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NEWS & ANALYSIS

A Nexus Runs Through It: Wetlands, Hydrological Connections, and Federal Jurisdiction in the Post-SWANCC World

by Jack Kerns

Editor's Summary: The U.S. Supreme Court's decision in Solid Waste Agency of Northern Cook County v. U.S. Army Corps of Engineers (SWANCC) has certainly caused much confusion about the exact contours of wetlands jurisdiction. In this Article, Jack Kerns reviews the circuit and district court decisions that followed SWANCC and their development of the "hydrologic connection" test. He then asks whether groundwater can serve as a jurisdictional basis for wetlands as "waters of the United States." This issue is fraught with uncertainty, as groundwater cannot be readily observed. Nevertheless, the author concludes that with proper documentation and field verification, the answer may be yes.

I. Introduction

Like the swirling eddies of Great Falls outside Washington, D.C., the law of wetlands has been whirling around in federal courts ever since the U.S. Supreme Court decided *Solid Waste Agency of Northern Cook County (SWANCC) v. U.S. Army Corps of Engineers*¹ in 2001. The decision has led to arguments over the fundamental protection afforded wetlands under the Clean Water Act (CWA)² in numerous subsequent decisions. In response to *SWANCC*, courts have developed the "hydrologic connection" test to satisfy the Commerce Clause nexus requirement. And two cases concerning federal wetlands jurisdiction will be argued before the Court this spring, further impacting the law in this field.

After providing an overview of wetlands regulation, the Article examines *SWANCC* and the cases that came about in its aftermath. The Article then focuses on an area of wetlands law that has yet to receive much attention, namely, what role, if any, groundwater connections should play in the debate over wetlands jurisdiction. The Article next looks at the science of wetlands generally and groundwater specifically as a means to determine what constitutes a "water of the United States." Courts are just beginning to address groundwater as a nexus for jurisdictional waters. It is the opinion of this author that wetlands science and developing

case law indicate that with the proper documentation and field verification, which is a very time-consuming process for which many government agencies may not be able to undertake due to resource limitations, groundwater can serve as a jurisdictional basis for wetlands as "waters of the United States."

II. Wetlands Regulation—An Overview

The regulation of wetlands developed in the latter part of the last century. At one time in the nation's history, wetlands were considered a nuisance, and not a second thought was given to filling in these swamps. The power of the United States to regulate waterways for commercial purposes is found in the U.S. Constitution at Article I, §8.³ Under the Commerce Clause, the U.S. Congress had the power to regulate navigation in any manner.⁴ "The U.S. Congress soon began to use its Commerce Clause authority to enact various statutes to regulate, improve, develop, and preserve the usefulness of the navigable waters of the United States."⁵

Subsequent Supreme Court cases further defined "navigable waters" to include non-tidal as well as tidal waters that are presently used or susceptible of being used in their ordinary condition as continuous highways of interstate commerce,⁶ or historically used for commerce.⁷

Jack Kerns is an attorney with the U.S. Army Corps of Engineers (the Corps). He recently completed the LL.M. program in environmental law at George Washington Law School, and also has an M.E.S.M from the University of California, Santa Barbara. Please note that the information contained in this Article represents the views of the author and does not represent official policy of the Corps. He would like to acknowledge the following individuals for their valued assistance: Jane Hicks, Dan Martel, Ryan Pingree, and Phelicia Thompson.

1. 531 U.S. 159, 31 ELR 20382 (2001) [hereinafter *SWANCC*].

2. 33 U.S.C. §§1251-1387, ELR STAT. FWPCA §§101-607.

3. U.S. CONST. art. X, §8.

4. *Gibbons v. Ogden*, 22 U.S. 1, 197 (1824). "Congress used that power throughout the nineteenth and twentieth centuries to enact numerous statutes promoting navigation and water-borne commerce." See Donna M. Downing et al., *Navigating Through Clean Water Act Jurisdiction: A Legal Review*, 23 WETLANDS 476 (2003).

5. Downing et al., *supra* note 4, at 476.

6. *The Daniel Ball v. United States*, 77 U.S. (10 Wall.) 557, 563 (1871). These are termed navigable-in-fact waters. *Id.*

Prior to the passage of the Federal Water Pollution Control Act (FWPCA) Amendments of 1972 (now known as the Clean Water Act (CWA)), the U.S. Army Corps of Engineers (the Corps), which has the day-to-day responsibility for regulating wetlands,⁸ was primarily concerned with regulating obstructions to navigation under §§9 and 10 of the Rivers and Harbors Act of 1899.⁹ The Rivers and Harbors Act instituted a permit system, administered by the Corps, for the construction of piers, docks, etc. in navigable waters. Section 13 of the Act,¹⁰ which prohibited the discharge of refuse into navigable waters of the United States, was increasingly used to control pollution until modern water pollution legislation was passed.¹¹

With the passage of the CWA, the Corps was given authority to issue permits for the discharge of dredged or fill material in “waters of the United States.”¹² There is no wetlands protection language in the CWA or in the regulations per se. Instead, the regulations define “waters of the United States” as follows:

(a) The term *waters of the United States* means

(1) All waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide; . . .

(3) All other waters such as interstate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation or destruction of which could affect interstate or foreign commerce including any such waters; . . .¹³

The Corps will generally issue either a general or individual permit for the discharge of fill or dredge material into wetlands.¹⁴ General permits are for activities that have minimal impacts on a wetland, whereas significant impacts require an individual permit.¹⁵ Individual permits require public notice and review as well as environmental assessments and environmental impacts analysis.¹⁶

The Corps initially adopted a restrictive interpretation of navigable waters.¹⁷ But in 1974, the U.S. District Court for the District of Columbia struck down this interpretation in *Natural Resources Defense Council, Inc. v. Callaway*.¹⁸ The court held that the term “navigable waters” under the CWA

was not limited to the traditional tests of navigability, and that Congress intended to assert jurisdiction over the nation’s waters to the maximum extent possible under the Commerce Clause.¹⁹ As will be seen, however, *SWANCC* has led the courts to revisit this principle.

III. *SWANCC*, Hydrologic Connections, and Adjacency

A. *United States v. Riverside Bayview Homes, Inc.*

As the courts continue to sort out the meaning and impact of *SWANCC*, a case decided 16 years earlier by the Court, *United States v. Riverside Bayview Homes, Inc.*,²⁰ has been referred to numerous times by environmentalists, developers, and government attorneys in their arguments of what *SWANCC* really means. Thus, to understand *SWANCC* and subsequent cases, *Riverside Bayview* must be discussed first.

When *Riverside Bayview Homes* began to fill marshy land near the shores of Lake St. Clair in Michigan, the government brought an enforcement action, arguing the wetlands were adjacent, defined as “bordering, neighboring, or contiguous” to “waters of the United States.”²¹ The Supreme Court ultimately held that the government did have jurisdiction over the adjacent wetlands. Even though the Court was reluctant to:

[A]bandon traditional notions of “waters” and include in that term “wetlands” as well. Nonetheless, the evident breadth of congressional concern for protection of water quality and aquatic ecosystems suggest that it is reasonable for the Corps to interpret the term “waters” to encompass wetlands adjacent to waters as more conventionally defined.²²

The Court also recognized that adjacent wetlands serve important environmental and ecological functions. In an oft-quoted phrase that gives an indication of this Court’s ability to grasp a fundamental tenet of hydrology, the Court stated that “protection of aquatic ecosystems, Congress recognized, demanded broad federal authority to control pollution, for [w]ater moves in hydrologic cycles and it is essential that discharge of pollutants be controlled at the source.”²³ Thus, the term “waters of the United States” was interpreted in broader hydrologic terms than traditional navigable waters. The Court also agreed with the Corps and the U.S. Environmental Protection Agency (EPA) that “wetlands adjacent to navigable waters do as a general matter play a key role in protecting and enhancing water quality to include flood control and filtering water.”²⁴ Thus, after *Riverside Bayview*, wetlands adjacent to navigable waters clearly fell within CWA jurisdiction.

7. *United States v. Steamer Montello*, 87 U.S. 430, 440-41 (1874). Once a river is navigable-in-fact, it retains that status forever, even if in the current state it is not navigable. *Economy Light & Power Co. v. United States*, 256 U.S. 113, 122 (1921). In addition, a water body that can be made navigable by improvements is navigable-in-fact. *United States v. Appalachian Elec. Power Co.*, 311 U.S. 377, 407 (1940). See also 33 C.F.R. §329.4 (2005).

8. See 33 C.F.R. §§320-331.

9. 33 U.S.C. §§401, 403.

10. 33 U.S.C. §407. This section is commonly referred to as the Refuse Act.

11. See *Dowling et al.*, *supra* note 4, at 478.

12. 33 U.S.C. §1344(a). The §404 program is actually co-administered by both the Corps and the U.S. Environmental Protection Agency (EPA), and EPA actually has veto authority over Corps permit decisions. See *Downing et al.*, *supra* note 4, at 478.

13. 33 C.F.R. §328.3(a) (emphasis in original).

14. See 33 C.F.R. §§325, 330.

15. See *id.* §330.

16. See *id.* §325.3, app. B.

17. See *Downing et al.*, *supra* note 4, at 480.

18. 392 F. Supp. 685, 5 ELR 20285 (D.D.C. 1975).

19. *Id.* at 686. The court noted that Congress had defined the term “navigable water” to mean “the waters of the United States, including the territorial seas.” *Id.* In addition, “the FWPCA was substantially amended in 1977 and 1987 and, since that time, has generally been referred to as the Clean Water Act” *Downing et al.*, *supra* note 4, at 478.

20. 106 S. Ct. 455, 16 ELR 20086 (1985).

21. 33 C.F.R. §328.3(a)(7).

22. 106 S. Ct. at 462.

23. *Id.* (citing S. REP. NO. 92-414, at 77 (1972), reprinted in 1972 U.S.C.A.N. 3668, 3742).

24. 106 S. Ct. at 462-63.

B. SWANCC

The plaintiffs in *SWANCC*, a consortium of 23 suburban Chicago cities and villages, challenged the Corps' denial of their §404 permit for a non-hazardous solid waste landfill in an abandoned sand and gravel pit mining site.²⁵ Although the landfill did not contain any wetlands, the water areas and spoil piles developed a natural character and became habitat for approximately 121 species of migratory birds.²⁶ The Corps, therefore, asserted jurisdiction over the land under the migratory bird rule. Under this rule, CWA jurisdiction was based not only on hydrologic factors, but also on the capability of the wetlands to serve as habitat for migratory birds.²⁷

In a 5 to 4 decision, the Supreme Court held that the Corps' §404 jurisdiction did not extend to isolated, non-navigable, intrastate waters used by migratory birds as habitat.²⁸ While the Court noted that under *Riverside Bayview* the Corps' jurisdiction under §404 covers wetlands adjacent to navigable waters,²⁹ the Court refused to hold that the Corps' §404 jurisdiction extends to ponds that have no significant nexus to navigable waters.³⁰ The Court also noted that the government's argument that the migratory bird rule would fall under Congress' power to regulate intrastate activities that substantially affect interstate commerce would raise significant constitutional issues.³¹ What the Court did not answer was what are the legal requirements of a "significant nexus"? Are ecological connections between the wetlands and the adjacent waters sufficient to satisfy the interstate commerce requirement? Is some sort of observable surface hydrological connection between the wetlands and the adjacent waters required for a "significant nexus"? Does the adjacent water have to be navigable, or simply a tributary of a navigable water? These questions were left unresolved by the *SWANCC* decision.

Immediately after the *SWANCC* decision, EPA and the Corps issued a joint memorandum and clarified that the *SWANCC* holding was confined to "isolated, non-navigable, intrastate waters" used solely by migratory birds as habitat.³² However, the language of *SWANCC* would spawn a line of cases involving what has become known as the hydrologic connection test. This test, evolved from court decisions, basically requires a documentation of a surface hydrological connection between the wetland and "waters of the United States." In addition, courts are just beginning to address whether this test applies to groundwater.

25. 531 U.S. at 162-63.

26. *Id.* at 164.

27. See 51 Fed. Reg. 41206, 41217 (Nov. 13, 1986); 53 Fed. Reg. 20764, 20764, 20765 (June 6, 1988); see also Downing et al., *supra* note 4, at 483.

28. 531 U.S. at 171-72.

29. *Id.* at 167.

30. *Id.*

31. *Id.* The Court did not reach this issue, ruling that there was no evidence that Congress intended under §404(a) to regulate an abandoned sand and gravel pit. *Id.* at 174. However, the Court noted that such a claim of federal jurisdiction would result in a significant impingement of the states' traditional and primary power over land and water use. *Id.*

32. Downing et al., *supra* note 4, at 488-89.

C. Appellate Court Decisions on Adjacency and Hydrological Connections

The U.S. Court of Appeals for the Ninth Circuit, in *Headwaters, Inc. v. Talent Irrigation District*,³³ was the first court after *SWANCC* to examine CWA jurisdiction in terms of the hydrologic flow of pollutants to navigable waters. In ruling that irrigation canals were waters of the United States, the Ninth Circuit found the irrigation canals were not isolated waters since they were receiving water from natural streams and lakes and diverting water to steams and creeks.³⁴ The court went on to note that even tributaries that flow intermittently are waters of the United States because "pollutants need not reach interstate bodies of water immediately or continuously in order to inflict serious environmental damage."³⁵ The court also noted a statement by the U.S. Court of Appeals for the Eleventh Circuit:

It makes no difference that a stream was or was not at the time of the spill discharging water continuously into a river navigable in the traditional sense. Rather, as long as the tributary would flow into the navigable body [under certain conditions], it is capable of spreading environmental damage and is thus a "water of the United States."³⁶

This idea that pollutants flowing from a wetlands through a surface hydrological connection to navigable waters downstream would become the cornerstone of the surface hydrological connection test for purposes of determining jurisdiction under the CWA.

Notably, this flow of pollutants theory had been applied by the courts several years earlier. For example, in *United States v. Ashland Oil & Transportation Co.*,³⁷ a case involving an oil company's failure to immediately report the dis-

33. 243 F.3d 526, 31 ELR 20535 (9th Cir. 2001).

34. *Id.* at 533.

35. *Id.* at 534.

36. *Id.* (citing *United States v. Eidson*, 108 F.3d 1336, 27 ELR 20853 (11th Cir. 1997); *Driscoll v. Adams*, 181 F.3d 1285, 29 ELR 21387 (11th Cir. 1999); *Quivara Mining Co. v. United States*, 765 F.2d 126, 15 ELR 20530 (10th Cir. 1985); *United States v. Texas Pipe Line*, 611 F.2d 345, 347 (10th Cir. 1979)). In *Eidson*, the court noted that the sewer, ditch, and canal were all part of a storm drainage system designed to discharge stormwater into Tampa Bay, and that during heavy rain falls and high tides, waters did flow from the drainage ditch into a tributary of Tampa Bay. 108 F.3d at 1342. For the court not to rule that the drainage ditch was a tributary "and to allow pollutants to contaminate this drainage system would defeat the intent of Congress and would jeopardize the health of our nation's waters." *Id.* at 1343. In *Quivara*, the plaintiffs challenged §402 permits on the grounds that the arroyo and creek into which its uranium milling and mining facilities discharged pollutants were not "waters of the United States." 765 F.2d at 127. The U.S. Court of Appeals for the Tenth Circuit found that the arroyo and the creek flowed from short distances from the discharge points, then percolating into groundwater aquifers that after a lengthy period, perhaps centuries, discharged into navigable waters. *Id.* at 129. Even though neither one was navigable-in-fact, surface flow occasionally occurred during heavy rains, providing a surface connection with navigable waters independent of the underground aquifers. *Id.* In *Driscoll*, a citizen suit action, the plaintiffs sued for stormwater runoff from the defendant's timber harvesting land that deposited mud, silt, and sand on their property. 181 F.3d at 1287. The intermittent stream flowed from the defendant's land through a pond on one of the plaintiff's land then through another pond on the other plaintiff's land before merging into a river that eventually flowed into the Tennessee River. *Id.* Citing *Eidson*, the court in *Driscoll* held that the intermittent stream was a "navigable water." *Id.* at 1291.

37. 504 F.2d 1317, 4 ELR 20784 (6th Cir. 1974).

charge of oil in violation of CWA §311(b)(5),³⁸ the U.S. Court of Appeals for the Sixth Circuit held that “the language of the Federal Water Pollution Control Act and its legislative history show the United States Congress was convinced that uncontrolled pollution of the nation’s waterways is a threat to the health and welfare of the country, as well as a threat to its interstate commerce.”³⁹ Citing a 1958 case in which a tugboat’s kerosene lamp ignited petroleum fumes from oil on the surface of a river and caused the death of seamen,⁴⁰ the court also stated that “water pollution is a direct threat to navigation.”⁴¹ The court noted that cities on non-navigable waters would have an economic advantage over those on navigable waters, being able to dump raw sewage and industrial wastes into an “effectively unrestricted sewer.”⁴² In addition, “if the power of flood control extends to the tributaries of navigable streams, . . . then . . . the power of pollution control extends to the tributaries of navigable streams likewise. Pollution control of navigable streams can only be exercised by controlling pollution of their tributaries.”⁴³

Thus, *Headwaters* applied the flow of pollutants theory that had been applied in *Ashland* and other cases many years earlier, making it, in the opinion of this author, one of the most significant cases to be decided after *SWANCC*. But soon after *Headwaters*, the U.S. Court of Appeals for the Fifth Circuit decided *Rice v. Harken Exploration Co.*,⁴⁴ which put forth an alternative interpretation of *SWANCC* and supported the arguments of developers and property rights advocates.

In holding that the defendants in *Rice* were not liable under the Oil Pollution Act (OPA)⁴⁵ for the discharge of oil from their oil and gas production, the Fifth Circuit noted that “under *Solid Waste Agency*, it appears that a body of water is subject to regulation under the CWA if the body of water is actually navigable or is adjacent to an open body of navigable water.”⁴⁶ While arguably dicta, this may become one of the issues closely looked at by the Supreme Court this spring. In addition, in addressing the issue of surface water contamination, the court determined that there was nothing in the record to convince a trier of fact that any of the creeks at issue in that case were “sufficiently linked to an open body of navigable water as to qualify for protection under

the OPA.”⁴⁷ Again, while not directly addressing the CWA, *Rice* created a divide in post-*SWANCC* interpretation.

Despite the Fifth Circuit’s holding in *Rice*, the majority of courts followed the reasoning applied in *Headwaters*. In *United States v. Krilich*,⁴⁸ involving the discharge of fill into adjacent wetlands, the U.S. Court of Appeals for the Seventh Circuit upheld a consent decree in an civil enforcement action that had been signed prior to the *SWANCC* decision, noting the Supreme Court had not ruled on the explicit meaning of “navigable waters.”

In *United States v. Lamplight Equestrian Center, Inc.*,⁴⁹ the court recognized the confusion brought about by the *SWANCC* decision, stating that “*SWANCC* does not clarify at what point between the two extremes—isolated waters, on the one hand, and wetlands directly adjacent to navigable waters, on the other—a nonnavigable body of water falls within the Act’s definition.”⁵⁰ In *United States v. Interstate General Co., Ltd. Partnership*,⁵¹ the U.S. Court of Appeals for the Fourth Circuit upheld a criminal violation of filling in adjacent wetlands. Because the court ruled that the *SWANCC* decision only applied to the migratory bird rule under 33 C.F.R. §328.3(a)(3), and because *United States v. Wilson*⁵² already invalidated this regulation in the Fourth Circuit, *SWANCC* effected no change in the law in that circuit.⁵³ In *United States v. Rueth Development Co.*,⁵⁴ the defendant argued that his pre-*SWANCC* consent decree with a development company was now unenforceable. But because the development company had agreed in the consent decree that the wetlands at issue were adjacent,⁵⁵ the Seventh Circuit dismissed the appeal. And in *United States v. Gerke Excavating, Inc.*,⁵⁶ the Seventh Circuit upheld the government’s enforcement action against a contractor who had dumped dredged stumps and fill into wetlands⁵⁷ that were connected by a ditch that drained into a non-navigable creek that flowed into a non-navigable river, which emptied into the Wisconsin River, a navigable river.⁵⁸

In a significant decision, the Fourth Circuit held in *United States v. Deaton*⁵⁹ that the defendant’s sidecasting in non-tidal wetlands, which were hydrologically connected by various ditches and streams to the Chesapeake Bay approximately 32 miles away, violated the CWA. The court

38. 33 U.S.C. §1321(b)(5).

39. 504 F.2d at 1325.

40. *Id.* at 1326 (citing *Kernan v. American Dredging Co.*, 355 U.S. 426, 427 (1958)). Several oil refineries were located along the river, and the lamp that ignited the fumes was not more than three feet about the water. The court took judicial notice that two rivers in the Sixth Circuit, the Rouge River in Dearborn, Michigan, and the Cuyahoga River in Cleveland, Ohio, were so polluted they had caught fire repeatedly in the 10 years prior to *Ashland Oil*. “Such pollution is an obvious hazard to navigation which Congress has every right to seek to abate under its interstate commerce powers.” *Id.*

41. 504 F.2d at 1325.

42. *Id.* at 1326.

43. *Id.* at 1327 (citing *Oklahoma ex rel. Phillips v. Atkinson Co.*, 313 U.S. 508 (1941), where the court found Congress’ power to control floods under the Commerce Clause extends to non-navigable tributaries of navigable streams). See also *United States v. Grand River Dam Auth.*, 363 U.S. 229 (1960).

44. 250 F.3d 264, 31 ELR 20599 (5th Cir. 2001).

45. 33 U.S.C. §§2701-2761, ELR STAT. OPA §§1001-7001.

46. *Rice*, 250 F.3d at 269.

47. *Id.* at 271.

48. 303 F.3d 784, 33 ELR 20035 (7th Cir. 2002).

49. No. 00 C 6486, 2002 WL 360652, 32 ELR 20526 (N.D. Ill. Mar. 8, 2002).

50. *Id.*, slip op. at 6. It is reasonable to assume that more litigation will arise over this issue of adjacency, as already evidenced by *Rapanos* and *Carabell*.

51. No. 01-4513, 2002 WL 1421411, 32 ELR 20781 (4th Cir. July 2, 2002).

52. 133 F.3d 251, 28 ELR 20299 (4th Cir. 1997). In *Wilson*, the Fourth Circuit held that 33 C.F.R. §328.3(a)(3) violated the Commerce Clause and was therefore invalid. 133 F.3d at 257.

53. 2002 WL 1421411, at *3.

54. 355 F.3d 598, 33 ELR 20238 (7th Cir. 2003).

55. *Id.* at 604. The court noted that “it is not even apparent that the necessary contiguity to a navigable water is missing here,” citing the surface runoff connection in *Riverside* and *United States v. Deaton*, 332 F.3d 698 (4th Cir. 2003).

56. No. 04-3941, 2005 WL 1422882, 35 ELR 20128 (7th Cir. June 21, 2005).

57. *Id.* slip op. at *2.

58. *Id.*

59. 332 F.3d 698, 33 ELR 20223 (4th Cir. 2003).

noted that “Congress’s power over the channels of interstate commerce, unlike its power to regulate activities with a substantial relation to interstate commerce, reaches beyond the regulation of activities that are purely economic in nature.”⁶⁰ This power includes the right to keep channels of interstate commerce free from immoral and injurious uses. The court noted that while “many cases concerning the power over navigable waters focus on congressional authority to regulate in aid of navigation,” there is “no reason to believe that Congress has less power over navigable waters than over other interstate channels such as highways, which may be regulated to prevent their ‘immoral and injurious use.’”⁶¹ The court found Congress’ power to regulate interstate channels as highways allowed Congress to regulate non-navigable waters in order to achieve congressional goals in protecting navigable waters.⁶² “Any pollutant or fill material that degrades water quality in a tributary of navigable waters has the potential to move downstream and degrade the quality of the navigable waters themselves.”⁶³ Moreover, the court ruled the ditch qualified as a tributary of a navigable water. This was significant in that the court found that since a ditch could transport pollutants downstream to navigable waters, the ditch served as a hydrological connection.

Following on the heels of *Deaton*, the Fourth Circuit, in *Treacy v. Newdunn Associates, Ltd. Liability Partnership*,⁶⁴ held wetlands that were hydrologically connected by the intermittent flow of water through natural streams and man-made ditches to a navigable water 2.4 miles away were jurisdictional under the CWA.⁶⁵ In *United States v. Rapanos*,⁶⁶ now on appeal before the Supreme Court, the Sixth Circuit found that the record demonstrated “there were hydrological connections between all three wetland sites and corresponding adjacent tributaries of navigable waters,”⁶⁷ and thus a significant nexus existed. On one site, the surface waters from the wetlands emptied into navigable waters between 11 and 20 miles downstream.⁶⁸ The court also held that there is no requirement that wetlands directly abut navigable waters for CWA jurisdiction.⁶⁹ The Supreme Court will be addressing the issue of whether these wetlands that have a surface hydrologic connection and are adjacent to non-navigable tributaries of traditional navigable waters are part of “waters of the United States.”⁷⁰

And what if a wetland is adjacent to waters of the United States but there is no observable hydrologic connection?

Two cases, one now before the Supreme Court, and another just recently decided by the Ninth Circuit, address this issue. In *Carabell v. U.S. Army Corps of Engineers*,⁷¹ the Sixth Circuit held wetlands separated by a berm from a ditch connected to tributaries of “waters of the United States” were adjacent under 33 C.F.R. §328.3(a)(7), even though there was no hydrologic connection between the wetlands and the ditch.⁷² The Sixth Circuit noted the post-*SWANCC* split in the courts and pointed out that a majority had narrowly interpreted *SWANCC* to hold only that the CWA does not reach isolated waters, such as an abandoned, isolated gravel pit with no connection with navigable waters.⁷³ Furthermore, the court noted that *SWANCC* did not alter *Riverside Bayview*’s upholding of the regulation of adjacent wetlands, and, in fact, “did not decide any issue with regard to ‘adjacent wetlands’ under 33 C.F.R. §328.3(a)(7).”⁷⁴ The Supreme Court will be addressing whether the adjacent wetland, which is separated by a man-made berm from a tributary, is within CWA jurisdiction.⁷⁵

In a similar case recently decided by the Ninth Circuit, *Baccarat Fremont Developers v. U.S. Army Corps of Engineers*,⁷⁶ the court held that wetlands separated from navigable waters (a flood control channel) by a berm and with no apparent hydrological connection were adjacent under the Corps’ regulations.⁷⁷ The court held that a significant hydrological or ecological connection is not required to support the Corps’ jurisdiction over particular adjacent wetlands,⁷⁸ and that the case was “remarkably similar” to the facts in *Carabell*.⁷⁹ The court also noted that even if the CWA did require demonstration of a significant nexus, there was no question that one existed in the *Baccarat* case because the wetlands were within reasonable proximity (60 to 75 feet) to the flood control channels, served important functions that contribute to the aquatic environment (flood control and water filtering), were within the 100-year floodplain, formed part of a hydric soil unit continuous with the tidal waters, and were particularly important given the reduction of wetlands in the San Francisco Bay Area.⁸⁰

The Fifth Circuit again raised its voice of dissent in *In re Needham*,⁸¹ where the government sought cleanup costs for oil spilled from a containment basin into an adjacent ditch.⁸² The court held that tributaries that are neither themselves navigable nor truly adjacent to navigable water are not within the Oil Pollution Act’s jurisdiction.⁸³ A body is subject to regulation only if the water is actually navigable or adjacent to an open body of navigable water.⁸⁴

60. *Id.* at 706.

61. *Id.* at 707 (citing *Caminetti v. United States*, 37 S. Ct. 192 (1917)).

62. *Id.*

63. *Id.* In fact, the court noted “the principle that Congress has the authority to regulate discharges into non-navigable tributaries in order to protect navigable waters has long been applied to the Clean Water Act.” *Id.* at 707 (citing *United States v. Ashland Oil & Transp. Co.*, 504 F.2d 1317, 4 ELR 20784 (6th Cir. 1974)).

64. 344 F.3d 407, 33 ELR 20268 (4th Cir. 2003).

65. *Id.* at 409-10, 417.

66. 376 F.3d 629, 34 ELR 20060 (6th Cir. 2004), *cert. granted*, 126 S. Ct. 414 (Oct. 11, 2005).

67. 376 F.3d at 629.

68. Brief of Respondents, *Rapanos v. United States*, No. 04-1034, at 11 (U.S. Jan. 2006) [hereinafter *U.S. Rapanos Brief*].

69. 376 F.3d at 642.

70. *U.S. Rapanos Brief*, *supra* note 68.

71. 391 F.3d 704, 34 ELR 20147 (6th Cir. 2004), *cert. granted*, 126 S. Ct. 415 (Oct. 11, 2005).

72. 391 F.3d at 708-09.

73. *Id.* at 709 (citing *Rapanos* and *United States v. Deaton*, 332 F.3d 698 (4th Cir. 2003)).

74. *Id.* at 709.

75. *U.S. Rapanos Brief*, *supra* note 68, at I.

76. 425 F.3d 1150, 35 ELR 20212 (9th Cir. 2005).

77. *Id.* at 1154.

78. *Id.* at 1156.

79. *Id.* at 1157.

80. *Id.* at 1157, 1158.

81. 354 F.3d 340 (5th Cir. 2003).

82. *Id.* at 343.

83. *Id.* at 345.

84. *Id.* at 346.

D. District Court Decisions

SWANCC has also made an impact on the district courts, with courts divided over the issue of what constitutes a wetlands for jurisdictional purposes. *United States v. Buday*⁸⁵ would squarely tackle the issue that developer and property rights advocates have and continue to argue: whether *SWANCC* rolled back the CWA to cover only traditional navigable waters and wetlands adjacent to those waters. In *Buday*, the district court upheld a conviction for digging ponds in wetlands adjacent to a creek that was a tributary to a tributary⁸⁶ of the Clark Fork River, a navigable water,⁸⁷ noting that cases such as *Headwaters* and *United States v. Eidson*⁸⁸ “indicate that any polluting activity is subject to federal jurisdiction if it impinges on any stream that flows primarily over the surface of the land and empties into a water that is at some point navigable-in-fact.”⁸⁹ The court did have a problem with the fact that the creek at issue was over 250 miles from a navigable waterway,⁹⁰ but, it noted, “the relative scarcity of Western waters that are navigable-in-fact and the distances that waters travel in Montana and the West do not provide solid ground on which to build distinctions of federal vs. state or local jurisdiction.”⁹¹

In *Idaho Rural Council v. Bosma*,⁹² a district court noted that while the Supreme Court in *SWANCC* had declined to read the term “navigable” entirely out of the CWA, it did say waters of the United States included at least some waters that were not navigable in the classical sense, such as non-navigable tributaries and streams.⁹³ The court ultimately held that the springs at issue were sufficiently connected through surface water to Clover Creek, a water of the United States.⁹⁴

The court generally agreed that waters of the United States do not include isolated, non-tributary groundwater, but it recognized that the courts are split on the issue of whether the discharge of pollutants into groundwaters are connected to surface waters of the United States.⁹⁵ The court found that while Congress concluded that it would not attempt to regulate discharges into groundwater in general, this did not mean “Congress intended to exempt ground water from all regulation—particularly under circumstances where the introduction of pollutants into the ground water

adversely affects the adjoining surface waters.”⁹⁶ This suggests that if pollutants flowed from a wetland into groundwater that emptied into “waters of the United States,” those wetlands would be jurisdictional.

In *Colvin v. United States*,⁹⁷ the defendant was found guilty of violating the CWA by using a bulldozer to deposit pollutants in the Salton Sea.⁹⁸ Noting the Salton Sea was a popular destination for out-of-state and foreign tourists who fish and recreate in it and that it ebbed and flowed with the tide, the district court held the Salton Sea was therefore navigable and a “water of the United States.”⁹⁹ The court also noted “*SWANCC* did not invalidate other Corps interpretations of navigable waters, including all traditional waters, all interstate waters, all tributaries to navigable or interstate waters, all wetlands adjacent to any and all of such waters, and all waters that are subject to the ebb and flow of the tide.”¹⁰⁰ Thus, unable to uphold jurisdiction solely on interstate commerce, the court was able to find jurisdiction based on the ebb and flow of the Salton Sea, unlike the “isolated” ponds in *SWANCC*.

*California Sportfishing Protection Alliance v. Diablo Grande, Inc.*¹⁰¹ involved Salado Creek, which ran across the defendant’s property, then over a weir into an underground pipeline, and eventually flowed into the San Joaquin River,¹⁰² a navigable-in-fact waterway.¹⁰³ The district court ruled Salado Creek was a tributary of a navigable water, the San Joaquin River, stating: “*Solid Waste* did not concern the well-established rule including tributaries in the definition of ‘navigable waters.’”¹⁰⁴ The court also distinguished the facts in that case from those in *Rice*.¹⁰⁵ The court noted that in *Rice* there was no evidence of discharge into surface water, whereas in *California Sportfishing* there was evidence of elevated turbidity levels of discharge directly into surface waters.¹⁰⁶

85. 138 F. Supp. 2d 1282 (D. Mont. 2001).

86. In hydrologic terms, streams are defined by orders, the “fingertip” tributaries being assigned an order 1. Moving downstream, the two first-order channels combine to become, below their confluence, a second-order stream, and so on. DAVID R. MAIDMONT, HANDBOOK OF HYDROLOGY 8.8 (McGraw-Hill 1993).

87. 138 F. Supp. 2d at 1288. The creek was 20 to 30 feet wide in some locations, varying in depth from six inches to three feet, and while the level of flow varied upon the time of year, there was always water in the creek. *Id.* at 1283.

88. 108 F.3d 1336, 27 ELR 20853 (11th Cir. 1997).

89. 138 F. Supp. 2d at 1289. The court noted groundwaters were not involved in this case and would not be discussed. *Id.* at 1290 n.13.

90. *Id.* at 1291.

91. *Id.*

92. 143 F. Supp. 2d 1169 (D. Idaho 2001).

93. *Id.* at 1178.

94. *Id.* Walker Spring drained into a pond, then across a pasture into a canal, and eventually drained into Clover Creek some point downstream. Butler Creek emptied directly into Clover Creek, at least seasonally, by means of a head gate. *Id.* at 1178 n.4.

95. *Id.* at 1179.

96. *Id.* at 1180. However, the court noted the plaintiff must prove the pollutants from a point source affect surface waters of the United States by tracing pollutants from their source to surface waters. It was not enough to allege groundwater pollution, and then assert a general hydrological connection between all waters. It remained to be seen whether the plaintiff in the present case could satisfy this burden of proof, according to the court. *Id.*

97. 181 F. Supp. 2d 1050 (C.D. Cal. 2001).

98. *Id.* at 1052. The Salton Sea was actually a lake, not a sea. *Id.* at 1055, n.6.

99. *Id.* at 1055. Some tourists visited the sea for medicinal purposes, believing it was good for their skin. *Id.* Others visited it to water ski, hunt ducks, and race boats and jet skis. *Id.*

100. *Id.* (citing *Headwaters, Inc. v. Talent Irrigation Dist.*, 243 F.3d 526, 31 ELR 20535 (9th Cir. 2001); *Idaho Rural Council v. Bosma*, 143 F. Supp. 2d 1169 (D. Idaho 2001); *United States v. Buday*, 138 F. Supp. 2d 1282 (D. Mont. 2001)).

101. 209 F. Supp. 2d 1059, 1061 (E.D. Cal. 2002).

102. *Id.* at 1062.

103. *Id.* at 1076.

104. *Id.* at 1075 (citing *Headwaters*, 243 F.3d at 526). The court also quoted Justice John Paul Stevens’ dissent in *SWANCC* that “in its decision today, the Court draws a new jurisdictional line, one that invalidates the 1986 migratory bird regulation as well as the Corps’ assertion of jurisdiction over all waters *except for actually navigable waters, their tributaries, and wetlands adjacent to each.*” *Id.* (emphasis added in original).

105. 209 F. Supp. 2d at 1076. The defendant had argued that since Salado Creek flowed through an underground pipe, it could not be a navigable water because in *Rice* the Fifth Circuit held that discharges of oil onto land adjacent to a seasonal creek did not involve navigable water. *Id.* at 1075.

106. *Id.* at 1076.

In *Lamplight Equestrian Center*,¹⁰⁷ the owners of an equestrian center filled in adjacent wetlands for a horse pathway without a permit.¹⁰⁸ The district court found there was a significant nexus between the adjacent wetlands and a tributary based on the owner's admission of a hydrological connection. Following the reasoning of *Headwaters*, the court observed that "water need not flow in an unbroken line at all times to constitute a sufficient connection to a navigable water or its tributaries; as recognized by other courts, intermittent flow of the type Lamplight has acknowledged can be sufficient to establish the Corps' jurisdiction."¹⁰⁹ The court held the "drainage connection" between the wetlands and the creek established adjacency, citing the fact that the dictionary definition of "contiguous" is "'being in actual contact: touching along a boundary or at point.'"¹¹⁰

In *United States v. The New Portland Meadows, Inc.*,¹¹¹ a district court held that a ditch was a tributary to waters of the United States:

The mere fact that the water from the District ditches is forced into the Columbia Slough by pumps is irrelevant. All of the water that enters the District ditches eventually ends up in the Columbia Slough, whether it flows naturally or not. Defendants were well aware of the ultimate destination of their wastewater and created their ditch system with the intent that the wastewater be transported to the Columbia Slough.¹¹²

In *San Francisco Baykeeper v. Cargill Salt Division*,¹¹³ the court considered whether a pond within the Don Edwards San Francisco Bay Wildlife Bay, which was adjacent and separated by a man-made berm from the Mowry Slough, a tidally influenced navigable water,¹¹⁴ was jurisdictional. The court held "bodies of water that are adjacent to navigable waters are 'waters of the United States' and therefore protected under the Clean Water Act."¹¹⁵ The court found that the pond was a body of water adjacent to a navigable water because one of the consultants opined that water regularly leaked through the berm into the pond during high tides, and dye tests conducted by the plaintiff's expert demonstrated that the soils were saturated, the berm leaked, and

water from the slough seeped through the berm into the pond at high tide.¹¹⁶

Despite the majority of district court cases following on the heels of *Headwaters*,¹¹⁷ some courts joined *Rice's* voice of dissent. In *United States v. RGM Corp.*,¹¹⁸ the U.S. District Court for the Eastern District of Virginia held that wetlands that did not extend "continuously" to a navigable waterway were not adjacent.¹¹⁹ Even though the wetlands were hydrologically connected by ditches to navigable waters, the court held they were not jurisdictional based on the court's reading of the regulations.

In another decision dissenting from the thinking of *Headwaters*, the district court in *FD&P Enterprises, Inc. v. U.S. Army Corps of Engineers*,¹²⁰ along the lines of *Rice* and *RGM*, read *SWANCC* much more expansively, holding that the hydrological connection test was no longer a valid mode of analysis:

In this context, the language of Chief Justice Rehnquist's opinion is instructive: it is "the significant nexus between the wetlands and 'navigable waters'" that must inform our reading of the CWA. Because, as Justice Stevens points out, *Solid Waste* had substantially altered the meaning of "navigable waters" in the CWA, a "significant nexus" must constitute more than a mere "hydrological connection." Therefore, this court must reject the Corps' reading of *Solid Waste*, which this court believes would essentially ignore the Supreme Court's instructions and maintain the "hydrological connection" status quo.¹²¹

However, the court went on to state that in *FD&P Enterprises*, "the question presented is whether there is a substantial nexus—beyond a mere hydrological connection—between the FD&P Property and the navigable waters of the Hackensack River."¹²² The court did note the Corps had "submitted sufficient evidence such that a reasonable jury

107. 2002 WL 360652, at *1.

108. *Id.* slip op. at 1, 4.

109. *Id.* (citing *Headwaters*, 243 F.3d at 526, and *United States v. Eidson*, 108 F.3d 1336, 27 ELR 20853 (11th Cir. 1997)). While *Headwaters* dealt with intermittent release of water from irrigation canals, here the court was addressing the issue of unbroken surface flow from a ditch to a swale.

110. *Id.* (citing MERRIAM WEBSTER'S COLLEGIATE DICTIONARY 250 (10th ed. 1997)).

111. No. 00-507-AS, 2002 WL 31180956 (D. Or. Sept. 9, 2002).

112. *Id.*

113. No. C 96-2161 SI, 2003 U.S. Dist. LEXIS 8247 (N.D. Cal. Apr. 30, 2003). Cargill, who owns a large amount of salt ponds bordering the San Francisco Bay, has been involved in numerous lawsuits over the government's jurisdiction of extremely valuable real estate as well as environmentally sensitive habitat.

114. *Id.* slip op. at 2.

115. *Id.* slip op. at 20. The court did not address, however, whether wetlands and ponds adjacent to non-navigable waters, such as tributaries, were jurisdictional under the CWA. Given the language of *SWANCC* cited in the decision—"it is . . . plausible, as petitioner contends, that Congress simply wanted to include all waters adjacent to 'navigable waters'—it is likely that this issue will continue to be litigated. *Id.* at 19 (citing *SWANCC*, 531 U.S. 159, 171, 31 ELR 20382 (2001)).

116. *Id.* at 21, 22, 27.

117. In addition to the cases described above, a district court held in *North Carolina Shellfish Growers Ass'n v. Holly Ridge Assocs., Ltd. Liab. Co.*, 278 F. Supp. 2d 654, 33 ELR 20248 (E.D.N.C. 2003), that wetlands "directly" adjacent to navigable-in-fact waters were jurisdictional, and that non-navigable waterways and ditches were tributaries of waters of the United States. The court agreed with the shellfish harvesters who sued owners of large parcels of land for water quality violations, finding "an absence of channelized flow between the two bodies of water does not necessarily prevent Cypress Branch from being considered a tributary of Batts Mill Creek."

The adjacency issue was again raised in *United States v. Thorson*, No. 03-C-0074-C, 2004 WL 737522 (W.D. Wis. Apr. 6, 2004), where the district court agreed with the reasoning in *Deaton* and *Rapanos* of a hydrological connection standard for determining adjacency, *id.* slip op. at 13, and that CWA jurisdiction extended to wetlands adjacent to tributaries of traditionally navigable waters. *Id.* slip op. at 15. The court also dismissed the defendant's argument that the CWA exceeded Congress' authority under the Commerce Clause if it was construed to extend to wetlands adjacent to non-navigable tributaries of traditionally navigable waters. *Id.*

118. 222 F. Supp. 2d 780, 32 ELR 20817 (E.D. Va. 2002).

119. *Id.* at 786.

120. 293 F. Supp. 2d 509, 33 ELR 20140 (D.N.J. 2003).

121. *Id.* at 516 (citations omitted) (emphasis in original). The court made this ruling despite acknowledging in the next to last paragraph that "a reading of *Solid Waste* which would confine CWA jurisdiction solely to navigable waters and those waters one step removed from navigable waters could ultimately serve to undermine the basic purpose of the CWA." *Id.* at 515-17. Thus, in full knowledge that a broad reading of *SWANCC* would be detrimental to water quality, the court ruled in favor of limiting the jurisdiction of *SWANCC*.

122. *Id.* at 516-17.

could find the filling of the wetlands will have a substantial injurious impact upon the chemical, physical, and/or biological integrity of the Hackensack River,” and thus a sufficient nexus would exist.¹²³ But it ultimately remanded the case to the lower court for a determination of whether a nexus existed.

E. Groundwater Connections

Most courts, in ruling that the holding of *SWANCC* was narrow, turned to the evidence of whether a surface hydrologic connection was present from the wetlands all the way to the navigable water. Those challenging the government’s jurisdiction began to attack the existence of the hydrological connection to show that pollutants could not flow from the wetlands to the navigable water, and thus a significant nexus would not exist. On the issue of adjacency, most courts continue to follow *Riverside Bayview* and hold that wetlands adjacent to navigable waters fall under the CWA’s jurisdiction. The Supreme Court’s rulings in *Rapanos* and *Carabell* should further clarify these aspects of wetlands law. Yet what about those water bodies for which there is no adjacency and only a groundwater hydrological connection?

One would think that with the field observations necessary to prove adjacency and hydrological connections, wetlands jurisdictional issues could not get any more complicated. The case of *Northern California River Watch v. City of Healdsburg*¹²⁴ has proven otherwise, raising the issue of a subsurface, or groundwater, jurisdictional basis in addition to the existing surface hydrological connection.

The court in *Healdsburg* not only held that wetlands and other bodies of waters such as ponds adjacent to navigable waters were jurisdictional, irrespective of hydrologic connections, but also that an aquifer provided an underground connection between the wetlands at issue and the bordering Russian River. Furthermore, the court held that the pond at issue and the subterranean groundwater that flows through it are “tributaries” of the Russian River.¹²⁵ The court noted that “case law is divided over whether the ‘tributary’ prong can be satisfied by *groundwater* as opposed to surface waters,” and also noted the Ninth Circuit has not yet addressed the question.¹²⁶ However, the court found persuasive the line of authority represented in *Idaho Rural*¹²⁷ and concurred with that district court’s finding that the CWA extended federal jurisdiction over groundwater hydrologically connected to navigable surface waters.¹²⁸

As the courts continue to refine and define the limits of wetlands jurisdiction after *SWANCC*, the science of wetlands will play an ever-greater role in the arguments for and against the regulation of wetlands. With this in mind, the next section discusses certain principles of wetlands science and the issue of groundwater connections, particularly with regard to seasonal vernal pools in California.

IV. Wetland Science

“Wetlands are among the most important ecosystems on Earth.”¹²⁹ Wetlands, the “aquatic ecosystem” that *Riverside Bayview*¹³⁰ referred to, are a very unique and complex system formed by just the right combination of hydrology, soils, and plants. If a wetland is an automobile, then hydrology is the engine, soil is the fuel, and plants are the body of the car. There are many kinds of wetlands, just as there are many types of cars, and there are even various definitions of wetlands. For regulatory purposes, all three “parts” are required, but as will be discussed, all three are not required simultaneously. An understanding of the interrelationship especially between hydrology and wetlands has become, and in the opinion of the author, will remain a crucial factor in determining jurisdictional wetlands, whether surface or subsurface hydrologically connected.

A. General Principles

Wetlands have been referred to as the “‘kidneys of the landscape’ because they function as the downstream receivers of waters and waste from both natural and human sources,” acting as filters, flood control, and groundwater recharge.¹³¹ They have also been referred to as “‘biological supermarkets’ because of the extensive food chain and rich biodiversity” of flora and fauna that they support.¹³² They are often thought of as transition zones, or “ecotones,” between uplands such as forests and farmland and water bodies such as rivers, lakes, and estuaries.¹³³

Wetlands, in general, can be divided into seven broad categories: tidal salt marshes; tidal freshwater marshes; mangrove swamps, which are found in coastal wetland ecosystems; non-tidal freshwater marshes; peatlands; freshwater swamps; and riparian/riverine wetlands, which are found in inland wetland ecosystems.¹³⁴ Furthermore, wetlands can be divided into the following systems based on their proximity to water bodies: marine; estuarine; riverine; lacustrine; and palustrine.¹³⁵

Even though litigation has focused primarily on surface hydrological connections, wetlands often form with no visible surface water connection. However, there may be a groundwater connection, such as a seep or spring, that may connect the wetlands hydrologically, and thus suggest a characterization other than “isolated.” One of the primary questions after *SWANCC* is whether there is a sufficient nexus between the wetlands and “waters of the United States.” As a starting point of wetlands identification and jurisdictional determination, therefore, the definition of a wetland should be examined.

The definition of wetlands varies depending upon the purpose for which it is used. “Wetlands are a half-way world between terrestrial and aquatic ecosystems and exhibit

123. *Id.* These types of factual issues could be expected if more courts adopt a broad reading of *SWANCC* in the future.

124. No. C01-04686WHA, 2004 WL 201502 (N.D. Cal. Jan. 23, 2004).

125. *Id.* slip op. at 12.

126. *Id.* See also Andrew John Dalton, Not All Waters Are Regulated Equally: Navigable Water, Ground Water, and the Clean Water Act (2000) (unpublished manuscript, on file with the George Washington University Law School library).

127. 143 F. Supp. 2d at 1169.

128. *Id.* at 1180.

129. WILLIAM J. MITSCH & JAMES G. GOSSELINK, *WETLANDS* 3 (3d ed. 2000).

130. 106 S. Ct. at 455.

131. MITSCH & GOSSELINK, *supra* note 129, at 3.

132. *Id.* at 4.

133. *Id.* at 20.

134. *Id.* at 71.

135. *Id.* at 739.

some of the characteristics of each.”¹³⁶ For ecological studies and inventories, the preferred definition is the one used by the U.S. Fish Wildlife Service (FWS):

Wetlands are lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water... Wetlands must have *one or more* of the following three attributes: (1) at least periodically, the land supports predominantly hydrophytes; (2) the substrate is predominantly undrained hydric soil; and (3) the substrate is nonsoil and is saturated with water or covered by shallow water at some time during the growing season of each year.¹³⁷

Under this definition, only one of three attributes of hydrology, plants, and soils is required. This is the major difference between the FWS definition and the Corps/EPA definition, which requires the presence of all three factors and which is used for wetlands’ delineation and mitigation purposes:

The term “wetlands” means those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.¹³⁸

Hydrology drives the train of wetlands formation,¹³⁹ and the majority of courts in the post-*SWANCC* world seem comfortable using a surface hydrological connection as a nexus for jurisdiction under the CWA. As the Corps’ definition points out, wetlands can be formed from either surface or groundwater sources. Since wetlands require some sort of depression or basin to collect standing water for a sufficient time for soils and plants to develop, wetlands are also greatly influenced by hydrogeomorphology.¹⁴⁰ However, a consultant or project manager for the Corps usually has little or no data about the site’s hydrology, soils, and plants before conducting a site inspection and delineation. In many cases, a shovel is the primary tool to discern the hydrology of the site. So unless the site visit is done during the rainy season, other variables such as soil and plants must be examined to infer the hydrology of the site.

Surface hydrology is complicated by the fact that some streams and creeks flow only during the rainy season. These ephemeral or intermittent streams¹⁴¹ have been held by the courts to satisfy the hydrological nexus requirement.¹⁴² But

what about such things as rills?¹⁴³ And what about sheet flow, surface water flowing across land without any channel or rill? Are these hydrologic connections sufficient for a nexus in the eyes of the courts?

B. Groundwater

Subsurface or groundwater connections to wetlands are likely to be raised in future litigation, and was recently found by the district court in *Healdsburg* to constitute a nexus to “waters of the United States.”¹⁴⁴ The difficulty for regulators and consultants is that unlike surface connections, groundwater cannot be readily observed. However, groundwater is becoming a very important issue in the debate on “isolated” wetlands.

Given that “many wetlands are dependent on a relatively stable influx of ground water throughout changing seasonal and annual weather patterns,”¹⁴⁵ what exactly constitutes groundwater? Water in the ground consists of two zones, the unsaturated zone and the saturated zone.¹⁴⁶ Gravity forces water at the surface to percolate through the soil-water zone into the unsaturated zone.¹⁴⁷ The unsaturated zone contains both air and water in the spaces between the soil particles, which could be gravel, silt, sand, loam, or other soil types. Below the unsaturated zone is the saturated zone, where the spaces are completely filled with water.¹⁴⁸ The water in the saturated zone is known as groundwater, and the highest point where the saturated zone begins marks the water table.¹⁴⁹ Thus, if one digs a 12-inch hole during a wetlands delineation site visit and observes standing water in the bottom of that hole, that marks the height of the water table and the saturated zone.

Water table depth is highly variable and can range from surface level to hundreds of thousands of feet.¹⁵⁰ “Usually, the depth to the water table is short near permanent bodies of surface water such as streams, lakes, and wetlands.”¹⁵¹ The water table depth can be measured by installing wells and piezometers and by making observations over a given period, usually one full year.¹⁵² Unfortunately, the Corps has neither the money nor the resources to install wells to determine water tables for wetland delineations. The Corps will need the assistance of other agencies and institutions if groundwater is to be utilized in the future as providing possible hydrological connections for wetlands jurisdiction purposes.

Just as courts have focused on the movement of pollutants from a wetland via a surface hydrological connection to a

136. *Id.* at 28.

137. *Id.* at 29 (emphasis added). “Hydrophytes” refers to plants adapted to wet conditions.

138. *Id.* at 32 (citing 33 C.F.R. §328.3(b) (1984)). See also U.S. ARMY CORPS OF ENGINEERS, WETLANDS DELINEATION MANUAL (1987), available at <http://www.mvn.usace.army.mil/ops/regulatory/manual.htm> (last visited Feb. 3, 2006).

139. MITSCH & GOSSELINK, *supra* note 129, at 109.

140. *Id.* at 108.

141. Ephemeral streams are comprised of surface runoff only and flow only during and immediately after rainfall or snowmelt. Normally, there are no permanent or well-defined channels, and the water table is always below the bed of the stream. Intermittent streams, on the other hand, flow during the entire rainy season. R.C. WARD, PRINCIPLES OF HYDROLOGY 323-24 (McGraw-Hill 1967).

142. See *Headwaters, Inc. v. Talent Irrigation Dist.*, 243 F.3d 526, 31 ELR 20535 (9th Cir. 2001).

143. Rills are caused by concentrated overland sheet flow and are small enough to be removed by normal tillage. MAIDMONT, *supra* note 86, at 12.46.

144. See *Northern Cal. River Watch v. City of Healdsburg*, No. C01-04686WHA, 2004 WL 201502 (N.D. Cal. Jan. 23, 2004).

145. THOMAS C. WINTER ET AL., GROUND WATER AND SURFACE WATER: A SINGLE RESOURCE, Circular No. 1139 VII (U.S. Geological Survey 1998).

146. *Id.* See also Jack M. Kerns, *Pump It Up: The Legacy and Future of Ground Water in California*, ENVTL. MONITOR (Ass’n Envtl. Prof’ls), Winter 2001, at 5-8.

147. MITSCH & GOSSELINK, *supra* note 129, at 67.

148. *Id.*

149. *Id.*

150. *Id.*

151. *Id.*

152. *Id.* at 151. A piezometer measures the depth of water table.

navigable water, the issue of pollutants moving through a subsurface hydrological connection must be addressed in the groundwater context, which the court recently did in *Healdsburg*.¹⁵³ In very simple terms, gravity forces groundwater to flow from a higher point to a lower point.¹⁵⁴ Groundwater movement can be expressed in an equation known as *Darcy's Law*, which in equation form is as follows:

$$G = kAs$$

Where

G = flow rate of groundwater (volume per unit time)

k = hydraulic conductivity or permeability (length per unit time)

A = groundwater cross-sectional area perpendicular to the direction of flow; and

s = hydraulic gradient (slope of water table or piezometric surface)¹⁵⁵

The hydraulic conductivity, k , is constant and depends on the type of soil. Gravel and sand, for instance, are quite porous and have high values, as opposed to clay, which has a very low value.¹⁵⁶ The hydraulic gradient, s , is simply the slope of the flow of groundwater at the water table. Thus, the greater the value of k or s , the greater the flow rate of groundwater. This becomes very important if a case is to be made based on the groundwater flow of a pollutant. How long is too long for groundwater movement—100 days, 1,000 days, 100 years? Unless Congress and the agencies address this issue, this determination will be for the courts to decide.

The influence of groundwater on wetlands varies from very large on some wetlands to little or no influence on others.¹⁵⁷ “The influence of wetland recharge and discharge on ground water resources has often been cited as one of the most important attributes of wetlands; nor is there sufficient experience with site-specific studies to make many generalizations.”¹⁵⁸ There can be various types of groundwater connections to wetlands, including seeps or springs,¹⁵⁹ that provide subsurface water to wetlands when wetlands are below the water table.¹⁶⁰ Wetlands can also “recharge” groundwater when they are above the water table.¹⁶¹ One paper has deemed these “geographically isolated wetlands,” completely surrounded by upland and having no surface connection.¹⁶² These include prairie pothole wetlands, West Coast vernal pools, desert springs, and kettlehole bogs in glaciated regions.¹⁶³ In the case of vernal pools, discussed below, there is little connection between the wetland and groundwater because the wetland is perched atop a fairly imperme-

able layer of soil, such as clay, preventing the downward percolation of water.¹⁶⁴ On the other hand, areas of past glaciation, such as karsts, are very likely to have a subsurface hydrological connection with navigable waters.¹⁶⁵ Topography plays an important role in wetland formation, and while most of these geographically isolated wetlands occur in depressions, some form on broad flats or, in the case of a seep, on a slope.¹⁶⁶

Aside from the uncertainty of whether a groundwater connection can serve as a nexus for jurisdictional purposes, there are practical issues to consider. Groundwater is difficult to measure, requiring dedication of resources. Some areas of the country are more likely to have a groundwater connection between wetlands and navigable waters than others. However, there is a general lack of data in this field. If a case is to be made that a groundwater connection between a wetland and a navigable water exists, there is little question that it must be well documented and fully supported by the record. With limited resources, that is a tall order for most agencies.

C. Vernal Pools

Vernal pools occur quite often in California and the Pacific Northwest, and to a lesser extent in other areas of the country, including the Midwest.¹⁶⁷ They are seasonal wetlands, barely discernable in the dry season and flooded during the rainy season. In the Central Valley, San Diego, the San Francisco Bay Area, and the Santa Rosa Plain of California, vernal pools sit atop a hard clay pan layer of soil that traps water from percolating into the soil, thereby creating a “pool” of water during the wet season.¹⁶⁸ Vernal pools can be defined as

a subset of ephemeral wetlands that are generally small, form reliably (excepting perhaps the driest years) in a permanent basin (thus excluding more dynamic riparian-associated pools and disturbance-related road ruts), and which also dry reliably so that a large portion of the basin has a level of moisture at least as dry as that of the surrounding uplands.¹⁶⁹

Since vernal pools have a dry and wet period, plants become extremely significant in identifying vernal pools, and “[s]omeone taken to view a vernal pool in late summer sees not a pond but a dessicated basin. The expert can accept the poolness of this habitat, but the obvious discrepancy could be ammunition for the unscrupulous who wish to make a mockery of preserving ‘dried up puddles.’”¹⁷⁰ However, this temporary aquatic habitat is “the primary or exclusive habitat for a rich array of highly specialized organisms.”¹⁷¹

153. See *supra* note 124 and accompanying text.

154. In reality, groundwater movement is three-dimensional, and movement can be quite complex. See WINTER ET AL., *supra* note 145, at 3-4.

155. MITSCH & GOSSELINK, *supra* note 129, at 134.

156. See *id.* at 138.

157. *Id.* at 134.

158. *Id.*

159. Springs and seeps are discharge areas where groundwater moves out of sediments or rocks to the surface. Springs are rapid flows that are often visible, whereas seeps are slow flowing. LAURA L. SANDERS, A MANUAL OF FIELD HYDROGEOLOGY 41 (Prentice Hall 1998).

160. See *id.*

161. See *id.*

162. Ralph W. Tiner, *Geographically Isolated Wetlands of the United States*, 23 WETLANDS 494, 495 (2003).

163. *Id.* at 496.

164. See *id.*

165. E-mail from Dan Martel, Wetlands Specialist, U.S. Army Corps of Engineers, to Jack Kerns (Apr. 29, 2005) (on file with author).

166. *Id.*

167. Paul H. Zedler, *Vernal Pools and the Concept of “Isolated Wetlands,”* 23 WETLANDS 597, 597-98 (2003).

168. Based on discussions with staff of the Corps’ regulatory branch and on the author’s personal observations.

169. Zedler, *supra* note 167, at 598.

170. *Id.*

171. *Id.* at 599. These “highly specialized organisms” can include such things as the aptly named vernal pool fairy shrimp and other endangered species. See also Tiner, *supra* note 162, at 509.

When a vernal pool is delineated, the question then becomes whether a hydrologic connection exists that would bring it within CWA jurisdiction.

The most obvious connection is evidence of surface water flowing from the wetland to “waters of the United States,” such as a ditch or a dry stream. However, many vernal pools are “geographically isolated” or flow into other nearby vernal pools, and, thus, the question is whether there is some subsurface hydrological connection. Many vernal pools in the San Francisco Bay Area sit atop a one- or two-foot clay hard pan, effectively blocking the migration of surface water to groundwater or groundwater to the surface. “In California, the vernal pools mostly have a ‘top-down’ hydrology, with water collecting in the basins and creating a locally perched water table above a soil horizon of very low hydraulic conductivity.”¹⁷² Thus, it is difficult to argue that a pollutant from a vernal pool would percolate to the water table and eventually discharge into a navigable water under these circumstances.

Some have suggested that during heavy rainfalls, water networks can form that connect vernal pools with one another and drain to navigable waters, thus forming a hydrological connection to U.S. waters.¹⁷³ Given the hydrogeomorphology of vernal pools, the clay pan beneath the surface causes soils to become saturated rather quickly during periods of heavy precipitation. As a result, water levels rise rapidly above the surface, connecting various vernal pools to one another. The rising water volume seeks an outlet, flows toward a discharge point, and eventually drains into a navigable water, possibly via culverts or ditches. Is this a sufficient nexus? How frequently must this connection occur? Does it have to occur once or twice during a rainy season? Once in five years? Once in 10 years? Again, the courts may eventually be forced to decide this question.

V. Conclusion

Clearly, federal wetlands jurisdiction has been a battleground since the *SWANCC* decision. As mentioned at the outset, the Supreme Court is poised to make further rulings on wetlands jurisdiction this spring. Developers and property rights advocates will likely argue that *SWANCC* radically redefined the limits of the CWA and wetlands jurisdiction. Agencies and environmental groups, on the other hand, will argue that the scope of *SWANCC*'s impact was more narrow. To date, the majority of circuits have adopted a test of a surface hydrological connection from a wetland to a traditional navigable water in order to satisfy the nexus requirement of the Commerce Clause as set forth by *SWANCC*. The logic of pollutant flow from a wetland through the hydrological connection to the navigable water is powerful, especially in light of the purpose of the CWA to restore the integrity of the nation's waters.

There are courts, however, that read *SWANCC* quite broadly, ignoring the environmental effects and reducing the permit burdens on developers and property rights advocates. These courts look to the traditional test of navigability and what they perceive as congressional intent. Water pollution control is a secondary or nonexistent factor to these courts.

At the present time, the Corps must carefully document the hydrological and ecological connections observed during site visits. Even in a jurisdiction that supports the hydrological connection theory, opponents will attempt to show no connection in fact exists. Actual water flows, and in the case of ephemeral streams, evidence of flow, must be noted as contemporaneous agency documentation. It is crucial that the direction and path of the flow be traced from the wetlands all the way to navigable waters in order to demonstrate to the court that pollutants could flow from the wetlands to navigable waters; otherwise, the agency risks having the court declare that a nexus does not exist. The case law strongly suggests that more and more opponents of regulation will attack the administrative record, arguing that a sufficient nexus of a hydrological connection does not exist. Thus, the duration of flow, the evidence of flow, whether the wetland is a channel or a rill, and other such issues will continue to be factors examined in litigation. In the case of adjacency, the regulations do not indicate any need for a hydrological connection when a wetland is separated from a navigable water by a berm or other such obstruction, yet the case law suggests that at least some sort of connection is required. Nevertheless, while some adjacent wetlands may not have an apparent hydrologic connection, they may have some sort of ecologic connection, such as plants, soils, or habitat. Thus, it is again vital that agencies document the administrative record, noting ecologic as well as hydrologic connections that may be cited to the court in the event of litigation. It may well be these ecologic connections, in addition to historic hydrologic connections, may be enough to satisfy the nexus requirements.

The issue of groundwater looms beneath the surface, and sooner or later it will become the focus of litigation. Wetlands science suggests that groundwater issues relating to wetlands are very site- and region-specific, especially in regions of karsts and former glaciated areas.¹⁷⁴ There seems to be a very credible argument that groundwater in these regions can serve as an underground hydrologic connection, as was certainly the case in *Healdsburg*. Conversely, the argument of a groundwater connection does not seem very plausible for most vernal pools, which are formed above a hard clay pan surface. Unless one can prove that these pools overflow on at least an intermittent basis into navigable waters, it is not likely such water bodies will fall under the CWA's jurisdictional reach. Courts, unless directed otherwise by Congress, will also have to sort out the issue of how long it takes pollutants to travel through groundwater. A few days or months may seem reasonable for demonstrating a nexus. However, years as a measurement of a pollutant's travel time may be unrealistic to some courts, especially when compared to the time it takes for a pollutant to travel in surface water.

No one can deny that these are interesting times for federal wetlands regulation. *SWANCC* reignited a debate over the basic tenets of wetlands jurisdiction, and in response, judges were forced to choose between environmental protection and property rights. As a means to lessen the impact of *SWANCC*, many courts endorsed the hydrologic connection test, even though wetlands in some instances were miles from the traditionally navigable waters. And so far, the Corps' adjacency regulations have withstood challenge.

172. Zedler, *supra* note 167, at 599; Tiner, *supra* note 162, at 509.

173. E-mail from Dan Martel, Wetlands Specialist, U.S. Army Corps of Engineers, to Jack Kerns (June 10, 2005) (on file with author).

174. *Id.* See also Tiner, *supra* note 162, at 496, 507.

This spring, the Supreme Court will hear cases concerning both of these issues. Whether an argument could be made for hydrological connections between a wetland and navigable waters via groundwater may depend in part upon the rulings of the Supreme Court, even though the issues are not directly before the Court. However, it may take another round of litigation before the Supreme Court ultimately answers this question. If the Court does further restrict federal jurisdiction, wetlands such as vernal pools, prairie potholes, and other valuable habitat may be further exposed to destruction

without regulatory oversight. It is telling that public support for the protection of wetlands is evident from comments EPA and the Corps received on their advanced notice of proposed rulemaking on the definition of “waters of the United States.”¹⁷⁵ Out of a sample of 135 comments of the total received, only 8 were in favor of less protection for wetlands. But at this time, it is up to nine Justices to decide how wetlands will fare in the future.

175. 68 Fed. Reg. 1991 (Jan. 15, 2003).