dredged or fill material into waters of the United States is authorized by any NWP if that activity is likely to jeopardize the continued existence of a threatened or endangered species as listed or proposed for listing under the Endangered Species Act of 1973, as amended, or to destroy or adversely modify the critical habitat of such species. See 33 CFR 330.4(f) and paragraph (a) of general condition 18. For NWP activities, compliance with the Endangered Species Act is discussed in more detail in Appendix B of this document.

(h) Fish, crustaceans, molluscs, and other aquatic organisms in the food web. All discharges of dredged or fill material into waters of the United States authorized by paragraph (b) of this NWP require pre-construction notification to the district engineer, which will allow review of each proposal to remove accumulated sediments, to ensure that adverse effects to fish and other aquatic organisms in the food web are no more than minimal. Under paragraph (c) of general condition 18, endangered species, proposed NWP activities conducted by non-federal permittees also require pre-construction notification, when a proposed NWP activity might affect listed species (or species proposed for listing) or designated critical habitat (or critical habitat proposed for such designation). Fish and other motile animals are likely to avoid the project site during construction activities. Sessile or slow-moving animals in the path of discharges of dredged or fill material, equipment, and building materials may be destroyed. Some aquatic animals may be smothered by the placement of dredged or fill material. Motile animals are likely to return to those areas that are temporarily impacted by the discharge of dredged or fill material into waters of the United States and restored or allowed to revert back to preconstruction conditions. Aquatic animals might not return to sites of permanent fills. Benthic and sessile animals are expected to recolonize sites temporarily impacted by the discharge of dredged or fill material into waters of the United States, after those areas are restored. Discharges of dredged or fill material into waters of the United States that alter the riparian zone, especially floodplains, may adversely affect populations of fish and other aquatic animals, by altering stream flow, flooding patterns, and surface and groundwater hydrology.

Division and district engineers can place conditions on this NWP to restrict or prohibit discharges of dredged or fill material into waters of the United States during important stages of the life cycles of certain aquatic organisms. Such time of year restrictions can prevent adverse effects to these aquatic organisms during reproduction and development periods. General conditions 3 and 5 address protection of spawning areas and shellfish beds, respectively. General condition 3 states that activities in spawning areas during spawning seasons must be avoided to the maximum extent practicable. In addition, general condition 3 also prohibits discharges of dredged or fill material into waters of the United States that result in the physical destruction of important spawning areas. General condition 5 prohibits discharges of dredged or fill material into waters of the United States in areas of concentrated shellfish populations. General condition 9 requires the maintenance of pre-construction course, condition, capacity, and location of open waters to the maximum extent practicable, which will help minimize adverse impacts to fish, shellfish, and other aquatic organisms in the food web.

(i) Other wildlife: Discharges of dredged or fill material into waters of the United States authorized by this NWP may result in adverse effects on other wildlife associated with aquatic ecosystems, such as resident and transient mammals, birds, reptiles, and amphibians, through the destruction of aquatic habitat, including breeding and nesting areas, escape cover, travel corridors, and preferred food sources. This NWP does not authorize discharges of dredged or fill material into waters of the United States that are likely to jeopardize the continued existence of federally-listed endangered and threatened species (or species proposed for listing) or result in the destruction or adverse modification of designated critical habitat (or critical habitat proposed for such designation). Compensatory mitigation, including the establishment and maintenance of riparian areas next to open waters, may be required for activities authorized by this NWP, which will help offset losses of aquatic habitat used by wildlife. General condition 4 states that activities in breeding areas for migratory birds must be avoided to the maximum extent practicable.

(j) Special aquatic sites: The potential impacts to specific special aquatic sites are discussed below:

(1) Sanctuaries and refuges: The discharges of dredged or fill material into waters of the United States authorized by this NWP may have adverse effects on waters of the United States within sanctuaries or refuges designated by federal or state laws or local ordinances. General condition 22 requires submittal of a pre-construction notification prior to the use of this NWP in NOAA-designated marine sanctuaries and marine monuments and National Estuarine Research Reserves. District engineers will exercise discretionary authority and require individual permits for specific projects in waters of the United States in sanctuaries and refuges if those activities will result in more than minimal adverse effects on the aquatic environment.

(2) Wetlands: The discharges of dredged or fill material into waters of the United States authorized by this NWP may have adverse effects on wetlands. District engineers will review pre-construction notifications to ensure that the adverse effects on the aquatic environment are no more than minimal. Division engineers can add regional conditions to this NWP to restrict or prohibit its use in certain high value wetlands. See paragraph (e) of section 6.1 of this document for a more detailed discussion of impacts to wetlands.

(3) Mud flats: The discharges of dredged or fill material into waters of the United States authorized by this NWP may have adverse effects on mud flats. Division engineers can add regional conditions to this NWP to restrict or prohibit its use in mudflats. District engineers can add activity-specific conditions to this NWP, such as mitigation requirements, to ensure that authorized discharges of dredged or fill material into waters of the United States result in no more than minimal adverse environmental effects to mud flats.

(4) Vegetated shallows: The discharges of dredged or fill material into waters of the United States authorized by this NWP may have adverse effects on vegetated shallows in tidal waters. Division engineers can add regional conditions to this NWP to restrict or prohibit discharges of dredged or fill material into vegetated shallows. Discharges of dredged or fill material into waters of the United States involving the removal of accumulated sediments are authorized by this NWP, but district engineers will review those proposed activities to determine if they will result in only minimal adverse effects on the aquatic environment. If the vegetated shallows are high value and the proposed discharge of dredged or fill material into waters of the United States will result in more than minimal adverse effects on the aquatic environment, the district engineer will exercise discretionary authority to require the project proponent to obtain an individual permit.

(5) Coral reefs: The discharges of dredged or fill material into waters of the United States authorized by this NWP may have adverse impacts to coral reefs. Division engineers can add regional conditions to this NWP to restrict or prohibit its use in coral reefs. District engineers can add activity-specific conditions to this NWP, such as mitigation requirements, to ensure that authorized discharges of dredged or fill material into waters of the United States result in no more than minimal adverse environmental effects to coral reefs.

(6) Riffle and pool complexes: Discharges of dredged or fill material into waters of the United States authorized by this NWP may have adverse effects on riffle and pool complexes. District engineers will review pre-construction notifications for proposed removals of accumulated sediments to determine if activities authorized by paragraph (b) of this NWP will result in no more than minimal adverse effects on the aquatic environment. If the riffle and pool complexes are high value and the proposed discharge of dredged or fill material into waters of the United States will result in more than minimal adverse effects on the aquatic environment, the district engineer will exercise discretionary authority to require the project proponent to obtain an individual permit. Division engineers can add regional conditions to this NWP to restrict or prohibit discharges of dredged or fill material into riffle and pool complexes.

(k) Municipal and private water supplies: See paragraph (n) of section 6.1 of this document for a discussion of potential impacts to water supplies.

(l) Recreational and commercial fisheries, including essential fish habitat: The discharges of dredged or fill material into waters of the United States authorized by this NWP may adversely affect waters of the United States that act as habitat for populations of economically important fish and shellfish species. Division and district engineers can add conditions to this NWP to prohibit discharges during important life cycle stages, such as spawning or development periods, of economically valuable fish and shellfish. All discharges of dredged or fill material into waters of the United States authorized by paragraph (b) require pre-construction notification to the district engineer, which will allow review of each activity in open waters to ensure that adverse effects to economically important fish and shellfish are no more than minimal. Compliance with general conditions 3 and 5 will help ensure that the authorized activity does not adversely affect important spawning areas or concentrated shellfish populations. As discussed in paragraph (g) of section 6.1 of this document, there are procedures to help ensure that impacts to essential fish habitat are no more than minimal, individually or cumulatively. For example, division and district engineers can impose regional and special conditions to ensure that activities authorized by this NWP will result in no more than minimal adverse effects on essential fish habitat.

(m) Water-related recreation: See paragraph (m) of section 6.1 of this document.

(n) Aesthetics: See paragraph (c) of section 6.1 of this document.

(o) Parks, national and historical monuments, national seashores, wilderness areas, research sites, and similar areas: General condition 22 requires submittal of a pre-construction notification prior to the use of this NWP in designated critical resource waters and adjacent wetlands, which may be located in parks, national and historical monuments, national seashores, wilderness areas, and research sites. This NWP can be used to authorize discharges of dredged or fill material into waters of the United States in parks, national and historical monuments, national seashores, wilderness areas, and research sites if the manager or caretaker wants to conduct activities in waters of the United States and those activities result in no more than minimal adverse effects on the aquatic environment. Division engineers can add regional conditions to the NWP to restrict or prohibit its use in designated areas, such as national wildlife refuges or wilderness areas.

Appendix B – Endangered and Threatened Species

No activity is authorized by any NWP if that activity is likely to jeopardize the continued existence of a threatened or endangered species as listed or proposed for listing under the Federal Endangered Species Act (ESA), or to destroy or adversely modify the critical habitat of such species (33 CFR 330.4(f)). If the district engineer determines a proposed NWP activity may affect listed species or designated critical habitat, he or she will conduct ESA Section 7 consultation with the U.S. FWS and/or NMFS as appropriate. The proposed NWP activity is not authorized until the ESA Section 7 consultation process is completed or the district engineer determines the proposed NWP activity will have no effect on listed species or designated critical habitat. Current local procedures in Corps districts are effective in ensuring compliance with ESA. Those local procedures include regional programmatic consultations and the development of Standard Local Operating Procedures for Endangered Species (SLOPES). The issuance or reissuance of an NWP, as governed by NWP general condition 18 (which applies to every NWP and which relates to endangered and threatened species and critical habitat) and 33 CFR 330.4(f), results in "no effect" to listed species or critical habitat, because no activity that "may affect" listed species or critical habitat is authorized by NWP unless ESA Section 7 consultation with the U.S. Fish and Wildlife Service (USFWS) and/or National Marine Fisheries Service (NMFS) has been completed. If the non-federal project proponent does not comply with 33 CFR 330.4(f)(2) and general condition 18, and does not submit the required PCN, then the activity is not authorized by NWP. In such situations, it is an unauthorized activity and the Corps district will determine an appropriate course of action under its regulations at 33 CFR part 326 to respond to the unauthorized activity. Unauthorized activities may also be subject to the prohibitions of Section 9 of the ESA.

Each activity authorized by an NWP is subject to general condition 18, which states that "[n]o activity is authorized under any NWP which is likely to directly or indirectly jeopardize the continued existence of a threatened or endangered species or a species proposed for such designation, as identified under the Federal Endangered Species Act (ESA), or which will directly or indirectly destroy or adversely modify designated critical habitat or critical habitat proposed for such designation." In addition, general condition 18 explicitly states that the NWP does not authorize "take" of threatened or endangered species, which will ensure that permittees do not mistake the NWP authorization as a Federal authorization to take threatened or endangered species. General condition 18 also requires a non-federal permittee to submit a pre-construction notification to the district engineer if any listed species or designated critical habitat (or proposed species or proposed critical habitat) might be affected or is in the vicinity of the project, or if the project is located in designated or proposed critical habitat. The Corps established the "might affect" threshold in 33 CFR 330.4(f)(2) and paragraph (c) of general condition 18 because it is more stringent than the "may affect" threshold for section 7 consultation in the USFWS's and NMFS's ESA Section 7 consultation regulations at 50 CFR part 402. The word “might” is defined as having “less probability or possibility” than the word “may” (Merriam-Webster’s Collegiate Dictionary, 10th edition). Since “might” has a lower probability of occurring, it is below the threshold (i.e., “may affect”) that triggers the requirement for ESA Section 7 consultation for a proposed federal action This general condition also states that, in such cases, non-federal permittees shall not begin work on the activity until notified by the district engineer that the requirements of the ESA have been satisfied and that the activity is authorized.

Under the current Corps regulations (33 CFR 325.2(b)(5)), the district engineer must review all permit applications for potential impacts on threatened and endangered species or critical habitat. For the NWP program, this review occurs when the district engineer evaluates the pre-construction notification or request for verification. Nationwide permit general condition 18 requires a non-federal applicant to submit a pre-construction notification to the Corps if any listed species (or species proposed for listing) or designated critical habitat (or critical habitat proposed for such designation) might be affected or is in the vicinity of the project, or if the project is located in designated critical habitat (or critical habitat proposed for such designation). Based on the evaluation of all available information, the district engineer will initiate consultation with the USFWS or NMFS, as appropriate, if he or she determines that the proposed activity may affect any threatened and endangered species or designated critical habitat. Consultation may occur during the NWP authorization process or the district engineer may exercise discretionary authority to require an individual permit for the proposed activity and initiate section 7 consultation during the individual permit process. If the district engineer determines a proposed NWP activity is likely to jeopardize the continued existence of any proposed species or result in the destruction or adverse modification of proposed critical habitat, he or she will initiate a conference with the USFWS or NMFS. If ESA Section 7 consultation or conference is conducted during the NWP authorization process, then the applicant will be notified that he or she cannot proceed with the proposed NWP activity until section 7 consultation is completed.

If the district engineer determines that the proposed NWP activity will have no effect on any threatened or endangered species or critical habitat, then the district engineer will notify the applicant that he or she may proceed under the NWP authorization as long as the activity complies with all other applicable terms and conditions of the NWP, including applicable regional conditions. When the Corps makes a “no effect” determination, that determination is documented in the record for the NWP verification.

In cases where the Corps makes a “may affect” determination, formal or informal section 7 consultation is conducted before the activity is authorized by NWP. A non-federal permit applicant cannot begin work until notified by the Corps that the proposed NWP activity will have “no effect” on listed species or critical habitat, or until ESA Section 7 consultation has been completed (see also 33 CFR 330.4(f)). Federal permittees are responsible for complying with ESA Section 7(a)(2) and should follow their own procedures for complying with those requirements (see 33 CFR 330.4(f)(1)). Therefore, permittees cannot rely on complying with the terms of an NWP without considering ESA-listed species and critical habitat, and they must comply with the NWP conditions to ensure that they do not violate the ESA. General condition 18 also states that district engineers may add activity-specific conditions to the NWPs to address ESA issues as a result of formal or informal consultation with the USFWS or NMFS.

Each year, the Corps conducts thousands of ESA Section 7 consultations with the FWS and NMFS for activities authorized by NWPs. These section 7 consultations are tracked in ORM. During the period of March 19, 2017, to October 20, 2020, Corps districts conducted 1,294 formal consultations and 8,233 informal consultations under NWP PCNs where the Corps verified that the proposed activities were authorized by NWP. During that time period, the Corps also used regional programmatic consultations for 21,677 NWP verifications to comply with ESA Section 7. Therefore, each year an average of 8,700 formal, informal, and programmatic ESA Section 7 consultations are conducted with the USFWS and/or NMFS in response to NWP PCNs, including those activities that required PCNs under paragraph (c) of general condition 18. In a study on ESA Section 7 consultations tracked by the USFWS, Malcom and Li (2015) found that during the period of 2008 to 2015, the Corps conducted the most formal and informal section 7 consultations, far exceeding the numbers of section 7 consultations conducted by other federal agencies.

Section 7 consultations are often conducted on a case-by-case basis for activities proposed to be authorized by NWP that may affect listed species or critical habitat, in accordance with the USFWS's and NMFS's interagency regulations at 50 CFR part 402. Instead of activity-specific section 7 consultations, compliance with ESA may also be achieved through formal or informal regional programmatic consultations. Compliance with ESA Section 7 may also be facilitated through the adoption of NWP regional conditions. In some Corps districts SLOPES have been developed through consultation with the appropriate regional offices of the USFWS and NMFS to make the process of complying with section 7 more efficient.

Corps districts have, in most cases, established informal or formal procedures with local offices of the USFWS and NMFS, through which the agencies share information regarding threatened and endangered species and their critical habitat. This information helps district engineers determine if a proposed NWP activity may affect listed species or their critical habitat and, when a "may affect" determination is made, initiate ESA Section 7 consultation. Corps districts may utilize maps or databases that identify locations of populations of threatened and endangered species and their critical habitat. Where necessary, regional conditions are added to one or more NWPs to require pre-construction notification for NWP activities that occur in known locations of threatened and endangered species or critical habitat. Any information provided by local maps and databases and any comments received during the pre-construction notification review process will be used by the district engineer to make a “no effect” or “may affect” determination for the pre-construction notification.

Based on the safeguards discussed in this Appendix, especially general condition 18 and the NWP regulations at 33 CFR 330.4(f), the Corps believes that the activities authorized by this NWP comply with the ESA. Although the Corps continues to believe that these procedures ensure compliance with the ESA, the Corps has taken some steps to provide further assurance. Corps district offices meet with local representatives of the USFWS and NMFS to establish or modify existing procedures such as regional conditions, where necessary, to ensure that the Corps has the latest information regarding the existence and location of any threatened or endangered species or their critical habitat. Corps districts can also establish, through SLOPES or other tools, additional safeguards that ensure compliance with the ESA. Through ESA Section 7 formal or informal consultations, the Corps ensures that no activity is authorized by any NWP if that activity is likely to jeopardize the continued existence of a threatened or endangered species as listed or proposed for listing under the ESA, or to destroy or adversely modify the critical habitat of such species. Other tools such as ESA Section 7 conferences, SLOPES, the development of regional conditions added to the NWP by the division engineer, and conditions added to a specific NWP authorization by the district engineer help ensure compliance with the ESA.

If informal section 7 consultation is conducted, and the USFWS and/or NMFS issues a written concurrence that the proposed activity may affect, but is not likely to adversely affect, listed species or designated critical habitat based on conservation measures incorporated in the project to avoid or minimize potential effects to ESA resources, the district engineer will add conditions (e.g., conservation measures) to the NWP authorization. If the USFWS and/or NMFS does not issue a written concurrence that the proposed NWP activity “may affect, but is not likely to adversely affect” listed species or critical habitat, the Corps will initiate formal section 7 consultation if it changes its determination to “may affect, likely to adversely affect.”

If formal section 7 consultation is conducted and a biological opinion is issued, the district engineer will add conditions to the NWP authorization to incorporate appropriate elements of the incidental take statement of the biological opinion into the NWP authorization, if the biological opinion concludes that the proposed NWP activity is not likely to jeopardize the continued existence of listed species or adversely modify or destroy critical habitat. If the biological opinion concludes that the proposed NWP activity is likely to jeopardize the continued existence of listed species or adversely modify or destroy critical habitat, the proposed activity cannot be authorized by NWP and the district engineer will instruct the applicant to apply for an individual permit. The incidental take statement includes reasonable and prudent measures and terms and conditions such as mitigation, monitoring, and reporting requirements that minimize incidental take. To fulfill its obligations under Section 7(a)(2) of the ESA, the Corps will determine which elements of an incidental take statement are appropriate to be added as permit conditions to the NWP authorization (see 33 CFR 325.4(a)). The appropriate elements of the incidental take statement are those reasonable and prudent measures and terms and conditions that: (1) apply to the activities over which the Corps has control and responsibility (i.e., structures or work in navigable waters and/or the discharges of dredged or fill material into waters of the United States), and (2) the Corps has the authority to enforce under its permitting authorities. Incorporation of the appropriate elements of the incidental take statement into the NWP authorization through binding, enforceable permit conditions may provide the project proponent an exemption from the "take" prohibitions in ESA Section 9 (see Section 7(o)(2) of the ESA).

The Corps can modify this NWP at any time that it is deemed necessary to protect listed species or their critical habitat, either through: 1) national general conditions or national-level modifications, suspensions, or revocations of the NWPs; 2) regional conditions or regional modifications, suspensions, or revocations of NWPs; or 3) activity-specific permit conditions (modifications) or activity-specific suspensions or revocations of NWP authorizations. Therefore, although the Corps has issued the NWPs, the Corps can address any ESA issue, if one should arise. The NWP regulations also allow the Corps to suspend the use of some or all of the NWPs immediately, if necessary, while considering the need for permit conditions, modifications, or revocations. These procedures are provided at 33 CFR 330.5.

Appendix C – Public Comments and Responses to Comments

For a summary of the public comments received in response to the September 15, 2020, Federal Register notice, refer to the preamble in the Federal Register notice announcing the reissuance of this NWP. The substantive comments received in response to the September 15, 2020, Federal Register notice were used to improve the NWP by changing NWP terms and limits, pre-construction notification requirements, and/or NWP general conditions, as necessary.

The Corps proposed to modify paragraph (a) of this NWP to authorize the repair, rehabilitation, or replacement of any currently serviceable structure or fill that did not require DA authorization at the time it was constructed. The Corps also proposed to modify paragraph (a) of this NWP to authorize the placement of new or additional riprap to protect the structure, provided the placement of riprap is the minimum necessary to protect the structure or to ensure the safety of the structure, to reinstate a provision was in the 2007 version of NWP 3 (see 72 FR 11181).

Several commenters stated that they support modifying paragraph (a) of this NWP to authorize the repair, rehabilitation, or replacement of any currently serviceable structure that did not require DA authorization of the time it was constructed. A few commenters expressed opposition to the proposed modification of this NWP and said that the text of the 2017 version of this NWP that limits maintenance to previously authorized and currently serviceable structures should be retained. Several commenters expressed opposition to the authorization of any currently serviceable fills that were installed prior to the Clean Water Act without requiring a PCN because those fills have not been evaluated under current environmental regulations. One commenter said that the maintenance of any structures or fills that existed prior to the Clean Water Act should not require any authorization from the Corps. One commenter stated that a timeframe should be added to NWP 3 to specify a maximum length of time the structure has been in disrepair in order to use this NWP to authorize maintenance of the structure.

After considering the comments received in response to the 2020 Proposal, the Corps is reissuing this NWP without modifying paragraph (a) of this NWP to authorize the repair, rehabilitation, or replacement of any currently serviceable structure that did not require DA authorization at the time it was constructed. The repair, rehabilitation, or replacement of any currently serviceable structure that did not require DA authorization of the time it was constructed may be authorized by other forms of DA authorization, such as regional general permits and individual permits.

The NWP is limited to the repair, rehabilitation, or replacement of currently serviceable structures or fills, so it is not necessary to impose a timeframe for NWP 3 eligibility during which the need for repair, rehabilitation, or replacement activity must be completed in order to be eligible for NWP 3 authorization. The term “currently serviceable” is defined in section F of the NWPs. This NWP does not authorize the reconstruction of structures or fills that are no longer currently serviceable. In addition, changes to a structure or fill that prompt the need for repair, rehabilitation, or replacement may occur gradually or abruptly, or at some intermediate rate. The timeframe in which the structure or fill requires some degree of repair, rehabilitation, or replacement is not as relevant to ensuring no more than minimal adverse environmental effects than the constraints imposed by the “currently serviceable” and “minor deviations” provisions of this NWP.

The Corps does not agree that PCNs should be required for maintenance activities authorized by paragraph (a) of this NWP because of the limitations in that paragraph.

One commenter stated that the text of this NWP should be modified to allow for maintenance of any existing infrastructure provided it does not change the intended use of the structure or fill. A few commenters requested clarification as to what the term “currently serviceable structure” means, including whether or not the structure or fill has to be operational. One commenter requested clarification on the differences between “replacement” and “reconstruction.” A few commenters asked for changes in the text of NWP 3 to clarify that any structures or fill that were previously permitted by the Corps may utilize NWP 3 for maintenance and repair activities.

This NWP authorizes the repair, rehabilitation, or replacement of existing infrastructure while allowing minor deviations due to due to changes in materials, construction techniques, requirements of other regulatory agencies, or current construction codes or safety standards. In addition, the NWP requires the structure or fill to not be put to uses that differ from the uses originally contemplated for it when the structure or fill was originally constructed. Repair, rehabilitation, or replacement activities that exceed the “minor deviations” provision of this NWP may be authorized by individual permits, regional general permits, or another NWP.

The term “currently serviceable” is currently defined in section F of the NWPs as: “useable as is or with some maintenance, but not so degraded as to essentially require reconstruction.” Therefore, there must be some degree of operability associated with the structure or fill in order for repair, rehabilitation, and replacement activities to be authorized by this NWP. The difference between “replacement” and “reconstruction” is based on the concept of “currently serviceable.” A currently serviceable structure or fill retains some degree of operability but can be replaced before it degrades to the extent where it is no longer operable (i.e., incapable of performing its intended function). In contrast, a structure or fill that is no longer capable of providing any degree of operability would have to be reconstructed to perform its intended function. This NWP can be used to repair, rehabilitate, or replace existing, currently serviceable structures or fills as long as the proposed activities satisfy the requirements in the text of the NWP, including any applicable NWP general conditions, regional conditions imposed by division engineers, and activity-specific conditions imposed by district engineers. The Corps declines to modify the text of this NWP to state that it can be used for maintenance and repair activities for previously permitted structures or fills because some of those maintenance and repair activities might not qualify for NWP 3 authorization and may require individual permits or other forms of DA authorization.

One commenter expressed opposition to authorizing the rehabilitation or replacement of structures that are derelict or not operational without a PCN and analyses of individual cumulative effects. One commenter recommended modifying this NWP to authorize regular maintenance of drainages to reduce exposed pipelines and pipeline spans. One commenter stated that without individual permit review, the Corps has no way of knowing if the structures are being replaced in kind, and whether those structures would have adverse environmental effects. This commenter also said that there need to be practicable alternatives if adverse effects are anticipated by these activities.

This NWP does not authorize the repair, rehabilitation, or replacement of structures and fills that are no longer currently serviceable. If a derelict or non-operational structure requires repair, rehabilitation, or replacement, and those activities require DA authorization, they may be authorized by individual permits or regional general permits. Discharges of dredged or fill material into waters of the United States that are necessary to rebury pipelines exposed in drainages or repair pipeline spans that extend over drainages may be authorized by this NWP or other NWPs, such as NWP 18, which authorizes minor discharges into waters of the United States. Corps district staff may conduct compliance actions for activities authorized by NWP 3, to ensure that authorized activities comply with the conditions of the NWP, including in-kind replacement. Because this NWP is limited to the repair, rehabilitation, and replacement of existing, currently serviceable structures or fills, there are usually no practicable alternatives for repairing, rehabilitating, or replacing these structures or fills. Relocating or reconstructing the structure or fill in a different location has the potential to result in more adverse environmental effects than the incremental impact caused by the repair, rehabilitation, or replacement of the structure or fill, and might not serve the intended purpose as the original structure or fill.

Many commenters stated that they support the proposed modification that authorizes the placement of new or additional riprap to protect the structure. Several commenters said that authorization of the placement of riprap under NWP 3 should require a PCN. Some commenters objected to this proposed modification. One commenter objected to this proposed modification, stating that it could be used to authorize substantial amounts of riprap to protect an existing structure or fill, such as a beach house. One commenter stated that the phrase “minimum necessary” is ambiguous and unquantifiable and NWP 3 activities should be limited to ensure that no significant adverse effects occur as a result of the placement of the riprap. One commenter said that riprap placed to protect the structure or fill should be limited to

25 cubic yards. One commenter said that riprap placed above the ordinary high water mark should be covered with topsoil and revegetated, and that stream-side areas at the ordinary high water mark should be revegetated with acceptable bioengineering techniques. A few commenters stated that using the term “riprap” in the proposed modification will result in preferential use of this technique when other forms of protection, such as bioengineering, may be feasible and less environmentally damaging.

After considering the comments received in response to the 2020 Proposal, the Corps is not reissuing NWP 3 with the proposed modification that would authorize the placement of new or additional riprap to protect the structure or fill, as long as the placement of riprap is the minimum necessary to protect the structure or fill and to ensure the safety of the structure or fill. The placement of new or additional riprap to protect the structure or fill may be authorized by other forms of DA authorization, such as regional general permits and individual permits. If a project proponent wants to place riprap to protect a building, such as a beach house constructed in uplands, then the project proponent can use NWP 13, which may require submittal of a PCN to the district engineer, or seek DA authorization through the individual permit process.

Riprap placed in uplands landward of the ordinary high water mark does not require DA authorization, so the Corps does not have the authority to require the permittee place topsoil in those upland areas and install plants in the topsoil. Bioengineering might not be a practicable alternative to riprap for the purposes of protecting a repaired, rehabilitated, or replaced structure or fill, or ensuring its safe operation. A permittee can choose to use bioengineering to protect a structure or fill from erosion, if appropriate, and bioengineering activities that require DA authorization may be authorized by NWP 3 if it is considered a minor deviation due to changes in materials, construction techniques, requirements of other regulatory agencies, or current construction codes or safety standards. Bioengineering for bank stabilization may also be authorized by NWP 13, which authorizes a variety of bank stabilization techniques.

A few commenters requested clarification on what constitutes a minor deviation, and what constitutes a small amount of riprap. One commenter suggested replacing the term “small” with “minor” when referring the amount of riprap that can be used to protect the structure or fill, to be consistent with the 1996 NWP. One of these commenters said that NWP 3 should have quantitative limits. One commenter requested that the Corps further restrict the NWP by adding text that states that the placement of riprap may be used to ensure the safety of the design, but not for other safety purposes.

As discussed above, the Corps is not reissuing this NWP with modifications that would authorize the placement of new or additional riprap to protect the existing structure or fill. What constitutes a “minor deviation” is dependent on the degree to which changes in the structure's configuration or filled area would occur as a result of the repair, rehabilitation, or replacement activity relative to the size and shape of the existing structure or fill, as well as any deviations that are necessary because of changes in materials, construction techniques, the requirements of other regulatory agencies, or current construction codes or safety standards. Because this NWP authorizes structures and work in navigable waters of the United States and discharges of dredged or fill material into waters of the United States for the repair, rehabilitation, or replacement of existing, currently serviceable structures or fills, and only allows minor deviations, it would not be appropriate to add quantitative limits to the text of the NWP other than the quantitative limits currently in paragraph (b) (i.e., the 200 foot limit for the removal of accumulated sediments and debris). The safety of the structure or fill may be dependent on more than the design of the structure or fill. For example, the safety of the structure or fill may be dependent on the types of materials used for the structure or fill, to help provide greater stability and help ensure that the structure or fill withstands expected erosive forces or other forces.

Many commenters stated that they support the removal of “previously authorized” from the Note and replacing it with “currently serviceable.” Several commenters suggested retaining in the “Note” the text that refers to “previously authorized” structures or fills to allow for maintenance of previously authorized structures or fills. One commenter said that in the Note the phrase “previously authorized” should be replaced with the term “existing.”

In the Note for this NWP, the Corps has retained “previously authorized” because the Corps is not reissuing this NWP with the proposed changes to paragraph (a), which would have authorized the repair, rehabilitation, or replacement of any currently serviceable structure or fill that did not require a permit at the time it was constructed. If the structure or fill is “currently serviceable” it is an existing structure or fill. Therefore, it is not necessary to replace the phrase “previously authorized” with “existing.”

One commenter said that the removal of accumulated sediments within 200 feet of a structure is excessive and should be evaluated on a case-by-case basis. One commenter stated that the provisions allowing removal of sediment could result in more than minimal impacts on aquatic organisms. One commenter stated that the PCN requirement for activities authorized under (b) of this NWP for sediment and debris removal is unnecessary unless the dredged material is proposed to be redeposited or retained within waters of the United States.

Paragraph (b) authorizes the removal of accumulated sediments and debris outside the immediate vicinity of existing structures (e.g., bridges, culverted road crossings, water intake structures, etc.) for a distance of no more than 200 feet from the structure. All activities authorized by paragraph (b) of this NWP require a PCN to district engineers. Therefore, district engineers will review these proposed activities to determine whether removal of accumulated sediments up to 200 feet from the structure will result in no more than minimal individual and cumulative adverse environmental effects. The removal of accumulated sediment and debris is likely to have temporary impacts on aquatic organisms because those activities occur on a periodic basis in response to the accumulation of sediment and debris in these dynamic waterbodies. Communities of aquatic organisms are likely to recover in the waterbody between sediment and debris removal activities. Division engineers may add regional conditions to this NWP to reduce the 200-foot limit in regions where shorter limits are necessary to ensure that the adverse environmental effects caused by these activities are no more than minimal. The Corps is retaining the PCN requirement for activities authorized by paragraph (b) of this NWP because of the potential for some of these activities to result in more than minimal adverse environmental effects. Therefore, district engineers should have the opportunity to review these proposed activities so that they can exercise discretionary authority when necessary to require individual permits for certain activities.

One commenter said that rebuilding existing electric utility lines should continue to be covered under NWP 3 even though NWP 57 would also authorize these activities. Numerous commenters stated that PCNs should be required for all activities authorized by this NWP. Many commenters stated this permit causes significant adverse impacts which are a violation of the Clean Water Act, and that this NWP should be withdrawn or stricter impact limitations should be imposed. One commenter said that NWP 3 authorizes activities that are not similar in nature, which violates Section 404(e) of the Clean Water Act. One commenter stated the draft decision document does not provide enough information to determine the full extent of impacts associated with this NWP.

This NWP can be used to repair, rehabilitate, or replace electric utility lines, as well as other structures or fills, as long as those electric utility lines are currently serviceable. If the electric utility line must be rebuilt because of destruction or damage by a storm, flood, fire, or other discrete event, this NWP can be used to authorize discharges of dredged or fill material into waters of the United States or structures as well as work in navigable waters of the United States for those rebuilding activities. Those electric utility line rebuilding activities may also be authorized by NWP 57. Because this NWP authorizes structures and work in navigable waters of the United States and discharges of dredged or fill material into waters of the United States for the repair, rehabilitation, or replacement of existing, currently serviceable structures or fills, and only authorizes minor deviations, the Corps does not believe that PCNs should be required for activities authorized by paragraph (a). The activities authorized by NWP 3 are similar in nature, because they are limited to the repair, rehabilitation, and replacement of currently serviceable structures or fills, or structures or fills damaged or destroyed by storms, floods (including tidal floods), fires, or other discrete events. The current qualitative and quantitative limits in the text of this NWP are sufficient to ensure that the NWP authorizes only those activities that result in no more than minimal individual and cumulative adverse effects, and no additional limits are necessary. The final decision document for this NWP provides an assessment of activities that may be authorized by this NWP during the 5-year period it is anticipated to be in effect, as well as an evaluation of potential environmental impacts that is commensurate with the anticipated degree and severity of those environmental impacts. The decision document has been prepared in compliance with the requirements of the National Environmental Policy Act (NEPA), the Corps' public interest review regulations, and the Clean Water Act Section 404(b)(1) Guidelines.

Appendix D – References

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DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, GALVESTON DISTRICT
2000 FORT POINT RD
GALVESTON, TEXAS 77550

April 16, 2025

Evaluation Branch

SUBJECT: Permit No. SWG-2024-00349; Nationwide Permit Verification

Texas Parks and Wildlife Department
Attn: Stephen McDowell
10 Parks And Wildlife Dr
Port Arthur, Texas 77640

Dear Mr. McDowell:

This is in reference to your request, dated February 13, 2025, to conduct maintenance activities within existing interior water control ditches to restore hydrologic function and improve water management capacity. The proposed work will involve the removal of up to 267,860 cubic yards of accumulated sediment and debris utilizing a short-reach marsh buggy and a hydraulic cutter suction dredge. Excavation will be conducted to achieve original bottom elevations and maintain 2:1 side slopes. Dredged material will be discharged via spray nozzle within the existing ditch right-of-way, impacting up to 517.1 acres below mean high water (MHW). Discharge will occur within 150 feet of the ditch banks, at a depth not to exceed two inches, to minimize potential impacts to surrounding wetlands. All work will be confined within the documented historical footprint of the existing ditches and no excavation will occur outside these boundaries. The project is located within Big Hill Bayou Wildlife Management Area and the J.D. Murphree Wildlife Management Area in Compartments 5-11, located approximately 6.17 miles southwest of Port Arthur, in Jefferson County, Texas.

This request is verified by Nationwide Permit (NWP) 3 pursuant to Section 404 of the Clean Water Act. This NWP verification is valid provided the activity is compliant with the enclosed plans, in 118 sheets. In addition, the activity must be in compliance with the NWP General/Regional Conditions, Section 401 Water Quality Certification, and the Coastal Management Program, which can be found at: https://www.swg.usace.army.mil/Missions/Regulatory/Permits/Nationwide-General-Permits/, a hard copy can be provided to you upon request.

NWP 3. Maintenance: Authorizes the repair, rehabilitation, or replacement of any previously authorized, currently serviceable structure or fill, or of any currently serviceable structure or fill authorized.

The NWP verification is valid until the NWP is modified, reissued, or revoked. The subject NWPs authorized in 2021 are scheduled to be modified, reissued, or revoked prior to March 15, 2026. It is incumbent upon you to remain informed of changes to the

NWPs. We will issue a public notice when the NWPs are reissued. Furthermore, if you commence or are under contract to commence this activity before the date that the relevant NWP is modified or revoked, you will have 12 months from the date of the modification or revocation of the NWP to complete the activity under the present terms and conditions of this NWP. The following special condition has been added to your authorization:

> The permittee shall comply with the Endangered Species Act and implement all of the Eastern Black Rail Best Management Practices (BMPs) identified in the enclosed Intra-Service Section 7 Biological Evaluation Form (dated 17 December 2024, Attachment A) including those ascribed to the Corps therein. If you are unable to implement any of these BMPs, you must immediately notify the Corps and the U.S. Fish and Wildlife Office so we may consult as appropriate, prior to initiating the work, in accordance with Federal law.

This verification does not address nor include any consideration for geographic jurisdiction on aquatic resources and shall not be interpreted as such. If you have any questions, please contact Broc Adams by telephone at 409-766-3171 or by electronic mail (email) Sterling.B.Adams@USACE.Army.Mil. Please notify the Chief of the Compliance Branch in the Galveston District Regulatory Division in writing by email at CESWGRegulatoryInbox@USACE.Army.Mil, upon completion of the authorized project.

FOR THE DISTRICT COMMANDER:

Andria Davis
Leader, North Evaluation Unit

cc w/Encl.

Eighth Coast Guard District, New Orleans, LA

National Oceanic and Atmospheric Administration (NOAA), National Ocean Service (NOS), Coast & Geodetic Survey, Silver Spring, MD

Texas Commission on Environmental Quality

Texas General Land Office

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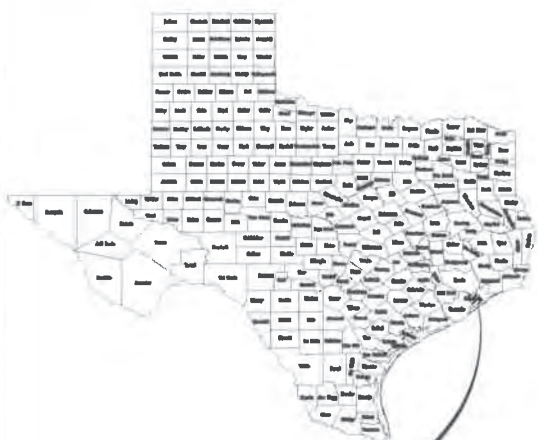
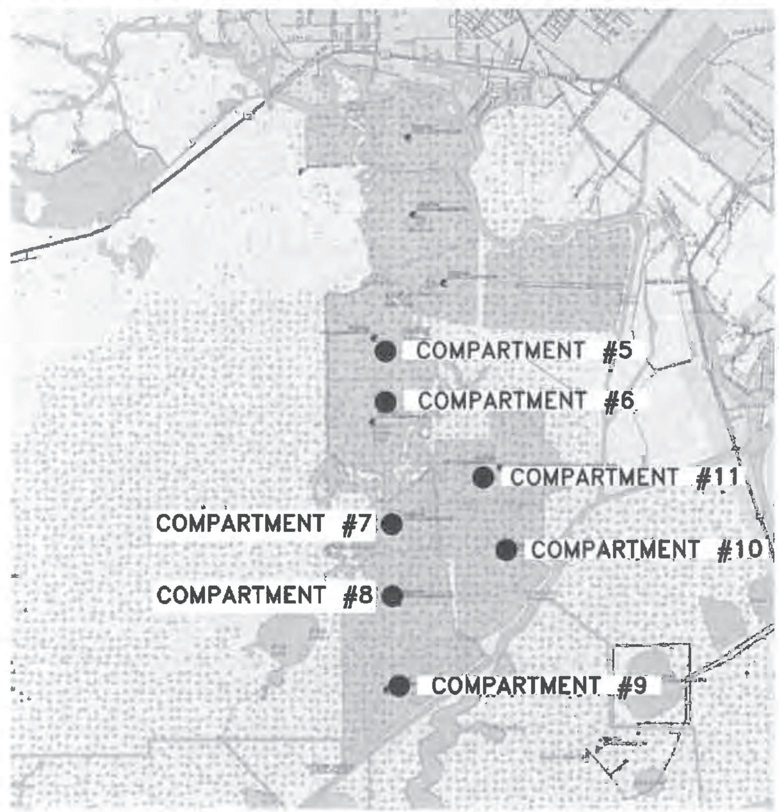
J.D. MURPHREE WMA COMPARTMENTS 5-11 DITCH CLEANOUT

JEFFERSON COUNTY
IN COOPERATION WITH

TEXAS PARKS AND WILDLIFE DEPARTMENT





PROJECT LOCATIONS

SPECIFICATIONS

201 MOBILIZATION
202 SITE PREPARATION
203 EXCAVATION
211 POLLUTION CONTROL

INDEX

CAUTION:
The engineer preparing these plans will not be responsible for, or liable for, unauthorized changes to or uses of these plans. All changes to the plans must be in writing and must be approved by the preparer of these plans.

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J. D. MURPHREE WMA - COMPARTMENTS 5-11
COVER SHEET

DATE: 12/24

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193 Business Park Drive; Suite E
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SHEET NUMBER
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GENERAL NOTES FOR J.D. MURPHREE COMPARTMENT 5 - 11 DITCH CLEANOUT PROJECT

1. ALL COORDINATES AND BEARINGS SHOWN HEREIN ARE GRID VALUES REFERENCED TO THE TEXAS COORDINATE SYSTEM OF 1983, SOUTH CENTRAL ZONE BASED ON TRIMBLE CENTER POINT RTX POST-PROCESSED SOLUTION FROM CORS DATA COLLECTED AT AUTONOMOUS BASE POSITION, CONTROL POINT #1. VERTICAL CONTROL IS NAVD88(GEOID12A). ALL DISTANCES SHOWN ARE MEASURED GRID DISTANCE AND ALL BEARINGS ARE GRID BEARINGS BASED ON THE BASIS OF BEARINGS, UNLESS OTHERWISE SPECIFIED.
2. THE GLOBAL POSITIONING SYSTEM (GPS) IS THE PROPERTY OF (AND OPERATED BY) THE U.S. DEPARTMENT OF DEFENSE. AS A RESULT, DU CANNOT BE HELD RESPONSIBLE FOR ANY POSITIONING DEGRADATION OR OMISSION OF POSITIONING DIRECTLY ATTRIBUTABLE TO THE GPS SYSTEM.
3. THIS DOCUMENT, TOGETHER WITH THE CONCEPTS AND DESIGNS PRESENTED HEREIN, IS INTENDED ONLY FOR THE SPECIFIC PURPOSE AND CLIENT FOR WHICH IT WAS PREPARED. REUSE OF AND IMPROPER RELIANCE ON THIS DOCUMENT WITHOUT WRITTEN AUTHORIZATION AND ADAPTATION BY DUCKS UNLIMITED, INC. SHALL BE WITHOUT LIABILITY TO DUCKS UNLIMITED, INC.
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5. ALL UTILITIES OBSERVED AT THE TIME OF DU SURVEY ARE SHOWN ON THE DRAWING IN THEIR APPROXIMATE LOCATION; HOWEVER, ABSENCE OF UTILITIES IN DRAWING IS NOT ASSURANCE THAT OTHER UTILITIES DO NOT EXIST ON THIS SITE. THE CONTRACTOR WILL BE RESPONSIBLE FOR ANY DAMAGE TO ANY EXISTING UTILITIES OR STRUCTURES DURING CONSTRUCTION. THE LANDOWNER OR LANDOWNER REPRESENTING SHALL BE RESPONSIBLE FOR ALL UTILITY COORDINATION.

ABBREVIATIONS

AC.	ACRES
AL/ALUM.	ALUMINUM
ASPT	ASPHALT
BNDY	BOUNDARY
BTM	BOTTOM
C	CHORD LENGTH
CAP	CORRUGATED ALUMINUM PIPE
CB	CHORD BEARING
CCA	CHROMATED COPPER ARSENATE
CLVE	CENTERLINE OF LEVEE
CLD	CENTERLINE OF DITCH
CMP	CORRUGATED METAL PIPE
CONC	CONCRETE
CORS	CONTINUOUSLY OPERATING REFERENCE STATION
CP	CONTROL POINT
CRNR	CORNER
CUM.	CUMULATIVE
C.Y.	CUBIC YARD
C.Y.-P	CUBIC YARD PLANNED
DIA.	DIAMETER
DU	DUCKS UNLIMITED, INC
E	EASTING
EA.	EACH
EG	EXISTING GRADE
EL./ELEV.	ELEVATION
ELVE	EDGE OF LEVEE
EOT	EDGE OF TREES/TIMBER
EPA	ENVIRONMENTAL PROTECTION AGENCY
E.S.	EMERGENCY SPILLWAY
ESMT	EASEMENT
EX/EXST	EXISTING
FG	FINISHED GRADE
FND	FOUND
FSL	FUNCTIONAL/FULL SERVICE LEVEL
FT	FEET
HORIZ.	HORIZONTAL
GALV	GALVANIZED
GLO	TEXAS GENERAL LAND OFFICE
GN	GRID NORTH
I.D.	INSIDE DIAMETER
INV	PIPE INVERT
INVI	PIPE INLET INVERT
INVO	PIPE OUTLET INVERT
MN	MAGNETIC NORTH
N	NORTHING
NAD 83	NORTH AMERICAN DATUM OF 1983
NAVD88	NORTH AMERICAN DATUM OF 1988
NGS	NATIONAL GEODETIC SURVEY
NO.	NUMBER
NOAA	NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NCEI	NATIONAL CENTERS FOR ENVIRONMENTAL INFORMATION
O.D.	OUTSIDE DIAMETER
OFF	OFFSET
OSHA	OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION
OZ	OUNCES
OPUS	ONLINE POSITIONING USER SERVICE
PROP	PROPOSED
PC	POINT OF CURVATURE
PI	POINT OF INTERSECTION
PT	POINT OF TANGENCY
PT.	POINT
PSI	POUNDS PER SQUARE INCH
PVI	POINT OF VERTICAL INTERSECTION
R	CURVE RADIUS
ROW	RIGHT OF WAY
RT	RIGHT
S.F.	SQUARE FOOT
SHT	SHEET
S.S.	STAINLESS STEEL
STK	CONSTRUCTION STAKE
S.Y.	SQUARE YARD
STA	STATION
T	TANGENT LENGTH
TBM	TEMPORARY BENCHMARK
TCEQ	TEXAS COMMISSION ON ENVIRONMENTAL QUALITY
TCBM	TIED CONCRETE BLOCK MAT
TN	GEODETIC TRUE NORTH
TOB	TOB OF BANK
TOL	TOP OF LEVEE
TOR	TOP OF RISER
TPWD	TEXAS PARKS AND WILDLIFE DEPARTMENT
TYP	TYPICAL (ACROSS PLAN SHEETS)
TXDOT	TEXAS DEPARTMENT OF TRANSPORTATION
USACE	UNITED STATES ARMY CORP. OF ENGINEERS
USFWS	UNITED STATES FISH AND WILDLIFE SERVICE
UTM	UNIVERSAL TRANSVERSE MERCATOR
VERT	VERTICAL
VOL.	VOLUME
W/	WITH
WCS	WATER CONTROL STRUCTURE
WMA	WILDLIFE MANAGEMENT AREA
WMM	WORLD MAGNETIC MODEL
WSEL	WATER SURFACE ELEVATION

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GENERAL NOTES
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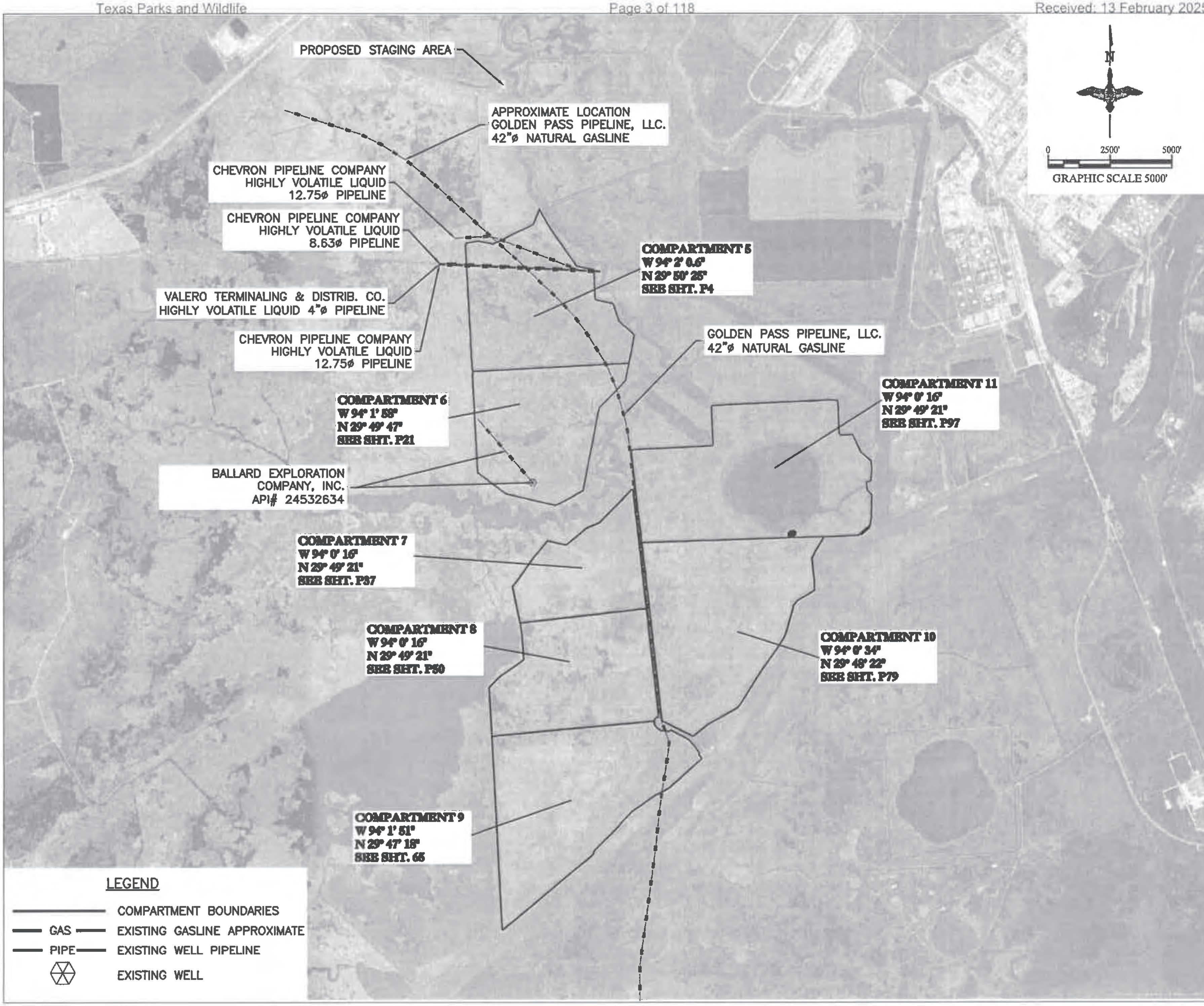
P2



FOR PERMITTING ONLY – THIS DOCUMENT IS NOT TO BE USED FOR CONSTRUCTION, BIDDING, RECORDATION, CONVEYANCE OR SALES.

J. D. MURPHREE WMA - COMPARTMENTS 5-11
PROJECT OVERVIEW

DATE: 12/24

DUCKS UNLIMITED INC.
SOUTHERN REGIONAL OFFICE
193 Business Park Drive; Suite E
Ridgeland, MS 39157

SHEET NUMBER
P3

Heather Young <heather.young@restorethegulf.gov>

Re: SWG-2024-00349 JD Murphree WMA leveww and ditch work

1 message

Heather Young <heather.young@restorethegulf.gov> Thu, May 15, 2025 at 2:35 PM
To: charrish stevens - NOAA Federal <charrish.stevens@noaa.gov>

Thank you very much Charrish.

On Thu, May 15, 2025 at 1:59 PM charrish stevens - NOAA Federal <charrish.stevens@noaa.gov> wrote:

> Hey Heather,
>
> The NMFS has reviewed the Department of the Army permit application listed below. We anticipate any adverse effects, which might occur to marine fishery resources and essential fish habitat would be minimal. Therefore, we don't object to the issuance of permits for the following Nationwide Permit, SWG-2024-00349, provided the applicant, TPWD, is in compliance with the NWP General/Regional Conditions for NWP 3.
>
> Thank you for your coordination,
>
> **Charrish Stevens**
> **Fishery Biologist**
> **Habitat Conservation Division**
> **NOAA National Marine Fisheries Service**
> ***4700 Ave U, Galveston, TX 77551***
>
> **Office Ph: (409) 766-3697**
> **Fax: (409) 766-3575**
> **Email:** charrish.stevens@noaa.gov
>
> On Thu, May 15, 2025 at 11:26 AM Heather Young <heather.young@restorethegulf.gov> wrote:
>
>> I am presenting next week to our Steering Commiting about proposed funding approval recommendations and need to make a decision as to whether to include this project in a funding approval proposal at this time or delay it for their consideration in the future. EFH review is our only outstanding item factoring into this decision.
>>
>> On Thu, May 15, 2025 at 11:22 AM Heather Young <heather.young@restorethegulf.gov> wrote:
>>
>>> As soon as you are able to would be wonderful, but I want to be respectful of your time of course.
>>> I'm willing to have a call if that helps.
>>>
>>> On Wed, May 14, 2025 at 12:57 PM charrish stevens - NOAA Federal <charrish.stevens@noaa.gov> wrote:
>>>
>>>> Yes, I will. I have a few things in my plate I need to take care of first. How soon do you need?
>>>> Sent from my iPhone
>>>>
>>>> On May 14, 2025, at 11:15 am, Heather Young <heather.young@restorethegulf.gov> wrote:
>>>>
>>>> Ok, can you please review this project for EFH concerns?
>>>>
>>>> On Wed, May 14, 2025 at 9:36 AM charrish stevens - NOAA Federal <charrish.stevens@noaa.gov> wrote:
>>>>
>>>>> Good morning Heather,
>>>>> No, I did not receive anything from USACE or TCEQ to review this permit.
>>>>> **Charrish Stevens**
>>>>> **Fishery Biologist**
>>>>> **Habitat Conservation Division**
>>>>> **NOAA National Marine Fisheries Service**
>>>>> ***4700 Ave U, Galveston, TX 77551***
>>>>>
>>>>> **Office Ph: (409) 766-3697**
>>>>> **Fax: (409) 766-3575**
>>>>> **Email:** charrish.stevens@noaa.gov

On Tue, May 13, 2025 at 3:24 PM Heather Young <heather.young@restorethegulf.gov> wrote:

Hi Charrish,

TCEQ is requesting RESTORE funding for maintenance and repair of levees and interior ditches in the Big Hill Unit of JD Murphree WMA. Please see attached USACE permit SWG-2024-00349 LOP for verifications under NWP 3. Did you review this one for EFH impacts?

Thanks in advance!
Heather

--
Heather D. Young

Senior Advisor for Ecosystem Restoration and Environmental Compliance
Gulf Coast Ecosystem Restoration Council
tel. 504-252-7716
www.restorethegulf.gov

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Ref: Wildlife Restoration Federal Compliance Approval for TX W-228-R-1/F22AF02126

Project: *JD Murphree WMA Wetland Restoration*

Approach:
Texas Parks and Wildlife Department (TPWD) is proposing to repair/reshape levees and ditches (borrow areas) within the JD Murphree Wildlife Management Area (WMA) Compartments 5, 6, and 11. The levees are designed to aid in the management of water levels and protect freshwater marshes within the compartments by reducing the effects of saltwater intrusion. TPWD is using federal funding from USFWS, matched with state funding and private funding from Ducks Unlimited, to construct the JD Murphree Compartments 5, 6, and 11 Rehabilitation Project.

TPWD proposes to rebuild/reshape approximately 12.7 total miles of levees around Compartments 5, 6, and 11 to a variable top width of 8 to 10 feet with variable side-slopes. Clearing would occur between the existing levee toe on the sides adjacent to the exterior canal and the top of bank of the interior ditches in areas previously disturbed during original construction of the levees. This clearing effort will likely result in holes in the existing levees from the removal of root balls and other subsoil rubbish. The organic material cleared from the levees will be transported across the ditches and stacked in piles in the interior of the units for burning by TPWD at a later date. Once clearing is completed, material will be excavated from the interior ditches to be used for levee refurbishment. TPWD proposes to borrow from and rehabilitate a total of 13.8 miles of interior ditches.

Endangered Species Act Determinations: *NLAA*
See attached concurrence from ESFO.

NHPA:
The Service concluded consultation with the Tribes on 12/05/2024; there were no concerns with the project. The TPWD consulted with SHPO per the Delegation Tracking # 202500608.

NEPA Determinations: No extraordinary circumstances were triggered by this project so NEPA compliance for these projects has been determined by WSFR to be a categorical exclusion as provided by 516 DM 8, Appendix 1 and/or 516 DM 2, Appendix 1.

B (3) The construction of new, or the addition of, small structures or improvements, including structures and improvements for the restoration of wetland, riparian, instream, or native habitats, which result in no or only minor changes in the use of the affected local area. The following are examples of activities that may be included:

A) The installation of fences.
B) The construction of small water control structures.
C) The planting of seeds or seedlings and other minor revegetation actions.
D) The construction of small berms or dikes.

Grant Manager
December 17, 2024

INTRA-SERVICE SECTION 7 BIOLOGICAL EVALUATION FORM

Originating Person:
Telephone Number:
Date:

I. Region: Southwest Region 2

II. Service Activity: TX W-228-R-1: Wetland Restoration at JD Murphree WMA, Phase II

III. Pertinent Species and Habitat*:

*Attach official species list from IPaC.

Key	
LE	Endangered Species
LT	Threatened Species
C	Candidate Species
PDL	Proposed Species for Delisting
[shaded box]	Critical Habitat (in Texas)

A. Listed Species and/or their Critical Habitat within the action area:

LT - West Indian Manatee – Trichechus manatus
LT- Eastern Black Rail – Laterallus jamaicensis ssp. jamaicensis
LT - Piping Plover – Charadrius melodus
LT - Rufa Red Know- Calidris canutus rufa
LE - Whooping Crane – Grus americana
LT - Green Sea Turtle – Chenlonia mydas
LE - Hawksbill Sea Turtle – Eretmochelys imbricata
LE - Kemp’s Ridley Sea Turtle – Lepidochelys kempii
LE - Leatherback Sea Turtle – Dermochelys coriacea

B. Proposed species and/or proposed critical habitat within the action area:

PLE- Tricolored Bat - Perimyotis subflavus

C. Candidate species within the action area:

C- Monarch Butterfly – Danaus plexippus

IV. Geographic Area and Action:

V. Location:

a. **County and State:** Jefferson County, Texas
b. **Section, Township, and Range (or Latitude and Longitude):**
c. **Distance (Miles) and Direction to Nearest Town:**

Shapefile shared.

VI. Description of the Proposed Action:

The J.D. Murphree WMA is a 24,516-acre tract of fresh, intermediate, and brackish water within the prairie- marsh zone along the upper coast of Texas. These wetlands are part of Texas Chenier Plain, the westernmost geologic delta of the Mississippi River. Three distinct units comprise the WMA: the Big Hill Unit (8,312 acres), the Hillebrandt Unit (591 acres), and the Salt Bayou Unit (15,347 acres). The WMA is highly diverse in coastal wetland communities. Vegetative communities found within the area are indicative of freshwater, intermediate, brackish and to a small extent saline wetlands. The wetland units on the Big Hill Unit on the project areas are emergent wetlands that are approximately 3' deep with surrounding ditches for water movement with adjoining levees. The wetland restoration project will remove silting in the ditches on the edge of wetland units and to use the material to build up levees to increase their elevation. Due to increased high tides and sea surface rise, combined with subsidence, the levees are being eroded and overtopped during inclement weather and high tides which decreases the ability for TPWD to manage these units properly for wildlife. Phase 1 (Units 1- 4) had methodology that included excavating soil by heavy machinery (already approved Section 7); Phase 2 (United 5, 6, and 11) include this methodology but also include using additional methodologies. Additionally, an amphibious buggy (similar to a Marsh Master) combined with a spray dredge would be used to move sediment at the bottom of the ditches back into the marsh to assist in increasing marsh elevation and not removing from the units.

VII. Determination of Effects

A. Explanation of Effects of the Action:

Tricolored bat (Perimyotis subflavus) – Proposed Endangered

This species is proposed for endangered wherever found. During the winter, tricolored bats are often found in caves and abandoned mines, although in the southern United States, where caves are sparse, tricolored bats are often found roosting in road-associated culverts where they exhibit shorter torpor bouts and forage during warm nights. During the spring, summer, and fall, tricolored bats are found in forested habitats where they roost in trees, primarily among leaves of live or recently dead deciduous hardwood trees, but may also be found in Spanish moss, pine trees, and occasionally human structures.

A. Species status – This species is not known to occur within the action area. Tricolored bats are not known to use coastal marsh for hibernacula, especially with no culverts in the action area.
B. Habitat status – Suitable habitat for this species does not within the action area.
C. Impacts of the proposed action on species and/or critical habitat – No impact since species and habitat does not exist in the project areas.
D. Assessment of effects – Proposed activities **would have no effect** the tricolored bat.

Eastern black rail (*Laterallus jamaicensis ssp. jamaicensis*) – Threatened
This species is listed threatened wherever found. Range is large, but distribution is disjunct and highly localized. In the U.S., breeding range includes California (San Francisco Bay area, Imperial Valley, San Luis Obispo County, formerly San Diego County); lower Colorado River valley, southeastern California and southwestern Arizona; Kansas (locally); northern and central Illinois, and southwestern Ohio; Atlantic coast from New York south to southern Florida; Gulf coast in eastern Texas and western Florida. Breeding habitat is characterized as Salt, brackish, and freshwater marshes, pond borders, wet meadows, and grassy "swamps." Nests in or along edge of marsh, in area with saturated or shallowly flooded soils and dense vegetation, usually in site hidden in marsh grass or at base of Salicornia; on damp ground, on mat of previous year's dead grasses, or over very shallow water. Nonbreeding range within the U.S. includes the California coast, southeastern California, Gulf Coast from Texas to Florida, and the Atlantic coast north to North Carolina. Non-breeding habitat is thought to be similar to that used during the breeding season.

A. Species status – This species is not known to occur within the action area. Black rails have been located at Murphree WMA, but not in these units based on past monitoring and research. Proposed activities would be conducted in compliance with the 4(d) rule and would not impact this species' distribution or population trends. The BMPs being adhered to are included as Attachment 1 to the Section 7.
B. Habitat status – Suitable habitat for this species occurs within the action area. Proposed activities would not negatively impact this species' habitat and would more likely yield habitat enhancement for this species.
C. Impacts of the proposed action on species and/or critical habitat – Black Rail BMPs will be utilized thereby making effect insignificant and discountable.
D. Assessment of effects – Proposed activities **may affect but are not likely to adversely affect** the Eastern black rail.

Piping Plover (*Charadrius melodus*) - Threatened
The threatened listing status applies to the entire population except those listed as endangered and occurring in the Great Lakes watershed of Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania, and Wisconsin. Wintering migrants occur on ocean beaches or on sand or algal flats in protected bays from September-March within Gulf and Atlantic coast states, the Caribbean, and Mexico. This species is most abundant on expansive sandflats, sandy mudflats, and sandy beach in close proximity. Open shoreline areas are preferred, and vegetated beaches are avoided. The project areas consist of emergent marsh that is approximately 3' deep with no open shoreline areas or mudflats. The project areas contains no habitat that would be conducive to use by piping plovers and no piping plovers have been observed in internal wetland units at the Big Hill Unit.

A. Species status – This species is not known to occur within the action area. The proposed activities would not impact any individuals.
B. Habitat status – Suitable habitat for this species occurs does not occur within the action

area.
C. Impacts of the proposed action on species and/or critical habitat – No impact since species and habitat does not exist in the project areas.
D. Assessment of effects – Proposed activities **would have no effect** the Piping plover.

Red Knot (*Calidris canutus rufa*) - Threatened
This species is listed threatened wherever found. Red knots migrate long distances in flocks northward through the contiguous United States mainly April-June, southward July-October. A small plump-bodied, short-necked shorebird that in breeding plumage, typically held from May through August, is a distinctive and unique pottery orange color. Its bill is dark, straight and, relative to other shorebirds, short-to medium in length. After molting in late summer, this species is in a drab gray-and-white non-breeding plumage, typically held from September through April. In the non-breeding plumage, the knot might be confused with the omnipresent Sanderling. During this plumage, look for the knot's prominent pale eyebrow and whitish flanks with dark barring. The Red Knot prefers the shoreline of coast and bays and also uses mudflats during rare inland encounters. Primary prey items include coquina clam (*Donax* spp.) on beaches and dwarf surf clam (*Mulinia lateralis*) in bays, at least in the Laguna Madre. Wintering Range includes- Aransas, Brazoria, Calhoun, Cameron, Chambers, Galveston, Jefferson, Kennedy, Kleberg, Matagorda, Nueces, San Patricio, and Willacy. Habitat: Primarily seacoasts on tidal flats and beaches, herbaceous wetland, and Tidal flat/shore.
The project areas consist of emergent marsh that is approximately 3' deep with no exposed or available tidal flat, beach, or shore. The project areas contains no habitat that would be conducive to use by red knots and no red knots have been observed in internal wetland units at Big Hill Unit.

A. Species status – This species is not known to occur within the action area. The proposed activities would not impact this species distribution or population trends.
B. Habitat status – No suitable habitat for this species occurs within the action. Proposed activities would not impact or would benefit this species habitat.
C. Impacts of the proposed action on species and/or critical habitat – This species or its critical habitat are not known to occur within the action area.
D. Assessment of effects – Proposed activities **would have no effect** on the Red Knot

West Indian manatee (*Trichechus manatus*) - Threatened
This species is listed threatened wherever found. Manatees are marine mammals found in marine, estuarine, and freshwater environments. Manatees have large, seal-shaped bodies with paired flippers and a round paddle-shaped tail. They are typically grey in color and occasionally spotted with barnacles or colored by patches of green or red algae. Manatees are herbivores that feed opportunistically on a wide variety of marine, estuarine, and freshwater plants, including submerged, floating, and emergent vegetation. Therange is generally restricted to the southeastern United States; individuals range as far north as Massachusetts and as far west as Texas. They have little tolerance for cold and seek out warm water sites.

A. Species status – This species is not known to occur within the action area. The proposed activities would not impact this species distribution or population trends.
B . Habitat status – Suitable habitat for this species does not occur within the action area.
C. Impacts of the proposed action on species and/or critical habitat –The proposed actions would not adversely impact the species or its habitat.
D. Assessment of effects – Proposed activities **would have no effect** on the West Indian manatee.

Green sea turtle (*Chelonia mydas*) – Threatened
This species is listed threatened within the North Atlantic population which includes Texas. This species migrates between nesting beaches and marine waters. Nesting occurs March-October in Caribbean-Gulf of Mexico region, with peak nesting in May-June. Nesting occurs on beaches, usually on islands but also on the mainland; most nesting occurs on high energy beaches with deep sand. Neonates migrate far from natal beaches to foraging areas and return to natal beach to breed/nest up to 40+ years later. Adults migrate up to about 3,000 km between nesting beaches and feeding areas; feeding occurs in shallow waters with abundant submerged vegetation and in convergence zones in the open ocean.

A. Species status – This species is not known to occur within the action area. The proposed activities would not impact this species distribution or population trends.
B. Habitat status – Suitable habitat for this species does not occur within the action area.
C. Impacts of the proposed action on species and/or critical habitat –The proposed actions would not adversely impact the species or its habitat.
D. Assessment of effects – Proposed activities **would have no effect** on the green sea turtle.

Hawksbill sea turtle (*Eretmochelys imbricata*) – Endangered
This species is listed endangered wherever found. This species uses a wide range of tropical and subtropical habitats, including shallow coastal waters with rocky bottoms, coral reefs, beds of sea grass or algae, mangrove-bordered bays and estuaries, and submerged mud flats. Nesting occurs on undisturbed, deep sand, insular or mainland beaches, from high energy ocean beaches to tiny pocket beaches several meters wide contained in crevices of cliff walls; a typical site would be a low-energy sand beach with woody vegetation, such as sea grape or salt shrub, near the water line.

A. Species status – This species is not known to occur within the action area. The proposed activities would not impact this species distribution or population trends.
B. Habitat status – Suitable habitat for this species does not occur within the action area.
C. Impacts of the proposed action on species and/or critical habitat –The proposed actions would not adversely impact the species or its habitat.
D. Assessment of effects – Proposed activities **would have no effect** on the Hawksbill sea turtle.

Kemp's ridley sea turtle (*Lepidocheyls kempii*) – Endangered
This species is listed endangered wherever found. Habitat of adults primarily includes shallow coastal and estuarine waters, often over sandy or muddy bottoms where crab are numerous. Most adults stay in the Gulf of Mexico. Nesting occurs on well-defined elevated dune areas, especially on beaches backed up by large swamps or bodies of open water having seasonal, narrow ocean connections.

A. Species status – This species is not known to occur within the action area. The proposed activities would not impact this species distribution or population trends.
B. Habitat status – Suitable habitat for this species does not occur within the action area.
C. Impacts of the proposed action on species and/or critical habitat –The proposed actions would not adversely impact the species or its habitat.
D. Assessment of effects – Proposed activities **would have no effect** on the Kemp's ridley sea turtle.

Leatherback sea turtle (*Dermochelys coriacea*) – Endangered
This species is listed endangered wherever found. The leatherback is the largest, deepest diving, and most migratory and wide ranging of all sea turtles. This species is mainly pelagic, seldom approaching land except for nesting. Nests on sloping sandy beaches backed up by vegetation, often near deep water and rough seas.

A. Species status – This species is not known to occur within the action area. The

proposed activities would not impact this species distribution or population trends.
B. Habitat status – Suitable habitat for this species does not occur within the action area.
C. Impacts of the proposed action on species and/or critical habitat –The proposed actions would not adversely impact the species or its habitat.
D. Assessment of effects – Proposed activities **would have no effect** on the Leatherback sea turtle.

Loggerhead sea turtle (*Caretta Caretta*) – Threatened
This species is listed threatened wherever found except for the North Pacific population which is under review. This species migrates between nesting beaches and marine waters. Nesting occurs usually on open
sandy beaches above high-tide mark, seaward of well-developed dunes.
A. Species status – This species is not known to occur within the action area. The proposed activities would not impact this species distribution or population trends.
B. Habitat status – Suitable habitat for this species does not occur within the action area.
C. Impacts of the proposed action on species and/or critical habitat –The proposed actions would not adversely impact the species or its habitat.
D. Assessment of effects – Proposed activities **would have no effect** on the Loggerhead sea turtle.

Whooping crane (*Grus americana*) - Endangered
This species is listed endangered in the entire U.S. except Colorado, Idaho, Florida, New Mexico, Utah, and western Wyoming, where it is listed as an experimental population, non- essential. This long-lived species only occurs in North America and is North America's tallest bird approaching 5 feet while standing erect. The July 2010 wild population was estimated at 383 birds. This species occurs in the wild at 3 locations. The Aransas-Wood Buffalo National Park population is the only self-sustaining wild population which nests in Wood Buffalo National Park and adjacent areas in Canada and winters in coastal marshes in Texas at Aransas. This species migrates across and winters in Texas utilizing a variety of wetland and other habitats, including coastal marshes and estuaries, inland marshes, lakes, ponds, wet meadows, rivers, and agricultural fields. During migration roosting occurs in shallow, seasonally and semi-permanently flooded palustrine wetlands and feeding occurs in wetlands and harvested grain fields for a diet of frogs, fish, crayfish, insects, and agricultural grains.
Wintering areas encompass salt marshes and tidal flats on the mainland and barrier islands.
The project area is approximately 3' deep in most areas which is not conducive to nesting whooping cranes which usually select areas with less than 18" of depth and then build a nest location. For instance, in Texas, rice field and crawfish farms have been actively used for nesting areas by the Louisiana experimental population. In addition, TPWD and Louisiana Department of Wildlife and Fisheries (LDWF) work very closely together coordinating efforts and movement of the experimental population. With a large portion of the experimental population being radiotagged, we are updated on locations in the case of whooping cranes on the WMA. To date, whooping cranes have not been selecting habitat types present on the Big Hill Unit.

A. Species status – This species is not known to occur within the action area, but the WMA is in a county where birds from the Louisiana experimental population are known to occur. These birds have nested in or near rice fields/crawfish ponds on private lands but not on either NWRs or WMAs. No birds are present in Texas as of September 2024.
B. Habitat status – Suitable foraging habitat for this species may occur within the WMA, but not the project area due to water depth and Whooping Cranes have been not been observed on the project areas.
C. Impacts of the proposed action on species and/or critical habitat – No impact to either

species or habitat due to water depth of project area (~ 3 feet).

D. Assessment of effects – Proposed activities **would have no effect** on Whooping crane.

Monarch butterfly (*Danaus plexippus*) –Candidate

This species is a candidate for listing with an expected range of the entire continental United States, with migration through Texas. During the breeding season, monarchs lay their eggs on their obligate milkweed host plant (primarily Asclepias spp.), and larvae emerge after two to five days. Larvae develop through five larval instars (intervals between molts) over a period of 9 to 18 days, feeding on milkweed and sequestering toxic chemicals (cardenolides) as a defense against predators. The larva then pupates into a chrysalis before emerging 6 to 14 days later as an adult butterfly. There are multiple generations of monarchs produced during the breeding season, with most adult butterflies living approximately two to five weeks; overwintering adults enter into reproductive diapause (suspended reproduction) and live six to nine months. In many regions where monarchs are present, monarchs breed year-round. Individual monarchs in temperate climates, such as eastern and western North America, undergo long-distance migration, and live for an extended period of time. In the fall, in both eastern and western North America, monarchs begin migrating to their respective overwintering sites. This migration can take monarchs distances of over 3,000 km and last for over two months. In early spring (February-March), surviving monarchs break diapause and mate at the overwintering sites before dispersing. The same individuals that undertook the initial southward migration begin flying back through the breeding grounds and their offspring start the cycle of generational migration over again. The species status assessment indicates that primary drivers affecting health include the loss and degradation of habitat (from conversion of grasslands to agriculture, widespread use of herbicides, logging/thinning at overwintering sites in Mexico, senescence and incompatible management of overwintering sites in California, urban development, and drought), continued exposure to insecticides, and effects of climate change. Habitat during migration includes open fields and meadows containing nectar plants and milkweed needed for survival.

A. Species status – This species has potential to occur within the impacted area.

B. Habitat status – Nearly of the existing habitat in the proposed area is emergent marsh which is not conducive to monarch nesting and occupancy.

C. Impacts of the proposed action on species and/or critical habitat – Minimal disturbance would occur to the species due the habitat not being a known benefit areas for monarchs.

D. Assessment of effects – Proposed activities **would have no effect on the** monarch butterfly.

This information was obtained from:

U.S. Fish and Wildlife Service. 2024. Southwest Region Texas Coastal Ecological Services Official Species List for JD Murphree WMA. Environmental Conservation Online System, Information for Planning and Conservation. Available at: http://ecos.fws.gov/ipac/. Accessed September 17, 2024.

U.S. Fish and Wildlife Service. 2024. Species Profiles. Environmental Conservation Online System. Available at https://ecos.fws.gov/ecp0/reports/ad-hoc-species-reportinput. Accessed: September 17,2024.

NatureServe. 2024. NatureServe Explorer [web application]. NatureServe, Arlington, Virginia. Available at http://explorer.natureserve.org/. Accessed: September 8, 2024.

B. Actions to be implemented to reduce adverse effects:

VIII. Effect Determination and Response Requested

<u>Federal Aid Determination</u> **<u>Response Requested</u>**

A. Listed species/designated critical habitat:

No effect: X_______ **Concurrence**

Piping Plover Red Knot West Indian Manatee Green Sea Turtle Kemp's Ridley Sea Turtle Leatherback Sea Turtle Loggerhead Sea Turtle Whooping Crane		

May affect, is not likely to adversely affect: _______ **Concurrence**

Eastern Black Rail

May affect, is likely to adversely affect: _______ **Formal Consultation**

Undetermined effect: X_______ **Informal Consultation**

B. Proposed species and/or proposed critical habitat

No effect: X_______ **Concurrence**

Tricolored Bat		

Is not likely to jeopardize proposed species/
adversely modify proposed critical habitat: _______ **Concurrence**

Is likely to jeopardize proposed species/
adversely modify proposed critical habitat: _______ **Conference Required**

Undetermined effect: _______ **Conference Required**

C. Candidate species

No effect: X_______ **Concurrence**

Monarch Butterfly

Is not likely to jeopardize: _______ **Concurrence**

Is likely to jeopardize: _______ **Conference Required**

Undetermined effect: _______ **Conference Required**

D. Remarks

State Reviewer:

[signature] 10/21/2024

Signature **Date**

Federal Aid Grant Manager:

______________________________ ______________________

Signature **Date**

IX. Reviewing Ecological Services Office Evaluation

A. Concurrence X______ **Nonconcurrence** _______

B. Formal Consultation required _______

C. Conference required _______

D. Remarks The Service concurs with the may affect, not likely to adversely affect determination with the implementation of Eastern black rail BMPs in the attached document.

DAVID HOTH Digitally signed by DAVID HOTH Date: 2024.12.17 10:57:10 -06'00'

Signature **Date**

WSFR IntraService Section 7 2023

Eastern Black Rail Best Management Practices

1. Required construction and mobilization equipment, and use of an amphibious excavator for ditch clearing, will use existing levees for access to the construction site.
2. The required construction equipment for the project only moves at slow speeds and will be operated at a slow enough speed that can allow species to escape the path to complete the ditch clearing.
3. The construction footprint will be from the outside toe of the existing levee to the top of the unit side ditch moving at a slow speed in areas that are not suitable habitat. Construction will occur in water depths 15 cm deep during the lowest low-tide period in the units which far exceeds the optimal depth (1-3 cm) for foraging and chick-rearing. All construction will occur during daylight hours (1 hour after sunrise and 1 hour before sunset) to reduce impacts to potential breeding call periods.
4. Equipment will be driven on existing levees and will avoid rutting and long-term surface damage. If rutting does occur, all rutting on existing levees will be repaired.
5. Whenever possible, roads, levees, or fire breaks will be used as equipment access routes to minimize the amount of habitat disturbance while traveling between management units.
6. The wetland restoration for this project will occur in the existing footprint of ditches and levees. Negligible disturbance to any wetland vegetation would occur outside of the wetland units.
7. Mowing within existing infrastructure footprints will occur frequently enough that suitable eastern black rail habitat is not allowed to develop. A goal of this project is to minimize future tree growth on the levees.
8. During ditch and levee maintenance this project will stack brush piles from the levee clearing operations within the interior of the unit for TPWD to burn at a later date. No equipment will be tracked within the interior units to accomplish this.
9. During levee repairs, no material will be taken from listed species habitat.
10. TPWD staff will meet with contractors at the pre-construction meeting to discuss eastern black rail BMPs with regards to this wetland restoration project and eastern black rail biology.

From: noreply@thc.state.tx.us
To: Ashley A. Chapman; reviews@thc.state.tx.us; Jerry.L.Androy@usace.army.mil
Subject: JD Murphree WMA – Big Hill Unit Compartments 5, 6, and 11 Ditch Rehabilitation
Date: Monday, October 14, 2024 2:09:06 PM

Re: Project Review under Section 106 of the National Historic Preservation Act and/or the Antiquities Code of Texas
THC Tracking #202500608
Date: 10/14/2024
JD Murphree WMA – Big Hill Unit Compartments 5, 6, and 11 Ditch Rehabilitation
10 Parks & Wildlife Dr.
Port Arthur,TX 77640

Description: TPWD proposes to rehabilitate a total of 13.8 miles of interior ditches the JD Murphree Wildlife Management Area

Dear Ashley A. Chapman:
Thank you for your submittal regarding the above-referenced project. This response represents the comments of the State Historic Preservation Officer, the Executive Director of the Texas Historical Commission (THC), pursuant to review under Section 106 of the National Historic Preservation Act and the Antiquities Code of Texas.

The review staff, led by Justin Kockritz and Marie Archambeault, has completed its review and has made the following determinations based on the information submitted for review:

Above-Ground Resources

- No historic properties are present or affected by the project as proposed. However, if historic properties are discovered or unanticipated effects on historic properties are found, work should cease in the immediate area; work can continue where no historic properties are present. Please contact the THC's History Programs Division at 512-463-5853 to consult on further actions that may be necessary to protect historic properties.

Archeology Comments

- THC/SHPO concurs with information provided.

We look forward to further consultation with your office and hope to maintain a partnership that will foster effective historic preservation. Thank you for your cooperation in this review process, and for your efforts to preserve the irreplaceable heritage of Texas. If the project changes, or if new historic properties are found, please contact the review staff. If you have any questions concerning our review or if we can be of further assistance, please email the following reviewers: justin.kockritz@thc.texas.gov, marie.archambeault@thc.texas.gov.

This response has been sent through the electronic THC review and compliance system (eTRAC). Submitting your project via eTRAC eliminates mailing delays and allows you to check the status of the review, receive an electronic response, and generate reports on your submissions. For more information, visit http://thc.texas.gov/etrac-system.

Sincerely,

for Joseph Bell, State Historic Preservation Officer
Executive Director, Texas Historical Commission

Please do not respond to this email.

cc: Jerry.L.Androy@usace.army.mil

Environmental Requirement	Has the Requirement Been Addressed?	Compliance Notes and documentation uploads (e.g., title and date of document, permit number, weblink etc.) [1]
National Environmental Policy Act	_X__ Yes ___ No ___ N/A	Council to adopt NEPA environmental assessment included in the 2021 Nationwide Permit 3 - Final Decision Document
Endangered Species Act	__X_ Yes ___ No ___ N/A	USFWS Intra-Service Section 7 Biological Evaluation Form, TX W-228-R-1: Wetland Restoration at JD Murphree WMA, Phase II, 12/17/2024
National Historic Preservation Act	_X__ Yes ___ No ___ N/A	THC Tracking #202304940, concurrence received 03/10/2023; THC Tracking #202500231, concurrence received 09/27/2024; THC Tracking #202500608, concurrence received 10/14/2024; USFWS consulted with the Tribes on 12/05/2024; no concerns with the project.
Magnuson-Stevens Act	_X__ Yes ___ No ___ N/A	No objection email dated 05/15/2025
Fish and Wildlife Coordination Act	__X_ Yes ___ No ___ N/A	USFWS and NMFS were provided with the opportunity to comment on the project through the USACE Interagency Coordination Notice review process.
Coastal Zone Management Act	_X__ Yes ___ No ___ N/A	The project was determined to be consistent with the Texas Coastal Management Program through the USACE permit process (SWG-2023-00275, SWG-2024-00349)
Coastal Barrier Resources Act	___ Yes ___ No __X_	

[1] Note: PIPER will allow for EC documentation uploads under each environmental requirement shown in the checklist.

	N/A	
Farmland Protection Policy Act	___ Yes ___ No _X__ N/A	
Clean Water Act Section 404	_X__ Yes ___ No ___ N/A	USACE permit SWG-2023-00275, issued on 8/15/2023; USACE permit SWG-2024-00349 issued 4/16/2025
River and Harbors Act Section 10	__X_ Yes ___ No ___ N/A	USACE permit SWG-2023-00275, issued on 8/15/2023; USACE permit SWG-2024-00349 issued 4/16/2025
Clean Water Act Section 401	__X_ Yes ___ No ___ N/A	USACE permit SWG-2023-00275, issued on 8/15/2023; USACE permit SWG-2024-00349 issued 4/16/2025
Marine Protection, Research and Sanctuaries Act	___ Yes ___ No __X_ N/A	
Marine Mammal Protection Act	___ Yes ___ No __X_ N/A	
National Marine Sanctuaries Act	___ Yes ___ No _X__ N/A	
Migratory Bird Treaty Act	__X_ Yes ___ No ___ N/A	USFWS analyzed potential project effects on migratory birds during the NEPA review process.
Bald and Golden Eagle Protection Act	___ Yes ___ No __X_ N/A	No suitable habitat in the project area.
Clean Air Act	_X__ Yes ___ No ___ N/A	USFWS analyzed potential project effects on air quality during the NEPA review process.
Other application environmental laws or regulations	_X__ Yes ___ No ___ N/A	The USFWS and USACE through their permit processes reviewed the project to ensure that it was in compliance with all other applicable laws and regulations.