Putting WOTUS on the Map: Estimating the Implications of *Sackett v. EPA* on Wetland Protections

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I. INTRODUCTION

Congress passed the Clean Water Act (CWA) in 1972 to "restore and maintain the physical, chemical, and biological integrity of the Nation's waters."[1] The scope of the CWA is broad, and among other things, regulates impacts to certain wetlands and bodies of water that are considered "Waters of the United States" (WOTUS).[2] The working definition of WOTUS[3] includes large bodies of water, such as oceans, lakes, and rivers, as well as smaller streams and "adjacent wetlands"—which from 1977 until 2023 were defined by the U.S. Army Corps of Engineers (USACE) as wetlands that are "bordering, contiguous, or neighboring" a WOTUS.[4] Without federal protections, mitigating the loss or degradation of non-WOTUS waters and wetlands depends on local protections, which in many cases do not exist, or state protections, which only exist in around half of states.[5]

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1. 33 U.S.C §§1251-1387.

2. 33 U.S.C. §1362(7).

3. Stephen P. Mulligan, *Evolution of the Meaning of "Waters of the United States" in the Clean Water Act*, CONGRESSIONAL RESEARCH SERVICE, R44585 (updated Mar. 5, 2019), available at https://crsreports.congress.gov/product/pdf/R/R44585.

4. 33 U.S.C §1344(g) (1977). See also Mulligan, *supra* note 3 at 10 n.71.

5. R. Kihslinger et al., *Filling the Gaps: Strategies for States/Tribes for Protection of Non-WOTUS Waters: A Taxonomy*, (2023), available at https://www.eli.org/sites/default/files/

The science is clear: protecting wetlands is essential to meet the stated goal of the CWA.[6] Wetlands play a key role in improving water quality, reducing downstream flooding, and providing habitats for ecologically, commercially, and recreationally important wildlife.[7] Although some types of wetlands are referred to as "isolated," nearly all wetlands are hydrologically connected to downstream waters and play a role in downstream water quality, through either surface or groundwater connections.[8] While all wetlands slow runoff from upstream and are hotspots for pollutant removal, smaller and more isolated wetlands provide some of the highest rates of pollutant removal and flood reduction because they hold water longer.[9] Wetlands are also dynamic, wetting and drying across seasons, which further increases their capacity to remove pollutants and store flood waters.[10]

While the breadth of wetlands included as WOTUS has evolved through multiple agency rules and related case law,[11] the Supreme Court's decision in *Sackett v. EPA*[12] is the narrowest interpretation to date. In *Sackett v. EPA*, the Court unanimously ruled for the Sacketts by rejecting the "significant nexus" test derived from Justice Kennedy's controlling

files-pdf/Strategies%20for%20States-Tribes%20for%20Protection%20of%20non-WOTUS%20waters%201.2.pdf.

6. Env't Prot. Agency, *Connectivity of Streams and Wetlands to Downstream Waters: A Review and Synthesis of the Scientific Evidence (Final Report)*, EPA/600/R-14/475F (Jan. 2015), https://nepis.epa.gov/Exe/ZyNET.exe/P100LOJZ.txt?ZyActionD=ZyDocument&Client=EPA&Index=2011%20Thru%202015&Docs=&Query=&Time=&EndTime=&SearchMethod=1&TocRestrict=n&Toc=&TocEntry=&QField=&QFieldYear=&QFieldMonth=&QFieldDay=&UseQField=&IntQFieldOp=0&ExtQFieldOp=0&XmlQuery=&File=D%3A%5CZYFILES%5CINDEX%20DATA%5C11THRU15%5CTXT%5C00000014%5CP100LOJZ.txt&User=ANONYMOUS&Password=anonymous&SortMethod=h%7C-&MaximumDocuments=1&FuzzyDegree=0&ImageQuality=r75g8/r75g8/x150y150g16/i425&Display=hpfr&DefSeekPage=&SearchBack=ZyActionL&Back=ZyActionS&BackDesc=Results%20page&MaximumPages=1&ZyEntry=1.

7. Charles R. Lane et al., *Vulnerable Waters Are Essential to Watershed Resilience*, 26 ECOSYSTEMS 1 (2023); Matthew J. Cohen et al., *Do Geographically Isolated Wetlands Influence Landscape Functions?*, 113 PROC. NAT'L ACAD. SCI. 1978 (2016); Irena F. Creed et al., *Enhancing Protection for Vulnerable Waters*, 10 NATURE GEOSCIENCE 809 (2017).

8. Env't Prot. Agency, *supra* note 6.

9. Frederick Y. Cheng & Nandita B. Basu, *Biogeochemical Hotspots: Role of Small Water Bodies in Landscape Nutrient Processing*, 53 WATER RES. RSCH. 5038 (2017); Heather E. Golden et al., *Non-Floodplain Wetlands Affect Watershed Nutrient Dynamics: A Critical Review*., 53 ENV'T SCI. TECH. 7203 (2019); Bo Yang et al., *Small Wetlands: Critical to Flood Management*, 386 SCIENCE 859 (2024), https://www.science.org/doi/10.1126/science.ads2055.

10. Lane et al., *supra* note 7.

11. Riley Walsh & Adam S. Ward, *An Overview of the Evolving Jurisdictional Scope of the U.S. Clean Water Act for Hydrologists*, 9 WIREs WATER e1603 (2022).

12. Sackett v. Env't Prot. Agency , 598 U.S. 651 (2023).

opinion in *Rapanos v. United States*.[13] The significant nexus test had previously extended CWA jurisdiction to wetlands that played an important role in maintaining the integrity of downstream navigable waters, through either surface or underground hydrologic connections.[14] The majority opinion in *Sackett*, written by Justice Alito, goes further to adopt Justice Scalia's plurality opinion in *Rapanos*,[15] stating that wetlands are only considered WOTUS if they are "indistinguishable" from federally protected waters such that "the wetland has a continuous surface connection with that water, making it difficult to determine where the 'water' ends and the 'wetland' begins."[16] The majority opinion has effectively redefined the term "adjacent," moving away from its longstanding definition of "bordering, contiguous, or neighboring" toward the significantly narrower definition of "adjoining."[17] Overall, the *Sackett* decision is considered a "dramatic and unprecedented retreat by the Court from the understanding of 'wetlands adjacent thereto.'"[18] *Sackett v. EPA* has likely dramatically increased the amount of wetland area without protection under the CWA,[19] although the specific implications remain uncertain.

II. ESTIMATING THE IMPLICATIONS OF *SACKETT V. EPA*

Because the *Sackett* decision uses vague and subjective language, there are multiple interpretations. The new *Sackett* test could be interpreted to exclude only the more isolated wetlands, or alternatively, most—if not all—nontidal wetlands from the CWA's jurisdiction.[20] While the Court does not provide objective or scientific definitions of the terms "indistinguishable" or "continuous surface connection," the

13. Rapanos v. United States, 547 U.S. 715, 759-87 (2006) (Kennedy, J., concurring in the judgement).

14. *Id*.

15. *See id.* at 719-57 (plurality opinion).

16. *Sackett*, 598 U.S., at 678-79.

17. Adam S. Ward & Adell Amos, *The Supreme Court Is Bypassing Science—We Can't Ignore It*, 104 EOS (2023), http://eos.org/opinions/the-supreme-court-is-bypassing-science-we-cant-ignore-it.

18. Cale Jaffe, Sackett *and the Unraveling of Federal Environmental Law*, 53 ENV'T L. REP. 10801 (2023).

19. Ward & Amos, *supra* note 17; *Examining the Implications of* Sackett v. U.S. Environmental Protection Agency *for Clean Water Act Protections of Wetlands and Streams*, (2023), available at https://www.epw.senate.gov/public/_cache/files/5/7/575e4e70-4e50-40ce-8ee9-def9c46f757b/6791ADF26116D5CFB2B14A514886238C.10-18-2023-sulliv-n-testimony.pdf.

20. ROYAL C. GARDNER, WATERS OF THE UNITED STATES: POTUS, SCOTUS, WOTUS, AND THE POLITICS OF A NATIONAL RESOURCE 214 (1st ed. 2024).

decision appears to establish a flooding or wetness requirement for wetlands to be considered WOTUS.[21] Justice Alito offers some additional clues by writing, "We also acknowledge that temporary interruptions in surface connection may sometimes occur because of phenomena like low tides or dry spells."[22] Surely, the "surface connection" requirement for jurisdiction under the CWA is not so strict that wetlands are excluded if they go dry for any amount of time, but the reassurance Justice Alito offers is equally unclear. Wetlands, by definition, are not open bodies of water,[23] and treating them as such would essentially omit them from the CWA's protection entirely. As noted by Justice Kavanaugh in his concurring opinion, the majority's new *Sackett* test calls into question the jurisdictional status of wetlands that are either separated from downstream waters by man-made structures or that dry out during the year but had previously been within the definition of WOTUS.[24]

Sackett v. EPA has created tremendous uncertainty around the scope of wetland protections under the CWA, and my recently published analysis in *Science*[25] estimates the potential implications. This nationwide geospatial analysis explores potential interpretations of the Court's new *Sackett* test by using a qualitative measure of wetland "wetness" from the National Wetlands Inventory[26] and a range of wetness and connectivity requirements. Depending on the interpretation of the *Sackett* decision, seventeen to ninety million acres (nineteen to nearly one hundred percent) of nontidal wetlands in the contiguous U.S. could be non-jurisdictional under the post-*Sackett* CWA.[27] In a potential scenario with no wetness requirement and solely a connection requirement to a perennial or intermittent water, nineteen percent of nontidal wetland area in the contiguous U.S. would be non-jurisdictional.[28] If wetlands must be at least "seasonally flooded," defined as being inundated with surface water for more than a month during the growing season, approximately fifty-five

21. William W. Buzbee, *The Lawlessness of* Sackett v. EPA, 74 CASE W. RES. L. REV. 318 (2023); Richard J. Lazarus, *Judicial Destruction of the Clean Water Act:* Sackett v. EPA, UNIV. CHI. L. REV. (2023), available at https://lawreview.uchicago.edu/judicial-destruction-clean-water-act-sackett-v-epa (last visited Jan. 17, 2025); GARDNER, *supra* note 20 at 217.

22. Sackett v. EPA, 598 U.S. 651, 678 (2023).

23. CORPS OF ENGINEERS WETLANDS DELINEATION MANUAL, Technical Report Y-87-1 (1987), available at https://usace.contentdm.oclc.org/digital/collection/p266001coll1/id/4532/.

24. *Sackett*, 598 U.S. at 718 (Kavanaugh J., concurring).

25. Adam C. Gold, *How Wet Must a Wetland Be to Have Federal Protections in Post-*Sackett *US?*, 385 SCIENCE 1450 (2024).

26. U.S. FISH AND WILDLIFE SERVICE, *National Wetlands Inventory*, (2023), available at https://www.fws.gov/wetlands.

27. Gold, *supra* note 25.

28. *Id*.

million acres (sixty-one percent) of nontidal wetlands would be non-jurisdictional.[29] This seasonally flooded scenario would still consider wetlands which are not covered with surface water for multiple months jurisdictional. Under an even more restrictive "wetness" requirement, under which wetlands would have to be "semi-permanently flooded"—defined as being inundated with surface water most of the growing season—approximately eighty-two million acres (ninety-one percent) of nontidal wetlands would be non-jurisdictional.[30] Taken to the furthest extreme, nearly all nontidal wetlands would be non-jurisdictional if permanent surface water inundation were required to be considered a WOTUS.[31]

The analysis also investigated state wetland protections and the amount of wetlands on protected areas.[32] For most scenarios of potential wetness requirements, nearly half of the wetland acreage estimated as non-jurisdictional under the CWA had some form of state protections.[33] Of the wetland acreage without federal or state protections,[34] around twenty-five percent was on protected areas.[35] Across all modeled scenarios, between thirty-nine and fifty-three percent of non-jurisdictional wetland area was also without state or parcel-based protection.[36] So, even when accounting for additional state protections and protected areas, there could be tens of millions of acres of wetlands completely unprotected.

III. TRACKING AGENCY DECISIONS POST-*SACKETT*

The EPA and USACE publish approved jurisdictional determination (AJD) decisions[37] with data that can be used to track how the new language from the *Sackett* decision is interpreted by the agencies on the ground. Importantly, there are some caveats to this kind of analysis. First, as already noted, these permits represent federal agency decisions and not the long-term impacts of the *Sackett* decision itself given the administration change and a likely future change to the Amended 2023

29. *Id.*

30. *Id.*

31. *Id.*

32. U.S. Geological Survey (USGS) Gap Analysis Project (GAP), *Protected Areas Database of the United States (PAD-US) 3.0 (Ver. 2.0, March 2023)* (2023), available at https://www.sciencebase.gov/catalog/item/61794fc2d34ea58c3c6f9f69.

33. Gold, *supra* note 25.

34. Kihslinger et al., *supra* note 5.

35. Gold, *supra* note 25.

36. *Id.*

37. *Clean Water Act Approved Jurisdictional Determinations*, EPA, available at https://watersgeo.epa.gov/cwa/CWA-JDs/.

WOTUS rule. Second, the AJD dataset spans from August 2015 to present (January 20, 2025), so there are many more pre-*Sackett* AJDs in the dataset. The post-*Sackett* period discussed here represents AJDs with a completion date after the Amended 2023 Rule took effect on September 8, 2023.[38] Third, this kind of simple comparison does not incorporate any spatial context, so comparing pre- and post-*Sackett* permits in smaller geographic areas increases the chance that there might be a large project post-*Sackett* that skews the comparison toward either direction. Incorporating spatial context helps improve comparisons between WOTUS rules, and a previous study has used this EPA data to do just that with pre-*Sackett* data.[39] One final caveat is that we do not know how many potential permittees decided to either go through the process of a preliminary jurisdictional determination or bypass the jurisdictional determination process altogether due to the belief that any wetlands on property were not jurisdictional post-*Sackett*.

After the *Sackett* decision, the percent of AJDs for palustrine (or nontidal) wetlands that are determined to be WOTUS has been nearly cut in half (Figure 1). For palustrine wetlands in the fifty U.S. states, 36.3% of 85,880 pre-*Sackett* AJDs were found jurisdictional, while 18.8% of 12,799 post-*Sackett* AJDs were found jurisdictional (Figure 1C, 1D). Breaking down the pre-*Sackett* data by individual WOTUS rules shows that the AJDs using the 1986/1988 Rule,[40] Clean Water Rule (CWR),[41] and 2023 Rule[42] have a much higher percentage of wetlands found jurisdictional (43.1—48.4%) than those using the Navigable Waters Protection Rule (NWPR)[43](22.1%), which is similar to the post-*Sackett* percentage of AJDs that were jurisdictional (Figure 1C, 1D). States

38. EPA & U.S. Army Corps of Engineers (USACE), *Revised Definition of "Waters of the United States"; Conforming*, 88 FR 61964 (2023), available at https://www.federalregister.gov/d/2023-18929.

39. Simon Greenhill et al., *Machine Learning Predicts Which Rivers, Streams, and Wetlands the Clean Water Act Regulates*, 383 SCIENCE 406 (2024).

40. USACE, *Final Rule for Regulatory Programs of the Corps of Engineers*, 51 FR 41206 (1986); EPA, *Clean Water Act Section 404 Program Definitions and Permit Exemptions; Section 404 State Program Regulations*, 53 FR 20764 (1988).

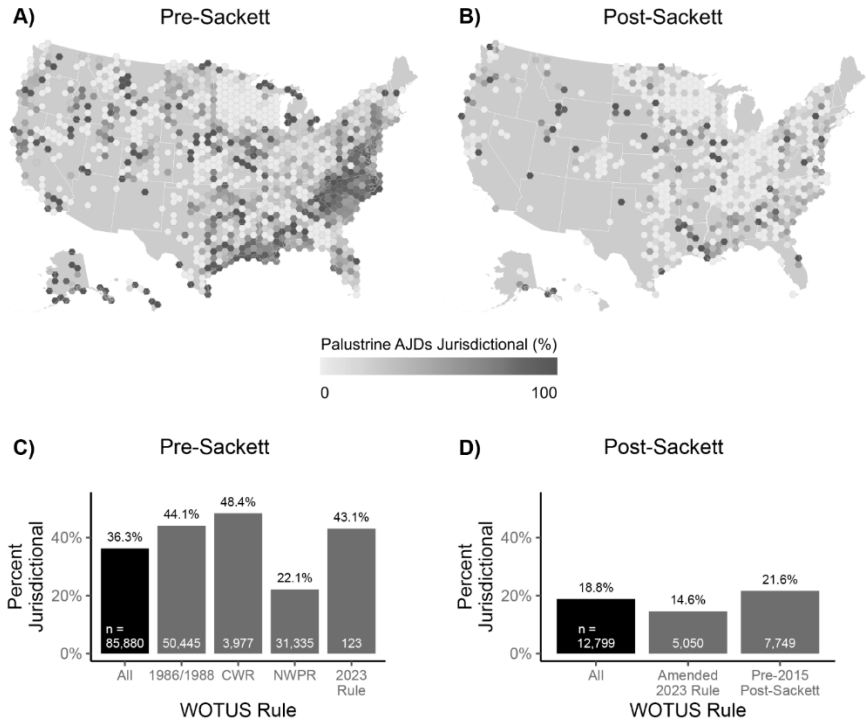
41. USACE & EPA, *Clean Water Rule: Definition of "Waters of the United States", Final Rule*, 80 FR 37054 (2015), available at https://www.federalregister.gov/documents/2015/06/29/2015-13435/clean-water-rule-definition-of-waters-of-the-united-states.

42. USACE & EPA, *Revised Definition of "Waters of the United States",* 88 FR 3004 (2023), available at https://www.federalregister.gov/d/2022-28595.

43. USACE & EPA, *The Navigable Waters Protection Rule: Definition of "Waters of the United States"*, 85 FR 22250 (2020), available at https://www.federalregister.gov/documents/2020/04/21/2020-02500/the-navigable-waters-protection-rule-definition-of-waters-of-the-united-states.

operating under the pre-2015 post-*Sackett* rule due to ongoing litigation,[44] ironically, have a higher percent of palustrine AJDs found to be jurisdictional than those operating under the Amended 2023 Rule (Figure 1D).

Figure 1: Spatially binned average percent of AJDs for palustrine wetlands found to be jurisdictional



during A) Pre-Sackett and B) Post-Sackett time periods. Overall average percent of AJDs for palustrine wetlands found to be jurisdictional during C) Pre-Sackett and D) Post-Sackett time periods across WOTUS rules (n = number of AJDs).

IV. APPLIED SCIENCE TO INCREASE AWARENESS

It is near certain that the second Trump administration will attempt to further constrain CWA protections of wetlands. Scientific studies estimating the implications of such constraints are essential. The administration will likely attempt to restrictively define the Court's ambiguous terms of "continuous surface connection" and "indistinguishability" in an updated WOTUS rule. The scientific evidence is clear that wetlands are essential for fulfilling the goal of the CWA due

44. *See* West Virginia v. EPA, No. 23-00032 (D. N.D. April 12, 2023); Texas v. EPA, Nos. 23-00017 & 23-00020 (S.D. Tex. March 19, 2023).

to their benefits for water quality, flood risk reduction, and critical wildlife habitat, but this concrete evidence is too often ignored.[45] Studies that estimate the jurisdiction of the CWA produce useful information for debates over wetland protections,[46] but also importantly, these studies put wetland benefits in context. Answering questions about the impacts of wetland loss—such as how many people will face increased flood risk, how much more water treatment will cost, and how many millions in tourism and recreation dollars will be lost—is critical to informing states and localities facing those impacts. *Sackett* does not prevent states and localities from enforcing or enacting more extensive wetland protections; nor does it prevent Congress from acting to clarify which wetlands are WOTUS. Illustrating the broad economic impacts of CWA rollbacks and identifying places most at risk are crucial components to inform protective action.

In addition to understanding the potential implications of this CWA rollback, improving the quality of wetland and stream datasets is another way that science can inform the WOTUS conversation. The first Trump administration claimed that estimating the impacts to changes in WOTUS rules (i.e., NWPR) was impossible because existing national datasets lacked the resolution to do this analysis.[47] While the existing national stream and wetland datasets do have limitations[48] and cannot be used alone to determine jurisdiction of specific wetlands for regulatory purposes, using them to estimate the broad jurisdictional scope of the CWA can produce helpful, high-level information on the overall potential impact.[49] Improving field measurements, modeling, and remote sensing of headwater streams and wetlands[50] will yield wide-ranging benefits for management, with one of these benefits being the increased precision of

45. Ward & Amos, *supra* note 17.

46. Dave Owen, *Mapping the New Clean Water Act*, 385 SCIENCE 1414 (2024).

47. Ariel Wittenberg & Kevin Bogardus, *EPA Claims 'no Data' on Impact of Weakening Water Rule. But the Numbers Exist*, available at https://www.science.org/content/article/epa-claims-no-data-impact-weakening-water-rule-numbers-exist.

48. Jay R. Christensen et al., *Headwater Streams and Inland Wetlands: Status and Advancements of Geospatial Datasets and Maps Across the United States*, 235 EARTH-SCI. REV. 104230 (2022).

49. Gold, *supra* note 25; Walsh and Ward, *supra* note 11; Riley Walsh & Adam S. Ward, *Redefining Clean Water Regulations Reduces Protections for Wetlands and Jurisdictional Uncertainty*, 1 FRONTIERS IN WATER (2019), available at https://www.frontiersin.org/articles/10.3389/frwa.2019.00001; Jeffrey Wade et al., *The Fluid Definition of the 'Waters of the United States': Non-Uniform Effects of Regulation on US Wetland Protections*, 36 HYDROLOGICAL PROCESSES e14747 (2022).

50. Christensen et al., *supra* note 48; Heather E. Golden et al., *Advancing the Science of Headwater Streamflow for Global Water Protection*, NATURE WATER 1 (2025).

jurisdictional estimates. Increased precision of jurisdictional estimates will allow for smaller-scale case studies of the impacts of changes in wetland protections, better attributing changes in national and state policy to local examples that will increase public awareness of the risks wetlands face.

V. CONCLUSION

The implications of *Sackett v. EPA* on federal wetland protections are likely extreme, but still unclear. Ambiguous language in the *Sackett* majority opinion has the potential to exclude either a small percentage or nearly all nontidal wetlands from the CWA. Though reported agency decisions for wetland jurisdiction post-*Sackett* roughly align with those made under the NWPR, a second Trump administration is likely to create a more restrictive WOTUS rule. There is an important role for science to play in the WOTUS conversation by increasing public awareness of the substantial benefits of wetlands—and the risks they now face post-*Sackett*.