Appalachian Mountain Advocates

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September 23, 2025

Sent via Electronic Mail to CELRH.Energy@usace.army.mil
United States Army Corps of Engineers
Huntington District
ATTN: CELRH-RD Public Notice Nos. LRH-2025-00827 &
LRH-2025-00151
502 8th Street
Huntington, WV 25701

Re: Proposed Regional General Permit for Energy and Energy Resource Related Projects in the State of West Virginia (LRH-2025-00287) and Proposed Letter of Permission Procedure for Discharges of Dredged or Fill Material into Waters of the United States for Energy and Energy Resource Related Projects in the State of West Virginia (LRH-2025-00151)

To Whom It May Concern:

On behalf of itself and Coal River Mountain Watch, West Virginia Highlands Conservancy, West Virginia Rivers Coalition, Appalachian Voices, Center for Biological Diversity, and Sierra Club, Appalachian Mountain Advocates submits these comments on the recently proposed "Regional General Permit for Energy and Energy Resource Related Projects in the State of West Virginia" (LRH-2025-00287) (hereinafter, "Proposed RGP") and "Letter of Permission Procedure for Discharges of Dredged or Fill Material into Waters of the United States for Energy and Energy Resource Related Projects in the State of West Virginia" (LRH-2025-00151) (hereinafter, "Proposed LOP Procedure"). Given the importance of the issues presented by the proposed actions—including multiple legal infirmities—we respectfully request that you consider these comments before making a decision on the proposed actions.

Such consideration is necessary in light of a recent United States Army Corps of Engineers ("Corps") response to a Freedom of Information Act request submitted by Appalachian Mountain Advocates and the Sierra Club. Exhibit 1. That September 4, 2025 request sought, among other things,

> All public records related to the United States Army Corps's compliance with the National Environmental Policy Act and/or the Endangered Species Act with respect to Permit Application Nos. LRH-2025-00287 ("Proposed Regional General Permit for Energy and Energy Resource related Projects in the State of West Virginia") and LRH-2025-00151 ("Proposed Letter of Permission Procedure for Discharges of Dredged or Fill Material into Waters of the United States for Energy and Energy Resource Related Projects in the State of West Virginia").

Id. On September 19, 2025, the Corps responded to that request with a "No Records" determination because the Corps, "[f]ollowing a thorough search of [its] records" was "unable to locate any documents responsive" to that request. Exhibit 2.

Because the lack of documentation of compliance with either the National Environmental Policy Act ("NEPA") or the Endangered Species Act ("ESA") was not made public in the Public Notice for either the Proposed RGP or the Proposed LOP Procedure, and was only confirmed after the public comment period closed, it would be arbitrary and capricious for the Corps to take the proposed actions without considering these comments that address, among other things, the Corps's obligations under NEPA and the ESA. *See Ohio Valley Environmental Coalition v. U.S. Army Corps of Eng'rs*, 674 F.Supp.2d 783, 804–14 (S.D.W. Va. 2009) ("[U]nder Section 404 of the CWA, the opportunity to comment and the right to a hearing both necessarily require that the Army present for public scrutiny the rationale and pivotal data underlying its proposed action *before* the close of the comment and hearing period." (quoting *National Wildlife Federation v. Marsh*, 568 F.Supp. 985, 994 (D.D.C. 1983)) (emphasis in original))

In short, the Corps must consider these comments in its review of whether to take the proposed actions. For the following reasons, the issuance of either proposed action would be unlawful.

A. The Corps Cannot Lawfully Issue the Proposed RGP.

1. The Proposed RGP Violates the Requirement that Activities Authorized by General Permits be "Similar in Nature."

Although Section 404(e)(1) of the Clean Water Act authorizes the Corps to issue regional general permits, the activities authorized by such permits must be in a "category of activities" that "are similar in nature[.]" 33 U.S.C. § 1344(e)(1). "The term 'similar in nature' is undefined in the statute." Alaska Ctr. for the Env't v. West, 157 F.3d 680, 683 (9th Cir. 1998). But since what the phrase means is a question of law, neither the Corps nor the Environmental Protection Agency ("EPA") will receive deference to any interpretation they may have of the term. Ozurumba v. Bondi, ___ F.4th ___, 2025 WL 2501923, at *7 (4th Cir. Sept. 2, 2025) (citing Loper Bright Enters. v. Raimondo, 603 U.S. 369, 412–13 (2024)).

EPA's Section 404(b)(1) Guidelines require a determination by the Corps that "[t]he activities in [the] category are similar in nature and similar in their impact upon water quality." 40 C.F.R. § 230.7(a)(1). The Corps's written evaluation of whether that condition is met must "include a precise description of the activities to be permitted under the General permit, explaining why they are sufficiently similar in nature and in environmental impact to warrant regulation under a single General permit." Id. § 240.7(b)(2).

The activities that would be authorized by the Proposed RGP are not sufficiently similar in either nature or environmental impact to warrant authorization under a general permit. The "Proposed Category of Activities" announced in the Public Notice is incredibly broad: "The proposed categories of activities to be authorized by this RGP include energy or energy resource related activities, such as those noted in Term and Condition 1 …." In turn, Term and Condition 1 lists ten (10) types of activities:

a. Energy or energy resource related activities and attendant features required for the identification, leasing, development, siting, production, transportation, refining, and generation of crude oil, natural gas, lease condensates, natural gas liquids, refined petroleum products, uranium, coal, biofuels, geothermal heat, the kinetic movement of flowing water, and critical minerals as defined by 30 U.S.C. § 1606(a)(3);
b. Energy supply, generation, production, refining and transportation related activities;
c. Activities and attendant features required for the construction, maintenance, repair, and removal of energy and energy resource related activities and associated facilities;
d. Construction or maintenance of foundations for aboveground energy and energy resource related activities and attendant features;
e. Construction of access roads for the construction and maintenance of energy and energy resource related activities and attendant features;
f. Temporary structures, fills, and work necessary for the remediation of inadvertent returns to waters of the United States through sub-soil fissures or fractures that might occur during energy and energy resource related activities and attendant features;
g. Temporary structures, fills, and work, including the use of temporary mats, necessary to conduct the energy and energy resource related activities and attendant features;
h. Construction, maintenance, or expansion of substation facilities associated with energy and energy resource related activities and attendant features;
i. Construction or maintenance for overhead energy and energy resource related activities associated with towers, poles, foundations and anchors and attendant features; or
j. Energy and energy resource related activities and attendant features associated with riverine facilities (i.e., fleeting, mooring, offloading, unloading).

Although each of the authorized activities may be "related" to energy or energy resources, that is not sufficient to make them similar in nature for purposes of a general permit. If categories of activities could be so broadly drawn, then Section 404(e) would effectively swallow the Corps's individual permit program.

For example, the proposed RGP would authorize activities as profoundly different as (1) hydropower dams, (2) valley fills attendant coal surface mines, (3) open-cut pipeline crossings, (4) footpads or foundations for electric transmission lines, and (5) natural gas pipeline compressor station construction, just to name a few. To say that those activities are "similar in nature" because they involve the discharge of dredged and/or fill material related to energy and energy resource projects deprives the phrase "similar in nature" of all meaning.

2. The Proposed RGP Violates the Minimal Adverse Environmental Effects Requirements.

Section 404(e) allows general permits for activities that "will cause only minimal adverse environmental effects when performed separately, and will have only minimal cumulative adverse effects on the environment." 33 U.S.C. § 1344(e). The Proposed RGP violates that provision for multiple reasons. These comments highlight only a few.

For example, the category of activities is so broad that it would be impossible to conclude that all energy and energy resource related filling activities will have only minimal cumulative adverse effects on the environment.

Moreover, the breadth of the surface coal mining activities that would be authorized by the proposed RGP alone would violate the minimal effects requirements. As the Corps concluded in 2010, a general permit that so broadly authorizes valley fill construction, sediment pond construction, road construction, and slurry impoundment construction, cannot ensure minimal individual and cumulative adverse effects to aquatic resources. See generally Suspension of Nationwide Permit 21, 75 Fed. Reg. 34711 (June 18, 2010). Moreover, when the Corps reissued Nationwide Permit 21 in 2012, it included three provisions to "constrain the effects to the aquatic environment, [and] to ensure compliance with the statutory requirement that general permits, including NWPs, may only authorize those activities that have minimal individual and cumulative adverse effects on the aquatic environment": (a) a ½ acre-limit on the footprint of the fill, (b) a 300-linear foot limit on the loss of stream bed, and (c) a prohibition on valley fills. Reissuance of Nationwide Permits, 77 Fed. Reg. 10184, 10205 (Feb. 21, 2012). Here, the Proposed RGP lacks those essential constraints, and would be a throwback to the pre-2012 version of NWP 21, which the Corps has all-but-conceded violated the minimal effects prohibition. An agency cannot make such a 180-degree turn without a well-reasoned and scientifically supported explanation, F.C.C. v. Fox Television Stations, Inc., 556 U.S. 502, 515–16 (2009), which is impossible in this context given the advancement in the science since 2010 of the understanding of the effects of valley fills on conductivity and biological impairment on streams in West Virginia. Exhibit 3.

3. The Corps's Public Notice was Deficient because it did not address the Endangered Species Act.

The Corps's permitting regulations require that its public notices include, inter alia, "[a] statement of the district engineer's current knowledge on endangered species (see § 325.2(b)(5)." 33 C.F.R. § 325.3(a)(11). In turn, Section 325.3(b)(5) provides that

> The district engineer will include a statement in the public notice of his current knowledge of endangered species based on his initial review of the application (see 33 CFR 325.2(a)(2)). If the district engineer determines that the proposed activity would not affect listed species or their critical habitat, he will include a statement to this effect in the public notice. If he finds the proposed activity may affect an endangered or threatened species or their critical habitat, he will initiate formal consultation procedures with the U.S. Fish and Wildlife Service or National Marine Fisheries Service. Public notices forwarded to the U.S. Fish and Wildlife Service

> or National Marine Fisheries Service will serve as the request for information on whether any listed or proposed to be listed endangered or threatened species may be present in the area which would be affected by the proposed activity, pursuant to section 7(c) of the Act. References, definitions, and consultation procedures are found in 50 CFR part 402.

33 C.F.R. § 325.2(b)(5).

Here, the Corps's public notice of the Proposed RPG was silent about the district engineer's current knowledge on endangered species or critical habitat. It lacks even a statement that the permit would not affect listed species or their habitat. Indeed, as the Corps's September 19, 2025 FOIA response confirms, the Corps has done nothing to document its compliance with the Endangered Species Act. Exhibit 2. Accordingly, the public notice is defective, and the Corps must issue a supplemental public notice and open an additional comment period.

4. The Corps must comply with NEPA and publish its NEPA documents for review.

The issuance of the Proposed RGP is a major federal action triggering the requirements of the National Environmental Policy Act. The Corps's public notice provides no indication of the Corps's efforts to comply with that statute. Indeed, the Corps's September 29, 2025 FOIA response confirms that the Corps has done nothing to document compliance with NEPA. Exhibit 2. The Corps must put its NEPA compliance documents out for public notice and comment prior to issuing the Proposed RGP.

5. The Corps Must Engage in Programmatic Consultation with the Fish and Wildlife Service and Cannot Delay Compliance with Section 7 of the Endangered Species Act to the Pre-Construction Notification Stage.

As was made crystal clear to the Corps in Northern Plains Resource Council v. U.S. Army Corps of Engineers, 454 F.Supp.3d 985 (D. Mont. 2020), the Corps must engage in programmatic consultation with the appropriate wildlife service prior to issuing a general permit. As that court explained,

> [p]rogrammatic consultation involves a type of consultation that addresses multiple agency actions on a programmatic basis. 50 C.F.R. § 402.02. Programmatic consultations allow the Services to consult on the effects of a programmatic action such as a "proposed program, plan, policy, or regulation" that provides a framework for future proposed actions. Id.

Northern Plains Res. Council, 454 F.Supp.3d at 989.

The threshold for Section 7 consultation is low: "An agency must initiate formal consultation for any activity that 'may affect' listed species and critical habitat." Id. at 991 (citing 50 C.F.R. § 402.14; 16 U.S.C. § 1536(a)(2)). Here, activities that would be authorized by the

Proposed RGP (such as open-cut pipeline construction and valley fill construction) certainly may affect multiple listed species and their habitat.

There are numerous aquatic species found in West Virginia that are listed under the Endangered Species Act as Endangered or Threatened, and many of them have critical habitat designated within the state. See Exhibit 4 (available at https://share.google/1M84xz7RHUxXAAnHJ. This includes multiple species of fish, crayfish, and mussels. Id.

The activities that would be authorized by the proposed RGP may affect those species and their habitat. The Corps knows that. For example, in the 2007 iteration of Nationwide Permit 21—the last iteration of that permit to authorize valley fills like the Proposed RGP may attempt to do—the Corps specifically made the following conclusions, inter alia, regarding the effects of the activities authorized under that permit: "Fish and other motile animals will avoid the project site during construction. Sessile or slow-moving animals in the path of discharges, equipment, and building materials will be destroyed. Some aquatic animals may be smothered by the placement of fill material." Exhibit 5. And in the draft decision document for the most proposed reissuance of Nationwide Permit 12, which, like the proposed RGP, would authorize open-cut stream crossings for natural gas and oil pipelines, the Corps made similar findings. Exhibit 6.

Because the Corps has concluded that activities similar to those that would be authorized by the Proposed RGP will kill, injure, and alter the behavior of aquatic species like fish, crayfish, and mussels, it must also necessarily conclude that the issuance of the Proposed RGP may affect listed species and their habitat and, thus, consult Fish and Wildlife Service prior to the issuance of the Proposed RGP.

The Corps cannot rely on project-specific analyses to avoid programmatic consultation on a general permit. Northern Plains Res. Council, 454 F.Supp.3d at 992–94. The Proposed RGP's requirement that an applicant for verification under the permit would be required to identify any listed species or habitat that may be affected is insufficient to take the place of programmatic consultation. Id. That is because programmatic consultation examines the combined effect of all authorized activities on listed species and their habitat, whereas project-specific consultation is much narrower in scope. Moreover, the structure of the Proposed RGP unlawfully shifts the Corps's obligations to make the initial effect determination to the entity seeking authorization. Id.

In short, the Corps cannot issue the Proposed RGP without first engaging in programmatic consultation with the United States Fish and Wildlife Service.

6. The Corps Has No Emergency Authority that Would Justify Its Abuse of the Process and Substance of the Clean Water Act that would occur if the Proposed RGP were to issue.

The Corps cites Executive Order ("E.O.") 14156, which purports to declare a "National Energy Emergency," and approval by the Great Lakes and Ohio River Division Commander of the use of expedited permitting processes for energy and energy resource related projects to justify

the Proposed RGP. But Congress has not given the Corps any emergency authorities that would justify the Proposed RGP, even assuming there were a "national energy emergency."

E.O. 14156 invoked the National Emergency Act ("NEA"), but that statute did not give the President any power to give additional authority to agencies. 50 U.S.C. § 1621(a). Rather, under the NEA, the President's declaration of emergency can activate only those emergency authorities that Congress had already given to agencies. Id. In other words, neither the NEA nor a presidential declaration create any new agency authority, rather they only trigger existing statutory authorities that are unlocked when an emergency exists.

Here, the CWA contains no such provision to unlock. Rather, the CWA refers to emergencies only twice, and only once with respect to the Corps's section 404 permitting authority. That subsection of Section 404 generally exempts from permitting discharges of dredeged or fill material "for the purpose of maintenance, including emergency reconstruction of recently damaged parts, of currently serviceable structures such as dikes, dams, levees, groins, riprap, breakwaters, causeways, and bridge abutments of approaches, and transportation structures." 33 U.S.C. § 1344(f)(1)(B) (emphasis added). The Proposed RGP is clearly not authorized by that provision because, through that provision, Congress eliminated the need for any permit – streamlined or otherwise. Moreover, the activities contemplated by the Proposed RGP are not limited to maintenance or reconstruction.

The Corps's regulations cannot create authority that Congress did not bestow upon it. Accordingly, the Corps's so-called "Emergency procedures" in 33 C.F.R. § 325.2(e)(4) cannot wipe away the legal infirmities of the Proposed RGP. Even if the provision were not ultra vires and inconsistent with the Clean Water Act (it is), it would not apply in this instance. The regulation specifically defines emergency conditions—"situation[s] which would result in an unacceptable hazard to life, a significant loss of property, or an immediate, unforeseen, and significant economic hardship." The record cannot support the existence of any of those conditions here.

B. The Corps Cannot Lawfully Issue the Proposed LOP Procedure.

1. Congress Did Not Authorize Letters of Permission under Section 404, and Their Use is Unlawful Because They Do Not Comply with Section 404(a).

In the public notice for the Proposed LOP Procedure, the Corps asserts that letters of permission "are a type of individual permit issued through an abbreviated processing procedure … without publishing an individual public notice." That is wholly unlawful.

Congress authorized the Corps to issue two—and only two—types of authorizations under Section 404: individual permits for "specified disposal sites" under Section 33 U.S.C. § 1344(a) and general permits under Section 33 U.S.C. § 1344(e). See also 33 U.S.C. § 1344(e)(2) (characterizing the types of permits available under Section 404 as "individual and general"). Nothing in the Clean Water Act authorizes the Corps to use so-called "letters of permission" as a form of authorization to discharge dredged and/or fill material under any processing procedures, abbreviated or otherwise. Rather, "letters of permission" as a method of authorization of the

discharge of dredged and/or fill material under Section 404 are entirely a creature of the Corps's regulations—and an ultra vires one at that. 33 C.F.R. § 325.2(e)(1)(ii).

If an activity does not qualify for a general permit under 33 U.S.C. § 1344(e), then it can only be authorized by an individual permit under 33 U.S.C. § 1344(a). 33 U.S.C. § 1344(e)(2). Individual permits are for "specified disposal sites" and can only be issued "after notice and opportunity for public hearings." 33 U.S.C. § 1344(a). Accordingly, any "letter of permission" issued by the Corps for a specified disposal site must be subjected to public notice and comment. Because the Proposed LOP Procedure contemplates individual permits without notice and comment, it is wholly unlawful.

2. Even if Letters of Permission were otherwise lawful, the Proposed LOP Procedure would not satisfy the requirements for such authorizations

Even if the Corps could authorize the discharge of dredged or fill material at a specified disposal site through a letter of permission without notice and comment (it cannot), the Proposed LOP Procedure would still be impermissible. The Corps's regulations for letters of permission allow the use of a letter of permission only if, inter alia, the district engineer develops a list of categories of activities "through consultation with Federal and state fish and wildlife agencies, the Regional Administrator, Environmental Protection Agency, [and] the state water quality certifying agency." 33 C.F.R. § 325.3(ii)(A). Here, there is no evidence in the public record that the district engineer consulted with the requisite Federal and state regulators in developing the categories of activities contemplated by the Proposed LOP Procedure. Accordingly, the Corps cannot approve the Proposed LOP Procedure.

3. The Corps must comply with NEPA and publish its NEPA documents for review.

The issuance of the Proposed LOP Procedure is a major federal action triggering the requirements of the National Environmental Policy Act. The Corps's public notice provides no indication of the Corps's efforts to comply with that statute. Indeed, the Corps's September 29, 2025 FOIA response confirms that the Corps has done nothing to document compliance with NEPA. Exhibit 2. The Corps must put its NEPA compliance documents out for public notice and comment prior to issuing the Proposed LOP Procedure.

4. The Corps Must Engage in Programmatic Consultation with the Fish and Wildlife Service and Cannot Delay Compliance with Section 7 of the Endangered Species Act to the Pre-Construction Notification Stage.

As was made crystal clear to the Corps in Northern Plains Resource Council v. U.S. Army Corps of Engineers, 454 F.Supp.3d 985 (D. Mont. 2020), the Corps must engage in programmatic consultation with the appropriate wildlife service prior to implementing a program that provides a framework for future actions, such as the Proposed LOP Procedure. As that court explained,

> [p]rogrammatic consultation involves a type of consultation that addresses multiple agency actions on a programmatic basis. 50 C.F.R. § 402.02. Programmatic consultations allow the Services to consult on the effects of a programmatic action such as a "proposed program, plan, policy, or regulation" that provides a framework for future proposed actions." Id.

Northern Plains Res. Council, 454 F.Supp.3d at 989.

The threshold for Section 7 consultation is low: "An agency must initiate formal consultation for any activity that 'may affect' listed species and critical habitat." Id. at 991 (citing 50 C.F.R. § 402.14; 16 U.S.C. 1536(a)(2)). Here, activities that would be authorized by the Proposed LOP Procedure (such as open-cut pipeline construction and valley fill construction) certainly may affect multiple listed species and their habitat.

There are numerous aquatic species found in West Virginia that are listed under the Endangered Species Act as Endangered or Threatened, and many of them have critical habitat designated within the state. Exhibit 4. This includes multiple species of fish, crayfish, and mussels. Id.

The activities that would be authorized by the Proposed LOP Procedure may affect those species and their habitat. The Corps knows this. For example, in the 2007 iteration of Nationwide Permit 21—the last iteration of that permit to authorize valley fills like the Proposed LOP Procedure may attempt to do—the Corps specifically made the following conclusions, inter alia, regarding the effects of the activities authorized under that permit: "Fish and other motile animals will avoid the project site during construction. Sessile or slow-moving animals in the path of discharges, equipment, and building materials will be destroyed. Some aquatic animals may be smothered by the placement of fill material." Exhibit 5. And in the draft decision document for the most proposed reissuance of Nationwide Permit 12, which, like the Proposed LOP Procedure, would authorize open-cut stream crossings for natural gas and oil pipelines, the Corps made similar findings. Exhibit 6.

Because the Corps has concluded that activities similar to those that would be authorized by the Proposed LOP Procedure will kill, injure, and alter the behavior of aquatic species like fish, crayfish, and mussels, it must also necessarily conclude that the issuance of the Proposed LOP Procedure may affected listed species and their habitat and, thus, consult Fish and Wildlife Service prior to the issuance of the proposed RGP.

The Corps cannot rely on project-specific analyses to avoid programmatic consultation on a regional permit. Northern Plains Res. Council, 454 F.Supp.3d at 992–94. The Proposed LOP Procedure's requirement that an applicant for a letter of permission would be required to identify any listed species or habitat that may be affected is insufficient to take the place of programmatic consultation. Id. That is because programmatic consultation examines the combined effect of all authorized activities on listed species and their habitat, whereas project-specific consultation is much narrower in scope. Moreover, the structure of the Proposed LOP Procedure unlawfully shifts the Corps's obligations to make the initial effect determination to the entity seeking authorization. Id.

In short, the Corps cannot issue the Proposed LOP Procedure without first engaging in programmatic consultation with the United States Fish and Wildlife Service.

5. The Corps Has No Emergency Authority that Would Justify Its Abuse of the Process and Substance of the Clean Water Act that would occur if the Proposed RGP were to issue.

The Corps cites Executive Order ("E.O.") 14156, which purports to declare a "National Energy Emergency," and approval by the Great Lakes and Ohio River Division Commander of the use of expedited permitting process for energy and energy resource related projects to justify the Proposed LOP Procedure. But Congress has not given the Corps any emergency authorities that would justify the Proposed LOP Procedure, even assuming there were a "national energy emergency."

E.O. 14156 invoked the National Emergency Act ("NEA"), but that statute did not give the President any power to give additional authority to agencies. 50 U.S.C. § 1621(a). Rather, under the NEA, the President's declaration of emergency can activate only those emergency authorities that Congress had already given to agencies. Id. In other words, neither the NEA nor a presidential declaration create any new agency authority, rather they only trigger existing statutory authorities that are unlocked when an emergency exists.

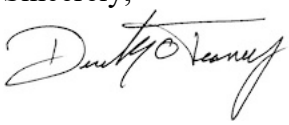
Here, the CWA contains no such provision to unlock. Rather, the CWA refers to emergencies only twice, and only once with respect to the Corps's section 404 permitting authority. That subsection of Section 404 generally exempts from permitting discharges of dredeged or fill material "for the purpose of maintenance, including emergency reconstruction of recently damaged parts, of currently serviceable structures such as dikes, dams, levees, groins, riprap, breakwaters, causeways, and bridge abutments of approaches, and transportation structures." 33 U.S.C. § 1344(f)(1)(B) (emphasis added). The Proposed LOP Procedure is clearly not authorized by that provision because, through that provision, Congress eliminated the need for any permit – streamlined or otherwise. Moreover, the activities contemplated by the Proposed LOP Procedure are not limited to maintenance or reconstruction.

The Corps's regulations cannot create authority that Congress did not bestow upon it. Accordingly, the Corps's so-called "Emergency procedures" in 33 C.F.R. § 325.2(e)(4) cannot wipe away the legal infirmities of the Proposed LOP Procedure. Even if the provision were not ultra vires and inconsistent with the Clean Water Act (it is), it would not apply in this instance. The regulation specifically defines emergency conditions—"situation[s] which would result in an unacceptable hazard to life, a significant loss of property, or an immediate, unforeseen, and significant economic hardship." The record cannot support the existence of any of those conditions here.

CONCLUSION

For the foregoing reasons, the Corps cannot lawfully issue either the Proposed Regional General Permit or the Proposed Letter of Permission Procedure. If you have any questions about these issues, please feel free to contact me.

Sincerely,



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cc: WQScomments@wv.gov

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EXHIBIT 1

September 4, 2025

Sent via electronic mail to foia-lrh@usace.army.mil
ENERGY RESOURCE BRANCH
UNITED STATES ARMY CORPS OF ENGINEERS
HUNTINGTON DISTRICT
502 Eighth Street
Huntington, WV 25701

To Whom it May Concern:

This request is made under the United States Freedom of Information Act, 5 U.S.C. § 522, on behalf of Sierra Club and Appalachian Mountain Advocates. Sierra Club is the nation's oldest and largest environmental organization. It regularly disseminates the type of information requested through a network of public education tools, such as nationally recognized magazines and newsletters, extensive online resources, and direct mail updates. It therefore has the ability and intention to disseminate the information to the general public. Appalachian Mountain Advocates is a nonprofit law and policy center located in Lewisburg, WV. The Federal ID number of Appalachian Mountain Advocates is 55-0781483.

We request access to and copies of the following public records:

1. All public comments received in response to the June 4, 2025 Public Notices for Permit Application Nos. LRH-2025-00287 ("Proposed Regional General Permit for Energy and Energy Resource related Projects in the State of West Virginia") and LRH-2025-00151 ("Proposed Letter of Permission Procedure for Discharges of Dredged or Fill Material into Waters of the United States for Energy and Energy Resource Related Projects in the State of West Virginia").

2. All public records related to the United States Army Corps's compliance with the National Environmental Policy Act and/or the Endangered Species Act with respect to Permit Application Nos. LRH-2025-00287 ("Proposed Regional General Permit for Energy and Energy Resource related Projects in the State of West Virginia") and LRH-2025-00151 ("Proposed Letter of Permission Procedure for Discharges of Dredged or Fill Material into Waters of the United States for Energy and Energy Resource Related Projects in the State of West Virginia").

In addition, please produce the requested records on a rolling basis. At no time should the Corps' search for—or deliberations concerning—any requested records herein delay the production of documents the Corps has already elected to produce.

Fee Waiver Request:

Sierra Club and Appalachian Mountain Advocates respectfully request that you waive all fees in connection with this request as provided by 5 U.S.C. § 552(a)(4)(A)(iii). As discussed above, Sierra Club has a long history of disseminating information about the environmental impacts of energy related projects to the public. It has spent years promoting the public interest through the development of policies that protect human health and the environment, and has routinely received fee waivers under FOIA. Appalachian Mountain Advocates also frequently posts information about the environmental impacts of energy projects to its website at www.appalmad.org or through social media outlets. These groups have frequent contact with the media and will work to circulate the requested information as appropriate.

Since Sierra Club and Appalachian Mountain Advocates are nonprofit organizations, the groups have no commercial interest in the requested information and the information will not be used for commercial gain. The only interest the groups have in the information is to benefit the public interest.

This FOIA request satisfies the factors listed in the Corps's governing regulations for waiver or reduction of fees, as well as the requirements of fee waiver under the FOIA statute. 5 U.S.C. § 552(a)(4)(A)(iii) ("[D]isclosure of the information is in the public interest because it is likely to contribute significantly to public understanding of the operations or activities of the government and is not primarily in the commercial interest of the requester."); 32 C.F.R. § 518.19(d).

First, the subject matter of the requested records specifically concerns identifiable "operations and activities of the government" because the requested records relate to the Corps' regulation of dredge and fill activities related to energy projects. These determinations and the policies and procedures on which they are based are unquestionably government activities or operations.

Second, the disclosure of the requested records has informative value and is "likely to contribute to and understanding of Federal government operations or activities." These requested records are not otherwise in the public domain nor accessible other than through a FOIA request, and therefore are "likely to contribute" to an understanding of the Corps' decisions. Given the environmental impacts associated with energy related projects, it is important for information relating to government operations or activities involving energy related projects to be made available to the public. The requested records will facilitate meaningful public participation in the decision-making process, and therefore are "meaningfully informative" and "likely to contribute" to an understanding of the Corps' government operations and activities.

Third, the disclosure of the requested records contributes to the understanding of the public at large, not simply the individual requester or a narrow segment of interested persons. As discussed above, Sierra Club and Appalachian Mountain Advocates have a longstanding interest and expertise in the regulation of energy related projects and their environmental impacts. Sierra Club has the "specialized knowledge" and "ability and intention" to disseminate the information requested in a broad manner and in a manner that contributes to the understanding of the "public at large." Sierra Club intends to disseminate the information received through this FOIA request in a variety of ways, including, but not limited to, analysis and distribution to the media, distribution through

publication and mailing, posting on the organization's websites, and emailing and list-serve distribution to members.

Fourth, the disclosure of the requested records contributes significantly to the public understanding of the Corps's operations and activities, and the public's understanding is likely to be enhanced by the disclosure to a significant extent. The disclosure is essential to public understanding of the impacts that energy project activities may have on their communities, homes, and the broader environment such as threats to human dwellings and drinking water resources. As such, disclosure will significantly enhance the public's understanding of this issue.

Lastly, as stated above, neither the Sierra Club nor Appalachian Mountain Advocates have a commercial interest in the requested records. Both are nonprofit organizations and therefore have no commercial interest; the requested records will only be used for the furtherance of the organizations' missions to inform the public on matters of vital importance to the environment and public health. As such, disclosure of the requested records is not "primarily" in either Sierra Club's or Appalachian Mountain Advocates' commercial interest. On the other hand, it is clear that the disclosure of the requested records is in the public interest and will contribute significantly to the public understanding of energy project regulation and its impacts on the environment.

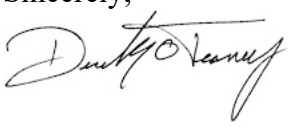
We therefore respectfully request that the Corps waive processing and copy fees pursuant to 5 U.S.C. § 552(a)(4)(A). In the event that your agency denies a fee waiver, please send a written explanation of that denial. In addition, please continue to produce the records as expeditiously as possible but contact me for authorization if total fees exceed $50.

If any part of this request is denied, please justify the denial by reference to specific exemptions of the Freedom of Information Act. We also expect you to release all segregable portions of otherwise exempt materials. We reserve the right to appeal your decision to withhold materials or deny a waiver of fees.

We would appreciate you communicating any questions you have by phone or email.

Thank you for your assistance.

Sincerely,



Derek O. Teaney
Deputy Director
(304) 646-1182
dteaney@appalmad.org

EXHIBIT
2

DEPARTMENT OF THE ARMY
HUNTINGTON DISTRICT, CORPS OF ENGINEERS
502 EIGHTH STREET
HUNTINGTON, WEST VIRGINIA 25701-2070

September 19, 2025

Office of Counsel

Via E-mail: dteaney@appalmad.org

Derek O. Teaney
Appalachian Mountain Advocates
PO Box 507
Lewisburg, WV 24901

Dear Mr. Teaney:

This is in response to your Freedom of Information Act (FOIA) requests dated 09 September 2025, designated as FA-25-0080, in which you requested the following:

1. All public comments received in response to the June 4, 2025 Public Notices for Permit Application Nos. LRH-2025-00287 ("Proposed Regional General Permit for Energy and Energy Resource related Projects in the State of West Virginia") and LRH-2025-00151 ("Proposed Letter of Permission Procedure for Discharges of Dredged or Fill Material into Waters of the United States for Energy and Energy Resource Related Projects in the State of West Virginia").

2. All public records related to the United States Army Corps's compliance with the National Environmental Policy Act and/or the Endangered Species Act with respect to Permit Application Nos. LRH-2025-00287 ("Proposed Regional General Permit for Energy and Energy Resource related Projects in the State of West Virginia") and LRH-2025-00151 ("Proposed Letter of Permission Procedure for Discharges of Dredged or Fill Material into Waters of the United States for Energy and Energy Resource Related Projects in the State of West Virginia").

Your request was sent to our Regulatory Division for processing. The documents responsive to the request outlined in "**Number 1**" above have been attached to our response email. Accordingly, this portion of your request is **Granted**.

Following a thorough search of our records, we were unable to locate any documents responsive to the request outlined in "**Number 2"** above**.** Therefore, this portion of your request is responded to with a **"No Records"** determination.

Because your request has been partially denied, you are hereby informed of your right to appeal this decision through this office to the Secretary of the Army (Attn: General Counsel). Your appeal must be postmarked or electronically transmitted within **90 days of the date of this letter**. Please ensure that the envelope or electronic submission is clearly marked with the notation 'Freedom of Information Act Appeal.'

Additionally, as part of this response includes a technical **'No Records'** determination, I am obligated to provide you with the following information:

In Oglesby v. Department of the Army, 920 F.2d 57 (1990), the court held that a "no records" response is an "adverse determination" under 5 U.S.C. §552 (a)(6)(A)(I). If you wish to challenge the adequacy of the agency's search, you have the right to appeal a "no records" response to the head of the agency, through the Huntington District Office of Counsel of the U.S. Army Corps of Engineers. You are advised of your right to appeal this determination through this office to the Secretary of the Army (Attn: General Counsel). Your appeal must be postmarked or electronically transmitted within **90 days** of the date of this letter. The envelope containing the appeal should bear the notation, "Freedom of Information Act Appeal," and should be sent to:

U.S. Army Corps of Engineers
Huntington District
Office of Counsel (CELRH-OC)
Attention: Billi Anne Belcher
502 Eighth Street
Huntington, West Virginia 25701-2070

For any further assistance and to discuss any aspect of your request, you have the right to contact the U.S. Army Corps of Engineers FOIA Public Liaison. Additionally, you have the right to contact the Office of Government Information Services (OGIS) to inquire about FOIA mediation services they offer. Contact Information:

U.S. Army Corps of Engineers
FOIA Public Liaison
441 G Street, NW
ATTN: CECC-G
Washington, DC 20314-1000
Email: foia-liaison@usace.army.mil
Phone: 202-761-0511

Office of Government Information Services
National Archives and Records Administration
8601 Adelphi Road - OGIS
College Park, MD 20740-6001
Email: ogis@nara.gov
Phone: 202-741-5770 or
Toll Free: 877-684-6448

As you have a fee waiver, there are no fees being collected for processing this request.

If you have any questions, please contact Ms. Billi A. Belcher, FOIA Officer, by telephone at (304) 399-5889 or by e-mail at billi.a.belcher@usace.army.mil.

Sincerely,

Paul J. Loftus
District Counsel
Initial Denial Authority

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PRIMARY RESEARCH PAPER

Mine reclamation does not restore leaf processing in low-order streams

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Received: 16 August 2022 / Revised: 15 January 2023 / Accepted: 18 January 2023 / Published online: 1 February 2023

Abstract In the United States, mine reclamation has been regulated under the Surface Mining Control and Reclamation Act (SMCRA) since 1977; however, there is a lack of research examining the efficacy of this legislation on restoring ecological structure and function in affected headwater streams. We compared water chemistry characteristics, rate of senescent white oak leaf litter processing, and invertebrate community composition of three first- and second-order streams draining surface mines reclaimed in accordance with SMCRA to that of streams draining three pre-SMCRA abandoned surface mines and three unmined reference watersheds within the Western Allegheny Plateau ecoregion of Ohio. Streams draining reclaimed and abandoned mines had lower pH, higher conductivity, and leaf processing rates that averaged 7 and 24 times lower, respectively, than reference streams. The invertebrate community composition of reclaimed streams differed in several respects from abandoned mine and reference streams, including a shift in proportional dominance from leaf shredding taxa to grazing and scraping taxa, such as gastropods. Although SMCRA has successfully mitigated some sources of water quality impairment, our results suggest that mine drainage remains a persistent barrier to the restoration of headwater stream ecology in mined landscapes.

Keywords Ecological function · Invertebrates · Mine drainage · SMCRA · Conductivity

Handling editor: Verónica Ferreira

Supplementary Information The online version contains supplementary material available at https://doi.org/10.1007/s10750-023-05154-1.

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Introduction

Surface coal mining is an important driver of land-use change in the Appalachian region of the United States, having altered the chemistry, ecology, and geomorphology of > 2 million ha of land surface and > 10,000 km of streams (Herlihy et al., 1990; Sayler et al., 2016; Zipper et al., 2021). During the surface mining process soil and rock layers overlying coal seams are removed to access the marketable coal beneath. Strata associated with coal contain metal sulfides, especially pyrite (FeS_2), and the disturbance of these strata exposes fragmented rock to water and oxygen, accelerating the oxidation and dissolution of these compounds, and producing an acidic solution laden with metal and sulfate ions. This acidic solution reacts with other mineral substances in the surrounding rock to produce a saline mine drainage that can be either acidic or alkaline depending upon the quantity of neutralizing agents within the surrounding strata.

Whether acid or alkaline, the saline drainage emanating from surface mines can lead to degraded water quality and substantial shifts in the community structure and ecological function of headwater streams (Pond et al., 2008; Cianciolo et al., 2020; Merovich et al., 2021).

Prior to the 1970s, land affected by surface mining in the United States often received little to no reclamation, leaving a heavily altered environment composed of heaps of overburden, exposed seams of acid-forming shales, crumbling highwalls, and polluted streams (Oblinger Childress, 1985; Montrie, 2003; Skousen & Zipper, 2021). In 1977, the U.S. Congress enacted the Surface Mining Control and Reclamation Act (SMCRA), requiring mine operators to restore the land to its approximate original contour and establish vegetative cover following coal extraction, with the goal of mitigating many of the negative environmental consequences of surface coal mining and especially those resulting in the degradation of water quality below standards established under the Clean Water Act. In the Appalachian region > 1 million ha of land have been mined and reclaimed under SMCRA-era regulations (Skousen & Zipper, 2021). SMCRA has resulted in the mitigation of some water quality problems associated with mining, such as low pH and high concentrations of some acid-soluble metal ions like iron, aluminum, and manganese (Pfaff et al., 1981); however, other sources of water quality impairment, such as elevated salinity, can persist long after reclamation is complete (Pfaff et al., 1981; Daniels et al., 2016; Cianciolo et al., 2020; Kruse Daniels et al., 2021), and studies generally suggest that mine reclamation has not led to the restoration of ecological structure and function in the headwater stream ecosystems of mined landscapes (e.g., Petty et al., 2010; Palmer & Hondula, 2014; Krenz et al., 2016; Giam et al., 2018; Cianciolo et al., 2020; Merovich et al., 2021).

Headwater streams are important sites of organic matter processing and sources of water, energy, and nutrients to higher-order streams, and pollutants if draining contaminated lands. Thus, headwater streams exert a strong influence on the water quality of larger streams within hydrological networks (Vannote et al., 1980; Alexander et al., 2007; MacDonald & Coe, 2007). In the historically forested Appalachian region, the food webs of headwater streams are primarily dependent upon allochthonous inputs of organic matter such as senescent tree leaves, which can provide more than 90% of a stream's energy budget (Fisher & Likens, 1973; Anderson & Sedell, 1979). These leaf litter inputs are processed by a suite of microorganisms and invertebrates into forms of biomass and inorganic nutrients available to the food webs within the headwater stream, the adjacent terrestrial landscape, and to higher-order streams (Wallace et al., 1999; England & Rosemond, 2004; Benfield et al., 2017). Because of the importance of senescent tree leaves to energy and nutrient flux in these networks, the rate of leaf processing can be an important indicator of the functional integrity of headwater stream ecosystems (Wallace et al., 1999; Gessner & Chauvet, 2002; Benfield et al., 2017).

Mine drainage can influence leaf processing within headwater streams in a variety of ways. For example, low pH conditions have been shown to alter the diversity of bacteria and fungi that are often the first organisms to initiate the decomposition process (Maltby & Booth, 1991; Baudoin et al., 2008; Bier et al., 2015; Valett & Ely, 2019), and thus, acidic mine drainage may reduce leaf palatability for invertebrates that subsequently feed on these biofilms and leaf tissues (Graça, 2001). Alternatively, the conditions of mine drainage can reduce the diversity and/or abundance of key invertebrate functional groups, such as shredders, thus, reducing the rate of leaf fragmentation and consumption (Cuffney et al., 1990; Fritz et al., 2010; Petty et al., 2013). When the pH of mine drainage becomes elevated, major metal ions, such as Fe and Al, become insoluble, forming metal hydroxide precipitates that can coat leaf surfaces, and thus, may inhibit the establishment of biofilms or reduce leaf palatability for invertebrate shredders (Barnden & Harding, 2005; Niyogi et al., 2013). Regardless of pH, all mine drainage results in an increase in the ionic strength of water, which has been shown to decrease the richness of key shredder taxa, resulting in simplified communities that may contain less-efficient leaf processing species (Drover et al., 2019).

Most studies examining water quality impacts of coal mining in the Appalachian region have focused on structural factors such as water chemistry, habitat quality, and benthic macroinvertebrate diversity (e.g.,

Pond et al., 2008, 2014; Petty et al., 2010; Griffith et al., 2012; Hopkins et al., 2013; Cianciolo, 2020). A number of studies have examined the effects of mine drainage on leaf processing in headwater streams within the Appalachian region (Maltby & Booth, 1991; Simmons et al., 2008; Fritz et al., 2010; Petty et al., 2013; Krenz et al., 2016; Vander Vorste et al., 2019); however, most of these have focused on the effects of drainage from pre-SMCRA abandoned mines (Maltby & Booth, 1991; Bott et al., 2012; Johnson et al., 2014) or newer mountaintop removal/valley fill (MTR/VF) mines within the central Appalachian ecoregion (Simmons et al., 2008; Fritz et al., 2010; Petty et al., 2013; Krenz et al., 2016; Vander Vorste et al., 2019). Few studies have examined mining's effect on leaf processing outside of the central Appalachian coal basin (Palmer & Hondula, 2014; Merovitch et al., 2021), where differences in geology, mining methods, and reclamation may result in important differences in the chemical composition of mine drainage and post-mining headwater stream ecology (Palmer & Hondula, 2014; Giam et al., 2018; Eriksson & Daniels, 2021).

We compared water chemistry, leaf processing rate, and invertebrate diversity of headwater streams draining from pre-SMCRA abandoned mines, post-SMCRA reclaimed mines, and forested unmined land in the Western Allegheny Plateau ecoregion of Ohio, U.S.A. We hypothesized that the rate of leaf processing and the diversity of leaf-associated invertebrate taxa in headwater streams draining from post-SMCRA reclaimed mines would approach that of unmined reference streams. This study expands the geographic range of research examining the long-term consequences of surface coal mining on aquatic ecosystems and sheds light on the efficacy of historic and contemporary reclamation efforts. To our knowledge, this is the first study comparing the community structure and ecological function of headwater streams draining from pre- and post-SMCRA mines in the Appalachian region, U.S.A.

Methods

Site Characteristics

We studied the processing rate of senescent white oak (*Quercus alba* L.) leaf litter and leaf-associated invertebrates of nine low-order streams in the Western Allegheny Plateau ecoregion of Ohio, U.S.A. between 28 October 2018 and 10 February 2019 (Fig. 1). Three of the streams drained from surface coal mines reclaimed in accordance with Ohio's C (1976–1981) and D (1982–present) laws (Table 1; ODNR 2020), which must meet or exceed the requirements of the federal Surface Mining Control and Reclamation Act of 1977 (SMCRA 1977; hereafter referred to as RMLs), 3 drained from abandoned surface coal mines that predated SMCRA-era reclamation laws (hereafter referred to as AMLs), and 3 were reference streams draining unmined land (hereafter referred to as UMLs). All streams were located within the Western Allegheny Plateau ecoregion and share a similar bedrock geology composed of Pennsylvanian-age fluvial-deltaic deposits of sandstone, shale, mudstone, and coal with a low calcareous content (Pfaff et al., 1981). The coal seams mined in this region are primarily the Middle Kittanning #6 and Lower Kittanning #5 coals of the Allegheny Formation (Pfaff et al., 1981). The historic vegetation of this region is classified as mixed mesophytic forest (Braun, 1961), and the topography is characterized by moderate to strong relief, with narrow ridge tops and deeply dissected stream valleys (Waters & Roth, 1986). Parent material for soils within the study area is primarily derived from shale, siltstone, and sandstone, and is moderately to strongly acidic (Waters & Roth, 1986).

All UML and AML stream reaches were situated in closed canopy conditions with riparian zones that extended over 100 m in either direction. Dominant tree species in these forests included *Liriodendron tulipifera* L., *Fagus grandifolia* Ehrh., *Prunus serotina* Ehrh., *Quercus* spp., *Carya* spp., and *Acer* spp. SMCRA-era reclamation strategies tend to result in compacted soils and herbaceous plant communities that inhibit the establishment of native tree species (Cavender et al., 2014); thus, the riparian zones of RML streams were more variable, with woody vegetation ranging from absent to sparse, and were dominated by reed canary grass (*Phalaris arundinacea* L.) and other herbaceous plant species. Woody plants occurring within the riparian zones of RML streams included a mix of native tree species, including *Populus deltoides* Bartr., *P. serotina*, *Platanus occidentalis* L., and *Acer* spp., and the non-native shrub species *Elaeagnus umbellata* Thunb., *Lonicera maackii* Maxim., and *Rosa multiflora* Thunb.

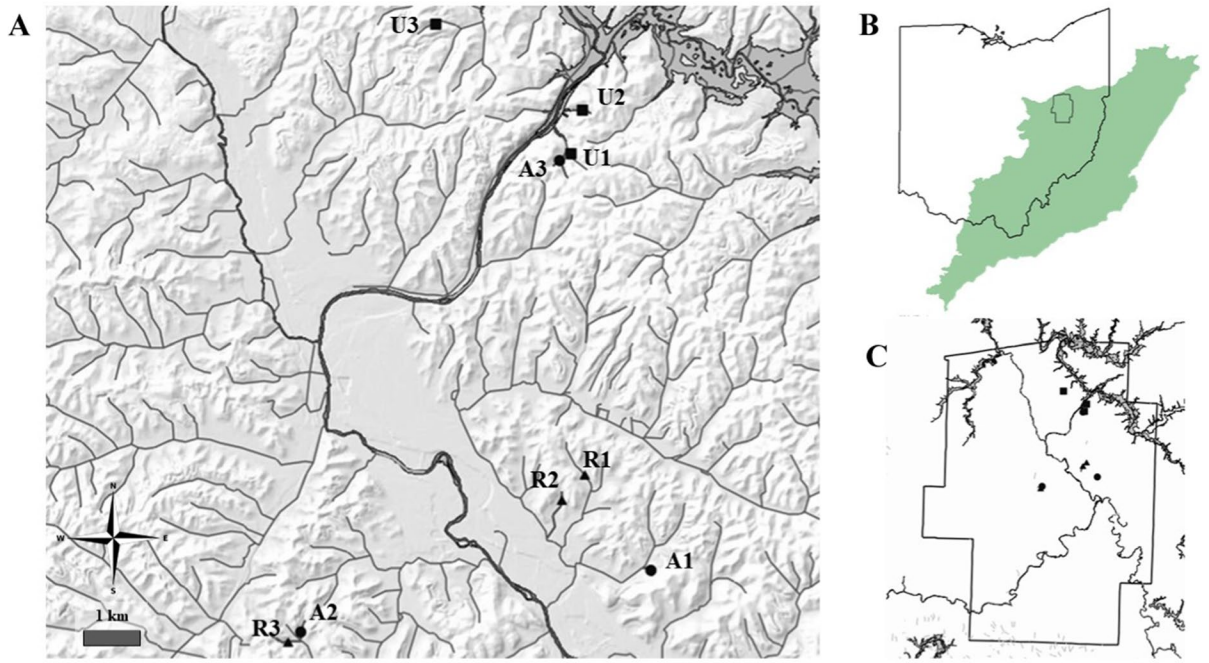

Fig. 1 Locations of study sites (**A**) within the Unglaciated Western Allegheny Plateau ecoregion (**B**), Tuscarawas County, Ohio U.S.A. (**C**). Squares (U1–U3) are unmined reference streams, triangles (R1–R3) are SMCRA-era reclaimed streams, and circles (A1–A3) are pre-SMCRA abandoned mine land streams

Table 1 Locations and general characteristics of nine study streams in the Western Allegheny Plateau ecoregion, U.S.A

Stream	Location	Stream category	Year reclamation completed	Elevation (m)	Stream order	Riparian width (m)
U1	40.56367, -81.40090	Unmined	–	330	1st	> 100
U2	40.55434, -81.40354	Unmined	–	315	1st	> 100
U3	40.58309, -81.44258	Unmined	–	318	1st	> 100
R1	40.47885, -81.39710	Reclaimed	1988	280	2nd	3
R2	40.47385, -81.40597	Reclaimed	1988	330	1st	10
R3	40.44244, -81.48733	Reclaimed	2000	300	1st	–
A1	40.45914, -81.37928	Abandoned	–	300	1st	> 100
A2	40.44451, -81.48358	Abandoned	–	290	1st	> 100
A3	40.55327, -81.40470	Abandoned	–	320	1st	> 100

Riparian width = average width of land on both sides of stream dominated by woody vegetation

Physical and chemical characteristics of streams

We used the USGS StreamStats web-based GIS application (USGS, 2020) to estimate watershed-scale characteristics of streams, including drainage area, stream gradient, and percent forest cover. Because the water quality parameters studied were determined by the watershed conditions upstream of sampling points, we defined watershed boundaries from our lowest sampling point within each stream.

We measured canopy cover at 10 random sample points along each of three 30 m transects spanning each stream reach using a GRS Densitometer (Geographic Resource Solutions, Arcata, California).

Two transects were situated along each stream bank approximately 2 m from the bank-full width margin, and one transect was located within the stream channel. The number of sample points that revealed coverage by tree leaves or branches divided by the total number of sample points ($n = 30$) was used to calculate percent canopy cover for each reach.

All streams were first- or second-order streams that fit the Ohio Environmental Protection Agency's definition of perennial primary headwater stream habitat (OEPA, 2018). AML streams had evidence of iron(III) hydroxide precipitates coating stream substrates to varying degrees, whereas UML and RML streams did not. We quantified potential headwater stream habitat quality of each stream using the Headwater Habitat Evaluation Index (HHEI; OEPA, 2018). This index was designed to determine the suitability of primary headwater stream habitat for vertebrates, such as salamanders, and benthic macroinvertebrates for watersheds < 259 ha and with a maximum pool depth < 40 cm. The HHEI involves scoring substrate type, maximum pool depth, and bank-full width for headwater streams using a scoring rubric (OEPA, 2018).

Discharge was measured on three occasions over the course of the study using a float method in which the velocity of a small plastic float was determined over a ~ 3 m straight run. The cross-sectional area of the run was estimated by averaging the depth at 3 points across the run and multiplying by the wetted width of the stream at that point. Discharge was calculated by multiplying the stream cross-sectional area by the average velocity from three trials. Discharge values were multiplied by a correction factor of 0.9 for streams with smooth streambeds and 0.8 for streams with rocky streambeds to yield the final discharge used to compare streams (Gordon et al., 2004).

Stream water temperature, pH, and conductivity were measured five times over the course of the study using an Oakton PCTestr 35 (Thermo Fisher Scientific, Waltham, Massachusetts). The concentrations of Fe, Al, Mn, and Zn were assessed for each stream from filtered (0.45 µm pore size) and acidified samples using inductively coupled plasma-atomic emission spectroscopy (ICP-AES; USEPA, 2007) at the Soil, Water, and Environmental Lab at The Ohio State University's College of Food, Agricultural, and Environmental Sciences. Method detection limits (MDLs) were 125 µg l^{-1} for Fe, 62.5 µg l^{-1} for Al, 6.25 µg l^{-1} for Mn, and 12.5 µg l^{-1} for Zn. Alkalinity was measured by titration using an alkalinity test kit (Hanna Instruments, USA). Physical and chemical variables of each stream are summarized in Table S1.

Leaf processing

Senescent white oak (*Q. alba*) leaf litter was collected from a single tree in early October 2018 and air dried to constant mass prior to initiation of the study. We placed ~ 5.0 g of dried leaves into individually numbered 30 × 38 cm plastic mesh bags (8 mm mesh size; AvisBag.com, Inc., New York). Bags were randomly arranged into groups of four, and then each group of bags was randomly assigned to one of three sample points within each stream. Sampling points were situated in pool habitats and were spaced 10 to 15 m apart. We selected pool habitats to ensure that bags remained submerged over the course of the study and to facilitate comparison between stream categories, because AML and RML streams tended to have fewer riffles. Bags were anchored to the streambed at each sample point with wooden stakes on 28 October 2018. A single bag was removed from each sample point at days 14, 42, 70, and 105, so a total of 3 bags were removed from each stream on each removal date. Between days 14 and 42 one sampling point at U2 and another at R2 were vandalized, so data from these streams were based on two samples at each time interval thereafter. Upon removal, each bag was placed into its own sealable plastic bag and refrigerated at 10°C for 12 to 24 h prior to analysis.

Mesh bags were rinsed in a series of three plastic shoebox (33 × 19 × 11 cm) containers filled with tap water. In the first container, the unopened bag was shaken gently to dislodge as much sediment as possible, in the second container, the bag was opened, each leaf or leaf fragment was gently cleaned once, and then transferred to a third container for a final cleaning. Cleaned leaves and leaf fragments were transferred to pre-weighed aluminum foil trays and air dried to constant mass prior to final mass determination. Exponential processing rates for leaves from each stream were derived from the slope of a linear regression comparing natural log transformed percentage leaf mass remaining to the number of days of exposure.

Invertebrate diversity

Invertebrates within litter bags were collected from rinse water remaining after leaf cleaning. Rinse water was left in plastic shoebox containers for 24 h to allow the water to clarify, and then each container was carefully inspected for invertebrates. Invertebrates obtained from litter bags were preserved in 95% ethanol prior to identification and enumeration. Arthropods were identified to the family level using keys from Merritt et al. (2008), Bouchard (2004) and McCafferty (1981). Gastropods were identified to the genus level using keys found in Thorp & Covich (2001). The rate of leaf processing in streams is often contingent on the composition of invertebrate functional feeding groups present (Petersen & Cummins, 1974; Merritt et al., 2008; Fritz et al., 2010), and invertebrates were classified into functional feeding group categories given by Merritt et al. (2008).

Statistical analysis

One-way analysis of variance (ANOVA) was used to test for significant differences in response variables between UML, RML, and AML streams, and Tukey's post-hoc tests were used to evaluate pairwise differences between stream categories. All data were inspected for homoscedasticity and normality and transformed as necessary to meet these assumptions prior to analysis. Proportional data and leaf processing rates were arcsine-square root transformed prior to analysis. One stream exhibited a net gain in mass over the course of the study, and it was treated as having a leaf mass loss of zero for the comparison of leaf processing rates. Welch's ANOVA was used to test for significant differences between categories when transformation did not resolve heteroscedasticity. Repeated measures ANOVA was used to test for significant differences in pH, conductivity, and water temperature over the course of the study. Metal concentrations below MDL were treated as MDL/2 for all analyses. Invertebrates obtained from each stream over the course of the study were pooled and analyzed as a single dataset. The proportion of invertebrates within functional feeding groups was compared by pooling all invertebrates collected for each stream category and comparing their relative abundances using Fisher's exact test. Relationships between measured variables and *Q. alba* processing rate and between invertebrate metrics and environmental conditions were evaluated using Spearman rank correlation. Analyses were performed using JASP Version 0.13 software (JASP Team 2020; https://jasp-stats.org/) and evaluated at the $\alpha = 0.05$ level.

Results

Physical and chemical characteristics of streams

Watershed area, gradient, forest cover, canopy cover, HHEI score, discharge, alkalinity, and Mn concentration did not differ significantly between UML, RML, and AML streams (Tables 2; S2). Temperature did not differ significantly between stream categories, but there was a significant interactive effect between time

Table 2 Comparison of physical and chemical variables of $n = 3$ UML, RML, and AML streams in the Western Allegheny Plateau ecoregion, U.S.A

Variable	UML streams		RML streams		AML streams	
	Mean	SE	Mean	SE	Mean	SE
Watershed area (ha)[1]	24.2[a]	4.9	62.2[a]	31.2	33.5[a]	9.1
Forest Cover (%)[1]	83[a]	11	51[a]	10	86[a]	11
Gradient (%)[1]	9.2[a]	2.0	6.8[a]	1.8	9.3[a]	2.5
Discharge (L s^{-1})[2]	23.1[a]	5.6	24.7[a]	16.1	19.9[a]	3.8
Canopy Cover (%)[2]	83[a]	2	37[a]	18	77[a]	8
HHEI Score[1]	71[a]	7	65[a]	1	64[a]	5
Temperature (°C)[3]	6.2[a]	0.1	5.0[a]	0.4	6.4[a]	1.3
pH[3]	7.3[a]	0.1	6.4[a]	0.1	5.4[a]	0.7
Conductivity (µS cm^{-1})[3]	177.7[a]	44.9	911.3[b]	206.3	912.0[b]	267.6
Alkalinity (mg $CaCO_3$ L^{-1})[1]	75[a]	14	173[a]	60	77[a]	54
Mn (mg L^{-1})[1]	0.052[a]	0.023	0.254[a]	0.169	3.223[a]	2.529

Means with the same superscript letters were not statistically different ([1]ANOVA: Tukey's test; [2]Welch's ANOVA: Gains-Howell Test; [3]repeated measures ANOVA: Tukey's test; $\alpha = 0.05$)

and stream category (Tables 3; S3). A comparison of simple main effects revealed no significant temperature differences between stream categories by time.

Conductivity (range: 67–1610 µS cm^{-1}) was significantly affected by stream category (ANOVA, $P=0.007$), time ($P<0.001$), and the interaction between factors ($P=0.009$) (Tables 3; S4). Conductivity was significantly lower in UML streams than RML (Tukey test, $P=0.014$) and AML ($P=0.014$) streams, which did not differ ($P=0.92$). Stream pH (range: 3.5–7.8) was significantly affected by stream category (ANOVA, $P=0.043$) and time ($P=0.001$), but there was no interaction between factors ($P=0.435$) (Tables 3; S5). The pH of AML streams was significantly lower than UML streams ($P=0.036$) but not RML streams ($P=0.21$), and the pH of UML and RML streams did not differ ($P=0.31$).

Table 3 Repeated measures ANOVA results comparing variables across n = 3 UML, RML, and AML streams in the Western Allegheny Plateau ecoregion, OH, U.S.A

Variable	Comparison	*df*	*F*	*P*
Temperature	Time	4,24	71.5	< 0.001
	Stream category	2,6	0.899	0.456
	Time × stream category	8,24	2.73	0.027
Conductivity	Time	4,24	9.86	< 0.001
	Stream category	2,6	12.57	0.007
	Time × stream category	8,24	3.42	0.009
pH	Time	4,24	6.53	0.001
	Stream category	2,6	5.56	0.043
	Time × stream category	8,24	1.04	0.435

Leaf processing

The rate of *Q. alba* leaf processing differed significantly between stream categories (Fig. 2; Table S6). The mean exponential leaf processing rate of UML streams was more than 7 times higher than RML (Tukey's test, $P=0.013$) and 24 times higher than AML ($P=0.005$) streams, which did not differ significantly from each other ($P=0.628$).

Invertebrate diversity

A total of 277 invertebrates, representing 32 taxa, were collected from litterbags over the course of this study (Table S7). The most abundant invertebrate taxa found were chironomid midges and gastropods,

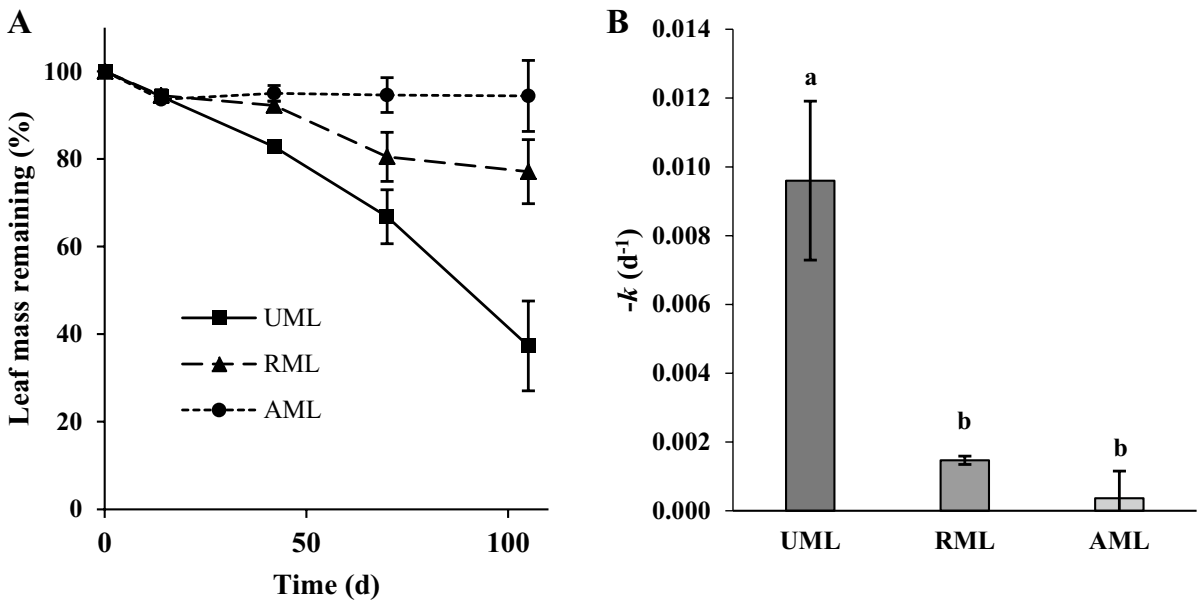

Fig. 2 Comparison of the rate of white oak leaf processing in $n=3$ UML, RML, and AML low-order streams, Western Allegheny Plateau ecoregion, U.S.A., over the course of 105 days (**A**) and a comparison of mean exponential decay constants derived from these data (**B**; ANOVA: $F_{2,6}=15.161$, $P=0.005$). Error bars show ± 1 SE. In graph **B**, columns sharing the same letter did not differ significantly (Tukey's test; $\alpha=0.05$)

which represented 29 and 28% of the total number of individuals, respectively. Chironomids were collected from litter bags at 6 of our streams and across all 3 categories, but they were particularly abundant at R1, R3, and U3. Gastropods were only collected from bags at RML streams. Of the 78 gastropods collected, 70 were in the genus *Physa*, and 53 of these were found at R3.

Total invertebrate family richness differed significantly between stream categories, but abundance did not (Fig. 3, Table 4). Total invertebrate family richness was significantly greater in UML and RML streams than in AML streams (Tukey's test, $P=0.009$ and $P=0.037$, respectively), but did not differ significantly between UML and RML streams ($P=0.46$). Ephemeroptera, Plecoptera, and Trichoptera (EPT) family richness differed significantly between stream categories, but their abundances did not (Fig. 3, Table 4). EPT family richness differed significantly between UML and AML streams (Tukey's test,

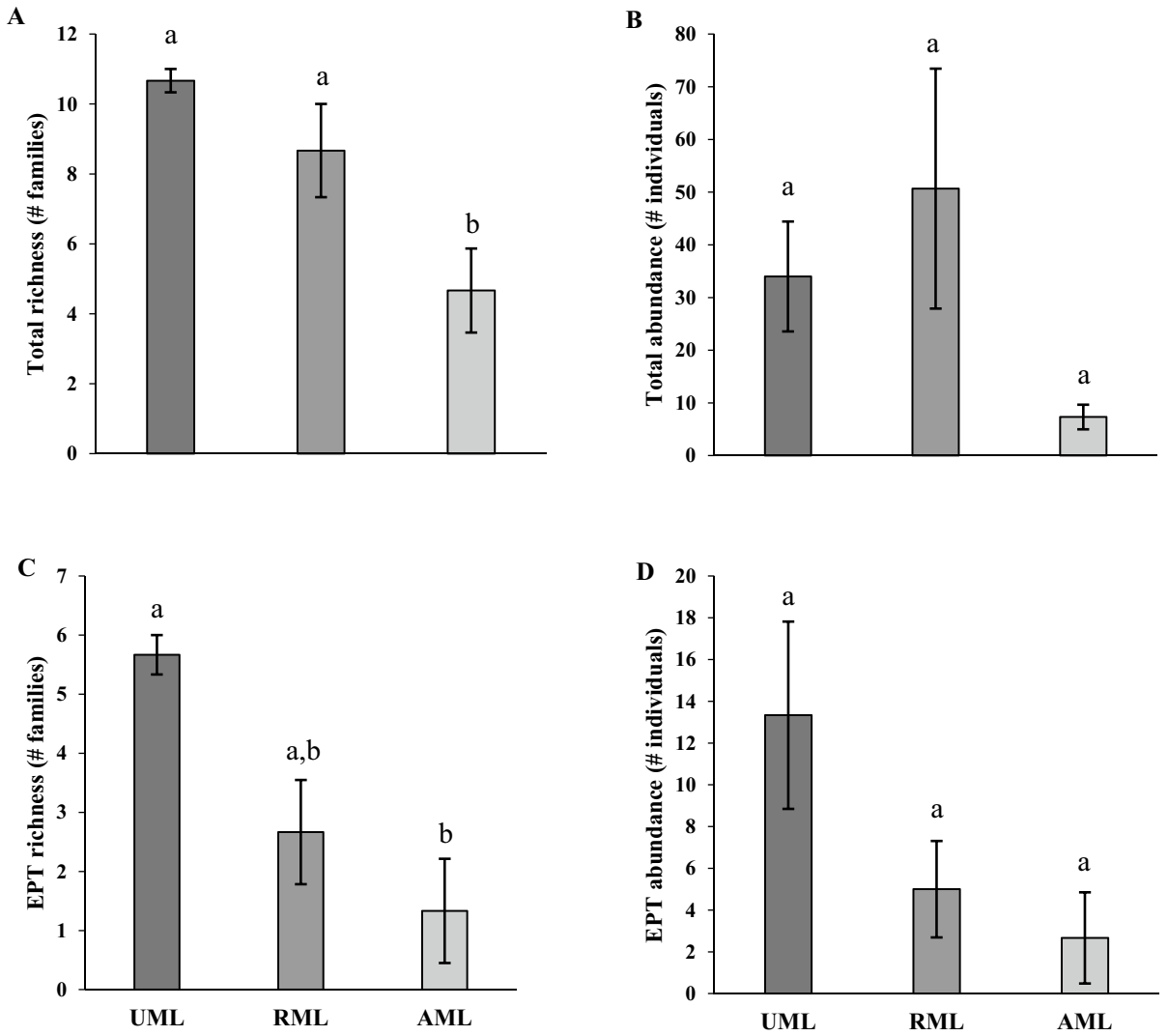

Fig. 3 Comparisons of mean invertebrate family richness (**A**) and abundance (**B**) and EPT family richness (**C**) and abundance (**D**) for invertebrates obtained from white oak litterbags placed in $n=3$ UML, RML, and AML low-order streams, Western Allegheny Plateau ecoregion, U.S.A. Error bars show ± 1 SE. Columns sharing the same letter did not differ significantly (Tukey's test, $\alpha=0.05$)

Table 4 ANOVA comparisons of diversity metrics for invertebrate communities obtained from white oak litterbags within $n=3$ UML, RML, and AML streams in the Western Allegheny Plateau ecoregion, U.S.A. ($df=2,6$ for all comparisons)

Response variable	F	P
Richness		
Total	11.26	0.009
EPT	8.87	0.016
Trichoptera	0.600	0.580
Shredders	9.30	0.014
Collector/gatherers	1.67	0.270
Predators	1.00	0.420
Abundance		
Total	2.27	0.190
EPT	3.12	0.120
Plecoptera	7.90	0.021
Trichoptera	0.305	0.750
Shredders	3.25	0.110
Collector/gatherers	1.66	0.270
Predators	2.83	0.140

$P=0.015$); however, that of RML streams was not significantly different from, and intermediate between UML and AML streams ($P=0.066$ and $P=0.46$, respectively). Within the EPT, only Plecoptera abundance differed significantly between categories (Table 4), with UML streams having significantly higher abundance than RML and AML streams (Tukey's test, $P=0.044$ and $P=0.025$, respectively); however, Plecoptera abundance did not differ significantly between RML and AML streams ($P=0.50$). The sparseness of Plecoptera families at RML and AML streams precluded statistical comparisons of Plecoptera richness. Neither Trichoptera family richness nor abundance differed significantly between stream categories (Table 4). Ephemeroptera were represented by one family (Ephemerellidae) and collected at only one UML stream (U1).

The pooled proportions of invertebrate functional feeding groups differed across stream categories (Fig. 4). The proportions of invertebrates within functional feeding groups in UML streams were significantly different from those of RML and AML streams (Fisher's exact test; $P<0.001$, $P=0.009$, respectively), and those of RML and AML streams were significantly different from each other ($P<0.001$). ANOVA comparisons of functional feeding groups are summarized in Table 4. Shredder richness differed significantly between stream categories, but shredder abundance did not. UML shredder richness was significantly greater than that of AML streams (Tukey's test, $P=0.013$), and RML shredder richness was intermediate between, but not significantly different from, that of UML and AML streams ($P=0.067$, $P=0.392$, respectively). The family richness and

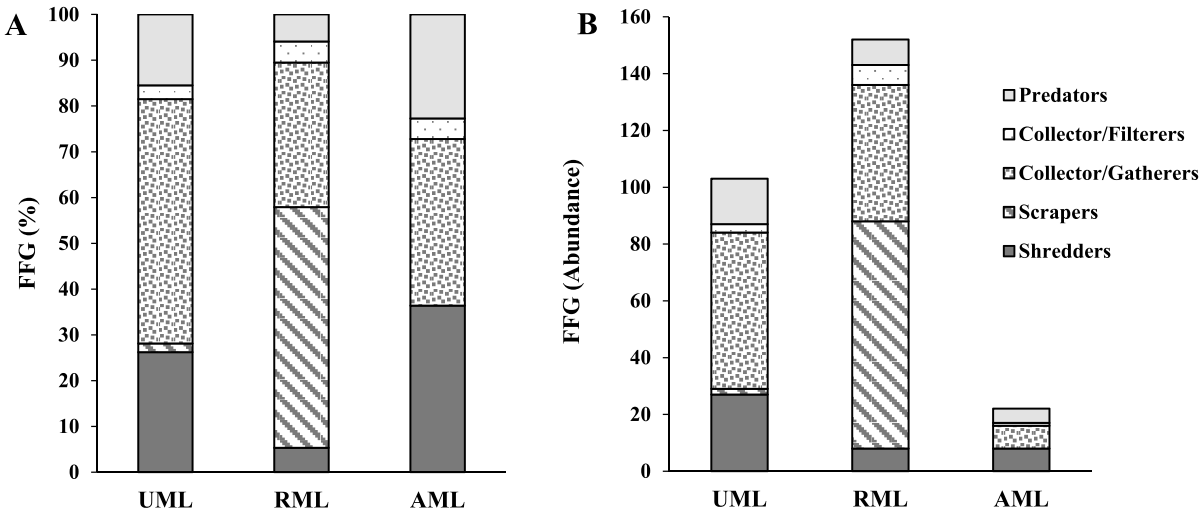

Fig. 4 Percentage (**A**) and abundance (**B**) of invertebrate functional feeding groups (FFGs) obtained from white oak litterbags placed in n = 3 UML, RML, and AML low-order streams, Western Allegheny Plateau ecoregion, U.S.A. Data were obtained by pooling all invertebrates collected in litterbags from each stream category

abundance of collector/filterers and scrapers had variances of zero, and so were not compared statistically. Comparisons of other functional feeding groups showed no significant differences in family richness or abundance (Table 4).

Invertebrate family richness, pH, Plecoptera richness and abundance, EPT richness, and shredder richness were positively correlated with *Q. alba* litter processing rate, while predator abundance and conductivity were negatively correlated (Table 5). Other watershed and reach-scale metrics, such as percent forest cover, percent canopy cover, gradient, discharge, and water temperature, were not significantly correlated with leaf processing rates.

Total family richness, EPT richness, and Plecoptera richness and abundance were positively correlated with pH; Plecoptera richness and abundance were negatively correlated with conductivity; invertebrate family richness was negatively correlated with Mn concentration and scraper abundance was positively correlated with alkalinity (Table 6).

Table 5 Significant Spearman rank correlations of white oak leaf litter processing rates (k) with chemical and structural variables in $n = 3$ UML, RML, and AML streams in the Western Allegheny Plateau ecoregion, U.S.A.

Variable	k (days^{-1})	
	ρ	P-value
Predator abundance	−0.86	0.003
Invertebrate family richness	+0.83	0.006
pH	+0.83	0.008
Plecoptera abundance	+0.81	0.008
Plecoptera richness	+0.79	0.011
EPT richness	+0.79	0.012
Shredder richness	+0.78	0.013
Conductivity	−0.70	0.043

Discussion

Physical and chemical characteristics of streams

The mean conductivity of RML and AML streams averaged over 5 times that of UML streams, and both RML and AML streams exhibited significant variability over the course of the study compared with UML streams. This pattern of elevated conductivity is a hallmark of mine drainage, both before and after reclamation (Pfaff et al., 1981) and is consistent with the results of other studies examining coal mining impacts in the Appalachian region (e.g., Fritz et al., 2010; Lindberg et al. 2011; Hopkins et al., 2013; Krenz et al., 2016; Timpano et al., 2018; Cianciolo et al., 2020).

The four major cations commonly present in mine drainage within the Western Allegheny Plateau ecoregion are those of Fe, Al, Mn, and Zn (Pfaff et al., 1981; Hopkins et al., 2013), but only Mn was present in measurable concentration across all streams. The only stream in our study with measurable concentrations of all four metals was A2, which also had the lowest pH and highest conductivity. Its concentrations of Fe (21.8 mg l^{-1}), Al (11.2 mg l^{-1}), Mn (8.3 mg l^{-1}) and Zn (0.179 mg l^{-1}) were within the ranges reported by Oblinger Childress (1985) for AML streams in this region. All other streams ultimately had circumneutral pH and concentrations of Fe, Al, and Zn below the MDL. We suspect that passive acid mine drainage (AMD) treatment systems, such as the open limestone channels upstream of A3

Table 6 Spearman rank correlations between select invertebrate metrics and conductivity, pH, Mn concentration, and alkalinity in $n = 3$ UML, RML, and AML streams in the Western Allegheny Plateau ecoregion, U.S.A. Significant correlations ($P < 0.05$) are in bold

Variable	Conductivity		pH		Mn		Alkalinity	
	ρ	P-value	ρ	P-value	ρ	P-value	ρ	P-value
Total richness	−0.57	0.110	**+0.79**	**0.012**	**−0.70**	**0.035**	+0.10	0.790
Total abundance	−0.24	0.110	+0.48	0.190	−0.36	0.340	+0.42	0.260
EPT richness	−0.63	0.072	**+0.74**	**0.022**	−0.48	0.190	−0.29	0.450
EPT abundance	−0.49	0.180	+0.66	0.051	−0.35	0.350	−0.27	0.480
Shredder richness	−0.65	0.058	+0.62	0.073	−0.41	0.270	−0.24	0.540
Scraper abundance	+0.16	0.690	+0.24	0.540	−0.27	0.480	**+0.67**	**0.047**
Plecoptera richness	**−0.92**	**< 0.001**	**+0.81**	**0.009**	−0.55	0.130	−0.36	0.350
Plecoptera abundance	**−0.89**	**< 0.001**	**+0.83**	**0.006**	−0.52	0.150	−0.30	0.440

and R3, or other SMCRA-era reclamation strategies employed at the RML streams are successfully neutralizing pH and reducing the concentrations of these ions either by precipitation or preventing acidity in the first place.

Abundant metal hydroxide precipitates, principally iron(III) hydroxide, coated the substrates in all three AML streams but were not evident in the substrates of UML and RML streams. Metal hydroxide precipitates are a common source of impairment associated with AML streams that can smother stream substrates and inhibit microbial and invertebrate-driven leaf processing (Niyogi et al., 2013; Merovich et al., 2021). The observation that RML streams did not have notable metal hydroxide precipitates suggests that SMCRA-era reclamation practices are successfully mitigating this source of impairment.

Although alkalinity did not differ significantly between UML, RML, and AML streams, their alkalinities ranged from 48–93, 117–288, and 0–180 mg $CaCO_3$ l^{-1}, respectively, and we suspect this non-significant result was related to our small sample size and the wide range of variation in alkalinity within RML and AML streams. Although two of the AML streams had very low alkalinity (i.e., 0 and 50 mg $CaCO_3$ l^{-1}), one (A1) had exceptionally high alkalinity (i.e., 180 mg $CaCO_3$ l^{-1}). Similarly, two of the RML streams had alkalinity values of 117 mg $CaCO_3$ l^{-1} (R2) and 147 mg $CaCO_3$ l^{-1} (R1) whereas the third stream (R3) had an alkalinity of 288 mg $CaCO_3$ l^{-1}. Thus, the non-significant trend was toward higher alkalinity in RML streams. The elevated alkalinity of RML streams relative to UML streams suggests mine reclamation can produce substantial changes to water chemistry from baseline conditions, which may result in important shifts in the ecological structure and function of affected streams.

One AML stream (A3) was affected by a watershed reclamation project upstream of our sampling location that was completed at the onset of our study, and this stream exhibited a steady decrease in conductivity and increase in pH that approached those of UML streams by the end of the study. In addition to removing coal refuse, closing abandoned underground mine portals, and recontouring and revegetating the landscape, the project involved installation of approximately 400 m of open limestone channels upstream of our study reach. Such passive treatment channels tend to decrease in efficacy over time (Skousen et. al, 2017). Continued monitoring of the water chemistry and ecology of this stream could yield important insights into the prospects for restoring ecological function to headwater streams of mined watersheds.

Leaf processing

The mean leaf processing rates of both RML and AML streams were significantly lower than those of UML streams. We found no other studies comparing leaf litter processing rates between RML, AML, and unmined reference streams, but studies that have examined the effects of passive and active AMD treatment systems (Simmons et al., 2005; Bott et al., 2012; Johnson et al., 2014), and the reclamation of MTR/VF mines (Simmons et al., 2008; Fritz et al., 2010; Petty et al., 2013; Krenz et al., 2016) on leaf processing have also found suppressed leaf processing rates relative to reference streams.

Gessner and Chauvet (2002) proposed comparing the ratio of the leaf processing rate constants of impacted streams (k_i) to those of reference streams (k_r) as a metric for the evaluation of functional integrity. Under their framework, streams having a k_i:k_r ratio between 0.75 and 1.33 show no evidence of a loss in functional integrity, those with a ratio of 0.5–0.75 or 1.33–2.0 show a moderate loss, and those with a ratio < 0.5 or > 2.0 have evidence of severely compromised function. Applying their framework to our data, the ratio of k_{RML}:k_{UML} yields 0.14 and k_{AML}:k_{UML} yields 0.042, which places both RML and AML streams in the lowest, severely compromised category. These results suggest that reclamation activities designed to meet SMCRA requirements have not resulted in the restoration of key physical and biological attributes essential to leaf processing, which is somewhat surprising, given the improvements in pH, concentrations of dissolved metals, and metal hydroxide precipitation that we observed.

The rate of leaf processing can be influenced by a variety of factors, including water temperature (Abelho, 2001; Martinez et al., 2014; Ferreira et al., 2020), dissolved nutrient concentrations (Suberkropp et al., 2010; Ferreira et al., 2020), flow rate (Chergui & Pattee 1988; dos Santos Fonseca et al., 2013), deposition of metal hydroxides (Niyogi et al., 2013), and the chemical compositions of the leaves themselves (Ostrofsky, 1997; Ferreira et al., 2020), making comparisons of leaf processing rates across

studies problematic. Other studies using *Q. alba* litter (Fritz et al., 2010; Bott et al., 2012; Krenz et al., 2016) and pin oak (*Quercus palustris* Muenchh; Petty et al., 2013) in coarse mesh bags like ours observed leaf processing rates in reference streams 1.5–2 times higher than in mine impacted streams, whereas those of our reference streams averaged 7 and 24 times higher than that of RML and AML streams, respectively.

The larger differences in leaf processing rate that we observed for *Q. alba* leaf litter may have resulted from how we measured mass loss, since we compared changes in the dry mass of leaves rather than ash-free dry mass (AFDM) as was used in these other studies. If metal precipitates formed to a greater extent on the leaf surfaces within one stream category than another, this would add mass and may have obscured the actual loss of organic matter occurring in our leaves. All AML streams in our study had substrates coated with metal hydroxide precipitates, and these precipitates can result in the formation of recalcitrant coatings on leaves that can potentially add to their dry mass (Schlief & Mutz, 2006) and inhibit biotic processing of leaf material (Gray & Ward, 1983; Niyogi et al., 2013). Metal accumulation on leaf surfaces probably led to the observed gain in mass for the leaves in stream A2, which had elevated concentrations of Fe, Al, Mn, and Zn. By comparing the average amount of mass lost from the leaves in A2 after 14 days of exposure to the average gain in mass after 105 days, we estimate that the metal precipitates in A2 accumulated at a rate of approximately 1.7 mg precipitates/g dry leaf mass/day. All other streams, regardless of category, had concentrations of Fe, Al, and Zn below the MDL, and so it seems reasonable to assume that metal precipitation would have been far lower in these other steams. Mn was above the MDL for 8 of the 9 streams, but we found no significant correlation between leaf processing rate and Mn concentration. Although we cannot rule out the possibility that some amount of precipitation of these or other metals present in mine drainage could have strengthened observed differences in leaf processing rate between mined and reference streams, given the magnitude of the differences, it seems unlikely that the use of AFDM would have led to a different conclusion. The leaves of mined streams showed very little evidence invertebrate feeding when compared with those of reference streams, and it is possible that armoring of the leaf surfaces by metal oxide precipitates may have inhibited leaf processing in these streams. Future studies should evaluate the effect of metal oxide precipitates on leaf processing in AML and RML streams.

Invertebrate diversity

Both total invertebrate family richness and EPT family richness differed significantly between stream categories, but total invertebrate abundance and EPT abundance did not. This is consistent with other studies, which have found that taxonomic richness is a more reliable indicator of mining effects than abundance, since declines in richness are often compensated by increases in abundance of more tolerant taxa (Pond, 2012; Drover et al., 2019). Total invertebrate and EPT family richness of UML streams were significantly higher than that of AML streams, whereas RML streams had intermediate numbers of families. Petty et al. (2013) observed similar invertebrate and amphibian richness between constructed channels draining reclaimed MTR/VF mines and unmined reference watersheds, which resulted from novel taxa present in the constructed channels that were not present in reference streams. The comparable taxonomic richness of UML and RML streams in our study also resulted from novel taxa in the RML streams, such as two families of damselfly and two families of aquatic gastropods. Overall, the taxa present in both RML and AML streams were only 24% similar to those of UML streams, whereas RML and AML streams shared 45% similarity in their taxa. These results, like those of others (Petty et al., 2013; Timpano et al., 2018; Drover et al., 2019; Vander Vorste et al., 2019), emphasize the importance of assessing taxonomic composition in addition to aggregate community metrics when evaluating the effects of mining on headwater stream communities.

The proportions of invertebrate functional feeding groups in our litterbags differed significantly between UML, RML, and AML streams, and there was a distinct shift toward a greater proportion of scrapers in RML streams, resulting from the relatively large number of aquatic gastropods inhabiting our litterbags. We are not aware of other studies that have reported gastropods in low-order streams draining mined watersheds, but 90% of the gastropods collected were in the genus *Physa*, which has been shown to be an

ineffective leaf processor (Brady & Turner, 2010). The percent canopy cover of RML streams averaged about half that of UML and AML streams, which may have allowed for greater in-stream primary production; thus, we suspect the presence of large numbers of gastropods indicates important shifts in basal resources available to RML stream communities and warrants further study.

Shredder richness was positively correlated with *Q. alba* processing rate, and the shredder richness of UML streams was significantly higher than that of AML streams and marginally higher than that of RML streams. The importance of invertebrate shredders in the processing of leaf litter is well known (Cuffney et al., 1990; Graça, 2001; Benfield et al., 2017), and we suspect that the higher rate of leaf processing in UML streams resulted from a more diverse and better adapted assemblage of leaf processing taxa than was found in RML and AML streams. We collected a relatively small sample of invertebrates in our litterbags compared with other studies that have used similar methods (Fritz et al., 2010; Vander Vorste et al., 2019), limiting our ability to resolve key functional relationships between benthic invertebrate communities and leaf processing. Future studies that seek to evaluate the role of invertebrates in leaf processing may benefit from supplementing invertebrate samples collected in litterbags with those obtained using other methods of sampling macroinvertebrate diversity from streambed substrates.

SMCRA and headwater stream ecology

The SMCRA-era reclaimed mines affecting the RML streams in our study ranged in age from 19 to 31 years since reclamation was completed; yet, despite improvements in some aspects of water quality, the rate of leaf processing in these streams remained like that of AML streams. We suspect the proximate cause of lower leaf processing rates in RML and AML streams was altered invertebrate communities; but, given the differences in other variables (e.g., metal hydroxide precipitates, dissolved metals, pH, riparian plant communities) between RML and AML streams, this impairment could have resulted from different underlying factors.

The elevated conductivity of RML and AML streams relative to UML streams suggests that some aspect of the increased ionic strength of drainage emanating from both RML and AML watersheds could be an important driver of the observed differences in leaf processing. Studies have generally shown that elevated conductivity within the range of our RML and AML streams is associated with significant alterations of stream invertebrate and microbial communities (Pond et al., 2008; Bier et al., 2015; Timpano et al., 2018; Drover et al., 2019; Vander Vorste et al., 2019); but, there are conflicting conclusions drawn from the limited research examining the effect of conductivity on leaf processing (Fritz et al., 2010; Petty et al., 2013; Krenz et al., 2016; Vander Vorste et al., 2019). Elevated conductivity is generally thought to impair stream invertebrate and microbial communities by inducing osmoregulatory stress (Cormier et al., 2013; DeVilbiss et al., 2022); thus, elevated conductivity could lead to impaired leaf processing via its osmoregulatory effects on stream biota. The conductivity of all UML streams fell below the 300 µS cm^{-1} aquatic life benchmark for the region, while the conductivity of both RML and AML streams averaged 3 times higher than the benchmark (USEPA, 2011). The concentrations of Fe, Al, and Zn were below chronic toxicity thresholds for all but one stream (USEPA, 2018, 2022); and, although there are no established chronic toxicity thresholds for Mn, it is generally considered to have a relatively low toxicity to invertebrates in hard water environments like our streams (Lasier et al., 2000; Strosnider et al., 2020). Some elements common in mine drainage, such as Se, Fe, and Mn can bioaccumulate, and studies in other regions demonstrate that, even at concentrations below ecotoxicity thresholds, some metals can result in impairment through interactive effects (Clark et al., 2021). Studies that more fully characterize the ionic composition of mine drainage are probably necessary to resolve the role that elevated conductivity may play in leaf processing.

SMCRA-era reclaimed mines in the Appalachian region tend to have highly compacted soils, plant communities that can inhibit tree seedling survival, and show little evidence of successional change toward baseline forest conditions several decades following reclamation (Cavender et al., 2014). Although canopy cover between stream categories was not significantly different in our study, the canopy cover of RML streams averaged approximately half that of UML streams, and the dominant plant communities of RML streams did not include many of the tree

species, including oak, typical of UML and AML streams. The leaves of oak tend to have slower rates of processing than other temperate species (Ostrofsky, 1997), lower rates of microbial colonization, and tend to be less palatable to invertebrate consumers like shredders (Canhoto & Graça, 1995); thus, the impaired rates of leaf processing in RML streams could have been driven by a community that is maladapted to oak leaf litter or is preferentially feeding on more palatable resources, including algae, available in those streams. Krenz et al. (2016) found that riparian subsidies of leaf litter to constructed stream channels below MTR/VF mines averaged only 22% that of forested reference watersheds and that there was a positive association between percent riparian forest cover and leaf processing rate. Studies of other systems have also found significant relationships between riparian vegetation, invertebrate shredder communities, and leaf processing rates (Stevens & Cummins, 1999; Huryn et al., 2002; Encalada et al., 2010). We are not aware of other studies that have evaluated the role of altered riparian vegetation and reduced detrital subsidies on leaf processing in low-order streams draining SMCRA-era reclaimed mines or the effect that newer approaches to reclamation, such as the Forestry Reclamation Approach (Zipper et al., 2011), might have on the restoration of litter processing within these systems. Research examining the role of terrestrial habitat in shaping the restoration of ecological function in reclaimed mines could lead to more effective reclamation strategies that improve upland habitat quality, water quality, and in-stream ecological function.

Microbial decomposers utilize dissolved inorganic nutrients directly from the water, so conditioning and processing of leaf litter can be facilitated by the availability of limiting nutrients like nitrogen and phosphorus (Ferreira et al., 2020). Although we did not measure concentrations of these nutrients in the present study, it seems likely that differences in nutrient availability could also have influenced observed differences in leaf processing rates. Metal hydroxides, such as those observed in AML streams, can adsorb phosphate, decreasing phosphate concentration, and limiting the production of microbial biofilms and decomposition (Bott et al., 2012). Similarly, higher autochthonous production resulting from greater light availability in RML streams could also limit nutrient availability to microbial decomposers via competition with algae. Thus, it is possible that the depletion of limiting nutrients, driven by two different processes, could also alter microbial-driven conditioning and leaf processing in AML and RML streams.

Conclusions

The long history of coal mining in the Appalachian region has left an indelible mark on the region's landscape and water quality. The primary purpose of the Surface Mining Control and Reclamation Act of 1977 was to "protect society and the environment from the adverse effects of surface coal mining operations" (SMCRA 30 U.S.C. § 1202); however, our results demonstrate that low-order streams receiving water from mines reclaimed in accordance with SMCRA remain functionally impaired long after reclamation is complete and have rates of leaf processing more akin to that of streams affected by pre-SMCRA mines than unmined, reference conditions. Several stressors that continue to impair pre-SMCRA streams, such as metal hydroxide precipitation, elevated metal concentrations, and low pH, seem to have been ameliorated by SMCRA reclamation strategies, suggesting that other stressors, possibly related to elevated conductivity and altered riparian habitat, remain barriers to stream restoration. Future research should seek to clarify the relative roles of water chemistry and landscape in driving the impaired ecological function of low-order streams draining from mined watersheds.

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Declarations

Competing interests The authors have no relevant financial or non-financial interests to disclose.

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EXHIBIT
4

Aquatic Habitats Supporting Federally listed Endangered and Threatened Species, and Proposed Threatened Species in West Virginia (Updated June 2018)

There are eighteen federally listed endangered and threatened or proposed endangered species that are associated with specific aquatic habitats in West Virginia. These include ten endangered freshwater mussels - clubshell (*Pleurobema clava*), fanshell (*Cyprogenia stegaria*), James spinymussel (*Pleurobema collina*), northern riffleshell (*Epioblasma torulosa rangiana*), pink mucket pearlymussel (*Lampsilis abrupta*), rayed bean (*Villosa fabilis*), sheepnose (*Plethobasus cyphyus*), snuffbox (*Epioblasma triquetra*), spectaclecase (*Cumberlandia monodonta*), and tubercled-blossum pearlymussel (*Epioblasma torulosa torulosa*); two endangered plants - Harperella (*Ptilimnium nodosum*) and northeastern bulrush (*Scirpus ancistrochaetus*); one threatened plant - Virginia spiraea (*Spiraea virginiana*); two threatened crustaceans – Madison Cave isopod (*Antrolana lira*) and Big Sandy crayfish (*Cambarus callainus*); one endangered crustacean –Guyandotte River crayfish (*Cambarus veteranus*); and one endangered fish - diamond darter (*Crystallaria cincotta*). The candy darter (*Etheostoma osburni*) has been proposed as threatened on October 4, 2017. Ten other listed species that are not as exclusively associated with specific aquatic habitats also occur in West Virginia. Those species are not addressed here.

The aquatic habitats below, listed alphabetically within the two U.S. Army Corps of Engineers (Corps) regulatory districts that operate in West Virginia (Huntington and Pittsburgh districts), represent the most current information on the known and potential distribution of the federally listed species described above. Prior to conducting any activities that could result in adverse impacts to these aquatic habitats (e.g., projects that involve the placement of rock or other fill material into or adjacent to these habitats, the withdrawal or diversion of water, projects that could introduce sediment or toxic chemicals into waterways, or which could alter water temperature, streamside vegetation, etc.), please contact the U.S. Fish and Wildlife Service, West Virginia Field Office, at (304) 636-6586. To determine if a Corps permit is required for activities in or near these or other aquatic habitats in West Virginia, please contact the Huntington District at (304) 399-5710 or the Pittsburgh District at (412) 395-7152.

U.S. Army Corps of Engineers Huntington District

1. Big Sandy Creek: Kanawha County: Snuffbox.

2. Bluestone River: Mercer and Summers Counties (Bluestone Gorge to slackwater of Bluestone Reservoir): Virginia spiraea.

3. Cedar Creek: Braxton and Gilmer Counties: Snuffbox.

4. Cove Creek: Monroe County: James spinymussel.

5. Elk River: Braxton, Clay, and Kanawha Counties (below Sutton Dam), including the lower one-half mile reaches of its tributaries Birch River, Blue Creek, and Laurel Creek: Clubshell, pink mucket pearlymussel, northern riffleshell, rayed bean, and snuffbox. The Elk River also contains the diamond darter (endangered). Critical habitat for this species is from King Shoals to slackwater below Coonskin Park.

6. Gauley River: Fayette and Nicholas Counties (Summersville Dam to Swiss): Virginia spiraea.

7. Greenbrier River: Greenbrier and Pocahontas Counties: Virginia spiraea.

8. Henry Fork: Calhoun and Roane Counties: Snuffbox.

9. Hughes River: Ritchie and Wirt Counties, including the lower one-half mile reach of its tributary Goose Creek: Snuffbox and clubshell.

10. Kanawha River: Fayette, Kanawha, Mason, and Putnam Counties: Fanshell, pink mucket pearlymussel, sheepnose, spectaclecase, and tubercled-blossum pearlymussel.

11. Leading Creek: Gilmer and Lewis Counties, including the lower one-half mile reach of its tributary Fink Creek: Snuffbox.

12. Little Kanawha River: Braxton, Calhoun, Gilmer, Wirt, and Wood Counties, including the lower one-half mile reaches of its tributaries Leading Creek (Calhoun County), Pine Creek, Sand Fork, Slate Creek, Straight Creek, Tanner Creek, Tucker Creek, and Walker Creek: Clubshell and snuffbox.

13. Marsh Fork River including Dingess Branch and Millers Camp Branch and associated palustrine emergent and scrub-shrub wetlands: Raleigh County: Virginia spiraea.

14. McElroy Creek: Doddridge and Tyler Counties: Snuffbox.

15. Meadow River: Fayette, Greenbrier, and Nicholas Counties: Virginia spiraea.

16. Meathouse Fork of Middle Island Creek: Doddridge County, including the lower one-half mile reach of its tributary Toms Fork: Clubshell and snuffbox.

17. Middle Island Creek: Doddridge, Pleasants, and Tyler Counties, including the lower one-half mile reaches of its tributaries Arnold Creek, Bluestone Creek, Buckeye Creek, Indian Creek, McKim Creek, Point Pleasant Creek, Sancho Creek, and Sugar Creek: Clubshell and snuffbox.

18. New River (Lower): Fayette County (Route 19 to Gauley Bridge): Virginia spiraea.

19. North Fork Hughes River: Ritchie and Wirt Counties, including the lower one-half mile reaches of its tributaries Addis Run, Bonds Creek, Devilhole Creek, and Gillespie Run: Snuffbox and clubshell.

20. Ohio River south of Hannibal Locks and Dam: Cabell, Jackson, Mason, Pleasants, Tyler, Wayne, Wetzel, and Wood Counties: Fanshell, pink mucket pearlymussel, sheepnose, and snuffbox.

21. Potts Creek and South Fork of Potts Creek: Monroe County: James spinymussel.

22. Reedy Creek: Roane and Wirt Counties: Snuffbox.

23. South Fork Hughes River: Doddridge, Ritchie, and Wirt Counties, including the lower one-half mile reaches of its tributaries Bone Creek, Indian Creek, Leatherbark Creek, Otterslide Creek, Slab Creek, and: Clubshell and snuffbox.

24. Spring Creek: Roane and Wirt Counties: Snuffbox.

25. Spruce Creek: Ritchie County: Snuffbox

26. Steer Creek: Calhoun and Gilmer Counties: Snuffbox.

27. Tug Fork Watershed: Tug Fork River including tributaries: Barrenshe Creek, Bradshaw Creek, Buffalo Creek, Dry Fork, Elkhorn Creek, Grapevine Creek, Hite Fork, Jacobs Fork, Laurel Fork of Pigeon Creek, Little Indian Creek, Marrowbone Creek, Mate Creek, Panther Creek, Pigeon Creek, Rockhouse Fork, South Fork Tug Fork, and Spice Creek: McDowell, Mercer, Mingo, and Wayne Counties: Big Sandy crayfish.

28. Upper Guyandotte Watershed: Guyandotte River including tributaries: Barkers Creek, Big Cub Creek, Brier Creek, Buffalo Creek, Clear Fork, Elk Creek, Gilbert Creek, Horsepen Creek, Huff Creek, Indian Creek, Island Creek, Laurel Fork of Clear Fork, Little Huff Creek, , Pinnacle Creek, Rockcastle Creek, Rum Creek, Slab Fork, Still Run, Stonecoal Creek, Tommy Creek, and Turkey Creek: Logan, Mingo, Raleigh, and Wyoming Counties: Guyandotte River crayfish.

29. West Fork Little Kanawha River: Calhoun, Roane, and Wirt Counties: Snuffbox.

U.S. Army Corps of Engineers Pittsburgh District

30. Back Creek: Berkeley County: Harperella.

31. Cacapon River: Morgan County: Harperella.

32. Dunkard Creek: Monongalia County: Snuffbox.

33. Fish Creek: Marshall County: Snuffbox.

34. Fishing Creek: Wetzel County: Snuffbox. Note – the mouth of Fishing Creek at the Ohio River is regulated by the Huntington District.

35. Hackers Creek (of the West Fork River): Harrison and Lewis Counties: Clubshell and snuffbox.

36. Potomac River: Morgan County (from the mouth of the Cacapon River to the mouth of Sleepy Creek): Harperella.

37. Sleepy Creek: Morgan County: Harperella.

38. West Fork River: Harrison, Lewis, and Marion Counties: Snuffbox and clubshell.

39. Streams, springs, and wetlands connected to the groundwater system including caves, areas near sinkholes, and other groundwater/surface interfaces, from the Potomac River west to Opequon Creek, especially in the Rippon and Leetown Areas, and the Evitts Run Watershed: Jefferson and Berkeley Counties: Madison Cave isopod.

40. Wetlands: Berkeley and Hardy Counties: Northeastern bulrush.

Please also note that freshwater mussels which are not federally listed are protected and managed by the State of West Virginia, Division of Natural Resources (WVDNR). Non-listed freshwater mussels may occur in the streams listed above as well as additional streams throughout the State. For information on the distribution of freshwater mussel species and their protections contact the WVDNR at (304) 637-0245.

EXHIBIT
5

DECISION DOCUMENT
NATIONWIDE PERMIT 21

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 impacts, 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

Surface Coal Mining Operations. Discharges of dredged or fill material into waters of the United States associated with surface coal mining and reclamation operations provided the activities are already authorized, or are currently being processed as part of an integrated permit processing procedure, by the Department of Interior (DOI), Office of Surface Mining (OSM), or by states with approved programs under Title V of the Surface Mining Control and Reclamation Act of 1977.

Notification: The permittee must submit a pre-construction notification to the district engineer and receive written authorization prior to commencing the activity. (See general condition 27.) (Sections 10 and 404)

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 Authority

- 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 minimal adverse effects on the aquatic environment and generally comply with the related laws cited in 33 CFR 320.3. Activities that result in more than minimal adverse effects on the aquatic

environment, individually or cumulatively, cannot be authorized by NWPs. Individual review of each activity authorized by an NWP will not normally be performed, except when preconstruction 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; and the Magnuson-Stevens Fishery and Conservation and Management 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 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 17 and 18). General condition 15 restricts the use of NWPs for activities that are located in Federally-designated wild and scenic rivers. None of the NWPs authorize artificial reefs. General condition 24 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 which may result in discharges of dredged or fill material 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 September 26, 2006, Federal Register notice, refer to the preamble in the Federal Register notice announcing the reissuance of this NWP. The substantive comments received in response to the September 26, 2006, Federal Register notice were used to improve the NWP by changing NWP terms and limits, notification requirements, and/or NWP general conditions, as necessary.

We proposed to change the title of this NWP. We also proposed allowing authorization of projects by this NWP that were currently being processed as part of an integrated permit processing procedure in lieu of an authorization from the Department of Interior, Office of Surface Mining (OSM) or by states with approved programs under Title V of the Surface Mining Control and Reclamation Act (SMCRA) of 1977. The Corps, the Environmental Protection Agency, OSM, and the U. S. Fish and Wildlife Service entered into a Memorandum of Understanding on February 8, 2005. This MOU envisioned a collaborative process in which the SMCRA authority chooses to be the lead agency in coordinating interagency review of applications for surface coal mining operations while preserving the authorities and responsibilities of each agency for permit decisions.

We believe there may be some confusion regarding the intent of the term "surface" coal mining operations. The Corps did not intend to restrict use of this NWP to only a particular type of coal mining technique. Any coal mining activities can be considered for

authorization under NWP 21 to the extent the activities occur on the surface of the land. In particular, while discharges associated with underground coal mining activities now require authorization under NWP 50 rather than NWP 21, surface processing activities associated with underground coal mining may still be authorized by this permit provided they meet the conditions for its use.

There were numerous comments regarding limitations on NWP 21. A number of commenters recommended limits on the length of stream that could be filled under NWP 21, and other commenters recommended an overall limit on impacts to waters of the United States of 1/2 acre. One commenter suggested that the threshold limits should be 2 acres and 1,500 linear feet. Three commenters recommended a 300 linear foot limit on filling streams and a 1/2 acre limit on impacts to all waters, and that these impacts could not be waived by the district engineer. Two other commenters concurred with the 300 foot limit but also suggested not allowing the use of NWP 21 in watersheds where the cumulative amount of filled streams was already causing more than minimal harm. Several commenters stated that any linear foot limits should apply to all streams, ephemeral, intermittent, and perennial. One commenter said that this NWP should not authorize discharges into perennial streams. Another commenter stated that the use of NWP 21 should not be allowed if more than 10 percent of the headwater streams in the watershed had been filled or otherwise degraded. One commenter stated that a 250-acre watershed limit was appropriate but that drainage areas was not the only factor that should be considered in determining if a project should qualify for NWP 21.

There were also a substantial number of comments that objected to limitations on NWP 21. Many commenters stated that acreage limits that may be appropriate for eastern states would not be appropriate for western states and would be unnecessarily restrictive. Two commenters suggested issuing two versions of NWP 21, one for the western United States and another for the eastern United States. They discussed the differences in mining and reclamation techniques and believed the Corps should recognize these differences by establishing two NWPs for coal mining. One commenter noted that acreage limits need to be larger for the western United States. A number of commenters suggested that regional conditions could be used to address the issue of limits. Several commenters noted that there was no compelling scientific or environmental basis or rationale to establish limits on NWP 21. They noted that due to hydrologic, climatic, and ecological variations, there was no defensible way to establish a specific threshold below which impacts could be said to be "minimal" across the vastly differing geographical and hydrological regimes where mining occurs. Several commenters stated that arbitrary and unnecessary thresholds would slow the permit process and result in a loss of coal production, which could be construed as a "takings" that violated substantive due process rights. Other commenters noted that limiting the use of NWP 21 would result in a loss in royalty and tax revenues and increases to the cost of the nation's energy supply by restricting coal production. One commenter noted that it would take more of the Corps' limited resources to review surface mining projects as individual permits. One commenter stated that thresholds would also impact the Corps' ability to comply with Executive Order 13212, which requires federal agencies to expedite their review of permits for energy related projects. One commenter noted that if a 2-acre

limit were established for NWP 21, more than 60 percent of the nation's coal production would not be eligible for the NWP. One commenter stated that a 3-acre limit in the western United States would have a significant impact on Western mining operations. One commenter noted that if a limit of less than 50 acres was adopted, the Corps' would not achieve its goal of focusing its limited resources on projects that have the potential for more environmentally damaging adverse effects. Two commenters believed safeguards were in place to ensure impacts do not cause more than minimal individual or cumulative effects. They noted that general condition 20, Mitigation, requires compensatory mitigation to offset the adverse effects to the aquatic environment, and that there was no need for arbitrarily chosen acreage limits because the mitigation requirement counterbalances all adverse effects.

This NWP is used to provide section 404 authorization for surface coal mining activities that have also been authorized by the Office of Surface Mining or states with approved programs under Title V of the Surface Mining Control and Reclamation Act (SMCRA). Previously, there have been no limits associated with impacts to waters of the United States for NWP 21. This was based partly on the belief that the analyses and environmental protection performance standards required by SMCRA in conjunction with the pre-construction notification requirement, are generally sufficient to ensure that NWP 21 activities result in minimal individual and cumulative adverse impacts on the aquatic environment.

Furthermore, we believe the change in NWP 21 in 2002, which requires not only notification to the Corps for all projects that may be authorized by this permit but also explicit authorization from the Corps before the activity can proceed, has strengthened the environmental protection for projects authorized by this permit. One commenter requested that this requirement be removed from this NWP. However, we continue to believe that this 2002 change helps ensure that no activity authorized by this permit will result in greater than minimal adverse impacts, either individually or cumulatively, on the aquatic environment, because it requires a case-by-case review of each project. If the district engineer determines through this case-by-case review that the activity has the potential to result in more than minimal adverse effects to the aquatic environment, he or she can exercise discretionary authority to require an individual permit. Also, because of the case-by-case review and the requirement for written verification, we do not agree that it is necessary to prohibit discharges of dredged or fill material into perennial streams.

Lastly, the Corps recognizes that there are vast differences in coal mining techniques not only between the western and eastern parts of the United States, but also within the Illinois Coal Basin and the Appalachian Coal Fields themselves. There are also considerable differences in geological, topographical, climatological, hydrological and ecological regimes in the areas where coal resources are located across the United States. Furthermore, no specific scientific or environmental basis for determining a uniform national limit on NWP 21 was submitted for consideration. As noted above, there were several comments suggesting specific limits but no ecological rationale was supplied to support these specific limits. Several commenters did submit information from the Programmatic Environmental Impact Statement (PEIS) for mountaintop mining/valley fill. However, the PEIS did not

support or determine appropriate limits for NWP 21. Based on these considerations along with the fact that the impacts to waters vary greatly depending on the mining techniques and the environmental factors in the area, we have determined that establishing a specific threshold limit would not be practical on a national basis. We believe that regional conditions, as appropriate, and site-specific review of each pre-construction notification will ensure that NWP 21 authorizes activities with no more than minimal adverse effects on the aquatic environment, individually and cumulatively. The Corps has determined that it is both efficient and environmentally protective to issue an NWP 21 that can be used to authorize most activities that have no more than minimal adverse effects on the aquatic environment and allow division engineers to establish regional conditions that determine appropriate limits for impacts to waters based on the functions and values of aquatic resources within their division.

There were three commenters who noted that the division engineer has the discretion to add regional terms and conditions to NWP 21 and that acreage limitations should be determined at the regional level. The Corps agrees, based on the discussion above regarding limitations, that regional conditions are the best way to address regional concerns regarding surface coal mining activities and NWP 21. Division engineers can add regional conditions to any NWP to further restrict the use of the NWP to ensure that the NWP authorizes only activities with no more than minimal adverse effects on the aquatic environment in a particular watershed or other geographic region. The division engineer cannot modify the NWP by adding regional conditions to make the NWP less restrictive (see 33 CFR 330.1(d)). The use of regional conditions recognizes that functions and values of aquatic resources differ greatly across the country.

Three commenters noted that NWP 21 allows the Corps to exercise discretionary authority during the pre-construction notification review process for any project which has the potential to cause more than minimal individual and cumulative adverse impacts on the aquatic environment.

We agree with these commenters. The pre-construction notification requirements of all NWPs allows for a case-by-case review of activities that have the potential to result in more than minimal adverse effects to the aquatic environment. If the adverse effects on the aquatic environment are more than minimal, then the district engineer can either add special conditions to the NWP authorization to ensure that the activity results in no more than minimal adverse environmental effects or exercise discretionary authority to require an individual permit. While many NWPs allow the permittee to assume authorization if he or she has not heard back from the Corps within 45 days of submitting a complete pre-construction notification, NWP 21 requires written verification before the project can proceed. This ensures that adequate time is available to the Corps to review the extensive documentation that pre-construction notifications for NWP 21 often include, coordinate with other agencies as necessary, and determine whether exercise of discretionary authority is necessary to ensure no more than minimal effects.

One commenter stated that the scope of analysis for NWP 21 review should extend beyond

the effects of fills in waters. Another commenter noted that the Clean Water Act is clear that general permits may only be issued if the permitted activities have minimal impacts on the environment as a whole and not just the aquatic environment.

Several commenters stated that NWP 21 should not be reissued, in order to protect wildlife habitat, outdoor recreation, the quality of life in rural communities and environmental integrity. A myriad of comments were received itemizing impacts related to authorizations associated with NWP 21. These impacts included irreversible damages to the American people, the destruction of lives and the natural and cultural heritage of Appalachia, Montana and Wyoming, loss of hunting opportunities, the exploitation of impoverished areas by large corporations, global warming, landslides, blasting, truck traffic on roads not designed or built to handle heavy loads, harm to bird populations, destruction of valuable hardwood trees, loss of medicinal plants, affects on the tourism/vacation home industry, and local sickness. Several commenters stated that mined areas cannot be restored to pre-mining conditions, such as native forest. Several commenters expressed concern about coal slurry damaging downstream areas.

All of these impacts are outside of the Corps' scope of analysis pursuant to the National Environmental Policy Act (NEPA). The Corps evaluation of coal mining activities is focused on impacts to aquatic resources. Mining in general is permitted under a separate Federal law, the Surface Mining Control and Reclamation Act. Impacts associated with surface coal mining and reclamation operations are appropriately addressed by the Office of Surface Mining or the applicable state agency. Under these circumstances, the Corps' NEPA implementing regulations clearly restrict the Corps' scope of analysis to impacts to aquatic resources.

Several commenters supported the Memorandum of Understanding (MOU) between the EPA, Corps, OSM and the USFWS regarding the integrated permit process for coal mining mentioned in the proposed NWP language. Some suggested the integrated permit process along with the Standard Operating Procedure (SOP) for NWP 21 be mandatory under NWP 21. Some commenters stated that the integrated permit process does not eliminate the dual review of section 404 and SMCRA as the MOU intended, while other commenters stated that the integrated permit process was unlawful because through it, the Corps has delegated its section 404 authority to the states processing the SMCRA permit applications. One of the commenters supporting the MOU stated that the current integrated permit process did not meet the goal of the MOU, as evidenced by its failure in Ohio, since dual reviews were still being undertaken by the regulatory agencies.

The MOU recommends that Federal and state agencies coordinate reviews of coal mining permit applications, with the SMCRA agency as the lead agency. Currently, in areas that have developed or are in the process of developing an integrated permit process, the agencies have elected to make the process voluntary. The integrated permit process does not eliminate the regulatory responsibilities of the participating agencies, but allows the various permit applications to be reviewed concurrently while utilizing information from one application to fulfill required sections of other applications, where appropriate. The process

allows for timelier reviews while providing the framework for better environmental protection. The Ohio integrated permit process is still in use for those who choose to use it.

Several commenters suggested that a state programmatic or regional general permit or other methods (e.g., a national MOU) be developed to reduce the duplication of effort by the regulatory agencies, therefore reducing cost and delays in receiving authorizations.

State programmatic and regional general permits are developed at the district level. The Corps supports and participates in such efforts where possible.

Several commenters stated that coal mining is the most environmentally regulated activity, and SMCRA, along with Sections 401 and 402 of the Clean Water Act, already require analyses of all of the factors addressed under Section 404 of the Clean Water Act. Therefore, as the above-referenced programs already regulate impacts to aquatic resources, including impacts related to water quality, endangered species, historic properties, and the hydrologic regime, further review by the Corps only creates an additional administrative burden without any real benefits.

The Corps understands coal mining is covered by many environmental regulations; however the Corps has determined that SMCRA, in its current form, does not remove the need, either legally or substantively, for independent authorization under Section 404 of the Clean Water Act. Consequently, this NWP does not duplicate the SMCRA permit process. The Corps continues to work with the other agencies to avoid potential duplication of efforts and uses appropriate work and studies done by or for other agencies (e.g., surveys/findings under the Endangered Species Act or Section 106 of the National Historic Preservation Act as well as SMCRA permit documentation) in its analysis of the proposed project.

Several commenters stated that mitigation done for NWP 21 is scientifically indefensible and, absent such mitigation, the projects authorized under NWP 21 have more than minimal adverse effect and are therefore impermissible. They stated that current mitigation projects have so far been unsuccessful and referenced a court case in the Southern District of West Virginia (Ohio Valley Environmental Coalition v. Bulen), where they noted that a Corps official stated that he did not know of a single instance of successful headwater stream creation. Also, the commenters stated that the Corps did not include any specific guidelines for how to assess stream function in order to determine the adequacy of compensatory mitigation. They also stated that the Corps has not shown that mitigation will offset the impacts authorized under NWP 21 or that off-site enhancement of streams would fully compensate for functions of streams that are destroyed. Other commenters stated that the Corps mistakenly allows the mitigation requirements of SMCRA and state water quality laws to satisfy the independent requirements of Section 404 of the Clean Water Act. They stated that allowing a permittee to claim a compensatory mitigation or reclamation activity already required under SMCRA as compensatory mitigation under the Clean Water Act is "double-counting" and improperly blurs the requirements of sequencing (i.e., avoidance, minimization, mitigation) imposed under the 404(b)(1) guidelines. Other commenters recommended that mitigation of 1:1 should be required in order to achieve no net loss, and

that mitigation also be required for potential, as well as actual, impacts. Several commenters stated that final reclamation of wetland habitat will most likely exceed the required compensatory mitigation.

In order to ensure that an activity results in no more than minimal adverse effect on the aquatic environment, the Corps will add permit conditions that require compensatory mitigation that meets specified success criteria. The Corps will generally require the permittee to monitor the mitigation site for five years and, if the mitigation site does not meet the success criteria at that time, remediation or additional mitigation will be required. This ensures that the authorized activity will not result in a net loss in aquatic functions. The Corps has increased its compliance efforts to ensure that projects authorized by DA permits are constructed as authorized and that mitigation is successful.

We are currently developing new stream functional assessment protocols to identify and quantify the functions lost through authorized impacts and the functions gained or enhanced through mitigation. We removed the language from the proposed NWP 21 that required the applicant to furnish a SMCRA or state-approved mitigation plan. The Corps recognizes that SMCRA does not require "mitigation" per-se, but does require "reclamation/restoration", and that some states require "mitigation" above Corps requirements. The Corps coordinates with the SMCRA and state resource agencies to achieve appropriate aquatic restoration on mine sites, which can reduce or eliminate off-site compensatory mitigation needs. The Corps does not consider this "double-counting", because the areas restored are only counted once in the replacement of aquatic resource functions. As long as the functions lost as a result of the permitted activity are mitigated through the onsite restoration or enhancement, it does not matter if the restoration also meets other goals unrelated to the Section 404 impacts. General condition 20 establishes the framework for achieving no net loss of waters/wetlands, as well as the sequential review of mitigation on-site. The Corps takes into account the fact that, in certain areas and circumstances, any Corps compensatory mitigation requirement may be fully encompassed or exceeded by requirements under other authorities. As long as the impacts to the aquatic environment are fully mitigated, the Corps will not require additional compensation.

Several commenters requested that NWP 21 be withdrawn and that the Corps consider authorizations under state or regional permits where cumulative impacts and mitigation measures can be evaluated on a more focused level that assures minimal impacts on the environment.

Division and district engineers have the authority to revoke or modify any or all of the NWPs and require authorizations for proposed projects by other general permits or individual permits. This should be determined on a local level.

Several commenters stated that the burial or other degradation of hundreds of miles of Appalachian streams from mining demands a thorough, independent review, public notice, and analysis of alternatives and minimization, which is provided only through the individual permit process. A few commenters stated that coal mining rearranges the natural landscape

and deserves to be studied on a case-by-case basis. One commenter stated that each project should be independently evaluated with proper safeguards in place to include meaningful bonds that would be sufficient to cover remediation costs when companies declare bankruptcy.

A careful case-specific determination that a project will result in no more than minimal impacts is necessary for a project to be authorized by this NWP. The pre-construction notification process for NWP 21, which requires the applicant to wait until he or she receives verification from the Corps, provides this case-specific determination. If the District Engineer determines that a particular proposal will result in more than minimal adverse environmental effects, he will assert discretionary authority and require an individual permit. Bonding is covered under general condition 20. The Corps notes that the SMCRA permitting process provides for public notice and comment on all coal mining permits.

A few commenters stated that the Secretary of the Army can only issue NWPs by making an up-front determination that the activities authorized by each NWP category will cause only minimal adverse effects and the Corps cannot ignore harm already done when assessing cumulative impacts. The commenters stated that the Corps has no reasoned basis or substantial evidence to support its determinations that the individual or cumulative environmental impacts associated with NWP 21 will be minimal. Several commenters similarly stated that compensatory mitigation could not be used to reduce the net adverse impacts to the minimal level in order to qualify for general permits. Therefore, NWP 21 exceeds the definition of minimal adverse environmental effects and all coal mining should be reviewed under the individual permit process. A number of commenters stated that surface coal mining results in significant ecological damage to headwater stream systems, when considered both individually and cumulatively, and it cannot be reasonably assumed that those stream losses can be mitigated into insignificance.

We believe our process for NWP 21 ensures that activities authorized by the NWP result in no more than minimal adverse impacts to the aquatic environment because each project is reviewed on a case-by-case basis and the district engineer either makes a minimal impacts determination on the project or asserts discretionary authority and requires an individual permit. Additionally, as noted above, division engineers can add regional conditions to any NWP to further restrict the use of the NWP to ensure that the NWP authorizes only activities with no more than minimal adverse effects on the aquatic environment in a particular watershed or other geographic region. Each district tracks losses of waters of the United States authorized by Department of the Army permits, including NWPs, as well as compensatory mitigation achieved through aquatic resource restoration, creation, and enhancement.

In addition, we believe that the Corps can rely on mitigation in making a minimal adverse environmental effects determination.

One commenter requested that the Corps clarify what constitutes a "single and complete

surface coal mining operation" since approved mines can expand through either the addition of substantial acreages or the addition of small acreages (incidental boundary revisions). This commenter asked whether all revisions, including incidental boundary revisions, are considered as single and complete coal mining operations.

District engineers use the criteria in the definition of "single and complete project," which is found in the "Definitions" section of the NWPs, when identifying single and complete coal mining operations. District engineers will determine, on a case-by-case basis, whether the expansion of an existing mine constitutes a separate single and complete project.

Many commenters opposed the reissuance of NWP 21 because of the potential impacts to the aquatic environment and water resources. Several commenters expressed concerns about impacts to water supplies and drinking water, downstream water uses, and recreational opportunities such as fishing. Concerns were also expressed about water pollution, the effects of burying streams that support aquifers, and loss of streams and wetlands. This NWP requires compliance with all of the general conditions for the NWPs, which address many of these concerns. Additionally, many of these factors will be evaluated during the project-specific evaluation.

One commenter noted that NWP 21 does not provide the public an opportunity to comment on the specific conditions of a permit that will affect their communities and watersheds.

Section 404(e) of the Clean Water Act provides the statutory authority for the issuance of general permits on a nationwide basis for any category of activities. The Corps establishes NWPs in accordance with section 404(e), by publishing and requesting comments on the proposed permits. The general public has the opportunity to comment on NWPs at this time. In order to address the requirements of the National Environmental Policy Act, the Corps prepares a decision document for each NWP along with a 404(b)(1) Guidelines analysis. The decision document discusses the anticipated impacts on the Corps' public interest factors from a national perspective. NWPs are issued at the conclusion of this process. The individual projects that are proposed for authorization under an NWP are not given a permit but a verification or authorization that the project complies with an NWP. There are no requirements for public comments on specific projects authorized under NWPs. However, in the case of NWP 21, all projects must have undergone a separate SMCRA review process the provides for public notice and comment.

Several commenters recommended that NWP 21 be eliminated because it fails to require that the applicant demonstrate that there are no practicable alternatives to placing fill in waters of the United States, a requirement of Section 404(e) of the Clean Water Act. The commenters stated that the Corps wrongly assumes the SMCRA process to be comparable to Section 404 and the 404(b)(1) Guidelines. The commenters noted that, in fact, SMCRA does not require the applicant to choose the method of coal waste management that avoids and minimizes impacts and is least damaging to waters of the United States.

The Corps does not assume that other state or Federal agencies conduct a review that is

comparable to the section 404(b)(1) Guidelines. Although analysis of offsite alternatives is not required in conjunction with general permits, each proposed project is evaluated for onsite avoidance and minimization, in accordance with general condition 20, and is not authorized under the NWP if the adverse impacts to waters of the United States are more than minimal.

Five commenters noted that coal slurry impoundments should not be allowed by an NWP and that NWPs can only be issued for activities that are similar in nature and that valley fills and coal slurry impoundments are not similar in nature.

The Corps has determined that slurry impoundments and valley fills are part of surface coal mining activities and are therefore similar in nature. The "similar in nature" requirement does not mean that activities authorized by an NWP must be identical to each other. We believe the "categories of activities that are similar in nature" requirement of Section 404(e) is to be interpreted broadly, for practical implementation of the NWP program.

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 minimal adverse effects on the aquatic environment, individually or cumulatively. 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 minimal adverse effects on the aquatic environment, 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 minimal individual or cumulative adverse effects on the aquatic environment 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 work 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 minimal adverse effects on the aquatic environment. 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 authorize activities that result only in minimal adverse effects on the aquatic environment, individually or cumulatively. 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 discharges of dredged or fill material into waters of the United States associated with surface coal mining and reclamation operations authorized by the Department of the Interior's Office of Surface Mining or states with approved programs under Title V of the Surface Mining Control and Reclamation Act of 1977, provided those activities have minimal adverse effects on the aquatic environment. This NWP also authorizes surface coal mining operations being processed under integrated permit processing procedures. The Corps has considered alternative terms and applicable waters for this NWP, as well as modifying or adding NWP general conditions, as discussed in the preamble of the Federal Register notice announcing the issuance of this NWP.

In the September 26, 2006, Federal Register notice, the Corps requested comments on the proposed reissuance of this NWP. The Corps proposed to change this NWP by including activities authorized through integrated permit processing procedures developed in response to the Joint Procedures Framework Memorandum of Understanding that was signed by the Corps, U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, and the Office of Surface Mining on February 8, 2005.

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 effects on the aquatic environment, especially in high value or unique wetlands and other waters.

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 effects on the aquatic environment. 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 effects on the aquatic environment resulting from regulated activities. When conducting such assessments, division and district engineers can only consider those activities regulated by the Corps under Section 10 of the Rivers and Harbors Act, Section 404 of the Clean Water Act, and Section 103 of the Marine Protection, Research, and Sanctuaries Act of 1972. Adverse impacts resulting from activities outside of the Corps scope of review, such as the construction or expansion of upland developments, cannot be considered in the Corps analysis of cumulative adverse effects on the aquatic environment.

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 minimal adverse effects on the aquatic environment, division and district engineers have the authority to impose case-specific special conditions on an NWP authorization to ensure that the authorized work will result in minimal adverse effects.

General condition 20 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 effects on the aquatic environment are minimal. As another example, the NWP authorization can be conditioned to prohibit the permittee from conducting the work during specific times of the year to protect spawning fish and shellfish. If the proposed work will result in more than minimal adverse effects on the aquatic environment, 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

The affected environment consists of terrestrial and aquatic ecosystems. The total land area in the contiguous United States is approximately 1,930,000,000 acres (Dahl 2006). Alaska is 366,050,000 acres in size and Hawaii is 4,110,720 acres in size (source: http://www.usgs.gov/state/ , accessed July 25, 2005). Terrestrial ecosystems comprise more than 93 percent of the contiguous United States and most are abundant compared to aquatic ecosystems, which make up the remainder (Dahl 2006). 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).

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 2006) (see also http://www.fgdc.gov/standards/projects/FGDC-standards-projects/wetlands/fgdc-announce , accessed April 3, 2006). 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 vegetation type, soils, and 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.

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 coastline. 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 2006).

The Emergency Wetlands Resources Act of 1986 (Public Law 99-645) requires the USFWS to submit wetland status and trends reports to Congress (Dahl 2006). The latest status and trends report, which covers the period of 1998 to 2004, is summarized in Table 3.1.

Table 3.1. Estimated aquatic resource acreages in the conterminous United States in 2004 (Dahl 2006).

Aquatic Habitat Category	Estimated Area in 2004 (acres)
Marine	128,600
Estuarine intertidal non-vegetated	600,000
Estuarine intertidal vegetated	4,571,700
All intertidal waters and wetlands	5,300,300
Palustrine non-vegetated	6,633,900
Palustrine vegetated	95,819,800
• Palustrine emergent wetlands	26,147,000
• Palustrine forested wetlands	52,031,400
• Palustrine shrub wetlands	17,641,400
All palustrine aquatic habitats	102,453,700
Lacustrine deepwater habitats	16,773,400
Riverine deepwater habitats	6,813,300
Estuarine subtidal habitats	17,717,800
All aquatic habitats	149,058,500

The acreage of lacustrine deepwater habitats does not include the open waters of Great Lakes (Dahl 2006).

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) (2003) 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. The land use determined by 2003 NRI is summarized in Table 3.2. The 2003 NRI estimates that there are 110,760,000 acres of palustrine and estuarine wetlands on non-Federal land and water areas

in the United States (NRCS 2003).

Table 3.2. The 2003 National Resources Inventory acreages for palustrine and estuarine wetlands on non-federal land, by land cover/use category (NRCS 2003).

National Resources Inventory Land Cover/Use Category	Area of Palustrine and Estuarine Wetlands (acres)
cropland, pastureland, and Conservation Reserve Program land	16,730,000
forest land	65,440,000
rangeland	7,740,000
other rural land	15,800,000
developed land	1,590,000
water area	3,460,000
Total	110,760,000

The land cover/use categories used by the 2003 NRI are defined below (NRCS 2003). Croplands are areas used to produce crops adapted 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.

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, by stream order. This estimate does not include many small streams. Many small streams are not mapped on 1:24,000 scale U.S. Geological Survey topographic maps (Leopold 1994) or included in other analyses (Meyer and Wallace 2001). In a study of stream mapping in the southeastern United States, only 20% 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). For a 1:24,000 scale topographic map, the smallest tributary found by using 10-foot contour interval has drainage area of 0.7 square mile and length of 1,500 feet, and smaller channels are common throughout the United States (Leopold 1994). 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 may be classified as "waters of the United States."

The USFWS status and trends study does not assess the condition or quality of wetlands and deepwater habitats (Dahl 2006). The Nation's aquatic resource base is underestimated by the USFWS status and trends study, the National Wetland Inventory (NWI), and studies that estimate the length or number of stream channels within watersheds (see above). The 2006 status and trends study does not include Alaska and Hawaii. The underestimate by the status and trends study and the NWI results from the minimum size of wetlands detected through remote sensing techniques and the difficulty of identifying certain wetland types through those remote sensing techniques. The NWI maps do not show small or linear wetlands (Tiner 1997) that may be directly impacted by activities authorized by NWPs. For the latest USFWS status and trends study, most of the wetlands identified are larger than 2.5 acres, but the minimum size of detectable wetland varies by wetland type (Dahl 2006). Some wetland types less than one acre in size can be identified; the smallest wetland detected for the most recent status and trends report was 0.005 acre (Dahl 2006). Because of the limitations of remote sensing techniques, certain wetland types are not included in the USFWS status and trends study: seagrass beds, submerged aquatic vegetation, submerged reefs, certain types of forested wetlands, and emergent wetlands along the Pacific coast (Dahl 2006). Therefore, 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 of the Nation's aquatic resources are subject to regulatory jurisdiction under Section 404 of the Clean Water Act. Waters of the United States subject to Section 404 of the Clean Water Act are defined at 33 CFR part 328. Some wetlands are not subject to Clean Water Act jurisdiction because they do not meet the criteria at Part 328. In its decision in *Solid Waste County of Northern Cook County v. U.S. Army Corps of Engineers*, 531 U.S. 159 (2001), the U.S. Supreme Court ruled that Clean Water Act jurisdiction does not apply to isolated, intrastate, non-navigable waters based on their use as habitat for migratory birds. Tiner (2003) estimated that in some areas of the country, the proportion of wetlands that are geographically isolated, and may not be subject to Clean Water Act jurisdiction is approximately 20 to 50 percent of the wetland area, and there are other areas where more than 50 percent of the wetlands are geographically isolated. Geographically isolated wetlands comprise a substantial proportion of the wetlands found in regions with arid, semi-arid, and semi-humid climates, as well as areas with karst topography (Tiner 2003). However, it is difficult to determine from maps or aerial photographs whether wetlands are hydrologically isolated from other waters, because there may be small surface hydrologic connections that are not included on those maps or detected by those photographs (Tiner 2003).

This NWP authorizes discharges of dredged or fill material into waters of the United States. Surface coal mining activities typically occur in the palustrine, lacustrine, and riverine systems of the Cowardin classification system.

Wetland functions are the biophysical processes that occur within a wetland (King et al. 2000). Wetlands provide many functions, such as habitat for fish and shellfish, habitat for

waterfowl and other wildlife, habitat for rare and endangered species, food production, plant production, flood conveyance, flood-peak reduction, flood storage, shoreline stabilization, water supply, ground water recharge, pollutant removal, sediment accretion, and nutrient uptake (NRC 1992).

Functions provided by streams include sediment transport, water transport, transport of nutrients and detritus, habitat for many species of plants and animals (including endangered or threatened species), and maintenance of biodiversity (NRC 1992). Streams also provide nutrient cycling functions, food web support, and transport organisms (Allan 1995).

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).

Activities authorized by this NWP will provide goods and services that are valued by society. For example, coal extracted through surface coal mining operations provide energy for a wide range of uses. Energy produced from coal may be converted into electrical energy that is used by residents, businesses, industry, and other entities.

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, the anticipated cumulative effects of those activities, and the potential future losses of waters of the United States that are estimated to occur until the expiration date of the NWP. In the assessment of these individual and cumulative effects, the terms and limits of the NWP, notification requirements, and the standard NWP general conditions are considered. The supplementary 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. 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 or indirect 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 effects on the aquatic environment. 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 activities that may affect endangered or threatened species or critical habitat.

4.2 Impact Analysis

This NWP authorizes discharges of dredged or fill material into waters of the United States for surface coal mining operations that are already authorized by the Office of Surface Mining, approved state agencies, or through integrated permit processing procedures. These operations include contour mining, mountaintop mining, and area mining.

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 adverse effects of those activities on the aquatic environment are 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).

Additional conditions can be placed on proposed activities on a regional or case-by-case basis to ensure that the work has minimal adverse effects on the aquatic environment. 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 minimal individual or cumulative adverse effects on the aquatic

environment, 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 notification thresholds, or require notification for all work in certain watersheds or types of waters. Specific NWPs can also be revoked on a geographic or watershed basis where the adverse 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) impose an acreage limit for the NWP; 3) add regional conditions to the NWP to ensure that the adverse environmental effects are minimal; or 4) for those activities that require notification, add special conditions to NWP authorizations, such as compensatory mitigation requirements, to ensure that the adverse effects on the aquatic environment are minimal. NWPs can authorize activities in high value waters as long as the individual and cumulative adverse effects on the aquatic environment are 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 work 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 Impacts

The cumulative impacts of an NWP generally depends on the number of times the permit is used on a national basis. However, in a specific watershed, division or district engineers may determine that the cumulative adverse effects of activities authorized by NWPs 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 effects. Division and district engineers have the authority to require individual permits where the cumulative adverse effects are more than minimal, or add conditions to the NWP either on a case-by-case or regional basis to ensure that the cumulative adverse effects are minimal. When division or district engineers determine that a geographic area is subject to more than minimal cumulative adverse effects due to the use of the NWPs, they will use the revocation and modification procedure at 33 CFR 330.5. In reaching the final decision, they will compile information on the cumulative adverse effects and supplement this document.

Based on reported use of this NWP during fiscal year 2003 and the period of July 1, 2005 to June 30, 2006, the Corps estimates that this NWP will be used approximately 217 times per year on a national basis, resulting in impacts to approximately 64 acres of waters of the United States, including jurisdictional wetlands. The Corps estimates that approximately 108 acres of compensatory mitigation will be required to offset these impacts. The demand for these types of activities could increase or decrease over the five-year duration of this

NWP. Using the current trend, approximately 1,085 activities could be authorized over a five year period until this NWP expires, resulting in impacts to approximately 320 acres of waters of the United States, including jurisdictional wetlands. Approximately 540 acres of compensatory mitigation would be required to offset those impacts. The required compensatory mitigation will attenuate cumulative impacts on the Nation's aquatic resources, so that the net effects on the aquatic environment resulting from the activities authorized by this NWP will be 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 rather than request individual permits for projects which could result in greater adverse impacts to the aquatic environment.

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 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. The required compensatory mitigation 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: Surface coal mining operations will have positive impacts on local economies. These activities will generate jobs and revenue for local contractors as well as revenue to companies that sell mining equipment and construction materials. The sale of coal extracted from these mines will generate revenue for mining companies. The energy provided by coal-burning power plants will provide power for businesses, including manufacturing industries, as well as residences and recreational facilities. Activities authorized by this NWP will also benefit the community by improving the local economic base, which is affected by employment, tax revenues, community services, and property values.

(c) Aesthetics: Surface coal mining operations will alter the visual character of some waters of the United States. The extent and perception of these changes will vary, depending on the size and configuration of the mining operations and any associated fills, the nature of the surrounding area, and the public uses of the area. Activities authorized by this NWP can also modify other aesthetic characteristics, such as air quality and the amount of noise. The increased human use of the project area and surrounding land will also alter local aesthetic values.

(d) General environmental concerns: Activities authorized by this NWP will affect general environmental concerns, such as water, air, noise, and land pollution. The authorized work 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 20 requires mitigation to minimize adverse effects to the aquatic environment through avoidance and minimization at the project site. Compensatory mitigation required by district engineers will ensure that the net adverse effects on the aquatic environment are minimal. Specific environmental concerns are addressed in other sections of this document.

(e) Wetlands: Surface coal mining operations may result in the destruction of wetlands. In most cases, the affected wetlands will be permanently filled, especially where rocks and soil from mining operations are deposited, resulting in the permanent loss of aquatic resource functions and values. Wetlands may also be converted to other uses and habitat types. Some wetlands may be temporarily impacted by the work through the use of temporary staging areas and access roads. These wetlands will be restored, unless the district engineer authorizes another use for the area, but the plant community may be different, especially if the site was originally forested. Compensatory mitigation may be required to offset the loss of wetlands and ensure that the adverse effects to the aquatic environment are minimal. Reclamation activities may also result in the restoration of wetlands.

Wetlands provide habitat, including foraging, nesting, spawning, rearing, and resting sites for aquatic and terrestrial species. The destruction 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.

General condition 20 requires avoidance and minimization of impacts to waters of the United States, including wetlands, at the project site. Compensatory mitigation required by district engineers will ensure that the net adverse effects on the aquatic environment are minimal. General condition 19 prohibits the use of this NWP to discharge dredged or fill material in designated critical resource waters and adjacent wetlands, which may include high value wetlands. Division engineers can regionally condition this NWP to restrict or prohibit the use of this NWP in high value wetlands. District engineers will also exercise discretionary authority to require an individual permit if the wetlands to be filled are high value and the work will result in more than minimal adverse effects on the aquatic environment. 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 18 states that in cases where the district engineer determines that the activity may affect properties listed, or eligible for listing, in the National Register of Historic Places, the activity is not authorized, until the requirements of Section 106 of the National Historic Preservation Act have been satisfied. Reviews required under the Surface Mining Control and Reclamation Act will also ensure compliance with the National Historic Preservation Act.

(g) Fish and wildlife values: This NWP authorizes activities in waters of the United States, including streams and wetlands, which provide habitat to many species of fish and wildlife. Activities authorized by this NWP may alter the habitat characteristics of streams and wetlands, decreasing the quantity and quality of fish and wildlife habitat. 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. Woody riparian vegetation shades streams, which reduces water temperature fluctuations and provides habitat for fish and other aquatic animals. Riparian vegetation provides organic matter that is consumed by fish and aquatic invertebrates. Woody riparian vegetation creates habitat diversity in streams when trees and large shrubs fall into the channel, forming snags that provide habitat and shade for fish. The morphology of a stream channel may be altered by activities authorized by this NWP, which can affect fish populations. However, notification is required for all activities authorized by this NWP, which provides the district engineer with an opportunity to review the proposed work and assess potential impacts on fish and wildlife values and ensure that the authorized activity results in minimal adverse effects on the aquatic environment. The district engineer must verify in writing that the proposed work will result in minimal adverse effects on the aquatic environment, individually and cumulatively. Compensatory mitigation required by district engineers to restore, enhance, establish, and/or preserve wetlands and other aquatic habitats will offset losses of waters of the United States, and provide fish and wildlife habitat. The establishment and maintenance of 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 necessary life cycle movements 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 work has minimal adverse effects on spawning areas and shellfish beds, respectively. The authorized work cannot have more than minimal adverse effects on breeding areas for migratory birds, due to the requirements of general condition 4.

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 minimal adverse effects on essential fish habitat.

(h) Flood hazards: The activities 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 the activity to comply with applicable FEMA-approved state or local floodplain management requirements. The requirements of general condition 10 will help ensure that the activities authorized by this NWP will have minimal adverse effects on flood hazards. 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 floodplains, 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. All activities authorized by this NWP require pre-construction notification, so that district engineers can review the proposed work on a case-by-case basis to ensure that those activities result in minimal adverse effects on the aquatic environment.

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 20 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 20 will help ensure that the adverse effects of these activities on floodplain values are minimal. 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: Activities authorized by this NWP will change land use. The mining of coal and the deposition of rock and soil from the mining operation will change the character of the land. Reclamation required for activities authorized by this NWP will restore natural land uses. 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 must comply with general condition 1, which states that no activity may cause more than minimal adverse effects on navigation. This NWP requires pre-construction notification for all activities, which will allow district

engineers to review the proposed work and determine whether adverse effects on navigation will be minimal.

(l) Shore erosion and accretion: The activities authorized by this NWP will have minor direct effects on shore erosion and accretion processes, since surface coal mining operations are usually located on inland areas. NWP 13, regional general permits, or individual permits may be used to authorize bank stabilization projects associated with surface coal mining activities, which may affect shore erosion and accretion.

(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 may no longer be available in the area during the mining operation, but these activities may resume after the mined area has been successfully reclaimed. Some surface coal mining operations may permanently eliminate recreational uses of the area.

(n) Water supply and conservation: Activities authorized by this NWP may adversely affect both surface water and groundwater supplies. Surface coal mining operations may increase the demand for potable water in the region. The deposition of rock and soil from surface coal mining operations may alter groundwater recharge areas, which could decrease replenishment of groundwater supplies. Surface water flow patterns may be affected by the authorized work. Activities authorized by this NWP can also affect the quality of water supplies by adding pollutants and toxic chemicals to surface waters and groundwater, but many causes of water pollution, such as discharges regulated under Section 402 of the Clean Water Act, are outside the Corps scope of review. The quantity and quality of local water supplies may be enhanced through the construction of water treatment facilities. 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. Compensatory mitigation may be required for activities authorized by this NWP, which will help maintain or improve the quality of surface waters.

(o) Water quality: Surface coal mining operations in wetlands and open waters will have adverse effects on water quality. These activities can cause increases in nutrients, sediments, and pollutants in the water. The loss of wetland and riparian vegetation will 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. 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 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 the work does not have more than minimal adverse effects on the aquatic environment, including water quality. Wetlands and riparian areas restored, established, enhanced, or

preserved as compensatory mitigation will provide local water quality benefits.

During surface coal mining operations, small amounts of oil and grease from mining and construction equipment may be discharged into the waterway. 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, because 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. The Office of Surface Mining or the state mining agency may require the permittee to implement water quality management measures that minimize the degradation of the downstream aquatic environment, including water quality. The establishment and maintenance of riparian areas may be required for activities authorized by the NWP, if there are streams or other open waters on the project site. The riparian areas will protect downstream water quality and enhance the aquatic habitat.

(p) Energy needs: During the mining operation, the activities authorized by this NWP may increase energy consumption in the area, especially electricity, natural gas, and petroleum products. The coal extracted from mines will be used to fuel power plants, thereby providing energy to people. Existing infrastructure may have to be expanded to distribute the electricity generated by power plants to cities and other areas.

(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 may adversely affect food and fiber production, especially where rock and soil from surface coal mining operations are deposited in farm fields. The use of farmland for the disposal of mined material and wastes reduces the amount of available agricultural land in the nation, unless that land is replaced by converting other land, such as forest, to agricultural land. The loss of farmland is more appropriately addressed through the land use planning and zoning authority held by state and local governments.

(s) Mineral needs: Activities authorized by this NWP may increase demand for aggregates and stone, which could be used for mining activities. Activities authorized by this NWP may increase the demand for other building materials, such as steel, aluminum, and copper, which are made from mineral ores.

(t) Considerations of property ownership: The NWP complies with 33 CFR 320.4(g), which states that an inherent aspect of property ownership is a right to reasonable private use. The NWP provides expedited DA authorization for activities in waters of the United States for surface coal mining operations, provided the activity complies with the terms and conditions of the NWP and results in minimal adverse effects on the aquatic environment.

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 discharges of dredged or fill material into waters of the United States for surface coal mining activities that have minimal adverse effects on the aquatic environment, individually and cumulatively. These activities satisfy public and private needs for energy. The need for this NWP is based upon the large number of these activities that occur annually with minimal adverse effects on the aquatic environment.

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 20 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 minimal individual and cumulative adverse effects on the aquatic environment and overall public interest. District engineers will exercise discretionary authority and require an individual permit if the proposed work 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 work authorized by the NWP will most likely restrict the extent of the beneficial and detrimental effects to the area immediately surrounding the surface coal mining operation. Activities authorized by this NWP will have minimal adverse effects on the aquatic environment.

The terms, conditions, and provisions of the NWP were developed to ensure that individual and cumulative adverse environmental effects are 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 Clean Water Act Section 404(b)(1) Guidelines Analysis

The 404(b)(1) compliance criteria for general permits are provided at 40 CFR 230.7.

6.1 Evaluation Process (40 CFR 230.7(b))

6.1.1 Alternatives (40 CFR 230.10(a))

General condition 20 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.

6.1.2 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 17 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 6.2.3(j)(1) of this document for further information.

6.1.3 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 6.2.3 of this document. Mitigation required by the district engineer will ensure that the adverse effects on the aquatic environment are 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.

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.

6.1.4 Factual determinations (40 CFR 230.11)

The factual determinations required in 40 CFR 230.11 are discussed in section 6.2.3 of this document.

6.1.5 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 20 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 required by the district engineer will ensure that the net adverse effects on the aquatic environment are minimal.

6.2 Evaluation Process (40 CFR 230.7(b))

6.2.1 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 for surface coal mining operations that are either: (1) authorized by the Office of Surface Mining or states with approved programs under Title V of the Surface Mining Control and Reclamation Act of 1977, or (2) being processed under integrated permit processing procedures. 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 surface coal mining operations) 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 or modification of aquatic habitats, with fills associated with surface coal mining operations, such as valley fills, permanent stream diversions, impoundments, processing plants, and road crossings.

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.

6.2.2 Cumulative effects (40 CFR 230.7(b)(3))

The cumulative effects, including the number of activities likely to be authorized under this NWP, are discussed in section 4.3 of this document. If a situation arises in which 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.

6.2.3 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 replacing the aquatic area with dry land, and changing the physical, chemical, and biological characteristics of the substrate. The original substrate will be removed or covered by other material, such as rock, soil, gravel, etc. Temporary fills may be placed upon the substrate, but must be removed upon completion of the work (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. Notification is required for all discharges, which will allow the district engineer to review each activity and ensure that adverse effects on the aquatic environment are 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: Surface coal mining operations may affect some characteristics of water, such as water clarity, chemical content, dissolved gas concentrations, pH, and temperature. These activities may change the chemical and physical characteristics of the waterbody by

introducing suspended or dissolved chemical compounds or sediments into the water. Changes in water quality can affect the species and quantities of organisms inhabiting the aquatic area. Water quality certification is required for activities authorized by this NWP that result in discharges of dredged or fill material into waters of the United States, which will ensure that the work does not violate applicable water quality standards. Permittees may be required to implement water quality management measures to ensure that the authorized work does not result in more than minimal degradation of water quality. Impoundments may be required to prevent or reduce the input of harmful chemical compounds into the waterbody. The district engineer may require the establishment and maintenance of riparian areas next to open waters, such as streams. Riparian areas help improve or maintain water quality, by removing nutrients, moderating water temperature changes, and trapping sediments.

(d) Current patterns and water circulation: Activities authorized by this NWP may adversely affect the movement of water in the aquatic environment. All activities authorized by this NWP require pre-construction notification to the district engineer, which will help ensure that adverse effects to current patterns and water circulation are minimal. Road crossings within a surface coal mining operation may alter water flow patterns and circulation. General condition 9 requires the authorized activity to be designed to withstand expected high flows and to maintain the course, condition, capacity, and location of open waters to the maximum extent practicable. General condition 10 requires activities to comply with applicable FEMA-approved state or local floodplain management requirements, which will reduce adverse effects to surface water flows.

(e) Normal water level fluctuations: The activities authorized by this NWP will not adversely affect normal patterns of water level fluctuations due to tides and flooding. The activities authorized by this NWP do not occur in tidal waters. To ensure that the NWP does not authorize activities that adversely affect normal flooding patterns, general condition 10 requires NWP activities to comply with applicable FEMA-approved state or local floodplain management requirements. General condition 9 requires the permittee to maintain the pre-construction course, condition, capacity, and location of open waters, to the maximum extent practicable.

(f) Salinity gradients: The activities authorized by this NWP are unlikely to adversely affect salinity gradients.

(g) Threatened and endangered species: The Corps believes that the procedures currently in place result in proper coordination under 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. The Corps also believes that current local procedures in Corps districts are effective in ensuring compliance with ESA.

Under general condition 17, no activity is authorized under any NWP which "may affect" a listed species or critical habitat, unless Section 7 consultation addressing the effects of the

proposed activity has been completed.

Each activity authorized by an NWP is subject to general condition 17, which states that "[n]o activity is authorized under any NWP which is likely to 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 destroy or adversely modify the critical habitat of such species." In addition, general condition 17 explicitly states that the NWP does not authorize the taking 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 17 also requires non-federal permittees to notify 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. Based on the evaluation of all available information, the district engineer will initiate consultation with the U.S. Fish and Wildlife Service (USFWS) or National Marine Fisheries Service (NMFS), as appropriate, if he or she determines that the regulated 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 consultation through the individual permit process. If ESA 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 activity until ESA consultation is complete. If the district engineer determines that the activity will have no effect on any threatened and endangered species or critical habitat, then the district engineer will notify the applicant that he or she may proceed under the NWP authorization.

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 activity may affect endangered species or their critical habitat and, if necessary, initiate 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 NWPs to require notification for 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 work 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" decision.

Based on the safeguards discussed above, especially general condition 17 and the NWP regulations at 33 CFR 330.5(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 ESA, the Corps has taken some steps to provide further assurance. Corps district offices have met with local representatives of the USFWS and NMFS to establish or modify existing procedures, 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 ESA. Through formal consultation under Section 7 of the Endangered Species Act, or through other coordination with the USFWS and/or the NMFS, as appropriate, the Corps will establish procedures to ensure that the NWP will not 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 special conditions to be added to an NWP authorization by the district engineer.

(h) Fish, crustaceans, molluscs, and other aquatic organisms in the food web. All activities authorized by this NWP, including discharges into open waters, require 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 minimal. Fish and other motile animals will avoid the project site during construction. Sessile or slow-moving animals in the path of discharges, equipment, and building materials will be destroyed. Some aquatic animals may be smothered by the placement of fill material. Motile animals will return to those areas that are temporarily impacted by the work and restored or allowed to revert back to preconstruction conditions. Aquatic animals will not return to sites of permanent fills. Benthic and sessile animals are expected to recolonize sites temporarily impacted by the work, after those areas are restored. Activities that alter the riparian zone, especially floodplains, may adversely affect populations of fish and other aquatic animals, by altering stream flow, flooding patterns, and surface and groundwater hydrology. Some species of fish spawn on floodplains, which could be prevented if the activity involves clearing or filling the floodplain. Surface coal mining operations conducted in the vicinity of streams may alter habitat features by increasing surface water flow velocities, which can increase erosion and reduce the amount of habitat for aquatic organisms and destroy spawning areas.

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 may result in adverse effects on other wildlife associated with aquatic ecosystems, such as resident and transient mammals, birds, reptiles, and amphibians, through the destruction of aquatic habitat, including breeding and nesting areas, escape cover, travel corridors, and preferred food sources. This NWP does not authorize activities that jeopardize the continued existence of Federally-listed endangered and threatened species or result in the destruction or adverse modification of critical habitat. Compensatory mitigation, including the establishment and maintenance of riparian areas next to open waters, may be required for activities authorized by this NWP, which will help offset losses of aquatic habitat for wildlife. General condition 4 states that activities in breeding areas for migratory birds must be avoided to the maximum extent practicable.

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

(1) Sanctuaries and refuges: The activities authorized by this NWP will have minimal adverse effects on waters of the United States within sanctuaries or refuges designated by Federal or state laws or local ordinances. General condition 19 prohibits the use of this NWP to discharge dredged or fill material in NOAA-designated marine sanctuaries, National Estuarine Research Reserves, coral reefs, state natural heritage sites, and outstanding national resource waters. 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 minimal adverse effects on wetlands. District engineers will review pre-construction notifications for all activities to ensure that the adverse effects on the aquatic environment are 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 minimal adverse effects on mud flats. District engineers will review pre-construction notifications for all activities to ensure that the adverse effects on the aquatic environment are minimal. Division engineers can regionally condition this NWP to restrict or prohibit its use in certain waterbodies.

(4) Vegetated shallows: The activities authorized by this NWP will have minimal adverse effects on vegetated shallows. District engineers will review pre-construction notifications for all activities to ensure that the adverse effects on the aquatic environment are minimal. Division engineers can regionally condition this NWP to restrict or prohibit its use in vegetated shallows.

(5) Coral reefs: The activities authorized by this NWP will have minimal adverse effects on coral reefs, since it is limited to surface coal mining operations.

(6) Riffle and pool complexes: Activities in riffle and pool complexes may be authorized by this NWP, but district engineers will review all proposed activities to determine if those activities will result in minimal adverse effects on the aquatic environment. If the riffle and pool complexes are high value and the proposed work 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.

(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. Division and district engineers can condition this NWP to prohibit discharges during important life cycle stages, such as spawning or development periods, of economically valuable fish and shellfish. All discharges into open waters require 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 minimal. Compliance with general conditions 3 and 5 will ensure that the authorized work does 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 impacts to essential fish habitat are minimal, individually or cumulatively. For example, division and district engineers can impose regional and special conditions to ensure that activities authorized by this NWP will result in 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: General condition 19 prohibits the use of this NWP to authorize discharges of dredged or fill material in designated critical resource waters and adjacent wetlands, which may be located in parks, national and historical monuments, national seashores, wilderness areas, and research sites. This NWP can be used to authorize activities

in parks, national and historical monuments, national seashores, wilderness areas, and research sites if the manager or caretaker wants to conduct work in waters of the United States and those activities result in 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.

7.0 Determinations

7.1 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.

7.2 Public Interest Determination

In accordance with the requirements of 33 CFR 320.4, the Corps has determined, based on the information in this document, that the issuance of this NWP is not contrary to the public interest.

7.3 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 not result in significant degradation of the aquatic environment.

7.4 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: MAR - 1 2007

DON T. RILEY
Major General, U.S. Army
Director of Civil Works

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EXHIBIT
6

DRAFT DECISION DOCUMENT
NATIONWIDE PERMIT 12

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

Oil or Natural Gas Pipeline Activities. Activities required for the construction, maintenance, repair, and removal of oil and natural gas pipelines and associated facilities in waters of the United States, provided the activity does not result in the loss of greater than 1/2-acre of waters of the United States for each single and complete project.

Oil or natural gas pipelines: This NWP authorizes discharges of dredged or fill material into waters of the United States and structures or work in navigable waters for crossings of those waters associated with the construction, maintenance, or repair of oil and natural gas pipelines. There must be no change in pre-construction contours of waters of the United States. An “oil or natural gas pipeline” is defined as any pipe or pipeline for the transportation of any form of oil or natural gas, including products derived from oil or natural gas, such as gasoline, jet fuel, diesel fuel. heating oil, petrochemical feedstocks, waxes, lubricating oils, and asphalt.

Material resulting from trench excavation may be temporarily sidecast into waters of the United States for no more than three months, provided the material is not placed in such a manner that it is dispersed by currents or other forces. The district engineer may extend the period of temporary side casting for no more than a total of 180 days, where appropriate. In wetlands, the top 6 to 12 inches of the trench should normally be backfilled with topsoil from the trench. The trench cannot be constructed or backfilled in such a manner as to drain waters of the United States (e.g., backfilling with extensive gravel layers, creating a french drain effect). Any exposed slopes and stream banks must be stabilized immediately upon completion of the utility line crossing of each waterbody.

Oil or natural gas pipeline substations: This NWP authorizes the construction, maintenance, or expansion of substation facilities (e.g., oil or natural gas or

gaseous fuel custody transfer stations, boosting stations, compression stations, metering stations, pressure regulating stations) associated with an oil or natural gas pipeline in non-tidal waters of the United States, provided the activity, in combination with all other activities included in one single and complete project, does not result in the loss of greater than 1/2-acre of waters of the United States. This NWP does not authorize discharges of dredged or fill material into non-tidal wetlands adjacent to tidal waters of the United States to construct, maintain, or expand substation facilities.

Foundations for above-ground oil or natural gas pipelines: This NWP authorizes the construction or maintenance of foundations for above-ground oil or natural gas pipelines in all waters of the United States, provided the foundations are the minimum size necessary.

Access roads: This NWP authorizes the construction of access roads for the construction and maintenance of oil or natural gas pipelines, in non-tidal waters of the United States, provided the activity, in combination with all other activities included in one single and complete project, does not cause the loss of greater than 1/2-acre of non-tidal waters of the United States. This NWP does not authorize discharges of dredged or fill material into non-tidal wetlands adjacent to tidal waters for access roads. Access roads must be the minimum width necessary (see Note 2, below). Access roads must be constructed so that the length of the road minimizes any adverse effects on waters of the United States and must be as near as possible to pre-construction contours and elevations (e.g., at grade corduroy roads or geotextile/gravel roads). Access roads constructed above pre-construction contours and elevations in waters of the United States must be properly bridged or culverted to maintain surface flows.

This NWP may authorize oil or natural gas pipelines in or affecting navigable waters of the United States even if there is no associated discharge of dredged or fill material (see 33 CFR part 322). Oil or natural gas pipelines routed in, over, or under section 10 waters without a discharge of dredged or fill material may require a section 10 permit.

This NWP authorizes, to the extent that Department of the Army authorization is required, temporary structures, fills, and work necessary for the remediation of inadvertent returns of drilling fluids to waters of the United States through sub-soil fissures or fractures that might occur during horizontal directional drilling activities conducted for the purpose of installing or replacing oil or natural gas pipelines. These remediation activities must be done as soon as practicable, to restore the affected waterbody. District engineers may add special conditions to this NWP to require a remediation plan for addressing inadvertent returns of drilling fluids to waters of the United States during horizontal directional drilling activities conducted for the purpose of installing or replacing oil or natural gas pipelines.

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

Notification: The permittee must submit a pre-construction notification to the district engineer prior to commencing the activity if: (1) a section 10 permit is required; (2) the discharge will result in the loss of greater than 1/10-acre of waters of the United States; or (3) the proposed oil or natural gas pipeline activity is associated with an overall project that is greater than 250 miles in length and the project purpose is to install new pipeline (vs. conduct repair or maintenance activities) along the majority of the distance of the overall project length. If the proposed oil or gas pipeline is greater than 250 miles in length, the pre-construction notification must include the locations and proposed impacts (in acres or other appropriate unit of measure) for all crossings of waters of the United States that require DA authorization, including those crossings authorized by an NWP would not otherwise require pre-construction notification. (See general condition 32.) (Authorities: Sections 10 and 404)

Note 1: Where structures or work are authorized in navigable waters of the United States (i.e., section 10 waters) within the coastal United States, the Great Lakes, and United States territories, the permittee should provide a copy of the ‘as-built drawings’ and the geographic coordinate system used in the ‘as-built drawings’ to the National Oceanic and Atmospheric Administration (NOAA), National Ocean Service (NOS), to inform updates to nautical charts and Coast Pilot corrections. The information should be transmitted via email to ocs.ndb@noaa.gov.

Note 2: For oil or natural gas pipeline activities crossing a single waterbody more than one time at separate and distant locations, or multiple waterbodies at separate and distant locations, each crossing is considered a single and complete project for purposes of NWP authorization. Oil or natural gas pipeline activities must comply with 33 CFR 330.6(d).

Note 3: Access roads used for both construction and maintenance may be authorized, provided they meet the terms and conditions of this NWP. Access roads used solely for construction of the oil or natural gas pipeline must be removed upon completion of the work, in accordance with the requirements for temporary fills.

Note 4: Pipes or pipelines used to transport gaseous, liquid, liquescent, or slurry substances over navigable waters of the United States are considered to be

bridges, and may require a permit from the U.S. Coast Guard pursuant to the General Bridge Act of 1946. However, any discharges of dredged or fill material into waters of the United States associated with such oil or natural gas pipelines will require a section 404 permit (see NWP 15).

Note 5: This NWP authorizes oil or natural gas pipeline maintenance and repair activities that do not qualify for the Clean Water Act section 404(f) exemption for maintenance of currently serviceable fills or fill structures.

Note 6: For NWP 12 activities that require pre-construction notification, the PCN must include any other NWP(s), regional general permit(s), or individual permit(s) used or intended to be used to authorize any part of the proposed project or any related activity, including other separate and distant crossings that require Department of the Army authorization but do not require pre-construction notification (see paragraph (b)(4) of general condition 32). The district engineer will evaluate the PCN in accordance with Section D, "District Engineer's Decision." The district engineer may require mitigation to ensure that the authorized activity results in no more than minimal individual and cumulative adverse environmental effects (see general condition 23).

Note 7: Where structures or work are proposed in navigable waters of the United States, project proponents should ensure they provide the location and dimensions of the proposed structures to the U.S. Coast Guard (USCG) prior to submittal of a Pre-Construction Notification, or prior to beginning construction. The USCG may assess potential navigation-related concerns associated with the location of proposed structures or work, and may inform project proponents of marking and lighting requirements necessary to comply with General Condition 1 (Navigation). For assistance identifying the appropriate USCG District or Sector Waterways Management Staff responsible for the area of the proposed work, contact USCG at CGWWM@uscg.mil.

1.1 Requirements

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

1.2 Statutory Authorities

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

1.3 Compliance with Related Laws (33 CFR 320.3)

1.3.1 General

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

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

1.3.2 Terms and Conditions

Many NWPs have pre-construction notification requirements that trigger case-by-case review of certain activities. Two NWP general conditions require case-by-case review of all activities that 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 addresses the use of an NWP with other NWPs to authorize a single and complete project, to ensure that the acreage limits of each of the NWPs used to authorize that single and complete

project are not exceeded.

In some cases, activities authorized by an NWP may require other federal, state, or local authorizations. Examples of such cases include, but are not limited to: activities that are in marine sanctuaries or affect marine sanctuaries or marine mammals; the ownership, construction, location, and operation of ocean thermal conversion facilities or deep water ports beyond the territorial seas; activities that 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 compliance with the water quality certification requirements of section 401 of the Clean Water Act. 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, unless a presumption of concurrence occurs. The procedures to ensure that the NWPs comply with these laws are described in 33 CFR 330.4(c) and (d), respectively.

2.0 Purpose and Need for the Proposed Action

The proposed action is the issuance of this NWP to authorize discharges of dredged or fill material into waters of the United States under section 404 of the

Clean Water Act and structures and work in navigable waters of the United States under section 10 of the Rivers and Harbors Act of 1899 for oil or natural gas pipeline activities that result in no more than minimal individual and cumulative adverse environmental effects. Activities associated with the construction, construction, maintenance, repair, and removal of segments of oil and natural gas pipelines and associated facilities within waters of the United States require DA authorization under section 404 of the Clean Water Act (for discharges of dredged or fill material into waters of the United States) and/or section 10 of the Rivers and Harbors Act of 1899 (for structures or work in navigable waters of the United States). The Corps does not have the authority to control the siting of oil or natural gas pipelines; those siting decisions are made by federal, tribal, state, and local government agencies with the authority to make land use decisions (e.g., federal agencies that manage federal lands). This proposed action is needed for efficient implementation of the Corps Regulatory Program, by authorizing with little, if any, delay or paperwork this category of activities, when those activities have no more than minimal individual and cumulative adverse environmental effects. The NWP also provides an incentive to project proponents to reduce impacts to jurisdictional waters and wetlands to receive the required authorization under section 404 of the Clean Water Act and section 10 of the Rivers and Harbors Act of 1899 in less time than it takes to obtain individual permits for those activities. Issuing an NWP to authorize activities that have no more than minimal adverse environmental effects instead of processing individual permit applications for these activities, reduces regulatory burdens on the public, benefits the environment through reduced losses of jurisdictional waters and wetlands, and allows the Corps to allocate more of its resources towards evaluating proposed activities requiring authorization under section 404 of the Clean Water Act and section 10 of the Rivers and Harbors Act of 1899 that have the potential to cause more substantial adverse environmental effects.

Oil and natural gas pipelines are used to transport these substances where they can be used to provide a wide variety of goods and services that are used by people across the country, including energy for heating, cooling, manufacturing, cooking, etc. and manufacturing of a wide variety of products, such as chemicals and pharmaceuticals, ingredients for making and growing food (e.g., fertilizer), plastics, electronics, car parts, bicycle parts, lubricants, fiberglass, paint, clothing, floor coverings, textiles, bitumen and asphalt, flight fuel (kerosene).

3.0 Alternatives

This evaluation includes an analysis of alternatives based on the text of NEPA, which requires consideration of a reasonable range of alternatives to the proposed agency action that are technically and economically feasible, and meet the purpose and need of the proposal. The alternatives identified below are based on an analysis of the reasonably foreseeable potential environmental impacts and socio-

economic impacts to the Corps, federal, tribal, and state resource agencies, the general public, and prospective permittees.

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

The no action alternative would be to allow this NWP to continue to authorize activities until it expires on March 14, 2026, and not reissue the NWP. After the NWP expires, the no action alternative would require individual permits to be processed for activities that were authorized by this NWP, unless Corps districts issue regional general permits to authorize a similar category of activities.

3.2 Reissue the Nationwide Permit With Modifications

This alternative consists of reissuing the NWP with modifications while considering changes to the terms and conditions of this NWP after evaluating the comments received in response to the proposal to reissue this NWP. This alternative consists of modifying a Note and adding a new Note.

In the proposed rule published in the June [insert date], 2025, issue of the Federal Register, the Corps requested comments on the proposed reissuance of this NWP. The Corps proposed to modify NWP 12 by modifying Note 1 and adding a Note (designated as Note 7). These changes would add language to clarify the intent of each Note, to identify information that should be provided to NOS or USCG, and to provide contact information for both NOS and USCG.

The Corps proposed to modify Note 1 to clarify that the information provided to NOS will be used to update nautical charts and make Coast Pilot corrections. In addition, the Corps is proposing to modify the text of Note 1 to remove the language that directs the Corps to provide a copy of the NWP verification to NOS and replace it with language recommending that the permittee provide as-built drawings and the geographic coordinate system used in the as-built drawings to NOS. The Corps is also proposing to remove language from the Note which specifies which structures should be reported to NOS. The Corps is retaining language to specify that this Note applies to structures and work authorized in coastal waters, the Great Lakes, and United States territories. The Corps is also proposing to add a new last sentence to the Note to state that the information should be transmitted via email to ocs.ndb@noaa.gov.

The Corps proposed to add a new Note to NWP12 to encourage project proponents to contact USCG before submitting a Pre-Construction Notification or, if no Pre-Construction Notification is required, before beginning construction. In addition, the Corps the proposed the Note would recommend that the project proponent provide USCG with the location and dimensions of the proposed structures. The proposed

Note would inform project proponents of the assistance that USCG may provide and informs the project proponent how to locate the appropriate USCG office. The proposed Note specifies that this Note applies to proposed structures and work in navigable waters of the United States.

Under this alternative, division and district engineers have the authority under 33 CFR 330.5(c) and (d) to modify, suspend, or revoke NWP authorizations on a regional or case-by-case basis to ensure that the NWP authorizes only those activities that result in no more than minimal individual and cumulative adverse environmental effects.

3.3 Reissue the Nationwide Permit Without Modifications

This alternative consists of reissuing the NWP without any modifications before it expires on March 14, 2026. Under this alternative, division and district engineers have the authority under 33 CFR 330.5(c) and (d) to modify, suspend, or revoke NWP authorizations on a regional or case-by-case basis to ensure that the NWP authorizes only those activities that result in no more than minimal individual and cumulative adverse environmental effects.

4.0 Current Environmental Setting

The current environmental setting is the baseline against which the environmental effects of the proposed action and alternatives are evaluated to determine whether the issuance of this NWP will have a significant impact on the quality of the human environment. The current environmental setting is also used to evaluate whether the activities authorized by this NWP across the country during the five year period it is likely to be in effect are likely to result in no more than minimal individual and cumulative adverse environmental effects when added to the current environmental setting and other federal, tribal, state, local, and private actions taking place concurrently with the activities authorized by this NWP. The current environmental setting consists of the present condition (i.e., structure and function) of aquatic and terrestrial ecosystems in the United States, including cultural ecosystems and urban ecosystems that have been directly and indirectly affected by past and present federal, non-federal, and private activities, as well as natural events such as storms, earthquakes, and wildfires.

The current environmental setting includes terrestrial and aquatic ecosystems within the United States and its territories, as well as the built environment. Ecosystems are assemblages of biotic and abiotic components in waterbodies or on land in which their components interact to form complex food webs, nutrient cycles, and energy flows (Gann et al. 2019). They are heterogeneous, open systems that interact with other ecosystems that occur in a landscape (Wallington et al. 2005) or

a seascape, and are comprised of biotic components (e.g., animals, plants, fungi, protists) and abiotic elements (e.g., air, water, soil, rocks, chemical elements). The current environmental setting also includes cultural, social, and economic systems in the United States and its territories. The affected environment also includes social-ecological systems, which are complex, integrated systems of people and nature (Gann et al. 2019). The geographic scope of this environmental assessment, and its characterization of the current environmental setting, covers the United States and its territories because this NWP may be used across the country to authorize discharges of dredged or fill material into waters of the United States and/or structures or work in navigable waters of the United States, 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.

All of the Earth's ecosystems have been affected either directly or indirectly by human activities (Vitousek et al. 1997). The current environmental setting has been shaped by human activities, environmental changes, natural disturbances, and a variety of other factors over thousands of years. Humans have been managing, altering, and manipulating landscapes, including ecosystems within those landscapes, for more than 12,000 years (Ellis 2021). Examples of land use practices that affect landscapes and ecosystems include burning, hunting, species domestication, species propagation, and cultivation (Ellis et al. 2021). Pre-industrial people in North America occasionally caused large amounts of environmental impacts through activities such as agriculture, hydrological engineering, over-hunting, establishing dense urban environments, moving species from place-to-place, and conducting prescribed burning at a scale that altered global and regional environmental conditions (Evans and Davis 2018). This includes indigenous people who have managed and altered ecosystems and landscapes throughout North America (Holl 2020).

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). 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). Human activities, and their impacts on organisms and communities inhabiting the Earth, have substantially increased since the 1970s because of growing human populations and increases in economic activities, including average per capita incomes (Diaz et al. 2018). These anthropogenic impacts have caused large global declines in the areal extent of ecosystems and their integrity, the species composition of local ecological communities, the abundance and number of wild species, and the number of locally domesticated varieties of species (Diaz et al. 2018).

In North America, multithreaded networks of stream channels and wetlands were common before land use changes (especially deforestation and agricultural conversions), mill dam construction, and other activities caused substantial sediment deposits to accumulate in valleys where these anastomosing riverine systems were located (e.g., Merritts et al. 2011, Wohl et al. 2021). Harvesting beaver and removal of large wood also contributed to losses of stream and wetland complexes in river valleys (Pollock et al. 2014).

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 located on the continental shelf and in slope areas, which are affected by both land-based and ocean-based human activities (Halpern et al. 2008).

The current environmental setting is the product of the cumulative or aggregated effects of human activities that have persisted over time, as well as the natural processes that have influenced, and continue to influence, the structure and function of aquatic ecosystems and other ecosystems. The current environmental setting includes the present effects of past activities authorized by previously issued versions of this NWP and other NWPs. The current environmental setting also includes the present effects of past activities authorized by other forms of DA authorization, as well as many types of human activities that are not regulated by the Corps under its permitting authorities. The current environmental setting varies substantially in different areas of the country and in different waterbodies. The current environmental setting is dependent in part on the degree to which past and present human activities have altered aquatic and terrestrial ecosystems in a particular geographic area over time. For a particular site in which an NWP activity may take place, the current environmental setting can range from highly developed/altered areas (e.g., urban and suburban areas, where human impacts to ecosystems are highest) to production areas (e.g., agricultural lands) to seminatural areas (e.g., parks) to near natural areas (e.g., wilderness where human impacts to ecosystems are lowest) (van Andel and Aronson 2012). Human impacts on semi-natural ecosystems are lower than human impacts to production ecosystems (van Andel and Aronson 2012). Because humans have altered aquatic and terrestrial environments in numerous, substantial ways for thousands of years (e.g., Ellis et al. 2021, Evans and Davis 2018), the current environmental setting takes into account how past and present human activities, natural disturbances, and changing biotic and abiotic conditions have modified existing aquatic and terrestrial resources.

Ecosystems and human communities are highly dependent upon each other, and through their interactions they comprise social-ecological systems (Walker and Salt 2006). They usually maintain reciprocal relationships with each other, where

humans make contributions to the maintenance and enhancement of ecosystems ("services to ecosystems") and ecosystems provide a variety of services to people (Comberti et al. 2015). Most ecosystems have been shaped by human uses, such as providing food, fiber, medicines, or culturally important artifacts (e.g. totems, spiritually significant tools), and the concept of traditional cultural ecosystems acknowledges that ecosystems are the result of co-evolution of plants, animals, and humans in response to past environmental conditions (Gann et al. 2019). Because the degree and scale of human impacts have increased substantially over the past several decades, even those ecosystems that may be considered "pristine" are changing in response to impacts attributed to human activities, even when those activities occur a substantial distance from the specific ecosystem being evaluated (Holl 2020).

Ecosystems are subjected to multiple categories of disturbances over a variety of spatial (local, regional, global) and temporal scales (Foley et al. 2015, Elmqvist et al. 2003). A disturbance is an anthropogenic or natural event that alters or disrupts the structure and function of an ecosystem, often to a substantial degree (Clewell and Aronson 2013). Disturbances are often caused by external influences, such as human activities (e.g., land use changes) and storms (Clewell and Aronson 2013). A disturbance can have positive, negative, or neutral effects on ecosystems.

The structure and function of aquatic ecosystems, including waters and wetlands subject to the Corps' permitting authorities, have been influenced by past and present activities in uplands, because land use/land cover changes in uplands and other activities in uplands have indirect effects on aquatic ecosystems (e.g., MEA 2005a, Reid 1993). Due to the large geographic scale of the affected environment (i.e., the United States and its territories), as well as the many past and present human activities that have shaped the affected environment, the affected environment can only be practicably described in general terms. In addition, for this environmental assessment it is not possible to describe the environmental conditions for specific sites where this NWP may be used to authorize regulated activities because those sites will be identified after this NWP is issued and goes into effect.

The total land area in the United States is approximately 2,260,000,000 acres, and the total land area in the contiguous United States is approximately 1,891,000,000 acres (Bigelow and Borchers 2017). Land uses in the United States as of 2012 is provided in Table 4-1 (Bigelow and Borchers 2017). Of the land area in the entire United States, approximately 60 percent (1,370,000,000 acres) is privately owned (Bigelow and Borchers 2017). Of the remaining lands in the United States, the federal government hold 28 percent (644,000,000 acres), state and local governments own 8 percent (189,000,000 acres), and 3 percent (63,000,000 acres) is held in trust by the Bureau of Indian Affairs (Bigelow and Borchers 2017).

Table 4-1. Major land uses in the United States – 2012 (Bigelow and Borchers 2017).

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

The National Land Cover Database tracks changes in land cover patterns in the conterminous United States, including changes in land use cover, impervious surface cover, and forest canopy cover. The 2016 National Land Cover Database uses imagery from Landsat (at 30 meter resolution) to estimate land cover, urban impervious surfaces, tree cover, shrub cover, herbaceous plant cover, and bare ground (Homer et al. 2020) in the conterminous United States. Table 4-2 presents National Land Cover Database class covers for 2016, in square kilometers.

Table 4-2. Classes of Land Cover in the Conterminous United States, in acres, in 2016 (Homer et al. 2020).

National Land Cover Database Class	2016 area (acres)	% of 2016 Land Cover
Open water	104,691,137	5.26
Perennial ice/snow	127,012	0.01
Developed-open space	57,396,650	2.84
Developed-low intensity	29,592,352	1.43
Developed-medium intensity	13,907,832	0.63
Developed-high intensity	5,006,355	0.23
Barren land	20,484,295	1.02
Deciduous forest	187,012,565	9.46
Conifer forest	228,271,009	11.61
Mixed forest	72,443,143	3.62
Shrub/scrub	434,938,831	21.77
Grassland herbaceous	276,365,624	13.89
Pasture/hay	125,422,784	6.52
Cultivated crops	324,477,536	15.90
Woody wetlands	87,158,763	4.33
Herbaceous wetlands	29,334,868	1.50

The five predominant land covers in the conterminous United States are cultivated crops, shrub/scrub, conifer forest, deciduous forest, and open water. The five least extensive land covers in the conterminous United States are perennial ice/snow,

developed-high intensity, developed-medium intensity, barren land, and developed-low intensity. Changes in the areal extent of open waters and wetlands over time are driven primarily by variations in precipitation, and by land use intensity and external disturbances (Homer et al. 2020). Between 2001 and 2016, the total area of surface water decreased by 0.30 percent, from 424,962 square kilometers in 2001 to 423,670 square kilometers in 2016 (Homer et al. 2020). Between 2001 and 2016, the total area of woody wetlands changed from 351,624 square kilometers in 2001 to 352,719 square kilometers in 2016 (a 0.31 percent increase), and herbaceous wetland extents changed from 119,391 square kilometers (2001) to 118,714 square kilometers (2016) (a 0.57 percent decrease) (Homer et al. 2020). Homer et al. (2020) concluded that land use cover across the conterminous United States is dynamic and substantial, and between 2001 and 2016 nearly 8 percent of the landscape had at least one change in land cover use. Almost 50 percent of that change involved forested areas, for which change was driven by harvesting, disease, pests, and fire (Homer et al. 2020).

4.1 Quantity of Aquatic Ecosystems in the United States

There are approximately 283.1 million acres of wetlands in the United States; 107.7 million acres are in the conterminous United States and the remaining 175.4 million acres are in Alaska (Mitsch and Hernandez 2013). Wetlands occupy less than 9 percent of the global land area (Zedler and Kercher 2005). According to Lang et al. (2024), wetlands and deepwater habitats cover less than 6 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. 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., Tiner (2017) for wetlands; Meyer and Wallace (2001) for streams).

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, Lang et al. 2024), when wetland regulation became more prevalent (Brinson and Malvárez 2002). Eutrophication of coastal waters can 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 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 (Lang et al. 2024) (see Federal Geographic Data Committee 2013). The Cowardin system is a hierarchical system which describes various wetland and deepwater habitats, using structural characteristics such as vegetation, substrate, and water regime as defining characteristics. Wetlands are defined by plant communities, soils, or inundation or flooding frequency. Deepwater habitats are permanently flooded areas located below the wetland boundary. In rivers and lakes, deepwater habitats are usually more than two meters deep. The Cowardin et al. (1979) definition of “wetland” differs from the definition used by the Corps for the purposes of implementing section 404 of the Clean Water Act. The Corps’ regulations define “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)(1)] The Cowardin et al. (1979) requires only one of the three factors (i.e., wetland vegetation, soils, hydrology) to be present for an area to be a wetland, while the Corps' wetland definition requires all three factors to be present under normal circumstances (Tiner 2017, Mitsch and Gosselink 2015). The NWI produced by applying the Cowardin et al. (1979) definition is the only national scale wetland inventory available. There is no national inventory of wetland acreage based on the Corps' wetland definition at 33 CFR 328.3(c)(1).

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 (Lang et al. 2024).

The Emergency Wetlands Resources Act of 1986 (Public Law 99-645) requires the USFWS to submit wetland status and trends reports to Congress (Lang et al. 2024). The latest wetland status and trends report, which covers the period of 2009 to 2019, is summarized in Table 4-3. The USFWS wetland 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 (Lang et al. 2024).

Table 4-3. Estimated aquatic resource acreages in the conterminous United States in 2019 (Lang et al. 2024).

Aquatic Habitat Category	Estimated Area in 2019 (acres)
Marine intertidal	209,000
Estuarine intertidal unconsolidated shore	1,035,000
Estuarine intertidal vegetated	4,817,000
All intertidal waters and wetlands	6,061,000
Palustrine ponds	6,876,000

Palustrine farmed	1,973,000
Palustrine vegetated	101,527,000
• Palustrine emergent wetlands	30,008,000
• Palustrine shrub wetlands	19,091,000
• Palustrine forested wetlands	52,428,000
All palustrine wetlands	110,376,000
Lacustrine deepwater habitats	17,227,000
Riverine deepwater habitats	7,402,000
Estuarine subtidal habitats	20,043,000
All deepwater habitats	44,672,000
All wetlands and deepwater habitats	161,109,000

The acreage of lacustrine deepwater habitats does not include the open waters of Great Lakes (Lang et al. 2024). A study conducted by Hall et al. (1994), found that 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 Alaska Department of Environmental Conservation's Division of Water estimates that the total wetland acreage in Alaska is 130 million acres.[1]

According to the U.S. Fish and Wildlife Service's most recent wetland status and trends report (Lang et al. 2024), during the period of 2009 to 2019 a net loss of 221,000 acres of wetlands occurred in the conterminous United States. During that time period, 194,000 acres of wetlands were converted to uplands, and 27,000 acres of wetlands changed to become deepwater habitats. The acreage of vegetated wetlands decreased while the acreage of non-vegetated wetlands increased. The largest driver of wetland losses during the time period evaluated by Lang et al. (2024) was the conversion of wetlands to upland forested plantations (a net loss of approximately 83,000 acres, or 26.9 percent of wetland losses in the conterminous United States). The second largest driver of wetland losses during 2009 to 2019 was the conversion to upland agriculture (a net loss of approximately 78,000 acres, or 25.3 percent of wetland losses). Conversions of wetlands to urban upland developments resulted in the net loss of approximately 50,000 acres of wetlands (16.2 percent), and conversions of wetlands to uplands for other purposes resulted in the net loss of approximately 43,000 acres of wetlands (14.0 percent) during the period of 2009 to 2019. Other drivers of wetland loss during 2009 to 2019 that were identified by Lang et al. (2024) were the conversions of wetlands to deepwater habitats and the construction of upland rural developments, both of

[1] https://dec.alaska.gov/water/wastewater/stormwater/permits-approvals/wetlands/ak-wetlands/#:~:text=Estimates%20place%20the%20total%20acreage,%2C%20streams%2C%20and%20underground%20aquifers. (accessed July 19, 2024)

which resulted in losses of approximately 27,000 acres, or 8.8 percent of the total wetland loss acreage.

Lang et al. (2024) also identified various drivers of wetland gains and losses in the United States. Those drivers include sea level rise; coastal storm impacts; changes in environmental conditions such as increased temperatures, increased evaporation, and altered precipitation patterns; development activities; agricultural activities; actions taken by federal, tribal, state, and local government entities; and conversions of wetlands to uplands for the purposes of development, agriculture, and other uses. Those drivers of wetland gains and losses interacted with each to produce greater losses (Lang et al. 2024). For freshwater wetlands, the primary drivers of loss were the construction of agricultural, urban, and industrial ponds, plus conversions of freshwater wetlands to agricultural uses, developments, and upland forest plantations (Lang et al. 2024). For saltwater (estuarine) wetlands, the changes from vegetated wetlands to unvegetated wetlands were driven mostly by estuarine emergent marshes changing to unvegetated wetlands or deepwater habitats because of sea level rise and coastal storms (Lang et al. 2024). Some of the wetland losses were the result of activities not regulated under the Clean Water Act, such as drainage activities that do not require DA authorization, exempt forestry activities, or water withdrawals. In addition, some of the lost wetland acreage consisted of wetlands that are not subject to federal jurisdiction under the Clean Water Act (Lang et al. 2024), such as wetlands that are not adjacent to navigable waters of the United States.

The National Resources Inventory (NRI) is a statistical survey conducted by the Natural Resources Conservation Service (NRCS) (USDA 2020) of natural resources on non-federal land in the United States. The NRCS defines non-federal land as privately owned lands, tribal and trust lands, and lands under the control of local and state governments. Acreages of palustrine and estuarine wetlands and the land uses those wetlands are subjected to are summarized in Table 4-4. The 2017 NRI estimates that there are 111,000,000 acres of palustrine and estuarine wetlands on non-federal land and water areas in the United States (USDA 2020). The 2017 NRI estimates that there are 52,038,000 acres of open waters on non-federal land in the United States, including lacustrine, riverine, and marine habitats, as well as estuarine deepwater habitats.

Table 4-4. The 2017 National Resources Inventory acreages for palustrine and estuarine wetlands on non-federal land, by land cover/use category (USDA 2020).

National Resources Inventory Land Cover/Use Category	Area of Palustrine and Estuarine Wetlands (acres)
cropland, pastureland, and Conservation Reserve Program land	17,400,000

forest land	66,000,000
rangeland	7,900,000
other rural land	14,800,000
developed land	1,500,000
water areas	3,700,000
Total	**111,000,000**

The land cover/use categories used by the 2017 NRI are defined below (USDA 2020). Croplands are areas used to produce crops grown for harvest. Pastureland is land managed for livestock grazing, through the production of introduced forage plants. Conservation Reserve Program land is under a Conservation Reserve Program contract. Forest land is comprised of at least 10 percent single stem woody plant species that will be at least 13 feet tall at maturity. Rangeland is land on which plant cover consists mostly of native grasses, herbaceous plants, or shrubs suitable for grazing or browsing, and introduced forage plant species. Other rural land consists of farmsteads and other farm structures, field windbreaks, marshland, and barren land. Developed land is comprised of large urban and built-up areas (i.e., urban and built-up areas 10 acres or more in size), small built-up areas (i.e., developed lands 0.25 to 10 acres in size), and rural transportation land (e.g., roads, railroads, and associated rights-of-way outside urban and built-up areas). Water areas are comprised of waterbodies and streams that are permanent open waters.

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

Leopold, Wolman, and Miller (1964) estimated that there are approximately 3,250,000 miles of river and stream channels in the United States. This estimate is based on an analysis of 1:24,000 scale topographic maps. Their estimate does not include many small streams. Many small streams, especially headwater streams, are not mapped on 1:24,000 scale U.S. Geological Survey (USGS) topographic maps (Leopold 1994) or included in other inventories (Meyer and Wallace 2001), including the National Hydrography Dataset (Elmore et al. 2013). Many small streams and rivers are not identified through maps produced by aerial photography or satellite imagery because of inadequate image resolution or trees or other vegetation obscuring the visibility of those streams from above (Benstead and Leigh 2012). In a study of stream mapping in the southeastern United States, only 20 percent of the stream network was mapped on 1:24,000 scale topographic maps, and nearly none of the observed intermittent or ephemeral streams were indicated on those maps (Hansen 2001). Another study in Massachusetts showed that 1:25,000 metric scale topographic maps exclude over 27 percent of stream miles in

a watershed (Brooks and Colburn 2011). For a 1:24,000 scale topographic map, the smallest tributary found by using 10-foot contour interval has a drainage area of 0.7 square mile and length of 1,500 feet, and smaller stream channels are common throughout the United States (Leopold 1994). Benstead and Leigh (2012) found that the density of stream channels (length of stream channels per unit area) identified by digital elevation models was three times greater than the drainage density calculated by using USGS maps. Elmore et al. (2013) made similar findings in watersheds in the mid-Atlantic, where they determined that the stream density was 2.5 times greater than the stream density calculated with the National Hydrography Dataset. Due to the difficulty in mapping small streams, there are no accurate estimates of the total number of river or stream miles in the conterminous United States that might be considered as “waters of the United States.”

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

Factors affecting the accuracy of wetland maps made by remote sensing include: the degree of ease or difficulty in identifying a particular wetland type, map scale, the quality and scale of the source information (e.g., aerial or satellite photos), the environmental conditions when the imagery was obtained, the time of year the imagery was obtained (e.g., leaf-off versus leaf on), the quality of the images, the minimum mapping unit (or target mapping unit), the mapping equipment, and the skills of the people drawing the maps (Tiner 2017). In general, wetland types that are difficult to identify through field investigations are likely to be underrepresented in maps made by remote sensing (Tiner 2017). Wetlands difficult to identify through remote sensing include evergreen forested wetlands, wetlands at the drier end of the wetland hydrology continuum, and significantly drained wetlands (Tiner 2017). Wetland types that are more readily identified and delineated through remote sensing techniques include ponds, marshes, bogs, and fens (Tiner 2017). In the 2011 wetland status and trends report published by the USFWS, the target

minimum wetland mapping unit was 1 acre, although some easily identified wetlands as small as 1/10-acre were identified in that effort (Dahl 2011). The NWI identifies wetlands regardless of their jurisdictional status under the Clean Water Act (Tiner 2017).

Because not all wetlands are identified through the remote sensing techniques discussed above for the national-scale inventories used to describe the current environmental setting in this environmental assessment, activities authorized by NWPs are likely to 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.

Another important consideration in this description of the current environmental setting is that not all wetlands, streams, and other types of aquatic resources are subject to federal jurisdiction under the Clean Water Act (Mitsch and Gosselink 2015). Non-jurisdictional wetlands, streams, and other types of aquatic resources can be altered or lost because of activities that do not require Clean Water Act section 404 authorization, and such alterations and losses may reduce the types and degrees of aquatic ecosystem functions and services being performed across the country. They can exacerbate losses of aquatic ecosystem functions and services caused by activities that require DA authorization, including activities that may be authorized by this NWP while it is in effect.

Three U.S. Supreme Court decisions have identified geographic limits to Clean Water Act's jurisdiction over waters and wetlands. In 2001, the U.S. Supreme Court held in *Solid Waste Agency of Northern Cook County v. Army Corps of Engineers* (531 U.S. 159) (SWANCC) 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 over those waters. In the U.S. 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. In 2023, the U.S. Supreme Court's decision in *Sackett et ux. v. Environmental Protection Agency et al.* (598 U.S. 651) (Sackett II) held that the use of the term "waters" under the Clean Water Act is limited to those geographic features that are described in ordinary language as 'streams, oceans, rivers, and lakes,' and to adjacent wetlands that are "indistinguishable" from those bodies of water due to a continuous surface connection.

In a study covering the conterminous United States that was published after the

U.S. Supreme Court's Sackett II decision, Greenhill et al. (2024) estimated that 67% of the stream miles identified in the National Hydrography Dataset are regulated under the Clean Water Act under the 2006 Rapanos decision, and 52% of wetlands are subject to Clean Water Act jurisdiction under the 2006 Rapanos decision. Greenhill et al. (2024) did not have sufficient data at the time they conducted their study to estimate the amounts of streams and wetlands regulated under the Clean Water Act under the 2023 Sackett II decision. After the 2001 SWANCC decision, Tiner (2003) used digital geographic data to examine 72 study areas across the United States to estimate the amount of wetlands and number of wetlands that predicted to be "geographically isolated wetlands", which were defined as "wetlands with no apparent surface-water connection to perennial rivers and streams, estuaries, or the ocean," and surrounded by dry land. While the geographically isolated wetlands estimated by Tiner (2003) were based on a definition that bears some resemblance to the "continuous surface connection" used in Sackett II to identify adjacent wetlands for the purposes of the Clean Water Act, those estimates show considerable variation in the number and acreage of geographically isolated wetlands across the United States. So the impact of Sackett II on the status of wetland jurisdiction under the Clean Water Act is likely to vary substantially by geographic region.

There are 95,471 miles of shoreline in the United States (NOAA 2024[2]). This estimate includes the continental United States, and Alaska and Hawaii. In a different effort, Gittman et al. (2015) estimated that there are 99,524 miles of tidal shoreline in the conterminous United States.

4.2 Quality of Aquatic Ecosystems in the United States

There is a wide variety of factors that can affect the ability of rivers, streams, wetlands, lakes, estuarine waters, and marine waters to perform physical, chemical, and biological processes (i.e., functions) and provide services that can benefit human populations. The primary direct drivers of degradation and loss of waters and wetlands include infrastructure development, land conversion, water withdrawal, eutrophication and pollution, overharvesting and overexploitation, and the introduction of invasive alien species (MEA 2005a). For the purposes of this environmental assessment, "quality" refers to the ability of aquatic ecosystems to perform physical, chemical, and biological functions, and the ecosystem services (i.e., benefits to people) that may be produced by those functions. The Corps' regulations define "functions" as "the physical, chemical, and biological processes that occur in ecosystems." [33 CFR 332.2] "Quality" may also refer to the ecological condition of aquatic ecosystems. The Corps' regulations define "condition" as "the relative ability of an aquatic resource to support and maintain a community of

[2] https://oceanservice.noaa.gov/facts/shorelength.html#:~:text=As%20there%20is%20no%20reference,in%201930%2D1940%20and%201970. (accessed August 9, 2024)

organisms having a species composition, diversity, and functional organization comparable to reference aquatic resources in the region." [33 CFR 332.2] "Condition" is typically considered to be produced through the combined interactions of wetland structure and functions (Fennessy et al. 2007). Some assessments of aquatic ecosystems examine the specific physical chemical, and biological functions performed by waters and wetlands, while other assessments examine the condition of waters and wetlands, which can be considered an aggregation of the functions being performed by those wetlands and waters (Stein et al. 2010).

The quality of aquatic ecosystems is dependent on the degree to which those aquatic ecosystems are degraded or impaired. Degradation can be defined as the "incremental and progressive impairment of an ecosystem on account of continuing stress events or punctuated minor disturbances that occur with such frequency that natural recovery does not have time to occur" (Clewell and Aronson 2013). Gann et. al (2019) define the degradation of ecosystems as "a level of deleterious human impact to ecosystems that results in the loss of biodiversity and simplification or disruption in their composition, structure, and functioning, and generally leads to a reduction in the flow of ecosystem services." Clewell and Aronson (2013) define "impairment" as the "state or condition of an ecosystem or landscape that has been damaged, degraded, or destroyed as a result of extraordinary impact or disturbance from which spontaneous recovery to its former state is unlikely, at least in the short term." Most, if not all, aquatic and terrestrial ecosystems in the United States are degraded or impaired to some degree (e.g., Ellis et al. 2021) because of the direct and indirect impacts of human activities and other drivers, including natural disturbances, that have occurred over long periods of time (thousands of years).

The primary indirect drivers of degradation and loss of waters and wetlands are population growth and increasing economic development (MEA 2005a). 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. The regulation of discharges of point sources of pollution other than dredged or fill material may occur through section 402 of the Clean Water Act, which is administered by states with approved programs and by the U.S. Environmental Protection Agency (USEPA). 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 changes and flow alterations in rivers and streams 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 subject to Clean Water Act jurisdiction, impairment due to habitat alterations, flow alterations, and hydrology modifications may involve activities regulated by the Corps under section 404, but these causes of impairment may also be due to unregulated activities, such as changes in upland land use that affects the movement of water through a watershed or contributing drainage area or the removal of vegetation.

The inventories of aquatic ecosystems in the previous section, including the USFWS status and trends studies, do not assess the condition or quality of wetlands and deepwater habitats, including ocean waters, estuaries, rivers, streams, lakes and ponds. USEPA conducts national assessments on the condition of coastal waters, rivers and streams, lakes, and wetlands. Information on water quality in waters and wetlands, as well as the causes of water quality impairment, is collected by USEPA under sections 305(b) and 303(d) of the Clean Water Act. The following sections summarize information gathered by USEPA in its national-scale assessments of the ecological condition of coastal waters, rivers and streams, lakes, and wetlands.

4.2.1 Rivers and Streams

USEPA's National Rivers and Stream Assessment, Third Collaborative Survey,[3] examined the ecological condition of rivers and streams in the United States. The purpose of the National Rivers and Streams Assessment is to determine the percentage of rivers and streams that support healthy ecological communities and recreation, identify the most common problems for rivers and streams, determine whether the ecological condition of rivers and streams is getting better or worse, and determine whether water quality investments are properly targeted. The Third Collaborative Survey presented the results of surveys conducted in 2018 and 2019 by USEPA and tribal and state partners. The survey focused on perennial rivers and streams in the conterminous United States. The survey sampled 1,851 sites, and used standardized sampling procedures to collect data on biological, chemical, physical, and human health indicators for those perennial rivers and streams.

The survey examined various biological, physical, chemical, and biological indicators or river and stream condition. Specific river and stream sites were evaluated to determine whether those sites were in "good," "fair," or "poor" condition by comparing those sites to fixed benchmarks or a set of river and stream reference sites. Some indicators (e.g., microcystins, cylindrospermospin, enterococci) were compared to fixed benchmarks that were developed nationally from values in peer reviewed scientific literature, values published by USEPA, or USEPA-derived screening levels.

Biological indicators used for USEPA's 2018-2019 National Rivers and Streams Assessment included benthic macroinvertebrates and fish communities. Benthic macroinvertebrates include aquatic insect larvae and nymphs, small aquatic mollusks, crustaceans such as crayfish, aquatic worms, and leeches. Benthic macroinvertebrates and fish are used as biological indicators of river and stream health because of their sensitivity to human-caused disturbances and their sensitivity to a particular stressor may be different.

[3] https://riverstreamassessment.epa.gov/webreport/ (accessed March 8, 2024)

Chemical indicators used for the 2018-2019 National Rivers and Streams Assessment included nutrients (i.e., total phosphorus and total nitrogen), salinity, and acidification. These four indicators were used by USEPA and their partners because of national or regional interest in these chemical components, and their potential influence on the biological communities present in rivers and streams.

Physical indicators used for the 2018-2019 National Rivers and Streams Assessment included in-stream fish habitat, riparian disturbance, riparian vegetation cover, and streambed sediments. In-stream habitat indicators examined habitat complexity provided by features such as rocks and boulders, undercut banks, overhanging vegetation, and large wood. Riparian disturbance indicated the extent and intensity of human activities that directly affected vegetated riparian areas along rivers and streams. Riparian vegetation cover examined the structure of riparian plant communities next to rivers and streams. Streambed sediments characterized the various sizes of particles on river and stream beds that contribute to habitat and other river and stream attributes.

Table 4-5 presents the summary results for the biological, chemical, and physical indicators examined in USEPA's 2018-2019 National Rivers and Streams Assessment.

Table 4-5. Summary Results for USEPA's 2018-2019 National Rivers and Streams Assessment for Biological, Chemical, and Physical Indicators

Indicator	% good miles	% fair miles	% poor miles	% not assessed
Biological indicators				
• Benthic macroinvertebrate community	28	25	47	<1
• Fish community	35	19	29	16
Chemical indicators				
• Nutrients (total nitrogen)	32	24	44	<1
• Nutrients (total phosphorous)	36	23	42	0
• Acidification	99	<1	1	1
• Salinity	85	11	4	<1
Physical indicators				
• In-stream fish habitat	68	22	10	<1
• Riparian disturbance	36	42	22	<1
• Riparian vegetation cover	56	17	27	<1
• Streambed sediments	57	23	20	<1

Human health indicators for rivers and streams that were evaluated for USEPA's 2018-2019 National Rivers and Streams Assessment included microcystins and cylindrospermopsin (two algal toxins), enterococci, and three types of chemical

contaminants that can occur in fish tissue: mercury, polychlorinated biphenyls, and polyfluoroalkyl substances (PFAS). Microcystins and cylindrospermopsin are toxins that may be released by blue-green algae, and they can have adverse effects on human health, such as skin rashes, respiratory symptoms, and potentially death. Enterococci can be used to indicate fecal contamination in rivers and streams. Mercury, polychlorinated biphenyls, and PFAS are used as indicators of the accumulation of contaminants in fish tissue, and whether fish harvested from rivers and streams are safe for human consumption. The survey results for human health indicators are provided in Table 4-6 below.

Table 4-6. Summary Results for USEPA's 2018-2019 National Rivers and Streams Assessment for Human Health Indicators

Human health indicator	% at or below criterion	% above criterion	% not assessed
Algal toxins			
• Microcystins risk condition	100	0	0
• Cylindrospermopsin risk condition	100	0	0
Enterococci bacteria	78	20	2
Mercury in fish tissue plugs	21	5	74

USEPA also assessed fish contamination in rivers, because contaminants in fish tissue present a human health threat. In the 2018-2019 National Rivers and Streams Assessment, USEPA found that 26% of the sampled population (41,099 river miles) were inhabited by fish with mercury concentrations of greater than 300 parts per billion. Mercury exposure in humans can cause impaired neurological development, cardiovascular disease, loss of coordination, muscle weakness, and impaired speech and hearing. For polychlorinated biphenyls (PCBs), which can cause cancer in animals, USEPA found that 45% of the 41,099 sampled river miles had fish with total PCB concentrations greater than 12 parts per billion. In its 2018-2019 assessment, USEPA also evaluated concentrations of per- and poly-fluoroalkyl substances (PFAS) in fish tissues. PFAS are toxic to humans, they persist in the environment, and they can adversely affect immune systems, cardiovascular systems, and the liver. They have also been linked to decreased fertility or low birth weights, and increased risks of certain cancers. One type of PFAS, perfluorooctanoic substances (PFOS), is the most frequently detected PFAS in freshwater fish tissue. USEPA's 2018-2019 National Rivers and Streams Assessment found that 92% of the 41,099 sampled river miles were inhabited by fish with PFOS concentrations that exceeded the 0.25 parts per billion non-cancer screening level for fish consumption of less than 8 ounces per week.

Most of the indicators used by USEPA's 2018-2019 National Rivers and Streams Assessment to evaluate the ecological condition of these waters are primarily influenced by human activities other than the activities authorized by the NWPs (i.e., discharges of dredged or fill material into waters of the United States and structures

or work into navigable waters of the United States). Changes to in-stream habitat and sediments in river and stream bed may be caused by NWP activities in some circumstances (e.g., discharging fill material to construct a road crossing or to stabilize stream banks), but in other cases those alterations may occur as a result of activities the Corps does not have the authority to regulate, the construction of impervious surfaces in uplands that alter watershed hydrology and river and stream hydrodynamics and cause subsequent changes in river and stream channel morphology through increased channel erosion during and shortly after storm events. In-stream habitat quality may also be adversely affected by runoff that carries sediments (e.g., silt and clay particles) from uplands to river or stream channels and increase embeddedness, which typically decreases the habitat quality of the river or stream bed. Inputs of pollutants to rivers and streams via point sources and non-point sources may also alter in-stream habitat quality. In wetland riparian areas, the removal or alteration of riparian vegetation can occur without any associated discharges of dredged or fill material (e.g., cutting down vegetation while leaving the roots and soil undisturbed). Removal and other alterations of riparian vegetation in upland riparian areas do not typically involve activities the Corps has the authority to regulate.

Increased inputs of nutrients such as nitrogen and phosphorous are often caused by non-point source pollution, and may also be caused by point source discharges regulated under Clean Water Act section 402. Acidification of river and stream waters may be caused by water picking up acidic compounds from the soil and rocks as it moves through the watershed. Acid mine drainage may be another contributor to river and stream acidification that the Corps does not have the authority to regulate. Higher salinity levels in rivers and streams may be caused by substances used to de-ice roads, mining and oil drilling activities, and discharges of industrial wastewater. Biological indicators such as macroinvertebrate communities and fish communities are often adversely affected by non-point sources of pollution (e.g., fertilizers washed away from lawns and agricultural fields) and discharges of pollutants regulated under section 402 of the Clean Water Act (e.g., sewage plant discharges). The production of algal toxins is often due to eutrophication of river and stream waters. Increases in chemical contaminants such as mercury in rivers and streams are typically caused by air deposition from coal combustion and waste incineration. Polychlorinated biphenyls (PCBs) and per- and polyfluoroalkyl substances (PFAS) are categories of pollutants the Corps does not have the authority to regulate under its permitting authorities.

4.2.2 Coastal Waters

In 2015, USEPA and its collaborators conducted the National Coastal Condition Assessment for estuaries in the conterminous United States, as well as the Great Lakes. Their results were published in 2021. For the National Coastal Condition Assessment, USEPA and its collaborators sampled 1,060 randomly selected sites in 28 coastal states. Estuarine waters in Alaska and Hawaii were excluded. Of the

randomly selected sites, 699 were in estuaries and 361 were in the Great Lakes, representing about 27,479 square miles in estuaries and 7,118 square miles in the Great Lakes. Survey field crews collected samples to characterize four ecological and three human health indicators to assess the ecological condition of estuaries and nearshore Great Lakes waters (USEPA 2021).

The ecological indicators consisted of biological condition, eutrophication, sediment quality, and the ecological effects of fish tissue contamination. Assessing biological condition involved examining the invertebrates (e.g., molluscs, worms, crustaceans) inhabiting the sediments of estuaries and the Great Lakes, including their abundance, pollution sensitivity, and biodiversity. The eutrophication indicator considers the levels of nutrients, dissolved oxygen, chlorophyll *a*, and water clarity in estuaries and the Great Lakes. The sediment quality indicator examined contaminant levels in waterbody bottom sediments, as well as the toxicity of the sediments. The "ecological effects fish tissue contamination" indicator was used to determine whether contamination in fish might lead to lethal or nonlethal effects in predators such as mammals, birds, and other fish.

For estuaries, USEPA's results for the biological condition, eutrophication, sediment quality, and the "ecological effects of fish tissue contamination" indicators are summarized in Table 4-7.

Table 4-7. Summary of the 2015 National Results for Biological, Chemical, and Physical Indicators for Estuarine Coastal Waters (USEPA 2021).

Indicator	% good	% fair	% poor	% not assessed
Biological condition – benthic macroinvertebrates index	71	15	7	7
Eutrophication	33	51	15	<1
Sediment quality	76	19	3	3
Ecological effects of contaminated fish	15	20	55	10

For the biological condition indicator, USEPA examined benthic macroinvertebrates found that 71% of the estuarine area sampled was in "good" ecological condition, and 15% of the sampled areas were in "fair" condition; 7% of sampled areas were determined to be in "poor" ecological condition. Under the eutrophication index indicator, USEPA found that 33% of the sampled estuarine areas were in "good" condition, 51% were in "fair" condition, and 15% of the sampled areas were in "poor" condition. Regarding sediment quality, 76% of the sampled areas within estuarine waters was found to be in "good" condition, 19% of the sampled areas were determined to be in "fair" condition, and 3% of the sampled estuarine areas were in "poor" condition. For the "ecological effects of contaminated fish" indicator, USEPA found that 15% of sampled estuarine water areas were in "good" condition,

20% were in “fair” condition, 55% were in “poor” condition, and 10% of sampled estuarine waters area was not assessed for this indicator.

For human health indicators, USEPA’s 2015 National Coastal Condition Assessment examined enterococci contamination, microcystins, and mercury in fish plugs. Enterococci are a type of bacteria that live in the intestines of humans and mammals that indicate whether there is water contamination from the release of human and animal waste into estuarine waters. USEPA established a benchmark for enterococci levels in estuarine waters, and in the 2015 assessment they found that nearly 99% of estuarine waters sampled were below that benchmark, which indicated safe levels for people who might swim in those waters. Microcystins can be released from cyanobacteria during algal blooms that may occur under eutrophic conditions. Exposure to microcystins can adversely affect human health by causing skin rashes, eye irritation, respiratory symptoms, gastroenteritis, and potentially liver or kidney failure and death. In the estuaries surveyed by USEPA in 2015, they found that 100% of all estuaries sampled were at or below the benchmark they established for microcystins. Mercury is a toxic metal that can accumulate in fish tissue and, if that fish is consumed by humans, it may contribute to problems in vision, hearing, the nervous system, and psychological and cognitive impairments. In their 2015 survey, USEPA found that 55% of the samples of fish plugs from surveyed waters had mercury levels in fish fillet plugs that were below the established benchmark (300 parts per billion). Fish fillet plug samples determined to be above the established benchmark occurred in 2% of samples, and 43% of samples were not assessed for mercury in fish fillet plugs.

Table 4-8 summarizes the results of USEPA’s 2015 National Coastal Condition Assessment for the Great Lakes, specifically the four indicators discussed above: biological condition, eutrophication, sediment quality, and the ecological effects of fish tissue contamination.

Table 4-8. Summary of the 2015 National Results for Biological, Chemical, and Physical Indicators for Great Lakes Coastal Waters (USEPA 2021).

Indicator	% good	% fair	% poor	% not assessed
Biological condition – benthic macroinvertebrates index	31	15	21	37
Eutrophication	54	22	24	<1
Sediment quality	62	15	2	21
Ecological effects of contaminated fish	17	19	47	17

For the biological condition indicator, USEPA found that 31% of the Great Lakes area sampled was in “good” ecological condition with respect to benthic

macroinvertebrates, 15% of the sampled areas were in “fair” condition, and 21% of sampled areas were determined to be in “poor” ecological condition. Under the eutrophication index indicator, USEPA found that 54% of the sampled Great Lakes areas were in “good” condition, 22% were in “fair” condition, and 15% of the sampled areas were in “poor” condition. Regarding sediment quality, 62% of the sampled areas within Great Lakes waters were found to be in “good” condition, 15% of the sampled areas were determined to be in “fair” condition, and 2% of the sampled Great Lakes areas were in “poor” condition; 21% of the sampled Great Lakes areas were not assessed for the eutrophication index indicator. For the “ecological effects of contaminated fish” indicator, USEPA found that 17% of sampled Great Lakes water areas were in “good” condition, 19% were in “fair” condition, 47% were in “poor” condition, and 17% of sampled Great Lakes waters area was not assessed for this indicator.

For the Great Lakes, USEPA also established a benchmark for enterococci levels in those waters, and in their 2015 assessment they found that nearly 99% of Great Lakes waters sampled were below that benchmark, less than 1% were above the benchmark, and 1% were not assessed. In the Great Lakes waters surveyed by USEPA, they found that 99% of all estuaries sampled were at or below the benchmark they established for microcystins, and less than 1% were found to be above USEPA’s benchmark. Regarding mercury in fish fillet plugs, in their 2015 assessment USEPA found that 65% of the samples of fish plugs from surveyed waters in the Great Lakes had mercury levels in fish fillet plugs that were below the established benchmark (300 parts per billion). Fish fillet plug samples determined to be above the established benchmark occurred in 6% of samples, and 29% of samples were not assessed for mercury in fish fillet plugs.

As a result of their 2015 National Coastal Condition Assessment, USEPA (2021) concluded that eutrophication is the most significant problem in coastal waters, and much of the nutrients that contribute to eutrophication in coastal waters comes from rivers that transport those nutrients from inland areas to estuaries and the Great Lakes. Eutrophication can result in algal blooms that can be harmful to aquatic organisms. They recognized the importance of efforts by federal agencies, tribes, and states to reduce nutrient pollution and other forms of pollution to coastal waters.

Benthic macroinvertebrates in estuarine and Great Lakes waters may be directly or indirectly affected by discharges of dredged or fill material into those waters that may be authorized by NWP. Benthic macroinvertebrates may also be directly or indirectly affected by structures and work in navigable waters of the United States authorized under section 10 of the Rivers and Harbors Act of 1899 that may be authorized by some NWPs. However, benthic macroinvertebrates may also be affected by activities in or near estuaries or the Great Lakes by activities that are not regulated under the Corps’ permitting authorities or authorized by the NWPs. Examples of such activities may include point source discharges of pollutants into those waters authorized by the USEPA or states with approved programs under

section 402 of the Clean Water Act, where those pollutants can change the species composition of benthic macroinvertebrate communities. Benthic macroinvertebrate communities may also change in response to non-point sources of pollution into those waters. For example, point source discharges of pollutants regulated under section 402 of the Clean Water Act and non-point sources of pollution may change benthic macroinvertebrate communities from being comprised of pollution intolerant species to being comprised of pollution tolerant species.

Eutrophication may be caused by inputs of higher levels of nutrients into estuarine waters and the Great Lakes from sources such as urban and agricultural runoff and discharges of treated wastewater. Excessive levels of these nutrients can cause estuarine and Great Lakes waters to produce harmful algal blooms, which can increase the abundance of phytoplankton, such as microscopic algae and cyanobacteria. Those organisms may produce harmful algal blooms that can reduce dissolved oxygen levels and release toxins to these waters. The activities authorized by the NWPs are not a direct source of increased nutrient loads that could cause eutrophication of estuarine and Great Lakes waters.

Sediment quality is an indicator of the absence or presence of persistent contaminants in estuarine waters and the Great Lakes. The contaminants may be metals and/or organic compounds. The presence of metals and organic compounds in bottom sediments of these waterbodies may have adverse effects on benthic communities and become concentrated in the food webs in estuarine waters and the Great Lakes, where they could cause harm to people that eat shellfish and fish from these waters. These contaminants are unlikely to be introduced into estuarine waters and the Great Lakes by discharges of dredged or fill material or structures and work authorized by the NWPs. They are more likely to be introduced into these waters via point source discharges regulated under section 402 of the Clean Water Act or unregulated or unintentional inputs by human activities.

The “ecological effects of fish contamination” indicator examines the degree to which fish absorb chemical contaminants from these waters. Those contaminants may come from a variety of sources, such as the water column, sediments, or by consuming other contaminated organisms. Sufficiently high levels of contaminants can cause lethal or non-lethal effects on birds, mammals, and other fish. Activities authorized by the NWPs are unlikely to be sources of the contaminants assessed for fish. Other indicators examined by the USEPA, specifically enterococci contamination, microcystins, and “mercury in fish fillet plugs” are also not likely to be influenced by discharges of dredged or fill material into waters of the United States or structures and work in navigable waters of the United States that may be authorized by the NWPs, because they are primarily influenced by sources of pollution that are outside of the Corps’ authority to regulate under section 404 of the Clean Water Act and section 10 of the Rivers and Harbors Act of 1899.

4.2.3 Lakes

USEPA issued their report titled: “National Lakes Assessment: The Fourth Collaborative Survey of Lakes in the United States,” which presents the results of their 2022 survey of lake condition in the conterminous United States.[4] The National Lakes Assessment examined the percentage of lake waters that support healthy ecosystems and recreation, the most common water quality problems in lakes, and whether lake water quality is improving or getting worse. The National Lakes Assessment categorizes lake condition as “good,” “fair,” or “poor.” The National Lakes Assessment did not include the Great Lakes and the Great Salt Lake. It assessed ponds, natural lakes, and reservoirs that were at least 2.47 acres in area, with a water depth of at least 3.3 feet, and with at least 0.25 acre of open water. In their assessment, USEPA sampled 981 lakes out of a population size of 268,020 lakes. In the lake population, 31% of lakes were natural lakes and 69% of lakes were reservoirs.

The trophic state indicator evaluates the biological productivity of lakes. It relates to the total amount of algae in lakes, which includes algae, cyanobacteria, and other photosynthetic microorganisms. USEPA’s 2022 National Lake Assessment found that 7% of surveyed lakes were oligotrophic, 19% were mesotrophic, 43% were eutrophic, and 30% were hypereutrophic; 1% of assessed lakes were not evaluated for the trophic state indicator. Eutrophic lakes have high nutrient levels and high biological productivity. Oligotrophic lakes have low concentrations of nutrients and low rates of productivity. Mesotrophic lakes fall between eutrophic and oligotrophic lakes, and hypereutrophic lakes have extremely high levels of algae, plants, and cyanobacteria that typically cause reduced biological diversity and reduced lake metabolism.

Table 4-9 provides a summary table of the biological, chemical, and physical indicators that were examined in the 2022 National Lake Assessment, and whether those indicators were found to be “good,” “fair,” or “poor.” The biological indicators examined by USEPA include chlorophyll *a*, benthic macroinvertebrates, and zooplankton. The chlorophyll *a* biological indicator shows the quantity of algae and cyanobacteria in a lake, which are naturally found in lakes. Benthic macroinvertebrates include organisms such as crayfish, small molluscs, and the larvae and nymphs of aquatic insects, and they provide information on the biological quality of lake shoreline habitats. Zooplankton are small animals that live in the water columns of lakes, are important components of lake food webs, and are sensitive to changes in lake ecosystems.

The chemical indicators examined by USEPA in their 2022 National Lake Assessment include acidification, dissolved oxygen, and nutrients, specifically total nitrogen and total phosphorous. Acidification relates to the addition of acidifying compounds to lake water, such from acid rain and acid mine drainage, which can

[4] https://nationallakesassessment.epa.gov/webreport/ (accessed February 4, 2025)

change the acidity or alkalinity (i.e., pH) of that water and affect fish and other aquatic life in those waterbodies. USEPA also examined the presence or absence of atrazine (an agricultural herbicide) in lake water, and they found that atrazine was not detected in 58% of assessed lakes, but it was detected in 41% of assessed lakes. However, it was not assessed in 2% of surveyed lakes. Dissolved oxygen is an indicator of water quality because it is necessary to support aquatic communities, especially animals. Nutrients (i.e., total phosphorus and total nitrogen) are an important indicator because they represent nutrients that are needed for all aquatic life, including primary production that helps support lake food webs. High inputs of nutrients can cause eutrophication in lakes.

Physical indicators that were included in USEPA's 2022 National Lake Assessment are lake drawdown exposure, lakeshore disturbance, riparian vegetation cover, shallow water habitat, and lake habitat complexity. Lake drawdown exposure refers to the fluctuation or lowering of lake water levels, which can affect conditions for littoral and riparian habitats, as well as biological communities. The lakeshore disturbance indicator relates to the extent and intensity of direct human alteration of lake shorelines, which can affect lake quality through excess sedimentation, loss of native plants, changes to vegetation structure and habitat complexity, changes to lake bottom materials, and effects on fish, wildlife and other aquatic communities. Riparian vegetation cover is comprised of the herbaceous, shrubs, and trees next to lakes, which can slow runoff, remove nutrients and sediments, reduce erosion along lake shorelines, shade water, and act as a source of leaf litter and woody debris that can act as food and habitat in lake ecosystems. The lake shallow water habitat indicator looks at the quality of the shallow habitats along the edge of lakes, such as the presence or absence of vegetation overhanging the water, aquatic plants, large wood, boulders and rock ledges. The habitat complexity indicator brings together the riparian vegetation cover and shallow water habitat indicators to assess the quantity and diversity of all cover types within land and water at the lake's edge, as habitat for macroinvertebrates and fish.

Table 4-9. Summary of National Results for Biological, Chemical, and Physical Indicators for USEPA's 2022 National Lake Assessment.

Indicator	% good	% fair	% poor	% not assessed
Biological				
• Chlorophyll *a*	31	20	49	1
• Benthic macroinvertebrates	42	26	29	3
• Zooplankton	48	25	25	2
Chemical				
• Acidification	98	2	<1	<1
• Dissolved oxygen	72	20	7	<1
• Nutrients (total nitrogen)	34	19	47	<1
• Nutrients (total phosphorous)	37	13	50	<1
Physical				

• Lake drawdown exposure*	79	15	5	<1
• Lakeshore disturbance	16	50	34	<1
• Riparian vegetation cover	52	21	27	<1
• Shallow water habitat	55	26	19	<1
• Lake habitat complexity	51	19	30	<1

* For “lake drawdown exposure,” “good” represents a small exposure condition, “fair” represents a medium exposure condition, and “poor” represents a large drawdown exposure condition.

USEPA’s 2022 National Lake Assessment also examines human health indicators in lakes. These human health indicators include:

- Cyanotoxins, which are unicellular photosynthetic organisms (cyanobacteria). Some cyanobacteria can release toxins such as microcystins and cylindrospermopsin that can cause skin rashes, eye irritation, respiratory symptoms, and other adverse human health consequences.
- Enterococci, which are bacteria that live in the intestinal tracts of warm-blooded animals, including humans. Enterococci are used as indicators of possible fecal contamination from various sources such as wastewater treatment plant discharges, leaking septic systems, and storm water runoff containing pet and livestock waste.
- Fish tissue contamination via substances such as mercury, polychlorinated biphenyls, per- and polyfluoroalkyl substances, which can make fish unsafe for people to eat and may help cause cancer and perhaps developmental, neurological or other health impacts.

Table 4-10 summaries the USEPA’s 2022 results for its National Lakes Assessment for human health indicators.

Table 4-10. Summary Results for USEPA’s 2022 National Lakes Assessment for Human Health Indicators

Human health indicator	% at or below criterion	% above criterion	% not assessed
Cyanotoxins			
• Microcystins risk condition	98	2	0
• Cylindrospermopsin risk condition	100	0	0
Enterococci bacteria	92	7	1
Fish tissue contamination			
• Mercury	49	51	0
• Polychlorinated Biphenyls (PCBs)	94	6	0

Except for mercury contamination in fish tissues, high percentages of surveyed lakes were found to be at or below USEPA’s benchmark criteria for cyanotoxins, enterococci bacteria, and PCB contamination. More than half of the sample fish tissues found mercury contamination concentrations above USEPA’s benchmark for

that indicator.

Discharges of dredged or fill material into waters of the United States and structures and work in navigable waters of the United States that may be authorized by the NWPs may affect the following indicators examined by the USEPA in their 2022 National Lakes Assessment: benthic macroinvertebrates, lakeshore disturbance, riparian vegetation cover, shallow water habitat, lake habitat complexity, These indicators may also be affected by activities that the Corps does not have the authority to regulate under section 404 of the Clean Water Act and section 10 of the Rivers and Harbors Act of 1899.

The remaining indicators used by USEPA to assess the condition of lakes are unlikely to be affected by activities authorized by the NWPs because they are influenced by releases of pollutants and other factors that the Corps does not have the authority to regulated under the two permitting authorities under which the NWPs are issued. Those indicators are: chlorophyll *a*, zooplankton, acidification, atrazine, dissolved oxygen, nutrients, lake drawdown exposure, cyanotoxins (including microcystins and cylindrospermopsin), enterococci bacteria, and fish tissue contamination via mercury, polychlorinated biphenyls (PCBs), and per- and polyfluoroalkyl substances (PFAS).

4.2.4 Wetlands

USEPA's 2021 National Wetland Condition Assessment[5] examined the ecological condition of wetlands across the conterminous United States, and ranked their condition as good, fair, or poor as a result of applying various biological, physical, chemical, and human heath indicators. The findings of that survey are summarized in Table 4-11.

Table 4-11. Results from USEPA's National Wetland Condition Assessment (2021)

Indicator	% good	% fair	% poor	% very poor	% not assessed
Biological indictors					
• Vegetation	45	20	34		<1
• Nonnative plants	48	27	13	11	<1
Physical indicators					
• Vegetation removal	42	31	26		2
• Vegetation replacement	42	23	33		2
• Flow obstruction	74	17	7		2
• Water addition or subtraction	79	15	4		2
• Soil hardening	49	38	12		2
• Surface modification	74	18	6		2

[5] https://wetlandassessment.epa.gov/webreport/ (accessed January 31, 2025).

• Physical alterations (sum)	17	40	42		2
Chemical indicators					
• Soil heavy metals*					
• Water chemistry (phosphorous)	29	7	24		40
• Water chemistry (nitrogen)	29	14	17		40

* Results not available according to webpage viewed on February 4, 2025 (https://wetlandassessment.epa.gov/webreport/)

Biological indicators include vegetation (i.e., the composition of the plant community inhabiting the surveyed wetlands) and the presence of non-native plants. The plant species at a wetland site reflect environmental conditions such as hydrology, soil properties and water chemistry, and may be changed by anthropogenic disturbances. Those disturbances may degrade wetland condition, and cause changes in the composition of plant species within a wetland. The presence of non-native plants can have direct and indirect effects on the wetland plant community and wetland function, including the species of insects, amphibians, reptiles, birds, and mammals that might utilize the wetland for various stages of their life cycles. Less than half of the surveyed wetlands scored as “good” for the vegetation and non-native plants biological indicators.

Physical indicators of wetland condition used for USEPA’s 2021 National Wetland Condition Assessment included vegetation removal (i.e., loss, removal or damage of vegetation due to human activity), vegetation replacement (i.e., the conversion of natural vegetation structure and composition due to human activity), flow obstruction (i.e., human activities that can impound water or impede its flow into, out of, or within wetlands, such as the construction of dams, dikes, berms, or railroad beds), water addition or subtraction (i.e., modifications that drain or add water to the site), soil hardening (i.e., soil compaction and the creation of impervious surfaces such as parking lots, roads, and buildings), surface modification (i.e., soil erosion or deposition), and the sum of physical alterations (i.e., considering combinations of multiple physical alterations). For the vegetation removal and vegetation replacement physical indicators, less than half of the surveyed wetlands were determined to be in “good” condition. Approximately three-quarters of the surveyed wetland were found to be in “good” condition for the flow obstruction, water addition or subtraction, and surface modification indicators.

Chemical stressors that can affect wetland condition include excess nutrients, metals, organic toxins and other chemicals. These chemical stressors can disrupt nutrient cycles, affect the growth of plants and animals, and have adverse consequences on human health. In their 2021 National Wetland Condition Assessment, USEPA examined soil heavy metals and water chemistry, in particular phosphorous and nitrogen. Regarding soil heavy metals, USEPA evaluated concentrations of EPA assessed concentrations the following heavy metals, which

are closely associated with human activities: antimony, cadmium, chromium, cobalt, copper, lead, nickel, silver, tin, tungsten, vanadium and zinc. USEPA stated that the soil heavy metal results are not yet available from the laboratory, and that the webpage would be updated when that information becomes available. USEPA also evaluated levels of phosphorous and nitrogen, which can come from various sources such as urban stormwater runoff, agricultural runoff, atmospheric deposition, and septic systems. USEPA found that less than 30 percent of surveyed wetlands scored as "good" for the "water chemistry (phosphorous)" and "water chemistry (nitrogen)" indicators. Wetland condition with respect to the soil heavy metals indicator was not reported in USEPA's 2021 National Wetland Condition Assessment report when it was viewed for the preparation of this section of the environmental assessment.

The composition of wetland plant communities and the presence of non-native plants in wetlands may be influenced to some degree by activities authorized by the NWPs. For example, activities authorized by NWPs may disturb plant communities by removing or harming individual plants, and when plants grow back in areas disturbed by NWP activities, the plant community species composition may change. Changes to plant community composition may also be caused by activities that disturb plant communities that do not involve activities regulated under the Corps' permitting authorities. For example, in wetlands plants may be disturbed by hand clearing or mowing or by inputs of nutrients and sediments from point and non-point sources. Invasive species may also become more prevalent in wetlands subject to inputs of debris, sediments, water, and nutrients that increase the potential for the replacement of native wetland plants by invasive plant species (Zedler and Kercher 2004).

For the physical indicators used in USEPA's National Wetland Condition Assessment, vegetation removal, vegetation replacement, flow obstruction, water addition and subtraction, soil hardening and surface modifications may be caused by discharges of dredged or fill material into waters of the United States authorized by the NWPs, but they may also be caused by activities the Corps does not have the authority to regulate. For example, land use changes in uplands can alter watershed hydrology, including the movement of water through wetland catchments, to alter wetland hydrology and wetland hydroperiods (Wright et al. 2006). Some water flow obstructions may authorized by NWPs, but other flow obstructions could be constructed without Department of the Army authorization (e.g., flow obstructions in upland swales that drain to wetlands). Water addition and subtraction may or may not involve activities authorized by NWPs. The construction or modification of features that increase or decrease water drainage and affect wetland hydrology could be authorized by NWPs, but they could also occur as a result of activities that do not require Corps authorization, such as the construction of drainage ditches in jurisdictional wetlands that do not involve a discharge of dredged material into those wetlands (see 33 CFR 323.2(d)) that the Corps can regulate under Clean Water Act section 404. Soil hardening may be caused by

activities authorized by NWP, such as the construction of a road crossing through wetlands. Soil hardening may also be caused by activities that the Corps does not have the authority to regulate, such as driving heavy equipment through wetlands that causes wetland soils to become compacted.

The chemical stressors that can affect wetland condition (e.g., excess nutrients, metals, organic toxins and other chemicals) are typically not subject to regulation by the Corps under its permitting authorities that apply to the NWP Program (i.e., section 404 of the Clean Water Act and section 10 of the Rivers and Harbors Act of 1899). Inputs of these pollutants to wetlands may be regulated under different authorities (e.g., section 402 of the Clean Water Act, which is administered by USEPA and states) or they might not be regulated at all. These chemical stressors may reach wetlands through the movement of through watersheds and wetland catchments (e.g., non-point sources), or they may accumulate in wetlands through inadvertent releases or intentional releases.

4.3 Human Activities Affecting the Quantity and Quality of Aquatic Ecosystems in the United States

The Corps Regulatory Program issues the NWPs under two of its four permitting authorities: section 404 of the Clean Water Act and section 10 of the Rivers and Harbors Act of 1899. Under section 404 of the Clean Water Act, the Corps has the authority to regulate discharges of dredged or fill material into waters of the United States. The Corps' two permitting authorities that are not used for the issuance of NWPs are section 9 of the Rivers and Harbors Act and section 103 of the Marine Research, Protection, and Sanctuaries Act of 1972, as amended. Section 9 of the Rivers and Harbors Act of 1899 prohibits the construction of any dam or dike across any navigable water of the United States in the absence of Congressional consent and approval of the plans by the Chief of Engineers and the Secretary of the Army. Under section 103 of the Marine Research, Protection, and Sanctuaries Act of 1972, the Corps has the authority to issue permits, after notice and opportunity for public hearing, for the transportation of dredged material for the purpose of disposal in the ocean. The activities authorized by DA permits, including the NWPs, under these four permitting authorities comprise a small subset of the human activities that can directly and indirectly affect the structure and functions of aquatic ecosystems, including waters and wetlands regulated by the Corps under its permitting authorities. Examples of other human activities that can directly and indirectly affect the structure and functions of aquatic ecosystems are listed in Table 4-12.

Table 4-12. Human activities that directly and indirectly affect the structure and functions of aquatic ecosystems

Aquatic ecosystem category	Human activities that directly and indirectly affect aquatic ecosystem structure and function	Reference(s)
wetlands and waters (generally)	• land use/land cover changes • alien species introductions • species overexploitation • pollution • eutrophication • resource extraction (e.g., water withdrawals)	MEA (2005a)
rivers and streams	• agriculture • urban development • industrial development • deforestation • mining • water removal • flow alteration • invasive species • point source and non-point source pollution • dams (hydroelectric, water supply) and navigational aids such as locks • dredging • erosion • filling • overfishing • road construction • drainage and channelization • sediment deposition • boating	Palmer et al. (2010) Carpenter et al. (2011) Allan (2004) NRC (1992)
river-floodplain systems	• dam construction • levee construction • floodplain drainage • river regulation • reservoir operations • urbanization • agriculture • biological invasions • navigation improvements • recreational activities • channelization • beaver removal • logging • removal of logjams • mining activities • stabilizing single-thread channels	Petsch et al. (2023) Wohl et al. (2021)

Aquatic ecosystem category	Human activities that directly and indirectly affect aquatic ecosystem structure and function	Reference(s)
lakes	• point and non-point sources of pollutants, including nutrients and contaminants • invasive species • land use and land cover changes in catchments • overharvesting • modifications of hydrologic regime • sediment loading • eutrophication • water level regulation	Schalleberg et al. (2013)
wetlands	• wetland conversion through drainage, dredging, and filling • hydrologic modifications that change wetland hydrology and hydrodynamics • pollutants (point source and non-point source), including nutrients and contaminants • waterfowl and wildlife management activities • agriculture and aquaculture activities • flood control and stormwater protection (e.g., severing hydrologic connections between rivers and floodplain wetlands) • silvicultural activities • agricultural activities • urban development • mining activities • water withdrawals, aquifer depletion • river management (e.g., channelization, navigation improvements, dams, locks, weirs) • altered sediment transport • introductions of non-native species • activities that cause land subsidence, erosion	Mitsch and Gosselink (2015) Mitsch and Hernandez (2013) Wright et al. (2006) Zedler and Kercher (2005) Brinson and Malvárez (2002)

Aquatic ecosystem category	Human activities that directly and indirectly affect aquatic ecosystem structure and function	Reference(s)
seagrass beds	• dredging • coastal development activities • degradation of water quality • sediment and nutrient runoff from adjacent lands • physical disturbances • natural processes, such as herbivore grazing, physical disturbances caused by waves and tidal currents • invasive species • diseases • commercial fishing activities • aquaculture • algal blooms • reduced light availability • nutrient limitations	Borum et al. (2013) Waycott et al. (2009) Orth et al. (2006)
coral reefs	• overexploitation/overfishing • dredging • destructive fishing practices (e.g., blast or cyanide fishing) • nutrients, sediments, pesticides, and other pollutants (point source and non-point source) • ocean acidification • coastal land uses, including development and agriculture • coral mining • introduction of invasive or non-native species • diseases	Sheppard (2014) MEA (2005a) Barbier et al. (2011)

Aquatic ecosystem category	Human activities that directly and indirectly affect aquatic ecosystem structure and function	Reference(s)
coastal areas	• development activities, including the construction of residences, commercial buildings, industrial facilities, resorts, and port developments • agricultural and forestry activities • point source and non-point source pollution (nutrients, organic matter, other pollutants) • aquaculture • fishing activities • overharvesting of species • intentional and unintentional introductions of non-native species • dredging • reclamation • shore protection and other structures • habitat modifications • structures that change hydrology and hydrodynamics • shoreline erosion • pathogens and toxins • debris and litter	Korpinen and Andersen (2016) Robb (2014) Day et al. (2013) Lotze et al. (2006) MEA (2005b) NRC (1994)
oceans	• pollution (point and non-point source) • fishing activities • aquaculture/mariculture • ultraviolet light • species invasions • commercial activities, including industrial activities • tourism • marine transportation • land-based activities, including urban and suburban development, agriculture, forestry, power generation, and mining • ports/marinas • benthic structures • offshore energy infrastructure and power generation (e.g., wind farms, pipelines)	Korpinen and Andersen (2016) Halpern et al. (2015) Clarke Murray et al. (2014) Halpern et al. (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 environmental conditions, including air quality (Foley et al. 2005). Despite the prevalence of human activities altering landscapes and seascapes and the ecosystems within those landscapes and seascapes over long periods of time,

many of those ecosystems continue to provide ecological functions and services to varying degrees (Clewell and Aronson 2013).

Human activities and other disturbances to ecosystems, landscapes, and seascapes may result in those systems recovering to their original state through biotic and abiotic characteristics and processes that provide resilience, or those systems may be transformed to a different ecological state (i.e., an alternative stable state) (van Andel and Aronson 2012). Resilience is defined by Folke et al. (2010) as the capacity of a social-ecological system to withstand disturbance and undergo changes, while retaining its ability to exhibit similar structure, functions, and interactions. If the ecosystem, landscape, or seascape changes to an alternative stable state, the alternative stable state may be considered an improvement or degradation, depending on the perspective of the person evaluating the change (Backstrom et al. 2018, van Andel and Aronson 2012).

Wetlands, streams, and other aquatic ecosystems 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, changing environmental conditions, and various types of natural disturbances (MEA 2005a). Freshwater ecosystems such as lakes, rivers, and streams are altered by changes to water flow, changes in environmental conditions, land use changes, additions of chemicals, resource extraction, and aquatic invasive species (Carpenter et al. 2011).

Most of the human activities that affect the structure and function of aquatic ecosystems do not involve activities regulated by the Corps under section 404 of the Clean Water Act or section 10 of the Rivers and Harbors Act of 1899. For example, changes in upland land use, such as the construction and expansion of upland developments, the conversion of upland forests to agricultural land, and mining activities in uplands, none of which the Corps Regulatory Program has the authority to regulate, can have substantial adverse effects on the ability of aquatic ecosystems to perform hydrologic, biogeochemical, and habitat functions because those upland activities alter watershed-scale processes that influence those functions. Those watershed-scale processes include water movement and storage, erosion and sediment transport, and the transport of nutrients and other pollutants. 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 surface runoff from farms, roads, and urban areas) are largely uncontrolled (Brown and Froemke 2012) because the Clean Water Act only requires permits for point sources discharges of pollutants (i.e., discharges of dredged or fill material regulated under section 404 and point source discharges of other

pollutants regulated under section 402). Habitat alterations as a cause or source of impairment may be the result of activities regulated under section 404 and section 10 because they involve discharges of dredged or fill material or structures or work in navigable waters that can change the structure and functions of aquatic ecosystems. 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 and the removal of ecosystem engineers such as beavers and some tree species. Activities that may cause hydrologic modifications may or may not be regulated under section 404 or section 10.

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 indirectly affected by activities in lands that drain to the wetlands (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 may have substantial indirect effects on the structure and functions of aquatic ecosystems, including streams and wetlands, and their ability to sustain species populations. 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) because of the interactions among watershed components.

In addition to the disturbances caused by human activities that can alter ecosystem structure and functions, ecosystem structure and functions can also be affected by disturbances caused by natural events or processes. Examples of those natural events or processes include storms, floods, wildfires, earthquakes, tsunamis, changing environmental conditions, and changes in precipitation patterns.

It is also important to consider that many disturbances are crucial and necessary for ecosystems to maintain their structure and functions and ensure their long-term sustainability (Clewell and Aronson 2013). The “services to ecosystems” concept articulated by (Comberti et al. 2015) captures the reciprocal relationship between people and ecosystems through management strategies implemented by people, including indigenous and rural societies, to sustain cultural ecosystems and contribute to the production of ecosystem services. Comberti and others (2015) define “services to ecosystems” as “actions humans have taken in the past and

currently that modify ecosystems to enhance the quality or quantity of the services they provide, whilst maintaining the general health of the cognized ecosystem over time." It is likely that all ecosystems are maintained to some degree by disturbances (Clewell and Aronson 2013), which may be caused by humans or natural events, or both.

4.4 Ecological Functions and Services Performed by Aquatic Ecosystems

Ecosystems perform a variety of physical, chemical, and biological functions. 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). Stream functions occur through physical, chemical, and biological processes that interact in complex and dynamic ways within watersheds to form and maintain streams and riparian areas (Fischenich 2006).

Ecosystem services are the benefits that human populations receive from ecosystem functions (33 CFR 332.2). People can readily be aware of some ecosystem services, but they are unaware of other ecosystem services, especially those services that are generally available to the public at large (Costanza 2008). Ecosystem disservices are the negative effects of ecosystem functions on human well-being (Blanco et al. 2019). Examples of ecosystem disservices are the provisioning of habitat for insects and other organisms that can infect people with diseases, such as malaria, and water storage that can increase the risk of flooding nearby lands.

Ecosystems are not necessarily fragile because they have the ability to persist or change in response to disturbances, but the ecosystem services they provide to people may be considered fragile because those services may change or be lost when ecosystem structure and functions change (Levin 1999) in response to one or more disturbances or other drivers of change. Identifying and classifying the various ecosystem services performed by different ecosystems need to consider the complexity and dynamics of ecosystems, and the fact that ecosystems and the functions and services they provide cannot be neatly put into discrete categories (Costanza 2008). Ecosystem services can be classified in a number of ways, and multiple classification systems are needed to fulfill different purposes for considering ecosystem services (Costanza 2008).

As they are most commonly considered, ecosystem services focus on a unidirectional flow (i.e., from ecosystems to people), so this dominant perception of ecosystem services often fails to recognize the important role that people, including people from indigenous and traditional societies, have in maintaining and improving ecosystems (Comberti et al. 2015). In response to that common view, Comberti and others (2015) developed the concept of "services to ecosystems," which they define

as actions humans have taken in the past, and currently undertake, that modify ecosystems to enhance the quality or quantity of the services they provide, while maintaining the general health of those ecosystems over time. “Ecosystem health” relates to the ability of ecosystems to provide a range of ecosystem services in a sustainable manner over time (Costanza 2012), which should be a desired endpoint to ecosystem management. Taking actions to help sustain ecosystem services can provide an effective means of promoting conservation and helping to improve the living conditions of people (Kareiva and Marvier 2017).

The amounts of specific ecosystem services provided by a particular site is not necessarily proportional to the size of the ecosystem at that site (de Groot et al. 2012). Below a threshold size, smaller sites might not provide some ecosystem services (de Groot et al. 2012). In addition, management of ecosystems, such as estuaries, can result in trade-offs among various ecosystem services as management actions such as flood protection, habitat restoration and protection, and construction and maintenance of transport facilities (e.g., navigation channels, ports), are implemented (Boerema and Meire 2017).

The Millennium Ecosystem Assessment (MEA) (2005a) describes four categories of ecosystem services for wetlands and waters: provisioning services, regulating services, cultural services, and supporting services. Those categories are summarized in Table 4-13. 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 regulation of environmental conditions; 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.

Table 4-13. General categories of ecosystem services for wetlands and waters (MEA 2005a).

Category	Services	Examples
Provisioning	Food	Fish, wild game, fruits, grains
	Fresh water	Store and retain water for domestic, industrial, and agricultural use
	Fiber and fuel	Produce logs, firewood, fodder
	Biogeochemical	Medicines and other material from organisms
	Genetic materials	Genes for resistance to diseases
Regulating	Regulation of environmental conditions	Sources and sinks for greenhouse gases; influence local precipitation, temperatures

	Water regulation (hydrologic flows)	Groundwater recharge/discharge
	Water purification and waste treatment	Retention, recovery, and removal of nutrients and pollutants
	Erosion regulation	Retention of soils and sediments
	Natural hazard regulation	Flood control, storm protection
	Pollination	Habitat for pollinators
Cultural	Spiritual and inspirational	Spiritual and religious values of wetlands and waters
	Recreational	Opportunities for recreational activities
	Aesthetic	People finding beauty or aesthetic value
	Educational	Opportunities for formal and informal education
Supporting	Soil formation	Sediment retention and accumulation of organic matter
	Nutrient cycling	Storage, recycling, processing, and acquisition of nutrients

There is little national-level information on the current ecological state of the Nation's wetlands, streams, and other aquatic ecosystems, or the general degree to which they perform various ecological functions and services. Reviews have acknowledged that most aquatic ecosystems are degraded to some degree (e.g., Holl 2020, Evans and Davis 2018, Zedler and Kercher 2005, Allan 2004) because of various human activities, natural disturbances, and other drivers of change. Therefore, the analysis in this environmental assessment is a qualitative analysis.

4.4.1 Ecosystem Functions and Services of Estuaries and Oceans

Marine and coastal waters can be influenced by environments (e.g., coastal zones) and activities that extend up to 60 miles inland (Barbier 2017). Estuarine and coastal ecosystems are located where coastal waters, coastal lands, and watersheds meet and interact with each other, which results in their production of more substantial and matchless ecological benefits compared any single ecosystem (Barbier et al. 2011). The functions and services provided by estuaries are the product of their hydrology, morphology, habitats, and water and sediment quality (Boerema and Meire 2017). They are also influenced by energy flows, biogeochemical processes, biological processes and functions (Barbier et al. 2011). Table 4-14 lists examples of ecosystem services provided by estuaries.

Table 4-14. Ecosystem services provided by estuaries. (Boerema and Meire 2017, Barbier et al. 2011)

Service category	Ecosystem services
Provisioning	• Production of animals and plants • Maintenance of fisheries • Water

	• Production of raw materials • Transportation
Regulating	• Nutrient cycling • Regulation of environmental conditions • Erosion and sedimentation regulation • Flood protection • Storm protection • Coastal protection • Water current reduction • Wave reduction • Water quality regulation
Cultural	• Aesthetics • Cultural heritage • Recreation • Tourism • Education • Research

Anthropogenic and natural disturbances affect the functions and services performed by estuarine habitats. Management activities also affect the ecosystem functions and services provided by estuaries (Boerema and Meire 2017). The principal drivers of direct change to estuarine and marine wetlands include the conversion of saltwater marshes, mangroves, seagrass meadows, and coral reefs to other land uses, diversions of freshwater flows, increased inputs of nitrogen, overharvesting various species, water temperature changes, and species introductions (MEA 2005a). These changes are indirectly driven by increases in human populations in coastal areas (MEA 2005a). Robb (2014) identified a number of threats to estuaries and estuarine habitats, such as the construction and operation of port facilities, dredging, pollution, aquaculture activities, resource extraction activities, species introductions, recreational activities, shoreline development and stabilization, waterway impairments, inputs of debris and litter, freshwater diversions, and land-based activities in surrounding watersheds (e.g., development activities, agricultural activities, forestry activities). Changing environmental conditions such as sea level rise, changing water temperatures, ocean acidification, and changing precipitation patterns also affect the functions and services performed by estuaries (Robb 2014).

Marine ecosystems interact with coastal lands within a seascape, where there is connectivity among various habitats in marine waters and estuarine waters (e.g., coral reefs, seagrasses, salt marshes, mangroves) and coastal lands (Barbier 2017). How those habitats interact with each other helps determine what ecosystem functions and services they will provide. Table 4-15 lists examples of ecosystem services provided by oceans and marine waters.

Table 4-15. Marine ecosystem services provided by oceans. (Barbier 2017).

Service category	Ecosystem services
Provisioning	• Food production • Fish harvests • Wild plant and animal resources • Water • Production of raw materials • Genetic materials • Transportation • Breeding and nursery habitats, including for economically important fish species
Regulating	• Nutrient cycling (e.g., nitrogen, carbon) • Erosion and sedimentation regulation • Flood control • Storm protection • Pollution control • Shoreline stabilization and erosion control
Cultural	• Aesthetics • Religious significance • Cultural heritage • Recreation • Tourism • Education • Scientific research

Coastal ecosystems exhibit substantial natural variations in space and time, which affects the functions and services they provide (Barbier et al. 2011). Marine and estuarine waters are also affected by human activities in ocean waters, coastal areas, and watersheds that drain to those marine and coastal waters (Korpinen and Andersen 2016). In marine and coastal environments, human activities and other disturbances that affect natural resources in those waters can come from a variety of sources, including water-based activities (e.g., transportation, fishing, mariculture, power generation, and tourism) and land-based activities (e.g., urban and suburban development, agriculture, non-point source pollution, forestry activities, power generation, and mining activities) (Clark Murray et al. 2014).

4.4.2 Ecosystem Functions and Services of Riverine Systems

Riverine systems, including rivers, streams, and their riparian area and floodplains provide various physical, chemical, and biological functions. Rivers, streams, and their riparian areas store water, which can reduce downstream flooding and subsequent flood damage (NRC 2002, MEA 2005a). These ecosystems also maintain populations of economically important fish, wildlife, and plant species, including valuable fisheries (MEA 2005a, NRC 2002). The nutrient cycling and pollutant removal functions they perform help maintain or improve water quality for surface waters (NRC 2002, MEA 2005a). Streams and riparian areas also provide important recreational opportunities. Rivers and streams also provide water for

agricultural, industrial, and residential use (MEA 2005a).

The basic functions that riverine systems perform were placed in five categories by Fischenich (2006), and those five categories are: (1) system dynamics, (2) hydrologic balance, (3) sediment processes and character, (4) biological support, and chemical processes and landscape pathways. Those categories and their functions, components and processes are summarized in Table 4-16.

Table 4-16. River and stream corridor functions (Fischenich 2006).

System dynamics	Hydrologic balance	Sediment processes and character	Biological support	Chemical processes and pathways
Stream evolution processes	Surface water storage processes	Sediment continuity	Biological communities and processes	Water and soil quality
Energy management	Surface / subsurface water exchange	Substrate and structural processes	Necessary habitats for life cycles	Chemical processes and nutrient cycles
Riparian succession	Hydrodynamic character	Quality and quality of sediments	Trophic structures and processes	Landscape pathways

Petsch and others (2023) and Hornung and others (2019) identified 23 ecosystem services performed by rivers and their floodplains. Those ecosystem services are listed in Table 4-17.

Table 4-17. Ecosystem functions services provided by river-floodplain corridors (Petsch et al. 2023, Hornung et al. 2019).

Service category	Ecosystem services
Provisioning	• Food production • Water supply • Genetic resources • Hydropower generation • Production of wild animals and fish • Fibers and other plant materials • Plant production • Agricultural production
Regulating	• Nutrient cycling (e.g., nitrogen, phosphorous, carbon) • Water regulation • Erosion control • Water purification and waste treatment • Disease regulation • Regulation of environmental conditions • Sediment

	• Flood risks • Drought risks • Temperature regulation • Habitat maintenance
Supporting	• Primary production • Soil formation • Habitat provisioning
Cultural	• Aesthetics • Spiritual and religious significance • Cultural heritage • Recreation • Tourism • Education • Scientific research

Most ecosystem services performed by, or provided by, river-floodplain ecosystems are primarily controlled by flood pulses that maintain spatial and temporal habitat variability, biotic and abiotic interactions, and high biodiversity (Petsch et al. 2023). Management measures such as constructing or upgrading wastewater treatment plants, reducing water withdrawals, restoring natural flow regimes, restoring floodplains, restoring longitudinal connectivity, controlling adverse impacts of recreational activities, removing or relocating levees, and constructing flood retention areas can influence the ecosystem services performed by rivers and their floodplains (Hornung et al. 2019).

The benefits that river-floodplain systems provide to people depend on whether there are people living near that river and its floodplain and are able to receive those benefits (Petsch et al. 2023). River-floodplain functions also have the potential to adversely affect people or communities (e.g., by providing habitat that supports populations of disease carrying organisms), and those adverse effects would be considered disservices rather than services. Rivers and streams that do not have floodplains (e.g., because of channel downcutting or incision) are likely to lose the ability to perform functions and services that are dependent on periodic flood events (Petsch et al. 2023). Activities that affect river-floodplain ecosystems often result in losses of ecosystem services, and the most common impacts are those that change flood pulses and connectivity within those systems, which can affect biological productivity, water regulation, nutrient retention, and flood control (Petsch et al. 2023).

River-wetland corridors (e.g., anastomosing river channels interspersed with wetlands and floodplains) in the United States have been substantially degraded or lost because of channel instability and changes in planform (e.g., from multiple thread channels to single thread channels) because of a variety of anthropogenic causes such as stream channelization, dam construction, erosion control activities, floodplain drainage, urbanization, and removing beavers, as well as land use changes in watersheds such as forest clearing and agricultural activities that may

have caused large amounts of sediment to accumulate and bury these river-wetland corridors (Wohl et al. 2021). The loss or alteration of river-wetland corridors, such as their transitioning from anastomosing stream channels to single-thread stream channels because of deforestation, conversion of lands to agricultural use, and other factors, has reduced the amounts and types of ecosystem services performed by these ecosystems (Cluer and Thorne 2013).

4.4.3 Ecosystem Functions and Services of Lakes

Lakes provide various ecological functions and services. Many of those ecological functions related to the assimilation and sequestration of nutrients and contaminants, which can help enhance water quality and various habitats, but invasive species and large inputs of nutrients can cause declines in lake ecosystem services (Schallenberg et al. 2013). Table 4-18 summarizes the lake ecosystem services identified by Schallenberg and others (2013).

Table 4-18. Ecosystem services provided by lakes (Schallenberg et al. 2013).

Service category	Ecosystem services
Provisioning	• Drinking water • Food production • Commercial and recreational fisheries • Waterfowl production • Hydroelectricity generation • Transportation
Regulating	• Nutrient cycling (e.g., nitrogen, phosphorous, carbon) • Sediment processing • Sequestration of nitrogen, phosphorous, sediments, and contaminants • Water storage • Hydrologic buffering
Cultural	• Scenic • Spiritual and religious significance • Historical • Recreation • Tourism

The types and degrees of ecosystems performed by lakes are influenced by lake morphology, land uses within the lake's catchment, and the environmental conditions in which the lake is located (Schallenberg et al. 2013). Human activities that affect the ability of lakes to provide ecosystem functions and services include hydrologic modifications, eutrophication, inputs of contaminants, increased sediment loads, invasive species, cyanobacteria, land use intensification, and overharvesting fish and other species (Schallenberg et al. 2013).

4.4.4 Ecosystem Functions and Services of Wetlands

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

Table 4-19 lists general categories of functions performed by wetlands. 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). In addition, 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.

Table 4-19. Wetland functions. General categories of wetland functions and their general effects (NRC 1995).

Function category	Function	Effects
Hydrologic	short-term water storage	reduce downstream peak flows
	long-term water storage	maintain base flows, seasonal flow distribution
	maintain high water table	maintain wetland plant community
Biogeochemical cycling	transformation, cycling of elements	maintain nutrient stocks

	retention, removal of dissolved substances	reduce downstream transport of nutrients
	accumulation of peat	retention of nutrients, metals, etc.
	accumulation of inorganic sediments	retention of sediments, nutrients
Habitat and food web support	maintenance of characteristic plant community	food, nesting cover for animals
	maintenance of characteristic energy flow	support for vertebrate populations

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).

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

Activities that may affect wetland quantity and quality, as well as the functions and services they provide, 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 activities (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 activities may adversely affect wetlands and reduce wetland functions because those activities can: (1) change surface water flows and alter wetland hydrology, (2) contribute stormwater and associated sediments, nutrients, and pollutants, (3) cause increases in invasive plant species abundance, and (4) 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 inputs of pollutants (Zedler and Kercher 2005). As discussed in 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.

5.0 Environmental Consequences

5.1 General Evaluation Criteria

NWPs can only authorize activities that have no more than minimal individual and cumulative adverse environmental impacts (see 33 U.S.C. 1344(e), 33 CFR 322.2(f), and 33 CFR 323.2(h)). This environmental assessment contains a general evaluation of the reasonably foreseeable effects of the individual activities authorized by this NWP and the reasonably foreseeable cumulative effects of the activities authorized by this NWP during the 5-year period it is anticipated to be in effect. In the assessment of these reasonably foreseeable individual and cumulative effects, the terms and limits of the NWP, pre-construction notification requirements, and the NWP general conditions are considered. The NWP general conditions include mitigation measures that avoid, minimize, rectify, and reduce individual and cumulative adverse environmental effects. For a specific activity authorized by the NWP, the district engineer may require compensatory mitigation and/or other forms of mitigation to ensure that the individual and cumulative adverse environmental effects caused by that NWP activity are no more than minimal.

The environmental effects of a proposed action are evaluated by assessing the direct and indirect effects that the action would likely have on the current environmental setting (Canter 1996). Effects are changes in ecosystem structure and functions over time (Spaling and Smit 1993) that are caused by anthropogenic and natural disturbances. How an ecosystem responds to disturbances is dependent on context, connections at various scales (e.g., local, regional, global) between ecosystems and ecosystem components, and the ecosystem's current structure and functions (Walker and Salt 2006). Disturbances to ecosystems are not always harmful, and disturbances may be an important component of the ecosystem's dynamics (Wallington et al. 2005) that help maintain its structure and function, as well as the ecological services it provides. Some ecosystems require management by people to maintain or enhance their structure and functions

(Comberti et al. 2015), as well as their resilience to disturbances (Lui et al. 2007) and other drivers of change.

Ecosystems are heterogeneous, open systems that interact with other ecosystems that occur in a landscape (Wallington et al. 2005) or a seascape. Ecosystems are subjected to multiple categories of disturbances over a variety of spatial (e.g., local, regional, global) and temporal scales (Foley et al. 2015, Elmqvist et al. 2003). A disturbance is an anthropogenic or natural event that alters or disrupts the structure and functions of an ecosystem, often to a substantial degree (Clewell and Aronson 2013). Disturbances are often caused by external influences, such as human activities (e.g., land use changes) and storms (Clewell and Aronson 2013). Activities authorized by this NWP are likely to act as disturbances that might temporarily or permanently change the structure and functions of aquatic ecosystems. When evaluating the potential environmental consequences of the issuance of this NWP on the current environmental setting, the direct and indirect impacts caused by activities authorized by this NWP should not be considered in isolation from the direct and indirect impacts on aquatic ecosystem structure and functions caused by other human activities, including activities not subject to the Corps' permitting authorities, because it is the collective impacts (i.e., cumulative impacts) of NWP activities and other categories of human activities that could alter the structure and functions of aquatic ecosystems.

For this environmental assessment, the proposed action is the issuance of this NWP. Because this environmental assessment is prepared for an NWP that may be used to authorize discharges of dredged or fill material into waters of the United States and/or structures and work in navigable waters of the United States across the country, it is a general, national scale assessment that takes into consideration the quantity and quality of waters and wetlands described with available national-scale information summarized in section 4.0 of this document to describe the current environmental setting. Because the decision by Corps Headquarters on whether to issue an NWP is made in advance of that NWP going into effect and becoming available for use by project proponents to provide DA authorization for their activities, this environmental assessment does not identify or characterize any specific sites at which this NWP may be used during the five year period it is in effect. This environmental assessment also does not address the degree to which specific waters and wetlands on a project site may perform ecological functions and services that may be directly or indirectly affected by the activities authorized by the NWP, because that information is not available at the geographic scale of this environmental assessment. In addition, the specific functions and services performed by waters and wetlands, and the degree to which they perform those functions and services, varies substantially among individual waters and wetlands, and may also vary over time (e.g., seasonally).

The decision on whether to issue an NWP is based on a general assessment of the reasonably foreseeable direct, indirect, and cumulative impacts on waters and

wetlands across the country during the five-year period it is anticipated to be in effect. As such, this assessment must be speculative or predictive in general terms. Because the NWP authorizes activities across the United States and its territories, activities eligible for NWP authorization may be constructed in a wide variety of environmental settings, and affect waters and wetlands of varying quality, from severely degraded (i.e., performing ecological functions and services to a low degree, or not performing one or more ecological functions and services) to performing some or all ecological functions and services to a moderate or high degree. NWP activities may result in permanent or temporary losses of aquatic ecosystems and the functions and services they provide, or partial or complete losses of aquatic ecosystems and the functions and services they provide. Therefore, it is difficult to predict all of the reasonably foreseeable direct and indirect impacts that may be caused by each activity authorized by an NWP. For example, the NWP that authorizes 25 cubic yard discharges of dredged or fill material into various types of waters of the United States may be used to fulfill a variety of project purposes, and the direct and indirect environmental effects caused by those discharges may vary as a result of the characteristics of that activity and the environmental characteristics of the site and landscape or seascape setting in which the activity takes place. Therefore, some NWPs activities require pre-construction notification for certain activities to provide district engineers the opportunity to review proposed activities on a case-by-case basis, consider the current environmental setting including the functions and services that may be performed by the affected waters and wetlands, and determine whether the NWP activity will result in no more than minimal individual and cumulative adverse environmental effects.

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

After this NWP is issued, division engineers prepare supplemental documentation to address whether regional conditions, regional suspensions, or regional revocations of this NWP are necessary to help ensure that the activities authorized by this NWP within a particular geographic area (e.g., watershed, seascape, county, state) result in no more than minimal individual and cumulative adverse environmental effects (see 33 CFR 330.5(c)). In addition, when reviewing PCNs, district engineers may add conditions to specific NWP activities to ensure that those activities will result in no more than minimal individual and cumulative adverse environmental effects (see 33 CFR 330.5(d)).

In a specific watershed or other geographic region, division or district engineers may make a preliminary determination that the cumulative adverse environmental effects of activities authorized by this NWP during the five year period may be becoming more than minimal. In such circumstances, division and district engineers will conduct more detailed assessments to determine whether additional regional conditions or suspension or revocation of the NWP is appropriate to ensure that activities with more than minimal cumulative adverse environmental effects are not being authorized by the NWP. 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 to 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 region 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 amend the supplemental documentation that was prepared in accordance with 33 CFR 330.5(c)(1)(iii).

5.2 Impact Analysis

This NWP authorizes activities (i.e., structures or work in navigable waters of the United States and/or discharges of dredged or fill material into waters of the United States) for the construction, maintenance, repair, or removal of oil or natural gas pipelines and associated facilities. The acreage limit for this NWP is 1/2 acre. The Corps regulates segments of oil or natural gas pipelines when the construction, maintenance, repair, or removal of oil or natural gas pipeline segments requires DA authorization under section 404 of the Clean Water Act and/or section 10 of the Rivers and Harbors Act of 1899. The Corps does not regulate the construction, maintenance, repair, or removal of segments of an oil or natural gas pipeline that are located in uplands. In addition, the Corps does not regulate the operation of an oil or natural gas pipeline because the operation of an oil or natural gas pipeline does not involve discharges of dredged or fill material or structures or work in navigable waters of the United States.

Pre-construction notification is required if: (1) a section 10 permit is required; (2) the discharge will result in the loss of greater than 1/10-acre of waters of the United States; or (3) the proposed oil or natural gas pipeline activity is associated with an overall project that is greater than 250 miles in length and the project purpose is to install new pipeline (vs. conduct repair or maintenance activities) along the majority of the distance of the overall project length.

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. In addition, pre-construction notification may be required through general conditions, such as general condition 18 (endangered species) and general condition 20 (historic properties). If the district engineer determines that the adverse environmental effects of a particular activity 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).

See section 1.0 of this document for a more complete description of the activities authorized by this NWP, as well as limitations on those activities. The general conditions that apply to this NWP also impose further limitations on authorized activities.

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

In this environmental assessment, the analysis of environmental consequences is a qualitative analysis because of the paucity of quantitative data at a national scale on the quantity of aquatic ecosystems within the current environmental setting, as well as the paucity of data relating to the specific ecosystem functions and services performed by those aquatic ecosystems and the degree to which those aquatic ecosystem functions and services are performed. In addition, there is a lack of quantitative data at a national scale concerning the various human activities and natural factors that may directly or indirectly affect aquatic ecosystems and the functions and services they provide. As discussed throughout this environmental assessment, the activities authorized by this NWP are just one category among many categories of human activities that directly and indirectly affect waters and wetlands and the ecological functions and services those waters and wetlands provide. This environmental assessment focuses on the potential impacts on waters and wetlands that are reasonably foreseeable and would occur after this NWP is issued and goes into effect.

The terms of this NWP, including any acreage limits or any other quantitative limits in the text of the NWP, the protections provided by the NWP general conditions, plus any regional conditions imposed by division engineers and activity-specific conditions imposed by district engineers, will help ensure that the activities authorized by this NWP will result in no more than minimal individual and

cumulative adverse environmental effects. An additional safeguard in the NWP Program is the ability of district engineers to exercise discretionary authority and require project proponents to obtain individual permits for proposed activities whenever a district engineer determines that a proposed activity will result in more than minimal individual or cumulative adverse environmental effects after considering any mitigation proposed by the project proponent (see 33 CFR 330.1(e)(3)).

In high value waters, division and district engineers can: 1) prohibit the use of the NWP in those waters and require an individual permit or regional general permit; 2) decrease the acreage limit for the NWP; 3) lower the pre-construction notification threshold of the NWP to require pre-construction notification for NWP activities with smaller impacts in those waters; 4) require pre-construction notification for some or all NWP activities in those waters; 5) add regional conditions to the NWP to ensure that the individual and cumulative adverse environmental effects are no more than minimal; or 6) 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.

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

5.2.1 Individual impacts

The individual environmental impacts are the reasonably foreseeable direct and indirect impacts to ecosystems caused by a specific activity authorized by this NWP (i.e., discharges of dredged or fill material into waters of the United States and/or structures and work in navigable waters of the United States) at a project site. Activities authorized by this NWP are likely to be disturbances that have the potential to temporarily or permanently change the structure and functions of aquatic ecosystems, including the degree to which those aquatic ecosystems perform ecosystem services. The types of activities generally considered to be “discharges of dredged or fill material into waters of the United States” and “structures and work in navigable waters of the United States” are discussed below.

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

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

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

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

The Corps' regulations define the term "discharge of fill material" as meaning "the

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

Discharges of dredged or fill material into a water or wetland subject to the Corps' jurisdiction under section 404 of the Clean Water Act may result in the complete or partial loss of wetland area, stream bed, or area of another type of aquatic ecosystem. That complete or partial loss of aquatic ecosystem area may result in a complete or partial loss of aquatic ecosystem functions and services, or changes in the types of ecosystem functions or services being performed at that site. The direct effects to waters and wetlands caused by activities authorized by this NWP may change those waters and wetlands to components of the built environment or uplands, convert an aquatic resource type to another aquatic resource type, or alter the functions and services provided by those waters and wetlands. The direct effects to waters and wetlands caused by activities authorized by this NWP may be permanent or temporary.

The indirect effects to waters and wetlands caused by activities authorized by this NWP may also convert an aquatic ecosystem type to another aquatic ecosystem type. The indirect effects to waters and wetlands caused by activities authorized by this NWP may be permanent or temporary. The contribution of activities authorized by this NWP to cumulative or aggregate effects to waters and wetlands is also dependent on the degree or magnitude to which the potentially affected aquatic resources perform ecological functions and services. Nearly all waters and wetlands have been directly and indirectly affected by human activities over time (e.g., Halpern et al. 2008 for oceans, Lotze et al. 2006 for estuaries, Zedler and Kercher 2005 for wetlands, Allan 2004 for streams), including land uses in areas that drain to these aquatic ecosystems.

This NWP authorizes structures and work in navigable waters of the United States. Structures and work in navigable waters of the United States may alter the

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

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

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

Discharges of dredged or fill material into waters of the United States and structures and work in navigable waters of the United States are anthropogenic disturbances that can affect the structure and functions of aquatic ecosystems, including the degree to which those functions are performed, but they are just two categories of anthropogenic disturbances among many categories of anthropogenic and natural disturbances that can affect the structure and functions of aquatic ecosystems. Many of the categories of human activities and natural factors that can affect the structure and functions of aquatic ecosystems are identified in section 4.0 of this environmental assessment.

Among the various regions and individual sites in the United States and its territories where this NWP may be used for activities that require DA authorization, there is substantial variability in the current environmental setting. As discussed in section 4.0, the current environmental setting is the result of direct and indirect alterations of aquatic and terrestrial ecosystems by various human activities and natural disturbances that have occurred over time (e.g., Ellis et al. 2021, Evans and Davis 2018, Clewell and Aronson 2013). The types of ecological functions and services provided by aquatic ecosystems vary considerably by region and by specific aquatic ecosystems, with some aquatic ecosystems performing ecological functions and services to a high degree, and other aquatic ecosystems performing ecological functions and services to a lesser degree. Given the geographic scope in which this NWP can be used to authorize activities under section 404 of the Clean Water Act and/or section 10 of the Rivers and Harbors Act of 1899 (i.e., the United States and its territories), the wide variability in aquatic ecosystem structure and functions from site to site and from region to region, and the limited quantitative data available at a national scale on functions and services provided by various types of aquatic ecosystems, the analysis of potential environmental consequences of the issuance of this NWP is a qualitative analysis. In addition, if this NWP is issued, it will be issued before many specific sites for proposed NWP activities are identified. Therefore, the impact analysis in this environmental assessment is a general, qualitative analysis and cannot consider site-specific characteristics associated with a particular NWP activity.

The individual activities authorized by this NWP are likely to affect, to some degree, the ecological functions and services provided by waters and wetlands. In addition, individual activities authorized by this NWP may indirectly affect non-aquatic ecosystems, such as upland forests and grasslands, as well as cultural or production ecosystems (e.g., parks or agricultural areas) that are cultural ecosystems that are managed by people. The severity of potential impacts to aquatic ecosystems caused by activities authorized by this NWP is dependent on a variety of factors. Impacts to aquatic ecosystems caused by activities authorized by this NWP may result in a partial, total, or no loss of aquatic ecosystem functions and services, depending on the specific characteristics of the NWP activity and the environmental setting in which the NWP activity occurs. In addition, the duration of

those impacts may vary by activity, with some NWP activities causing permanent impacts, some NWP activities causing temporary impacts, and other NWP activities causing both permanent and temporary impacts. In addition, the duration of permanent or temporary impacts caused by an NWP activity may also be influenced by the resilience and resistance of the affected aquatic ecosystems to disturbances caused by the NWP activity.

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

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

Oil and natural gas pipelines are transportation structures to move of any form of oil

or natural gas, including products derived from oil or natural gas, such as gasoline, jet fuel, diesel fuel, heating oil, petrochemical feedstocks, waxes, lubricating oils, and asphalt, from a point of origin (e.g., a facility that extracts oil or natural gas from the ground or the seabed) to a terminal point (e.g., end users such as an oil or natural gas refinery that manufactures a variety of products from oil or natural gas (e.g., plastics, pharmaceuticals, fertilizers, fuels), or combusts oil or natural gas to generate electrical energy). Pipelines may be used to transport oil or natural gas from the point of origin to a central collection point (e.g., gathering pipelines), to transport large volumes of oil or natural gas long distances (e.g., transmission pipelines), or to transport natural gas to an end user, such as a residence or commercial property (e.g., distribution pipeline).

Pipelines are one mode for transporting oil and natural gas. Oil and natural gas may also be transported by other modes, such as ships, barges, trucks, and railroads. So if one mode of transportation is not available for oil or natural gas, or products made from oil or natural gas, entities that rely on oil or natural gas for energy production or making consumer products from oil or natural gas are likely to use other modes of transportation to satisfy the demand for energy or other products of oil or natural gas. Based on percentage of spills, there are safer modes of transportation than pipelines (e.g. the transportation of oil by ship is safer than transport by pipeline, truck or rail, (USDOT, 2018)), but these other modes may not be available or practicable in many areas of the country. In the United States, the vast majority of crude oil, ethanol, and natural gas transported by pipelines, railways, and barges reaches its end users without incidents involving inadvertent releases of those substances (NASEM 2018).

During the operation of oil and natural gas pipelines, inadvertent releases of oil, natural gas, and substances derived from oil and natural gas may occur. Higher rates of transport of oil and natural gas through pipelines have occurred since 2005, however the frequency of unintended releases from pipelines has not increased in that same timeframe (NASEM 2018). While occasional major inadvertent release incidents occur from these pipelines, the amounts of oil or natural gas released during those incidents exhibit large fluctuations from year-to-year (NASEM 2018). Inadvertent releases may occur from pipeline corrosion and cracking, or outside forces such as strikes from construction equipment (NASEM 2018), vessels, or dredging activities.

Inadvertent releases of oil or natural gas and products derived from oil or natural gas cause negative impacts to ecosystems, the severity of which is dependent upon the location of the inadvertent release and the type of oil or natural gas product that has been released (Chang et al., 2014). Inadvertent releases of oil result in toxic effects to plants and to animals through ingestion or inhalation, injury (e.g., from coating or smothering), or impacts to habitats and food sources.[6] Wave action, temperature, substrates, and weather conditions can influence the severity of

6 https://apps.ecology.wa.gov/publications/documents/1008001.pdf

impacts from an inadvertent releases of oil (Change et al., 2014). Animals that inhabit nearshore habitats or near the ocean surface are more likely to be impacted by oil spills since many oil products float.[7] Inadvertent releases of oil or oil products on humans may cause negative impacts to subsistence resources (e.g., fish or other aquatic organisms), health impacts (e.g., skin irritation, ingestion of contaminated food or water, contact with carcinogenic compounds), loss of access to recreational opportunities (e.g., boating, fishing, sightseeing) or closures of commercial fisheries. Inadvertent releases of natural gas products result in air quality impacts, including replacing oxygen with methane, and inadvertent releases that occur under the soil surface can cause changes in soil chemistry (Schollaert et al., 2020).

Safety standards for the operation and maintenance of onshore pipelines that transport hazardous materials, including oil, natural gas, and products derived from oil and natural gas are administered and enforced by The Department of Transportation's Office of Pipelines and Hazardous Materials Safety Administration (PHMSA). The Federal Energy Regulatory Commission regulates the construction, maintenance, and operation of interstate natural gas pipelines.

The siting of oil or natural gas pipelines falls primarily under tribal, state, or local government land use authorities, unless a proposed oil or natural gas pipeline is being considered on federal lands. On federal lands, the federal agency with responsibility for managing those lands determines whether to allow oil or natural gas pipelines to be constructed and maintained on those federal lands. The Corps' regulations at 33 CFR 320.4(j)(2) state that the "primary responsibility for determining zoning and land use matters rests with state, local and tribal governments." In addition, DA authorizations, including NWP authorizations, do not convey any property rights, either in real estate or material, or any exclusive privileges (see 33 CFR 320.4(g)(6) and, in this proposed rule, paragraph 3 in Section E, Further Information.

The Corps Regulatory Program's role in regulating oil or natural gas pipelines is limited to determining whether to issue Department of the Army authorization under section 404 of the Clean Water Act and/or section 10 of the Rivers and Harbors Act of 1899 for the construction, maintenance, repair, or removal of pipeline segments that involve discharges of dredged or fill material into waters of the United States and/or structures and work in navigable waters of the United States. For oil or natural gas pipeline activities authorized by NWP 12, the Corps' permitting authority is limited to authorizing discharges of dredged or fill material into waters of the United States and structures and work in navigable waters to: (1) construct, maintain, repair, or remove oil and natural gas pipelines; (2) construct, maintain, or expand oil or natural gas pipeline substations; (3) construct or maintain foundations for above-ground oil or natural gas pipelines; and (4) construct access roads for the construction or maintenance of oil or natural gas pipelines. Focus on impacts of

7 https://darrp.noaa.gov/oil-spills/how-can-spill-affect-your-community

waterbody crossings; the Corps does not have the authority to regulate the construction, maintenance, or removal of oil or natural gas pipelines in uplands

There are aspects of oil and natural gas pipelines that the Corps does not have the statutory authority to regulate or control, such as the siting of oil or natural gas pipelines, oil or natural gas pipeline operational activities, pipeline safety, inadvertent releases of oil or natural gas from these pipelines, and how the products transported by the pipelines would be used after it reaches its destination. For instance, the Corps' permitting authorities do not apply to whether and how oil or natural gas pipelines transport oil or natural gas through those pipelines, or how that oil or natural gas will be used after it has reached its destination (e.g., a refinery or industrial facility that produces gasoline, jet fuel, diesel fuel. heating oil, petrochemical feedstocks, waxes, lubricating oils, asphalt, and other products from oil or natural gas or energy from the combustion of that oil or natural gas). The Corps also does not have the authority to regulate the end uses of oil or natural gas, such as combustion to produce energy, the air pollution that occurs when oil or natural gas is burned to produce energy, the air pollutants emitted when oil or natural gas is transformed to different products, including consumer goods, the water pollutants that may be generated and discharged (likely regulated under section 402 of the CWA)

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

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

those NWPs are more than minimal.

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

5.2.2 Cumulative impacts

The activities authorized by this NWP must result in no more than minimal cumulative adverse environmental effects (see 33 USC 1344(e)(1); also see 33 CFR 322.2(f)(1) and 33 CFR 323.2(h)(1)). The cumulative impacts caused by the issuance of this NWP are the collective impacts on the environment across the country that are directly or indirectly caused by the use of this NWP to authorize discharges of dredged or fill material into waters of the United States under section 404 of the Clean Water Act and structures and work in navigable waters of the United States under section 10 of the Rivers and Harbors Act of 1899 during the period it is anticipated to be in effect (i.e., five years or less). The cumulative impacts to the current environmental setting that are anticipated to be caused by activities authorized by this NWP during the next five years are evaluated against the current environmental setting to determine whether those cumulative impacts will be no more than minimal (for the purposes of general permit authorization) and will not have a reasonably foreseeable significant impact on the quality of the human environment, for the purposes of the National Environmental Policy Act.

The evaluation of cumulative impacts on the current environmental setting also needs to take into account activities authorized by other forms of DA authorization

that will occur during the five year period this NWP is in effect, because activities authorized by standard individual permits, letters of permission, other NWPs, regional general permits, and programmatic general permits are also likely to cause direct and indirect environmental effects, including effects on aquatic ecosystems.

The evaluation of cumulative impacts on the current environmental setting must also take into account the direct and indirect environmental impacts caused by activities conducted by other federal, non-federal, and private entities across the country that do not require DA authorization and are likely to occur concurrently with the activities authorized by this NWP during the five-year period it is likely to be in effect. Examples of the activities that can alter the structure and functions of aquatic ecosystems and are not subject to the Corps' permitting authorities include changes in upland land use, discharges of pollutants regulated under section 402 of the Clean Water Act, non-point sources of pollution, harvesting species that inhabit waters and wetlands, and species introductions. Additional examples of activities not regulated by the Corps that directly and indirect affect the structure and functions of aquatic ecosystems and the services they may perform are provided in Table 4-12.

The activities authorized by this NWP, activities authorized by other forms of DA authorization (e.g., individual permits, regional general permits), and the activities conducted by other federal, non-federal, and private entities across the country that do not require Department of the Army authorization will interact with each other and may cause changes to the current environmental setting, including the structure and functions of aquatic ecosystems, and the ecosystem services they may provide. As discussed further in this section, those interactions may be additive, synergistic, or antagonistic. The assessment of cumulative impacts, especially at the large geographic scale covered by this environmental assessment (i.e., the United States and its territories, where the NWP can be used) is a difficult task for numerous reasons, such as: The complexities of aquatic ecosystems and the landscapes and seascapes they are located in are complex and our limited understanding of those systems (Harris and Heathwaite 2012); (2) the multitude of contributors to cumulative impacts; (3) the various ways in which the contributors to cumulative impacts can interact with each other; and (4) the challenges in determining whether a change in ecosystem structure and functions is caused by a specific activity or type of activity.

Based on reported use of this NWP during the period of March 15, 2021, to March 14, 2024, the Corps estimates that this NWP will be used approximately 3,700 times per year on a national basis, resulting in temporary and permanent impacts to approximately 1,500 acres of waters of the United States, including jurisdictional wetlands. The text of this NWP requires the permittee to submit a pre-construction notification to the district engineer prior to commencing the activity if: (1) a section 10 permit is required; (2) the discharge will result in the loss of greater than 1/10-acre of waters of the United States; or (3) the proposed oil or natural gas pipeline

activity is associated with an overall project that is greater than 250 miles in length and the project purpose is to install new pipeline (vs. conduct repair or maintenance activities) along the majority of the distance of the overall project length. Pre-construction notification may also be required by the NWP general conditions or by regional conditions imposed by division engineers.

Based on reported use of this NWP during that time period, the Corps estimates that five percent of the NWP 12 verifications will require compensatory mitigation to offset the authorized impacts to waters of the United States and ensure that the authorized activities result in only minimal adverse effects on the aquatic environment. The verified activities that do not require compensatory mitigation will have been determined by Corps district engineers to result in no more than minimal individual and cumulative adverse effects on the aquatic environment without compensatory mitigation. During the period of 2026 to 2031, the Corps expects little change to the percentage of NWP 12 verifications requiring compensatory mitigation, because there have been no substantial changes in the mitigation general condition or the NWP regulations for determining when compensatory mitigation may be required for NWP activities. The Corps estimates that approximately 650 acres of compensatory mitigation will be required each year to offset authorized impacts. The demand for these types of activities could increase or decrease during the five year period this NWP is anticipated to be in effect.

Based on these annual estimates, the Corps estimates that approximately 18,500 activities could be authorized until this NWP expires, resulting in impacts to approximately 7,500 acres of waters of the United States, including jurisdictional wetlands. Approximately 3,250 acres of compensatory mitigation would be required to offset those impacts. During the period this NWP is in effect, the individual and cumulative impacts on the aquatic environment caused by activities authorized by this NWP are expected to result in only minor changes to the current environmental setting at the scale at which this NWP is issued (i.e., the United States and its territories), which is described in section 4.0 of this document. Division engineers have the authority to modify, suspend, or revoke this NWP in a particular geographic region (e.g., a Corps district, state, watershed, or seascape) if they believe those discharges of dredged or fill material into waters of the United States are likely to result in more than minimal individual and cumulative adverse environmental effects in the identified geographic region (see 33 CFR 330.5(c)). District engineers have the authority to modify, suspend, or revoke this NWP on a case-by-case basis if they determine those discharges of dredged or fill material into waters of the United States are likely to result in more than minimal individual and cumulative adverse environmental effects on the project site (see 33 CFR 330.5(d))

Cumulative impacts result from the accumulation of direct and indirect impacts caused by multiple activities in a particular geographic area that persist over time (MacDonald 2000). Substantial changes in ecosystem structure and function are

usually the result of the cumulative impacts of multiple disturbances (Hughes et al. 2013, Levin and Mollmann 2015, Scheffer and Carpenter 2003) and other drivers of ecosystem change.

Human activities that disturb ecosystems may interact with each other and cause larger impacts than expected, and natural variation in those ecosystems may also affect the severity of cumulative impacts (Clarke Murray et al. 2014). Disturbances are anthropogenic and natural events that change the structure and/or functions of an ecosystem, usually in a substantial manner (Clewell and Aronson 2013). Those changes may be temporary or permanent, depending on the ecological resilience of the ecosystem and whether thresholds are crossed (Suding and Hobbs 2008).

Cumulative impacts have also been defined as being produced by the interactions of multiple activities within a landscape, such as a watershed or ecoregion (Gosselink and Lee 1989). Cumulative impacts can also occur at a continental scale (Gosselink and Lee 1989). In coastal areas and ocean waters, the counterpart to a landscape unit for evaluating cumulative impacts would be a seascape. A seascape consists of marine and estuarine waters and their adjacent coastal lands (Pungetti et al. 2012). Since cumulative impacts occur at a broad geographic scale, it is usually difficult to clearly establish cause-and-effect relationships between the numerous activities that contribute to cumulative impacts and the ecosystems' responses to those multiple activities (Gosselink and Lee 1989). In a watershed or other type of ecological system, at any point in time there are numerous activities that overlap in space and time, which makes it difficult to establish precise causal linkages between specific activities, their impacts, and ecological outcomes (Harris and Heathwaite 2012).

All ecosystems are subjected to multiple disturbances that cause cumulative impacts to those ecosystems (Hodgson et al. 2019, Hodgson and Halpern 2018, Suding and Hobbs 2009). Cumulative impacts to aquatic ecosystems and other ecosystems include all human activities that can affect those ecosystems, and extend well beyond the activities authorized by this NWP. Cumulative impacts to aquatic ecosystems are caused by a variety of human activities (see section 4.3 for a discussion and list of those activities). Natural disturbances may also contribute to cumulative impacts to aquatic ecosystems and other ecosystems, because they have to potential to change ecosystem structure and functions. Cumulative impacts have gained a substantial human component because of the numerous activities conducted by people as they interact with their environment (Crain et al. 2008).

Contributors to cumulative impacts are not limited to activities that are regulated by a single agency, but they also include activities that are not regulated by that agency (Gosselink et al. 1990). Therefore, cumulative impact assessment should consider the impacts of multiple projects that occur in a region, as well as other human activities that are not considered "projects" per se, such as on-going agricultural activities, forestry activities, urbanization, and fossil fuel consumption

(Spaling 1994) that are not subjected to environmental review by any entity (Hunsicker et al. 2016) but are likely to directly or indirectly affect ecosystem structure and functions. Some “non-project” contributors to cumulative impacts may be identified in a cumulative impact analysis but there may be other non-project contributors to cumulative impacts that cannot be identified (Spaling 1994) by the entity conducting the cumulative impact assessment.

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

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

Many cumulative impact assessment methods assume additive interactions between disturbances and ecosystem components, but broader ecological studies show that synergistic and antagonistic interactions among disturbances are

common (Korpinen and Andersen 2016). Some cumulative impact assessments assume that synergistic interactions are the most common form of disturbance interaction, and more consideration needs to be given to antagonistic and additive interactions (Côté et al. 2016). Assuming that all or most interactions among disturbances are synergistic interactions can lead to a false conclusion that ecosystem structure and functions have become more degraded than they actually have been. To avoid such false conclusions, it is important to consider antagonistic and additive disturbance interactions (Côté et al. 2016) when evaluating cumulative impacts and whether it is necessary to respond to those types of cumulative impacts. Côté and others (2016) recommend that natural resource managers consider that synergistic, antagonistic, and additive interactions among disturbances are equally likely to occur. In watersheds, cross-scale interactions between patterns and processes, multiple disturbances or stressors, and the organisms that inhabit those watersheds, as well as our limited understanding of these complex, adaptive, nonlinear systems (Harris and Heathwaite 2012) produces unavoidable uncertainty that poses challenges to making management decisions, including decisions regarding actions to respond to cumulative impacts.

For activities authorized by this NWP, the contribution of those activities to cumulative impacts on the structure and functions of jurisdictional waters and wetlands is dependent in part on how the disturbances cause by NWP activities interact with the disturbances caused by other human activities and natural events that occur during the period this NWP is in effect. Those interactions may be additive, synergistic, and/or antagonistic. Cross-scale interactions among ecosystems and disturbances are also likely to occur over geographic scales such as landscapes, watersheds, and seascapes, to further complicate the evaluation of cumulative impacts. The specific types of interactions that occur among NWP activities and other anthropogenic disturbances may vary by aquatic ecosystem types and geographic regions. The interactions that occur may also depend on the degree to which the affected jurisdictional waters and wetlands perform ecological functions and services, the categories of human activities and natural disturbances that affect the structure and function of jurisdictional waters and wetlands in that region, and other factors. The complexity of aquatic ecosystems, the potential types of interactions among the various causes of disturbance that can occur, and other factors make it difficult to predict how aquatic ecosystems in a particular region will respond to the cumulative impacts of the activities authorized by this NWP, activities authorized by other forms of DA authorization, and other activities that are not subject to the Corps' permitting authorities. Because of this uncertainty, a monitoring and reactive approach to addressing cumulative impacts through the division and district engineer's authority to modify, suspend, or revoke NWP authorization on a regional or activity-specific basis is likely to be the most effective approach for ensuring in a particular region that this NWP authorizes only those activities that have no more than minimal cumulative adverse environmental effects.

All ecosystems are subject to disturbances, and it is the type, magnitude, and

frequency of disturbances that causes an ecosystem to either: (1) maintain its structure and functions, (2) improve its structure and functions, or (3) exhibit a decline in its structure and functions (Spaling 1994). All ecosystems have some capacity to assimilate various amounts of disturbances without degrading ecosystem structure or functions (Spaling 1994). Potential ecosystem responses to multiple disturbances should take into account ecosystem dynamics, because ecosystems are not static and they are constantly changing in response to anthropogenic and natural drivers of environmental change as well as their internal processes that influence species composition and abundance (Clewell and Aronson 2013). Cumulative impact assessment should consider how aquatic ecosystems and other ecosystems respond to multiple and overlapping disturbances, and whether those ecosystems will continue to maintain their structure and functions or change their structure and functions to one or more alternative states.

Ecosystems are complex adaptive systems that self-organize in response to changes in environmental and biological drivers at various scales (Levin 1999), including human activities. Complexity imposes basic limits on what people can know and predict, so it is necessary to learn to expect surprises as ecosystems change (Harris and Heathwaite 2012). Ecosystem complexity is due to variability in the physical environment, stochastic variations in ecological processes, and differences in how anthropogenic and natural disturbances affect those ecosystems (Clewell and Aronson 2013). Ecosystem complexity poses challenges in attempting to predict when, and whether, cumulative impacts will alter the structure and functions of the ecosystems being assessed. Other factors, including ecological resilience and potential ecological thresholds may also influence how ecosystems respond to various disturbances.

Ecological science has altered its understanding of how ecosystems change over time, from static models based on equilibrium and predictable behavior to complex, dynamic models that are based on non-equilibrium and unpredictable behavior that accounts for the complexity and non-linearity of ecosystem dynamics (Wallington et al. 2005). Some ecosystems may exhibit gradual, continuous overall responses to multiple disturbances, while other ecosystems exhibit more complex dynamics, expressing little or no change in structure and functions in response to multiple disturbances until a threshold is reached where those ecosystems undergo abrupt, discontinuous (i.e., non-linear) changes in structure and functions (Wallington et al. 2005, Scheffer et al. 2001). Non-linear threshold dynamics in ecosystems are more difficult to predict than linear ecosystem responses to disturbances (Foley et al. 2015). Most ecosystems exhibit complex dynamics, especially as human activities have had increasing cumulative impacts on these systems (Suding and Hobbs 2009) over time.

Most ecosystems can tolerate disturbances and continue to provide ecological functions and services until they reach an ecological threshold that when crossed, causes the ecosystem to change to an alternative state with a substantially different

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

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

Resilience is the ability of ecosystems to withstand or absorb disturbance while maintaining their basic structure and functions (Suding and Hobbs 2009, Walker and Salt 2006, Folke et al. 2004). An ecosystem with greater resilience can absorb more disturbances than an ecosystem with lower resilience (Kelly et al. 2014). Resilience is linked to non-linear dynamics, where an ecosystem can absorb disturbances to some degree before approaching an ecological threshold where an additional amount of disturbance causes that ecosystem to abruptly change to a different structure and functions (Kelly et al. 2014). Loss of resilience can increase an ecosystem’s susceptibility to changing to a different structure and functions, and some changes to alternative states may be irreversible (Folke et al. 2004). Human activities can affect the resilience of ecosystems by changing their biotic composition and how those ecosystems respond to disturbances (Suding and Hobbs 2009). Examples of human activities that can reduce the resilience of

ecosystems, and the ability of those ecosystems to sustain their structure and functions after being subjected to disturbances, include land use changes, pollution, resource exploitation, changes in disturbance regimes, and changes in environmental conditions (Folke et al. 2004). Activities authorized by this NWP may also contribute to decreases in aquatic ecosystem resilience, but those contributions are likely to be insignificant because of the wide variety of potential disturbances outside of the Corps' jurisdictional authority to which ecosystems are exposed.

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

Current environmental laws (e.g., the Clean Water Act, the National Environmental Policy Act) were passed in the late 1960s and early 1970s, before ecological science began to understand that many ecosystems exhibit non-linear responses to disturbances (Kelly et al. 2014). Therefore, those environmental laws assume that ecosystems exhibit linear responses to disturbances. Activities authorized by this NWP during the period it is in effect may, or may not, alter the structure, functions, and dynamics of aquatic ecosystems, and the responses of those ecosystems to multiple disturbances may be linear or non-linear. In most cases, our current understanding of aquatic ecosystems or other ecosystems is not sufficient for predicting how they are likely to respond to single disturbances or multiple disturbances (Clarke Murray et al. 2014, Kelly et al. 2014, Suding and Hobbs 2009, Cocklin et al. 1992).

Cumulative impacts are evaluated against the current environmental setting, and the current environmental setting is the product of environmental change (Cocklin et

al. 1992) that has occurred over many years over broad geographic areas (e.g., landscapes, seascapes) as a result of a variety of human activities and natural disturbances. For a particular ecosystem, its response to cumulative impacts may be dependent on the current condition of that ecosystem (Clarke Murray et al. 2014), which may not be well understood with currently available information. Ecological thresholds can provide useful, science-based targets for environmental regulation (Kelly et al. 2014), including the evaluation of the cumulative impacts to ecosystems caused by multiple human activities and natural disturbances. However, because of ecosystem complexity and dynamics, our incomplete understanding of these ecosystems, incomplete information about the current functions and services provided by these ecosystems, whether a particular ecosystem is near an ecological threshold where it might be more susceptible to transforming to an alternative state, incomplete information about other concurrent activities that might affect ecosystem structure and functions, and other information gaps make it difficult to predict whether or not the cumulative use of this NWP during the five year period it is in effect may, or may not, cause no more than minimal adverse cumulative effects.

Because this NWP authorizes activities across the United States and its territories, for the issuance of this NWP, the analysis of cumulative impacts would be the accumulation of impacts caused by activities authorized by this NWP during the period it is in effect (i.e., no more than five years), and how those accumulated impacts could affect the current environmental setting within the United States and its territories. The effects of those accumulated impacts on ecosystem structure and functions are also dependent on how the impacts authorized by this NWP interact (i.e., synergistically, antagonistically, or additively) with impacts caused by other federal, non-federal, and private actions that occur during the period this NWP is in effect, because the activities conducted under this NWP cannot be isolated from those federal, non-federal, and private actions, or from activities that are authorized by other forms of DA authorization, such as individual permits and regional general permits. During the five year period this NWP is in effect, it is the collective impacts of all of these activities that may alter the structure and functions of the ecosystems being evaluated for cumulative impacts.

Cumulative impact analysis can utilize either a stressor-based approach or an effects-based approach (e.g., Duinker et al. 2013, Dubé 2003, Cocklin et al. 1992). A stressor-based approach evaluates the cumulative effects caused by a specific type of disturbance or cause of environmental change (Cocklin et al. 1992). A stressor-based approach to cumulative impact assessment does not take into account other potential anthropogenic or natural disturbances that may also cause changes in ecosystem structure and functions (Duinker et al. 2013, Noble 2010). A stressor-based approach to cumulative impact assessment is unlikely to be effective in identifying and implementing management actions that could reduce or reverse those cumulative impacts because it might not identify all of the primary drivers of change in aquatic ecosystem structure and functions. With respect to the activities

authorized by this NWP, under a stressor-based approach to cumulative impact analysis, those NWP activities might not be a substantial driver of changes in aquatic ecosystem structure and functions in a waterbody, watershed, or other geographic region.

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

Because of the numerous categories of anthropogenic activities that contribute to cumulative effects to aquatic ecosystems, and the fact that activities authorized by this NWP do not occur in isolation from those other human activities, a stressor-based approach is not appropriate for an environmental assessment to determine whether the issuance of this NWP might cause more than minimal cumulative adverse environmental effects in the United States and its territories. In other words, during the period this NWP is in effect it is the interactions among: (1) the current environmental setting (i.e., the environmental baseline); (2) activities authorized by this NWP; (3) activities authorized by other forms of DA authorization; and (4) federal, non-federal, and private activities that the Corps does not have the authority to regulate (see section 4.3 of this document) that have substantial influence on cumulative impacts that may, or may not, change the structure and functions of aquatic ecosystems within the geographic scope of the cumulative impact analysis. Therefore, this environmental assessment takes an effects-based approach to evaluating cumulative impacts of the proposed action and its alternatives.

There are a number of ecological considerations that should be taken into consideration when evaluating cumulative impacts, including the cumulative impacts of one category of activities (e.g., activities authorized by this NWP), that can alter or disrupt ecological processes and affect the structure and functions of jurisdictional waters and wetlands and other aquatic ecosystems and the services

they provide. Those ecological considerations include: (1) the difficulties of establishing cause-and-effect relationships between a specific category of anthropogenic or natural disturbance and changes in ecosystem structure and functions; (2) evaluating how various types of anthropogenic and natural disturbances interact with each other; (3) ecosystem dynamics; (4) and ecological thresholds in ecosystems that exhibit non-linear dynamics. Cumulative effects analysis should take into account the complexity, uncertainty, and natural variation of ecosystems (Clarke Murray et al. 2014). Another challenge with cumulative impact assessment in practice is that there are currently substantial gaps in our ecological understanding of how multiple anthropogenic and natural disturbances interact with each other to cause changes to ecosystems and the ecological functions and services they provide (Hodgson et al. 2019, Côté et al. 2016, Clarke Murray et al. 2014).

When the capacity of a waterbody to perform ecological functions decreases substantially, it is usually difficult to identify one specific activity that is responsible for that degradation, because that degradation is usually the result of multiple anthropogenic disturbances that caused cumulative environmental change in that waterbody (Dubé 2003). When considering cumulative impacts to aquatic ecosystems caused by a specific category of anthropogenic disturbances, firmly establishing a cause-and-effect relationship between that disturbance category and subsequent environmental change is difficult because of the complexity of these ecosystems, their dynamic nature, and the many categories of human activities and natural disturbances that can affect their structure and function (e.g., Korpinen and Andersen 2016, Clarke Murray et al. 2014, Cocklin et al. 1992). Establishing a decisive cause-and-effect relationship between the use of the NWP in a region and substantial changes in the structure and functions of aquatic ecosystems in that region is difficult because of the greater likelihood that those substantial changes were caused by a combination of human activities and natural disturbances that affect the structure and function of those aquatic ecosystems. NWP activities occur concurrently with other human activities and natural disturbances, and the collective disturbances caused by human activities are the causes of cumulative change in aquatic ecosystems. Slowly-occurring changes to ecosystem structure and functions can also make it difficult to identify cause-and-effect linkages between disturbances and changes in ecosystem structure and function, making decision-making for regulatory and resource agencies more challenging (Hughes et al. 2013, Kelly et al. 2015).

Attempting to manage cumulative effects requires an understanding all of the various anthropogenic and natural disturbances that can affect the ecosystem(s) being evaluated, not just the disturbances caused by a specific category of activities (Noble 2010). Therefore, all of those human activities and natural disturbances should be considered when assessing cumulative effects and determining whether there are appropriate management actions that could be required under the Corps' permitting authorities (and any other applicable federal, tribal, state, and local

regulatory authorities) to address substantial cumulative adverse environmental effects. Because of the variety of human activities and natural disturbances that contribute to cumulative environmental change, resource managers should also understand that cumulative impacts are likely to continue to occur even if one particular of category of activities (e.g., the activities authorized by this NWP) is prohibited from occurring in that region for the foreseeable future.

Ecological thresholds can guide decision-making for regulatory programs (Kelly et al. 2014) for ecosystems with non-linear dynamics. However, it is difficult to predict where these thresholds are, and ecosystems may exhibit little change before a threshold is reached (Scheffer et al. 2009). If an ecological threshold exists, it may be difficult to identify because many thresholds are not known to exist until after an ecosystem has changed to an alternative state, especially if the ecosystem has resisted change after being exposed to multiple disturbances (Selkoe et al. 2015). Ecological thresholds are less useful for decision-making for ecosystems that have linear dynamics, because they change gradually in response to multiple disturbances over time, with no discernable threshold. Thresholds may be a critical tool for evaluating the significance of cumulative impacts (Duinker et al. 2013). Identifying ecological thresholds requires gathering sufficient information to better understand ecosystem dynamics and reduce uncertainty about where ecological thresholds may occur and under what circumstances they may be reached (Kelly et al. 2014) and cause the ecosystem to exhibit a substantial change in structure and functions. In addition, ecological thresholds are likely to change as ecosystems change over time, and it may be difficult to predict where an ecological threshold will exist in the future (Standish et al. 2014). Another factor to consider regarding the use of ecological thresholds in decision-making is that slower transitions to alternative states (i.e., substantial changes in ecosystem structure and functions) can be more difficult to identify and manage than sudden transitions to alternative states (Hughes et al. 2013). In some ecosystems, these transitions can take decades, centuries, or longer to occur (Hughes et al. 2013). Therefore, the utility of ecological thresholds in decision-making by Corps divisions and districts, as well as natural resource managers, is dependent on how quickly these transitions shifts are likely to occur in a particular ecosystem.

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

Because of the difficulty in identifying thresholds in advance of an ecosystem shifting to a substantially different structure and functions, the most certain way to identify thresholds in ecosystems is to observe when a change to a substantially different structure and functions occurs (Kelly et al. 2014, Selkoe et al. 2015).

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

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

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

Cumulative impact analysis involves uncertainty because of our limited understanding of ecosystems, including aquatic ecosystems, and how various human activities and natural disturbances affect the structure and function of those ecosystems (Clarke Murray et al. 2014). An additional challenge to assessing cumulative impacts is the difficulty of quantifying the response of an ecosystem to a specific disturbance, including the degree to which that disturbance affects the structure and functions of that ecosystem (Clarke Murray et al. 2014). Furthermore,

if ecosystem response to a particular disturbance is difficult to quantify, then it is likely to be even more difficult to quantify how an ecosystem responds to the cumulative impacts of multiple disturbances and other drivers of ecosystem change. These factors point to the challenges and difficulties in quantifying cumulative impacts and determining whether or not they are likely to have a reasonably foreseeable significant impact on the quality of the human environment.

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

This qualitative assessment of cumulative impacts that may be caused by the issuance of this NWP is necessary because of the lack of data concerning: (1) the quantity of aquatic ecosystems across the country, (2) the degree to which those aquatic ecosystems perform various ecological functions and services, (3) the numbers, types, and impacts of federal, non-federal, and private actions across the country that may affect the structure and functions of aquatic ecosystems, (4) what types of interactions are likely to occur among the various anthropogenic disturbances to aquatic ecosystems, (5) the degree to which those aquatic ecosystems are resilient to disturbances, and (6) other data gaps. These data limitations make it difficult to conclude, with any confidence, that the issuance of this NWP is likely to cause more than minimal cumulative adverse environmental effects to aquatic ecosystems in the United States and its territories. However, because of the "no more than minimal cumulative adverse effects" is much lower than the threshold for requiring an environmental impact statement under NEPA, the issuance of this NWP will not have a reasonably foreseeable significant impact on the quality of the human environment.

Because the activities authorized by this NWP constitute only a small proportion of the categories of human activities across the country that directly and indirectly affect ocean waters, estuarine waters, lakes, wetlands, streams, and other aquatic resources, the activities authorized by this NWP during the period it is anticipated to be in effect are likely to result in only a minor incremental change to the jurisdictional waters and wetlands in the affected environment (i.e., the current environmental setting in the United States and its territories), and the ecological functions and services those waters and wetlands provide. Division and district engineers will monitor the use of this NWP on a regional and activity-specific basis,

and under their authorities in 33 CFR 330.5(c) and (d), will modify, suspend, or revoke NWP authorizations in situations where those activities will result in more than minimal cumulative adverse environmental effects in a waterbody, watershed, or other geographic region.

If, during the period the NWP is in effect, Corps Headquarters determines that this NWP is resulting in more than minimal cumulative adverse environmental effects across the country, it will take action under 33 CFR 330.5(b) to modify, suspend, or revoke this NWP. At a regional scale, division and district engineers will take actions under 33 CFR 330.5(c) and (d) respectively, to modify, suspend, or revoke this NWP when they determine that the use of this NWP in a region or for a specific activity will result in more than minimal cumulative adverse environmental effects.

5.3 Impact Analysis for Alternatives to the Proposed Action

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

The no action alternative would be contrary to one of the goals of the Corps' Nationwide Permit Program, which is to regulate with little, if any, delay or paperwork certain activities having minimal impacts (33 CFR 330.1(b)). The no action alternative would also reduce the Corps' ability to pursue the current level of review for other activities that have greater adverse effects on the aquatic environment, including activities that require individual permits as a result of division or district engineers exercising their discretionary authority under the NWP program. The no action alternative would also reduce the Corps' ability to conduct compliance actions.

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

Under the no action alternative, district engineers may issue regional general permits or programmatic general permits to authorize similar categories of activities that would have no more than minimal adverse environmental effects that could have been authorized by this NWP. However, those regional general permits or programmatic general permits may have different quantitative limits, different restrictions, and other permit conditions, and those quantitative limits, restrictions, and permit conditions may result in the authorization of activities that have greater, similar, or lesser adverse environmental effects than the activities that would have been authorized by this NWP. Under the no action alternative, there may be differences in consistency in implementation of the Corps Regulatory Program among Corps districts. District engineers can tailor their regional general permits and programmatic general permits to effectively address the specific categories of aquatic resources found in their geographic areas of responsibility, the specific categories of activities that occur in those geographic areas, and the ecological functions and services those categories of aquatic resources provide. The environmental consequences of this aspect of the no action alternative are more difficult to predict because of the potential variability of regional general permits and programmatic general permits among Corps districts across the country, when such general permits are available to authorize a similar category of activities as this NWP authorizes. If this NWP is not reissued, districts would have to draft, propose, and issue regional general permits or programmatic general permits through the public notice and comment process and prepare applicable environmental documentation to support their decisions on whether to issue those regional general permits or programmatic general permits. It would take a substantial amount of time to issue those regional general permits and programmatic general permits, and in the interim proposed activities would have to be authorized through the individual permit process.

If the Corps does not reissue this NWP, oil or natural gas pipeline activities that require DA authorization under section 404 of the Clean Water Act and/or section 10 of the Rivers and Harbors Act of 1899 may continue to be authorized by individual permits, regional general permits, and programmatic general permits. If oil or natural gas pipeline activities that require DA authorization do not receive that DA authorization from the Corps, oil or natural gas companies and other entities that utilize oil or natural gas will find alternative means of transporting oil or natural gas (e.g., trucks, railroad cars, ships) to the various users of oil or natural gas. The adverse environmental effects directly or indirectly caused by the combustion of oil or natural gas (e.g., the emission of greenhouse gases), or the use of oil to produce other products such as gasoline, plastics, pharmaceuticals, fertilizer, etc., are likely to continue to occur.

The risks of oil spills or natural gas leaks from pipelines are no different depending on whether the construction of crossings of waters of the United States is authorized by nationwide permit or individual permit. The construction of new oil or

natural gas pipelines would still be subject to the same engineering standards, federal/state/local government regulatory requirements (e.g., from FERC, DOT/PHSMA, state agencies, local government agencies) regardless of whether the activity under Corps' authority is authorized by a general permit (e.g., nationwide permit or regional general permit) or by a standard individual permit. If the Corps denies authorization of the crossings of waters of the U.S., the project proponent could construct the oil or natural gas pipeline by using techniques that do not involve discharges of dredged or fill material into waters of the United States (an exception would be crossings over, in, or under section 10 waters) using horizontal directional drilling or crossing non-jurisdictional waterbodies (e.g., ephemeral streams). If the new oil or natural gas pipeline would be denied Corps authorization, oil and natural gas entities are likely to transport those substances through other means, such as trucks, railroads, and ships. Trucks and railroad transport of oil and natural gas are often considered to have higher risks of oil spills or gas leaks than the transport of oil or natural gas through pipelines. Transport of oil and natural gas by ship is not practicable in many areas of the country.

5.3.2 Reissue the Nationwide Permit With Modifications

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

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

Changing the national terms and conditions of this NWP may change the incentives for project proponents to reduce their proposed impacts to jurisdictional waters and wetlands to qualify for NWP authorization, and receive the required DA authorization for regulated activities in less time than it would take to receive individual permits for those activities. Under the individual permit process, the project proponent may request authorization for activities that have greater impacts on jurisdictional waters and wetlands, and may result in larger losses of aquatic resource functions and services.

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

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

An environmental consequence of district engineers modify, suspending, or revoking this NWP on a case-by-case basis is the ability of district engineers to address site-specific conditions, including the degree to which aquatic resources on the project site provide ecological functions and services. Activity-specific modifications may also address site-specific resources (e.g., listed species or cultural resources) that may be affected by NWP activities. The environmental consequences of modification of this NWP on an activity-specific basis by district

engineers may be further reductions in losses of waters of the United States for specific activities authorized by NWP because of mitigation required by district engineers during their reviews of PCNs to ensure that those activities result in no more than minimal individual and cumulative adverse environmental effects (see 33 CFR 330.1(e)(3)). Examples of mitigation that may be required by district engineers include permit conditions requiring compensatory mitigation to offset losses of waters of the United States or conditions added to the NWP authorization to prohibit the permittee from conducting the activity during specific times of the year to protect spawning fish and shellfish. If a proposed NWP activity will result in more than minimal adverse environmental effects, then the district engineer will exercise discretionary authority and require an individual permit. The individual permit review process requires a project-specific alternatives analysis, including the consideration of off-site alternatives, and a public interest review.

5.3.3 Reissue the Nationwide Permit Without Modifications

Retaining the current terms and conditions of this NWP would likely result in little or no changes in the number of activities authorized by this NWP, and the environmental impacts of authorized activities. Project proponents would likely continue to design their project to qualify for NWP authorization. Retaining the current national terms and conditions of this NWP would likely continue to provide incentives for project proponents to reduce their proposed impacts to jurisdictional waters and wetlands to qualify for NWP authorization, and receive the required DA authorization for regulated activities in less time than it would take to receive individual permits for those activities. Under this alternative, for those activities that require individual permits project proponents may request authorization for activities that have greater impacts on jurisdictional waters and wetlands, and may result in larger losses of aquatic resource functions and services.

Under this alternative, the environmental consequences of division engineers exercising their discretionary authority to modify, suspend, or revoke this NWP on a regional basis would be similar to the environmental consequences discussed in section 5.0 of this document. Corps divisions may add regional conditions to the NWPs to enhance protection of the aquatic environment in a region (e.g., a Corps district, state, or watershed) and address regional concerns regarding jurisdictional waters and wetlands and other resources (e.g., listed species or cultural resources) that may be affected or impacted by the activities authorized by this NWP. Division engineers can also revoke an NWP in a region if the use of that NWP results in more than minimal adverse environmental effects, especially in high value or rare waters or wetlands. When an NWP is issued or reissued by the Corps, division engineers issue supplemental documents that evaluate potential impacts of the NWP at a regional level, and assess cumulative impacts caused by this NWP on a regional basis during the period this NWP is in effect. [33 CFR 330.5(c)]

The modification and reissuance of this NWP adopts the alternative identified in

section 3.2 of this document. The Corps has considered the comments received in response to the proposed rule, and made changes to the NWPs, general conditions, and definitions to address those comments. Division engineer may add regional conditions to this NWP to help ensure that the use of the NWPs in a particular geographic area will result in no more than minimal individual and cumulative adverse environmental effects. District engineers may also add regional conditions to this NWP to help ensure compliance with other applicable laws, such as section 7 of the Endangered Species Act, section 106 of the National Historic Preservation Act, and the essential fish habitat provisions of the Magnuson-Stevens Fishery Conservation and Management Act. Division engineers may also add regional conditions to this NWP to fulfill its tribal trust responsibilities.

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

6.0 Determinations

6.1 Finding of No Significant Impact

[*To be determined after review of comments received in response to the proposal and the evaluation process for the final NWP.*]

6.2 Public Interest Determination

[*To be determined after review of comments received in response to the proposal and the evaluation process for the final NWP.*]

6.3 Section 404(b)(1) Guidelines Compliance

[*To be determined after review of comments received in response to the proposal and the evaluation process for the final NWP.*]

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

[*To be determined after review of comments received in response to the proposal and the evaluation process for the final NWP.*]

FOR THE COMMANDER

Dated:

[*insert signature*]

Appendix A – Public Interest Review

A.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. Compensatory mitigation, if required for activities authorized by this NWP, should result in the restoration, enhancement, establishment, or preservation of aquatic habitats that will offset losses to conservation values. Leaks from oil or natural gas pipelines or their substations may alter conservation values in the vicinity of the oil or natural gas pipeline. Conservation values of the local area may also be changed by the construction of access roads for the oil or natural gas pipeline. For those activities that require pre-construction notification, the district engineer will review the proposed activity and may add permit conditions to ensure that adverse effects to conservation are no more than minimal.

Discharges of dredged or fill material that convert wetlands, streams, and other aquatic resources to upland areas may 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. During construction of oil or natural gas pipelines, where horizontal directional drilling is used to install or replace a portion of the pipeline, there is a possibility of inadvertent returns of drilling fluids that could adversely affect wetlands, streams, and other aquatic resources. Those inadvertent returns of drilling fluids are not considered discharges of dredged or fill material that require Clean Water Act section 404 authorization. Activities necessary to remediate these inadvertent returns of drilling fluids may involve activities that require DA authorization, and those activities may be authorized by NWP 12. The establishment of oil or natural gas pipeline rights-of-way may cause changes in land cover and habitat type. Some species may benefit from changes in habitat type and other species may be adversely affected by changes in habitat type (Richardson et al. 2017).

(b) Economics: Oil or natural gas pipelines activities are likely to 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 materials. Oil or natural gas pipelines provide energy to residences and schools, as well as factories, offices, stores, and other places of business, to allow those facilities to operate. They also transport oil to processing plants where the oil can be transformed into a variety of products, such as plastics, that are used for a wide variety of purposes.

(c) Aesthetics: Oil or natural gas pipeline activities may alter the visual character of some waters of the United States. The extent and perception of these changes may vary, depending on the size and configuration of the activity, the nature of the surrounding area, and the public uses of the area. Oil or natural gas pipeline activities authorized by this NWP can also modify other aesthetic characteristics, such as air quality and the amount of noise. The increased human use of the project area and surrounding land may also alter local aesthetic values. Inadvertent releases or spills from oil pipelines may alter aesthetics in the vicinity of the pipeline.

(d) General environmental concerns: Activities authorized by this NWP may affect general environmental concerns, such as water, air, noise, and land pollution. The authorized activities will also affect the physical, chemical, and biological characteristics of the environment. 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.

Oil or natural gas pipeline activities and associated facilities may also contribute to other general environmental concerns, including potential adverse effects to aquatic and terrestrial environments and to the atmosphere during their construction, maintenance, and operation. During the operation of oil or natural gas pipelines, the oil, natural gas, or petrochemical substances carried by those pipelines may leak into surrounding areas. Inadvertent releases, such as spills, from oil or natural gas pipelines may have adverse effects on water quality, fish and wildlife, soil structure and function, etc. (Chang et al., 2014; Schallaert et al., 2020). Natural gas leaks may have adverse effects on air quality, and public safety, through the potential danger for explosions to occur[8] (NASEM, 2018). For interstate oil pipelines, operators are required to comply with the Pipeline and Hazardous Materials Safety Administration's safety requirements and have plans for addressing the risk of inadvertent releases from oil or natural gas pipelines. Oil spills are also addressed through the Oil Pollution Act of 1990, which is administered by the U.S. Environmental Protection Agency and the U.S. Coast Guard. The U.S. EPA is responsible for oil spills in inland waters and the U.S. Coast Guard is responsible for oil spills in coastal waters and deepwater ports. For natural gas pipelines, there may

8 https://www.apga.org/natural-gas-safety

be gas leaks during the operation of those pipelines. The Federal Energy Regulatory Commission regulates the interstate transmission of natural gas and oil, and issues licenses for interstate natural gas pipelines. For natural gas pipelines, the U.S. Department of Transportation‘s Pipeline and Hazardous Pipeline Materials Safety Administration is responsible for regulating the operation of the pipeline during its lifetime, including imposing requirements to address potential leaks of natural gas from the pipeline. The U.S. Department of Transportation is also responsible for setting the federal safety standards for natural gas pipelines, and other pipelines, and related facilities

Oil and natural gas pipelines may also be targets of intentional damage, including sabotage and vandalism, as well as unintentional damage, such dredging, excavation, or drilling activities that are conducted without checking to see whether pipelines are buried in the area. This intentional and unintentional damage may cause leaks that release the substances that are transported by the oil or natural gas pipelines.

Other potential adverse environmental effects from oil or natural gas pipeline construction, maintenance, repair, or replacement activities may be inadvertent returns of drilling fluids that may occur during horizontal directional drilling activities. These drilling fluids may be released into aquatic and terrestrial environments and may contribute to cumulative adverse environmental effects to those environments. Inadvertent returns of drilling fluids are not regulated under section 404 of the Clean Water Act because they are not discharges of dredged or fill material. They may be regulated under section 402 of the Clean Water Act or under state laws and regulations. This NWP contains provisions that allow permittees to quickly take actions that require DA authorization (e.g., discharges of dredged or fill material into waters of the United States to contain inadvertent returns of drilling fluids) to respond to inadvertent returns to minimize the adverse environmental effects of those inadvertent returns.

For oil or natural gas pipelines, general environmental concerns may include the burning of the fossil fuels that occurs after the oil or natural gas reaches its destination, which produce carbon dioxide that contribute to greenhouse gas emissions. The Corps does not have the authority to control the burning of fossil fuels or the adverse environmental effects that are caused by burning those fossil fuels to produce energy.

A variety of pollutants might be released into the environment during the operation and maintenance of oil or natural gas pipelines. Those pollutants may be discharged through either point sources or non-point sources and reach jurisdictional waters and wetlands. 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 inadvertent releases, such as

spills, and other accidents. Operations and maintenance activities may also other direct and indirect effects on wetlands, streams, and other aquatic resources. The Corps does not have the authority to regulate operations and maintenance activities that: (1) do not involved discharges of dredged or fill material into waters of the United States; (2) involve activities exempt from Clean Water Act section 404 permit requirements under section 404(f) of the Act; and (3) do not involve structures or work requiring DA authorization under sections 9 or 10 of the Rivers and Harbors Act of 1899. The Corps does not have authority under section 404 of the Clean Water Act to regulate the placement of trash or garbage into waters of the United States because trash and garbage are excluded from the regulatory definition of "fill material" (see 33 CFR 323.2(e)(3)). Operations and maintenance activities regulated by the Corps are considered during the pre-construction notification review process.

Division engineers have discretionary authority to modify, suspend, or revoke NWP authorizations for any specific geographic area, class of activities, or class of waters within a Corps division because of concerns regarding the environment or the other relevant factors of the public interest (33 CFR 330.5(c)(1)). District engineers have discretionary authority to review any activity authorized by NWP to determine whether the activity complies with the NWP, including whether the proposed activity would have more than minimal individual or cumulative net adverse effects on the environment or otherwise may be contrary to the public interest (33 CFR 330.1(d).

(e) Wetlands: The construction, maintenance, repair, or removal of oil or natural gas pipelines and associated facilities may result in the loss or alteration of wetlands. For the construction or maintenance of oil or natural gas pipelines impacts to wetlands are often temporary, unless the site contains forested wetlands that are not allowed to regenerate because of maintenance of the pipeline right-of-way or because of permanent fills in wetlands. The construction of oil or natural gas pipeline rights-of-way through forested wetlands may result in the conversion of forested wetlands to scrub-shrub or emergent wetlands. Those conversions may be permanent to maintain the oil or natural gas pipeline in good, operational order. The conversion of wetlands to other types of wetlands may result in the loss of certain wetland functions, or the reduction in the level of wetland functions being performed by the converted wetland (Richardson, 1994). District engineers have the authority to require mitigation to offset losses of wetland functions caused by regulated activities (see paragraph (i) of general condition 23, mitigation). The construction of oil or natural gas pipeline substations may result in the permanent loss of wetlands. Wetlands may also be converted to other uses and habitat types. Forested wetlands may not be allowed to grow back in the oil or natural gas pipeline right-of-way so that the oil or natural gas pipeline will not be damaged and can be easily maintained. Only shrubs and herbaceous plants may be allowed to grow in the right-of-way. Some wetlands may be temporarily impacted if those wetlands are located in temporary staging areas. These wetlands will normally be restored, unless the district engineer authorizes another use for the area, but the plant

community may be different, especially if the site was originally forested.

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 can reduce erosion by stabilizing the substrate. Wetlands can also act as storage areas for stormwater and flood waters. Wetlands may act as groundwater discharge or recharge areas. The loss of wetland vegetation may adversely affect water quality because these plants trap sediments, pollutants, and nutrients and transform chemical compounds. Wetland vegetation can also provide habitat for microorganisms that remove nutrients and pollutants from water. Wetlands, through the accumulation of organic matter, can act as sinks for some nutrients and other chemical compounds, reducing the amounts of these substances in the water.

General condition 23 requires avoidance and minimization of impacts to waters of the United States, including wetlands, at the project site. Compensatory mitigation may be required to offset losses of waters of the United States so that the net adverse environmental effects are no more than minimal. General condition 22 prohibits the use of this NWP to discharge dredged or fill material in designated critical resource waters and adjacent wetlands, which may include high value wetlands. Division engineers can impose regional conditions on this NWP to restrict or prohibit its use in high value wetlands. District engineers can also exercise discretionary authority to require an individual permit if high value wetlands will be affected by the activity and the activity will result in more than minimal adverse environmental effects. District engineers may also add case-specific special conditions to the NWP authorization to reduce impacts to wetlands or require compensatory mitigation to offset losses of wetlands.

(f) Historic properties: General condition 20 states that in cases where the district engineer determines that the proposed NWP activity may have the potential to cause effects to properties listed, or eligible for listing, in the National Register of Historic Places, the activity is not authorized until the requirements of section 106 of the National Historic Preservation Act have been satisfied.

(g) Fish and wildlife values: This NWP authorizes certain oil or natural gas pipeline activities in all waters of the United States. Discharges of dredged or fill material into waters of the United States for the construction of oil or natural gas pipeline substations is limited to non-tidal waters, excluding non-tidal waters adjacent to tidal waters. Waters of the United States often provide habitat to many species of fish and wildlife. Activities authorized by this NWP may alter the habitat characteristics of streams, wetlands, and other waters of the United States, which may decrease the quantity and quality of fish and wildlife habitat. The construction of oil or natural gas pipeline rights-of-way may fragment existing habitat and increase the amount of edge habitat in the area, causing changes in local species composition. Inadvertent releases from oil or natural gas pipelines substations, and other structures may

have adverse effects on fish and wildlife, such as mortality, injury, and reduced reproductive fitness (Chilvers et al., 2020).

The construction or replacement of oil or natural gas pipelines and the establishment and maintenance of their rights-of-way may fragment terrestrial and aquatic ecosystems and may affect local fish and wildlife values. Habitat fragmentation may occur without a loss of habitat. For example, during the establishment of a pipeline right-of-way, a forested wetland may be converted to a herbaceous wetland without habitat loss. In this example, the herbaceous wetland may have different habitat functions than the forested wetland, but could still provide habitat for a number of species. In a review of studies that examined ecological responses to habitat fragmentation where the total amount of habitat did not change, Fahrig (2017) found that most of the ecological responses were positive. Examples of the positive ecological responses identified by Fahrig (2017) included increased habitat, diversity, increased functional connectivity, positive edge effects, enhanced stability of enhanced stability of predator-prey relationships, and landscape complementation. Substations may leak fluids, or the liquids or gases carried by the oil or natural gas pipelines those substations support. predator-prey relationships, and landscape complementation. Substations may leak fluids, or the liquids or gases carried by the oil or natural gas pipelines those substations support.

Wetland, riparian, and estuarine vegetation often provides food and habitat for many species, including foraging areas, resting areas, corridors for wildlife movement, and nesting and breeding grounds. Open waters may provide habitat for fish and other aquatic organisms. Fish and other motile animals may avoid the project site during construction and maintenance. Woody riparian vegetation usually shades streams, which can reduce water temperature fluctuations and provide habitat for fish and other aquatic animals. Riparian and estuarine vegetation can provide organic matter that is consumed by fish and aquatic invertebrates. Woody riparian vegetation can create habitat diversity in streams when trees and large shrubs fall into the channel, forming snags that provide habitat and shade for fish. The morphology of a stream channel may be altered by activities authorized by this NWP, and subsequently affect fish populations. However, pre-construction notification is required for certain activities authorized by this NWP, which will provide district engineers with opportunities to review those activities, assess potential impacts on fish and wildlife values, and ensure that the authorized activities result in no more than minimal adverse environmental effects. Compensatory mitigation may be required by district engineers to restore, enhance, establish, and/or preserve wetlands to offset losses of waters of the United States. Stream rehabilitation, enhancement, and preservation activities may be required as compensatory mitigation for impacts to streams. The establishment and maintenance of riparian areas next to open and flowing waters may also be required as compensatory mitigation. These methods of compensatory mitigation are expected to provide fish and wildlife habitat values.

General condition 2 will reduce adverse effects to fish and other aquatic species by prohibiting activities that substantially disrupt the necessary life cycle movements 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 regional 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 activities authorized by this NWP may affect the flood-holding capacity of the 100-year floodplain, including surface water flow velocities. Changes in the flood-holding capacity of the 100-year floodplain may impact human health, safety, and welfare. Compliance with general condition 9 will 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. General condition 10 requires the activity to comply with applicable FEMA-approved state or local floodplain management requirements. 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 adversely affect the flood-holding capacity of the floodplain, as well as other floodplain values. The fish and wildlife habitat values of floodplains may 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.

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 requirements of general condition 23 will minimize adverse effects to floodplain values, such as flood storage capacity, wildlife habitat, fish spawning areas, and nutrient cycling for aquatic ecosystems. Compliance with general condition 10 will ensure that authorized activities in 100-year floodplains will not cause more than no more than minimal adverse effects on flood storage and conveyance.

(j) Land use: Activities authorized by this NWP may change the land use from natural to developed. Activities authorized by this NWP may occur on lands that have already been substantially modified by human activities. The installation of oil or natural gas pipelines may induce more development in the vicinity of the project. Siting decisions for pipelines are made by state and local governments, consistent with the principle that land planning and zoning is the responsibility of states (with some exceptions for federal and tribal lands). Since the primary responsibility for land use decisions is held by state, local, and tribal governments, the Corps scope of review with respect to land use 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 must comply with general condition 1, which states that no activity may cause more than minimal adverse effects on navigation. This NWP requires pre-construction notification for all activities in section 10 waters, which will allow the district engineer to review the pre-construction notification and determine if the proposed activity will adversely affect navigation.

Under paragraph (c) of general condition 1, the permittee may be required, upon due notice from the Corps of Engineers, to remove, relocate, or alter the structural work or obstructions caused thereby, without expense to the United States. The Corps may require these actions if, in the opinion of the Secretary of the Army or his or her authorized representative, the structure or work will cause unreasonable obstruction to the free navigation of the navigable waters.

An advisory Note has been added to this NWP to recommending that permittees contact the U.S. Coast Guard to discuss siting of proposed structures and any marking requirements that are necessary to comply with general condition 1.

(l) Shore erosion and accretion: The activities authorized by this NWP may have minor direct effects on shore erosion and accretion processes, since the NWP does not authorize the construction of oil or natural gas pipeline substations in tidal waters. The construction of oil or natural gas pipelines are likely to have only

minimal adverse effects on shore erosion and accretion. However, NWP 13, regional general permits, or individual permits may be used to authorize bank stabilization projects associated with oil or natural gas pipeline activities, which may affect shore erosion and accretion.

(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 may no longer be available in the area. Changes in habitat caused by the activities authorized by this NWP, such as discharges of dredged or fill material into waters of the United States to construct an oil or natural gas pipeline right-of-way, may attract certain species of wildlife, such as birds and mammals, that prefer edge habitat, thereby potential increasing some recreational opportunities. Some oil or natural gas pipeline activities may eliminate certain other recreational uses of the area, such as camping and hiking.

(n) Water supply and conservation: Activities authorized by this NWP may adversely affect both surface water and groundwater supplies. Activities authorized by this NWP can also affect the quality of water supplies by adding pollutants to surface waters and groundwater, but many causes of water pollution, such as discharges regulated under section 402 of the Clean Water Act, are outside the Corps' control and responsibility. Some water pollution concerns may be addressed through the water quality management measures that may be required for activities authorized by this NWP. 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. Compensatory mitigation may be required for activities authorized by this NWP, which may help improve the quality of surface waters. For oil or natural gas pipeline activities that involve horizontal directional drilling activities, this NWP authorizes activities that may be necessary to remediate inadvertent returns of drilling fluids, to minimize the effects of those inadvertent returns on water supplies.

(o) Water quality: Oil or natural gas pipeline activities in wetlands and open waters may have adverse effects on water quality. These activities can result in increases in sediments and pollutants in the water. The loss of wetland and riparian vegetation may adversely affect water quality because these plants trap sediments, pollutants, and nutrients and transform chemical compounds. Wetland and riparian vegetation can also provide habitat for microorganisms that remove nutrients and pollutants from water. Wetlands, through the accumulation of organic matter, may act as sinks for some nutrients and other chemical compounds, reducing the amounts of these substances in the water column. Wetlands and riparian areas may also decrease the velocity of flood waters, removing suspended sediments from the water column and reducing turbidity. Riparian vegetation can also serve 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 the activity does 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.

A variety of pollutants might be released into the environment during the operation and maintenance of oil or natural gas pipelines. Those pollutants may be discharged through either point sources or non-point sources and reach jurisdictional waters and wetlands. 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 inadvertent releases or oil or natural gas and other accidents. Oil and natural gas released into the environment from a pipeline, substation, or other structure through spills, leaks, and other accidents may have adverse effects on water quality.

During the construction, maintenance, and repair of oil or natural gas pipelines and related activities, small amounts of oil and grease from construction equipment may be discharged into the waterway. Because most of the construction is likely to 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. For oil or natural gas pipeline activities that involve horizontal directional drilling activities, this NWP authorizes activities that may be necessary to remediate inadvertent returns of drilling fluids, to minimize the effects of those inadvertent returns on water quality.

Activities authorized by this NWP may require Clean Water Act section 401 water quality certification, since the NWP 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 certifying authority. In accordance with general condition 25, the permittee may be required to implement water quality management measures to minimize the degradation of water quality. Water quality management measures may involve the installation of stormwater management facilities to trap pollutants and the establishment and maintenance of riparian areas next to waters of the United States. Riparian areas may help protect downstream water quality and enhance aquatic habitat.

(p) Energy needs: The oil or natural gas pipeline activities authorized by this NWP may induce higher rates of energy consumption in the area by making natural gas and petroleum products more readily available to consumers. Additional power plants or oil refineries may be needed to meet increases in energy demand, but these issues are beyond the Corps' control and responsibility. This NWP may be used to authorize the expansion of existing infrastructure to provide energy to new residential, commercial, and institutional developments, as well as other energy consumers.

(q) Safety: The oil or natural gas pipeline activities authorized by this NWP will be subject to Federal, state, and local safety laws and regulations. Therefore, the activities authorized by this NWP are not likely to adversely affect the safety of the project area. The Federal Energy Regulatory Commission is responsible for ensuring that natural gas pipelines and aboveground facilities, such as substations, are safely constructed and installed. After the natural gas is flowing in the new system, the Department of Transportation's Pipeline and Hazardous Materials Safety Administration's. Operators of oil pipelines are required to comply with the Pipeline and Hazardous Materials Safety Administration's safety requirements, and have plans for addressing the risk of inadvertent releases from oil or natural gas pipelines. Pipelines carrying other types of substances must comply with other applicable federal and state laws and regulations during their operations. For example, the Federal Energy Regulatory Commission regulates the interstate transmission of natural gas, and issues licenses for interstate natural gas pipelines.

(r) Food and fiber production: Activities authorized by this NWP may adversely affect food and fiber production, especially when oil or natural gas pipeline activities are constructed on agricultural land. Oil or natural gas pipelines often require easements, which may take some agricultural land out of production. These activities may reduce the amount of available farmland in the nation, unless that land is replaced by converting other land, such as forest, to agricultural land. The loss of farmland is more appropriately addressed through the land use planning and zoning authorities held by state and local governments. Food production may be increased by activities authorized by this NWP. For example, this NWP can authorize the construction or expansion of natural gas lines that provide energy to commercial food production facilities, such as bakeries, canneries, and meat processing plants.

(s) Mineral needs: Activities authorized by this NWP may increase demand for aggregates and stone, which may be used to construct oil or natural gas pipelines, substations, and access roads. Oil or natural gas pipeline activities authorized by this NWP may increase the demand for other building materials, such as steel, aluminum, and copper, which are made from mineral ores.

(t) Considerations of property ownership: The NWP complies with 33 CFR 320.4(g), which states that an inherent aspect of property ownership is a right to reasonable private use. The NWP provides expedited DA authorization for oil or natural gas pipeline activities, provided those activities comply with the terms and conditions of the NWP and result in no more than minimal adverse environmental effects. The owners or operators of oil or natural gas pipelines may obtain easements to place their oil or natural gas pipelines on lands they do not own.

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

A.2.1 Relative extent of the public and private need for the proposed structure or work

This NWP authorizes the construction, maintenance, repair, and removal of oil or natural gas pipelines and associated facilities, provided those activities have no more than minimal individual and cumulative adverse environmental effects. These activities typically satisfy public and private needs for the conveyance of oil or natural gas. The need for this NWP is based upon the number of these activities that occur annually with only minimal individual and cumulative environmental adverse effects.

A.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.

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. The district engineer will exercise discretionary authority and require an individual permit if the proposed activity will result in more than minimal adverse environmental effects on the project site. The consideration of off-site alternatives can be required during the individual permit process.

A.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 oil or natural gas pipeline activity. Activities authorized by this NWP will result in no more than minimal individual and cumulative adverse environmental effects because of the terms and conditions in this NWP, the pre-construction notification review process, regional and activity-specific conditions imposed by division and district engineers, and the authority of division and district engineers to modify, suspend, or revoke this NWP on a regional or activity specific basis to

ensure that the authorized activities result in no more than minimal individual and cumulative adverse environmental effects.

The terms, conditions, and provisions of the NWP were developed to help 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.

Appendix B – 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.

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

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

B.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)).

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

This NWP authorizes discharges of dredged or fill material into waters of the United States, which may 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 are authorized by this NWP. General condition 6 states that the material must be free from toxic pollutants in toxic amounts.

This NWP does not authorize discharges of dredged or fill material into waters of the United States that are likely to jeopardize the continued existence of any listed threatened or endangered species or 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 discharges of dredged or fill material into waters of the United States that violate any requirement to protect any marine sanctuary. Refer to section B.2.3(j)(1) of this Appendix for further information.

B.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 B.2.3 of this Appendix. Mitigation required by the district engineer will ensure that the adverse effects on the aquatic environment caused by discharges of dredged or fill material into waters of the United States are no more than minimal.

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

Based upon Subparts B and G, after consideration of Subparts C through F, and because NWPs can authorize only those discharges of dredged or fill material into waters of the United States that result in no more than minimal individual and cumulative adverse environmental effects, the discharges of dredged or fill material into waters of the United States authorized by this NWP will not cause or contribute to significant degradation of waters of the United States.

B.1.4 Factual determinations (40 CFR 230.11)

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

B.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.

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

B.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 environmental consequences in section 5.0 of this document, the activities authorized by this NWP are sufficiently similar in nature and environmental impact to warrant authorization under a single general permit. Specifically, the purpose of the NWP is to authorize discharges of dredged or fill material into waters of the United States for the construction, maintenance, repair, or removal of oil or natural gas pipelines and associated facilities. 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, maintenance, repair, or removal of oil or natural gas pipeline activities and associated facilities) into a specific category of waters (i.e., waters of the United States subject to Clean Water Act jurisdiction). The terms of the NWP do not authorize discharges of dredged or fill material into waters of the United States for the construction of oil or natural gas pipeline substations in tidal waters or in non-tidal wetlands adjacent to tidal waters. The restrictions imposed by the terms and conditions of this NWP will result in the authorization of discharges of dredged or fill material into waters of the United States that have similar impacts on the aquatic environment, namely the replacement of aquatic habitats, such as certain categories of non-tidal wetlands, with oil or natural gas pipelines and associated facilities. Many of the impacts relating to the construction, maintenance, repair, or removal of oil or natural gas pipeline activities are likely to be temporary.

If a situation arises in which the discharges of dredged or fill material into waters of the United States require 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.

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

The 404(b)(1) Guidelines at 40 CFR 230.11(a) define cumulative effects as "…the changes in an aquatic ecosystem that are attributable to the collective effect of a number of individual discharges of dredged or fill material." For the issuance of general permits, such as this NWP, the 404(b)(1) Guidelines require the permitting authority to "set forth in writing an evaluation of the potential individual and cumulative impacts of the categories of activities to be regulated under the general permit." [40 CFR 230.7(b)] More specifically, the 404(b)(1) Guidelines cumulative effects assessment for the issuance or reissuance of a general permit is to include an evaluation of "the number of individual discharge activities likely to be regulated under a general permit until its expiration, including repetitions of individual discharge activities at a single location." [40 CFR 230.7(b)(3)] If a situation arises in

which cumulative effects are likely to be more than minimal and the proposed discharge of dredged or fill material into waters of the United States requires further review, or is more appropriately reviewed under the individual permit process, provisions of the NWPs allow division and/or district engineers to take such action.

Based on reported use of this NWP during the period of March 15, 2021, to March 14, 2024, the Corps estimates that this NWP will be used approximately 3,700 times per year on a national basis, resulting in temporary and permanent impacts to approximately 1,500 acres of waters of the United States, including jurisdictional wetlands. The text of this NWP requires the permittee to submit a pre-construction notification to the district engineer prior to commencing the activity if: (1) a section 10 permit is required; (2) the discharge will result in the loss of greater than 1/10-acre of waters of the United States; or (3) the proposed oil or natural gas pipeline activity is associated with an overall project that is greater than 250 miles in length and the project purpose is to install new pipeline (vs. conduct repair or maintenance activities) along the majority of the distance of the overall project length. Pre-construction notification may also be required by the NWP general conditions or by regional conditions imposed by division engineers.

Based on reported use of this NWP during that time period, the Corps estimates that five percent of the NWP 12 verifications will require compensatory mitigation to offset the authorized impacts to waters of the United States and ensure that the authorized activities result in only minimal adverse effects on the aquatic environment. The verified activities that do not require compensatory mitigation will have been determined by Corps district engineers to result in no more than minimal individual and cumulative adverse effects on the aquatic environment without compensatory mitigation. During the period of 2026 to 2031, the Corps expects little change to the percentage of NWP 12 verifications requiring compensatory mitigation, because there have been no substantial changes in the mitigation general condition or the NWP regulations for determining when compensatory mitigation may be required for NWP activities. The Corps estimates that approximately 650 acres of compensatory mitigation will be required each year to offset authorized impacts. The demand for these types of activities could increase or decrease during the five year period this NWP is anticipated to be in effect.

Based on these annual estimates, the Corps estimates that approximately 18,500 activities could be authorized until this NWP expires, resulting in impacts to approximately 7,500 acres of waters of the United States, including jurisdictional wetlands. Approximately 3,250 acres of compensatory mitigation would be required to offset those impacts. During the period this NWP is in effect, the individual and cumulative impacts on the aquatic environment caused by activities authorized by this NWP are expected to result in only minor changes to the current environmental setting at the scale at which this NWP is issued (i.e., the United States and its territories), which is described in section 4.0 of this document. Division engineers have the authority to modify, suspend, or revoke this NWP in a particular

geographic region (e.g., a Corps district, state, watershed, or seascape) if they believe those discharges of dredged or fill material into waters of the United States are likely to result in more than minimal individual and cumulative adverse environmental effects in the identified geographic region (see 33 CFR 330.5(c)). District engineers have the authority to modify, suspend, or revoke this NWP on a case-by-case basis if they determine those discharges of dredged or fill material into waters of the United States are likely to result in more than minimal individual and cumulative adverse environmental effects on the project site (see 33 CFR 330.5(d))

Compensatory mitigation is the restoration (re-establishment or rehabilitation), establishment (creation), enhancement, and/or in certain circumstances preservation of aquatic resources for the purposes of offsetting unavoidable adverse impacts which remain after all appropriate and practicable avoidance and minimization has been achieved (33 CFR 332.2). For discharges of dredged or fill material into waters of the United States authorized by NWPs, compensatory mitigation and other forms of mitigation may be used to ensure that the adverse environmental effects are no more than minimal, individually and cumulatively (33 CFR 330.1(e)(3); NWP general condition 23). Restoration is usually the first compensatory mitigation option considered because the likelihood of ecological success is greater (33 CFR 332.3(a)(2)). As discussed below, restoration of wetlands, streams, and other aquatic ecosystems can increase the ecological functions and services provided by those aquatic ecosystems.

The ecological outcomes of restoration projects are exceeding unpredictable (Brudvig et al. 2017), which is why monitoring, taking corrective actions, and adaptive management are important tools for attempting to achieve the desired outcomes of those projects, usually gains in ecosystem functions and services. Because of that unpredictability and for other reasons, such as greater ecosystem resilience, restoration activities should allow for a range of acceptable outcomes (Hiers et al. 2016). Restoration activities typically cannot return a degraded wetland, stream, or other aquatic ecosystem to a prior historic condition because of changes in environmental conditions and other drivers that occur at various scales over time (e.g., Moreno-Mateos et al. 2017, Higgs et al. 2014, Jackson and Hobbs 2009, Zedler and Kercher 2005; Palmer et al. 2014). In addition, many of the drivers of ecosystem change are beyond the control of a mitigation provider. Therefore, it is important to establish realistic goals and objectives for ecosystem restoration projects (e.g., Hobbs 2007, Ehrenfeld 2000), including the restoration of wetlands, streams, and other types of aquatic ecosystems.

Rey Banayas et al. (2009) concluded that restoration activities can increase biodiversity and the level of ecosystem services provided. However, such increases do not approach the amounts of biodiversity and ecosystem services performed by undisturbed reference sites. The ability to restore ecosystems to provide levels of ecological functions and services similar to historic conditions or reference standard

conditions is affected by human impacts (e.g., urbanization, agriculture) to watersheds or other landscape units and to the processes that sustain those ecosystems (Zedler et al. 2012, Hobbs et al. 2014). Those changes need to be taken into account when establishing goals and objectives for restoration projects (Zedler et al. 2012), including compensatory mitigation projects. The ability to reverse ecosystem degradation to restore ecological functions and services is dependent on the degree of degradation of that ecosystem and the surrounding landscape, and whether that degradation is reversible (Hobbs et al. 2014). Most studies of the ecological performance of compensatory mitigation projects have focused solely on the ecological attributes of the compensatory mitigation projects, and few studies have also evaluated the aquatic resources impacted by permitted activities (Kettlewell et al. 2008), so it is difficult to assess whether compensatory mitigation projects have fully or partially offset the lost functions provided by the aquatic resources that are impacted by permitted activities.

Wetland restoration, enhancement, and establishment projects can provide wetland functions, as long as the wetland compensatory mitigation project is placed in an appropriate landscape position, has appropriate hydrology for the desired wetland type, and the watershed condition will support the desired wetland type (NRC 2001). Tomscha and others (2021) used a number of methods to evaluate whether wetland restoration activities improve ecosystem functions and services and they found that wetland restoration activities produced gains in soil organic carbon, increases in native plant species richness, gains in saturated hydraulic connectivity, declines in plant-available phosphorous, gains in nitrogen and phosphorous retention, and small increases in sediment retention. Site selection is critical to find a site with appropriate hydrologic conditions and soils to support a replacement wetland that will provide the desired wetland functions and services (Mitsch and Gosselink 2015).

In a meta-analysis of 70 wetland restoration studies, Meli et al. (2014) concluded that wetland restoration activities increase biodiversity and ecosystem service provision in degraded wetlands, but the degree of recovery is context dependent. They identified the following factors as influencing wetland restoration outcomes: wetland type, the main cause of degradation, the type of restoration action conducted, and the assessment protocol used to evaluate restoration outcomes. Moreno-Mateos et al. (2015) reviewed the recovery trajectories of 628 wetland restoration and creation projects and concluded that restoring or establishing wetland hydrology is of primary importance, and is more likely to be ecologically successful if wetland hydrology can be achieved by re-establishing water flows instead of extensive earthwork. In addition, they determined that, with respect to the plant community, natural revegetation is sufficient for recovery and development of most wetland types after wetland hydrology is restored or established. Adams and others (2024) found that short-term performance criteria that focus on target plant species are not useful for predicting the long-term outcomes of wetland restoration projects, and stress related performance criteria (e.g., hydrological dissimilarity,

invasive species canopy cover) are more effective a predicting long-term outcomes.

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

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

The ecological performance of wetland restoration and enhancement activities is affected by the amount of changes to hydrology and inputs of pollutants, nutrients, and sediments within the watershed or contributing drainage area (Wright et al. 2006). Wetland restoration is becoming more effective at replacing or improving wetland functions, especially in cases where monitoring and adaptive management

are used to correct deficiencies in these efforts (Zedler and Kercher 2005). Wetland functions take time to develop after the restoration or enhancement activity takes place (Mitsch and Gosselink 2015, Gebo and Brooks 2012), and different functions develop at different rates (Moreno-Mateos 2012, NRC 2001). Irreversible changes to landscapes, especially those that affect hydrology within contributing drainage areas or watersheds, cause wetland degradation and impede the ecological performance of wetland restoration efforts (Zedler and Kercher 2005). Gebo and Brooks (2012) evaluated wetland compensatory mitigation projects in Pennsylvania and compared them to reference standards (i.e., the highest functioning wetlands in the study area) and natural reference wetlands that showed the range of variation due to human disturbances. They concluded that most of the wetland mitigation sites were functioning at levels within with the range of functionality of the reference wetlands in the region, and therefore were functioning at levels similar to some naturally occurring wetlands. The ecological performance of mitigation wetlands is affected by on the landscape context (e.g., urbanization) of the replacement wetland and varies with wetland type (e.g., riverine or depressional) (Gebo and Brooks 2012). Moreno-Mateos 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.

Process-based approaches may be used for wetland restoration, enhancement, and establishment activities. For wetlands, the focus would be on re-establishing or establishing appropriate hydrological conditions (Mitsch and Gosselink 2015) that drive wetland ecosystem development and the functions and services they provide. Appropriate hydrological conditions include the hydroperiod, which is the hydrologic signature of a wetland that establishes and maintains a wetland's structure and function (Mitsch and Gosselink 2015). The hydrologic signature consists of hydrologic inputs and outputs, such as water depth, flow patterns, and the duration and frequency of flooding. A wetland's hydrologic signature influences abiotic factors, including soil anaerobiosis, nutrient availability, and in coastal wetlands, salinity, and those abiotic factors determine which plant and animal species and other organisms will inhabit a wetland (Mitsch and Gosselink 2015). Wetland restoration, enhancement, and establishment activities that focus on providing an appropriate hydrologic signature would allow natural energy, self-organization, and physical, chemical and biological processes to drive the development of wetland structure and function. Focusing on restoring wetland processes and giving the wetland the ability and space to respond to changing environmental conditions and other anthropogenic and natural disturbances may result in more resilient and sustainable wetlands.

Under the Corps' regulations, streams are considered to be 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)). It is difficult to achieve good ecological outcomes from river and stream rehabilitation projects because rivers and streams and their catchments are complex systems with multiple stressors and cross scale interactions, and we have limited knowledge about the dynamics of these systems (Harris and Heathwaite 2012). For the purposes of this section, the term “stream restoration” is used to cover river and stream rehabilitation and enhancement activities. Restoration can be done on large rivers and small streams, and sometimes entire stream networks (Wohl et al. 2015), in a variety of watershed land use settings, including urban and agricultural areas.

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

To be effective, stream restoration activities should address the causes of stream degradation, which are often within the watershed and outside of the stream channel (Palmer et al. 2014). Actions that focus on restoring physical, chemical, and biological processes and connectivity, and giving the stream space to adjust to changing environmental conditions and physical and biological drivers of change are more likely to be successful that channel reconfiguration efforts (Ciotti et al. 2021, Hawley 2018, Kondolf 2011). Stream restoration projects, including the restoration and maintenance of riparian areas, can improve the functions collectively performed by rivers and streams and their riparian areas (e.g., Allan and Castillo 2007, NRC 2002). Ecologically effective stream restoration activities can be conducted by enhancing riparian areas, removing dams, reforestation, and implementing watershed best management practices that reduce storm water and agricultural runoff to streams (Palmer et al. 2014).

Process-based river and stream restoration attempts to reestablish the rates and degrees of physical, chemical, and biological processes that sustain riverine ecosystems, including their floodplains (Beechie et al. 2010). They identify four principles for process-based restoration of rivers and streams: (1) focusing on

addressing the root causes of ecosystem change; (2) tailoring restoration actions to local potential; (3) matching the scale of restoration to the scale of the problem causing ecosystem change; and (4) establishing explicit expectations for restoration outcomes (Beechie et al. 2010). Under a process-based restoration approach, rivers and streams are not just seen as channels, but as complex and changing systems within a valley floor where fluvial processes occur (Ciotti et al. 2021). Process-based stream restoration can also reduce long-term restoration costs, including maintenance costs (Ciotti et al. 2021, Beechie et al. 2013, Hawley 2018).

Restoration of incised streams to reconnect the streams to their floodplains (and thus provide greater amounts of functions and services) can be accomplished through low-tech river or stream corridor restoration activities, such as the use of beaver dams, beaver dam analogs (BDAs), or post-assisted log structures (PALS), to restore incised streams and their floodplains (e.g., Wheaton et al. 2019, Pollock et al. 2014, DeVries et al. 2012). Another approach to reconnecting incised streams with their floodplains involves the use of native materials such as large wood harvested on-site to construct wood jams (e.g., Ciotti et al. 2021) that promote sediment accumulation, the establishment of vegetation, and increases in water levels.

Process-based stream restoration activities may improve the dynamism and diversity of these systems (Powers et al. 2018). They may also attempt to improve habitat for native fish species, other species that utilize river and stream channels and riparian areas, and improve or protect water quality (Flitcroft et al. 2022). Some process-based stream restoration approaches attempt to restore anastomosing river-wetland corridors that were common in various regions of the United States (e.g., Merritts et al. 2011, Walter and Merritts 2008). In the eastern United States, these multi-channel stream-floodplain-wetland systems were disturbed by the accumulation of sediment in valleys caused by the construction of mill dams, clearing forests, and the development of agricultural land (Walter and Merritts 2008), which often changed multi-threaded channels into single threaded channels as the stream eroded the substantial depths of sediment that accumulated in the valley over many years. Anastomosing river-wetland corridors have the potential to provide greater ecological diversity, complexity, richness, and functionality (Cluer and Thorne 2013), as well as ecosystem services.

Examples of stream restoration techniques include: dam removal and modification, culvert replacement or modification, fish passage structures when connectivity cannot be restored or improved by dam removal or culvert replacement, levee removal or setbacks, reconnecting floodplains and other riparian habitats, road removal, road modifications, reducing sediment and pollution inputs to streams, replacing impervious surfaces with pervious surfaces, restoring adequate in-stream or base flows, restoring riparian areas, fencing streams and their riparian areas to exclude livestock, improving in-stream habitat, recreating meanders, and replacing hard bank stabilization structures with bioengineering bank stabilization measures

(Roni et al. 2013). Miller and Kochel (2010) recommend that stream restoration projects allow the stream channel to self-adjust in response to changing hydrologic and sediment regimes in the watershed, and include other restoration actions such as re-establishing riparian areas next to the stream channel and excluding livestock from the riparian area and stream channel. Large and medium sized rivers can be restored through various approaches, including levee setbacks, levee removal, or creating openings in levees, to restore or improve connectivity between the river and the floodplain, as well as other ecological and geomorphic processes (Wohl et al. 2015). Dam removal, as well as changes in dam operations that provide environmentally-beneficial flows of water and sediment, can also restore functions of rivers and larger streams (Wohl et al. 2015).

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

Attempting to restore streams by constructing specific channel forms or shapes, instead reinstating ecological processes that allow for variability and responding to changing environmental conditions, can reduce stream habitat variability and ecological resilience (Hiers et al. 2016), and may result in the affected streams providing fewer ecological functions than restoration actions that allow rivers and streams to flood and self-adjust (Kondolf 2011). Form-based stream restoration efforts, such as channel reconfiguration, can cause substantial adverse impacts to riverine systems through earthmoving activities (which can cause substantial increases in sediment loads) and the removal of riparian trees and other vegetation, with little demonstrable improvements in stream functions (Palmer et al. 2014). In-stream habitat enhancement activities, such as channel reconfiguration and adding in-stream structures, have resulted in limited effectiveness in improving biodiversity in streams (Palmer et al. 2010). In an evaluation of 644 stream restoration projects, Palmer et al. (2014) concluded that stream channel reconfiguration does not promote ecological recovery of degraded streams, but actions taken within the

watershed and in riparian areas to restore hydrological processes and reduce pollutant inputs to streams can improve stream functions and ecological integrity. Form-based stream restoration activities may be more likely to fail as hydrology and sediment loads change, because those approaches make riverine systems less resilient to such changes (Tullos et al. 2021). Stream restoration activities should also include consideration of social factors, especially the people that live in the floodplain or near the river or stream (Wohl et al. 2015). These social factors may also impose constraints on what restoration actions can be taken.

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

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

Fonseca (2011) recommends locating seagrass restoration activities in areas with water depths similar to nearby natural seagrass beds, at a sufficient size to achieve restoration goals, with characteristics that are similar to those at other ecologically successful seagrass restoration projects, and where anthropogenic disturbances

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

As discussed in section 4.0 of this document, the ecological condition of waters and wetlands in the United States varies, and assessments conducted by USEPA for rivers and streams, estuaries, the Great Lakes, other lakes, and wetlands categories ecological condition as "good," "fair," or "poor." One of the criteria that district engineers consider when they evaluate proposed NWP activities is the "degree or magnitude to which the aquatic resources perform these functions" (see paragraph 2 of Section D, "District Engineer's Decision." The quality of the affected waters is considered by district engineers when making decisions on whether to require compensatory mitigation for proposed NWP activities to ensure no more than minimal adverse environmental effects (see 33 CFR 330.1(e)(3)), and amount of compensatory mitigation required (see 33 CFR 332.3(f)). The quality of the affected waters also factors into the determination of whether the required compensatory mitigation offsets the losses of aquatic functions caused by the NWP activity.

The compensatory mitigation required by district engineers in accordance with general condition 23 and through activity-specific conditions added to NWP authorizations is expected to provide aquatic resource functions and services to offset some or all of the losses of aquatic resource functions caused by the activities authorized by this NWP, and reduce the incremental contribution of those activities to the cumulative effects on the Nation's wetlands, streams, and other aquatic resources. Compensatory mitigation required by district engineers 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 whether the objectives and ecological performance standards of compensatory mitigation projects are being achieved, or whether corrective measures or adaptive management are needed to address deficiencies that may occur. The district engineer will evaluate monitoring reports to determine if the compensatory mitigation project has fulfilled its objectives, has achieved its ecological performance standards, and offsets the permitted impacts. If the

monitoring efforts indicate that the compensatory mitigation project is failing to meet its objectives and ecological performance standards, the district engineer may require additional measures, such as corrective measures and/or adaptive management or alternative compensatory mitigation, to address the compensatory mitigation project's deficiencies. [33 CFR 332.7(c)]

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

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

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

(b) Suspended particulates/turbidity: Depending on the method of construction, soil erosion and sediment control measures, equipment, composition of the bottom substrate, and wind and current conditions during construction, fill material placed in open waters may temporarily increase water turbidity. Pre-construction notification is required for certain activities authorized by this NWP, which allows the district engineer to review those activities and ensure that the individual and cumulative adverse effects on the aquatic environment are no more than minimal. Particulates may be resuspended in the water column during removal of temporary fills. The turbidity plume may 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, sediment and erosion control plans are required 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: Discharges of dredged or fill material into waters of the United States for oil or natural gas pipeline activities may affect some characteristics of water, such as water clarity, chemical content, dissolved gas concentrations, pH, and temperature. The construction of oil or natural gas pipelines, oil or natural gas substations, and access roads may change the chemical and physical characteristics of the waterbody by introducing suspended or dissolved chemical compounds or sediments into the water. Changes in water quality has potential to affect the species and quantities of organisms inhabiting the aquatic area. Water quality certification is required for discharges of dredged or fill material into waters of the United States authorized by this NWP, which will help ensure that the discharge complies with applicable water quality requirements. Permittees may be required to implement water quality management measures to ensure that the authorized discharge of dredged or fill material into waters of the United States does not result in more than minimal degradation of water quality. Stormwater management facilities may be required to prevent or reduce the input of harmful chemical compounds into the waterbody. The district engineer may require the establishment and maintenance of riparian areas next to open waters, such as streams. Riparian areas can help improve or maintain water quality, by removing nutrients, moderating water temperature changes, and trapping sediments.

(d) Current patterns and water circulation: Discharges of dredged or fill material into waters of the United States authorized by this NWP may adversely affect the movement of water in the aquatic environment. Certain oil or natural gas pipeline activities authorized by this NWP require pre-construction notification to the district engineer, who will review the proposed discharges of dredged or fill material to 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, including tidal flows, and to maintain the pre-construction course, condition, capacity, and location of open waters to the maximum extent practicable. General condition 10 requires activities to comply with applicable FEMA-approved state or local floodplain management requirements, which will reduce adverse effects to surface water flows.

(e) Normal water level fluctuations: The discharges of dredged or fill material into waters of the United States authorized by this NWP may have adverse effects on normal patterns of water level fluctuations due to tides and flooding. Most oil or natural gas pipeline activities are likely to have little effect on normal water level fluctuations because they occupy a small proportion of the land surface or are installed under the surface of the substrate. The NWP requires the removal of temporary fills after completion of the authorized work, and restoration of affected areas to pre-construction elevations. General condition 9 requires the authorized activity to be designed to withstand expected high flows, including tidal flows, and to

maintain the pre-construction course, condition, capacity, and location of open waters to the maximum extent practicable. To ensure that the NWP does not authorize activities that adversely affect normal flooding patterns, general condition 10 requires NWP activities to comply with applicable FEMA-approved state or local floodplain management requirements.

(f) Salinity gradients: The discharges of dredged or fill material into waters of the United States authorized by this NWP may adversely affect salinity gradients, if the oil or natural gas pipelines are located in estuarine or marine waters. There may be an outfall structure associated with an oil or natural gas pipeline that could release freshwater into marine or estuarine waters, thereby altering the salinity of those waters in the vicinity of the outfall structure.

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

(h) Fish, crustaceans, molluscs, and other aquatic organisms in the food web. Certain discharges of dredged or fill material into waters of the United States authorized by this NWP require pre-construction notification to the district engineer, which will provide an opportunity for the district engineer to review certain proposed discharges and add permit conditions, such as mitigation measures, 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 are likely to avoid the project site during construction, repair, or removal activities. Sessile or slow-moving animals in the path of discharges, equipment, and building materials may be destroyed. Some aquatic animals may be smothered by the placement of dredged or fill material. Motile animals are likely to return to those areas that are temporarily impacted by the NWP activity and restored or allowed to revert back to preconstruction conditions. Aquatic animals might not return to sites of permanent fills. Benthic and sessile animals are likely to recolonize sites temporarily impacted by the activity, after those areas are restored. Discharges of dredged or fill material into waters of the United States that alter the riparian zone, especially floodplains, may adversely affect populations of fish and other aquatic animals, by altering stream flow, flooding patterns, and surface and groundwater hydrology.

Division and district engineers can add conditions to this NWP to prohibit discharges of dredged or fill material into waters of the United States during important stages of the life cycles of certain aquatic organisms. Such time of year restrictions can prevent adverse effects to these aquatic organisms during reproduction and development periods. General conditions 3 and 5 address

protection of spawning areas and shellfish beds, respectively. General condition 3 states that activities in spawning areas during spawning seasons must be avoided to the maximum extent practicable. In addition, general condition 3 also prohibits 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: Discharges of dredged or fill material into waters of the United States authorized by this NWP may result in adverse effects to other wildlife associated with aquatic ecosystems, such as resident and transient mammals, birds, reptiles, and amphibians, through the destruction of aquatic habitat, including breeding and nesting areas, escape cover, travel corridors, and preferred food sources. This NWP does not authorize discharges of dredged or fill material that are likely to jeopardize the continued existence of federally-listed endangered and threatened species or result in the destruction or adverse modification of critical habitat. Compensatory mitigation, including the establishment and maintenance of riparian areas next to open waters, may be required for discharges of dredged or fill material into waters of the United States authorized by this NWP, which will help offset losses of aquatic habitat for wildlife. General condition 4 requires 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: General condition 22 prohibits the use of this NWP to discharge dredged or fill material in NOAA-managed marine sanctuaries and marine monuments and National Estuarine Research Reserves. The district engineer will exercise discretionary authority and require an individual permit for proposed discharge of dredged or fill material into waters of the United States in sanctuaries and refuges if he or she determines that the proposed discharge will result in more than minimal adverse effects on the aquatic environment.

(2) Wetlands: District engineers will review pre-construction notifications for certain discharges of dredged or fill material into waters of the United States authorized by this NWP to ensure that the adverse effects on wetlands are no more than minimal. Some activities authorized by this NWP (e.g., discharges of dredged or fill material into jurisdictional wetlands to construct oil or natural gas pipeline substations, permanent access roads, or foundations to support above-ground oil or natural gas pipelines, may result in permanent wetland losses. Some discharges of dredged or fill material into waters of the United States authorized by this NWP may result in temporary impacts to wetlands, and those wetlands will be restored to pre-

construction elevations after temporary fills are removed, and revegetated as appropriate. Some discharges of dredged or fill material into waters of the United States authorized by this NWP may convert wetlands to different types (e.g., a forested wetland to an herbaceous or scrub-shrub wetland), which may occur in an oil or natural gas pipeline right-of-way. For some discharges of dredged or fill material into waters of the United States authorized by this NWP, there may be losses of wetlands in cases where the authorized discharge of dredged or fill material involves permanent fills in jurisdictional wetlands to convert those areas to dry land. Division engineers may add regional conditions to this NWP to restrict or prohibit its use in certain high value wetlands. Compensatory mitigation may be required by district engineers to offset wetland losses authorized by this NWP. See paragraph (e) of section A.1 of Appendix A of this document for a more detailed discussion of impacts to wetlands.

(3) Mud flats: Discharges of dredged or fill material into waters of the United States authorized by this NWP may result in temporary or permanent impacts to mud flats, if the discharge of dredged or fill material into waters of the United States for the construction, maintenance, repair, and removal of oil and natural gas pipelines and associated facilities occurs in coastal waters. Small portions of mud flats may be destroyed by the construction or repair of oil or natural gas pipelines. Some impacts to mudflats authorized by this NWP may convert portions of a mudflat to another habitat type. Pre-construction notification is required for certain discharges of dredged or fill material into waters of the United States authorized by this NWP and the pre-construction notification must include a delineation of special aquatic sites, including mud flats. District engineers will review these pre-construction notifications and determine whether the proposed discharges will result in no more than minimal individual and cumulative adverse effects on the aquatic environment.

(4) Vegetated shallows: Discharges of dredged or fill material into waters of the United States authorized by this NWP may result in temporary or permanent adverse effects to vegetated shallows. District engineers will receive pre-construction notifications for all oil or natural gas pipeline activities in section 10 waters to determine if those discharges of dredged or fill material into waters of the United States will result in only minimal adverse effects on the aquatic environment, including vegetated shallows in navigable waters. Division engineers can add regional conditions to this NWP to restrict or prohibit its use in vegetated shallows. For those discharges of dredged or fill material into waters of the United States that require pre-construction notification, the district engineer will review the proposed discharge and may exercise discretionary authority to require the project proponent to obtain an individual permit if he or she determines the proposed discharge will result in more than minimal adverse effects on the aquatic environment.

(5) Coral reefs: Discharges of dredged or fill material into waters of the United States authorized by this NWP may result in permanent or temporary

impacts to coral reefs. Pre-construction notification is required for all section 10 activities authorized by this NWP, so that the district engineer can review each proposed discharge of dredged or fill material into waters of the United States and ensure that it results in no more minimal adverse environmental effects on the aquatic environment, including coral reefs. If the proposed discharge of dredged or fill material into waters of the United States will result in more than minimal adverse effects on the aquatic environment, the district engineer will exercise discretionary authority to require the project proponent to obtain an individual permit. Division engineers may also add regional conditions to this NWP to restrict or prohibit its use in coral reefs.

(6) Riffle and pool complexes: Some discharges of dredged or fill material into waters of the United States authorized by this NWP, such as stream crossings for oil or natural gas pipelines, may result in permanent or temporary impacts to riffle and pool complexes. This NWP requires the removal of temporary fills after the authorized work has been completed, and restoration of the affected area to pre-construction elevations. Division engineers can add regional conditions to this NWP to restrict or prohibit its use in riffle and pool complexes. Pre-construction notification is required for certain discharges of dredged or fill material into waters of the United States for oil or natural gas pipeline activities authorized by this NWP, which will allow district engineers to review those proposed discharges. If the district engineer determines the adverse environmental effects caused by the proposed discharge of dredged or fill material into waters of the United States are more than minimal, he or she will exercise discretionary authority to require the project proponent to obtain an individual permit.

(k) Municipal and private water supplies: See paragraph (n) of section A.1 of Appendix A of this document for a discussion of potential impacts to water supplies.

(l) Recreational and commercial fisheries, including essential fish habitat: The discharges of dredged or fill material into waters of the United States authorized by this NWP may adversely affect waters of the United States that act as habitat for populations of economically important fish and shellfish species. Division and district engineers can add conditions to this NWP to prohibit discharges during important life cycle stages, such as spawning or development periods, of economically valuable fish and shellfish. All oil or natural gas pipeline activities requiring section 10 authorization require submission of pre-construction notifications to the district engineer, which will allow review of each discharge in navigable 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 activity does not adversely affect important spawning areas or concentrated shellfish populations. As discussed in paragraph (g) of section A.1 of Appendix A of this document, 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

activity-specific conditions to ensure that discharges of dredged or fill material into waters of the United States authorized by this NWP will result in only minimal adverse effects on essential fish habitat.

(m) Water-related recreation: See paragraph (m) of section A.1 of Appendix A of this document.

(n) Aesthetics: See paragraph (c) of section A.1 of Appendix A of this document.

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

Appendix C – Endangered Species Act

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

Each activity authorized by an NWP is subject to general condition 18, which states that “[n]o activity is authorized under any NWP which is likely to directly or indirectly jeopardize the continued existence of a threatened or endangered species or a species proposed for such designation, as identified under the Federal Endangered Species Act (ESA), or which will directly or indirectly destroy or adversely modify designated critical habitat or critical habitat proposed for such designation.” In addition, general condition 18 explicitly states that the NWP does not authorize “take” of threatened or endangered species, which will ensure that permittees do not mistake the NWP authorization as a federal authorization to take threatened or endangered species. General condition 18 also requires a non-federal permittee to submit a pre-construction notification to the district engineer if any listed species or designated critical habitat (or proposed species or proposed critical habitat) might be affected or is in the vicinity of the project, or if the project is located in designated or proposed critical habitat. The Corps established the “might affect” threshold in 33 CFR 330.4(f)(2) and paragraph (c) of general condition 18 because it is more

stringent than the “may affect” threshold for section 7 consultation in the USFWS’s and NMFS’s ESA section 7 consultation regulations at 50 CFR part 402. The word “might” is defined as having “less probability or possibility” than the word “may” (Merriam-Webster’s Collegiate Dictionary, 10th edition). Since “might” has a lower probability of occurring, it is below the threshold (i.e., “may affect”) that triggers the requirement for ESA section 7 consultation for a proposed federal action This general condition also states that, in such cases, non-federal permittees shall not begin work on the activity until notified by the district engineer that the requirements of the ESA have been satisfied and that the activity is authorized.

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

If the district engineer determines that the proposed NWP activity will have no effect on any threatened or endangered species or critical habitat, then the district engineer will notify the applicant that he or she may proceed under the NWP authorization as long as the activity complies with all other applicable terms and conditions of the NWP, including applicable regional conditions. When the Corps district 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 for a proposed NWP activity, 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 USFWS and NMFS for activities authorized by NWPs. These section 7 consultations are tracked in ORM. During the period of January 1, 2022, to December 31, 2024, Corps districts conducted 990 formal consultations and 7,785 informal consultations under NWP PCNs where the Corps verified that the proposed activities were authorized by NWP. During that time period, the Corps also used regional programmatic consultations for 15,937 NWP verifications to comply with ESA section 7. During those three years, 309 ESA section 7 conferences were conducted for NWP activities. Therefore, each year an average of 8,340 formal, informal, programmatic ESA section 7 consultations and conferences are conducted with the USFWS and/or NMFS in response to NWP PCNs, including those activities that required PCNs under paragraph (c) of general condition 18. In a study on ESA section 7 consultations tracked by the USFWS, Malcom and Li (2015) found that during the period of 2008 to 2015, the Corps conducted the most formal and informal section 7 consultations, far exceeding the numbers of section 7 consultations conducted by other federal agencies.

Section 7 consultations are often conducted on a case-by-case basis for activities proposed to be authorized by NWP that may affect listed species or critical habitat, in accordance with the USFWS’s and NMFS’s interagency regulations at 50 CFR part 402. Instead of activity-specific section 7 consultations, compliance with ESA section 7(a)(2) may also be achieved through formal or informal regional programmatic consultations. Compliance with ESA section 7 may also be facilitated through division engineers adding regional conditions to the NWPs to address the requirements of ESA section 7. In some Corps districts SLOPES or EDGES have been developed through consultation with USFWS and NMFS regional offices to make the process of complying with ESA section 7 more efficient.

Corps districts have, in most cases, established informal or formal procedures with regional or 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 a district engineer 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 by division engineers to require pre-construction notifications for NWP activities that occur in known locations of threatened and endangered species or designated critical habitat. Any information provided by local maps and databases and any comments received during the pre-construction notification review process will be used by the district engineer to make a "no effect" or "may affect" determination for the pre-construction notification.

Based on the safeguards discussed in this Appendix, especially general condition 18 and the NWP regulations at 33 CFR 330.4(f), the Corps believes that the activities authorized by this NWP comply with the requirements of the ESA. Although the Corps continues to believe that these procedures ensure compliance with the ESA, the Corps has taken some steps to provide further assurance. Corps district offices meet with local representatives of the USFWS and NMFS to establish or modify existing procedures, such as regional conditions and coordination procedures, where necessary, to ensure that the Corps has the latest information regarding the existence and location of any threatened or endangered species or their critical habitat. Corps districts can also establish, through SLOPES, EDGES, or other tools, additional safeguards that ensure compliance with the ESA.

Through ESA section 7 formal or informal consultations, including regional programmatic consultations, the Corps ensures that no activity is authorized by any NWP if that activity is likely to jeopardize the continued existence of a threatened or endangered species as listed or proposed for listing under the ESA, or to destroy or adversely modify the critical habitat of such species. Other tools such as ESA section 7 conferences, SLOPES, EDGES, the development of regional conditions added to the NWP by division engineers, and conditions added to specific NWP authorizations by district engineers help ensure compliance with section 7 of the ESA.

If informal section 7 consultation is conducted, and the USFWS and/or NMFS issues a written concurrence that the proposed NWP activity may affect, but is not likely to adversely affect, listed species or designated critical habitat based on conservation measures incorporated in the NWP activity to avoid or minimize potential effects to listed or proposed species or designated or proposed critical habitat, the district engineer will add conditions for those conservation measures to the NWP authorization. If the USFWS and/or NMFS does not issue a written concurrence with the district engineer's determination that the proposed NWP activity "may affect, but is not likely to adversely affect" listed species or critical habitat, the district engineer will initiate formal section 7 consultation if he or she changes the effects determination to "may affect, likely to adversely affect." The project proponent might also be able to modify the proposed NWP activity to a sufficient extent so that a "no effect" determination could be made by the district engineer.

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

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

Appendix D – Public Comments and Responses

For a summary of the public comments received in response to the June [insert date], 2025, issue of the Federal Register, refer to the preamble in the Federal Register notice announcing the reissuance of this NWP. The substantive comments received in response to the proposed rule published in the Federal Register on June [insert date], 2025, were used to improve the NWP by changing NWP terms and limits, pre-construction notification requirements, and/or NWP general conditions, as necessary.

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