DECISION DOCUMENT
NATIONWIDE PERMIT 54

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 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

Living Shorelines. 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 construction and maintenance of living shorelines to stabilize banks and shores in coastal waters, which includes the Great Lakes, along shores with small fetch and gentle slopes that are subject to low- to mid-energy waves. A living shoreline has a footprint that is made up mostly of native material. It incorporates vegetation or other living, natural "soft" elements alone or in combination with some type of harder shoreline structure (e.g., oyster or mussel reefs or rock sills) for added protection and stability. Living shorelines should maintain the natural continuity of the land-water interface, and retain or enhance shoreline ecological processes. Living shorelines must have a substantial biological component, either tidal or lacustrine fringe wetlands or oyster or mussel reef structures. The following conditions must be met:

(a) The structures and fill area, including sand fills, sills, breakwaters, or reefs, cannot extend into the waterbody more than 30 feet from the mean low water line in tidal waters or the ordinary high water mark in the Great Lakes, unless the district engineer waives this criterion by making a written determination concluding that the activity will result in no more than minimal adverse environmental effects;

(b) The activity is no more than 500 feet in length along the bank, unless the district engineer waives this criterion by making a written determination concluding that the activity will result in no more than minimal adverse environmental effects;

(c) Coir logs, coir mats, stone, native oyster shell, native wood debris, and other structural materials must be adequately anchored, of sufficient weight, or installed in a manner that prevents relocation in most wave action or water flow conditions, except for extremely severe storms;

(d) For living shorelines consisting of tidal or lacustrine fringe wetlands, native plants appropriate for current site conditions, including salinity, must be used if the site is planted

by the permittee;

(e) Discharges of dredged or fill material into waters of the United States, and oyster or mussel reef structures in navigable waters, must be the minimum necessary for the establishment and maintenance of the living shoreline;

(f) If sills, breakwaters, or other structures must be constructed to protect fringe wetlands for the living shoreline, those structures must be the minimum size necessary to protect those fringe wetlands;

(g) The activity must be designed, constructed, and maintained so that it has no more than minimal adverse effects on water movement between the waterbody and the shore and the movement of aquatic organisms between the waterbody and the shore; and

(h) The living shoreline must be properly maintained, which may require periodic repair of sills, breakwaters, or reefs, or replacing sand fills after severe storms or erosion events. Vegetation may be replanted to maintain the living shoreline. This NWP authorizes those maintenance and repair activities, including any minor deviations necessary to address changing environmental conditions.

This NWP does not authorize beach nourishment or land reclamation activities.

Notification: The permittee must submit a pre-construction notification to the district engineer prior to commencing the construction of the living shoreline. (See general condition 32.) The pre-construction notification must include a delineation of special aquatic sites (see paragraph (b)(4) of general condition 32). Pre-construction notification is not required for maintenance and repair activities for living shorelines unless required by applicable NWP general conditions or regional conditions. (Authorities: Sections 10 and 404)

Note: In waters outside of coastal waters, nature-based bank stabilization techniques, such as bioengineering and vegetative stabilization, may be authorized by NWP 13.

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

NWPs are a type of general permit designed to authorize certain activities that have only 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: 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 may adversely 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 authorize the construction of artificial reefs. General condition 28 prohibits the use of an NWP with other NWPs, except when the acreage loss of waters of the United States does not exceed the highest specified acreage limit of the NWPs used to authorize the single and complete project.

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 result in discharges of dredged or fill material 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 concerns and resources. [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 water quality certification. NWPs 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. The procedures to ensure that the NWPs comply with these laws are described in 33 CFR 330.4(c) and (d), respectively.

1.4 Public Comment and Response

For a summary of the public comments received in response to the June 1, 2016, 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 June 1, 2016, 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.

We proposed to issue this new NWP to authorize 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 construction and maintenance of living shorelines. Living shorelines can be used to protect property from erosion in sheltered coastal environments, as an alternative to

bulkheads, revetments, and other structures.

We received many comments supporting the issuance of this NWP and many comments opposing the issuance of this NWP. Many commenters stated that they should have the right to protect their waterfront property from erosion using whatever techniques authorized by NWP that they choose as long as those activities will have no more than minimal adverse environmental impacts. Many commenters voiced their concerns that this new NWP would mandate the use of living shorelines over other approaches to bank stabilization. These commenters said that landowners should continue to be allowed to use bulkheads or revetments for shore erosion control if they want to protect their land in that way. Several commenters stated that this NWP should be withdrawn and that all bank stabilization and shore erosion control activities should require individual permits. One commenter opposed this NWP stating that it has the potential to result in impacts to tribal treaty fishing rights.

We are issuing this NWP to provide general permit authorization for the construction of maintenance of living shorelines in order to offer landowners an alternative general permit authorization to the various types of bank stabilization activities authorized by NWP 13. Built infrastructure (e.g., bulkheads, revetments), natural infrastructure (e.g., fringe wetlands, oyster reefs, beach dunes), and hybrid infrastructure (e.g., living shorelines) to control erosion all have various strengths and weaknesses (Sutton-Grier et al. 2015, Table 1). The strengths of built shoreline infrastructure include long periods of experience in using these approaches, expertise in how to design and construct these features, understanding the level of protection provided by these structures, and their immediate effectiveness in controlling erosion after they are constructed (Sutton-Grier et al. 2015). Weaknesses of built shore protection infrastructure include an inability to adjust to changing environmental conditions (e.g., sea level rise), decreasing effectiveness over time as structures deteriorate, and negative impacts to coastal ecosystems on the project site (Sutton-Grier et al. 2015).

The strengths of living shorelines and other hybrid infrastructure shore protection approaches include the ability to use the best features of built and natural infrastructure, the provision of some ecological services other than erosion protection, the ability to design and implement innovative shore protection systems, and their ability to be used in coastal areas where there is not sufficient space for natural infrastructure (Sutton-Grier et al. 2015). Living shorelines may be an approach to adapting to sea level rise in coastal areas where there is space available for landward migration of fringe wetlands (Bilkovic et al. 2016). The weaknesses of living shorelines and other hybrid infrastructure approaches include: the present lack of empirical data demonstrating their performance, the need for more studies on the most effective designs for these hybrid approaches, their inability to provide all the ecological services that natural infrastructure supplies, the limited expertise of coastal planners and developers with these approaches, their negative impacts on species diversity, and the lack of cost-benefit data for these approaches (Sutton-Grier et al. 2015).

In these NWPs, we are not establishing a preference over one approach to shore erosion control over other approaches because there are numerous factors that must be considered when choosing an appropriate shore erosion control technique. The appropriate approach for shore erosion control is dependent on a variety of factors, such as substrate

characteristics, site topography, water depths near the shore, fetch, and the extent of coastal development in the area (Saleh and Weinstein 2016). The type of waterbody is also important.

We are limiting this NWP to coastal waters, which consists of estuarine and marine waters and the Great Lakes. Another consideration in determining the appropriate shore erosion technique is the lack of space on urban coasts where there is not enough area to implement hybrid or natural approaches to shore erosion control (Sutton-Grier et al. 2015). We have revised the definition of "living shoreline" in this NWP using information in the Systems Approach to Geomorphic Engineering (SAGE) publication entitled: "Natural and structural measures for shoreline stabilization"[1] which was published in 2015 by the National Oceanic and Atmospheric Administration (NOAA) and the U.S. Army Corps of Engineers (USACE). According to this publication, living shorelines are only applicable in coastal waters with low- to mid-energy waves, small fetch, and gentle slopes. Landowners and other entities that identify a need to protect their property and infrastructure from erosion can request authorization (if the proposed activity requires a PCN) under the NWP that is appropriate for the erosion control approach they propose to use.

There are other factors to consider when evaluating appropriateness and feasibility of living shorelines (Bilkovic et al. 2016). The construction of a living shoreline may require grading the riparian area and removing riparian vegetation (Bilkovic et al. 2016), which provides a number of ecological functions and services (NRC 2002). The removal of that riparian vegetation may not be consistent with local water quality or habitat protection requirements (Bilkovic et al. 2016). As an alternative to grading the riparian area and removing the vegetation, the living shoreline components may be constructed further into the waterbody, which may require variances from state or local tidewater regulations and impair navigation (Bilkovic et a. 2016). Finally, the construction of living shorelines in subtidal waters can infringe on state subaqueous lands (Bilkovic et al. 2016) and affect the finfish, shellfish, and other resources that use those tidewaters and submerged lands.

We have added a Note to this NWP to inform prospective permittees that bank stabilization activities outside of coastal waters, such as bioengineering and vegetative stabilization in inland rivers and streams, may be authorized by NWP 13. This NWP authorizes the construction and maintenance of living shorelines, as long as those activities result in no more than minimal individual and cumulative adverse environmental effects. Paragraphs (e) and (f) of this NWP require structures and fills in jurisdictional waters and wetlands, including navigable waters, to be minimized to the maximum extent practicable on the project site (see also paragraph (a) of general condition 23, mitigation). The district engineer will review the PCN and if the proposed activity will result in more than minimal individual and cumulative adverse environmental effects after considering mitigation proposed by the applicant, the district engineer will exercise discretionary authority and require an individual permit. Activities authorized by this NWP must comply with general condition 17, tribal rights. Under that general condition, NWP activities cannot cause more than minimal adverse effects on tribal rights (including treaty rights), protected tribal

[1] http://sagecoast.org/

resources, or tribal lands.

Several commenters said that this NWP should be withdrawn and that these activities should be authorized by modifying NWP 13. Many commenters expressed support for this proposed NWP because they are concerned that it is easier to obtain NWP 13 authorization than authorization to construct a living shoreline. These commenters said that under the current NWPs, living shorelines usually require individual permits, which discourage use of living shorelines as an alternative to hardened bank stabilization measures such as bulkheads, seawalls, and revetments. Several commenters said they support a new NWP that reduces the amount of time to obtain DA authorization for these activities. These commenters acknowledged the shorter timeframes in which an NWP authorization can be provided. One commenter noted that the issuance of this NWP would relieve regulatory burdens and support landowner preferences for the aesthetics and ecosystem services of living shorelines.

We have determined that it would be more appropriate to issue a separate NWP to authorize the construction and maintenance of living shorelines. Living shorelines are effective in specific areas of coastal waters, while NWP 13 authorizes a variety of bank stabilization approaches in a range of different categories of waters, from headwater streams to small lakes, larger rivers, high energy coastlines, and open ocean waters. The PCN thresholds differ between NWPs 13 and this new NWP because bank stabilization activities authorized by NWP 13 can often be constructed with small amounts of fill. On the other hand, living shorelines require larger amounts of fill to achieve desired grades for wave dissipation and vegetation establishment to reduce erosion, as well as fill structures such as sills to protect the sand fills and vegetation. If we had modified NWP 13 to authorize living shorelines, most proposed living shorelines would require written waivers from district engineers because they would exceed the limit of one cubic yard of fill material per running foot. Under this new NWP, written waivers from district engineers are only required if the structures or fills extend more than 30 feet from the mean low water line in tidal waters or the ordinary high water mark in the Great Lakes, or if more than 500 linear feet of shoreline as measured along the bank is to occupied by the proposed living shoreline. Despite the differences in PCN thresholds, this NWP provides general permit authorization for the construction and maintenance of living shorelines. During FY 2106, the average (mean) evaluation time for NWP verifications was 40 days and the mean evaluation time for standard individual permits was 217 days.

Several commenters stated that living shorelines are not appropriate in the Great Lakes or other inland waters, especially inland lakes because long-term fluctuations of lake levels and major impacts of ice on the shorelines of these lakes.

We have modified the definition of “living shoreline” in the NWP to state that it can be used to authorize living shorelines in the Great Lakes. Living shorelines are not appropriate for streams, rivers, small lakes, and other inland waters. Vegetative stabilization and bioengineering may be used in inland waters to control erosion, and we have added a Note to this NWP to inform potential users of this NWP of the availability of NWP 13 to authorize those activities. If ice is likely to periodically damage or destroy the living shoreline and cause frequent maintenance and repair activities to be conducted after ice

seasons, then other approaches to shore erosion control might be more appropriate for those sites.

Several commenters said that the NWP should use NOAA's definition of living shoreline. One commenter stated that under the certain conditions living shorelines can be used in higher energy shorelines. Another commenter said that properly engineered living shorelines can be used in any environment. One commenter recommending deleting the terms "low-energy" and "mid-energy" from the definition.

As discussed above, we have modified the definition of "living shoreline" to incorporate the site characteristics amenable to living shorelines that are identified in the 2015 NOAA-USACE SAGE publication that describes nature-based measures for shoreline protection. For the definition used for this NWP, we have used some concepts from NOAA's 2015 guidance on considerations for the use of living shorelines. We have utilized NOAA's definition with respect to a living shoreline being comprised mostly of native material, and incorporating living materials such as marsh plants with or without hard structures such as oyster reefs or stone sills.

We have deleted the following sentence from the first paragraph of the proposed NWP B: "'Living shoreline' is a broad term that encompasses a range of shoreline stabilization techniques along estuarine coasts, bays, sheltered coastlines, and tributaries." This sentence conveys an expansive view of living shorelines and where they are appropriate for use, and could lead to landowners and other entities considering the use of living shorelines on sites where they will not be appropriate or effective and where other approaches to erosion control should be used instead. We do not agree that living shorelines can be used in high energy coastlines. For those sites, substantial amounts of hard structures would be needed to protect the shoreline, and it is doubtful that there would be much of a sustainable living component in that higher energy erosive forces (Pilkey et al. 2012). We are not deleting the term "low- to mid-energy" from the definition because it is a critical component of the definition and it helps prospective permittees better understand where living shorelines are appropriate and feasible.

One commenter asked whether an oyster reef, by itself, could serve as the biological element of a living shoreline. This commenter said the text of this NWP should clarify that "reef structures" refers to oyster reefs. One commenter stated that this NWP should authorize restoration of sandy beaches in front of existing bulkheads.

An oyster reef can provide the biological element of a living shoreline. We have modified the first paragraph of this NWP to state that the reef structures may be inhabited by oysters or mussels. We have also modified paragraph (e) to refer to oyster or mussel reef structures. Sandy beaches restored in front of existing bulkheads may not be sustainable because the wave energy reflected from the bulkhead may erode the sand.

Many commenters said that living shorelines are not appropriate for man-made hydropower reservoirs where water levels are determined by the operator of the reservoir. Many commenters stated that living shorelines are not appropriate for shores subject to waves from boats, wind, and storms and that bulkheads and riprap are the appropriate erosion control

measures for these types of sites. Several commenters opined that living shorelines are impractical for any waterbody that does not have a "no wake" restriction. Several commenters requested clarification on which other lakes and inland waters this NWP could be used. One commenter said this NWP should not authorize activities in inland freshwater lakes or rivers other than the Great Lakes and that NWPs 13 and 27 should be modified to allow for natural shoreline stabilization in inland waters.

We have modified the definition of "living shoreline" to make it clear that living shorelines are limited to coastal waters, including the Great Lakes. This NWP cannot be used to authorize erosion control activities in other lakes or inland waters, including hydropower reservoirs. In coastal waters, living shorelines may be successfully used for shorelines exposed to short fetches and subject to low- to mid-energy waves, including waves generated by moving vessels, wind, and storms. Landowners may seek advice from contractors and consultants to determine which shore erosion control approaches would be most appropriate and effective for their waterfront properties. Living shorelines can be effective for coastal shorelines subject to low to moderate boat wakes. We do not believe further clarification is necessary regarding which types of lakes living shorelines can be used because we are limiting this NWP to the Great Lakes and other coastal waters. We have added a Note to this NWP to notify prospective permittees of the availability of NWP 13 to authorize bank stabilization activities, including vegetative stabilization and bioengineering, in waters that are not coastal waters. Nationwide permit 27 only authorizes aquatic habitat restoration, enhancement, and establishment activities and does not authorize bank stabilization activities per se. Please see the preamble discussion of the modifications we made to NWP 27 to help ensure that it only authorizes aquatic habitat restoration, enhancement, and establishment activities.

One commenter requested justification of the following sentence, which appeared in the preamble of the proposed rule (81 FR 35206): "Living shorelines maintain the continuity of natural land-water interface and provide ecological benefits which hard bank stabilization structures do not, such as improved water quality, resilience to storms, and habitat for fish and wildlife." This commenter stated that the statement should be removed or modified to improve its accuracy.

There is a growing number of studies and other documents that explain the features of living shorelines and the ecological services or benefits they can provide. Living shorelines, such as marsh-sill features, are nature-based measures to control shore erosion that provide some degree of ecological functions and services through fringe wetlands or shellfish reefs that are integral components of those shore protection measures (NOAA-USACE 2015, Bilkovic and Mitchell 2013, Gittman et al. 2016). A bulkhead or seawall results in an abrupt barrier between aquatic and terrestrial environments (Dugan et al. 2011, Peterson and Lowe 2009). Both hard shore protection structures and living shorelines provide protection against storms and offer varying degrees of resilience, and sills and breakwaters and protect shorelines while continuing to allow fish and wildlife to access intertidal areas. Bulkheads, revetments, and seawalls do little to improve water quality, except to reduce sediment loads to waterbodies. Constructed fringe marshes along estuarine shorelines sequester carbon and nitrogen as those fringe wetlands develop over time (Craft et al. 2003).

One commenter recommended changing the 30-foot limit in paragraph (a) to 70 feet. Another commenter said the 30-foot limit should be increased to 35 feet, or use a 1/2-acre limit instead. A third commenter said that either the 30-foot limit should be eliminated or measured from the mean low water shoreline. This commenter recommended using the mean low water shoreline in tidal waters because using the mean high tide line would often require oyster reef components of living shorelines to be installed in intertidal waters rather than subtidal waters. One commenter said the proposed 30-foot limit is appropriate for the Great Lakes. One commenter said that the proposed 30-foot limit should be measured from the highest astronomical tide determined by the current National Tidal Datum Epoch. One commenter suggested replacing the 30-foot limit with a provision that limits the placement of structures and fills into waters less than 3 feet deep at mean low water in tidal waters or the ordinary high water elevation in non-tidal waters. Another commenter recommended authorizing living shorelines in regions with tidal ranges between 4 and 8 feet. The 4-foot tidal range would allow encroachment to 45 feet from the mean high water line and the 8-foot tidal range would allow encroachment up to 85 feet from the mean high water line.

We have changed paragraph (a) to measure the 30-foot encroachment from the mean low water line instead of the mean high water line in tidal waters. Since tidal range is not an issue in the Great Lakes, we are retaining the ordinary high water mark as the shoreline from which the 30-foot limit would be applied. This change should reduce the number of waivers needed by project proponents to construct oyster or mussel reef structures in subtidal waters. Using the highest astronomical tide to measure the 30-foot limit would result in nearly every living shoreline requiring a written waiver of that limit from the district engineer. We believe that using a linear foot limit for encroachments into the waterbody will be more effective at ensuring that these activities result in no more than minimal adverse environmental effects. For a narrow waterfront property an acreage limit could allow substantial encroachment into the waterbody. Using tidal ranges or water depths to limit encroachments of structures and fills into a waterbody would not be an effective approach for ensuring no more than minimal adverse environmental effects because substantial areas of the waterbody could be filled if it has shallow water depths that extend over a substantial distance.

One commenter said the 30-foot limit for this NWP should be changed to require fills to extend no more than 5 feet waterward from the edge of natural wetlands or to the mid-tide depth contour, whichever is deeper. This commenter also recommended that along shores where no wetlands exist, the landward edge of the sill should not extend greater than 30 feet waterward of the mean high water mark of tidal waterbodies or the ordinary high water mark of n non-tidal waterbodies. One commenter stated that grading steeper banks up to 30 feet into the water in an attempt to establish vegetation is likely to have the effect of altering the natural shoreline and extending the uplands. One commenter asked whether this NWP authorizes fills, especially sand fills, landward of sills, breakwaters, or other fill structures.

Changing the 30-foot limit to a 5-foot limit measured from the edge of existing wetlands would not be practical because there might not be vegetated wetlands along the existing shore, or the wetland vegetation might be sparse and the shore would need to be filled with sand and graded to construct a marsh fringe. The 30-foot limit, as measured from mean low water in tidal waters or the ordinary high water mark in non-tidal waters, is a simpler

approach than trying to establish different limits based on the presence or absence of an existing marsh. As stated in the definition of "living shoreline" provided in the final NWP, living shorelines are constructed along shores with gentle slopes. Living shorelines may be less desirable to landowners with waterfront property that has steep slopes or bluffs if substantial grading of nearshore lands is necessary to install a living shoreline. We have modified paragraph (a) to include sand fills along with sills, breakwaters, or reefs, to make it clear that this NWP authorizes sand fills landward of sills, breakwaters, or reefs. Such fills may be necessary to achieve the proper shore elevations for the establishment of a wetland fringe, either through plantings or natural recruitment.

One commenter said that the 30 foot and 500 linear foot limits are too prescriptive, given the variability of shorelines across the United States. This commenter said that these limits should be determined through the regional conditioning process.

We are allowing the 30-foot and 500 linear foot limits to be waived by the district engineer on a case-by-case basis, after reviewing the PCN and coordinating that PCN with the resource agencies. For a waiver to occur, the district engineer has to issue a written determination with a finding that the proposed activity will result in no more than minimal individual and cumulative adverse environmental effects. Division engineers can reduce these 30-foot and 500 linear foot limits through the regional conditioning process. If these limits and the ability to waive these limits make the use and administration of this NWP challenging in a particular geographic region, the district engineer can issue a regional general permit with different limits and procedures than this NWP and its general conditions.

One commenter recommended removing the 500 linear foot limit to encourage landowners and community groups to collectively implement living shorelines in a more cost effective manner. One commenter stated that activities in the Great Lakes that are over 500 feet long should require individual permits. One commenter stated that there should be no length limit on shoreline projects as long as those activities comply with state Coastal Zone Management Act (CZMA) policies.

The 500 linear foot limit does not preclude groups of adjoining landowners from working together to construct living shorelines at the same time, and working out arrangements with contractors to lower costs. For a proposed living shoreline in the Great Lakes that exceeds 500 feet in length, the district engineer will review the PCN and coordinate that PCN with the resource agencies. If the district engineer makes a written determination that the proposed living shoreline will result in no more than minimal individual and cumulative adverse environmental effects, he or she will issue an NWP verification with or without additional conditions. The criteria under which states can issue CZMA consistency concurrences may be different from the "no more than minimal adverse environmental effects" requirement for NWPs and other general permits. States can impose conditions on these activities through their CZMA consistency determinations. To be authorized by this NWP, these activities require either CZMA consistency concurrences or presumptions of concurrence (see general condition 26, coastal zone management).

One commenter stated that the length limit should be defined as the total shoreline length of

an activity minus any breaks in the treated shoreline. In other words, if the total length, minus the length of breaks, is greater than 500 feet, then a waiver would be required. One commenter said there should be no linear foot limits for this NWP. Several commenters asked how the length of a proposed activity would be calculated. One commenter suggested that as technology improves with the use of living shorelines, the 500 linear foot limit should be increased.

The 500 linear foot limit applies to the entire length of the treated shoreline. The treated shoreline is the footprint of the structures and fills for the living shoreline. If there are segments of the shore where no living shoreline will be constructed and those shore segments will be left in their current condition, then those segments are not counted towards the 500 linear foot limit. The 500 linear foot limit is necessary to ensure that these activities result in no more than minimal individual and cumulative adverse environmental effects. The waiver provision for this limit adds flexibility to the NWP, to allow district engineers to authorize activities that exceed the 500 linear foot limit without going through the individual permit process. To determine whether the 500 linear foot limit is exceeded, the length of treated shoreline for a single and complete project would be added. The 500 linear foot limit will be reevaluated during future rulemakings to reissue this NWP.

Several commenters recommended adding terms to this NWP to limit the use of oysters, mussels, and vegetation in living shoreline projects to native species. One commenter said that the NWP should allow natural processes to vegetate the living shoreline, instead of requiring vegetation to be planted. One commenter said that this NWP should authorize the use of mud for substrate to establish vegetation. Many commenters stated that this NWP should specify a minimum amount of living material to be required to meet the definition of living shoreline. One commenter asked for a definition of "native material."

We have revised paragraph (d) of this NWP to state that native plants appropriate for site conditions, including salinity, must be used for living shorelines that have tidal or lacustrine fringe wetlands, if the site is planted by the permittee. Natural revegetation is an effective approach to establishing or re-establishing coastal fringe wetlands, as long as the appropriate sediment elevations are provided for the development of the fringe wetland (Mitsch and Gosselink 2015, Chapter 18). In different areas of the country, various oyster and mussel species have been introduced into waterbodies and provide important ecosystem functions and services. If those non-native molluscan species are already the waterbody, there is not likely to be a substantive benefit to prohibiting their use in reefs for living shorelines. Mud is not an appropriate substrate for living shorelines, because it will be rapidly transported by tides, waves, and currents. For constructed marshes in estuaries, coarse grain sands are often used to reduce the likelihood of erosion of the substrate used for marsh plantings. The term "native material" generally applies to the plant materials that may be used for living shorelines. It may also refer to other organic materials such as oyster shell, coir logs, or wood that may be used for the construction and maintenance of living shorelines (Bilkovic et al. 2016).

One commenter said that the NWP should allow the use of beneficial, non-native structural material as long as that material does not pose a risk to wildlife. One commenter stated that if fill material is used the fill material must meet water quality standards and support the

target vegetation. One commenter stated that sills can be constructed of native material found in a particular part of the country or use other local native materials that may have higher biological value than traditional slab concrete. This commenter also said that placement of clean, soft, dredged sediment can be beneficially reused for living shorelines and placed in coastal areas that have subsided.

The use of non-native structural materials may be necessary for some living shorelines. General condition 6 requires that suitable materials be used for NWP activities. Sills are usually constructed with stone, rather than concrete, slabs. If dredged material is suitable for the construction or maintenance of living shorelines then that material may be used.

One commenter stated that this NWP should require planting plans that show that no invasive species will be planted. One commenter said that this NWP should allow natural recruitment to establish the wetland fringe, instead of requiring the permittee to install plants for the wetland fringe. One commenter suggested adding a condition to require that all habitats altered or created by a living shoreline be free from non-native invasive plants for a minimum of 5 years. One commenter said this NWP should have a condition prohibiting the introduction of non-native species.

Paragraph (d) requires the use of native plants appropriate for current site conditions, including salinity, to be used for living shorelines that will have a wetland fringe, if the permittee wants to install plants to facilitate the development of the wetland fringe. As discussed above, the permittee may also allow natural recruitment to vegetate the wetland fringe for the living shoreline. A condition requiring permittees, over a five-year period, to remove any non-native plants that colonize a living shoreline is not reasonably enforceable, so adding such a condition would be contrary to the Corps' policy for permit conditions at 33 CFR 325.4(a). There have been a number of non-native species introduced to coastal waters over time. Those non-native plants and animals have naturalized and are as likely to occupy living shorelines as they have established themselves in a variety of coastal habitats.

Several commenters stated that breakwaters and groins should not be authorized by this NWP. One commenter requested clarification of what constitutes an artificial reef. One commenter said that this NWP should include a design standard for sills. This commenter expressed concern that not having a design standard would result in hardening of the shoreline in a manner inconsistent with the intent of the proposed NWP.

Breakwaters and groins may be a necessary component of living shorelines in coastal environments subject to higher energy waves, boat wakes, and currents. For the purposes of this NWP, a reef structure may consist of oyster or mussel bags, or other fill structures occupied by oysters or mussels. We do not use the term artificial reef, to avoid confusion with artificial reefs constructed for other purposes under 33 CFR 322.5(b). There are a variety of approaches for constructing living shorelines, so it would not be appropriate to establish a national design standard in an NWP that can be used in coastal waters across the country.

One commenter said that many living shorelines are armored shorelines given a different name. This commenter stated that living shorelines have substantial adverse effects on

estuarine beaches by altering their habitat characteristics and decreasing their ability to support estuarine communities. This commenter recommended requiring minimal use of larger hard, engineered structures, to prevent unneeded and damaging hard stabilization of these shorelines.

We have added a new paragraph (f) to this NWP to require sills, breakwaters, and other structures that are needed to protect the living shoreline's fringe wetlands to be the minimum size necessary to protect those wetlands. New paragraph (f) follows the recommendation in Bilkovic et al. (2016) which states that engineered structures should only be used when they are needed to support the wetland fringe and beach habitat of the living shoreline. Engineered structures such as sills and breakwaters should not be oversized relative to the living components (Bilkovic et al. 2016, Pilkey et al. 2012). Paragraph (a) of general condition 23, mitigation, also requires NWP activities, including the activities authorized by this NWP, to be designed and constructed to avoid and minimize permanent and temporary adverse effects to the maximum extent practicable on the project site.

One commenter remarked that if the proposed activity would compromise the flow of water, it should require an individual permit. One commenter stated that proposed paragraph (f) should require that any temporary impacts to living shorelines resulting from seawall repair or replacement should be exempt from mitigation requirements, as long as the area is restored after that seawall is repaired or replaced.

Living shorelines, especially living shorelines with sills or breakwaters, will have some effects on water flows because they are constructed to decrease the energy of incoming waves and other erosive water flows. Paragraph (f) of the proposed NWP has been redesignated as paragraph (g). This NWP requires that living shorelines be designed, constructed, and maintained so that they only have minimal adverse effects on water flows between the waterbody and the shore. Repair activities do not generally require compensatory mitigation. If a bulkhead or seawall is located landward of a living shoreline, and repair activities will have temporary impacts on the living shoreline, then the living shoreline should be repaired as well.

Several commenters said that paragraph (g) of the proposed NWP should be removed. One commenter stated that living shorelines should not be authorized in special aquatic sites.

We have removed the requirement to obtain a waiver for discharges of dredged or fill material into special aquatic sites. All activities authorized by this NWP require PCNs. Pre-construction notifications for this NWP require delineations of special aquatic sites (see the "Notification" paragraph of this NWP), as well as a delineation of other waters and wetlands on the project site (see paragraph (b)(4) of general condition 32). The construction and maintenance of living shorelines in special aquatic sites can be authorized by this NWP, as long as the permanent and temporary impacts to those special aquatic sites are minimized to the maximum extent practicable, and the district engineer determines that the adverse environmental effects are no more than minimal.

One commenter suggested adding language to the NWP to clarify that the maintenance of structures cannot increase the size of those structures beyond what was originally

authorized. One commenter asked for clarification of the duration of this NWP and how that duration applies to long-term maintenance and repair activities. One commenter said paragraph (h) in the proposed NWP should be eliminated.

General condition 14 requires activities authorized by NWP to be properly maintained. The requirement for proper maintenance is emphasized by paragraph (h) of this NWP, because living shorelines require periodic maintenance to continue to serve as living shorelines. After storm events, it may be necessary to repair stone sills, breakwaters, reef structures, sand fills for fringe wetlands, and other components of the living shoreline. We have included maintenance activities in this NWP so that any required maintenance can be conducted under the authorization provided by this NWP. The NWP authorization applies for the length of time the authorized structures and fills are in place. If the landowner or other responsible party no longer wants to maintain the living shoreline, the structures and fills should be removed and the affected area restored.

Several commenters stated that beach nourishment to control erosion should be authorized by this NWP. We have not included beach nourishment in this NWP because they do not have a living component such as fringe wetland vegetation or oysters or mussels and are not considered living shorelines. When using the term "beach nourishment," we are referring to larger scale beach fill projects, which usually occur on open coasts. This NWP does not authorize those beach restoration or replenishment activities because those types of shore protection approaches do not include a living component as required by the definition of "living shoreline." For a living shoreline, there may be a portion of the living shoreline that consists of unvegetated sandy substrate (e.g., a micro-beach or pocket-beach within or next to the fringe wetland). In this NWP we do not specify a minimum percent cover for vegetation, if the living shoreline authorized through an NWP 54 verification is designed to have a wetland fringe. In addition, we recognize that some movement of sand fill may be necessary to maintain the living shoreline. We have also revised paragraph (h) to make it clear that for maintenance activities the permittee has the option of planting vegetation or allowing natural recruitment of vegetation.

Many commenters said that the PCN requirements should be changed to provide a more streamlined authorization process. Many commenters supported the proposed PCN thresholds. Several commenter stated that PCNs should not be required for activities authorized by this NWP. Several commenters said that the PCN thresholds should be changed to make them equivalent to the PCN thresholds for NWP 13. Several commenters stated that all activities authorized by this NWP should require PCNs because living shorelines result in adverse environmental effects that need to be evaluated on a case-by-case basis to ensure that they are no more than minimal, individually and cumulatively. One commenter supported the proposal to not require PCNs for maintenance activities, but stated that if native corals or other organisms settle on the structure to be repaired, then a PCN should be required and the relocation of corals should be required.

We are requiring PCNs for all activities authorized by this NWP because living shorelines usually require substantial amounts of fill material, and the structures and work may extend 30 feet into the waterbody, with potential impacts to navigation and public resources in submerged lands. Living shorelines often convert subtidal habitats to intertidal habitats, so

there are ecological tradeoffs (e.g., Bilkovic and Mitchell 2013) that need to be considered by district engineers when making their decisions on whether to issue NWP verifications. As stated elsewhere in this final rule, NWP 13 activities can often be constructed with minor amounts of fills in waters of the United States, whereas activities authorized by this new NWP typically require larger amounts of fill to construct fringe wetlands (Bilkovic and Mitchell 2013), protective structures such as sills and breakwaters, and oyster or mussel reefs. We have retained the provision that does not require PCNs for maintenance activities. If the proposed maintenance activity might affect Endangered Species Act (ESA) listed species or designated critical habitat, including ESA-listed coral species, and the prospective permittee is a non-federal permittee, then a PCN is required under general condition 18, endangered species.

Several commenters suggested that the PCN require information on the types of materials to be used for the proposed activity and to specify the height and slope of the proposed activity. One commenter said that the PCN should include information on how the methods and timing of construction may affect threatened or endangered species. One commenter said that the PCN should include a detailed biological assessment of the habitat that is proposed to be altered by the proposed living shoreline. One commenter stated that the PCN should include an alternatives analysis and explain why installation of a living shoreline is needed to control erosion.

The PCN must include the information required in paragraph (b)(4) of general condition 32. The PCN must include a description of the proposed living shoreline. We also recommend that the PCN include sketches or plans of the proposed NWP activity. If, during the review of the PCN, the district engineer determines that the proposed activity may affect ESA-listed species or designated critical habitat, then he or she will conduct ESA section 7 consultation. The formal or informal ESA section 7 consultation may result in permit conditions that impose time-of-year restrictions and other conditions to protect listed species and critical habitat. Those consultations may also result in conditions that affect the construction methods to avoid or minimize impacts to listed species or critical habitat. We do not believe a detailed biological assessment of the potentially impacted coastal habitat is required. If ESA section 7 consultation is required for the proposed activity, then a biological assessment or biological evaluation will be prepared for that formal section 7 consultation. If informal section 7 consultation is conducted and a written concurrence is issued by the U.S. Fish and Wildlife Service and/or National Marine Fisheries Service, the district engineer will add applicable conditions to the NWP authorization that were necessary to get the written concurrence for the informal consultation request. Activities authorized by NWPs do not require an alternatives analysis (see 40 CFR 230.7(b)(1)). However, paragraph (a) of general condition 23, mitigation, requires permittees to avoid and minimize adverse effects to waters of the United States to the maximum extent practicable on the project site.

Many commenters expressed support for the proposed waiver provisions and many other commenters stated their opposition to the proposed waiver provisions. One commenter said that waivers not be issued for any of these activities. This commenter stated that if waivers are included, they should be capped at 50 feet for structures or fills extending into the water from the mean high tide line or ordinary high water mark. This commenter also

recommended capping the length along the shore to no more than 750 linear feet. Proposed activities exceeding these thresholds would require individual permits. This commenter also said there should be no waivers for discharges in special aquatic sites. One commenter stated that waiver requests should be coordinated with other natural resource agencies prior to issuing those waivers.

We have retained the waiver provisions for the 30-foot limit for structures and fills extending into the waterbody, and for the 500-foot limit. The waivers provide the district engineer with the flexibility to authorize a living shoreline activity by NWP if he or she determines in writing, after coordinating the PCN with the resource agencies, that the proposed activity will result in no more than minimal individual and cumulative adverse environmental effects. We do not believe that caps on waivers are necessary for the numeric limits in paragraphs (a) and (b) because of the requirement for the district engineer to issue a written waiver determination. A proposed activity that requires a waiver of one or both of these limits is not authorized unless the district engineer issues that written determination and an NWP verification is issued to the permittee. If the district engineer does not issue that written waiver determination, then the waiver is not granted and an individual permit is required. As discussed above, we have removed the provision requiring waivers for discharges in special aquatic sites. Paragraph (d)(2)(iv) of general condition 32 states that requests for waivers for this NWP require agency coordination.

One commenter asked how it would be determined if a living shoreline is appropriate for a particular location. Several commenters suggested rewording the text of this NWP to include shoreline restoration, shoreline softening, and shoreline enhancement projects. One of these commenters said the Corps should collect data on all shoreline stabilization projects to share with applicants examples of successful projects. Two commenters stated that there should be an evaluation period for new living shorelines to determine their effectiveness. One commenter suggested requiring multi-landowner projects that would result in large-scale living shorelines.

The project proponent determines whether to propose a living shoreline to control erosion at the coastal shoreline. The project proponent may hire a consultant or contractor to evaluate options for controlling erosion and determine which approach would satisfy the project proponent's needs. A coastal waterfront property owner may feel safer with a bulkhead, seawall, or revetment (Popkin 2015). The district engineer may offer advice to the project proponent on potential alternatives for controlling erosion at the site (see 33 CFR 320.4(g)(2)). Shoreline restoration, shoreline softening, and shoreline enhancement projects likely mean different things to different people, so we have not changed the text of this NWP to incorporate those terms. For example, shoreline restoration may be an ecological restoration activity authorized by NWP 27 because it returns structure, functions, and dynamics to a shoreline that has been damaged or degraded by human activities. Shoreline softening may mean the removal of a bulkhead, seawall, or revetment and replacing those hard structures with a tidal fringe wetland protected by stone sills. Shoreline enhancement projects may be actions taken to improve ecological functions performed by the shore at a particular site. These activities are likely to serve different purposes and authorization by other NWPs may be appropriate, or those activities may require other forms of DA authorization.

It would be more appropriate for consultants and contractors to share information on successful living shoreline activities with landowners and other entities that are considering using living shorelines to protect their property or infrastructure. As this NWP is used over the next five years, we expect to receive feedback from Corps districts, permittees, contractors, consultants, and other interested parties. That feedback will be considered as we develop the proposed rule for the 2022 NWPs. There is also likely to be evaluations conducted by scientists and other academics on the effectiveness and long-term sustainability of living shorelines. Adjoining landowners can work together to plan, design, and implement living shorelines.

One commenter stated that this NWP should require the use of qualified consultants and contractors. Another commenter suggested that this NWP require that the work to design the proposed living shoreline be done under the supervision of a certified ecological designer. Several commenters stated that Corps districts should work with local designers and agencies to determine the availability of living shoreline contractors in their geographic areas of responsibility. Several commenters said that this NWP should require consultation with local watershed planning entities, water supply entities, or other local government agencies to ensure that proposed NWP activities do not interfere with a local level project or issue. One commenter said that living shorelines should not be built on undeveloped shorelines. One commenter stated that this NWP should require the installation of reflectors or other types of markers at intervals along the living shoreline. One commenter said that the PCN should require a monitoring plan for these activities.

An NWP cannot specify qualifications for consultants and contractors. Project proponents need to do their due diligence in selecting a consultant or contractor. We cannot add terms to this NWP to require the living shoreline to be designed and constructed under the supervision of a certified ecological designer. General condition 7, water supply intakes, states that no NWP activity may occur in the proximity of a public water supply intake, unless it is needed to repair or improve that intake or for adjacent bank stabilization. Authorization of the construction and maintenance of living shorelines by this NWP does not eliminate the need for the permittee to obtain other required federal, state, or local permits, approvals, or authorizations that are required by law. If the shoreline is undeveloped, then there might not be a need for a living shoreline to control erosion. However, if the parcel in question is zoned for development, it may be developed in the near future and the developer or landowner might request NWP authorization for a living shoreline in advance of constructing a house or other structure on that parcel. Paragraph (b) of general condition 1, navigation, requires for authorized activities the installation of any safety lights or signals prescribed by the U.S. Coast Guard. District engineers can add conditions to this NWP to require monitoring of the living shoreline to ensure that it is developing the intended features. However, we do not believe a monitoring plan should be required for all PCNs for these activities.

One commenter suggested adding a provision to this NWP that requires living shorelines to be designed, constructed, and maintained for the specific lifetime of the project. This commenter stated that this NWP should authorize temporary fills for the construction of these activities, similar to the language in NWP 13. One commenter stated that working at low tide should not be a requirement of this NWP. One commenter requested a definition of

the term "shoreline." One commenter stated that this NWP should require the permittee to provide assurances that the structures are sound and that they will not pose hazards to navigation.

Paragraph (h) of this NWP requires the authorized activity to be properly maintained. We have modified this paragraph as follows: "The living shoreline must be properly maintained, which may require periodic repair of sills, breakwaters, and reefs, or replacing sand fills and replanting vegetation after severe storms or erosion events. This NWP authorizes those maintenance and repair activities, including any minor deviations necessary to address changing environmental conditions." These changes are intended to authorize repair activities, plus minor deviations needed to response to changing environmental conditions such as an increase in sea level at the site, so that the living shoreline can continue to function as a living shoreline. We have removed the phrase "to the original permitted conditions" that was in the proposed paragraph (h) to recognize the dynamic nature of coastal shorelines and the likely need to adjust living shoreline projects over time as environmental conditions change.

All activities authorized by this NWP require PCNs, so using NWP 33 to authorize temporary structures or fills that are not covered by this NWP would not place any additional burdens on prospective permittees. Their PCNs would specify this NWP and NWP 33 as the NWPs for which they are seeking verification from the district engineer. We have not added any terms and conditions that require regulated activities to be conducted at low tide. A shoreline is where a land mass intersects with a waterbody. That intersection may be identified in a number of ways, such as a high tide line, mean high tide line, mean low tide line, or other criteria. Activities authorized by this NWP must comply with general condition 1, navigation. Under that general condition, the Corps may require the permittee to remove the authorized structures or work (see paragraph (c) of that general condition).

One commenter stated that if the proposed living shoreline will impact one resource type and replace it with another resource type, the proposed activity should only qualify for this NWP if the district engineer determines the resource type substitution represents a desirable ecological outcome for the affected system. One commenter said that this NWP should not authorize activities in areas with Endangered Species Act listed species or designated critical habitat. One commenter asked for clarification whether mitigation is required for activities authorized by this NWP. One commenter stated that mitigation should not be required for living shorelines even if those activities result in impacts greater than 1/10-acre, because these activities result in net ecological gains through enhancement. One commenter said that this NWP should not be used by a permittee to provide compensatory mitigation for another activity.

All activities authorized by this NWP require PCNs, to provide district engineers the opportunity to review proposed activities to ensure that they result in no more than minimal individual and cumulative adverse environmental effects. We recognize that these activities will require ecological tradeoffs, as shallow water habitats are filled to construct features that reduce erosion, even though those features will have some living component such as fringe wetlands or oyster or mussel reefs and provide some ecological functions and services. Activities authorized by this NWP must comply with general condition 18,

endangered species. District engineers will review PCNs and determine whether the proposed activities may affect ESA-listed species or designated critical habitat. For those activities that district engineers determine may affect listed species or designated critical habitat, they will conduct formal or informal ESA section 7 consultations.

District engineers may require mitigation for activities authorized by this NWP. If the district engineer reviews a PCN and determines that the proposed activity will result in more than minimal adverse environmental effects, he or she will notify the project proponent and offer the applicant an opportunity to submit a mitigation proposal. If the applicant submits a mitigation proposal that is acceptable to the district engineer, then the district engineer will add conditions to the NWP authorization to require implementation of the mitigation proposal. Living shorelines are likely to provide some ecological functions and services, but they might not produce net gains because of the ecological tradeoffs that occur as a result of the structures and fills for living shorelines causing changes to plant and animal communities in nearshore estuarine waters (e.g., Gittman et al. 2016, Bilkovic and Mitchell 2013, Pilkey et al. 2012). Those changes may be beneficial for some organisms and harmful to other organisms.

The construction and maintenance of a living shoreline could be considered by a district engineer to be a mitigation measure, especially if the project proponent proposes to replace a bulkhead, seawall, or revetment with a living shoreline to provide some additional ecological functions and services at a coastal site. But a living shoreline would not be considered compensatory mitigation because its primary purpose is shore erosion control, not aquatic resource restoration, enhancement, or preservation to offset unavoidable losses of jurisdictional waters or wetlands.

One commenter stated that the text of this NWP should make it clear that it authorizes the construction and maintenance of living shorelines on the west coast. More specifically, this commenter said that this NWP should authorize activities in bodies of water, such as the San Francisco Bay. One commenter remarked that the final NWP rule should recognize that coastal areas have other types of habitats, such as tidal marshes, mudflats, shellfish beds, submerged aquatic vegetation, microalgal and other vegetative beds. Many commenters expressed their support for the use of regional conditions to tailor this NWP to different geographic areas of the country.

This NWP authorizes the construction and maintenance of living shorelines in all coastal waters, not just the east and Gulf coasts. Approaches to designing and constructing living shorelines may vary by geographic region. Division engineers can impose regional conditions on this NWP to account for regional differences in aquatic resource functions and services, and potential regional impacts and benefits of living shorelines. San Francisco Bay is a coastal waterbody, so this NWP can be used to authorize living shorelines in that waterbody. There are many different types of habitats in coastal waters, and evaluation of impacts to the habitat types present at a specific site will be conducted during the PCN review process.

2.0 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.

2.1 No Action Alternative (No Nationwide Permit)

The no action alternative would not achieve one of the goals of the Corps Nationwide Permit Program, which is to reduce the regulatory burden on applicants for activities that result in only minimal individual and cumulative adverse environmental effects. 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 individual permits as a result of the Corps exercising its 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 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 only 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. 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 projects to comply with the NWPs and avoid the delays and costs typically associated with the individual permit process.

In the absence of this NWP, Department of the Army (DA) authorization in the form of another general permit (i.e., regional or programmatic general permits, where available) or individual permits would be required. Corps district offices may develop regional general permits if an NWP is not available, but this is an impractical and inefficient method for activities with no more than minimal individual and cumulative adverse environmental effects that are conducted across the Nation. Not all districts would develop these regional general permits for a variety of reasons. The regulated public, especially those companies

that conduct activities in more than one Corps district, would be adversely affected by the widespread use of regional general permits because of the greater potential for lack of consistency and predictability in the authorization of similar activities with no more than minimal individual and cumulative adverse environmental effects. These companies would incur greater costs in their efforts to comply with different regional general permit requirements between Corps districts. Nevertheless, in some states Corps districts have issued programmatic general permits to take the place of this and other NWPs. However, this approach only works in states with regulatory programs comparable to the Corps regulatory program.

2.2 National Modification Alternatives

Since the Corps Nationwide Permit program began in 1977, the Corps has continuously strived to develop NWPs that only authorize activities that result only in 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. This NWP was developed to authorize the construction of building pads and foundations for commercial and institutional developments, as well as their attendant features, that have only minimal individual and cumulative adverse environmental effects. The Corps has considered suggested changes to the terms and conditions of this NWP, as well as modifying or adding NWP general conditions, as discussed in the preamble of the Federal Register notice announcing the reissuance of this NWP.

In the June 1, 2016, Federal Register notice, the Corps requested comments on the proposed issuance of this NWP. The Corps proposed to issue this NWP to provide general permit authorization for the construction and maintenance of living shorelines, to reduce land erosion and protect infrastructure located in sheltered coasts.

2.3 Regional Modification Alternatives

An important aspect for the NWPs is the emphasis on regional conditions to address differences in aquatic resource functions, services, and values across the nation. All Corps divisions and districts are expected to add regional conditions to the NWPs to enhance protection of the aquatic environment and address local concerns. Division engineers can also revoke an NWP if the use of that NWP results in more than minimal adverse environmental effects, especially in high value or rare wetlands and other waters. When an NWP is issued or reissued by the Corps, division engineers issue supplemental decision documents that evaluate potential impacts of the NWP at a regional level, and include regional cumulative effects assessments.

Corps divisions and districts also monitor and analyze the cumulative adverse effects of the NWPs, and if warranted, further restrict or prohibit the use of the NWPs to ensure that the NWPs do not authorize activities that result in more than minimal adverse environmental effects. 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 NWPs, as well as substantive public comments, to assess the individual and cumulative adverse environmental effects resulting from regulated activities.

2.4 Case-specific On-site Alternatives

Although the terms and conditions for this NWP have been established at the national level to authorize most activities that have only minimal individual and cumulative adverse environmental effects, division and district engineers have the authority to impose case-specific special conditions on NWP authorizations to ensure that the authorized activities will result in no more than minimal individual and cumulative adverse environmental effects.

General condition 23 requires the permittee to minimize and avoid impacts to waters of the United States to the maximum extent practicable on the project site. Off-site alternatives cannot be considered for activities authorized by NWPs. During the evaluation of a pre-construction notification, the district engineer may determine that additional avoidance and minimization is practicable. The district engineer may also condition the NWP authorization to require compensatory mitigation to offset losses of waters of the United States and ensure that the net adverse environmental effects are no more than minimal. As another example, the NWP authorization can be conditioned to prohibit the permittee from conducting the activity during specific times of the year to protect spawning fish and shellfish. If the proposed activity will result in more than minimal adverse environmental effects, then the district engineer will exercise discretionary authority and require an individual permit. Discretionary authority can be asserted where there are concerns for the aquatic environment, including high value aquatic habitats. The individual permit review process requires a project-specific alternatives analysis, including the consideration of off-site alternatives, and a public interest review.

3.0 Affected Environment

This environmental assessment is national in scope because the 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 terrestrial and aquatic ecosystems in the United States, as they have been directly and indirectly affected by past and present federal, non-federal, and private activities. The past and present activities include activities authorized by the various NWPs issued from 1977 to 2012, activities authorized by other types of Department of the Army (DA) permits, as well as other federal, tribal, state, and private activities that are not regulated by the Corps. Aquatic ecosystems are also influenced by past and present activities in uplands, because

those land use/land cover changes in uplands and other activities in uplands have indirect effects on aquatic ecosystems (e.g., MEA 2005b, Reid 1993). Due to the large geographic scale of the affected environment (i.e., the entire United States), as well as the many past and present human activities that have shaped the affected environment, it is only practical to describe the affected environment in general terms. In addition, it is not possible to describe the environmental conditions for specific sites where the NWPs may be used to authorize eligible activities.

The total land area in the United States is approximately 2,264,000,000 acres, and the total land area in the contiguous United States is approximately 1,894,000,000 acres (Nickerson et al. 2011). Land uses in 48 states of the contiguous United States as of 2007 is provided in Table 3.1 (Nickerson et al. 2011). Of the land area in the entire United States, approximately 60 percent (1,350,000,000 acres) is privately owned (Nickerson et al. 2011). In the contiguous United States, approximately 67 percent of the land is privately owned, 31 percent is held by the United States government, and two percent is owned by state or local governments (Dale et al. 2000). Developed non-federal lands comprise 4.4 percent of the total land area of the contiguous United States (Dale et al. 2000).

Table 3.1. Major land uses in the United States (Nickerson et al. 2011).

Land Use	Acres	Percent of Total
Agriculture	1,161,000,000	51.3
Forest land	544,000,000	24.0
Transportation use	27,000,000	1.2
Recreation and wildlife areas	252,000,000	11.1
National defense areas	23,000,000	1.0
Urban land	61,000,000	2.7
Miscellaneous use	197,000,000	8.7
Total land area	2,264,000,000	100.0

3.1 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 3.2. 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 3.2. 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 and U.S. EPA for the purposes of implementing Section 404 of the Clean Water Act. The Corps-U.S. EPA regulations defines 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(c)(4); 40 CFR 230.3(o)(3)(iv)] 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-U.S. EPA wetland definition requires all three factors to be present under normal circumstances (Tiner 1997b, 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-U.S. EPA wetland definition at 33 CFR 328.3(c)(4).

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 2015) 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 3.3. The 2012 NRI estimates that there are 111,220,800 acres of palustrine and estuarine wetlands on non-Federal land and water areas in the United States (USDA 2015). The 2012 NRI estimates that there are 49,518,700 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 3.3. The 2012 National Resources Inventory acreages for palustrine and estuarine wetlands on non-federal land, by land cover/use category (USDA 2015).

National Resources Inventory Land Cover/Use Category	Area of Palustrine and Estuarine Wetlands (acres)
cropland, pastureland, and Conservation Reserve Program land	17,800,000
forest land	65,800,000
rangeland	8,000,000
other rural land	14,700,000
developed land	1,400,000
water area	3,600,000
Total	111,300,000

The land cover/use categories used by the 2012 NRI are defined below (USDA 2015). 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 those types of 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 (USFWS status and trends studies, National Wetland 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 study does 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 1997a). These errors of omission are due to wetland type and the size of target mapping units (Tiner 1997a). 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 difficulty in identifying a wetland, map scale, the quality and scale of the source

information (e.g., aerial or satellite photos), the environmental conditions when the source information was obtained, the time of year source information was obtained, the mapping equipment, and the skills of the people producing the maps (Tiner 1999). The map scale usually affects the target mapping unit, which is the minimum wetland size that can be consistently mapped (Tiner 1997b). In general, wetland types that are difficult to identify through field investigations are likely to be underrepresented in maps made by remote sensing (Tiner 1999). Wetlands difficult to identify through remote sensing include forested wetlands, small wetlands, narrow wetlands, mowed wetlands, farmed wetlands, wetlands with hydrology at the drier end of the wetland hydrology continuum, and significantly drained wetlands (Tiner 1999). 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 0.1 acre were identified in that effort (Dahl 2011). The National Wetland Inventory identifies wetlands regardless of their jurisdictional status under the Clean Water Act (Tiner 1997b).

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) estimate that there is 99,524 miles of tidal shoreline in the conterminous United States.

3.2 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 3.4 provides U.S. EPA's most recent

national summary of water quality in the Nation's waters and wetlands.

Table 3.4. National summary of water quality data (U.S. EPA 2015).

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	1,046,621 miles	29.6	476,765 miles	7,657 miles	562,198 miles
Lakes, reservoirs and ponds	41,666,049 acres	17,904,395 acres	43.0	5,658,789 acres	145,572 acres	12,100,034 acres
Bays and estuaries	87,791 square miles	33,402 square miles	38.0	7,291 square miles	0 square miles	26,111 square miles
Coastal shoreline	58,618 miles	8,162 miles	13.9	900 miles	0 miles	7,262 miles
Ocean and near coastal waters	54,120 square miles	1,674 square miles	3.1	616 square miles	0 square miles	1,058 square miles
Wetlands	107,700,000 acres	1,112,438 acres	1.0	573,947 acres	0 acres	538,492 acres
Great Lakes shoreline	5,202 miles	4,431 miles	85.2	78 miles	0 miles	4,353 miles
Great Lakes open waters	60,546 square miles	53,332 square miles	88.1	62 square miles	0 square miles	53,270 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 (U.S. EPA 2015), 54 percent of assessed rivers and streams, 68 percent of assessed lakes, reservoirs, and ponds, 78 percent of assessed bays and estuaries, 89 percent of assessed coastal shoreline, 63 percent of assessed ocean and near coastal waters, and 48 percent of assessed wetlands are impaired.

For rivers and streams, 34 causes of impairment were identified, and the top 10 causes were

pathogens, sediment, nutrients, mercury, organic enrichment/oxygen depletion, polychlorinated biphenyls, metals (other than mercury), temperature, habitat alterations, and flow alteration(s). The primary sources of impairment for the assessed rivers and streams were agriculture, unknown sources, atmospheric deposition, urban-related runoff/stormwater, hydromodification, municipal discharges/sewage, natural/wildlife, unspecified point source, habitat alterations not directly related to hydromodification, and resource extraction.

Thirty-one causes of impairment were identified for bays and estuaries. The top 10 causes of impairment for these waters is: mercury, polychlorinated biphenyls, pathogens, organic enrichment/oxygen depletion, dioxins, other causes, fish consumption advisories, metals (other than mercury), noxious aquatic plants, and pesticides. For bays and estuaries, the top 10 sources of impairment were atmospheric deposition, unknown sources, municipal discharges/sewage, other sources, industrial, natural/wildlife, urban-related runoff/stormwater, spills/dumping, unspecified non-point sources, and agriculture.

Coastal shorelines were impaired by 15 identified causes, the top 10 of which were: mercury, pathogens, organic enrichment/oxygen depletion, turbidity, pH/acidity/caustic conditions, nutrients, temperature, oil and grease, algal growth, and causes unknown/impaired biota. The top 10 sources of impairment of coastal shorelines are "unknown," atmospheric deposition, municipal discharges/sewage, urban-related runoff/ stormwater, hydromodification, unspecified non-point sources, agriculture, recreational boating and marinas, industrial, and spills/dumping.

For wetlands, 26 causes of impairment were identified, and the top 10 causes were organic enrichment/oxygen depletion, mercury, pathogens, metals (excluding mercury), toxic inorganics, temperature, sediment, algal growth, flow alterations, and turbidity. The primary sources for wetland impairment were "unknown," agriculture, atmospheric deposition, industrial, municipal discharges/sewage, recreational boating and marinas, resource extraction, natural/wildlife, hydromodification, and unspecified point sources.

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 States review proposed discharges to determine compliance with applicable water quality standards.

Most causes and sources of impairment 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).

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 daily maximum 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).

Most causes and sources of impairment 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. 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 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).

3.3 Aquatic resource functions and services

Functions are the physical, chemical, and biological processes that occur in ecosystems (33 CFR 332.2). 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 the stream channel and riparian area over time, as well as energy management by the stream and riparian area. 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 and their 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 and their riparian areas. Rivers and streams function perform functions to different degrees, depending on watershed condition, the severity of direct and indirect impacts to streams caused by human activities, and their interactions with other environmental components, such as their 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 (2005b) 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.

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 2005b) and the production of populations of wetland plant species that are economically important commodities, such as timber, fiber, and fuel (MEA 2005b). Wetlands can also provide important climate regulation and storm protection services (MEA 2005b).

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 2005b). These ecosystems also maintain populations of economically important fish, wildlife, and plant species, including valuable fisheries (MEA 2005b, NRC 2002). The nutrient cycling and pollutant removal functions help maintain or improve water quality for surface waters (NRC 2002, MEA 2005b). Streams and riparian areas also provide important recreational opportunities. Rivers and streams also provide water for agricultural, industrial, and residential use (MEA 2005b).

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).

This NWP authorizes structures and work in navigable waters and discharges of dredged or fill material into waters of the United States for the construction and maintenance of living shorelines to protect property and infrastructure from erosion.

Activities authorized by this NWP will provide a wide variety of goods and services that are valued by society. Living shorelines will reduce erosion in sheltered coastal environments, to help protect the land from erosion and protect infrastructure from being exposed and damages by erosion. Living shorelines include components that support aquatic organisms, such as marsh vegetation and the animals that living in fringe marshes. Living shorelines may also be comprised of reef structures, which provide habitat for oysters and other shellfish. Living shorelines can be designed and constructed to allow aquatic organisms to access the shore during various stages of their life cycles, as well as for feeding. Those aquatic organisms may include economically important fish and shellfish. Living shorelines also enhance aesthetics of shores in sheltered coasts and provide some recreational opportunities by allowing continued access to the shore and nearshore waters..

4.0 Environmental Consequences

4.1 General Evaluation Criteria

This document contains a general assessment of the foreseeable effects of the individual activities authorized by this NWP and the anticipated cumulative effects of those activities. In the assessment of these individual and cumulative effects, the terms and limits of the NWP, pre-construction notification requirements, and the standard NWP general conditions are considered. The supplemental documentation provided by division engineers will address how regional conditions affect the individual and cumulative effects of the NWP.

The following evaluation comprises the NEPA analysis, the public interest review specified in 33 CFR 320.4(a)(1) and (2), and 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. Since NWPs authorize activities across the nation, projects eligible for NWP authorization may be constructed in a wide variety of environmental settings. Therefore, it is difficult to predict all of the indirect impacts that may be associated with each activity authorized by an NWP. For example, the NWP that authorizes 25 cubic yard discharges of dredged or fill material into waters of the United States may be used to

fulfill a variety of project purposes, and the indirect effects will vary depending on the specific activity and the environmental characteristics of the site in which the activity takes place. 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. Only the reasonably foreseeable direct, indirect, and cumulative effects are included 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 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, Section 7 Endangered Species Act consultation will be required for all activities that may affect endangered or threatened species or critical habitat (see 33 CFR 330.4(f) and NWP general condition 18).

4.2 Impact Analysis

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 construction and maintenance of living shorelines.

Pre-construction notification is required for all 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 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).

When making minimal effects determinations the district engineer will consider the direct and indirect effects caused by the NWP activity. The district engineer will also consider site specific factors, such as the environmental setting in the vicinity of the NWP activity, the type(s) of resource(s) 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. These criteria are listed in the NWPs in Section D, “District Engineer’s Decision.” 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. The district engineer may add

case-specific special conditions to the NWP authorization to address site-specific environmental concerns.

Additional conditions can be placed on proposed activities on a regional or case-by-case basis to ensure that the activities have only minimal individual and cumulative adverse environmental effects. Regional conditioning of this NWP 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, and allow each Corps district to prioritize its workload based on where its efforts will best serve to protect the aquatic environment. Regional conditions can prohibit the use of an NWP in certain waters (e.g., high value waters or specific types of wetlands or waters), lower pre-construction notification thresholds, or require pre-construction notification for some or all NWP activities in certain watersheds or types of 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.

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) decrease the acreage limit for the NWP; 3) add regional conditions to the NWP to ensure that the individual and cumulative adverse environmental effects are no more than minimal; or 4) for those NWP activities that require pre-construction notification, add special conditions to NWP authorizations, such as compensatory mitigation requirements, to ensure that the adverse environmental effects are no more than minimal. NWPs 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 issued by division or district engineers. The related activity must meet the terms and conditions of the specified permit(s). If the discharge 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)]

4.3 Cumulative Effects

4.3.1 General Analysis

The Council on Environmental Quality's (CEQ's) NEPA regulations define cumulative effects as: "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time." [40 CFR 1508.7.] Therefore, the NEPA cumulative effects analysis for an NWP is not limited to activities authorized by the NWP, other NWPs, or other DA permits (individual permits and regional general permits). The NEPA

cumulative effects analysis must also include other Federal and non-Federal activities that affect the Nation's wetlands, streams, and other aquatic resources, as well as other resources (e.g., terrestrial ecosystems, air) that may be directly or indirectly affected by the proposed action and other actions. According to guidance issued by CEQ (1997), a NEPA cumulative effects analysis should focus on specific categories of resources (i.e., resources of concern) identified during the review process as having significant cumulative effects concerns. These cumulative effects analyses also require identification of the disturbances and stressors that cause degradation of those resources, including those caused by actions unrelated to the proposed action. A NEPA cumulative effects analysis does not need to analyze issues that have little relevance to the proposed action or the decision the agency will have to make (CEQ 1997).

The geographic scope of this cumulative effects analysis is the United States and its territories, where the NWP may be used to authorize specific activities that require DA authorization. The temporal scope of the cumulative effects analysis includes past federal, non-federal, and private actions that continue to affect the Nation's wetlands, streams, and other aquatic resources (including activities authorized by previously issued NWPs, regional general permits, and DA individual permits) as well as present and reasonably foreseeable future federal, non-federal, and private actions that are affecting, or will affect, wetlands, streams, and other aquatic resources. The present effects of past federal, non-federal, and private actions on wetlands, streams, and other aquatic resources are included in the affected environment, which is described in section 3.0. The affected environment described in section 3.0 also includes present effects of past actions, including activities authorized by NWPs issued from 1977 to 2012 and constructed by permittees, which are captured in national information on the quantity and quality of wetlands, streams, and other aquatic resources.

In addition to the activities authorized by this NWP, there are many categories of activities that contribute to cumulative effects on wetlands, streams, and other aquatic resources in the United States, and alter the quantity of those resources, the functions they perform, and the ecosystem services they provide. Activities authorized by past NWPs, individual permits, letters of permission, and regional general permits have resulted in direct and indirect impacts to wetlands, streams, and other aquatic resources. Those activities may have legacy effects that have added to the cumulative effects and affected the quantity of those resources and the functions they provide. Discharges of dredged or fill material that do not require DA permits because they are exempt from section 404 permit requirements can also adversely affect the quantity of the Nation's wetlands, streams, and other aquatic resources and the functions and services they provide. Discharges of dredged or fill material that convert wetlands, streams, and other aquatic resources to upland areas result in permanent losses of aquatic resource functions and services. Temporary fills and fills that do not convert waters or wetlands to dry land may cause short-term or partial losses of aquatic resource functions and services.

Humans have long had substantial impacts on ecosystems and the ecological functions and services they provide (Ellis et al. 2010). 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 variability (Steffen et al. 2007). All of the Earth's ecosystems have been affected either directly or indirectly by human activities (Vitousek et al. 1997). Over 75 percent of the ice-free land on Earth has been altered by human occupation and use (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 are affected by multiple anthropogenic stressors (e.g., land use activities that generate pollution that go to coastal waters, marine habitat destruction or modification, and the extraction of resources). The marine waters most highly impacted by human activities are continental shelf and slope areas, which are affected by both land-based and ocean-based 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 causing smaller impacts to ecosystems and higher population densities having 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 (Foley et al. 2005).

Recent changes in climate have had substantial impacts on natural ecosystems and human communities (IPCC 2014). Climate change, both natural and anthropogenic, is a major driving force for changes in ecosystem structure, function, and dynamics (Millar and Brubaker 2006). However, there are other significant drivers of change to aquatic and terrestrial ecosystems. 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 (Staudt et al. 2013, Bodkin 2012, MEA 2005d) and changes in nutrient cycling (Julius et al. 2013).

Cumulative effects to wetlands, streams, and other aquatic resources in the United States are not limited to the effects caused by activities regulated and authorized by the Corps under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act of 1899. Other federal, non-federal, and private activities also contribute to the cumulative effects to wetlands, streams, and other aquatic resources, by changing the quantity of those resources and the functions they provide. 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 2005b). 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 are the result of landscape-level processes (Gosselink and Lee 1989). As discussed in more detail

below, cumulative 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).

Cumulative effects also include environmental effects caused by reasonably foreseeable future actions that may take place after the permitted activity is completed. Such effects may include direct and indirect environmental effects caused by the operation and maintenance of the facility constructed on the discharge of dredged or fill material into waters of the United States or the structures or work in navigable waters of the United States. For NWP 54, this includes activities associated with the continued maintenance of the living shorelines constructed as a result of activities authorized by this NWP. Human use of the shore after the living shoreline is constructed will result in environmental effects that will contribute to cumulative effects, even though those activities are not regulated by the Corps. Waterfront property owners may discharge a variety of pollutants into those waters through point sources. There are also likely to be non-point sources of pollution contributed by those waterfront property owners during the reasonably foreseeable future, as they use lawn chemicals and other household chemicals that are transported to nearby waterbodies during storm events. Point-source discharges would likely require National Pollutant Discharge Elimination System Permits under section 402 of the Clean Water Act, which is administered by U.S. EPA or by states with approved programs. Pollutants may also be discharged through spills and other accidents. Reasonably foreseeable future actions that are regulated by the Corps are considered during the evaluation process.

In a specific watershed, division or district engineers may determine that the cumulative adverse environmental effects of activities authorized by this NWP 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, he or she 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 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 projects which could result in greater adverse impacts to the aquatic environment. The minimization encouraged by the issuance of this NWP, as well as compensatory mitigation that may be required for specific activities authorized by this

NWP, will help reduce cumulative effects to the Nation's wetlands, streams, and other aquatic resources.

Cumulative effects to specific categories of resources (i.e., resources of concern in accordance with CEQ's (1997) guidance) are discussed in more detail below. As discussed above, in addition to activities regulated under section 404 of the Clean Water Act and/or section 10 of the Rivers and Harbors Act of 1899, there are many categories of activities that contribute to cumulative effects to the human environment. The activities authorized by this NWP during the 5-year period it will be in effect will result in no more than minimal incremental contributions to cumulative effects to these resource categories.

4.3.2 Cumulative Effects to Aquatic Ecosystems

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). 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.

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.

There is also little national-level information on the ecological condition of the Nation's wetlands, streams, and other aquatic resources, or the amounts of functions they provide, although reviews have acknowledged that most of these resources are degraded (Zedler and Kercher 2005, Allan 2004) or impaired (U.S. EPA 2015) because of various activities, disturbances, and other stressors. These data deficiencies make it more difficult to characterize the affected environment to assess cumulative effects, and the relative contribution of the activities authorized by this NWP to those cumulative effects.

As discussed in section 3.0 of this document 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.

Many of the activities discussed in this cumulative effects section that affect wetlands,

streams, and other aquatic resources are not subject to regulation under Section 404 of the Clean Water Act or Section 10 of the Rivers and Harbors Act of 1899.

Estimates of the original acreage of wetlands in the United States vary widely because of the use of different definitions and how those estimates were made (Harris and Gosselink 1990). Dahl (1990) estimates that approximately 53 percent of the wetlands in the conterminous United States were lost in the 200-year period covering the 1780s to 1980s. Much of the wetland loss occurred in the mid-19th century as a result of indirect effects of beaver trapping and the removal of river snags, which substantially reduced the amount of land across the country that was inundated because of beaver dams and river obstructions (Harris and Gosselink 1990). 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 (389,600 acres during 2004 to 2009) (Dahl 2011). Inventories of wetlands, streams, and other aquatic resources are incomplete, especially at national or regional scales, because the techniques used for those inventories cannot identify all of those resources, especially small wetlands and streams (e.g., Dahl (2011) for wetlands; Meyer and Wallace (2001) for streams).

As discussed in section 3.0, national scale inventories of wetlands, streams, and other types of aquatic resources underestimate the quantity of those resources, and only general information is available on their ability to perform ecological functions and services. Therefore, it is not appropriate to make decisions concerning the significance of cumulative effects by calculating the relative proportion of the aquatic resources baseline impacted by a particular action, or a series of actions subject to a particular federal program. In addition, such an approach does not take into account the many categories of other activities that have direct and indirect effects on aquatic resources that are regulated under other federal, states, or local programs or are not regulated by any entity. Under the Council on Environmental Quality's NEPA definition at 40 CFR 1508.7, a cumulative effects analysis should instead examine the relative contribution that a proposed action will have on cumulative effects to one or more categories of natural resources (i.e., "the incremental impact of the action" and whether that incremental impact is significant or not significant).

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 changes the pH of the oceans, resulting in ocean acidification (RS and NAS 2014), which adversely affects corals and some other marine organisms.

Compensatory mitigation required by district engineers for specific activities authorized by this NWP will help reduce the contribution of those activities to the cumulative effects on the Nation's wetlands, streams, and other aquatic resources, by providing ecological functions to partially or fully replace some or all of the aquatic resource functions lost as a result of those activities. Compensatory mitigation requirements for the NWPs are described in general condition 23 and compensatory mitigation projects must also comply with the applicable provisions of 33 CFR part 332. District engineers will establish compensatory mitigation requirements on a case-by-case basis, after evaluating 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 authorizations. 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 resource structure and functions. If the compensatory mitigation project is not meeting its objectives, adaptive management will be required. 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)).

The estimated contribution of activities authorized by this NWP to the cumulative effects to wetlands, streams, and other aquatic resources in the United States during the five year period that the NWP would be in effect, in terms of the estimated number of time this NWP would be used until it expires and the projected impacts and compensatory mitigation, is provided in section 7.2.2. It is not practical or feasible to provide quantitative data on the multitude of other contributors to cumulative effects to these resources, including the federal, non-federal, and private activities that are not regulated by the Corps that will also occur during the five year period this NWP is in effect. National-level data on these many categories of activities that are not regulated by the Corps but contribute to cumulative effects are either not collected for the nation or they are not accessible. The activities authorized by this NWP will result in a minor incremental contribution to the cumulative effects to wetlands, streams, and other aquatic resources in the United States because, as discussed in this section, they are one category of many categories of activities that affect those aquatic resources. The causes of cumulative effects discussed in this section include past, present, and reasonably foreseeable future federal, non-federal, and private activities. For the national-scale cumulative effects analysis presented in this section, it is not possible to quantify the relative contributions of all of the various activities that affect the quantity of

wetlands, streams, and other aquatic resources and the functions and services they provide, because such data are not available at the national scale.

As discussed above, there are many categories of activities not regulated by the Corps under section 404 of the Clean Water Act and/or section 10 of the Rivers and Harbors Act of 1899 that contribute to cumulative effects to wetland, streams, and other aquatic resources. During the 5-year period this NWP is in effect, the activities it authorizes will result in only a no more than minimal incremental contribution to cumulative effects to wetlands, streams, and other aquatic ecosystems.

4.3.3 Cumulative Effects to Coastal Areas

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). Coastal waters are also affected by a wide variety of activities. 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 2005d). 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 2005d). Nitrogen pollution to coastal zones change coral reef communities (MEA 2005d). 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).

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 2005d).

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 2005b). The introduction of non-native species may change the

functions and structure of coastal wetlands and other habitats (MEA 2005b). Fishing activities may also modify coastal habitats by changing habitat structure and the biological communities that inhabit those areas (NRC 1994).

As discussed above, there are many categories of activities not regulated by the Corps under section 404 of the Clean Water Act and/or section 10 of the Rivers and Harbors Act of 1899 that contribute to cumulative effects to coastal areas. During the 5-year period this NWP is in effect, the activities it authorizes will result in only a no more than minimal incremental contribution to cumulative effects to coastal areas.

4.3.4 Cumulative Effects to Endangered and Threatened Species

The status of species as threatened or endangered is also due to cumulative effects (NRC 1986, Odum 1982), and activities authorized by Department of the Army permits are a minor contributor to the cumulative effects to endangered and threatened species. Land use and land cover changes are the main cause of the loss of biodiversity (Vitousek et al. 1997). The decline of a species that leads to its status as endangered or threatened is usually caused by multiple factors rather than a single factor (Wilcove et al. 1998, Venter et al. 2006, Czech and Krausman 1997, Richter et al. 1997). It is difficult to determine the relative contribution of each cause of species decline or endangerment (Czech and Krausman 1997). For example, for fish species, the number of factors affecting their status ranged from 1 to 15, with an average of 4.5 threats. Over 40 percent of fish species were endangered or threatened as a result of 5 or more factors, and less than 7 percent of fish species were identified as imperiled because of a single factor. During the past few hundred years, human activities have increased species extinction rates by around 1,000 times the Earth's background extinction rates (MEA 2005c).

The main causes of the decline of species to endangered or threatened status are habitat loss and degradation, introduction of species, overexploitation, disease, and climate change (MEA 2005d). Habitat degradation also includes changes in habitat quality caused by habitat fragmentation and pollution. Habitat fragmentation can occur in rivers, and is characterized by disruption of a river's natural flow regime by dams, inter-basin water transfers, or water withdrawals and affects 90 percent of the world's river water volume (MEA 2005d). Invasive alien species are a major cause of species endangerment in freshwater habitats (MEA 2005d). Losses of biological diversity are directly caused by habitat modifications, including land use changes, alteration of river and stream flows, water withdrawals from rivers, losses of coral reefs, and alteration of the sea bed caused by trawling (MEA 2005c). Other direct causes of losses of biodiversity include pollution, invasive species, species overexploitation, climate change, and disease (MEA 2005c). There are often multiple factors interacting with each other to reduce biodiversity, instead of single factors working alone (MEA 2005c).

Wilcove et al. (1998) evaluated five categories of threats to species in the United States, and conducted further analyses on the types of habitat destruction that caused species to be listed as endangered or threatened under the Endangered Species Act. The five categories of threats were habitat destruction, alien species, overharvest, pollution, and disease. Wilcove

et al. (1998) focused on species under the jurisdiction of the U.S. Fish and Wildlife Service. More than half of the endangered and threatened species under the jurisdiction of the NMFS were listed after this study was published. Wilcove et al. (1998) found information on the threats to 1,880 species, out of a total of 2,490 species that were categorized as imperiled at that time. Habitat destruction and degradation was the most comment threat, a factor for 85 percent of the imperiled species analyzed. The second most common threat was competition with non-native species, or predation by those species. For aquatic animal species, pollution was the second most common cause of endangerment, after habitat loss (Wilcove et al. 1998).

To more closely examine the causes of habitat loss, Wilcove et al. (1998) analyzed U.S. Fish and Wildlife endangered species listing documents and identified 14 categories of habitat loss or degradation: agriculture; livestock grazing; mining and oil and gas extraction; logging; infrastructure development; road construction and maintenance; military activities; outdoor recreation; use of off-road vehicles; water development projects (e.g., water diversions, flood control facilities; drainage projects; aquaculture; navigation); dams, impoundments, and other water barriers; pollutants (e.g., sediment and mining pollutants); residential and commercial developments; and disruption of fire ecology. Many species were subject to more than one cause of endangerment (Wilcove et al. 1998). Agriculture was the leading cause of habitat destruction, affecting 38 percent of endangered species, followed by residential and commercial development (35 percent), water development (30 percent), and infrastructure development (17 percent). Habitat destruction caused by water development affected 91 percent of listed fish species and 99 percent of listed mussel species.

Richter et al. (1997) studied the factors that endanger freshwater animals. The most significant threats to those species are habitat destruction, habitat fragmentation, pollution, and exotic species. Richter et al. (1997) also looked at the stressors that are impeding the recovery of aquatic species at risk of extinction and found that changes in stream bed substrate composition (e.g., siltation), hydrologic alteration, interactions with other species, nutrient inputs, and habitat destruction were the most common factors. The major sources of stressors to aquatic species are agricultural land use, urban land use, energy generation industries (especially hydroelectric power), and exotic species (Richter et al. 1997). Agricultural activity was identified as having significant adverse effects on aquatic species through non-point source pollution (sediment and nutrients), interactions with exotic species, and water impoundments (Richter et al. 1997). Water impoundments cause changes in hydrology, as well as habitat destruction and fragmentation. Urban land use resulted in much less non-point source pollution than agricultural activities (Richter et al. 1997).

Note that in these studies on species threats and endangerment, the categories of human activities are discussed in general terms, and may include activities in uplands as well as activities in jurisdictional and non-jurisdictional waters and wetlands. Climate change will also alter species distributions, and extinction may occur for those species that cannot adjust to the changes in climate (Starzmoski 2013).

As discussed above, there are many categories of activities not regulated by the Corps under

section 404 of the Clean Water Act and/or section 10 of the Rivers and Harbors Act of 1899 that contribute to cumulative effects to endangered and threatened species and their designated critical habitats. During the 5-year period this NWP is in effect, the activities it authorizes will result in only a no more than minimal incremental contribution to cumulative effects to endangered and threatened species and their habitats.

4.4 Climate Change

Climate change represents one of the greatest challenges our country faces with profound and wide-ranging implications for the health and welfare of Americans, economic growth, the environment, and international security. Evidence of the warming of climate system is unequivocal and the emission of greenhouse gases from human activities is the primary driver of these changes (IPCC 2014). Already, the United States is experiencing the impacts of climate change and these impacts will continue to intensify as warming intensifies. It will have far-reaching impacts on natural ecosystems and human communities. These effects include sea level rise, ocean warming, increases in precipitation in some areas and decreases in precipitation in other areas, decreases in sea ice, more extreme weather and climate events including more floods and droughts, increasing land surface temperatures, increasing ocean temperatures, and changes in plant and animal communities (IPCC 2014). Climate change also affects human health in some geographic area by increasing exposure to ground-level ozone and/or particulate matter air pollution (Luber et al. 2014). Climate change also increases the frequency of extreme heat events that threaten public health and increases risk of exposure to vector-borne diseases (Luber et al. 2014). Climate impacts affect the health, economic well-being, and welfare of Americans across the country, and especially children, the elderly, and others who are particularly vulnerable to specific impacts. Climate change can affect ecosystems and species through a number of mechanisms, such as direct effects on species, populations, and ecosystems; compounding the effects of other stressors; and the direct and indirect effects of climate change mitigation or adaptation actions (Staudt et al. 2013). Other stressors include land use and land cover changes, natural resource extraction (including water withdrawals), pollution, species introductions, and removals of species (Staudt et al. 2013, Bodkin 2012, MEA 2005d) and changes in nutrient cycling (Julius et al. 2013).

5.0 Public Interest Review

5.1 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 modify the natural resource characteristics of the project area. Living shorelines will enhance some natural resource characteristics through the establishment or enhancement of fringe wetlands or reef structures, even though structures and fills associated with those living shorelines will alter some nearshore habitats. The construction of living shorelines often involves fills in shallow estuarine waters that provide a substantial amount of primary and secondary production, as well as other ecosystem functions (Bilkovic and Mitchell 2013). Compensatory mitigation, if required for activities authorized by this NWP, will result in the restoration, enhancement, establishment, or preservation of aquatic habitats that will offset losses of conservation values. The adverse effects of activities authorized by this NWP on conservation will be minor.

(b) Economics: The construction and maintenance of living shorelines will have positive impacts on the local economy. During construction, these activities will generate jobs and revenue for local contractors as well as revenue to building supply companies that sell construction and plant materials. Living shorelines can enhance property values by reducing erosion of waterfront property while providing access to the water and aesthetic services.

(c) Aesthetics: Living shorelines will alter the visual character of some waters of the United States, giving them a more naturalistic appearance. The extent and perception of these changes will vary, depending on the size and configuration of the living shoreline, the nature of the surrounding area, and the public uses of the area. Living shorelines authorized by this NWP can also modify other aesthetic characteristics, such as air quality and the amount of noise, during construction and maintenance activities.

(d) General environmental concerns: Activities authorized by this NWP will affect general environmental concerns, such as water, air, noise, and land pollution, but those effects will usually be temporary. The authorized activities will 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 will be minor. 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 avoidance and minimization at the project site. Compensatory mitigation may be required by district engineers to ensure that the net adverse environmental effects are no more than minimal. Specific environmental concerns are addressed in other sections of this document.

(e) Wetlands: Activities authorized by this NWP may result in the loss or alteration of existing wetlands, but will generally increase the amount of fringe wetlands on the project site. Fringe wetlands established or enhanced as a result of living shoreline projects will provide habitat for organisms that utilize intertidal areas. Wetlands may also be converted to other uses and habitat types. For many living shorelines, existing wetlands will need to be filled to establish the proper grades for dissipating wave energy and providing substrate for marsh grass plantings. District engineers may require compensatory mitigation to offset the loss of wetlands and ensure that the adverse environmental effects are no more than

minimal.

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 will 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.

Living shorelines are a type of hybrid infrastructure (a combination of natural and built infrastructure) intended to reduce erosion in coastal areas, and often include the establishment or re-establishment of fringe wetlands (Sutton-Grier et al. 2015). The fringe wetlands used in living shorelines are usually less than 20 meters wide (Bilkovic et al. 2016).

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 by district engineers to ensure that the net adverse environmental effects are no more than minimal. Division engineers can regionally condition this NWP to restrict or prohibit the use of this NWP in high value non-tidal wetlands. District engineers will also exercise discretionary authority to require an individual permit if the wetlands to be filled are high value and the activity will result in more than minimal adverse environmental effects. District engineers can also add case-specific special conditions to the NWP authorization to provide protection to wetlands or require compensatory mitigation to offset losses of wetlands.

(f) Historic properties: General condition 20 states that the NWPs cannot authorize activities that affect historic properties listed, or eligible for listing in, the National Register of Historic Places, until the district engineer has complied with the Corps current procedures for addressing the requirements of Section 106 of the National Historic Preservation Act.

(g) Fish and wildlife values: This NWP authorizes activities in tidal and non-tidal waters of the United States, including estuaries, lakes, wetlands, and rivers, which provide habitat to many species of fish and wildlife. Activities authorized by this NWP may alter the habitat characteristics of waters and wetlands, changing the quantity and quality of fish and wildlife habitat. At some project sites, it may be necessary to remove riparian vegetation to provide sufficient sunlight for marsh grasses planted for living shorelines to survive at sufficient densities to dissipate wave energy. There may be some habitat conversions as nearshore areas are filled for marsh plantings and reef structures (Pilkey et al. 2012). Living shorelines often require the placement of stone for sills, low-profile sand containment structures, or breakwaters, which can provide habitat for certain aquatic organisms. The construction of living shorelines usually requires the filling of intertidal and subtidal areas to establish

proper elevations for marsh plants and the placement of rock structures (e.g., sills) to protect the fringe wetlands (Bilkovic and Mitchell 2013), which alter existing shoreline habitats and affects the fish and wildlife that were using that habitat. Sills that have been in place for at least three years are used for foraging because they become inhabited by organisms that are consumed by fish and crustaceans (Gittman et al. 2016). 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. Open waters provide habitat for fish and other aquatic organisms. Shallow habitats next to coastal shorelines provide a number of important ecological functions (Bilkovic and Mitchell 2013) that are altered by the placement of fill to construct living shorelines. Woody riparian vegetation shades streams, which reduces water temperature fluctuations and provides habitat for fish and other aquatic animals. For fish and crustaceans, sills constructed as part of living shorelines also provide refuge from predators (Gittman et al. 2016). 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 shorelines may be altered by activities authorized by this NWP, which can affect animal populations. However, pre-construction notification is required for all activities authorized by this NWP, which provides the district engineer with an opportunity to review the proposed activity and assess potential impacts on fish and wildlife values and ensure that the authorized activity results in only minimal adverse environmental effects. Compensatory mitigation may be required by district engineers to restore, enhance, establish, and/or preserve aquatic habitats to offset losses of those habitats. Riparian areas next to open and flowing waters may also be required as compensatory mitigation. These methods of compensatory mitigation will provide fish and wildlife habitat values.

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, unless the primary purpose of the activity is to impound water. Compliance with general conditions 3 and 5 will ensure that the authorized activity has only 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 adversely affect essential fish habitat. Consultation may occur on a case-

by-case or programmatic basis. Division and district engineers can impose regional and special conditions to ensure that activities authorized by this NWP will result in only minimal adverse effects on essential fish habitat.

(h) Flood hazards: The fills authorized by this NWP may affect the flood-holding capacity of 100-year floodplains, including surface water flow velocities. Changes in the flood-holding capacity of 100-year floodplains may impact human health, safety, and welfare. To minimize these adverse effects, general condition 10 requires authorized activities to comply with any applicable FEMA-approved state or local floodplain management requirements. Compliance with general condition 9 will also reduce flood hazards. This general condition requires the permittee to maintain, to the maximum extent practicable, the pre-construction course, condition, capacity, and location of open waters, except under certain circumstances. Much of the land area within 100-year floodplains is upland, and outside of the Corps scope of review.

(i) Floodplain values: Activities authorized by this NWP may affect the flood-holding capacity of the floodplain, as well as other floodplain values. The fish and wildlife habitat values of floodplains will be adversely affected by activities authorized by this NWP, by modifying or eliminating areas used for nesting, foraging, resting, and reproduction. The water quality functions of floodplains may also be adversely affected by these activities. Modification of the floodplain may also adversely affect other hydrological processes, such as groundwater recharge. Since each activity authorized by this NWP requires pre-construction notification, district engineers will review the proposed activities to ensure that those activities result in only minimal adverse environmental effects.

Compensatory mitigation may be required for activities authorized by this NWP, which will offset losses of waters of the United States and provide water quality functions and wildlife habitat. General condition 23 requires avoidance and minimization of impacts to waters of the United States to the maximum extent practicable at the project site, which will reduce losses of floodplain values. The mitigation requirements of general condition 23 will help ensure that the adverse effects of these activities on floodplain values are no more than minimal. The requirements of general condition 10 will minimize adverse effects to the flood storage capacity of 100-year floodplains. Compliance with general condition 9 will also ensure that activities in 100-year floodplains will not cause more than minimal adverse effects on flood storage and conveyance.

(j) Land use: In most cases, activities authorized by this NWP will not directly change land use, since landowners usually implement shore erosion control measures after they have developed their waterfront property. Living shorelines will alter the character of the nearshore area, and may require the removal of trees along the shore. Since the primary responsibility for land use decisions is held by state, local, and Tribal governments, the Corps scope of review is limited to significant issues of overriding national importance, such as navigation and water quality (see 33 CFR 320.4(j)(2)).

(k) Navigation: Activities authorized by this NWP will not adversely affect navigation, because these activities must comply with general condition 1. Living shorelines usually

involve the construction of structures in navigable waters, such as sills, low-profile sand containment structures, and breakwaters to dissipate wave energy and prevent fringe wetlands from eroding. Living shorelines may also include reef structures to support oyster growth. Sills, low-profile sand containment structures, breakwaters, and reef structures can affect navigation and shore access from the water, and district engineers will review pre-construction notifications to ensure that the adverse effects to navigation are minimal. This NWP requires pre-construction notification for all activities.

(l) Shore erosion and accretion: The activities authorized by this NWP will have direct effects on shore erosion and accretion processes, since the NWP is intended to reduce shore erosion and allow some accretion, to protect waterfront properties in sheltered coasts. Living shorelines are an approach to shore protection that is intended to provide a variety of ecological functions and services while reducing the adverse effects of erosion (NRC 2007). Living shorelines might be a cost-effective alternative to engineered shore erosion control structures (e.g., bulkheads and seawalls) that also provides ecological and economic benefits while controlling shore erosion (Sutton-Grier et al. 2015).

(m) Recreation: Activities authorized by this NWP may change the recreational uses of the area. Certain recreational activities, such as bird watching, hunting, and fishing will continue to be available in the area. Living shorelines can be designed to enhance waterfront recreational opportunities.

(n) Water supply and conservation: Activities authorized by this NWP will have negligible effects on surface water and groundwater supplies because they are constructed next to open waters, especially estuarine waters that do not provide potable water. Living shorelines can also be constructed in lakes, but those living shorelines will not adversely affect water supplies because the structures and fills are constructed near those larger open water bodies. Division and district engineers can prohibit the use of this NWP in watersheds for public water supplies, if it is in the public interest to do so. General condition 7 prohibits discharges in the vicinity of public water supply intakes.

(o) Water quality: Living shorelines in wetlands and open waters may have adverse effects on water quality, but these erosion control measures will include living components, either marsh grasses or oyster reefs, that help protect or improve water quality. Living shorelines also reduce erosion, which improves water quality by reducing sediment inputs to nearby waters. The loss of riparian vegetation may adversely affect water quality because these plants trap sediments, pollutants, and nutrients and transform chemical compounds. Wetland and riparian vegetation also provides habitat for microorganisms that remove nutrients and pollutants from water. Living shorelines may enhance wetland acreage and marsh plant density in the project area, which will help improve water quality. 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 column. Wetlands and riparian areas also decrease the velocity of tidal and flood waters, removing suspended sediments from the water column and reducing turbidity. Riparian vegetation also serves an important role in the water quality of streams by shading the water from the intense heat of the sun. Compensatory mitigation may be required for activities authorized

by this NWP, to ensure that those activities do not have more than minimal adverse environmental effects, including water quality. Wetlands and riparian areas restored, established, enhanced, or preserved as compensatory mitigation may provide local water quality benefits.

During construction of these developments, small amounts of oil and grease from construction equipment may be discharged into the waterway. Because most of the construction will occur during a relatively short period of time, the frequency and concentration of these discharges are not expected to have more than minimal adverse effects on overall water quality.

This NWP requires a section 401 water quality certification, since it authorizes discharges of dredged or fill material into waters of the United States. Most water quality concerns are addressed by the state or Tribal section 401 agency.

(p) Energy needs: During construction of living shorelines, there will be increases in energy consumption in the area, especially electricity, natural gas, and petroleum products. Increases in energy consumption will be temporary.

(q) Safety: The activities authorized by this NWP will be subject to Federal, state, and local safety laws and regulations. Therefore, this NWP will not adversely affect the safety of the project area.

(r) Food and fiber production: Activities authorized by this NWP will have negligible adverse effects on food and fiber production, because they are limited to shores in sheltered coasts.

(s) Mineral needs: Activities authorized by this NWP may increase demand for aggregates and stone, which are used to construct sills, low-profile sand containment structures, breakwaters, and reef structures. Living shorelines also require sand to establish appropriate grades for fringe wetlands and to dissipate wave energy.

(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. It also complies with 33 CFR 320.4(g)(2), which recognizes a landowner's general right to protect his or her property from erosion. The NWP provides expedited DA authorization for structures and work and discharges of dredged or fill material to construct and maintain living shorelines, provided those activities comply with the terms and conditions of the NWP and result in only minimal adverse environmental effects.

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

5.2.1 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 and

discharges of dredged or fill material into waters of the United States, for the construction and maintenance of living shorelines that have only minimal individual and cumulative adverse environmental effects. These activities satisfy public and private needs for places to protect property and infrastructure from erosion. 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.

5.2.2 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 only minimal individual and cumulative adverse effects on the environment and the overall public interest. District engineers will exercise discretionary authority and require individual permits if the proposed activities 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.

5.2.3 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 living shoreline. Activities authorized by this NWP will have only minimal individual and cumulative adverse environmental effects.

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.

6.0 Endangered Species Act

The Corps' current regulations and procedures for the NWPs result in compliance with Section 7 of the Endangered Species Act (ESA) and ensure that activities authorized by this NWP will not jeopardize the continued existence or any listed threatened and endangered species or result in the destruction or adverse modification of 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. Activities that do not comply with general condition 18 or other applicable general or regional conditions are not authorized by any NWP, and thus fall outside of the NWP Program. Unauthorized activities are 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 the critical habitat of such species." 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 might be affected or is in the vicinity of the project, or if the project is located in designated critical habitat. 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 designated critical habitat might be affected or is in the vicinity of the project, or if the project is located in designated critical habitat. 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 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 ESA Section 7 consultation is conducted during the NWP authorization process without the district engineer exercising discretionary authority, 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 ORM2. During the period of March 19, 2012, to September 30, 2016, Corps districts conducted 1,402 formal consultations and 9,302 informal consultations for NWP activities under ESA section 7. During that time period, the Corps also used regional programmatic consultations for 9,829 NWP verifications to comply with ESA section 7. Therefore, each year NWP activities are covered by an average of more than 4,500 formal, informal, and programmatic ESA section 7 consultations with the FWS and/or NMFS. 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. For activities that require agency coordination during the pre-construction notification process, the USFWS and NMFS will review the proposed activities for potential impacts to threatened and endangered species and their 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 section, especially general condition 18 and the NWP regulations at 33 CFR 330.4(f), the Corps has determined that the activities authorized by this NWP will not jeopardize the continued existence of any listed threatened or endangered species or result in the destruction or adverse modification of designated critical habitat. 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 local procedures or other means, additional safeguards that ensure compliance with the ESA. Through ESA Section 7 formal or informal consultations, or through other coordination with the USFWS and NMFS, the Corps establishes procedures to ensure that the NWP is not likely to jeopardize any threatened and endangered species or result in the destruction or adverse modification of designated critical habitat. Such procedures may result in the development of regional conditions added to the NWP by the division engineer, or in conditions to be added to a specific NWP authorization by the district engineer.

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, the district engineer will add conditions (e.g., minimization measures) to the NWP authorization that are necessary to avoid the likelihood of adverse effects to listed species or designated critical habitat. 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 a condition to the NWP authorization to incorporate the appropriate elements of the incidental take statement of the biological opinion into the NWP authorization, if the biological opinion concludes that the 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 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 such as mitigation, monitoring, and reporting requirements that minimize incidental take. The appropriate elements of the incidental take statement are dependent on those activities in the biological opinion over which the Corps has control and responsibility (i.e., the discharges of dredged or fill material into waters of the United States and/or structures or work in navigable waters and their direct and indirect effects on listed species or critical habitat). The appropriate elements of the incidental take statement are those reasonable and prudent measures that 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 by a binding, enforceable permit condition provides 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.

7.0 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 authorized by this NWP.

7.1 Evaluation Process (40 CFR 230.7(b))

7.1.1 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)).

7.1.2 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).

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 activities that jeopardize the continued existence of any listed threatened or endangered species or result in the destruction or adverse modification of critical habitat. 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 will not authorize the violation of any requirement to protect any marine sanctuary. Refer to section 7.2.3(j)(1) of this document for further information.

7.1.3 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 7.2.3 of this document. Mitigation required by the district engineer will ensure that the adverse environmental effects are no more than minimal.

Evaluation and testing (Subpart G): Because the terms and conditions of the NWP specify the types of discharges 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 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 authorized by this NWP will not cause or contribute to significant degradation of waters of the United States.

7.1.4 Factual determinations (40 CFR 230.11)

The factual determinations required in 40 CFR 230.11 are discussed in section 7.2.3 of this document.

7.1.5 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 are no more than minimal.

7.2 Evaluation Process (40 CFR 230.7(b))

7.2.1 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 4.0, 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 discharges of dredged or fill material into waters of the United States for the construction or maintenance of living shorelines. 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., discharges of dredged or fill material for the construction or maintenance of living shorelines) in a specific category of waters (i.e., waters of the United States). The restrictions imposed by the terms and conditions of this NWP will result in the authorization of activities that have similar impacts on the aquatic environment, namely the replacement of aquatic habitats, such as certain categories of waters and wetlands, with living shorelines that reduce erosion of waterfront property in sheltered coasts.

If a situation arises in which the activity 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.

7.2.2 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 activity 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.

The Corps estimates that this NWP will be used approximately 200 times per year on a national basis, resulting in impacts to approximately 30 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. Because of the types of activities authorized by this NWP, and since that living shorelines provide important ecosystem functions and services in coastal environments (NRC 2007), in general compensatory mitigation will not be required for the activities authorized by this NWP. The demand for these types of activities could increase or decrease over the five-year duration of this NWP.

Based on the estimate in the previous paragraph, approximately 1,000 activities could be authorized over a five year period until this NWP expires, resulting in impacts to approximately 150 acres of waters of the United States, including jurisdictional wetlands.

There might be circumstances in which district engineers require compensatory mitigation for the activities authorized by this NWP, based on the conditions for a particular site. Compensatory mitigation is the restoration (re-establishment or rehabilitation), establishment, 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]

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). 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). 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 has fully or partially offset the lost functions provided by the aquatic resources that are impacted by

permitted activities. 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, sea grasses, 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. Wetland functions develop at different rates in wetland restoration and establishment projects (NRC 2001). 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). 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 and others (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.

Streams 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)). Stream rehabilitation is usually the most effective compensatory mitigation mechanism since restoring a stream to a historic state is not possible because of changes in land use and other activities in a watershed (Roni et al. 2008). 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). Improvements in ecological performance of stream restoration projects is dependent on the restoration method and how outcomes are assessed (Palmer et al. 2014). Non-structural and structural techniques can be used to rehabilitate and enhance streams, and restore riparian areas (NRC 1992). Non-structural practices include removing disturbances to allow recovery of stream and riparian area structure and function, reducing or eliminating activities that have altered stream flows to restore natural flows, preserving or restoring floodplains, and restoring and protecting riparian areas, including fencing those areas to exclude livestock and people (NRC 1992). Structural rehabilitation and enhancement techniques include dam removal, as well as channel, bank, and/or riparian area modifications to improve river and stream habitat (NRC 1992).

The restoration and enhancement of river and stream functions and services can be improved through a variety of techniques and in many cases combinations of these techniques are used (Roni et al. 2013). 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). Road improvements, riparian rehabilitation, reconnecting floodplains to their rivers, and installing in-stream habitat structures have had varying degrees of ecological performance in stream rehabilitation activities (Roni et al. 2008). The ecological performance of these stream rehabilitation activities is strongly dependent on addressing impaired water quality and insufficient water quantity, since those factors usually limit the biological response to stream rehabilitation efforts (Roni et al. 2008). Ecologically successful stream rehabilitation and enhancement activities depend on addressing the factors that most strongly affect stream functions, especially water quality, water flow, and riparian quality, and not focusing solely on rehabilitating or enhancing the physical habitat of streams (Palmer et al. 2010). 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). Stream restoration projects should focus on restoring ecological processes, such as dam removal, watershed best management practices, improving the riparian zone, and reforestation, instead of focusing on the manipulation the structure of the stream channel (Palmer et al. 2014).

For compensatory mitigation projects, restoration is the preferred mechanism (see 33 CFR 332.3(a)(2). In an analysis of 89 ecosystem restoration projects, 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 functions and services similar to historic conditions or reference standard conditions is influenced by human impacts to watersheds and other types of landscapes (e.g., urbanization, agriculture) 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).

As discussed in section 3.0, 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 1 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 activity-specific conditions will 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 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 and is ecological successful. [33 CFR 332.6] 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 activities authorized by this NWP will 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.

7.2.3 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 will alter the substrate of those waters, usually will sand fills to provide the appropriate grade for dissipating wave energy and planting a fringe wetland. The substrate will also be altered by the placement of stone to construct sills, low-profile sand containment structures, and breakwaters to protect the fringe wetland from waves. Living shorelines may also include reef structures that will cover the existing substrate with stone or other materials to provide substrate for oysters or other organisms. The grain size of sand fills used to construct living shorelines may be larger than the sand grain size in natural shorelines (Bilkovic and Mitchell 2013), and may affect colonization of the living shoreline by invertebrates after construction. 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, fill material placed in open waters will temporarily increase water turbidity. Pre-construction notification is required for all activities authorized by this NWP, which will allow district engineers to review each activity and ensure that adverse effects on the aquatic environment are no more than minimal. Particulates will 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 reduce turbidity. In many localities, contractors are required to develop and implement sediment and erosion

control plans to minimize the entry of soil into the aquatic environment. NWP activities cannot create turbidity plumes that smother important spawning areas downstream (see general condition 3).

(c) Water: The construction and maintenance of living shorelines can affect some characteristics of water, such as water clarity, chemical content, dissolved gas concentrations, pH, and temperature, and those effects will occur mostly during construction and maintenance activities. Temporary 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 of dredged or fill material into waters of the United States, which will ensure that the activities do not violate applicable water quality standards. Permittees may be required to implement water quality management measures to ensure that the authorized activities do not result in more than minimal degradation of water quality.

(d) Current patterns and water circulation: Activities authorized by this NWP may adversely affect the movement of water in the aquatic environment. Nearshore currents and water circulation patterns will be altered by the placement of sills, low-profile sand containment structures, and breakwaters, and by the installation of reef structures. All activities authorized by this NWP require pre-construction notification, which will help 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.

(e) Normal water level fluctuations: The activities authorized by this NWP will have minor adverse effects on normal patterns of water level fluctuations due to tides and flooding. Water fluctuations due to tides will be altered by sand fills placed in the intertidal zone to establish grades to dissipate wave energy and provide substrate for fringe wetland plants. Normal water level fluctuations will also be affected by the construction of sills and breakwaters. 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 activities authorized by this NWP are unlikely to adversely affect salinity gradients because living shorelines do not alter the salinity of estuarine waters, nor do they alter the chemical composition of fresh waters. Living shorelines are constructed so that tides and other water movements continue to flow to and from the shore on a regular basis, and not create standing water that might evaporate and increase salt concentrations that might alter local salinity gradients.

(g) Threatened and endangered species: The NWPs do not authorize activities that will jeopardize the continued existence of species listed as endangered or threatened under the Endangered Species Act of 1973, as amended. In addition, the NWPs do not authorize activities that will destroy or adversely modify critical habitat of those 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 section 6.0 of this document.

(h) Fish, crustaceans, molluscs, and other aquatic organisms in the food web. All activities authorized by this NWP require pre-construction notification to the district engineer, which will allow review of each activity in open waters to ensure that adverse effects to fish and other aquatic organisms in the food web are no more than minimal. Fish and other motile animals will avoid the project site during construction. Sessile or slow-moving animals in the path of discharges, structures, and construction equipment will be destroyed. Some aquatic animals may be smothered by the placement of fill material or structures. The placement of fill to construct tidal marsh and sills in subtidal waters adversely affects the abundance, diversity, and biomass of organisms that live in the substrate of those shallow subtidal waters, and changes their community structure (Bilkovic and Mitchell 2013). Motile animals will return to those areas that are temporarily impacted by the activity and restored or allowed to revert back to preconstruction conditions. After the living shoreline is constructed, aquatic animals will use the intertidal and subtidal areas. The terms of this NWP require that living shorelines are designed and constructed so that aquatic organisms can continue to move between the waterbody and the shore. Benthic and sessile animals are expected to recolonize sites temporarily impacted by the activity, after those areas are restored. Sills, low-profile sand containment structures, breakwaters, and reef structures will provide habitat for some species of aquatic organisms, either as substrate for sessile organisms to attached to or in the gaps between stones. The construction of living shorelines consisting of marshes and sills provides more habitat functions than the construction of bulkheads or revetments, but less habitat than existing natural shorelines (Bilkovic and Mitchell 2013).

Division and district engineers can place conditions on this NWP to prohibit discharges 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 activities that result in the physical destruction of important spawning areas. General condition 5 prohibits activities 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: Activities authorized by this NWP will result in minor 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 activities that jeopardize the continued existence of Federally-listed endangered and threatened species or result in the destruction or adverse modification of critical habitat. 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 activities authorized by this NWP will have only minimal adverse effects on waters of the United States within sanctuaries or refuges designated by Federal or state laws or local ordinances. 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 activities authorized by this NWP will have only minimal adverse effects on wetlands. There may be existing wetlands that are filled to construct the living shoreline, if the shore needs to be filled with sand to establish the appropriate grade for dissipating wave energy and providing more suitable grades and elevations for planting wetland vegetation to establish a more vigorous wetland fringe that will also dissipate wave energy. The initial loss of wetland will be offset by the wetland established for the living shoreline. District engineers will review pre-construction notifications to ensure that the adverse effects on wetlands are no more than minimal. Division engineers can regionally condition this NWP to restrict or prohibit its use in certain high value wetlands. See paragraph (e) of section 5.1 for a more detailed discussion of impacts to wetlands.

(3) Mud flats: The activities authorized by this NWP will have only minimal adverse effects on mud flats. In some cases, living shorelines may be constructed in mud flats, replacing the mud substrate with sand substrate to support wetland vegetation to form a fringe wetland. All activities authorized by this NWP require pre-construction notification, which provides district engineers with the opportunity to evaluate proposed impacts to mud flats, and determine whether those impacts are no more than minimal.

(4) Vegetated shallows: The activities authorized by this NWP will have only minimal adverse effects on vegetated shallows in tidal waters. In some cases, the construction of living shorelines involves discharges of dredged or fill material or structures or work in subtidal waters that are inhabited by submerged aquatic vegetation. There may be some loss of vegetated shallows, and those losses may be determined to be only minimal when considering the ecological functions and services being provided by the overall living shoreline. For example, if the construction of a living shoreline results in small losses of vegetated shallows, and the living shoreline will result in substantial increases in the area of fringe wetland and/or reef habitat, the district engineer may determine that the net adverse effects on the aquatic environment are no more than minimal. The district engineer's evaluation of the pre-construction notification that is required for every activity authorized by this NWP provides an opportunity to make those site-specific determinations. Where there are regional concerns for vegetated shallows, division engineers can regionally condition this NWP to restrict or prohibit its use in vegetated shallows. If the vegetated shallows are high value and the proposed activity 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 activities authorized by this NWP will have no more than minimal adverse effects on coral reefs, because pre-construction notification is required for all activities authorized by this NWP and district engineers will evaluate all proposed activities. If there are coral reefs in the vicinity of a proposed living shoreline, the district engineer will determine whether the adverse effects on coral reefs are no more than minimal. The district engineer may add conditions to the NWP authorization to protect coral reefs, or exercise discretionary authority to require an individual permit if the proposed impacts to coral reefs are more than minimal. Division engineers may add regional conditions to restrict or prohibit the use of this NWP in or near coral reefs.

(6) Riffle and pool complexes: The activities authorized by this NWP will not adversely affect riffle and pool complexes, because living shorelines are constructed in sheltered coasts. These sheltered coasts are located in estuarine waters and in lakes, and not in rivers and streams.

(k) Municipal and private water supplies: See paragraph (n) of section 5.1 for a discussion of potential impacts to water supplies.

(l) Recreational and commercial fisheries, including essential fish habitat: The activities 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. These impacts will usually be minor, because living shorelines provide habitat that can be used by certain species. There may be some habitat alteration, including the alteration of essential fish habitat, that adversely affects some fish species that are important for recreational and commercial fisheries. Division and district engineers can condition this NWP to prohibit activities during important life cycle stages, such as spawning or development periods, of economically valuable fish and shellfish. All activities authorized by this NWP 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 ensure that the authorized activities do not adversely affect important spawning areas or concentrated shellfish populations. As discussed in paragraph (g) of section 5.1, there are procedures to help ensure that individual and cumulative impacts to essential fish habitat are no more than minimal. For example, division and district engineers can impose regional and special conditions to ensure that activities authorized by this NWP will result in only minimal adverse effects on essential fish habitat.

(m) Water-related recreation: See paragraph (m) of section 5.1 above.

(n) Aesthetics: See paragraph (c) of section 5.1 above.

(o) Parks, national and historical monuments, national seashores, wilderness areas, research sites, and similar areas: This NWP can be used to authorize activities 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 only minimal adverse effects on the aquatic environment. Division engineers can regionally condition the NWP to prohibit its use in designated areas, such as national wildlife refuges or wilderness areas.

8.0 Determinations

8.1 Finding of No Significant Impact

Based on the information in this document, the Corps has determined that the issuance of this NWP will not have a significant impact on the quality of the human environment. Therefore, the preparation of an Environmental Impact Statement is not required.

8.2 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 is not contrary to the public interest.

8.3 Section 404(b)(1) Guidelines Compliance

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, necessary to minimize adverse effects on affected aquatic ecosystems. The activities authorized by this NWP will result in no more than minimal individual and cumulative adverse effects on the aquatic environment.

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

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: 21 Dec 2016

Donald E. Jackson
Major General, U.S. Army
Deputy Commanding General
for Civil and Emergency Operations

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