

IN THE UNITED STATES DISTRICT COURT FOR THE
DISTRICT OF SOUTH CAROLINA
CHARLESTON DIVISION

SOUTH CAROLINA COASTAL)
CONSERVATION LEAGUE, et al.,)

Plaintiffs,)

v.)

ANDREW R. WHEELER, in his official)
capacity as Administrator of the)
U.S. Environmental Protection Agency, et)
al.,)

No. 2:20-cv-01687-DCN

Defendants.)

AMERICAN FARM BUREAU)
FEDERATION, et al.,)

Intervenor-Defendants.)

Brief of Amici Curiae

**Trout Unlimited, Izaak Walton League of America, Theodore Roosevelt
Conservation Partnership, American Fly Fishing Trade Association, and
H. Dale Hall, Former Director, U.S. Fish and Wildlife Service
and Former CEO, Ducks Unlimited, in Support of
Plaintiffs’ Motion for Summary Judgment**

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INTERESTS OF *AMICI CURIAE*

Trout Unlimited is a non-profit organization with 370,000 members and supporters dedicated to conserving, protecting and restoring the Nation's trout and salmon fisheries and their watersheds. Trout Unlimited staff and volunteers, working with landowners, and local, state and federal agency partners, restore hundreds of miles of the waters at issue in this case.

Founded in 1922 by avid anglers, the Izaak Walton League of America's 40,000 members are hunters and anglers who work to conserve outdoor America for future generations. The Izaak Walton League of America members and citizens trained by the League conduct stream monitoring at hundreds of sites across the nation to ensure that stream health is maintained and improved for hunting, fishing, and safe drinking water supplies.

The Theodore Roosevelt Conservation Partnership is a non-profit organization with individual as well as 60 hunting, angling and outdoor recreation organization members dedicated to ensuring that all Americans have quality places to hunt and fish.

The American Fly Fishing Trade Association represents the business of fly fishing which includes manufacturers, retailers, outfitters and guides across the nation. The protection and enhancement of fish habitat is the foundation of our industry.

H. Dale Hall worked in wetlands and wildlife conservation for over thirty years in the U.S. Fish and Wildlife Service, where he became Director in 2005 under President George W. Bush, and nine years as the CEO of Ducks Unlimited, Inc, the largest wetlands and waterfowl habitat conservation organization in the world. He has published numerous scientific articles on wetlands and their functions, as well as co-authoring a book chapter on the fisheries values of bottomland hardwood wetlands.

Protecting our nations’ waters is of critical importance to Sportsmen and Sportswomen Amici. Healthy waters support healthy fish and wildlife and help to support and sustain water-based businesses, including hunting, fishing, outdoor recreation and the recreational economy. As of 2014, an estimated 47 million people hunted and fished in the United States, and delivered an astonishing \$200 billion to the country’s economy, along with 1.5 million jobs.¹ So, when streams are polluted or wetlands drained, it directly affects Sportsmen Amici and Sportswomen and America’s hunting and fishing economy.

Since its enactment, Amici Curiae (collectively herein “Amici”) have relied upon the Clean Water Act (“CWA” or “Act”), 33 U.S.C. §§ 1251 *et seq.*, with its long-standing and science-based definition of “Waters of the United States” to ensure protections for the many streams and wetlands that function to “restore and maintain the chemical, physical, and biological integrity of the Nation’s waters” – the central objective of the Clean Water Act. 33 U.S.C. § 1251. The Act also sets as an explicit national goal the achievement of “water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water...” 33 U.S.C. § 1251(a)(2). Few other laws so clearly place the interests of hunters and anglers at their core. And sportsmen and women reciprocate, with 92% supporting broad application of Clean Water Act protections.²

SUMMARY OF ARGUMENT

Amici vigorously oppose the 2020 Waters of the United States Final Rule –85 Fed. Reg. 22,250 (April 21, 2020) (“Replacement Rule” or “2020 Rule”) because it drastically and arbitrarily departs from law, longstanding CWA policy, and science. The Replacement Rule

¹ See, National Wildlife Federation, et al., “Hunters and Anglers: Fueling our Nation’s Economy and Paying for Conservation,” (2014), available on-line [here](#).

² See, Weigel, Lori, “TRCP Sportsmen National Survey,” (2018), available on line [here](#).

eliminates all permit requirements for an estimated half of the Nation's stream miles and tens of millions of its remaining wetland acres, and cripples the effectiveness of the Act's remaining permit and water-quality protection framework to restore and maintain the chemical, physical, and biological integrity of the Nation's waters. If allowed to stand, the 2020 Rule would result in increased pollution and destruction of streams, rivers, lakes, wetlands, and estuaries upon which Amici depend for fish and wildlife-related outdoor-recreation, restoration work, employment, and businesses.

Amici will not substantially repeat the persuasive arguments advanced by Plaintiffs' summary judgment brief. Rather, Amici demonstrate below that the 2020 Replacement Rule is arbitrary and capricious because: (1) the Rule disregards the primary statutory objective and goals of the CWA, the established science, and record evidence of environmental and economic impacts; (2) the Rule undermines the CWA's permit programs and will have devastating effects on the states' and tribes' ability to meet the water quality standards they set for navigable waters; and, (3) the Rule disregards the reliance interests of millions of people and businesses on longstanding protections for clean water.

Amici present below what they do every day – we discuss the science of rivers, wetlands and drinking water of the American public – the Waters of the United States. We show the science ignored by the Agencies and the sheer irrationality of the Replacement Rule in the face of the Act's permit framework and implementation in watersheds across the Nation.

ARGUMENT

- I. **The 2020 Replacement Rule arbitrarily eliminates all permit requirements for about half the Nation's stream miles and tens of millions of wetland acres, making it impossible to achieve the Act's primary objective to restore and maintain the chemical, physical, and biological integrity of U.S. waters.**

A. The 2020 Rule excludes CWA permit review for approximately half of U.S. stream miles.

Streams that do not flow year-round, but instead flow seasonally and intermittently or ephemerally (in response to precipitation events), are the backbone of every watershed, comprising on average 60-80% of their total length of streams.³ The 2020 Rule categorically and expressly removes CWA jurisdiction for all ephemeral streams, which the Agencies' own early estimate pegged at 18% of stream miles nationally and Trout Unlimited ("TU") scientists calculate at more than 50% of stream miles.⁴ In addition, the Replacement Rule excludes intermittent (seasonal) streams that do not contribute flow "in a typical year" to a navigable water, although the Agencies did not quantify how many streams this would encompass. The 2020 Rule even eliminates protection for some perennial (year-round) streams, also without quantifying how many. *See* U.S. EPA & Dep't of the Army, *Economic Analysis for the Navigable Waters* ("Final EA") (AR 11572).⁵ *Protection Rule: Definition of "Waters of the United States"* 10-11, 22-23 (Jan. 22, 2020).

The irrationality of the proposed rule is simple to describe. Imagine a navigable stream with two tributaries, one which flows year-round and one which is ephemeral, flowing only

³ *See* Dr. S. Mažeika Patricio Sullivan Decl., *California v. Wheeler*, 3:20-cv-00-3005-RS (N.D. Cal.), ECF No. 30-18 (Sullivan Decl.) ¶ 14 & n. 32 *citing* T. Nadeau and M.C. Rains, *Hydrological connectivity between headwater streams and downstream waters: how science can inform policy*, 43 J Am Water Resour Assoc 118 (2007).

⁴ *Compare*, Ariel Wittenberg & Kevin Bogardus, "EPA Falsely Claims 'No Data' on Waters in WOTUS Rule," E&E News (Dec. 11, 2018), available on line [here](#) and [here](#) (last visited 6/20/2020) with Comment Submitted by Steve Moyer, Vice President, Government Affairs, Trout Unlimited (April 15, 2019) Attachments: Kurt Fesenmyer, GIS Director, Trout Unlimited. 2019. Trout Unlimited PowerPoint Presentation, "What it all means: waters of the U.S. on the ground." (April 4, 2019) (2019 Trout Unlimited Mapping PowerPoint) (*e.g.*, estimating ephemeral stream miles comprise 57% of U.S. stream miles), (AR 4912) available on line [here](#).

⁵ The Final EA is available on line [here](#). Perennial waters that would not be waters of the US include those that flow into ephemeral features, which themselves do not contribute flows to a traditional navigable water or territorial sea in a typical year and perennial tributaries that similarly do not contribute such flows, *e.g.*, because they spill into the desert.

occasionally and unpredictably. Under the proposed rule, a party could completely fill the ephemeral stream or place discharge harmful substances into it without violating the CWA, while being precluded from discharging into the year-round tributary. In both instances, these actions would change the flows or cause pollution to reach the main river and cause it harm. Congress knew that water flows downhill and could not have intended that the damage from the tributaries to the navigable stream would be permitted in one case, but not the other. It is the very definition of arbitrary to exclude categorically the identical effects merely because one stream flows all year-round and another does not. Both possess the substantial nexus to navigable waters, which is the standard set in *Rapanos*.

TU scientists now estimate that approximately 4.8 million stream miles, 52% of stream channels by length in the continental U.S., will no longer benefit from CWA protection under the 2020 Rule.⁶ TU scientists conducted this analysis because the government failed to conduct its own analysis of the effect of its own 2020 Rule. These percentages are much higher in certain regions and watersheds. For example, in the Southwestern United States, over 81% of stream length have ephemeral or intermittent flow.⁷ Recent modeling indicates that greater than 85% of stream length in some New Mexico watersheds will lose protection under the 2020 Rule.⁸ In the

⁶ Sullivan Decl. ¶ 3 & n. 4 citing K. Fesenmyer *et al.* *Majority of streams are unprotected in new interpretation of Clean Water Act*. Nature Geoscience (in review). See K. Fesenmyer *et al.* attached hereto as **EXHIBIT 2** (currently in review as *Majority of U.S. streams lose protection with new interpretation of Clean Water Act* at Comm. Earth Environment).

⁷ Sullivan Decl. ¶ 3 & n. 5 citing L.R. Levick *et al.*, *The ecological and hydrological significance of ephemeral and intermittent streams in the arid and semi-arid American Southwest*, U.S. Environmental Protection Agency and USDA/ARS Southwest Watershed Research Center, EPA/600/R-08/134, ARS/233046. Washington, D.C. (2008) (Levick *et al.* (2008)) (AR 0037).

⁸ See, Andrew G. Robertson Decl. & Exs. A-E, *California v. Wheeler*, 3:20-cv-00-3005-RS (N.D. Cal.), ECF No. 68-2-68-7 (Robertson Decl.) summarizing R. Meyer and A. Robertson. *Navigable Waters Protection Rule spatial analysis: A GIS-based scenario model for comparative analysis of the potential spatial extent of jurisdictional and non-jurisdictional waters and wetlands*. Saint Mary's University of Minnesota, Winona, MN (2020) (Only 5.2% of stream

South Platte watershed of Colorado, protection will drop from an estimated 96.5% of stream length under the 2015 Rule⁹ to 55.2% under the 2020 Rule, and from 95.9% under the 2015 Rule to 26.2% under the 2020 Rule in Montana’s Roanwood Creek watershed.¹⁰

Even in the wet Atlantic coastal plain, the categorical exclusion of ephemeral streams is significant, particularly considering the aggregate impact of losing protections for those streams along with protections for the wetlands directly and indirectly connected to those streams. For example, in the Nanticoke watershed of Delaware and Maryland, that flows to the Chesapeake Bay, jurisdictional stream length will drop from 99.2% under the 2015 Clean Water Rule to 79.7% under the 2020 Rule.¹¹

The Agencies were armed with the record evidence¹² and the analytical tools to confirm these devastating impacts, but chose not to quantify or examine them. *See* 85 Fed. Reg. 22,292-

miles in New Mexico’s Rio Salado watershed, and only 8.7% in the Rio Penasco watershed would remain protected under the 2020 Rule).

⁹ As used in this brief, the “2015 Rule” refers to the Clean Water Rule the Agencies promulgated to define waters of the U.S. in 2015. 80 Fed. Reg. 37,054 (June 29, 2015). The Agencies withdrew the 2015 Rule, reinstating their 1986 definition of waters of the U.S., as modified by their 2008 guidance. *See*, 84 Fed. Reg. 56,626 (October 22, 2019). According to the Agencies’ 2015 Economic Analysis, the 2015 Rule expanded jurisdiction from the 1986 rule as modified by the 2008 guidance by 2.84 to 4.65 percent. The 2015 Economic Analysis is contained here: https://www.epa.gov/sites/production/files/2015-06/documents/508-final_clean_water_rule_economic_analysis_5-20-15.pdf.

¹⁰ *Id.* *See also*, L.K. Vance, *Geographically isolated wetlands and intermittent/ephemeral streams in Montana: extent, distribution, and function*. Montana Natural Heritage Program, Prepared for Montana Department of Environmental Quality and U.S. EPA (2009) (Vance 2009) *cited in* NWF Comments to the Clean Water Rule Record (November 14, 2014) (NWF CWR Comments), p. 101 & n. 265 at Docket ID No. EPA-HQ-OW-2011-0880-15020 and available [here](#) (finding that more than 60% of streams are ephemeral and would lose protection in central and eastern Montana, and more than 30% of stream miles are ephemeral and would no longer be protected in wetter, mountainous regions of the state.).

¹¹ Meyer and Robertson (2020), *supra* n. 8, available on line [here](#).

¹² *See, e.g.* Comment Submitted by Steve Moyer, Vice President, Government Affairs, Trout Unlimited (April 15, 2019) (AR 4912), 5, 13 & Attachments: Fesenmyer et al, 2019 Trout Unlimited Mapping PowerPoint, available on line [here](#); U.S. EPA, *Connectivity of streams and wetlands to downstream waters: a review and synthesis of the scientific evidence*. Technical

22,293; Final EA at 10-11, 14-17, 22-23; U.S. EPA and Department of the Army, Corps of Engineers, *Resources and Programmatic Assessment for the Navigable Waters Protection Rule: Definition of “Waters of the United States”* (Jan. 23, 2020), EPA-HQ-OW-2018-0149 (“RPA”) (AR 11573) at 10, 20-24 (ephemeral waters), 26-28 (wetlands).

B. The 2020 Rule removes CWA protections for tens of millions of the Nation’s remaining wetland acres.

Wetlands serve functions important to the integrity of the associated tributary and downstream waters, acting as sponges to absorb flood waters and sediment, filtering pollutants, and providing the food chain and habitat upon which fish and wildlife depend throughout the watershed. They also provide substantial habitat for migratory birds. *See, e.g.*, Connectivity Science Report ES-2-ES-4, 4-2, 4-5, 6-6 to 6-7; 80 Fed. Reg. 37054, 37063 (June 29, 2015).¹³ Removal of CWA permit review for tens of millions of wetland acres exposes them to dredging and filling and threatens the health of nearby and downstream waters. The Agencies’ internal analysis of the National Hydrography Dataset (NHD)¹⁴ and National Wetlands Inventory (NWI)¹⁵ databases estimated that nationally, given the requirement of a “continuous surface water connection,” approximately 51% of the NWI mapped wetland acreage in the U.S. would not be considered adjacent and could lose CWA protections under the Replacement Rule.¹⁶

Report, EPA/600/R-14/475f. U.S. Environmental Protection Agency, Washington, D.C. (2015) (Connectivity Science Report) (AR 11691) 2-17, 2-29, 3-4.

¹³ *See also* Sullivan Decl. ¶ 5, 14, 15 & n. 35.

¹⁴ U.S.G.S. *National Hydrography Dataset* (NHD)(NHD provides GIS data to define the spatial locations of U.S. surface waters. High-resolution NHD is the best nationally available source for surface water data. *See* 85 Fed. Reg. at 22,329).

¹⁵ U.S. Fish and Wildlife Service, *National Wetlands Inventory* (NWI) (the NWI is a publicly available dataset that provides detailed information on the abundance, characteristics, and distribution of U.S. wetlands.).

¹⁶ Wittenberg & Bogardus, *supra* n. 4; *see also*, Plaintiffs’ Memorandum at 9 & n. 14.

While the Agencies now disclaim this estimate due to “data limitations,” RPA at 41 & n. 56, other studies indicate this initial, conservative estimate may well be close to the mark.

The 2020 Rule categorically excludes geographically isolated, non-floodplain wetlands that occupy an estimated 16.3 million acres,¹⁷ at least 15% of the estimated 110 million wetland acres remaining in the contiguous United States.¹⁸ In just one important geography, the Upper Midwest prairie pothole region, often called America’s duck factory because it provides habitat to half of the continent’s migratory waterfowl, the non-floodplain wetlands “that would lose protection equal the size of the state of West Virginia.”¹⁹

In addition, the Agencies identify the following categories of adjacent wetlands where a portion within each category will lose CWA protections because they neither directly abut a jurisdictional stream nor have a direct hydrological surface connection to a jurisdictional stream “in a typical year:” 1) wetlands adjacent to traditionally navigable waters (TNWs); 2) wetlands adjacent to intermittent and perennial “relatively permanent waters;” and 3) wetlands adjacent to ephemeral and intermittent “non-relatively permanent waters.” The Agencies fail to estimate the extent of these wetland losses, arbitrarily leaving that task to others. *See* Final EA at 14-17. *See also*, Plaintiffs’ Memorandum at 9 & n. 15.

Taking into account both isolated, non-floodplain wetlands and the various categories of floodplain wetlands that do not abut or have a clear surface water connection to perennial and intermittent streams, recent geospatial modeling estimates indicate that tens of millions of the

¹⁷ Sulliván Decl. ¶ 3 *citing* C.R. Lane and E. D’Amico, *Identification of putative geographically isolated wetlands of the conterminous United States*, 52 J. Am. Water Resources Association 705 (2016) (also cited in NWF Comments to the 2020 Replacement Rule at Docket No. EPA-HQ-OW-2018-0149-6880 at 77-78).

¹⁸ U.S. Fish and Wildlife Service, “Status and Trends of Wetlands in the Conterminous United States 2004-2009,” at 16, 37 (2009), available [here](#) .

¹⁹ Comment on Rule by Susan Colvin, Asst Prof, Sustainable Fisheries, & Randall Colvin, Instructor, Unity College School of Biodiversity Conservation (2019), p. 2, available [here](#).

nation's remaining wetlands could lose CWA protections due to the 2020 Rule's insistence upon evidence of a surface water connection to a tributary in a "typical year."²⁰ A second geospatial analysis modeling at the watershed level, comparing the 2015 Clean Water Rule and the 2020 Replacement Rule, estimates that more than 40% of wetland acres in some New Mexico watersheds will lose federal protection under the 2020 Rule, including wetlands providing important water quality, flood protection, and fish and wildlife habitat functions.²¹ This 2020 modeling estimates that while the 2015 Rule protected 85.7% of Montana's Roanwood Creek wetlands, the 2020 Rule will protect only 46.6%.²²

In wetter systems to the East, a similar geospatial analysis submitted for the 2020 rulemaking record indicates that at least 22% of wetlands would no longer be protected in Minnesota's Cottonwood River watershed, including wetlands providing important water quality, flood protection, and fish and wildlife habitat functions.²³ A related modeling analysis submitted for the record for the Nanticoke River watershed in Delaware and Maryland found that the Replacement Rule would likely exclude from CWA protection at least 20% of the wetland acres in the watershed, including an estimated 15,000 wetland acres with surface water detention

²⁰ Plaintiffs' Memorandum for Summary Judgment (Plaintiffs' Memorandum) at 9 & Plaintiffs' Ex. 47 at ¶ 23 (estimating the potential loss of over 45 million acres of wetlands in the coterminous U.S.).

²¹ Meyer and Robertson (2020), *supra* n. 8, available on line [here](#), Exs. A & B (2015 CWR would protect 97.3% of wetlands in the New Mexico's Rio Salado watershed, 2020 Rule would protect only 50.7%. The 2015 Rule would protect 71.5% of Rio Penasco wetlands; 2020 Rule would protect only 28%).

²² *Id.* at Ex. C.

²³ Meyer, R. and A. Robertson. 2019. Clean Water Rule spatial analysis: A GIS-based scenario model for comparative analysis of the potential spatial extent of jurisdictional and non-jurisdictional wetlands. Saint Mary's University of Minnesota, Winona, Minnesota (Meyer and Robertson 2019) available [here](#) and submitted for the record by several commentators including NWF Replacement Rule Comments (April 15, 2019) and available [here](#).

function, over 16,000 with wildlife habitat function, and an estimated 9,187 wetland acres with moderate to high nutrient transformation function.²⁴

At the state level, the majority of North Carolina's basin, bog, bottomland hardwood forest, headwater forest, Carolina bay, floodplain pool, hardwood flat, non-riverine swamp forest, pine savanna, pocosin, and seep wetland types would likely lose federal protection under the 2020 Rule.²⁵ A Montana state study found that 61% of the state's wetlands lack an apparent surface water connection to any other waterbody and could lose protection.²⁶

Finally, the Final EA includes some analysis of the Corps' "ORM2" jurisdictional determination database, in conjunction with USGS and NWI maps and other remote tools, which also seems consistent with the Agencies' early 51% loss estimate. For example, in assessing whether wetlands are abutting or not abutting a TNW, the Corps found that almost half (45%) of these wetlands adjacent to TNWs were not abutting, and might no longer be subject to CWA protections under the 2020 Rule's narrow definition of "adjacent wetlands." Final EA at 15-17. Further, this analysis found that only about 10% of these wetlands that are adjacent to TNWs, but are "non-abutting," have a surface connection to the TNW via a culvert or tide gate. This suggests, particularly given the data limitations the Agencies identify, that about 40% (90% of 45%) of wetlands adjacent to TNWs would likely lose CWA jurisdiction under the 2020 Rule.

²⁴ Meyer, R., and A. Robertson. 2019. Clean Water Rule Spatial Modeling and Quantitative Analysis of Jurisdictional Wetlands in the Nanticoke Watershed (2019 Nanticoke Analysis), Maryland. Saint Mary's University of Minnesota, Winona, Minnesota, submitted to rulemaking docket as Attachment B at p. 89-93, Association of State Wetland Managers Comments (April 15, 2019), available [here](#).

²⁵ See, e.g., Letter from K. Moser, SELC to A. Wheeler, U.S. EPA, & R.D. James, Dep't of Army at 4 (April 15, 2019) (AR 9717) (Submitted by SELC to EPA Docket Center EPA-HQ-OW-2018-0149-9717 (April 15, 2019)(SELC Comments); Moffat and Nichol, Proposed Changes to the Waters of the United States (WOTUS) Definition – Summary of M&N Conclusions (April 7, 2019), attached as Ex. B to SELC Comments, available [here](#).

²⁶ Vance (2009), *supra*, n. 9, at 15 & n.15.

Id. at 16. Had the Agencies applied a similar analysis to wetlands not abutting other perennial, intermittent, and ephemeral tributaries, they likely would have found that a very significant percentage of these non-abutting wetlands would lose CWA jurisdiction given the 2020 Rule’s insistence on a demonstrable surface water connection in a “typical year.” *Id.* See also, Plaintiffs’ Memorandum at 42 *citing* Plaintiffs’ Ex. 47 ¶¶ 6, 23 (Nearly 160,000 wetlands in the Charleston Harbor watershed are likely to lose CWA jurisdiction due to the Rule’s narrow definition of “adjacent wetlands.”).

In sum, while the Agencies disclaim their initial estimate, ignore record evidence, and refuse to quantify the extent of wetland losses under the 2020 Replacement Rule, it is reasonable to estimate that the Rule will categorically exclude tens of millions of the remaining wetland acres in the coterminous United States.

C. The Agencies failed to analyze the crippling effect of removing all permitting requirements for approximately half of stream miles and tens of millions of wetland acres on the chemical, physical, and biological integrity of the Nation’s waters.

As discussed above, and in the Plaintiffs’ briefing, the Agencies have arbitrarily ignored the overwhelming scientific evidence of the impacts of small streams and wetlands upstream on the integrity of downstream waters. This failure to consider the scientific evidence of impacts ignores the Act’s objective and goals at 33 U.S.C. 1251(a) & (a)(2), permitting and water quality standard framework,²⁷ legislative history,²⁸ and Supreme Court precedent, “entirely fail[ing] to consider an important aspect of the problem,” in violation of the Administrative Procedure Act (“APA”). See Plaintiffs’ Memorandum at 17-23, *citing, inter alia, Motor Vehicles Mfrs. Ass’n of*

²⁷ Congress reinforced the Act’s commitment to its 1251(a) objectives by explicitly requiring, e.g., that the Act’s water quality and permitting standards provide for fish, wildlife, and water-based outdoor recreation. See, 33 U.S.C. §§ 1312 (a), 1313 (d), 1314 (a), 1317 (a)(2), 1321 (b) and (f)(4), 1343 (c), 1344(b)(1) (cross-referencing 1343(c)), and 1362(13).

²⁸ See, e.g., Senate Committee on Public Works, S. Rep. No. 92-414, 92nd Cong., 76, 77 (1971); see also, Sen. Baker, 123 Cong. Rec. 26718-19 (daily ed. Aug. 4, 1977).

U.S., Inc. v. State Farm Mut. Auto. Ins. Co., 463 U.S. 29, 43 (1983) (*State Farm*). Indeed, implementing the Replacement Rule will not only undercut the Act’s objectives, it will make achieving them impossible.²⁹

Stream and wetland science have long been at the core of CWA decision-making. In *United States v. Riverside Bayview Homes, Inc.*, 474 U.S. 121 (1985), the Court accepted the Corps’ judgment that wetlands adjacent to lakes, rivers, streams, and other bodies of water are integral parts of the interconnected aquatic environment, noting the ability of wetlands to “filter and purify water draining into adjacent bodies of water, [...] to slow the flow of surface runoff into lakes, rivers, and streams and thus prevent flooding and erosion,” and to “serve significant natural biological functions, including food chain production, general habitat, and nesting, spawning, rearing and resting sites for aquatic ... species.”³⁰ Justice Kennedy’s significant nexus jurisdictional standard in *Rapanos* flows from *Riverside Bayview* and *SWANCC*, calling for more than “speculative or insubstantial evidence” that “the wetlands, either alone or in combination with similarly situated lands in the region, significantly affect the chemical, physical, and biological integrity of other covered waters more readily understood as ‘navigable.’” *See, Rapanos*, 547 U.S. at 759, 779-80 (Kennedy, J. concurring in the judgment). *See* Plaintiffs’ Memorandum at 31-33.

The 2006 *Rapanos* significant nexus standard and the 2008 *Rapanos* Guidance sparked EPA research conducting, compiling, and synthesizing some 1,200 peer-reviewed scientific

²⁹ *See also* Plaintiffs’ Memorandum at 32-34 (By ignoring the CWA’s science mandate and undercutting its primary objective, the Agencies violate the CWA as well as the APA).

³⁰ 474 U.S. at 134-35, 139 (citations omitted) (internal quotation marks omitted). Twelve years later, Chief Justice Rehnquist observed, “It was the *significant nexus* between the wetlands and “navigable waters” that informed our reading of the CWA in *Riverside Bayview Homes*.” *Solid Waste Agency of N. Cook Cty v. US Army Corps of Eng.*, 531 U.S. 159, 167 (2001) (“*SWANCC*”) (emphasis added).

studies of the chemical, physical, and biological influences of streams and wetlands on downstream waters in a watershed, and culminating in the 2015 Connectivity Science Report (“Connectivity Report” or “Report”).³¹ The Report underwent an extensive public peer review by an EPA Science Advisory Board (“SAB”) panel of scientists in 2013-2014 and provided the scientific foundation for the proposed and final 2015 Rule. *See* 80 Fed. Reg. at 37,057. *See also* Plaintiffs’ Memorandum at 5-6 & 18-19.

In eliminating discharges to so many wetlands and ephemeral streams from the CWA permitting framework and other CWA protections, the Agencies have arbitrarily ignored the Connectivity Report, recommendations of the EPA SAB Panel,³² and the ever-growing body of evidence that streams and wetlands are biologically, chemically, and hydrologically connected throughout every watershed. This science demonstrates that these streams and wetlands contribute to freshwater ecosystem integrity, and that their destruction and degradation undermines and degrades the integrity of the waters downstream.³³ *See also*, Plaintiffs’ Memorandum at 19-21 & 31.

For example, the Agencies categorically exclude ephemeral streams, ignoring the Report’s “strong scientific support for the conclusion that ephemeral streams exert a strong influence on the character and functioning of downstream waters.” *See* 85 Fed. Reg. at 22,251; Final EA at 107 (acknowledging that ephemeral and intermittent streams “perform similar

³¹ Connectivity Science Report *supra*, n.12.

³² EPA Science Advisory Board’s finding at SAB Letter to Gina McCarthy. October 17, 2014. *SAB Review of the Draft EPA Report Connectivity of Streams and Wetlands*.(AR 0386).

³³Sullivan Decl. ¶¶6-7 & notes 17-19 *citing* Connectivity Science Report, *supra*, n. 12 & SAB Letter to Gina McCarthy, October 17, 2014 (2014 SAB Connectivity Science Report Review) available [here](#).

hydrological and ecological functions, including moving water, sediments, and nutrients, providing connectivity within the watershed and habitat to wildlife.”).³⁴

The Agencies also disregard the Report’s findings that, with or without a direct surface water connection, floodplain wetlands serve functions important to the integrity of associated tributaries and downstream waters, including acting as sources of key nutrients and dissolved organic compounds and providing spawning and rearing habitat for many species of fish and other aquatic organisms.³⁵ They also disregard the SAB’s findings of the important role that both floodplain and non-floodplain wetlands play in supporting the food chain and habitat upon which fish and wildlife depend throughout the watershed.³⁶

The Agencies then impose, without scientific justification, a novel “typical year” test to exclude periods of flooding or drought.³⁷ This test ignores the Connectivity Report’s findings that floodplain wetlands without a direct surface water connection to a jurisdictional water in a “typical year” are key players in reducing the number and severity of floods, as well as in storing stormwater runoff and minimizing non-point pollution.³⁸ It also disregards that atypical flood years are also critical for stream function, *i.e.* to mobilize sediment and wash accumulated

³⁴ See also, *e.g.*, Connectivity Science Report at ES-5 & ES-7 (“[T]he evidence for connectivity and downstream effects of ephemeral streams was strong and compelling.”). See also, Plaintiffs’ Memorandum at 19-20 & 24-25.

³⁵ Connectivity Science Report at 4-4; see also *id.* at 4-2, 4-5, 6-6 to 6-7; 80 Fed. Reg. at 37,062-37,063.

³⁶ *Id.*; Sullivan Decl. ¶16.

³⁷ 85 Fed. Reg. at 22,274-75.

³⁸ Sullivan Decl. ¶¶47-48 & n. 168 *citing, inter alia*, M. Acreman and J. Holden, *How wetlands affect floods*, 33 *Wetlands* 773 (2013); EPA SAB Letter to Andrew R. Wheeler, Administrator, U.S. EPA, *Commentary on the Proposed Rule Defining the Scope of Waters Federally Regulated Under the Clean Water Act* (Feb. 27, 2020) (SAB 2020 Rule Commentary) (Plaintiffs’ Ex. 57).

pollutants downstream.³⁹ *See also* Plaintiffs’ Memorandum at 25-27 (discussing the scientific and policy flaws of imposing the “typical year” limitation on stream and wetland jurisdiction).

In addition, the Agencies ignore the aggregate hydrological and biological contributions of similarly situated wetland complexes such as California vernal pools or prairie potholes to the physical, chemical, and biological integrity of their watersheds, and the significant adverse consequences of doing so.⁴⁰

The Agencies also disregard the close, integrated connections between surface water and groundwater flow systems that characterize how natural waters accumulate on any given landscape, fundamentally mischaracterizing the very nature of water connectivity. For example, the health of a river depends in no small part on the boundary where river water and groundwater mix in the gravel under and around the river channel.⁴¹

In sum, without scientific justification and in contravention of extensive record evidence, the Agencies categorically exclude from CWA permit review and water quality standard protections millions of ephemeral stream miles, some intermittent and perennial streams, and tens of millions of acres of both floodplain and non-floodplain wetlands, crippling CWA efforts to maintain and restore the integrity of U.S. waters. By ignoring the underlying connectivity science, the Agencies undermine the primary statutory objective, goals, and permitting framework of the CWA. As such, the Agencies have acted arbitrarily and capriciously, running

³⁹ *See, e.g.*, Connectivity Science Report, p. 3-15 and papers cited therein.

⁴⁰ Sullivan Decl. ¶14; Connectivity Science Report at ES-5-6, ES-10-14; 80 Fed. Reg. at 37,063-37,064, 37071-37,072; EPA SAB Letter to Gina McCarthy, Administrator, *SAB Consideration of the Adequacy of the Scientific and Technical Basis for the Proposed Rule Titled Definition of Waters of the United States under the Clean Water Act*. U.S. EPA (September 30, 2014) (2014 SAB Clean Water Rule Review) at 3, available [here](#); *See also* U.S. EPA and U.S. Army Technical Support Document for the Clean Water Rule: Definition of Waters of the United States (May 27, 2015) (2015 TSD), at 330-349.

⁴¹ Sullivan Decl. ¶18; Connectivity Science Report at ES-2-3; 80 Fed. Reg. at 37,063; SAB 2020 Rule Commentary at 3-4; 2014 SAB Clean Water Rule Review, *supra* n. 40, at 3.

afoul of decades of Supreme Court precedent. *See, e.g., State Farm* at 43. *See also* Plaintiffs’ Memorandum at 34 *citing, inter alia, Maislin Indus., U.S., Inc. v. Primary Steel*, 497 U.S. 116, 134-35 (1990) (By ignoring the CWA’s science mandate and undercutting its primary objective, the Agencies violate the CWA as well as the APA). *See also, County of Maui v. Hawaii Wildlife Fund*, 140 S. Ct. 1462, 1468 &1474 (2020) (rejecting EPA’s CWA interpretation because it would allow “easy evasion of the statutory provision’s basic purposes.”).

II. The 2020 Rule’s elimination of all CWA permit requirements for approximately half of the Nation’s remaining stream miles and tens of millions of its wetland acres undermines the Act’s primary objective and cripples the Act’s many programs designed to work together to restore and maintain the chemical, physical, and biological integrity of the Nation’s waters.

The rulemaking record, the underlying science, and the facts presented in the challenges to the 2020 Rule provide overwhelming evidence that eliminating all CWA permit requirements and water quality standard protections for an estimated half of the Nation’s stream miles and tens of millions of its remaining wetland acres will significantly degrade those waters as well as the downstream waters they support. This radical reduction in protection potentially renders futile these remaining, ongoing efforts to meet state water quality standards.

In order to achieve those water quality standards, the CWA created an interrelated system of regulatory and incentive provisions. These provisions work together towards restoring water quality; many of them are implemented by the states pursuant to mandates from the EPA. CWA §402 created the National Pollution Discharge Elimination System (NPDES) which requires “point sources” of pollution to obtain permits. Reduction of pollutants from end-of-pipe systems—such as industrial waste, municipal wastewater, and mining operations—into waters is managed under §402 permits. State agencies administer this NPDES system in all but four states (and the District of Columbia). Section 303 requires states to establish water quality standards

for all waters in their borders. Under §302, NPDES permits must ensure compliance with these water quality standards and, under §303(d), states may adopt additional requirements in permits, and through other means, if needed to restore impaired waters. Finally, the §404 permit program controls discharges of dredge and fill materials to streams and wetlands so that they maintain hydrologic function—passing water from upstream down, moderating flood flows, providing cold and clean groundwater inflows in dry times, managing sediment and nutrient inputs and creating fish and wildlife habitat. Unlike the §402 permit program, only two states issue §404 permits; others rely on the Corps of Engineers to do so. This means that, especially with §404, the scope of CWA jurisdiction defines the limits of protection for the Nation’s waters.

Removing approximately half of stream miles and tens of millions of wetland acres from the agencies’ jurisdiction for all permit purposes, but especially §404 permits, will make it much more difficult to achieve the water quality standards required under §303. Removing these waters from CWA jurisdiction will place enormous stress on the CWA’s other provisions, and indeed make their implementation potentially futile. Much of this stress will be borne by state agencies who implement most of the provisions of the CWA. Permitting provisions for activities in jurisdictional waters will have to be made even more stringent do to upstream pollution and loss to wetland and hydrologic function. The increased burden will be borne by state agencies who implement most of the provisions of the CWA and by businesses that discharge into or conduct activities in jurisdictional waters.

A. The 2020 Rule’s elimination of CWA permit obligations is so extensive that it likely makes achieving the Act’s objective impossible, because the Act’s programs will be so crippled that they will not be able to protect the Nation’s waters.

The Agencies admit the 2020 Rule will degrade the functions of ephemeral streams and non-floodplain, isolated wetlands, resulting in an increase in downstream flooding, increased

water pollution in jurisdictional waters, increased oil spill pollution, and increased drinking water treatment costs. However, they fail to quantify any of these impacts. *See* RPA at 10, 20-24 (ephemeral waters), 26-28 (wetlands). *See* RPA at 10, 20-24 (ephemeral waters), 26-28 (wetlands) and, *e.g.*, Final EA at Figure III-9 & 105-107. *See e.g.*, U.S. Environmental Protection Agency and U.S. Army Corps of Engineers, “Economic Analysis for the Proposed Revised Definition of ‘Waters of the United States,’” at 133-134 (Dec. 14, 2018). *See also* Plaintiffs’ Memorandum at 22 (discussing and including Figure III-9 graphic).

The Agencies also acknowledge that the 2020 Rule will undermine the effectiveness of CWA programs essential to maintaining the integrity of the nation’s waters, including §303 water quality standards, §303(d) “Total Maximum Daily Load” (TMDL) non-point source pollution reduction programs, state and tribal §401 certification programs, §402 and §404 discharge permits, and §311 oil spill prevention programs. *See, e.g.* Final EA at 28-32.

The Agencies acknowledge that the 2020 Rule will disproportionately degrade the quality of waters in the arid West, ignoring the Act’s mandate to maintain and restore water quality of waters for the whole country.⁴² This admission comes without explanation for how to reconcile abandoning huge swaths of the waters on the Nation’s more arid landscapes with effective implementation of the Act’s remaining permit obligations. Nor does it explain how a rule that will result in substantial pollution of one region’s waterways fits the Act’s fundamental purpose to create a baseline level of protection for all the Nation’s waters. Congress passed the Clean Water Act in 1972 in part because the 1965 Water Quality Act, which had put states in the lead

⁴² *See* RPA at 22, 61; EA at 56 (fewer facilities requiring NPDES permits in the arid West); Final EA at 61-62 (fewer construction and industrial stormwater discharge permits in the arid West); Final EA at 107 (importance of ephemeral streams in the arid West for replenishing groundwater, “which people in the study area heavily depend on for irrigation and drinking water supply (Levick et al., 2008)).”

to protect water quality had failed (as had the earlier effort in 1948). *See* Plaintiffs' Memorandum at 36 (1972 CWA as a "total restructuring" assigning the federal government the primary role in response to earlier failed, fractured state efforts).

While acknowledging that the 2020 Rule dismantles the Act's comprehensive protection for the Nation's waters, the Agencies cavalierly assert that future protections will "depend[] on state or tribal regulations...where such regulations exist." *See* RPA at 86 (impacts to §402 and §404 permitting); *See also*, RPA at 59, 61-62 (with respect to TMDLs), 64 & 70 (with respect to 311 oil spill programs), and 80, 84 & 86 (with respect to 401, 402, & 404 permitting). *See* 85 Fed. Reg. at 22,269. The CWA simply does not empower the Agencies to pass the buck in this way.

On the contrary, the elimination of federal protection for such a large swath of the nation's waters will put enormous stress on states and tribes that implement both the other provisions of the CWA for remaining jurisdictional waters and state programs. Nowhere in the 2020 Rule federal register notice, EA, or RPA do the Agencies attempt to address whether, and how, the Rule will affect implementation of the CWA's other provisions. The 2020 Rule's elimination of CWA permit obligations is so extensive that it may make the Act's other provisions too weak to "restore the chemical, physical, and biological integrity of the Nation's waters."

B. The extensive loss of protected stream and wetland areas resulting from the Rule will degrade the chemical, physical, and biological integrity of the Nation's waters.

The Clean Water Act is widely considered one of the Nation's most successful environmental laws. Its permitting requirements and grant programs have improved the quality of thousands of miles of rivers and streams across the country and have protected thousands of acres of wetlands from destruction. Yet, almost fifty years after its passage, the work is not done.

Freshwater habitats are vital to fish and wildlife, but too many remain severely impaired. EPA rates 46% of U.S. streams and rivers as in poor condition.⁴³ Extinction rates for species dependent on freshwater habitats are four to five times higher than their terrestrial counterparts⁴⁴ due to habitat loss and pollution.⁴⁵ Seasonal waterways and non-floodplain, isolated wetlands provide important physical habitats for various life stages of fish and wildlife and contribute to the physical, chemical, and biological integrity of downstream receiving waters on which additional fish and wildlife depend.⁴⁶ Ephemeral streams, non-floodplain wetlands, and floodplain wetlands play an important role in buffering excess nutrients and sediment.⁴⁷

1. The Rule's elimination of CWA permitting obligations for so many streams and wetlands will significantly degrade fish and wildlife habitat and the physical, chemical, and biological integrity of the nation's waters.

By leaving so many headwater streams and wetlands subject to increased pollution, dredging and filling, the 2020 Rule will severely impair the quality of downstream waters that depend on the functions performed by streams and wetlands throughout the watershed.⁴⁸ Headwater streams and wetlands are critical for sustaining aquatic ecosystems, fisheries, and overall watershed integrity, including slowing and retaining flood waters and sediment and nutrient pollution, as well as providing habitat.⁴⁹ Several fish species occupy primarily

⁴³EPA, National Rivers and Streams Assessment 2008-2009, at xiii, available [here](#).

⁴⁴ Ricciardi, Anthony, and Joseph B. Rasmussen. "Extinction rates of North American freshwater fauna." *Conservation biology* 13.5 (1999): 1220-1222.

⁴⁵ Miller, Robert R., James D. Williams, and Jack E. Williams. "Extinctions of North American fishes during the past century." *Fisheries* 14.6 (1989): 22-38.

⁴⁶ Colvin, Susan A.R. *et al.*, *Headwater streams and wetlands are critical for sustaining fish, fisheries, and ecosystem services*. *Fisheries* 44.2 (2019): 73-91.

⁴⁷Connectivity Science Report, *supra* n.12, at ES-5-6, ES-10-14.

⁴⁸*See* Sullivan Decl. ¶3 & notes 13-14 *citing* Colvin, *et al.* (2019), *supra* n. 46; L.F. Creed *et al.*, *Enhancing protection for vulnerable waters*. 10 *Nat Geosci* 809 (2017).

⁴⁹Colvin *et al* (2019), *supra* n. 46 (also submitted to 2020 rulemaking record by American Fisheries Society (April 15, 2019) available [here](#)).

headwaters tributaries, many of which are intermittent or ephemeral.⁵⁰ By removing CWA protections for all ephemeral streams, as well as their associated wetlands, the 2020 Rule subjects approximately half the Nation's stream miles⁵¹ and associated wetlands to loss of habitat for many fish and wildlife species, including many that are already threatened or endangered.⁵² The degradation of these headwaters then compounds pollution and habitat degradation downstream.⁵³ Increased alteration of ephemeral stream hydrology can increase peak flows and increase the transport of eroded sediment downstream, increasing sediment loads in downstream waters.⁵⁴ Excess sedimentation is the most common form of pollution in streams and rivers, and has been estimated to cause \$16 billion in environmental damage annually.⁵⁵ Sediment pollution harms aquatic biota, such as fish and aquatic invertebrates.⁵⁶

By eliminating CWA permit requirements for tens of millions of the remaining wetland acres in the U.S., the Rule removes from federal protection millions of wetland acres that provide essential pollution-trapping, flood control, and fish and wildlife habitat. The extensive, cumulative, and lasting loss of these functions will lead to increases in nutrient, sediment, and

⁵⁰ *Id.* (The fry of at least one Colorado rare and endangered fish use wetlands as habitat).

⁵¹ See Sullivan Decl. ¶ 3 & n. 4 *citing* K. Fesenmyer *et al.* (in review), *supra*, n.6. *see also*, K. Fesenmyer, 2019 Trout Unlimited Mapping PowerPoint, *supra*, n.4.

⁵² See Sullivan Decl. ¶¶ 3 & 16.

⁵³ See Sullivan Decl. ¶¶ 3 & 14, Connectivity Science Report at ES-5 to ES-6; 80 Fed. Reg. at 37,063-37,064.

⁵⁴ See Sullivan Decl. ¶ 28 & n. 5 *citing* Levick *et al.* (2008) (AR 0037). *See also* Connectivity Science Report at 3-14, 3-15.

⁵⁵ Sullivan Decl. ¶ 28 *citing* Mid-America Regional Council, Kansas City, MO. *What is a watershed? What is sediment pollution?* available [here](#).

⁵⁶ See Sullivan Decl. ¶ 28 & n. 96 *citing* T.R. Angradi, *Fine sediment and macroinvertebrate assemblages in Appalachian streams: a field experiment with biomonitoring applications*, 18 *Journal of the North American Benthological Society* 49 (1999).

other pollution, increases in flooding and flood damage, reductions in water storage during times of drought, and reductions in fish and wildlife populations.⁵⁷

Small wetlands, often outside the floodplain, can provide landscape-scale pollution control, for example, by removing 50% of nutrient pollution runoff from cities and farms.⁵⁸ Non-floodplain wetlands such as the Midwest's prairie potholes also help remove nutrient pollution; draining them therefore risks introducing high levels of phosphorus elsewhere in the watershed.⁵⁹ Potholes also store water during drought and recharge aquifers, contributing to baseflow of many interstate streams and rivers. Similarly, the draining and filling of Atlantic coastal plain pocosins has elevated stream peak flows, turbidity, and ammonium, nitrate, and phosphate, while decreasing salinity in adjacent estuaries, degrading both.⁶⁰

By removing millions of streams and wetlands from permit review and any mitigation requirement, the 2020 Rule threatens many water-dependent threatened and endangered species, undermining the biological integrity of the Nation's waters. The list of imperiled species includes scores of fish species from darters, pupfish, dace, chub, and shiners to sturgeon, trout, steelhead, and salmon.⁶¹ Conversion of Carolina bays, Delmarva potholes, and vernal pools to logging,

⁵⁷See Sulliván Decl. ¶¶ 3, 5, 14, 16; Connectivity Science Report at ES-5-6, ES-10-14; 80 Fed. Reg. at 37,063-37,064, 37071-37,072 and *supra* n. 41.

⁵⁸See Sulliván Decl. ¶ 41 *citing* F.Y. Cheng and N.B. Basu, *Biochemical hotspots: role of small water bodies in landscape nutrient processing*, 53 *Water Resources Research* 5038 (2017); *see also* Connectivity Science Report at ES-10.

⁵⁹See Sulliván Decl. ¶ 41 *citing* P. Badiou *et al.*, *Phosphorus retention in intact and drained prairie wetland basins: implications for nutrient export*, 47 *J Environ Qual* 902 (2018).

⁶⁰See Sulliván Decl. ¶ 41 *citing* R.R. Sharitz and C.A. Gresham, *Pocosins and Carolina bays*. p. 343-377. *Southern forested wetlands. Ecology and management*. Lewis Publishers, Boca Raton, Florida (1998); 80 Fed. Reg. at 37,072.

⁶¹See Sulliván Decl. ¶49; *See also*, Colvin *et al* (2019), *supra* n. 46, at 78-82; Michael R. Bower, et al., *Habitat Features Affect Bluehead Sucker, Flannelmouth Sucker, and Roundtail Chub Across a Headwater Tributary System in the Colo. River Basin*, 23 *J. FRESHWATER ECO.* 3, pp. 347-58 (Sept. 2008).

agriculture, and urban development eliminates refuge and breeding habitat for vertebrate and invertebrate species, including rare, threatened, and endangered species.⁶²

The Army Corps issues over 52,000 Section 404 permits on average each year.⁶³ In the West, elimination of §404 permits for ephemeral streams and non-floodplain wetlands means large portions of watersheds may be paved over without permit review and without any requirement to minimize or mitigate harm. The elimination of §404 permits for an estimated 4.8 million miles of ephemeral streams,⁶⁴ at least 16.3 million acres of non-floodplain, geographically isolated wetlands,⁶⁵ and millions more of non-abutting floodplain wetlands will subject those upstream and upslope waters to pollution, development, dredging, and filling. It will also eliminate the permanent protection of restored or intact non-floodplain wetlands or ephemeral streams, which is routinely required as mitigation under issued §404 permits.

2. *Several examples demonstrate how the loss of protection against, and mitigation for, filling ephemeral streams and non-floodplain and non-abutting floodplain wetlands will degrade the Nation's waters.*

The following examples highlight projects that currently require §404 permits even though they discharge to ephemeral waters, non-floodplain wetlands, or non-abutting floodplain wetlands. They demonstrate how the loss of permanent protection for these features' hydrological function can ripple through whole watersheds, with significant adverse consequences.

The New England Clean Energy Connect transmission line would run from the Canadian border to central Maine, crossing 25 ephemeral streams along its approximately 60-mile route

⁶² See Sulliván Decl. ¶ 41; Connectivity Science Report at B-4.

⁶³ U.S. ENVTL. PROT. AGENCY, *Economic Analysis for the Proposed Clean Water Act Section 401 Rulemaking* (Aug. 2019) Table 3-1 at 7, available [here](#).

⁶⁴ Fesenmyer, Kurt A. *et al.* (2020) at [Exhibit 2](#).

⁶⁵ Lane and D'Amico (2016), *supra* n. 17.

through the Kennebec River basin.⁶⁶ If built under the 2019 rule, the project would have to spend over \$2 million to permanently protect vernal pools, over \$3 million to permanently protect other of the region's wetlands, and over \$2 million to mitigate for stream impacts, among other required §404 permit mitigation.⁶⁷ Under the 2020 Rule, this and future projects would no longer have to permanently protect the important watershed hydrologic functions that vernal pools and dozens of ephemeral streams provide. As a result, the downstream waterbodies that remain subject to Clean Water Act jurisdiction will receive more pollution and degradation, making compliance with water quality standards much more difficult and imposing higher burdens on downstream permittees.⁶⁸

In Montana's Tongue River basin, in 2015, approximately 35.21% of 142 waters that were impacted by projects permitted under §404 were ephemeral streams and non-floodplain wetlands.⁶⁹ If the new Rule had been in effect, loss of permit conditions and mitigation would have degraded or eliminated these streams and wetlands would face degradation or elimination, resulting in increased downstream delivery of pollutants, including nutrients⁷⁰ and sediment,⁷¹ as well as higher downstream peak flows and flood risk.⁷² Degradation in the Tongue Basin could also lead to degradation in the iconic Yellowstone River downstream.⁷³

⁶⁶GOOGLE EARTH PRO, *Maine Data Maps – NECEC Project* (2019) (available on the State of Maine website, these maps depict the route of the transmission line and stream crossings and wetlands along the route. Ephemeral stream crossings are labeled as such on the maps.).

⁶⁷Army Corps of Engineers, Public Notice on Permit Application File No. NAE-2017-01342 (2019) at Table 1-1, available [here](#).

⁶⁸Colvin *et al* (2019), *supra* n. 46.

⁶⁹U.S. ARMY CORPS OF ENGINEERS, *AJD Form*, at 9-12 (2015), available [here](#).

⁷⁰Cheng, Frederick Y., and Nandita B. Basu. *Biogeochemical hotspots: Role of small water bodies in landscape nutrient processing*. *Water Resources Research* 53.6 (2017): 5038-5056 *cited supra*, at n. 58.

⁷¹Levick *et al.* (2008) (AR 0037), *cited supra*, at n. 7 & 54.

⁷²Acreman, M., and J. Holden (2013) *cited supra*, at n. 38.

⁷³American Rivers, [Yellowstone River](#) (2019) (world-renown blue ribbon trout fishery).

The West faces high rates of urbanization.⁷⁴ For example, two and one half percent of the 18,000 acres in Bernalillo County New Mexico, home to Albuquerque, were converted to urban land use between 2001 and 2016.⁷⁵ This included a new residential development near Tijeras Arroyo, an ephemeral tributary to the Rio Grande, a traditional navigable water.⁷⁶ The 350-lot project, Juan Tabo Hills West, permanently filled 4.2 acres of ephemeral streams. The developer mitigated these impacts by permanently preserving 12.3 acres of Tijeras Arroyo and building a half-acre stormwater retention pond.⁷⁷ Under the 2020 Rule, similar future developments will neither offset their adverse impacts nor mitigate lost hydrologic function. As a result, Bernalillo County's continuing urbanization will contribute sediment, alter flow regimes, and amplify flood impacts to over 1,600 miles of the Rio Grande's downstream receiving waters. These waters supply surface drinking water to 1.2 million residents in New Mexico and Texas⁷⁸, and support warmwater and coldwater fisheries.⁷⁹

Although more than a hundred times as many §404 as §402 permits are issued each year,⁸⁰ the elimination of §402 permits on ephemeral streams and non-floodplain wetlands under the 2020 Rule is significant. In Colstrip, Montana, the Rosebud coal mine's industrial outfall into an alleged ephemeral stream was litigated last year, *Montana Env'tal Info. Center v. Montana Dept. Env'tal Quality*, 2019 MT 213, ¶¶99-100, and was remanded to determine the

⁷⁴White, Eric M., Anita T. Morzillo, and Ralph J. Alig. *Past and projected rural land conversion in the US at state, regional, and national levels*. Landscape and Urban Planning 89.1-2 (2009): 37-48.

⁷⁵ U.S. GEOLOGICAL SURVEY, *National Land Cover Dataset Land Cover Change* (2016), available [here](#)

⁷⁶U.S. ENVTL. PROT. AGENCY, *Clean Water Act Approved Jurisdictional Determinations Database* (2020), available [here](#).

⁷⁷U.S. ARMY CORPS OF ENGINEERS, *Juan Tabo Hills West Subdivision Project (Action No. SPA-2012-00299-ABQ)* (2014), available [here](#).

⁷⁸U.S.D.A. FOREST SERV., *Forests to Faucets* (2020) available [here](#).

⁷⁹N.M. ENV'T DEP'T, *OpenEnviroMap* (2020) available [here](#).

⁸⁰ U.S. ENVTL. PROT. AGENCY, *supra* n. 63.

contested issues of whether the receiving water was intermittent or ephemeral, and what water quality standards applied. Under the 2020 Rule, the Rosebud mine's heavy metals and other mining waste could be introduced into ephemeral streams without a §402 permit. Yet during any wet, rainy period, the mining waste would still flow downstream to the Yellowstone River.

The preamble to the 2020 Rule states that a §402 permit is no longer required for a discharge of pollutants into an ephemeral stream, although it then describes potential exceptions or speculative workarounds. 85 Fed. Reg. at 22,297. The final 2020 Rule itself, however, carves out no such exceptions. The Supreme Court recently rejected a different categorical exclusion from needing a §402 permit. Considering the categorical exclusion from permitting for a discharge of pollutants traveling from a point source through groundwater to navigable waters, the Court held in *County of Maui* that the CWA “require[s] a permit if the addition of the pollutants through groundwater is the functional equivalent of a direct discharge from the point source into navigable waters.” 140 S. Ct. at 1468. Discharges of pollutants into an ephemeral stream such as the Rosebud mine's, above, would almost certainly fail the Court's seven-part “functional equivalent” test, creating prohibited “loopholes that undermine the statute's basic federal regulatory objectives” and undermine states' regulation of water quality. *Id.* at 1477.

The Agencies' dismissal of the magnitude of the impacts of the Replacement Rule on water quality, and their indirect dismantling of the Act's comprehensive permit protections for the Nation's waters “entirely fail[s] to consider an important aspect of the problem,” in violation of the APA. The Replacement Rule is arbitrary and capricious. *State Farm* at 43.⁸¹

III. The Agencies' elimination of permitting for all of the activities that discharge to approximately half the Nation's stream miles and tens of millions of its wetland

⁸¹ See also Plaintiffs' Memorandum at 32-34 (By ignoring the CWA's science mandate, failing to consider the impacts of removing so many streams and wetlands from CWA requirements, and undercutting its primary objective, the Agencies violate the CWA and the APA).

acres will significantly harm the outdoor recreation, fisheries, and restoration economy and the rural communities that depend on it.

A. The Agencies failed to consider the reliance interests of Amici in all previous, substantially broader federal protections for the waters of the U.S.

For almost fifty years, Amici have relied on the Agencies to apply a broad, science-based definition of “Waters of the United States” to ensure federal protection for the significant watershed components - streams and wetlands - that together maintain and restore the physical, chemical, and biological integrity of the Nation’s waters, achieving “water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water...” 33 U.S.C. § 1251(a)(2). Amici organizations representing individual anglers, hunters, boaters, and birdwatchers as well as outdoor recreation businesses, have invested heavily in conservation advocacy and restoration projects, as well as organizing countless volunteer hours to conserve and restore streams, rivers, lakes, and wetlands as fish and wildlife habitat in support of fish and wildlife and fish and wildlife-related outdoor recreation.⁸² In addition, our individual members have contributed millions of dollars in license and other user fees that directly support fish and wildlife habitat.

The Agencies’ abandonment of CWA protections for approximately 50% of the remaining stream miles and tens of millions of wetland acres in the U.S., crippling collective efforts to restore and maintain the integrity of the Nation’s waters, without addressing the serious reliance interests of Amici (and the many others impacted by this policy reversal⁸³) is arbitrary and capricious. *See*, Plaintiffs’ Memorandum at 23 *citing, inter alia, Department of Homeland*

⁸² Amici investment supports state fish and wildlife resources owned or held in trust for the use and enjoyment of the people of the State. *See, e.g., Betchart v. Department of Fish & Game*, 158 Cal.App.3d 1104, 1106 (1984); Cal. Fish & Game Code, § 1801; Wis. Stat. § 29.011.

⁸³ *See, e.g., Ralph B. Brown and John F. Toth Jr., 17 Southern Rural Sociology*, “Natural Resource Access and Interracial Associations: Black and White Subsistence Fishing in the Mississippi Delta,” at 81, 104 (2001), available [here](#).

Security et al v. University of California Board of Regents, 140 S. Ct. 1891, 1914-1915 (June 18, 2020). *See also* Plaintiffs’ Memorandum at 41-44 (detailing reliance interests of Plaintiffs’ members ignored by the Agencies in promulgating the 2020 Rule).

B. The removal of protections for so many streams and wetlands will significantly harm outdoor recreation, commercial fishing, and restoration businesses and the rural communities that depend on them.

On an annual basis, headwater streams provide \$15.7 trillion and non-floodplain wetlands, alone, provide \$673 billion in ecosystem services for the conterminous U.S. and Hawaii.⁸⁴ These waters’ increased degradation and destruction at the scale the Rule portends threatens the economy, including water-dependent sectors of particular interest to Amici.

Nationally, trout anglers spent \$3.5 billion on their pursuits, supported over 100,000 jobs, and had a \$10 billion economic impact, including \$1.3 billion in federal and state tax revenues in 2006⁸⁵ and 30.1 million freshwater anglers spent \$29.9 billion on freshwater fishing trips in 2016.⁸⁶ Fishing generated an annual \$2.75 billion in spending and \$200 million in state sales and income taxes in Wisconsin, alone.⁸⁷

Commercial and recreational fisheries contributed over \$212 billion in economic impact and 1.7 million jobs in 2016.⁸⁸ Headwaters have both direct and indirect impacts on the health of fisheries. North Carolina predicts that the significant loss of wetlands triggered by the 2020 Rule

⁸⁴Colvin *et al.* (2019), *supra* n. 46, *citing* Nadeau and Rains (2007) and Lane and D’Amico (2016), *cited supra* at n. 2 & nn. 17 and 65, respectively.

⁸⁵ U.S. Fish and Wildlife Service, *2011 National Survey of Fishing, Hunting and Wildlife-Associated Recreation*, FHW//11-NAT (rev’d 2014) available [here](#).

⁸⁶ U.S. Department of Interior, U.S. Fish and Wildlife Service, and U.S. Department of Commerce, U.S. Census Bureau. *2016 National Survey of Fishing, Hunting and Wildlife-Associated Recreation*, available [here](#).

⁸⁷*See* Siebert Decl. ¶15, *California v. Wheeler*, 3:20-cv-00-3005-RS (N.D. Cal.), ECF No. 30-7.

⁸⁸ National Marine Fisheries Service. 2018. Fisheries Economics of the United States, 2016. U.S. Department of Commerce, NOAA Tech. Memo. NMFS-F/SPO-187a, 243 pp., available [here](#).

will adversely impact the state's commercial and recreational fisheries that had an estimated revenue of \$430 million and an economic impact of \$3.9 billion in 2017, respectively.⁸⁹

A recent Outdoor Industry Association report shows that consumers spend \$887 billion annually on outdoor recreation; consumers spent over \$175 billion on fishing, kayaking, rafting, canoeing, scuba diving and other water sports alone.⁹⁰ In 2019, Colorado residents and visitors spent an estimated \$10.8 billion on outdoor recreation, including water sports, fishing, and wildlife-watching, within Colorado's river basins. This retail spending contributed an estimated \$18.8 billion in economic output, supporting over 131,000 jobs and \$6.3 billion in household income.⁹¹

In 2006, more than 1.3 million waterfowl hunters expended approximately \$900 million, generating an estimated 28,000 jobs and a total related industry output of \$2.3 billion.⁹² Birding, much of it also water-related waterfowl watching by 77% of away-from-home birders, supported total trip-related and equipment expenditures of \$36 billion in 2006, generating 671,000 jobs and a total industry output of \$82 billion.⁹³

The restoration industry, including the private sector mitigation banking industry, directly provides 126,111 jobs a year, from engineers and construction firms to greenhouses and

⁸⁹ See Smith Decl. ¶13, *California v. Wheeler*, 3:20-cv-00-3005-RS (N.D. Cal.), ECF No. 30-6.

⁹⁰ Outdoor Industry Association. 2017. *The Outdoor Recreation Economy*, available [here](#). The Agencies were aware of this information as a result of public comments submitted for the record. See, e.g., Kassen, Melinda, *Comments of the Theodore Roosevelt Conservation Partnership*, submitted 4/15/19 to Docket ID No. EPA-HQ-OW-2018-0149, p. 4.

⁹¹ Business for Water Stewardship & Southwick Assoc., *The Economic Contributions of Water-Related Outdoor Recreation in Colorado* (March 9, 2020) 5, available [here](#).

⁹² Carver, E. 2008. *Economic impact of waterfowl hunting in the United States. Addendum to the 2006 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation*. U.S. Fish and Wildlife Service, Report 2006-2, 13 pp.

⁹³ Carver, E. 2009. *Birding in the United States. Addendum to the 2006 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation*. U.S. Fish and Wildlife Service, Report 2006-4, 15 pp.

nurseries. Overall, the restoration industry contributes 221,398 jobs each year and has a gross economic impact of nearly \$25 billion each year.⁹⁴

The total annual cost of the nutrient pollution of U.S. freshwaters, which will only increase in severity under the 2020 Rule, is estimated to be \$2.2 billion, including recreational and angling costs, property value losses, drinking water treatment costs, and a conservative estimate of the costs of the loss of biodiversity.⁹⁵

Non-floodplain wetlands contribute trillions of dollars in flood damage reduction benefits.⁹⁶ For example, prairie potholes in the flood-prone Red River valley alone contribute \$800 million in avoided flood damage and other benefits.⁹⁷

The Agencies misleadingly underestimate the effect of the 2020 Rule on the outdoor recreation economy, fishermen, hunters, boaters, swimmers, and other outdoor enthusiasts, as well as impacts on commercial fisheries and the fishing industry. They misleadingly assume that wetland benefits are valued only by in-state residents,⁹⁸ and they significantly undercount the

⁹⁴ Todd BenDor *et al.*, *Estimating the Size and Impact of the Ecological Restoration Economy*, PLoS One, 3, 7-9 (2015).

⁹⁵ Dodds, W.F. *et al.* 2009. *Eutrophication of U.S. freshwaters: Analysis of potential economic damages*. Environmental Science and Technology 43:12-19.

⁹⁶ See, e.g., Brody, S.D. *et al.* 2014. *Examining the impact of land use/land cover characteristics on flood losses*. Journal of Environmental Planning and Management 57: 1252-1265 and Jacob, John S., et al, *Houston-Area Freshwater Wetland Loss, 1992-2010* (2014) available [here](#) (discussed and cited in NWF Comments to the 2020 Rule Record, *supra*, n. 17, p. 85-86). See, also, Narayan, et al., “The Value of Coastal Wetlands for Flood Damage Reduction in the Northeastern USA” 7 *Scientific Reports*, article 9463 (2017), cited in TRCP Comments to the 2020 Rule Record, p. 13 (“wetlands avoided \$625 Million in direct flood damages during Hurricane Sandy”).

⁹⁷ Hall, H. Dale, Comments of Ducks Unlimited on Clean Water Rule (November 5, 2014) (CWR Comments of DU) at 39-44, 49-50, 69 at Docket ID No. EPA-HQ-OW-2011-0880-11014 *citing, inter alia*, Kurz et al. 2007. *An evaluation of basinwide, distributed storage in the Red River Basin: The Waffle Concept*. Energy & Environmental Research Center.

⁹⁸ See Final EA at 207 and Draft EA at 62-65. See, Kling Report (2019); Whitehead Report (2019) (more than 80% of the benefits of wetlands protection are interstate). See, e.g., TRCP Comments, *supra* n. 96, p. 12, and citations therein.

number of wetlands in each state.⁹⁹ Economists demonstrated in the record that correcting these errors shows that the 2020 Rule could result in over \$1.6 billion in annual benefits foregone under the §404 program alone, and that the costs of the 2020 Rule significantly outweigh its benefits.¹⁰⁰ The Agencies failure to consider and inform decision-makers and the public of the full economic cost and foregone benefits of the 2020 Rule renders the rulemaking and the final rule arbitrary and capricious. *State Farm* at 43.

CONCLUSION

The Agencies' removal of CWA protections for an estimated half of the remaining stream miles and tens of millions of wetland acres in the continental U.S., will cripple the ability of the Act's other programs to restore and maintain the chemical, physical, and biological integrity of the Nation's waters. Doing so without considering the underlying connectivity science, without quantifying or analyzing the extent and harmful environmental and economic impacts of those lost protections, and without considering the reliance interests of Amici is arbitrary, capricious, and contrary to law in violation of the APA. Amici urge the Court to grant summary judgment to Plaintiffs and vacate the 2020 Replacement Rule.

[SIGNATURE PAGE FOLLOWS]

⁹⁹ Compare Final EA at 210 (assuming 10,000 acres of wetlands in each state), *with id.* at 199 (stating that the fewest acres of wetlands in any state, according to the National Wetlands Inventory, is 57, 052, with a high of 12.2 million).

¹⁰⁰ See, e.g., SELC Comments, *supra* n. 22; John C. Whitehead, Comments on "Economic Analysis for the Proposed Revised Definition of 'Waters of the United States'" (EPA-Army 2018) (April 9, 2019), attached as Ex. C to SELC Comments; Jeffrey D. Mullen, Ph.D., Draft Review of the 2018 EPA Economic Analysis for the Proposed Definition of "Waters of the United States" (April 10, 2019), attached as Ex. D to SELC Comments (2020 Rule could result in over \$1.6 billion in annual benefits foregone under the Section 404 program alone).

Respectfully submitted,

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EXHIBIT 1

**EXHIBIT 1
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EXHIBIT 2

Fesenmyer, K.A, S.J. Wenger, D.S. Leigh, and H.M. Neville. Majority of U.S. Streams Lose Protection with New Interpretation of Clean Water Act. Manuscript submitted 18 May 2020 to *Communications Earth & Environment*. Status as of 13 July 2020: Under peer review

Majority of U.S. Streams Lose Protection with New Interpretation of Clean Water Act

Ephemeral streams are essential to water quality and healthy ecosystems and will lose protection under the recently announced Navigable Waters Protection Rule. The National Hydrography Dataset and a simple headwater stream map derived from digital elevation models enable rapid assessment of ephemeral stream abundance, here estimated to comprise 52% of conterminous U.S. stream channels by length.

On January 23, 2020 the United States Army Corps of Engineers and Environmental Protection Agency announced the Navigable Waters Protection Rule (NWPR), redefining the “Waters of the United States” – those streams and wetlands that fall under the regulatory jurisdiction of the federal 1972 Clean Water Act. For flowing waters, the largest change is the removal of protections for ephemeral streams, which flow only in direct response to precipitation events.

Ephemeral streams with an ordinary high-water mark (i.e., a defined channel) have been covered under the Clean Water Act since 1986, but under the new rule a permit will no longer be required to dredge, fill, or discharge pollutants into these channels. For streams, only perennial and intermittent streams that flow to territorial waters or traditional navigable waters used for interstate commerce will remain protected.

In announcing the new rule, the regulatory agencies concluded that limitations of the best available national maps of streams and stream types, including “errors of omission, errors of commission, positional inaccuracies, misclassification of flow regime, and different (map) definitions compared to both existing and proposed regulations” precluded the agencies from

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quantifying “the potential extent of waters whose CWA jurisdictional status could change under the proposed revised definition” (1). In doing so, the agencies wrongly suggest that there is no useful information regarding the location and relative abundance of ephemeral streams across the country and obfuscate the potential impacts of the proposed rule. We demonstrate it is straightforward to use readily available topographic data to estimate the total extent of ephemeral streams and assess the scope of impact of the rule across the U.S.

The high-resolution National Hydrography Dataset The U.S. Geological Survey’s 1:24,000 scale high-resolution National Hydrography Dataset (NHD) is widely regarded as the most comprehensive national map for characterizing the location and flow type of surface waters across the conterminous U.S. The NHD was originally derived from topographic maps produced by cartographers interpreting aerial photographs, and the agencies are correct that the dataset has errors and inconsistencies in stream location, upstream extent, and classification. However, we demonstrate here that these issues are not obstacles to reasonable estimates of ephemeral stream abundance in the U.S.

First, there is no basis to the agencies’ claim that different map definitions limit the use of the NHD for estimating the effect of the NWPR, as the NHD and NWPR use consistent definitions of perennial, intermittent, and ephemeral streams. Relevant to the new rule, an NHD ephemeral stream “contains water only during or after a local rainstorm or heavy snowmelt” (2), while an ephemeral stream in the NWPR is a “surface water flowing or pooling only in direct response to precipitation (e.g., rain or snow fall)” (1). Intermittent streams, those channels with “surface water flowing continuously during certain times of the year and more than in direct response to precipitation” (1), and perennial streams, those channels with continuous, year-round stream flow, also have consistent definitions. Second, the agencies cite positional inaccuracies as

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a limitation, but the horizontal position errors of the NHD are irrelevant for describing national patterns. While these errors would affect the evaluation of whether a specific waterway or stream is subject to Clean Water Act jurisdiction (e.g., it lies within a parcel of land slated for development), such determinations have been and will continue to be made by field visits to the stream.

Errors of omission likely represent the largest source of error in the NHD. Early versions of the high-resolution NHD only included intermittent and perennial flow typing; ephemeral flow typing has only been added recently in ten Western states. In the latest version of the dataset, ephemeral stream typing remains largely absent in 38 states (*Fig. 1 a*). This is despite the widespread presence of ephemeral streams on the ground: assessments in forested landscapes across the U.S. – including locations where ephemeral stream typing is absent in the NHD – describe ephemeral channels as comprising 49 - 71% of the length of field-surveyed stream networks (3,4). Even where ephemeral stream typing is included in the NHD, ephemeral stream channels visible in field surveys are often omitted due to limitations in the scale and resolution of the source topographic maps used to produce the NHD. Research in headwater streams in forest, prairie, and desert ecosystems found that the NHD represented only 8 - 50% of the total length of the stream network visible on the ground (3-7). The majority of omitted, unmapped features in these studies were dry stream channels or ephemeral streams, but even perennial streams are omitted by the NHD in some cases.

Quantifying ephemeral streams Because the primary limitations of the NHD relate to the omission of ephemeral stream typing and undermapping of ephemeral streams visible in the field, the NHD provides a conservative baseline for readily characterizing the *minimum* extent of streams affected by the NWPR. To characterize the total length of this baseline we used a

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geographic information systems (GIS) version of the high-resolution NHD (2) and selected flowlines typed as perennial, intermittent, and ephemeral. We excluded NHD canals and ditches and any flowlines overlapping mapped agricultural lands because of long-standing Clean Water Act exemptions of “prior converted cropland” and “normal farming, silviculture, and ranching activities,” including maintenance of drainage ditches and irrigation infrastructure (1).

Ephemeral streams with defined channels constitute the true headwaters of the stream network. To address undermapping of ephemeral stream channels in the NHD, we extended the NHD network by estimating channel headwaters using a GIS analysis based on 30-meter resolution digital elevation models. Studies have described ephemeral stream channel heads as initiating with as little as 0.1 ha of upstream watershed area in steep landscapes and up to 10 ha in flat landscapes (8). We modeled these stream channels based on a conservative 5 ha upstream contributing watershed area threshold (*Fig 1 b, c*). Our approach likely under-mapped stream channels in mountainous landscapes and over-mapped stream channels in flat landscapes, but we argue that it provides a reasonable first-approximation for estimating the nationwide length of unmapped ephemeral stream channels excluded from the new interpretation of the law. As with our analysis of the NHD, we removed any portion of the modeled stream network overlapping agricultural land use. Additional details on all methods are provided as Supplementary Information.

The total length of flowing waters mapped in the NHD and jurisdictional under the Clean Water Act prior to the NWPR totaled 9.3M km, of which 2.1M km (23%) were typed as ephemeral. We combined the NHD and our modeled stream network to produce a total national stream length estimate of 14.8M km. Assuming that all stream channels from the modeled stream network not mapped in the NHD are ephemeral, and with the addition of features mapped as

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ephemeral in the NHD, ephemeral streams formerly subject to the Clean Water Act in the conterminous U.S. represent 7.7M km, or 52% of stream channels by length (*Fig. 1 d*). These streams will lose protection under the Navigable Waters Protection Act. The data that support these findings are available on the Open Science Framework (<https://osf.io/0>) with the identifier [data DOI upon acceptance].

Ephemeral streams sustain clean water and ecosystems The NWPR ignores the best-available science on the role of ephemeral streams for maintaining water quality and healthy ecosystems (9). In 2015 the EPA's own Office of Research and Development provided a comprehensive synthesis of the crucial role of headwater streams, including ephemeral reaches, in support of the Clean Water Rule, a regulation that codified protection of ephemeral streams under the Clean Water Act but was replaced with the NWPR (10). That review and more recent science shows that, although individually small, ephemeral reaches are conduits for disproportionate exchange with the terrestrial environment and collectively provide ecosystem services that are of great value to humans (10,11). Much like wetlands, the network of ephemeral streams absorbs stormwater runoff and reduces flooding downstream (13). Ephemeral streams also play a critical role in filtering sediment, pollutants and agricultural run-off (11,12). The smallest streams are the most active locations for nitrogen transformation, improving water quality and reducing algal blooms in rivers, lakes and estuaries downstream (10). Furthermore, ephemeral streams play an important role in releasing groundwater and building downstream thermal refugia that are critical for cold-water dependent species (e.g. salmon and trout), and loss of headwater streams has been tied to lower downstream productivity and reduced viability of downstream biota (10). In addition to these downstream beneficial impacts, headwater streams, including ephemeral streams, themselves support a surprising amount of biodiversity (10,11,13), much of it imperiled.

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Missed Opportunities Given these contributions to clean water and healthy ecosystems, a rule change to allow dredging, filling, and discharging pollutants into ephemeral streams should, at a minimum, consider the spatial extent of these features. We show that these features can be estimated rapidly, and furthermore demonstrate that they are abundant and ubiquitous. Federal agencies already have the capability to produce accurate estimates of headwater streams at watershed- and basin- scales (14). Our coarse assessment provides conterminous U.S.-scale estimates that can be improved to incorporate recent advances in GIS-based channel mapping and flow characterization including addition of other topographic, soil, vegetation, runoff, and climate variables, remote sensing products (7,14,15), and advanced computing techniques. High-resolution topographic mapping (e.g., Lidar) and big data collections for training and validating models (e.g., historical and ongoing field determinations of Clean Water Act jurisdiction) will only further advance the accuracy of those potential refinements. However, existing data are sufficient to give a sense of the magnitude of the loss of protection under the NWPR: even accounting for exemption of agricultural activities, the NWPR removes protection from a majority of the streams in the conterminous U.S.

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15 **Supplementary Information:**

Methods

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Fig. 1. Patterns of ephemeral streams in the conterminous U.S. **a,** Percent of total stream network typed as ephemeral in high-resolution NHD by subbasin (8-digit hydrologic unit code) – note that ephemeral streams are not mapped in most states. **b, c,** Examples of high-resolution NHD with flow typing, ephemeral stream channels in modeled stream network, and agricultural land use in NLCD 2011 overlaid on hillshaded topography in Jolon Creek, California (b) and Chatham Run, Pennsylvania (c) – modeled stream network raster is simplified for cartographic purposes; scale bar segments represent 2 km. **d,** Percent of the total stream network estimated as ephemeral in the combined high-resolution NHD and modeled stream network after excluding areas of overlap with agriculture by subbasin.

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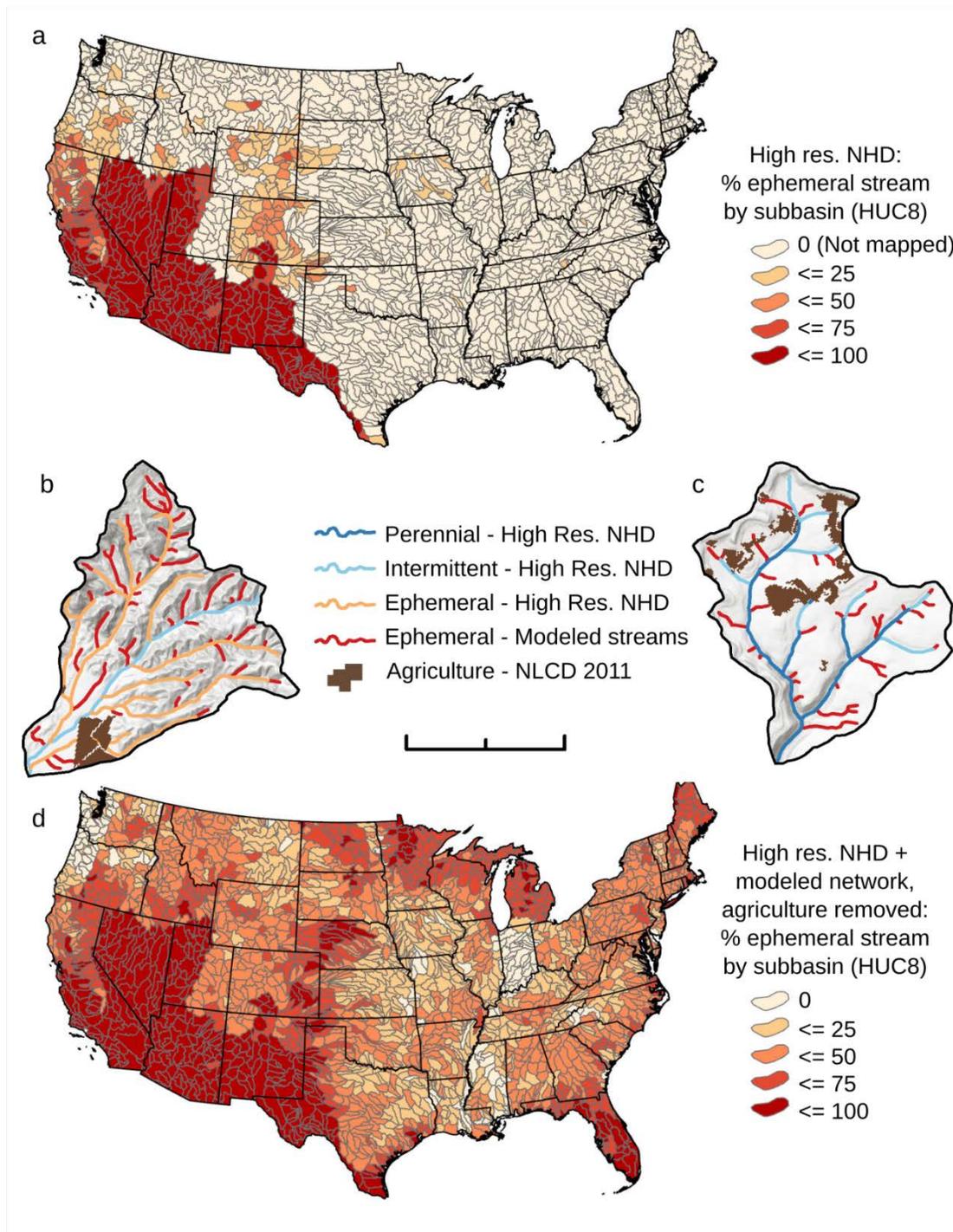


Fig 1.

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Supplementary Information for

Majority of U.S. Streams Lose Protection with New Interpretation of Clean Water Act

Methods

We used national flow accumulation and slope raster datasets derived from a hydrologically-conditioned 30-meter resolution digital elevation model (1) to delineate the location of headwater channels that contribute to the mapped stream features in the National Hydrography Dataset (NHD). Flow accumulation datasets quantify the upslope area contributing to each pixel in the gridded dataset (2). Flow accumulation datasets alone or in combination with slope datasets improve the accuracy of stream channel mapping in comparison to maps like the NHD (2, 3). We further refined the network by removing areas with slopes equal to 0% to resolve problematic flow accumulation in flat areas (2) and by masking areas mapped as open water in the 30-meter resolution 2011 National Land Cover Dataset (4).

To remove the portions of the NHD (5) and our modeled stream network that overlap with agricultural land use, we clipped those flowlines and raster cells that intersected with pasture/hay or cultivated crops mapped in the 2011 National Land Cover Dataset (4).

We summarized the length of the NHD and cell count of the total modeled stream network within subbasins (8-digit hydrologic unit code watersheds) in the conterminous U.S. For the total modeled stream network, we converted the cell count to a length by multiplying by

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30m. We then subtracted the length of the NHD from the modeled stream network to calculate the length of the modeled stream network not included in the NHD and set all negative values to zero. We summed the length of the NHD and the length of the modeled stream network not in the NHD to calculate the total national stream length estimate.

References:

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