No. 21-454

IN THE

Supreme Court of the United States

MICHAEL SACKETT, *et ux.*,

Petitioners,

v.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY, *et al.*,

Respondents.

ON WRIT OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE NINTH CIRCUIT

BRIEF OF SCIENTIFIC SOCIETIES AS *AMICI CURIAE* IN SUPPORT OF RESPONDENTS

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QUESTION PRESENTED

Whether the Ninth Circuit set forth the proper test for determining whether wetlands are "waters of the United States" under the Clean Water Act, 33 U.S.C. § 1362(7).

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INTERESTS OF *AMICI CURIAE*[1]

Amici curiae are twelve national and international scientific societies: American Fisheries Society, American Institute of Biological Sciences, Association for the Sciences of Limnology and Oceanography, Coastal and Estuarine Research Federation, Ecological Society of America, Freshwater Mollusk Conservation Society, International Association for Great Lakes Research, North American Lake Management Society, Phycological Society of America, Society for Ecological Restoration, Society for Freshwater Science, and Society of Wetland Scientists. The scientific societies, which collectively represent more than 125,000 members, are all actively involved in research, education, and the conservation, management, and restoration of aquatic ecosystems and resources in the United States. *Amici* have an interest in this case because of its potential impact on the integrity of those ecosystems and resources. The Clean Water Act's singular objective—"to restore and maintain the chemical, physical, and biological integrity of the Nation's waters"—

1. In accordance with this Court's Rule 37.3(a), all parties have provided written consent to the filing of this brief. In a letter submitted to this Court on February 10, 2022, counsel for Respondents provided blanket consent to the filing of *amici curiae* briefs in support of either or neither party, filed within the time allowed by this Court's rules. Counsel for Petitioners provided written consent to the filing of this brief on May 12, 2022.

Additionally, pursuant to this Court's Rule 37.6, *amici curiae* state that no counsel for a party authored this brief in whole or in part, that no party or party's counsel made a monetary contribution intended to fund the preparation or submission of this brief, and that no person—other than *amici curiae*, their members, or their counsel—made a monetary contribution intended to fund the preparation or submission of this brief.

can only be achieved by considering the science that demonstrates the critical role wetlands and streams play in supporting the health of downstream and downslope waters, including traditional navigable waters such as lakes and rivers.

SUMMARY OF ARGUMENT

A proper interpretation of the Clean Water Act requires a basic understanding of water science in order to further the Act's mandate to restore and maintain the chemical, physical, and biological integrity of the Nation's waters. This mandate is inherently founded on science and thus can only be achieved through the consideration of science. The Ninth Circuit's approach below in applying the significant nexus test is consistent with the science discussed in this brief as it recognizes the contribution of wetlands and streams to the overall quality of traditional navigable waters. In contrast, Petitioners' proposed framework rejects hydrological reality, ignoring the science behind the ways in which wetlands and streams affect traditional navigable waters. If Petitioners' proposed "continuous surface-water connection" to a traditional navigable water were required for wetlands, more than 50% percent of wetlands in some watersheds would no longer be protected by the Clean Water Act. Were such a standard applied to streams, ephemeral and intermittent streams would not be jurisdictional waters, and thus more than 90% percent of stream length in some watersheds would no longer be protected by the Clean Water Act.

Furthermore, Petitioners' "difficult-to-tell" requirement—*i.e.*, that a wetland should be jurisdictional only if it is so "inseparably bound up" with a water "that it is difficult to tell where the wetland ends and the 'water' begins"—would have even more dramatic, negative results. Wetland science has developed to the point that the boundaries between a wetland and another water can almost always be determined. Because the boundaries of a wetland can be delineated in nearly every case, the "difficult-to-tell" requirement would effectively eliminate Clean Water Act jurisdiction over almost all wetlands. Such an approach is utterly at odds with the Clean Water Act's singular objective: restoring and maintaining the quality of the Nation's waters.

ARGUMENT

The legal and policy decisions at issue in this case must be informed by the best available science. Scientific knowledge often assists and informs courts when they are considering the practical consequences of a decision or the application of a particular rule. *See, e.g.*, *Mississippi v. Tennessee*, 142 S. Ct. 31, 36 (2021) (discussing hydrogeology and cones of depression in the context of an underground aquifer). In *County of Maui v. Hawaii Wildlife Fund*, 140 S. Ct. 1462, 1476 (2020), this Court recognized the importance of science by crafting a science-based rule regarding point-source discharges regulated by the Clean Water Act. As Justice Breyer has noted, "[t]he law must seek decisions that fall within the boundaries of scientifically sound knowledge." Fed. Jud. Ctr. & Nat'l Rsch. Council, *Reference Manual on Scientific Evidence* 4 (3d ed. 2011). The Clean Water Act's mandate to restore and maintain the chemical, physical, and biological integrity of the Nation's waters can only be met if the science regarding wetlands and streams is taken into account when determining which waters the Clean Water Act protects.

I. THE DEFINITION OF "WATERS OF THE UNITED STATES" MUST BE INFORMED BY SCIENCE.

The Clean Water Act's only objective is "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters." 33 U.S.C. § 1251(a). This Court has noted that the Clean Water Act's "objective incorporated a broad, systemic view of the goal of maintaining and improving water quality: as the House Report on the legislation put it, 'the word "integrity" . . . refers to a condition in which the natural structure and function of ecosystems . . . [are] maintained.'" *United States v. Riverside Bayview Homes, Inc.*, 474 U.S. 121, 132 (1985) (quoting H.R. Rep. No. 92–911, at 76 (1972)). Science is critically important to making the necessary empirical determinations about the chemical, physical, and biological integrity of our waters to achieve the Clean Water Act's broad, clear objective. And the only way to empirically assess "the chemical, physical, and biological integrity of the Nation's waters" and the "water quality" and "natural structure" or "function of ecosystems" is through science.[2]

2. Every material aspect of the Clean Water Act's implementation requires the use of science. For example, the U.S. Army Corps of Engineers ("Corps"), the agency vested with the responsibility to issue Clean Water Act Section 404 permits, relies on scientific manuals in making Clean Water Act jurisdictional determinations. *See, e.g.*, *Tin Cup, LLC v. U.S. Army Corps of Eng'rs*, No. 4:16-cv00016-TMB, 2017 WL 6550635, at *8 (D. Alaska Sept. 26, 2017) (discussing the scientific basis of Clean Water Act jurisdictional determinations and noting that the Corps' supplemental manual for Alaska "reflect[s] the benefit of nearly two decades [of] advancement in wetlands research and science"), *aff'd*, 904 F.3d 1068 (9th Cir. 2018). The Corps' Clean Water

Even Petitioners concede the importance of "scientific judgment" regarding wetlands and the role that they play in maintaining the integrity of traditional navigable waters. Pet'rs' Br. Merits 13 (citing *Riverside Bayview Homes, Inc.*, 474 U.S. at 133–34). It is only through the lens of science that the Clean Water Act's objective can be achieved.

A. Wetlands are "waters."

As a fundamental matter, "wetlands" are waters; some are even "traditional navigable waters." "Wetlands" is a term that encompasses a range of different aquatic ecosystems. As a scientific matter, the National Research Council, which is the principal operating arm of the National Academy of Sciences, defined wetlands as "an ecosystem that depends on constant or recurrent, shallow inundation or saturation [of water] at or near the surface of the substrate." Nat'l Rsch. Council, *Wetlands: Characteristics and Boundaries* 3 (1995). The National Research Council's definition notes that, in addition to the presence of water, common features include hydric soils and hydrophytic vegetation. *Id.* The definition of "wetlands" used by the Environmental Protection Agency ("EPA") contains these three criteria (presence of water, hydric soils, and hydrophytic vegetation) and is consistent with this scientific definition.[3]

Act determinations themselves have been labeled as "scientific decision[s]." *Avoyelles Sportsmen's League, Inc. v. Marsh*, 715 F.2d 897, 906 (5th Cir. 1983).

3. In the recent rulemakings on the definition of "waters of the United States," the EPA's definition of "wetlands" has remained constant:

Wetlands may be classified or categorized by type, such as riparian/floodplain versus non-floodplain, coastal/marine versus inland, or saltwater/estuarine versus freshwater. The National Research Council identified several major classes of wetlands:

- *Tidal salt and brackish marsh*: located in tidal zones, subject to semidiurnal to fortnightly flooding.

- *Mangrove*: located in tropical and subtropical regions, subject to intermittent flooding through tidal action.

- *Freshwater marsh*: widespread distribution, subject to seasonal to permanent flooding.

> The term wetlands means 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.

See Clean Water Rule: Definition of "Waters of the United States," 80 Fed. Reg. 37,053, 37,106 (June 29, 2015); Definition of "Waters of the United States"—Recodification of Pre-Existing Rules, 84 Fed. Reg. 56,626, 56,667 (Oct. 22, 2019); The Navigable Waters Protection Rule: Definition of "Waters of the United States," 85 Fed. Reg. 22,250, 22,339 (Apr. 21, 2020).

The Corps has the same definition, 33 C.F.R. § 328.3 (2022), although it is the EPA that has the ultimate authority within the Executive Branch to define "waters of the United States." *See* 43 Op. Att'y Gen. 197 (1979), https://www.epa.gov/sites/default/files/2015-08/documents/civiletti_memo.pdf.

- *Swamp*: widespread distribution, often with woody vegetation, with prolonged saturation and flooding.

- *Bottomlands*: located primarily in the East and Southeast, subject to seasonal flooding.

- *Bog*: abundant in recently glaciated regions and elsewhere, with precipitation as the principal source of water.

- *Fen*: associated with mineral-rich water, permanently saturated by flowing water.

- *Prairie pothole*: located in the Northern Plain states, subject to temporary to permanent flooding.[4]

Petitioners' assertion that wetlands are "non-waters," Pet'rs' Br. Merits 23, is incorrect as a scientific and a legal matter. From a scientific perspective, the National Research Council emphasized "the centrality of water in creating and sustaining wetland ecosystems." Nat'l Rsch. Council, *Wetlands: Characteristics and Boundaries*, *supra*, at 59. "[H]ydrologic conditions are paramount to the maintenance of a wetland," and "specific hydrologic conditions are an absolute requirement for the formation

4. Nat'l Rsch. Council, *Wetlands: Characteristics and Boundaries*, *supra*, at 21; *see also* EPA Off. of Rsch. & Dev., *Connectivity of Streams & Wetlands to Downstream Waters: A Review & Synthesis of the Scientific Evidence* 2–7 (Jan. 2015) [hereinafter *Connectivity Report*] (distinguishing between riparian/floodplain wetlands (which have a bidirectional, lateral flow to and from a river network) and non-floodplain wetlands (which have a unidirectional, lateral flow to a river network)).

and maintenance of wetlands." *Id.* at 4, 5. From a legal perspective, tidal marshes and mangroves—which are both subject to the ebb and flow of the tide and defined as classes of wetlands by the National Research Council—are traditional navigable waters. This Court has long held that navigable waters include waters subject to the ebb and flow of the tide. *See, e.g.*, *Waring v. Clarke*, 46 U.S. (5 How.) 441, 464 (1847) (concluding that admiralty jurisdiction "extends to tide waters, as far as the tide flows, though that may be *infra corpus comitatus*"); *Victory Carriers, Inc. v. Law*, 404 U.S. 202, 205 (1971) (admiralty jurisdiction applies to torts committed "on waters within the ebb and flow of the tide" (quoting Justice Story in *Thomas v. Lane*, 23 F. Cas. 957, 960 (C.C. Me. 1813) (No. 13,902))); *Kaiser Aetna v. United States*, 444 U.S. 164, 166, 172–73 (1979) (Kuapa Pond, influenced by tidal action, was found to be a navigable water and subject to regulation by the Corps under the Rivers and Harbors Act).[5] Moreover, portions of some mangroves and marshes are navigable-in-fact (see Figure 1). Thus, not only are wetlands "waters" from a scientific standpoint, but some wetlands are traditional navigable waters from a legal standpoint.

5. While Petitioners cite *The Daniel Ball*, 77 U.S. (10 Wall.) 557 (1870), to suggest that navigability is not a function of the ebb and flow of the tide, Pet'rs' Br. Merits 44 n.22, that case left the "ebb and flow" rule undisturbed. Rather, *The Daniel Ball* extended navigability to portions of rivers that were **not** subject to the ebb and flow of the tide. 77 U.S. at 563.

Figure 1. Coastal marsh in Louisiana. Source: Nat'l Oceanic & Atmospheric Admin., *RESTORE Science Program*, https://restoreactscienceprogram.noaa.gov/freshwater-sediment-and-nutrient-flows/siphon-opening-creates-research-opportunity (last visited June 8, 2022). Photo credit: Eddie Weeks (Louisiana State University).

B. Wetlands and streams contribute significantly to the chemical, physical, and biological integrity of traditional navigable waters.

Navigable waters do not exist in isolation. Nat'l Rsch. Council, *Compensating for Wetland Losses Under the Clean Water Act* 46–59 (2001). Wetlands often are hydrologically connected to traditional navigable waters, such as rivers, and to streams, which may be non-navigable tributaries of rivers. The EPA's 2015 report, *Connectivity of Streams & Wetlands to Downstream Waters: A Review & Synthesis of the Scientific Evidence*, summarized and explained the scientific understanding of the numerous ways in which wetlands and streams influence the chemical, physical, and biological integrity of downstream waters, including traditional navigable waters. The *Connectivity Report* was one of the most procedurally thorough analyses ever conducted by the EPA and Corps. Developed over several years, it reviewed and synthesized more than 1,200 peer-reviewed scientific publications. *Connectivity Report*, *supra*, at ES-2. Multiple rounds of peer review, as well as public comment and other processes, contributed to the *Connectivity Report*. *See* EPA & U.S. Dep't of Army, *Technical Support Document for the Clean Water Rule: Definition of Waters of the United States* 158–63 (2015) (describing the extensive peer review process of the *Connectivity Report*, including the use of a panel of 27 technical experts from an array of relevant fields).

As the *Connectivity Report* explained, wetlands and streams play a central role "in maintaining the structure and function of downstream waters." *Connectivity Report*, *supra*, at ES-6. Wetlands and streams serve as "sinks" and are integral to removing and storing materials; for example, wetlands retain and store sediments, contaminants, and stormwater, preventing these materials from negatively impacting downstream waters. *Id.* at ES-3, ES-6, ES-9, ES-10, 4-8, 6-2 to 6-3. Streams—perennial, intermittent, and ephemeral[6]—are the main water source for most rivers. *Id.* at ES-2.

Furthermore, wetlands and streams act as refuges and provide protection and habitat for fish, shellfish, and

6. Perennial streams are channels that convey surface and subsurface water year-round. *Connectivity Report*, *supra*, at ES-7. Intermittent streams are those that convey surface and subsurface water weekly to seasonally. *Id.* Ephemeral streams convey surface and subsurface water only as a result of precipitation events. *Id.*

wildlife—which, based on the plain language of the Clean Water Act,[7] Congress explicitly sought to protect. *Id.* at ES-3, ES-8, ES-9 to ES-10, 3-38 to 3-39, 3-40 to 3-43, 4-15, 4-19, 4-32 to 4-35, 4-36 to 4-37, 6-3.

In addition, wetlands transform "materials, especially nutrients and chemical contaminants, into different physical or chemical forms" and perform important lag functions by "delay[ing] or regulat[ing] [the] release of materials, such as stormwater." *Id.* at ES-3, ES-6. Wetlands thus reduce or delay floods—thereby regulating navigable waters—by capturing and storing water, and over time, the water can move back to a navigable water as baseflow. *Id.* at 4-5 tbl.4-1, 4-7, 4-24, 6-2.

The functions provided by, and the effects of, an individual wetland or stream on downstream waters are cumulative and should be considered over time and in the context of other waters in the watershed. *Id.* at ES-5, 6-7. For example, the cumulative influence of many wetlands in a watershed can exert a strong impact on downstream waters. *Id.* at ES-11, 4-44. Similarly, an individual ephemeral stream may contribute a small amount of water, organisms, and/or materials to downstream waters in a given year, but the aggregate contribution from that

7. Clean Water Act Section 101(a)(2) establishes a national goal of "protection and propagation of fish, shellfish, and wildlife." 33 U.S.C. § 1251(a)(2). The Section 404(b)(1) Guidelines, used by the Corps when making Section 404 permit decisions, "shall be based" on criteria comparable to the criteria in Section 403 for discharges to the territorial seas. 33 U.S.C. § 1344(b). Section 403 expressly specifies that criteria for such discharges must take into account the effect of pollutants on "fish, shellfish, [and] wildlife." 33 U.S.C. § 1343(c)(1)(A).

stream over time or from all of the ephemeral streams in that watershed can be substantial. *Id.* at ES-5, ES-14, 6-11. One stream also may provide multiple functions, such as water transport and nutrient removal and transformation, and these functions should be considered cumulatively. *Id.* at ES-5, 1-10, 1-11.

Human activities can negatively affect the functions provided by wetlands and streams, which, in turn, can harm downstream waters, including traditional navigable waters. *E.g.*, Scott G. Leibowitz et al., *Connectivity of Streams and Wetlands to Downstream Waters: An Integrated Systems Framework*, 54 J. Am. Water Res. Ass'n 298, 311–12 (2018). The loss of wetlands through filling results in the loss of functions that wetlands provide: "improv[ing] water quality, provid[ing] natural flood control, diminish[ing] droughts, recharg[ing] groundwater aquifers, and stabiliz[ing] shorelines." *See* Nat'l Rsch. Council, *Compensating for Wetland Losses Under the Clean Water Act*, *supra*, at 1. Such negative effects also can be cumulative—for example, a single discharge of a pollutant to a stream may have a negligible effect, but multiple discharges could have a cumulative negative impact, degrading downstream waters. *Connectivity Report*, *supra*, at 6-12. Similarly, the filling of wetlands can have a cumulative negative effect on the functions that wetlands provide, such as filtering pollutants and controlling floods. Consequently, protecting hydrologically connected wetlands and streams is necessary to minimize adverse effects on downstream waters and achieve the goal of the Clean Water Act.[8] Indeed, Congress has on

8. While the functional equivalent test adopted in *County of Maui* would cover the discharge of pollutants such as chemical

several occasions expressly recognized the need to offset the impacts of filling wetlands and streams in the context of the Clean Water Act Section 404 program. *E.g.*, National Defense Authorization Act for Fiscal Year 2004, Pub. L. No. 108-136, § 314, 117 Stat. 1392, 1430 (Nov. 24, 2003) (requiring the Corps to adopt compensatory mitigation regulations that take into account "regional variations in wetland conditions, functions and values"); Transportation Equity Act for the 21st Century, Pub. L. No. 105-178, § 1106, 112 Stat. 107, 133 (June 9, 1998) (expressing a preference that mitigation banks provide compensatory mitigation to offset wetland and stream impacts from federally funded transportation projects).

Scientific research since 2015 confirms and reinforces the *Connectivity Report*'s conclusions. *E.g.*, Charles R. Lane et al., *Vulnerable Waters Are Essential to Watershed Resilience*, Ecosystems (Feb. 7, 2022), https://link.springer.com/article/10.1007/s10021-021-00737-2; Kelly Addy et al., *Connectivity and Nitrate Uptake Potential of Intermittent Streams in the Northeast USA*, 7 Frontiers Ecology & Evolution (June 19, 2019), https://www.frontiersin.org/articles/10.3389/fevo.2019.00225/full; Leibowitz et al., *supra*. The EPA's Office of Research and Development analyzed the peer-reviewed scientific literature since the *Connectivity Report*'s publication and found that it supported the *Connectivity Report*'s conclusions and "expanded scientific understanding and

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and biological contaminants, it would not apply to the discharge of dredged or fill material because those pollutants largely remain in place. *See Rapanos v. United States*, 547 U.S. 715, 723 (2006) (plurality opinion) (noting that, "unlike traditional water pollutants," dredged or fill material "are solids that do not readily wash downstream").

quantification of functions that ephemeral streams and non-floodplain waters perform that affect the integrity of larger downstream [waters], particularly in the aggregate." EPA & U.S. Dep't of Army, *Technical Support Document for the Proposed "Revised Definition of 'Waters of the United States'" Rule* 62 (2021). Accordingly, "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters," 33 U.S.C. § 1251(a), the definition of "waters of the United States" must take into account what scientific research has demonstrated: the quality of traditional navigable waters relies on certain wetlands and streams.

II. THE SIGNIFICANT NEXUS TEST REASONABLY BALANCES SCIENCE AND POLICY TO ADVANCE THE CLEAN WATER ACT'S WATER QUALITY OBJECTIVE.

By acknowledging the chemical, physical, and biological functions that wetlands and streams perform, the significant nexus test, used by the Ninth Circuit below, is consistent with Congress's singular objective in enacting the Clean Water Act: restoring and maintaining the quality of the Nation's waters. Courts and regulatory agencies have historically interpreted the Clean Water Act to protect wetlands and streams with a "significant nexus" to traditional navigable waters as "waters of the United States." *See Rapanos*, 547 U.S. at 759 (Kennedy, J., concurring in the judgment); *Solid Waste Agency of N. Cook Cnty. v. U.S. Army Corps of Eng'rs*, 531 U.S. 159, 167 (2001); *see also Riverside Bayview Homes, Inc.*, 474 U.S. at 134–35 & n.9.

Science clearly shows that many wetlands have a "significant nexus" to traditional navigable waters, and the EPA and Corps have identified specific wetland functions that contribute to the integrity of traditional navigable waters. *See Connectivity Report*, *supra*, at 2-22 to 2-26, 4-1 to 4-2. Physical functions include flood storage volume, flood flow alteration, flow maintenance, groundwater recharge/discharge, and sediment trapping. Ken M. Fritz et al., *Physical and Chemical Connectivity of Streams and Riparian Wetlands to Downstream Waters: A Synthesis*, 54 J. Am. Water Res. Ass'n 323, 330–31 (2018). Chemical functions include absorption of excess nutrients and pollutant filtering, *id.*, and biological functions relate to wildlife nesting, feeding, and spawning. Nat'l Rsch. Council, *Wetlands: Characteristics and Boundaries*, *supra*, at 37–38. These wetland functions help ensure that navigable waters are drinkable, fishable, and swimmable.

Importantly, the significant nexus test can be used to determine whether the Clean Water Act covers other types of waters, not just wetlands. Thus, the EPA and Corps use this approach when analyzing a non-navigable stream's relationship to a traditional navigable water and whether, as a result, that tributary qualifies as a water of the United States. The significant nexus test appropriately considers an entire aquatic ecosystem and its watershed, which is necessary if the integrity—"the natural structure and function of ecosystems"—is to be maintained. *See Riverside Bayview Homes, Inc.*, 474 U.S. at 132. Whether the functions of a particular wetland or stream (or a group of "similarly situated" waters) satisfy the legal threshold of "significant nexus" depends on the extent of its connectivity with traditional navigable waters.

The significant nexus test correctly recognizes that a wetland's connection to traditional navigable waters and their non-navigable tributaries may be through sub-surface connections. *E.g.*, EPA & U.S. Army Corps of Eng'rs, *Clean Water Act Jurisdiction* 5 (Dec. 2, 2008) (noting that wetlands with a "shallow sub-surface connection" and adjacent to a traditional navigable water are jurisdictional). A wetland that is separated from other waters by a road or berm may nevertheless significantly affect the quality of downstream traditional navigable waters by, for example, "hold[ing] floodwaters . . . and then release[ing] waters to tributaries in a more even and constant manner." *Id.* at 9. There is no scientific reason to use inundation (surface connection) as a bright-line jurisdictional rule and ignore saturation (sub-surface connections). *See generally* Brian P. Neff et al., *A Hydrologic Landscapes Perspective on Groundwater Connectivity of Depressional Wetlands*, 12 Water 50 (2020) (discussing groundwater connectivity and how groundwater discharge contributes to streams, including through maintaining baseflow and moderating temperature); Thomas C. Winter et al., *Ground Water and Surface Water: A Single Resource* (U.S. Geological Survey Circular 1139, 1999). As this Court observed in *Riverside Bayview Homes*, regulation under the Clean Water Act "cannot rely on . . . artificial lines . . . but must focus on all waters that together form the entire aquatic system." 474 U.S. at 133 (internal quotation marks omitted) (quoting 42 Fed. Reg. 37,122, 37,128 (July 19, 1977)). Similarly, this Court in *County of Maui* recognized that discharges to groundwater may be the functional equivalent of a direct discharge to surface waters and therefore subject to regulation. 140 S. Ct. at 1476–77.

The significant nexus test also appropriately considers the cumulative influence that wetlands and streams in a watershed can exert on a traditional navigable water. Accordingly, when applying the significant nexus test, regulators and consultants "assess the flow characteristics and functions of the tributary itself, together with the functions performed by any wetlands adjacent to that tributary, to determine whether collectively they have a significant nexus with traditional navigable waters." EPA & U.S. Army Corps of Eng'rs, *supra*, at 8. Such an approach is fundamental to protect the quality of traditional navigable waters. *See* Lane et al., *supra*.

The significant nexus test ***does not***, however, result in jurisdiction over all waters that are hydrologically connected to traditional navigable waters. Kurt A. Fesenmyer et al., *Large Portion of USA Streams Lose Protection with New Interpretation of Clean Water Act*, 40 Freshwater Sci. 252, 255 (2021) (reporting that jurisdictional determinations for 1,729 ephemeral stream features in 33 States found that only 48% were "waters of the United States" under the significant nexus test). While from a scientific perspective a broader approach would be justified,[9] the Court has rejected this standard, in part because of Congress's recognition of the States' traditional responsibilities over land and water resources. *See Rapanos*, 547 U.S. at 756 (plurality opinion). Applying the significant nexus test avoids any unbounded jurisdictional reach of the Clean Water Act. As this Court recognized in *County of Maui*, scientific factors can be used to distinguish the "functional equivalence"

9. *See generally* S. Mažeika P. Sullivan et al., *The Proposed Change to the Definition of "Waters of the United States" Flouts Sound Science*, 116 Proc. Nat'l Acad. Scis. 11,558 (June 11, 2019).

of a point-source discharge into surface waters from a discharge that does not have that functional equivalence. 140 S. Ct. at 1476–77. Similarly, the EPA and Corps did not define every type of wetland (or stream) as necessarily connected to navigable waters, but instead applied long-developed scientific factors to delineate the difference so that stakeholders can retain some predictability with respect to permitting requirements. The significant nexus test strikes a reasonable balance that considers both State responsibilities and science—as Congress intended.

By design, the significant nexus test applies to waters that are not subject to categorical treatment. While Petitioners and many of their *amici* criticize the significant nexus test for not providing bright lines, the Court has previously noted that with respect to judicial resolution of Clean Water Act jurisdictional disputes, Congress did not place a premium on efficiency. *Nat'l Ass'n of Mfrs. v. Dep't of Def.*, 138 S. Ct. 617, 622 (2018). Indeed, despite Petitioners' protestations, the primary purpose of Congress's actions in 1972 was to improve the Nation's water quality, not provide "certainty."

III. PETITIONERS' PROPOSED FRAMEWORK FAILS TO TAKE INTO ACCOUNT SCIENCE AND WOULD FRUSTRATE THE CLEAN WATER ACT'S WATER QUALITY OBJECTIVE.

Unlike the significant nexus test, Petitioners' proposed framework disregards the fact that traditional navigable waters exist within interconnected aquatic ecosystems. Likewise, their proposed framework ignores the critical functions that wetlands and streams, individually and cumulatively, provide to traditional navigable waters. It also fails to recognize that these functions are delivered to traditional navigable waters through both surface and groundwater connections. Petitioners' approach elevates certainty (in this context, the removal of federal regulation) over the only objective of the Clean Water Act: restoring and maintaining the integrity of the Nation's waters.

Step one of Petitioners' proposed framework would significantly limit Clean Water Act jurisdiction over wetlands in two ways: (A) by requiring a continuous surface-water connection between the wetland and another water, and (B) by requiring that the wetland and other water be "inseparably bound . . . such that it is difficult to tell" where the wetland ends and the other water begins. As explained below, the "continuous surface-water connection" requirement would dramatically reduce Clean Water Act protections for wetlands—and even more so for streams—throughout the country. And if the "difficult-to-tell" requirement were adopted, federal regulatory jurisdiction over wetlands would essentially be eliminated. Either result would greatly frustrate the sole objective of the Clean Water Act.

A. Scientific models demonstrate the magnitude of reduction of Clean Water Act protections for wetlands and streams under a "continuous surface-water connection" requirement.

If, as Petitioners argue, "waters of the United States" were limited to waters with a "continuous surface-water connection" to traditional navigable waters, many wetlands and streams would no longer receive Clean Water Act protections. Wetlands with a groundwater connection to traditional navigable waters would not be jurisdictional waters. Intermittent and ephemeral streams and their adjacent wetlands also would not be jurisdictional waters. While the effects would vary from watershed to watershed, the reduced federal protections would lead to serious negative water quality impacts for the Nation's waters. Susan A. R. Colvin et al., *Headwater Streams and Wetlands Are Critical for Sustaining Fish, Fisheries, and Ecosystem Services*, 44 Fisheries 73, 74 (Feb. 2019) (discussing how eliminating Clean Water Act protections for headwater streams and wetlands "would create a cascade of consequences, including reduced water quality, impaired ecosystem functioning, and loss of fish habitat for commercial and recreational fish species"); V. Acuña et al., *Why Should We Care About Temporary Waters?*, 343 Science 1080, 1080–81 (Mar. 7, 2014) (explaining that failing to protect intermittent streams will result in negative impacts).

Scientific models demonstrate the likely negative effects of Petitioners' proposed framework. As the National Research Council stated, "[m]odels have a long history of helping to explain scientific phenomena and of predicting outcomes and behavior in settings where empirical observations are limited or not available." Nat'l Rsch. Council, *Models in Environmental Regulatory Decision Making* 1 (2007). Courts regularly rely on scientific models in Clean Water Act cases. *See, e.g.*, *Save Our Cabinets v. U.S. Dep't of Agric.*, 254 F. Supp. 3d 1241, 1252–53 (D. Mont. 2017) (stream baseflow model); *Greater Yellowstone Coal. v. Larson*, 641 F. Supp. 2d 1120, 1139 (D. Idaho 2009) (groundwater model); *see also* Fed. Jud. Ctr. & Nat'l Rsch. Council, *supra*, at 530–33 (discussing environmental models generally).

A widely publicized model developed by GeoSpatial Services ("GSS") of Saint Mary's University of Minnesota illustrates the potential contraction of Clean Water Act jurisdiction under Petitioners' "continuous surface-water connection" theory. GSS developed a Geographic Information System ("GIS")-based model,[10] called the "CWA Jurisdictional Scenario Model," that compares and contrasts the extent of Clean Water Act protection for aquatic ecosystems under different regulatory scenarios.[11] The CWA Jurisdictional Scenario Model was developed in collaboration with an advisory group of "experts who have a working understanding of the [Clean Water Act and its regulations], wetland functional assessment, and spatial analysis techniques."[12] The CWA Jurisdictional Scenario Model uses nationally available GIS datasets, including the National Hydrography Dataset ("NHD"),[13]

10. GIS is a conceptualized, computerized framework commonly used by researchers since the 1990s to capture and analyze spatial and geographic data. *See* Nigel Waters, *History of GIS*, *in The International Encyclopedia of Geography: People, the Earth, Environment, and Technology* 2978, 2985–86 (Douglas Richardson et al. eds., 2017).

11. Roger Meyer & Andrew Robertson, *Clean Water Rule Spatial Analysis: A GIS-Based Scenario Model for Comparative Analysis of the Potential Spatial Extent of Jurisdictional and Non-Jurisdictional Wetlands* ix, 1 (2019), https://static1.squarespace.com/static/578f93e4cd0f68cb49ba90e1/t/5c50c0e988251bc68fe33388/1548796144041/Hewlett_report_Final.pdf [hereinafter *GSS Report*].

12. *GSS Report*, *supra*, at 6. The model uses ArcGIS ModelBuilder, a standard software system used to model hydrological interactions in the GIS environment. *Id.* at 7.

13. The U.S. Geological Survey ("USGS") produced the NHD, which provides digital vector GIS data from across the

National Wetlands Inventory ("NWI"),[14] and Soil Survey Geographic Database ("SSURGO"),[15] and allows users to

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nation to "define the spatial locations of surface waters" at medium resolution (1:100,000 scale) or high resolution (1:24,000 scale or better). USGS, *What Is the National Hydrography Dataset (NHD)?*, https://www.usgs.gov/faqs/what-national-hydrography-dataset-nhd?qt-news_science_products=0#qt-news_science_products (last visited June 8, 2022); USGS, *National Hydrography Dataset*, https://www.usgs.gov/core-science-systems/ngp/national-hydrography/national-hydrography-dataset?qt-science_support_page_related_con=0#qt-science_support_page_related_con (last visited June 8, 2022). High-resolution NHD is the best nationally available source for surface water data. *See GSS Report*, *supra*, at 11; *see also* The Navigable Waters Protection Rule: Definition of "Waters of the United States," 85 Fed. Reg. at 22,329.

14. The U.S. Fish and Wildlife Service manages the NWI dataset, which "is a publicly available resource that provides detailed information on the abundance, characteristics and distribution of America's wetlands." U.S. Fish & Wildlife Serv., *National Wetlands Inventory Use Highlights*, https://www.fws.gov/story/national-wetlands-inventory-use-highlights (last visited June 8, 2022). NWI is the best nationally available source for wetland data. *See* Qiusheng Wu, *GIS and Remote Sensing Applications in Wetland Mapping and Monitoring*, *in Comprehensive Geographic Information Systems* 140, 147 (Bo Huang ed., 2018); *see also* The Navigable Waters Protection Rule: Definition of "Waters of the United States," 85 Fed. Reg. at 22,329.

15. The Natural Resources Conservation Service produces the SSURGO, which is a digital soils database that "is intended for natural resource planning and management." Natural Res. Conservation Serv., *Description of SSURGO Database*, https://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/survey/?cid=nrcs142p2_053627 (last visited June 8, 2022). SSURGO is the best nationally available source for soils data. *See* NOAA Off. for Coastal Mgmt., *Soil Survey Geographic Database*, https://coast.noaa.gov/digitalcoast/data/ssurgo.html (last modified Apr. 12, 2021).

compare potential jurisdiction of aquatic ecosystems for different regulatory scenarios. *GSS Report*, *supra*, at ix–x, 11. The model provides a user interface for modifying model input parameters for exploratory analysis; it is "easily transferable to other geographic areas and watersheds." *Id.* at 11. Additionally, the model captures factors such as "hydrologic connectivity to traditional navigable waters [and] hydrologic permanence using stream classification." *Id.* at 5. Ultimately, the CWA Jurisdictional Scenario Model uses the input data and model criteria to generate results demonstrating the extent of protection of aquatic ecosystems under each scenario.

The CWA Jurisdictional Scenario Model and scenarios were recently updated to model three scenarios: (1) a scenario showing all waters in a watershed; (2) a scenario showing jurisdictional waters based on the application of the significant nexus test; and (3) a scenario showing jurisdictional waters based on the application of a "continuous surface-water connection" standard.[16]

The results are qualified, as they often are in scientific research, but they illustrate broad-scale results. *See GSS Report*, *supra*, at 33–34 (explaining that appropriate use of the model includes "[b]road-scale evaluation of environmental impact" but not delineations of individual wetlands). Indeed, the model likely ***underestimates*** the reduction of Clean Water Act jurisdiction for wetlands under the "continuous surface-water connection" standard

16. For the "continuous surface-water connection" standard, the model included wetlands that were directly connected to a traditional navigable water or directly connected to a non-navigable perennial stream or river that has a continuous flow connection to a traditional navigable water.

because it is not necessarily able to account for roads and other features that cut off a continuous surface connection. Thus, the model's results regarding wetlands should be considered the likely ***minimum*** reduction in Clean Water Act jurisdiction under a "continuous surface-water connection" scenario.[17]

Even so, the model demonstrates a drastic reduction in Clean Water Act protections if the "continuous surface-water connection" requirement were adopted.[18] The impacts would be most dramatic in the more arid regions of the western United States. For example, in the Rio Salado Watershed in New Mexico, where there is a high proportion of ephemeral streams, wetland jurisdiction likely would be reduced by more than 50%, and stream jurisdiction likely would be reduced by more than 90% (see Figure 2 below). The Rio Salado is a tributary of the Rio

17. Of course, if as Petitioners suggest, wetlands are not "waters" and a wetland should be protected only if it has a continuous surface connection to a water of the United States "such that it is difficult to tell where the wetland ends and the 'water' begins," the model would dramatically underestimate the decline in wetland coverage. The vast majority of individual wetlands can be delineated, and thus a regulator can identify where a wetland ends and another water begins. *See infra* Section III.B.

18. Figures 2–5 at the end of Section III.A show model outputs displayed in an Esri Operation Dashboard web application. The NWI wetland polygons are symbolized as yellow outlines, and the NHD flowlines are initially represented as blue lines. The dashboard allows a user to zoom in/out or navigate around the maps; a user must zoom in to view the wetland polygons. Clicking on each wetland polygon will provide the NWI code and the number of acres for the polygon. Clicking on an NHD line will show the NHD code and length of the line segment in square kilometers.

Grande, a traditional navigable water, that already suffers from environmental degradation. Rossana Sallenave et al., *Fishes in the Middle and Lower Rio Grande Irrigation Systems of New Mexico*, Coop. Extension Serv. Circular No. 653, at 4 (2018) (reporting that only 14 of the 27 native fish species in the Rio Grande in New Mexico remain). Eliminating Clean Water Act protections for wetlands and streams in watersheds such as the Rio Salado Watershed would further reduce critically important flows to the Rio Grande, which supplies irrigation water for two million acres and drinking water for six million people. *See* Int'l Water & Boundary Comm'n, *About the Rio Grande*, https://www.ibwc.gov/crp/riogrande.htm (last visited June 8, 2022).

Similarly, in the South Platte Watershed in Colorado, the minimum reduction in wetland jurisdiction would be approximately 30%, while protections for streams would likely contract by more than 80% (see Figure 3 below). Eliminating protections for wetlands that filter pollutants into the traditionally navigable South Platte River would exacerbate negative water quality trends. *See* Bruce Finley, *Fecal Matter Elevated in South Platte River as Denver Fights State Health Agency over Water Pollution*, Denver Post (Mar. 4, 2021), https://www.denverpost.com/2021/03/04/south-platte-river-ecoli-pollution/ (reporting that *E. coli* contamination in the South Platte River in Denver is "up to 137 times higher than a federal safety limit").

Comparable negative results would occur in other parts of the country. For example, in Minnesota's Cottonwood Watershed, wetland jurisdiction likely would be reduced by at least 20%, and stream jurisdiction likely would be reduced by nearly 75% (see Figure 4 below). The Cottonwood River, a tributary of the traditionally navigable Minnesota River (which joins the Mississippi River), already suffers from poor water quality. *See* Minn. Pollution Control Agency, *Cottonwood River Watershed Monitoring and Assessment Report* 1 (2020), https://www.pca.state.mn.us/sites/default/files/wq-ws3-07020008.pdf (reporting that current levels of *E. coli* contamination can make it "unsafe for swimming or wading, and secondary body contact such as fishing from a boat or shore"). Again, curtailing Clean Water Act protections for wetlands that filter pollutants would exacerbate poor water quality conditions.

The Nanticoke Watershed in Maryland and Delaware also would see wetland protections decline by at least 20%, and likely more than 50% of streams would lose Clean Water Act protections (see Figure 5 below). The traditionally navigable Nanticoke River flows into the Chesapeake Bay, which continues to struggle with water quality issues. Md. Dep't of Nat. Res., *2022 Blue Crab Winter Dredge Survey*, https://dnr.maryland.gov/fisheries/Pages/blue-crab/dredge.aspx (last visited June 8, 2022) (reporting results of the 2022 Chesapeake Bay blue crab survey, which estimated the number of crabs at the lowest level since the survey began in 1990). Once again, the reduction in Clean Water Act jurisdiction, which would lead to replacing wetlands with impervious surfaces, would frustrate restoring and maintaining the water quality in the Chesapeake Bay. *See* Colvin et al., *supra*, at 74.

The model results are consistent with findings in the scientific literature. *See, e.g.*, S. Mažeika Patricio Sullivan et al., *Distorting Science, Putting Water at*

Risk, 369 Science 766, 766 (Aug. 14, 2020) (stating that a surface-water connection standard would result in loss of protections for "millions of miles of streams and acres of wetlands"); Fesenmyer et al., *supra*, at 255 (estimating that eliminating jurisdiction over ephemeral streams would eliminate protections for 23% of streams in the conterminous United States, representing 3.8 million kilometers of stream channel length). The loss of Clean Water Act protections for millions of miles of streams and acres of wetlands would degrade water quality across the Nation.

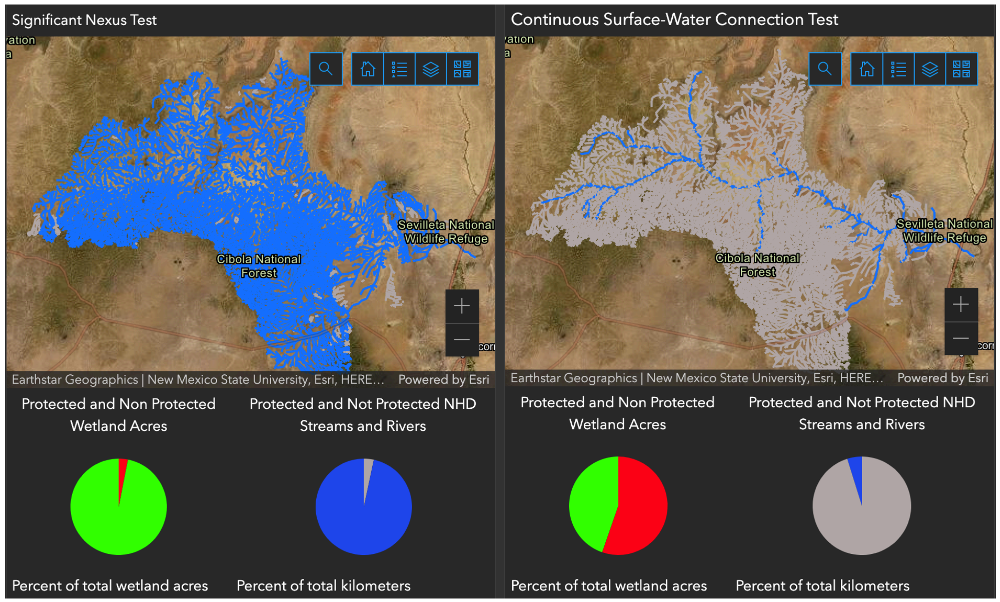

Figure 2. Graphic showing model output of two scenarios displayed in an Esri Operation Dashboard web application for the Rio Salado Watershed, New Mexico. Source: GSS, *WOTUS Jurisdictional Scenario Modeling Results: Rio Salado Watershed, New Mexico*, https://smumn.maps.arcgis.com/apps/dashboards/bd8c925abfc44fe3b7bbcfa3a40028e8 (last visited June 8, 2022).

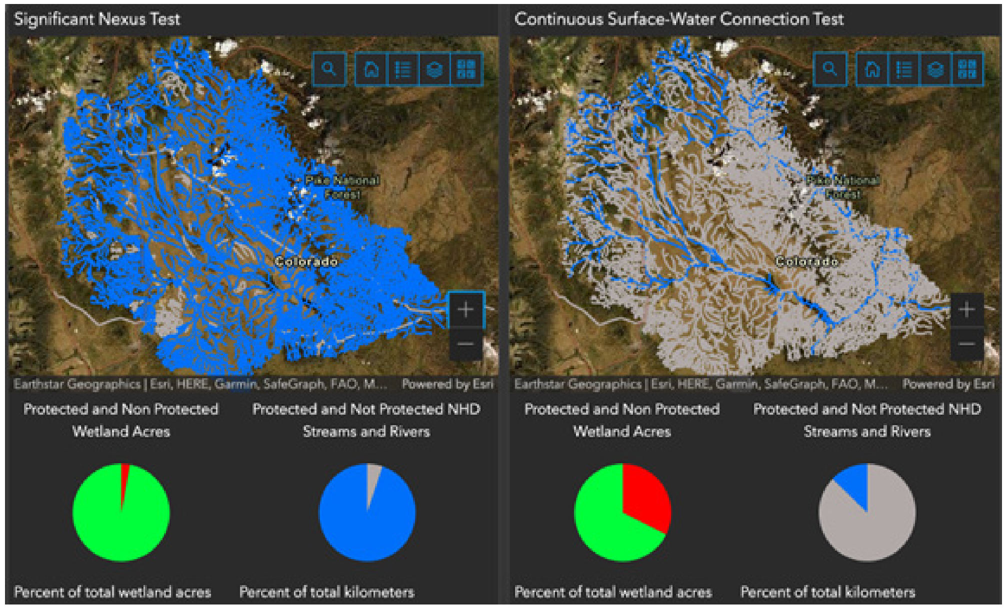

Figure 3. Graphic showing model output of two scenarios displayed in an Esri Operation Dashboard web application for the South Platte Watershed, Colorado. Source: GSS, *WOTUS Jurisdictional Scenario Modeling Results: South Platte Watershed, Colorado*, https://smumn.maps.arcgis.com/apps/dashboards/1c8ce1e58e2a4dd090c727368c125e48 (last visited June 8, 2022).

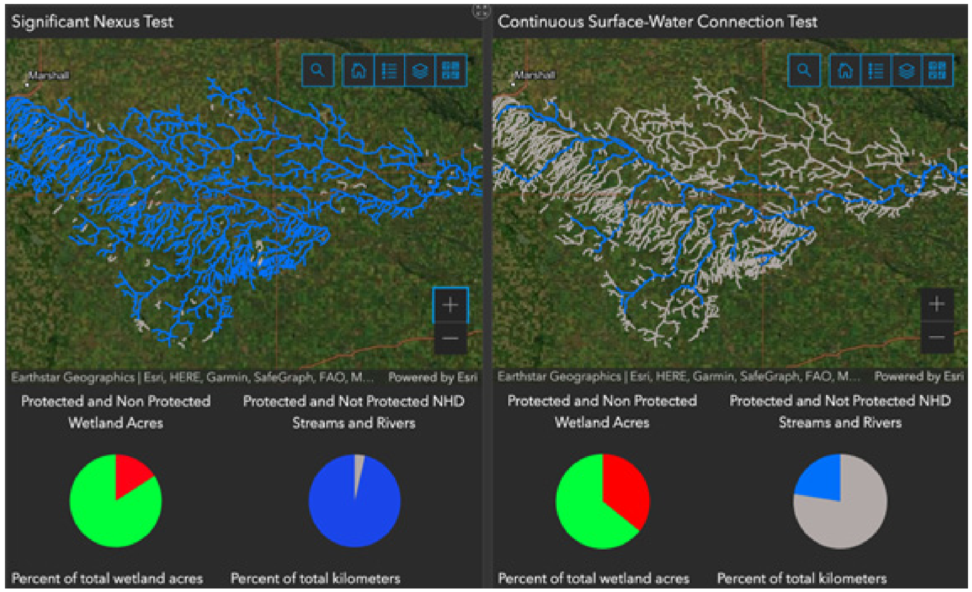

Figure 4. Graphic showing model output of two scenarios displayed in an Esri Operation Dashboard web application for the Cottonwood Watershed, Minnesota. Source: GSS, *WOTUS Jurisdictional Scenario Modeling Results: Cottonwood Watershed, Minnesota*, https://smumn.maps.arcgis.com/apps/dashboards/7c1604069ef644bdb1b72d54f678ea16 (last visited June 8, 2022).

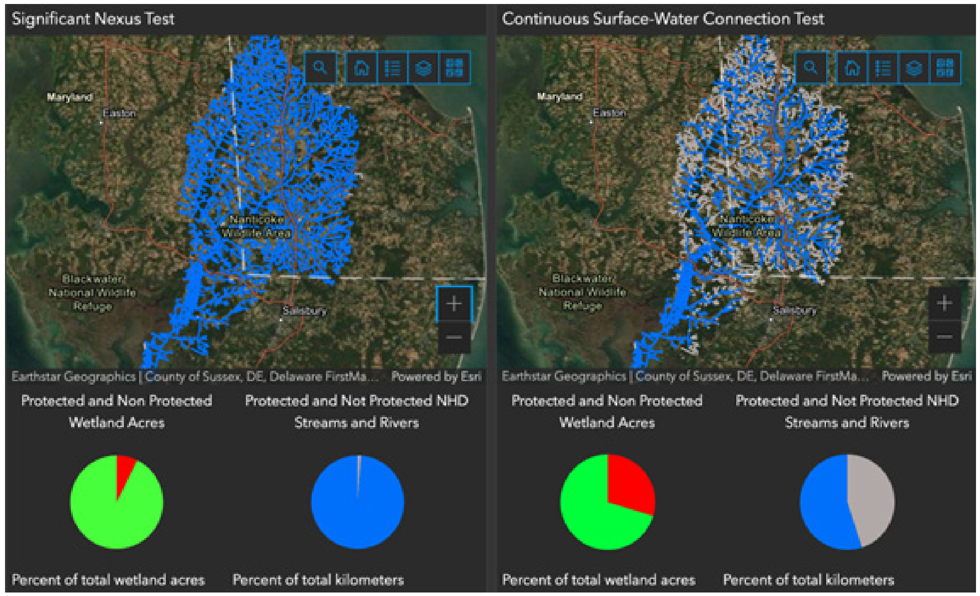

Figure 5. Graphic showing model output of two scenarios displayed in an Esri Operation Dashboard web application for the Nanticoke Watershed, Maryland/Delaware. Source: GSS, *WOTUS Jurisdictional Scenario Modeling Results: Nanticoke Watershed, Maryland/ Delaware*, https://smumn.maps.arcgis.com/apps/dashboards/1943922773634eb09f828dd325653cf6 (last visited June 8, 2022).

B. Because the boundaries of a wetland can almost always be delineated, the "difficult-to-tell" requirement would effectively eliminate Clean Water Act jurisdiction over all wetlands.

One aspect of Petitioners' proposed framework that the CWA Jurisdictional Scenario Model does not cover is the "difficult-to-tell" requirement, *i.e.*, that a wetland should be jurisdictional only if it is so "inseparably bound up" with a water "that it is difficult to tell where the wetland ends and the 'water' begins." Pet'rs' Br. Merits 5–6. But for jurisdictional determinations for individual sites, wetland science has developed to the point that the boundaries between a wetland and another water can almost always be determined. While Corps regulators still use the 1987 Wetland Delineation Manual, that manual is now supplemented with ten regional guides.[19] These scientific, technical manuals inform the permit applicant and the regulator where the boundaries are between wetlands and uplands—and they are also used to demarcate where a wetland connects with a stream, river, lake, or ocean.

While delineating the boundaries between a wetland and an upland can be challenging, *Rapanos*, 547 U.S.

19. The regional guides are for the following: Alaska (2007); Arid West (2008); Atlantic and Gulf Coast (2010); Caribbean Islands (2011); Eastern Mountains and Piedmont (2012); Great Plains (2010); Hawaii and Pacific Islands (2012); Mid-West (2010); Northcentral and Northeast (2012); and Western Mountains (2010). *See* U.S. Army Corps of Eng'rs, *Regional Supplements to Corps Delineation Manual*, https://www.usace.army.mil/Missions/Civil-Works/Regulatory-Program-and-Permits/reg_supp/ (last visited June 8, 2022).

at 740 (plurality opinion) (quoting *Riverside Bayview Homes, Inc.*, 474 U.S. at 132), drawing boundaries where a wetland joins another water is more straightforward. Generally, the limit of the wetland vegetation, which is driven by water depth, will mark the boundary between a wetland and a stream, river, lake, or ocean. *See, e.g.*, R. Peters et al., *The Interplay Between Vegetation and Water in Mangroves: New Perspectives for Mangrove Stand Modelling and Ecological Research*, 28 Wetlands Ecol. Mgmt. 697, 699 (2020) (depicting mangroves stopping at shoreline).

When applying for a Clean Water Act Section 404 permit, applicants routinely identify where a wetland ends and another water begins.[20] The Corps issues public notices for proposed projects being reviewed for standard permits, and these public notices regularly make distinctions between wetlands and other waters.[21] When requiring compensatory mitigation as a Section 404 permit condition, the Corps, as a matter of course, makes a distinction between wetlands and streams and

20. An applicant must fill out a Department of the Army form that requires information about the extent of the impact area, including wetland impacts in terms of acres and stream impacts in terms of linear feet. *See* U.S. Army Corps of Eng'rs, *Application for Department of the Army Permit (ENG Form 4345)* (Feb. 2019), https://www.publications.usace.army.mil/Portals/76/Publications/EngineerForms/Eng_Form_4345_2019Feb.pdf?ver=2019-03-08-083618-337.

21. *See, e.g.*, U.S. Army Corps of Eng'rs, Jacksonville Dist., *Public Notices*, https://www.saj.usace.army.mil/Missions/Regulatory/Public-Notices/ (last visited June 8, 2022).

other waters.[22] Nothing in the day-to-day operations of the Section 404 program suggests it is ever difficult to determine where a wetland ends and another water begins. Nor is there anything in the scientific literature to suggest that it is difficult to determine where a wetland ends and another water begins. The "difficult-to-tell" requirement is thus not supported by practice or science.

The boundaries of a wetland can almost always be delineated. As a practical matter, if the "difficult-to-tell" requirement were used, almost no wetland would qualify as a water of the United States.

Congress did not intend such an absurd result. *Cf. County of Maui*, 140 S. Ct. at 1473 (rejecting interpretation contrary to "one of the key regulatory innovations of the Clean Water Act"). As explained earlier, some wetlands are in fact traditional navigable waters. Furthermore, statutory language also demonstrates that Congress intended wetlands beyond those that are traditionally navigable to be afforded Clean Water Act protections. Congress exempted "wetlands adjacent" to traditional navigable waters from those waters for which the States could assume Section 404 permitting responsibility, 33 U.S.C. § 1344(g)(1), which suggests that adjacent wetlands are jurisdictional waters. Furthermore, Congress expressed its preference on how best to offset the negative impacts to non-navigable wetlands caused by activities

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22. For example, the Corps' Regulatory In-lieu Fee and Bank Information Tracking System (RIBITS) distinguishes between wetland and stream credits available to be used by permittees to satisfy any compensatory mitigation conditions. *See* RIBITS, *Banks and Sites*, https://ribits.ops.usace.army.mil/ords/f?p=107:158:13456445044735::NO (last visited June 8, 2022).

discharging dredged or fill material. *E.g.*, National Defense Authorization Act for Fiscal Year 2004 § 314. Ultimately, eliminating Clean Water Act protections for wetlands would lead to the degradation of the chemical, physical, and biological integrity of the Nation's waters, frustrating the Clean Water Act's only objective.

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CONCLUSION

The Clean Water Act's mandate can only be met by considering science, which demonstrates the relationship between wetlands and streams and traditional navigable waters, and how damage to wetlands and streams leads to negative changes in water quality of traditional navigable waters. The significant nexus test properly considers the crucial chemical, physical, and biological functions that wetlands and streams perform. In contrast, Petitioners' proposed framework would effectively eliminate Clean Water Act protections for almost all wetlands and the majority of streams. Such a result would be contrary to the only objective that Congress identified in the Clean Water Act: restoring and maintaining the integrity of the Nation's waters.

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