BEFORE THE U.S. ENVIRONMENTAL PROTECTION AGENCY

PETITION TO ADOPT A REBUTTABLE PRESUMPTION THAT LARGE CAFOs USING WET MANURE MANAGEMENT SYSTEMS ACTUALLY DISCHARGE POLLUTANTS UNDER THE CLEAN WATER ACT

Alabama State Association of Cooperatives, Alianza Nacional de Campesinas, Alliance for the Great Lakes, American Indian Movement Interpretive Center, American Rivers, Anthropocene Alliance, Assateague Coastkeeper, Black Warrior Riverkeeper, California Coastkeeper Alliance, Cape Fear River Watch, Catskill Mountainkeeper, Central California Environmental Justice Network, Clean Water Action, Coachella Valley Waterkeeper, Community Water Center, Concerned Citizens of Tillery, Conservation Law Center, Cortland-Onondaga Federation of Kettle Lake Associations, Earthjustice, Endangered Habitats League, Environment America, Environmental Law and Policy Center, Environmental Working Group, FLOW (For Love Of Water), Friends of the Earth, Friends of Toppenish Creek, GreenLatinos, Healthy Gulf, Hoosier Environmental Council, Humane Society of the United States, Illinois Environmental Council, Inland Empire Waterkeeper, Leadership Counsel for Justice and Accountability, Milwaukee Riverkeeper, Missouri Coalition for the Environment, Missouri Confluence Waterkeeper, Natural Resources Defense Council, North Carolina Conservation Network, Ohio Environmental Council, Orange County Coastkeeper, Our Children's Earth Foundation, Our Santa Fe River, Rural Coalition, Rural Empowerment Association for Community Help, San Francisco Baykeeper, Sierra Club, Snake River Waterkeeper, Three Fires Spiritual and Cultural Education Society, Waterkeeper Alliance, Waterkeepers Chesapeake, Waterway Advocates, Yadkin Riverkeeper

PETITIONERS

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EXECUTIVE SUMMARY

Concentrated animal feeding operations ("CAFOs")—industrial meat, dairy, and poultry production facilities that hold many hundreds or thousands of animals in close confinement—pollute the nation's water, contaminate its air, generate and spread dangerous pathogens, and exacerbate climate change. As a result, CAFOs cause serious, well-documented harm to humans, wildlife, and the environment. The burdens of CAFO pollution fall disproportionately on communities of color, low-income communities, and under-resourced rural communities. Yet, despite causing serious and disproportionate harm, the CAFO industry largely escapes regulation under the nation's key environmental statutes. This petition urges the U.S. Environmental Protection Agency ("EPA" or "Agency") to take a critical first step toward improving oversight of CAFOs, reducing harmful pollution, and correcting CAFOs' widespread failure to comply with the clear requirements of the Clean Water Act ("CWA" or "Act") by adopting a rebuttable presumption that Large CAFOs using wet manure management systems actually discharge water pollution and, thus, must apply for permits under the CWA.[1]

EPA admits that many CAFOs currently discharge water pollution without permits issued under the CWA, in violation of federal law.[2] CWA permits are key to "advanc[ing] the Act's objectives[,] including the ambitious goal that water pollution be not only reduced, but eliminated," because they "place important restrictions on the quality and character" of authorized water pollution.[3] And Congress plainly required CAFOs to obtain CWA permits before discharging water pollution to the nation's navigable waters.[4] However, although there are at least 21,237 Large CAFOs across the country, only about 6,200 CAFOs hold CWA permits.[5] The majority of Large CAFOs thus lack water pollution permits altogether or operate under state laws and permits that, as compared with permits issued under the CWA, typically are

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[1] This request is distinct from the requests in a separate petition submitted to EPA by a different group of petitioners on March 8, 2017. As such, this petition is not a supplement to the March 8, 2017 petition.
[2] *See* EPA, *EPA Legal Tools to Advance Environmental Justice* 75 (2022), https://www.epa.gov/system/files/documents/2022-05/EJ%20Legal%20Tools%20May%202022%20FINAL.pdf.
[3] *Waterkeeper All., Inc. v. EPA*, 399 F.3d 486, 491 (2d Cir. 2005).
[4] *See* 33 U.S.C. §§ 1311(a), 1342(a), 1362(12), 1362(14).
[5] *See* EPA, *NPDES CAFO Permitting Status Report: National Summary, Endyear 2021, completed 07/20/22*, https://www.epa.gov/system/files/documents/2022-07/CAFO%20Status%20Report%202021.pdf. Although EPA's permitting status report is somewhat unclear, Petitioners conclude that EPA's estimate reflects the total number of Large CAFOs in the country, rather than the total number of CAFOs of any size, based on footnote one of the report, as well as records received from EPA in response to a Freedom of Information Act request. However, EPA's estimate is likely low. A review of EPA's CAFO data, along with publicly available CAFO data, found that EPA undercounted the number of CAFOs in at least nine states. *See* Jon Devine & Valerie Baron, *CAFOs: What We Don't Know Is Hurting Us*, Nat. Res. Def. Council at 11–12 (2019), https://www.nrdc.org/sites/default/files/cafos-dont-know-hurting-us-report.pdf. The reviewers thus concluded that "EPA may have significantly underestimated the number of CAFOs" in the country. *Id.* at 5.

less protective of water quality, offer less transparency, and provide fewer opportunities for public participation.

As EPA emphasized in a May 2022 report, CAFOs cause grave harms that disproportionately burden environmental justice communities, and existing regulations fail to achieve necessary protections.[6] This report is a recent entry in the large, well-established, and growing body of evidence showing that CAFOs cause serious harm to human health, degrade the environment, and disproportionately burden communities of color and low-income communities. To combat these long-standing and pervasive problems, EPA proposed "explor[ing] its authority to improve the effectiveness of [its] CAFO regulations."[7] This petition does just that, and it identifies a clear first step. Based on EPA's authority—and responsibility—under the CWA and executive orders aimed at advancing environmental justice, the petition proposes a significant improvement to EPA's CAFO regulations that will expand protections against water pollution, increase transparency and public participation in CAFO permitting, and support enforcement of permit violations.

Petitioners—a nationwide coalition of citizens' groups and community advocacy, environmental justice, and environmental advocacy organizations—are pleased to submit this petition asking EPA to establish a rebuttable presumption that Large CAFOs using wet manure management systems actually discharge water pollution and, thus, must apply for CWA permits.[8] In support of this request, Petitioners summarize decades of well-established scientific research;[9] present a new report on disparities in exposure to CAFO pollution, which, to Petitioners' knowledge, is the first to describe the disproportionate burdens that CAFOs impose on environmental justice communities in California's Central Valley; and include declarations from individuals who live near CAFOs, along with environmental and community advocates who have extensive experience with the harms CAFOs cause. These declarants tell a story that is common in communities across the country where CAFOs are concentrated—CAFOs "create

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[6] *See* EPA, *EPA Legal Tools to Advance Environmental Justice*, *supra* note 2, at 75.
[7] *Id.*
[8] Petitioners use EPA's regulatory definition of a "Large CAFO." *See* 40 C.F.R. § 122.23(b)(4). CAFOs using wet manure management systems, also called "liquid manure handling systems," are "operation[s] [where] animals are raised outside with swimming areas or ponds, or with a stream running through an open lot, or in confinement buildings where water is used to flush the manure to a lagoon, pond, or some other liquid storage structure." EPA, *NPDES Permit Writers' Manual for Concentrated Animal Feeding Operations* at Glossary-10 (2012), https://www.epa.gov/sites/default/files/2015-10/documents/cafo_permitmanual_entire.pdf.
[9] Examples of this scientific research are summarized in the annotated bibliography attached as Exhibit 1.

serious water contamination problems,"[10] produce "a very sharp and pungent industrial-type odor,"[11] "destroy[] small farms,"[12] and "break[] up communities."[13]

Although CAFOs of all types and sizes pollute the nation's waters, Large CAFOs using wet manure management systems—that is, predominately Large CAFOs that confine swine and dairy cows[14]—are an especially significant source of water pollution. Nationwide, relatively few Large CAFOs confine the majority of swine and dairy cows produced in the country, and these facilities generate an outsize share of manure. For instance, according to data collected by the U.S. Department of Agriculture ("USDA"), only five percent of swine facilities confine more than 5,000 swine each.[15] But together, those operations confine 73 percent of all swine produced in the country.[16] As for dairy cow facilities, only four percent confine more than 1,000 dairy cows, but those operations account for 50 percent of all dairy cows.[17] **As of 2012, Large CAFOs *alone* generated 404 million tons of manure[18]—that is, over 20 times the amount of**

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[10] Decl. of Sonja Trom Eayrs ¶ 12, attached as Exhibit 2.
[11] Decl. of David Carter ¶ 7, attached as Exhibit 3.
[12] Decl. of Kathy Tyler ¶ 8, attached as Exhibit 4.
[13] *Id.*
[14] A swine operation is a Large CAFO if it confines 2,500 or more swine weighing 55 pounds or more or if it confines 10,000 or more swine weighing less than 55 pounds. *See* 40 C.F.R. § 122.23(b)(4). A dairy cow operation is a Large CAFO if it confines 700 or more mature dairy cows. *Id.*
[15] *See* U.S. Dep't Agric., *2017 Census of Agriculture* 23, Tbl. 19 (2019), https://www.nass.usda.gov/Publications/AgCensus/2017/Full_Report/Volume_1,_Chapter_1_US/usv1.pdf. Because EPA does not provide publicly available data on the number of Large CAFOs by animal type or individual CAFO size, Petitioners use data from the USDA Census of Agriculture. USDA does not use EPA's thresholds for Large CAFOs when it collects data for the Census of Agriculture. As relevant here, USDA collects data on swine operations with 2,000 to 4,999 swine and 5,000 or more swine. *Id.* Operations in the latter range are most likely to meet EPA's definition of a Large swine CAFO, which includes operations that confine 2,500 or more swine weighing 55 pounds or 10,000 or more swine weighing less than 55 pounds. 40 C.F.R. § 122.23(b)(4). However, for operations that confine 2,000 or more swine, it is also the case that they make up a small percentage of all swine operations but confine the majority of swine raised for food production. As of 2017, only 12 percent of all swine operations (8,324 operations) confined more than 2,000 swine, but those operations confined 94 percent of all swine on farms. *See* USDA, *2017 Census of Agriculture* 23, Tbl. 19 (2019).
[16] *See id.*
[17] *See* USDA, *2017 Census of Agriculture* 23, Tbl. 17 (2019). As relevant here, USDA collects data on dairy cow operations that confine 500 to 999 cows and 1,000 or more cows. *Id.* EPA defines a Large dairy cow CAFO as one that confines 700 or more mature dairy cows. 40 C.F.R. § 122.23(b)(4). For dairy operations that confine 500 or more cows, those operations made up only 6.4 percent (3,464 operations) of all dairy farms, but they accounted for 66 percent of all dairy cows on farms. *See* USDA, *2017 Census of Agriculture* 23, Tbl. 17 (2019).
[18] *See* Noel R. Gollehon et al., USDA, *Estimates of Recoverable and Non-Recoverable Manure Nutrients Based on the Census of Agriculture—2012 Results*, at 9, Tbl. 2 (2016). This number does not include the manure produced by pastured livestock on Large CAFOs.

fecal wet mass produced by all humans in the United States.[19] Storing, transporting, and disposing of this waste using wet manure management systems routinely and predictably results in water pollution.

EPA's current approach to permitting Large CAFOs using wet manure management systems, which depends on self-reporting by polluters, falls short of what is required to protect communities and the environment in at least two significant ways. ***First*, EPA's approach violates the CWA.** The CWA makes clear that CAFOs are subject to the Act's prohibition on discharges of pollutants from point sources to the nation's navigable waters, except as authorized by a permit.[20] This prohibition means that EPA must "either [] issue a permit for [a CAFO's] discharge of the pollutant or [] enforce the total proscription on discharge[s]."[21] However, EPA and state agencies are failing to accomplish either directive. Indeed, in four of the top five swine-producing states and two of the top five dairy cow-confining states, fewer than ten percent of CAFOs have CWA permits.[22] Yet, ample evidence shows that CAFOs in these states and across the country are causing extensive water pollution.[23]

***Second*, EPA's approach fails to implement executive orders dedicated to advancing environmental justice.** Executive Order 12,898 requires EPA to collect data on environmental justice problems, address those problems, and ensure that environmental justice communities are able to participate in its activities.[24] Executive Order 14,008 requires EPA to strengthen enforcement of environmental violations that disproportionately harm environmental justice communities.[25] EPA recently reiterated that these Executive Orders require federal, state, and local environmental permitting programs to "integrate environmental justice . . . into relevant environmental permitting processes."[26] Nonetheless, EPA acknowledges that its current approach to CAFO permitting allows many CAFOs that discharge water pollution to operate without permits altogether or according to state laws and permits that fail to collect standardized

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[19] This figure assumes roughly 149 grams/person/day fecal wet mass (0.06 tons/person/year) and a U.S. population of 332,917,628. *See* C. Rose et al., *The Characterization of Feces and Urine: A Review of the Literature to Inform Advanced Treatment Technology*, 45 Critical Revs. Env't Sci. & Tech 1827 (2015); *See U.S. and World Population Clock*, U.S. Census Bureau, https://www.census.gov/popclock/, for current population (accessed Nov. 2021).
[20] *See* 33 U.S.C. §§ 1311(a), 1342(a), 1362(12), 1362(14).
[21] *L.A. Waterkeeper v. Pruitt*, 320 F. Supp. 3d 1115, 1122 (C.D. Cal. 2018); *see Nat. Res. Def. Council v. Costle*, 568 F.2d 1369, 1375 (D.C. Cir. 1977); *see also Nw. Env't Advocs. v. EPA*, 537 F.3d 1006, 1021–22 (9th Cir. 2008).
[22] *See infra* Section III.A.1.
[23] *See infra* Section III.A.3.
[24] *See* Exec. Order No. 12,898.
[25] *See* Exec. Order No. 14,008.
[26] EPA, *Interim Environmental Justice and Civil Rights in Permitting Frequently Asked Questions* 1 (2022), https://www.epa.gov/system/files/documents/2022-08/EJ%20and%20CR%20in%20PERMITTING%20FAQs%20508%20compliant.pdf.

information, protect water quality, allow for meaningful public participation, or provide for citizen suits, which enable CAFO neighbors and other advocates to enforce permit violations.[27]

Due in part to EPA's failure to implement these executive orders, longstanding disparities in exposure to CAFO pollution persist. According to a recent study, in North Carolina, the percentage of Black, Hispanic, and American Indian residents living within three miles of a Large swine CAFO is 1.42, 1.57, and 2.20 times higher, respectively, than the percentage of non-Hispanic Whites.[28] **If people of all races and ethnicities in the North Carolina study area were exposed to Large swine CAFOs at the same rate, then approximately 53,000 fewer Black residents, 29,400 fewer Hispanic residents, and 16,000 fewer American Indian residents would live within three miles of a Large swine CAFO in North Carolina.**[29] Similarly, in California's Central Valley, the percentage of Hispanic residents living within three miles of a Large dairy cow CAFO is 1.54 times higher than the percentage of non-Hispanic Whites.[30] **If Hispanic people were exposed to Large dairy cow CAFOs at the same rate as White non-Hispanic people, then approximately 227,600 fewer Hispanic people would live within three miles of a Large dairy cow CAFO in California's Central Valley.**[31] And in Iowa, 99.48 percent of all Large swine CAFOs are located in the most rural census tracts, which have the least access to grocery stores, physicians, and hospitals—meaning that people living in those communities might be more susceptible to harm from CAFO pollution and less able to seek help.[32]

To comply with the CWA and environmental justice executive orders, EPA should adopt a rebuttable presumption that Large CAFOs using wet manure management systems actually discharge pollutants. It is well settled that administrative agencies may establish presumptions,[33] and an agency's presumption is lawful if there is "a sound and rational connection" between the proved facts, which trigger the presumption, and the inferred facts, which follow.[34] A sound and rational connection is present "when 'proof of one fact renders the existence of another fact so probable that it is sensible and timesaving to assume the truth of [the inferred] fact . . . until the adversary disproves it.'"[35]

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[27] *See infra* Sections III.B.2 & III.B.3.
[28] *See* Arbor J.L. Quist et al., *Disparities of Industrial Animal Operations in California, Iowa, and North Carolina* 5 (2022) ("Quist Report"), attached as Exhibit 5.
[29] *Id.*
[30] *Id.*
[31] *Id.*
[32] *Id.* at 18, Tbl. 4.
[33] *See Chemical Mfrs. Ass'n v. Dep't of Transp.*, 105 F.3d 702, 705 (D.C. Cir. 1997); *see also Cole v. U.S. Dep't of Agric.*, 33 F.3d 1263, 1267 (11th Cir. 1994) ("The law is well established that presumptions may be established by administrative agencies[.]").
[34] *Chemical Mfrs. Ass'n*, 105 F.3d at 705.
[35] *Id.* (quoting *NLRB v. Curtin Matheson Sci., Inc.*, 494 U.S. 775, 788–79 (1990)) (some internal quotation marks omitted).

As described in detail in this petition, there is a sound and rational connection between Large CAFOs using wet manure management systems and actual discharges. CAFOs using wet manure management systems store urine, feces, and other waste in liquid form in vast pits or large tanks. These CAFOs often use pipes to transport the liquid waste from one location to another, and they typically dispose of the waste by applying it to fields. Using these practices to store, transport, and dispose of massive quantities of waste predictably causes discharges, and these discharges are likely to occur with increasing frequency due to climate change. Large CAFOs using wet manure management systems are an especially significant source of discharges from waste storage, transport, and disposal. **Indeed, a USDA study shows that the *majority* of Large CAFOs generate more manure nutrients than they can feasibly apply to fields at USDA-recommended rates meant to prevent discharges of water pollution.**[36] In other words, the most convenient, affordable strategy for waste disposal available to Large CAFOs likely causes discharges. In addition, the requested presumption is a sensible and timesaving device in light of the difficulty EPA and state agencies face in proving actual discharges on a CAFO-by-CAFO basis and the fact that Large CAFO operators are well-positioned to rebut the presumption in the rare instances in which no discharges occur.

Adopting the requested presumption will protect human health and the environment, while advancing the objectives of the CWA and environmental justice executive orders. The presumption will require Large CAFOs using wet manure management systems to apply for CWA permits or present evidence showing that they do not actually discharge pollutants. It would ensure that discharging CAFOs obtain CWA permits, an important outcome in light of the demonstrated failure of EPA and state governments to control water pollution from CAFOs. And, because CWA permits typically offer increased protections, transparency, and opportunities for public participation, the presumption will benefit people living near CAFOs and help EPA implement the environmental justice goals in Executive Orders 12,898 and 14,008.

Not only does the requested presumption meet the legal requirements for agency presumptions, but it also comports with case law clarifying the circumstances in which EPA may require a CAFO to apply for a CWA permit. Indeed, in 2005, the U.S. Court of Appeals for the Second Circuit expressly raised the prospect of a presumption that Large CAFOs actually discharge, stating that "such a prophylactic measure may be necessary to effectively regulate water pollution from Large CAFOs."[37] As this petition shows, in the nearly 20 years since the Second Circuit's decision, evidence has continued to grow, leaving little question that Large CAFOs using wet manure management systems actually discharge and that a presumption of discharge is necessary to regulate their discharges.

In sum, EPA's current approach to CAFO permitting exposes millions of people to harm, in violation of the CWA and executive orders aimed at advancing environmental justice. By contrast, the requested presumption is fair, legally sound, and protective of communities.

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[36] *See* Gollehon et al., *Estimates of Recoverable and Non-Recoverable Manure Nutrients Based on the Census of Agriculture—2012 Results* 19, Tbl. 7 (2016).
[37] *Waterkeeper All., Inc.*, 399 F.3d at 506, n.22.

Indeed, the requested presumption does nothing more than ensure that discharging CAFOs comply with existing requirements under the CWA. Petitioners urge EPA to act swiftly to adopt this presumption, advance environmental justice, and fulfill the CWA's promise to restore and maintain the nation's waters.

INTRODUCTION

Across the country, CAFOs generate staggering quantities of pollution that cause serious harm to humans, wildlife, and the environment. The burdens of this pollution fall disproportionately on communities of color, low-income communities, and under-resourced rural communities. EPA has known of these problems for decades. Indeed, EPA recently reiterated that "many waters are affected by pollutants from CAFOs," and these pollutants cause environmental injustice.[38] Nonetheless, as described below, EPA is failing to fulfill its legal responsibilities to regulate CAFOs that discharge water pollution. Because of EPA's failure, CAFOs continue to pollute the nation's waters, evade government and public oversight, and largely escape consequences for the harms they cause. Petitioners' members and supporters, along with millions of other people in the United States, suffer as a result. In their words, "CAFOs are industrial facilities, and they pollute on an industrial scale."[39] CAFOs "threaten every ecosystem in [a] watershed,"[40] "put many small farms . . . out of business,"[41] and cause "irreparable rift[s] in the community."[42] For the reasons that follow, Petitioners urge EPA to establish a rebuttable presumption that Large CAFOs using wet manure management systems actually discharge water pollution and, thus, must apply for CWA permits.

I. FACTUAL BACKGROUND

Meat and dairy production in the United States today looks very different than it did just 40 years ago.[43] While most animals were once raised on small, diversified, and independent farms, they are now primarily produced in massive, industrial CAFOs. For example, according to USDA, in 1987, only eight percent of swine were held in facilities with 5,000 or more swine.[44] By 2017, that percentage had increased ninefold; 73 percent of swine were held in facilities with 5,000 or more swine.[45] Likewise, the percentage of dairy cows held in facilities with 500 or more cows has grown dramatically, increasing from nine percent in 1987 to 61 percent in 2017.[46]

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[38] *See* EPA, *EPA Legal Tools to Advance Environmental Justice*, *supra* note 2, at 75.
[39] Decl. of Larry Baldwin ¶ 7, attached as Exhibit 6.
[40] Decl. of Kathryn Bartholomew ¶ 3, attached as Exhibit 7.
[41] Decl. of Edith Haenel ¶ 11, attached as Exhibit 8.
[42] Decl. of Jean Lappe ¶ 14, attached as Exhibit 9.
[43] *See* James M. MacDonald & William D. McBride, U.S. Dep't of Agric., *The Transformation of U.S. Livestock Agriculture: Scale, Efficiency, and Risks* at 1, 5 (2009), https://www.ers.usda.gov/webdocs/publications/44292/10992_eib43.pdf?v=0; *see also* James M. MacDonald, *Tracking the Consolidation of U.S. Agriculture*, 42 Applied Econ. Persps. & Pol'y 361, 370, Tbl. 3 (2020).
[44] *See* U.S. Dep't of Commerce, *1987 Census of Agriculture* 30, Tbl. 32 (1989), https://agcensus.library.cornell.edu/wp-content/uploads/1987-United_States-1987-01-full.pdf.
[45] *See* USDA, *2017 Census of Agriculture* 23, Tbl. 19 (2019).
[46] *See* U.S. Dep't of Commerce, *1987 Census of Agriculture* 30, Tbl. 30 (1989); *see also* USDA, *2017 Census of Agriculture* 23, Tbl. 17 (2019). Because EPA does not provide publicly available data on the number of Large CAFOs by animal type or individual CAFO size, Petitioners use data from the USDA Census of Agriculture. USDA does not use EPA's thresholds for Large CAFOs when it collects data for the Census of Agriculture; instead, it collects data on swine operations with 2,000 to 4,999 swine and 5,000 or more swine, and dairy cow operations with 500 or more cows.

As detailed in this petition, environmental regulations have not kept pace with the transformation of the meat and dairy industry, leaving a significant number of industrial facilities largely unregulated. Without adequate regulation, CAFOs cause a tremendous amount of pollution that harms humans, wildlife, and the environment.

There are now at least 21,237 Large CAFOs across the country.[47] These CAFOs generate a staggering amount of urine and feces. As of 2012, Large CAFOs alone generated over 20 times the amount of fecal wet mass produced by humans in the United States,[48] totaling 404 million tons of manure.[49] Given that meat and dairy production has continued to shift toward large facilities since 2012,[50] the amount of manure produced at Large CAFOs has almost certainly increased. A single CAFO can generate more waste than an entire city. For example, according to the U.S. Government Accountability Office, a dairy CAFO "meeting EPA's large CAFO threshold of 700 dairy cows can create about 17,800 tons of manure annually, which is more than the about 16,000 tons of sanitary waste per year generated by the almost 24,000 residents of Lake Tahoe, California."[51] And, as of 2007, all of the breeding and market swine in North Carolina together generated over 17 million tons of manure annually,[52] which is more than the amount of sanitary waste generated each year by the residents of New York and South Carolina combined.[53] Unlike human waste, however, CAFO waste generally is not treated or disinfected prior to disposal.

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[47] *See* EPA, *NPDES CAFO Permitting Status Report: National Summary, Endyear 2021, completed 07/20/22*, *supra* note 5.
[48] *See* sources cited *supra* note 19.
[49] *See* Gollehon et al., *supra* note 18 at 9, Tbl. 2.
[50] For example, between 2012 and 2017, the total number of swine held in facilities with 5,000 or more swine increased from 44.7 million to 52.7 million, and the percentage of all swine held in facilities of that size increased from 68 percent to 73 percent. *See* USDA, *2017 Census of Agriculture* 23, Tbl. 19 (2019). Similarly, between 2012 and 2017, the total number of dairy cows held in facilities with 1,000 or more cows increased from 7.7 million to 8.95 million, and the percentage of all dairy cows held in facilities of that size increased from 44 percent to 50 percent. *See* USDA., *2012 Census of Agriculture* 21, Tbl. 17 (2014); USDA, *2017 Census of Agriculture* 23, Tbl. 17 (2019).
[51] U.S. Gov't Accountability Office, *Concentrated Animal Feeding Operations: EPA Needs More Information and a Clearly Defined Strategy to Protect Air and Water Quality from Pollutants of Concern* 19 (2008), https://www.gao.gov/assets/gao-08-944.pdf.
[52] *See* EPA, *Literature Review of Contaminants in Livestock and Poultry Manure and Implications for Water Quality*, at 114, Tbl. A-5 (2013), https://nepis.epa.gov/Exe/ZyPDF.cgi/P100H2NI.PDF?Dockey=P100H2NI.PDF.
[53] According to the U.S. Government Accountability Office, a person generates 3.72 pounds of sanitary waste per day. *See* U.S. Gov't Accountability Office, *Concentrated Animal Feeding Operations: EPA Needs More Information and a Clearly Defined Strategy to Protect Air and Water Quality from Pollutants of* Concern 58 (2008), https://www.gao.gov/assets/gao-08-944.pdf. The population of New York is 19,835,913, and the population of South Carolina is 5,190,705. *See* U.S. Census Bureau, *Quick Facts*, https://www.census.gov/quickfacts/fact/table/US/PST045219 (enter "New York" and "South Carolina" in the search bar).

As described below, the manure and other pollutants generated at CAFOs across the country pollute the nation's water, contaminate its air, generate and spread dangerous pathogens, and exacerbate climate change. Each of these harms contributes to the burden that CAFOs impose on communities, particularly communities of color, low-income communities, and rural communities. EPA and other agencies consistently have allowed CAFOs to escape regulation necessary to curb each of these harms, which heightens the importance of EPA taking prompt action now. Although the requested presumption will not address every harm that CAFOs cause, it is a necessary first step toward reducing their water pollution and ensuring that communities have a voice in the proper regulation of CAFOs under the CWA.

A. <u>CAFOs Cause Water Pollution and Threaten Access to Water.</u>

As detailed below, CAFOs cause water pollution that threatens surface water, groundwater, and drinking water. In addition, CAFO water pollution harms wildlife. And CAFO water use threatens communities' access to water. Although CAFOs of all types cause these harms, CAFOs using wet manure management systems pose a particular threat because they handle urine, feces, and other waste in liquid form; this waste typically contains numerous pollutants, including nitrogen, phosphorus, disease-causing pathogens, salts, heavy metals, trace elements, pharmaceuticals, pesticides, hormones, and ions such as magnesium, sodium, potassium, and chloride.[54] According to a leading soil scientist with USDA's Natural Resources Conservation Service, liquid waste "behaves like water;" that is, the waste and associated pollutants easily flow into surface water and groundwater.[55]

1. <u>CAFO Water Pollution Threatens Surface Water, Groundwater, and Drinking Water.</u>

CAFOs using wet manure management systems threaten surface water, groundwater, and drinking water in at least three ways. *First*, these CAFOs typically store liquid waste in vast pits or large tanks. But storage pits and tanks can breach, fail, and overflow, releasing large quantities of waste into surface water,[56] and waste seeps out of storage pits into groundwater.[57] *Second*, CAFOs using wet manure management systems often use pipes to transport liquid waste; these pipes can clog or rupture, releasing waste into surface water and groundwater.

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[54] *See* JoAnn Burkholder et al., *Impacts of Waste from Concentrated Animal Feeding Operations on Water Quality*, 115 Env't Health Persps. 308 (2007).
[55] David Green, *Frank Gibbs: Liquid Manure is Too Wet*, State Line Observer (Aug. 20, 2006), attached as Exhibit 10.
[56] Burkholder et al., *supra* note 54, at 308.
[57] *See* R.L. Huffman & Phillip W. Westerman, *Estimated Seepage Losses from Established Swine Waste Lagoons in the Lower Coastal Plain of North Carolina*, 38 Transactions Am. Soc'y Agric. Eng'rs 449 (1995); *see also* Michael A. Mallin, *Impacts of Industrial Animal Production on Rivers and Estuaries*, 88 Am. Scientist 26, 31 (2000).

Third, CAFOs using wet manure management systems typically dispose of liquid waste by spreading it on fields, and land-applied waste commonly runs off fields into surface water or seeps into subsurface tile drains or groundwater.[58] Indeed, water pollution predictably results from numerous industry-standard, government-authorized waste disposal practices, such as spreading waste on fields during the winter, when soil is unlikely to absorb the waste and crops do not utilize the nutrients it contains. And climate change is worsening CAFO water pollution, leading to increased precipitation and stronger, more frequent storms that cause waste to run off fields and storage pits to breach and overflow.[59] Thus, as demonstrated in more detail below,[60] waste storage, transport, and disposal routinely cause discharges that pollute waterbodies.

Once CAFO waste enters surface water and groundwater, it can contaminate drinking water. Indeed, numerous studies have found CAFO pollutants in drinking wells near CAFOs,[61] and these pollutants can harm human health. For instance, "[o]ne pollution event by a CAFO could become a lingering source of viral contamination for groundwater," posing "a serious threat to drinking water."[62] In addition to dangerous pathogens, CAFO waste is a source of nitrate pollution, and nitrates in drinking water are associated with birth defects and cases of the potentially fatal blood condition methemoglobinemia, or "blue baby syndrome," in infants under six months of age.[63] Exposure to nitrates in drinking water is also associated with an increased risk for hyperthyroidism,[64] insulin-dependent diabetes,[65] bladder cancer,[66] ovarian cancer,[67] and colorectal cancer.[68]

Threats to drinking wells are a serious concern for community members. According to a resident of Worth County, Iowa, where there are 14 CAFOs: "The potential contamination of groundwater is especially worrisome . . . because, like nearly everyone in our community, my

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58 *Id.*
59 *See infra* Section IV.B.4.
60 *See infra* Section IV.B.
61 *See* Burkholder et al., *supra* note 54, at 310; *see also* Kenneth C. Stone et al., *Impact of Swine Waste Application on Ground and Stream Water Quality in an Eastern Coastal Plain Watershed*, 41 Transactions Am. Society Agric. & Biological Eng'rs 1665, 1670 (1998).
62 Carrie Hribar, Nat'l Ass'n of Local Bds. of Health, *Understanding Concentrated Animal Feeding Operations and Their Impact on Communities* 4 (2010), https://www.cdc.gov/nceh/ehs/docs/understanding_cafos_nalboh.pdf .
63 *See* Burkholder et al., *supra* note 54, at 310.
64 *Id.*
65 *Id.*
66 *See* Rena R. Jones et al., *Nitrate from Drinking Water and Diet and Bladder Cancer Among Postmenopausal Women in Iowa*, 124 Env't Health Persps. 1751 (2016).
67 *See* Maki Inoue-Choi et al., *Nitrate and Nitrite Ingestion and Risk of Ovarian Cancer Among Postmenopausal Women in Iowa*, 137 Int'l J. Cancer 173 (2014).
68 *See* Alexis Temkin et al., *Exposure-Based Assessment and Economic Valuation of Adverse Birth Outcomes and Cancer Risk Due to Nitrate in United States Drinking Water*, 176 Env't Rsch. 108442 (2019).

husband and I get our drinking water from a well."[69] The resident is concerned that she "might learn of groundwater contamination only after people in our community start to get sick."[70] Because of these threats, many people who live near CAFOs have stopped using their wells for drinking water.[71] A resident of Boone County, Iowa, where there are 42 CAFOs, explains: "My husband and I used to drink water from our well, until agricultural pollution made our well water unsafe. Now, we get our drinking water from [a rural water system], which is quite expensive compared to well water."[72] Moreover, public drinking water suppliers have had to build extremely costly water treatment plants. In Haviland, Kansas, for example, a town of 700 people was forced to spend $2.4 million on a treatment plant to address high nitrate levels, which were driven in part by runoff from CAFOs.[73] To cover the cost, water bills in Haviland almost tripled.[74] Similarly, the Boone County, Iowa resident relates that "Des Moines has had to develop one of the most sophisticated water treatment plants in the country, because it treats water that is heavily polluted by CAFOs and other industrial agriculture facilities."[75]

CAFO pollutants in surface water also can harm human health, prevent people from enjoying an area's waterways, and damage local economies. For example, a study of publicly accessible surface waters adjacent to swine CAFOs in North Carolina found multiple pathogens of public health concern, including hepatitis E virus.[76] Ingesting hepatitis E virus can cause acute hepatitis, a potentially fatal condition that, in turn, causes jaundice, anorexia, nausea, and vomiting.[77] In addition, the nitrogen and phosphorus in CAFO waste can cause harmful algal blooms in surface water.[78] Contact with these algal blooms can lead to gastrointestinal tract distress and skin, eye, and ear infections.[79] According to the Executive Director of Lake Erie Waterkeeper, "annual toxic algal blooms in Lake Erie have serious consequences each year,"[80]

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[69] Exhibit 8 ¶ 7.
[70] *Id.*
[71] *See* Decl. of Devon Hall ¶ 11, attached as Exhibit 11; *see also* Exhibit 2 ¶ 10; Exhibit 9 ¶ 7; Exhibit 15 ¶ 8.
[72] Decl. of Danielle Wirth ¶ 7, attached as Exhibit 12.
[73] *See* David Condos, *As Fertilizer Pollutes Tap Water in Small Towns, Rural Kansans Pay the Price*, Kansas Pub. Radio (Mar. 28, 2022), https://kansaspublicradio.org/kpr-news/fertilizer-pollutes-tap-water-small-towns-rural-kansans-pay-price.
[74] *Id.*
[75] Exhibit 12 ¶ 7.
[76] Jennifer Gentry-Shields et al., *Hepatitis E Virus and Coliphages in Waters Proximal to Swine Concentrated Animal Feeding Operations*, 505 Sci. Total Env't 487, 487 (2015).
[77] *See* Julie A. Kase et al., *Detection and Molecular Characterization of Swine Hepatitis E Virus in North Carolina Swine Herds and Their Faecal Wastes*, 347 J. Water & Health 344 (2009) (finding hepatitis E virus in swine feces and swine CAFO waste pits); *see also* Jennifer Gentry-Shields et al., *Hepatitis E Virus and Coliphages in Waters Proximal to Swine Concentrated Animal Feeding Operations*, 505 Sci. Total Env't 487, 487 (2015).
[78] *See* JoAnn M. Burkholder et al., *Impacts to a Coastal River and Estuary from Rupture of a Large Swine Waste Holding Lagoon*, 26 J. Env't Quality 1451 (1997).
[79] *See* Burkholder et al., *supra* note 54, at 310.
[80] Decl. of Sandy Bihn ¶ 10, attached as Exhibit 13.

including causing severe diarrhea and skin infections in people and killing dogs that have come into contact with the water.[81]

In light of these harms, many people who live near CAFOs are no longer able to enjoy local waterways.[82] A resident of Jefferson County, Iowa—where there are approximately 80 CAFOs—explains that she used to take her children swimming in a local lake, but "[a]s the number of CAFOs grew, nutrient and sediment pollution in the lake increased and eventually rendered it unusable."[83] Even after the state spent millions of dollars to restore the lake, residents are still frequently advised that it is not safe for swimming.[84] Nationwide, harmful algal blooms cost the tourism industry nearly $1 billion each year, and they raise the cost of treating drinking water.[85] The EPA Office of Inspector General recently declared that "the prevalence, severity, and frequency of [harmful algal bloom] occurrences in recreational waters . . . will increase as excess nutrients flow into these waters, temperatures rise, and extreme weather events increase with a changing climate."[86] As a result, "EPA needs an agencywide strategic action plan for protecting human health and the environment from this continuing threat."[87]

2. <u>CAFO Water Pollution Threatens Wildlife.</u>

The pollutants in CAFO waste also threaten wildlife. Harmful algal blooms can deplete dissolved oxygen levels and fuel the growth of toxic organisms,[88] sometimes leading to major fish kills.[89] For example, an analysis by the *Chicago Tribune* found that between 2005 and 2014, swine waste impaired 67 miles of Illinois's waterways and caused the deaths of nearly 500,000

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[81] *Id.* ¶ 14.
[82] *See id.* ¶ 13 (describing how algal blooms in Maumee Bay turned the water green and prevented people from swimming and recreating in the Bay); *see also* Decl. of Kemp Burdette ¶ 14, attached as Exhibit 14 ("I don't let my daughters swim in the river [near our home] very often, because I'm concerned that the CAFO pollutants will make them sick.").
[83] Decl. of Diane Rosenberg ¶ 7, attached as Exhibit 15.
[84] *Id.*
[85] *See The Effects: Economy*, EPA, https://www.epa.gov/nutrientpollution/effects-economy (Last accessed Apr. 19, 2022); *see also* All. for the Great Lakes, *Western Lake Erie Basin Drinking Water Systems: Harmful Algal Bloom Cost of Intervention* (2022), https://greatlakes.org/wp-content/uploads/2022/05/FINAL-COI-Report-051622.pdf (finding that a family of five in Toledo, Ohio is paying close to an additional $100 per year to cover the costs of monitoring and treatment for harmful algal blooms).
[86] Office of Inspector Gen., EPA, *EPA Needs an Agencywide Strategic Action Plan to Address Harmful Algal Blooms*, Report No. 21-E-0264, at 17 (2021), https://www.epa.gov/system/files/documents/2021-09/_epaoig_20210929-21-e-0264.pdf.
[87] *Id.*
[88] *See* Burkholder et al., *Impacts to a Coastal River and Estuary from Rupture of a Large Swine Waste Holding Lagoon, supra* note 78, at 1462.
[89] *Id.* at 1451.

fish—that is, approximately half the total number of fish killed by water pollution in the state.[90] CAFO pollutants also harm the endocrine and reproductive systems of wild fish, reducing the diversity of fish species in a waterbody.[91]

Community members in areas where CAFOs are concentrated have observed harm to fish and other wildlife. For example, a resident of Yakima County, Washington shares that the increasing concentration of CAFOs in the county has coincided with declining salmon populations.[92] Eating fresh, local salmon "was one of the joys of [her] life," but "locally caught fish is harder to find" and "[m]any salmon species in the region are now endangered."[93] Since CAFOs came to Boone County, Iowa, a resident has noticed that "turtles used to climb up from the creek that runs through [her] land to try nesting in [her] yard, but [she has] not seen some of [her] favorite turtle species for many years."[94] And a resident of Duplin County, North Carolina—where there are more than 520 swine CAFOs—was once an avid fisher, but he stopped fishing after he began to catch fish with open sores, which he believes are caused by bacteria and other pollutants from the many CAFOs in the county.[95]

Among the wildlife at risk from CAFO water pollution are threatened and endangered species. Indeed, multiple federal agencies have specifically identified CAFOs as threats to such species. In North Carolina, the U.S. Fish and Wildlife Service ("FWS") has named CAFOs as threats to the Neuse River waterdog,[96] Atlantic pigtoe,[97] Dwarf wedgemussel,[98] and Carolina madtom,[99] which are all threatened or endangered and depend on clean water. FWS explained that CAFOs threaten these species because "CAFO wastes contain nutrients, pharmaceuticals, and hormones, and cause eutrophication of waterways, toxic blooms of algae and dinoflagellates,

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[90] *See* David Jackson & Gary Marx, *Spills of Pig Waste Kill Hundreds of Thousands of Fish in Illinois*, Chicago Trib. (Aug. 5, 2016), https://www.chicagotribune.com/investigations/ct-pig-farms-pollution-met-20160802-story.html.

[91] *See* Edward P. Kolodziej et al., *Dairy Wastewater, Aquaculture, and Spawning Fish as Sources of Steroid Hormones in the Aquatic Environment*, 38 Env't Sci. & Tech. 6377 (2004); *see also* Jessica K. Leet et al., *Assessing Impacts of Land-Applied Manure from Concentrated Animal Feeding Operations on Fish Populations and Communities*, 46 Env't Sci. & Tech. 13440 (2012); Edward F. Orlando et al., *Endocrine-Disrupting Effects of Cattle Feedlot Effluent on an Aquatic Sentinel Species, the Fathead Minnow*, 112 Env't Health Persps. 353 (2004).

[92] Decl. of Jean Mendoza ¶ 12, attached as Exhibit 16.

[93] *Id.*

[94] Exhibit 12 ¶ 9.

[95] *See* Exhibit 11 ¶ 10.

[96] *See* FWS, Species Status Assessment Report for the Neuse River Waterdog (*Necturus lewisi*) Version 1.2, at 39–40 (2021), https://ecos.fws.gov/ServCat/DownloadFile/195540.

[97] *See* FWS, Species Status Assessment Report for the Atlantic Pigtoe (*Fusconaia masoni*) Version 1.4, at 53–54 (2021), https://ecos.fws.gov/ServCat/DownloadFile/201267.

[98] *See* FWS, Dwarf Wedgemussel *Alasmidonta heterodon* 5-Year Review: Summary and Evaluation, at App'x A (2019), https://ecos.fws.gov/docs/tess/species_nonpublish/2774.pdf.

[99] *See* FWS, Species Status Assessment Report for the Carolina Madtom (*Noturus furiosus*) Version 1.2, at 35–36 (2021), https://ecos.fws.gov/ServCat/DownloadFile/195532.

and endocrine disruption in downstream wildlife."[100] As shown below in Figure One, these species' North Carolina habitat ranges significantly overlap with the locations of CAFOs, including many Large CAFOs. The Neuse River waterdog's North Carolina range has at least 288 Large swine CAFOs, the Atlantic pigtoe's range has at least 125 Large swine CAFOs, the Dwarf wedgemussel's range has at least 43 Large swine CAFOs, and the Carolina madtom's range has at least 254 Large swine CAFOs.[101] Of all these Large CAFOs, only 10 have CWA permits.[102] As discussed below, Large CAFOs are a significant source of water pollution.[103] Thus, these species are especially at risk of harm from CAFOs.

Similarly, the National Oceanic and Atmospheric Administration ("NOAA") has specifically identified CAFOs as a threat to endangered population segments of the Atlantic sturgeon in North Carolina.[104] NOAA explained that CAFOs "contribute[] to both atmospheric and aquatic inputs of nitrogenous contamination, possibly causing [dissolved oxygen] levels to regularly fall below the 5 mg/L state standard."[105] As shown in Figure Two, the Atlantic sturgeon's habitat significantly overlaps with the locations of CAFOs in North Carolina.

In Iowa, FWS has specifically identified CAFOs as a threat to the endangered pallid sturgeon. FWS found that "observed concentrations of nutrients and indicators of nutrient pollution were above benchmark levels throughout the pallid sturgeon's range."[106] It determined that "run-off from agricultural lands and confined animal feeding operations (CAFOs) are the most likely sources."[107] Almost 96 percent of CAFOs in Iowa operate without CWA permits.[108]

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[100] FWS, Species Status Assessment Report for the Neuse River Waterdog (*Necturus lewisi*) Version 1.2, *supra* note 96, at 39.

[101] *See* N.C. Dep't of Env't Quality, *List of Permitted Animal Facilities – 4-1-2020*, https://deq.nc.gov/cafo-map (providing CAFO locations); *see also* FWS, *Environmental Conservation Online System*, https://ecos.fws.gov/ecp/report/species-listings-by-tax-group?statusCategory=Listed&groupName=All%20Animals (enter the species name in the search bar) (providing habitat ranges).

[102] *See* N.C. Dep't of Env't Quality, *List of Permitted Animal Facilities – 4-1-2020*, https://deq.nc.gov/cafo-map (providing CAFO locations and permit types).

[103] *See infra* Section IV.B.5.

[104] *See* Endangered and Threatened Wildlife and Plants; Final Listing Determinations for Two Distinct Population Segments of Atlantic Sturgeon (*Acipenser oxyrinchus oxyrinchus*) in the Southeast, 77 Fed. Reg. 5,914, 5,969–70 (Feb. 6, 2012).

[105] *Id.* at 5,969.

[106] *See* Molly Webb et al., *Pallid Sturgeon Basin Wide Contaminants Assessment* 3, FWS, Missouri Dep't of Conservation (2019), http://www.pallidsturgeon.org/wp-content/uploads/2019/12/FINAL-Pallid-Sturgeon-Contaminants-Assessment-8-March-2019.pdf.

[107] *Id*. at 28.

[108] *See* EPA, *NPDES CAFO Permitting Status Report: National Summary, Endyear 2021, completed 07/20/22*, *supra* note 5.

Instead, they operate under state laws that are generally less protective of water quality[109] and, thus, are insufficient to protect threatened and endangered species.

Even where CAFOs are not specifically named as threats, CAFO water pollution almost certainly harms threatened and endangered species, including in Michigan, Iowa, California, and Oregon, where CAFOs are concentrated and CAFO location data are publicly available. In Michigan, the piping plover is sensitive to pollutants from CAFOs, and its range overlaps significantly with areas where CAFOs are concentrated.[110] In Iowa, the Spectaclecae mussel, Higgins eye pearlymussel, Topeka shiner, and Sheepnose mussel are sensitive to CAFO pollutants,[111] and as shown in Figure Three, their ranges also overlap significantly with areas where CAFOs are concentrated.[112] In California, the California tiger salamander, Conservancy fairy shrimp, Vernal pool fairy shrimp, and Vernal pool tadpole shrimp are sensitive to CAFO pollutants and found in areas where CAFOs are concentrated, as demonstrated in Figure Four.[113] And, as shown in Figure Five, in Oregon, swine and dairy CAFOs are concentrated along critical habitat streams for Chinook salmon, coho salmon, and steelhead. Given the concentration of CAFOs in these species' habitats, along with the water pollution CAFOs cause, CAFOs likely harm these species and numerous other threatened and endangered species across the country.

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[109] *See infra* Section III.A.3.

[110] *See* Sierra Club Mich. Chapter, *A Watershed Moment: Michigan CAFO Mapping Report*, https://www.sierraclub.org/michigan/michigan-cafo-mapping-report (showing CAFO locations); *see also* FWS, *Environmental Conservation Online System*, *supra* note 101 (providing habitat ranges).

[111] *See* Tyler Lark & Ian Schelly, *Potential Impacts of Cropland Expansion on Threatened and Endangered Species in the United States* (2018), http://www.gibbs-lab.com/wp-content/uploads/2019/01/Endangered_Species_extended_brief.pdf; *see also* Ira R. Adelman et al., *Acute And Chronic Toxicity Of Ammonia, Nitrite, And Nitrate To The Endangered Topeka Shiner (Notropis Topeka) And Fathead Minnows (Pimephales Promelas)*, 28 Env't Toxicology & Chemistry 2216 (2009); Rory T. Mott et al., *Use of Non-Lethal Endpoints to Establish Water Quality Requirements and Optima of the Endangered Topeka Shiner (Notropis topeka)*, 104 Env't Biology of Fishes 1215 (2021).

[112] *See* Iowa Dep't of Nat. Res., *Animal Feeding Operations Databases*, https://programs.iowadnr.gov/animalfeedingoperations/Default.aspx (providing CAFO locations*); see also* FWS, *Environmental Conservation Online System*, *supra* note 101 (providing habitat ranges).

[113] *See* Ca. Env't Protection Agency, Regulated Facility Report (Detail), https://ciwqs.waterboards.ca.gov/ciwqs/readOnly/CiwqsReportServlet?reportID=8210359&inCommand=drilldown&reportName=RegulatedFacilityDetail&program=ANIMALWASTE (providing CAFO locations); *see also* FWS, *Environmental Conservation Online System*, *supra* note 101 (providing habitat ranges).

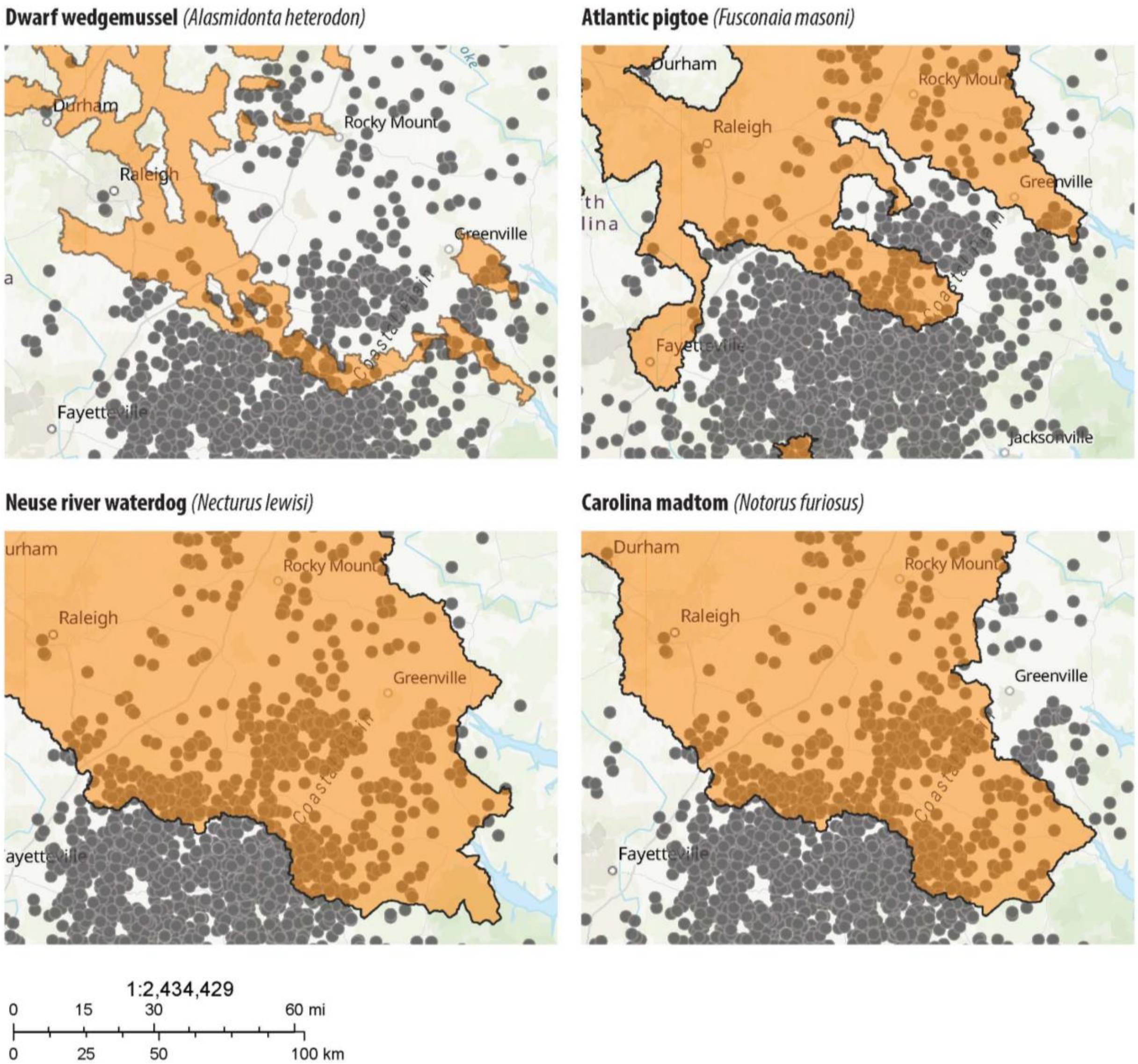

Figure One. Habitat ranges of the Dwarf wedgemussel, Atlantic pigtoe, Neuse River waterdog, and Carolina madtom, along with locations of CAFOs in North Carolina.[114]

[114] *See* sources cited *supra* note 101.

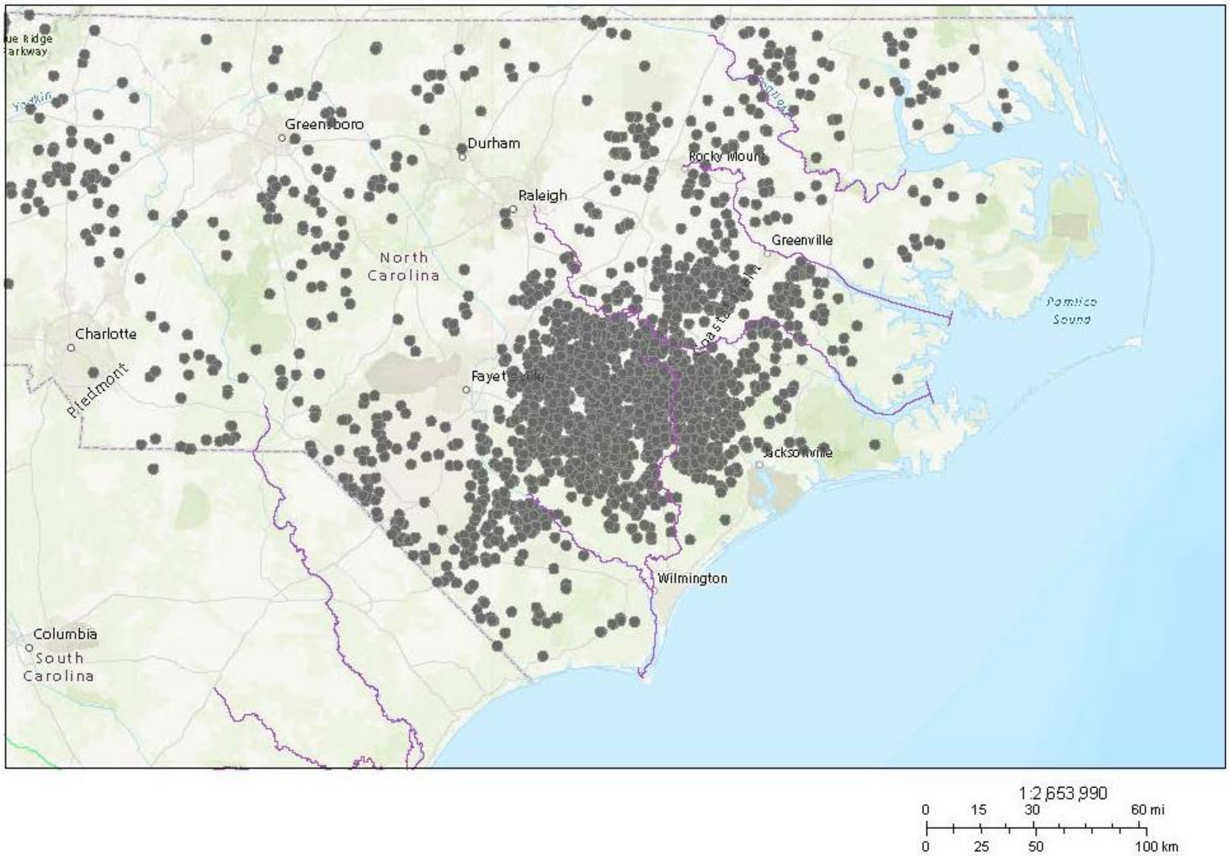

Figure Two. Habitat of the Atlantic sturgeon (shown in purple), along with locations of CAFOs in North Carolina.[115]

[115] *See* N.C. Dep't of Env't Quality, *List of Permitted Animal Facilities – 4-1-2020*, *supra* note 101 (providing CAFO locations); *see also* NOAA, *Atlantic Sturgeon Critical Habitat Map and GIS Data*, https://www.fisheries.noaa.gov/resource/map/atlantic-sturgeon-critical-habitat-map-and-gis-data (providing habitat ranges).

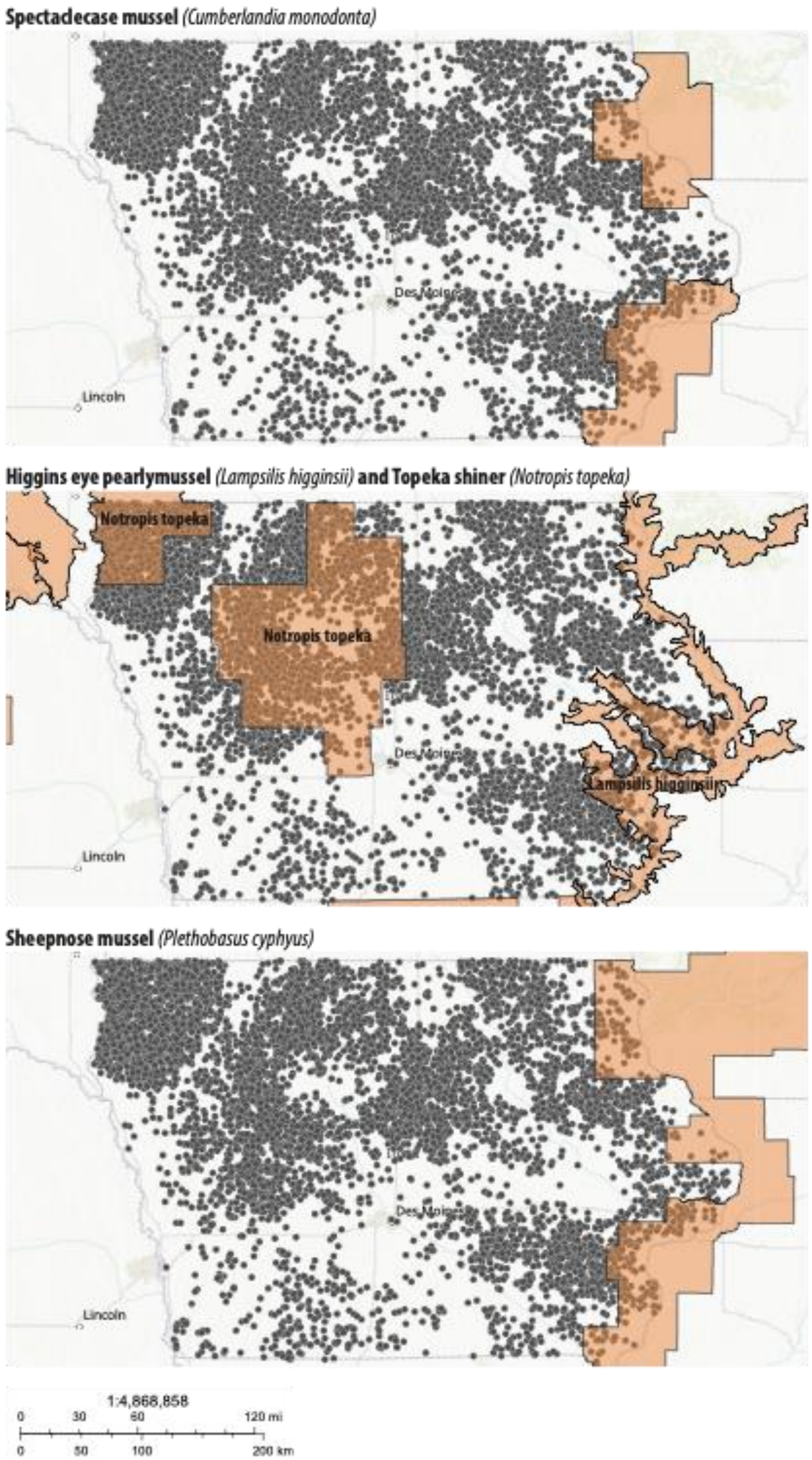

Figure Three. Habitat ranges of the Spectaclecase mussel, Higgins eye pearlymussel, Topeka shiner, and Sheepnose mussel, along with locations of CAFOs in Iowa.[116]

[116] *See* sources cited *supra* note 112.

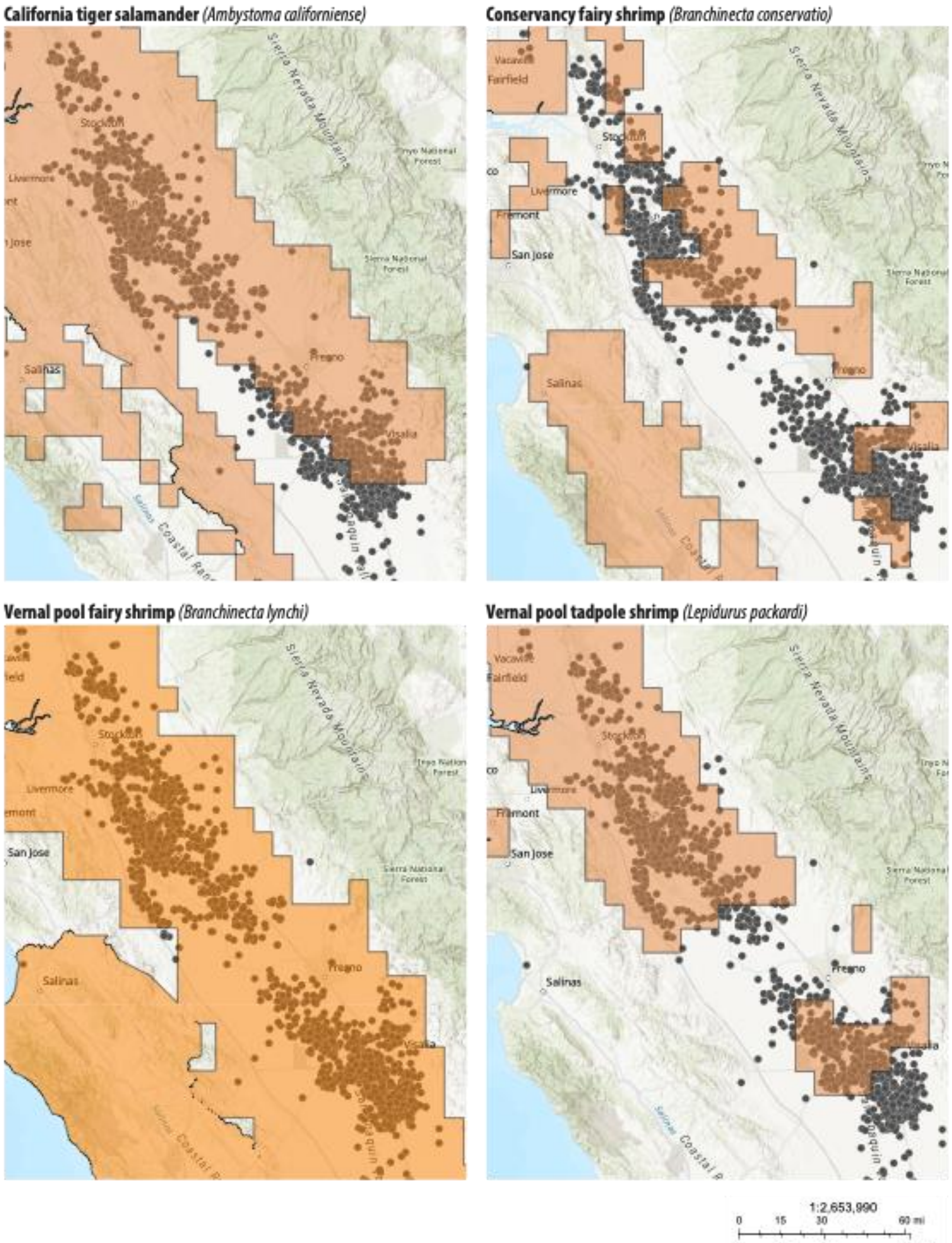

Figure Four. Habitat ranges of the California tiger salamander, Conservancy fairy shrimp, Vernal pool fairy shrimp, and Vernal pool tadpole shrimp, along with locations of CAFOs in California's Central Valley.[117]

[117] *See* sources cited *supra* note 113.

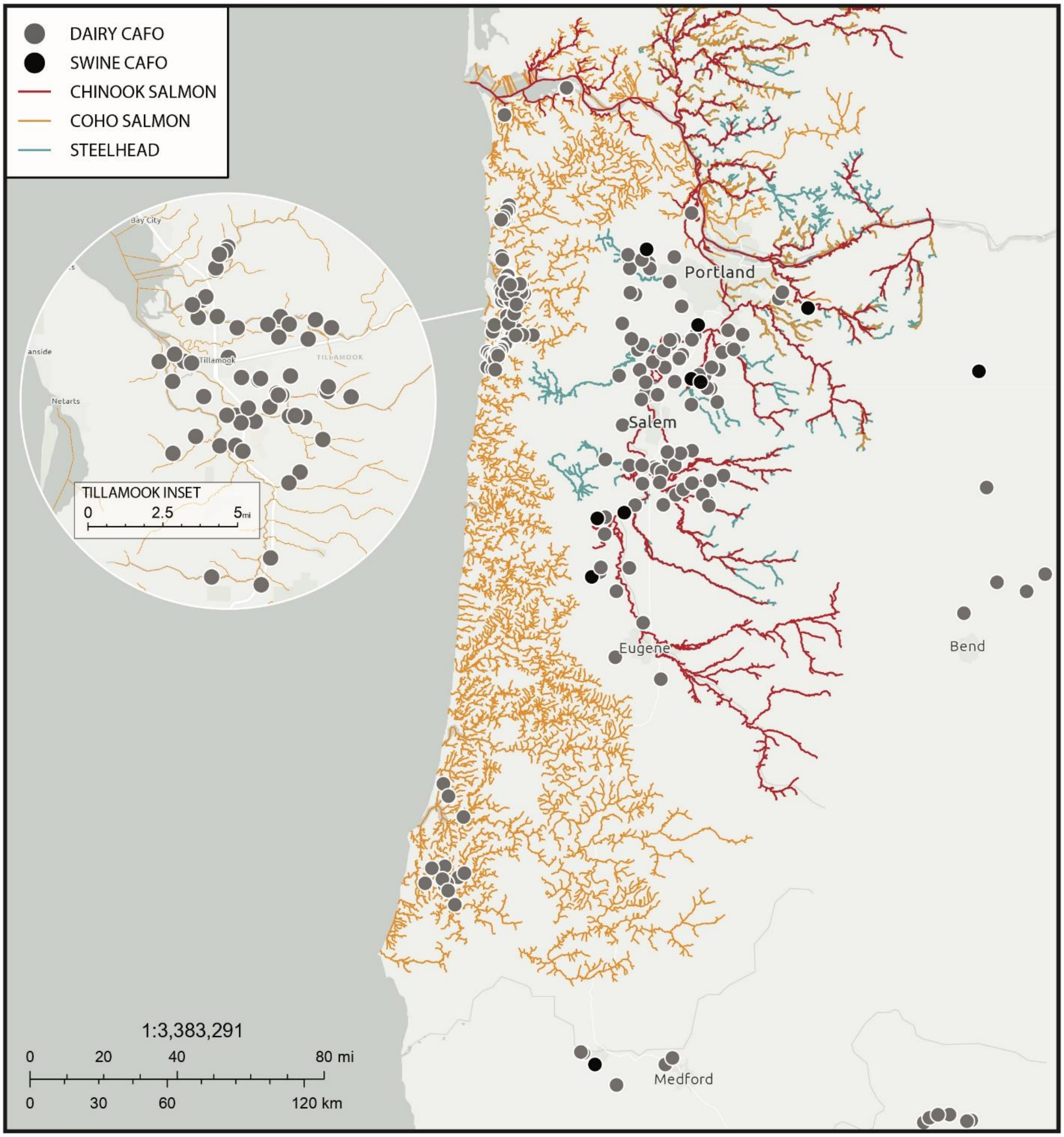

Figure Five. Critical habitat streams of Chinook salmon (shown in red), coho salmon (shown in orange), and steelhead (shown in blue), along with locations of swine and dairy CAFOs in Oregon.[118]

[118] *See* Nat'l Marine Fisheries Serv., WCR/NMFS_WCR_ESA_Critical Habitat (MapServer) (2021), https://www.webapps.nwfsc.noaa.gov/server7/rest/services/WCR/NMFS_WCR_ESA_Critical_Habitat/MapServer (providing critical habitat streams). CAFO locations were obtained from the Oregon Department of Agriculture.

3. CAFOs Threaten Access to Water.

In addition to threatening water quality, CAFOs can imperil communities' access to water. CAFOs use large amounts of water to maintain animals, clean confinement buildings, and wash urine and feces into waste pits. For example, 448 CAFOs in Minnesota reported using a total of 2.3 billion gallons of water in 2017.[119] This is enough water to meet the basic needs of at least 238,356 people for one year.[120] And by one estimate, California's dairy CAFOs use 142 million gallons of water per day to maintain cows and clean the confinement buildings.[121] This is enough water to meet the daily recommended water usage for all the residents of San Jose and San Diego combined.[122] In California and other areas where drought is common, community members fear that CAFO water use will prevent them from having access to the water they need. Indeed, a resident of Yakima County, Washington explains that CAFOs in the area "withdraw millions of gallons of pure water from deep aquifers every day."[123] She worries that "[u]nless CAFOs are monitored more closely, . . . there might not be much water left for future generations."[124]

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EPA acknowledges that "many waters are affected by pollution from CAFOs"[125] and that "all or virtually all large CAFOs have had a discharge [of water pollution] in the past, [or] have a current discharge."[126] Nonetheless, as discussed more fully below,[127] the Agency has struggled to increase its oversight of this pollution, in part because "CAFOs often claim that they do not discharge [water pollution], and EPA and state permitting agencies lack the resources to regularly inspect these facilities to assess these claims."[128] Though courts have struck down

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[119] *See* Dara Meredith Fedrow, *Water Use in Confined Animal Feeding Operations (CAFOs) in Minnesota: Who's Keeping Track?*, Univ. of Montana, at 44 (2019), https://scholarworks.umt.edu/cgi/viewcontent.cgi?article=12430&context=etd#:~:text=The%20water%20appropriation%20permit%20program,different%20amounts%20of%20water%20use.

[120] This calculation is based on the World Health Organization's conclusion that a person needs 50 to 100 liters of water per day to meet their basic needs. *See* UN-Water Decade Programme on Advocacy & Commc'n & Water Supply & Sanitation Collaborative Council, *The Human Right to Water and Sanitation* 2, https://www.un.org/waterforlifedecade/pdf/human_right_to_water_and_sanitation_media_brief.pdf.

[121] *See* Food & Water Watch, *Big Ag, Big Oil and California's Big Water Problem* 6–7 (2021), https://www.foodandwaterwatch.org/wp-content/uploads/2021/10/CA-Water-White-Paper.pdf.

[122] *Id.* at 6.

[123] Exhibit 16 ¶ 7.

[124] *Id.*

[125] EPA, *EPA Legal Tools to Advance Environmental Justice*, *supra* note 2, at 75.

[126] National Pollutant Discharge Elimination System Permit Regulation and Effluent Limitations Guidelines and Standards for Concentrated Animal Feeding Operations, 66 Fed. Reg. 2,960, 3,007 (Jan. 12, 2001).

[127] *See infra* Section III.A.1.

[128] EPA, *EPA Legal Tools to Advance Environmental Justice*, *supra* note 2, at 75.

certain aspects of EPA's past regulations pertaining to water pollution from CAFOs,[129] this petition presents a first step toward adequate oversight that both comports with all legal requirements[130] and targets an especially significant source of CAFO water pollution.[131]

B. In Addition to Polluting Water, CAFOs Cause Other Harm to Human Health and the Environment.

1. CAFOs Cause Air Pollution.

Not only do CAFOs pollute surface water, groundwater, and well water, but they also generate pollutants that contaminate the air and harm human health and well-being. When CAFO waste decomposes, it releases hydrogen sulfide, ammonia, and hundreds of volatile organic compounds.[132] As of 2017, livestock waste was the largest source of ammonia emissions in the United States.[133] Waste pits, animal confinement buildings, and waste applied to fields emit these gasses and compounds into the air.[134] In addition, the large fans that CAFOs use to ventilate confinement buildings blow animal feed, skin cells, and feces into the air.[135] These gasses, compounds, and particles produce strong odors that are characteristic of CAFOs.[136] People who live near CAFOs describe these odors as "putrid,"[137] "horrifying,"[138] and "unbearable,"[139] and they agree that CAFO odors are nothing like odors from smaller farms.[140] Numerous studies show that air pollutants and odors from CAFOs travel into nearby communities,[141] and the experiences of community members corroborate these studies.

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[129] *See infra* Section IV.F.1.
[130] *See infra* Section IV.F.2.
[131] *See infra* Section IV.B.5.
[132] *See* Virginia T. Guidry et al., *Hydrogen Sulfide Concentrations at Three Middle Schools Near Industrial Livestock Facilities*, 27 J. Exposure Sci. & Env't Epidemiology 167 (2017).
[133] *See* EPA, *2017 National Emissions Inventory (NEI) Data*, https://www.epa.gov/air-emissions-inventories/2017-national-emissions-inventory-nei-data#dataq (In the "Data Queries" section, select "Ammonia – NH3" in the "Pollutant" selection box).
[134] *See* Guidry et al., *supra* note 132, at 167.
[135] *Id.*
[136] *Id.*
[137] Exhibit 2 ¶ 6.
[138] *Id.* ¶ 12.
[139] Exhibit 3 ¶ 7.
[140] *See* Decl. of Ronald J. Wyse ¶ 6, attached as Exhibit 17; *see also* Exhibit 3 ¶ 7, Exhibit 8 ¶ 9; Exhibit 7 ¶ 4.
[141] *See* Dana Cole et al., *Concentrated Swine Feeding Operations and Public Health: A Review of Occupational and Community Health Effects*, 108 Env't Health Persps. 685, 693 (2000) (explaining that gasses, dusts, and odors from CAFOs can travel long distances and cause health concerns in neighboring communities); *see also* Burkholder et al., *supra* note 54, at 309 (citing studies showing that ammonia from swine CAFOs commonly moves off-site to contaminate the overlying air); Kelley J. Donham et al., *Community Health and Socioeconomic Issues Surrounding Concentrated Animal Feeding Operations*,

Exposure to CAFO air pollutants can cause serious health problems and even death. A recent study found that ammonia emissions from CAFO waste management practices cause at least 6,900 deaths per year.[142] Exposure to CAFO air pollutants can also cause nausea, headaches, dizziness, runny nose, scratchy throat, burning eyes, coughing, wheezing, and shortness of breath.[143] One study found that people living up to two miles from a CAFO experienced increased rates of these symptoms,[144] and another found that children attending schools up to three miles from CAFOs, who were thus estimated to be exposed to CAFO air pollutants, experienced asthma symptoms, including wheezing.[145] In addition, residents living near CAFOs share stories of themselves or family members suffering from hydrogen sulfide poisoning, which caused headaches, dizziness, and nausea.[146] Beyond causing these health problems, exposure to pollutants associated with CAFOs is linked to high rates of COVID-19 infection and severity.[147]

Odors from CAFOs can also cause psychological harm. Researchers have found that CAFO neighbors regularly subjected to livestock odors experience significantly higher rates of tension, depression, anger, confusion, and fatigue, as compared with otherwise similar people who do not live near CAFOs.[148] These negative moods are concerning not only in their own right, but also because "mood has been found to play a role in immunity . . . and can potentially affect subsequent disease."[149]

In addition to harming physical and psychological health, air pollutants and odors from CAFOs can significantly diminish neighbors' quality of life. For instance, children who suffer from asthma symptoms, which can result from exposure to CAFO air pollution, miss

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115 Env't Health Persps. 317, 318 (2007) (noting that air quality assessments in communities near CAFOs show concentrations of hydrogen sulfide and ammonia); Yelena Ogneva-Himmelberger et al., *CALPUFF and CAFOs: Air Pollution Modeling and Environmental Justice Analysis in the North Carolina Hog Industry*, 4 Int'l J. Geo-Information 150 (2015) (finding that ammonia concentrations in areas downwind of swine CAFOs were up to three times higher than the average concentration in the watershed, exposing approximately 3,500 people to ammonia concentrations higher than the minimal risk level).

[142] *See* Nina G.G. Domingo et al., *Air Quality-Related Health Damages of Food*, 118 Proceedings Nat'l Acad. Scis., at 1, 2, Fig. 1 (2021).

[143] *See* Kendall M. Thu et al., *A Control Study of the Physical and Mental Health of Residents Living Near a Large-Scale Swine Operation*, 3 J. Agric. Safety & Health 13, 16–18 (1997).

[144] *Id.*

[145] *See* Maria C. Mirabelli et al., *Asthma Symptoms Among Adolescents Who Attend Public Schools that are Located Near Confined Swine Feeding Operations*, 118 Pediatrics e66, e70 (2006).

[146] *See* Exhibit 2 ¶ 12; Exhibit 15 ¶ 10.

[147] *See* Biswaranjan Paital & Pawan Kumar Agrawal, *Air Pollution by NO_2 and $PM_{2.5}$ Explains COVID-19 Infection and Severity by Overexpression of Angiotensin-Converting Enzyme 2 in Respiratory Cells: A Review*, 19 Env't Chemistry Letters 25 (2021).

[148] *See* Susan S. Schiffman et al., *The Effect of Environmental Odors Emanating from Commercial Swine Operations on the Mood of Nearby Residents*, 37 Brain Rsch. Bull. 369 (1995).

[149] *Id.* at 370.

opportunities to engage in social, recreational, and physical activities.[150] Similarly, studies show that odor from swine CAFOs prevents neighbors from participating in activities like "barbequing, . . . socializing with neighbors [and family], gardening, working outside, playing, drying laundry outside, opening doors and windows for fresh air and to conserve energy, . . . growing vegetables," and even sleeping through the night.[151] A resident of Dodge County, Minnesota—whose home is surrounded by 12 CAFOs—says, "While our farm traditionally served as a gathering place for multiple generations, children, grandchildren, and great-grandchildren have not been able to gather at our farm for years. The risk that a family gathering will be ruined by the overwhelming stench from area CAFOs is just too great."[152]

Although EPA and other federal agencies have long been aware of the substantial and well-documented harms associated with exposure to air pollution from CAFOs, they have allowed CAFOs to escape regulation necessary to protect public health. In 1998, a group of nearly 50 scientists participating in an expert workshop convened in part by EPA agreed that "odorous emissions from animal operations . . . have an impact on physical health."[153] That same year, air quality experts at a workshop organized by the Centers for Disease Control concluded that "adequate evidence currently exists to indicate airborne emissions from large-scale swine facilities constitute a public health problem."[154] Despite these findings, after years of negotiations with the animal agriculture industry, EPA agreed in 2005 to *excuse* approximately 13,900 industrial animal agriculture facilities from any obligations under the Clean Air Act ("CAA");[155] the Comprehensive Environmental Response, Compensation, and Liability Act ("CERCLA");[156] and the Emergency Planning and Community Right-to-Know Act

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[150] *See* Mirabelli et al., *supra* note 145, at e71.
[151] M. Tajik et al., *Impact of Odor from Industrial Hog Operations on Daily Living Activities*, 18 New Solutions 193, 201 (2008); *see* Exhibit 11 ¶ 14; *see also* Exhibit 4 ¶ 7; Exhibit 2 ¶ 14, Exhibit 17 ¶ 8; Exhibit 9 ¶ 5; Exhibit 3 ¶ 8; Exhibit 7 ¶ 4.
[152] Exhibit 2 ¶ 15.
[153] Kendall M. Thu, *Public Health Concerns for Neighbors of Large-Scale Swine Production*, 8 J. Agric. Safety & Health 175, 179 (2002).
[154] *Id.* at 180.
[155] Stationary sources, potentially including CAFOs, which emit air pollutants in sufficient quantities can trigger CAA permit requirements. *See* 42 U.S.C. § 7661a. However, for over a decade, Congress has passed an appropriations rider that prohibits EPA from using appropriated funds "to promulgate or implement any regulation requiring the issuance of permits under title V of the Clean Air Act (42 U.S.C. 7661 et seq.) for carbon dioxide, nitrous oxide, water vapor, or methane emissions resulting from biological processes associated with livestock production." *See* H.R. 2471, 117th Cong. § 436 (2022).
[156] CERCLA imposes various reporting requirements for releases of hazardous substances, such as ammonia and hydrogen sulfide, including a duty for facility operators to notify EPA when hazardous substances are released. *See* 42 U.S.C. § 9603(a); 40 C.F.R. § 302.4(a).

("EPCRA"),[157] pending the development of metrics for measuring air pollution, known as emissions estimating methodologies ("EEMs").[158]

EPA originally estimated that it would begin publishing EEMs by 2009 and industrial animal agriculture facilities would obtain necessary permits and install emissions controls by 2010,[159] but these dates have come and gone without adequate federal oversight of air pollution from CAFOs. Though EPA published draft EEMs in August 2022, it does not plan to finalize the EEMs until the end of 2023, to say nothing of its plans for requiring facilities to obtain permits and install emissions controls, which remain uncertain.[160] Similarly, EPA has not required CAFOs to report dangerous air emissions under CERCLA and EPCRA. In 2017, the U.S. Court of Appeals for the District of Columbia concluded that EPA lacked authority to exempt CAFOs from these reporting requirements—in part, because EPA conceded that it could respond to emissions reports by requiring CAFO operators to "eliminate the risk" of death or serious injury through improving their management of liquid waste.[161] However, in 2018, Congress exempted CAFOs from reporting dangerous air emissions under CERCLA.[162] And, in 2019, EPA issued a rule exempting CAFOs from reporting emissions under EPCRA, leaving the public with few protections against dangerous CAFO air pollution.[163]

2. <u>CAFOs Generate and Spread Pathogens, Including Antibiotic-Resistant Bacteria.</u>

In addition to the pollutants described above, CAFOs harbor and spread harmful pathogens, including influenza viruses, *Salmonella*, *Leptospira*, and *E. coli*, which cause illness

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[157] EPCRA requires facilities to notify state, tribal, and local authorities of any areas likely to be affected by releases of hazardous and extremely hazardous substances, including ammonia and hydrogen sulfide. *See* 42 U.S.C. § 11004; 40 C.F.R. § 355 App. A.

[158] *See* EPA, Off. of Inspector Gen., *Eleven Years After Agreement, EPA Has Not Developed Reliable Emission Estimation Methods to Determine Whether Animal Feeding Operations Comply with Clean Air Act and Other Statutes Report* (2017), https://www.epa.gov/sites/default/files/2017-09/documents/_epaoig_20170919-17-p-0396.pdf.

[159] *Id.* at 5.

[160] *See* EPA, *National Air Emissions Monitoring Study*, EPA, https://www.epa.gov/afos-air/national-air-emissions-monitoring-study (last visited August 7, 2022).

[161] *Waterkeeper All. v. EPA*, 853 F.3d 527, 536 (D.C. Cir. 2017).

[162] *See* Consolidated Appropriations Act of 2018, H.R. 1625, 115th Cong. § 1102 (2018).

[163] *See* Amendment to Emergency Release Notification Regulations on Reporting Exemption for Air Emissions from Animal Waste at Farms; Emergency Planning and Community Right-to-Know Act, 84 Fed. Reg. 27,533-01 (June 13, 2019). On February 14, 2022, a federal district court granted EPA's motion to remand this rule without vacatur because EPA had admitted a need to "revise or rescind" the rule in light of Executive Order 13,990, which directs federal agencies to review and address rules that fail to improve public health and protect the environment. *See Rural Empowerment Ass'n for Cmty. Help v. EPA*, Civ. Action No. 18-2260 (D.D.C. Feb. 14, 2022). As of September 2022, the exemption—which, as EPA essentially has admitted, fails to improve public health and protect the environment—remains in place.

in humans.[164] Holding large numbers of animals in crowded confinement buildings—where accumulated manure attracts disease-carrying insects—facilitates the spread and mutation of pathogens, putting the health of CAFO workers and community members at risk.[165] Numerous studies demonstrate that pathogens at CAFOs can pass to humans through exposure to contaminated animal tissues, feed, and waste, as well as through surface water, groundwater, and the air.[166] For example, one recent study found that bacteria passed from swine to CAFO workers and neighbors.[167] The same study also found evidence of household-level transmission between CAFO workers and their children.[168]

CAFO operators commonly administer antibiotics at low doses over long periods of time in order to prevent disease, even among healthy animals.[169] Consistent exposure to antibiotics encourages bacteria to develop antibiotic resistance genes,[170] and as a result, many pathogens associated with CAFOs are resistant to common antibiotics.[171] The development and spread of resistance genes and antibiotic-resistant bacteria harm human health. Infections caused by antibiotic-resistant bacteria are difficult and sometimes impossible to treat, leading to prolonged infections, high medical costs, increased spread of resistant infections, and increased death

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[164] *See* Cole et al., *supra* note 141, at 691–93.

[165] *See* Bonnie M. Ballard, *COVID and CAFOs: How a Federal Livestock Welfare Statute May Prevent the Next Pandemic*, 100 N.C. L. Rev. 281, 286–287 (2021), https://scholarship.law.unc.edu/cgi/viewcontent.cgi?article=6861&context=nclr .

[166] *See* Cole et al., *supra* note 141, at 688 (noting that contact with infected urine or tissues can transmit pathogens from animals to humans); *see also* Shawn G. Gibbs et al., *Isolation of Antibiotic-Resistant Bacteria from the Air Plume Downwind of a Swine Confined or Concentrated Animal Feeding Operation*, 114 Env't Health Persps. 1032, 1036 (2006) (finding antibiotic-resistant bacteria in air plumes 150 meters downwind from a swine CAFO); Michael Greger & Gowri Koneswaran, *The Public Health Impacts of Concentrated Animal Feeding Operations on Local Communities*, 33 Family & Cmty. Health 373, 375 (2010) (linking overflowing waste pits, runoff from land application, and the spread of pathogens in the environment); Bridgett M. West et al., *Antibiotic Resistance, Gene Transfer, and Water Quality Patterns Observed in Waterways Near CAFO Farms and Wastewater Treatment Facilities*, 217 Water, Air, & Soil Pollution 473 (2011) (finding that CAFOs may increase the prevalence of multi-drug-resistant bacteria in waterways).

[167] *See* Pranay R. Randad et al., *Transmission of Antimicrobial-Resistant* Staphylococcus aureus *Clonal Complex 9 Between Pigs and Humans, United States*, 27 Emerging Infectious Diseases 740, 742–44 (2021).

[168] *Id.* at 744.

[169] *See* Amy Chapin et al., *Airborne Multidrug-Resistant Bacteria Isolated from a Concentrated Swine Feeding Operation*, 113 Env't Health Persps. 137 (2005).

[170] *Id.*; *see also* Cole et al., *supra* note 141, at 692 (reviewing studies showing that antimicrobial resistance increases "with increasing antimicrobial use on farms").

[171] *See, e.g.*, Engeline van Duijkeren et al., *Transmission of Methicillin-Resistant Staphylococcus Aureus Strains Between Different Kinds of Pig Farms*, 126 Veterinary Microbiology 383, 387–88 (2008); Tushar Khanna et al., *Methicillin Resistant Staphylococcus Aureus Colonization in Pigs and Pig Farmers*, 128 Veterinary Microbiology 298, 301 (2008); Chapin et al., *supra* note 169, *at* 139–41.

rates.[172] In the United States, Methicillin-Resistant *Staphylococcus aureus* ("MRSA"), which causes skin, urinary tract, and wound infections, along with more serious and potentially fatal health problems, including bacteremia, endocarditis, and necrotizing pneumonia,[173] is a major antibiotic resistance threat.[174] Multiple studies have linked CAFOs to the spread of MRSA.[175]

Like CAFO water and air pollution, CAFO antibiotic use escapes regulation necessary to protect public health. The U.S. Food and Drug Administration ("FDA") has acknowledged that animals exposed to antimicrobials, a category of substances that includes antibiotics, "can contribute to the development and proliferation of antimicrobial resistant bacteria," and "antimicrobial resistance poses [a risk] to public health."[176] The World Health Organization recommends that regulatory agencies support "reductions in the overall use of medically important antimicrobials in food-producing animals, including complete restriction of use of antimicrobials for growth promotion and for disease prevention (i.e., in healthy animals considered at risk of infection.)"[177] Nonetheless, in 2021, FDA denied a citizen petition asking the agency to withdraw approval for the preventative and growth-promoting uses of certain antibiotics in livestock and poultry.[178] Since the petition was filed, approval for growth-promoting uses was withdrawn at the request of drug manufacturers, but disease-prevention uses are still allowed. As a result, FDA continues to allow the widespread, long-term use of antibiotics among CAFO animals, despite evidence that medically important antibiotics now are more widely sold for use in swine and cattle production than they are for use in human beings.[179] The threats to human health posed by CAFOs' reliance on antibiotics largely remain unchecked.

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[172] *See* Gibbs et al., *supra* 166, at 1032.
[173] *See* Miranda M. L. van Rijen et al., *Livestock-Associated MRSA Carriage in Patients Without Direct Contact with Livestock*, 9 PLoS ONE e100294, e100294–95 (2014).
[174] *See* Ctrs. for Disease Control & Prevention, *Antibiotic Resistance Threats in the United States, 2013* 77 (2013), https://www.cdc.gov/drugresistance/threat-report-2013/pdf/ar-threats-2013-508.pdf (noting that MRSA infected over 80,000 people and killed 11,285 in 2011).
[175] *See* Gibbs et al., *supra* note 166, at 1,036; *see also* van Duijkeren et al., *supra* note #, at 387; *see also* Noah Rosenblatt-Farrell, *The Landscape of Antibiotic Resistance*, 117 Env't Health Persps. A244, A247 (2009); Joan A. Casey et al., *High-Density Livestock Production and Molecularly Characterized MRSA Infections in Pennsylvania*, 122 Env't Health Persps. 464 (2014).
[176] Letter from Steven M. Solomon, Director, Ctr. For Veterinary Med., U.S. Food & Drug Admin., to Allison Johnson & Avinash Kar, Nat. Res. Def. Council, at 2, 4 (Feb. 25, 2021).
[177] *See* Awa Aidara-Kane et al., *World Health Organization (WHO) Guidelines on Use of Medically Important Antimicrobials in Food-Producing Animals*, 7 Antimicrobial Resistance & Infection Control 1 (2018).
[178] *See* Letter from Steven M. Solomon, *supra* note 176.
[179] *See* David Wallinga et al., Nat. Res. Def. Council, *U.S. Livestock Antibiotic Use Is Rising, Medical Use Falls* (Nov. 18, 2021), https://www.nrdc.org/experts/david-wallinga-md/us-livestock-antibiotic-use-rising-medical-use-falls-0 (explaining that "[s]ales of medically important antibiotics for pigs and cattle combined are 55% higher than sales of those medicines for human patients").

3. **CAFOs Exacerbate Climate Change.**

In addition to polluting the water and air, CAFOs emit vast quantities of methane and nitrous oxide, two potent greenhouse gasses that contribute to climate change.[180] Manure management and enteric fermentation—a digestive process in cows and other ruminant animals that produces methane as a by-product—are the primary sources of greenhouse gas emissions from CAFOs.[181] Manure primarily emits methane and nitrous oxide when it decomposes anaerobically in waste pits and when CAFO operators dispose of it on fields.[182] The quantity of greenhouse gasses emitted from manure management is growing, with methane emissions increasing by 66 percent from 1990 to 2017 and nitrous oxide emissions increasing by 34 percent over the same time period.[183] As of 2020, manure management was both the fourth-largest source of methane emissions and the fourth-largest source of nitrous oxide emissions in the United States.[184] Wet manure management systems cause particular harm, generating many times more methane than systems that store manure in dry form.[185] Indeed, EPA recently recognized that "[i]n many cases, manure management systems with the most substantial methane emissions are those associated with confined animal management operations where manure is handled in liquid-based systems" and that "the shift toward larger dairy cattle and swine facilities since 1990 has translated into an increasing use of liquid manure management systems, which have higher potential [methane] emissions than dry systems."[186]

Despite CAFOs' substantial contributions to climate change, lawmakers have shielded the CAFO industry from public scrutiny. For over a decade, Congress has prohibited EPA from using its appropriated funds "to implement any provision in a rule, if that provision requires mandatory reporting of greenhouse gas emissions from manure management systems."[187] In addition, a statutory provision known as Section 1619, introduced in the 2008 Farm Bill, prohibits USDA from disclosing certain information about CAFOs and other agricultural operations.[188] Section 1619 has impeded USDA's efforts to conduct scientific research,[189] and it

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[180] *See* Patricia M. Glibert, *From Hogs to HABS: Impacts of Industrial Farming in the US on Nitrogen and Phosphorus and Greenhouse Gas Pollution*, 150 Biogeochemistry 139, 165 (2020).
[181] *See* EPA, *Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990-2020*, 2-29, Tbl. 2-10 (2022), https://www.epa.gov/system/files/documents/2022-04/us-ghg-inventory-2022-main-text.pdf.
[182] *See* Glibert, *supra* note 180, at 157.
[183] *Id.* at 139.
[184] *See* EPA, *Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990-2020, supra* note 181, at ES-13, ES-14.
[185] *See* Olga Gavrilova et al., *Emissions From Livestock and Manure Management, in* 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, at 67, Tbl. 10.17 (2019), https://www.ipcc-nggip.iges.or.jp/public/2019rf/pdf/4_Volume4/19R_V4_Ch10_Livestock.pdf.
[186] EPA, *Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990-2020*, *supra* note 181, at 5-12.
[187] H.R. 2471, 117th Cong. § 437 (2022).
[188] *See* 7 U.S.C. § 8791.
[189] *See, e.g.*, Adena R. Rissman et al., *Public Access to Spatial Data on Private-Land Conservation*, 22 Ecology & Soc'y 24 (2017) (explaining that Section 1619 "makes it impossible to assess the efficacy of

has increased inefficiencies between federal and state conservation programs, preventing action to reduce greenhouse gas emissions from CAFOs.[190]

Not only has the CAFO industry largely escaped accountability for its greenhouse gas emissions, but industry actors also have made misleading claims and offered false solutions that exacerbate CAFOs' climate harm. Although multiple meat and dairy industry leaders claim that they will achieve "net zero" emissions targets within the next couple of decades, these claims depend on *ignoring* greenhouse gas emissions from CAFOs, including "enteric and manure emissions from live animal operations."[191] In another act of obfuscation, the industry has advocated for the expansion of biodigesters, which capture methane from CAFO manure to produce biogas, also known as biofuel. Proponents characterize biogas as a "renewable" energy source,[192] but by making methane profitable, the biogas industry eliminates any incentive for CAFO owners and operators to reduce methane emissions through responsible manure management.[193] Indeed, evidence indicates that states already are "overcounting the climate benefits of manure biofuel as a mechanism to reach . . . greenhouse gas reduction targets—a miscount that will only grow as the industry expands."[194] And, as explained in more detail below, early evidence indicates that biogas operations exacerbate the environmental injustice associated with CAFO pollution.[195]

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the hundreds of millions of dollars that the U.S. taxpayer spends on conservation"); Laurie Ristino & Gabriela Steier, *Losing Ground: A Clarion Call for Farm Bill Reform to Ensure a Food Secure Future*, 42 Colum. J. Env't L. 79 (2016) (noting that, because of Section 1619, "[s]cientists are thwarted from, among other things, carrying out research on conservation practices to assess their effectiveness in achieving improved environmental outcomes").

[190] *See* Jess R. Phelps, *Conservation, Regionality, and the Farm Bill*, 71 Me. L. Rev. 293, 339 (2019) (observing that Section 1619 "makes integrated [conservation] project planning . . . more difficult and less effective than would otherwise be the case").

[191] *See, e.g.*, *Environment: Energy and Emissions*, JBS USA, https://sustainability.jbsfoodsgroup.com/chapters/environment/energy-emissions/ (last visited Mar. 30, 2022).

[192] *See* Phoebe Gittleson et al., *The False Promises of Biogas: Why Biogas Is an Environmental Justice Issue*, Env't Just. (2021), https://www.liebertpub.com/doi/pdf/10.1089/env.2021.0025.

[193] *See, e.g.*, Markus Lauer et al., *Making Money from Waste: The Economic Viability of Producing Biogas and Biomethane in the Idaho Dairy Industry*, 222 Applied Energy 621 (2018); Cal. Climate & Agric. Network, *Diversified Strategies for Reducing Methane Emissions from Dairy Operations*, at 5 (2015), https://calclimateag.org/wp-content/uploads/2015/11/Diversified-Strategies-for-Methane-in-Dairies-Oct.-2015.pdf ("Another challenge posed by too great a focus on incentivizing dairy digesters is that, rather than avoiding methane generation altogether, these technologies can actually create incentives to generate methane from manure.").

[194] Tracy Tullis, *Big Oil Wants New York's Cow Manure*, N.Y. Focus (May 25, 2022), https://www.nysfocus.com/2022/05/25/big-oil-wants-new-yorks-cow-manure/.

[195] *See infra* Section III.B.1.b.

C. Large CAFOs Are a Small Percentage of All Animal Operations but a Significant Source of Pollution.

Large CAFOs comprise a small percentage of farms in the United States, but they confine a huge number of animals, which together produce enormous quantities of manure. As shown below in Figure Six, as of 2012, only 0.6 percent of U.S. farms were Large CAFOs.[196] However, Large CAFOs accounted for 32 percent of all animal units on farms[197] and 33 percent of all farm manure.[198] Even in the context of industrial-scale facilities, Large CAFOs confine strikingly high numbers of animals and generate an outsize share of manure; as of 2012, Large CAFOs made up only seven percent of animal feeding operations—that is, facilities that hold any number of animals in confinement[199]—but they accounted for 63 percent of all animal units confined in animal feeding operations and 59 percent of all manure produced at animal feeding operations.[200]

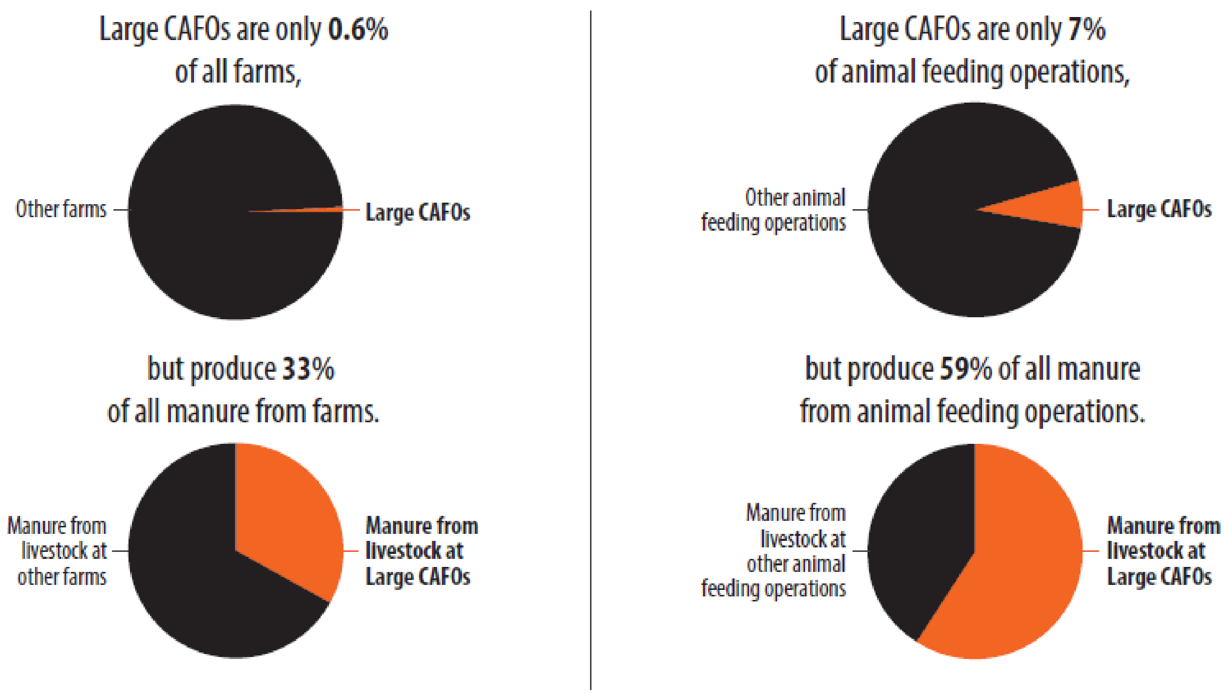

Figure Six. Percentage of manure from farms and all manure from animal feeding operations generated by Large CAFOs.

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[196] *See* Gollehon et al., *supra* note 18 at 4, Tbl. 1.

[197] *See id.* An "animal unit" represents 1,000 pounds of live animal weight. *See* Robert L. Kellogg *et al.*, U.S. Dep't of Agric., Natural Res. Conservation Serv., *Manure Nutrients Relative to the Capacity of Cropland and Pastureland to Assimilate Nutrients: Spatial and Temporal Trends for the United States* 2 (2000). The measure serves as a common unit for comparing different types of animals. *Id.*

[198] *See id.* at 9, Tbl. 2.

[199] *See* 40 C.F.R. § 122.23(b)(1).

[200] *See id.* at 9, Tbl. 2.

Looking to swine and dairy production in particular, Large CAFOs similarly make up a very small percentage of all swine and dairy facilities but confine a huge number of animals. According to the 2017 Census of Agriculture, only five percent of all swine facilities (3,600 operations) confined more than 5,000 swine.[201] Yet, that five percent of facilities confined 73 percent of all swine produced in the United States.[202] And, as for dairy cow facilities, only four percent (1,953 operations) confined more than 1,000 dairy cows, but those facilities accounted for 50 percent of all dairy cows produced in the country.[203] Because the amount of manure produced closely corresponds to the number of animals confined, relatively few Large swine and dairy cow CAFOs produce the majority of swine and dairy cow manure. Given the serious and extensive water pollution that results from this manure,[204] increasing oversight of these few Large CAFOs will achieve significant benefits for humans, wildlife, and the environment.

II. LEGAL BACKGROUND

A. **The CWA Specifically Identifies CAFOs as Point Sources Subject to the Act's Requirements.**

The CWA expressly states that CAFOs are subject to the Act's requirements. Designed to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters,"[205] the CWA prohibits all discharges of pollutants from point sources to "navigable waters,"[206] except as authorized by permit.[207] The Act defines "point sources" primarily by

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[201] *See* USDA, *2017 Census of Agriculture* 23, Tbl. 19 (2019). As previously noted, USDA does not use EPA's thresholds for Large CAFOs when it collects data for the Census of Agriculture. As relevant here, USDA collects data on swine operations with 2,000 to 4,999 swine and 5,000 or more swine. *Id.* Operations in the latter range are most likely to meet EPA's definition of a Large swine CAFO, which includes operations that confine 2,500 or more swine weighing 55 pounds or 10,000 or more swine weighing less than 55 pounds. *See* 40 C.F.R. § 122.23(b)(4). However, for operations that confine 2,000 or more swine, it is also the case that they make up a small percentage of all swine operations but confine the majority of swine raised for food production. As of 2017, only 12 percent of all swine operations (8,324 operations) confined more than 2,000 swine, but those operations confined 94 percent of all swine on farms. *See* USDA, *2017 Census of Agriculture* 23, Tbl. 19 (2019).
[202] *See id.*
[203] *See* USDA, *2017 Census of Agriculture* 23, Tbl. 17 (2019). As relevant here, USDA collects data on dairy cow operations that confine 500 to 999 cows and 1,000 or more cows. *See id.* EPA defines a Large dairy cow CAFO as one that confines 700 or more mature dairy cows. *See* 40 C.F.R. § 122.23(b)(4). For dairy operations that confine 500 or more cows, those operations made up only 6.3 percent (3,464 operations) of all dairy farms, but they accounted for 61 percent of all dairy cows on farms. *See* USDA, *2017 Census of Agriculture* 23, Tbl. 17 (2019).
[204] *See infra* Section IV.B.
[205] 33 U.S.C. § 1251(a).
[206] "Navigable waters" means the "waters of the United States, including the territorial seas." *Id.* § 1362(7).
[207] *See id.* §§ 1311(a), 1342(a), 1362(12).

reference to various types of "conveyance[s]," such as pipes, ditches, and channels.[208] Importantly, the definition also includes one—and only one—industrial category by name: CAFOs.[209]

The CWA's prohibition on unpermitted discharges extends to intermittent, sporadic, and occasionally, groundwater discharges. "[A]n intermittent polluter—one who [discharges] one month out of every three—is just as much 'in violation' of the Act as a continuous violator."[210] In addition, a polluter is liable for discharges of "pollutants that reach navigable waters after traveling through groundwater if [those] discharge[s] [are] the functional equivalent of a direct discharge from the point source into navigable waters."[211] Thus, operations that meet EPA's regulatory definition of a CAFO[212] must obtain CWA permits if they discharge pollutants to the nation's navigable waters, even if their discharges are intermittent, sporadic, or in certain circumstances, allowed to leach through groundwater into a river or stream.[213]

Congress's express inclusion of CAFOs in the definition of "point source" reflects its understanding that CAFOs are significant—and growing—sources of water pollution.[214] In a Senate committee report on the Federal Water Pollution Control Act Amendments of 1971, which became the CWA, Senator Robert Dole remarked that "[a] major new thrust of this bill is in the field of agricultural pollution."[215] Pollution from CAFO waste was of particular concern. As Senator Dole explained:

> Animal and poultry waste, until recent years, has not been considered a major pollutant. Until the past ten or fifteen years few problems existed, because animals were relatively wide-spread on pasture and rangeland and their manure was

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[208] *See* 33 U.S.C. § 1362(14).
[209] *Id.* A CAFO's "manure spreading vehicles, as well as manure storing fields, and ditches used to store or transfer the waste" all constitute CAFO point sources under the CWA. *Cmty. Ass'n for Restoration of the Env't v. Henry Bosma Dairy*, 305 F.3d 943, 955 (9th Cir. 2002) ("*CARE II*").
[210] *Gwaltney of Smithfield, Ltd. v. Chesapeake Bay Found.*, 484 U.S. 49, 63 (1987); *see also CARE II*, 305 F.3d at 953; *Nat. Res. Def. Council, Inc. v. Texaco Refin. & Mktg, Inc.*, 2 F.3d 493, 501 (39d Cir. 1993); *Carr v. Alta Verde Indus., Inc.*, 931 F.2d 1055, 1062 (5th Cir. 1991); *Atl. States Legal Found., Inc. v. Tyson Foods, Inc.*, 897 F.2d 1128, 1133 (11th Cir. 1990).
[211] *Cnty. of Maui v. Hawaii Wildlife Fund*, 140 S. Ct. 1462, 1477 (2020).
[212] *See* 40 C.F.R. § 122.23(b)(2).
[213] *See* Comments on Ohio's Preliminary Modeling Results for the Maumee Watershed Nutrient TMDL 4 (2022), attached as Exhibit 18 (applying *County of Maui v. Hawaii Wildlife Fund* to discharges from CAFOs).
[214] *See CARE II*, 305 F.3d at 955 ("The very nature of a CAFO and the amount of animal wastes generated constitute a large threat to the quality of the waters of the nation. Therefore, Congress empowered the EPA to regulate CAFOs as point sources."); *see also Cmty. Ass'n for Restoration of the Env't v. Sid Koopman Dairy*, 54 F. Supp. 2d 976, 981 (E.D. Wash. 1999) ("*CARE I*") ("Congress and the EPA were concerned with the amount of animal wastes generated by a CAFO and the threat those wastes pose to the waters of the United States.").
[215] S. Rep. No. 92-414, at 98 (1971).

> deposited on the ground to be naturally recycled through the soil and plant cover. . . ..
>
> The picture has changed dramatically, however, as development of intensive livestock and poultry production on feedlots and in modern buildings has created massive concentrations of manure in small areas. The recycling capacity of the soil and plant cover has been surpassed. In these modern facilities the use of bedding and litter has been greatly reduced; consequently, the manure which is produced remains essentially in the liquid state and is much more difficult to handle without odor and pollution problems. Precipitation runoff from these areas picks up high concentrations of pollutants which reduce oxygen levels in receiving streams and lakes and accelerate the eutrophication process.[216]

As discussed above, the problem identified in this legislative history—industrial animal production that generates "massive concentrations of manure in small areas," causing "odor and pollution problems"[217]—has grown exponentially since 1971. Indeed, a recent federal bill proposing a moratorium on all Large CAFOs reflects the continuing and worsening problems that Large CAFOs pose.[218]

1. <u>CAFOs Operating Under NPDES Permits Are Subject to Specific and Enforceable Effluent Limitations.</u>

To restrict pollutant discharges from CAFOs and other point sources, the CWA established the National Pollutant Discharge Elimination System ("NPDES"), a permitting scheme managed by EPA in partnership with state environmental agencies.[219] NPDES permits include "effluent limitations," which are "restriction[s] established by a State or the [EPA] Administrator on quantities, rates, and concentrations" of discharges.[220] To ensure that NPDES permits meet the CWA's requirements, EPA may object to any NPDES permit that a state proposes to issue if the permit does not comply with the CWA.[221] As the Second Circuit has explained, "the NPDES permit is critical to the successful implementation of the Act because . . . the NPDES permit 'defines, and facilitates compliance with, and enforcement of, a preponderance of a discharger's obligations under the [Act].'"[222]

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[216] *Id.*
[217] *Id.*
[218] *See* Farm System Reform Act of 2021, S.2332, 117th Cong. § 102 (2021).
[219] *See* 33 U.S.C. § 1342. Where state agencies administer the NPDES permitting scheme, they must comply with all requirements of the CWA and federal regulations. *See id.* § 1342(b).
[220] *Id.* at § 1362(11).
[221] *Id.* at § 1342(d).
[222] *Waterkeeper All., Inc.*, 399 F.3d at 492 (quoting *EPA v. California*, 426 U.S. 200, 205 (1976)).

Currently, CAFO NPDES permits rely largely on best management practice effluent limitations, which are qualitative limitations on pollutant discharges.[223] For example, CAFOs operating under NPDES permits must develop and implement a nutrient management plan, which CAFO operators should use to manage the storage and disposal of manure and other waste; analyze manure and soil for their nutrient content at specific intervals; and avoid applying waste within 100 feet of any down-gradient surface water unless certain conditions are satisfied.[224] These best management practices are specific, enforceable requirements for CAFO operations; however, they are not technologically complex and, thus, are not unduly burdensome. As detailed below, the best management practices in NPDES permits are often more protective of water quality than the requirements for CAFOs in state laws and permits.[225]

2. CAFOs Operating Under NPDES Permits Are Subject to Public Participation During the Permitting Process.

The CWA requires that the public have an opportunity to participate in the NPDES permitting process.[226] When a CAFO operator applies for a NPDES permit, the permitting agency must notify the public of the application and make the application available for public review.[227] If the CAFO operator has applied for coverage under a NPDES general permit,[228] and the permitting agency makes a preliminary determination to grant coverage, the agency must accept public comments on the application, including the CAFO's nutrient management plan, which the CAFO operator should use to manage the storage and disposal of manure and other waste to reduce the likelihood of discharges.[229] The agency must respond to "significant comments" received during the comment period and, if necessary, require the CAFO operator to revise its application in response to comments.[230] In addition, before a permitting agency grants any NPDES permit, it must provide an opportunity for a public hearing.[231]

The CWA's legislative history "emphasize[s] that an essential element of the NPDES program is public participation."[232] In fact, lawmakers recognized that "[a] high degree of

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[223] *See* 40 C.F.R. § 412.
[224] *Id.* § 412.4.
[225] *See infra* Section III.A.3.
[226] *See* 33 U.S.C. § 1251(e) ("Public participation in the development, revision, and enforcement of any regulation, standard, effluent limitation, plan, or program established by the Administrator or any State under this chapter shall be provided for, encouraged, and assisted by the Administrator and the States.").
[227] *See* 33 U.S.C. § 1342(a)(3), (b)(3), (j).
[228] NPDES general permits authorize categories of discharges within geographic areas. *See* 40 C.F.R. § 122.2.
[229] *Id.* § 122.23(h)(1).
[230] *Id.*
[231] *See* 33 U.S.C. § 1342 (a)(3), (b)(3).
[232] *Costle v. Pac. Legal Found.*, 445 U.S. 198, 216 (1980); *see Env't Def. Ctr., Inc. v. EPA*, 344 F.3d 832, 856 (9th Cir. 2003) ("Congress identified public participation rights as a critical means of advancing the goals of the Clean Water Act in its primary statement of the Act's approach and philosophy.").

informed public participation . . . is essential to the accomplishment of the objectives [of the Act]—a restored and protected natural environment."[233] Thus, "[t]he public must have a genuine opportunity to speak on the issue of protection of its waters."[234] In the CAFO NPDES permitting context, public review of nutrient management plans is particularly important. Reviewing nutrient management plans enables the public to "call[] for a hearing about—and then meaningfully comment on—NPDES permits before they issue."[235] And, as discussed below, public participation is also necessary to reveal and begin to address the environmental injustice that CAFOs cause.[236] Despite the importance of public participation, however, state laws and permits governing CAFOs typically provide fewer opportunities for public involvement than NPDES permits.[237]

3. CAFOs Operating Under NPDES Permits Are Subject to Citizen Suits.

In addition to providing for public participation in NPDES permitting, the CWA allows the public to enforce effluent limitations in NPDES permits. The Act provides that, so long as certain conditions are satisfied, any citizen may bring a civil action against any person who has violated an effluent limitation.[238] In other words, the CWA allows citizens to sue CAFOs that violate the terms of the CWA or their NPDES permits. These "citizen suits" allow citizens to "act[] as private attorneys general,"[239] and they are "intended [to be used . . .] to both spur and supplement government enforcement actions."[240] "[A]ccordingly, the purpose of [a citizen] suit is to protect and advance the public's interest in pollution-free waterways[.]"[241]

Citizen suits have played an important role in holding CAFOs accountable for the water pollution they cause. Indeed, one of the seminal decisions involving CAFO water pollution—*Community Association for Restoration of the Environment v. Henry Bosma Dairy*—was the result of a citizen suit.[242] In that case, the U.S. Court of Appeals for the Ninth Circuit affirmed a $171,500 civil penalty assessed against a CAFO operator with "a long history of [NPDES permit] compliance problems," including continuing violations and violations that were likely to recur related to the "misapplication or overapplication" of manure to a nearby field, discharges from which ultimately reached the Yakima River.[243] Advocates also have relied on citizen suits

[233] S. Rep. No. 92-414, at 12.
[234] *Id.* at 72.
[235] *Waterkeeper Alliance, Inc.*, 399 F.3d at 503.
[236] *See infra* Sections II.B.1. and III.B.2.
[237] *See infra* Section III.A.3.
[238] *See* 33 U.S.C. § 1365.
[239] *Pa. Env't Defense Found. v. Bellefonte Borough*, 718 F. Supp. 431, 434 (M.D. Pa. 1989).
[240] *Waterkeeper All., Inc.*, 399 F.3d at 503 (quoting S. Rep. No. 50, 99th Cong., 1st Sess. 28 (1985)).
[241] *Pa. Env't Defense Found.*, 718 F. Supp. at 434.
[242] *See CARE II*, 305 F.3d at 948.
[243] *Id.* at 954.

to challenge CAFOs that discharge water pollution without NPDES permits in violation of federal law, lengthy and costly actions that illustrate the importance of the requested presumption.[244] Citizen suits provide CAFO neighbors with recourse in situations in which EPA and state environmental agencies are unable or unwilling to bring enforcement actions. And, as described below, citizen suits offer members of environmental justice communities who are disproportionately harmed by CAFO permit violations an additional tool to hold those CAFOs accountable.[245] Although citizen suits can be a powerful tool, the CWA imposes limitations to ensure that they do not overwhelm courts or regulated parties with excessive and burdensome litigation.[246] For example, the CWA provides that citizens must provide the federal government and defendants with 60 days' notice of alleged violations prior to filing suit, thereby allowing "agencies [to] step in, investigate, and bring the defendant into compliance."[247] In addition, courts have made clear that a CWA citizen suit will fail if it alleges "wholly past violations;" instead, plaintiffs must "allege a state of either continuous or intermittent violation—that is, a reasonable likelihood that a past polluter will continue to pollute in the future."[248] Because of these limitations, citizen suits serve a narrow but important role in vindicating the CWA's protections. Yet, as discussed below, Petitioners are not aware of any state law governing CAFOs that provides for citizen suits.[249]

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[244] *See, e.g.*, *Carr v. Alta Verde Industries, Inc.*, 931 F. 2d 1055, 1063 (concluding that a discharging cattle facility, which confined up to 30,000 animals and employed a wet manure management system, constituted a CAFO within the meaning of the CWA, and it would "remain[] in a continuing state of violation until it either obtains a permit or no longer meets the definition of a point source"); *Concerned Area Residents for the Env't v. Southview Farm*, 34 F.3d 114, 118, 121, 123 (finding that a dairy facility, which confined 2,200 animals and employed a wet manure management system, constituted a CAFO within the meaning of the CWA and improperly discharged water pollution without an NPDES permit by, among other things, allowing manure to travel through a ditch that ultimately led to the Genesee River and over-applying manure to fields in advance of rain).
[245] *See infra* Section III.B.3.
[246] *See, e.g.*, *Hallstrom v. Tillamook Cnty.*, 493 U.S. 20, 29 (1989) (explaining that the CWA "strike[s] a balance between encouraging citizen enforcement of environmental regulations and avoiding burdening the federal courts with excessive numbers of citizen suits").
[247] *CARE II*, 305 F.3d at 953; *see also Gwaltney of Smithfield, Ltd. v. Chesapeake Bay Found., Inc.*, 484 U.S. 49, 60 (1987) (observing that the purpose of the 60-day notice provision is "to give [the alleged violator] an opportunity to bring itself into complete compliance with the Act and thus likewise render unnecessary a citizen suit."); *CARE II*, 305 F.3d at 953 ("The point is to trigger agency enforcement and avoid a lawsuit. Congress did not intend to unduly burden citizens by requiring them to basically carry out the job of the agency.").
[248] *Gwaltney of Smithfield*, 484 U.S. at 57.
[249] *See infra* Section III.B.3.

B. Executive Orders Require EPA to Advance Environmental Justice.

1. Executive Order 12,898 Requires EPA to Collect Data on Environmental Justice Issues, Address Those Issues, and Ensure that Environmental Justice Communities Are Able to Participate in EPA's Activities.

Executive Order 12,898 establishes "the goal of achieving environmental protection for all communities."[250] To accomplish this goal, the order requires each federal agency to "collect, maintain, and analyze information assessing and comparing environmental and human health risks borne by populations identified by race, national origin, or income."[251] The agencies "shall use this information to determine whether their programs, policies, and activities have disproportionately high and adverse human health or environmental effects on minority populations and low-income populations."[252] The order also requires that, to "the greatest extent practicable," each federal agency must "identify[] and address[], as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations."[253] In addition, the order requires each federal agency to "conduct its programs, policies, and activities that substantially affect human health or the environment[] in a manner that ensures that such programs, policies, and activities do not have the effect of excluding persons . . . from participation" in them.[254]

In response to Executive Order 12,898, EPA developed an environmental justice strategy that reiterates the importance of the objectives in the executive order.[255] The strategy aims to ensure that "[n]o segment of the population, regardless of race, color, national origin, or income, . . . suffers disproportionately from adverse human health or environmental effects, and all people live in clean, healthy, and sustainable communities."[256] EPA recognized that both data and public participation are necessary for achieving this goal. EPA explained that its "mission of protecting public health and the environment depends on individuals within and outside of the Federal government having access to good data for informed decision-making" and that "[a] comprehensive approach to identifying and addressing environmental justice concerns requires

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[250] EPA, *Summary of Executive Order 12898 – Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, https://www.epa.gov/laws-regulations/summary-executive-order-12898-federal-actions-address-environmental-justice.
[251] Exec. Order No. 12,898 § 3-302.
[252] *Id.*
[253] *Id.* § 1-101.
[254] *Id.* § 2-2.
[255] *See* EPA, *The Environmental Protection Agency's Environmental Justice Strategy* (1995), https://www.epa.gov/sites/default/files/2015-02/documents/ej_strategy_1995.pdf.
[256] *Id.*

the early involvement of affected communities."[257] EPA also committed to "incorporat[ing] environmental justice concerns into its program for ensuring compliance with Federal environmental requirements at both private and Federal facilities" and to using "the full range of tools available to it to correct noncompliance" in environmental justice communities.[258]

In an August 2022 document, EPA again highlighted the importance of public participation to advancing environmental justice. EPA stated:

> Community engagement should occur as soon as possible and should go far beyond simply posting public notices. With respect to permitting actions that could result in significant health, environmental, and quality of life impacts, the stakes are often that much higher for communities with [environmental justice] concerns. The goal of community engagement is to ensure that the people most affected by the permit have input into the decisions that will impact their lives. . . . Robust community engagement is crucial for making informed permitting decisions that meaningfully consider the site-specific circumstances of the permitting action.[259]

As this petition makes clear, CAFO permitting has significant health, environmental, and quality of life impacts.[260] Thus, opportunities for public participation are crucial for the environmental justice communities that CAFOs disproportionately harm.[261]

2. Executive Order 14,008 Requires EPA to Strengthen Enforcement of Environmental Violations that Disproportionately Harm Environmental Justice Communities.

Executive Order 14,008 reiterates and builds on Executive Order 12,898's requirement that agencies address environmental justice issues. Executive Order 14,008 acknowledges that "[t]o secure an equitable economic future, the United States must ensure that environmental and economic justice are key considerations in how we govern."[262] To this end, the order directs EPA to "strengthen enforcement of environmental violations with disproportionate impact on underserved communities."[263]

Following Executive Order 14,008, EPA Administrator Michael Regan emphasized the role of enforcement in advancing environmental justice. Administrator Regan directed all EPA offices to "examine, and appropriately use, the full array of policy and legal tools at [their]

[257] *Id.*
[258] *Id.*
[259] EPA, *Interim Environmental Justice and Civil Rights in Permitting Frequently Asked Questions*, *supra* note 26, at 16–17.
[260] *See supra* Section I.
[261] *See infra* Section III.B.1.
[262] Exec. Order No. 14,008 § 219.
[263] *Id.* § 222(i).

disposal to incorporate environmental and climate justice considerations in [their] analysis, rulemaking, permitting, enforcement, . . . and other activities."[264] Administrator Regan also specifically directed EPA offices to "[s]trengthen enforcement of violations of cornerstone environmental statutes and civil rights laws in communities overburdened by pollution."[265]

III. JUSTIFICATION

EPA's current approach to CAFO permitting depends on self-reporting. CAFO operators are responsible for determining whether they discharge and, if so, applying for NPDES permits. EPA's approach allows many CAFOs that discharge water pollution to avoid operating under NPDES permits and instead operate without permits or according to state laws and permits that fail to protect water quality or advance environmental justice. Indeed, EPA itself has acknowledged the importance of "improv[ing] the effectiveness of [its] CAFO regulations."[266] For these reasons and as explained in detail below, when applied to Large CAFOs using wet manure management systems, EPA's current approach violates the CWA and falls short of the environmental justice goals set out in Executive Orders 12,898 and 14,008.

A. EPA's Current Approach to Permitting Large CAFOs Using Wet Manure Management Systems Violates the CWA.

The CWA is the "principal legislative source of the EPA's authority—*and responsibility*—to abate and control water pollution."[267] The Act prohibits discharges from point sources to navigable waters unless the discharger has a permit. For any given discharge subject to the CWA, therefore, EPA must "either [] issue a permit for the discharge of the pollutant or [] enforce the total proscription on discharge[s]."[268] Under no circumstances may EPA "leave pollutants subject to the requirements of the statute unregulated."[269] Because the CWA expressly identifies CAFOs as point sources, EPA must either ensure that discharging CAFOs obtain NPDES permits or enforce the Act's prohibition on unpermitted discharges from CAFOs.[270]

[264] Michael S. Regan, Message from the Administrator, https://www.epa.gov/sites/default/files/2021-04/documents/regan-messageoncommitmenttoenvironmentaljustice-april072021.pdf.
[265] *Id.*
[266] *See* EPA, *EPA Legal Tools to Advance Environmental Justice, supra* note 2, at 75.
[267] *Waterkeeper All., Inc.*, 399 F.3d at 491 (emphasis added).
[268] *L.A. Waterkeeper v. Pruitt*, 320 F. Supp. 3d 1115, 1122 (C.D. Cal. 2018); *see Nat. Res. Def. Council v. Costle*, 568 F.2d 1369, 1375 (D.C. Cir. 1977); *see also Nw. Env't Advocs. v. EPA*, 537 F.3d 1006, 1021–22 (9th Cir. 2008).
[269] *L.A. Waterkeeper*, 320 F. Supp. 3d at 1122 (emphasis omitted).
[270] EPA may not evade this requirement by citing infeasibility. The CWA provides "devices to mitigate the burden to accommodate within a practical regulatory scheme Congress's clear mandate that all point sources have permits." *Nat. Res. Def. Council v. Costle*, 568 F.2d at 1381. For example, EPA may use general permits to avoid an "intolerable permit load." *Id.*

For the reasons below, EPA's self-reporting approach does not ensure that discharging CAFOs obtain NPDES permits. Indeed, EPA admits that, under its current approach, "[m]any CAFOs are not regulated and continue to discharge without NPDES permits," and "many waters are affected by pollutants from CAFOs."[271] EPA also admits that EPA and state agencies are failing to enforce the Act's prohibition on unpermitted discharges.[272] As a result, many CAFOs discharge water pollution without appropriate oversight, causing serious and extensive harm to human health and the environment, including water quality.[273] Thus, EPA's approach runs counter to the CWA and undermines the Act's goal of restoring and maintaining the nation's waters.

1. <u>**EPA's Approach Fails to Require NPDES Permits for CAFOs that Discharge.**</u>

As EPA is aware, under the Agency's current approach to CAFO permitting, many CAFOs discharge water pollution without NPDES permits, in violation of the CWA.[274] Three sources of evidence demonstrate the under-permitting problem. *First*, EPA's own estimates and admissions indicate that a majority of all discharging CAFOs lack NPDES permits, and the same pattern holds true for Large CAFOs. *Second*, data on NPDES permit coverage in states where CAFOs are concentrated show that many CAFOs almost certainly discharge water pollution without NPDES permits. *Third*, documented evidence of numerous unpermitted discharges confirms that CAFOs routinely discharge water pollution without NPDES permits.

First, EPA's own estimates and admissions show that a majority of CAFOs that discharge water pollution do not, in fact, have NPDES permits. In 2001, EPA estimated that approximately 12,000 CAFOs discharged water pollution, but only 2,530 had applied for NPDES permits, meaning that about 9,470 CAFOs were discharging without NPDES permits in violation of the CWA.[275] In 2009, EPA estimated that there were "19,000 large and medium-sized CAFOs nationwide and that as many as 75% of these may need to obtain NPDES permits because they discharge."[276] However, as of March 2008, only 47 percent—or 8,930 CAFOS—had obtained NPDES permits,[277] meaning that about 5,320 CAFOs were discharging without NPDES permits. Since 2009, the estimated number of Large CAFOs in the country has grown to

[271] *See* EPA, *EPA Legal Tools to Advance Environmental Justice, supra* note 2, at 75.
[272] *Id*.
[273] *See infra* Section III.A.3.
[274] *See* EPA, *EPA Legal Tools to Advance Environmental Justice, supra* note 2, at 75.
[275] *See* 66 Fed. Reg. at 2,963.
[276] EPA Office of Civil Enforcement, EPA 325-F-09-001, *EPA Targets Clean Water Act Violations at Livestock Feeding Operations Enforcement Alert* 2 (2009), https://nepis.epa.gov/Exe/ZyPDF.cgi/P10039VB.PDF?Dockey=P10039VB.PDF. EPA did not explain how it determined the percentage of CAFOs required to obtain NPDES permits because they discharge.
[277] *Id.*

21,237, but the number of CAFOs operating under NPDES permits has fallen to 6,266.[278] Conservatively assuming that 75 percent of CAFOs require NPDES permits, as EPA has estimated in the past, this means that almost 10,000 Large CAFOs are discharging without NPDES permits in violation of the CWA. In other words, the under-permitting problem that EPA identified over 20 years ago persists and has grown worse. Indeed, in May 2022, EPA acknowledged that "[m]any CAFOs are not regulated and continue to discharge without NPDES permits."[279]

EPA has acknowledged that Large CAFOs are especially likely to discharge water pollution without NPDES permits. According to EPA, "since the inception of the NPDES permitting program in the 1970s, only a small number of Large CAFOs have actually sought permits . . . while numerous documented discharges occurred over time."[280] The U.S. Court of Appeals for the Second Circuit has reiterated this point, observing that "Large CAFOs are important contributors to water pollution and [] they have, historically at least, improperly tried to circumvent the permitting process."[281]

Second, recent data on NPDES permit coverage in states where swine and dairy CAFOs are most concentrated confirm that discharging CAFOs routinely lack NPDES permits. Most swine and dairy cow CAFOs use wet manure management systems,[282] and wet manure management systems predictably cause discharges.[283] Yet, as the figures below show, in four of the top five swine-producing states and four of the top five dairy cow-confining states,[284] the majority of Large CAFOs do not have NPDES permits. Indeed, in six of these states, fewer than 10 percent of Large CAFOs have NPDES permits, and in three states, *zero* Large CAFOs have NPDES permits. These data strongly suggest that, across the country, thousands of LargeCAFOs are discharging water pollution without a permit in violation of the CWA.

[278] *See* EPA, *NPDES CAFO Permitting Status Report: National Summary, Endyear 2021, completed 07/20/22*, *supra* note 5.
[279] EPA, *EPA Legal Tools to Advance Environmental Justice*, *supra* note 2, at 75.
[280] National Pollutant Discharge Elimination System Permit Regulation and Effluent Limitation Guidelines and Standards for Concentrated Animal Feeding Operations (CAFOs), 68 Fed. Reg. 7,176, 7,201 (Feb. 12, 2003).
[281] *Waterkeeper Alliance, Inc.*, 399 F.3d at 506, n.22.
[282] *See* 66 Fed. Reg. at 2,989, 2991.
[283] *See infra* Section IV.B.
[284] *See* Univ. of Iowa Dep't of Geographical & Sustainability Scis., *CAFOs in the US: The Wheres and Whys of Industrial Meat Production in the United States*, https://cafomaps.org/index.html (drawing from the 2017 Census of Agriculture).

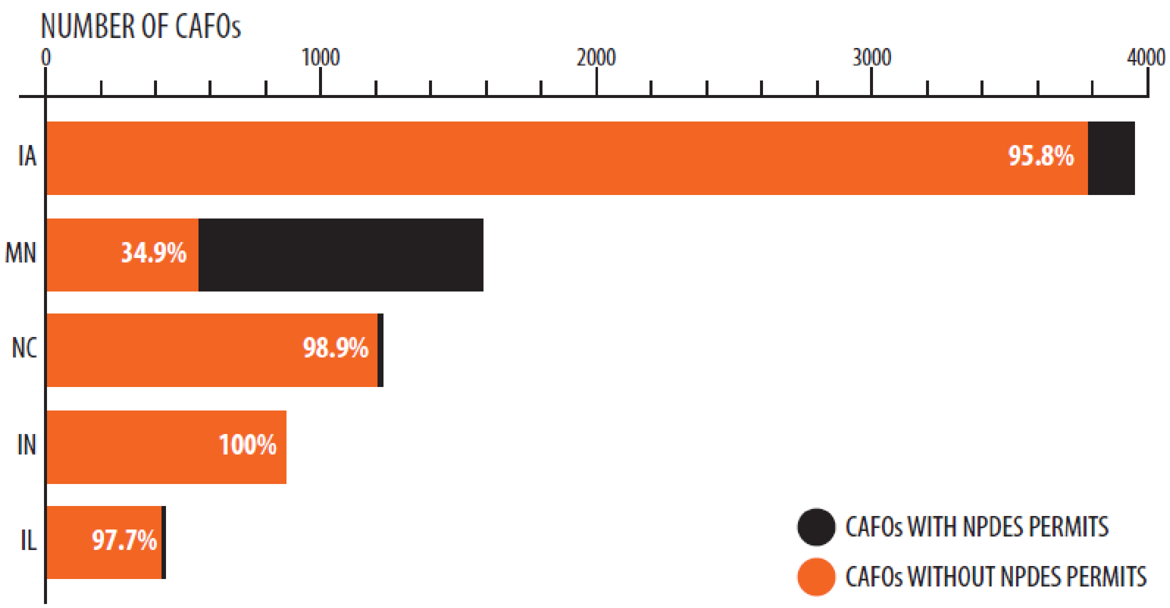

Figure Seven. Percentage of Large CAFOs with NPDES permits in the top five swine-producing states.[285]

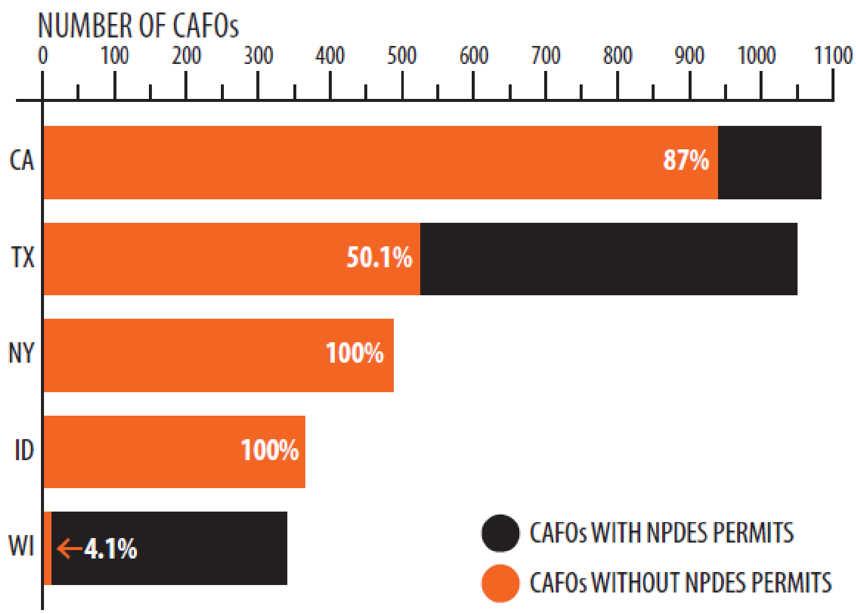

Figure Eight. Percentage of Large CAFOs with NPDES permits in the top five dairy cow-producing states.[286]

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[285] *See* EPA, *NPDES CAFO Permitting Status Report: National Summary, Endyear 2021, completed 07/20/22*, *supra* note 5.
[286] *Id.*

CAFO permit coverage in New York, the third-largest dairy cow-confining state, offers particularly strong evidence that discharging CAFOs are operating without NPDES permits. In 2017, a coalition of environmental organizations won an order directing New York to bring its CAFO NPDES permit into compliance with federal law.[287] Following the court's order, 288 CAFOs that had been operating under the NPDES permit switched to New York's state-law CAFO permit.[288] In other words, nearly 300 CAFOs that had previously concluded that they required NPDES permits suddenly claimed that they no longer discharge. At least 30 of those CAFOs had been subject to enforcement actions for NPDES permit violations since 2012, and at least three additional CAFOs had indicated that they were "daily spread" operations with no or minimal manure storage,[289] meaning that they could have no alternative but to land apply waste during conditions that pose a high risk of discharges. Unless those CAFOs significantly changed their practices or facilities—and there is no evidence whatsoever that they did so—this switch was inappropriate, and it led to a serious under-permitting problem in New York.[290]

Third, as EPA itself has acknowledged, "there are numerous documented instances . . . of actual discharges at unpermitted CAFOs."[291] A recent report by the North Carolina Department of Environmental Quality ("NC DEQ") supports this conclusion. Between July 1, 2020 and June 30, 2021, NC DEQ inspectors found 36 separate instances of unpermitted discharges at swine CAFOs.[292] Eighteen of those discharges reached surface waters.[293] Similarly, the Illinois Environmental Protection Agency reported in 2011—the most recent year for which a report is available—that its inspectors visited 189 CAFOs and found that 25 CAFOs without NPDES permits must obtain them.[294] In addition, inspectors observed 63 instances of runoff from production areas, 18 instances of discharges from waste storage structures, 7 instances of intentional discharges, and 12 instances of discharges from land application.[295] In Washington, information produced in response to a public records request revealed that CAFOs are

[287] *See Riverkeeper, Inc. v. Seggos*, 75 N.Y.S. 3d 854 (N.Y. Sup. Ct. 2018).
[288] *See* "GP-04-02," attached as Exhibit 19. This spreadsheet was produced by the New York Department of Environmental Conservation as part of its response to a 2018 Freedom of Information Law records request. The request sought, *inter alia*, a list of CAFOs formerly covered under the NPDES permit that later obtained coverage under the state-law permit.
[289] Based on records received in response to a 2017 Freedom of Information Law records request.
[290] *See* Lee Harris, *New York Dairy Farms Skirt Clean Water Act Requirements*, The Am. Prospect (Aug. 11, 2021), https://prospect.org/environment/new-york-dairy-farms-skirt-clean-water-act-requirements/.
[291] 68 Fed. Reg. at 7,201.
[292] *See* N.C. Dep't Env't Quality, *Animal Waste Management July 1, 2020 – June 30, 2021* 5, Tbl. 6, https://deq.nc.gov/media/17775/open.
[293] *Id.*
[294] *See* Ill. Env't Protection Agency, *Illinois EPA Livestock Program 2011 Livestock Facility Investigation Annual Report* 2, 4, http://www.epa.state.il.us/water/cafo/reports/2011-livestock-annual.pdf.
[295] *Id.* at 6.

discharging without NPDES permits.[296] And in Ohio, a 2015 report on CAFOs in the Western Lake Erie Watershed found that since 2008, seven dairy CAFOs discharged on at least 44 occasions.[297] According to the Ohio Environmental Protection Agency, none of these CAFOs currently have NPDES permits.[298] These findings likely represent only a small percentage of the total number of unpermitted discharges, as CAFO discharges usually are unplanned or intermittent,[299] and there is no reason to believe that an unplanned or intermittent discharge would be especially likely to coincide with an inspection.

2. <u>EPA and State Agencies Are Failing to Enforce the CWA's Prohibition on Unpermitted Discharges.</u>

Not only does EPA's permitting approach fail to require NPDES permits for discharging CAFOs, but EPA also fails to enforce the CWA's prohibition on unpermitted discharges, in contravention of the CWA. Indeed, the Agency admits that "EPA and state permitting agencies lack the resources to regularly inspect [CAFOs] to assess" whether discharges are occurring, and its existing regulations "make it difficult to compel permit coverage, limit the discharge of pollutants under certain circumstances, and enforce requirements even when discharges have been established."[300] According to a 2016 report, EPA "decreased the number of federal inspections and enforcement actions against [CAFOs] every year" from 2012 to 2015.[301] During that period, the number of EPA inspections at CAFOs dropped from 291 to 141, and the number of enforcement actions fell from 55 to 26.[302] Yet there is no reason to believe that discharges declined during this time. As the report concluded, "[t]he decline is steady, reflecting a trend and not a one-year anomaly."[303] Indeed, given the agency-wide reduction in enforcement from

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[296] *See* Letter from Jean Mendoza, Exec. Director, Friends of Toppenish Creek to Chery Sullivan, Director, Dairy Nutrient Mgmt. Program, Wash. State Dep't of Agric. 2 (Dec. 27, 2019), attached as Exhibit 20.
[297] *See Follow the Manure: Factory Farms and the Lake Erie Algal Crisis* 15, Tbl. 4 (2015), https://drive.google.com/file/d/0B9i1r38NLgy9TkhYdUgwWVhRUEE/view?resourcekey=0-guzNJUhVf7n_OC0heFaXfA.
[298] *See* Ohio Env't Protection Agency, *Concentrated Animal Feeding Operations*, https://epa.ohio.gov/divisions-and-offices/surface-water/permitting/concentrated-animal-feeding-operations#:~:text=You%20are%20also%20responsible%20for,expiration%20date%20of%20your%20permit (listing each CAFO with an NPDES permit).
[299] *See infra* Section IV.C.
[300] *See* EPA, *EPA Legal Tools to Advance Environmental Justice*, *supra* note 2, at 75.
[301] Brett Walton, *Preventing CAFO Water Pollution Not an EPA Priority*, Circle of Blue (Jan. 22, 2016), https://www.circleofblue.org/2016/world/67739/.
[302] *Id.*
[303] *Id.*

2017 to 2020,[304] the trend in declining CAFO inspections and enforcement actions has certainly continued and accelerated.

Like EPA, state agencies administering NPDES programs do not adequately enforce the prohibition on unpermitted discharges. For example, in 2010, EPA released a report finding that the Illinois Environmental Protection Agency "fails to act in a timely and/or appropriate way in response to violations of NPDES program requirements" by CAFOs.[305] In 2012, EPA released another report finding that the Iowa Department of Natural Resources ("IA DNR") failed to act in response to CWA violations by CAFOs in nearly half of the cases EPA reviewed, and IA DNR failed to assess adequate penalties for CWA violations by CAFOs.[306] And, a recent analysis of records from the Missouri Department of Natural Resources ("MO DNR") concerning the 21 swine CAFOs currently owned and operated by Smithfield Foods ("Smithfield") in Missouri found that "[MO DNR's] enforcement efforts appear to have decreased markedly since . . . 2006."[307] Similarly, an analysis of records from the Washington State Department of Ecology found that the agency rarely takes enforcement action in response to complaints about air and water pollution from dairy cow CAFOs and fails to require discharging CAFOs to obtain NPDES permits.[308]

Community members confirm these findings. For example, the Dodge County, Minnesota resident reports that she filed a complaint with the Minnesota Pollution Control Agency ("MPCA") after witnessing a CAFO operator overapply manure on frozen ground, which creates a significant risk of discharge, but MPCA did not investigate her complaint.[309] A resident of Grant County, South Dakota—whose home is surrounded by six CAFOs—says that "[t]here is little oversight of CAFOs in South Dakota" and "there are little or no inspections or

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[304] *See* Env't Integrity Project, *New EPA Enforcement Data Show Continued Downward Trend During Trump Administration* (2021), https://environmentalintegrity.org/news/epa-enforcement-data-downward-trend-during-trump-administration/.

[305] EPA Region 5, *Initial Results of an Informal Investigation of the National Pollutant Discharge Elimination System Program for Concentrated Animal Feeding Operations in the State of Illinois* 27 (2010), https://archive.epa.gov/region5/illinoisworkplan/web/pdf/iepa_cafo-report.pdf.

[306] *See* Env't Integrity Project, *EPA Report: Iowa Factory Farm Program Shown to Violate Federal Clean Water Act* (July 13, 2012), https://environmentalintegrity.org/news/epa-report-iowa-factory-farm-program-shown-to-violate-federal-clean-water-act/; *see also* Exhibit 15 ¶ 13 (explaining that IA DNR "fails to take adequate enforcement actions against CAFOs when they pollute waterways"). Though the reports in this section do not distinguish between enforcement actions against unpermitted discharges and those against permit violations, these general enforcement failures strongly suggest that EPA and state agencies are failing to take enforcement actions against unpermitted discharges.

[307] *See* Scott Dye, Socially Responsible Agric. Project, *The Rap Sheet on* Smithfield's *Industrial Hog Facilities in Missouri* 12–71 (2022), https://sraproject.org/1/smithfieldmorapsheet/#:~:text=The%20Rap%20Sheet%20on%20Smithfield's%20Industrial%20Hog%20Facilities%20in%20Missouri,-Share&text=SRAP%20reviewed%20three%20decades%20of,land%20and%20waterways%20across%20Missouri (press "Read the Rap Sheet Hyperlink").

[308] *See* Exhibit 20.

[309] *See* Exhibit 2 ¶ 18.

monitoring to detect spills."[310] And the Executive Director of Snake River Waterkeeper explains that CAFOs in Idaho "avoid operating under NPDES permits because the Idaho Department of Environmental Quality . . . does very little to monitor them or take enforcement actions against them when they discharge."[311] As a result of these weak enforcement efforts by EPA and state agencies, many CAFOs—including Large CAFOs—are able to discharge water pollution without NPDES permits, in violation of federal law, with little fear of being held accountable.

3. EPA's Approach Fails to Restore and Maintain the Nation's Waters.

Not only does EPA's approach to CAFO permitting fail to require that discharging CAFOs obtain NPDES permits or cease discharging, but it also fails to advance our national goal of restoring and maintaining water quality. Under EPA's approach, most Large CAFOs either lack water pollution permits altogether or operate under state laws and permits that typically are less protective of water quality than federal law and regulations governing NPDES permits.[312] Indeed, state laws and permits in California, Idaho, Illinois, Indiana, Iowa, Missouri, New York, North Carolina, and Washington—states where swine and dairy cow CAFOs are concentrated and most CAFOs operate under state laws or permits—all have components that are less stringent than federal law and regulations. Many of these less-stringent components fall into four categories: (1) practices for land application of waste, (2) requirements for monitoring to ensure that a CAFO doses not discharge, (3) provisions for agency review of nutrient management plans, and (4) opportunities for public review and comment on permits and nutrient management plans prior to permit issuance. Moreover, in Idaho, Illinois, and Iowa, not only are state laws less stringent, but they also allow CAFOs that do not operate under NPDES permits to operate without *any* permit to prevent water pollution.

First, some state laws and permits allow practices for the land application of waste that are less protective than federal requirements. One such practice is applying manure in close proximity to waterways. For example, in Idaho, Iowa, North Carolina, and Washington, CAFOs operating under state laws and permits are allowed to apply manure and other waste to fields less than 100 feet from surface waters under some circumstances.[313] In North Carolina, CAFOs sited or expanded prior to September 30, 1995 may apply waste up to 25 feet from streams or

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[310] Exhibit 4 ¶ 9.
[311] Decl. of Buck Ryan ¶ 11, attached as Exhibit 21.
[312] *See* EPA, *NPDES CAFO Permitting Status Report: National Summary, Endyear 2021, completed 07/20/22*, *supra* note 5. Although most states with a substantial number of pig and dairy cow CAFOs have low NPDES permit coverage, some states, including Michigan, Minnesota, and Wisconsin, have achieved high NPDES permit coverage. *See id.*
[313] *See* Iowa Admin. Code 567-65.3(3)(g)(1) (allowing CAFOs to apply waste within 200 feet from surface water if the manure is injected or incorporated into the soil on the same day as it was applied); *see also* N.C. Dep't of Env't Quality, Swine Waste Management System General Permit § I(12)(b)–(d) (April 12, 2019) (allowing land application as close as 25 feet from surface water for certain CAFOs). Idaho law does not set any limits on the distance between land application areas and surface water for dairy cow CAFOs.

waterbodies.[314] In Iowa, CAFOs may apply waste to the edge of waterbodies, provided that they inject or incorporate the waste into the soil.[315] In Washington, CAFOs may apply waste to the edge of waterbodies regardless of the application method.[316] And in Idaho, dairy cow CAFOs are not subject to any statewide prohibition on applying waste within 100 feet of surface waters. Under federal regulations, however, CAFOs operating under NPDES permits may not apply waste less than 100 feet from down-gradient surface water or conduits to surface water, regardless of the application method, unless there is a 35-foot vegetated buffer between the application area and the surface water where application is prohibited.[317] This restriction is necessary because land application close to surface waters is more likely to lead to discharges.[318]

In other states, CAFOs operating under state law and permits can apply waste at higher rates than CAFOs operating under NPDES permits. For example, in Illinois, CAFO operators are allowed to apply waste at rates based on the nitrogen needs of the crops averaged over a five-year period.[319] In other words, in any single year, they may apply *more* waste than is necessary to meet crops' nitrogen needs. By contrast, federal regulations prohibit CAFOs operating under NPDES permits from applying more nitrogen than crops can utilize.[320]

Similarly, in California's Central Valley, CAFO operators are allowed to apply waste at rates that exceed crops' phosphorus needs, until the applications cause "adverse impacts."[321] The Central Valley Regional Water Quality Control Board recognizes that excessive application rates can cause phosphorus to "build up in the soils and . . . cause adverse impacts," including "leav[ing] the land application area in surface runoff and contribut[ing] to excessive algae growth in receiving waters."[322] But CAFO operators are not required to prevent these adverse

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[314] *See* N.C. Dep't of Env't Quality, Swine Waste Management System General Permit § I(12)(b) (April 12, 2019).
[315] *See* Iowa Admin. Code 567-65.3(3)(g)(1) (allowing CAFOs to apply waste within 200 feet from surface water if the manure is injected or incorporated into the soil on the same day as it was applied).
[316] *Compare* State of Wash. Dep't of Ecology, National Pollutant Discharge Elimination System and State Waste Discharge General Permit S4.M. (Jan. 18, 2017) (prohibiting CAFOs from applying waste less than 100 feet from down-gradient surface water or conduits to surface water unless certain conditions are satisfied), *with* State of Wash. Dep't of Ecology, State Waste Discharge General Permit (Jan. 18, 2017) (containing no prohibition on applying waste less than 100 feet from down-gradient surface water or conduits to surface water).
[317] *See* 40 C.F.R. § 412.4(c)(5).
[318] EPA, *NPDES Permit Writers' Manual for Concentrated Animal Feeding Operations* 5-32 (2012), https://www.epa.gov/sites/default/files/2015-10/documents/cafo_permitmanual_entire.pdf. (explaining that the federally required 100-foot setback from waterbodies "reduces pollution by increasing the distance pollutants in land-applied manure, litter or process wastewater has to travel to reach surface water bodies").
[319] *See* 510 Ill. Comp. Stat. 77/20(f)(4).
[320] *See* 40 C.F.R. § 122.42(e)(1)(viii).
[321] Cal. Regional Water Quality Control Board, Central Valley Region, Order R5-2013-0122, Reissued Waste Discharge Requirements General Order for Existing Milk Cow Dairies, Attach. C, at C-11.
[322] *Id.* at C-11–12.

impacts from occurring; they are required to stop applying waste at rates above crops' phosphorus needs only *after* the adverse impacts have occurred.[323] Federal regulations require CAFOs operating under NPDES permits to take greater precautions when applying waste at rates above crops' phosphorus needs. Under federal regulations, CAFO operators can apply waste at rates above phosphorus needs for one year, but they must not apply *any* additional waste to the crops in subsequent years, until the phosphorus has been removed by harvest and crop removal.[324] As California recognizes, allowing CAFOs to apply waste at higher rates increases the likelihood of discharges.

Second, some state laws and permits have less stringent requirements for monitoring CAFO waste storage structures to ensure that they do not breach or overflow. Under Idaho state law, CAFO operators are not required to inspect waste storage structures at any specific intervals.[325] Under Iowa state law, CAFO operators are required to inspect earthen waste storage structures only "at least semiannually."[326] And under North Carolina state permits, CAFO operators are required to inspect waste storage structures only "at least monthly and after all storm events of greater than one (1) inch in 24 hours."[327] Under federal regulations, by contrast, CAFO operators must inspect waste storage structures weekly and note the level of the waste stored in the structure.[328] As the Ninth Circuit Court of Appeals has held, these federal inspection requirements are, in effect, monitoring requirements, and they help ensure that a CAFO will not discharge from a waste storage structure.[329]

Third, some state laws and permits have weaker requirements for agency review of "nutrient management plans," which CAFOs should use to plan for the storage and disposal of manure and other waste, thereby reducing the likelihood of discharges. Unlike CAFOs operating under federal regulations,[330] CAFOs operating under state law or permits in California's Central Valley, Illinois, New York, and Washington generally do not have to submit their nutrient management plans to the permitting agency for review.[331] But impartial agency review is

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[323] *Id.* at C-11.
[324] *See* 40 C.F.R. § 412.4(b)(3), (c)(2)(ii).
[325] *See* Idaho State Dep't of Agric., *Nutrient Management Plan for Example Dairy Farm* 10 (1998), https://agri.idaho.gov/main/wp-content/uploads/2017/12/ExamplePlan.pdf (noting only that "[c]ontinual inspection and maintenance of waste handling facilities and equipment will prevent unwarranted waste discharges into surface water and groundwater").
[326] Iowa Admin. Code r. 65.15(15)(b).
[327] *See* N.C. Dep't of Env't Quality, Swine Waste Management System General Permit § III(1) (April 12, 2019).
[328] *See* 40 C.F.R. § 412.37(a)(1)(iii).
[329] *See Food & Water Watch v. EPA*, 20 F.4th 506, 516–17 (9th Cir. 2021).
[330] *See* 40 C.F.R. § 122.23(h)(i).
[331] In California, New York, and Washington, CAFO operators do not have to submit their nutrient management plans to the permitting agency at all. In Illinois, only CAFO operators that confine more than 13,350 breeding swine or 45,450 swine for slaughter have to submit their nutrient management plans. *See* 510 Ill. Comp. Stat. 77/20(b)–(d).

essential to ensuring both that CAFOs actually develop nutrient management plans and that those plans are adequate to prevent discharges.[332] In addition, failing to require agency review increases the likelihood that nutrient management plans will remain hidden from the public, as plans in the possession of CAFO operators, unlike plans in the possession of state agencies, likely are not subject to disclosure under public records laws.

Fourth, some states do not provide for public review and comment on permits and nutrient management plans prior to permit issuance. In California's Central Valley, Idaho, Illinois, Indiana, Iowa, Missouri, New York, North Carolina, and Washington, CAFOs operating under state law and permits are not required to make their nutrient management plans available for public review and comment, unlike CAFOs applying to operate under NPDES permits.[333] This difference prevents the public from identifying aspects of a nutrient management plan that are insufficient to protect local waterways, and it also reduces transparency around the plans. In addition, in California's Central Valley, New York, and North Carolina, state law does not provide for public review and comment on CAFO construction permits or water pollution control permits. In those areas, the public cannot provide input on a proposed CAFO before permit issuance, and it has little access to information on the CAFO.

In addition to allowing the less-stringent provisions above, Idaho, Illinois, and Iowa further weaken protections for water quality by allowing CAFOs that do not operate under NPDES permits to operate without *any* water pollution control permits. Permitting systems help protect water quality by making applicable laws and regulations more accessible to CAFO operators and community members. Permits generally reflect a compilation of the laws and regulations that govern a CAFO's operations. Collecting the relevant provisions in a single document that a CAFO operator typically must maintain on site makes it easier for a CAFO operator to consult and adhere to provisions meant to prevent water pollution.[334] When permits are made publicly available, community members are better able to access those provisions and ensure that CAFOs comply with them. Permitting systems also help protect water quality by periodically requiring CAFO operators to provide updated information to state agencies and confirm that they continue to operate in accordance with state laws and regulations. If CAFO operators modify their facilities, they generally must notify the permitting agency, which allows the agency to confirm that the CAFO is still in compliance with the permit's requirements for

[332] *See Waterkeeper All., Inc.*, 399 F.3d at 502 (explaining that a decision not to require agency review of nutrient management plans constitutes failure to "ensure that . . . CAFOs will, in fact, develop nutrient management plans—and waste application rates—that comply with all applicable . . . limitations and standards").
[333] *See* 40 C.F.R. § 122.23(h)(1).
[334] *See, e.g.*, N.Y. Dep't of Env't Conservation, ECL SPDES General Permit for Concentrated Animal Feeding Operations § IV.F.1. (July 22, 2022) (requiring CAFO owners or operators to maintain a copy of the state permit on site).

preventing water pollution.[335] In addition, when a state permit expires, the permitting agency typically issues a renewed permit and requires all CAFOs to reapply for coverage under the renewed permit.[336] CAFOs must resubmit information about their operations and confirm that they are complying with the renewed permit. As discussed below, this information helps state agencies ensure that CAFOs are not discharging water pollution.[337]

Inadequately protective measures in state law and permits have had devastating consequences for the quality of our nation's waters, resulting in contaminated surface water and drinking water in areas where CAFOs are concentrated. For example, a recent study concluded that "[u]nregulated animal factory farms [in Ohio, Indiana, and Michigan] are funneling nutrient-rich pollution into Lake Erie, feeding an enormous toxic algae bloom each summer."[338] Harmful algal blooms also plague the Finger Lakes in New York,[339] which are surrounded by many Large dairy cow CAFOs operating without NPDES permits.[340] In Iowa, the Raccoon River was included in a 2021 inventory of America's most endangered rivers in light of "the grave threat that factory farms and industrial agricultural pollution [in this watershed] pose" to the river.[341] Likewise, in Indiana, 73 percent of the state's river and stream miles are designated as unsafe for recreation.[342] The Indiana Department of Environmental Management lists *E. coli* as the top source of impairment, and it names CAFOs as a significant source of the *E. coli* contamination.[343] And, as discussed below, water pollution in North Carolina and California's Central Valley has been linked to CAFOs in those states.[344] Indeed, NC DEQ has concluded that "[t]he land application of waste . . . is contributing to runoff of nutrients to the nutrient sensitive

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[335] *See* N.C. Dep't of Env't Quality, Swine Waste Management System General Permit § I(6) (April 12, 2019).
[336] *See, e.g.*, *id.* § V(9).
[337] *See infra* Section IV.C.
[338] Env't Working Grp., *Investigation: Manure from Unregulated Factory Farms Fuels Lake Erie's Toxic Algae Blooms* (Apr. 9, 2019), https://www.ewg.org/news-insights/news-release/investigation-manure-unregulated-factory-farms-fuels-lake-eries-toxic.
[339] *See* Citizen staff, *Harmful Algal Blooms Proliferate in Owasco, Skaneateles Lakes*, The Citizen (Aug. 28, 2021), https://auburnpub.com/news/local/harmful-algal-blooms-proliferate-in-owasco-skaneateles-lakes/article_e5fb11e3-e323-5c01-a04b-a0fafdd81051.html.
[340] *See* N.Y. State Dep't of Env't Conservation, Map of Concentrated Animal Feeding Operations in New York State, https://www.dec.ny.gov/permits/36895.html (last accessed May 7, 2022).
[341] Am. Rivers, *Raccoon River Named Among America's Most Endangered Rivers*, https://www.americanrivers.org/conservation-resource/raccoon-river-named-among-americas-most-endangered-rivers/#:~:text=Raccoon%20River%20named%20among%20America's%20Most%20Endangered%20Rivers,-Factory%20farm%20pollution&text=Washington%2C%20D.C.%20%E2%80%93%20Today%2C%20American,pose%20to%20drinking%20water%20supplies.
[342] *See* Env't Integrity Project, *The Clean Water Act at 50: Promises Half Kept at the Half-Century Mark* 33 (2022), https://environmentalintegrity.org/wp-content/uploads/2022/03/CWA@50-report-EMBARGOED-3.17.22.pdf.
[343] *Id.* at 34.
[344] *See infra* Section III.B.1.b.

waters of the Neuse [River]" and, as a result CAFOs "are having a significant negative impact on the Neuse River water quality."[345]

B. EPA's Current Approach to Permitting Large CAFOs Using Wet Manure Management Systems Fails to Implement Executive Orders Dedicated to Advancing Environmental Justice.

Not only does EPA's approach to permitting Large CAFOs using wet manure management systems violate the CWA, but it also fails to implement executive orders dedicated to advancing environmental justice. EPA has acknowledged that "[it] is aware of a growing body of literature suggesting that the communities disproportionately impacted by CAFOs are communities of color and economically disadvantaged communities."[346] In fact, as discussed below, ample well-established and emerging evidence shows that CAFOs disproportionately harm environmental justice communities across this country. EPA has also acknowledged that Executive Orders 12,898 and 14,008 require federal, state, and local environmental permitting programs to "integrate environmental justice . . . into relevant environmental permitting processes."[347] Despite this evidence, EPA's approach to permitting Large CAFOs using wet manure management systems fails to implement the environmental justice initiatives in Executive Orders 12,898 and 14,008.

1. CAFOs Disproportionately Harm Environmental Justice Communities.

As Judge Wilkinson of the U.S. Court of Appeals for the Fourth Circuit acknowledged when assessing claims brought by North Carolina residents against a Large swine CAFO, "[i]t is well-established—almost to the point of judicial notice—that environmental harms are visited disproportionately upon . . . minority populations and poor communities." *McKiver v. Murphy-Brown, LLC*, 980 F.3d 937, 982 (4th Cir. 2020) (Wilkinson, J., concurring).[348] As discussed below, decades of evidence supports this conclusion. Further, new data confirm that CAFOs in North Carolina, California's Central Valley, and Iowa are located disproportionately in communities of color, low-income communities, and under-resourced rural communities. And additional evidence indicates that CAFO pollution harms environmental justice communities.

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[345] Nora Deamer, N.C. Dep't of Env't & Nat. Res., *Neuse River Basinwide Water Quality Plan*, 360 (2009), https://deq.nc.gov/media/4220/download.
[346] *See* EPA, *EPA Legal Tools to Advance Environmental Justice*, *supra* note 2, at 75.
[347] EPA, *Interim Environmental Justice and Civil Rights in Permitting Frequently Asked Questions*, *supra* note 26, at 1.
[348] In *McKiver v. Murphy-Brown*, the Fourth Circuit held that the CAFO's use of a lagoon-and-sprayfield waste management system, "dead boxes" to collect dead swine, and persistent and unconstrained truck traffic was sufficient evidence to support an award of punitive damages. *Id.* at 965–68 (majority opinion).

a. <u>CAFOs Are Located Disproportionately in Environmental Justice Communities.</u>

Decades of well-established evidence shows that CAFOs disproportionately burden people living in environmental justice communities. For example, a 2000 study found that swine CAFOs in North Carolina were located disproportionately in communities with higher levels of poverty, higher proportions of nonwhite people, and higher dependence on wells for household water supply.[349] The study also found that operations run by corporate integrators—that is, corporations that own the animals and establish the confinement conditions that CAFO operators then implement—are more concentrated in poor and nonwhite areas than operations run by independent operators.[350] A 2002 study found that swine CAFOs in Mississippi were located disproportionately in Black communities and low-income communities.[351] Similarly, a 2013 study found that CAFOs in Ohio disproportionately harmed Black and Hispanic residents, as well as low-income residents.[352] And a 2014 study found that swine CAFOs in North Carolina were located disproportionately near Black, Hispanic, and American Indian residents.[353] In 2017, in response to a complaint under Title VI of the Civil Rights Act of 1964 alleging that North Carolina's permitting program for swine CAFOs has discriminatory impacts, EPA expressed "deep concern about the possibility that African Americans, Latinos, and Native Americans have been subject to discrimination" as a result of North Carolina's permitting program.[354] Thus, it is clear that CAFOs have long been a source of environmental injustice across the country.

A recent study of data from North Carolina, California's Central Valley, and Iowa builds on this evidence and confirms this conclusion. To Petitioners' knowledge, this is the first study to describe the disproportionate burdens that CAFOs impose on environmental justice

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[349] *See* Steve Wing et al., *Environmental Injustice in North Carolina's Hog Industry*, 108 Env't Health Persps. 225, 229 (2000); *see also* Gary R. Grant & Steve Wing, *Hogging the Land*, RP&E J., https://reimaginerpe.org/node/164.

[350] *See* Wing et al., *supra* note 349, at 225.

[351] *See* Sacoby M. Wilson et al., *Environmental Injustice and the Mississippi Hog Industry*, 110 Env't Health Persps. 195, 199 (2002).

[352] *See* Julia Lenhardt & Yelena Ogneva-Himmelberger, *Environmental Injustice in the Spatial Distribution of Concentrated Animal Feeding Operations in Ohio*, 6 Env't Just.133 (2013).

[353] *See* Steve Wing & Jill Johnston, Univ. N.C. at Chapel Hill, *Industrial Hog Operations in North Carolina Disproportionately Impact African-Americans, Hispanics and American Indians* 1 (2014), attached as Exhibit 22; *see also* Ji-Young Son et al., *Distribution of Environmental Justice Metrics for Exposure to CAFOs in North Carolina, USA*, 195 Env't Rsch. 110862, 110862 (2021) (finding that CAFOs in North Carolina are located disproportionately in communities of color and low-income communities).

[354] Letter from Lilian S. Dorka, Director, External Civil Rights Compliance Off., EPA, to Wiliam G. Ross, Jr., Acting Secretary, N.C. Dep't of Env't Quality, at 1 (Jan. 12, 2017) ("EPA Letter of Concern"), https://www.epa.gov/sites/default/files/2018-05/documents/letter_of_concern_to_william_g_ross_nc_deq_re_admin_complaint_11r-14-r4_.pdf.

communities in the Central Valley. The study assessed the relationship between the presence of one or more Large CAFOs in a census block and the race and ethnicity of the population in the census block in order to identify disparities in exposure to pollution from Large CAFOs.[355] It also examined CAFO exposure disparities by income, rurality, and social vulnerability. As described in greater detail below, the study concluded that in North Carolina and California's Central Valley, Large CAFOs are disproportionately located in communities of color and low-income communities. And in Iowa, over 7,500 CAFOs—including 3,443 Large CAFOs—burden the state's most rural areas, which span the vast majority of the state and are characterized by a lack of easy access to grocery stores, physicians, and hospitals.[356] In these parts of Iowa, pollution from thousands of Large CAFOs poses a serious risk to almost all residents, especially elderly residents, and it has fundamentally changed the character of rural communities.

In North Carolina, Large swine CAFOs are located disproportionately in communities of color. The percent of people of color[357] living within three miles of a Large swine CAFO in North Carolina is 1.42 times higher than the percent of non-Hispanic Whites.[358] More specifically, the percent of Black, Hispanic, and American Indian[359] residents living within three miles of a Large swine CAFO is 1.42, 1.57, and 2.20 times higher, respectively, than the percent of non-Hispanic Whites.[360] These population statistics translate to tens of thousands of people at risk. If people of all races and ethnicities in the North Carolina study area were exposed to Large swine CAFOs at the same rate, then approximately 53,000 fewer Black residents, 29,400 fewer Hispanic residents, and 16,000 fewer American Indian residents would live within three miles of a Large swine CAFO.[361]

[355] *See* Quist Report at 1.
[356] The study measured rurality using a geographic isolation scale that classifies census tracts according to their access to resources such as food, healthcare, and internet. *Id.* at 4; *see* Nathan J. Doogan et al., *Validation of a New Continuous Geographic Isolation Scale: A Tool for Rural Health Disparities Research*, 215 Social Sci. & Med. 123, 128 (2018).
[357] In the study, the term "people of color" refers to all people who identified as Hispanic and/or one or more non-White race. Quist Report at 4.
[358] *Id.* at 5.
[359] The term "Black" includes residents who identified only as Black, as well as those who identified as Black and another racial or ethnic group. *Id.* at 3–4. The same is true for the terms "Hispanic" and "American Indian." *Id.*
[360] *Id.* at 5.
[361] *Id.*

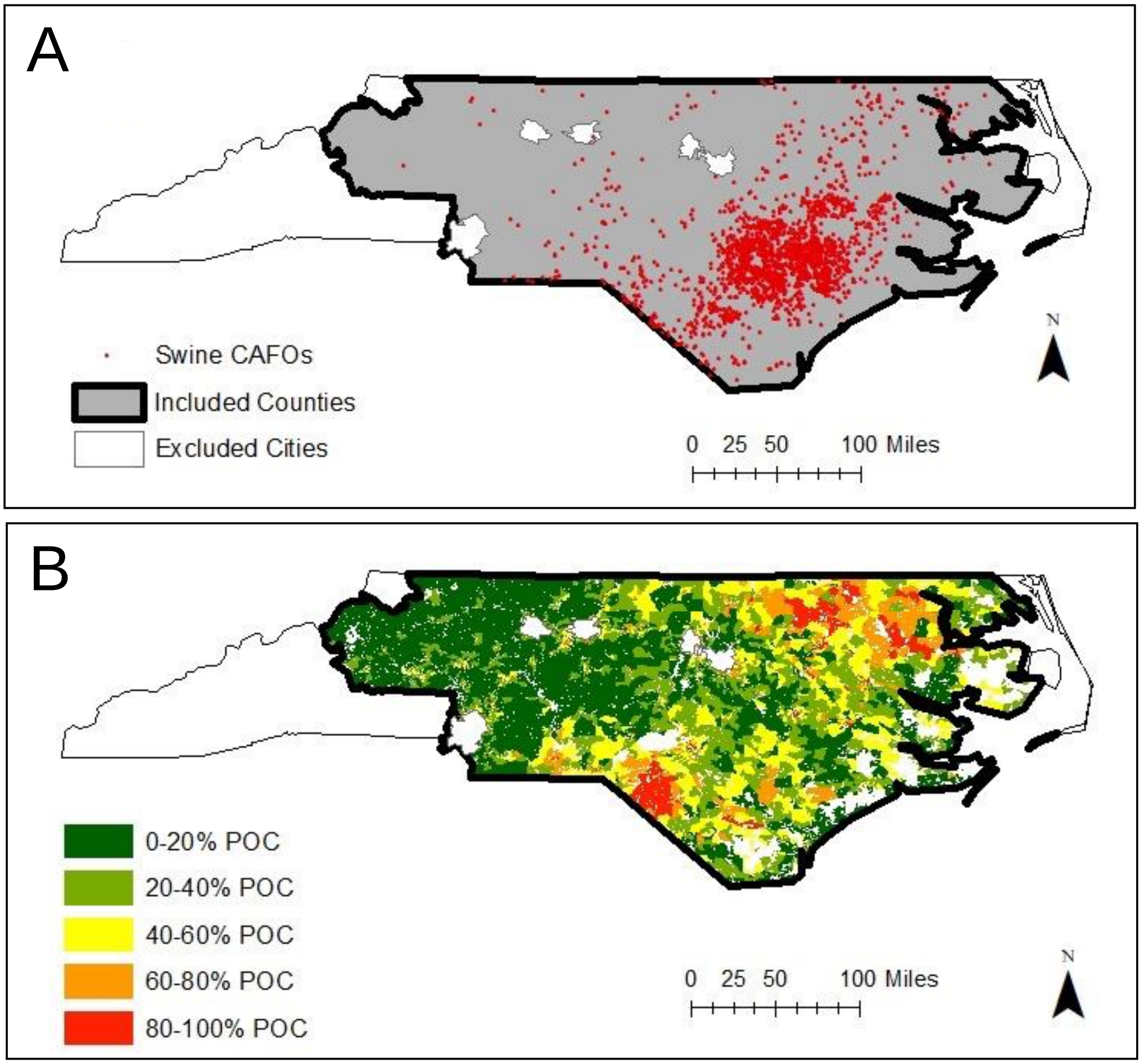

Figure Nine. North Carolina (A) swine CAFOs and (B) census blocks categorized by people of color ("POC"). The largest five cities in North Carolina (populations>250,000) and counties that do not contain swine CAFOs and do not neighbor counties with swine CAFOs were excluded from the study area and analysis. Swine CAFOs are concentrated in eastern North Carolina, where the percent of POC is higher than in central and western North Carolina.[362]

In addition, Large swine CAFOs in North Carolina are located disproportionately in low-income census blocks—that is, census blocks in which more than 35 percent of households fall below the 200 percent poverty level.[363] The percent of North Carolina residents in low-income census blocks living within three miles of a Large swine CAFO is 15 times higher than the

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[362] *Id.* at 12.
[363] *See id.* at 6.

percent of residents in higher-income census blocks, where fewer than 20 percent of households are below the 200 percent poverty level.[364]

Like swine CAFOs in North Carolina, Large dairy cow CAFOs in California's Central Valley disproportionately burden communities of color. There, the percent of people of color living within three miles of a Large dairy cow CAFO is 1.29 times higher than the percent of non-Hispanic Whites.[365] Specifically, the percent of Hispanic and American Indian residents living within three miles of a Large dairy cow CAFO is 1.54 and 1.15 times higher, respectively, than the percent of non-Hispanic Whites.[366] If Hispanic people in the Central Valley were exposed to Large dairy cow CAFOs at the same rate as White non-Hispanic people, then approximately 227,600 fewer Hispanic people would live within three miles of a Large dairy cow CAFO.[367]

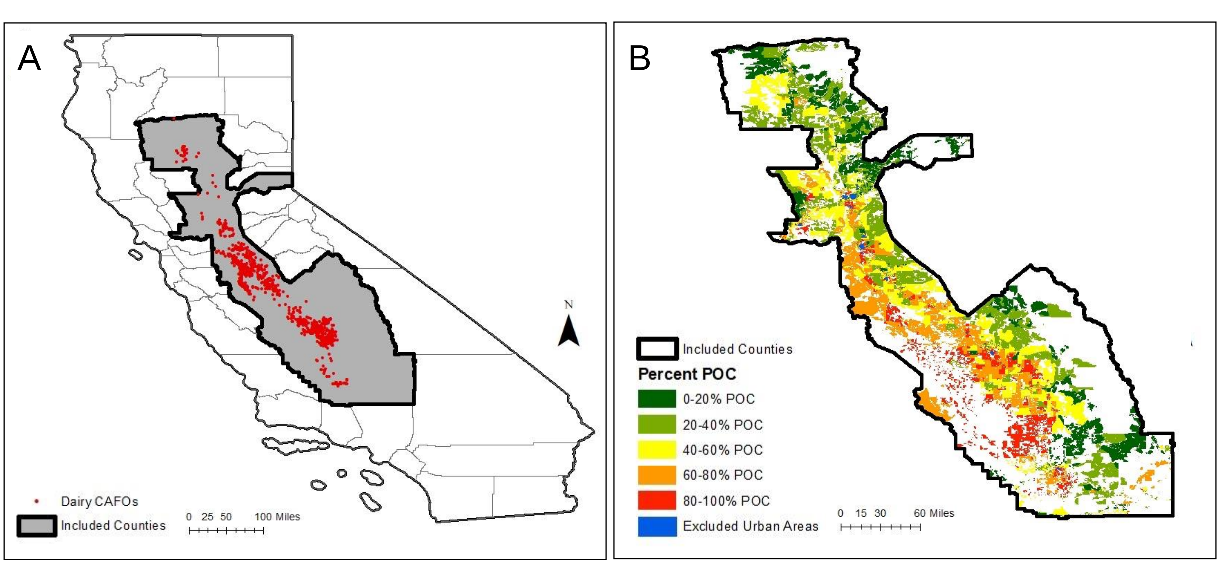

Figure Ten. California (A) dairy cow CAFOs and (B) census blocks categorized by people of color ("POC") within study area. Urban areas and counties that do not contain CAFOs were excluded from the study area and analysis. Dairy cow CAFOs in California tend to be located in areas with a higher percent of POC.[368]

Not only do Large dairy cow CAFOs in the Central Valley disproportionately burden communities of color, but they also disproportionately burden low-income communities. The

[364] *Id.* at 6.
[365] *Id.* at 5.
[366] *Id.*
[367] *Id.*
[368] *Id.* at 10.

percent of residents in low-income census blocks living within three miles of a Large dairy cow CAFO is 2.5 times higher than the percent of residents in higher-income census blocks.[369]

In Iowa, where the population is predominately White and over 7,500 swine CAFOs are spread across the state, harms from CAFOs especially burden the most rural areas, which make up the vast majority of the state and are where residents have the least access to grocery stores, physicians, and hospitals. In Iowa, 7,528 CAFOs, including 3,443 Large CAFOs—that is, 99.07 percent of all CAFOs and 99.48 percent of all Large CAFOs—are located in the most rural census tracts.[370] In the most rural and isolated Iowa census tracts, 80.54 percent of the population—over 1.1 million people—lives within three miles of a CAFO, and 66.68 percent of the population lives within three miles of a Large CAFO.[371]

In addition to burdening very rural communities, Large swine CAFOs in Iowa tend to be located near older residents. Areas in Iowa that have a higher-than-average percent of the population aged 70 and older have a larger proportion of the population living within three miles of a Large CAFO, compared to areas where the population is younger.[372]

Thus, for many elderly Iowans and over one million Iowans with limited access to food and healthcare, CAFO air and water pollution—which can spread for miles[373]—is likely inescapable and poses serious risks. Because CAFO pollution is linked to serious health problems,[374] it is a particular threat to older residents and residents who have the least access to physicians and hospitals. And because CAFO odors often prevent community members from engaging in gardening,[375] it is an especially large burden on people who have the least access to grocery stores. CAFO pollution also disrupts the way of life that inspires many people to live in rural communities.

The concentration of CAFOs in isolated areas in Iowa likely leads to further isolation in these communities. A recent report found that in Iowa, "[c]ounties that sold the most hogs and those with the largest farms suffered declines across several economic indicators—including real median household income and total wage jobs" and "also experienced significant population

[369] *Id.* at 6.
[370] *Id.* at 18, Tbl. 4.
[371] *Id.* at 17, Tbl. 3.
[372] *Id.* at 6.
[373] *See* Thu et al., *supra* note 143, at 13; *see also* Mirabelli et al., *supra* note 145, at e70.
[374] *See supra* Sections I.A. & I.B.
[375] *See supra* Section I.B.1.

decline—twice the rate of Iowa's more rural counties."[376] This report builds on previous research showing that CAFOs adversely affect property values in Iowa and across the country.[377]

b. CAFO Pollution Is Causing Harm in Environmental Justice Communities.

Not only are CAFOs disproportionately located in environmental justice communities, but they are also polluting the water and air and harming human health in those communities. For example, in a study of watersheds with active CAFOs in Eastern North Carolina, researchers found "measurable CAFO effects on water quality" in most watersheds.[378] The researchers concluded that "it is apparent that land-applications of waste manure at swine CAFOs" caused ion and nutrient pollution in the watersheds.[379] This water pollution can harm human health and wildlife, prevent people from enjoying an area's waterways, and damage local economies. In addition, a study of areas downwind of swine CAFOs in North Carolina found ammonia concentrations that were up to three times higher than average.[380] Exposure to ammonia can cause severe coughing, chronic lung disease, and chemical burns to the respiratory tract, skin, and eyes.[381]

North Carolina's CAFOs have harmed community members' health. A recent study found that North Carolina residents who live near high densities of CAFOs have higher rates of all-cause mortality, infant mortality, mortality from anemia, kidney disease, tuberculosis, and septicemia, compared to residents who do not live near CAFOs.[382] Another recent study of North Carolina residents found that living near CAFOs is associated with increased rates of acute gastrointestinal illness, and the association is strongest in Black and American Indian communities.[383]

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[376] Food & Water Watch, *The Economic Cost of Food Monopolies: The Hog Bosses* 1–2 (2022), https://www.foodandwaterwatch.org/wp-content/uploads/2022/05/RPT2_2205_IowaHogs-WEB4.pdf.

[377] *See* Raymond B. Palmquist et al., *Hog Operations, Environmental Effects, and Residential Property Values*, 73 Land Econ. 114 (1997); *see also* Joseph A. Herriges et al., *Living with Hogs in Iowa: The Impact of Livestock Facilities on Rural Residential Property Values*, 81 Land Econ. 530 (2005) (finding a statistically significant relationships between proximity to swine CAFOs and lower property values, especially for residences downwind of operations).

[378] *See* Stephen L. Harden, *Surface-Water Quality in Agricultural Watersheds of the North Carolina Plain Associated with Concentrated Animal Feeding Operations* 50 (2015), https://pubs.usgs.gov/sir/2015/5080/pdf/sir2015-5080.pdf.

[379] *Id.* at 51.

[380] *See* Ogneva-Himmelberger et al., *supra* note 352, at 150.

[381] *Id.* at 151.

[382] *See* Julia Kravchenko et al., *Mortality and Health Outcomes in North Carolina Communities Located in Close Proximity to Hog Concentrated Animal Feeding Operations*, 79 N.C. Med. J. 278 (2018).

[383] *See* Arbor J.L. Quist et al., *Exposure to Industrial Hog Operations and Gastrointestinal Illness in North Carolina, USA*, 830 Sci. Total Env't 154823 (2022).

CAFO pollution is also harming environmental justice communities in California's Central Valley. In the San Joaquin Valley, which makes up the southern portion of the Central Valley, drinking water is highly contaminated with nitrates, and nitrate levels are especially high in majority-Hispanic communities.[384] As of 2019, CAFO land application areas constituted 88 percent of the lands in the San Joaquin Valley that contributed the highest amounts of nitrogen—a source of nitrates—to groundwater,[385] meaning that CAFOs likely bear significant responsibility for the drinking water contamination that disproportionately harms Hispanic communities. Confirming the connection between CAFOs and nitrate pollution, a recent report by a dairy industry group on groundwater quality near 42 dairy CAFOs in the Central Valley found that "elevated [nitrate] concentrations were present beneath all monitored dairies."[386] This contamination forces many Central Valley residents to pay for bottled water, with some spending 10 percent of their household income on drinking water.[387]

In addition, CAFO pollution is harming rural communities in Iowa. A study of private drinking wells in Iowa found unsafe levels of nitrate, coliform bacteria, and fecal coliform bacteria in thousands of wells, and almost 75 percent of the contaminated wells were in rural counties.[388] The study attributed the contamination to fertilizer and animal manure applied to fields.[389]

Algal blooms in Lake Erie, which are fueled by CAFO pollution, are contaminating drinking water in environmental justice communities.[390] A recent report found that of the 35 water systems that get their water from Lake Erie, eight systems serving 77 percent of all people who get water from Lake Erie served communities with a higher percentage of people of color than the state average.[391] In addition, 11 systems serving 78 percent of people served low-

384 *See* Ann Weir Schechinger, Env't Working Grp., *In California, Latinos More Likely to Be Drinking Nitrate-Polluted Water* (Oct. 7, 2020), https://www.ewg.org/interactive-maps/2020-california-latinos-more-likely-drinking-nitrate-polluted-water/.

385 *See* Ellen Hanak et al., Public Policy Institute of California, *Water and the Future of the San Joaquin Valley* 9 (2019), https://www.ppic.org/wp-content/uploads/water-and-the-future-of-the-san-joaquin-valley-overview.pdf.

386 Central Valley Dairy Representative Monitoring Program, *Summary Representative Monitoring Report (Revised*)* 6 (2019), https://leadershipcounsel.org/wp-content/uploads/2019/10/Dairy-report.pdf.

387 *See* Twilight Greenaway, *California Dairy Uses Lots of Water. Here's Why It Matters*, Civ. Eats (June 30, 2022), https://civileats.com/2022/06/30/california-dairy-water-uses-climate-change-drought-pollution/?utm_source=Verified+CE+list&utm_campaign=837d1e83fc-EMAIL_CAMPAIGN_7_3_2018_8_13_COPY_01&utm_medium=email&utm_term=0_aae5e4a315-837d1e83fc-294264333.

388 *See* Env't Working Grp., *Iowa's Private Wells Contaminated by Nitrate and Bacteria* (2019), https://www.ewg.org/interactive-maps/2019_iowa_wells/.

389 *Id.*

390 *See* Env't Working Grp., *Lake Erie's Annual Algae Outbreak Mostly Threatens Health of People in Disadvantaged Communities* (2021), https://www.ewg.org/news-insights/news/2021/08/lake-eries-annual-algae-outbreak-mostly-threatens-health-people.

391 *Id.*

income communities.[392] Because of the harmful algal blooms, these communities are at risk of drinking water contaminated with bacteria that causes gastrointestinal issues and harms the kidney and liver.[393] In the wake of the 2014 algal bloom in Lake Erie, many residents of Toledo, Ohio—where the percentage of people of color is higher than the state average[394]—continued to avoid drinking tap water even five years later.[395]

In Yakima County, Washington, dairy CAFOs are harming environmental justice communities. Yakima County has a high proportion of low-income and Indigenous people and people of color.[396] In 2013, EPA issued a report that concluded that dairies in the Lower Yakima Valley, which includes Yakima County, were likely responsible for elevated nitrate levels in residential drinking wells.[397] And on a map of environmental health disparities in Washington State, Yakima County "is a big, red blemish" due, in part, to pollution from CAFOs.[398]

Further, ample evidence shows that many communities suffering disproportionate harm from CAFOs also are exposed to other pollution sources, which can worsen the human health and environmental problems associated with CAFOs. For example, in North Carolina, the same communities suffering from swine CAFO pollution are also overburdened by pollution from poultry CAFOs.[399] A 2019 report found that "82 million poultry are packed in between four million pigs" in Duplin and Sampson Counties, which together "are home to almost half of all the swine operations in North Carolina."[400] Like swine CAFOs, poultry CAFOs contaminate waterways and emit toxic air pollution.[401]

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[392] *Id.*
[393] *Id.*
[394] *Id.*
[395] *See* All. for the Great Lakes, *Five Years Later: Lessons From the Toledo Water Crisis* (Aug. 1, 2019), https://greatlakes.org/2019/08/five-years-later-lessons-from-the-toledo-water-crisis/.
[396] *See* Letter from Jennifer D. Calkins, Att'y & Diehl Fellow, Western Env't L. Center, et al., to Laura Watson, Dir., Wash. State Dep't of Ecology 4–5 (May 6, 2022), attached as Exhibit 23.
[397] *See* EPA, *Relation Between Nitrate in Water Wells and Potential Sources in the Lower Yakima Valley, Washington* ES-9 (2013), https://www.epa.gov/sites/default/files/2017-12/documents/lower-yakima-valley-groundwater-report-2013.pdf.
[398] *See* Esmy Jimenez, *New Map Shows Hotspots of Environmental Health Hazards for Washington Neighborhoods*, Nw. Pub. Broadcasting (Jan. 20, 2019), https://www.nwpb.org/2019/01/10/new-map-shows-hotspots-of-environmental-health-hazards-for-washington-neighborhoods/.
[399] *See* Soren Rundquist & Don Carr, Env't Working Grp., *Under the Radar: New Data Reveals N.C. Regulators Ignored Decade-Long Explosion of Poultry CAFOs* 3 (2019), https://www.ewg.org/research/under-radar.
[400] *Id.*
[401] *See* Env't Integrity Project, *Poultry Industry Pollution in the Chesapeake Region* 1 (2020), https://environmentalintegrity.org/wp-content/uploads/2020/04/Chesapeake-Poultry-Report-.pdf.

Adding to these burdens, CAFO operators in North Carolina have begun collaborating with energy companies on biogas projects,[402] which entrench the use of wet manure management systems at CAFOs—particularly Large CAFOs[403]—and exacerbate water and air pollution.[404] For example, USDA has concluded that "[c]ompounds such as nitrogen, phosphorus and other elements become more soluble due to [the biogas production process] and therefore have higher potential to move with water."[405] In other words, pollutants in the waste that remains after the biogas production process are even more likely to reach surface water and groundwater. In addition, waste pits used in biogas projects can breach or fail, just as other waste pits. For example, at a swine CAFO in North Carolina, a cover on a waste pit used in a biogas project ruptured, spilling at least 37,000 gallons of gelatinous gray foam into nearby wetlands.[406] In light of the pollution that biogas projects threaten, community groups in North Carolina have filed a complaint against NC DEQ under Title VI of the Civil Rights Act of 1964, contending that NC DEQ's issuance of four permits for biogas projects has discriminatory impacts on communities of color already overburdened by CAFO pollution.[407] EPA is investigating the complaint.[408]

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[402] *See* Michael Sainato & Chelsea Skojec, *The North Carolina Hog Industry's Answer to Pollution: A $500m Pipeline Project*, The Guardian (Dec. 11, 2020), https://www.theguardian.com/us-news/2020/dec/11/north-carolina-hog-industry-lagoons-pipeline; *see also* Phoebe Gittelson et al., *The False Promises of Biogas: Why Biogas Is an Environmental Justice Issue* 4 (2021), https://www.liebertpub.com/doi/epdf/10.1089/env.2021.0025.

[403] *See* Ruthie Lazenby, *Rethinking Manure Biogas* 24–25 (2022), https://www.vermontlaw.edu/sites/default/files/2022-08/Rethinking_Manure_Biogas.pdf.

[404] *See* Viney Aneja, et. al, *Characterizing Ammonia Emissions from Swine Farms in North Carolina: Part 2—Potential Environmentally Superior Technologies for Waste Treatment*, 58 J. Air & Waste Mgmt. Ass'n, 1145, 1156, Tbl. 4 (2008) (finding a 11.9 percent increase in ammonia emissions from an open secondary lagoon storing digester waste over an open lagoon storing conventional hog waste); *see also* Michael A. Holly et al., *Greenhouse Gas and Ammonia Emissions from Digested and Separated Dairy Manure During Storage and After Land Application*, 239 Agric., Ecosystems & Env't 410, 413 (2017) (finding that anaerobic digestion resulted in an 81 percent increase in ammonia emissions from waste storage pits); *see also* Exhibit 11 ¶ 16.

[405] USDA, Conservation Practice Standard, Anaerobic Digester, Code 366, at 366-CPS-6 (2017), https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1254996.pdf.

[406] *See* Adam Wagner, *Really Terrible Science Experiment Leads to Weeks-Long Spill from NC Hog-Waste Lagoon*, The News & Observer (Sept. 6, 2022), https://www.newsobserver.com/news/state/north-carolina/article264779224.html.

[407] *See* Letter from Blakely Hildebrand, Staff Attorney, Southern Env't Law Center, to Michel S. Regan, Administrator & Lilian Dorka, External Civil Rights Compliance Off., EPA 1 (Sept. 27, 2021), https://www.southernenvironment.org/wp-content/uploads/2021/09/2021-09-27-Title-VI-Complaint-Index-DEQ-Biogas-Permits.pdf.

[408] *See* Letter from Lilian S. Dorka, External Civil Rights Compliance Off., EPA, to Blakely Hildebrand, Staff Attorney, Southern Env't Law Center (Jan. 13, 2022), https://www.southernenvironment.org/wp-content/uploads/2022/01/2022.01.13-Final-CP-Acceptance-Ltr.-EPA-Complaint-No.-05RNO-21-R4-NCDEQ-copy.pdf.

Similar patterns are evident in California's Central Valley, where communities disproportionately burdened by CAFO pollution are also overburdened by air pollution from crop production, truck traffic, and oil drilling.[409] And there too, CAFO operators are launching biogas projects.[410]

2. EPA's Approach Fails to Implement Executive Order 12,898.

Officers of the executive branch "are duty-bound to give effect to the policies embodied in the President's direction, to the extent allowed by the law."[411] Thus, "if an executive agency . . . may lawfully implement [an] Executive Order, then it must do so."[412] Despite this clear standard and the Biden Administration's commitment to "ma[ke] achieving environmental justice a top priority,"[413] EPA's approach to CAFO permitting fails to implement the directives in Executive Order 12,898 for at least three reasons. *First*, EPA's approach fails to "collect, maintain, and analyze" information necessary to determine whether CAFOs "have disproportionately high and adverse human health or environmental effects on minority populations and low-income populations."[414] *Second*, EPA's approach fails to "address . . . [the] disproportionately high and adverse human health [and] environmental effects" that CAFOs impose on environmental justice communities.[415] *Third*, EPA's approach fails to ensure that the public is able to participate in the CAFO permitting process.

First, EPA's approach to CAFO permitting does not allow the agency to collect, maintain, and analyze information necessary to show that CAFOs disproportionately harm environmental justice communities, despite clear indications that disproportionate harm exists.[416] As noted above, EPA's approach allows "[m]any CAFOs . . . to discharge [water pollution] without NPDES permits" in violation of federal law, instead allowing CAFOs to operate without water pollution permits or under state laws and permits.[417] However, these state laws and

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[409] *See* Brendan Borrell, *California's Fertile Valley is Awash in Air Pollution*, Mother Jones (Dec. 10, 2018), https://www.motherjones.com/environment/2018/12/californias-fertile-valley-is-awash-in-air-pollution/.
[410] *See* Michael Sainato, *California Subsidies for Dairy Cows' Biogas are a Lose-Lose, Campaigners Say*, The Guardian (Feb. 4, 2022), https://www.theguardian.com/environment/2022/feb/04/california-subsidies-biogas-dairy-cows-emissions-climate.
[411] *Bldg. & Constr. Trades Dep't v. Allbaugh*, 295 F.3d 28, 32 (D.C. Cir. 2002).
[412] *Id.* at 33; *see Sherley v. Sebelius*, 689 F.3d 776, 784–85 (D.C. Cir. 2012).
[413] The White House, *Biden-Harris Administration Outlines Historic Progress on Environmental Justice in Report Submitted to Congress* (May 23, 2022), https://www.whitehouse.gov/ceq/news-updates/2022/05/23/biden-harris-administration-outlines-historic-progress-on-environmental-justice-in-report-submitted-to-congress-2/.
[414] Exec. Order No. 12,898 § 3-302.
[415] *Id* §1-101.
[416] *See supra* Section III.B.1.
[417] *See* EPA, *EPA Legal Tools to Advance Environmental Justice*, *supra* note 2, at 75.

permits do not have standardized information collection requirements.[418] As a result, many states "lack critical data about operations' size, permit status, location, method of storing manure, animal type, and ownership."[419] Because EPA relies on states to collect this data,[420] their failure also affects EPA. And without comprehensive, facility-specific information on CAFOs, EPA more easily can turn a blind eye to the disproportionate burdens that CAFOs impose on environmental justice communities.

Second, EPA's approach to CAFO permitting fails to address the disproportionate burdens imposed by CAFOs. As shown above, EPA's approach allows discharging CAFOs to operate under state laws and permits that are less stringent than NPDES permits.[421] This under-permitting problem is present across the country, including in states where data shows that CAFOs disproportionately burden environmental justice communities. In North Carolina, for example, nearly 99 percent of Large CAFOs operate under state-law permits, rather than NPDES permits.[422] And, as discussed above, North Carolina's state-law permit contains provisions that are less stringent than federal requirements for CAFOs operating under NPDES permits.[423] CAFO operators in North Carolina are allowed to apply manure and other waste to fields less than 100 feet from surface waters, and they are not required to make their nutrient management plans available for public review and comment.[424] Thus, in North Carolina, not only are members of environmental justice communities more likely to live near CAFOs, but they also are more likely to live near CAFOs operating under permits that offer fewer protections against water pollution and less transparency.

The same is true in California's Central Valley. Nearly 87 percent of Large CAFOs in California operate under a state-law general order, rather than NPDES permits.[425] Because most CAFOs in California are concentrated in the Central Valley,[426] it follows that a significant number of Large CAFOs in the Central Valley operate under the state-law general order. And, as discussed above, that order contains provisions that are less stringent than federal

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[418] *See* Jon Devine & Valerie Baron, *CAFOs: What We Don't Know Is Hurting Us*, Nat. Res. Def. Council at 11–12 (2019), https://www.nrdc.org/sites/default/files/cafos-dont-know-hurting-us-report.pdf.
[419] *Id.* at 5.
[420] *See* National Pollutant Discharge Elimination System (NPDES) Concentrated Animal Feeding Operation (CAFO) Reporting Rule, 77 Fed. Reg. 42,679-01, 42, 681 (explaining that EPA will rely on the states for CAFO information).
[421] *See supra* Sections III.A.1. & III.A.3.
[422] *See* EPA, *NPDES CAFO Permitting Status Report: National Summary, Endyear 2021, completed 07/20/22*, *supra* note 5.
[423] *See supra* Section III.A.3.
[424] *Id.*
[425] *See* EPA, *NPDES CAFO Permitting Status Report: National Summary, Endyear 2021, completed 07/20/22*, *supra* note 5.
[426] *See* Sunghoon Baek & Charlotte D. Smith, *Potential Contaminant Runoff from California's Dairy Concentrated Animal Feeding Operations (CAFOs): A Geospatial Analysis*, 11 Int'l J. Water Res. & Env't Eng'g 1, 6 (2019).

requirements.[427] CAFO operators in California are allowed to apply waste at rates that exceed crops' phosphorus needs, even though the Central Valley Regional Water Quality Control Board recognizes that these rates can cause harmful algal blooms and other adverse impacts, and CAFOs are not required to make their nutrient management plans available for public review and comment.[428]

Third, EPA's approach to CAFO permitting limits community members' ability to participate in the CAFO permitting process. EPA's approach allows discharging CAFOs to operate under state laws and permits that, in addition to being less stringent than NPDES permits, also offer fewer opportunities for public participation. This is the case in both North Carolina and California's Central Valley. In both areas, CAFOs operating under state law and permits are not required to make their nutrient management plans available for public review and comment. As a result, under EPA's approach, the communities that disproportionately suffer as a result of CAFO pollution also have little say in decisions to monitor, reduce, or continue that pollution.

3. <u>EPA's Approach Fails to Implement Executive Order 14,008.</u>

EPA's approach to CAFO permitting also fails to implement Executive Order 14,008's directive that EPA strengthen enforcement of environmental violations with disproportionate impacts on environmental justice communities. As explained above, EPA admits that "EPA and state permitting agencies lack the resources to regularly inspect [CAFOs] to assess [whether discharges are occurring," and EPA's current regulations "make it difficult to compel permit coverage, limit the discharge of pollutants under certain circumstances, and enforce requirements even when discharges have been established."[429] In addition, under EPA's current approach, most CAFOs operate under state laws, which generally do not provide for citizen suits. This is the case in both North Carolina and California's Central Valley, where CAFOs disproportionately harm environmental justice communities.

Allowing discharging CAFOs to operate under state laws and permits that do not provide for citizen suits weakens enforcement against CAFOs. Without citizen suits, only permitting agencies can take enforcement actions when CAFOs violate a state law or permit. But, for the reasons detailed below, permitting agencies often lack the facility-specific information necessary to identify violations, and violations commonly are unplanned or intermittent.[430] Unlike permitting agencies, citizens who live near discharging CAFOs are well-suited to identify violations, as they can consistently observe the CAFOs' operations and typically are the first to experience harm associated with CAFO pollution. When citizens identify a violation of a NPDES permit, they can use citizen suits to "both spur and supplement government enforcement

[427] *See supra* Section III.A.3.
[428] *See supra* Section III.A.3.
[429] *See* EPA, *EPA Legal Tools to Advance Environmental Justice, supra* note 2, at 75.
[430] *See infra* Section IV.C.

actions."[431] Under EPA's approach, however, which allows many discharging CAFOs to operate without NPDES permits, citizens are left without this recourse.

IV. EPA SHOULD ADOPT A REBUTTABLE PRESUMPTION THAT LARGE CAFOs USING WET MANURE MANAGEMENT SYSTEMS ACTUALLY DISCHARGE POLLUTANTS.

To remedy its failure to satisfy its duties under the CWA and Executive Orders 12,898 and 14,008, EPA should adopt a rebuttable presumption that Large CAFOs using wet manure management systems actually discharge and, thus, must apply for NPDES permits. For the reasons that follow, the requested presumption is legally sound, and it will help ensure the objectives of the CWA and the environmental justice initiatives in Executive Orders 12,898 and 14,008, thereby protecting human health and the environment.[432]

A. EPA May Adopt Rebuttable Presumptions.

It is "well settled" that administrative agencies may establish presumptions.[433] An agency's presumption is lawful if there is "a sound and rational connection" between the proved facts, which trigger the presumption, and the inferred facts, which follow.[434] A sound and rational connection is present "when 'proof of one fact renders the existence of another fact so probable that it is sensible and timesaving to assume the truth of [the inferred] fact . . . until the adversary disproves it.'"[435] In other words, "the circumstances giving rise to the presumption must make it more likely than not that the [inferred] fact exists."[436]

A presumption is sensible and timesaving—and, therefore, appropriate—where the inferred fact is difficult to prove.[437] For example, in *United States Steel Corp. v. Astrue*, the U.S. Court of Appeals for the Eleventh Circuit upheld the Social Security Administration's ("SSA") rebuttable presumption that a beneficiary was employed in the coal industry and, thus, entitled to certain benefits, if the employer was a coal mine operator that had signed a national coal wage agreement and the employment occurred during the employer's participation in the agreement.[438]

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[431] *Waterkeeper All., Inc.*, 399 F.3d at 503 (quoting S. Rep. No. 50, 99th Cong., 1st Sess. 28 (1985)).
[432] *See NLRB v. Tahoe Nugget, Inc.*, 584 F.2d 293, 303 (9th Cir. 1978) (explaining that whether a presumption "ensures the [governing statute's] . . . objective" is a "secondary consideration supporting the presumption's continued vitality").
[433] *Chemical Mfrs. Ass'n,* 105 F.3d 702, 705 (D.C. Cir. 1997); *see also Cole v. U.S. Dep't of Agric.*, 33 F.3d 1263, 1267 (11th Cir. 1994) ("The law is well established that presumptions may be established by administrative agencies[.]").
[434] *Chemical Mfrs. Ass'n*, 105 F.3d at 705.
[435] *Id.* (quoting *NLRB v. Curtin Matheson Scientific, Inc.*, 494 U.S. 775, 788–79 (1990)) (some internal quotation marks omitted).
[436] *Nat'l Mining Ass'n. v. Babbitt*, 172 F.3d 906, 910 (D.C. Cir. 1999).
[437] *See USX Corp. v. Barnhart*, 395 F.3d 161, 172 (3d Cir. 2004).
[438] *See U.S. Steel Corp. v. Astrue*, 495 F.3d 1272, 1284 (11th Cir. 2007).

The court explained that there was a sound connection between the proved and inferred facts and that "the SSA's 'rebuttable presumption is a sensible response' to the difficulty of locating records that the worker was employed specifically in the coal industry[,] as the 'beneficiaries' personnel files can date back fifty to sixty years, and even a [worker]'s own employer can have difficulty retrieving them.'"[439] A presumption is also sensible and timesaving where, as here, the party against whom the presumption applies is well-positioned to rebut the presumption.[440]

Whether a presumption "ensures the [governing statute's] . . . objective" is a "secondary consideration supporting the presumption's continued vitality."[441] For example, in *National Labor Relations Board v. Tahoe Nugget, Inc.*, the Ninth Circuit upheld a presumption adopted by the National Labor Relations Board because there was a sound connection between the proved and inferred facts and, secondarily, because the presumption "ensure[d] the [National Labor Relations Act's] most valued objective: industrial peace."[442] The court explained that "[p]resumptions often function to further social, economic, or other policies, distinct from the fact presumed."[443]

EPA and other agencies commonly adopt rebuttable presumptions, and courts regularly uphold them. For example, in 2003, EPA adopted a rebuttable presumption concerning the designation of "nonattainment" areas under the Clean Air Act.[444] Under the presumption, "if any area within a metropolitan area exceeds the annual [air quality standard], then *all* areas within the metropolitan area presumptively 'contribute' to that violation . . . and therefore warrant 'nonattainment' designations."[445] EPA explained that it adopted the presumption after examining the geographic distribution of pollutant sources in some metropolitan areas and finding that they were distributed throughout the areas.[446] Thus, "[the] presumption reflects EPA's view that, in the absence of evidence to the contrary, violations of the [air quality standard] in urban areas may be presumed attributable at least in part to contributions from sources distributed throughout the Metropolitan Area."[447] Here, EPA has similar support for the requested presumption. Along with the following evidence showing that Large CAFOs using wet manure management systems actually discharge, EPA has examined some CAFOs and concluded that "[m]any . . . discharge without NPDES permits."[448] Thus, absent evidence to the

[439] *Id.* (quoting *USX Corp.*, 395 F.3d at 172).
[440] *See USX Corp.*, 395 F.3d at 172 (noting that the party against whom the presumption applied was "in a position to correct any misapprehensions").
[441] *NLRB v. Tahoe Nugget, Inc.*, 584 F.2d at 303.
[442] *Id.*
[443] *Id.* at 304.
[444] *See Catawba Cnty. v. EPA*, 571 F.3d 20, 25–27 (D.C. Cir. 2009).
[445] *Id.* at 27.
[446] *Id.* at 28.
[447] *Id.*
[448] EPA, *EPA Legal Tools to Advance Environmental Justice*, *supra* note 2, at 75.

contrary, EPA may presume that all Large CAFOs using wet manure management systems actually discharge.

In addition, EPA's regulations implementing the Resource Conservation and Recovery Act include a rebuttable presumption concerning the identification of hazardous waste.[449] And the Department of Transportation ("DOT") uses a rebuttable presumption to identify the cause of loose closures on railroad tank cars transporting hazardous materials.[450] Courts upheld both EPA's presumption regarding the designation of nonattainment areas and DOT's presumption regarding the cause of loose closures on railroad tank cars,[451] and EPA's presumption concerning the identification of hazardous waste has not been challenged.

B. There Is a Sound and Rational Connection Between Large CAFOs Using Wet Manure Management Systems and Actual Discharges.

As described above, CAFOs generate a tremendous amount of urine and feces.[452] CAFOs using wet manure management systems store urine, feces, and other wastewater in liquid form in vast pits or large tanks. These CAFOs often use pipes to transport the liquid waste from one location to another, and they typically dispose of the waste by applying it to fields. For the reasons that follow, using these practices to store, transport, and dispose of large amounts of liquid waste is almost certain to cause at least intermittent or sporadic discharges. Indeed, discharges regularly occur, causing serious harm to human health and the environment, and the effects of climate change increase the risk of additional, severe discharges in the future. Large CAFOs using standard storage, transport, and disposal practices to manage liquid waste are an especially significant source of water pollution. Thus, there is a sound and rational connection between Large CAFOs using wet manure management systems and actual discharges.

1. CAFOs Using Wet Manure Management Systems Discharge from Waste Storage Structures.

Extensive evidence shows that CAFOs using wet manure management systems release pollutants from waste storage structures into surface water and groundwater, because waste pits breach and overflow, waste tanks fail, and waste seeps out of storage pits. Provided that these pollutants reach navigable waters, which CAFO operators can address to rebut the presumption,

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[449] *See* 40 C.F.R. § 279.10(b)(1)(ii). The regulation provides that "[u]sed oil containing more than 1,000 [parts per million] total halogens is presumed to be a hazardous waste because it has been mixed with halogenated hazardous waste." *Id.*
[450] *See* 49 C.F.R. § 173.31(d)(2). Under this presumption, "the lack of securement of any closure to a tool-tight condition, detected at any point, will establish a rebuttable presumption that a proper inspection was not performed by the offeror of the car." *Id*.
[451] *See Catawba Cnty. v. EPA*, 571 F.3d at 40; *see also Chemical Mfrs. Ass'n*, 105 F.3d at 707–08.
[452] *See supra S*ection I.

the releases constitute discharges that require a permit under the CWA.[453] As shown below, these discharges are routine, predictable consequences of storing large quantities of liquid waste in vast pits and tanks. Thus, there is a sound and rational connection between waste storage structures and discharges.

Waste pits and tanks regularly breach or fail due to structural problems and precipitation, releasing pollutants into waterbodies. Not only are these incidents common, but they also cause serious harm to wildlife and disrupt recreational and commercial uses of waterways. For example, in August 2005, the side of a CAFO waste pit in New York gave way, spilling three million gallons of waste into the Black River.[454] The waste plume grew to roughly one-fourth the size of the infamous Exxon Valdez oil spill and killed vast numbers of fish.[455] In 2009 in Illinois, a waste pit breach released approximately 200,000 gallons of waste, killing at least 110,436 fish in a nearby creek.[456] In 2017, a storage tank at a CAFO in Oregon failed, releasing 190,000 gallons of manure into the Tillamook River.[457] As a result of the spill, health officials closed the area to recreational and commercial use for more than a week.[458] In 2020 in North Carolina, relatively light precipitation—just two inches of rainfall—caused a waste pit to breach, releasing over three million gallons of waste and killing at least 1,000 fish in surrounding waterways.[459] And there are other structural failures that have occurred at CAFOs across the country, causing extensive water pollution.[460]

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[453] *See* 33 U.S.C. § 1362(12) (defining a discharge as "any addition of any pollutant to navigable waters from any point source"); *see also Cnty. of Maui*, 140 S. Ct. at 1477 (holding that the CWA's permitting requirement extends to "a discharge (from a point source) of pollutants that reach navigable waters after traveling through groundwater if that discharge is the functional equivalent of a direct discharge from the point source into navigable waters").

[454] *See* Michelle York, *Workers Trying to Contain Effects of Big Spill Upstate*, N.Y. Times (Aug. 15, 2005), https://www.nytimes.com/2005/08/15/nyregion/workers-trying-to-contain-effects-of-big-spill-upstate.html.

[455] *Id.*

[456] Jackson & Marx, *supra* note 90.

[457] *See* Tracy Loew, *Dairy Fined $16,800 for Manure Spill that Shut Down Tillamook Bay*, Statesman J. (Feb. 13, 2018), https://www.statesmanjournal.com/story/tech/science/environment/2018/02/13/dairy-fined-16-800-manure-spill-shut-down-tillamook-bay/334888002/.

[458] *Id.*

[459] *See* Lisa Sorg, *1,000+ Dead Fish: NC DEQ Releases More Troubling Details on Hog Lagoon Spill*, NC Policy Watch (July 17, 2020), https://pulse.ncpolicywatch.org/2020/07/17/1000-dead-fish-deq-releases-more-troubling-details-on-hog-lagoon-spill/#sthash.aQq63lkY.dpbs.

[460] *See DNR Assisting With Cleanup of Manure Spill Near the Town of Merrill*, Antigo Times (June 11, 2021), https://antigotimes.com/2021/06/dnr-assisting-with-cleanup-of-manure-spill-near-the-town-of-merrill/ (describing a manure spill caused by an open valve on a manure pit at a dairy cow CAFO in Missouri, which killed fish in multiple sections of a nearby creek); *see also* Lisa Sorg, *Hog Farm That Spilled 1 Million Gallons of Feces, Urine Into Waterways Had Been Warned of Lagoon Problems*, N.C. Policy Watch (Jan. 12, 2021), https://ncpolicywatch.com/2021/01/12/hog-farm-that-spilled-1-million-gallons-of-feces-urine-into-waterways-had-been-warned-of-lagoon-problems/ (describing a waste pit

In addition to breaching, waste storage pits commonly overflow, releasing large amounts of waste. For example, in 2021 in Ohio, a dairy cow CAFO's waste pit overflowed, polluting up to a mile of a nearby stream and leaving the cows to stand in manure a foot deep.[461] Ohio Attorney General Dave Yost said of the overflow, "This isn't a farm right now. It's a biohazard that needs cleaned up before more harm is done."[462] Other overflow incidents have occurred at CAFOs across the country.[463] Waste pit overflows are especially common and destructive in areas that experience hurricanes and other extreme storms. In Eastern North Carolina, where over 500 waste pits are located in or near the state's 100-year floodplain, hurricanes and tropical storms commonly cause overflows.[464] In 1999, flooding from Hurricane Floyd caused at least 45

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breach at a swine CAFO in North Carolina, which spilled an estimated one million gallons of waste into a tributary of the Trent River); Jennifer Bjorhus, *Minnesota Pollution Officials Monitoring Large Stearns County Manure Spill*, Star Tribune (Sept. 26, 2019), https://www.startribune.com/minnesota-pollution-officials-monitoring-large-stearns-county-manure-spill/561460822/ (describing a manure spill caused by a failed valve on a manure storage tank at a dairy cow CAFO in Minnesota); Ad Crabel, *100,000-Gallon Manure Spill Causes Fish Kill in Sadsbury Township*, Lancaster Online (Mar. 6, 2018), https://lancasteronline.com/news/local/100-000-gallon-manure-spill-causes-fish-kill-in-sadsbury-township/article_728195ca-2169-11e8-a744-9bb6fe255de4.html (describing waste pit ruptures in March 2018 and October 2017 at CAFOs in Pennsylvania, which both caused fish kills); *Manure Spill Kills Fish in Creek Near Freedom*, FOX 11 News (July 11, 2017), https://fox11online.com/news/local/fox-cities/manure-spill-kills-fish-in-creek-near-freedom (describing a 20,000 gallon manure spill from a dairy cow CAFO waste pit in Wisconsin, which caused a fish kill); O. Kay Henderson, *Manure Spill at Dubuque County Dairy Farm*, Radio Iowa (Sept. 18, 2014), https://www.radioiowa.com/2014/09/18/manure-spill-at-dubuque-county-dairy-farm/ (describing a manure spill from a dairy cow CAFO waste pit in Iowa, which caused a fish kill).

[461] *See* Cameron Knight, *'Hundreds of Dead Fish' and Foot-Deep Manure: State Acts Against Clermont County Farm*, Cincinnati Enquirer (June 9, 2021), https://www.cincinnati.com/story/news/2021/06/09/foot-deep-manure-and-dead-fish-state-takes-action-against-clermont-co-farm/7619801002/.

[462] *Id.*

[463] *See* Jeremy Boyer, *Cayuga County Farm to Pay $111K Penalty for March Violations*, The Citizen (Aug 4, 2021), https://auburnpub.com/news/local/cayuga-county-farm-to-pay-111k-penalty-for-march-violations/article_5f831245-dad1-50b3-a87c-ea98c1db3123.html (describing an overflow at a dairy cow CAFO in New York that caused waste to enter a tributary of Cayuga Lake); *see also* Tracy Loew, *Oregon Megadairy Lost Velley Farm Fined $187,320 for 224 Environmental Violations*, Statesman J. (Oct. 16, 2018), https://www.statesmanjournal.com/story/tech/science/environment/2018/10/16/oregon-megadairy-lost-valley-farm-fined-environmental-violations/1659452002/ (describing overflows at a Large dairy cow CAFO in Oregon); Assoc. Press, *Heavy Rains Cause Flooding, Manure Discharges in Northwest Iowa*, Des Moines Register (Sept. 21, 2018), https://www.desmoinesregister.com/story/news/2018/09/21/flooding-northwest-iowa-spencer-hartley-national-weather-service-little-sioux-river-storms-rain-road/1379221002/ (describing overflows at 26 CAFOs in Iowa).

[464] *See* Env't Working Grp., *Exposing Fields of Filth* (Nov. 4, 2016), https://www.ewg.org/research/exposing-fields-filth.

waste pits to overflow;[465] in 2016, Hurricane Matthew caused 14 pits to overflow;[466] and in 2018, Hurricane Florence caused 49 pits to breach or overflow and an additional 60 pits to nearly overflow, increasing the risk of later overflows due to additional precipitation.[467] Satellite images taken after Hurricane Florence show brown liquid from flooded waste pits flowing through rivers into the Atlantic ocean.[468] And a resident of Pender County, North Carolina, whose home was flooded after Hurricane Florence, explains that flood waters "flow into communities downstream and sometimes remain there for weeks while animal waste seeps into homes, churches, schools, and anything else in the waters' path."[469]

Waste pits also leach pollutants into soil, groundwater, and aquifers, even in the absence of structural failures or precipitation.[470] Indeed, one court has recognized that the national standards for waste pit design "specifically allow for permeability and, thus, the [pits] are designed to leak."[471] National standards for waste pits with clay liners, which acknowledge that it is "seldom technically or economically feasible" for those pits to leach less than 500 gallons per acre per day,[472] confirm the court's conclusion. In addition, samples of soil around waste pits show that the pits leach pollutants. For example, soil samples collected from 10 feet below the bottom of a waste pit in Washington revealed ammonia and nitrate concentrations in excess of target levels.[473] And a study of waste pits in North Carolina showed that the pits leached moderate to significant amounts of pollutants, including fecal bacteria and nutrients.[474] These

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[465] *See* Amy Henderson et al., *Mathematical Modeling of Algal Blooms Due to Swine CAFOs in Eastern North Carolina*, 15 Am. Inst. Mathematical Scis. 555, 558 (2022).

[466] *See* Kendra Pierre-Louis, *Lagoons of Pig Waste Are Overflowing After Florence. Yes, That's as Nasty as It Sounds*, N.Y. Times (Sept. 19, 2019), https://www.nytimes.com/2018/09/19/climate/florence-hog-farms.html.

[467] *See* Emilie Karrick Surrusco, *The Storm Moved On, but North Carolina's Hog Waste Didn't* (Jan. 9, 2019), https://earthjustice.org/blog/2019-january/hog-waste-creates-problems-for-north-carolina-residents.

[468] *See* Alex Formuzis, *Dramatic Satellite Photos Reveal Impact of Hurricane Florence on North Carolina CAFOs*, Environmental Working Group (Sept. 21, 2018), https://www.ewg.org/news-insights/news-release/dramatic-satellite-photos-reveal-impact-hurricane-florence-north.

[469] Exhibit 14 ¶ 9.

[470] As noted above, these releases of pollutants into groundwater require permits under the CWA so long as they reach navigable waters and are the functional equivalent of direct discharges to navigable waters, which CAFO operators can address to rebut the presumption. *See Cnty. of Maui*, 140 S. Ct. at 1477.

[471] *Cmty. Ass'n for Restoration of the Env't, Inc. v. Cow Palace, LLC*, 80 F. Supp. 3d 1180, 1223 (E.D. Wash. 2015).

[472] Nat. Res. Conservation Serv., *Design and Construction Guidelines for Impoundments Lined with Clay or Amendment-Treated Soil* 10D-15 (2008), https://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=17767.wba.

[473] *See* Anchor QEA, LLC, *H&S Bosma Dairy Lagoon No. 3 Abandonment Plan* 4 (2022), attached as Exhibit 24.

[474] *See* R.L. Huffman & Phillip W. Westerman, *Estimated Seepage Losses from Established Swine Waste Lagoons in the Lower Coastal Plain of North Carolina*, 38 Transactions Am. Soc'y Agric. & Biological Eng'rs 449 (1995).

results led researchers to conclude that "about half of the older, unlined swine lagoons in the lower coastal plain of North Carolina are inadvertently contributing to local contamination of the surficial aquifer," and "[t]his could also be true of swine lagoons constructed in a similar manner in the lower coastal plain of other states in the Atlantic Coastal Plain."[475] As explained above, 99 percent of swine CAFOs in North Carolina do not have NPDES permits authorizing the discharge of pollutants.

Evidence of soil, groundwater, and aquifer contamination from waste pits is unsurprising, because studies show that widely used waste pit construction features are insufficient to prevent, and may in fact exacerbate, leaching of pollutants. For instance, a study of waste pits constructed in sandy soil without liners found that the pits continued to leach pollutants into groundwater even after 3.5 to 5 years of receiving waste, which contradicts the common assumption that, over time, animal waste creates a natural liner.[476] Another study of waste pits in Iowa concluded that most waste pits in the state were constructed to sit at least partially below the water table, increasing the likelihood that pollutants leaching from the pits reach groundwater.[477]

EPA has acknowledged that wet manure storage causes discharges in a variety of circumstances. As EPA has explained, "[d]ry weather discharges to surface waters associated with CAFOs have been reported to occur through spills or other accidental discharges from lagoons and irrigation systems, or through intentional releases. Other reported causes of discharge to surface waters are overflows from containment systems following rainfall, catastrophic spills from failure of manure containment systems, and washouts from floodwaters when lagoons are sited on floodplains."[478] As this quote shows, storing large quantities of liquid waste in vast pits and tanks presents numerous threats to surface waters.

2. <u>CAFOs Using Wet Manure Management Systems Discharge from Waste Transport Pipes.</u>

Not only do CAFOs using wet manure management systems discharge from waste storage structures, but they also discharge from waste transport pipes. As shown below, there is ample evidence that transport pipes cause spills—and, often, repeated spills occur at the same facilities. Provided that spills from transport pipes reach navigable waters, which CAFO operators can address to rebut the presumption, they constitute discharges that require a permit

[475] *Id.* at 453.
[476] *See* Philip Wayne Westerman et al., *Swine-Lagoon Seepage in Sandy Soil*, 38 Transactions Am. Soc'y Agric. & Biological Eng'rs 1749 (1995).
[477] *See* William W. Simpkins et al., *Potential Impact of Earthen Waste Storage Structures on Water Resources in Iowa*, 38 J. Am. Water Res. Ass'n 759, 769 (2002).
[478] 68 Fed. Reg. at 7,236–37.

under the CWA.[479] Thus, there is a sound and rational connection between transporting liquid waste through pipes and water pollution discharges.

CAFOs regularly spill waste from transport pipes, and this waste regularly contaminates waterbodies. For example, in February 2022, a pipe at a dairy cow CAFO in New York burst and discharged waste to a nearby stream.[480] In 2018, a pipe at a Michigan dairy cow CAFO released up to 10,000 gallons of waste to a tributary of the Coldwater River, a popular trout-fishing stream.[481] And in 2013, a pipe at a Wisconsin dairy cow CAFO ruptured, releasing 300,000 gallons of waste into a creek.[482]

The report on CAFOs owned by Smithfield Foods in Missouri confirms that waste transport pipe spills are common, recurring events. Of the 21 CAFOs analyzed, all but one reported at least one waste spill due to a broken or blocked pipe over a thirty-year period.[483] Many of the facilities reported repeated spills from waste transport pipes. For example, a facility in Daviess County, Missouri reported at least 32 transport pipe spills between 1991 and 2021, including five spills in a single year.[484] On at least two occasions, these spills flowed into a tributary of Raccoon Creek.[485] Similarly, another facility in Daviess County reported at least 19 transport pipe spills between 1991 and 2021.[486] At least two of the spills entered Hickory Creek or a tributary of the creek,[487] and one flowed onto a neighboring property.[488]

3. **CAFOs Using Wet Manure Management Systems Discharge from Land Application.**

In addition to discharging from waste storage structures and transport pipes, CAFOs using wet manure management systems discharge from land application. Indeed, according to EPA, "the runoff from land application of manure at CAFOs is a major route of pollutant

[479] *See* 33 U.S.C. § 1362(12) (defining a discharge as "any addition of any pollutant to navigable waters from any point source"); *see also Cnty. of Maui*, 140 S. Ct. at 1477 (holding that the CWA's permitting requirement extends to "a discharge (from a point source) of pollutants that reach navigable waters after traveling through groundwater if that discharge is the functional equivalent of a direct discharge from the point source into navigable waters").
[480] *See* Lucas Day, *DEC Monitor Manure Spill in Skaneateles*, Finger Lakes Daily News (Feb. 10, 2022), https://www.fingerlakesdailynews.com/2022/02/10/1330882/.
[481] *See* Garrett Ellison, *Kent County Dairy CAFO Pipeline Spills Manure into River*, M Live (May 1, 2018), https://www.mlive.com/news/grand-rapids/2018/05/coldwater_river_manure_spill.html.
[482] *See* Lee Bergquist & Kevin Crowe, *Manure Spills in 2013 the Highest in Seven Years Statewide*, Milwaukee Journal Sentinel (Dec. 5, 2013), https://archive.jsonline.com/news/wisconsin/manure-spills-in-2013-the-highest-in-seven-years-statewide-b99157574z1-234701931.html.
[483] *See* Dye, *supra* note 307.
[484] *See id.*
[485] *Id.* at 15, 16.
[486] *Id.* at 12–71.
[487] *Id.* at 30, 58.
[488] *Id.* at 33.

discharges from CAFOs."[489] This is true for at least four reasons. *First*, CAFOs applying waste at recommended application rates allowed by states likely cause discharges because those rates often cause CAFOs to apply nutrients in excess of crop needs. *Second*, CAFOs commonly apply waste during the winter, which causes discharges. *Third*, CAFOs regularly apply waste shortly before or during wet weather, which also causes discharges. And *fourth*, CAFOs often apply waste to fields with tile drainage systems, which causes discharges as well. In each of these situations, provided that the activities release pollutants to navigable waters, which CAFO operators can address to rebut the presumption, the releases constitute discharges that require a permit under the CWA.[490] As shown below, not only are these practices common, but they also are often allowed under state laws and permits. Ample evidence of CAFO pollutants in waterbodies near land application sites supports the conclusion that land application results in the discharge of water pollution. Thus, there is a sound and rational connection between land application and discharges.

a. <u>Land Application at Recommended Rates Causes Discharges.</u>

When CAFOs land apply manure, a certain amount of nitrogen and phosphorus from the manure will be taken up by living organisms, including plant roots, or retained in the soil. However, when CAFO operators apply more nitrogen and phosphorus than living organisms can take up and the soil can retain, the excess nutrients almost certainly will cause water pollution, either directly or indirectly. Nitrogen and phosphorus that is not taken up by plants or retained in soil pollutes water directly by running off into surface water or percolating into groundwater, which is hydrologically connected to surface water.[491] Nitrogen also pollutes water indirectly, by volatilizing—that is, entering the atmosphere as ammonia—and then depositing from the air into surface water.[492]

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[489] 68 Fed. Reg. at 7,196.

[490] *See* 33 U.S.C. § 1362(12) (defining a discharge as "any addition of any pollutant to navigable waters from any point source"); *see also Cnty. of Maui*, 140 S. Ct. at 1477 (holding that the CWA's permitting requirement extends to "a discharge (from a point source) of pollutants that reach navigable waters after traveling through groundwater if that discharge is the functional equivalent of a direct discharge from the point source into navigable waters"). As discussed below, the wet weather discharges described in this section do not constitute agricultural stormwater discharges.

[491] *See Cnty. of Maui*, 140 S. Ct. at 1470 (explaining that groundwater, like "[v]irtually all water, polluted or not, eventually makes its way to navigable water"). As noted above, these releases of pollutants require permits under the CWA so long as they reach navigable waters or are the functional equivalent of direct discharges to navigable waters, which CAFO operators can address to rebut the presumption. *See id.* at 1477.

[492] Volatilized ammonia that is deposited into surface waters constitutes a discharge that requires an NPDES permit in at least one state. *See In re. Assateague Coastal Tr.*, No. 482915-V (Md. Cir. Ct. Mar. 11, 2021). Another state court has concluded that the state agency has the authority to require NPDES permits for depositions of ammonia and other pollutants into surface waters. *See Rose Acre Farms Inc. v. N.C. Dep't of Env't*, No. 12-CVS-10, 2013 WL 459353 ¶ 56 (N.C. Super. Ct. Jan. 4, 2013).

In an effort to reduce the likelihood that land application will cause water pollution, USDA and other entities establish recommended nutrient application rates.[493] However, well-established scientific evidence demonstrates that even at recommended rates, land application of manure leads to the addition of more nutrients than plants can take up and soil can retain, posing a serious threat of water pollution. In fact, recommended rates assume that some nutrients will be "lost" to the environment, even under ideal conditions.[494] Researchers analyzing recommended application rates for Coastal bermudagrass, a crop commonly grown on CAFO land application fields, found that "[n]itrogen application at the recommended rate . . . resulted in [phosphorus] application at nearly *three times* the recommended rate."[495] The researchers concluded that, due to the difficulty of balancing application rates for multiple nutrients, continued application at the recommended rate would result in phosphorus discharges, because eventually, more phosphorus would be added than the soil could retain.[496] Another recent study found that "standard operating procedures for land application of swine wastes create significant potential for nutrient overloads of soils and potential export of excess nutrients from CAFOs to the surrounding environment."[497] And numerous other studies have reached similar conclusions.[498]

Given the massive amount of animal urine and feces that CAFOs generate, many CAFOs have no alternative for waste disposal other than land application *above* recommended rates. As an individual with nearly 20 years of experience documenting water pollution from CAFOs explains, "most CAFOs don't have enough land to absorb the volume of waste they generate, and it's expensive to move liquid waste very far," so CAFOs "typically overapply waste to the land they have."[499] This also holds true for Large CAFOs. As discussed below, most Large

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[493] Recommended rates are often referred to as "agronomic" rates—that is, rates that meet but do not exceed the crops' nutrient needs. However, as shown in this section, these rates are not always agronomic, as they can lead to the application of excess nutrients.
[494] *See* Thomas F. Morris et al., *Strengths and Limitations of Nitrogen Rate Recommendations for Corn and Opportunities for Improvement*, 110 Agronomy J. 1, 1–2 (2018).
[495] R. O. Evans et al., *Subsurface Drainage Water Quality from Land Application of Swine Lagoon Effluent*, 27 Am. Soc'y Agric. Eng'rs 473, 479 (1984) (emphasis added).
[496] *Id.*
[497] Kimberley A. Rosov et al., *Waste Nutrients from U.S. Animal Feeding Operations: Regulations are Inconsistent Across States and Inadequately Assess Nutrient Export Risk*, 269 J. Env't Mgmt. 1, 8 (2020).
[498] *See* Philip Wayne Westerman et al., *Swine Manure and Lagoon Effluent Applied to a Temperate Forage Mixture: II. Rainfall Runoff and Soil Chemical Properties*, 16 J. Env't Quality 106 (1987) (finding that manure application to tall fescue at "acceptable maximum application rates" led to "much higher applications of [nitrogen, phosphorus, potassium], and other nutrients than are normally used," posing "surface and groundwater pollution hazards"); *see also* Burkholder et al., *supra* note 54, at 308.(citing additional studies showing that land application "even at recommended application rates" can cause pollutants to enter surface water and groundwater).
[499] Exhibit 6 ¶ 5; *see also* Exhibit 13 ¶ 8 ("I strongly suspect that CAFO operators commonly overapply manure on fields close to their confinement buildings, because it is too expensive for them to transport the manure to fields that are farther away and might have more need for the nutrients in the manure.").

CAFOs generate more manure nutrients than they can feasibly apply at recommended rates,[500] meaning that they are almost certainly applying waste in excess of those rates and, thus, causing discharges. Because standard, authorized land application rates likely lead to discharges, and many CAFOs are likely applying waste above those rates, the connection between land application and water pollution discharges is sound and rational.

b. Winter Land Application Causes Discharges.

In addition to land application at recommended rates, land application during the winter also causes discharges. Winter application poses an especially significant risk of discharges if the ground is frozen or snow-covered, preventing soil from absorbing the waste.[501] But, even if soil can absorb the waste, winter application poses a serious risk because crops typically do not take up a significant amount of nutrients during the winter, meaning that land application during the winter is even more likely to result in discharges of excess nutrients.[502]

Numerous studies confirm that "winter application of manure is the least desirable from both a nutrient utilization and pollution standpoint."[503] For example, one study involving a watershed in New York found that applying manure to snow-covered fields for five days caused a "significant increase" in phosphorus concentrations in the watershed.[504] Another study concluded that "[o]ver half of annual runoff can occur during the winter season in temperate regions with snow and frozen soils present."[505] And a survey of studies of winter application concluded that "the vast majority of studies suggest that winter application of manure increases loss of nutrients."[506] Moreover, another study concluded that climate change-induced warmer

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[500] *See infra* Section III.C.2.v.
[501] *See* Melanie N. Stock et al., *Fall Tillage Reduced Nutrient Loads from Liquid Manure Application During the Freezing Season*, 48 J. Env't Quality 889, 889 (2019) ("Winter application . . . can lead to elevated runoff risks from frozen soils, snowmelt, and rain-on-snow events."); *see also* Jason S. Smith et al., *Winter Manure Application: Management Practices and Environmental Impact* 12 (2017), https://soilhealthnexus.org/files/2018/02/ncrwn-winter-manure-app-mngmt-practices-enviro-impact-report-FINAL.pdf ("Most frozen soils have been shown to be impervious. Impervious soils carry a greatly increased risk of snowmelt causing a runoff event capable of carrying particulate matter, pathogens, and soluble compounds contained in winter spread manure.").
[502] *See* Jian Liu et al., *Seasonal Manure Application Timing and Storge Effects on Field- and Watershed-Level Phosphorus Losses*, 46 J. Env't Quality 1403 (2017) ("Winter manure applications, which experience minimal, if any, nutrient crop uptake, often coincide with active transport pathways created by frozen and water-saturated soils.").
[503] Theodore W. Lewis & Joseph C. Makarewicz, *Winter Application of Manure on an Agricultural Watershed and its Impact on Downstream Nutrient Fluxes*, 35 J. Great Lakes Res. 43 (2009).
[504] *Id.* Similarly, another study found that fall and winter land applications increased total phosphorus losses by 12 to 16 percent as compared to spring land applications. *See* Liu et al., *supra* note 502, at 1403.
[505] Stock et al., *supra* note 501, at 889.
[506] Smith et al., *supra* note 501, at 11.

winter temperatures are exacerbating winter runoff.[507] As a result, "[t]he assumption that discharge and nutrient transport remains low during the winter months no longer holds."[508]

Despite these serious risks, state laws and permits in many states allow CAFO operators to apply waste to frozen or snow-covered ground.[509] Although some of these states have taken steps to reduce the risks associated with winter application, the following evidence makes clear that those steps are insufficient to prevent discharges. As a result, winter application and resulting discharges are common. Indeed, during the early part of 2014, the New York Department of Environmental Conservation investigated at least forty incidents of water pollution following winter land applications.[510] Because New York continues to allow winter application,[511] numerous incidents like those that took place in 2014 almost certainly have continued to occur.[512]

Similar incidents are also common in other states. In November 2019 in Wisconsin, a CAFO operator applied manure to cold, stiff soil, and the manure ran off into a nearby creek, causing a fish kill.[513] In March 2019 in Michigan, a CAFO operator applied manure to frozen, snow-covered ground, and the manure ran off into Coldwater River, turning the prized trout

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[507] *See* Erin C. Seybold et al., *Winter Runoff Events Pose an Unquantified Continental-Scale Risk of High Wintertime Nutrient Export*, 17 Env't Rsch. Letters 1 (2022).
[508] *Id.* at 10.
[509] *See, e.g.*, Idaho Dairy Nutrient Management Standard 3 (providing exceptions to prohibition on applying waste to frozen or snow-covered ground); 510 Ill. Comp. Stat. 77/20(f)(9) (allowing application on frozen and snow-covered ground under certain circumstances); Iowa Admin. Code r.567-65.3(4) (same); N.Y. Dep't of Env't Conservation, ECL SPDES General Permit for Concentrated Animal Feeding Operations § III.A.8.c. (July 22, 2022) (same); Ohio Admin. Code 901:10-2-14(G)(1)(same).
[510] *See* N.Y. Dep't of Env't Conservation, Partial Response to FOIL Requests 14-1526 and 14-1658 (July 8, 2014), Summary of New York State Contamination Incidents Related to CAFOs in Winter and Spring of 2014, attached as Exhibit 25. In one 2014 incident in New York, snowmelt caused manure to run off fields and into Owasco Lake, creating a 75-by-25-foot plume of liquid manure. *See* Carrie Chantler, *Owasco Lake Advocates Decry Runoff of Manure into Water*, Auburn Citizen (Apr. 6, 2014), https://auburnpub.com/news/local/owasco-lake-advocates-decry-runoff-of-manure-into-water/article_498bd2fe-a7ec-5994-b4ed-005111da2e89.html.
[511] *See* N.Y. Dep't of Env't Conservation, ECL SPDES General Permit for Concentrated Animal Feeding Operations § III.A.8.c. (July 22, 2022).
[512] For example, in February 2017 in New York, a structural issue with a waste pit required a CAFO operator to land apply waste, and snowmelt then caused the waste to run off the field and into nearby waterbodies. *See* Kelsey O'Connor, *Manure Spill Impacts Salmon Creek and Cayuga Lake; Municipal Water Supplies Not Affected*, The Ithaca Voice (Feb. 20, 2017), https://ithacavoice.com/2017/02/manure-spill-impacts-salmon-creek-cayuga-lake-municipal-water-supplies-not-affected/.
[513] *See* Greg Seitz, *Factory Farm Runoff Contaminates Creek in St. Croix River Watershed, Killing Fish*, St. Croix 360 (Jan. 9, 2020), https://www.stcroix360.com/2020/01/factory-farm-runoff-contaminates-creek-in-st-croix-river-watershed-killing-fish/.

stream murky and black.[514] And in February 2011 in Illinois, thawing caused manure to run off a field and into tributaries of Panther Creek.[515] Community members also report that they have witnessed CAFOs applying waste during the winter.[516] The Dodge County, Minnesota resident describes seeing "pooled manure sit[ting] on top of the frozen ground, while dozens of birds pick at dead and decomposing pig body parts mixed in with the manure."[517] In the many states that allow winter application, CAFOs very likely cause discharges.

c. Wet Weather Land Application Causes Discharges.

Like land application during the winter, land application during wet weather also causes discharges. The CWA exempts "agricultural stormwater discharges,"[518] which EPA has defined as "precipitation-related discharge[s] . . . where the manure, litter, or process wastewater has been land applied in accordance with site-specific nutrient management practices that *ensure appropriate agricultural utilization of the nutrients*."[519] However, as the Second Circuit has explained, "there can be no escape from liability for agricultural pollution simply because it occurs on rainy days."[520] Thus, "the real issue [with respect to liability] is not whether the discharges occurred during rainfall or were mixed with rain water run-off, but rather, whether the discharges were the *result* of precipitation."[521]

To fall within the regulatory agricultural stormwater exemption, a release of pollutants must be the result of precipitation and must follow land application carried out in accordance with site-specific nutrient management practices that ensure appropriate agricultural utilization of nutrients—that is, practices that ensure nutrients are utilized by crops, not discharged.[522] But CAFOs routinely cause precipitation-related discharges following land application at rates that *exceed* those set out in their nutrient management plans and, therefore, fail to ensure appropriate agricultural utilization of the nutrients.[523] Those precipitation-related discharges are subject to the CWA.

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[514] *See* Michael Kransz, *Manure Spill Turns Portions of West Michigan Stream 'Ink Black,'* M Live (Mar. 21, 2019), https://www.mlive.com/news/grand-rapids/2019/03/manure-spill-turns-portions-of-west-michigan-trout-stream-ink-black.html.
[515] Jackson & Marx, *supra* note 90.
[516] *See* Exhibit 9 ¶ 10; Exhibit 3 ¶ 6; Exhibit 15 ¶ 5; Exhibit 12 ¶5.
[517] Exhibit 2 ¶ 7.
[518] 33 U.S.C. § 1362(14).
[519] 40 C.F.R. § 122.23(e)(1) (emphasis added).
[520] *Concerned Area Residents for the Env't v. Southview Farm*, 34 F.3d 114, 120 (2d Cir. 1994).
[521] *Id.* at 120–21 (emphasis added); *see also CARE I*, 54 F. Supp. 2d at 981 ("The agricultural stormwater . . . exemption . . . does not act to relieve CAFO farmers from responsibility for over applications and misapplications of CAFO animal wastes to fields in amounts or locations which will then discharge into the waters of the United States.").
[522] *Id.*; *see also* 40 C.F.R. § 122.23(e)(1).
[523] *See infra* Section IV.B.5.

CAFOs commonly apply manure at rates that exceed those set out in their nutrient management plans. As detailed below, most Large CAFOs generate more manure nutrients than they can feasibly apply at recommended rates,[524] meaning that their most convenient, affordable strategy for waste disposal likely involves land application in excess of those rates. In addition, studies show that CAFOs routinely apply manure above recommended rates. A study of 13 CAFOs in Michigan over a three-year period found 256 applications that exceeded recommended rates for nitrogen and 111 applications that exceeded recommended rates for phosphorus.[525] Four of the CAFOs averaged six or seven nitrogen overapplications per year, three averaged 11 or 12 per year, and one averaged 20 per year.[526] People living near CAFOs also report numerous instances of CAFOs applying excess manure, occasionally resulting in manure left to pool on fields.[527] Even if this over-applied manure reaches surface waters "during rainfall or . . . mixed with rainwater runoff," those discharges are subject to the CWA because they result from excessive application, not precipitation alone.

In addition, CAFOs routinely cause precipitation-related discharges following land application before or during wet weather—which also does not ensure appropriate agricultural utilization of nutrients[528]—and those discharges are subject to the CWA. In states that prohibit land application during wet weather, any such applications necessarily are not in accordance with site-specific practices that ensure appropriate agricultural utilization of nutrients, and thus, precipitation-related discharges following those applications are subject to the CWA. For example, North Carolina's state permit—under which nearly all Large CAFOs in North Carolina operate[529]—prohibits land application during precipitation and requires CAFO operators to stop land application within 12 hours after the National Weather Service issues a Hurricane Warning, Tropical Storm Warning, Flood Warning, or Flash Flood Watch.[530] Yet community members in

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[524] *See infra* Section IV.B.5.
[525] *See* Colleen M. Long et al., *Use of Manure Nutrients from Concentrated Animal Feeding Operations*, 44 J. Great Lakes Rsch. 245, 248 (2018).
[526] *Id.*
[527] *See, e.g.*, Exhibit 2 ¶¶ 7–8.
[528] *See, e.g.*, Pierre Gérard-Marchant et al., *Simple Models for Phosphorus Loss from Manure during Rainfall*, 34 J. Env't Quality 872 (2005) (noting that phosphorus losses are greatest when precipitation occurs shortly after land application); Seth Laurenson & D.J. Houlbrooke, *Nutrient and Microbial Loss in Relation to Timing of Rainfall Following Surface Application of Dairy Farm Manure Slurries to Pasture*, 52 Soil Rsch. 513 (2014) (finding that the "[g]reatest risk to water quality occurred when rainfall was received within 2 days of manure slurry application"); Philip Wayne Westerman et al., *Swine Manure and Lagoon Effluent Applied to a Temperate Forage Mixture: II. Rainfall Runoff and Soil Chemical Properties*, 16 J. Env't Quality 106, 106 (1987) ("Pollution by runoff was more likely when rainfall occurred soon after manure or fertilizer application.").
[529] *See* EPA, *NPDES CAFO Permitting Status Report: National Summary, Endyear 2021, completed 07/20/22*, *supra* note 5.
[530] *See* N.C. Dep't of Env't Quality, Swine Waste Management System General Permit § II(23) (April 12, 2019). Illinois also prohibits land application during rainfall events. Ill. Admin. Code tit. 8, § 900.803(u).

North Carolina report that CAFOs routinely apply waste during wet weather and before hurricanes and tropical storms,[531] which cause waste pits and land application areas to flood, releasing massive amounts of waste into waterways.[532] Indeed, in 2018, the North Carolina Pork Council admitted that CAFO operators "*prepared* for [Hurricane Florence] by lowering the levels of the[ir] lagoons to accommodate more rainwater [and] using the manure as fertilizer in nearby fields."[533] Because North Carolina prohibits land application during precipitation or more than 12 hours after the state has issued a storm or flood warning, applying waste under those conditions cannot constitute a site-specific practice that ensures appropriate agricultural utilization of nutrients. Thus, precipitation-related discharges following applications under those conditions are subject to the CWA.

Even in states that allow land application before and during wet weather, this practice fails to ensure appropriate agricultural utilization of nutrients, so precipitation-related discharges following this practice are subject to the CWA. Ample scientific and anecdotal evidence makes clear that application before and during wet weather leads to discharges.[534] For example, researchers studying runoff following land applications of dairy manure found that the amount of nutrients and E. coli in the runoff was highest when rainfall occurred within two days after application.[535] Reports from community members confirm that wet weather land application causes discharges. A resident of Henry County, Iowa—who used to live just 2,200 feet from a swine CAFO—recalls that the CAFO operator once applied waste before heavy rains, which caused "green and foamy" liquid to run off the field and spill into a creek on the resident's property.[536] Water samples from the creek showed levels of E. coli and nitrates that were just under the state's maximum acceptable level.[537] Yet, in Indiana, Iowa, and New York, CAFOs may apply waste before and during wet weather.[538] Because wet-weather application—which causes discharges and, thus, does not ensure appropriate agricultural utilization of nutrients—is

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531 *See* Exhibit 11 ¶ 8.
532 *See* Pierre-Louis, *supra* note 466.
533 *See* Chris Megerian, *Environmentalists Worry that Florence Will Leave Behind a Toxic Mess in North Carolina*, L.A. Times (Sept. 18, 2018), https://www.latimes.com/nation/la-na-florence-environment-20180918-story.html (emphasis added).
534 *See supra* note 8.
535 Laurenson & Houlbrooke, *supra* note 528, at 513.
536 Exhibit 17 ¶ 3; *see also* Exhibit 15 ¶ 5 (describing runoff following rainfall, which "formed a froth on top of the water").
537 *See id.*
538 *See* 327 Ind. Admin. Code Rule 14 (allowing wet weather application so long as it will not "likely result in runoff"); *see also* Iowa Admin. Code 567-65.3(2)(b) (allowing wet weather application so long as the CAFO operator uses practices to "minimize" groundwater or surface water pollution); N.Y Dep't of Env't Conservation, ECL SPDES General Permit for Concentrated Animal Feeding Operations § III.A.8.c. (July 22, 2022) (allowing wet weather application so long as the CAFO operator follows certain recommendations).

allowed in these states, CAFOs there are almost certainly causing discharges that are subject to the CWA.

d. Land Application to Fields with Tile Drains Causes Discharges.

Land application to fields with tile drains—perforated pipes that run under fields to transport water and other liquids out of the soil and into surrounding ditches, streams, and rivers—is a significant source of discharges. As discussed below, ample evidence shows that when CAFO operators apply liquid waste to fields with tile drains, the waste often moves rapidly into the drains, which transport it to ditches that flow into surface water. And industry-standard, government-authorized waste disposal practices exacerbate discharges from tile drains. Numerous instances of discharges from tile drains to surface water confirm that they are a common source of discharges.

A robust body of evidence shows that liquid waste often moves rapidly into tile drains, which carry it to surface water, causing discharges. Indeed, the Natural Resources Conservation Service's Conservation Practice Standard for nutrient management—on which many states rely to develop guidelines for CAFO nutrient management plans[539]—states that "[w]hen applied to fields with subsurface drains, the liquid can follow soil macropores directly to the tile drains[,] creating a surface water pollution hazard from direct tile discharge."[540] In other words, rather than remaining in the soil or being taken up by plants, the liquid waste follows pathways through the soil directly to the tile drains. As a result, "even a field with one subsurface drainage line may present a risk of manure/wastewater movement to subsurface drains and cause a direct discharge."[541] Scientific studies support this conclusion. For instance, a study of a tile-drained field at a swine CAFO in Ohio found that earthworm burrows created pathways through the soil, which rapidly transported liquid to the tile drain.[542] After applying dyed water to the field, researchers observed the water emerging from the tile drain outlet after only 14 minutes.[543] They concluded that "a substantial portion of the dyed water must have entered the tile."[544] Additional

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[539] *See, e.g.*, N.Y. Dep't of Env't Conservation, ECL SPDES General Permit for Concentrated Animal Feeding Operations § III.A.4.a. (July 22, 2022).
[540] Nat. Res. Conservation Serv., Conservation Practice Standard, Nutrient Management, Code 590, at 590-CPS-6 (2020), https://agri.ohio.gov/wps/wcm/connect/gov/3dd2869c-32d2-4dd7-84d7-5c21f2f3b74b/Ohio_590_Standard_November_2012.pdf?MOD=AJPERES&CONVERT_TO=url&CACHEID=ROOTWORKSPACE.Z18_M1HGGIK0N0JO00QO9DDDDM3000-3dd2869c-32d2-4dd7-84d7-5c21f2f3b74b-n4cuBr3.
[541] *Id.*
[542] *See* Martin J. Shipitalo & Frank Gibbs, *Potential for Earthworm Burrows to Transmit Injected Animal Wastes to Tile Drains*, 64 Soil Sci. Soc. Am. J. 2103, 2107 (2000).
[543] *Id.* at 2105.
[544] *Id.*

studies demonstrate that tile-drained fields around the country pose similar threats of discharge.[545]

Industry-standard, government-authorized waste disposal practices can exacerbate discharges from tile drains. For example, some states allow CAFO operators to apply waste to fields that are not tilled.[546] Studies show that no-till fields tend to have more pathways through the soil because they are not disturbed through soil turning.[547] Thus, applying waste to no-till fields with tile drains is particularly likely to cause discharges.

Numerous instances of discharges confirm that applying liquid waste to fields with tile drains commonly causes discharges. For example, reports from agencies in Ohio show that from January 2000 to December 2003, animal waste entered tile drains and contaminated surface waters at least 98 times.[548] Most of the violations occurred on swine and dairy CAFOs, which was attributed to their use of wet manure management systems.[549]

e. Ample Evidence of CAFO Pollutants in Waterbodies Near Land Application Sites Indicates that Land Application Causes Discharges.

Extensive scientific evidence of CAFO pollutants—including ions, nutrients, bacteria, antibiotic residue, and pathogens—in waterbodies near CAFO land application sites confirms that land application causes discharges. For example, a study of a stream in a North Carolina watershed that, at the time of the study, contained 13 swine CAFOs and 11 poultry CAFOs found fecal coliform bacteria, ammonium, and nitrate in the stream and concluded that "the stream pollution is chronic and a result of normal CAFO operations and presently accepted waste disposal techniques."[550] Similarly, a study of multiple North Carolina watersheds found higher median values of ions and nutrients in watersheds that contain CAFOs than in those without CAFOs; the study concluded that "land applications of waste manure at swine CAFOs influenced ion and nutrient chemistry in many of the . . . streams that were studied."[551] Another

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[545] *See, e.g.*, Laurent Ahiablame et al., *Nutrient Content at the Sediment-Water Interface of Tile-Fed Agricultural Drainage Ditches*, 2 Water 411 (2010).
[546] *See* Generally Accepted Agricultural and Management Practices for Manure Management and Utilization, Mich. Comm'n on Agric. & Rural Dev. 41 – 42 (Jan. 2021) (including no-till among recommended conservation practices on Michigan fields) and *Nutrient Management Basics*, Wisc. Dep't of Ag. And Consumer Prot. (detailing no-till as a method of managing nutrient loss).
[547] *See* N.K. Patni et al., *Tile Effluent Quality and Chemical Losses Under Conventional and no Tillage–Part 1: Flow and Nitrate*, 39 Transactions of Am. Soc'y Agric. & Biological Eng'rs 1665 (1996).
[548] *See* James J. Hoorman & Martin J. Shipitalo, *Subsurface Drainage and Liquid Manure*, 61 J. Soil & Water Conservation 94A, 95A (2006).
[549] *Id.*
[550] Michael A. Mallin et al., *Industrial Swine and Poultry Production Causes Chronic Nutrient and Fecal Microbial Stream Pollution*, 226 Water, Air, and Soil Pollution 407 (2015).
[551] Stephen L. Harden, *supra* note 378 at 1, 50 (2015).

study of water samples taken near swine and poultry CAFOs found high levels of antimicrobial compounds in the samples, which "suggests that animal waste applied to agricultural fields as fertilizer may act as a . . . source of antimicrobial residues in water resources."[552] And two studies of waterways in Wisconsin also link CAFOs with discharges. One study found that found that total phosphorus concentrations in waterways increased with proximity to dairy operations, and concentrations downstream from CAFOs were 19 percent higher than upstream concentrations.[553] The second study concluded that increasing the number of CAFOs in an area also increases the levels of total phosphorus and ammonia in surface water in the area.[554] Similar results have been found in studies of antibiotic-resistant bacteria and viruses in waterbodies near land application sites.[555]

4. Discharges from Land Application and Waste Storage Structures Are Likely to Occur with Increasing Frequency Due to Climate Change.

As a result of climate change, many areas of the country where CAFOs are concentrated are experiencing, or are predicted to experience, increased precipitation and stronger, more frequent storms. For example, since 1999, Eastern North Carolina has experienced at least four 100-year storms—that is, storms once determined to have a one percent chance of occurring in a given year.[556] In the Midwest, the average annual amount of precipitation has increased by five to 10 percent over the last half century, with rainfall during the four wettest days of the year increasing by about 35 percent.[557] And in California's Central Valley, intense storms known as "atmospheric rivers," which have contributed to most of the state's largest floods, are expected to become more frequent due to climate change.[558]

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[552] Enzo R. Campagnolo et al., *Antimicrobial Residues in Animal Waste and Water Resources Proximal to Large-Scale Swine and Poultry Feeding Operation*, 299 Sci. Total Env't 89, 94 (2002).
[553] *See* Donald M. Waller et al., *Shifts in Precipitation and Agricultural Intensity Increase Phosphorus Concentrations and Loads in an Agricultural Watershed*, 284 J. Env't Mgmt. 112019 (2021).
[554] *See* Zach Raff & Andrew Meyer, *CAFOs and Surface Water Quality: Evidence from Wisconsin*, 104 Am J. Agric. Econ. 161 (2022).
[555] *See* Elizabeth Christenson et al., *A Watershed Study Assessing Effects of Commercial Hog Operations on Microbial Water Quality in North Carolina, USA*, 838 Sci. Total Env't 1 (2022); *see also* Jennifer Gentry-Shields et al., *Hepatitis E Virus and Coliphages in Waters Proximal to Swine Concentrated Animal Feeding Operations*, 505 Sci. Total Env't 487, 487 (2015); Sarah M. Hatcher et al., *Occurrence of Methicillin-Resistant Staphylococcus Aureus in Surface Waters Near Industrial Hog Operation Spray Fields,* 565 Sci. Total Env't 1028, 1033 (2016); Amy R. Sapkota et al., *Antibiotic-Resistant Enterococci and Fecal Indicators in Surface Water and Groundwater Impacted by a Concentrated Swine Feeding Operation*, 115 Env't Health Persps. 1040, 1040–41, 1045 (2007).
[556] *See* Surrusco, *supra* note 467.
[557] *See* EPA, *What Climate Change Means for Iowa* (2016), https://19january2017snapshot.epa.gov/sites/production/files/2016-09/documents/climate-change-ia.pdf.
[558] Central Valley Regional Water Quality Control Bd., *Central Valley Region Climate Change Work Plan* 10 (2017).

Stronger and more frequent storms will exacerbate discharges from waste storage structures and land application. These storms increase the likelihood that waste pits will overflow or breach. In addition, storm-related precipitation will cause waste pits to fill more quickly than anticipated, requiring CAFO operators to land apply waste more frequently or in larger amounts to lower the waste level in the pits and, thereby, reduce the likelihood of overflows and breaches.[559] As explained above, the North Carolina Pork Council acknowledged that CAFO operators prepared for Hurricane Florence by land applying waste so that storage pits could accommodate more rainwater.[560] But, as one resident who lives near at least 30 CAFOs in North Carolina explains, "[b]ecause the workers' main concern is reducing the waste in the lagoons, . . . it's likely that they overapply it on the fields,"[561] creating a certain or near certain risk of discharges.

5. <u>Large CAFOs Using Wet Manure Management Systems Are Especially Significant Sources of Discharges.</u>

For over 20 years, EPA has recognized that Large CAFOs "produce quantities of manure that can be a risk to water quality and public health" and, thus, "are a priority for permit issuance."[562] Given the massive amount of urine and feces that Large CAFOs generate,[563] it is not surprising that Large CAFOs using wet manure management systems are especially significant sources of discharges through waste storage, transport, and disposal practices. Thus, there is a sound and rational connection between Large CAFOs using wet manure management systems and discharges.

Large CAFOs using wet manure management systems are especially likely to discharge from land application. According to USDA, in 2012, the majority of Large CAFOs generated more manure nutrients than they could feasibly apply at USDA-recommended rates.[564] In fact, USDA found that at least 64 percent of Large CAFOs produced "farm-level" excess manure

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[559] *See* Mo. Code Regs. Ann. tit. 10, § 20-6.300(4)(A)(5) ("When wastewater storage structures are in danger of an overflow due to a chronic weather event, CAFO owners shall take reasonable steps to lower the liquid level in the structure through land application[.]"); *see also* N.C. Dep't of Env't Quality, Swine Waste Management System General Permit § II(29) ("[A]n operator may temporarily lower lagoon levels . . . to provide additional temporary storage for excessive rainfall during the hurricane season[.]"); *see also* Barry Yeoman, *'It Smells Like a Decomposing Body': North Carolina's Polluting Pig Farms*, The Guardian (Aug. 27, 2019), https://www.theguardian.com/environment/2019/aug/27/it-smells-like-a-decomposing-body-north-carolinas-polluting-pig-farms (reporting that at least 35 CAFOs in North Carolina were seen land applying waste shortly before Tropical Storm Hermine hit the state).
[560] *See* Megerian, *supra* note 533.
[561] Exhibit 11 ¶ 8.
[562] U.S. Dep't Agric. & EPA, *Unified National Strategy for Animal Feeding Operations* (1999), https://www3.epa.gov/npdes/pubs/finafost.pdf.
[563] *See supra* Section I.C.
[564] *See* Gollehon et al., *supra* note 18, at 19, Tbl. 7. USDA's calculations include Large swine, dairy, poultry, and beef CAFOs.

nutrients—that is, more manure nutrients than they could possibly apply at recommended rates on the cropland and pastureland available at each CAFO.[565] USDA estimated that, in total, Large CAFOs generated 1,365 million pounds of farm-level excess manure nitrogen and 594 million pounds of farm-level excess manure phosphorus in 2012.[566] This excess manure nitrogen *alone* exceeds the amount of nitrogen used to fertilize over nine million acres of corn fields, and it is nearly equivalent to the amount used to fertilize all 80 million acres of soybean fields in the United States.[567] By contrast, Large CAFOs reported applying manure to only 2.4 million acres in the 2012 Census of Agriculture.[568]

Large CAFOs with farm-level excess manure nutrients—that is, at least 64 percent of Large CAFOs, according to USDA's study—are almost certain to cause discharges. These CAFOs are unlikely to apply their excess manure nutrients *off-farm*, because it is costly and inconvenient to do so.[569] As Dr. John Ikerd, Professor Emeritus of Agricultural Economics at the University of Missouri, explains, when the cost of transporting manure exceeds its value as a fertilizer, it is more economical for a CAFO operator to overapply the waste closer to the CAFO than to transport it.[570] According to figures from Iowa State University, the cost of transporting manure exceeds its value as a fertilizer at [an average] transportation distance of just one mile.[571] In addition, USDA notes that "[o]ff-farm application[] . . . is not a universally accepted practice because of the potential for the spread of diseases between farms."[572] Given the cost, inconvenience, and risk of spreading diseases associated with transporting manure, Large CAFOs with farm-level excess manure nutrients are likely applying the excess manure on-farm and causing discharges as a result.[573]

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565 *Id.*
566 *Id.*
567 On average, farmers apply 149 pounds of nitrogen per acre of corn, and 17 pounds of nitrogen per acre of soybeans. There are 83.1 million acres of soybeans in the United States. *See* USDA Nat'l Agric. Statistics Serv., *Agricultural Chemical Use Survey: Corn*, https://www.nass.usda.gov/Surveys/Guide_to_NASS_Surveys/Chemical_Use/2018_Peanuts_Soybeans_Corn/ChemUseHighlights_Corn_2018.pdf; *see also* USDA Nat'l Agric. Statistics Serv., *Agricultural Chemical Use Survey: Soybeans*, https://www.nass.usda.gov/Surveys/Guide_to_NASS_Surveys/Chemical_Use/2020_Soybeans/soybean-chem-highlights.pdf.
568 *See* Gollehon et al., *supra* note 18, at 33, Tbl. B1.
569 *See* April B. Leytem et al., *Cycling Phosphorus and Nitrogen through Cropping Systems in an Intensive Dairy Production Region*, 11 Agronomy 1, 15 (2021) ("[Nitrogen], as well as [phosphorus], are concentrated around dairies due to the cost and inconvenience of transporting manures away from the facility.").
570 *See* Interview by Kara Goad, Associate Attorney, Earthjustice with Dr. John Ikerd, Professor Emeritus of Agric. Economics at the Univ. of Missouri (July 15, 2022).
571 *See* Greg Brenneman, *You Can't Afford* Not *to Haul Manure* (1995), https://store.extension.iastate.edu/Product/You-Cant-Afford-Not-to-Haul-Manure-Livestock-Industry-Facilities-and-Environment-PDF.
572 Gollehon et al., *supra* note 18 at 18 n.10.
573 *See supra* Section IV.B.3.a.

Large CAFOs were responsible for a significant majority of all farm-level excess manure nutrients. As of 2012, Large CAFOs were responsible for 71 percent of farm-level excess manure nitrogen and 70 percent of farm-level excess manure phosphorus.[574] In other words, Large CAFOs were responsible for a significant majority of manure nutrients that almost certainly cause water pollution.

Not only do most Large CAFOs lack sufficient *on-farm* land application areas, but they also frequently lack adequate *off-farm* alternatives, because together with other CAFOs, they often generate more manure than can be applied at recommended rates to all the cropland and pastureland available in their county or, in some cases, in their shared hydrologic basins. According to USDA, in 2012, there were 205 counties with county-level excess manure, meaning that CAFOs in those counties together produced more manure than could be applied at recommended rates to all the cropland in the counties.[575] In addition, there were at least twelve hydrologic basins with basin-level excess manure, meaning that CAFOs in those hydrologic basins together produced more manure than could be applied at recommended rates to all the cropland in the basins.[576] A number of the counties with county-level excess manure were in North Carolina and California's Central Valley,[577] and one of the hydrologic basins with basin-level excess manure was in North Carolina,[578] where pollution disproportionately harms communities of color and low-income communities.

In the many areas with excess manure nutrients at the county or hydrologic basin level, Large CAFOs with farm-level excess manure are especially likely to cause discharges. Not only do they lack adequate on-farm cropland, but they are also more likely to lack adequate off-farm cropland. This is because, together with other CAFOs in the county or basin, they generate more manure than can be applied at recommended rates across all the cropland in the area.

The actual amount of excess manure nutrients generated at Large CAFOs, across counties, and across hydrologic basins is likely even higher than USDA's estimates. USDA assumed that land application areas did not receive any additional nutrients from applications of synthetic fertilizer, which also contains nitrogen and phosphorus.[579] However, that is often not the case. Rather, cropland that receives CAFO manure also commonly receives synthetic

574 *See* Gollehon et al., *supra* note 18 at 18.
575 *See* Gollehon et al., *supra* note 18, at 25, Tbl. 8.
576 *See* Robert L. Kellogg et al., *Database of Estimates by 6-Digit HUC of Animal Units and Recoverable and Non-Recoverable Manure Nutrients Based on the Census of Agriculture* 36, Tbl. S7, https://www.nrcs.usda.gov/wps/PA_NRCSConsumption/download?cid=nrcseprd1360816&ext=pdf. "Basins" correspond to 6-digit Hydrologic Unit Codes.
577 *See* Gollehon et al., *supra* note 18, at 27, Map 8.
578 *See* Kellogg et al., *supra* note 576, at 36, Tbl. S7.
579 *See* Gollehon et al., *supra* note 18, at 33.

fertilizer,[580] often in excess of crop needs and without accounting for manure application.[581] Application of synthetic fertilizer likely leads to excess nutrients when manure is applied to the land, as the crops and soil may already be saturated with nutrients from the synthetic fertilizer. For example, a 2020 study found that, "[i]n almost all of Minnesota's farm counties, the combination of manure plus commercial fertilizer is likely to load too much nitrogen or phosphorus or both onto crop fields, threatening drinking water and fouling the state's iconic lakes and rivers[.]"[582]

USDA likewise did not account for other CAFO practices that likely lead to excess nutrients. For example, North Carolina's state permit allows CAFO operators to leave hay harvested from land application fields on the fields for up to two years.[583] An individual who has nearly 20 years of experience monitoring CAFOs in North Carolina reports seeing baled hay left on fields or even "dumped in wetlands."[584] When hay remains on application fields, the nutrients taken up by the hay remain as well, and as the hay decomposes over time, those nutrients can return to the soil. Thus, crops allowed to decompose on fields increase the likelihood that land applying manure will result in excess nutrients. For all these reasons, Large CAFOs likely generate even more excess nutrients than USDA has estimated.

A new study of the Western Lake Erie Basin demonstrates that the problem of excess manure nutrients across entire watersheds has persisted. The study found that in nine watersheds within the basin, more than 90 percent of the cropland is required to avoid applying excess nutrients.[585] In those nine watersheds, there is a high risk that CAFOs will overapply nutrients—

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[580] *See* Sarah Porter & Craig Cox, Env't Working Grp., *MANURE OVERLOAD: Manure Plus Fertilizer Overwhelms Minnesota's Land and Water* (2020), https://www.ewg.org/interactive-maps/2020-manure-overload/#:~:text=In%20almost%20all%20of%20Minnesota's,an%20Environmental%20Working%20Group%20investigation; *see also* Kenneth C. Stone et al., *Water Quality Status of a USDA Water Quality Demonstration Project in the Eastern Coastal Plain*, 50 J. Soil & Water Conservation 567 (1995) ("Although swine and poultry operations produce sufficient quantities of waste to supply more than half of the needed nutrients, 90% of the nutrients applied to cropland are supplied by commercial fertilizers.").

[581] *See* Yushu Xia et al., *Developing County-Level Data of Nitrogen Fertilizer and Manure Inputs for Corn Production in the United States*, 309 J. Cleaner Production 1, 11 (2021); *see also* Long et al., *supra* note 525, at 249.

[582] Porter & Cox, *supra* note 580.

[583] *See* N.C. Dep't of Env't Quality, Swine Waste Management System General Permit § II(28) (April 12, 2019).

[584] Exhibit 6 ¶ 8.

[585] *See* Ethan Bahe et al., Env't Working Grp., *EWG Analysis: In the Western Lake Erie Basin, Newly Identified Animal Feeding Operation Hot Spots Produce Excess Manure, Threatening Waterways and Human Health* (2022), https://www.ewg.org/research/ewg-analysis-western-lake-erie-basin-newly-identified-animal-feeding-operation-hot-spots. A study of excess nutrients in Wisconsin adds to the evidence that excess nutrients remain a problem. The study found that in nine Wisconsin counties, "commercial fertilizer and animal manure are overapplied to farmland at rates that are causing a water pollution crisis." Sarah Porter et al., *Double Trouble: Wisconsin's Land and Water are Inundated with Pollution from Animal Manure and Excess Farm Fertilizer* (Feb 2, 2022),

and, thus, very likely cause discharges—because so much of the cropland is at its capacity for nutrients. The study also found that 116 animal feeding operations in the basin would need to use cropland farther than three miles from the operations to avoid overapplying phosphorus, and 55 operations would need to use cropland farther than five miles from the operations to avoid overapplying phosphorus.[586] Given the cost and inconvenience of transporting liquid manure,[587] waste disposal at these CAFOs likely involves overapplication on fields closer to the operations.

Since 2012, the problem of excess nutrients generated at Large CAFOs has likely worsened. Indeed, USDA found that, in 2012, the amount of excess nutrients generated by Large CAFOs was trending upward, and Large CAFOs were the driving force behind an increase in excess manure nutrients generated by all CAFOs. USDA found that the total amount of farm-level excess manure nitrogen generated at Large CAFOs was nearly 5 times greater in 2012 than it was in 1982, and the total amount of farm-level excess manure phosphorus generated at Large CAFOs more than tripled over the same time period.[588] In 1982, Large CAFOs accounted for 45 percent of total excess manure nitrogen; by 2012, they accounted for over 71 percent of it.[589]

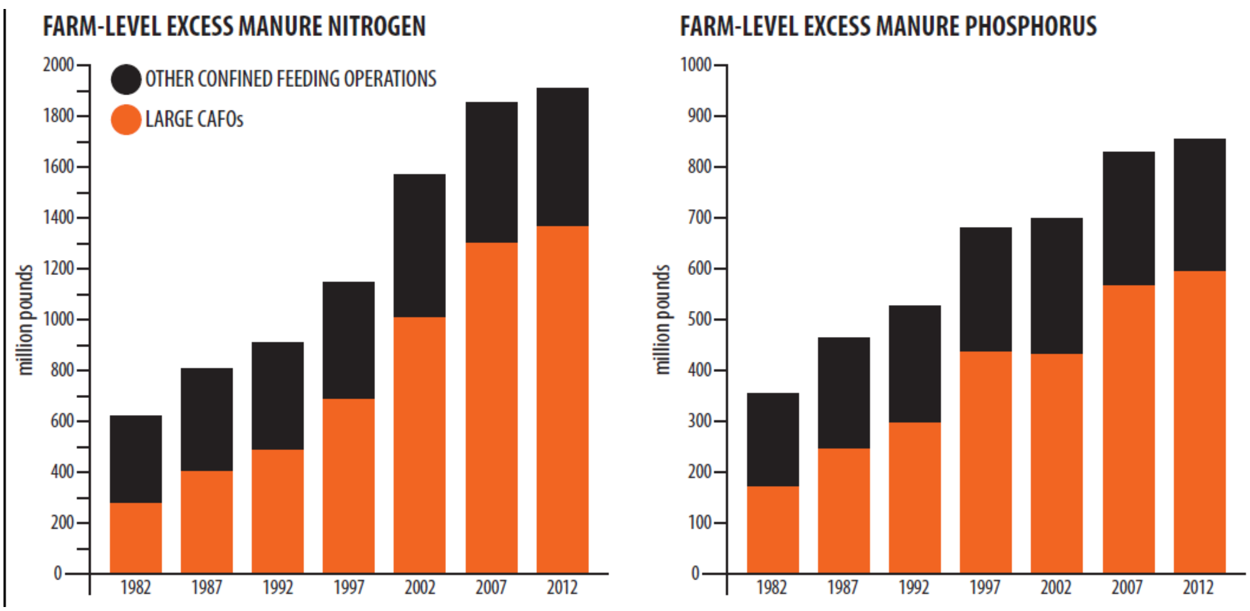

Figure Eleven. Farm-level excess manure nitrogen and farm-level excess manure phosphorus generated by Large CAFOs between 1982 and 2012.[590]

https://www.ewg.org/research/double-trouble-wisconsins-land-and-water-are-inundated-pollution-animal-manure-and-excess.

[586] *Id.*

[587] *See* Long et al., *supra* note 525, at 247 ("In many cases, cost remains a barrier to [manure] redistribution because it is expensive to haul manure long distances.").

[588] *See* Gollehon et al., *supra* note 18, at 31, Tbl. A-4.

[589] *Id.*

[590] *Id.* at 20, Fig.11 & Fig.12.

Because the number of animals confined in Large CAFOs has continued to increase, these trends in excess manure nutrients have almost certainly continued. As a result, the connection between Large CAFOs using wet manure management systems and discharges has also almost certainly grown stronger.

* * *

Taken together, the evidence presented above makes clear that there is a sound and rational connection between Large CAFOs using wet manure management systems and actual discharges from, at a minimum, waste storage structures, waste transport pipes, and land application. As an official with the Michigan Department of Environmental Quality reported to EPA more than a decade ago in 2008, "virtually all CAFOs with lagoons and/or land application have discharges."[591] And EPA itself has acknowledged that, "based on EPA's and the States' own experience in the field . . . all or virtually all large CAFOs have had a discharge in the past, [or] have a current discharge."[592] The evidence presented above provides ample support for a rebuttable presumption that Large CAFOs using wet manure management systems actually discharge pollutants.

C. The Presumption Is a Sensible and Timesaving Device.

A presumption that Large CAFOs using wet manure management systems actually discharge water pollution is a sensible and timesaving device because proving discharges on a CAFO-by-CAFO basis is a difficult and time-consuming endeavor, and Large CAFO operators are well-positioned to rebut the presumption in the rare instances in which no discharges occur.[593] As discussed below, at least five factors make it difficult for EPA to prove discharges on a CAFO-by-CAFO basis. *First*, EPA and state agencies lack facility-specific information about CAFOs. *Second*, CAFO discharges are generally unplanned and intermittent. *Third*, EPA and state agencies lack the resources necessary to prove discharges on a CAFO-by-CAFO basis. *Fourth*, EPA should not place the burden on community members or researchers to investigate and prove discharges. And *fifth*, EPA cannot rely on CAFO self-reporting to prove discharges. In contrast, however, these factors will not prevent Large CAFO operators from rebutting the presumption of discharge, if appropriate.

First, EPA and state agencies lack facility-specific information about CAFO locations, sizes, animal types, manure storage structures, and land application areas. EPA has recognized the importance of this information for proving CAFO discharges.[594] For instance, EPA has

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[591] Letter from Richard A. Powers, Chief, Water Bureau, Mich. Dep't Env't Quality to U.S. EPA Docket Center 2 (Apr. 4, 2008), attached as Exhibit 26.
[592] 66 Fed. Reg. at 3,007.
[593] *See USX Corp.*, 395 F.3d at 172.
[594] *See* National Pollutant Discharge Elimination System (NPDES) Concentrated Animal Feeding Operation (CAFO) Reporting Rule, 76 Fed. Reg. 65,431, 65,436–38 (Oct. 21, 2011).

acknowledged that "knowing the location of the CAFO's production area . . . is essential for determining sources of water quality impairments."[595] And knowing "the number and type of animals provides an indication of the quantity and characteristics of the CAFOs' manure . . . which then informs EPA as to the possible environmental effects of that manure."[596]

Despite recognizing the importance of this information, however, EPA frequently does not have it. Indeed, a 2019 report found that EPA lacked facility-specific information for the majority of U.S. CAFOs.[597] Because CAFOs frequently operate under state laws and permits, rather than NPDES permits, the availability of information about the locations of these facilities and their application fields varies significantly by state.[598] Many state agencies do not collect facility-specific information, making it more difficult for the agencies and the public to prove discharges.[599] The difficulty of obtaining facility-specific information about land application is made worse by the fact that CAFOs are often allowed to transfer their waste to third parties for disposal,[600] and even less information is collected from these third parties. Moreover, the meat and dairy industries compound the difficulty of obtaining facility-specific information by aggressively pursuing and defending privacy protections rarely afforded to other industrial polluters.[601]

Second, the nature of CAFO discharges makes it difficult to prove discharges on a CAFO-by-CAFO basis. As EPA has explained, "[o]perations in other industries are typically designed to routinely discharge after appropriate treatment; this is not the case at CAFOs, where discharges are largely unplanned and intermittent."[602] In addition, CAFO discharges often occur in remote locations or adjacent to private land. Moreover, in areas where CAFOs are highly

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[595] *Id.* at 65,438.
[596] *Id.*
[597] *See* Devine & Baron, *supra* note 418; *see also* U.S. Gov't Accountability Off., *Concentrated Animal Feeding Operations: EPA Needs More Information and a Clearly Defined Strategy to Protect Air and Water Quality from Pollutants of Concern* (2008), https://www.gao.gov/assets/gao-08-944.pdf (finding that "EPA does not have data on the number and location of CAFOs nationwide and the amount of discharges from these operations" and that "[w]ithout this information and data . . . , it is difficult to estimate the actual discharges occurring and to assess the extent to which CAFOs may be contributing to water pollution").
[598] *Id.* at 5, 12.
[599] *See id.* at 12; *see also* David Jackson & Gary Marx, *State Officials Defend Hog Confinement Regulations*, Chicago Tribune (Nov. 7, 2017), https://www.chicagotribune.com/investigations/ct-pork-met-20171107-story.html (noting that an official with the Illinois Environmental Protection Agency "acknowledged his agency does not know how many large hog confinements exist in the state, or where many of them are located").
[600] *See* Minn. R. 7020.2225(D) (allowing CAFOs to transfer ownership of manure or process wastewater).
[601] *See* Ohio Rev. Code Ann § 940.42(A) (generally excluding "[d]ata or records of a person's agricultural operations" from disclosure to the public).
[602] 68 Fed. Reg. at 7,201; *see also* Exhibit 6 ¶ 6 (explaining that identifying discharges from CAFOs "is challenging, in part, because discharges from land application sites to surface water are often intermittent").

concentrated—such as Duplin County, North Carolina, where there are over 520 swine CAFOs[603]—it may be difficult to identify the CAFO responsible for a particular discharge based on water samples alone, because there frequently are multiple CAFOs discharging to a river or stream.[604] These aspects of CAFO discharges mean that, even if EPA knew the location of every CAFO, it would remain difficult for EPA to prove discharges on a CAFO-by-CAFO basis.

Third, EPA and state agencies lack the resources and, often, the political will necessary to identify discharges on a CAFO-by-CAFO basis. Indeed, EPA recently acknowledged that "EPA and state permitting agencies lack the resources to regularly inspect [CAFOs] to assess [CAFO operators' claims that they do not discharge], particularly since discharges often only occur during certain weather conditions."[605] State agencies also are unable to dedicate the resources necessary to identify discharges. In Washington, for example, CAFO inspections occur approximately once every 22 months, and they typically last only a few hours.[606] In Indiana, there were only seven inspectors available to visit the state's 796 CAFOs as of 2017, and CAFOs are only inspected once every five years.[607] Illinois likewise aims to inspect Large CAFOs only once every five years.[608]

Fourth, EPA cannot and should not place the burden on community members or scientists to investigate and prove discharges. Many people who have made complaints about CAFOs in their communities have experienced intimidation or harassment from government employees, industry representatives, and neighbors with financial ties to CAFOs. For example, the Dodge County, Minnesota resident has experienced harassment and intimidation that she perceives as "signs of the power imbalance" between community members and CAFO operators.[609] And the Duplin County, North Carolina resident explains that he was contacted by a CAFO operator after anonymously reporting the operator's permit violation to the North Carolina Department of Environmental Quality ("NC DEQ"), leading the resident to conclude that NC DEQ had not kept his report anonymous. As he explains, "[i]f complaints aren't kept anonymous, it deters people from reporting permit violations."[610] In light of experiences like

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[603] *See* Exhibit 11 ¶ 3.
[604] *See, e.g.*, Christopher D. Heaney et al., *Source Tracking Swine Fecal Waste in Surface Water Proximal to Swine Concentrated Animal Feeding Operations*, 511 Sci. of the Total Env't 676, 680 (2015) (reporting "overall diffuse and poor microbial quality of surface waters proximal to swine CAFO liquid waste land application sites in [North Carolina]," including the presence of fecal bacteria both upstream and downstream of land application sites, and concluding that upstream sampling locations were potentially contaminated by "numerous upstream swine CAFO liquid waste land application sites as well as poultry CAFO dry litter land application sites").
[605] *See* EPA, *EPA Legal Tools to Advance Environmental Justice*, *supra* note 2, at 75.
[606] *See* Exhibit 20.
[607] *See* Ind. Dep't of Env't Mgmt., *Indiana Confined Feeding Program* 25 (2017), https://www.in.gov/idem/cfo/files/about_cfo_presentation.pdf.
[608] *See* Danielle J. Diamond, *Illinois' Failure to Regulate Concentrated Animal Feeding Operations in Accordance with the Federal Clean Water Act*, 11 Drake J. Agric L. 185, 209 (2006).
[609] Exhibit 2 ¶ 16.
[610] Exhibit 11 ¶ 19.

this, EPA has expressed "grave concerns about . . . a potential hostile and intimidating environment for anyone seeking to provide relevant information to [NC DEQ] or EPA."[611]

CAFO industry representatives also have sought to intimidate scientists by publicly impugning their motives, threatening aggressive legal action, and attempting to undermine employment and research funding. For example, in response to research by Dr. Steve Wing of the University of North Carolina ("UNC") at Chapel Hill, finding that swine CAFOs in North Carolina are "differentially sited in areas populated by poor African-Americans" and CAFO neighbors reported more respiratory and gastrointestinal complaints than residents of agricultural communities without CAFOs, the North Carolina Pork Council issued news releases accusing Dr. Wing of engaging in biased, "irresponsible," and "immoral" "pseudo-science."[612] Even though Dr. Wing was a "respected scientist at a high-status institution, someone who had won state and federal funding for his work," the North Carolina pork industry and allied state legislators nonetheless "expressed concerns about [Dr. Wing's] research through every level of his institutional superiors, from his dean to the Chapel Hill chancellor's office, the UNC-system president's staff, and the Board of Trustees (where the pork industry was prominently represented)."[613] Dr. Wing understood these actions to be efforts at "harassment and intimidation."[614]

Similarly, Dr. JoAnn Burkholder of North Carolina State University has reported that she experienced harassment after discovering a toxic organism linked to water pollution from CAFOs. According to Dr. Burkholder, on the day her research was released, her employer received over "160 messages sent in by various representatives of the concentrated swine industry demanding that [she] be fired."[615] In addition, Dr. Burkholder received multiple death threats.[616] She has expressed concern that "the backlash that resulted from her research on swine pollution has damaged her reputation and hurt her ability to receive grants."[617] As a result of these intimidation and harassment tactics, scientists who might otherwise study the effects of CAFOs on public health have chosen to pursue different research interests,[618] and "[i]n some

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611 EPA Letter of Concern, *supra* note 354, at 8.
612 *See* S. Holly Stocking & Lisa W. Holstein, *Manufacturing Doubt: Journalists' Roles and the Construction of Ignorance in a Scientific Controversy*, 18 Pub. Understand. Sci. 23, 30, Fig. 2 (2009).
613 *Id*. at 27, 36.
614 Steve Wing, *Social Responsibility and Research Ethics in Community-Driven Studies of Industrial Hog Production*, 110 Env't Health Persp. 437, 441 (2002).
615 Alicia Allen, *ISU Graduate Claims Backlash Hurt Career*, Iowa State Daily (Dec. 4, 2002), https://iowastatedaily.com/198794/news/isu-graduate-claims-backlash-hurt-career/.
616 *See* Perry Beeman, *Ag Scientists Feel the Heat*, Inst. Agric. & Trade Pol'y (Feb. 2, 2003), https://www.iatp.org/news/ag-scientists-feel-the-heat.
617 Allen, *supra* note 615.
618 *See* Wing et al., *supra* note 349, at 443.

areas, community members have been fearful of participating in the research because of the influence of the hog industry in local affairs."[619]

Fifth, EPA cannot rely on CAFO self-reporting to prove discharges. Multiple courts have recognized that self-reporting schemes allow regulated entities, or entities that should be regulated, to escape oversight.[620] And EPA has acknowledged that self-reporting has failed to ensure that CAFO operators obtain appropriate permits. Indeed, according to EPA, "[m]any CAFOs are not regulated and continue to discharge without NPDES permits" and "many waters are affected by pollutants from CAFOs," but nonetheless, "many CAFOs often claim that they do not discharge."[621] Similarly, Jim Werntz, EPA's former director in Idaho, has recognized that "[w]e know we have large CAFO . . . facilities, but they have made the business decision to not participate" in NPDES permitting.[622] As advocates have long recognized, "[g]iven the costs of permitting and the relatively low likelihood of an enforcement action, it is not surprising that many CAFOs [opt not to report their discharges]."[623] For these reasons, EPA stated *over 20 years ago* that "[w]ithout [a] rebuttable presumption, EPA believes it could not effectuate proper permitting of CAFOs because of operations that would claim to be excluded from the CWA because they do not discharge."[624] The intervening decades have borne out EPA's conclusion. As discussed above, in four of the top five swine-producing states and two of the top five dairy cow-confining states, less than ten percent of CAFOs have CWA permits.[625] Yet, ample evidence shows that CAFOs in these states are discharging.[626] As the resident of Jefferson County, Iowa puts it, "This self-policing policy is like allowing the fox to guard the hen house, with serious consequences for our waterways."[627]

In contrast to the difficulties EPA faces in proving discharges on a CAFO-by-CAFO basis, CAFO operators are well-positioned to rebut the presumption of discharge, if they truly do

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[619] *See id*. at 441–42.
[620] *See U.S. v. EME Homer City Generation L.P.*, 823 F. Supp. 2d 274, 283–85 (W.D. Pa. 2011), *aff'd*, 727 F.3d 274 (3d Cir. 2013) (explaining that CAA regulations that impose a permitting requirement only after the regulated entity self-reports are "reliant on the proverbial fox to guard the henhouse" and give rise to "efforts to evade the [permitting] program"); *see also Lana'ians for Sensible Growth v. Land Use Comm'n*, 463 P.3d 1153, 1164 (Haw. 2020) (noting that there is a "conflict of interest inherent in self-reporting"); *Riverkeeper, Inc. v. Seggos*, 75 N.Y.S.3d 854 (N.Y. Sup. Ct. 2018) (concluding that a state's general permit for CAFOs failed to provide for sufficient agency oversight because it made CAFO operators and third-parties hired by CAFO operators solely responsible for certifying nutrient management plans).
[621] *See* EPA, *EPA Legal Tools to Advance Environmental Justice*, *supra* note 2, at 75.
[622] Richard Manning, *Idaho's Sewer System is the Snake River*, High Country News (Aug. 11, 2014), https://www.hcn.org/issues/46.13/idahos-sewer-system-is-the-snake-river?b_start:int=2#body.
[623] *See* Devine & Baron, *supra* note 418, at 10.
[624] 66 Fed. Reg. at 3,009.
[625] *See supra* Section III.A.1.
[626] *See supra* Section III.A.3.
[627] Exhibit 15 ¶ 12.

not discharge. CAFO operators possess all of the facility-specific information—such as the CAFO's location, design, and operating practices—necessary to show that they do not discharge. And because CAFO operators have this information, as well as access to discharge locations, the unplanned and intermittent nature of CAFO discharges does not prevent operators from assessing whether they discharge. For the same reason, CAFO operators do not suffer from a lack of resources necessary to assess whether they discharge. And CAFO operators certainly will not experience intimidation that would prevent them from proving that they do not discharge, if that is the case. Similarly, concerns about self-reporting do not apply when CAFO operators are required to present evidence that they do not discharge and, thus, are not required to operate under an NPDES permit.

D. The Presumption Will Help Ensure the Objectives of the CWA and Environmental Justice Executive Orders.

Not only is there a sound and rational connection underlying the presumption, but the presumption also will help ensure the objectives of the CWA and Executive Orders 12,898 and 14,008.[628] For the reasons that follow, the presumption will better allow EPA to ensure that discharging CAFOs obtain NPDES permits, thereby aligning with the CWA's express statement that CAFOs are point sources under the Act , as well as advancing the CWA's goal of restoring and maintaining water quality. The presumption will also improve EPA's compliance with the environmental justice initiatives in Executive Orders 12,898 and 14,008.

1. The Presumption Will Help Ensure the Objectives of the CWA.

The presumption will improve EPA's ability to ensure that discharging CAFOs obtain NPDES permits. As shown above, EPA's approach to CAFO permitting allows many CAFOs to discharge without NPDES permits.[629] EPA's approach undermines the CWA's express statement that CAFOs are point sources and, as such, must have NPDES permits for their discharges. The presumption will help correct this problem by requiring Large CAFOs using wet manure management systems—which are an especially significant source of discharges—to apply for NPDES permits or present evidence showing that they do not actually discharge pollutants.

The presumption will also better support the CWA's goal of restoring and maintaining water quality by subjecting Large CAFOs using wet manure management systems to more stringent permit requirements. Large CAFOs using wet manure management systems "are important contributors to water pollution."[630] Despite their significant contribution to water pollution, however, Large CAFOs have "improperly tried to circumvent the [NPDES] permitting

[628] *See NLRB v. Tahoe Nugget, Inc.*, 584 F.2d at 303–04.
[629] *See supra* Section III.A.1.
[630] *Waterkeeper All., Inc.*, 399 F.3d at 506, n.22.

process."[631] When Large CAFOs fail to obtain NPDES permits, they perpetuate and exacerbate water pollution. As discussed above, Large CAFOs operating without NPDES permits operate instead under state laws or state permits that are generally less protective of water quality than NPDES permits.[632] Adopting a presumption that Large CAFOs using wet manure management systems actually discharge will correct this problem by shifting these CAFOs to more-protective NPDES permits. And EPA's ability to object to inadequate NPDES permits will further ensure that these CAFOs' permits contain the protections that the CWA requires.[633]

Shifting Large CAFOs to more-protective NPDES permits is even more necessary in light of recent efforts by states to undermine local regulations that impose more stringent requirements on CAFOs. In response to community concerns about the threats CAFOs pose to local waterways and public health, local governments across the country have enacted CAFO regulations that are more stringent than state requirements.[634] These local regulations reflect the communities' desire and need for increased protections against CAFO pollution, including in states like Iowa[635] and Missouri,[636] where the vast majority of Large CAFOs operate without more-protective NPDES permits.[637] However, state legislatures have responded to the local regulations by enacting sweeping laws aimed at thwarting all local efforts to increase regulation and oversight of CAFOs.[638] In several cases, state courts have held that the state laws override the more stringent local rules.[639] As additional states consider adopting expansive laws that

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[631] *Id.*; *see also* 68 Fed. Reg. at 7,201 ("[S]ince the inception of the NPDES permitting program in the 1970s, only a small number of Large CAFOs have actually sought permits.")
[632] *See supra* Section III.A.3.
[633] *See* 33 U.S.C. § 1342(d).
[634] *See, e.g.*, Cooper Cnty., Missouri Health Ctr. Reg. 2019-6 (prohibiting land application in areas with karst formations under certain circumstances, setting limitations on where CAFOs can construct subsurface manure confinement structures, and providing for inspections by county officials upon receipt of a community member's complaint); Austin Huguelet, *Judge Halts New Missouri Law Blocking Local Regulations on CAFOs*, Springfield News-Leader (Aug. 20, 2019), https://www.news-leader.com/story/news/local/ozarks/2019/08/20/judge-cole-county-blocks-missouri-cafos-law/2065806001/.
[635] *See Worth Cnty. Friends of Agric. v. Worth Cnty.*, 688 N.W.2d 257 (2004) (discussing a Worth County, Iowa ordinance that set limits on CAFO air pollution and required CAFOs to install systems for water quality monitoring).
[636] *See* Cooper Cnty., Missouri Health Ctr. Reg. 2019-6.
[637] *See* EPA, *NPDES CAFO Permitting Status Report: National Summary, Endyear 2021, completed 07/20/22*, *supra* note 5.
[638] *See, e.g.*, Mo. Ann. Stat. § 192.300 (providing that local governments may not "[i]mpose standards or requirements on [CAFOs] . . . that are inconsistent with, in addition to, different from, or more stringent than" state law); 3 Pa. Con. Stat. Ann. § 519(a) (providing that state law "occup[ies] the whole field of regulation regarding nutrient management . . . to the exclusion of all local regulations"); Iowa Code Ann. § 331.304A (similar); Wis. Stat. Ann. § 93.90 (similar).
[639] *See, e.g.*, *Cedar Cnty. Comm. v. Parson*, Case No. 19AC-CC00373 (Mo. Cir. Ct. Dec. 23, 2021) (holding local ordinance preempted by Missouri state law); *Com., Off. of Atty. Gen. ex rel. Corbett v. Locust Twp.*, 49 A.3d 502 (Pa. Commw. Ct. 2012) (similar, Pennsylvania); *Adams v. State Livestock*

would stifle local attempts to increase protections against CAFO pollution,[640] EPA must ensure that discharging CAFOs are operating under the more protective requirements in NPDES permits.

The presumption will also restore water quality by subjecting Large CAFOs using wet manure management systems to increased public participation and transparency, as well as to citizen suits. Allowing the public to review and comment on a CAFO's application for coverage under a NPDES permit, including its nutrient management plan, will help restore water quality. The public can identify aspects of the nutrient management plan that are insufficient to protect water quality, and it can draw attention to the plan's potential impact on local waterways. For example, the Cape Fear Riverkeeper explains: "[I]f I had the opportunity to comment on nutrient management plans, I would encourage [NC DEQ] to include numeric limitations on the amount of nutrients that CAFOs can discharge, which could help reduce algal blooms in waterways."[641]

In addition, increasing transparency regarding nutrient management plans will facilitate enforcement, as it will allow the public to identify violations of the plans and pursue citizen suits.[642] The Grant County, South Dakota resident explains, "I've looked at the state's online record of complaints against CAFOs, and I've seen complaints that they applied manure on the same field two years in a row or that they applied too much manure on a field. Without seeing the nutrient management plans, I can't make sure that those things aren't happening on the fields near our home and our drinking well."[643] Similarly, the Executive Director of Snake River Waterkeeper explains that "[w]ithout access to information on where a CAFO is land applying its waste, the amount of waste it is applying, and the guidelines it should be following to prevent discharges, it is difficult for the public to monitor CAFOs and hold them accountable for causing discharges."[644] Increasing the public's ability to bring citizen suits will, in turn, help address and deter permit violations that cause water pollution.

Facilities Siting Rev. Bd., 820 N.W.2d 404 (2012) (similar, Wisconsin); *Worth Cnty. Friends of Agric. v. Worth Cnty.*, 688 N.W.2d 257 (2004) (similar, Iowa); *David v. Bd. of Comm'rs of Norton Cnty.*, 89 P.3d 893 (2004) (similar, Kansas).

[640] *See, e.g.*, Animal Enterprise and Working Animal Regulation, Utah H.B. 746 (2022) (proposed Utah legislation that would prohibit political subdivisions from regulating CAFOs).

[641] Exhibit 14 ¶ 17.

[642] *See* Terence J. Centner, *Challenging NPDES Permits Granted Without Public Participation*, 38 B.C. Env't Affs. L. Rev. 1, 20 (2011) (explaining that "citizen suits can only be successful if people have sufficient information to learn about violations"); *see also* Exhibit 2 ¶ 20 ("As a result of self-reporting and lack of oversight, no one in our community knows where or how much manure is applied to the land. This lack of information makes it very difficult for our community to understand—let alone fight back against—pollution near our homes.").

[643] Exhibit 4 ¶ 10.

[644] Exhibit 21 ¶ 13; *see also* Exhibit 14 ¶ 17 ("If community members had access to nutrient management plans, they would know whether certain risky practices are allowed, which would help them identify and report permit violations.").

Shifting CAFOs to permits that allow for citizen suits is especially important in light of recent state legislation and judicial decisions that limit citizens' ability to bring nuisance suits against CAFOs. For example, shortly after CAFO neighbors in North Carolina brought nuisance suits alleging that odors, pests, and noises from nearby CAFOs interfered with their use and enjoyment of their homes, the North Carolina legislature enacted bills that capped the amount of damages that plaintiffs can receive from nuisance suits against CAFOs and restricted the conditions under which neighbors can bring nuisance suits against a CAFO.[645] Following North Carolina's lead, other states have also proposed or enacted legislation restricting citizens' ability to sue CAFOs for causing nuisances.[646] And a recent decision by the Iowa Supreme Court similarly makes it more difficult for CAFO neighbors in Iowa to bring nuisance suits against CAFOs.[647] As a recent article explains, limiting the availability of nuisance suits "enabl[es] industrial agribusiness entities to pollute and escape accountability at the expense of rural people and the environment."[648] Given these restrictions on nuisance suits and the lack of accountability they entail, it is all the more important for citizens to have the ability to use citizen suits to hold CAFOs accountable for the water pollution they cause.

2. **The Presumption Will Help Ensure the Objectives of Executive Order 12,898.**

The presumption will improve EPA's compliance with Executive Order 12,898, which requires EPA to collect data on and address environmental justice issues and ensure that environmental justice communities are able to participate in EPA's activities.[649] The presumption will better allow EPA to collect the data necessary to show that CAFOs disproportionately harm environmental justice communities—and, thereby, enable EPA to act to protect human health in those communities—because NPDES permits require CAFO operators to submit uniform, facility-specific information to EPA.[650] The presumption will also help address the disproportionate harms CAFOs impose, as it will shift CAFOs that are an especially significant source of discharges to more protective permits. And the presumption will help ensure that environmental justice communities are able to participate in EPA's CAFO permitting process, because it will move CAFOs to a permitting scheme that allows the public to review and comment on permit applications. Although "public participation by itself is not the solution to

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[645] *See* Leah Douglas, *Big Ag is Pushing Laws to Restrict Neighbors' Ability to Sue Farms*, NPR (Apr.12, 2019), https://www.npr.org/sections/thesalt/2019/04/12/712227537/big-ag-is-pushing-laws-to-restrict-neighbors-ability-to-sue-farms.

[646] *Id.*

[647] *See* David Pitt, *Iowa Court Reverses Precedent on Iowa Pig Farm Lawsuits*, AP News (June 30, 2022), https://apnews.com/article/lawsuits-iowa-pollution-water-718f84c3cce75fdf0bb2ed16daf27df8.

[648] Danielle Diamond et al., *Agricultural Exceptionalism, Environmental Injustice, and U.S. Right-to-Farm Laws* 52 ELR 10727, 10747 (2022).

[649] *See* Exec. Order 12,898.

[650] *See* 40 C.F.R. § 122.21(h)(8)(i) (requiring CAFO operators to submit information on their facility's location, size, animal type, manure storage structures, and land application areas).

environmental justice problems, . . . such problems cannot be resolved without improved public participation."[651]

3. <u>The Presumption Will Help Ensure the Objectives of Executive Order 14,008.</u>

Lastly, the presumption will improve EPA's compliance with Executive Order 14,008, which requires EPA to strengthen enforcement of environmental violations that disproportionately harm environmental justice communities.[652] Shifting Large CAFOs using wet manure management systems to NPDES permits will make those CAFOs subject to citizen suits. Citizen suits will, in turn, allow members of environmental justice communities to "both spur and supplement government enforcement actions"[653] against CAFOs that violate their permits.

E. <u>Non-Discharging CAFOs Can Rebut the Presumption.</u>

In general, a presumption may be rebutted by evidence indicating that the presumption does not apply in a specific instance.[654] Here, an operator of a Large CAFO using a wet manure management system can rebut the presumption by presenting evidence showing that the CAFO does not discharge. In light of the sound and rational connection between discharges and waste storage, transport, and land application, EPA should require the CAFO operator to present evidence showing that the CAFO does not discharge from its waste storage structures, its waste transport pipes, or its land application areas, including any tile drains and ditches. Evidence sufficient to show that a CAFO does not discharge might include evidence that the CAFO's waste pit is synthetically lined and designed, constructed, operated, and maintained to prevent discharges and contain all process-generated wastewater plus the runoff from a 100-year, 24-hour rain event; the CAFO has access to enough land application areas to apply its waste at rates that ensure that no more nutrients are applied than are necessary for the crops to achieve

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[651] EPA, Nat'l Acad. of Pub. Admin., *Environmental Justice in EPA Permitting: Reducing Pollution in High-Risk Communities is Integral to the Agency's Mission*, at 63 (2001).
[652] *See* Exec. Order No. 14,008.
[653] *Waterkeeper All., Inc.*, 399 F.3d at 503 (quoting S. Rep. No. 50, 99th Cong., 1st Sess. 28 (1985)).
[654] *See* 40 C.F.R. § 279.10(b)(1)(ii) ("Used oil containing more than 1,000 ppm total halogens is presumed to be a hazardous waste because it has been mixed with halogenated hazardous waste listed in subpart D of part 261 of this chapter. Persons may rebut this presumption by demonstrating that the used oil does not contain hazardous waste (for example, by showing that the used oil does not contain significant concentrations of halogenated hazardous constituents listed in appendix VIII of part 261 of this chapter)."); 49 C.F.R. § 173.31(d)(2) ("ln any action brought to enforce this section, the lack of securement of any <u>closure</u> to a tool-tight condition, detected at any point, will establish a rebuttable presumption that a proper inspection was not performed by the offeror of the car. That presumption may be rebutted by any evidence indicating that the lack of securement resulted from a specific cause not within the control of the offeror.") (underline added).

reasonable yield goals;[655] the CAFO relies on off-farm land application areas to apply its waste at those rates; the CAFO has implemented all necessary best management practices; the CAFO conducts upstream, downstream, and groundwater water monitoring; any water pollution caused by the CAFO will not reach navigable waters; and any groundwater pollution caused by the CAFO is not a functional equivalent of a direct discharge to navigable waters.[656]

F. The Presumption Comports with Relevant Caselaw.

EPA has repeatedly concluded that CAFOs discharge and, thus, must obtain NPDES permits. As a result, EPA has made multiple attempts at revising its regulations governing CAFO permitting to increase NPDES permit coverage. As discussed below, EPA's past attempts at revising its regulations have led to two decisions clarifying when EPA may require a CAFO to apply for a NPDES permit. The requested presumption complies with both of those decisions.

1. EPA's Past CAFO Regulations Reflect the Need to Improve CAFO Permitting.

In 2001, EPA proposed to revise its regulations governing CAFO permitting and effluent limitations for the first time since 1976. EPA explained that it had "bec[o]me apparent that the regulation and permitting of CAFOs needed review due to changes in the livestock industry, specifically the consolidation of the industry into fewer, but larger operations."[657] In addition, "[d]espite more than twenty years of regulation, there [were] persistent reports of discharge and

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[655] To ensure that no more nutrients are applied than are necessary for crops to achieve a reasonable yield goal, rates should be determined based on land grant university fertility rates, soil testing for available nutrients, manure nutrient analyses, and other planned nutrient applications.

[656] The evidence sufficient to rebut the presumption may be more stringent than the requirements that a CAFO would have to satisfy under a NPDES permit. For example, CAFOs operating under NPDES permits need only have a production area designed to withstand a 25-year, 24-hour rain event, *see* 40 C.F.R. § 412.31(a)(1)(i), while EPA may require a CAFO seeking to rebut the presumption to have a production area designed to withstand a 100-year, 24-hour rain event. In the case of this storm standard, EPA should require CAFOs seeking to rebut the presumption to meet the more stringent standard because NPDES permits contemplate and, indeed, allow discharges due to storms that exceed the 25-year, 24-hour standard. *Id.* However, CAFOs operating without NPDES permits may not discharge at all. Thus, the more stringent storm standard is necessary to ensure that those CAFOs do not discharge. And, more generally, because CAFOs operating without NPDES permits are often not subject to agency and public oversight meant to ensure that they do not discharge, *see supra* Section III.A.3., it is appropriate and necessary for EPA require CAFOs seeking to rebut the presumption and avoid operating under NPDES permits to show that they have adopted more stringent operating standards and, thus, do not need that oversight.

[657] 66 Fed. Reg. at 2,965.

runoff of manure and manure nutrients from livestock and poultry operations."[658] Yet, "[u]nder the existing regulations, few operations [had] obtained NPDES permits."[659]

To remedy the problem of CAFOs discharging without NPDES permits, in 2003, EPA promulgated revised CAFO permitting regulations. As relevant here, EPA's 2003 regulations required all CAFO owners or operators to apply for a NPDES permit, except "in very limited situations where they make an affirmative demonstration of 'no potential to discharge.'"[660] EPA explained that there was a "sound basis in the administrative record for the presumption that all CAFOs have a *potential* to discharge to the waters of the United States such that they should be required to apply for a permit, unless they can show no potential to discharge."[661]

A court found that requiring all CAFO owners or operators to apply for a NPDES permit violated the CWA. In *Waterkeeper Alliance, Inc. v. EPA*, the court explained that "unless there is a 'discharge of any pollutant,' there is no violation of the Act, and point sources are, accordingly, neither statutorily obligated to comply with EPA regulations for point source discharges, nor are they statutorily obligated to seek or obtain an NPDES permit."[662] This is because "the [CWA] gives the EPA jurisdiction to regulate and control only *actual* discharges—not potential discharges, and certainly not point sources themselves."[663] Because the 2003 regulations imposed obligations on CAFOs regardless of whether they actually discharge, the court found that the regulations violated the Act's statutory scheme.[664]

In response to the *Waterkeeper* decision, EPA promulgated revised regulations aimed at "continu[ing] to maintain the focus on regulating discharges" from CAFOs.[665] EPA's 2008 regulations required CAFOs that "discharge or propose to discharge" to apply for NPDES permits.[666] A CAFO proposed to discharge if it was "designed, constructed, operated, or maintained such that a discharge will occur, not simply such that it might occur."[667] Whether a CAFO proposed to discharge was based on the CAFO operator's objective assessment of the

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658 *Id.* at 2,972.
659 *Id.* at 2,976.
660 68 Fed. Reg. at 7,200.
661 *Id.* at 7,201 (emphasis added).
662 *Waterkeeper All., Inc.*, 399 F.3d at 504.
663 *Id.* at 505.
664 *Id.*
665 Revised National Pollutant Discharge Elimination System Permit Regulation and Effluent Limitation Guidelines for Concentrated Animal Feeding Operations in Response to Waterkeeper Decision, 71 Fed. Reg. 37,744-01, 37,746 (June 30, 2006).
666 Revised National Pollutant Discharge Elimination System Permit Regulation and Effluent Limitations Guidelines for Concentrated Animal Feeding Operations in Response to the Waterkeeper Decision, 73 Fed. Reg. 70,418, 70,423 (Nov. 20, 2008).
667 *Id.*

manmade aspects of the CAFO, along with the climatic, hydrological, and topographical characteristics of the area where the CAFO was located.[668]

A court again found that EPA's regulation violated the CWA. In *National Pork Producers Council v. EPA*, the court held that EPA's definition of CAFOs that "propose to discharge" ran afoul of the rule that "there must be an actual discharge into navigable waters to trigger the CWA's requirements and the EPA's authority."[669] The court explained that, rather than applying to CAFOs that "form or declare a plan or intention" to discharge, the 2008 regulation applied to CAFOs "regardless of whether the operator wants to discharge or is presently discharging."[670] Because the 2008 regulation imposed an obligation to obtain a permit in the absence of an actual discharge, EPA had exceeded its authority under the Act.[671]

Following the decision in *National Pork Producers*, EPA's CAFO permitting regulations returned to their reliance on self-reporting. CAFO operators determine whether they discharge or plan to discharge and, thus, whether they must apply for a NPDES permit. As detailed above, the problems that EPA identified in its past CAFO regulations—persistent reports of discharges from CAFOs, yet few CAFOs operating under NPDES permits—have not been resolved.[672]

2. The Presumption Comports with *Waterkeeper* and *National Pork Producers*.

The requested presumption does not suffer from the same flaws as the rules at issue in *Waterkeeper* and *National Pork Producers*. Whereas those rules applied to CAFOs that had not yet discharged—including CAFOs that had a *potential* to discharge[673] and those that *proposed* to discharge[674]—the requested presumption applies to CAFOs that *actually* discharge. And, because the presumption is properly supported by a proven sound and rational connection between Large CAFOs using wet manure management systems and actual discharges, it operates as a stand-in for the inferred fact: actual discharge.[675] Therefore, the presumption regulates

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[668] *Id.* at 70, 424.
[669] *Nat'l Pork Producers Council v. EPA*, 635 F.3d 738, 751 (5th Cir. 2011).
[670] *Id.* at 750.
[671] *Id.* at 751.
[672] *See supra* Section III.A.1.
[673] *Waterkeeper All., Inc.*, 399 F.3d at 505 (noting that in the rule at issue, "[t]he 'duty to apply' provision is based on the presumption that every CAFO has a potential to discharge" (emphasis added)).
[674] *Nat'l Pork Producers Council*, 635 F.3d at 750 (noting that the rule at issue defined CAFOs that propose to discharge as CAFOs that are "designed, constructed, operated, and maintained in a manner such that the CAFO *will* discharge" (emphasis added)).
[675] *See Cole v. U.S. Dep't of Agric.*, 33 F.3d 1263, 1268 (11th Cir. 1994) (explaining that "[t]o the extent that the fact to be presumed (event A) is properly inferred from proof of the predicate fact (event B)," the agency "is *not*, in fact, imposing a penalty on event B"; rather, it is imposing a penalty on event A); *see also Ortiz v. McDonough*, 6 F.4th 1267, 1281 (Fed. Cir. 2021) ("A presumption itself . . . effectively

discharges, not CAFOs. Each CAFO subject to the presumption is deemed to discharge and, as a result, the presumption imposes the obligation to apply for a NPDES permit or present evidence to rebut the presumption only on CAFOs that actually discharge.[676] For all these reasons, the presumption comports with the CWA, *Waterkeeper*, and *National Pork Producers*.[677]

The *Waterkeeper* court, in fact, expressly raised the prospect of the requested presumption, leaving open the possibility that EPA "might properly presume that Large CAFOs—or some subset thereof—actually discharge."[678] The requested presumption fits squarely in this opening. The *Waterkeeper* court observed that "EPA ha[d] marshaled evidence suggesting that such a prophylactic measure may be necessary to effectively regulate water pollution from Large CAFOs."[679] In the nearly 20 years since EPA's 2003 regulations, there has only been an increase in evidence showing that Large CAFOs using wet manure management systems actually discharge and a presumption of discharge is necessary to regulate their

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'supplies the required evidence' when specified 'preconditions are satisfied.'" (quoting *Snyder v. McDonough*, 1 F.4th 996, 1004 (Fed. Cir. 2021))).

[676] Even if the requested presumption were understood to impose an obligation on Large CAFOs using wet manure management systems that do not discharge water pollution, that obligation is neither unreasonable nor unprecedented. *First*, given the sound and rational connection between Large CAFOs using wet manure management systems and actual discharge, any CAFO meeting this description that does *not* discharge plainly has avoided discharge through careful planning and responsible oversight. The owner or operator of such a CAFO could rebut the presumption simply by providing EPA with evidence of the measures they already have implemented to avoid discharge. *Second*, EPA and other federal agencies already require certain entities to establish that they are *not* subject to legal requirements. For instance, under the Clean Air Act, facilities with the potential to emit regulated pollutants at or above certain thresholds can avoid stringent requirements only by agreeing to adhere to enforceable restrictions. *See* EPA, *True Minor Source and Synthetic Minor Source Permits*, https://www.epa.gov/tribal-air/true-minor-source-and-synthetic-minor-source-permits.

[677] In addition, the requested presumption does not implicate the major questions doctrine because it does not reflect an extravagant assertion of regulatory power. Instead, the presumption applies narrowly; it applies only to Large CAFOs using wet manure management systems, and as noted above, all Large CAFOs make up just 0.6 percent of all farms and seven percent of all concentrated feeding operations. *See supra* Section I.C. Nor is the presumption unprecedented. EPA has long required discharging CAFOs to obtain NPDES permits, as the CWA requires, and it has attempted at least twice to ensure that all discharging CAFOs obtain NPDES permits. In addition, the presumption does not reflect a fundamental revision of the CWA. To the contrary, the CWA expressly prohibits CAFOs from discharging to the nation's waters unless authorized to do so subject to NPDES permits. Moreover, even if the presumption triggered the major questions doctrine, EPA can overcome any skepticism as to its regulatory authority because the CWA contains clear congressional authorization to regulate in this manner. As explained above, the CWA *requires* EPA to either ensure that discharging CAFOs obtain NPDES permits or enforce the Act's prohibition on unpermitted discharges from CAFOs. *See supra* Section III.A. The presumption is a tool that will help EPA meet Congress's requirement.

[678] *Waterkeeper All., Inc.*, 399 F.3d at 506, n.22.399 F.3d at 506, n.22.

[679] *Id.*

discharges. As described above, extensive evidence shows that Large CAFOs discharge from waste storage, transport, and disposal, and that CAFOs continue to be under-permitted.

PROPOSED REGULATORY LANGUAGE

All Large CAFOs using wet manure management systems are presumed to actually discharge pollutants and, thus, must apply for an individual NPDES permit or submit a notice of intent for coverage under a general NPDES permit, unless the CAFO presents evidence showing that it does not actually discharge pollutants.

CONCLUSION

EPA has long known that "[d]espite more than [forty] years of regulation, there are persistent reports of discharge[s]"[680] from CAFOs and that "a growing body of literature suggest[s] that the communities disproportionately impacted by CAFOs are communities of color and economically disadvantaged communities."[681] Yet, as this petition shows, EPA's approach to permitting Large CAFOs using wet manure management systems—which are an especially significant source of discharges—*exacerbates*, rather than addresses, these problems. EPA's failure to adequately regulate these industrial operations violates the CWA and perpetuates environmental injustice. To help correct this failure, Petitioners ask EPA to adopt a rebuttable presumption that Large CAFOs using wet manure management systems actually discharge water pollution and, thus, must apply for NPDES permits.

[680] 66 Fed. Reg. at 2,972.
[681] EPA, *EPA Legal Tools to Advance Environmental Justice*, *supra* note 2, at 75.

EXHIBITS

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Exhibit 1

ANNOTATED BIBLIOGRAPHY

Peer-Reviewed Literature

1970s

T.G. Ciravolo et al., *Pollutant Movement to Shallow Ground Water Tables from Anaerobic Swine Waste Lagoons*, 8 J. Env't Quality 126 (1979). All lagoons tested seeped fecal coliforms, nutrients, and ion contaminants into the surrounding groundwater.

S. D. Klausner, P. J. Zwerman & D. F. Ellis, *Nitrogen and Phosphorus Losses from Winter Disposal of Dairy Manure*, 5 J. Env't Quality 47 (1976). Manure disposal during active thaw periods can result in increased losses of inorganic nitrogen and total soluble phosphorus.

1980s

J. C. Burns et al., *Swine Lagoon Effluent Applied to 'Coastal' Bermudagrass: I. Forage Yield, Quality, and Element Removal*, 14 J. of Env't Quality 9 (1985). Medium to high application rates of swine lagoon effluent to bermudagrass can increase the concentration of nitrates to levels that are close to being unsafe for ruminants. It can also result in levels of nitrogen and phosphorus that are four and ten times higher, respectively, than levels recommended for fertilizer applications, leading to environmental impacts on soil, groundwater, and surface runoff.

H. Williams Smith, *Antibiotic-Resistant Escherichia Coli in Market Pigs in 1956-1979: The Emergence of Organisms with Plasmid-Borne Trimethoprim Resistance*, 84 J. Hygiene 467 (1980). Pigs can harbor strains of bacteria that are resistant to common antibiotics.

Philip Wayne Westerman et al., *Swine Manure and Lagoon Effluent Applied to a Temperate Forage Mixture: II. Rainfall Runoff and Soil Chemical Properties*, 16 J. Env't Quality 106 (1987). Swine lagoon effluent and swine manure slurry can supply excess nitrogen to crops like tall fescue, resulting in surface water and groundwater pollution hazards, especially when rainfall occurs soon after application.

1990s

JoAnn M. Burkholder et al., *Impacts to a Coastal River and Estuary from Rupture of a Large Swine Waste Holding Lagoon*, 26 J. Env't Quality 1451 (1997). Hurricanes in eastern North Carolina have led to severe flooding of industrial swine facilities, lagoon ruptures, and waste overflows into North Carolina's creeks, rivers, and streams.

Lawrence B. Cahoon et al., *Nitrogen and Phosphorus Imports to the Cape Fear and Neuse River Basins to Support Intensive Livestock Production,* 33 Env't Sci. & Tech. 410 (1999). The quantities of "new" nitrogen and phosphorus added to watersheds due to industrial animal facilities in North Carolina's Cape Fear and Neuse River basins were more than an order of magnitude greater than the annual loads of these nutrients in each river during the 1990s, posing significant threats of nutrient over-enrichment.

Bahman Eghball et al., *Phosphorus Movement and Adsorption in a Soil Receiving Long-Term Manure and Fertilizer Application*, 25 J. Env't Quality 1339 (1996). Phosphorus from long-term manure or fertilizer application and from heavy loading of manure can leach into groundwater in areas with shallow water tables or coarse-textured soils.

R.L. Huffman & Phillip W. Westerman, *Estimated Seepage Losses from Established Swine Waste Lagoons in the Lower Coastal Plain of North Carolina*, 38 Transactions Am. Soc'y of Agric. & Biological Eng'rs 449 (1995). Of 11 lagoons studied, 54 percent demonstrated moderate or severe seepage into the superficial aquifer.

A.W. Jongboeld & N.P. Lenis, *Environmental Concerns About Animal Manure,* 76 J. Animal Sci. 2641 (1998). Swine manure application can lead to accumulation in soil of minerals such as phosphorus, copper, and zinc; nitrate leaching into surface water and groundwater; and emissions of odors, ammonia, and dust above tolerable levels.

F. Liu, *Phosphorus Recovery in Surface Runoff from Swine Lagoon Effluent by Overland Flow*, 26 J. Env't Quality 995 (1997). Applications of swine lagoon effluent to bermudagrass and ryegrass resulted in dissolved phosphorus and total phosphorus concentrations exceeding critical values associated with accelerated eutrophication, especially when applied to slopes greater than five percent.

Raymond B. Palmquist et al., *Hog Operations, Environmental Effects, and Residential Property Values*, 73 Land Econ. 114 (1997). Property values for homes decline with proximity to industrial swine facilities.

Stephen J. Reynolds et al., *Air Quality Assessments in the Vicinity of Swine Production Facilities*, 4 J. Agromedicine 37 (1997). Air around industrial swine facilities contained concentrations of hydrogen sulfide and ammonia that exceeded recommendations from the U.S. Environmental Protection Agency and Agency for Toxic Substances and Disease Registry.

Susan S. Schiffman et al., *The Effect of Environmental Odors Emanating from Commercial Swine Operations on the Mood of Nearby Residents*, 37 Brain Rsch. Bull. 369 (1995). People living near industrial swine facilities experienced odors and reported significantly more tension, depression, anger, fatigue, confusion, and mood disturbance.

Kenneth C. Stone et al., *Impact of Swine Waste Application on Ground and Stream Water Quality in an Eastern Coastal Plain Watershed*, 41 Transactions Am. Soc'y of Agric. & Biological Eng'rs 1665 (1998). When a facility increased the number of hogs from 3,300 to over 14,000, nitrate concentrations in groundwater increased significantly in three of seven wells tested near a sprayfield.

Kendall M. Thu et al., *A Control Study of the Physical and Mental Health of Residents Living Near a Large-Scale Swine Operation*, 3 J. Agric. Safety & Health 13 (1997). Neighbors living within a two-mile radius of a 4,000-sow industrial swine facility had higher rates of toxic or inflammatory respiratory effects, which were similar to health problems documented among industrial swine facility workers.

Philip Wayne Westerman et al., *Swine-Lagoon Seepage in Sandy Soil*, 38 Transactions Am. Soc'y of Agric. & Biological Eng'rs 1749 (1995). Swine lagoons without clay liners and in sandy soils demonstrate significant seepage of contaminants into groundwater, even after 3.5 to 5 years of receiving waste, despite assumptions that manure physically seals the lagoons.

Steve Wing et al., *Community Based Collaboration for Environmental Justice: South-East Halifax Environmental Reawakening*, 8 Env't & Urbanization 129 (1996). Industrial animal facilities are located disproportionately in communities of color and poverty and, thus, among populations more likely to experience detrimental health consequences.

James A. Zahn et al., *Characterization of Volatile Organic Emissions and Wastes from a Swine Production Facility*, 26 J. Env't Quality 1687 (1997). Twenty-seven volatile organic compounds are linked to decreased air quality in the vicinity of an industrial swine facility.

2000s

André J.A. Aarnink & Martin W. A. Verstegen, *Nutrition, Key Factor to Reduce Environmental Load From Pig Production*, 109 Livestock Sci. 194 (2007). Dietary composition impacts odor production and emissions from swine, and altering the sources and levels of crude protein and fermentable carbohydrates in swine diets may reduce odor emissions.

M.E. Anderson & M.D. Sobsey, *Detection and Occurrence of Antimicrobially Resistant E. coli in Groundwater on or near Swine Farms in Eastern North Carolina*, 54 Water Sci. & Tech. 211 (2006). Antibiotic-resistant *E. coli* is present in groundwater near industrial swine facilities using lagoons and sprayfields.

Rachel C. Avery et al., *Odor From Industrial Hog Farming Operations and Mucosal Immune Function in Neighbors*, 59 Archives Env't Health 101 (2004). Neighbors of industrial swine facilities experienced impaired immune function during periods of odor.

Julia R. Barrett, *Hogging the Air: CAFO Emissions Reach into Schools*, 114 Env't Health Persps. A241 (2006). Children living closer to industrial animal facilities had a higher incidence of asthma symptoms.

Susan Bullers, *Environmental Stressors, Perceived Control, and Health: The Case of Residents Near Large-Scale Hog Farms in Eastern North Carolina*, 33 Human Ecology 1 (2005). Residents living near industrial swine facilities experienced increased psychological distress, nausea, and respiratory and sinus problems.

JoAnn M. Burkholder & Howard B. Glasgow, *History of Toxic Pfiesteria in North Carolina Estuaries from 1991 to the Present*, 51 BioScience 827 (2001). The adverse environmental and health effects caused by *Pfistiera*, a potentially toxic microbe, are linked to water pollution from industrial swine facilities.

JoAnn Burkholder et al., *Impacts of Waste from Concentrated Animal Feeding Operations on Water Quality*, 115 Env't Health Persps. 308 (2007). Contaminants from industrial animal facilities find pathways into the environment from leaky lagoons, heavy rainfalls that cause overflow, and runoff from waste fields, posing a public health threat, particularly for infants, pregnant women, children, the elderly, and others with weakened immunological states living close to hog farms.

Enzo R. Campagnolo et al., *Antimicrobial Residues in Animal Waste and Water Resources Proximal to Large-Scale Swine and Poultry Feeding Operations*, 299 Sci. of the Total Env't 89 (2002). There can be high levels of antimicrobial compounds in lagoons, and sprayfields can spread antimicrobial residues into water sources.

Amy Chapin et al., *Airborne Multidrug-Resistant Bacteria Isolated from a Concentrated Swine Feeding Operation*, 113 Env't Health Persps. 137 (2005). Multi-drug resistant bacteria are present at levels dangerous to human health in the air within an industrial swine facility.

Joanne C. Chee-Sanford, *Occurrence and Diversity of Tetracycline Resistance Genes in Lagoons and Groundwater Underlying Two Swine Production Facilities*, 67 Applied Env't Microbiology 1494 (2001). Antibiotic-resistant genes from industrial swine facilities can be traced in local groundwater.

Dana Cole et al., *Concentrated Swine Feeding Operations and Public Health: A Review of Occupational and Community Health Effects*, 108 Env't Health Persps. 685 (2000). The human health threats posed by industrial swine facilities include patterns of antimicrobial resistance, the spread of pathogens, and the impacts of airborne contaminants.

Kelley J. Donham et al., *Community Health and Socioeconomic Issues Surrounding Concentrated Animal Feeding Operations*, 115 Env't Health Persps. 317 (2007). Due to factors like low income, inadequate housing, health problems, and insufficient access to medical care, racial discrepancies compound the negative impacts of industrial swine facilities.

Kelley J. Donham et al., *Assessment of Air Quality at Neighbor Residences in the Vicinity of Swine Production Facilities,* 11 J. Agromedicine 15 (2006). The air surrounding homes near industrial swine facilities had hydrogen sulfide levels exceeding federally recommended limits, posing potential health risks.

Kelley J. Donham, *The Concentration of Swine Production: Effects on Swine Health, Productivity, Human Health, and the Environment*, 16 Veterinary Clinics of N. Am.: Food Animal Practice 559 (2000). The impacts of industrial swine facilities on water, air, soil, and health have been documented and discussed since the early- and mid-1970s.

Engeline van Duijkeren et al., *Transmission of Methicillin-Resistant Staphylococcus Aureus Strains Between Different Kinds of Pig Farms*, 126 Veterinary Microbiology 383 (2008). The use of standard antimicrobials for pigs is a likely risk factor for finding MRSA-positive pigs on a farm, and MRSA-colonized personnel are found more often at MRSA-positive farms.

Angela M. Ebeling et al., *Dairy Diet Phosphorus Effects on Phosphorus Losses in Runoff from Land-Applied Manure*, 66 Soil Sci. Soc'y Am. J. 284 (2002). High inorganic phosphorus concentrations in dairy cow diets increase the potential for phosphorus loss in runoff from land-applied manure.

Bob Edwards & Anthony E. Ladd, *Environmental Justice, Swine Production and Farm Loss in North Carolina*, 20 Sociological Spectrum 263 (2000). Industrial swine facilities are located disproportionately in communities of color and poverty, and recent patterns of farm loss were more pronounced in Black communities, regardless of income, and low-income communities, regardless of race.

Shawn G. Gibbs et al., *Airborne Antibiotic Resistant and Nonresistant Bacteria and Fungi Recovered from Two Swine Herd Confined Animal Feeding Operations*, 1 J. Occupational & Env't Hygiene 699 (2004). Dangerously high levels of multi-drug resistant bacteria are present both within and downwind of industrial swine facilities.

Shawn G. Gibbs et al., *Isolation of Antibiotic-Resistant Bacteria from the Air Plume Downwind of a Swine Confined or Concentrated Animal Feeding Operation*, 114 Env't Health Persps. 1032 (2006). Bacteria with multidrug and multiple antibiotic resistances can be found both inside and downwind of an industrial swine facility, posing potential health risks for residents nearby such facilities.

Mary J. Gilchrist, *The Potential Role of Concentrated Animal Feeding Operations in Infectious Disease Epidemics and Antibiotic Resistance*, 115 Env't Health Persps. 313 (2006). Industrial swine facilities encourage antibiotic resistance, raising the risk of infectious disease epidemics.

Joseph D. Grande et al., *Corn Residue Level and Manure Application Timing Effects on Phosphorus Losses in Runoff*, 34 J. Env't Quality 1620 (2005). Manure application increased dissolved reactive phosphorus concentrations in spring runoff by two to five times.

Christopher F. Green et al., *Bacterial Plume Emanating from the Air Surrounding Swine Confinement Operations*, 3 J. Occupational & Env't Hygiene 9 (2006). Bacteria from an industrial swine facility traveled both upwind and downwind from the facility.

Sukhbir K. Grewal et al., *Persistence of Mycobacterium avium subsp. paratuberculosis and Other Zoonotic Pathogens during Simulated Composting, Manure Packing, and Liquid Storage of Dairy Manure*, 72 Applied & Env't Microbiology 565 (2006). Pathogens persist in dairy manure stored in liquid form and are detectable for up to 175 days.

Dick Heederik et al., *Health Effects of Airborne Exposures from Concentrated Animal Feeding Operations*, 115 Env't Health Persps. 298 (2007). Air pollutants from industrial animal facilities—including ammonia, hydrogen sulfide, carbon dioxide, malodorous vapors, and particles contaminated with a wide range of microorganisms—cause respiratory and other health impacts.

Joseph A. Herriges et al., *Living with Hogs in Iowa: The Impact of Livestock Facilities on Rural Residential Property Values*, 81 Land Econ. 530 (2005). Proximity to industrial animal facilities has a statistically significant negative effect on property value, particularly for properties located downwind of facilities.

Rachel Avery Horton et al., *Malodor as a Trigger of Stress and Negative Mood in Neighbors of Industrial Hog Operations*, 99 Am. J. Pub. Health Suppl. S610 (2009). Individuals living in African-American communities near industrial swine facilities in southeastern North Carolina reported high rates of stress and negative mood, which were associated with hydrogen sulfide concentrations.

Tushar Khanna et al., *Methicillin Resistant Staphylococcus Aureus Colonization in Pigs and Pig Farmers*, 128 Veterinary Microbiology 298 (2008). MRSA is common in pigs in Ontario, Canada, and there is a strong correlation between MRSA presence in humans and pigs on farms, providing further support for transmission of MRSA between pigs and humans.

Jungik Kim & Peter Goldsmith, *A Spatial Hedonic Approach to Assess the Impact of Swine Production on Residential Property Values*, 42 Env't & Res. Econ. 509 (2009). Residential property values in Craven County, North Carolina declined on a per hog basis.

Peter J. A. Kleinman & Andrew N. Sharpley, *Effect of Broadcast Manure on Runoff Phosphorus Concentrations over Successive Rainfall Events*, 32 J. Env't Quality 1072 (2003). Levels of dissolved reactive phosphorus in runoff increased with increasing manure application rates.

Peter J. A. Kleinman et al., *Effect of Cover Crops Established at Time of Corn Planting on Phosphorus Runoff from Soils before and after Dairy Manure Application*, 60 J. Soil & Water Conservation 311 (2005). Dairy manure application at test sites in a watershed within New York City's drinking water supply system resulted in phosphorus losses through runoff.

Peter J. A. Kleinman et al., *Effect of Mineral and Manure Phosphorus Sources on Runoff Phosphorus*, 31 J. Env't Quality 2026 (2002). In a study of applications of dairy manure, poultry manure, and swine slurry to soils by surface application or mixing, surface application resulted in the highest rates of phosphorus losses following simulated rainfall.

I.G. Krapac et al., *Impacts of Swine Manure Pits on Groundwater Quality*, 120 Env't Pollution 475 (2002). Fecal bacteria from swine manure pits can enter shallow groundwater, indicating possible threats to human health through drinking water contamination.

Hannah C. Lewis et al., *Pigs as Source of Methicillin-Resistant Staphylococcus Aureus CC398 Infections in Humans, Denmark*, 14 Emerging Infectious Diseases 1383 (2008). An emerging subtype of MRSA that was found in humans came from pigs.

Michael A. Mallin & Lawrence B. Cahoon, *Industrialized Animal Production–A Major Source of Nutrient and Microbial Pollution to Aquatic Ecosystems*, 24 Population & Env't 369 (2003). Industrial animal facilities cause phosphorus and nitrogen to enter the environment, contributing to eutrophication in nutrient-sensitive watersheds.

Donald W. Meals & David C. Braun, *Demonstration of Methods to Reduce E. coli Runoff from Dairy Manure Application Sites*, 35 J. Env't Quality 1088 (2006). Bacterial pathogen levels in runoff from fields receiving liquid dairy manure pose a significant risk of pollution, particularly from fields receiving manure before rainfall.

James A. Merchant et al., *Asthma and Farm Exposures in a Cohort of Rural Iowa Children*, 113 Env't Health Persps. 350 (2005). There is a high prevalence of asthma in rural children living on swine farms and swine farms that add antibiotics to feed.

Katherine Milla et al., *Evaluating the Effect of Proximity to Hog Farms on Residential Property Values: A GIS-Based Hedonic Model Approach*, 17 J. Urban & Reg'l Info. Systems Ass'n 1 (2005). Proximity to industrial swine facilities adversely affects residential property values.

Maria C. Mirabelli et al., *Asthma Symptoms Among Adolescents Who Attend Public Schools that are Located Near Confined Swine Feeding Operations*, 118 Pediatrics e66 (2006). High rates of wheezing among schoolchildren in North Carolina are correlated with proximity to industrial swine facilities and noticeable odor.

Maria C. Mirabelli et al., *Race, Poverty, and Potential Exposure of Middle-School Students to Air Emissions from Confined Swine Feeding Operations*, 114 Env't Health Persps. 591 (2006). There is noticeable odor in North Carolina schools located near industrial swine facilities, indicating potential exposure of students to airborne pollutants.

A.J. de Neeling et al., *High Prevalence of Methicillin Resistant Staphylococcus Aureus in Pigs*, 122 Veterinary Microbiology 366 (2007). There are high levels of MRSA among hogs at slaughterhouses and industrial swine facilities.

Katja Radon et al., *Environmental Exposure to Confined Animal Feeding Operations and Respiratory Health of Neighboring Residents*, 18 Epidemiology 300 (2007). Adults living in rural German towns with a high density of industrial animal facilities experience asthma, nasal allergies, and odor annoyance.

D. Raj Raman et al., *Estrogen Content of Dairy and Swine Wastes,* 38 Env't Sci. & Tech. 3567 (2004). Dairy and swine manure in the U.S. contains an order of magnitude more estrogen than that in wastewater treatment plants, which can contaminate surface water and groundwater.

Noah Rosenblatt-Farrell, *The Landscape of Antibiotic Resistance*, 117 Env't Health Persps. A244 (2009). Pig-specific MRSA strains are detectable among farmworkers, and antibiotic-resistant microbes such as MRSA can contaminate the air and water emissions of industrial animal facilities.

Amy R. Sapkota et al., *Antibiotic-Resistant Enterococci and Fecal Indicators in Surface Water and Groundwater Impacted by a Concentrated Swine Feeding Operation,* 115 Env't Health Persps. 1040 (2007). There are elevated levels of fecal indicators and antibiotic-resistant bacteria in water sources situated down gradient from an industrial swine facility compared with up-gradient sources, demonstrating that water contaminated with swine manure could contribute to the spread of antibiotic resistance.

Susan S. Schiffman et al., *Potential Health Effects of Odor from Animal Operations, Wastewater Treatment, and Recycling of Byproducts,* 9 J. Agromedicine 397 (2004). People living near industrial swine facilities reported more tension, depression, anger, fatigue, and confusion, and less vigor.

Susan S. Schiffman et al., *Quantification of Odors and Odorants from Swine Operations in North Carolina*, 108 Agric. & Forest Meteorology 213 (2001). Air pollutants emitted from industrial swine facilities include hydrogen sulfide, ammonia, and other respiratory irritants.

Susan S. Schiffman et al., *Symptomatic Effects of Exposure to Diluted Air Sampled from a Swine Confinement Atmosphere on Healthy Human Subjects*, 113 Env't Health Persps. 567 (2005). People exposed to diluted air from an industrial swine facility were more likely to report eye irritation, nausea, and headaches than a control group exposed to clean air.

Charles W. Schmidt, *Swine CAFOs & Novel H1N1 Flu: Separating Facts from Fears*, 117 Env't Health Persps. A394 (2009). One potential source of the H1N1 influenza virus that led to a global swine flu pandemic in 2009 was confined pigs; swine flu is more likely to persist in larger farms with higher pig densities.

Sigurdur T. Sigurdarson & Joel N. Kline, *School Proximity to Concentrated Animal Feeding Operations and Prevalence of Asthma in Students*, 129 Chest 1486 (2006). There is a higher prevalence of asthma among elementary school children attending schools near industrial animal facilities in Iowa.

Stacy Sneeringer, *Does Animal Feeding Operation Pollution Hurt Public Health? A National Longitudinal Study of Health Externalities Identified by Geographic Shifts in Livestock Production*, 91 Am. J. Agric. Econ. 124 (2009). Living near industrial animal facilities is linked to increased infant mortality due to respiratory disease.

M. Tajik et al., *Impact of Odor from Industrial Hog Operations on Daily Living Activities*, 18 New Solutions 193 (2008). Within 1.5 miles of industrial swine facilities, odor limits activities that participants either enjoyed doing the most or expected to be able to perform inside and outside their homes, including social interactions, physical activities, energy- and cost-saving activities, relaxing outside or indoors, and sleeping, which can have secondary adverse impacts on health and well-being.

Kendall M. Thu, *Public Health Concerns for Neighbors of Large-Scale Swine Production Operations*, 8 J. Agric. Safety & Health 175 (2002). Industrial animal facilities and the odors they produce adversely affect quality of life in rural communities and produce health effects similar to those experienced by workers in these facilities.

P.A. Vadas et al., *Transformations of Soil and Manure Phosphorus After Surface Application of Manure to Field Plots*, 77 Nutrient Cycling in Agroecosystems 83 (2007). Concentrations of dissolved phosphorus in runoff from fields that have received manure are highest after the first rainfall event, and they remain higher than phosphorus concentrations in runoff from fields that have not received manure even long after the manure application.

Andreas Voss et al., *Methicillin-Resistant Staphylococcus aureus in Pig Farming*, 11 Emerging Infectious Diseases 1965 (2005). MRSA rates were 760 times higher among pig farmers studied than among regular hospital patients, suggesting potential pig-to-human transmission of drug-resistant disease.

John T. Walker et al., *Atmospheric Transport and Wet Deposition of Ammonium in North Carolina*, 34 Atmospheric Env't 3407 (2000). Industrial swine facilities are the primary domestic animal source of ammonia, accounting for 48 percent of all North Carolina ammonia emissions.

Sacoby M. Wilson & Marc L. Serre, *Examination of Atmospheric Ammonia Levels Near Hog CAFOs, Homes, and Schools in Eastern North Carolina*, 41 Atmospheric Env't 4977 (2007). There are high ammonia concentrations near industrial swine facilities in Eastern North Carolina, suggesting dangerous levels of exposure for populations living or attending school near these facilities.

Sacoby M. Wilson & Marc L. Serre, *Use of Passive Samplers to Measure Atmospheric Ammonia Levels in a High-Density Industrial Hog Farm Area of Eastern North Carolina*, 41 Atmospheric Env't 6074 (2007). Populations living close to industrial swine facilities have higher exposure to ammonia.

Steve Wing & Susanne Wolf, *Intensive Livestock Operations, Health, and Quality of Life Among Eastern North Carolina Residents*, 108 Env't Health Persps. 233 (2000). Residents living near industrial animal facilities are more likely to experience detrimental health consequences, are more likely to have reduced quality of life indicators, and are more susceptible to illness, stress, depression, and physical injury.

Steve Wing et al., *Air Pollution and Odor in Communities Near Industrial Swine Operations*, 116 Env't Health Persps. 1362 (2008). Study participants living within 1.5 miles of industrial swine facilities altered or ceased normal daily activities when hydrogen sulfide concentrations, and associated odor, were the highest.

Steve Wing et al., *Environmental Injustice in North Carolina's Hog Industry*, 108 Env't Health Persps. 225 (2000). Industrial swine facilities are concentrated in areas with both high poverty and a high percentage of nonwhites, and facilities run by corporate integrators are more concentrated in poor and nonwhite areas than are facilities run by independent growers.

Steve Wing et al., *The Potential Impact of Flooding on Confined Animal Feeding Operations in Eastern North Carolina*, 110 Env't Health Persps. 387 (2002). African Americans were more likely than Whites to live in areas where industrial animal facilities flooded during storms, according to satellite estimates.

2010s

Ann M. Arfken et al., *Assessing Hog Lagoon Waste Contamination in the Cape Fear Watershed Using Bacteroidetes 16S rRNA Gene Pyrosequencing*, 99 Applied Microbiology & Biotechnology 7283 (2015). A new methodology allows for more accurate assessments of waterways in which contamination previously could not be detected, indicating that contamination of waterways with swine waste may be more extensive than previously thought.

S. Biswas et al., *Effect of Dairy Manure Storage Conditions on the Survival of E. coli O157:H7 and Listeria*, 47 J. Env't Quality 185 (2018). Bacterial pathogens survive in stored dairy manure for up to six months and may enter the environment during subsequent land application.

Tucker Burch et al., *Quantitative Microbial Risk Assessment for Spray Irrigation of Dairy Manure Based on an Empirical Fate and Transport Model*, 125 Env't Health Persps. 8 (2017). Aerosolized zoonotic pathogens downwind of spray-irrigated dairy manure pose a human health risk.

Joan A. Casey et al., *High-Density Livestock Operations, Crop Field Application of Manure, and Risk of Community-Associated Methicillin-Resistant Staphylococcus Aureus Infection in Pennsylvania*, 173 JAMA Internal Med. 1980 (2014). People living near industrial swine facility waste application sites in Pennsylvania receive treatment for more skin and soft tissue infections and infections caused by MRSA than people living farther away from application sites.

Zeyou Chen et al., *Antibiotic Resistance Genes and Bacterial Communities in Cornfield and Pasture Soils Receiving Swine and Dairy Manures*, 248 Env't Pollution 947 (2019). Compared to soils where animal manure was not applied, soils where pig and cow manure was applied had a greater diversity of antibiotic resistance genes. Cornfield soil frequently receiving raw pig manure had the greatest antibiotic resistance gene abundance.

Meghan F. Davis et al., *Occurrence of Staphylococcus aureus in Swine and Swine Workplace Environments on Industrial and Antibiotic-Free Hog Operations in North Carolina, USA: A One Health Pilot Study*, 163 Env't Rsch. 88 (2018). Workers at industrial swine facilities are exposed to Staphylococcus aureus, including MRSA, through indirect, airborne transmission, as well as direct contact with animals.

Jennifer Gentry-Shields et al., *Hepatitis E Virus and Coliphages in Waters Proximal to Swine Concentrated Animal Feeding Operations*, 505 Sci. Total Env't 487 (2015). Current waste management practices for industrial swine facilities may be associated with the dissemination of viruses of public health concern in waters near sprayfields.

Michael Greger & Gowri Koneswaran, *The Public Health Impacts of Concentrated Animal Feeding Operations on Local Communities*, 33 Family & Cmty. Health 11 (2010). There are demonstrable links between: (1) waste spilled from overflowing lagoons and runoff from application of the waste to fields and (2) outbreaks of harmful pathogens, such as salmonella and *E. coli* in the environment.

Virginia Guidry & Steve Wing, *A Longitudinal Study of Exposure to Livestock Odor and Symptom Reports in Children*, Env't Health Persps. (2011). Reported presence of livestock odor within the previous 24 hours is associated with increased reports of respiratory and irritation issues among children.

Virginia T Guidry et al., *Hydrogen Sulfide Concentrations at Three Middle Schools Near Industrial Livestock Facilities*, 27 J. Exposure Sci. & Env't Epidemiology 167 (2017). Off-site migration of pollutants like hydrogen sulfide from industrial animal facilities can decrease air quality at nearby schools.

Virginia T. Guidry et al., *Connecting Environmental Justice and Community Health Effects of Hog Production in North Carolina*, 79 N.C. Med. J. 324 (2018). Industrial swine facilities, which are associated with adverse health effects, including respiratory conditions, irritation symptoms, mental health problems, and infectious disease risk, disproportionately impact communities of color and low-income communities in North Carolina.

Sarah M. Hatcher et al., *Occurrence of Methicillin-Resistant Staphylococcus Aureus in Surface Waters Near Industrial Hog Operation Spray Fields*, 565 Sci. Total Env't 1028 (2016). Antibiotic-resistant Staphylococcus aureus, including MSSA, MRSA, and MDRSA, are present in surface waters adjacent to swine waste sprayfields in southeastern North Carolina.

Sarah M. Hatcher et al., *The Prevalence of Antibiotic-Resistant Staphylococcus aureus Nasal Carriage Among Industrial Hog Operation Workers, Community Residents, and Children Living in Their Households: North Carolina, USA*, 125 Env't Health Persps. 560 (2017). Children under the age of seven living in households with industrial swine facility workers are more likely to carry antibiotic-resistant Staphylococcus aureus than children in a reference community, especially if industrial swine facility workers take their personal protective equipment home with them.

Christopher D. Heaney et al., *Source Tracking Swine Fecal Waste in Surface Water Proximal to Swine Concentrated Animal Feeding Operations*, 511 Sci. Total Env't 676 (2015). Where industrial swine facility density is high, surface waters have poor sanitary quality.

Mariëtte Hooiveld et al., *Odour Annoyance in the Neighbourhood of Livestock Farming –Perceived Health and Health Care Seeking Behaviour,* 22 Annals Agric. & Env't Med. 55 (2015). The number of pigs, poultry, and cattle are equally associated with odor annoyance, which in turn, is associated with reduced general health.

Keisha N. Johnson et al., *Effect of Dairy Manure Slurry Application in a No-Till System on Phosphorus Runoff*, 90 Nutrient Cycling in Agroecosystems 201 (2011). Total phosphorus losses following rainfall simulation on fields with reduced tillage vary by dairy manure slurry application method, with particularly high rates of dissolved reactive phosphorus in runoff following broadcast manure slurry application.

Alexander P. Keil et al., *Suitability of Public Records for Evaluating Health Effects of Treated Sewage Sludge in North Carolina*, 72 N.C. Med. J. 98 (2011). Eastern North Carolina communities near industrial swine facilities that apply waste to land demonstrate human exposure to airborne pollutants and dose-response relationships between pollutant levels, symptoms of illness, and stress levels.

Kaye H. Kilburn, *Human Impairment from Living near Confined Animal (Hog) Feeding Operations*, 2012 J. of Env't & Pub. Health 56,5690 (2012). Neighbors of industrial swine facilities and manure lagoons who experienced offensive odors had impaired neurobehavioral and pulmonary functions, and these effects extended to people thought to be the study control group.

Julia Kravchenko et al., *Mortality and Health Outcomes in North Carolina Communities Located in Close Proximity to Hog Concentrated Animal Feeding Operations*, 79 N.C. Med. J. 278 (2018). North Carolina residents living near industrial swine facilities had higher all-cause mortality, infant mortality, kidney disease, septicemia, tuberculosis, and higher hospital and emergency room visits for infants with low birth weights.

Gopi Krishna Kafle & Lide Chen, *Emissions of Odor, Ammonia, Hydrogen Sulfide, and Volatile Organic Compounds from Shallow-Pit Pig Nursery Rooms*, 39 J. Biosystems Eng'g 76 (2014). The gas and odor concentrations of emissions from industrial swine facilities indicate an acute need for using gas and odor mitigation technologies in these facilities.

Jesper Larsen et al., *Meticillin-Resistant Staphylococcus Aureus CC398 Is an Increasing Cause of Disease in People with No Livestock Contact in Denmark, 1999 to 2011*, 20 Eurosurveillance (2015). The spatial and temporal distribution of MRSA infections among patients with and without livestock exposure suggests that MRSA spreads from livestock facilities into surrounding communities.

Zifei Liu et al., *Ammonia and Hydrogen Sulfide Emissions from Swine Production Facilities in North America: A Meta-Analysis*, 92 J. Animal Sci. 1656 (2014). Swine hoop facilities have significantly higher ammonia emissions, and deep-pit facilities have the highest hydrogen sulfide emissions, compared to other manure-handling systems.

K.M. Lockhart et al., *Identifying Sources of Groundwater Nitrate Contamination in a Large Alluvial Groundwater Basin with Highly Diversified Intensive Agricultural Production*, 151 J. Contaminant Hydrology 140 (2013). Over 40 percent of well water samples from Tulare, Kings, Stanislaus, and Merced counties in San Joaquin Valley, California exceeded EPA's maximum contaminant level for nitrate. In Stanislaus and Merced counties, elevated nitrate levels in domestic wells most strongly correlated with shallow water table depths and the presence of either CAFO-derived animal waste applications or deciduous fruit and nut crops.

David C. Love et al., *Dose Imprecision and Resistance: Free-Choice Medicated Feeds in Industrial Food Animal Production in the United States*, 119 Env't Health Persps. 279 (2010). Providing antibiotics to animals, including swine, for purposes besides treating disease can cause the development of antimicrobial-resistant microorganisms.

Michael A. Mallin & Matthew R. McIver, *Season Matters When Sampling Streams for Swine CAFO Waste Pollution Impacts*, 16 J.Water & Health 78 (2018). Seasonal spraying of animal waste on fields in North Carolina aligns with seasonal differences in adjacent stream water quality for concentrations of conductivity, nitrate, total nitrogen, total organic carbon, and fecal bacteria.

Michael A. Mallin et al., *Industrial Swine and Poultry Production Causes Chronic Nutrient and Fecal Microbial Stream Pollution*, 226 Water, Air, Soil & Pollution 407 (2015). Industrial-scale swine and poultry production leads to chronic surface water and groundwater pollution that is both a human health and ecosystem hazard, and current waste management protocols for this form of animal production fail to protect freshwater and estuarine ecosystems.

Chad W. McKinney et al., *Occurrence and Abundance of Antibiotic Resistance Genes in Agricultural Soil Receiving Dairy Manure*, 94 FEMS Microbiology Ecology fiy010 (2018). Dairy manure application increases clinically relevant antibiotic resistance gene abundances, with higher manure application rates leading to greater abundances of resistance genes.

Jennifer S. Meyer et al., *Reproductive Physiology in Eastern Snapping Turtles (Chelydra serpentina) Exposed to Runoff from a Concentrated Animal Feeding Operation*, 49 J. Wildlife Diseases 996 (2013). Eastern snapping turtles exposed to runoff from CAFO manure application sites show differences in reproductive physiology.

Maya Nadimpalli et al., *Persistence of Livestock-Associated Antibiotic-Resistant Staphylococcus Aureus Among Industrial Hog Operation Workers in North Carolina over 14 Days*, 72 Occupational & Env't Med. 90 (2015). Workers at industrial swine facilities had persistent nasal carriage of MRSA, including after a period of 96 hours away from work.

Maya Nadimpalli et al., *Face Mask Use and Persistence of Livestock-Associated Staphylococcus aureus Nasal Carriage Among Industrial Hog Operation Workers and Household Contacts, USA*, 126 Env't Health Persps. 127,005 (2018). Industrial swine facility workers may persistently carry antibiotic-resistant, livestock-associated Staphylococcus aureus in their nasal cavities. Consistent face mask use was associated with reduced exposure to antibiotic-resistant, livestock-associated S. aureus among industrial swine facility workers and their household members.

Wendee Nicole, *CAFOs and Environmental Justice: The Case of North Carolina*, 121 Env't Health Persps. A182 (2013). The pervasive presence of odors in communities on North Carolina's coastal plain affects quality of life, use of property, water quality, and public health. Even without lagoon spills, ammonia and nitrates may seep into groundwater, especially in North Carolina's coastal plain, where the water table is near the surface.

Yelena Ogneva-Himmelberger et al., *CALPUFF and CAFOs: Air Pollution Modeling and Environmental Justice Analysis in the North Carolina Hog Industry,* 4 Int'l J. Geo-Info. 150 (2015). At locations downwind of industrial swine facilities, modeled ammonia concentrations are up to three times higher than the average concentration in the entire watershed, exposing around 3,500 people in the study area to ammonia concentrations greater than the minimal risk level.

Patrick T. O'Shaughnessy & Ralph Altmaier, *Use of AERMOD to Determine a Hydrogen Sulfide Emission Factor for Swine Operations by Inverse Modeling*, 45 Atmospheric Env't 4617 (2011). Hydrogen sulfide emitted from industrial swine facilities can travel up to six kilometers (3.7 miles).

Brian T. Pavilonis et al., *Relative Exposure to Swine Animal Feeding Operations and Childhood Asthma Prevalence in an Agriculture Cohort*, 122 Env't Rsch. 74 (2013). There is a significant relationship between poor respiratory health among children and environmental exposure to the cumulative impacts of all industrial swine facilities within 4.8 kilometers (2.98 miles) of their homes.

Anne T. Pollard & Matthew J. Morra, *Fate of Tetracycline Antibiotics in Dairy Manure-Amended Soils*, 26 Env't Revs. 102 (2018). Tetracycline antibiotics in dairy manure applied to soils may encourage development of antibiotic resistance.

Pranay R. Randad et al., *Comparison of Livestock-Associated and Community-Associated Staphylococcus Aureus Pathogenicity in a Mouse Model of Skin and Soft Tissue Infection*, 9 Scientific Reps. 6774 (2019). Industrial swine facility workers are at increased risk of carrying Staphylococcus aureus in their nostrils, particularly strains that are livestock-associated and multidrug-resistant.

Miranda M. L. van Rijen et al., *Livestock-Associated MRSA Carriage in Patients Without Direct Contact with Livestock*, 9 PLoS ONE e100294 (2014). There is a significant association between individuals residing in communities with pigs and livestock-associated MRSA; pig-associated MRSA is present even in people without direct contact with swine.

Jessica L. Rinsky et al., *Livestock-Associated Methicillin and Multidrug Resistant Staphylococcus Aureus Is Present Among Industrial, Not Antibiotic-Free Livestock Operation Workers in North Carolina*, 8 PloS ONE e67641 (2013). Nasal swabs from individuals exposed to industrial animal facilities tested positive for livestock-associated MRSA and MDRSA, while those from people exposed to antibiotic-free livestock operations did not.

Günther Schauberger et al., *Empirical Model of Odor Emission from Deep-Pit Swine Finishing Barns to Derive a Standardized Odor Emission Factor*, 66 Atmospheric Env't 84 (2013). Odor emissions from swine facilities increase with indoor temperature, barn ventilation rate, and animal activity.

Leah Schinasi et al., *A Case Control Study of Environmental and Occupational Exposures Associated with Methicillin Resistant Staphylococcus Aureus Nasal Carriage in Patients Admitted to a Rural Tertiary Care Hospital in a High Density Swine Region*, 13 Env't Health 54 (2014). MRSA carriers identified at a local hospital had higher odds of reporting that they could smell odor from farms while at home and of living in areas with medium densities of swine.

Leah Schinasi et al., *Air Pollution, Lung Function, and Physical Symptoms in Communities Near Concentrated Swine Feeding Operations*, 22 Epidemiology 208 (2011). The odors and chemicals emitted from industrial swine facilities, including hydrogen sulfide and endotoxins, lead to acute eye, nose, and throat irritation; increased incidents of difficulty breathing; increased wheezing; chest tightness; and nausea among adults living in eastern North Carolina.

Amy A. Schultz et al., *Residential Proximity to Concentrated Animal Feeding Operations and Allergic and Respiratory Disease*, 130 Env't Int'l 104911 (2019). Residential proximity to dairy CAFOs is associated with reduced lung function and self-reported asthma. The adjusted odds of lung allergies were consistently more than two-fold higher among those living one to three miles from a CAFO as compared to those living five miles from a CAFO, and reports of current asthma were nearly two-fold more common among those living one to three miles versus five miles from a CAFO.

Jochen Schulz et al., *Longitudinal Study of the Contamination of Air and of Soil Surfaces in the Vicinity of Pig Barns by Livestock-Associated Methicillin-Resistant Staphylococcus Aureus*, 78 Applied & Env't Microbiology 5666 (2012). MRSA can be detected 300 feet from a pig barn in which animals, air, and workers' plastic boots tested positive for MRSA.

Steven Trabue et al., *Odorous Compounds Sources and Transport from a Swine Deep-Pit Finishing Operation: A Case Study*, 233 J. Env't Mgmt. 12 (2019). An industrial swine facility in Iowa emitted odorous chemical classes, including volatile sulfur compounds, volatile fatty acids, and phenol and indole compounds. Two odorous compounds were detected above their odor threshold values 1.5 kilometers (almost one mile) downwind from the facility.

David A. Verbree et al., *Runoff Losses of Sediment and Phosphorus from No-Till and Cultivated Soils Receiving Dairy Manure*, 39 J. Env't Quality 1762 (2010). No-till can reduce phosphorus runoff from dairy manure on well-drained soils; however, no-till on poorly drained soils can exacerbate phosphorus losses in the absence of dairy manure incorporation.

Joshua S. Wallace et al., *Occurrence and Transformation of Veterinary Antibiotics and Antibiotic Resistance Genes in Dairy Manure Treated by Advanced Anaerobic Digestion and Conventional Treatment Methods*, 236 Env't Pollution 764 (2018). Tetracycline antibiotics persist in manure solids following anaerobic digestion.

Carl Wepking et al., *Exposure to Dairy Manure Leads to Greater Antibiotic Resistance and Increased Mass-Specific Respiration in Soil Microbial Communities*, 284 Proc. Royal Soc'y B 20162233 (2017). Microbial communities in sites exposed to dairy manure have higher abundances of antibiotic resistance genes.

Bridgett M. West et al., *Antibiotic Resistance, Gene Transfer, and Water Quality Patterns Observed in Waterways near CAFO Farms and Wastewater Treatment Facilities*, 217 Water, Air, & Soil Pollution 473 (2011). Waterways near CAFOs have elevated total phosphorus levels, increased turbidity, and greater abundances of multi-drug-resistant bacteria.

Fabienne Wichmann et al., *Diverse Antibiotic Resistance Genes in Dairy Cow Manure*, 5 MBIO e01017-13 (2014). Dairy cow manure is a significant reservoir of antibiotic resistance genes, including resistance to beta-lactams, phenicols, aminoglycosides, and tetracyclines.

Steve Wing et al., *Air Pollution from Industrial Swine Operations and Blood Pressure of Neighboring Residents*, 121 Env't Health Persps. 92 (2013). Malodors from industrial swine facilities may be associated with acute blood pressure increases and, in turn, could contribute to chronic hypertension.

2020s

Renys E. Barrios et al., *Fate and Transport of Antibiotics and Antibiotic Resistance Genes in Runoff and Soil as Affected by the Timing of Swine Manure Slurry Application*, 712 Sci. Total Env't 136505 (2020). Antibiotics and antibiotic resistance genes persist in runoff for two weeks following swine manure application, and antibiotic resistance genes persist in soil for at least four weeks.

Colleen N. Brown et al., *Tracing Nutrient Pollution from Industrialized Animal Production in a Large Coastal Watershed*, 192 Env't Monitoring Assessment 515 (2020). CAFO-derived nutrients can be detected many kilometers downstream from CAFOs. Nitrogen inputs in the Northeast Cape Fear River, Black River, and Cape Fear River are largely derived from CAFO swine effluent. Samples taken during months when waste application occurs have maximum nitrate concentrations, and these concentrations can be attributed to waste effluent.

Patricia M. Glibert, *From Hogs to HABs: Impacts of Industrial Farming in the US on Nitrogen and Phosphorus and Greenhouse Gas Pollution*, 150 Biogeochemistry 139 (2020). Waste from CAFOs contributes substantially to nutrient pollution when spread on fields, and waste is often applied to fields at higher nitrogen and phosphorus rates than commercial fertilizer.

Maria C. Hall et al., *Influence of Setback Distance on Antibiotics and Antibiotic Resistance Genes in Runoff and Soil Following the Land Application of Swine Manure Slurry*, 54 Env't Sci. & Tech. 8 (2020). A setback distance of 34 to 67 meters between a manure application area and surface water may mitigate concentrations of manure-borne antibiotics and antibiotic resistance genes in runoff from swine manure.

Danika Hill et al., *Dairy Manure As a Potential Source of Crop Nutrients and Environmental Contaminants*, 100 J. Env't Sci. 117 (2021). Dairy manure contains hormones, antibiotics, heavy metals, antibiotic resistance genes, and veterinary drugs.

Jason P. Oliver et al., *Invited Review: Fate of Antibiotic Residues, Antibiotic-Resistant Bacteria, and Antibiotic Resistance Genes in US Dairy Manure Management Systems*, 103 J. Dairy Sci. 1051 (2020). Over 60 antibiotic resistance genes are found in dairy manure, along with antibiotic residues and antibiotic-resistant bacteria, contributing to the spread of antibiotic resistance.

Zach Raff & Andrew Meyer, *CAFOs and Surface Water Quality: Evidence from Wisconsin*, 104 Am. J.Agric. Econ. 161 (2022). Adding one CAFO to a hydrological Unit Code-8 (HUC8) region leads to a 1.7 percent increase in total phosphorus levels and a 2.7 percent increase in ammonia levels in surface waters, relative to sample mean levels.

Pranay R. Randad et al., *Transmission of Antimicrobial-Resistant Staphylococcus aureus Clonal Complex 9 Between Pigs and Humans, United States*, 27 Emerging Infectious Diseases 740 (2021). In the top 10 pig-producing counties in North Carolina, there is a high degree of relatedness between isolates of livestock-associated Staphylococcus aureus clonal complex 9 from pigs in industrial swine facilities and isolates from humans, supporting potential transmission between pigs and humans. There is also evidence of household-level transmission between industrial swine facility workers and their children, who are at higher risk of developing invasive infections.

Kelly Shea et al., *Using Remote Sensing to Identify Liquid Manure Applications in Eastern North Carolina*, 317 J. Env't Mgmt. 115334 (2022). Using satellite-based radar to identify the location and timing of liquid manure application reveals that soil saturation in corn sprayfields is highest during the winter months, indicating that manure application may be occurring during those months.

Donald M. Waller et al., *Shifts in Precipitation and Agricultural Intensity Increase Phosphorus Concentrations and Loads in an Agricultural Watershed*, 284 J. Env't Mgmt. 112019 (2021). Total phosphorus concentrations in an agricultural watershed often exceeded EPA surface water standards, increased as the volume of water flowing through river channels increased, and increased with proximity to dairy operations. Total phosphorus concentrations downstream from newly permitted CAFOs increased, and total daily phosphorus loads downstream from CAFOs increased by 91 percent following CAFO expansions.

Fengxia Yang et al., *Swine Liquid Manure: A Hotspot of Mobile Genetic Elements and Antibiotic Resistance Genes*, 10 Sci. Reports 15037 (2020). Liquid swine manure is a reservoir for antibiotic-resistant genes, and a high prevalence of these genes persists even in treated effluent.

Xiaorong Zhang et al., *Environmental Risks Caused by Livestock and Poultry Farms to the Soils: Comparison of Swine, Chicken, and Cattle Farms*, 317 J. En't Mgmt. 115320 (2022). Heavy metals, including copper and zinc; antibiotics; and antibiotic resistance genes are enriched in soils amended with swine manure.

Sample of Grey Literature Supplementing Peer-Reviewed Publications

1990s

R.L. Huffman & Phillip W. Westerman, *Seepage and Electromagnetic Terrain Conductivity Around New Swine Lagoons*, 47 Transactions Am. Soc'y Agric. & Bio. Eng'g 1507 (1991). Contaminants in unlined lagoons built in deep sands in North Carolina's coastal region seep significantly into the soil and groundwater.

Michael A. Mallin et al., Water Res. Rsch. Inst., Univ. of N.C., *Effect of Organic and Inorganic Nutrient Loading on Photosynthetic and Heterotrophic Plankton Communities in Blackwater Rivers* (1998). Pollution from lagoons could contribute to toxic algae outbreaks in blackwater stream systems in the Coastal Plain of North Carolina.

James P. Murphy & Joseph P. Harner, *Lagoon Seepage Through Soil Liners*, Swine Day 1997 Report of Progress (1997), https://krex.k-state.edu/dspace/bitstream/handle/2097/2769/Swine97pg1-4.pdf?sequence=1&isAllowed=y. Lagoons can leach wastewater into soil, potentially leading to groundwater contamination.

Melva Okun, Univ. of N.C. at Chapel Hill, *Human Health Effects Associated with the Hog Industry* (1999). Effects of industrial swine facilities include odors, waste, flies, poor air quality, and the contamination of drinking water supplies.

Susan S. Schiffman et al., *Mood Changes Experienced by Persons Living Near Commercial Swine Operations*, in *Pigs, Profits, and Rural Communities* (Kendall M. Thu & E. Paul Durrenberger eds., 1998). Odor can have a deleterious health effect, including a physiological pathway between the olfactory lobe and the immune system, which directly implicates odor as a health risk.

Understanding the Impacts of Large-Scale Swine Production: Proceedings from an Interdisciplinary Scientific Workshop, June 29-30, 1995, Des Moines, Iowa (Kendall M. Thu & Kelley J. Donham eds., 1996). Research has found that industrial animal facilities adversely impact water and air quality and harm community members' quality of life.

2000s

Policy Statement, Am. Pub. Health Ass'n, *Precautionary Moratorium on New Concentrated Animal Feed Operations* (2003), https://www.apha.org/policies-and-advocacy/public-health-policy-statements/policy-database/2014/07/24/11/17/precautionary-moratorium-on-new-concentrated-animal-feed-operations. A precautionary moratorium on new industrial animal facilities may be necessary based on evidence of the health hazards from over 400 volatile compounds emitted by manure.

Brother David Andrews & Timothy J. Kautza, Pew Comm'n on Indus. Farm Animal Prod., *Impact of Industrial Farm Animal Production on Rural Communities* (2008), http://www.pcifapia.org/_images/212-8_PCIFAP_RuralCom_Finaltc.pdf. Industrial animal facilities produce recurrent strong odors, degrade water bodies, and increase fly populations, making it intolerable for neighbors and their guests to participate in normal outdoor recreational activities and social activities in and around their homes.

Adam Driscoll & Bob Edwards, *From Farms to Factories: The Social and Environmental Consequences of Industrial Swine Production in North Carolina,* in *Twenty Lessons in Environmental Sociology* (Kenneth A. Gould & Tammy L. Lewis eds., 2015). In North Carolina, the increase in industrial swine facilities has led to a range of externalities, including farm loss, reduced quality of life, adverse impacts on health, and environmental degradation.

Rolf U. Halden & Kellogg J. Schwab, Pew Comm'n on Indus. Farm Animal Prod., *Environmental Impact of Industrial Farm Animal Production* (2008), https://www.pewtrusts.org/-/media/legacy/uploadedfiles/wwwpewtrustsorg/reports/industrial_agriculture/pcifapenvimpactpdf.pdf. All industrial animal facilities impact public health and quality of life in rural America due to odors and interference with neighbors' ability to spend time outdoors.

Iowa State Univ. & Univ. of Iowa Study Grp., *Iowa Concentrated Animal Feeding Operations Air Quality Study* (2002). Air emissions from industrial animal facilities cause odors that are of major concern to residents living nearby, and they may constitute a public health hazard. The report calls for recognition of the effects of industrial animal facilities on surrounding communities in permitting decisions.

Michael A. Mallin, *Impacts of Industrial-Scale Swine and Poultry Production on Rivers and Estuaries*, 88 Am. Scientist 26 (2000). Lagoons and sprayfields located near aquatic environments can harm public health and degrade water quality.

James Merchant et al., *Pew Commission on Industrial Farm Animal Production (PCIFAP) Staff Summary of Occupational and Community Public Health Impacts* (2008), http://www.pcifapia.org/_images/PH_FINAL.pdf. Bacterial agents that spread contagious diseases between animals and humans can travel downwind as spray aerosols and infect local populations, as can disease-transmitting flies and pests.

N.C. Council of Churches, Hog Lagoons Policy Statement (Nov. 9, 2000), https://www.ncchurches.org/2000/11/hog-lagoons/. Contaminated water supplies and air emissions from industrial swine facilities adversely affect the health of those who live in the surrounding neighborhoods, causing respiratory problems, exposure to disease-causing bacteria, and psychological problems.

Brian C. Murray et al., RTI Int'l, *Benefits of Adopting Environmentally Superior Swine Waste Management Technologies in North Carolina: An Environmental and Economic Assessment* (2003). The costs of health effects and premature deaths linked to ammonia emissions from industrial swine facilities total hundreds of millions of dollars.

James A. Zahn et al., *Air Pollution from Swine Production Facilities Differing in Waste Management Practice*, Proceedings of the Odors and Emission 2000 Conference (2000). Odor intensity and the concentration of volatile organic compounds emitted from swine manure management systems are strongly correlated. The concentration of ammonia and methane in air samples was highest with systems that stored waste in lagoons.

2010s

Thijs Bosch & Leo M. Schouls, *Livestock-Associated MRSA: Innocent or Serious Health Threat?*, 10 Future Microbiology 445 (2015). A review of past studies links the spread of MRSA to industrial swine facilities and finds that livestock-associated MRSA can successfully colonize human hosts, pointing to a potentially serious health threat and the possibility that livestock-associated MRSA could persist and spread in communities without contact with hogs.

Univ. of N.C. at Chapel Hill, *Identifying Opportunities and Impacts for New Uses of Hog Waste in Eastern North Carolina* (2013), https://ncgrowth.unc.edu/wp-content/uploads/2014/06/OpportunitiesAndImpactsOfHogWasteInEasternNC.pdf. Proximity to an industrial swine facility lagoon in Sampson County, North Carolina resulted in a $10,382-per-lagoon decline in the value of residential parcels with homes and an assessed property value loss of anywhere from $5,443 to $15,563, depending on the type of residential parcel.

Stephen L. Harden, U.S. Geological Surv., Scientific Investigations Report 2015-5080, *Surface-Water Quality in Agricultural Watersheds of the North Carolina Coastal Plain Associated with Concentrated Animal Feeding Operations* (2015). North Carolina watersheds with industrial animal facilities have significantly higher concentrations of ammonium, nitrate, and total nitrogen than those without industrial animal facilities.

Carrie Hribar, Nat'l Ass'n of Local Bds. of Health, *Understanding Concentrated Animal Feeding Operations and Their Impact on Communities* (2010), https://www.cdc.gov/nceh/ehs/docs/understanding_cafos_nalboh.pdf. The impacts of odors from industrial animal facilities include preventing children from playing outside or going to school; causing negative mood states, tension, anger, and depression; increasing asthma rates in neighboring communities; and elevating levels of fly populations in homes close to the facilities.

Steve Wing & Jill Johnston, *Industrial Hog Operations in North Carolina Disproportionately Impact African-Americans, Hispanics and American Indians*, N.C. Pol'y Watch (2014), http://www.ncpolicywatch.com/wp-content/uploads/2014/09/UNC-Report.pdf. Industrial swine facilities in North Carolina disproportionately affect Black, Hispanic, and American Indian residents, and North Carolina's industrial swine facilities are relatively absent from low-poverty White communities.

Exhibit 2

DECLARATION OF SONJA TROM EAYRS

I, SONJA TROM EAYRS, declare and state as follows:

1. My name is Sonja Trom Eayrs, and I am actively involved in the day-to-day operation of our family farm located in Dodge County, Minnesota. I am uncomfortable sharing our farm's address because, as explained in greater detail below, my family has faced repeated harassment and intimidation for speaking out against industrial agriculture pollution in our community. I am also an attorney and am licensed to practice law in Minnesota, Wisconsin, and Florida.

2. Our family farm has long been a source of pride for my family. My grandparents, Elmer and Marie Trom, moved to the farm in 1925 and raised their 10 children there. My father, Lowell Trom, was born on the farm in 1929 and eventually assumed ownership of it. My father devoted his entire life to farming the land. As children, my siblings and I grew up on the farm, where we helped with farm chores and played outside. With its perfect park-like atmosphere, the farm served as a special gathering place for our aunts, uncles, and cousins—a home where we would come together for family reunions on Father's Day, picnics, graduations, baptisms, communions, birthday parties, and other family celebrations. In 1979, my husband and I held our wedding reception here at the farm.

3. My family cherishes our ability to enjoy the rural countryside and time outdoors. For many years, my mother maintained a beautiful garden on the farm, planting hundreds of flowers each year. My father, prior to his death in October 2019, loved to work in the open air. Almost every aspect of his work happened outdoors, from preparing the machinery for planting and harvesting, to tilling the land, filling the planter boxes with seed, and harvesting soybeans and corn each fall.

4. In the early 1990s, we witnessed significant changes to the rural countryside around our farm, as concentrated animal feeding operations ("CAFOs") began to disrupt the quiet community. In 1993, the first pig CAFO was constructed approximately one mile north of our farm, confining approximately 4,000 pigs. Since then, numerous pig CAFOs have been constructed in the immediate area, including one located a half-mile west of our farm and another located a mile north of our farm. Today, there are 12 pig CAFOs within a three-mile radius of our farm, housing an estimated 30,000 pigs.

5. These facilities generate an incredible amount of waste. One pig produces approximately 10 times more fecal waste than a human,[1] so the pigs right around our farm generate the same amount of waste as a city of 300,000 people. That's *15 times* the population of Dodge County.[2] This waste contains antibiotics, nitrogen, phosphorus, and other contaminants.[3]

6. This accumulation of fecal waste is incredibly disruptive to our lives. At the nearby CAFOs, the confinement barns are located over manure pits capable of holding hundreds of thousands of gallons of urine and feces. Each evening, the facilities raise the curtains that close off parts of the confinement barns, and the putrid stench from the manure pits rolls across the countryside. During the fall, the CAFO operators pump the urine and feces out of the manure pits. During pump-out, the manure pits are agitated, which causes them to release

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[1] *See* Mark Sobsey & Vicent Hiil, *Hog Waste Treatment to Control Microbial Contamination* (2008), Water Res. Rsch. Inst. Univ. of N.C., https://repository.lib.ncsu.edu/bitstream/handle/1840.4/4110/NC-WRRI-380.pdf?sequence=1&isAllowed=y.

[2] *See* U.S. Census Bereau, Quickfacts, Dodge County, Minnesota, https://www.census.gov/quickfacts/fact/table/dodgecountyminnesota,MN/PST045219%20.

[3] *See* Michael A. Mallin et al., *Industrial Swine and Poultry Production Causes Chronic Nutrient and Fecal Microbial Stream Pollution*, 226 Water, Air, Soil & Pollution 407 (2015).

Hydrogen sulfide, ammonia, methane, and other dangerous gases. CAFO operators then apply the manure pumped from the pits on neighboring fields by injecting it into the soil.

7. Immediately adjacent to our farm, I have personally witnessed application of manure onto frozen ground that cannot absorb the manure, as well as over-application of manure. These are dangerous practices, as manure frequently pools and eventually runs off into area drainage ditches, rivers, and road ditches, which in tum increases the risk of water pollution. Over the course of two days in November 2017, I took multiple photographs to document these practices adjacent to our farm, one of which is reproduced below. In the bottom left corner of the field, pooled manure sits on top of the frozen ground, while dozens of birds peck at dead and decomposing pig body parts mixed in with the manure.

Source: Sonja Trom Eayrs

8. A local waterway, the Westfield-Ripley Drainage Ditch, cuts through our farm and joins the Cedar River two miles to the south. The Cedar River then flows through southern

Minnesota and Iowa, eventually connecting with the Mississippi River. The Cedar River is an important waterway, and I am concerned that the CAFOs concentrated in close proximity to it have already polluted the river and will continue to do so, absent more thorough government oversight. According to the Minnesota Pollution Control Agency ("MPCA"), "improper application of manure can contaminate surface or groundwater."[4] The MPCA lists the Cedar River as an impaired water that is "non-supporting of aquatic life for aquatic macroinvertebrate communities," in part because of high concentrations of nitrogen and phosphorus, two pollutants often present in animal waste.[5] I believe that the Cedar River is impaired, at least in part, because of water pollution from CAFOs.

9. This belief was confirmed in 2017, when our citizens group, Dodge County Concerned Citizens, worked with the Izaak Walton League on the Cedar River Watershed Project, which documented water pollution in our community. Over a 19-week period, 40 volunteers collected 498 samples from 83 sites across the Cedar River watershed.[6] Of the samples collected, 70 percent indicated the presence of E. coli exceeding health standards for safe recreational uses, such as swimming, wading, and boating.[7] Throughout the watershed, DNA testing also indicated contamination from pig and cattle fecal waste. After major rainstorms, testing consistently found high E. coli readings, indicating that "the rain is flushing E. coli on the land, and in tile lines and ditches into the streams," raising concerns "about the health of children and adults who enjoy our streams, rivers and lakes."[8] According to the U.S.

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[4] Minn. Pollution Control Agency, *Mississippi River – Sartell Watershed E. coli and Phosphorus Total Maximum Daily Load* 29 (2020), https://www.pca.state.mn.us/sites/default/files/wq-iw8-61e.pdf.
[5] Minn. Pollution Control Agency, *Cedar River Watershed Stressor Identification* 46 (2016), https://www.pca.state.mn.us/sites/default/files/wq-ws5-07080201a.pdf.
[6] Izaak Walton League, Cedar River Watershed Project Report (2018), https://nebula.wsimg.com/16b21fefe4f708157573df19349576f6?AccessKeyId=41762AA0E44EDC919738&disposition=0&alloworigin=1.
[7] *Id.*

Geological Survey, exposure to E. coli-contaminated water can cause "health problems and sickness," including "urinary tract infections, respiratory illness, and pneumonia."[9]

10. CAFOs in Dodge County also pollute area private wells. One of our neighbors, Dale, whose farm is also surrounded by nearly 30,000 pigs within a two-mile radius, has not been able to drink the water at his farm for years. Dale's well tested positive for coliform bacteria on several occasions, which he believes is due to manure application on the land adjacent to his farm.

11. Local wells also often have high levels of nitrate, a chemical component of manure that can run off fields, seep into groundwater, and cause serious health problems, including an increased risk of cancer and birth defects.[10] Recently, Dodge County officials acknowledged that 21 percent of local private wells contained nitrate and were potentially unsafe for supplying drinking water.[11] According to the Minnesota Department of Health, nitrate pollution has been detected "in more than 8,000 [] drinking water wells" across the state, and the agency's testing showed that "[m]ore than 1,000 had nitrate levels deemed unsafe for infants and pregnant women."[12] Due to the proliferation of CAFOs in Minnesota, which now ranks as

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[8] *Id.*
[9] Water Sci. School, U.S. Geological Surv., *Bacteria and E. Coli in Water* (June 5, 2018), https://www.usgs.gov/special-topics/water-science-school/science/bacteria-and-e-coli-water#:~:text=coli%20is%20a%20type%20fecal,types%20of%20disease%20causing%20organisms.
[10] *See* Minn. Dep't of Health, Nitrate in Drinking Water Feact Sheet, https://www.health.state.mn.us/communities/environment/water/docs/contaminants/nitratefctsht; *see also* Sara Porter, Tap Water for 500,000 Minnesotans Contaminated With Elevated Levels of Nitrate, Env't Workin Grp. (Jan. 14, 2020), https://www.ewg.org/interactive-maps/2020_nitrate_in_minnesota_drinking_water_from_groundwater_sources/.
[11] *Nitrogen in Dodge County Ground and Surface Waters,* Dodge Cnty. Env't Servs.
[12] Mark Zdechlik*, Trouble in the Water: Can Minnesota Stop Polluting its Lakes, Rivers?,* MPRNews (May 16, 2016), https://www.mprnews.org/story/2016/05/16/water-can-minnesota-stop-polluting-lakes-rivers.

second in the nation in pig production, I believe that CAFOs are in large part responsible for this statewide problem.

12. Not only do area CAFOs create serious water contamination problems, but they also degrade the air quality and produce a horrifying odor. In November 2017, my father was combining his last several acres of corn. Despite keeping the cabin of his combine closed, odors caused by manure application from a nearby CAFO penetrated the cabin interior. Forced to stop the combine, my father stepped out onto the platform and vomited. He immediately experienced symptoms commonly associated with hydrogen sulfide poisoning, including headache, dizziness, and nausea.[13] He suffered from these symptoms for weeks thereafter.

13. My father and brothers, Brad and Jim, have experienced other physical reactions to emissions from CAFOs near our farm. Following construction of several neighboring CAFOs, my father suffered frequent headaches, felt a burning sensation in his eyes and nose, and often got sick to his stomach if he stayed outside for extended periods. My brother Brad has repeatedly suffered nosebleeds while cutting weeds, picking rock, mowing the lawn, or performing other outdoor tasks on our farm.

14. At my father's funeral visitation in October 2019, my brother Brad walked from his car to the funeral home, choking from the stench of manure that had been applied to the land just steps from the funeral home. Brad immediately got a bloody nose—undoubtedly from the air pollution released during manure application. Manure spreading interfered not only with the funeral visitation, but also with the graveside service the following day. As we gathered

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[13] *See* Erica Rogers, The Dangers of Manure Gas and Strategies for Mitigation, Mich. State Univ. Farm Mgmt. (Sept. 18, 2018), https://www.canr.msu.edu/news/the-dangers-of-manure-gas-and-strategies-for-mitigation.

graveside at the nearby rural cemetery, several family members retreated to their vehicles, unable to bear the stench and fumes.

15. CAFOs have completely changed life in Dodge County and throughout southern Minnesota. While our farm traditionally served as a gathering place for multiple generations, children, grandchildren, and great-grandchildren have not been able to gather at our farm for years. The risk that a family gathering will be ruined by the overwhelming stench from area CAFOs is just too great.

16. With a front row seat, my family has witnessed the destructive power of the agriculture industry. While fighting back against CAFOs, my family has faced repeated harassment and intimidation: bullet holes shot in the stop sign near our farm, constant garbage dumped in our roadside ditches and driveway, a large piece of metal hidden in the tall grass that damaged our mower, pure Roundup sprayed on the corn field that caused thousands of dollars of damage, harassing late-night phone calls to my elderly father—all signs of the power imbalance tearing at the fabric of our community. Other farm families who have opposed CAFOs have experienced similar harassment and intimidation. In the face of these tactics, we continue to speak up because we are fighting for our homes and our families.

17. While the industry tries to silence our voices, local government officials—many of whom have industry ties—do not want to hear what we have to say. In 2014, the Dodge County Planning Commission recommended construction of a CAFO a half-mile from our farm. At a public hearing on the issue, I was given just three minutes to voice my concerns, and the Planning Commission quickly shut down public comments, even though it had set aside several hours for community discussion. Several of my family members—including my mother, who suffers from advanced Parkinson's disease and struggles to speak—had requested that I speak on

their behalf, but when I requested additional time to address our family's concerns, counsel for Dodge County stated that I was disrupting the meeting and threatened to call the Sherriff's Office. The entire approval process, in my opinion, was nothing more than a rubber stamp.

18. Our concerns also do not receive the attention of state regulators. I have personally filed several complaints with the MPCA regional office in Rochester, Minnesota. I initially contacted the MPCA office in November 2017, as I was concerned about the overapplication of manure on frozen ground near our farm. I also reported that my father had likely suffered from hydrogen sulfide poisoning. I filed an online complaint and subsequently followed up with a phone call to MPCA staff. Despite my repeated outreach, the MPCA took no action to investigate my complaint. Through a records request filed in accordance with the Minnesota Data Practices Act, I obtained copies of notes on file with the MPCA and discovered that the MPCA staff member who I spoke to had left for vacation following our phone call. When he returned from vacation several days later, he concluded that investigation of my complaint was no longer necessary because any harmful emissions had likely already dissipated.

19. Recently, I received an alarming call from a resident of my hometown, Blooming Prairie, Minnesota. Area CAFO operators had spread manure onto the same small parcel of land—within feet of a local water treatment facility—for several days in a row. A horrifying stench cloaked the town for several days afterwards. I immediately filed a complaint with the MPCA using the Agency's online portal. A few days later, a MPCA staff member contacted me, but instead of listening to my concerns, he hung up on me.

20. Our community needs transparency to adequately address CAFO pollution. The industry fights all attempts at transparency, and people like us who have seen their hometowns invaded by industrial polluters are continually left in the dark. When our local citizens group

sought to audit manure management plans on file with Dodge County, we discovered only 37 plans, even though, by our estimate, at least 100 local operators should have filed manure management plans given their size. As a result of self-reporting and lack of oversight, no one in our community knows where or how much manure is applied to the land. This lack of information makes it very difficult for our community to understand—let alone fight back against—pollution near our homes.

21. All CAFOs should be required to obtain a Clean Water Act ("CWA") permit, and community members should be able to access CAFO manure management plans. We need to make sure that CAFOs adhere to more rigorous environmental and reporting requirements. People in my community need to know where and how much manure is being applied to the land. We also need to know that if we see CAFOs polluting the water, we can take action to enforce the CWA. Without these protections, it's much harder to keep our community safe.

22. The lack of oversight by the Environmental Protection Agency ("EPA") is compounding the problems in rural America. We rely on the EPA to protect our air and water from CAFO pollution. Despite repeated cries for help, the EPA has not taken any action. If the regulators will not act, where are we supposed to turn for help?

I declare under penalty of perjury that, to the best of my knowledge, the foregoing is true and correct. Executed this 1st day of February, 2022.

Sonja Trom Eayrs

Sonja Trom Eayrs

Exhibit 3

<u>**DECLARATION OF DAVID CARTER**</u>

I, DAVID CARTER, declare and state as follows:

1. I am 44 years old, and I live with my wife and three kids at [redacted] Jefferson County, Iowa. My wife and I have lived here for 15 years, and we have raised our kids here. Our home is on 24 acres of land. We have a small tree farm and a few animals, including sheep, a llama, some chickens, and a duck. The area around our property is relatively rural. We live about five miles from the nearest town, which has a population of roughly 9,600 people.

2. The land where I live now was passed down from my grandparents to my parents and then to my wife and me; we hope to pass it on to our children when the time comes. We love the culture and the people here, and we really enjoy being outside. We are surrounded by family, and many of our neighbors have lived in the area for generations. It's quiet and spacious, and living here, we can truly enjoy the great seasons that we have in the Midwest.

3. Over the past decade or two, our area has seen an explosion in the number of concentrated animal feeding operations ("CAFOs").[1] There are now 66 CAFOs in Jefferson County, including 12 CAFOs within five miles of our home. As the map below shows, five of those 12 CAFOs are only three miles away or closer. According to the Iowa Department of Natural Resources ("IA DNR"), the five closest CAFOs confine a total of 16,718 swine.[2] By a

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[1] *See* Jamie Konopacky, *EWG Study and Mapping Show Large CAFOs in Iowa Up Fivefold Since 1990*, Env't Working Grp. (Jan. 21, 2020), https://www.ewg.org/interactive-maps/2020-iowa-cafos/#methodology (reporting that the number of Large CAFOs in Iowa increased more than fivefold from 1990 to 2019, from 789 Large CAFOs in 1990 to 3,963 Large CAFOs in 2019).

[2] *See* Iowa Dep't of Nat. Res., *Animal Feeding Operations Databases*, https://programs.iowadnr.gov/animalfeedingoperations/.

conservative estimate, these swine produce 45.2 million pounds of manure every year.[3] That is 84 percent more manure than the amount of sanitary waste produced annually by the entire human population of Jefferson County, all within a three-mile radius of our home.[4] Based on information made available by IA DNR, I do not believe that any of the 12 CAFOs within five miles of our home have federal permits authorizing them to discharge water pollution.

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[3] According to IA DNR, the average weight of the swine confined at these five CAFOs is 130-150 pounds. At least one study has determined that 150-pound swine produce 7.4 pounds of manure per day—that is, 2,701 pounds per year. *See* Lorimor et al., *Manure Characteristics - Manure Management Systems Series* (2004), https://www.canr.msu.edu/uploads/files/ManureCharacteristicsMWPS-18_1.pdf. According to this estimate, 16,718 150-pound swine produce 45.2 million pounds of manure each year. Other studies yield less-conservative estimates, including one study finding that 135-pound swine produce 4,139 pounds of manure each year. *See* John P. Chastain et al., *Swine Manure Production and Nutrient Content* (2003), https://www.clemson.edu/extension/camm/manuals/swine/sch3a_03.pdf. This less conservative estimate suggests that 16,718 135-pound swine produce 69.2 million pounds of manure annually.

[4] Based on the 2020 U.S. Census, 18,153 people live in Jefferson County. The U.S. Government Accountability Office estimates that humans produce 3.72 pounds of sanitary waste per person per day. *See* U.S. Gov't Accountability Off., *Concentrated Animal Feeding Operations: EPA Needs More Information and a Clearly Defined Strategy to Protect Air and Water Quality from Pollutants of Concern*, GAO-08-944 at 58 (Sept. 2008), https://www.gao.gov/assets/gao-08-944.pdf. Thus, the human population in Jefferson County produces 24.6 million pounds of sanitary waste per year.

Source: Iowa Department of Natural Resources, Animal Feeding Operations Databases, https://programs.iowadnr.gov/animalfeedingoperations/; Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community.

4. My wife and I worry that, any day, a CAFO could be built even closer to us. If a CAFO were built very close to our house, we would move. Even though we love our community and feel tied to this land, the odor and other pollution would be too much to endure. Already, CAFOs inject and spray manure on the farmland surrounding our property, including fields just a few hundred feet from our house. The manure spreading has been going on most of the time we have lived here, and it has increased over the years.

5. I am concerned that the disposal of manure from nearby CAFOs has degraded water quality near my home. I know that farm runoff is a huge source of water pollution, and

Iowa now has some of the worst water quality in the country.[5] In fact, I've experienced Iowa's declining water quality firsthand. My aunt and uncle live just north of us, and they have a large pond that is fed by runoff from cropland to the west. Fifteen years ago, my family and I would go over to the pond and swim; it was a nice place to cool down and have fun. These days, however, we will not go anywhere near that pond because the water quality has degraded. I am not an expert, but I believe the degradation at least partly results from the overapplication of CAFO manure to nearby cropland.

6. I blame CAFOs for declining water quality, in part, because I have seen nearby CAFOs engaging in risky manure disposal practices. For example, I understand that it is not advisable to spread manure on fields when the ground is frozen, because doing so poses a high risk of water pollution. But I have noticed that a lot of the manure spraying and injecting near my home occurs in the late fall, including in November, when the ground often freezes. As a result, I believe that the CAFOs near me are applying manure to frozen ground.

7. Not only am I concerned that CAFOs degrade water quality, but I am also concerned about air pollution from CAFOs. This is an agricultural area, and like most people who live here, I am used to the natural smells that come from being around animals. But the smell of CAFO manure is different. It is not a natural, organic smell, like the smell of waste from animals on our farm. Instead, it is a very sharp and pungent industrial-type odor. It smells toxic. It permeates everywhere, and it sticks around. Sometimes, when I drive though nearby

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[5] *See* Env't Integrity Project, *The Clean Water Act at 50: Promises Half Kept at the Half Century Mark* 7 (2022), https://environmentalintegrity.org/wp-content/uploads/2022/03/CWA@50-report-EMBARGOED-3.17.22.pdf (finding that 93 percent of Iowa's river and stream miles are impaired for swimming and recreation—more than all but three other states—and 83 percent of its lake acres are impaired for swimming and recreation—more than all but two other states).

Washington County, where CAFOs are even more densely concentrated than they are in Jefferson County, the smell is unbearable.

8. On days when CAFO manure is applied to fields around my home, I literally cannot be outside because the smell is so disgusting. Instead, I stay inside, and I make sure that all the doors and windows are closed to keep out the smell. If it's a warm day, I turn on the air conditioning to stay cool, and I just try to think about something else. It is incredibly upsetting to me that my family and I have to shut ourselves up inside our home to avoid breathing an unbearably awful and unsafe odor. It prevents us from being outside and enjoying our land, which is one of the main reasons why we love living here.

9. I believe that it would be incredibly valuable for my community if the U.S. Environmental Protection Agency were to improve transparency about CAFO activities, especially the timing and location of manure disposal. Right now, CAFOs are very polarizing, and I do not think that the secrecy about CAFO activities fosters good communication between neighbors. If I had more information about the manure-disposal practices used by CAFO operators near me, I would be in a better position to consider whether there are any solutions or agreements we could reach that would help CAFOs and the community co-exist. For instance, we could explore whether it's possible to limit the window of time each year when CAFOs are allowed to spread manure, so people know what to expect. It might also be possible to agree to adjust application practices to reduce odors and minimize the risk of water pollution.

10. Increasing access to information about CAFO activities also could help community members determine whether particular CAFOs are violating the law. In general, I do not think it is a good idea for community members to bear primary responsibility for watching and policing CAFOs. Neighbors reporting on neighbors results in a lack of trust. Federal and

state agencies should be in charge of overseeing industry and protecting the water, but right now, those agencies simply are not doing their jobs.

11. Typically, I think the less bureaucracy there is, the better. However, CAFOs are having a real, harmful effect on people that needs to be taken seriously, existing laws are incredibly biased in favor of industrial agriculture, and there’s not enough enforcement. We need the government to do better. At the same time, increasing transparency and giving more information to the community would be helpful because there are no other weapons left for us to use to defend our families.

I declare under penalty of perjury that, to the best of my knowledge, the foregoing is true and correct. Executed this 25th day of October, 2022.

David Carter

Exhibit 4

DECLARATION OF KATHY TYLER

I, KATHY TYLER, declare and state as follows:

1. I am 69 years old, and I live with my husband at [redacted] Grant County, South Dakota. We have lived here since 1974. Our home is on nine acres of land, and we also own about 640 additional acres in Grant and Marshall counties. We have gardens, horses, and pastureland. We live about nine miles from the nearest town, which has a population of about 3,100 people, so our area is very rural. Living in a rural environment is very important to me and my husband. We both grew up on farms, and we wanted our family to experience the same way of life.

2. When we first moved to the land where we live now, there were a lot of small dairies in the area, but you don't see small dairies anymore. Now, there are six huge concentrated animal feeding operations ("CAFOs") in Grant County. I'm not sure whether the CAFOs are operating under South Dakota's state permit or under its Clean Water Act National Pollutant Discharge Elimination System ("CWA NPDES") permit. Three of the CAFOs have at least 5,000 dairy cows, and two more have over 10,000 dairy cows. There is also a hog CAFO with 6,500 pigs, and it's just a half-mile from our home. When I look out my window, I can see the roofs of its three huge confinement barns.

3. The pig CAFO next to our home stores the animals' urine and feces in concrete pits below the confinement barns. These pits hold millions of gallons of the waste. To get rid of the waste, manure hauling contractors use huge machinery to inject it into fields near the facility via a system of pumps and hoses. One of the fields is only about 300 feet from our home.

4. I am concerned that the CAFO's current methods for manure disposal will contaminate nearby waterbodies. When the workers are applying the waste, they're supposed to

turn off the equipment each time they turn around at the end of a field, but I've seen them leave the equipment on while turning, which causes huge pools of manure to form at the end of the fields. The manure just sits there and is slowly absorbed by the soil, or it drains off the field. In addition, the fields where the waste is applied have drain tiles, which are underground pipes with holes in them that take excess water out of the soil. Many of the fields are near creeks, and research has shown that manure applied inappropriately will work its way into the tiles and then go into local waterways.[1] Although South Dakota's state permit includes some guidelines for the application of manure, I don't think the guidelines are sufficient to prevent water pollution, based on what I've seen on the fields near my home.

5. CAFO waste has contaminated drinking wells in other parts of South Dakota. Here, our well is deep, so it may not become contaminated with CAFO waste during my lifetime, but I think there will come a time when our water is no longer safe to drink.

6. In addition to threatening water, the CAFO also produces a horrendous smell. The urine and feces in the waste pits below the confinement barns produce fumes that can kill the pigs. The CAFO uses fans and an HVAC system to push clean air into the confinement barns and to remove the toxic air. That means we breathe the garbage air that the pigs wouldn't be able to live with. If this air can kill the pigs, how is it affecting our health? When my husband is outside and the smell is present, it gives him a headache, and he has to go inside. There are no air quality regulations for CAFOs. We breathe the same air that kills the pigs.

7. The smell from the pig CAFO has disrupted our lives. The odor is so bad that I can't enjoy horseback riding and my husband can't enjoy going for walks. The smell has also

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[1] *See* Heather E. Gall et al., *Hormone Discharges from a Midwest Tile-Drained Agroecosystem Receiving Animal Wastes*, 45 Env't Sci. & Tech. 8755 (2011).

affected my daily mood because I can't guarantee myself a free day outside. You never know when the smell is going to hit you. We moved to this rural area to enjoy the fresh air and be able to go outside anytime we want, but we can't do these things anymore.

8. What bothers me most about the CAFOs is that they don't support small communities. They have destroyed the small farms; their employee turnover is tremendous; they bring in their own management staff; and they have very little to do with local, small businesses. But worst of all, they pit the big boys against the little guys—breaking up communities. Instead of supporting the community, the CAFOs, their pollution, and their business plans drive people away from it. Our children have moved away from Big Stone City, and they won't be back. Our neighborhood CAFO and what it took away from us is a factor. CAFOs stink—in more ways than one.

9. There is little oversight of CAFOs in South Dakota. A major spill needs to be reported, but there are little or no inspections or monitoring to detect spills. But, we have almost no rules, so I guess why inspect? The Environmental Protection Agency ("EPA") and state agencies need to do more to identify and regulate the CAFOs that are polluting our water and air. There should be inspections for the manure pits because, eventually, they are going to crack and break. There should also be soil and water monitoring around the pits, so that we can be sure they're not already leaking pollution.

10. It is also important to me to be able to see the CAFOs' nutrient management plans. I know that CAFO operators are supposed to apply manure to fields on a rotational basis, but without seeing the nutrient management plans, I don't know which fields they're supposed to be using each year. I've looked at the state's online record of complaints against CAFOs, and I've seen complaints that they applied manure on the same field two years in a row or that they

applied too much manure on a field. Without seeing the nutrient management plans, I can't make sure that those things aren't happening on the fields near our home and our drinking well.

11. For CAFOs that operate under South Dakota's state permit, rather than its CWA NPDES permit, it is more difficult to access information on CAFO locations, sizes, and nutrient management plans. The South Dakota Department of Agriculture and Natural Resources ("SD DANR") maintains a database of information on operations that have CWA NPDES permits,[2] but, to my knowledge, it does not provide similar information on operations that have state permits. To get information on CAFOs operating under state permits, I think I would have to submit a public records request to SD DANR, which is a time-consuming process. EPA should increase transparency around CAFOs by ensuring that CAFOs that cause water pollution have CWA NPDES permits.

I declare under penalty of perjury that, to the best of my knowledge, the foregoing is true and correct. Executed this 8th day of March, 2022.

Kathy Tyler

Kathy Tyler

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[2] *See* SD DANR, *Search for Surface Water Discharge Permits*, https://danr.sd.gov/OfficeOfWater/SurfaceWaterQuality/swdpermitting/wwDBSearch.aspx.

Exhibit 5

Disparities of industrial animal operations in California, Iowa, and North Carolina

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Summary

Background: Concentrated animal feeding operations (CAFOs) densely house thousands of animals in confined areas. CAFOs in the United States commonly store animal manure in open lagoons and apply manure to nearby fields. These processes can pollute the water and air with pathogens and chemicals that impair the quality of life and physical health of neighboring communities. Iowa (IA) and North Carolina (NC) are two of the leading swine producers in the United States, while California (CA) is the nation's leading milk producer.
Methods: We obtained information on the location and size of swine CAFOs in IA and NC and of dairy CAFOs in CA's Central Valley. We calculated the number of animal units (AUs, a measure of the estimated weight of all the animals) in each CAFO and used the EPA definition to categorize Large CAFOs. We focused on Large CAFOs because they produce an exceptionally large amount of waste and are likely responsible for the majority of air and water pollution from CAFOs. We obtained 2019 block group demographic data and appropportionated the race and ethnicity data to the 2010 census blocks. We calculated the number of Large CAFOs and total CAFOs within 3 miles of the block centroids. We compared the proportions of people of color (POC), Black, Hispanic, and American Indian residents living within 3 miles of a CAFO to the proportion of non-Hispanic White residents for the study area of each state. We used Poisson and linear regression to assess the relationship between race/ethnicity and the presence of one or more Large CAFO or the AUs of CAFOs. We also examined the proportion of people living within 3 miles of a Large CAFO by income, rurality (measured as isolation to resources), and social vulnerability.
Results: The proportion of POC, Hispanic, and American Indian residents living within 3 miles of a Large Dairy CAFO in the CA study area is 1.29, 1.54, and 1.15, times higher, respectively, than the percent of non-Hispanic Whites. In the NC study area, percent of POC, Black, Hispanic, and American Indian residents living within 3 miles of a Large CAFO is 1.42, 1.42, 1.57, and 2.20 times higher, respectively, than the percent of non-Hispanic Whites. In NC and CA, blocks with >40% POC had 738-1657 more animal units when adjusting for rurality than areas with <20% POC. In IA, White non-Hispanics are more likely to live near a Large Swine CAFO than POC. Increased census tract poverty was associated with greater exposure to Large CAFOs: the proportion of residents in Census tracts with ≥35% of households below the 200% poverty level who live within 3 miles of a Large CAFO is about 2.5 times higher in CA and 15 times higher in NC compared to Census tracts with <20% of households below the 200% poverty level. Of people in Census tracts with the least access to resources, 81%, 27%, and 25% live <3 miles of a CAFO in IA, CA, and NC respectively. Increased tract-level social vulnerability was associated with greater resident exposure to Large CAFOs in NC and CA.
Conclusions: Swine CAFOs in NC and dairy CAFOs in CA are disproportionately located in low-income communities and near POC. Swine CAFOs in IA tend to be located in rural areas that lack access to resources. This environmental injustice harms the neighboring communities as water and air pollution associated with CAFOs are linked to adverse health effects.

Background

Animal production has intensified greatly across the United States since the 1980s.[1,2] While the number of swine and cattle has increased, the number of farms has decreased.[3] The majority of livestock in the United States is now housed in large, concentrated animal feeding operations (CAFOs), which each hold thousands of animals.[3] These industrial animal operations produce enormous volumes of waste, which is often stored in uncovered manure lagoons and sprayed onto nearby land as fertilizer.[4] Because the land cannot absorb the massive amounts of manure, pathogens and chemicals from the waste often pollute the air and water, which can harm the environment and the health of nearby residents.[4,5]

Iowa (IA) is the United States' top swine-producing state, with approximately 23 million hogs housed in CAFOs located throughout the entire state.[6,7] Swine CAFOs are heavily concentrated in eastern North Carolina (NC), the second leading U.S. swine producer with approximately 8.5 million hogs.[8,9] Many studies have concluded that living near swine CAFOs is associated with worse physical and mental health.[10] One NC study found that residents in ZIP codes with a high density of hogs within 2-5 km had higher all-cause mortality, infant mortality, mortality from anemia, kidney disease, tuberculosis, and septicemia, compared to ZIP codes without hog CAFOs.[11] Residents living within two miles of a swine CAFO in NC have reported higher incidence of headaches, runny nose, sore throat, coughing, diarrhea, and burning eyes compared to residents who do not live near intensive livestock operations.[12]

California has been the nation's leading milk producer for almost 30 years.[13] Approximately 1.8 million dairy cows are housed in California, with most of them located in the San Joaquin Valley.[13] Much of this region is flat with shallow water tables that are susceptible to groundwater contamination.[14] In recent years, many small drinking water systems in the San Joaquin Valley Watershed have not met US EPA safe drinking water standards.[15] Dairy CAFOs can contaminate water and air and can also negatively affect the health of nearby residents. A study of dairy CAFOs in the Yakima Valley, Washington State measured elevated airborne particulate matter and ammonia up to 3 miles from dairy operations.[16] Particulate matter exposure has been linked to many health conditions, including asthma, chronic obstructive pulmonary disease, and stroke.[17] Ammonia exposure can cause burning of the eyes, nose, and throat, and long-term exposure may have lasting effects on the respiratory system.[18] Residents living near cattle, poultry, and swine CAFOs have reported increased incidence of respiratory, gastrointestinal, neurological, and stress-related symptoms.[19] High intensity farming has also been associated with increased acute gastrointestinal illness hospitalizations, especially among children under age 5.[20]

Due to the large amount of manure produced by CAFOs and the current lagoon and spray field system, surface and groundwater near CAFOs are often contaminated. Groundwater near swine CAFOs with lagoons has been found to have higher *Escherichia coli* levels than reference sites, including antibiotic-resistant *E. coli* strains.[21] The overuse of antibiotics causes more antibiotic resistant bacteria to evolve, resulting in harder-to-treat infections and increased mortality.[22] Most CAFOs give antibiotics to their animals to prevent microbial infection and promote growth; however, antibiotics can be released into surface and groundwater, exposing nearby humans.[14,23] Antibiotics have been found in shallow groundwater downstream from dairy lagoons.[14] Other pathogens linked to CAFOs include *Salmonella*, *Campylobacter*, *Yersinia enterocolitica*, *Cryptosporidium*, and *Giardia*; many of these pathogens can survive in water for several weeks and can cause acute gastrointestinal illness in exposed humans.[24] Researchers have found high fecal indicator bacteria concentrations near swine CAFOs.[25] Swine-specific microbial source-tracking markers were found to be 2.3-2.5 times more prevalent in proximal downstream surface water compared to proximal surface water upstream from swine CAFOs, and these microbial source tracking markers were detected more frequently during the 48 hours after heavy rain.[25] Nutrients and pathogens from animal manure can be transported via groundwater or through soil during wet conditions.[23] A study of runoff after land application of cattle and swine manure and after simulated heavy rainfall events found *E.coli* and enterococci concentrations to be significantly higher than in runoff from control plots with no manure.[26]

During heavy precipitation events, lagoons can flood or breech, transporting manure that may contain illness-causing pathogens. NC swine CAFOs are most densely located in areas of eastern NC that commonly flood during hurricanes, a reoccurring issue as NC is the third most hurricane-prone state.[27] Black residents were more likely than White residents to live in areas with flooded CAFOs in NC, according to satellite estimates after Hurricane Floyd (1999).[28] Breeched swine manure lagoons in NC after Hurricane Fran (1996) contributed to anoxia and hypoxia in the Cape Fear watershed much more than human sewage, likely because swine waste is more concentrated than human sewage.[29] Although heavy rain events may contribute more to the transport of pathogens from CAFOs in NC than CA and IA, as NC has a higher average annual rainfall (50 inches) than IA (32 in) or CA (22 in),[30] climate change has been increasing the frequency and intensity of heavy precipitation events across various areas of the United States.[31]

NC, IA, and CA have different climates, histories, and demographics, but these three states contain thousands of CAFOs that are impacting the environment and neighbors' health. In this report, we examine the disproportionate siting of CAFOs in communities of color, low-income communities, rural communities isolated from resources, and communities with additional environmental and social vulnerabilities across these three states.

Methods

For these analyses, we abstracted NC swine CAFO permit data (2019) from NC Department of Environmental Quality,[32] IA swine CAFO data from Iowa Department of Natural Resources,[33] and CA dairy CAFO data from the California Integrated Water Quality System in 2021.[34] We identified Large CAFOs using the United States Environmental Protection Agency's (EPA) definition (dairy CAFOs with ≥700 dairy cows, swine CAFOs with ≥2500 animals that weigh ≥55 lbs or CAFOs with ≥10,000 animals that weigh <55 lbs, and CAFOs with >1000 animal units; as established in EPA 40 CFR 122.23(b)(4)).[35] We focused on Large CAFOs because they produce an exceptionally large amount of waste and are likely responsible for the majority of air and water pollution from CAFOs. We calculated the number of animal units (AUs) for each CAFO, to be able to compare dairy and swine CAFOs. One animal unit is equal to approximately 1000 pounds of animal weight, which is approximately the weight of a typical steer.[36] AUs were calculated for hogs based on the average weight of the life stage of permitted swine. (Growing feeder to finish pigs weigh 50-220 lbs—on average 135 lbs or 0.135 AU; boar studs weigh 250-550 lbs—on average 400 lbs or 0.4 AU).[36,37]

We obtained 2019 block group demographic data (total population and number of residents by race and ethnicity) for CA, IA, and NC from the American Community Survey (ACS) and apportioned this data to the block level (using the block-block group proportions from the 2010 census). Blocks with centroids within 3 miles of a CAFO were considered exposed and blocks with centroids >3 miles from a CAFO were considered unexposed. We chose this 3 mile threshold as CAFO exposures can travel several miles and as living within 0.5, 2, and 3 miles from a CAFO has been associated with various health outcomes.[11,16,19,38,39] As many people indicate more than one racial/ethnic category, we used estimates of all people identifying with a race, regardless of the other categories they indicated. For example, the

Black race category in our analysis includes residents who only identified as Black as well as those who also indicated another race or ethnic group. We defined people of color as all people who identify as Hispanic and/or who identify with one or more non-White race.

As CAFOs are seldom located in urban areas, and as urban areas have different demographic patterns and environmental exposures, we excluded urban areas from analysis. In NC, we excluded cities with populations >250,000 for NC (top five populous NC cities). Since all IA cities have a population <250,000, we excluded the top 3 IA cities (population >100,000 people). As dairy CAFOs in CA were located in more urban areas than swine CAFOs in IA and NC, we excluded the most urban CA Census tracts (geographic isolation scale <3.9; threshold determined as the least isolated tract with a dairy CAFO). We sought to create a contiguous study area where CAFOs may be located in each state. In NC, we excluded counties if they do not contain swine CAFOs and they do not neighbor counties with swine CAFOs; this removed western NC from analysis. Since CA counties are very large, we only included CA counties with dairy CAFOs. All IA counties contain swine CAFOs, thus no counties were excluded from the IA analyses.

We examined the percent of population living within 3 miles of a CAFO by percent of POC. We conducted weighted Poisson regression to examine the relationships between race/ethnicity and the presence of at least one Large CAFO within 3 miles of the center of a block (weighted by census block population), with White non-Hispanic as the reference. We conducted weighted linear regression to assess the relationship between the block-level percent of POC and the number of animal units within 3 miles of a block centroid. Although we excluded the most urban areas that do not contain CAFOs, rurality still varied substantially in the study area. In adjusted models, we controlled for rurality using the cubic natural log of the population density, with the median (i.e., the median after exclusion of urban areas) subtracted to standardize the values.[8]

In additional analyses, we obtained 2019 block group median income from American Community Survey for each state and drew a 3-mile buffer around each block group centroid. We counted the number of CAFOs located in each 3-mile buffer from the centroid and the number of CAFOs located within each block group and used the largest count for each block group in order to account for differing sizes of block groups. We split block groups into six income groups and examined the percent of the population living within 3 miles from a CAFO among each income group. We conducted similar analyses for the percent of each Census tract living below the 200% federal poverty level. We similarly attributed Census tracts as exposed to CAFOs if they contained CAFOs or if CAFOs were located within 3 miles of the Census tract centroid. We also used a geographic isolation scale (a continuous measure split into quartiles based on nationwide data) that classifies Census tracts according to their access to resources, such as food, healthcare, and internet, as a measure of rurality.[41] We assessed the percent of the population living in tracts within 3 miles of a CAFO among each rurality group.

We also used the CDC/ATSDR Social Vulnerability Index (SVI) and the EPA's EJScreen: Environmental Justice Screening and Mapping Tool to examine the other social and environmental exposures and vulnerabilities residents living near Large CAFOs face.[42,43] The SVI assesses Census tract vulnerability in terms of socioeconomic status, household composition and disability, minority status and language, and housing type and transportation. EJScreen estimates environmental exposures for Census block groups for diesel particulate matter level in air, air toxics cancer risk, indicator for major direct dischargers to water, and other environmental exposures. EJScreen does not currently incorporate CAFO data into its environmental justice calculation tools, though CAFO waste can and does discharge into waterways. For both the SVI and EJScreen, we split the continuous indices into quartiles (separate quartiles for each state) and examined the percent of the population living within 3 miles from a Large CAFO.

These descriptive analyses use publicly available data to examine the environmental injustices associated with CAFOs. Because the US EPA examines statistical significance, we have included p-values and confidence intervals; however, we join many other scientists in urging against relying purely on statistical significance and p-value thresholds to interpret results.[44–46] The confidence intervals (CIs) we report indicate the precision of the associations; typically, results are considered to be statistically significant if the 95% CIs do not include the null value (1 for ratio and 0 for differences). The p-values reported indicate the statistical difference between each ratio by race/ethnicity and the proportion of White non-Hispanic residents living with 3 miles of a CAFO.

In order to place these CAFO disparities analyses in context, we also describe the rurality, income, and racial demographics of California, Iowa, and North Carolina.

Results

California, North Carolina, and Iowa have different demographics, but all three states are home to thousands of CAFOs, affecting their populations in different ways. Statewide, a much larger proportion of California's population are people of color, while Iowa's residents are predominantly White non-Hispanic (Figure 1). California has a larger proportion of high-income households than Iowa and North Carolina. California has many more urban block groups than Iowa or North Carolina, and Iowa contains a larger proportion of block groups that are very rural and very isolated from resources. In general, swine CAFOs in Iowa are located in very isolated areas and dairy CAFOs are located in less isolated areas in California (Figure 2).

In general, blocks with a higher percent of people of color (POC) have a larger percent of population living within 3 miles of a CAFO in CA and NC, while the opposite was observed in IA (Figure 3). In the CA study area, the percent of POC, Hispanic, and American Indian residents living within 3 miles of a Large Dairy CAFO is 1.29, 1.54, and 1.15, times higher, respectively, than the percent of non-Hispanic Whites (Table 1; Figure 7). These rates translate into hundreds of thousands more POC living near Large CAFOs than if all residents were equally likely to live near a Large CAFO. For example, if Hispanic people in the CA Central Valley study area were exposed to Large Dairy CAFOs at the same rate as White non-Hispanics in this area, then approximately 227,600 fewer Hispanic residents would be exposed to (i.e., live <3 miles) a Large Dairy CAFO. In the NC study area, percent of POC, Black, Hispanic, and American Indian residents living within 3 miles of a Large Swine CAFO is 1.42, 1.42, 1.57, and 2.20 times higher, respectively, than the percent of non-Hispanic Whites (Table 1, Figure 6). If people of all races and ethnicities were equally exposed to Large Swine CAFOs at the same rate across the NC study area, then approximately 16,000 fewer American Indian residents, 53,000 fewer Black residents, and 29,400 fewer Hispanic residents would live <3 miles of a Large Swine CAFO in NC. In CA and NC, the racial/ethnic disparities are more apparent for the Large CAFOs than the medium CAFOs. Figures 4-6 illustrate each state's study area, location of CAFOs, and the block-level percent of POC.

Blocks with a higher percent of POC in NC and CA have, on average, more animal units within 3 miles than blocks without POC. Thus, some of the largest facilities in NC and CA are in areas with the highest percent of POC. When accounting for rurality, blocks with 60-79% POC have, on average, 1647 more animal units of dairy cattle within a 3-mile radius than blocks with 0-19% POC in CA (Table 2). In IA, when accounting for rurality, blocks with >80% POC have, on average, 1126 fewer animal units of hogs within a 3-mile radius than blocks with no POC. In NC, blocks with 60-79% POC have, on average, 1120 more animal units of swine within a 3-mile radius than blocks with no POC, when adjusting for rurality.

The increase in animal units in blocks with 40-100% POC in CA and NC is substantially higher, with 738-1657 more animal units, than areas with <20% POC.

Exposure to CAFOs differs across geographic isolation, a measure of rurality. In IA, 67% of people in Census tracts with the least access to resources live within 3 miles of a Large Swine CAFO, and 81% of them live within 3 miles of any swine CAFO (Table 3; Figure 8). In NC, a quarter of the population in the most isolated tracts in the study area lived within 3 miles of a swine CAFO. CA dairy cattle CAFOs are located in less rural areas than IA and NC, with 19% of residents in the least isolated, most urban tracts of the CA study area living within 3 miles of dairy CAFO. In CA, 45% of Large Dairy CAFOs are located in very isolated areas, while 99.5% of Large Swine CAFOs in IA and 99.9% of Large Swine CAFOs in NC are located in very isolated Census tracts (Table 4).

CAFOs are disproportionately located near low-income communities in NC and CA. The percent of residents in Census tracts with ≥35% of households below the 200% poverty level who live within 3 miles of a Large CAFO is about 2.5 times higher in CA and 15 times higher in NC compared to Census tracts with <20% of households below the 200% poverty level (Table 5; Figure 9). No residents in NC block groups with median incomes ≥$90,000 live within 3 miles of a Large CAFO, but 16% of residents in block groups with median incomes <$35,000 live within 3 miles of a Large Swine CAFO (Table 6). We do not see any strong patterns between poverty level or median income and proximity to swine CAFO in IA.

Socioeconomic status is one part of the social vulnerability index, but disability and lack of transportation can also lead to social vulnerability. In CA and NC, greater social vulnerability was associated with a larger population proportion living within 3 miles of a Large CAFO, especially among the socioeconomic and household composition and disability indices (Figure 10). In IA, the proportion of the population living within 3 miles of a Large Swine CAFO is somewhat lower in areas with high social vulnerability compared to medium low vulnerability.

People who live near Large CAFOs are also often exposed to multiple other environmental exposures. In IA and NC, areas with medium high levels of various exposures, especially diesel particulate matter, major direct dischargers to water (not including CAFOs), traffic proximity and volume, and proximity to treatment storage and disposal facilities have higher proportions of the population living within 3 miles of a Large CAFO compared to areas with low levels of these exposures (Figure 11). Exposure to diesel particulate matter and traffic may be linked to the CAFOs, as trucks frequent CAFOs, carrying animals between CAFOs specialized for growing animals of different sizes and often carrying away waste. In CA, areas with higher levels of ozone and fine particulate matter in air and major direct dischargers to water are also areas with a higher proportion of residents living near a Large Dairy CAFO.

Because CAFOs in IA are so widespread throughout the state and because IA has a relatively racially homogeneous population, we also examined how swine CAFO locations in IA varied across age and education. Areas with higher-than-average percent of the population aged 70 and older have a larger proportion of the population living within 3 miles of a Large Swine CAFO, compared to areas where <8% of the population are aged 70 and older (the lowest quartile; Table 7). Additionally, areas where 5-47% of the population do not have a high school degree have a larger percent of the population living within 3 miles of a Large CAFO compared to areas where <5% of the adult population lacks a high school degree.

Conclusions

In the California study area, dairy CAFOs are disproportionately located near low-income communities and POC, particularly Hispanic and Native American residents. These are areas with other social vulnerabilities, including areas with more residents with disabilities, older residents, and lower socioeconomic status. In Iowa, swine CAFOs are located across the entire state, but especially located in rural areas that are very isolated from resources. As Iowa is predominantly White non-Hispanic with POC located mostly in the cities, a larger proportion of White non-Hispanic residents live near swine CAFOs in Iowa than POC. Swine CAFOs in IA tend to be located near older residents, who may have existing health issues, and near less educated residents. In the North Carolina study area, swine CAFOs are disproportionately located near POC, especially Native American, Hispanic, and Black residents, and in lower-income areas. Residents in these areas also have greater social vulnerabilities, including disabilities.

These results highlight the environmental injustice associated with the locations of CAFOs. This report builds on the existing literature documenting the disproportionate effect swine CAFOs have on Black, Hispanic, and Native American residents, and on low-income communities in North Carolina.[8,47,48] These same clear environmental justice issues with race and income are not seen in Iowa, as Iowa's history and demographics differ from NC, but very isolated and rural areas of Iowa are disproportionately impacted from CAFOs.[49] These are the first analyses to our knowledge that describe the disproportionate exposure of CA dairy CAFOs to Hispanic communities.

CAFOs pollute the air, water, and soil, harming the quality of life of nearby residents and producing inequitable health effects. CAFOs are often commonly densely located in vulnerable communities, where residents may have existing health conditions. These vulnerable communities may have reduced levels of political power or representation needed to self-determine and protect the quality of their environments. Decreasing CAFO density (especially in low-income, older, and systematically marginalized communities) and improving waste management systems and flood protection to inhibit manure release into the environment may mitigate some of CAFOs' disproportionate exposures and effects.

Tables and Figures

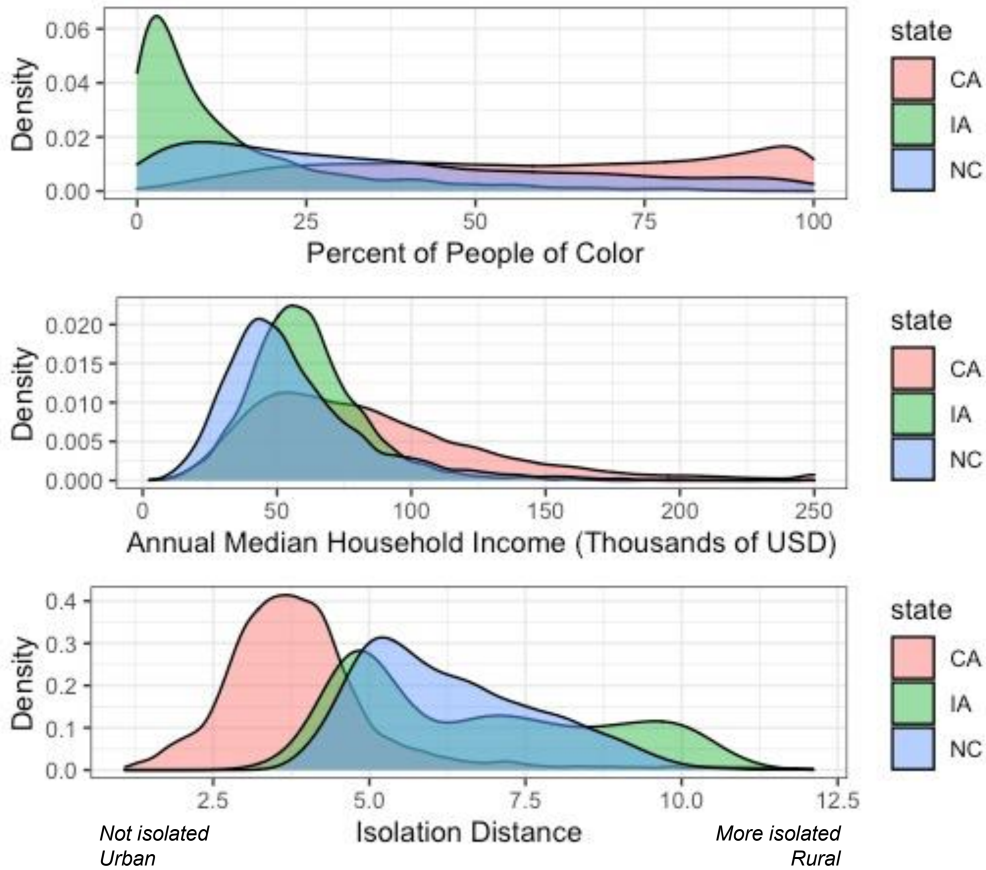


Figure 1. Statewide comparison of percent of people of color, annual median household income, and isolation distance (a measure of rurality; higher isolation distance indicates less access to resources and a more rural area), as shown in density graphs using census block group-level data from 2019 American Community Survey. Statewide, only a small percent of IA's population are people of color (POC), while CA contains many block groups with a high percent of POC, with NC falling somewhat between CA and IA. NC and IA have similar distributions of annual median household income, while CA contains many block groups with high median incomes. CA contains many more urban block groups than NC or IA, and IA has more very rural block groups than CA or IA.

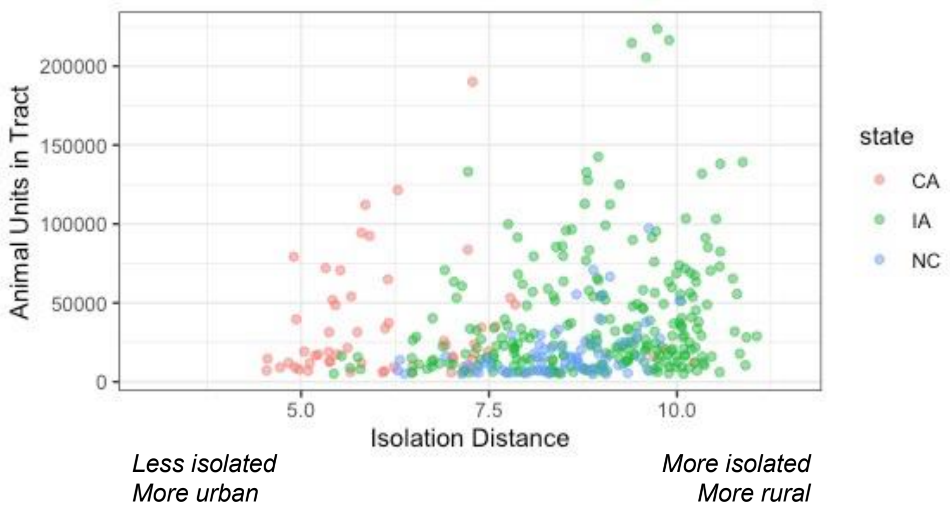


Figure 2. Number of animal units (AUs) of swine in North Carolina and Iowa and dairy cattle in California within Census tracts with over 5000 AUs by geographic isolation distance. Tracts with ≤5000 AUs were excluded for visual reasons because of the large numbers of these tracts (CA: 66 tracts, IA: 104, NC: 162 tracts). The continuous geographic isolation scale classifies every Census tract according to its access to resources; a higher isolation distance indicates less access to resources and a more rural area.[41] The tracts with the most dairy cattle in CA are much more urban than those of IA and NC; the tracts with the most swine in IA are much more rural than those of CA and IA.

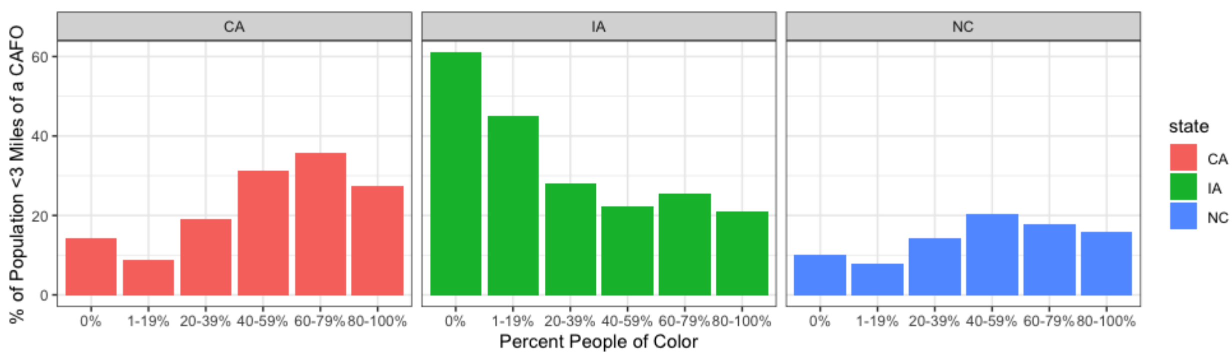


Figure 3. Percent of population living within 3 miles of any permitted dairy CAFO in CA, swine CAFO in IA, or swine CAFO in NC, within study area, by percent of people of color (POC) in census block. Areas with a higher percent of POC in CA and NC tend to have a larger proportion of their population living within 3 miles of a CAFO, while the opposite is true in IA.

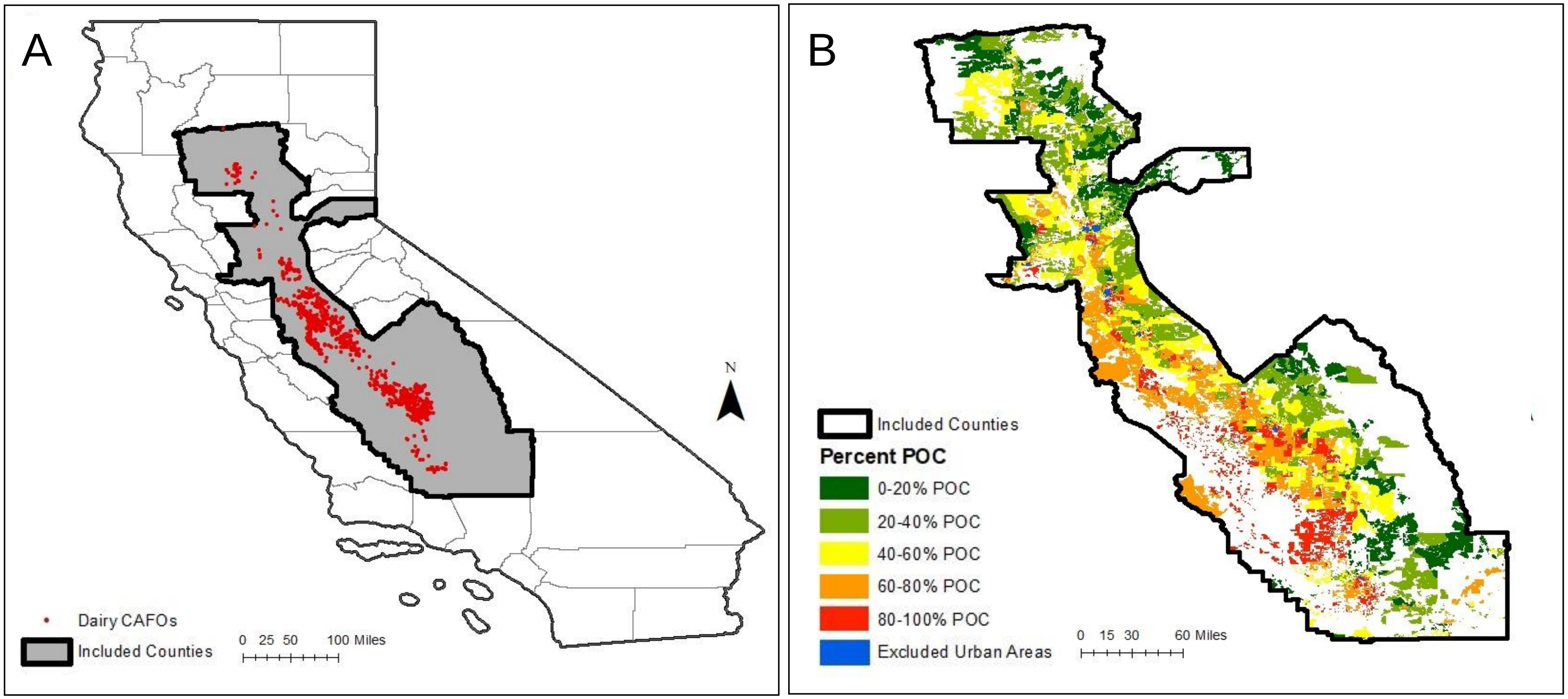


Figure 4. California (A) dairy cattle CAFOs and (B) census blocks categorized by people of color within study area. Urban areas and counties that do not contain CAFOs were excluded from study area and analysis. Dairy cattle CAFOs in CA tend to be located in areas with a higher percent of people of color (POC).

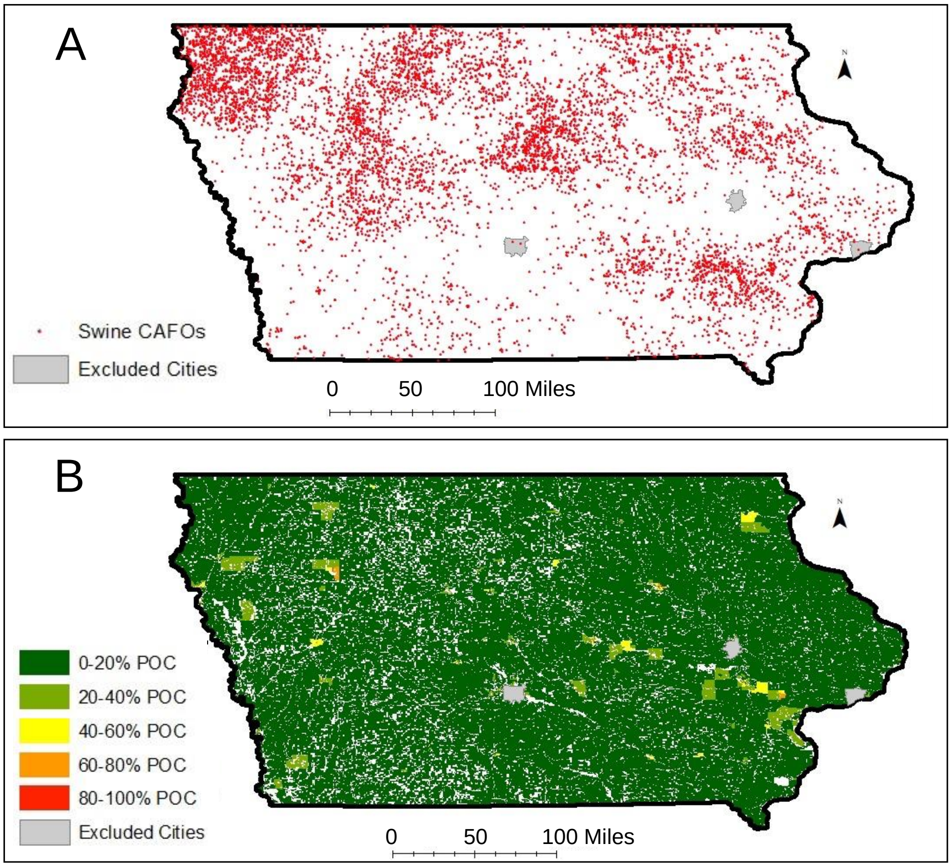


Figure 5. Iowa (A) swine CAFOs and (B) census blocks categorized by people of color (POC). The largest three cities in Iowa (populations >100,000) were excluded from study area and analysis. Swine CAFOs are located throughout IA, and there are very few blocks in IA with >40% POC.

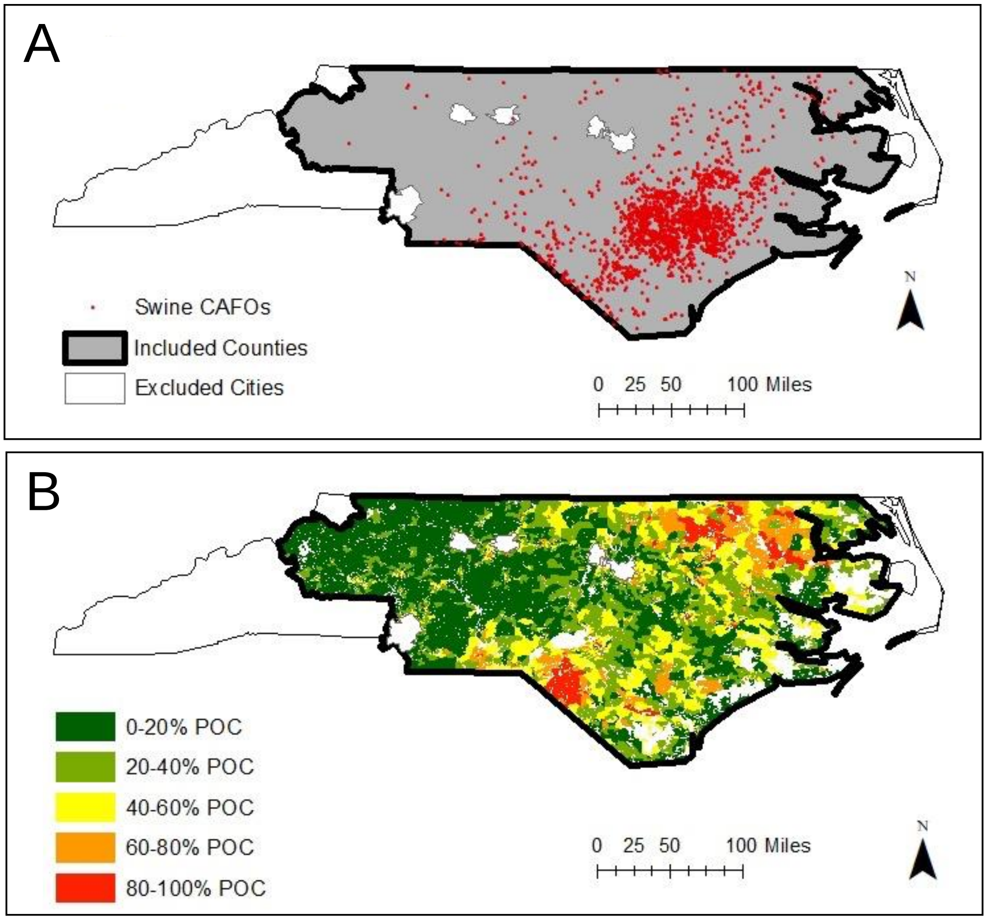


Figure 6. North Carolina (A) swine CAFOs and (B) census blocks categorized by people of color (POC). The largest five cities in North Carolina (populations>250,000) and counties that do not contain swine CAFOs and do not neighbor counties with swine CAFOs were excluded from study area and analysis. Swine CAFOs are concentrated in eastern NC where the percent of POC is higher than central/western NC.

Table 1. Ratios of POC, Black, Hispanic, and American Indian residents compared to non-Hispanic White residents living within 3 miles of a Large CAFO or a medium CAFO in CA, IA, and NC. In the CA study area, the percent of POC, Hispanic, and American Indian residents living within 3 miles of a Large Dairy CAFO is 1.29, 1.54, and 1.15, times higher, respectively, than the percent of non-Hispanic Whites. In the NC study area, percent of POC, Black, Hispanic, and American Indian residents living within 3 miles of a Large Swine CAFO is 1.42, 1.42, 1.57, and 2.20 times higher, respectively, than the percent of non-Hispanic Whites. In IA, the percent of POC living within 3 miles of a swine CAFO is lower than the percent of non-Hispanic Whites. Ratios above 1 indicate that the proportion of that racial/ethnic group living near a CAFO is higher that of non-Hispanic Whites, with a higher ratio indicating more exposure disparity. Ratios below 1 indicate that the proportion of that racial/ethnic group living near a CAFO is lower that of non-Hispanic Whites (the reference group). See Supplementary Table 1 for ratios of these racial/ethnicity groups within 3 miles of ***any*** *CAFO compared to non-Hispanic White residents.*

	Within 3 Miles of a Large CAFO				Within 3 Miles of a Medium CAFO				
Race/Ethnicity Category	Number of People	Percent of Population	Ratio[4]	P-value	Number of People	Percent of Population	Ratio[4]	P-value	Total Population
<u>CALIFORNIA</u>									
American Indian[1]	32,093	18.16	1.15	<0.0001	13,990	7.92	0.87	<0.0001	176,727
Asian	99,340	12.33	0.78	<0.0001	99,485	12.35	1.36	<0.0001	805,771
Black	56,679	12.12	0.76	<0.0001	44,049	9.42	1.04	<0.0001	467,687
Hispanic	647,950	24.43	1.54	<0.0001	225,697	8.51	0.94	<0.0001	2,651,833
Pacific Islander[2]	10,121	15.65	0.99	0.17	7145	11.05	1.21	<0.0001	64,673
Other Race	172,391	24.42	1.54	<0.0001	61,951	8.77	0.96	<0.0001	706,067
Multiracial	58,027	15.59	0.98	<0.0001	36,779	9.88	1.09	<0.0001	372,272
POC	807,133	20.44	1.29	<0.0001	369,267	9.35	1.03	<0.0001	3,949,451
White non-Hispanic	432,553	15.85	1	1	248,407	9.1	1	1	2,729,076
Total	1,239,686	18.56			617,674	9.25			6,678,526
<u>IOWA</u>									
American Indian[1]	4574	20.11	0.74	<0.0001	3029	13.32	0.81	<0.0001	22,747
Asian	7085	10.19	0.37	<0.0001	11,407	16.4	0.99	0.32	69,553
Black	11,289	12.13	0.45	<0.0001	8846	9.5	0.57	<0.0001	93,095
Hispanic	31,036	21.33	0.78	<0.0001	25,018	17.19	1.04	<0.0001	145,496
Pacific Islander[2]	1158	21.41	0.79	<0.0001	817	15.1	0.91	<0.0001	5409
Other Race	7064	22.26	0.82	<0.0001	5594	17.63	1.07	<0.0001	31,728
Multiracial	9115	18.34	0.67	<0.0001	6983	14.05	0.85	<0.0001	49,705
POC	52,509	16.12	0.59	<0.0001	48,096	14.76	0.89	<0.0001	325,832

White non-Hispanic	642,843	27.19	1	1	391,045	16.54	1	1	2,363,878
Total	695,353	25.85			439,142	16.33			2,689,711
<u>NORTH CAROLINA</u>									
American Indian[1]	29,327	18.54	2.20	<0.0001	11,708	7.4	1.75	<0.0001	158,167
Asian	7591	3.53	0.42	<0.0001	4009	1.87	0.44	<0.0001	214,790
Black	180,516	11.92	1.42	<0.0001	76,558	5.05	1.19	<0.0001	1,514,767
Hispanic	81,583	13.18	1.57	<0.0001	25,893	4.18	0.99	0.05	619,201
Pacific Islander[2]	1174	8.71	1.03	0.23	519	3.85	0.91	0.03	13,481
Other Race	21,772	10.94	1.30	<0.0001	8828	4.44	1.05	<0.0001	199,050
Multiracial	19,358	10.27	1.22	<0.0001	9220	4.89	1.15	<0.0001	188,550
POC[3]	292,306	11.97	1.42	<0.0001	114,861	4.7	1.11	<0.0001	2,442,211
White non-Hispanic	371,630	8.42	1.00	1	186,935	4.24	1.00	1	4,414,030
Total	663,936	9.68			301,797	4.4			6,856,241

[1]Includes all people who indicate they are American Indian or Alaska Native residents. Race/ethnic groups are not mutually exclusive; one person may be present in multiple categories; thus, the racial and ethnic categories do not sum to the total.
[2]Includes all people who indicate they are Native Hawaiian or other Pacific Islander.
[3]People of color (POC) was calculated as the total population minus the White non-Hispanic population.
[4]Ratio of the percent of people of other racial and ethnic groups to the percent of non-Hispanic Whites who live within 3 miles of a CAFO.

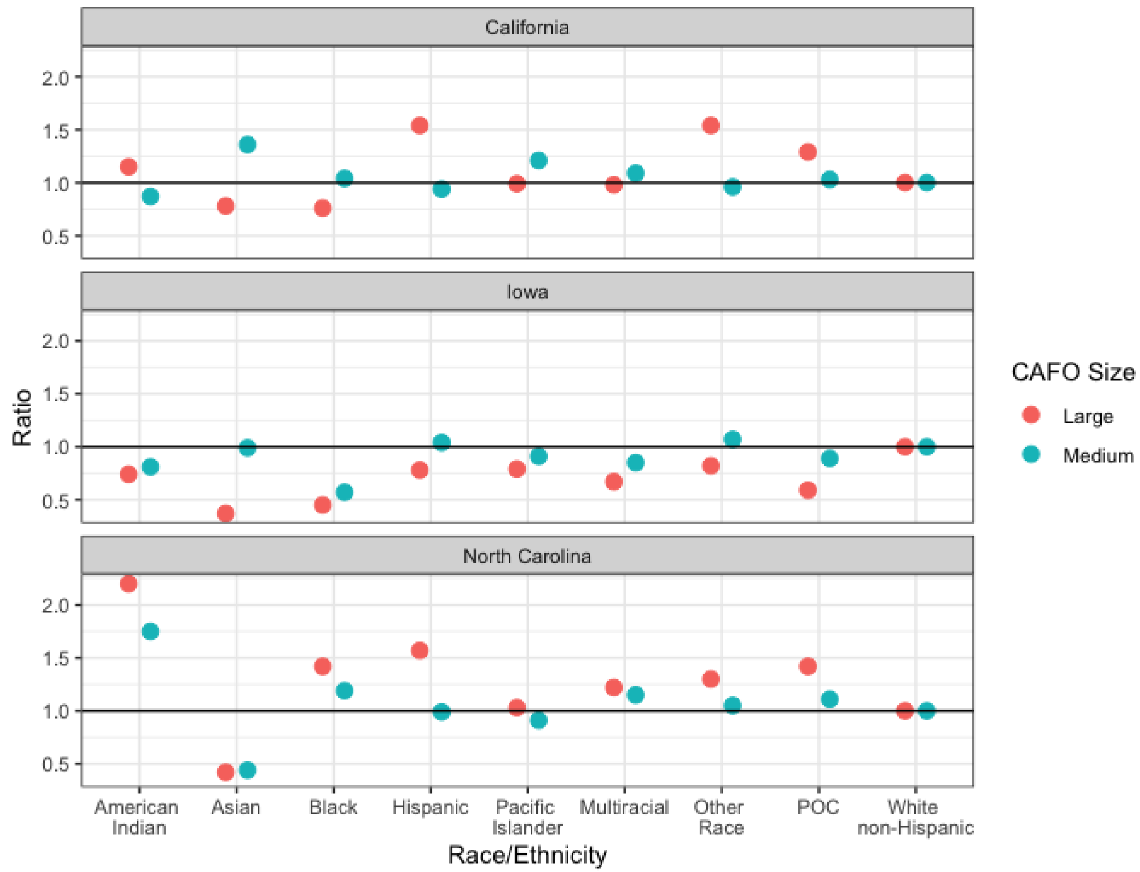


Figure 7. The ratio of residents by race/ethnicity group compared to non-Hispanic White residents living within 3 miles of a Large CAFO or a medium CAFO in CA, IA, and NC (visual representation of Table 1). Points above 1 (line on graph, the null value) indicate that the proportion of that race/ethnicity group living near a CAFO is higher than that of non-Hispanic White; points below 1 indicate that the proportion of that race/ethnicity group living near a CAFO is lower than that of non-Hispanic Whites. The ratios are farther from the null and more extreme when examining Large CAFOS than Medium CAFOs.

Table 2. Average difference in animal units within 3 miles of residents of blocks with varying percent of POC compared to blocks without POC (in CA analysis, blocks with 0-19% POC were used as the reference because very few blocks in the CA had 0% POC). In CA and NC, blocks with 40-100% POC contained many more animal units than blocks with 0-19% POC, although the opposite is true for IA.

	CALIFORNIA		IOWA		NORTH CAROLINA	
Percent POC	Unadjusted	Adjusted[1]	Unadjusted	Adjusted[1]	Unadjusted	Adjusted[1]
0%	(ref)	(ref)	(ref)	(ref)	(ref)	(ref)
1-19%	(ref)	(ref)	-918 (-1017, -818)	-88 (-185, 10)	57 (-37, 150)	273 (182, 364)
20-39%	606 (487, 725)	889 (771, 1007)	-2193 (-2306, -2080)	-798 (-910, -686)	247 (153, 340)	577 (486, 668)
40-59%	963 (847, 1080)	1400 (1284, 1516)	-2214 (-2358, -2071)	-761 (-903, -620)	434 (340, 529)	814 (722, 906)
60-79%	1139 (1024, 1254)	1657 (1542, 1772)	-2360 (-2562, -2158)	-794 (-991, -596)	701 (605, 797)	1120 (1027, 1214)
80-100%	742 (626, 858)	1366 (1250, 1483)	-2673 (-3108, -2237)	-1126 (-1547, -704)	272 (172, 372)	738 (641, 835)

[1]Adjusted for the rurality using the cubic natural log of the population density.

Table 3. Percent of population living within 3 miles of a CAFO by geographic isolation in census tract (no urban areas were removed from this analysis, although counties without dairy CAFOs were excluded in CA and counties without CAFOs and not neighboring CAFOs were removed in NC). A larger percent of residents in the very isolated areas reside near Large CAFOs, especially in IA. CA has more CAFOs in urban and suburban areas (not isolated and slightly isolated areas) compared to NC and IA.

		Any CAFO		Large CAFO		No CAFOs	
Geographic Isolation[1]	Total Population	Population within 3 miles	Percent of total population	Population within 3 miles	Percent of population	Population within 3 miles	Percent of population
CALIFORNIA							
Not isolated	968,916	179,276	18.50	102,727	10.60	789,640	81.50
Slighted Isolated	4,153,714	1,098,277	26.44	652,050	15.70	3,055,437	73.56
Somewhat Isolated	1,548,899	659,343	42.57	561,302	36.24	889,556	57.43
Very Isolated	826,878	219,194	26.51	181,117	21.90	607,684	73.49
IOWA							
Not isolated	63,416	0	0	0	0	63,416	100
Slighted Isolated	592,247	215,086	36.32	5167	0.87	377,161	63.68
Somewhat Isolated	1,020,296	204,412	20.03	101,762	9.97	815,884	79.97
Very Isolated	1,463,549	1,178,730	80.54	978,559	66.86	284,819	19.46
NORTH CAROLINA							
Not isolated	64,272	0	0	0	0	64,272	100
Slighted Isolated	1,112,242	0	0	0	0	1,112,242	100
Somewhat Isolated	4,054,306	60,594	1.49	27,435	0.68	3,993,712	98.505
Very Isolated	5,034,056	1,270,767	25.24	971,211	19.29	3,763,289	74.757

[1]A continuous geographic isolation scale that classifies census tract according to their access to resources was split into quartiles (based on national data) to create these categories.[41]

Table 4. Number of CAFOs within each Census tract, by geographic isolation (areas very isolated from resources are very rural areas). Almost all the Large CAFOs in IA and NC are in very isolated, rural areas, while the majority of Large CAFOs in CA are in less isolated areas (slightly and somewhat isolated areas, which correspond to small towns and suburban areas).

Geographic Isolation[1]	Number of Large CAFOs	Number of Medium CAFOs	Total CAFOs	Percent of Large CAFOs	Percent of Total CAFOs
CALIFORNIA					
Not isolated	1	1	2	0.15	0.19
Slightly isolated	15	17	32	2.22	3.12
Somewhat isolated	357	209	566	52.81	55.11
Very isolated	303	124	427	44.82	41.58
IOWA					
Not isolated	0	0	0	0	0
Slightly isolated	0	3	3	0	0.04
Somewhat isolated	18	50	68	0.52	0.89
Very isolated	3443	4085	7528	99.48	99.07
NORTH CAROLINA					
Not isolated	0	0	0	0	0
Slightly isolated	0	0	0	0	0
Somewhat isolated	1	2	3	0.09	0.15
Very isolated	1055	902	1957	99.91	99.85

[1]A continuous geographic isolation scale that classifies census tract according to their access to resources was split into quartiles (based on national data) to create these categories.[41]

Figure 8. Iowa census tracts by isolation category[14] and swine CAFOs. Swine CAFOs are spread across IA, especially in the very isolated areas.

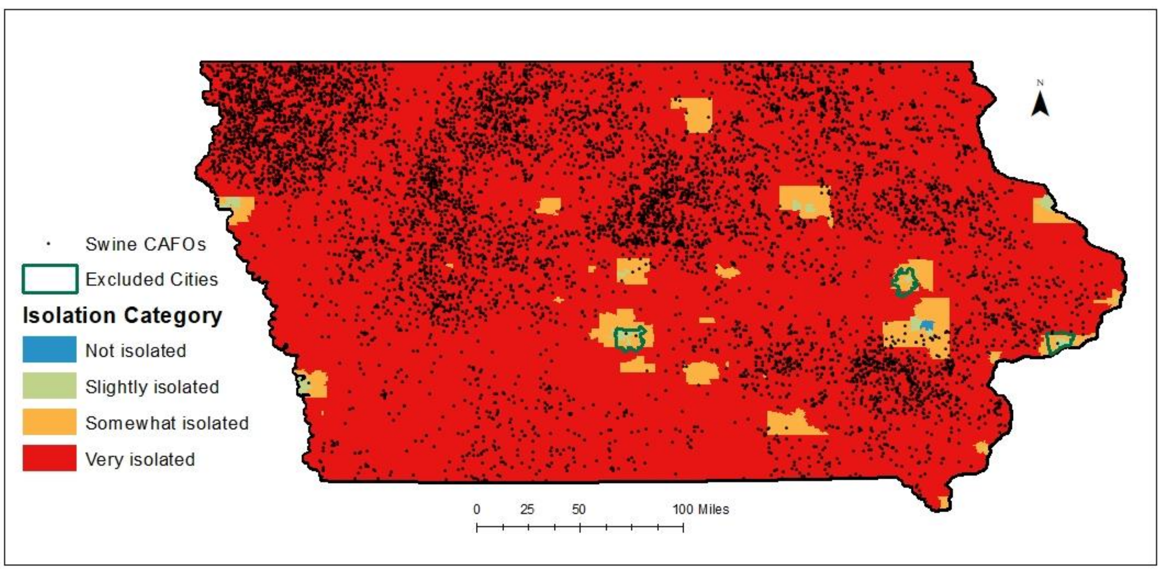


*Table 5. Percent of population living within 3 miles of a Large CAFO by percent of households below the 200% poverty level by Census tract. In CA and NC, areas with a high poverty level (i.e., ≥35% of households below the 200% poverty level) have a larger percent of their population living within 3 miles of a Large CAFO than areas with a low poverty level (<20% of households below the 200% poverty level). In contrast, in IA, areas with higher poverty levels (≥35%) have a lower percent of their population <3 miles of a Large CAFO than areas with lower poverty levels (<35%). See supplementary table 2 for poverty group populations within 3 miles of **any** CAFO.*

Percent of Households Below 200% Poverty Level	Population in Category <3 Miles of a Large CAFO	Total Population in Category	Percent of Population <3 Miles from Large CAFO	Ratio
CALIFORNIA				
Below 20%	90,933	908,350	10.01	(ref)
20-34%	537,205	2,755,714	19.49	1.95
35-49%	378,515	1,511,127	25.05	2.50
≥50%	417,234	1,747,992	23.87	2.38
IOWA				
Below 20%	227,068	780,581	29.09	(ref)
20-34%	627,157	1,251,271	50.12	1.72
35-49%	77,516	399,609	19.40	0.67
≥50%	2108	113,480	1.86	0.06
NORTH CAROLINA				
Below 20%	20,221	1,254,755	1.61	(ref)
20-34%	263,839	2,198,604	12.00	7.45
35-49%	474,940	2,022,555	23.48	14.58
≥50%	239,646	1,013,171	23.65	14.69

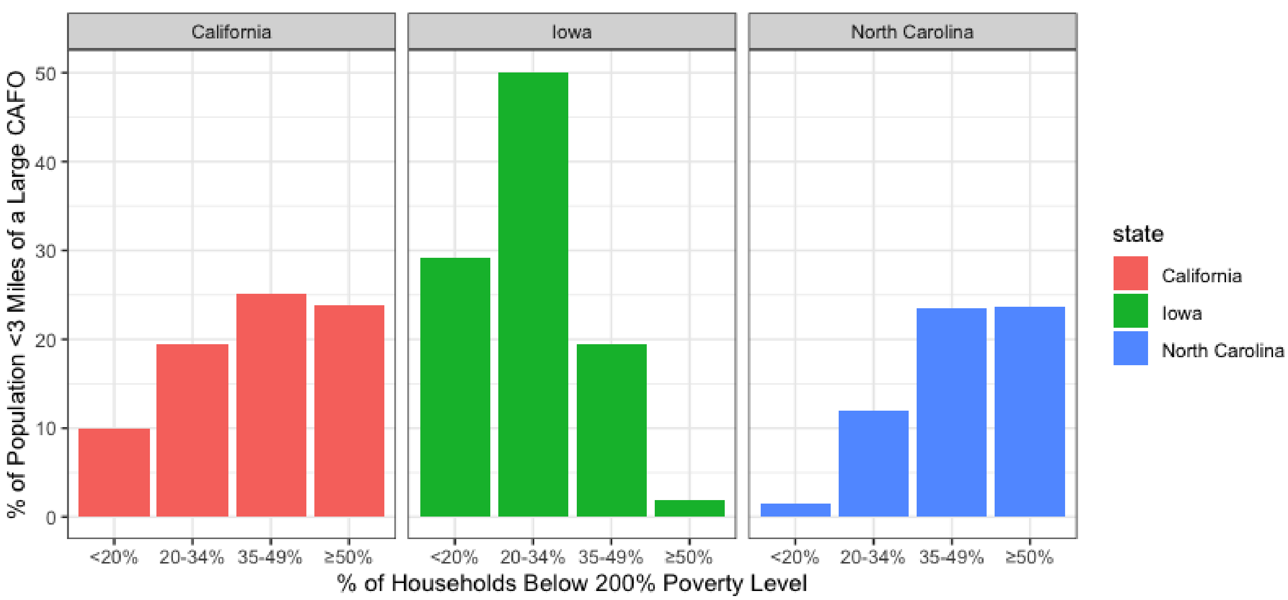


Figure 9. Percent of population living within 3 miles of a CAFO by percent of households below the 200% poverty level by Census tract (a visual representation of Table 5). In CA and NC, areas with a high poverty level (i.e., ≥35% of households below the 200% poverty level) have a larger percent of their population living within 3 miles of a Large

CAFO than areas with a low poverty level (<20% of households below the 200% poverty level). In contrast, in IA, areas with higher poverty levels (≥35%) have a lower percent of their population <3 miles of a Large CAFO than areas with lower poverty levels (<35%).

Table 6. Percent of population living within 3 miles of a Large CAFO by median household income in each block group. In CA and IA, fewer rich households (≥$90,000) live near Large CAFOs than poorer households.

Median Household Income Category ($)[1]	Population in Category within 3 Miles of a Large CAFO	Total Population in Category	Percent of Population within 3 Miles from a Large CAFO
CALIFORNIA			
<35,000	161,772	895,919	18.06
35,000-44,999	188,767	912,458	20.69
45,000-54,999	198,856	940,047	21.15
55,000-64,999	180,655	860,928	20.98
65,000-89,999	334,720	1,806,660	18.53
≥90,000	246,206	1678,126	14.67
IOWA			
<35,000	22,183	171,004	12.97
35,000-44,999	76,891	278,791	27.58
45,000-54,999	175,882	460,638	38.18
55,000-64,999	226,061	524,835	43.07
65,000-89,999	298,547	771,999	38.67
≥90,000	41,443	363,113	11.41
NORTH CAROLINA			
<35,000	141,127	892,668	15.81
35,000-44,999	207,714	1,222,393	16.99
45,000-54,999	180,850	1,244,261	14.53
55,000-64,999	118,621	982,463	12.07
65,000-89,999	88,930	1,263,368	7.04
≥90,000	0	864,988	0

[1]2019 block group median income from American Community Survey, urban areas excluded

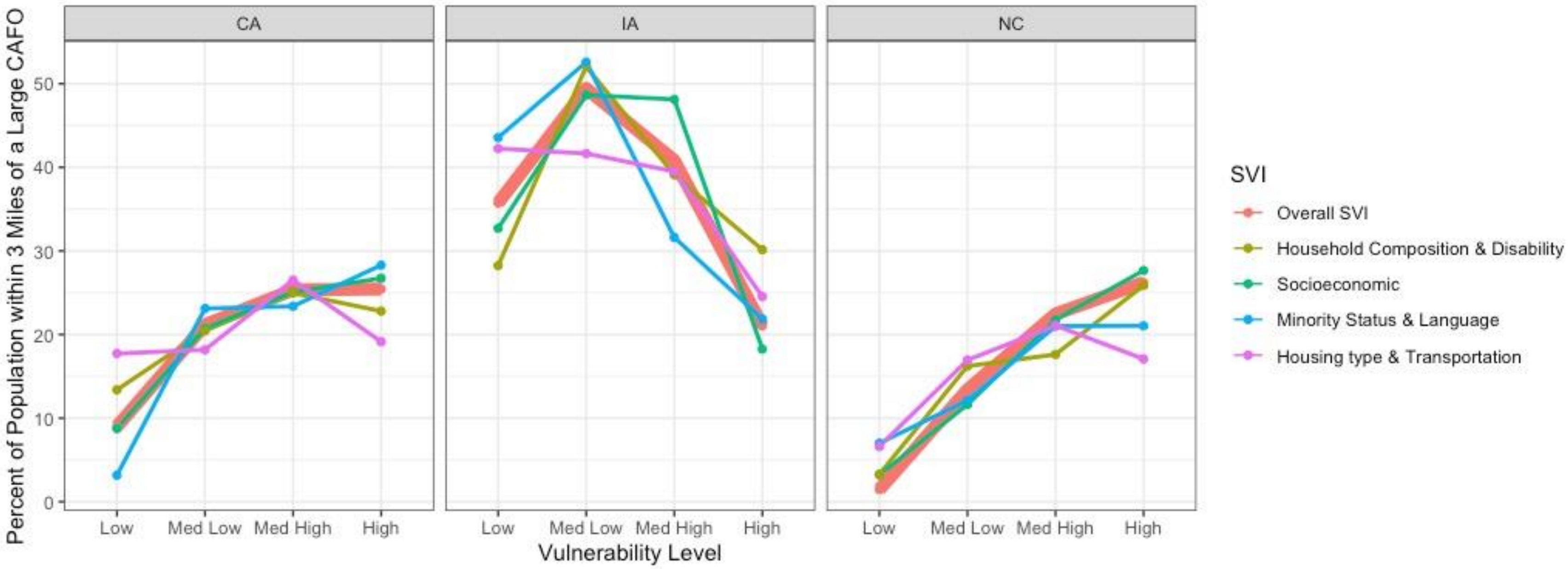


Figure 10. Percent of study population within 3 miles of a Large CAFO by varying levels of vulnerability, as measured by the social vulnerability index. Low, medium low, medium high, and high categories correspond to the state-specific social vulnerability quartiles. The thicker, peach-colored line represents the overall social vulnerability (SVI) that summarizes all categories. In CA and NC, as vulnerability increases, the percent of the population living near a Large CAFO also increases.

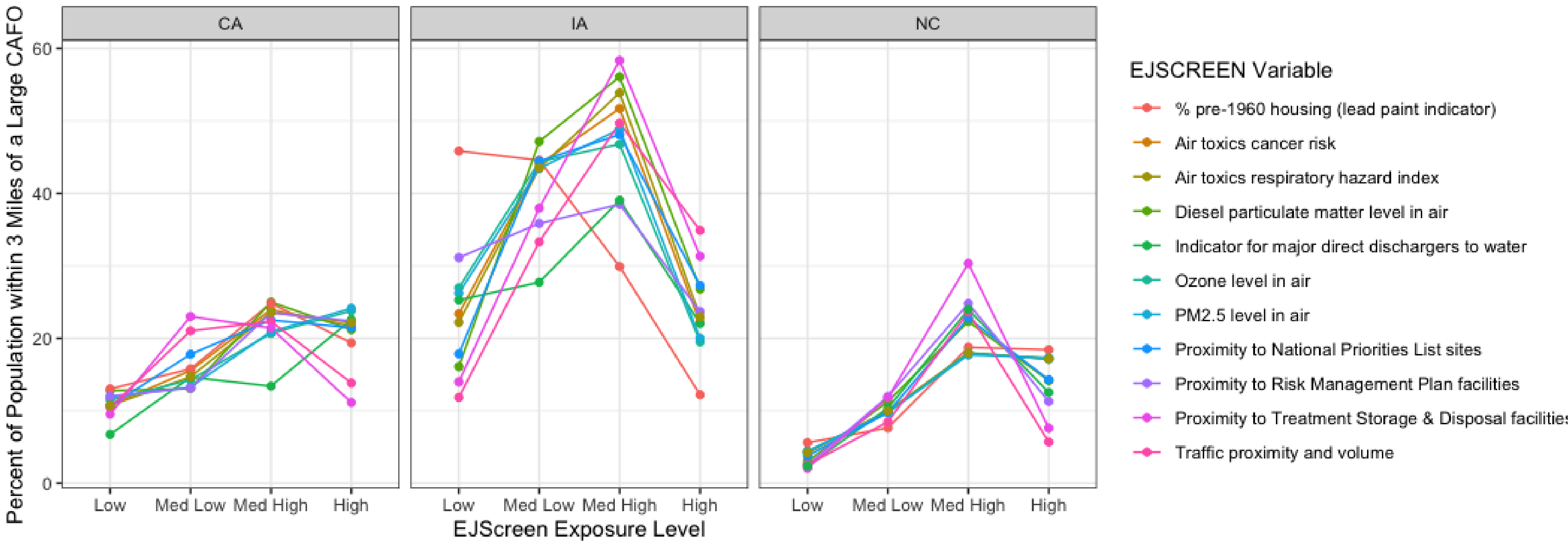


Figure 11. Percent of study population within 3 miles of a Large CAFO by varying levels of EJScreen exposure. Low, medium low, medium high, and high categories correspond to the state-specific quartiles for each EJSCREEN measure. In IA and NC, areas with medium high levels of various exposures, especially diesel particulate matter, major direct dischargers to water (not including CAFOs), traffic proximity and volume, and proximity to treatment storage and disposal facilities have higher proportions of the population living within 3 miles of a Large CAFO compared to areas with low levels of these exposures.

Table 7. Percent of population living in IA within 3 miles of a Large Swine CAFO in 2021 by percent of people aged 70 and older in census block group, within study area. In IA, areas with a low percent (<8%) of the population above age 70 also have a lower percent of the population living near swine CAFOs.

Percent of Population Age 70+	Total population	Population of adults age 70+	Total population <3 mile of a CAFO	Population of adults age 70+ <3 mile of a CAFO	Percent of total population <3 mile of a CAFO	Percent of population age 70+ <3 mile of a CAFO	Ratio
<8%	762,703	37,762	71,488	4329	9.37	11.46	1.00 (ref)
8-11%	696,104	69,640	168,030	17,008	24.14	24.42	2.13
12-15%	560,279	77,676	157,895	21,701	28.18	27.94	2.44
≥16%	582,628	122,171	133,819	27,005	22.97	22.10	1.93

Table 8. Percent of population living within 3 miles of a Large Swine CAFO in IA by percent of population with less than a high school degree in census block group, within study area. In IA, areas with a low percent (<5%) of adults without a high school degree (i.e., highly educated areas) have a lower percent of their population living near a swine CAFO than areas with a higher percent (≥5%) of the population without a high school degree.

Percent of Adults with less than a HS degree	Total population	Total population within 3 miles of a Large CAFO	Percent of population within 3 miles of a Large CAFO	Ratio
<5%	238,733	959,394	24.88	1.00
5-6%	261,096	500,098	52.21	2.10
6.5-10.5%	256,399	511,367	50.14	2.02
≥10.5%	177,621	574,082	30.94	1.24

References

1. *North Carolina Agricultural Statistics*. Raleigh, NC; 2017.
2. *California Agricultural Statistics*.; 2017.
3. *Putting Meat on the Table: Industrial Farm Animal Production in America*.; 2008. https://clf.jhsph.edu/sites/default/files/2019-05/putting-meat-on-the-table-exe-summary.pdf.
4. Mallin MA, Cahoon LB. Industrialized Animal Production—A Major Source of Nutrient and Microbial Pollution to Aquatic Ecosystems. *Popul Environ*. 2003;24(5):369-385. doi:10.1023/A:1023690824045
5. Cole D, Todd L, Wing S. Concentrated swine feeding operations and public health: a review of occupational and community health effects. *Environ Health Perspect*. 2000;108(8):685-699. doi:10.1289/ehp.00108685
6. Quick Stats - Iowa. United States Department of Agriculture National Agricultural Statistics Service. https://quickstats.nass.usda.gov/results/4D6EAC08-79F0-356F-A116-686396AA674E. Published 2021. Accessed February 20, 2022.
7. 2020 Iowa Pork Industry Facts. Iowa Pork Producers Association. https://www.iowapork.org/news-from-the-iowa-pork-producers-association/iowa-pork-facts/. Published 2020. Accessed October 21, 2021.
8. Wing S, Cole D, Grant G. Environmental injustice in North Carolina's hog industry. *Environ Health Perspect*. 2000;108(3):225-231.
9. Quick Stats - North Carolina. United States Department of Agriculture National Agricultural Statistics Service. https://quickstats.nass.usda.gov/#B0D8CA4E-F0DB-3D8B-B048-D4AFF1231F11. Published 2021. Accessed February 20, 2022.
10. Schinasi L, Horton RA, Guidry VT, Wing S, Marshall SW, Morland KB. Air pollution, lung function, and physical symptoms in communities near concentrated Swine feeding operations. *Epidemiology*. 2011;22(2):208-215. doi:10.1097/EDE.0b013e3182093c8b
11. Kravchenko J, Rhew SH, Akushevich I, Agarwal P, Lyerly HK. Mortality and Health Outcomes in North Carolina Communities Located in Close Proximity to Hog Concentrated Animal Feeding Operations. *N C Med J*. 2018;79(5):278-288. doi:10.18043/ncm.79.5.278
12. Wing S, Wolf S. Intensive livestock operations, health, and quality of life among eastern North Carolina residents. *Environ Health Perspect*. 2000;108(3):233-238. doi:10.1289/ehp.00108233
13. California: 2020 Census of Agriculture. United States Department of Agriculture. National Agricultural Statistics Service. https://www.nass.usda.gov/Quick_Stats/Ag_Overview/stateOverview.php?state=CALIFORNIA. Published 2020. Accessed February 23, 2022.
14. Watanabe N, Bergamaschi BA, Loftin KA, Meyer MT, Harter T. Use and environmental occurrence of antibiotics in freestall dairy farms with manured forage fields. *Environ Sci Technol*. 2010;44(17):6591-6600. doi:10.1021/es100834s
15. Actions for Cleaner Water. United States Environmental Protection Agency. https://www.epa.gov/sanjoaquinvalley/actions-cleaner-water. Accessed February 15, 2022.
16. Williams DL, Breysse PN, McCormack MC, Diette GB, McKenzie S, Geyh AS. Airborne cow allergen, ammonia and particulate matter at homes vary with distance to industrial scale dairy operations: an exposure assessment. *Environ Health*. 2011;10:72. doi:10.1186/1476-069X-10-72
17. Thompson JE. Airborne Particulate Matter: Human Exposure and Health Effects. *J Occup Environ Med*. 2018;60(5). https://journals.lww.com/joem/Fulltext/2018/05000/Airborne_Particulate_Matter__Human_Exposure_and.2.aspx.
18. Preller L, Heederik D, Boleij JS, Vogelzang PF, Tielen MJ. Lung function and chronic respiratory

symptoms of pig farmers: focus on exposure to endotoxins and ammonia and use of disinfectants. *Occup Environ Med*. 1995;52(10):654 LP - 660. doi:10.1136/oem.52.10.654
19. Hooiveld M, Smit LAM, van der Sman-de Beer F, et al. Doctor-diagnosed health problems in a region with a high density of concentrated animal feeding operations: a cross-sectional study. *Environ Health*. 2016;15:24. doi:10.1186/s12940-016-0123-2
20. Febriani Y, Levallois P, Lebel G, Gingras S. Association between indicators of livestock farming intensity and hospitalization rate for acute gastroenteritis. *Epidemiol Infect*. 2009;137(8):1073-1085. doi:10.1017/S0950268808001647
21. Anderson ME, Sobsey MD. Detection and occurrence of antimicrobially resistant E. coli in groundwater on or near swine farms in eastern North Carolina. *Water Sci Technol a J Int Assoc Water Pollut Res*. 2006;54(3):211-218. doi:10.2166/wst.2006.471
22. Antibiotic resistance. World Health Organization. https://www.who.int/news-room/fact-sheets/detail/antibiotic-resistance. Published 2018. Accessed June 8, 2019.
23. Burkholder J, Libra B, Weyer P, et al. Impacts of waste from concentrated animal feeding operations on water quality. *Environ Health Perspect*. 2007;115(2):308-312. doi:10.1289/ehp.8839
24. Guan TY, Holley RA. Pathogen survival in swine manure environments and transmission of human enteric illness--a review. *J Environ Qual*. 2003;32(2):383-392.
25. Heaney CD, Myers K, Wing S, Hall D, Baron D, Stewart JR. Source tracking swine fecal waste in surface water proximal to swine concentrated animal feeding operations. *Sci Total Environ*. 2015;511:676-683. doi:10.1016/j.scitotenv.2014.12.062
26. Thurston-Enriquez JA, Gilley JE, Eghball B. Microbial quality of runoff following land application of cattle manure and swine slurry. *J Water Health*. 2005;3(2):157-171.
27. LaurenC. Top Ten Hurricane Prone States. National Hurricane Center. https://www.national-hurricane-center.org/hurricane-news/top-ten-most-hurricane-prone-states. Published 2012. Accessed January 8, 2021.
28. Wing S, Freedman S, Band L. The potential impact of flooding on confined animal feeding operations in eastern North Carolina. *Environ Health Perspect*. 2002;110(4):387-391. doi:10.1289/ehp.02110387
29. Mallin MA, Posey MH, Shank GC, McIver MR, Ensign SH, Alphin TD. Hurricane effects on water quality and benthos in the Cape Fear watershed: natural and anthropogenic impacts. *Ecol Appl*. 1999;9(1):350-362.
30. *Climate Normals*.
31. Carter L, Jones J. *Climate Change Impacts in the United States: The Third National Climate Assessment*.; 2014. doi:10.7930/J0Z31WJ2
32. List of Permitted Animal Facilities. North Carolina Environmenta Quality. https://deq.nc.gov/cafo-map. Published 2020. Accessed April 27, 2021.
33. Iowa DNR Animal Feeding Operation. Iowa Department of Natural Resources. https://programs.iowadnr.gov/animalfeedingoperations/Default.aspx. Published 2021. Accessed October 1, 2021.
34. CIWQS Regulated Facility Report. California Environmental Protection Agency. https://ciwqs.waterboards.ca.gov/ciwqs/readOnly/CiwqsReportServlet?reportID=8210359&inCommand=drilldown&reportName=RegulatedFacilityDetail&program=ANIMALWASTE. Published 2021. Accessed November 1, 2021.
35. Regulatory Definitions of Large CAFOs, Medium CAFOs, and Small CAFOs. United States Environmental Protection Agency. https://www3.epa.gov/npdes/pubs/sector_table.pdf. Accessed September 1, 2021.
36. Animal Manure Management. United States Department of Agriculture Natural Resources

Conservation Service.
https://www.nrcs.usda.gov/wps/portal/nrcs/detail/null/?cid=nrcs143_014211. Published 1995. Accessed September 1, 2021.
37. Pietrosemoli S, Green J, Bordeaux C, Menius L, Curtis J. *Conservation Practices in Outdoor Hog Production Systems: Findings and Recommendations from the Center for Environmental Farming Systems*. Raleigh, NC; 2012.
38. Casey JA, Shopsin B, Cosgrove SE, et al. High-density livestock production and molecularly characterized MRSA infections in Pennsylvania. *Environ Health Perspect*. 2014;122(5):464-470. doi:10.1289/ehp.1307370
39. Kilburn KH. Human impairment from living near confined animal (hog) feeding operations. *J Environ Public Health*. 2012;2012:565690. doi:10.1155/2012/565690
40. Census Bureau Releases Estimates of Undercount and Overcount in the 2020 Census. United States Census Bureau. https://www.census.gov/newsroom/press-releases/2022/2020-census-estimates-of-undercount-and-overcount.html. Published 2022. Accessed March 21, 2022.
41. Doogan NJ, Roberts ME, Wewers ME, Tanenbaum ER, Mumford EA, Stillman FA. Validation of a new continuous geographic isolation scale: A tool for rural health disparities research. *Soc Sci Med*. 2018;215:123-132. doi:10.1016/j.socscimed.2018.09.005
42. Registry USA for TS and D. Social Vulnerability Index. https://www.atsdr.cdc.gov/placeandhealth/svi/data_documentation_download.html. Published 2018. Accessed October 1, 2021.
43. EJScreen. United States Environmental Protection Agency. www.epa.gov/ejscreen. Published 2020. Accessed February 10, 2022.
44. Amrhein V, Greenland S. Remove, rather than redefine, statistical significance. *Nat Hum Behav*. 2018;2(1):4. doi:10.1038/s41562-017-0224-0
45. McShane BB, Gal D, Gelman A, Robert C, Tackett JL. Abandon Statistical Significance. *Am Stat*. 2019;73(sup1):235-245. doi:10.1080/00031305.2018.1527253
46. Wasserstein RL, Lazar NA. The ASA Statement on p-Values: Context, Process, and Purpose. *Am Stat*. 2016;70(2):129-133. doi:10.1080/00031305.2016.1154108
47. Wing S, Johnston J. Industrial Hog Operations in North Carolina Disproportionately Impact African-Americans, Hispanics and American Indians. *Title VI Complain*. 2014.
48. Son J-Y, Muenich RL, Schaffer-Smith D, Miranda ML, Bell ML. Distribution of environmental justice metrics for exposure to CAFOs in North Carolina, USA. *Environ Res*. 2021;195:110862. doi:10.1016/j.envres.2021.110862
49. Carrel M, Young SG, Tate E. Pigs in Space: Determining the Environmental Justice Landscape of Swine Concentrated Animal Feeding Operations (CAFOs) in Iowa. *Int J Environ Res Public Heal* . 2016;13(9). doi:10.3390/ijerph13090849

Supplementary Table 1. Ratios of POC, Black, Hispanic, and American Indian residents compared to non-Hispanic White residents living within 3 miles of <u>any</u> CAFO in CA, IA, and NC. In the CA study area, the percent of Hispanic residents living within 3 miles of <u>any</u> dairy CAFO is 1.32 times higher than the percent of non-Hispanic Whites. In the NC study area, percent of Black, Hispanic, and American Indian residents living within 3 miles of any swine CAFO is 1.34, 1.37, and 2.05 times higher, respectively, than the percent of non-Hispanic Whites. In IA, the percent of POC living within 3 miles of any swine CAFO is lower than that of non-Hispanic Whites.

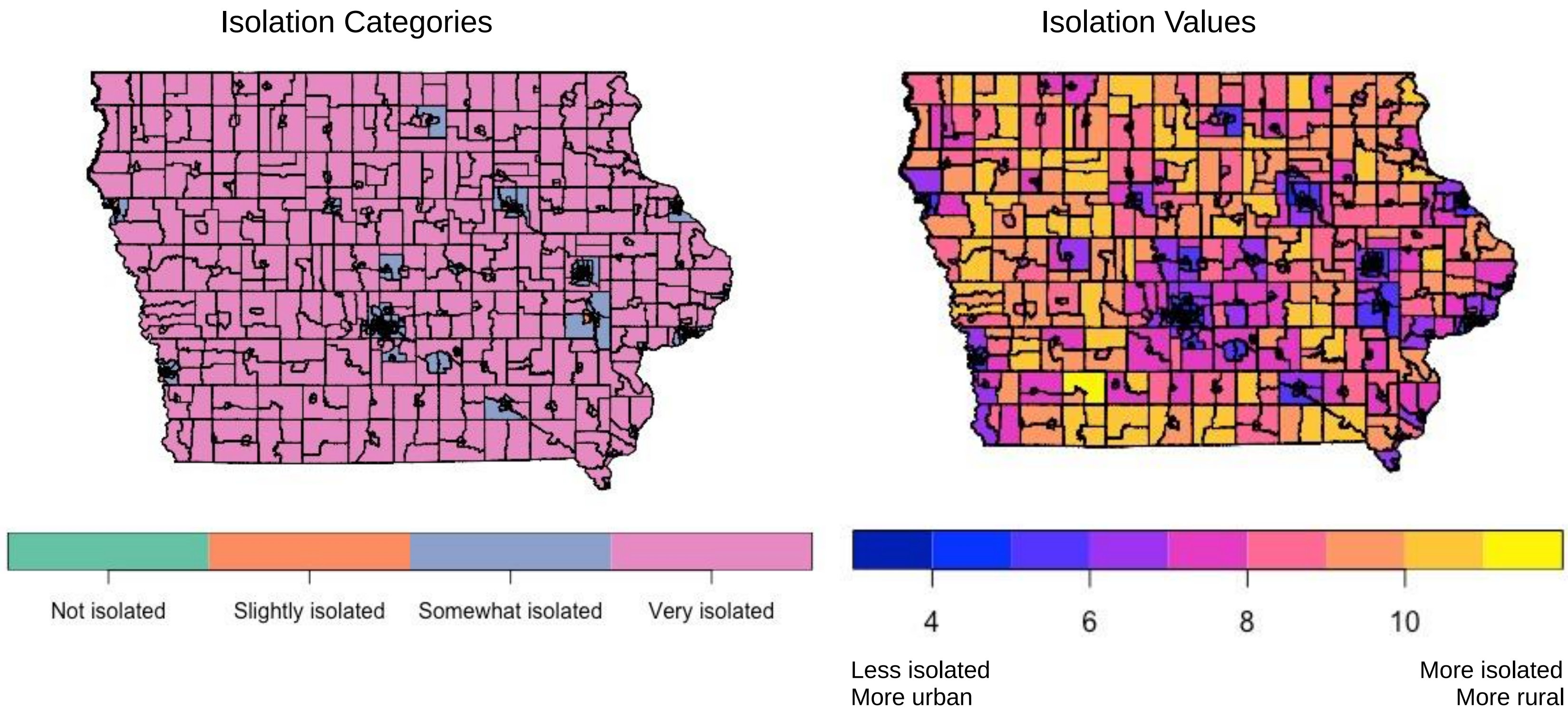
	Within 3 Miles of any CAFO				
Race/Ethnicity Category	Number of People	Total Population	Percent of Population	Ratio[4]	P-value
CALIFORNIA					
American Indian[1]	46,083	176,727	26.08	1.05	<0.0001
Asian	198,825	805,771	24.68	0.99	<0.0001
Black	100,729	467,687	21.54	0.86	<0.0001
Hispanic	873,647	2,651,833	32.95	1.32	<0.0001
Pacific Islander[2]	17,266	64,673	26.7	1.07	<0.0001
Other Race	234,342	706,067	33.19	1.33	<0.0001
Multiracial	94,806	372,272	25.47	1.02	<0.0001
POC	1,176,400	3,949,451	29.79	1.19	<0.0001
White non-Hispanic	680,960	2,729,076	24.95	1	1
Total	1,857,360	6,678,526	27.81		
IOWA					
American Indian[1]	7603	22,747	26.08	0.76	<0.0001
Asian	18,492	69,553	24.68	0.61	<0.0001
Black	20,135	93,095	21.54	0.49	<0.0001
Hispanic	56,054	145,496	32.95	0.88	<0.0001
Pacific Islander[2]	1975	5409	26.7	0.83	<0.0001
Other Race	12,658	31,728	33.19	0.91	<0.0001
Multiracial	16,098	49,705	25.47	0.74	<0.0001
POC	100,606	325,832	29.79	0.71	<0.0001
White non-Hispanic	1,033,889	2,363,878	24.95	1	1
Total	1,134,495	2,689,711	27.81		
NORTH CAROLINA					
American Indian[1]	41,035	158,167	25.94	2.05	<0.0001
Asian	11,600	214,790	5.4	0.43	<0.0001
Black	257,074	1,514,767	16.97	1.34	<0.0001
Hispanic	107,476	619,201	17.36	1.37	<0.0001
Pacific Islander[2]	1693	13,481	12.56	0.99	0.74
Other Race	30,600	199,050	15.37	1.22	<0.0001
Multiracial	28,579	188,550	15.16	1.2	<0.0001
POC[3]	407,168	2,442,211	16.67	1.32	<0.0001
White non-Hispanic	558,566	4,414,030	12.65	1	1
Total	965,733	6,856,241	14.09		

[1]Includes all people who indicate they are American Indian or Alaska Native residents. Race/ethnic groups are not mutually exclusive; one person may be present in multiple categories; thus, the racial and ethnic categories do not sum to the total.
[2]Includes all people who indicate they are Native Hawaiian or other Pacific Islander.
[3]People of color (POC) was calculated as the total population minus the White non-Hispanic population.
[4]Ratio of the percent of people of other racial and ethnic groups to the percent of non-Hispanic Whites who live within 3 miles of a CAFO.

Supplementary Table 2. Percent of population living within 3 miles of ***any*** *CAFO by percent of households below the 200% poverty level by Census tract. In CA and NC, areas with a high poverty level (i.e., ≥35% of households below the 200% poverty level) have a larger percent of their population living within 3 miles of a Large CAFO than areas with a low poverty level (<20% of households below the 200% poverty level). In contrast, in IA, areas with higher poverty levels (≥35%) have a lower percent of their population <3 miles of a Large CAFO than areas with lower poverty levels (<35%).*

Percent of Households Below 200% Poverty Level	Population in Category <3 Miles of any CAFO	Total Population in Category	Percent of Population <3 Miles from Large CAFO	Ratio
CALIFORNIA				
Below 20%	362,826	1,673,184	21.68	1.00
20-34%	580,035	1,990,880	29.13	1.34
35-49%	576,616	1,511,127	38.16	1.76
≥50%	550,360	1747,992	31.49	1.45
IOWA				
Below 20%	278,996	780,581	35.74	1.00
20-34%	759,383	1,251,271	60.69	1.70
35-49%	101,825	399,609	25.48	0.71
≥50%	2108	113,480	1.86	0.05
NORTH CAROLINA				
Below 20%	42,595	1,254,755	3.39	1.00
20-34%	365,619	2,198,604	16.63	4.90
35-49%	635,957	2,022,555	31.44	9.26
≥50%	287,190	1,013,171	28.35	8.35

Supplementary Figure 1. Percent of population living within 3 miles of a CAFO by median household income in each block group (a visual of Table 6). In CA and IA, fewer rich households (≥$90,000) live near Large CAFOs than poorer households.



Supplementary Figure 2. Isolation categories and isolation values highlighting how widespread very isolated, rural areas are in Iowa.

Exhibit 6

DECLARATION OF LARRY BALDWIN

I, LARRY BALDWIN, declare and state as follows:

1. I am 66 years old, and I live in New Bern, North Carolina. I have devoted much of my life to combatting water pollution, especially water pollution from concentrated animal feeding operations ("CAFOs"). I currently work for Waterkeeper Alliance ("Waterkeeper") as the Campaign Coordinator for the Pure Farms, Pure Waters North Carolina campaign, and I've held this position since June 2021.

2. Waterkeeper is the largest and fastest-growing nonprofit focused solely on clean water. We fight for every community's right to drinkable, fishable, and swimmable water, and we work to hold polluters accountable. Consistent with our mission, Waterkeeper connects more than 300 member and affiliate organizations worldwide, including multiple Riverkeeper organizations headed by individual Riverkeepers.

3. Prior to my current position, I spent nearly 20 years working with Riverkeeper and Waterkeeper affiliate organizations. From 2002 to 2011, I was the Lower Neuse Riverkeeper, overseeing a river in a watershed with a high concentration of CAFOs. In 2011, I joined Waterkeeper as the North Carolina CAFO Coordinator. In that role, I worked with eight Riverkeeper programs throughout North Carolina to end the stranglehold that the CAFO industry has on communities and the environment. From 2016 to 2021, I was the Crystal Coast Waterkeeper, overseeing a group of rivers, creeks, and coastal waters.

4. As the Campaign Coordinator for the Pure Farms, Pure Waters North Carolina campaign, I help to lead the campaign, which focuses on calling attention to polluting practices at CAFOs, ensuring that CAFOs comply with federal law, and supporting independent and responsible family farmers. In addition, I help to train, manage, and coordinate Riverkeepers

working on CAFO pollution across North Carolina. And I partner with clean water and community advocates combatting CAFO pollution across the United States and internationally.

5. CAFOs generate a staggering amount of waste. Each pig produces about 10 times as much waste as a human being. So, a CAFO with 2500 swine produces roughly as much waste as a city with 25,000 people. Most cities have some sort of system for the treatment of human waste, but swine CAFOs generally do not. Instead, swine CAFOs typically store liquid waste in large pits, which the industry calls "lagoons." I think "cesspool" is a more accurate term. After enough waste builds up in a storage pit, CAFO workers spray it across nearby fields. But most CAFOs don't have enough land to absorb the volume of waste they generate, and it's expensive to move liquid waste very far. So, in my experience, CAFO operators typically overapply waste to the land they have, and they allow the excess to leach into groundwater or wash off fields into surface waters.

6. At Waterkeeper and our partner organizations, monitoring water quality and collecting water samples are important components of our work. All our samples are collected from public locations; we do not trespass. When we find evidence of CAFO pollution, we work to identify the facility responsible. Our work is challenging, in part, because discharges from land application sites to surface water are often intermittent. Unlike some other industrial facilities, a CAFO might discharge a substantial amount of water pollution from a land application site on one day and very little on another day. The amount of discharge depends on a variety of factors, including the CAFO's schedule for applying waste, its application methods, and the amount of precipitation. In addition, CAFO operators are aware of our work, and I believe that some operators change their behavior to avoid detection. For example, when we're

monitoring water quality from the air, we sometimes see people at CAFOs spot our plane, jump into pickup trucks, and rush to shut off the equipment that is spraying waste onto fields.

7. Although some water pollution from CAFOs can be intermittent, I do not believe that it is possible for CAFOs to avoid pollution altogether. This is especially true for Large CAFOs using wet manure management systems. Over the years, my colleagues and I have collected evidence of ubiquitous water pollution from CAFOs both through our water sampling and through our direct observations of discharges. The source of the problem, in my opinion, is apparent from the first word of the acronym: CAFOs are *concentrated*. The defining characteristic of a CAFO—that is, confining hundreds or thousands of animals in an enclosed space while they generate tremendous quantities of urine and feces—is a recipe for disaster. Not too long ago, there were more than 20,000 farms raising swine in North Carolina. Now, there are about 2,300 swine CAFOs, and they confine a larger number of swine overall. The CAFO industry and its allies like to characterize CAFOs as "farms," but that term conjures up images of idyllic green pastures and happy animals, like a real-life "Charlotte's Web." The truth is that CAFOs are industrial facilities, and they pollute on an industrial scale.

8. Based on my experience and observations, most CAFO operators do not spray animal waste on fields solely to fertilize those fields. Some CAFOs grow only Bermuda grass and other crops of very little value, so they don't have much of an incentive to fertilize. And CAFOs that grow more valuable crops, such as hay and alfalfa, sometimes leave baled crops on the fields. Eventually, the nutrients in those crops seep back into the soil, making it more likely that future waste applications will cause water pollution discharges. I've even seen baled crops dumped in wetlands.

9. In my opinion, the primary object of spraying waste is waste disposal. The CAFO industry has done a great job of hiding this reality, and they've worked to drive a wedge between environmentalists and community advocates, on one side, and CAFO operators, on the other. But I don't want to put CAFO operators out of business, and neither do my colleagues or partners. We want to put them out of the business of *pollution*. And, right now, pollution is a key part of the CAFO industry's business model. I believe it's possible to raise animals while respecting your fellow man and the environment. The first step is acknowledging your impact and obtaining necessary permits, just as family businesses in other industries do every day, all across the country. In my opinion, many CAFO operators want to do the right thing, but the structure of the industry makes it difficult.

10. The problem isn't only that animals are concentrated in CAFOs, but also that CAFOs are concentrated in certain parts of North Carolina, where they inflict disproportionate harm on Black, Latinx, Native American, and low-income communities. I do not believe that this concentration is accidental. Instead, I believe that the CAFO industry deliberately targets the communities with the least political and financial power. In my opinion, North Carolinians can do better than disrespecting our neighbors for the false promise of cheap meat. Under-regulated CAFOs don't really produce cheap meat anyway. They just shift the costs onto the people living next-door, who bear the brunt of CAFO pollution.

11. Over the years, I have seen the harm that CAFO pollution causes to people living in environmental justice communities in North Carolina, and I have spoken to many community members about their experiences. It is heart-wrenching. CAFO pollution is an ever-present, pervasive problem that community members can see, smell, and taste every day. Adding insult to injury, I have heard people suggest that anyone living near a CAFO should move away if they

don't like the pollution. But the communities were there first, and some families have deep roots in areas where CAFOs now are densely concentrated. Even if people wanted to leave, it's difficult to do so because CAFOs have damaged their health and driven down the value of their property.

12. I do not believe that CAFO operators set out to harm their neighbors or pollute the water. Instead, I think the CAFO industry and our current regulatory system incentivize unsustainable practices. A few major corporations control most animal production in this country, and it's not surprising that those corporations seek to maximize profits, while shifting the burdens of pollution elsewhere. That's why we need government agencies to provide oversight. Right now, I believe our agencies are failing.

13. It's my understanding that the North Carolina Department of Environmental Quality ("NC DEQ") inspects CAFOs only once each year. Those inspections are scheduled two weeks in advance, which means that CAFO operators have an opportunity to prepare for inspections by temporarily obscuring any obvious problems at their facilities. In addition, the inspections last only about 45 minutes, and inspectors often rely on a CAFO's self-created records instead of reaching their own conclusions by walking around the facility. As long as a CAFO operator claims that they comply with all relevant rules, inspectors seem to take their word for it.

14. Even when Waterkeeper and its partners present clear evidence of water pollution, NC DEQ usually ignores the evidence and fails to address the problem. One Riverkeeper, who focuses on the Catawba River, has filed over 600 complaints about water pollution from CAFOs. Even though he includes evidence to support his complaints, absolutely nothing has changed. I've had similar experiences myself, going back years. NC DEQ isn't even required to keep

complainants informed about the status of their complaints unless the agency issues a violation. It's very frustrating for Riverkeepers and others to spend time gathering evidence and making complaints, only to be ignored by the agency. I suspect that, instead of issuing violations, NC DEQ calls CAFO operators to warn them about our monitoring.

15. The time has come for the U.S. Environmental Protection Agency to ensure that all discharging CAFOs obtain National Pollutant Discharge Elimination System ("NPDES") permits, as required under the Clean Water Act. Unfortunately, NC DEQ is not doing its job, and we can't count on state lawmakers, because too many of them have close ties to the CAFO industry. Based on my experience, I believe NPDES permits help to increase transparency and reduce pollution. Many other industrial facilities obtain NPDES permits, comply with the CWA, respect their neighbors, and remain profitable. There's no reason why CAFOs should be treated differently.

I declare under penalty of perjury that, to the best of my knowledge, the foregoing is true and correct. Executed this 24TH day of October 2022.

Larry Baldwin

Exhibit 7

DECLARATION OF KATHRYN BARTHOLOMEW

I, KATHRYN BARTHOLOMEW, declare and state as follows:

1. I am 58 years old, and I live at [redacted] Schuyler County, New York. Schuyler County is a rural, agricultural area with a population of less than 18,000 people, located in New York's Finger Lakes region. My family's roots in this area go back six generations, and I have lived here my entire life. I care deeply about the natural resources and beauty of Schuyler County and the entire Finger Lakes region. I love to spend time walking through the woods, past gorges and waterfalls, and along the beach at nearby Seneca Lake. Since 2004, I have been the Chair of the Schuyler County Environmental Management Council.

2. I am dismayed by the increasing presence of concentrated animal feeding operations ("CAFOs") in Schuyler County and throughout the Finger Lakes region. Most of the farms in this area are small. However, large CAFOs started operating here in the early 1990s, and every year, CAFO owners build more confinement barns; purchase more fields to grow corn, soybeans, and alfalfa for their cows; and construct more slurry lagoons to hold their cows' urine and feces. CAFOs have also begun to partner with energy companies to construct biodigesters, which capture methane from slurry lagoons to make biogas.[1] I'm concerned that CAFOs will use the biogas projects as a means to further justify their existence. It seems that CAFOs are always expanding, and I am

[1] *See Bergen Farms, Glenview Dairy Sign on for Renewable Natural Gas Project in Schuyler*, The Odessa File (Sept. 12, 2022), http://www.odessafile.com/government.html.

worried that this expansion—without proper regulation—will endanger our community and environment.

3. CAFOs threaten every ecosystem in our watershed, particularly our water. Seneca Lake holds half of the water in all the Finger Lakes, and along with other members of my community, I am concerned about threats to its water quality. Several brooks and creeks in Schuyler County already are officially designated as "impaired" because of problems associated with CAFO manure.[2] Seneca Lake itself has been affected by harmful algal blooms, which experts link to manure runoff.[3] As CAFOs in this area expand in number and size, I am concerned that they might pose a serious threat to our water supply. There's only so much potable water, and serious contamination could take years to repair. Even though my drinking water comes from a deep well, I get it checked regularly to make sure that it is safe.

4. In addition to threatening our water, CAFO manure also produces an awful smell. I grew up across the street from a dairy farm, so I am used to the smell of cow patties; the smell of CAFO manure is something of another order altogether. I live three miles from

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[2] *See* N.Y. Dep't of Env't Conservation, 2018 Section 303(d) List of Impaired Waters Requiring a TMDL/Other Strategy, at 5, 23 (June 2020), https://www.dec.ny.gov/docs/water_pdf/section303d2018.pdf (listing Reeder Creek and Pond Brook as impaired for phosphorous and dissolved oxygen).

[3] *See* Kelly Coughlin & David Youst, *Seneca Lake Water Quality Overview* (Oct.2017), https://senecalake.org/resources/Documents/Water%20Quality/Publications/Seneca%20Lake%20Water%20Quality%20Overview%20Oct%202017.pdf (reporting high phosphorus levels and increasing numbers of harmful algal blooms in Seneca Lake and its tributaries); *see also* Patricia Glibert, *From Hogs to HABs: Impacts of Industrial Farming in the US on Nitrogen and Phosphorous and Greenhouse Gas Pollution*, 150 Biogeochemistry 139 (2020) (explaining that water pollution from CAFOs can lead to harmful algal blooms).

the closest CAFO, and I feel fortunate that I cannot smell the slurry lagoons at this distance. However, the CAFO applies slurry to corn and alfalfa fields adjacent to my property, and I find the smell of that slurry to be extremely unpleasant. After the CAFO workers spray the slurry, I won't hang my laundry outside because of the odor. In other areas of Schuyler County, where there are larger CAFOs closer together, the smell is truly terrible; when I drive by, I have to roll up my windows and hold my breath.

5. I am lucky that the CAFO closest to my home is operated reasonably well. To my knowledge, it complies with state and federal laws. Apart from two instances that I have witnessed, the CAFO workers generally do not apply slurry to the land when rain or snow is in the forecast. The CAFO operators try to be good neighbors. However, other residents in the region are not so fortunate. I have heard of manure spills in neighboring counties,[4] and as head of the Schuyler County Environmental Management Council, I have seen that the CAFO industry can be a Goliath, and community members aren't always able to address concerns about odors, noise, and water pollution; it is disturbing.

6. I think it is ridiculous that New York State does not require CAFOs to obtain National Pollutant Discharge Elimination System permits under the Clean Water Act. Based on my experience, there is no question that Large CAFOs pollute the water, and

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[4] *See* Carrie Chantler, *Owasco Lake Advocates Decry Runoff of Manure into Water*, Auburn Citizen (Apr. 6, 2014), https://auburnpub.com/news/local/owasco-lake-advocates-decry-runoff-of-manureintowater/article_498bd2fe-a7ec-5994-b4ed-005111da2e89.html (reporting that discharge from a Large CAFO caused a 25-by-75 foot plume of liquid manure to enter Lake Owasco in 2014); *see also* Matt Weinstein, *DEC: Manure Runoff Affecting Cayuga Lake*, Ithaca J. (Feb. 20, 2017), https://www.ithacajournal.com/story/news/local/2017/02/20/dec-manure-runoff-impacting-cayuga-lake/98152244/ (explaining that "emergency applications of manure," made in advance of "rapidly warming temperatures" in February 2017, had reached Cayuga Lake).

there is no reason why the CAFO industry should be treated differently than any other polluting industry. I believe that it is possible for CAFOs to be good neighbors, but we should not have to rely on a CAFO operator's good will when the health of our community and our environment is at stake. That's why we have environmental laws.

7. To protect our health and environment, I believe that U.S. Environmental Protection Agency should adopt a rebuttable presumption that Large CAFOs using wet manure management systems actually discharge water pollution.

I declare under penalty of perjury that, to the best of my knowledge, the foregoing is true and correct. Executed this 25 day of October, 2022.

Kathryn Bartholomew

Kathryn Bartholomew

Exhibit 8

DECLARATION OF EDITH HAENEL

I, EDITH HAENEL, declare and state as follows:

1. I am 71 years old. For the past 40 years, I have lived with my husband on 25 acres of land at [redacted], Worth County, Iowa. Our area is very rural. In fact, Worth County is among the most sparsely populated counties in Iowa. Northwood is the county seat, and it has a population of about 2,000 people.

2. I met my husband when I came to Iowa to pursue my master's degree in social work. At the time, he was working on a small farm growing crops and raising livestock. I fell in love with him and with the land. To this day, my husband and I value our rural lifestyle. We love our community. We love that our land is quiet.

3. When we first moved to the property where we live now, there were small farms all around us. However, about 20 years ago, we started to notice that the small farms were being replaced by concentrated animal feeding operations ("CAFOs"). According to the Iowa Department of Natural Resources ("IA DNR"), there are now 14 CAFOs in Worth County, including five Large swine CAFOs.[1] The nearest CAFO to us is about a mile from our home. According to IA DNR, it confines 2,486 swine, and it stores their waste in concrete pits beneath where the pigs stand and live. CAFO owners spread the stored waste onto fields, including the field that directly abuts our property.

4. The CAFO nearest to us sits right above a stream called Elk Creek. We are concerned that, over time, the CAFO will significantly impair the water in Elk Creek.

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[1] *See* Iowa Dep't of Nat. Res., *Animal Feeding Operations Databases*, https://programs.iowadnr.gov/animalfeedingoperations/ (click "Search," input Worth in "County" dropdown).

5. In addition, I worry that the CAFO nearest to us will contaminate the groundwater. Like many CAFOs in Worth County,[2] this CAFO is built on top of a karst formation. Karst is made up of soft, porous limestone.[3] Building CAFOs on top of karst formations is risky, because it's easy for animal waste to pass through the karst and contaminate the groundwater underneath.[4] I am especially worried about the CAFO nearest to us because that CAFO is located above an aquifer, and the karst bedrock is only 13 feet below ground.

6. In addition, I am concerned that CAFOs could contaminate groundwater by applying more manure to fields than the land can hold. According to my husband, there is sandy soil in this area, and sandy soils might not be able to absorb as much manure as clay soil. I have heard that some CAFO operators in our area sometimes spread waste on the same fields, and I worry that this practice increases the risk of groundwater contamination.

7. The potential contamination of groundwater is especially worrisome to me because, like nearly everyone in our community, my husband and I get our drinking water from a well. As a result, we cannot rely on a rural water system to filter or clean our water before it reaches our home. Although the county offers free water testing, that testing does not cover contaminants associated with CAFO manure. I am afraid that we might learn of groundwater contamination only after people in our community start to get sick. I understand that, elsewhere

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[2] *See* Iowa Dep't of Nat. Res., *AFO Siting Atlas*, https://programs.iowadnr.gov/maps/afo/ (select "Sinkhole or Potential Karst" and "Animal Feeding Operations" map layers) (showing that the majority of CAFOs in Worth County are located on or within 500 feet of sinkholes and karst formations).

[3] *See* Iowa Dep't of Nat. Res., *AFO Construction Permits*, https://www.iowadnr.gov/Environmental-Protection/Animal-Feeding-Operations/AFO-Construction-Permits.

[4] *Id.*

in Iowa, people have gotten sick after drinking groundwater contaminated with pollutants that are associated with CAFOs.

8. I am also concerned about air pollution from CAFOs. I have epilepsy, and I worry that I could be especially vulnerable to CAFO pollution. I also worry about the effects of long-term exposure to CAFO pollution among children. My great-nieces and nephews live about three-quarters of a mile downwind from a CAFO, and I understand that children living near CAFOs may have a greater risk of developing asthma and other health conditions.

9. In addition to raising health concerns, air pollution from CAFOs smells terrible. My husband has lived in this area for his entire life, and he has worked on farms, so he is used to the smells of animals and agriculture. But even he thinks that CAFO odors are unbearable; he says that the smell from smaller farms cannot even compare. I know from conversations with friends and family that CAFO odors affect many areas.

10. I believe that CAFOs have attracted insects to our area, and I am especially concerned about biting flies. I see more biting flies near my home now than I did before the CAFOs moved in. I am very sensitive to chemicals on my skin, so I cannot use bug spray. The biting flies can be exceedingly annoying.

11. It's not only the pollution and insects that bother me. I am concerned that CAFOs are fundamentally changing our community. Over time, CAFOs have put many small farms in our area out of business, and they affect non-farm businesses too. It's my understanding that most CAFO operators do not buy supplies locally, and CAFOs tend to bring only low-paying jobs. Ultimately, I worry that CAFOs might cause many of my friends and neighbors to leave Iowa. I have spoken with people from across the state whose communities already have been significantly impacted by CAFOs. In addition, I have heard of people who left Iowa because

they were overwhelmed by water pollution, air pollution, odors, and pests from CAFOs; it just became impossible for them to remain in their homes any longer.

12. I think the CAFO industry has an outsize influence on our state and local government, and I worry that our community is losing its independence. Back when the CAFO nearest to us first moved in, I became more involved in local government, because I wanted to ensure that CAFO pollution would not destroy our home. I started going to Worth County Board of Supervisors meetings, and after every meeting, I would publish notes on Facebook so everybody had access to them. People who read my notes and shared my concerns about CAFOs started to attend meetings themselves. These people and I often have differing views from the Board of Supervisors, as some of the board members support the CAFO industry. Some of the board members did not welcome our opposing views. The Board began to cut down the amount of time in which members of the public were allowed to ask questions, until no questions were allowed unless we asked to be put on the agenda. It has become more difficult to have open discussions at the meetings where crucial decisions are made.

13. IA DNR is the watchdog agency that is supposed to protect Iowans from CAFO pollution and other environmental harms. However, I do not believe that IA DNR is doing its job. I have been disappointed by IA DNR's failure to engage with citizens concerned about CAFOs. I do not think IA DNR fairly reports the extent of damage to Iowa's waterbodies, and I believe its decision to approve biodigesters indicates that it does not take seriously the threats that CAFOs pose to people and the environment. At one point, IA DNR didn't even know how many CAFOs there are in the state.

14. I feel like my neighbors and I are being run over, and the agencies that are supposed to protect our health and our resources are not doing anything to stop it.

15. To empower Iowans and other people across the country, I hope the U.S. Environmental Protection Agency will ensure that CAFOs provide transparency about their operations, including information about their location, the number of animals they confine, and when and where they apply manure to fields. Without access to that information, people cannot protect their health, their families' health, or the environment.

I declare that under penalty of perjury that, to the best of my knowledge, the foregoing is true and correct. Executed this 25th day of October, 2022.

Edith L. Haenel

Edith Haenel

Exhibit 9

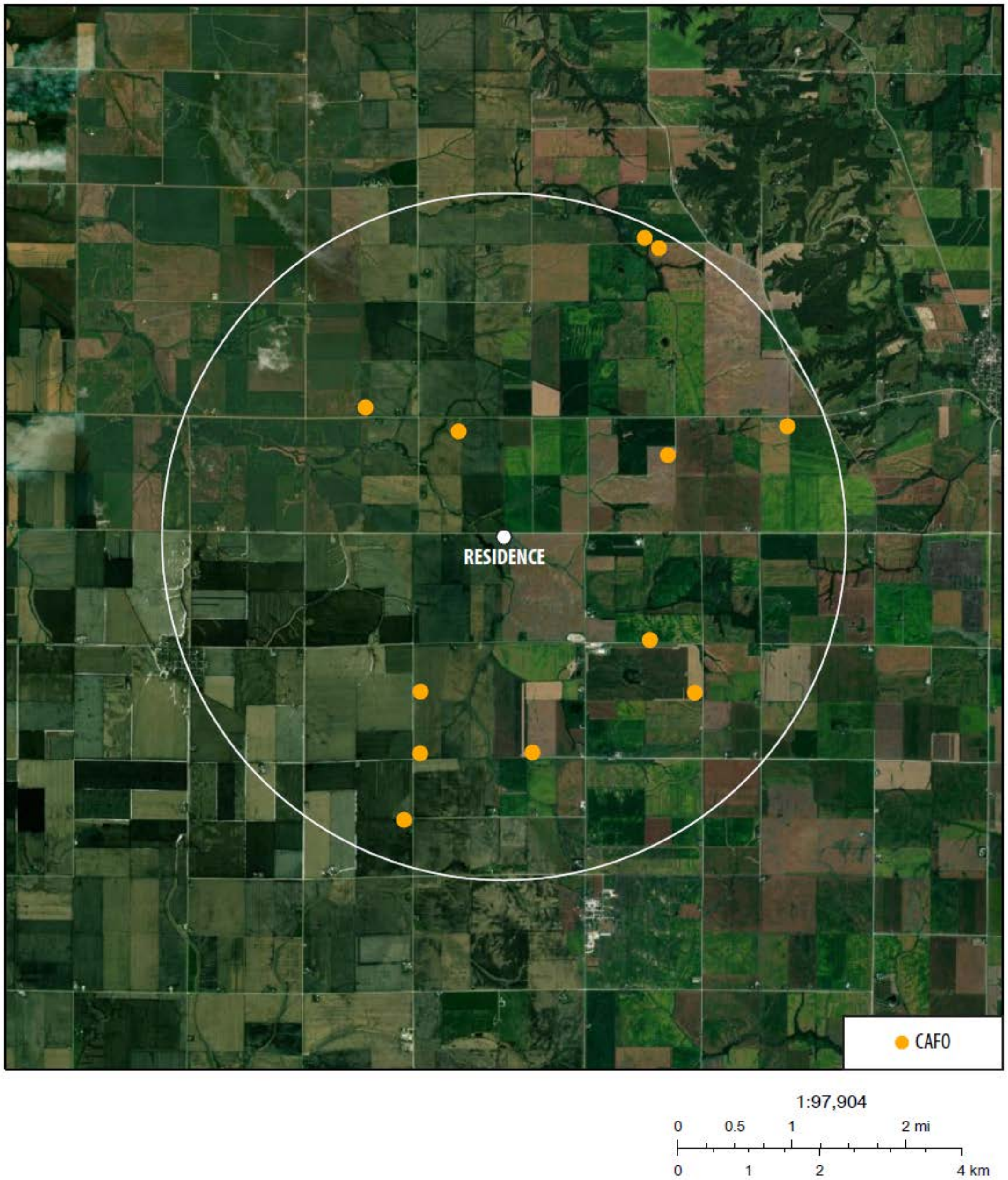
DECLARATION OF JEAN LAPPE

I, JEAN LAPPE, declare and state as follows:

1. I am 69 years old, and my husband and I have lived at [redacted] Louisa County, Iowa for 40 years. I grew up in this area and have lived within a 10-mile radius for most of my adult life. The reason we live in this rural area is because we love having open space and spending time outdoors, and our home is secluded, as our closest neighbor is a half-mile away. Our home is very important to us, and over the years, we have put a lot of blood, sweat, and tears into it. We hope to one day pass it along to our son.

2. For the first 30 or so years of our time living in our home, we routinely opened the windows on nice days and spent hours outside gardening, picking apples, walking near the local creeks, hanging clothes out to dry, and entertaining family and friends. I love feeling the breeze, and in the warmer months, we'd leave our windows open and let the wind flow through the house.

3. That all changed when concentrated animal feeding operations ("CAFOs") started popping up in our community. The first CAFO near our home started operating in the mid-2000s. Since 2014, more CAFOs have begun operating, confining tens of thousands of pigs essentially in our backyard. As shown on the following map, there are now 12 CAFOs within three miles of our house, and the closest one is just under a mile away from us. The operations around us generally have two confinement buildings, and each building houses just under 2,500 pigs.



Source: Iowa Dep't of Nat. Resources, AFO Siting, https://programs.iowadnr.gov/maps/afo/?utm_medium=email&utm_source=govdelivery; Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community.

4. The CAFOs near my home generate millions of gallons of manure and, to my knowledge, they are all wet-manure management facilities, meaning that they store manure in liquid form—typically, in huge pits under the buildings where they confine the pigs. Sometimes,

the CAFOs contract with local farmers to haul the manure away. Other times, the CAFOs move the manure by pumping it through tubes and apply it to fields right near our home.

5. Being so close to CAFOs and land application fields has completely changed our lives. The stench can be simply unbearable. The pollution irritates my throat and sinuses and exacerbates health problems I experience due to an autoimmune disease. We've purchased two air purifiers, which help us breathe indoors, but the odor makes it difficult to go outside for even short periods of time. I miss my peaceful morning coffee in front of an open window or out on the deck. Now, if I spend too much time outside, I cough and get congested from the polluted air. When the stench is really bad, my husband and I waste no time getting into the house. I usually choose to stay inside to avoid the odor altogether, and consequently, I feel like I'm a prisoner in my own house.

6. The odor is especially bad during the months when local farmers spread manure on nearby fields. Recently, when they were spreading manure, the air was so unbreathable that I took my daughter's RV and left the area for three weeks. A couple of years ago, I went to visit my daughter in Colorado to escape the smell. I'm not the only one; I know many people in the community who leave the area to avoid odors and air pollution from manure application.

7. In addition to polluting the air, the animal waste generated by the CAFOs threatens drinking water. I would like to have our well tested by the state, but it is too expensive. Instead, I have done my own monitoring, and I have found that ammonia levels have increased since the CAFOs came to the area. One of my neighbors stopped drinking their well water altogether because it was contaminated with pollutants that probably came from the CAFOs. They are not alone: One recent study showed that, throughout Iowa, 40 percent of private wells

are contaminated with bacteria, which likely come from animal agriculture facilities.[1] A doctor once told me that no one in Iowa should be drinking their well water because contamination is so widespread.

8. I'm concerned that CAFOs also are polluting our local creeks. Several of the CAFOs near our house border East Fork Crooked Creek, which has been designated by the State of Iowa as an impaired waterway.[2] I used to participate in volunteer water quality monitoring, and we found that samples from the creek had high nitrate levels. We would test the nitrate levels before and after farmers applied manure near the creek, and the levels were higher after the manure applications. At times, the nitrate levels were 30 parts per million, which is well above the safe drinking water standard of 10 parts per million. But before we could report the results of our testing, we learned that the monitoring program had been shut down.

9. The pollution in East Fork Crooked Creek prevents us from enjoying it. We can't let our grandchildren wade in the water because contact with CAFO pollution could make them sick. And, when our children come home with their dogs in tow, we must make sure the dogs don't go in the creek, either. My daughter once had to take her golden retriever to the vet because he got a bad rash after going in the creek.

10. I have personally witnessed local farmers, whose fields run into East Fork Crooked Creek, engaging in dangerous manure management practices. For example, I have seen farmers applying manure right up to the banks of creek, without any buffers between the manure and the water. Applying the manure so close to the creek makes it easy for the waste to run off

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[1] *See* Env't Working Grp., *Iowa's Private Wells Contaminated by Nitrate and Bacteria* (Apr. 2019), https://www.ewg.org/interactive-maps/2019_iowa_wells/ (showing that, of 55,000 private wells in Iowa that were tested, 22,000 were contaminated with bacteria).

[2] *See* Iowa Dep't of Nat. Res., *Water Quality Assessments Impaired Water List: East Fork Crooked Creek*, https://programs.iowadnr.gov/adbnet/Segments/6268/Assessment/2022.

into the water. And one year during early December, just a quarter mile from my house, I saw a farmer applying manure to frozen fields, as you can see in the picture below. When farmers spread manure on frozen fields, it just sits on the ground, which means there's a significant chance that it will eventually wash off fields into nearby waterways. And manure applied to frozen fields continues to smell. We were smelling that manure for weeks—even many days later on Christmas morning!

Source: Jean Lappe

11. Over the past several years, I have repeatedly opposed new CAFOs opening in our area, because I am concerned about the threats CAFOs pose to our air and water. Along with other members of the grassroots non-profit organization Iowa Citizens for Community Improvement, I gave comments to the Iowa Environmental Protection Commission, explaining that the concentration of CAFOs in our community has caused dangerously high levels of

nitrates in local creeks. I drove three hours to speak to the Commissioners for only two minutes—but, in the end, the Commission didn't do anything to stop more CAFOs from polluting our community.

12. I have also submitted comments to IA DNR opposing new CAFOs and objecting to individual CAFOs' manure management plans. In those comments, I told IA DNR that adding more CAFOs to our community would only exacerbate already unlivable conditions. I also explained that IA DNR should prevent local farmers from engaging in unsafe manure management practices, like applying manure to fields that don't have buffering systems. Despite the outcry from our community, IA DNR has done nothing to protect us from the threats CAFOs pose to our water quality.

13. As a last resort, in 2014, I joined a coalition of community members and the nearby City of Mount Union to bring a lawsuit against local CAFO operators for producing odors, emissions, particulate matter, and flies, which make it impossible for us to enjoy our property. Unfortunately, that lawsuit failed, in part because the Iowa legislature and courts have erected numerous barriers to prevent community members from holding CAFOs accountable for their pollution.

14. Perhaps most distressing is the way that the CAFO industry has torn our community apart. We used to be a peaceful community, but now we're pitted against each other. Anybody who dares to stand up against the CAFO industry is subject to intimidation and harassment. One woman who joined the lawsuit was subjected to incessant bullying. She eventually committed suicide, and that tragedy caused an irreparable rift in the community. Our lives and the fabric of our community have become collateral damage to corporate agriculture.

15. We need the U.S. Environmental Protection Agency ("EPA") to protect us from the corporate greed that is destroying our way of life. To combat CAFO water pollution, CAFOs should be required to get permits under the Clean Water Act. We need to make sure that CAFOs are held to stricter standards. We also need more effective ways for community members to have their objections taken seriously—and to hold CAFOs accountable when they pollute. Right now, the system is simply broken.

16. EPA is supposed to protect us from corporate bullies who see nothing but dollar signs. Our water quality has been stolen, and our property values and quality of life have been destroyed. Please help us start the clean-up in Southeast Iowa before it's too late.

I declare under penalty of perjury that, to the best of my knowledge, the foregoing is true and correct. Executed this 24th day of October, 2022.

Jean Lappe

Jean Lappe

Exhibit 10

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Frank Gibbs: Liquid manure is too wet

Written by David Green. Aug. 20, 2006

By DAVID GREEN

Don't blame tile lines for discharges of liquid manure into drains, says soil scientist and farmer Frank Gibbs, and don't blame the rich soil with its worm holes leading to the tile.

Put the blame on the watered down manure. That's where the problem lies.

Gibbs, from the National Resources Conservation Service office in Findlay, Ohio, spoke to farmers last Wednesday at the annual Center for Excellence Field Day at Bakerlads Farm north of Clayton.

Gibbs told how he came to this conclusion several years ago, after he got a call from a producer in Ohio who had a problem. He was applying manure from his swine operation at only about half the recommended rate, but it was still finding its way into tile and drains.

A DNR officer told the farmer that he wouldn't cite him for discharges this time, but it had to be stopped.

"I went down there thinking I'd see big cracks in the ground," Gibbs said, "but the soil moisture was ideal. Impeccable shape. I saw lots and lots of night crawler holes and I thought, 'My God, could this be what's going on here?'"

Gibbs got ahold of some dye—similar to the kind used to check for leaks in a toilet tank—dumped it into the manure lagoon and agitated the mixture. After he dug down to a six-inch tile, manure was injected into the soil with a drag line. The tile was dry when the experiment began.

“We wondered how long it might take to percolate down to the tile lines. Twenty minutes? Should we go to lunch?”

There was no time for lunch, Gibbs said. The dye was there within seconds, and every time a pass was made over a lateral tile line, another pulse of colored liquid came through.

Gibbs wondered if the pressure from the applicator pump was the cause, so they next tried a gravity-feed system. Same problem. One more idea came to mind. This time they avoided the watery manure from the lagoon and loaded some of the thicker slurry from the pit under the hog barn.

“It didn’t go anywhere,” Gibbs said. “It behaved like manure. We dug up some areas with a back hoe and it was laying right where it was shot.”

He knew then not to fault the tile nor the healthy soil.

“The problem is simple. We’re watering manure down to where it behaves like water. Let me repeat that. We’re watering manure down to where it behaves like water. You don’t need to be a rocket scientist to understand that.”

Gibbs has heard the suggestion that no-till soil is at fault. Get rid of the worm holes and there’s no conduit for the manure.

Not true.

“Preferential flow will occur in conventional tillage through cracks and around the soil structure,” he said. “We need to stop confusing the issue with tillage. The issue is that we’re adding too much water.”

This is a situation that needs to be addressed, Gibbs said.

“We need to keep on top of this. We really do. I think some basic research could solve the problem.”

Maybe the percentage of solids needs to be up to four or five percent, he said. Or, from what he learned in Europe, even higher.

The Dutch method

With so many Dutch farmers investing in this area, Gibbs decided to take a trip to the Netherlands to see how they farmed in that country. He was in for a surprise.

He didn't see any of the watered down manure that the large dairies are using here. The solid content was at about eight percent.

He noticed a plastic membrane spread over a storage lagoon with rain water waiting to be pumped from an overnight storm. Gibbs figured it was to keep the water out of the lagoon, but he was wrong. It was to control odor.

Gibbs watched as a farmer loaded his applicator with manure and inserted a paper form into equipment that recorded his position by GPS. Once in the field, additional data was stamped onto the form. A sample bag of manure was collected to send for analysis by a government agency.

If manure exceeds the allowable nitrate rates, Gibbs was told, the farmer receives a bill from the government.

The Dutch farmer joked about having one government official for every farmer, but it isn't the heavy regulation that's hurting agriculture in Holland, he said, it's simply a lack of space.

Gibbs returned home knowing that the practice of watering down manure didn't come from Europe.

"That's our technology," he said. "We're going to all the work of writing up Comprehensive Nutrient Management Plans and then where does it go? Into the tile. We just need a little bit of research to figure this thing out so we don't have to scrap the whole thing."

Gibbs said he's made attempts to urge agricultural agencies to study the issue, but it's never gone far.

"Everybody's going off in other directions," he said. "We need to work together. We don't have to destroy our soils. We don't need to rip our tile out.

"What we should do is look at solids. Eight percent isn't that much. I don't know why we can't tweak that."

- Aug. 30, 2006

Stop it in the root zone

A visit to Wisconsin gave soil scientist Frank Gibbs additional hope for the future.

“They have some really good things going on there,” he said.

For example, the custom manure applicators have formed an association. They have standards and training, for those who choose to join the group. They work closely with the EPA. They practice cleanup of spills for when something goes wrong.

Gibbs was impressed with the beautiful crops growing on rolling hills. The key was the soil.

“They’ve got hay and they’ve got alfalfa and they put manure on it,” he said.

In this area, it’s almost always corn and soybeans, year after year. It’s the root system of a plant such as alfalfa that breaks up the soil to prevent compaction.

Custom applicators have to work with what they’re given, Gibbs said, and sometimes control structures are in order. Gibbs has built shut-off valves at the property line to stop the flow of liquid manure. A catch basin is added to collect the flow—a septic tank will do the job—and the manure can be pumped out and applied in a safe area between tile lines.

It’s just a Band-Aid approach, Gibbs said, not a solution, but it’s better than using rubber tile plugs in which case a farmer has no idea if the manure has left the tile. Besides, he asks, do we know where all the tile is? And if we miss one, who’s fault is it?

That’s when the arguing and finger-pointing begins. When manure flows into a drain, who is at fault—the farmer who owns the animals, the owner of the land where it’s being applied, or the person in charge of the application?

“If we do it the wrong way,” Gibbs said, “it’s going to be a mess.”

Any time manure enters a tile line, it’s wasted. At that point, Gibbs said, the nutrient is too deep to be absorbed by plants.

“We have to stop it in the root zone,” Gibbs said.

Smoke test highlights no-till

As a long-time proponent of no-till farming, Frank Gibbs often tries to convince other farmers to give it a try.

One of his early attempts was to dig out a cubic foot of his no-till soil and place it next to a sample from his neighbor’s sugar beet field that suffered from a lot of compaction due to trucks. Then he would pour a bottle of water onto each and watch it soak into his soil and run off his neighbor’s.

“It was kind of hokey,” Gibbs said. “Farmers would say, ‘You’re from the government. You probably poked holes in it.’ I needed a different way to show the value of no-till.”

He remembered a blower contraption a friend created for planting beans—it never worked right—and as a fan of Red Green, Gibbs got out the duct tape to rig up a device for blowing smoke into a tile line.

“I could make smoke come out of millions of worm holes,” he thought.

The smoke test shows good soil conditions and at the same time, it shows the avenue that liquid manure takes to reach tile lines. It takes the easiest route, Gibbs said, the path of least resistance. Through worm holes and cracks in the glacial till, manure can quickly makes its way to tile.

To set up the Center of Excellence Field Day at Bakerlads Farm, Gibbs dug a hole to reach a tile line. He found two hand-laid tile lines, then a plastic line, then another older line. Tile is everywhere.

He set up his blower, dropped in a smoke bomb and watched for smoke to start rising out of a soybean field. Smoke started to run toward the bean field, but the line made a turn and headed back into the cornfield. That’s the trouble with tile lines, he said, you never know how many there are or where they end up.

Watching smoke rise out of the soil is a great demonstration, Gibbs said, and a real attention-getter.

“It’s hard for folks to deny this stuff happens when there’s smoke coming up under their feet.”

Exhibit 11

DECLARATION OF DEVON HALL

I, DEVON HALL, declare and state as follows:

1. My name is Devon Hall. I am African-American, and I am 66 years old. I live at [redacted] in Warsaw, Duplin County, North Carolina. Duplin County is a rural area with a significant proportion of low-income African-American residents. I was born and raised in Duplin County, and I have lived here my whole life. My three brothers and three sisters live in Duplin County too, and our children grew up together here. Our roots are here.

2. In 2002, I co-founded the Rural Empowerment Association for Community Help ("REACH"). Currently, I am REACH's Executive Director. REACH works to address social, economic, and environmental inequities in and around Duplin County. We work to help people understand that everybody is somebody and has a right to be heard. I co-founded REACH because I saw that there was a lack of resources in Duplin County to help people like me and my family, and I worried that my grandchildren's generation might not have any future here.

3. For years, much of REACH's work has focused on pollution from concentrated animal feeding operations ("CAFOs"). According to the North Carolina Department of Environmental Quality ("NC DEQ"), there are more than 520 swine CAFOs in Duplin County. Together, these facilities confine almost two-and-a-half million pigs. Because there are so many swine CAFOs, some people call Duplin County the "hog capital of the world."

4. As the map below shows, there are at least 30 swine CAFOs within three miles of my home. Together, these CAFOs confine up to 150,388 pigs. All 30 CAFOs operate under North Carolina's Swine Waste Management System General Permit, rather than permits issued under the Clean Water Act's National Pollutant Discharge Elimination System. According to NC DEQ data on the number of animals confined in each CAFO, I understand that at least 12 of

these 30 CAFOs are allowed to meet or exceed the threshold for a “Large CAFO” set by the U.S. Environmental Protection Agency (“EPA”). The closest CAFOs of any size are only about a half-mile from my home. I drive by those CAFOs almost every day, and I can see the confinement barns when I drive by. The closest Large CAFOs are about a mile-and-a-half from my home.

Source: *See* N.C. Dep’t of Env’t Quality, List of Permitted Animal Facilities – 4-1-2020, https://deq.nc.gov/cafo-map; *see also* Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community.

5. By a conservative estimate, the pigs in the 30 CAFOs near my home together generate more than 250,000 tons of manure each year,[1] which is more than the amount of fecal matter annually produced by the combined population of North Carolina's five largest cities.[2] Almost all the CAFOs near my home store the pigs' urine and feces in giant uncovered pits, which the industry calls "lagoons." There are at least 48 lagoons within three miles of my home.

6. Hurricanes, storms, and even relatively light rainfall can cause lagoons to breach or overflow, flooding surrounding areas with urine and feces. After Hurricane Florence hit North Carolina in 2018, NC DEQ reported that 49 CAFO lagoons had breached or overflowed, releasing waste into surrounding areas. The flooding disrupted people's access to safe drinking water. Samples of private well water taken after the hurricane showed an increase in the presence of *E. coli*.[3] I worry that, because climate change is causing strong storms to hit the area more and more frequently, we will continue to experience flooding and flooding-related water pollution from CAFOs. But even light rainfall can cause lagoons to overflow. In June 2020, it

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[1] According to NC DEQ, the CAFOs are permitted to confine a combined 150,388 pigs, which is approximately 21,860 1,000-pound animal units. According to the Natural Resources Conservation Service, hogs and pigs produce 63.1 pounds of manure per day per 1,000-pound animal unit, which amounts to 11.5 tons of manure per year per 1,000-pound animal unit. *See* Nat. Res. Conservation Serv., *RCA Issue Brief #7* (Dec. 1995), https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/technical/nra/rca/?cid=nrcs143_014211#table1.

[2] According to EPA, a person produces 0.5 pounds of fecal matter per day, which amounts to 0.091 tons of fecal matter per year. *See* EPA, *Risk Assessment Evaluation for Concentrated Animal Feeding Operations* 9, Tbl. 3.3 (2004). The combined population of Charlotte, Raleigh, Greensboro, Durham, and Winston-Salem is 2,183,425. *See* U.S. Census Bureau, *Quick Facts*, https://www.census.gov/quickfacts/fact/table/US/PST045219 (enter "Charlotte," "Raleigh," "Greensboro," "Durham," and "Winston-Salem" in the search bar).

[3] *See* John Murawski, *The Amount of E. coli and Fecal Matter in NC Wells Has Spiked Since Hurricane Florence*, The News & Observer (Oct. 25, 2018), https://amp.newsobserver.com/news/business/article220561095.html.

was reported that just two inches of rainfall flooded a lagoon in Sampson County, which is directly west of Duplin County, killing over 1,000 fish in surrounding waterways.[4]

7. To get rid of the waste stored in the lagoons, the CAFOs apply it to fields using mechanized sprinkler systems that spray it high into the air. There are sprayfields within three-quarters of a mile in either direction of my home. I know from my work at REACH that once waste is applied to fields, it can seep into groundwater and run off into nearby rivers and streams.

8. I have seen CAFO workers apply waste in ways that increase the risk that the waste will run off the field. For example, I have seen workers spray waste on fields during rainy weather, when the soil is more likely to become oversaturated and unable to absorb all the waste. I have also seen waste being sprayed when no one was monitoring the equipment to make sure it wasn't broken or overapplying the waste. In addition, I've seen workers spraying waste day and night when rain is forecasted, in order to reduce the amount of waste in the lagoons. Because the workers' main concern is reducing the waste in the lagoons, I think it's likely that they overapply it on the fields.

9. In addition to witnessing CAFOs apply waste in ways that are likely to cause water pollution, I have seen CAFO waste in ditches that lead to waterways. The waste is red and smells like manure. Once the waste is in the ditches, it's almost certain that it runs downstream into waterways.

10. I am concerned about the negative health and environmental consequences of water pollution from so many CAFOs being released in one relatively small area, in and around Duplin County. Because of my concerns, I have changed my behavior and given up activities I

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[4] *See* Lisa Sorg, *1,000+ Dead Fish: NC DEQ Releases More Troubling Details on Hog Lagoon Spill*, NC Policy Watch (July 17, 2020), https://pulse.ncpolicywatch.org/2020/07/17/1000-dead-fish-deq-releases-more-troubling-details-on-hog-lagoon-spill/#sthash.wHd88Yfu.dpbs.

enjoy. For instance, I was once an avid fisherman, but I have not been fishing near my home in over a decade. I stopped fishing after I began to catch fish with open sores. I believe these sores are caused by bacteria and other pollution from CAFOs, and I do not think that fish with open sores are safe to eat. I have spoken with multiple REACH members who have also given up fishing after catching deformed fish, seeing dead fish floating in the water, and noticing that the water had turned an unusual color or begun to give off an unpleasant odor. Duplin County is a rural community; hunting and fishing are a way of life, and most people do not have extra income to spare. By forcing people to buy fish at the store, instead of fishing in the creeks and streams near their homes, CAFOs are harming our recreational interests and our economic interests, too.

11. In addition to giving up fishing, I have given up drinking tap water. The same is true for many REACH members. Most people in Duplin County used to drink well water, but many now receive county water instead. Even though my water comes from the county, I am not confident that it is safe to drink. I do not think that county water is any safer than well water; I am concerned that both water sources are contaminated with pollution from CAFOs. Some REACH members have complained that county water tastes like chlorine or that it looks milky. Most people buy bottled water instead. We always buy bottled water to serve at REACH meetings, and we distribute bottled water to community-members during and after hurricanes and other emergencies.

12. Not only do CAFOs pollute our water, but they also produce terrible odors. At first, I didn’t know what chemicals were in the air, causing it to smell so terrible. I began to work as a citizen scientist in 2004, because I wanted to understand exactly what I was breathing and how it was likely to affect my body, so that I could better protect myself and help my

neighbors protect themselves. I learned that CAFOs smell terrible because they release toxic gases, like ammonia and hydrogen sulfide.

13. The odors that CAFOs produce cause serious health problems. I have personally experienced watery eyes, headaches, and nausea on days when the smell is bad. I have also spoken to hundreds of people whose health has suffered as a result of exposure to these gases. People have shared that they have experienced nausea, shortness of breath, watery eyes, and runny noses. I am also familiar with studies showing that CAFO odors cause people's stress levels to increase.

14. To avoid the nearly constant stench of animal waste, most people in Duplin County close their windows and stay indoors, relying on expensive air conditioning to keep cool. People here have given up some of the most cherished aspects of rural life, like gardening, drying clothes on a line, hosting cookouts, and spending time outdoors. Many of us worry about declining home values. One REACH member has said that he looks for excuses to leave home and stays away longer than necessary, "because the smell that is there depresses [him]."

15. My own published research confirms that under-regulated CAFOs pose serious risks to people living nearby. For instance, I contributed to a study showing that kids who attend school downwind of swine CAFOs are exposed to relatively high levels of hydrogen sulfide, putting them at greater risk of symptoms like difficulty breathing and impaired lung function.[5] I also worked on a study finding that the children of people who work in swine CAFOs are more

[5] *See* Virginia T. Guidry et al., *Hydrogen Sulfide Concentrations at Three Middle Schools Near Industrial Livestock Facilities*, 27 J. Exposure Sci. & Env't Epidemiology 167 (2017).

likely to carry dangerous antibiotic-resistant bacteria on their bodies—even though those children never set foot in industrial hog-growing operations themselves.[6]

16. The CAFO problem in Duplin County is only getting worse. Now, energy companies are collaborating with CAFOs to trap and sell the methane and carbon dioxide that CAFO lagoons generate. These "biogas" projects involve capping the lagoons to trap the methane and carbon dioxide, transporting it through pipelines, constructing facilities to process it, and injecting it into existing natural gas pipelines. These projects rely on and further the outdated and unsafe system of storing animal urine and feces in lagoons and spraying it on fields, which causes water and air pollution. Biogas projects may in fact worsen this pollution. I understand that capping CAFO lagoons causes an increase in ammonia and other harmful pollutants in the liquid waste that remains in the lagoons and is then sprayed on fields.[7]

17. In addition to the growing biogas industry, I have witnessed the poultry industry expand dramatically in Duplin County. It seems like I can't travel two miles from my house or from REACH's office without seeing a new poultry facility being built. I am aware of one report from 2016 that estimates that industrial poultry operations confine more than 16 million chickens and turkeys in Duplin County alone.[8] That report is old now, and, based on my personal experience, I believe the number of poultry operations has continued to increase. Like pig

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[6] *See* Sarah M. Hatcher et al., *The Prevalence of Antibiotic-Resistant* Staphylococcus aureus *Nasal Carriage Among Industrial Hog Operation Workers, Community Residents, and Children Living in their Households: North Carolina, USA*, 125 Env't Health Persps. 560 (2017).

[7] *See* Cameron Oglesby, *'This Plan Is a Lie': Biogas on Hog Farms Could Do More Harm than Good*, Southerly (Mar. 24, 2022), https://southerlymag.org/2022/03/24/biogas-could-do-more-harm-than-good-hog-industry/?utm_source=ActiveCampaign&utm_medium=email&utm_content=Weekend+Reader%3A&utm_campaign=Weekend+Reader+Email.

[8] Env't Working Grp. & Waterkeeper All., *Exposing Fields of Filth: Locations of Concentrated Animal Feeding Operations in North Carolina by County: Duplin County* (last visited July 18, 2020), https://www.ewg.org/interactive-maps/2016_north_carolina_animal_feeding_operations_bycounty.php.

operations, poultry facilities usually dispose of waste by applying it to fields without appropriate prior treatment. Poultry waste, too, can seep into groundwater or wash into nearby waterways. In light of the growing poultry and biogas industries in Duplin County, both of which contribute to water pollution, it is all the more important to ensure that CAFOs and the water pollution they cause are properly regulated.

18. In my experience, many of the CAFOs in Duplin County are essentially self-regulated. NC DEQ does not have enough people to inspect all the CAFOs appropriately, to ensure that they are properly permitted and complying with their permits. In light of NC DEQ's difficulties, EPA should act to require CAFOs to apply for the correct permits.

19. EPA action is also important because it difficult for community members to hold the CAFOs accountable for the pollution they cause. For example, I once made an anonymous complaint to NC DEQ after I saw a CAFO spraying waste when it was raining, which is a violation of the Swine Waste Management System General Permit. Later in the day, the CAFO operator called me and said that he knew that someone with my phone number had made a complaint about the CAFO. I invited the CAFO operator to come to the REACH office to talk about the issue, but he didn't take me up on the offer. After I got off the phone with the CAFO operator, I called NC DEQ and told them that they had dropped the ball by giving out my information. If complaints aren't kept anonymous, it deters people from reporting permit violations. The state legislature has also made it more difficult for community members to hold the CAFOs accountable. In 2018, the legislature passed a bill that makes it more difficult for neighbors to bring nuisance suits against CAFOs. Because it can be difficult for community members to hold CAFOs accountable at the state level, I think it would be beneficial to have more federal involvement in CAFO permitting in North Carolina.

20. REACH has no interest in putting anybody out of business. But we believe it is possible for CAFOs to be more environmentally friendly and more community friendly. It is very upsetting to me that some of the corporations providing jobs in our community are also polluting the environment, destroying quality of life, and making people sick. We only have one Earth, and everyone should want to help take care of it.

I declare under penalty of perjury that, to the best of my knowledge, the foregoing is true and correct. Executed this 28 day of September, 2022.

Devon J. Hall

Devon Hall

Exhibit 12

DECLARATION OF DANIELLE WIRTH

I, DANIELLE WIRTH, declare and state as follows:

1. I am 69 years old, and I live with my husband and our two English Labradors at [redacted], Boone County, Iowa. Boone County is a rural area with a population of about 26,700 people. My husband and I have lived here for 43 years, and during that time, we have done our best to restore and care for our land. Among other things, we pay close attention to the plants, the animals, and the weather cycles.

2. I am a naturalist, ecologist, and environmental educator. I hold a Ph.D. from the College of Agriculture and Life Sciences at Iowa State University, where I served as a lecturer in environmental ethics, with an emphasis on empirical science. For 10 years, I served as an assistant professor in Drake University's Environmental Science and Policy Program, where I taught courses on environmental science, ecological restoration, and nature writers throughout history. I also have worked at the Iowa Department of Natural Resources ("IA DNR"), both as a regulator in the Environmental Protection Bureau and as an education specialist, helping to run an environmental education facility. Before that, I served as a federal park ranger. Although I am retired now, I still try to make myself available as a resource and helper to young people who are working to protect our land and water.

3. As an engaged citizen of Iowa and a naturalist, ecologist, and environmental educator, I know that industrial animal agriculture—including concentrated animal feeding operations ("CAFOs")—heavily pollute rivers and streams in my state, degrading important and fragile ecosystems. CAFOs generate, store, and spread large amounts of manure, which contains high levels of nitrogen. When this manure is released in excessive quantities, as the result of spills or improper application, the nitrogen in the manure contaminates water in the form of

nitrate and nitrite, both of which promote algae growth. Algae, in turn, depletes dissolved oxygen levels and endangers aquatic species. Blue-green algae is particularly dangerous because it produces microcystins, a class of toxins that can cause serious health problems for humans, including dangerous skin infections. Microcystins can also cause liver damage in canines, potentially killing them within three hours of contact with contaminated water. In addition to nitrogen, CAFO manure also can carry dangerous pathogens that threaten human health, such as E. coli and Methicillin-resistant Staphylococcus aureus, a bacterium that is nearly impossible to kill with traditional antibiotics. It does not take a science degree to realize that we should do our best to keep these pollutants out of our water.

4. Many people assume that the rural Midwest is a bucolic place, full of red barns and animals grazing on green pastures, but that image has not been the reality for many decades. Now, many smaller, independent farms have been replaced by industrial agriculture facilities. According to the IA DNR, there are 42 concentrated animal feeding operations ("CAFOs") in Boone County, confining over 111,000 swine, along with 120,000 chickens and more than 4,000 cattle.[1] The swine CAFOs in Boone County *alone* produce about 285 million pounds of manure every year,[2] nearly eight times as much as the sanitary waste produced annually by the entire

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[1] *See* Iowa Dep't of Nat. Res., *Animal Feeding Operations Databases*, https://programs.iowadnr.gov/animalfeedingoperations/ (click "Search," input Boone in "County" dropdown).

[2] This estimate is calculated using data available in the IA DNR Animal Feeding Operations Database, including animal type, number, and average weight, as well as daily manure production estimates. *See* Jeff Lorimor et al., *Manure Characteristics: Manure Management Systems Series* 13 (2004), https://www.canr.msu.edu/uploads/files/ManureCharacteristicsMWPS-18_1.pdf.

human population of Boone County.[3] Based on the information made available by IA DNR, I do not believe that any CAFOs in Boone County have federal permits authorizing them to discharge water pollution.

5. As industrial agriculture has taken over in Iowa, water quality has deteriorated, and I believe that CAFOs bear significant responsibility for the problem. I have seen CAFOs engaging in practices that pose serious risks of water pollution, such as applying manure to frozen ground. And I have collected data suggesting that these risky practices, in fact, are polluting our water. Starting in the 1990s, I helped to develop a statewide water quality testing program implemented by volunteers, including students, teachers, and other engaged citizens. At first, our testing revealed higher nitrate levels in the spring, when farmers typically apply synthetic fertilizers to crop fields. Around 2010, however, we began to observe very high nitrate levels in the fall, correlating with the land application of CAFO manure. When our findings started to get attention, Iowa DNR stopped allowing us to input our data. Soon after, the testing program was shut down. I believe that the decision to shut down the program was motivated by a desire to hide evidence that CAFOs degrade surface water quality.

6. Not only do I believe that CAFOs have degraded surface water, but I also am concerned that CAFOs threaten drinking water. To learn more about these threats, several friends and I requested and studied manure management plans submitted to IA DNR by CAFO owners and operators. With help from my husband, who is an archaeologist familiar with

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[3] Based upon the 2020 U.S. Census, 26,715 people live in Des Moines, Iowa. The U.S. Government Accountability Office estimates that humans produce 3.72 pounds of sanitary waste per person per day. *See* U.S. Gov't Accountability Off., *Concentrated Animal Feeding Operations: EPA Needs More Information and a Clearly Defined Strategy to Protect Air and Water Quality from Pollutants of Concern* 58 (2008), https://www.gao.gov/assets/gao-08-944.pdf. Thus, the human population in Boone County produces 36.2 million pounds of sanitary waste per year.

superficial and subsurface geology, I identified a CAFO from which discharge would flow directly into the Des Moines River, near the headwaters of Saylorville Lake. It's my understanding that Saylorville Lake is a source of drinking water for the city of Des Moines, but water from the lake is often too polluted for the city to use.[4] Based on my research, I believe the CAFO that I identified could be partly responsible for this problem.

7. My husband and I used to drink water from our well, until agricultural pollution made our well water unsafe. Now, we get our drinking water from Xenia Rural Water District, which is quite expensive compared to well water. Xenia Rural Water District purchases water from the city of Des Moines, which is about 35 miles southeast of our home. As a former employee of IA DNR, I know that Des Moines has had to develop one of the most sophisticated water treatment plants in the country, because it treats water that is heavily polluted by CAFOs and other industrial agriculture facilities. Not every city can afford such a sophisticated plant, and we cannot rely on industry to clean up on its own.

8. Because of my concerns about water pollution from CAFOs and other industrial agriculture facilities, I am no longer able to enjoy Iowa's waterbodies as I once did. For example, my husband and I love to canoe and kayak, but we no longer paddle in the Raccoon River near our home. I understand that there are 727 CAFOs, including 355 Large CAFOs, in the North and South Raccoon watersheds,[5] and we are concerned about coming into contact with pollution from these CAFOs that could threaten our health. In addition, we've stopped eating

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[4] *See* Perry Beeman, *Water Works pays for Saylorville water too polluted to use, eyes $50M plant expansion*, July 6, 2021, https://iowacapitaldispatch.com/2021/07/06/water-works-pays-for-saylorville-water-too-polluted-to-use-eyes-50m-plant-expansion/.

[5] *See* Iowa Dep't of Nat. Res., *Animal Feeding Operations Databases*, https://programs.iowadnr.gov/animalfeedingoperations/; *see also* Snoflo, *North Raccoon Watershed*, https://snoflo.org/hydrology/watershed-h07100006-north-raccoon; Snoflo, *South Raccoon Watershed*, https://snoflo.org/hydrology/watershed-h07100007-south-raccoon.

fish from the river. And, much to their dismay, I will not allow my two English Labradors to swim there, because I do not want them to be exposed to pollution. I have reason to be concerned. While I was teaching, I heard from a colleague who took a class canoeing on the river that one student had developed a skin infection, and another had suffered an E. coli infection. After hearing this, I made sure that all my students wore protective gear when touching the water. But one should not have to wear nitrile gloves while paddling.

9. I enjoy viewing and identifying aquatic species—including clams, mussels, fish, frogs, otters, and great blue herons—and I am concerned that water pollution from CAFOs and other industrial agriculture facilities could be putting these species at risk. Our home is less than a quarter mile from the Des Moines River. Turtles used to climb up from the creek that runs through our land to try nesting in our yard, but I have not seen some of my favorite turtle species for many years. I believe that pollution from CAFOs and other industrial agriculture facilities has damaged these species' habitat and reduced their numbers. Piping plovers, wonderful little shorebirds that nest and feed along waterways, already are listed as endangered in Iowa—in part, because of our degraded water. And, recently, otters have been reintroduced to Iowa. I am thrilled to have otters back in waterbodies near my home, but I worry that pollution from CAFOs and other industrial agriculture facilities might prevent otters from thriving here.

10. CAFOs damage more than the environment. All across Iowa, small businesses are disappearing, and small towns are dying. Our young people are leaving the state, and I think it's because rural Iowa is being hollowed out by industrial agriculture. I see notices of small farms up for sale in the paper every day. Often, these small farms are bought by industrial operations. These days, there are very few independent farmers raising animals near me.

11. I think Iowans have been let down by officials who are too closely associated with industrial agriculture. I am especially disappointed with IA DNR; they are not transparent, and they are not thorough. For instance, it was extremely difficult for my friends and me to obtain the manure management plans mentioned above. In the end, we had to pay $600 for copies of those plans, because IA DNR did not have electronic versions available. And, based on conversations I have had with IA DNR staff, I believe the agency's CAFO permitting program is far too lax. It's my understanding that IA DNR staff do not always visit CAFOs to investigate whether they discharge. Instead, staff sometimes rely on maps and snapshots that don't show the full picture.

12. If the U.S. Environmental Protection Agency ("EPA") were to grant this petition and significantly increase the number of discharging CAFOs with NPDES permits, I would feel relieved and encouraged. In particular, I would welcome the opportunity to submit comments and attend public hearings about CAFO permits. The current system simply does not work, but increased oversight of CAFOs under federal law could be a first step toward protecting surface and drinking water, restoring recreation opportunities, helping aquatic species to recover, and rebuilding rural communities. Without action from EPA, Iowa's rural communities don't stand a chance against pollution from CAFOs and other industrial agriculture facilities.

I declare under penalty of perjury that, to the best of my knowledge, the foregoing is true and correct. Executed this 25th day of October, 2022.

D. Wirth

Danielle Wirth

Exhibit 13

DECLARATION OF SANDY BIHN

I, SANDY BIHN, declare and state as follows:

1. I live in Lucas County, Ohio with my husband, Frank Bihn. I am the Executive Director of Lake Erie Waterkeeper. I founded Lake Erie Waterkeeper in 2004, and we became a licensed member of Waterkeeper Alliance in 2005.

2. Lake Erie Waterkeeper serves the entire Lake Erie watershed, which includes parts of Michigan, New York, Ohio, Indiana, and Ontario. We seek to ensure fishable, swimmable, and drinkable water throughout the watershed, and we advance this goal using advocacy, education, litigation, and innovation.

3. Lake Erie is an extremely important resource for the region. The lake provides drinking water for over 11 million people across the United States and Canada, and it is home to more fish than all the other Great Lakes combined. The lake is also an economic engine, attracting visitors who use the lake for sailing, swimming, kayaking, and other recreational activities.

4. I have always loved Lake Erie, ever since I first visited during family vacations as a kid. In 1987, my family built our home on the shores of Maumee Bay/Lake Erie, which is located in the western part of Lake Erie. My love for the lake is one reason why I was inspired to found Lake Erie Waterkeeper. The other reason is that, after seeing parts of the lake turn green with algae in the late 1990s, I realized that Lake Erie needed a spokesperson. So, I began advocating for the lake, which eventually led me to found Lake Erie Waterkeeper.

5. Concentrated animal feeding operations ("CAFOs") started coming to the Lake Erie watershed in the late 1990s, around the same time that the lake's water started to turn green. While farmers in the watershed used to raise animals in pastures, CAFO operators keep their

animals confined in buildings on small pieces of land. The animals in these CAFOs generate an enormous amount of urine, feces, and other waste. The swine and dairy cow CAFOs in the region store this waste in liquid form in concrete pits under the confinement buildings or in large open pits, and they get rid of it by spreading it on fields. There is a stark contrast between how CAFOs manage animal waste and how we manage human sewage. We make individuals repair their septic tanks to make sure their waste is treated, but CAFOs with millions of animals do not have to treat their waste at all before spreading it on the ground.

6. Most CAFOs in the Lake Erie watershed are located in the western portion of the watershed, in Indiana, Michigan, and Ohio. There are now approximately 2,500 confined animal feeding operations in the Western Lake Erie watershed, which together confine about 400,000 cows, 1.8 million pigs, and nearly 24 million chickens and turkeys.[1] The Ohio Department of Agriculture estimates that between 2002 and 2017, the number of animals in the Maumee watershed, which makes up just part of the Western Lake Erie watershed, increased by 88 percent.[2]

7. The massive amount of manure that is generated by animals in the Maumee/Western Lake Erie watershed and applied to fields by CAFOs and smaller operations overwhelms the soil and ends up in waterways. The Maumee/Western Lake Erie watershed has over 14,000 miles of ditches (which drained the Black Swamp) and the most tile-drained fields in the U.S. Tile drains are underground pipes with holes in them that take excess water out of the

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[1] *See* Ethan Bahe et al., *EWG Analysis: In the Western Lake Erie Basin, Newly Identified Animal Feeding Operation Hot Spots Produce Excess Manure, Threatening Waterways and Human Health* (2022), https://www.ewg.org/research/ewg-analysis-western-lake-erie-basin-newly-identified-animal-feeding-operation-hot-spots.

[2] *See* Ohio Lake Erie Comm'n, Ohio Lake Erie Commission Meeting (June 9, 2021), https://lakeerie.ohio.gov/static/Meetings/Ohio+Lake+Erie+Commission_meeting+minutes_June_2021.pdf.

soil. When CAFO operators apply manure to these fields, it enters the drain tiles and flows directly into ditches, streams, and other waterways. Manure also washes off the fields when CAFO operators apply it before or during rainy weather.

8. I strongly suspect that CAFO operators commonly overapply manure on fields close to their confinement buildings, because it is too expensive for them to transport the manure to fields that are farther away and might have more need for the nutrients in the manure. My suspicions are based in part on an Ohio program called H2Ohio, which launched in 2019 and is meant to help CAFO operators reduce phosphorus runoff from manure application. Under the program, the state pays operators $35 per acre to apply poultry manure and $60 per acre to apply all other manure to fields that have phosphorus levels of 50 parts per million or less.[3] I think the state has decided to pay operators to apply manure on fields with lower phosphorus levels because, without the financial incentive, the operators will continue to apply it on fields that don't need additional phosphorus, which causes runoff.

9. CAFO manure causes serious water pollution throughout the Lake Erie watershed. Both Michigan and Ohio have declared that Western Lake Erie is an impaired waterbody under the Clean Water Act because of the massive toxic algal blooms that occur in the lake each year. The harmful algal blooms are caused by excess nutrients in the water. The state agencies acknowledge that agriculture is a primary source of the excess nutrients, but they don't distinguish between nutrients from commercial fertilizer and CAFO manure. However, it's clear that manure is a significant source of the excess nutrients. For example, in 2019, the region had a very rainy spring that prevented many farmers from planting crops, which meant that they

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[3] *See* H2Ohio, Manure Incorporation (2020), https://hancockswcd.com/wp-content/uploads/Grants/H2Ohio/H2Ohio-Program-Manure-Incorpation-Guideline-Sheets.pdf.

applied less commercial fertilizer. But the algal bloom in 2019 was one of the worst that we've had. I think the algal bloom was so bad because the CAFO operators still had to get rid of their manure by spreading it on the fields, even though the fields weren't planted with crops. A lot of that manure then made its way to the lake and contributed to the algal bloom. In addition, scientific studies connect manure from CAFOs to nutrients in waterways. A recent study found that adding a CAFO to a region leads to an increase in phosphorus in the region's drainage basin.[4]

10. The annual toxic algal blooms in Lake Erie have serious consequences each year, but the one in 2014 was especially harmful. That year, an algae-induced toxin from the lake was found in a water treatment plant that supplied drinking water for Toledo. The governor declared a state of emergency and banned people from drinking and showering in the water. The ban affected nearly half-a-million people for almost three days.

11. To address the harmful algal blooms in Lake Erie, the United States and Canada entered into the Great Lakes Water Quality Agreement. As part of the Agreement, the countries set a goal of reducing the amount of nutrients entering Lake Erie by 40 percent by 2025.[5] The United States' domestic action plan requires reductions in nutrient runoff from Indiana, Michigan, and Ohio—where CAFOs in the Western Lake Erie watershed are concentrated—and the Canadian plan requires reductions from Ontario.[6]

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[4] *See* Zach Raff & Andrew Meyer, *CAFOs and Surface Water Quality: Evidence from Wisconsin*, 104 Am J. Agric. Econ. 161 (2022).

[5] *See* Kevin Bunch, International Joint Commission, *Binational Plans Call for 40 Percent Reduction to Algal-Fueling Nutrients* (Apr. 5, 2018), https://www.ijc.org/en/binational-plans-call-40-percent-reduction-algal-fueling-nutrients.

[6] *See id.*

12. In addition to causing toxic algal blooms, manure that enters waterways can kill fish. In 2017, three CAFO operators in Ohio applied manure to fields shortly before a heavy rainstorm, and the manure washed off into nearby creeks. Ammonia in the manure depleted oxygen levels in the creeks, which killed nearly 67,000 fish.[7]

13. CAFO pollution has disrupted my ability to enjoy the water near my home. After we built our home on Maumee Bay, we swam and drove WaveRunners in the water. But when the water started turning green with algae, it clogged the intakes of our WaveRunners and prevented us from using them. We installed a pool because we no longer wanted to swim in the bay, and we got rid of the WaveRunners. Then, during the 2019 algal bloom, the algae-laden water from the bay flowed into a ditch on our property and along a bike path in the area, and the smell was so bad that people didn't use the bike path all summer. The water had a putrid, septic smell that made people sick. The city spent about $40,000 to prevent it from happening again.

14. Exposure to harmful algal blooms can cause illness in humans and animals. I once got a call from people who had gone in the water when it was green, and they had gotten diarrhea. In another incident, water from the bay was on a slide in Maumee Bay State Park, and children who used the slide got severe diarrhea, which led to the slide being removed from the park. I also know of people who have gone into the water with open cuts and gotten infections. And I know of dogs that have died after coming into contact with the algae in the water.

15. The algal blooms also cause serious economic harm in the region. Reports show that the algal blooms reduce tourism, which costs the region both income and jobs. They also

[7] *See* Associated Press, *Fines Handed Out after Manure Spills Kills 67,000 Fish in Ohio*, Outdoor News (Oct. 13, 2017), https://www.outdoornews.com/2017/10/13/fines-handed-manure-spills-kill-67000-fish-ohio/.

lower property values and drive up people's water bills, which is the result of the increased cost of treating the polluted water.

16. In addition to causing destructive pollution, the CAFOs in the region have driven out small, independent farmers, which creates a rural environmental justice issue. Since the CAFOs came to the area, they have put about 80 percent of small farmers out of business. When I've visited the rural communities where those farmers once were, the people have told me that the number of churches and stores in the community has declined, which has reduced their quality of life.

17. CAFO pollution is also an urban environmental justice issue. Urban areas that get their drinking water from Lake Erie have to spend millions of dollars to treat the water, and this cost gets passed on to residents, who are often people of color. For example, one report found that in Toledo, where the percentage of residents of color is higher than the state average, a family of five's water bill includes almost $100 each year just to cover the cost of treating their drinking water.[8]

18. Although the Western Lake Erie watershed is full of CAFOs that are causing extensive water pollution, most CAFOs in the watershed do not have National Pollutant Discharge Elimination System ("NPDES") permits under the Clean Water Act. CAFOs avoid getting NPDES permits by claiming that they do not discharge any water pollution, but it's clear from the algal blooms in the watershed that this isn't true. CAFOs that avoid getting NPDES permits instead operate without water pollution permits at all or under state-law permits. This means that in the Western Lake Erie watershed—where CAFOs are located across three states—

[8] *See* All. for the Great Lakes, *Western Lake Erie Basin Drinking Water Systems: Harmful Algal Bloom Cost of Intervention* (May 2022), https://greatlakes.org/wp-content/uploads/2022/05/FINAL-COI-Report-051622.pdf.

CAFOs are subject to a patchwork of different rules. These disjointed rules fall short of the collective efforts that are necessary to protect the watershed.

19. I track when CAFO operators apply for construction permits, and I know that Ohio is reviewing permits for approximately 6,400 more dairy cows; 16,950 more pigs; and 120,000 more chickens and turkeys. Given the ongoing growth in the CAFO industry, at a minimum, the U.S. Environmental Protection Agency and states need to ensure that CAFOs have NPDES permits to better regulate the water pollution they cause.

I declare under penalty of perjury that, to the best of my knowledge, the foregoing is true and correct. Executed this 25th day of October, 2022.

Sandy Bihn

Sandy Bihn

Exhibit 14

DECLARATION OF KEMP BURDETTE

I, KEMP BURDETTE, declare and state as follows:

1. I am 48 years old. I live in Pender County, North Carolina with my partner and two daughters, aged 13 and 15. I am the Cape Fear Riverkeeper at Cape Fear River Watch ("CFRW"), and I have held this position for 12 years. Before that, I served as CFRW's Executive Director from 2009 to 2014. I have been a member of CFRW for 17 years.

2. The Cape Fear River Basin is the largest river basin in North Carolina, encompassing about 9,164 square miles, or approximately 16.5 percent of North Carolina's total land area. Nearly one-third of the State's population lives in the Cape Fear River Basin, and about 20 percent of North Carolinians get their drinking water from the Cape Fear River Basin, including people living in Greensboro, Fayetteville, and Wilmington. The Cape Fear River Basin also boasts some of North Carolina's most impressive remaining natural biodiversity, providing habitat for a variety of native, threatened, and endangered species and supporting a thriving tourism economy for recreational boaters, birders, and other nature-lovers.

3. As the Cape Fear Riverkeeper, I work to protect and improve the water quality of the Lower Cape Fear River, its estuary, tributaries, wetlands, and groundwater. I respond to citizen complaints of water pollution; carry out patrols in the air, on the ground, and on the water to identify threats to water quality; and collaborate with members, local partners, regulators, and legislators at the local, state, and federal levels to eliminate identified threats. I also conduct water-quality sampling in the Black, Northeast Cape Fear, and Cape Fear Rivers and associated waters, and I share this data with the public, so they know if and when it is safe to recreate in the water.

4. Concentrated animal feeding operations ("CAFOs") that confine swine and poultry are more densely concentrated in the Cape Fear River Basin than they are anywhere else on Earth. Each year, CAFOs in this region raise about 316 million birds and more than 10 million pigs.[1] Collectively, these animals generate a staggering quantity of waste, much of which finds its way into the Cape Fear River and associated waters.

5. Swine CAFOs typically store animal urine and feces in huge, uncovered pits, and they get rid of the waste by spraying it on fields. These practices cause a tremendous amount of water pollution. To illustrate the scale of this problem, I think it is helpful to compare the management of swine waste with the management of human waste. There are about 10 million people and 10 million pigs in North Carolina. Unlike the human population, however, swine are not distributed throughout the State; instead, almost all the pigs are concentrated in Eastern North Carolina. Each pig produces six to 10 times more waste than a person, which means that, in Eastern North Carolina alone, pigs are producing roughly as much waste as 100 million people. Although human waste is treated before disposal, swine waste typically is not. So, when CAFOs spray swine waste on fields in Eastern North Carolina, it's not too different from spraying untreated waste from a city with a population of 100 million out in the open, right near people's homes, which no one would ever dream of doing.

6. I have firsthand experience of water pollution from CAFOs in the Cape Fear River and associated waters. At CFRW, we patrol the river and surrounding areas by air at least once a month. From the air, it's easy to see that the basin is full of CAFOs, and many are very close to waterways. I don't think we have ever done an aerial patrol that didn't reveal either a

[1] *See CAFOs*, Cape Fear River Watch, https://capefearriverwatch.org/cafos/ (last visited Sept. 28, 2022).

swine or poultry CAFO violating state waste management rules in a manner that poses serious risks to our waterways. For example, we have seen swine CAFOs continuing to spray waste even as the waste runs off into waterways or pools on the field, which increases the risk of runoff. We have also seen swine CAFOs spraying waste into ditches that lead to waterways. During one recent flight, we saw a swine CAFO spraying waste on a field using a leaking pump. The waste leaking out of the pump was flowing right into a nearby stream. Figures One through Six at the end of this declaration show just some of the evidence that we have collected during our aerial patrols of runoff from land application by swine CAFOs.

7. Not only have I witnessed swine CAFOs discharging water pollution during the land application of waste, but I also am aware of CAFOs discharging from waste storage pits. As shown in Figure Seven, one of our aerial patrols revealed a swine CAFO using a hose to pump waste over the side of a waste pit and onto a neighboring field. Waste pit breaches and overflows can also cause discharges. For example, in June 2020, a waste pit at a swine CAFO breached, spilling three million gallons of urine and feces into the waters of the Cape Fear River Basin and killing at least 1,000 fish.[2]

8. Over the past decade, hurricanes and tropical storms have repeatedly caused CAFO waste pits to breach and overflow, releasing massive amounts of waste into waterways. During Hurricane Matthew in 2016, a number of waste pits in the Cape Fear River Basin overflowed. Just two years later, during Hurricane Florence, at least two waste pits breached and other pits overflowed. I toured parts of the basin affected by Hurricane Florence, and I saw that

[2] *See* Lisa Sorg, *1,000+ Dead Fish: DEQ Releases More Troubling Details on Hog Lagoon Spill*, The Pulse, N.C. Policy Watch (July 17, 2020), https://pulse.ncpolicywatch.org/2020/07/17/1000-dead-fish-deq-releases-more-troubling-details-on-hog-lagoon-spill/.

the two breached waste pits had released their entire contents, which totaled an estimated seven million gallons, into the flood waters.

9. Flood waters contaminated with CAFO waste have devastating effects. The contaminated waters flow into communities downstream and sometimes remain there for weeks, while animal waste seeps into homes, churches, schools, and anything else in the waters' path. The pollutants in the waste, including dangerous bacteria, can cause illness in people who return to clean up their communities, and they can also contaminate private drinking wells and public drinking water supplies. After Hurricane Florence, several public drinking water systems in North Carolina stopped supplying drinking water because of potential contamination from CAFO waste.[3]

10. During Hurricane Florence, my family and I experienced firsthand the damage that flooding at CAFOs causes. Our home was flooded, and the water reeked of swine waste. We weren't able to drive back to our home for three weeks, and we had to move out for three years while the damage was repaired. It takes a long time to recover from flooding, and some people aren't ever able to return to their homes. My next-door neighbor's house has been sitting empty since Hurricane Florence, with the door wide open. Other houses near mine have been torn down entirely.

11. In addition to seeing and experiencing water pollution from CAFOs, I have documented the effects of CAFO pollution on water quality. CFRW conducts water-quality sampling upstream and downstream of CAFOs, and we have found unbelievably high levels of bacteria in waterbodies near CAFOs. For example, in Stocking Head Creek, which has over 40

[3] *See* Wynne Davis, *Overflowing Hog Lagoons Raise Environmental Concerns in North Carolina*, NPR (Sept. 22, 2018), https://www.npr.org/2018/09/22/650698240/hurricane-s-aftermath-floods-hog-lagoons-in-north-carolina.

CAFOs in its watershed, we have gotten samples with fecal coliform bacteria levels of over 120,000 colony-forming units/100 milliliter ("mL")—that is, over 600 times the state standard of 200 colony-forming units/100 mL. Exposure to fecal coliform bacteria can cause nausea, vomiting, and diarrhea.

12. CFRW's water-quality sampling has also found high levels of nitrogen and phosphorus in waterbodies near CAFOs. Because animal waste contains these nutrients, I think CAFOs are responsible for the nutrients in the water. Recent research supports this conclusion. Researchers at the University of North Carolina Wilmington who have been monitoring water quality in the Lower Cape Fear River Basin for more than 25 years recently presented data that show steady and significant increases in nutrients and other indicators of CAFO pollution throughout the Lower Cape Fear River Basin.[4] The researchers concluded that the increases are likely the result of CAFOs and their waste management practices.[5]

13. During CFRW's aerial patrols, we have seen numerous algal blooms in the Cape Fear River and associated waters, which are a clear sign that there are too many nutrients in the water. Algal blooms cause serious harm to aquatic plants and animals. Algal blooms form on the top of the water, depriving aquatic vegetation of the sunlight necessary to grow. And when algae decays, it pulls dissolved oxygen out of the water, which kills fish and other aquatic wildlife.

14. Because of the CAFO water pollution that I have seen, my family and I don't fully enjoy the waterways near our home. I am an avid outdoorsman, fisherman, and bird enthusiast. I grew up in Wilmington, exploring the waterways, wetlands, and swamps of the

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[4] *See* Michael A. Mallin et al., *Environmental Assessment of the Lower Cape Fear River System, 2020*, at 17 (2021), https://uncw.edu/cms/aelab/lcfrp/wq%20reports/2020-lcfrp-env-report.pdf.

[5] *Id.*

Cape Fear River Basin, and it's important to me that my daughters have the same opportunity to experience our region's incredible waterways. The opportunity to spend time near the water is one reason why we chose to live on the Black River, which is a tributary of the Cape Fear River. However, our home is downstream from many CAFOs; the headwaters of the Black River are in Sampson County, which has over 450 swine CAFOs that confine more than two million pigs, as well as an enormous number of poultry CAFOs. I used to fish in the river regularly, but I no longer fish as often as I would like to. I don't feel comfortable eating fish from the Black River knowing that they may have come into contact with bacteria or other CAFO pollutants. In addition, I don't let my daughters swim in the river very often, because I'm concerned that the CAFO pollutants will make them sick. I wish my family could enjoy the water near our home without having to question whether it is unsafe because of CAFO pollution.

15. In North Carolina, CAFO pollution is an environmental justice issue. Most CAFOs in North Carolina are in Sampson County and Duplin County, where there are high poverty rates, and a large proportion of the population is Black, Latinx, and Native American. The disparity in exposure to CAFO pollution is clear just from driving around the area—you don't see CAFOs next to country clubs or expensive houses; instead, you usually see them next to small homes in low-income communities.

16. To better protect waterways and communities from CAFO pollution, the U.S. Environmental Protection Agency ("EPA") should ensure that discharging CAFOs obtain National Pollutant Discharge Elimination System ("NPDES") permits consistent with the Clean Water Act ("CWA"), as federal law requires. Less than two percent of CAFOs in North Carolina

have NPDES permits,[6] so I think it is likely that much of the water pollution from CAFOs in the Cape Fear River Basin comes from CAFOs *without* NPDES permits.

17. Increasing NPDES permit coverage would help community members protect themselves and their local waterways from CAFO pollution by increasing transparency and giving people the opportunity to comment on CAFO nutrient management plans. If community members had access to nutrient management plans, they would know whether certain risky practices are allowed, which would help them identify and report permit violations. And if nutrient management plans were available for public comment, community members could help to improve them. For example, if I had the opportunity to comment on nutrient management plans, I would encourage the North Carolina Department of Environmental Quality ("NC DEQ") to include numeric limitations on the amount of nutrients that CAFOs can discharge, which could help reduce algal blooms in waterways.

18. In addition, EPA and NC DEQ should take more enforcement actions against CAFOs that discharge water pollution without CWA permits or otherwise violate state waste management rules. When my colleagues at CFRW and I witness these violations during our aerial patrols, we report them to NC DEQ, but it doesn't seem like there are any consequences because the violations keep happening.

19. The Cape Fear River Basin is my home, and I have committed my life to protecting the Cape Fear River and the communities that depend on it. I feel privileged to serve as the voice of the river and to represent the interests of CFRW members against polluting

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[6] *See* EPA, *NPDES CAFO Permitting Status Report: National Summary, Endyear 2021, completed 07/20/22*, https://www.epa.gov/system/files/documents/2022-07/CAFO%20Status%20Report%202021.pdf.

industries. But my work has made clear to me that EPA and NC DEQ need to do more to address the serious harm that CAFOs are inflicting in the Cape Fear River Basin.

I declare under penalty of perjury that, to the best of my knowledge, the foregoing is true and correct. Executed this 26 day of October, 2022.

Kemp M Burdette

Kemp Burdette

Figure One. Runoff from land application by a swine CAFO.
Source: Kemp Burdette

Figure Two. Runoff from land application by a swine CAFO.
Source: Kemp Burdette

Figure Three. Runoff from land application by a swine CAFO.
Source: Kemp Burdette

Figure Four. Runoff from land application by a swine CAFO.
Source: Kemp Burdette

Figure Five. Runoff from land application by a swine CAFO.
Source: Kemp Burdette

Figure Six. Runoff from land application by a swine CAFO.
Source: Kemp Burdette

Figure Seven. Swine CAFO pumping waste out of a waste pit and onto a neighboring field. Source: Kemp Burdette

Exhibit 15

DECLARATION OF DIANE ROSENBERG

I, DIANE ROSENBERG, declare and state as follows:

1. My name is Diane Rosenberg. I am 68 years old, and I live in Fairfield, Jefferson County, Iowa. Fairfield is a lively town of about 10,000 people. The town has a university, which has attracted people from all over the country.

2. I love the community and quality of life in Fairfield. For the first 40 years of my life, I lived in very congested suburban areas. I grew up in New York, and I have also lived in Boston and Washington, D.C. I moved to Fairfield in 1995 with my husband at the time. I quickly fell in love with the quiet and the fresh air in this area. The people here are very friendly, and we look out for each other.

3. The character of agriculture in Jefferson County has changed in the time that I have lived here. When I first moved to the area, I would see hogs out grazing, and I found it very charming. However, in the early 2000s, I noticed that I saw fewer hogs grazing. Around 2004, when I was an editor for a local newspaper, the paper published a series of articles on concentrated animal feeding operations ("CAFOs"). The articles alerted me to the prevalence of CAFOs in Jefferson County.

4. There are now approximately 80 CAFOs in Jefferson County. Together, the CAFOs confine nearly 200,000 pigs, which together generate at least 55 million gallons of manure per year. The CAFOs generally store this manure in liquid form in huge pits under the confinement buildings, or in the case of some of the older CAFOs, out in the open in uncovered lagoons, and they get rid of the manure by spreading it on fields.

5. I'm aware of CAFOs spreading manure on fields in ways that pose serious risks of water pollution. For example, I've seen workers spreading manure on fields with snow on

them, which is a sure way to cause water pollution. The snow prevents the manure from absorbing into the soil, leaving the manure to sit on the surface of the snow and ground. Then, when the temperature warms, the snowmelt mixes with the manure and carries it into nearby waterways. In addition, I'm aware of stories about CAFOs applying manure shortly before rainfall, which also can carry the manure into waterways. Once, a community member reported that rain had washed manure off a field and into a nearby stream. The manure formed a froth on top of the water. She reported the incident to the Iowa Department of Natural Resources ("IA DNR"), and the agency's water quality testing showed E. coli in the stream. I've even heard of one instance in which a company that had contracted with a CAFO to haul manure just dumped the manure in a field and left it there.

6. Not only do CAFOs apply manure in risky ways, but they also overuse application fields. I've reviewed many manure management plans for CAFOs in Jefferson County, and I worked with a college student to create a map of the fields designated for manure application in each plan. The map shows that some fields are included in more than one CAFO's manure management plan. In fact, some fields are included in four or five CAFOs' plans, and many of the fields that are receiving more than one CAFO's waste are directly adjacent to or near each other. When so many CAFOs are using one field, it's very likely that they are applying more manure than the soil and crops can take up, leaving the excess manure to run off into waterways. And when these fields are close to each other, they put nearby waterways at even greater risk of pollution from runoff. I am also aware that IA DNR can't adequately monitor how much of the manure is going where, when, and at what rates because they use an outdated paper system to file manure management plans, which makes it nearly impossible to keep on top of all the CAFOs' manure application practices.

7. CAFOs have created a water quality crisis in Iowa. Our waterways are full of pollutants that are associated with CAFOs, including nutrients like nitrogen and phosphorus and bacteria like E. coli and Campylobacter. One example that's close to home is Lake Darling in Washington County, just north of Jefferson County. When we first moved here, I would take my children to swim in the lake. Over the years, more and more CAFOs came to Washington County. As the number of CAFOs grew, nutrient and sediment pollution in the lake increased and eventually rendered it unusable. The state took six years and spent $16 million dollars to restore the lake. Right after it reopened, four CAFOs that together hold approximately 10,000 pigs were added to the watershed, and others have continued to come. Washington County is now home to over one million pigs. The CAFOs have made the expensive restoration of Lake Darling totally useless. Some of the fields that are in four or five CAFOs' manure management plans are in the Lake Darling watershed. Just about every week this year, there have been advisories that it isn't safe to swim in the lake because of high levels of E. coli and microcystin, which is a harmful toxin produced by certain bacteria. Last year, there were also many advisories for E. coli and microcystin. I've read articles warning dog owners to prevent their dogs from going into lakes polluted with microcystin because exposure can make their pets very ill or even kill them. This is just one lake, but it's an example of what CAFOs are doing to waterways all over Iowa.

8. In addition to polluting surface water, the CAFOs also contaminate drinking water. I know a woman in Howard County who had to stop using her drinking well after the water became unsafe to drink. She had to pay for bottled water and then "shock" the well by adding a large amount of chlorine to the water in order to use it again. I also know of other people who have had to stop using their drinking wells altogether and switch to the rural water

system at their own expense. Parts of Iowa—including Howard County—have karst terrain, which puts the aquifer at a particularly high risk of contamination. As we see in the case of the Howard County woman who lives in an area with karst terrain and sinkholes, pollutants from CAFOs are sometimes reaching the aquifer and contaminating drinking wells.

9. CAFOs also pollute the air and create noxious odors. I first smelled a CAFO when I drove by one with my daughter. I had heard how horrible the smell was, and I was curious to experience it myself. I rolled down the windows, and the odor that we smelled was indescribable. It made me sick to my stomach for about 20 minutes. The second time I experienced the smell, I was driving by a field where a CAFO was spreading manure. It was winter and all the car windows were up, but the smell still came inside. I was nauseous for about 20 minutes again. It's a kind of nausea that doesn't go away very quickly. I understand this nausea is caused by inhaling the hydrogen sulfide gas that CAFOs generate and emit, which then affects the central nervous system.

10. CAFO air pollution can harm community members' health. I once went on a bus tour of CAFOs in Davis County, which has even more operations than Jefferson County. After the tour, I developed the most miserable migraine, which I think was from breathing in all the hydrogen sulfide and ammonia that CAFOs emit. I also know of people who developed environmental asthma and irritable bowel syndrome, and who experienced nausea, vomiting, confusion, depression, and migraines from living near a CAFO. And I know of a woman who had to close her home-based elder care business after a CAFO was built nearby, because one of her residents developed respiratory problems, and she didn't want to risk the health of other

residents. Her daughter also stopped bringing her children to see their grandmother because of concerns for their respiratory health.[1]

11. I've spent a lot of time collecting information on the CAFOs in Jefferson County, because I think it's important for people to be informed about CAFOs in their community. Knowing where CAFOs and manure application fields are located is essential for protecting public health. For example, I know of studies showing that people who live near CAFOs can be exposed to Methicillin-Resistant *Staphylococcus aureus*, which can cause serious health problems.[2] People should know if they're close enough to a CAFO to be at risk of exposure. Knowing where manure application fields are located also is important for protecting water quality, and I believe that people deserve to know if their drinking water could be contaminated by CAFO pollutants. And regulators should know where the application fields are so they can ensure that each field receives only an appropriate amount of manure and monitor nearby groundwater and surface water for signs of contamination.

12. IA DNR is not doing enough to oversee CAFOs in the state. I've heard from people who work at IA DNR that they don't have enough staff to thoroughly review CAFO manure management plans. I've reviewed some of the plans myself, and I've found mistakes that impact how much manure the CAFOs can apply. IA DNR mostly leaves it up to the CAFO operators to complete and follow the manure management plans correctly. This self-policing

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[1] *See* Maria C. Mirabelli et al., *Asthma Symptoms Among Adolescents Who Attend Public Schools that are Located Near Confined Swine Feeding Operations*, 118 Pediatrics e66, e70 (2006) (finding that children attending schools up to three miles from CAFOs, who were thus estimated to be exposed to CAFO air pollutants, experienced asthma symptoms, including wheezing).

[2] *See* Shawn G. Gibbs et al., *Isolation of Antibiotic-Resistant Bacteria from the Air Plume Downwind of a Swine Confined or Concentrated Animal Feeding Operation*, 114 Env't Health Persps. 1032 (2006).

policy is like allowing the fox to guard the hen house, with serious consequences for our waterways.

13. IA DNR also fails to take adequate enforcement actions against CAFOs when they pollute waterways. When community members make complaints about runoff, the agency sometimes investigates, but not always. IA DNR doesn't have enough staff to investigate every incident. Over the years, they shifted from issuing more violations and fines to "coaching for compliance," which basically means they advise a CAFO owner on how to avoid the problem again. I don't feel this is a strong enough deterrent to encourage CAFOs to carefully follow regulations and best management practices. Even when IA DNR issues fines, the amounts are pathetic. The fines range from $3,000 to $10,000, which is low enough that the CAFOs just treat them as the cost of doing business. The fines provide little incentive for CAFOs to be more careful. The IA DNR has the option to refer more egregious violations to the State Attorney's Office to recommend larger fines, but they rarely do.

14. Right now, there aren't enough safeguards to protect people and the environment from CAFO pollution. While lots of people try to do the right thing, the bad actors take advantage of the system and harm Iowa's public health and environment. Almost every year, the number of polluted waterways in Iowa is the same or greater than the year before. The state's efforts haven't been enough to stop this trend. We need significant federal policy changes to ensure that CAFO pollution doesn't continue to harm people's lives and the environment.

I declare under penalty of perjury that, to the best of my knowledge, the foregoing is true and correct. Executed this 25 day of October, 2022.

Diane Rosenberg

Diane Rosenberg

Exhibit 16

DECLARATION OF JEAN MENDOZA

I, JEAN MENDOZA, declare and state as follows:

1. I am 77 years old, and I live in White Swan, Washington—an unincorporated community on the Yakama Indian Reservation in Yakima County. I am the Executive Director of Friends of Toppenish Creek ("FOTC"), and I have held this position for over 12 years.

2. Together with surrounding areas, Yakima County is a major agricultural hub. Portions of Yakima County and the Yakama Indian Reservation make up the Lower Yakima Valley, an approximately 1000-square-mile area where about half the land is irrigated and comprises the most productive agricultural region in Washington State. Among other things, Yakima County has over fifty dairy cow-confining concentrated animal feeding operations ("CAFOs"). Most dairy CAFOs in Yakima County are clustered in the Lower Yakima Valley, including about five located on the Yakama Indian Reservation.

3. The Lower Yakima Valley is an environmental justice community. About 80 percent of people living in the Lower Yakima Valley identify as Latino, and 10 percent identify as Native American.[1] By contrast, Latinos make up less than 14 percent of people living in Washington State as a whole, and Native Americans make up only two percent.[2] In addition, people in the Lower Yakima Valley tend to have relatively low incomes, as compared with the rest of the state. The median annual household incomes in Yakima County and the Lower

[1] *See* Jean Mendoza, Friends of Toppenish Creek, *Life is Cheap in Yakima County*, Front & Centered (Dec. 2, 2015), https://frontandcentered.org/life-cheap-yakima/.

[2] *See QuickFacts: Washington*, U.S. Census Bureau, https://www.census.gov/quickfacts/fact/table/WA/PST045221 (last visited Oct, 19, 2022).

Yakima Valley are $55,000 and $33,000, respectively, both of which fall far below the statewide median annual household income of around $77,000.[3]

4. A group of neighbors formed FOTC in 2008 when a dairy CAFO with 7,000 cows threatened to relocate to the banks of Toppenish Creek, an important tributary of the Yakima River, which in turn, is a tributary of the Columbia River. Even though it might seem to be a minor waterbody, Toppenish Creek is vital for our region, which receives relatively little rainfall. Based on our experiences with other dairy CAFOs in the area, my neighbors and I knew that the relocating CAFO would pose a major threat to our water and destroy our quality of life. We succeeded in opposing that CAFO, and we incorporated as a non-profit in 2009. We have since become a leader in the fight for clean water and clean air in Yakima County.

5. These days, FOTC continues to work for the protection and restoration of the Toppenish Creek, Yakima River, and Columbia River watersheds as natural and community resources. Because CAFOs cause significant harm to these watersheds, a major portion of our work focuses on CAFOs. Among other activities, we support community-led initiatives to raise awareness about the threats that CAFOs pose to our water, health, and environment. We gather and disseminate information about the problems we seek to address, including by testing drinking water for CAFO pollutants such as nitrates and phosphates. We regularly engage with the Yakima Regional Clean Air Agency and other government decision-makers. From 2012 to 2019, we were part of the Lower Yakima Valley Groundwater Management Area Advisory Committee, which focused on monitoring and reducing nitrate concentrations in groundwater through the development and implementation of educational campaigns and protective measures.

[3] *See* Don Meseck, Wash. State Emp't Sec. Dep't, *Yakima County Profile* (updated Apr. 2022), https://esd.wa.gov/labormarketinfo/county-profiles/yakima (last visited Oct. 19, 2022).

We also collaborate with other groups in advocating for the enforcement of our nation's Safe Drinking Water Act, Clean Water Act, and Clean Air Act. And we hold state agencies accountable for the implementation and enforcement of the state's laws and regulations protecting our air, land, and water. FOTC operates under the simple principle that all people deserve clean air, clean water, and protection from abuse that results when profit is favored over people.

6. Dairies have a long history in Yakima County, but the industry has changed significantly over time. In the 1980s, Yakima County had approximately 140 dairy operations, with a total population of roughly 20,000 milk cows. Since then, the number of small dairies has decreased, but the remaining operations have grown dramatically. Now, there are about 50 CAFOs in the area, confining approximately 100,000 milk cows. Each cow produces about as much waste as 23 adult humans. Together, CAFOs in Yakima County generate as much waste as a city of more than two million people,[4] but unlike cities, these CAFOs don't have sewage treatment systems to disinfect their waste.

7. CAFOs in the Lower Yakima Valley deplete our precious water supplies. It's my understanding that a 1945 law has been interpreted to allow CAFOs to withdraw virtually unlimited amounts of groundwater to maintain the animals they confine.[5] Years ago, that law

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[4] The U.S. Government Accountability Office estimates that each person produces 3.72 pounds of sanitary waste per person per day. *See* U.S. Gov't Accountability Off., *Concentrated Animal Feeding Operations: EPA Needs More Information and a Clearly Defined Strategy to Protect Air and Water Quality from Pollutants of Concern* 58 (2008), https://www.gao.gov/assets/gao-08-944.pdf. Lactating cows can produce up to 155 pounds of manure each day. *See* Jeff Lorimor et al., *Manure Characteristics: Manure Management Systems Series* 13 (2004), https://www.canr.msu.edu/uploads/files/ManureCharacteristicsMWPS-18_1.pdf.

[5] *See Five Corners Family Farmers v. State*, 268 P.3d 892, 900–01 (Wash. 2011) (finding that RCW 90.44.050 allows for the construction of wells and withdrawal of groundwater for stock-watering purposes without a permit and that such withdrawals are not limited to 5,000 gallons per day).

might not have raised alarm, but now, CAFOs withdraw millions of gallons of pure water from deep aquifers every day.[6] Unless CAFOs are monitored more closely, I worry that there might not be much water left for future generations of people in this area.

8. In addition, I believe that CAFOs in the Lower Yakima Valley routinely discharge water pollution. Based on my research and experience, I know that the vast majority of CAFOs in this area rely on wet manure management systems, which involve storing liquid manure in often-unlined pits before spraying it onto fields. However, storage pits do not prevent pollutants in manure, such as ammonia and nitrate, from leaching into soil and groundwater. In fact, recent samples of soil from the sidewall of a waste pit in Yakima County revealed nitrate concentrations of 113.1 parts per million ("ppm"), which is significantly higher than the target level of 45 ppm.[7]

9. Evidence of CAFO pollutants in wells in the Lower Yakima Valley indicates that CAFOs are discharging water pollution. In 2017, the U.S. Geological Survey determined that about 20 percent of wells tested in the Lower Yakima Valley consistently exceeded safe drinking water standards for nitrates.[8] The Washington State Department of Ecology also gathers quarterly water samples from 30 monitoring wells in the Lower Yakima Valley Groundwater Monitoring Area, and it found that 45 percent of the initial samples exceeded safe drinking water

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[6] *See* Mendoza, *supra* note 1.

[7] *See* Anchor QEA, *H&S Bosma Dairy Lagoon No. 3 Abandonment Plan* 4–5 (2022), attached to petition as Exhibit 24.

[8] *See* Raegan L. Huffman, U.S. Geological Survey, *Concentrations of Nitrate in Drinking Water in the Lower Yakima River Basin, Groundwater Management Area, Yakima County, Washington, 2017* (2018), https://pubs.usgs.gov/ds/1084/ds1084.pdf.

standards for nitrates.[9] This is concerning because nitrates in drinking water are associated with a range of health problems, including birth defects, insulin-dependent diabetes, and cancer.

10. In 2015, a federal district judge concluded that several dairy CAFOs in the Lower Yakima Valley were responsible for contaminating neighboring drinking-water wells with nitrate pollution.[10] As part of a settlement agreement, the CAFOs agreed to line their waste pits. Lining the waste pits was supposed to reduce pollution, but unfortunately, nitrate levels have not decreased significantly over time.[11] In my opinion, wet manure management—and particularly, the storage of liquid manure—inevitably leads to groundwater contamination; merely lining storage pits is not enough to protect public health.

11. In addition to contaminating groundwater, I believe that CAFOs regularly pollute surface water in this area. There is a strong connection between groundwater and surface water here, so contaminated groundwater also affects creeks, rivers, and streams. In addition, sprayed waste sometimes drifts across fields into nearby waterbodies, and manure spills can reach waterbodies too.

12. I am concerned about surface water pollution from CAFOs because, for me and many other people living in the Lower Yakima Valley, life is intimately connected to fish and the Yakima River. In fact, some Native people believe that human life will cease if salmon do

[9] *See* Lower Yakima Valley Groundwater Advisory Committee, *Ambient Monitoring Initial Report Part of GWMA Implementation Plan* (June 20, 2019), https://www.yakimacounty.us/DocumentCenter/View/21633/GWAC-Presentation---Monitoring-Well-Report-Overview---2019620-v20-1.

[10] *See Cmty. Ass'n for Restoration of the Env't, Inc. v. Cow Palace, LLC*, 80 F. Supp. 3d 1180 (E.D. Wash. 2015).

[11] *See* Letter from Vincent McGowan, Water Quality Program Manager, State of Wash. Dep't of Ecology, to Edward Kowalski, EPA Region 10 (July 11, 2022), https://ecology.wa.gov/DOE/files/dc/dc1cc49b-d818-419b-8664-349807c76073.pdf.

not return to this area to spawn. I moved to the White Swan area in 1995, and in the first few years after my move, I regularly saw people selling fish along the roadsides during fishing season. Fishermen sold locally caught salmon. Eating this beautiful food was one of the joys of my life. However, I no longer see people selling fish by the sides of the road, and locally caught fish is harder to find. Many salmon species in the region are now endangered. I know that there are many threats to waterbodies in this part of the country. Because declining fish populations have coincided with the increasing concentration of CAFOs in this area, I think that water pollution from CAFOs could be at least partly at fault for the population declines. And not only has water pollution from CAFOs contributed to declining fish populations, but it also adds to the mix of pollutants that makes fish caught in this area unsafe to eat.

13. I'm worried that the dairy industry's efforts to expand the use of biodigesters, which capture methane emitted by manure in CAFO waste pits to produce biogas, will exacerbate the contamination impacting our communities. Biodigesters fail to address the water pollution that CAFOs cause, and they ultimately produce little output compared to the effort required.[12]

14. Even though evidence suggests that they discharge water pollution, most CAFOs in this area lack National Pollutant Discharge Elimination System ("NPDES") permits under the Clean Water Act ("CWA"). According to the Washington State Department of Ecology ("WA Ecology"), there are over 100 Large CAFOs in Washington State, but only 24 have active

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[12] *See* Friends of Toppenish Creek, *Air Pollution from CAFOs in Yakima County – Potential Impact of Digesters that Produce Natural Gas from Cow Manure*, http://www.friendsoftoppenishcreek.org/cabinet/data/Air%20Pollution%20from%20CAFOs%20in%20Yakima%20County%20III.pdf.

NPDES permits.[13] Based on my research and experience, I believe that the majority of CAFOs without NPDES permits are discharging water pollution in violation federal law, but I do not think that Washington officials will hold those CAFOs to account.

15. Under-regulated CAFOs in the Lower Yakima Valley threaten the health of people living in our community. For example, Campylobacter infection is very common here. Campylobacter species are widespread in dairy cows and other mammals, and campylobacter infection is a leading cause of diarrhea in humans. Rates of Campylobacter infection are about four times higher in the Lower Yakima Valley than they are elsewhere in the state.[14] And bacteria aren't the only problem. Agriculture-related ammonia pollution is almost twice as high in Yakima County as it is in any other county in Washington,[15] and Yakima County has high rates of health conditions associated with exposure to this pollution, including pre-term birth, myocardial infarction, and lung disease.[16]

16. I do not believe that Washington officials take adequate enforcement actions against CAFOs that discharge. Last spring, while I was visiting friends who live near a dairy CAFO, I noticed that a truck transporting liquid manure had spilled manure on the road. I reported the incident to the Washington State Department of Agriculture and WA Ecology. In

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[13] *See* Dep't of Ecology State of Wash., *Clean Water Permit for Large Livestock Operations, Manure Lagoons Available for Review* (updated July 7, 2022), https://ecology.wa.gov/About-us/Who-we-are/News/2022/June-22-Clean-water-permit-for-large-livestock-ope.

[14] *See* Margaret A. Davis et al., *Risk Factors for Campylobacteriosis in Two Washington State Counties with High Numbers of Dairy Farms*, 51 J. Clinical Microbiology 3921 (2013).

[15] *See* EPA, Envirofacts about Ammonia on Washington State in Agriculture Sectors (2020), https://enviro.epa.gov/envirofacts/embed/nei?pType=SECTOR&pReport=county&pState=&pState=53&pPollutant=&pPollutant=NH3&pSector=&pSector=38&pSector=18&pSector=31&pYear=2017&pCounty=&pTier=&pWho=NEI (last visited Oct. 19, 2022).

[16] *See* Wash. State Dep't of Health, *Washington Tracking Network*, https://fortress.wa.gov/doh/wtn/WTNPortal/#!q0=370.

addition, I took photos of the spill and submitted those photos to the agencies. Although the agencies were required to notify me of the outcome of their investigation, I never received an update. Instead, when I reached out for news, WA Ecology staff told me to submit a public records request. When I eventually received the investigative report, I saw that WA Ecology had waited several days to investigate my complaint. By that time, there was no manure on the road. WA Ecology staff ignored my photographs and concluded that the CAFO was following best management practices. They recommended that I ask the county to repave the road, but I do not believe that repaving is the best way to avoid future spills.

17. Along with others at FOTC, I have invested significant time and effort in working to strengthen Washington's NPDES program for CAFOs, including through successful litigation. But our time and efforts won't pay off unless discharging CAFO actually obtain NPDES permits. Accordingly, I urge the U.S. Environmental Protection Agency to protect public health and the environment by granting this petition and, thus, ensuring that the owners and operators of discharging CAFOs come into compliance with federal law.

I declare under penalty of perjury that, to the best of my knowledge, the foregoing is true and correct. Executed this 25 day of October, 2022.

Jean Mendoza

Jean Mendoza

Exhibit 17

<u>DECLARATION OF RONALD J. WYSE</u>

I, RONALD J. WYSE, declare and state as follows:

1. I am 83 years old, and I live with my wife in Mt. Pleasant, Henry County, Iowa. My wife and I moved to our current home in town about two years ago, but before that, we lived outside of town at [redacted], Henry County, Iowa. We lived there for about 40 years, and during some of that time, my son and his wife lived about a half mile down the road from us. After we moved into town, my son and his wife moved into our old home [redacted]. We have a herd of six grass-fed beef cows there, and I like to visit the farm just about every day.

2. In 2012, when my wife and I were living at our old home, a swine concentrated animal feeding operation ("CAFO") was built about 2,200 feet away from us. The CAFO confines just under 2,500 hogs in a single large confinement building. The CAFO stores the hogs' urine and feces in a pit below the confinement building, and it gets rid of the waste by spreading it on fields that are very close to our old home.

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community.

3. One Sunday morning about two years after the CAFO was built, the CAFO operator applied waste on their field before heavy rains, which caused the waste to run off their field and into a creek that is on our property. As we were leaving for church, we noticed that the CAFO operator was applying waste on a field just 1,800 feet from my son's home and 2,200 feet from our home. The field the CAFO operator was using has tile drains, which are underground pipes that take excess water and manure runoff out of the soil. The tile drains empty into a creek on our property that our cattle drink from. The field also has terraces that are meant to prevent waste from running off the field. Later that day, we got about three inches of rain, which caused the waste to run through the tile drains and into our creek. The rain also caused the waste to spill over the top of the terraces and into our creek. The liquid spilling onto our property was green and foamy, and it smelled terrible.

4. Two days after the waste spilled into our creek, I took a water sample and sent it to the University of Iowa to be tested. The tests showed that the levels of E. coli and nitrate in the water were just under the state's maximum acceptable level. Because two days had passed between the runoff and the sampling, the E. coli and nitrate levels likely would have been above the acceptable level right after the runoff. I reported the runoff and the test results to the Iowa Department of Natural Resources ("IA DNR"), but they said they couldn't do anything because they hadn't done the testing themselves. However, they did make a note of the incident. Since the incident, the CAFO operator has made the terraces taller, and waste hasn't spilled over them again.

5. Even when we don't have a heavy rain, CAFO waste still enters our creek because the tile drains empty into it. Around the time when my wife and I moved into town, we learned that if a pregnant cow drinks water contaminated with CAFO waste, it can kill the calf.

Our cattle could drink out of our creek, and we didn't want to risk losing a calf, so my son put up fences to prevent the cattle from accessing the creek. The fencing was expensive, and it felt unfair that we had to pay to protect our business from the CAFO's pollution.

6. In addition to polluting our creek, the CAFO also pollutes the air. The pollutants smell terrible, and they have made me sick. The CAFO smells nothing like the farms that I am used to being around. One of my neighbors has a herd of 50 beef cows, and when the wind blows from that direction, it is a pleasant smell that I don't mind. That is not the case for the CAFO.

7. I remember two incidents when the smell from the CAFO was particularly bad. The first incident happened one morning when I was mowing the lawn at our old home. When I went outside to start mowing, I immediately noticed a strong smell from the CAFO that was hardly bearable. As I was mowing, I started feeling sicker and sicker. After about two hours of mowing, I went inside and told my wife that I had a terrible headache and felt sick. She told me that my clothes smelled like I had been right next to the CAFO. I changed my clothes, took some asprin, and continued mowing. When I was back outside, I started feeling sick again, but I was able to finish mowing. The second incident happened at about 3:00 in the morning when I got up to stoke the fire in our fireplace. I walked outside to get some wood, and it smelled so terrible that I almost went right back inside. The smell hit me like a brick wall. I quickly grabbed the wood and retreated inside.

8. Although these two incidents are particularly clear in my mind, the smell from the CAFO is a constant problem. When we lived at our old home, we couldn't ever use the screened-in porch in the evenings, because when the wind blew from the direction of the CAFO and/or the air settled down around the house, the smell of the CAFO was terrible. The porch is

on the first floor of our old home, which is about eight feet lower than the land where the CAFO sits. The air pollution and odor from the CAFO settles down in the low-lying land. I felt angry and disappointed that the smell prevented us from fully enjoying the home that we had lived in for so long. Now, I drive by the CAFO every time I visit my son at my old home, and I smell the odor most of the times I drive by.

9. I wonder whether some of the illnesses I've had over the last nine years are because I've been exposed to the CAFO's air pollution. I've had respiratory problems, and I have to monitor my lungs very closely. I know that exposure to CAFO air pollution can cause respiratory problems, so I think the illnesses I've experienced could be from living next to a CAFO for so long.

10. It is increasingly difficult for community members to hold CAFOs accountable for the pollution they cause. I'm disappointed that IA DNR did not investigate or penalize the CAFO after I told them about the discharge into our creek and provided them the test results showing high levels of E. coli and nitrate in the creek. I was also disappointed to learn of the Iowa Supreme Court's recent decision making it more difficult for people to sue CAFOs for causing a nuisance.[1] Given the difficulties community members face holding CAFOs accountable, IA DNR, state legislators, and the U.S. Environmental Protection Agency need to do more to prevent CAFO pollution from occurring in the first place.

I declare under penalty of perjury that, to the best of my knowledge, the foregoing is true and correct. Executed this 22 day of October, 2022.

Ronald J. Wyse

Ronald J. Wyse

[1] *See Garrison v. New Fashion Pork LLP*, 977 N.W. 2d 67 (2022).

Exhibit 18

15. U.S. EPA Region 5

Comments on Ohio's Preliminary Modeling Results for the Maumee Watershed Nutrient TMDL
EPA comments dated 08/17/2022

1. ***General Comment:*** EPA requests Ohio EPA (OEPA) to clarify the endpoint/location of the Maumee Watershed Nutrient (MWN) TMDL and describe how it will attain and maintain applicable WQS for Lake Erie. Is the compliance point the Waterville gage, the mouth of the Maumee River, or both?
   - Wherever OEPA decides that endpoint(s) to be, please review the draft PMR document and address any language which may be inconsistent with the choice of an end point (e.g., p. 95, *"…the TMDL target that will primarily be measured at the Waterville gage."* Updating this sentence would be necessary if the mouth of the Maumee River location was chosen to be the endpoint)

2. ***General Comment:*** OEPA does a sound job of explaining that the TMDL allocations described in the draft PMR are applicable to the "spring" season of March 1 through July 31. EPA is curious to understand OEPA's thoughts about the applicability of the TMDL, which is calculated to meet targets during 3/1 to 7/31, for remainder of the calendar year (August 1 through February 28).
   - Can one assume that allocations calculated to meet the spring season (i.e., 3/1 to 7/31) apply all year round? If yes, OEPA should state that someplace in the PMR.
   - Are there are any assumptions built in for the 8/1 to 2/28 time period for wasteload allocations (WLAs) and/or permits?
   - Section 2.2.4 (pp. 44-47) of the PMR document discusses numerous impacts on the delivery of phosphorus and time lags regarding phosphorus. Given this information, further discussion is needed on why it is appropriate to have WLAs that apply to the spring season only.

3. ***General Comment:*** How is the TMDL applicable to the period outside of the spring season? How will climate change be factored into the TMDL/TMDL analysis, including outside of the spring season?
   - Section 3.8.1, Pg. 90 - *"Phosphorus pollutant reduction targets are correlated with the HABs to serve as actionable acceptable levels related to Ohio's impairment metrics. These targets were developed by the binational Annex 4 subcommittee of the GLWQA (Annex 4, 2015). The phosphorus that directly contributes to the growth of the HABs was determined by the subcommittee to be primarily delivered with springtime snowmelt and rain. This resulted in targets limited to phosphorus delivered to Lake Erie from the Maumee River in the "spring" March 1 through July 31 period each year. The TMDL allocations are therefore only applicable during this spring season."*

4. ***General Comment:*** EPA appreciates that OEPA assigned individual WLAs to individual facilities/permittees within the Tables of Appendix 3. EPA notes that an EPA TMDL approval typically applies to WLAs assigned to individual facilities; the use of Group WLAs will need to be discussed with EPA, and that the use of watershed permits, compliance schedules, etc., will need to be addressed through the NPDES permit process. Please be aware that 40 C.F.R. §122.44(d)(1)(vii) provides that water quality-based effluent limits in NPDES permits must be consistent with the assumptions and requirements of a WLA in any approved TMDL.

5. ***General Comment:*** In several locations in the document, it is stated that dissolved reactive phosphorus (DRP) is the focus or the goal of the MWN TMDL (i.e., bottom of p. 2). However, this seems to imply that the MWN TMDL will address DRP, when the MWN TMDL is for total phosphorus (TP) only. Suggest replacing "focuses" with "includes discussion" or some other similar phrase. The current wording, especially so early in the document, implies that the TMDL is

addressing DRP, when the TMDL is developing loads for TP only. The language as noted below (Comment #34 below) is a better example.

6. ***General Comment:*** EPA requests additional information on how other sources of TP to the Western Lake Erie Basin (WLEB) are being addressed/considered in the MNW TMDL.
   - Phosphorus contributions from other watersheds (e.g., Cedar-Toussaint Watershed, Portage Watershed) and how those contributions will be accounted for in the consideration of water quality, and the attainment of water quality targets for Western Lake Erie assessment units.
   - Air deposition of phosphorus directly to waterbodies.
   - Other contributions stated to be "negligible", such as direct discharges of manure (Section 2.2.1.1) and natural sources (Section 2.2.1.5). (Comment #10 below)

7. ***General Comment*:** EPA requests OEPA provide additional detail on the impaired uses and how designated uses and criteria will be attained. This detail can be provided in the revised PMR or the draft TMDL report.
   - **p. 4, Section 2.1, 3rd paragraph below Section 2.1 heading:** The paragraph discussing the Lake Erie HAB recreation assessment methodology needs to be expanded. Annex 4 developed loads of TP and DRP to address algal blooms in Lake Erie. A notation that OEPA will "adhere" to the Annex 4 targets and "therefore" is directly applicable to the impairment will likely need further linkage. Suggest adding a paragraph or more on information from the 2022 IR regarding time periods (10 days), areal coverage (30%), and frequency (2 out of 6 years), and concentration (20,000 cells). Since there are no specific numeric criteria, there needs to be a clear link between the Annex 4 load and how the WQS will be attained.
   - **p. 4, Section 2.1, 4th paragraph below Section 2.1 heading:** Similar to the comment above, further discussion is requested regarding the drinking water use. The discussion in the LAP (pp. 15 and 16) and 2022 IR (pp. H-4 and H-5) both contain important details on how HABs impact the use. We note that the LAP does not state that "…these impairments can be removed…" when the Annex 4 targets are achieved; microcystin sample results indicate use attainment, not algal bloom size.
   - **p. 4, Section 2.1, 5th paragraph below Section 2.1 heading:** Regarding the aquatic life use (ALU) discussion in this paragraph. Similar to above, additional details are requested on the linkage between TP loads and aquatic life use. It is clear in this document and in others that OEPA is in the process of developing ALU assessment targets for the impaired segments. Since no numeric criteria (or assessment targets) currently exist, it will be important to note explicitly that OEPA is utilizing the goals of the Lake Erie Commission (LEC) to address ALU in the interim and explain why this is appropriate. Please provide reference to where the mesotrophic status goal or the 10-15 µg/L (assuming TP) is from.

8. **p. 8, paragraphs beneath Figure 6:** EPA requests that, overall, the PMR (and the TMDL) clarify the purpose of the SWAT model.
   - EPA requests that the modeling section of the revised PMR or TMDL contains a discussion on the overall modeling approach (Mass Balance used for TMDL loads, SWAT for implementation details) to clarify which models are used for what purpose.
   - EPA requests that the revised PMR or TMDL includes a summary paragraph of the Mass Balance model: how it was developed, how it was used, and potentially cite/direct the reader to any other resources (e.g., a more detailed report on the model, assuming there are other resources out there).
   - EPA requests that the revised PMR or TMDL includes a summary paragraph on SWAT: what it is, and what it will be used for during this project.

9. **p. 16, 1st paragraph beneath *Fertilizer contribution to phosphorus pollution* heading**: This paragraph discusses phosphorus entering stream networks – is this both chemical and manure, or just chemical?

- **2nd paragraph beneath *Fertilizer contribution to phosphorus pollution* heading**: EPA recommends that OPEA clarify what "direct discharge(s)" of fertilizer means. Not all readers will understand that runoff from fields might not be considered as a "direct discharge". Given the high visibility regarding CAFOs and animal operations, suggest being very clear on terms and definitions. How is it known that direct discharges are a negligible proportion of the overall loading?
- **4th paragraph beneath *Fertilizer contribution to phosphorus pollution* heading**: Manure overapplication from CAFOs/CAFFs is noted as not being widespread in fields controlled by CAFO/CAFFs. It would be important to note the areas which are typically controlled by a CAFO – do most CAFOs control the land their manure is spread upon? What about the smaller non-CAFO designated facilities, do those facilities control the lands where manure is spread? It is also unclear where in Section 2.3 there is further discussion on the critical source areas regarding CAFOs and manure spreading.

10. ***General comment*:** Factors that are "negligible" or "minor" seem to be discounted, and EPA requests additional discussion/rationale of how these are handled.

- **p. 16, Section 2.2.1:** EPA requests additional rationale for how these direct discharges are addressed. *"While detrimental to the aquatic life of receiving streams during an episode (i.e., the near-field), direct discharges that have occurred represent a negligible proportion of the Maumee's overall seasonal far-field phosphorus load."*

- **p. 42, Section 2.2.2.2:** Stormwater discharges are 20% of WLA, but are considered minor here. *"Combined with information presented above, and the overall small proportion of developed land, stormwater from developed land is expected to be minor source of phosphorus to the Maumee."*

11. **p. 19:** There are a number of percentages noted on this page; some seem to imply differing messages. For example, the first paragraph notes that SWAT modeling noted that commercial fertilizer contributes an average of 58% TP and 42% DRP to Maumee Bay, and manure contributes 12% and 8% respectively. However, the last paragraph notes that the delivery ratio of phosphorus for commercial and manure fertilizer is 3% and 1%, which may imply that despite the predominance of fertilizer use, little is getting to Maumee Bay. While these are two different statistics (load vs ratio), it could be misinterpreted that these sources do not contribute to the problems in Maumee Bay.

12. **p. 21, 3rd paragraph below Fertilizer's role in increased DRP to Lake Erie heading:** The discussion on the IJC report suggests the impact conservation tillage has on DRP loads. This will need to be considered as the Reasonable Assurance Section is developed; relying on conservation tillage will be much more nuanced when this information is considered.

- Is there any way to quantify the impacts of conservation tillage, such as through modeling of scenarios under which conservation tillage is adopted by various percentages of acreage?
- Is the reduction in TP (particulate) phosphrous greater than the increase in DRP? This is somewhat discussed on Page 22, but a more explicit determination is needed.

13. ***General comment*:** EPA requests additional discussion regarding the nature of "legacy" phosphorus, how it is defined, and how it can and will be addressed.

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- **<u>p. 22-23, Soil and Legacy Sources Section:</u>** "Legacy" phosphorus may be interpreted to be phosphorus that cannot be controlled, or is "just there". It will be important to emphasize that controlling legacy phosphorus will rely not only on controlling soil runoff, but also "turning off the tap" by reducing fertilizer use/reducing activities which add more phosphorus to the soil. EPA notes that subdividing phosphorus inputs to current fertilizer use vs legacy phosphorus could lessen the importance of many of the nonpoint source controls needed to reduce phosphorus.

<u>14.</u> **<u>p. 26, top paragraph</u>**: This paragraph regarding the Muenich et al (2016) scenarios should be carefully reviewed in regards to reasonable assurance.

<u>15.</u> **<u>p. 32, Title of Subsection 2.2.2:</u>** EPA recommends revising the heading of this subsection to "NPDES permitted point sources (including permitted stormwater) of phosphorus" to reference NPDES permitted point sources and to reflect the types of permitted facilities addressed in the subsection.

<u>16.</u> **<u>p. 32, Table 3:</u>** As discussed in the comment immediately below, NPDES Permits for CAFOs must be included in the summary of types of NPDES permitted entities in Table 3. EPA's NPDES program has identified 6 CAFOs within the Ohio portion of the Maumee Basin with NPDES permits, and 70 CAFOs without such permits. If confirmed by OEPA, please revise Table 3 to reflect this information.

<u>17.</u> **<u>p. 34, 5th paragraph:</u>** The first sentence reads, "*There are no NPDES permitted CAFO facilities within the Maumee Watershed*." Concentrated animal feeding operations are point sources under the CWA. EPA's NPDES program has identified 76 CAFOs in the Ohio portion of the Maumee watershed, 6 CAFOs with a NPDES permit and 70 CAFOs without a NPDES permit. EPA requests that OEPA characterize existing phosphorus loads from this point source sector, and establish allowable loads for all 76 identified CAFOs, including related production and land application areas, in the wasteload allocation portion of the forthcoming TMDL.

Such loads should account for (1) all releases from production areas and (2) all releases from land application areas that do not qualify for the agricultural storm water exclusion under the Act. *See* 40 C.F.R. § 122.23(e). Releases that qualify for the agricultural storm water exclusion may be placed in the load allocation portion of the TMDL. Releases that should be placed in the WLA include, but are not limited to, releases to a jurisdictional water (1) through artificial subsurface drainage (i.e., tile drainage), as well as (2) through ground water "if the addition of pollutants … is the functional equivalent of a direct discharge from the point source to navigable waters." *See* 140 S. Ct. 1462 (2020).

EPA offers the above as a point of emphasis in light of the statements on p. 34 and in Table 3 (p. 32) that no CAFOs in the watershed possess NPDES permits and the lack of CAFO discussions in the existing point source loading or waste load allocation sections of the draft PRM, as well as the following quote from p. 52, "*… 85 percent of Ohio's contribution of total phosphorus load was sourced from agricultural lands.*", as CAFOs operate within the broader agricultural sector.

<u>18.</u> **<u>p. 36, paragraph beneath Figure 19</u>**: The last sentence reads, "*…point sources contribute a similar proportion of phosphorus as manure fertilizer sources.*" and potentially highlights why the splitting of fertilizer into direct and legacy phosphorus sources may be misinterpreted. This could imply that point sources and manure are not really significant sources, and thus, make implementation of phosphorus source controls more difficult. It seems that manure inputs contribute not only to the direct sources of phosphorus to the system, but also slow phosphorus loss/reduction from the legacy phosphorus "pool" within soils of the basin.

- It seems that in this last sentence of the paragraph beneath Figure 19, OEPA is summarizing an argument from the Kast et al. (2021) study and not making a definitive statement regarding the proportion of phosphorus from point sources vs. phosphorus contributions from manure?

19. **pp. 38-40, Existing facility-based (discharging) point source reduction efforts Section**: There appears to be no discussion of DRP reduction efforts in the existing facility discussion; is there a reason why DRP was left out of this section? DRP is acknowledged and discussed as part of the source discussion for numerous other sources in the draft PMR document.

20. ***General comment*:** EPA requests additional supporting language and rationale behind several conclusions including:

- **p. 74, Section 3.3.3:** Please provide more clarification for excluding these SSOs. Please provide more rationale behind the 15 percent removal and greater than 6 percent removal: *"Therefore, SSOs are excluded from the analysis unless flow volumes are reported. This report uses a wet weather loading nutrient concentration of 0.75 mg/L for total phosphorus, the median concentration of 131 samples reported from September 2014 to August 2017 by two Ohio sewer districts that are required to monitor total phosphorus at select CSO outfalls in their NPDES permit. When bypasses go through primary treatment, 15 percent removal is assumed by Ohio EPA to account for settling and sludge removal. This value is set to be greater than the 6 percent removal from septic tanks but not as high a removal rates observed when fine solids are removed via extended settling and/or anaerobic digestion."*

- **p. 75, Section 3.3.4:** Please provide additional discussion/rationale: *"For this study, 80 percent efficiency will be used because the studies reviewed by Beal used fresh soil columns and did not consider a reduction in efficiency with system age."*

- **p. 75, Section 3.3.4:** Please provide additional discussion/rationale: *"The value used for this study is 40 percent total phosphorus removal for failing soil adsorption systems, or half that is assumed for properly working systems."*

- **p. 76, Section 3.3.4, Table 14:** Please provide additional discussion/rationale to explain how this was adapted: *"Proportions of total HSTS systems grouped into categories for Ohio's Nutrient Mass Balance Study. Adapted from the 2012 ODH statewide inventory (ODH, 2013)."*

- **p. 78, Section 3.3.5.3:** Please provide additional discussion/rationale: *"Without adequate monitoring data to compare with other land uses, a small positive bias of 0.1 lbs./acre/year is assumed for natural lands."*

- **p. 83, Section 3.4.1.2:** What is the rationale behind the using the "second greatest?" *"With only a few exceptions, the individual wasteload allocation for each of these facilities is set based the second greatest spring season load each facility has discharged in the last five spring seasons (2017-2021). Many of these facilities do not monitor total phosphorus in their effluent. Similar assumption to those used to calculate the 2008, "existing", loads were used to determine these facilities total phosphorus concentrations."*

21. **p. 81 and Appendix 3:** It is important for EPA to understand how the individual WLAs in Tables A2.1 and A2.2 were calculated. Are the WLAs in the Appendix 3 tables calculated using the concentrations described in Table 17 (i.e., for GP1 facilities – flow * 0.5 mg/L * conversion factor…GP2 facilities – flow * 0.47 mg/L * conversion factor…etc)? Or are the WLA's in the Appendix 3 tables calculated using 1.0 mg/L?

- Are there any additional assumptions at play related to the calculation of WLAs in the Tables in Appendix 3? If yes, please explain.
- Please add additional columns to the Tables in Appendix 3 which include the flows and concentration values used to calculate the WLAs.

22. **p. 81, Footnote #1:** EPA R5 TMDL and OEPA TMDL staff had previous discussion (i.e., May-June 2022) regarding a scenario where a permittee has two assigned WLAs, one WLA from an earlier near-field TMDL (i.e., those projects described in Appendix 4) and a second WLA calculated in the development of WLAs for the MWN TMDL. EPA and OEPA came to the understanding that under these circumstances when there are two WLAs assigned to the same facility, ultimately the permit issued to the permittee must be consistent with the more stringent WLA.

- Please include language which explains this scenario and expectation that the more stringent WLA will be incorporated into the permit. This language can be included within the revised PMR or TMDL document.
- Unsure if the language in Footnote #1 is fully accurate given this understanding. Namely that all prior WLAs calculated for previous near-field TMDLs are not impacted by the WLAs from the MWN TMDL. The language of Footnote #1 could be interpreted to suggest that all WLAs from earlier near-field TMDLs would be more stringent than the WLAs calculated in the MWN TMDL.
- It would be very helpful for OEPA to designate (e.g., asterisk) those permittees that have a pre-existing WLA from an earlier near-field TMDL within the Tables of Appendix 3. Another option would be to include the previously approved WLA in Appendix 3 with a notation, so the PMR/TMDL would serve as the overall source of information regarding approved WLAs.
- Appendix 4 identifies many of the WLAs as annual loads. Please update any WLAs represented with annual loads to include a daily expression of the WLA in Appendix 4.
- EPA reminds OEPA that permits for discharges to impaired waters in the WLEB upstream from the mouth of the Maumee, which do not yet have a TMDL calculated to address that upstream impairment, must have a pre-TMDL Water Quality Based Effluent Limit (WQBEL) when the discharge is at a level that will cause, have the reasonable potential to cause, or contribute to an excursion above the applicable numeric or narrative water quality criterion.

23. **p. 82, Table 17:** Table 17 indicates that major publicly-owned treatment works that have a design flow equal to or greater than 10 million gallons a day (mgd) will receive a WLA equal to design flow times 0.37 milligrams per liter (mg/L) for a 153-day spring season, and that a monthly average effluent limit of 0.5 mg/L in a permit will drive performance to the 0.37 mg/L level. EPA appreciates the reference to an effluent limit of 0.5 mg/L for such POTWs because the *Great Lakes Water Quality Agreement* (*GLWQA*) provides that the United States and Canada are to, "assess and, where necessary, develop and implement programs such that municipal wastewater treatment facilities that discharge one million liquid gallons or more per day major municipal wastewater treatment plants discharging to the Lake Erie basin achieve a maximum of one-half of a milligram per liter of phosphorus in effluent." This quote from the international *Agreement* is not confined to the spring (i.e., March 1 to July 31). Furthermore, algae blooms can occur or continue after July 31, and phosphorus loadings outside of the spring timeframe contribute to legacy loads that the TMDL seeks to address. For these reasons, should the WLAs in the forthcoming TMDL (including those addressed in the comment immediately below) apply during the growing season, an annual period that may end between September 30 and October 15?

24. **p. 82, Table 17:** Table 17 indicates (with language that is confusing) that POTWs that have a design flow equal to or greater than one but less than 10 mgd will receive a WLA equal to design flow times 0.47 mg/L for a 153-day spring season, and that a monthly average effluent limit of 0.66 mg/L in a permit will drive performance to the 0.47 mg/L level[1]. An effluent limit of 0.66 mg/L will not achieve the outcome to which the United States agreed in *GLWQA* (see quote in comment immediately above). EPA requests that OEPA explain how the WLAs are consistent with the objectives under the GLWQA. EPA notes that Ontario and Michigan are or will be applying an effluent limit of 0.5 mg/L to all of their major POTWs, including those with design flows equal to or greater than one but less than 10 mgd. Application of such limits to all major POTWs in the Ohio part of the Maumee basin will address equity across the three jurisdictions from the head of the Detroit River to the mouth of the Maumee.

25. **p. 83, Section 3.4.1.2, 2nd paragraph:** The text mentions that, "*…the individual wasteload allocation for each of these facilities is set based on the second greatest spring season load each facility has discharged in the last five spring seasons (2017-2021).*" The EPA requests further explanation of these assumptions and why they are appropriate. Would it be possible to provide an actual example WLA calculation using this method looks like? E.g., Flow * TP concentration (X mg/L) * conversion factor.

- Assume this calculative approach was used to set WLAs assigned in Table A2.2 in Appendix 3?

26. **p. 84, Section 3.4.1.3:** Is it appropriate to use 5/12 of the year for determining the CSO season?

- Are the CSOs effectively year-round, or are they more common in the spring?
- To clarify, no WLA (WLA=0) is assigned to SSOs? An explicit statement of this would be good.
- Note that this section would be a good place to identify presence and status of a Long Term Control Plan (LTCP).

27. **p. 85, Section 3.4.2, 1st sentence:** The text mentions "*natural infrastructure projects*"; can OEPA provide some examples of what these types of projects are? Are they green infrastructure (e.g., bioswales, rain gardens, impermeable pavement, curb cut etc.) related projects?

28. **p. 87, Section 3.4.5:** Is there any connection (i.e., story to tell) between the breakout of Landscape Allocations (i.e., Agricultural Land, Developed Land and Natural Land) from the Ohio 2020 DAP (e.g., Tables A5, A6, etc.) and this project effort?

- If, one were able to subdivide the LA value of Table 21 and Table 25 of the draft PMR into the landscape components (Agricultural, Developed and Natural) on the HUC-12 scale, would those values roughly agree with the summation of landscape estimates from the Ohio 2020 DAP (e.g., Tables A5, A6, etc.)?
- Would there be differences between these two sets (i.e., the Ohio 2020 DAP Landscape Allocation numbers (e.g., Tables A5, A6, etc.) and a hypothetical split of the Load Allocation (LA) on the HUC-12 scale for this TMDL effort) of values? If yes, what would those differences be and why?
- The draft-PMR document shares the message that the NPS contributions are the source which really needs to be improved upon (i.e., reduction of 92 MT to enhance NPS sinks and reduction of 366 MT to improve NPS management in Figure 44) to ultimately meet the WLEB total

[1] The GP2 text in Table 17 appears not agree with the final sentence in the GP2 narrative on page 83.

phosphorus (TP) targets. How will local stakeholders know what their goals/targets are for reducing nonpoint source contributions without greater specificity at the HUC-12 scale?

- It would be worthwhile for OEPA to provide more detail on LA and/or explain why it has chosen to have minimal detail on the LA.
    - Suggest a citation to 40 CFR 130.2(g) regarding the definition of "load allocation". *The portion of a receiving water's loading capacity that is attributed either to one of its existing or future nonpoint sources of pollution or to natural background sources. Load allocations are best estimates of the loading, which may range from reasonably accurate estimates to gross allotments, depending on the availability of data and appropriate techniques for predicting the loading. Wherever possible, natural and nonpoint source loads should be distinguished.*
- Is there an opportunity to highlight the LA portion of the TMDL for implementation purposes? To connect it to other documents (e.g., the DAP or existing Nine Key Element planning documents) which provide greater specificity to aid implementation planning?

29. **pp. 87-88, Section 3.4.7:** Can OEPA add some additional discussion regarding how it calculated the "*out of state boundary condition"* at 228.7 MT? How is the boundary condition divided between IN and MI (e.g., IN has 128.7 MT and MI has 100 MT)?

- Also, has OEPA consulted with TMDL staff at IDEM and MEGLE regarding this boundary condition calculation? Are their staff aware of this boundary condition set at the state border of IN-OH and MI-OH?

30. **pp. 88-89, Section 3.6, Margin of Safety:** The text mentions that, "*…conservative assumptions are made through TMDL development and implementation.*" What are the specific conservative assumptions used in the report? These assumptions mustto be explicitly identified, and a detailed discussion of why they are conservative (i.e., what effect did the assumption have on the loading calculation, or what effect did the assumption have on reduction efforts, etc.?).

- Are there any conservative assumptions used in the Annex 4 target development, or the modeling effort?
- Explicit MOS: Why is 3% considered appropriate for the MWN TMDL? A detailed discussion, perhaps highlighting the significant data source at Watertown as well as other monitoring efforts, the SWAT modeling in progress that will provide more detailed analysis of loading and impacts, and any other work that will further refine the data should be considered and discussed when developing the MOS.
- In Section 4.2, 11.1 MT are noted as "unassigned" in the allocations. Can those 11.1 MT be used as MOS? That would raise the MOS to 4.8%.

31. **p. 89, Section 3.7, Allowance for Future Growth:** To confirm, Allowance for Future Growth (AFG) was considered, but there is no explicit, line item of AFG as part of the final TMDL, but OEPA did consider AFG as part of its implementation approach for certain NPDES facilities. Also, AFG was incorporated as part of OEPA's assumptions used to quantify the single WLA for the minor facilities covered under the Small Sanitary General Permit (OHS000005), and referenced in Section 3.4.1.2 on pp. 83-84. This approach is almost like an implicit AFG approach.

- Are there any other instances for AFG was considered or incorporated as part of the draft PMR effort?
- EPA recommends that OEPA revise Section 3.7 to expressly address
    - Proposed future increases in the number of animals at existing CAFO;
    - Proposed future increases in the number of animals at small- or medium-sized animal feeding operations such that a given operation would become a Large CAFO;
    - Proposed construction of new CAFOs;

- Proposed increases in the design flow of POTWs;
- Proposed construction of new (non-domestic) sources or increases in discharge from existing non-domestic sources;
- Proposed construction of new POTWs;
- Proposed expansion of the service area for municipal separate storm sewer systems; and
- Construction sites at which one or more acres of land will be disturbed. OEPA should consult with the Ohio Department of Agriculture regarding (1), (2), and (3) in the above list.

32. **p. 90, Section 3.8.2, Critical Conditions, 1st paragraph, 4th sentence:** EPA requests that the sentence that starts with "Because of this, the …" be reworded or potentially even deleted. "*Phosphorus delivered by the stream network that makes up the Maumee Watershed is causing the impairments in western Lake Erie. Because of this, the "near-field" concerns that phosphorus may bring out within the stream network near the point or non-point source areas are not applicable to this particular project.*"

- Is this sentence in reference to the idea that the MWN TMDL will not address impairments for "near-field" areas at this time? E.g., waters in the basin which still require TMDLs (e.g., the Lower Auglaize subwatershed) will not be addressed via the MWN TMDL and a future TMDL to address these impairments will still need to be developed in the future?

33. **p. 90, Section 3.8.2, Critical Conditions:** The discussion of critical condition seems to contradict some of the basis for the MWN TMDL, e.g., "*…the specific timing of phosphorus delivery, within the "targeted" spring period, is not relevant*." Using the Annex 4 targets for the spring season (March 1 to July 31) would seem to imply that March 1 to July 31 is the critical period, especially for phosphorus loading in order to attain the MNW TMDL calculations. While blooms may occur or continue later in the year, runoff from the spring season seems to have been identified in Annex 4 as the critical time to control phosphorus loading. The language of Section 3.8.2 will need additional clarifying language to present this point. The goal of the TMDL is to attain and maintain WQS throughout the year.

34. **p. 90, Section 4.1**: The last sentence on the page appears appropriate for discussion of DRP ("*Reducing the DRP portion of total phosphorus as much as possible is an explicit goal of the implementation plan for this TMDL*"). It appears to be more accurate to note this as a goal of the implementation plan and not the TMDL.

35. **p. 92, Section 4.2, Allocations for the Waterville monitoring point:** Confused by the different loading capacity values, 620.2 MT of TP (presented in Table 25) and 631.3 MT of TP (shared on p. 88 in the 2nd paragraph). We gather the difference between both values is 11.1 MT but what is happening to this 11.1 MT and why was it subtracted from the 631.1 MT value?

- The text mentions further explanation of the 11.1 MT difference is found in Section 3.4.8 of the draft PMR document, but there doesn't seem to be a Section 3.4.8 of the draft PMR document.

36. **p. 93, Section 4.3**: This information should be considered when determining the adequacy of the MOS and much of this information should also be summarized within the MOS discussion of Section 3.6. Demonstrating that the model and calculations are conservative can be used to determine/support how much MOS is needed in a TMDL. This is likely something we will need to discuss further.

37. **p. 95, Section 5:** The document describes adaptive management as a process to monitor the implementation of a TMDL over time. Section 5, describes how OEPA will adjust and assess the implementation of the TMDL. EPA recommends that Section 5 of the document be revised to reflect that any adaptive management plans included in the implementation section of the TMDL will include specific milestones and timeframes that would trigger consideration and implementation of alternative strategies if certain metrics are not met within specific timeframes.

38. **p. 107, Section 5.3.1.1, above Ditch and Streamside Sources paragraph:** Should there be a paragraph here to discuss Non-Agricultural Stormwater?

39. **p. 115, Section 6, Reasonable Assurance:** EPA was interested to see the draft Reasonable Assurance discussions as part of the draft PMR document. Let's (EPA and OEPA) continue to brainstorm on content for this Section as part of the draft TMDL document, to be shared in December 2022. EPA is happy to look at early iterations of the draft Reasonable Assurance Section prior to December 2022.

40. General Comments for upcoming Reasonable Assurance (RA) discussion:

An analysis of RA is required for TMDLs with mixed point and nonpoint sources. In order to appropriately evaluate RA in the context of this TMDL, EPA requests that OEPA provide additional information on Reasonable Assurance, including discussion on the following details:

- What actions and activities have the various State, counties, SWCDs, and Federal Programs implemented in in the basin over the last decade or so.
    - This should include information on funding, timelines, milestones, monitoring results (if any), and any estimates of pollutant reductions.
- What actions and activities are currently being developed in the basin by the various State, counties, SWCDs, and Federal Programs?
    - This should include information on funding, timelines, milestones, critical areas, monitoring results (if any), and any estimates of expected pollutant reductions.
- What actions and activities are planned in the basin by the various State, counties, SWCDs, and Federal Programs?
    - This should include information on funding, timelines, milestones, critical areas, monitoring plans, and any estimates of expected pollutant reductions.
    - This should also include the roles and responsibilities of the various organizations/governments.
- EPA requests that discussion be provided to better understand how the RA and implementation efforts will be adjusted over time. As noted in Section 2.2 of the PMR, SWAT modeling is ongoing in the basin. A process for incorporating the results of the SWAT model and BMP follow-up monitoring will be important in utilizing the adaptive management process envisions in the PMR.
- EPA requests that the upcoming discussion will also address the impacts of climate change on existing and proposed BMPs and projects.
- It will also be important to explain the process for overseeing all the various projects planned or underway in the basin, to ensure the overall goals of the TMDL are addressed. Many NPS projects are developed at the HUC-14 level, and understanding how all these various projects will "fit together" in an overall plan will be important. To date, ODNR and ODA have been active participants in the stakeholder meetings, and it will be important to identify how all these efforts will be overseen to ensure the goals of the TMDL are attained.

41. **General Comment:** Please describe how climate change impacts/influence were considered during the development of the draft PMR and the use of the empirical mass balance model.

42. **Appendix 3, Tables A2.1, A2.2, A2.3 and A2.4:** Please delineate/identify the facilities that are above Waterville and those below Waterville in these tables? Perhaps add an asterisk to their facility name within the Facility Name column?

43. **Appendix 3, Expression of WLAs:** Appendix 3 expresses WLAs in terms of mass (kilograms), so it is unclear if the proposed WLAs would result in reduced allowable pollution loads compared to existing effluent limits set in current NPDES permits. Please expand Appendix 3 or some other portion of the PMR to compare existing loadings and proposed WLAs, which would highlight any expected reductions from current discharges.

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Minor Edits:

+ **p. 21, 2nd to last paragraph above Section 2.2.1.2, last sentence:** Text reads, "*It shows that ~~high~~ improving fertilization rate, timing and placement of phosphorus could quickly reduce DRP loads*." It appears "high" may be a typo.

+ **p. 81, Section 3.4.1, 1st paragraph, last sentence:** Text mentions, "*…between currently authorized and actual loads shown above in Figure 21*." Should this be Figure 22 instead of Figure 21?

+ **pp. 82-83, Table 17 and language beneath GP2 paragraph:** In Table 17, the WLA calculation method for GP2 describes a concentration of 0.47 mg/L (which approximates to a 0.66 mg/L monthly limit over the 153 day spring season). Later in the language of the GP2 paragraph on p. 83, the numbers described are slightly different, 0.48 mg/L (long-term average) and a monthly concentration limit of about 0.59 mg/L.

- Should there be consistency between these two sets of numbers (i.e., Table 17 and GP2 paragraph)?

+ **Appendix 3:** Should the table names in this Appendix should read A3.1, A3.2 etc. Please double check.

Exhibit 19

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	CURRENT SPDES	FACILITY NAME													
2	NYA00E158	DUEPPENGIESSER DAIRY													
3	NYA00E164	AQUEDUCT RACETRACK													
4	NYA00E165	COON BROTHERS FARM, LLC.													
5	NYA00E166	ACE FARM, INC.													
6	NYA00E167	HAROLD BREY & SONS INC													
7	NYA00E168	HVFG, LLC													
8	NYA00E171	LABELLE FARM INC													
9	NYA00E173	BELLA POULTRY INC.													
10	NYA00E170	HITS-ON-THE-HUDSON													
11	NYA00E102	STANTON FARMS													
12	NYA00E180	BERKSHIRE VALLEY DAIRY, LLC.													
13	NYA00E176	WIL-ROC FARMS													
14	NYA00E253	HAGER FARMS													
15	NYA00E384	R & R Rarms LLC/DYKEMAN & SONS, INC.													
16	NYA00E331	GLENVUE FARM, LLC													
17	NYA00E385	MILK TRAIN, INC													
18	NYA00E373	SOUTHTOWN DAIRY													
19	NYA00E250	COOPERSTOWN HOLSTEIN CORPORATION													
20	NYA00E372	HEMLOCK VALLEY FARM, LLC													
21	NYA00E252	STITZEL'S WATERPOINT FARMS													
22	NYA00E275	CDS TILLAPAUGH													
23	NYA00E091	THREE L FARM													
24	NYA00E088	ADIRONDACK FARMS													
25	NYA00E097	CARTER FARMS, INC.													
26	NYA00E098	BUBBINS FARM													
27	NYA00E109	RUSTY CREEK FARM													

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
28	NYA00E450	GIROUX'S POULTRY FARM													
29	NYA00E407	CHA-LIZ FARMS													
30	NYA00E106	DIMOCK FARMS													
31	NYA00E093	REMILLARD FARMS													
32	NYA00E094	ASHLINE DAIRY													
33	NYA00E092	TRAINER FARM													
34	NYA00E110	OOMSVIEW HOLSTEINS													
35	NYA00E096	PAPAS DAIRY													
36	NYA00E099	BILOW FARMS													
37	NYA00E090	CARSADA DAIRY													
38	NYA00E125	SARATOGA HARNESS RACING													
39	NYA00E451	EILDON TWEED FARM													
40	NYA00E089	WELCOME STOCK FARM													
41	NYA00E107	KINGS-RANSOM FARM													
42	NYA00E108	BARBER BROTHERS DAIRY													
43	NYA00E105	TIASHOKE FARM													
44	NYA00E041	BROTHERHOOD FARM LLC													
45	NYA00E022	ALLENWAITE FARMS, INC.													
46	NYA00E305	KA SUNSET VIEW FARM, LLC.													
47	NYA00E120	WOLFF FARMS													
48	NYA00E304	CHAMBERS VALLEY FARMS, INC.													
49	NYA00E118	WOODY HILL FARMS, INC.													
50	NYA00E119	LANDVIEW FARM, LLC.													
51	NYA00E023	INSIGHT DAIRY													
52	NYA00E334	DANUBE DAIRIES													
53	NYA00E391	ENTWISTLE Bros, Farm, LLC													
54	NYA00E040	MURCREST FARMS													

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
55	NYA00E390	WOOD FARMS, LLC.													
56	NYA00E429	CTS DAIRY													
57	NYA00E431	BIRCH CREEK FARM													
58	NYA00E290	ONE MORE FARM													
59	NYA00E284	HILLCREST FARMS													
60	NYA00E039	SHELAND FARMS													
61	NYA00E430	BUTTERVILLE FARMS													
62	NYA00E424	MURROCK FARMS													
63	NYA00E291	HANCOR HOLSTEIN'S II													
64	NYA00E428	PORTERDALE FARMS													
65	NYA00E037	MILK STREET DAIRY													
66	NYA00E286	HANCOR HOLSTEINS													
67	NYA00E025	MOSERDALE DAIRY													
68	NYA00E034	KENNELL FARMS													
69	NYA00E289	DOUBLE E DAIRY													
70	NYA00E027	DEMKO DAIRY													
71	NYA00E425	BUTLER CREEK DAIRY FARM													
72	NYA00E426	HANNO FARMS													
73	NYA00E285	MARKS FARMS													
74	NYA00E388	HILLTOP FARMS													
75	NYA00E026	WOODS HILL FARMS													
76	NYA00E117	TRUANDVIN DAIRY													
77	NYA00E435	CURTIN DAIRY													
78	NYA00E438	CHAMPION FARMS													
79	NYA00E447	GALLAGHER FARMS													
80	NYA00E437	FINNDALE FARMS													
81	NYA00E003	VAILL BROTHERS DAIRY													

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
82	NYA00E436	BRABANT FARM													
83	NYA00E452	WOODCREST DAIRY LLC													
84	NYA00E454	BRANDY VIEW FARMS													
85	NYA00E115	ROYAL-J-ACRES													
86	NYA00E455	FOBARE FARM													
87	NYA00E374	Winsor Acres													
88	NYA00E410	GLEZEN FARMS, LLC.													
89	NYA00E007	OAKWOOD DAIRY LLC													
90	NYA00E310	CONQUEST CATTLE FEEDERS													
91	NYA00E008	SPRUCE HAVEN FARM LLC													
92	NYA00E419	LINCOLN DAIRY, LLC.													
93	NYA00E038	WILLET DAIRY LLC													
94	NYA00E009	AURORA RIDGE DAIRY, LLC													
95	NYA00E124	GREEN HILL DAIRY, INC.													
96	NYA00E460	ALLEN FARMS													
97	NYA00E042	VANS RIDGE FARM													
98	NYA00E422	PETER'S DAIRY, Inc													
99	NYA00E123	PATTERSON FARMS, INC.													
100	NYA00E417	ROACH FARM													
101	NYA00E031	SUNNYSIDE FARMS, INC.													
102	NYA00E418	PINE HOLLOW DAIRY, LLC													
103	NYA00E420	RIDGECREST DAIRY, LLC													
104	NYA00E421	HANEHAN FAMILY DAIRY LLC													
105	NYA00E340	RIVERSIDE DAIRY, LLC													
106	NYA00E462	WILLOW BREEZE FARM													
107	NYA00E461	CURRIE VALLEY DAIRY, LLC.													
108	NYA00E396	PREBLE HILL FARM, LLC													

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
109	NYA00E415	WHITE EAGLE FARMS, LLC													
110	NYA00E279	SPRINGWATER FARMS													
111	NYA00E306	HUDSON EGG FARMS													
112	NYA00E395	HOURIGAN DAIRY FARM, LLC													
113	NYA00E336	VENTURE FARMS LLC													
114	NYA00E122	BARBLAND FARMS, INC.													
115	NYA00E338	FABIUS GREENWOOD FARM LLC													
116	NYA00E409	ALLEN FAMILY FARMS LLC													
117	NYA00E309	ELMER RICHARDS & SONS													
118	NYA00E314	VOLLES DAIRY FARM													
119	NYA00E413	HOURIGAN FAMILY DAIRY, LLC													
120	NYA00E458	CO-VALE HOLSTIENS, LLC.													
121	NYA00E464	FESKO DAIRY, LLC.													
122	NYA00E308	TWIN BIRCH DAIRY													
123	NYA00E456	AA DAIRY													
124	NYA00E349	FARVIEW FARMS LLC													
125	NYA00E311	BECK FARMS, LLC.													
126	NYA00E416	MILLBROOK FARM													
127	NYA00E121	WALNUT RIDGE DAIRY, LLC.													
128	NYA00E473	LLOYDS USA DEVELOPMENT, INC.													
129	NYA00E017	MCCORMICK FAMILY DAIRY													
130	NYA00E353	OFFHAUS FARMS, INC.													
131	NYA00E401	LOR-ROB DAIRY FARM													
132	NYA00E016	BASKIN LIVESTOCK													
133	NYA00E184	ZUBER FARMS													
134	NYA00E186	MILLER'S SONSHINE ACRES													
135	NYA00E185	REYNCREST FARMS													

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
136	NYA00E355	OAK ORCHARD DAIRY, LLC.													
137	NYA00E350	CY HEIFER FARMS, LLC													
138	NYA00E190	TORREY FARMS DAIRY, INC.													
139	NYA00E002	MAIN FACILITY													
140	NYA00E140	STEIN FARMS													
141	NYA00E029	LAMB FARMS													
142	NYA00E187	HILDENE FARMS													
143	NYA00E351	COYNE FARMS, INC.													
144	NYA00E352	MULLIGAN FARM, INC.													
145	NYA00E126	SPARTA FARMS, LP.													
146	NYA00E342	LA CASA DE LECHE, LLC.													
147	NYA00E444	DAIRY KNOLL FARMS, LLC.													
148	NYA00E130	THORNAPPLE DAIRY													
149	NYA00E439	MT. MORRIS DAIRY FARMS													
150	NYA00E142	ROLL-N-VIEW FARMS													
151	NYA00E145	T. JOSEPH SWYERS FARM													
152	NYA00E354	WALKER FARM													
153	NYA00E127	LAWNEL FARMS 2													
154	NYA00E341	DONNAN FARMS													
155	NYA00E400	ERNEST GATES & SONS, LLC													
156	NYA00E045	NOBLEHURST FARMS													
157	NYA00E147	FINGER LAKES RACING ASSOCIATION													
158	NYA00E132	WILLOW BEND FARM													
159	NYA00E135	WILL-O-CREST FARMS, LP													
160	NYA00E134	SCHUM-ACRES DAIRY OPS													
161	NYA00E466	DEBOOVER FAMILY FARMS LLC													
162	NYA00E441	HEMDALE FARMS													

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
163	NYA00E317	HATHORN FARMS													
164	NYA00E318	LAWNHURST FARMS													
165	NYA00E136	HEIFER HAVEN FARMS													
166	NYA00E467	PHALEN FARMS													
167	NYA00E402	J. MINNS FARMS, LLC.													
168	NYA00E128	BONNA TERRA FARMS													
169	NYA00E192	JOHN, MARK, MAUREEN J. TORREY PA													
170	NYA00E440	BERGEN FARMS													
171	NYA00E469	CANOGA SPRING FARMS													
172	NYA00E470	HARTY HOG FARMS													
173	NYA00E056	MAYBURY-ROSENKRANS REAL ESTATE. LLC													
174	NYA00E474	GEORGE FAMILY FARMS, LLC													
175	NYA00E028	J.P. SWINE ENTERPRISES, LLC													
176	NYA00E150	WILKINS DAIRY FARM													
177	NYA00E137	DUNLEA DAIRY FARM													
178	NYA00E144	LENT HILL DAIRY FARM													
179	NYA00E141	LISMORE DAIRY													
180	NYA00E149	KARR DAIRY FARMS													
181	NYA00E033	DAMIN FARM													
182	NYA00E326	STONY BROOK FARM													
183	NYA00E151	WHITESVILLE POULTRY													
184	NYA00E316	RUTT FARMS													
185	NYA00E320	WAYNE COUNTY EGGS													
186	NYA00E035	MERRELL DAIRY, LLC													
187	NYA00E383	MAYLINE FARMS													
188	NYA00E382	BAINBRIDGE FARM													
189	NYA00E366	R & D ADAMS DAIRY FARMS, LLC.													

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
190	NYA00E197	EDELWEISS FARMS													
191	NYA00E365	C & J DAIRY FARMS, INC.													
192	NYA00E218	MALLARDS DAIRY													
193	NYA00E362	BEAVERS DAIRY FARM, LLC.													
194	NYA00E364	SCHWAB DAIRY FARM, LLC.													
195	NYA00E361	COUNTRY AYRE FARMS, LLC.													
196	NYA00E367	RIDGELINE FARM, LLC.													
197	NYA00E036	SCHOFIELD FARMS, LLC													
198	NYA00E370	PHILLIPS FAMILY FARM, INC.													
199	NYA00E357	KREHER'S FARM FRESH EGGS, LLC.													
200	NYA00E363	EDEN VALLEY DAIRY, LLC.													
201	NYA00E358	PALMER DAIRY FARMS, LLC.													
202	NYA00E212	GASPORT VIEW DAIRY FARMS													
203	NYA00E201	MCCOLLUM FARMS													
204	NYA00E224	CHAFFEE FARMS, LLC.													
205	NYA00E228	ATWATER FARMS													
206	NYA00E210	LAKESHORE DAIRY, LLC													
207	NYA00E199	DZIEDZIC FARMS													
208	NYA00E015	BAKER BROOK DAIRY, LLC													
209	NYA00E378	PANKOW FARM													
210	NYA00E346	SOUTHVIEW FARMS, LP													
211	NYA00E376	TABLE ROCK FARM													
212	NYA00E406	SCHREIBERDALE HOLSTEINS, LLC													
213	NYA00E203	SYNERGY, LLC													
214	NYA00E359	MCCORMICK FARMS, INC. - DAIRY													
215	NYA00E229	BLISS CATTLE COMPANY													
216	NYA00E232	BROUGHTON FARM OPERATION													

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
217	NYA00E476	ROBBIEHILL DAIRY FARM													
218	NYA00E206	HI-LAND FARMS													
219	NYA00E214	BOXLER DAIRY FARMS													
220	NYA00E156	OLD ACRE FARM													
221	NYA00E216	TRUE FARMS													
222	NYA00E381	SUNNY KNOLL FARMS													
223	NYA00E380	GARDEAU CREST FARM													
224	NYA00E196	EMERLING FARMS													
225	NYA00E377	HIGHBANKS DAIRY													
226	NYA00E211	VAN SLYKE'S DAIRY FARM													
227	NYA00E213	PERL FARMS													
228	NYA00E204	BREEZYHILL DAIRY													
229	NYA00E198	SWISS VALLEY FARMS, LLC.													
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Exhibit 20

Friends of Toppenish Creek

December 27, 2019

Chery Sullivan
Director Dairy Nutrient Management Program
Washington State Department of Agriculture
Natural Resources Building, 2nd Floor
P.O. Box 42560
1111 Washington St. SE
Olympia, WA 98504-2560

Dear Ms. Sullivan,

Thank you for your e-mail of December 26, 2019 in response to Friends of Toppenish Creek's (FOTC) June 2019 request for information. We have several responsive observations.

1. When FOTC first approached officials with our concerns related to composting dead cows, we spoke with the WA State Dept. of Ecology (Ecology) and the Yakima Health District (YHD), the agencies responsible for environmental issues and public health. Both referred us to the WSDA Dairy Nutrient Management Program (DNMP). This has occurred in other situations. The Yakima Regional Clean Air Agency (YRCAA) and the WA State Board of Health (BOH) have asserted that problems related to dairies are all handled by the WSDA DNMP. As your citations of the law clearly demonstrate this is invalid. It appears to FOTC that some state and local agencies are avoiding their own responsibilities by attempting to shift them to your office.

Earlier this year a resident of the Lower Yakima Valley complained to the YHD about health issues related to manure storage. The health district actually told her to call the WSDA DNMP. Our neighbor shared your email stating that you had no authority but would contact the dairies and ask them to address her concerns. This was very nice but not very helpful overall.

2. Your email failed to include several Washington rules and laws that involve the DNMP.

- Agricultural composting operations are clearly cited under exemptions from solid waste permitting in RCW 70.95.205
- Dairy nutrient management plans are clearly cited under exemptions from solid waste permitting in WAC 173-350-220
- WAC 173-350-220 states, "Producers that fail to meet the conditions of RCW 70.95.306 (composting of bovine and equine carcasses) will be required to obtain a solid waste handling permit from the jurisdictional health department and must comply with all other conditions of this chapter."
- The only way to know that a dairy fails to meet the conditions of RCW 70.95.306 is through a dairy inspection by the DNMP.

3. Your email cited dairy inspections as the DNMP's method of detecting water quality violations. Quite frankly, this is insulting. There is one DNMP inspector for all of eastern Washington where 60% of the state's dairy cows are located. There are three or four inspectors for the Puget Sound area. Inspections occur approximately once every 22 months and last a few hours.

The questions for mortality composting operations that you listed are insufficient to evaluate whether there is leaching to groundwater. A subjective determination that composting takes place on "a hardened pad" is not the same as testing soil permeability. Evidence from the Lower Yakima Valley is clear. There is leakage from composting operations built on "hardened pads". (See Attachments 1 through 5).

The DNMP essentially ignores air emissions. Turning compost generates large dust clouds. In this case the dust comes from bovine carcasses and is inhaled by neighbors.

4. WSDA and Ecology know, or should know, that the Natural Resource Conservation Service (NRCS) Soil Web Survey considers the area where the mortality composting presumably occurs to be "very limited" for large animal mortality composting after a catastrophic event. Here is the NRCS explanation:

> *Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect these uses. "Not limited" indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected of a properly designed and installed system on these soils. "Somewhat limited" indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. "Very limited" indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil*

reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Since the 15th District Legislators are part of this conversation I have attached instructions on accessing NRCS Soil Survey data. (Attachment 6)

All this is complicated by the fact that monitoring wells drilled by the Lower Yakima Valley Groundwater Management Area (LYV GWMA) describe an aquifer that is already contaminated with nitrate. Here is a map from that program with 2019 nitrate levels next to the sites and a circle around the area where public records requests say the mortality composting occurs. Source https://www.yakimacounty.us/DocumentCenter/View/21633/GWAC-Presentation---Monitoring-Well-Report-Overview---2019620-v20-1

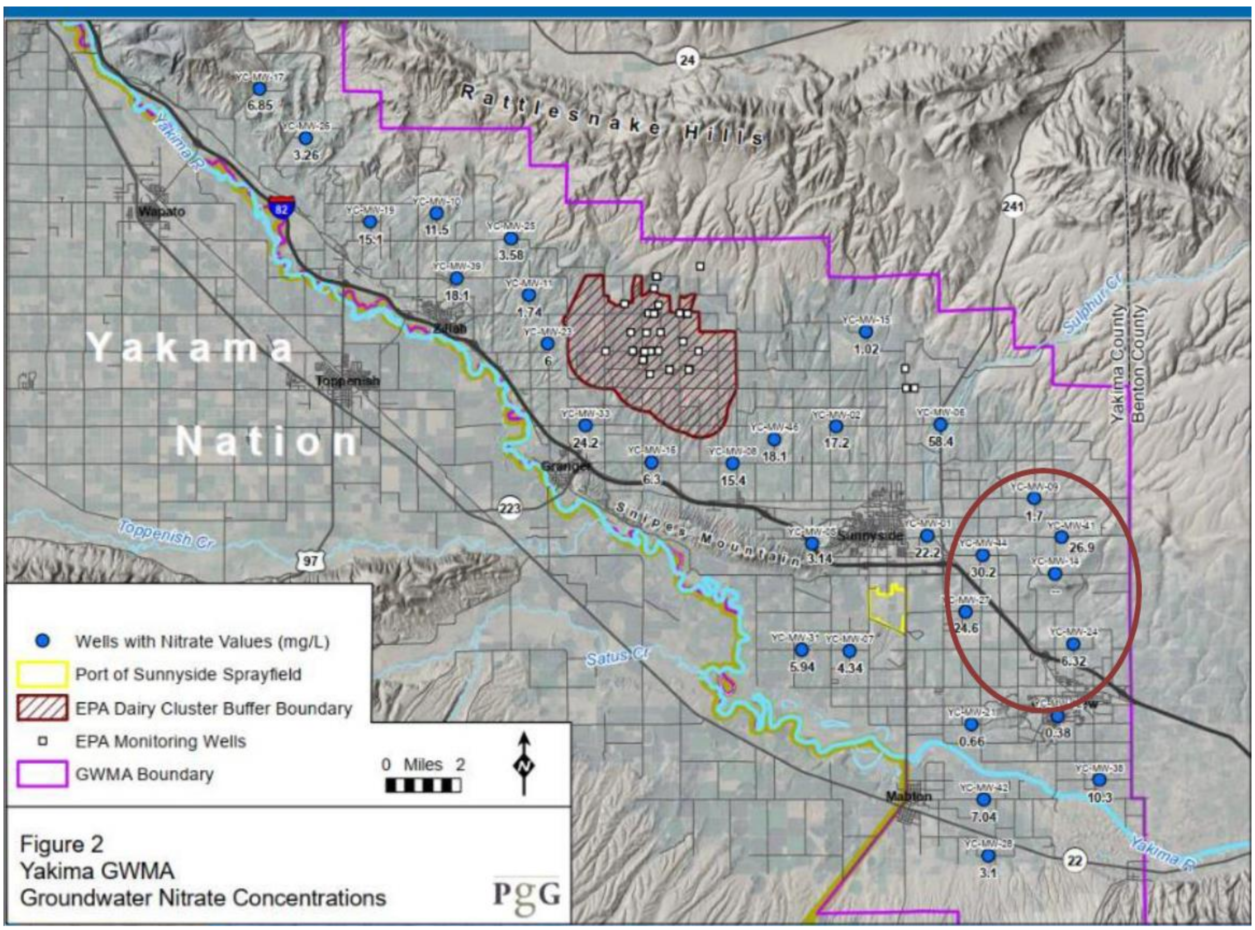

Figure 2
Yakima GWMA
Groundwater Nitrate Concentrations

5. FOTC still has serious concerns about the impact of this mortality composting on public health. Our questions have not been answered, although it may not be within WSDA's authority to do so.

FOTC firmly believes that none of the officials who directed these operations from their climate controlled offices would allow composting of dead cows next to their own homes and families. The agencies have shown callous disregard for the health and welfare of the people who live in this area.

It now appears that there is no limit to the number of dead animals that can be composted in whatever sized area a CAFO chooses and there is essentially no regulatory oversight. Composting 1,000 animals at a time is the new normal, at least for Yakima County and this will likely change the definition of "agricultural activity" in Washington's Right to Farm Law, RCW 7.48.300 to 7.48.320. This is wrong and it contributes to mistrust of government to protect the citizens.

6. FOTC asks the WSDA DNMP to:

- Stop providing cover for other agencies that wish to avoid responsibility for environmental and health issues related to animal mortality composting
- Publicly acknowledge the need for groundwater testing around the mortality composting sites as the only way to evaluate leakage and/or spread of waterborne disease
- Publicly acknowledge the need for air monitoring to search for airborne pathogens and elevated levels of particulate matter

Thank you for reading and for addressing these serious observations. We look forward to hearing from you.

Sincerely,

Jean Mendoza

Jean Mendoza

Executive Director, Friends of Toppenish Creek

Exhibit 21

<u>**DECLARATION OF BUCK RYAN**</u>

I, BUCK RYAN, declare and state as follows:

1. I am 40 years old, and I live in Ada County, Idaho with my wife. I am the Founder, Executive Director, and first Waterkeeper of Snake River Waterkeeper. I founded Snake River Waterkeeper in 2014, and I have been the Executive Director since then. I am also an attorney, and I worked at a law firm in Eastern Idaho for three years before I founded Snake River Waterkeeper.

2. The Snake River is a vital resource for drinking water, recreation, wildlife, and tourism in Idaho. To protect the river and its tributaries, Snake River Waterkeeper monitors water quality, investigates citizen concerns, and demands enforcement of environmental laws. We also issue a SWIM Guide, which provides water quality conditions and safety warnings for sites across the Snake River and its tributaries. Snake River Waterkeeper's work spans the Snake River Basin, from the river's headwaters in Wyoming, across Idaho, to the river's confluence with the Columbia River in Washington. Our work also covers the river's tributaries, including the Clearwater and Salmon rivers. In total, our jurisdiction is approximately 100,000 square miles.

3. As the Executive Director of Snake River Waterkeeper, I have many duties. I do fundraising and accounting, maintain our social media pages and website, plan events, and interact with the group's members. I also speak with our attorneys about any lawsuits that we are involved in, which are aimed at holding polluters accountable and increasing protections for the Snake River and its tributaries.

4. Snake River Waterkeeper focuses much of its work on dams, fish hatcheries, and concentrated animal feeding operations ("CAFOs") in the Snake River Basin. These things are

significant sources of water pollution and harm to wildlife in the area, and the damage they cause is under-addressed.

5. As of 2021, there were at least 365 Large CAFOs in Idaho. Most of Idaho's CAFOs are dairies, and the Large dairy CAFOs confine at least 700 cows each, with some holding up to 150,000 cows in a single operation. The cows in Idaho's dairies produce an enormous amount of manure. Snake River Waterkeeper estimates that Idaho dairy operations generate approximately 4 billion pounds of manure each year. The dairy CAFOs typically store this waste in liquid form in large uncovered pits, and they get rid of it by spreading it on fields, either on their property or offsite. The fields often cannot retain all of the waste that CAFOs spread on them, so the waste runs off into nearby waterbodies, including the Snake River and its tributaries. For example, a prominent article on pollution in the Snake River explains that CAFOs along the river "have discharged manure by spreading it as a liquid three inches thick and miles wide on surrounding farm fields, which are crusted over with dried muck."[1]

6. Snake River Waterkeeper has repeatedly found pollutants associated with CAFOs in the river. For our SWIM Guide, we monitor sites along the river and its tributaries for nitrates and total dissolved solids, which can make the water unsafe for swimming. We used to monitor water quality at over 100 sites. For the last three years, we've monitored the 28 sites that are most popular for public use. We've found that, at least once during the summer, about a third of these sites will be too contaminated with nitrates or dissolved solids for children under the age of seven to swim in safely. Some sites are never clean enough to swim in. Nitrates and dissolved

[1] Richard Manning, *Idaho's Sewer System is the Snake River*, High Country News (Aug. 11, 2014), https://www.hcn.org/issues/46.13/idahos-sewer-system-is-the-snake-river?b_start:int=2#body.

solids are an indicator that the water is contaminated with manure, so I think the CAFOs along the river are responsible for the pollution.

7. In addition to polluting surface water, CAFOs in the area also pollute the groundwater. Our groundwater has high levels of nitrates, and I think this contamination is the result of manure percolating through the soil and bedrock after CAFOs apply it to fields, as well as manure seeping out of CAFO waste pits. Contaminated groundwater can enter people's drinking wells. I'm aware of research showing that, based on the bedrock in the area, the manure storage and disposal practices that CAFOs are employing on the surface now will threaten Idahoans' drinking water by 2050. About 95 percent of Idahoans get their drinking water from the Snake River Plain Aquifer, and nitrates and other CAFO pollutants in drinking water can cause serious health problems, so preventing CAFOs in the area from contaminating groundwater is very important.

8. Not only do CAFOs cause water pollution, but they also produce an overwhelming odor. If I'm driving in an area with a lot of CAFOs, I close my car windows and air vents and try to avoid stopping for gas. If you have your windows or air vents open, the odor can make you choke.

9. CAFOs in Idaho are located mostly in low-income communities and rural communities. As a result, these community members often experience the worst of the pollution the CAFOs cause, and they are at especially high risk of developing health problems from breathing the contaminated air and drinking the polluted water.

10. Although CAFOs in Idaho cause extensive water pollution, no CAFOs in the state have National Pollutant Discharge Elimination System ("NPDES") permits under the Clean Water Act. The CAFOs avoid operating under NPDES permits because the U.S. Environmental

Protection Agency ("EPA") relies on self-reporting by CAFO operators to determine which CAFOs discharge water pollution and, thus, require NPDES permits. But self-reporting is generally only effective when there is monitoring to document discharges, such as equipment at the end of a pipe that records the amount of pollutants that are discharged. CAFOs do not have that type of monitoring, so it is easy for them to claim that they do not discharge. In fact, every CAFO in Idaho claims that it does not discharge water pollution. In the article on pollution in the Snake River, the EPA director for Idaho recognized that Idaho CAFOs have "made the business decision" to not participate in NPDES permitting.[2]

11. CAFOs in Idaho are also able to avoid operating under NPDES permits because the Idaho Department of Environmental Quality ("ID DEQ") does very little to monitor them or take enforcement actions against them when they discharge. The lack of oversight from ID DEQ makes it easier for CAFOs to get away with claiming that they do not discharge. It also attracts more CAFOs to Idaho, because they know that they will not be held accountable for causing pollution.

12. From my experience, I think it's reasonable to assume that all CAFOs discharge water pollution. I have yet to see a CAFO that looks to have enough land to dispose of all the manure the animals generate without any of the manure running off the land and causing water pollution. I am also aware of specific instances of CAFOs discharging water pollution. For example, in 2017, a dairy CAFO with at least 1,000 cows and no NPDES permit discharged a significant amount of manure and other waste from a waste pit into a canal that flows into the

[2] *Id.*

Malad River and then into the Snake and Columbia rivers.[3] The CAFO operators cut the side of the waste pit open to allow the waste to flow into the canal. Because Idaho CAFOs discharge, they should have NPDES permits.

13. Increasing NPDES permit coverage for CAFOs in Idaho would benefit Snake River Waterkeeper and all Idahoans. The Clean Water Act requires that the public have access to CAFO nutrient management plans, which describe how a CAFO will store and dispose of the waste it generates and help CAFOs operators avoid discharging water pollution. Under Idaho law, however, manure disposal is considered a "trade secret," which is laughable. In Idaho, the public is barred from accessing a CAFO's nutrient management plan unless the CAFO is operating under a NPDES permit. Without access to information on where a CAFO is land applying its waste, the amount of waste it is applying, and the guidelines it should be following to prevent discharges, it is difficult for the public to monitor CAFOs and hold them accountable for causing discharges.

14. Increasing NPDES permit coverage would also complement Snake River Waterkeeper's efforts to strengthen Idaho's NPDES General Permit for CAFOs. ID DEQ is currently revising the NPDES General Permit, and Snake River Waterkeeper is participating closely in the revisions to ensure that the permit complies with the CWA. A permit that complies with the CWA will better protect the Snake River from CAFO pollution. However, our efforts to improve the NPDES General Permit will have less impact if CAFOs continue to operate without NPDES permits.

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[3] *Shoshone Dairy, Owner Sentenced for Wastewater Violation Stemming from 2017 Flooding*, KMVT News (Mar. 17, 2021), https://www.kmvt.com/2021/03/17/shoshone-dairy-owner-sentenced-for-wastewater-violation-stemming-from-2017-flooding/.

15. Lastly, increasing NPDES permit coverage will allow Snake River Waterkeeper to use citizens suits to hold CAFOs accountable for causing water pollution. CAFOs operating under NPDES permits are subject to citizen suits for violating their permits, including by causing discharges. However, Idaho law does not provide for citizen suits. Snake River Waterkeeper identifies wastewater treatment plants and hatcheries that are violating their NPDES permits and brings citizen suits to bring them into compliance with the permits, and it would also do this for CAFOs operating under NPDES permits.

I declare under penalty of perjury that, to the best of my knowledge, the foregoing is true and correct. Executed this 20th day of October, 2022.

Buck Ryan

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Exhibit 22

Industrial Hog Operations in North Carolina
Disproportionately Impact African-Americans, Hispanics and American Indians

Steve Wing and Jill Johnston
Department of Epidemiology
The University of North Carolina at Chapel Hill
August 29, 2014

Summary

Background: In 2014, the North Carolina Department of Environment and Natural Resources (NC-DENR) issued a swine waste management general permit (the General Permit), which is expected to cover more than 2,000 industrial hog operations (IHOs). These facilities house animals in confinement, store their feces and urine in open pits, and apply the waste to surrounding fields. Air pollutants from the routine operation of confinement houses, cesspools, and waste sprayers affect nearby neighborhoods where they cause disruption of activities of daily living, stress, anxiety, mucous membrane irritation, respiratory conditions, reduced lung function, and acute blood pressure elevation. Prior studies showed that this industry disproportionately impacts people of color in NC, mostly African Americans.

Methods: We obtained records on the sizes and locations of permitted IHOs from NC-DENR and calculated the steady state live weight (SSLW) of hogs as an indicator of the amount of feces and urine produced at each IHO. We obtained block-level information on race and ethnicity from the 2010 census of the United States. We compared the proportions of people of color (POC), Blacks, Hispanics, and American Indians living within 3 miles of an IHO to the proportion of non-Hispanic Whites. We quantified relationships between race/ethnicity, presence of one or more IHOs, and the SSLW of IHOs, using Poisson regression and linear regression to adjust for rurality.

Results: Analyses based on a study area that excludes the state's five major cities and western counties that have no presence of this industry show that the proportion of POC living within 3 miles of an industrial hog operation is 1.52 times higher than the proportion of non-Hispanic Whites. The proportions of Blacks, Hispanics and American Indians living within 3 miles of an industrial hog operation are 1.54, 1.39 and 2.18 times higher, respectively, than the proportion of non-Hispanic Whites ($p<0.0001$). In census blocks with 80 or more percent people of color, the proportion of the population living within 3 miles of an industrial hog operation is 2.14 times higher than in blocks with no people of color. This excess increases to 3.30 times higher with adjustment for rurality. Adjusted for rurality, the SSLW of hogs within 3 miles of a census block increases, on average, 100,000, 64,000, 243,000, and 93,000 pounds for every 10 percent increase in POC, Black, Hispanic, and American Indian population ($p<0.0001$).

Conclusions: IHOs in NC disproportionately affect Black, Hispanic and American Indian residents. Although we did not examine poverty or wealth in this study, the results are consistent with previous research showing that NC's IHOs are relatively absent from low-poverty White communities. This spatial pattern is generally recognized as environmental racism.

Background

Swine production in North Carolina (NC) changed dramatically during the last decades of the 20th century. Between 1982 and 2006 the number of hog operations in the state declined precipitously while the hog population increased from approximately 2 to 10 million (Edwards and Driscoll 2009). Production became concentrated in eastern NC (Furuseth 1997).

Traditional NC producers raised small numbers of hogs, commonly fewer than 25, and hogs were one of several commercial crops on diversified farms (Edwards and Driscoll 2009). In contrast, industrial producers raise large numbers of hogs, often many thousands, in confinement houses that are designed to vent toxic gases and particles into the environment. Animal wastes are flushed into open cesspools and then sprayed on nearby fields. Pollutants emitted by IHOs include hydrogen sulfide, ammonia, a wide array of volatile organic compounds, and bioaerosols including endotoxins and other respiratory irritants (Cole et al. 2000) (Schiffman et al. 2001).

The negative impacts of particles and gases inside IHO confinements on worker health have been extensively described (Cole et al. 2000; Donham 1993; Donham et al. 1995; Donham et al. 2000; Donham 1990). Environmental pollutants from IHOs affect people who are more susceptible than workers due to young or old age, asthma or allergies, or other conditions. An extensive body of peer-reviewed scientific evidence shows that IHOs release contaminants into neighboring communities where they affect the health and quality of life of neighbors. Many of these studies have been conducted in NC. Hydrogen sulfide concentrations within 1.5 miles of IHOs in NC are associated with neighbors' ratings of hog odor and inability to engage in routine daily activities (Wing et al. 2008), increased stress and anxiety (Horton et al. 2009), irritation of the eyes, nose and throat, respiratory symptoms (Schinasi et al. 2011), and acute elevation of systolic blood pressure (Wing et al. 2013). A study of NC public middle school children who participated in an asthma survey, which was conducted by the NC Department of Health and Human Services, found that children attending schools within three miles of an IHO had more asthma-related symptoms, more doctor-diagnosed asthma, and more asthma-related medical visits than students who attended schools further away (Mirabelli et al. 2006). The same study reported a 23% higher prevalence of wheezing symptoms among children who attended schools where staff reported noticing livestock odor inside school buildings twice or more per month compared to children who attended schools where no livestock odor was reported (Mirabelli et al. 2006). Other studies in NC (Tajik et al. 2008) (Wing and Wolf 2000) (Bullers 2005) (Schiffman et al. 1995) and elsewhere (Donham et al. 2007) (Thu et al. 1997) (Radon et al. 2007) also document negative impacts of IHO air pollution on neighbors' health and quality of life.

Liquid contaminants from IHOs are released to the environment through leakage of animal waste storage pits, runoff from land application of liquid wastes, atmospheric deposition, and failure of the earthen walls of waste pits (Burkholder et al. 2007). Overflow of waste pits during heavy rain events results in massive spills of animal waste into neighboring communities and waterways. For example, in late September, 1999, 237 NC IHOs were located in flooded areas identified from satellite imagery provided by the NC Division of Emergency Management (Wing et al. 2002). Parasites, bacteria, viruses, nitrates, and other components of liquid IHO waste pose threats to human health (Burkholder et al. 2007; Cole et al. 2000).

Routine use of sub-therapeutic doses of antibiotics to promote weight gain of hogs promotes antibiotic resistance, making infections in humans more difficult to treat (Silbergeld et al. 2008). Airborne bacteria, including antibiotic resistant strains, have been isolated from IHO air emissions (Schulz et al. 2012) (Green et al. 2006) (Gibbs et al. 2006), and antibiotic resistant bacteria are associated with animal vectors near industrial animal operations, including flies (Graham et al. 2009), rodents (van de Giessen et al. 2009), and migratory geese that land on NC's IHO liquid waste pits (Cole et al. 2005). A recent medical records study from Pennsylvania shows that people living near IHO liquid waste application sites have elevated rates of infection with methicillin resistant *Staphylococcus aureus* (Casey et al. 2013). NC industrial livestock workers carry strains of *Staphylococcus aureus* that are associated with swine, including antibiotic resistant strains (Rinsky et al. 2013). These bacteria could be spread by liquid waste and airborne particles.

Using information from the United States Census of 1990 and locations of IHOs reported by the North Carolina Department of Environment and Natural Resources (NC-DENR) in 1998, we showed that the state's IHOs were disproportionately located in areas where more people of color (POC), primarily African Americans, live (Wing et al. 2000). We concluded that their disproportionate location in communities of color represented an environmental injustice. Since 1998 additional IHOs have obtained permission to operate and others are no longer in business. Additionally, between 1990 and 2010 the state's population size and spatial distribution changed due to births, deaths and migration. In this report we update our previous findings by evaluating whether IHOs operating under the general permit issued on March 7, 2014, will disproportionately impact POC, Blacks, Hispanics, and American Indians.

Materials and Methods

Lacking a list of the unique IHOs operating under the General Permit finalized in 2014, we used a list of all permitted industrial animal operations provided by NC-DENR on January 24, 2013 that we had prepared for prior research. First we excluded all non-swine operations from the list. Next we excluded swine operations with expired permits and permits with an allowable head count equal to zero. We also excluded permits that did not appear on a list of permitted animal operations published by DENR in January, 2014. We merged multiple permits issued for the same facilities to obtain a total head count for each operation. However the head count may be misleading as a measure of the pollution from each IHO because some facilities primarily house small pigs while others primarily house large hogs. We therefore calculated each facility's total steady state live weight (SSLW) using NC-DENR's formula based on the number and average weight of each growth stage of swine permitted at the facility. We interpret SSLW as a summary measure of the feces and urine produced by the swine of different growth stages at each facility.

Following the protocol provided in our previous study we excluded facilities operated by research institutions because they are subject to different location and management decisions than are commercial operations (Wing et al. 2000). Finally, we excluded facilities that do not hold a certificate of coverage to operate under the General Permit because they operate under individual permits or National Pollutant Discharge Elimination System general permits. The resulting facilities should closely approximate those expected to seek to continue operating under the renewed General Permit. The renewed General Permit takes effect on October 1, 2014, at which time we plan to update the list created for this research.

The vulnerability of people of any race/ethnicity to having polluting facilities nearby can be affected by the race and ethnicity of other people in their community. For example, African-Americans who live in areas primarily populated by non-Hispanic Whites have, generally, a lower susceptibility to being near polluting facilities than African-Americans who live in areas primarily populated by Hispanics or American Indians. We therefore conducted our primary analyses of disproportionate impact using the POC category. We also conducted analyses for specific racial/ethnic categories. We defined the following racial/ethnic categories: non-Hispanic White (non-Hispanics who identified as White and no other race), POC (all people not categorized as non-Hispanic white), Black (people who identified themselves as African-American or Black with or without any other race), Hispanic of any race, and American Indian (people who identified themselves as American Indian with or without any other race). We used block-level race/ethnicity-specific population counts from the US Census of 2010.

As large-scale agricultural facilities, IHOs are not located in major cities. Following the protocol adopted in our prior research, we defined a study area for our primary analyses that excluded census blocks in the five major metropolitan areas of NC (Charlotte, Winston Salem, Greensboro, Durham and Raleigh) as well as 19 western counties that neither have an IHO nor border a county that has an IHO. We conducted additional analyses for the entire state.

We considered residents of blocks to be affected by IHOs within three miles of the block centroid. Blocks were categorized as either having, or not having, an IHO within three miles. Additionally, we calculated the total permitted SSLW of hogs within three miles of the centroid of each block as a measure of the total potential influence of pollutants from nearby IHOs on the residents of the block.

As in our prior study, we also calculated the population density of each block, defined as the number of people per square mile. Population density is a measure of rurality, which is strongly related to the availability of land for agriculture and the price of land. Racial/ethnic groups in NC differ in their urban vs. rural residence, making them differentially susceptible to types of polluting facilities that locate in rural vs. urban locations. For example, a larger proportion of non-Hispanic Whites in NC live in remote rural areas than do Blacks, the racial comparison is affected not only by the susceptibility of Whites vs. Blacks to IHOs, but also by differences in whether they live in rural vs. urban areas. By adjusting for population density (or rurality), we compare racial vulnerability to IHOs for racial groups within each level of rurality. This adjustment is analogous to other statistical adjustments in epidemiology, as when the death rates of two countries are compared: even though death rates at every age may be higher in a poor than a rich country, the poor country may have a lower overall death rate simply because it has a younger age distribution. In that case, age-adjustment is used to compare mortality in the two countries just as we use density-adjustment to compare the proximity to IHOs in areas with different racial/ethnic make-up.

We used weighted Poisson regression to quantify relationships between race/ethnicity and the presence of one or more IHOs within three miles of a block. We used weighted linear regression to quantify relationships between race/ethnicity and the SSLW of hogs permitted within three miles of a block. We used census block populations as weights. In density-adjusted models we included variables for the natural log of population density raised to the first, second and third power. As in our prior analysis, this cubic model fit the data well and additional power terms added little to the model fit (Wing et al. 2000). For the two largest racial/ethnic groups other than non-Hispanic Whites, POC and Blacks, we categorized race/ethnicity in groups of blocks 20% in width compared to blocks with no POC using indicator variables. Due to smaller numbers in these categories we did not fit models with indicator variables for Hispanics and American Indians. We also considered the percent of population of each race/ethnicity as a continuous variable, estimating the added burden of IHOs for a 10% increase in the population.

This study involves neither random sampling nor randomization of exposure to IHOs, therefore statistical significance testing is inappropriate and confidence intervals do not correspond to the probability that the true values of measures of association are within the interval. However, the US-EPA considers statistical significance in its assessment of environmental racism. We therefore report p-values for differences in proportions of each racial/ethnic group within 3 miles of an IHO using t-tests. We report 95% confidence intervals (CIs) as measures of precision of the associations estimated from regression models. 95% CIs that exclude the null value (1.0 for ratios and 0.0 for differences) are commonly considered to be statistically significant at $p<0.05$.

Results

We estimate that 2,055 IHOs were operating under the General Permit in January 2014, and that they were permitted to house approximately 1.2 billion pounds of swine (Table 1). The 160 (7.7%) IHOs permitted to house between 20 and 100 thousand pounds accounted for only 1% of the total permitted SSLW. The 342 (17.2%) IHOs permitted to house between 1 and 10.2 million pounds accounted for 46.5% of the total.

Table 2 shows that there are over 6.5 million residents of the study area. Approximately 986,000 (15.1%) of these live in census blocks whose centroid is within 3 miles of an IHO that operates under the General Permit. This includes 602,380 non-Hispanic Whites and 383,522 POC. 13.1% of non-Hispanic Whites and 19.9% of POC in the study area live in blocks within 3 miles of an IHO.

Based on the study area population in Table 2, Table 3 shows ratios of percentage of POC living within 3 miles of an IHO compared to the percentage of non-Hispanic Whites living within 3 miles of an IHO. The percentage of POC living within 3 miles of an IHO is 1.52 times higher than the percentage of non-Hispanic Whites. The percentages of Blacks, Hispanics and American Indians living within 3 miles of an IHO are 1.54, 1.39 and 2.18 times higher, respectively, than non-Hispanic Whites. If residents of the study area had been randomized to live within 3 miles of an IHO, the probabilities of observing differences of these magnitudes or greater are less than 0.0001; the observed differences are considered to be highly statistically significant.

We calculated these same ratios based on the entire state population of 9,535,483. The percentages of POC, Blacks, Hispanics and American Indians living within 3 miles of an IHO are 1.38, 1.40, 1.26 and 2.39 times higher than the percentage of non-Hispanic Whites, respectively. These ratios are considered to be highly statistically significant.

Figure 2 shows the percent of people living within 3 miles of an IHO in relation to the percent of people of color in blocks. In areas with less than 20% POC, just over 10% of the population lives within 3 miles of an IHO. In areas with 60-80% POC, over 20% of the population lives so close to an IHO. In areas with more than 80% POC, more than a quarter of the population lives within 3 miles of an IHO.

Table 4 presents ratios of the percent of people living within 3 miles of an IHO in blocks with >0 to <20%, 20 to <40%, 40 to <60%, 60 to <80% and 80 to 100% POC compared to blocks with no POC. The total population in these categories ranges from 526,305 in blocks with 60 to <80% POC to 2,577,015 in blocks with >0 to <20% POC. Ratios are statistically significantly elevated for all areas with more than 40% POC with or without adjustment for rurality. Ratios on the right side of Table 4 are adjusted for rurality. These ratios increase with the percentage POC. The highest ratios occur in areas with more than 80% POC, where over three times as many people live near IHOs, adjusted for rurality, compared to areas with no POC. These excesses are considered to be highly statistically significant.

Table 5 shows the results of analyses for Blacks parallel results to in Table 4 for all POC. Although ratios are somewhat lower for Blacks than POC, the percent of people living within 3 miles of an IHO is statistically significantly elevated in all groups of blocks that are more than 40% Black, with or without adjustment for rurality. In areas that are 80% or more Black, twice as many people live within 3 miles of an IHO compared to areas with no Blacks, a disparity that increases to three times more with adjustment for rurality. These excesses are considered to be highly statistically significant.

Table 6 presents the increased percent of the population living within 3 miles of an IHO for each additional 10 percent of the population of POC, Blacks, Hispanics, and American Indians. This analysis is similar to the results in Tables 4 and 5, but rather than using categories, the relationship between race/ethnicity and proximity to IHOs is modelled as a linear function. For every ten percent increase in POC, the proportion of people residing within 3 miles of an IHO increases, on average, by 10.7%. These values are 9.4, 8.5, and 16.2 for Blacks, Hispanics, and American Indians, respectively. Adjusting for rurality, 14.8% more people reside within 3 miles of an IHO for each additional ten percent POC. Adjusted values are 13.0, 16.3 and 11.8 for Blacks, Hispanics and American Indians, respectively. These linear relationships between race/ethnicity and living near IHOs are considered to be highly statistically significant.

Table 7 shows the difference in SSLW of hogs within 3 miles of residents of blocks with >0 to <20%, 20 to <40%, 40 to <60%, 60 to <80% and 80 to 100% POC compared to blocks with no POC. Blocks in categories with more than 20% POC have, on average, between 177 and 510 thousand pounds more hogs within 3 miles than blocks with no POC. Adjusting for population density, blocks with more than 60 percent POC have, on average, more than three-quarters of a million pounds more hogs permitted within 3 miles than areas with no POC. These excesses are considered to be highly statistically significant.

Table 8 presents parallel results for percentage Black population. As for POC, areas with more than 20% Black residents have an excess SSLW of hogs compared to areas with no Black residents, and differences are greater with adjustment for rurality. Adjusted for population density, blocks with more than 40% Black residents have between 493,000 and 620,000 more pounds of hogs within 3 miles than areas with no Black residents. These excesses are considered to be highly statistically significant.

Table 9 provides the average additional SSLW of hogs permitted in areas with POC for each percent increase in specific racial/ethnic categories. Adjusted for population density, the permitted SSLW of hogs within 3 miles of blocks increases 100, 64, 242, and 92 thousand pounds for each ten percent increase in POC, Black, Hispanic, and American Indian population, respectively. These linear relationships between race/ethnicity and SSLW are considered to be highly statistically significant.

Figure 3 depicts the data analyzed above. Each dot represents an IHO that was operating under the General Permit in 2014. IHOs are concentrated in NC's Coastal Plain Region, between the Piedmont and Tidewater. The red areas of Figure 3 indicate that this region has more people of color than other parts of the study area.

Conclusion

IHOs operating under the NC-DENR General Permit in 2014 are disproportionately located near communities of color. The disparities are considered to be highly statistically significant for Blacks, Hispanics, American Indians, and all POC. IHOs pollute local ground and surface water. They routinely emit air pollutants that negatively impact the quality of life and health of nearby residents. In addition to their well-documented effects on physical, mental and social well-being, residents of areas with a high density of IHOs, and especially residents of color, have been subjected to intimidation including threats of legal action, violence, and job loss (Wing 2002). The industry's close ties with local and state government officials help it to avoid regulation that could protect neighbors, and creates barriers to democracy in rural communities of color (Thu 2001, 2003). These discriminatory impacts could be reduced by decreasing the density of production and use of technologies that prevent releases of pollutants.

References

Bullers S. 2005. Environmental Stressors, Perceived Control, and Health: The Case of Residents Near Large-Scale Hog Farms in Eastern North Carolina. Human Ecology 33:1-16.

Burkholder J, Libra B, Weyer P, Heathcote S, Kolpin D, Thorne PS, et al. 2007. Impacts of Waste from Concentrated Animal Feeding Operations on Water Quality. Environ. Health Perspect. 115:308-312.

Casey JA, Curriero FC, Cosgrove SE, Nachman KE, Schwartz BS. 2013. High-Density Livestock Operations, Crop Field Application of Manure, and Risk of Community-Associated Methicillin-Resistant Staphylococcus Aureus Infection in Pennsylvania. JAMA Internal Medicine 173:1980-1990.

Cole D, Todd L, Wing S. 2000. Concentrated Swine Feeding Operations and Public Health: A Review of Occupational and Community Health Effects. Environ. Health Perspect. 108:685-699.

Cole D, Drum DJ, Stalknecht DE, White DG, Lee MD, Ayers S, et al. 2005. Free-living Canada Geese and Antimicrobial Resistance. Emerging Infectious Diseases 11:935-938.

Donham K. 1993. Respiratory Disease Hazards to Workers in Livestock and Poultry Confinement Structures. Seminars in Respiratory Medicine 14:49-59.

Donham K, Reynolds S, Whitten P, Merchant J, Burmeister L, Popendorf W. 1995. Respiratory Dysfunction in Swine Production Facility Workers: Dose-response Relationships of Environmental Exposures and Pulmonary Function. American Journal of Industrial Medicine 27:405-418.

Donham K, Cumro D, Reynolds S, Merchant J. 2000. Dose-Response Relationships Between Occupational Aerosol Exposures and Cross-Shift Declines of Lung Function in Poultry Workers: Recommendations for Exposure Limits. Journal of Occupational and Environmental Medicine 42:260-269.

Donham KJ. 1990. Health Effects from Work in Swine Confinement Buildings. American Journal of Industrial Medicine 17:17-25.

Donham KJ, Wing S, Osterberg D, Flora JL, Hodne C, Thu KM, et al. 2007. Community Health and Socioeconomic Issues Surrounding Concentrated Animal Feeding Operations. Environ. Health Perspect. 115:317-320.

Edwards B, Driscoll A. 2009. From Farms to Factories: The Environmental Consequences of Swine Industrialization in North Carolina. In: Twenty Lessons in Environmental Sociology, (Gould K, Lewis T, eds). New York: Oxford University Press, 153-175.

Furuseth O. 1997. Restructuring of Hog Farming in North Carolina: Explosion and Implosion. Professional Geographer 49:391-403.

Gibbs SG, Green CF, Tarwater PM, Mota LC, Mena KD, Scarpino PV. 2006. Isolation of Antibiotic-Resistant Bacteria from the Air Plume Downwind of a Swine Confined or Concentrated Animal Feeding Operation. Environ. Health Perspect. 114:1032-1037.

Graham JP, Price LB, Evans SL, Graczyk TK, Silbergeld EK. 2009. Antibiotic Resistant Enterococci and Staphylococci Isolated from Flies Collected near Confined Poultry Feeding Operations. Sci Total Environ 407:2701-10.

Green CF, Gibbs SG, Tarwater PM, Mota LC, Scarpino PV. 2006. Bacterial Plume Emanating from the Air Surrounding Swine Confinement Operations. Journal of Occupational and Environmental Hygiene 3:9-15.

Horton RA, Wing S, Marshall SW, Brownley KA. 2009. Malodor as a Trigger of Stress and Negative Mood in Neighbors of Industrial Hog Operations. American Journal of Public Health 99 Suppl 3:S610-615.

Mirabelli MC, Wing S, Marshall SW, Wilcosky TC. 2006. Asthma Symptoms Among Adolescents Who Attend Public Schools that are Located Near Confined Swine Feeding Operations. Pediatrics 118:e66-75.

Radon K, Schulze A, Ehrenstein V, van Strien RT, Praml G, Nowak D. 2007. Environmental Exposure to Confined Animal Feeding Operations and Respiratory Health of Neighboring Residents. Epidemiology 18:300-308.

Rinsky JL, Nadimpalli M, Wing S, Hall D, Baron D, Price LB, et al. 2013. Livestock-Associated Methicillin and Multidrug Resistant Staphylococcus Aureus Is Present Among Industrial, Not Antibiotic-Free Livestock Operation Workers in North Carolina. PloS One 8:e67641.

Schiffman S, Bennett J, Raymer J. 2001. Quantification of Odors and Odorants from Swine Operations in North Carolina. Agricultural and Forest Meteorology 108:213-240.

Schiffman SS, Sattely Miller EA, Suggs MS, Graham BG. 1995. The Effect of Environmental Odors Emanating from Commercial Swine Operations on the Mood of Nearby Residents. Brain Research Bulletin 17:369-375.

Schinasi L, Horton RA, Guidry VT, Wing S, Marshall SW, Morland KB. 2011. Air Pollution, Lung Function, and Physical Symptoms in Communities Near Concentrated Swine Feeding Operations. Epidemiology 22:208-215.

Schulz J, Friese A, Klees S, Tenhagen BA, Fetsch A, Rosler U, et al. 2012. Longitudinal Study of the Contamination of Air and of Soil Surfaces in the Vicinity of Pig Barns by Livestock-Associated Methicillin-Resistant Staphylococcus Aureus. Applied and Environmental Microbiology 78:5666-5671.

Silbergeld EK, Graham J, Price LB. 2008. Industrial Ffood Animal Production, Antimicrobial Resistance, and Human Health. Annual Review of Public Health 29:151-169.

Tajik M, Muhammad N, Lowman A, Thu K, Wing S, Grant G. 2008. Impact of Odor from Industrial Hog Operations on Daily Living Activities. New Solututions 18:193-205.

Thu K, Donham K, Ziegenhorn R, Reynolds S, Thorne P, Subramanian P, et al. 1997. A Control Study of the Physical and Mental Health of Residents Living near a Large-Scale Swine Operation. Journal of Agricultural Safety and Health 3:13-26.

Thu K. 2001. Agriculture, the Environment, and Sources of State Ideology and Power. Culture and Agriculture 23:1-7.

Thu K. 2003. Industrial Agriculture, Democracy, and the Future. In: Beyond Factory Farming: Corporate Hog Barns and the Threat to Public Health, the Evironment, and Rural Communities, (Ervin A, Holtslander C, Qualman D, Sawa R, eds). Saskatoon, Saskatchewan:Canadian Centre for Policy Alternatives.

van de Giessen AW, van Santen-Verheuvel MG, Hengeveld PD, Bosch T, Broens EM, Reusken CB. 2009. Occurrence of Methicillin-Resistant Staphylococcus Aureus in Rats Living on Pig Farms. Preventive Veterinary Medicine 91:270-273.

Wing S, Cole D, Grant G. 2000. Environmental Injustice in North Carolina's Hog Industry. Environ. Health Perspect. 108:225-231.

Wing S, Wolf S. 2000. Intensive Livestock Operations, Health, and Quality of Life among Eastern North Carolina Residents. Environ. Health Perspect. 108:233-238.

Wing S. 2002. Social Responsibility and Research Ethics in Community-Driven Studies of Industrialized Hog Production. Environ. Health Perspect. 110:437–444.

Wing S, Freedman S, Band L. 2002. The Potential Impact of Flooding on Confined Animal Feeding Operations in Eastern North Carolina. Environ. Health Perspect. 110:387-391.

Wing S, Horton RA, Marshall SW, Thu K, Tajik M, Schinasi L, et al. 2008. Air Pollution and Odor in Communities Near Industrial Swine Operations. Environ. Health Perspect. 116:1362-1368.

Wing S, Horton RA, Rose KM. 2013. Air Pollution from Industrial Swine Operations and Blood Pressure of Neighboring Residents. Environ. Health Perspect. 121:92-96.

Figure 1
North Carolina study area, 2014

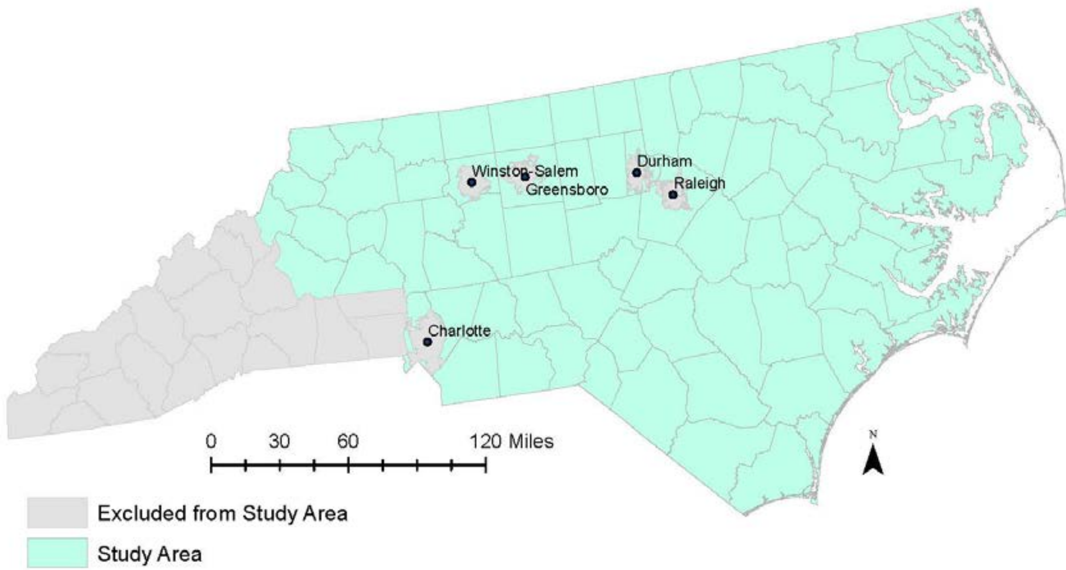

Figure 2
Percent of population living within 3 miles of an IHO
in relation to percent people of color, NC, 2014

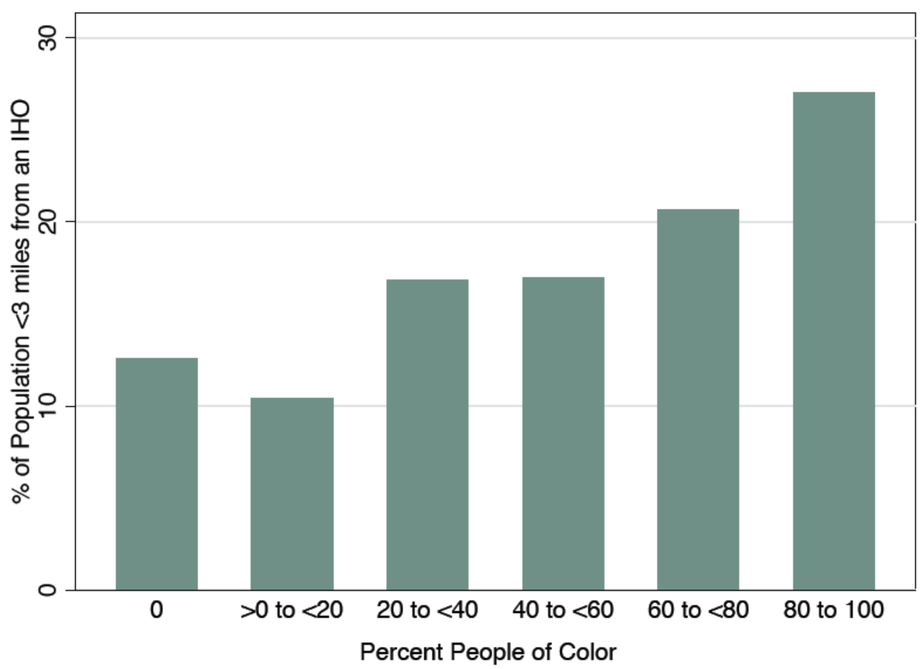

Figure 3
Racial and ethnic composition of census blocks and the locations
of NC IHOs operating under the General Permit, 2014

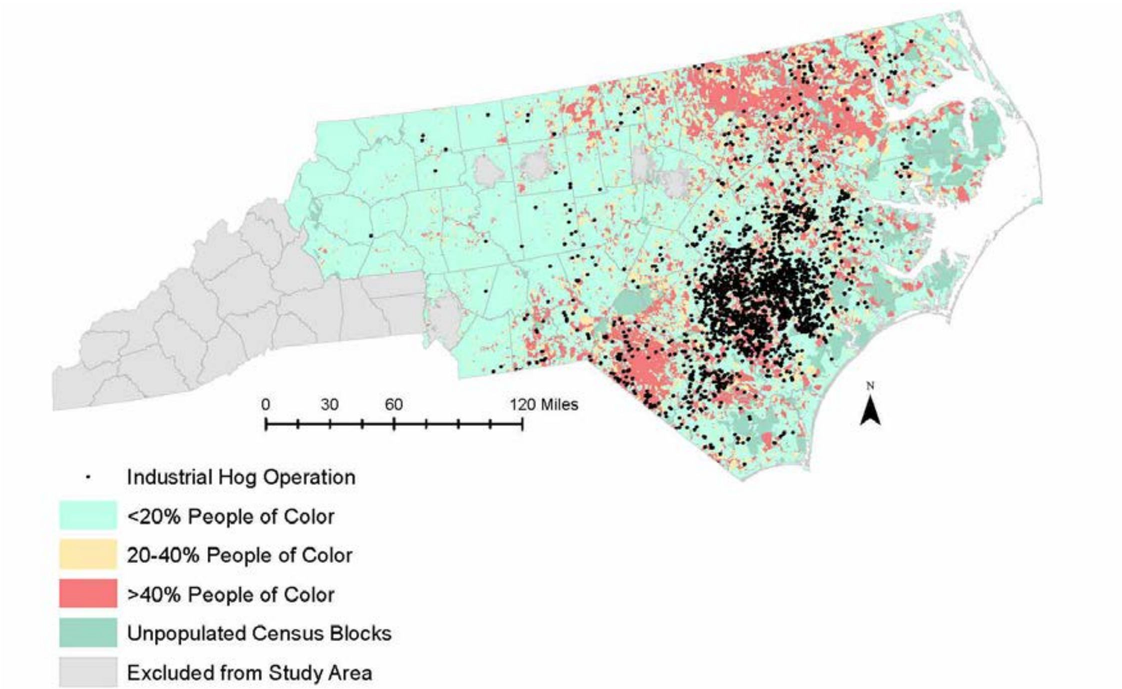

Table 1
Steady state live weight of IHOs
operating under the General Permit, NC, 2014

Permitted SSLW[1]	Number of IHOs	Percent of IHOs	Total SSLW[1]	Percent of total SSLW
20-	160	7.7	12,574	1.0
100-	447	21.6	76,626	5.9
250-	577	28.1	222,003	17.1
500-	529	25.4	383,918	29.6
1,000-10,200	342	17.2	603,354	46.5
Total	2055	100.0	1,298,474	100.0

[1]Thousands of pounds

Table 2
Racial and ethnic composition of NC census blocks within 3 miles
of an IHO and more than 3 Miles of an IHO, 2014

	≤3 miles from an IHO		>3 miles from an IHO		
Racial Category	Number	Percent	Number	Percent	Total[1]
Non-Hispanic white	602,380	13.1	4,003,455	86.9	4,605,835
POC[1]	383,522	19.9	1,548,276	80.1	1,931,798
Black	277,199	20.2	1,096,795	79.8	1,373,994
Hispanic	92,679	18.1	418,292	81.9	510,971
American Indian	40,621	28.5	101,872	71.5	142,493
Total[1]	985,902	15.1	5,551,731	84.9	6,537,633

[1]POC can be counted in more than one racial/ethnic category. The total population is equal to the number of non-Hispanic Whites plus the number of POC.

Table 3
Ratios of POC compared to non-Hispanic Whites living within 3 Miles
of an IHO operating under the General Permit, 2014

Racial/ethnic Category	Population	≤3 miles from an IHO Number	Percent	Ratio[2]	p-value[3]
Non-Hispanic white	4,605,835	602,380	13.1	1.00	--
POC[1]	1,931,798	383,522	19.9	1.52	<0.0001
Black	1,373,994	277,199	20.2	1.54	<0.0001
Hispanic	510,971	92,679	18.1	1.38	<0.0001
American Indian	142,493	40,621	28.5	2.18	<0.0001
Total[1]	6,537,633	985,902	15.1		

[1]People of color can be counted in more than one racial/ethnic category. The total population is equal to the number of non-Hispanic Whites plus the number of POC.
[2]Ratio of the percent of people of other racial/ethnic groups to percent of non-Hispanic Whites living within 3 miles of an IHO
[3]A difference in proportions of this magnitude or greater would be expected to occur less than one time in ten thousand if people of different racial/ethnic groups had been randomized to live within 3 miles of an IHO.

Table 4
Ratios comparing the percent of people residing within 3 miles of an IHO
in blocks with POC compared to blocks with no POC

Percent POC	Population	Unadjusted Prevalence Ratio	95% CI	Adjusted[1] Prevalence Ratio	95% CI
0	694,747	1.0	referent	1.00	referent
>0 to <20	2,577,015	0.83	0.82, 0.83	1.01	1.00,1.02
20 to <40	1,364,923	1.34	1.33, 1.45	1.95	1.93, 1.97
40 to <60	799,124	1.35	1.34, 1.36	2.15	2.13, 2.16
60 to <80	526,305	1.64	1.62, 1.65	2.53	2.50, 2.55
80 to 100	575,519	2.14	2.12, 2.16	3.30	3.27, 3.32

[1]Adjusted for rurality using a cubic polynomial of the natural log of population density

Table 5
Ratios comparing the percent of people residing within 3 miles of an IHO in blocks with Black residents compared to blocks with no Black residents

Percent Black	Population	Unadjusted Prevalence Ratio	95% CI	Adjusted[1] Prevalence Ratio	95% CI
0	1,308,061	1.00	referent	1.00	referent
>0 to <20	2,941,746	0.93	0.92, 0.94	1.20	1.19,1.21
20 to <40	1,043,277	1.44	1.43, 1.45	2.07	2.05, 2.08
40 to <60	536,198	1.52	1.51, 1.53	2.18	2.17, 2.20
60 to <80	336,232	1.57	1.56, 1.59	2.19	2.17, 2.21
80 to 100	372,119	2.01	1.99, 2.02	3.06	3.04, 3.09

[1]Adjusted for rurality using a cubic polynomial of the natural log of population density

Table 6
Percent difference in the percent of people residing within 3 miles of an IHO for a ten percent increase in the population of each racial/ethnic group

Racial/ethnic group	Unadjusted Percent	95% CI	Adjusted[1] Percent	95% CI
POC	10.7	10.6, 10.8	14.8	14.7, 14.9
Black	9.4	9.3, 9.4	13.0	12.9, 13.1
Hispanic	8.5	8.4, 8.6	16.3	16.1, 16.4
American Indian	16.2	16.0, 16.4	11.8	11.6, 12.0

[1]Adjusted for rurality using a cubic polynomial of the natural log of population density

Table 7
Difference in SSLW of hogs within 3 miles of residents of blocks with POC compared to blocks with no POC

Percent POC	Unadjusted SSLW[2]	95% CI	Adjusted[1] SSLW	95% CI
0	Referent	-	Referent	-
>0 to <20	-35	-73, 3	190	154, 227
20 to <40	177	136, 219	535	495, 575
40 to <60	308	262, 353	717	672, 762
60 to <80	510	459, 561	896	846, 946
80 to 100	453	403, 503	837	788, 885

[1]Adjusted for rurality using a cubic polynomial of the natural log of population density
[2]1,000s of pounds

Table 8
Difference in SSLW of hogs within 3 miles of residents of blocks with Black residents compared to blocks with no Black residents

Percent Black	Unadjusted SSLW[2]	95% CI	Adjusted[1] SSLW	95% CI
0	Referent	-	Referent	-
>0 to <20	-4	-33, 25	237	207, 265
20 to <40	190	153, 227	493	457, 530
40 to <60	327	281, 372	620	576, 665
60 to <80	275	221, 330	547	494, 599
80 to 100	165	113, 218	494	444, 545

[1]Adjusted for rurality using a cubic polynomial of the natural log of population density
[2]1,000s of pounds

Table 9
Difference in SSLW of hogs within 3 miles of residents of blocks for a ten percent increase in population of each racial group

Racial/ethnic group	Unadjusted SSLW[2]	95% CI	Adjusted[1] SSLW	95% CI
POC	67	63, 71	100	96, 104
Black	38	34, 42	64	60, 68
Hispanic	183	174, 192	242	234, 251
American Indian	124	111, 137	92	80, 105

[1]Adjusted for rurality using a cubic polynomial of the natural log of population density
[2]1,000s of pound

Exhibit 23

May 6, 2022

Via First Class and Electronic Mail

Laura Watson, Director
Washington State Department of Ecology
P.O. Box 47600
Olympia, WA 98504-7600

Re: Environmental Justice and Washington Concentrated Animal Feeding Operations Permitting

Dear Director Watson,

Puget Soundkeeper Alliance, Friends of Toppenish Creek, Sierra Club, Waterkeeper Alliance, Center for Food Safety, and Western Environmental Law Center, and their tens of thousands of members, supporters, and volunteers throughout the State of Washington, are writing to express our concern with the Department of Ecology's (Ecology) failure to engage with communities impacted by discharge from Concentrated Animal Feeding Operations (CAFO) while drafting its general NPDES permit.[1]

Introduction

As we have made clear in our advocacy during the CAFO permitting process, Ecology must engage with the communities impacted by its regulatory decisions, particularly those already overburdened by past and ongoing environmental discrimination. Because Ecology is the state agency charged with protecting our air and water, this engagement is not only a moral imperative but also a legal requirement.

Ecology acknowledges this moral and legal requirement. Yet, in its efforts to develop a general NPDES permit for CAFOs, Ecology is failing to engage with the people directly harmed by pollution from these operations. Because of this, the agency is uninformed of the true impacts and interests of the people working and living in and around CAFOs, and is at risk of producing yet another inadequate and unprotective general permit.

CAFOs have profoundly negative impacts on the health of workers and the people who live in surrounding communities, including through pollutant discharge into water.[2] As a result,

[1] We use the terms "impacted" and "affected" to refer to regions and people subject to harms from CAFO discharges ranging from lack of access to healthy drinking water to impacts on fish that are an important source of food. Because there is the tendency for CAFOs to be located in regions where people experience cumulative environmental burdens, these terms overlap with the "vulnerable populations" and "overburdened communities" identified in the HEAL Act. *See* RCW 70A.02.010.

[2] *See, e.g.*, Grout et al., A Review of Potential Public Health Impacts Associated With the Global Dairy Sector, 4 GeoHealth 1 (January 30, 2020); Carrie Hribar, Understanding concentrated animal feeding operations and their impact on communities, National Association of Local Boards of Health at 7, 9 (2020) available at https://www.cdc.gov/nceh/ehs/docs/understanding_cafos_nalboh.pdf.

Ecology must actively engage members of communities affected by CAFO discharge in a dialogue regarding the impact of industrial dairy farms on their water, the legal requirements mandating NPDES permitting of these operations, the scope of the general permit, and the needs and wishes of the members of the local community regarding the regulation of these entities under federal and state clean water law. To do less is unacceptable in any case, but is particularly egregious here given the agency's professed commitment to environmental justice.

I. **Ecology's mission and duties mandate attention, consultation, and engagement with people affected by CAFO discharge**

Ecology's mission is to "[p]rotect, preserve and enhance Washington's land, air and water for current and future generations."[3] This mandate to protect our natural resources is broad, and is based on the "fundamental and inalienable right of the people of the state of Washington to live in a healthful and pleasant environment and to benefit from the proper development and use of its natural resources."[4] To carry out this mission effectively, Ecology, "in consultation with affected constituent groups, [must] continue appropriate public involvement and outreach mechanisms designed to provide cost-effective public input on their programs and policies."[5]

While the duty to consult with communities affected by pollution is not new, it is now informed by the specific duties of the HEAL Act, passed in 2021, requiring the agency to act towards realizing environmental justice for overburdened communities and vulnerable populations.[6] Ecology reaffirms this duty by stating that it is "committed to making decisions that do not place disproportionate environmental burdens" on communities in Washington State.[7] Further, the agency recognizes that full participation by impacted communities in decision-making is an essential step toward environmental justice.[8] This is consistent with the HEAL Act's requirement that Ecology adopts and implements a plan to engage overburdened communities and vulnerable populations by July 1, 2022.[9]

Because Ecology failed to draft a general permit that met the mandates under state and federal law, CAFOs in Washington State now operate under a permit that expired in March 2022.[10] Ecology's current timeline indicates it plans to release a draft general permit by late

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[3] Ecology, About Us https://ecology.wa.gov/About-us (last visited April 8, 2022).

[4] RCW 43.21A.010.

[5] RCW 43.20A.005.

[6] Engrossed Second Substitute Senate Bill 5141 67th Leg. 2021 Reg. Session (HEAL Act).

[7] Ecology, Environmental Justice https://ecology.wa.gov/About-us/Who-we-are/Environmental-Justice (last visited May 2, 2022).

[8] *Id.*

[9] RCW 70A.02.050(1).

[10] Ecology, Concentrated Animal Feeding Operation https://ecology.wa.gov/Regulations-Permits/Permits-certifications/Concentrated-animal-feeding-operation (last visited May 4, 2022); *Washington State Dairy Fed'n v. State*, 18 Wash. App. 2d 259, 304, 490 P.3d 290 (2021).

spring 2022 for public comment.[11] This means the first stage of drafting will be complete before the July 1 date by which the HEAL Act requires Ecology to adopt its engagement plan. However, any attempt by Ecology to suggest it has some grace period not to engage because its plan is not required at the time the draft permit is released is contrary to stated policy and statutory mandates.

First, as discussed above, Ecology itself states that it is "committed to providing environmental justice to our most vulnerable communities."[12] It claims that environmental justice "is a priority in our efforts to restore and protect land, air, and water."[13] The agency does not tie this commitment to a timeline but indicates it is working towards environmental justice now. Second, under RCW 43.20A.005, the agency has a statutory duty predating the HEAL Act to make at least some effort toward facilitating public engagement.[14] Third, the Clean Water Act requires "[p]ublic participation in the development, revision, and enforcement of any regulation, standard, effluent limitation, plan, or program established by the Administrator or any State."[15] This was one of the legal mandates that Ecology violated in its last iteration of the permit according to the Washington State Court of Appeals.[16]

Finally, apart from policy declarations and statutory duties, any suggestion by Ecology that it is not prepared to effectively engage in outreach is belied by the fact that it already has started outreach efforts under the Climate Commitment Act.[17] Through this program, it is seeking input **from some of the very same communities most impacted by CAFOs**. Despite this overlap, Ecology is not coordinating these efforts.[18] Additionally, Ecology can look to the Environmental Justice Task Force Final Report, produced nearly two years ago, for detailed information about approaches for effectively facilitating community engagement.[19]

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[11] Ecology, Concentrated Animal Feeding Operation https://ecology.wa.gov/Regulations-Permits/Permits-certifications/Concentrated-animal-feeding-operation (last visited May 4, 2022).

[12] Ecology, Prioritizing EJ https://ecology.wa.gov/About-us/Who-we-are/Environmental-Justice/Prioritizing-EJ (last visited April 12, 2022).

[13] *Id.*

[14] RCW 43.20A.005.

[15] 33 U.S.C. § 1251(e).

[16] *Washington State Dairy Fed'n v. State*, 18 Wash. App. 2d 259, 304, 490 P.3d 290 (2021).

[17] *See* Ecology, Improving Air Quality in Overburdened Communities https://storymaps.arcgis.com/stories/1409205ca61847faa4194072330709cd (last visited May 4, 2022); *See also Ecology*, Overburdened communities https://ecology.wa.gov/Air-Climate/Climate-change/Reducing-greenhouse-gases/Climate-Commitment-Act/Overburdened-communities (last visited April 12, 2022).

[18] *Id.*

[19] Washington State Environmental Justice Task Force Final Report (Fall 2020).

II. To comply with its own policy goals and its legal duty to realize environmental justice, Ecology must engage those members of overburdened communities and vulnerable populations affected by CAFO discharge[20]

Environmental justice is an effort to redress the impacts of historical and ongoing racism and poverty on the distribution of environmental benefits and harms and resulting health outcomes. Currently, the pattern seen across the United States and within Washington State is the inequitable distribution of environmental burdens and benefits, where the cumulative harms of pollutants and other environmental risk factors fall hardest on people of color, Indigenous and Tribal people, and low-income residents, among others.[21] These disparate environmental impacts result in clear patterns of higher mortality rates and worse general health outcomes for people with historically marginalized identities.[22] The discrimination driving the decision-making by governmental entities that lead to these patterns is directly related to failures to ensure that people with historically marginalized identities have a voice and power in decisions directly affecting them. Thus, a governmental entity, such as Ecology, in working towards repairing its and other entities' legacies of discrimination must ensure the right of individuals most impacted by environmental decisions to "participate as equal partners at every level of decision-making, including during needs assessment, planning, implementation, enforcement, and evaluation."[23] Waiting until decision-making processes have already reached draft form is too late because, at this point, members of these communities have already been stripped of the power to drive the shape and parameters of the governmental action.

In Washington State, many CAFOs regulated under Ecology's general permit occur in regions, such as Yakima County, with a higher proportion of low-income and Indigenous people,

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[20] The HEAL Act defines an "overburdened community" as "a geographic area where vulnerable populations face combined, multiple environmental harms and health impacts, and includes, but is not limited to, highly impacted communities as defined in RCW 19.405.020." RCW 70A.02.010(11). It defines "vulnerable populations" as

> population groups that are more likely to be at higher risk for poor health outcomes in response to environmental harms, due to: (i) Adverse socioeconomic factors, such as unemployment, high housing and transportation costs relative to income, limited access to nutritious food and adequate health care, linguistic isolation, and other factors that negatively affect health outcomes and increase vulnerability to the effects of environmental harms; and (ii) sensitivity factors, such as low birth weight and higher rates of hospitalization.

RCW 70A.02.010(14)(a).

The Heal Act states that the term "vulnerable populations" "includes, but is not limited to: (i) Racial or ethnic minorities; (ii) Low-income populations; (iii) Populations disproportionately impacted by environmental harms; and (iv) Populations of workers experiencing environmental harms." *Id.*

[21] *See, e.g.*, Julie Sze, Environmental Justice in a Moment of Danger (2020); Clifford Villa et al., Environmental Justice: Law, Policy & Regulation, Third Edition (2020).

[22] *See, e.g.*, Rachel Morello-Frosch et al., Understanding the Cumulative Impacts of Inequalities in Environmental Health: Implications for Policy, 30 Health Affairs 879 (May 2011).

[23] *See* First National People of Color Environmental Leadership Summit, Principles of Environmental Justice (1991), available at https://www.ejnet.org/ej/principles.html.

people of color, and Tribal members living and working in the area.[24] People with these historically marginalized identities who live and work in the regions where CAFOs tend to be clustered experience elevated environmental burdens where community members suffer worse health outcomes as a result of air and water pollution, including higher rates of asthma, lower birth rates, and shorter life-spans.[25]

Ecology's current regulatory approach for addressing the environmental damage of CAFOs is through its NPDES general permitting program. Under federal law, as reiterated and reaffirmed by the Washington State Court of Appeals in June 2021, Ecology must provide a means for the public to comment on the draft NPDES permit for regulating CAFO discharge. Under state law, Ecology must work to engage and consult with impacted communities. Finally, Ecology's commitment to equity and environmental justice makes it imperative that it ensure the full participation of local communities in the process.

III. <u>Ecology's public outreach to date has been inadequate</u>

So far, unfortunately, Ecology has failed to engage impacted communities sufficiently.[26] In contrast, the agency has reached out to and visited the *regulated* community.[27] Fortunately, there is still time for Ecology to take the necessary steps to engage the public before finalizing the draft permit.

As Ecology is well aware, the permitting process is complex. Fundamental, therefore, to enfranchising people who are not experts in the technical or legal field, but are experts in their own lived experience, is effectively communicating to the public the impacts of CAFOs on water, the function of NPDES permitting to address these impacts, the process by which Ecology goes about developing these permits, and how affected individuals can be involved in the process. Ecology's website is one obvious place where the agency should host this information.

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[24] U. S. Census, Quickfacts Washington State https://www.census.gov/quickfacts/fact/map/WA,US/PST045221 (last visited April 28, 2022).

[25] *See, e.g.*, E. Min, Quantifying the Distribution of Environmental Health Threats and Hazards in Washington State Using a Cumulative Environmental Inequality Index, 14 Environmental Justice 298 (2021) (determining that pollution burdens in general, are significantly higher for people of color and those living in poverty in Washington State); Esmy Jimenez, New Map Shows Hotspots Of Environmental Health Hazards For Washington Neighborhoods, Northwest Public Broadcasting (January 10, 2019) (describing Yakima County's reduced health outcomes as appearing like "a big, red blemish" on the Washington State Health Disparities Map) available at https://www.nwpb.org/2019/01/10/new-map-shows-hotspots-of-environmental-health-hazards-for-washington-neighborhoods/; Jacques Colon, The Disproportionate Burden of Fossil Fuel Air Pollution on Communities of Color in Washington State, Front and Centered Report (June 15, 2016) (describing shorter life-spans on average resulting from community exposure to cumulative environmental harms).

[26] Chelsea Morris mentioned that she was sending information to one community group at our meeting with her on January 7, 2022.

[27] Statements by Chelsea Morris during the September 21, 2021 meeting between Ecology's Chelsea Morris, Jeff Killelea, Nathan Lubliner, and members of Center for Food Safety, Friends of Toppenish Creek, and Puget Soundkeeper Alliance.

Currently, Ecology's website does not provide this information. In particular, it does not explain the permitting process, discuss why permitting is needed for CAFOs, or describe exactly how the agency develops the CAFO permit.[28] Instead, the website briefly mentions the current development of the general permit as a direct response to the June 2021 court opinion, with little further information, and no indication of how public input functions as part of what it is considering.

Further, the website's information about opportunities to comment is stale, as it is limited to links for the two "listening sessions" held in October 2021 and a link to an "online comment form" that closed on Sunday, October 24, 2021.[29] Information such as the "Detailed Explanation of the Permits" discusses the previous iteration of the permit and is long and dense rather than user-friendly.[30]

Ecology has provided a Spanish-language focus sheet discussing the NPDES permit regulation of CAFOs, including a description of the potential for the operations to pollute drinking water, and instructions for reporting contamination.[31] This sheet provides one possible starting point for developing more information on the website itself. However, it does not provide a discussion of the current permitting process, nor does it invite input.[32] So it does not solve the website's fundamental lack of information regarding the permitting process.

Another approach to outreach is public forums, including listening sessions. Ecology had two virtual listening sessions in October 2021. Unfortunately, these listening sessions did not represent effective forums for communication. They did not provide clear information but rather meandered through the dense technical weeds of the court opinion and Ecology's concerns.

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[28] The site links to a fact sheet in Spanish that at least provides some basic explanation of the problem. Translating some of this fact sheet back to English, particularly in the discussion of the impact of CAFO discharge on drinking water could be one, of many, ways Ecology could update the landing site to make it more relevant and useful to people affected by CAFO discharge in their region. *See,* Ecology, Hoja de Enfoque: Permiso de Operación de Alimentación de Animales Confinados (April 2022) available at https://apps.ecology.wa.gov/publications/parts/1710002part1.pdf .

[29] As we communicated to Ecology during the January 7, 2022 meeting, those "listening sessions" were deeply flawed.

[30] Ecology, Fact Sheet for the Concentrated Animal Feeding Operation National Pollutant Discharge Elimination System and State Waste Discharge General Permit and Concentrated Animal Feeding Operation State Waste Discharge General Permit (June 15, 2016) available at https://ecology.wa.gov/DOE/files/a3/a36ceb3d-7767-4a21-a354-d4b7c1965c95.pdf.

[31] Ecology, Hoja de Enfoque: Permiso de Operación de Alimentación de Animales Confinados (April 2022) available at https://apps.ecology.wa.gov/publications/parts/1710002part1.pdf . The opportunity to report violations is not currently an effective way for people in the community to protect their waters given apparent failures in agency response to these reports. This is, in part, the result of the 2011 Memorandum of Understanding between Ecology and the Washington State Department of Agriculture, which has led to holes between permitting under state and federal clean water law and enforcement in situations where dairies are violating the law.

[32] It is a positive step that Ecology provides the possibility of translated materials via contacting Chelsea Morris or Ecology's Language Access Team. But this service still requires a member of the community know what information it is he/she/they seek, take the step of asking for that information to be translated, and be prepared to wait however long it takes the agency to return the translated materials.

Further, the information provided was not always accurate. The webinars were hosted on a platform that disenfranchised participants because people could not see each other, and the webinars were not moderated in any way to facilitate comments by those not part of the regulated community. Finally, when people, for example from the regulated community, spoke the agency did not provide information about these speakers and their involvement and interests in the process or correct the misinformation that was provided.

Providing clarity of process and a sense that input is valued and can impact agency decision-making is essential to effective engagement. Unfortunately, as described above, Ecology does not explain how it will use public input in its permit development process. And by stating on its website that it "will not create a formal response to verbal or written comments during [its] listening session comment period"[33] it gives the appearance of relieving itself of any duty to consider the comments.

This opacity of process, apparent lack of interest in community dialogue, and failure to even do the minimum on its website or in forums to reduce barriers to access for members of the impacted community is unacceptable. We know Ecology can do better.

V. **Ecology must engage in far more effective outreach as it develops the draft and final CAFO general permit**

As mentioned above, Ecology has the internal knowledge, connections, and resources to far more effectively engage and empower members of impacted communities in the process of CAFO permit development than it has done so far. Given the legal and policy landscape under which it is undertaking this process, the agency does not have a choice. It must do a better job. Although ultimately, it is the agency's role to develop an engagement plan, we provide some basic expectations below for how the agency might improve its outreach and engagement with impacted communities moving forward.

These expectations arise out of our recognition of the barriers to engagement experienced by members of impacted communities resulting from the systems of oppression, including White supremacy, settler colonialism, capitalist hegemony, patriarchy, and Christian hegemony threaded through agency culture and structure.[34] These barriers include lack of access and information, failure of effective communication, apathy and a sense of burden, lack of clear and transparent process, lack of resources, lack of a sense of potential for influence, lack of trust, and a failure to recognize different types of knowledge.[35] Many of these barriers result from Ecology's fundamental failure to recognize its role as the steward of the state's clean water, and the expertise people in communities impacted by CAFOs have regarding their own life experiences. Realizing environmental justice requires Ecology to approach these communities with humility, an interest

[33] Ecology, Concentrated animal feeding operations, https://ecology.wa.gov/Regulations-Permits/Permits-certifications/Concentrated-animal-feeding-operation (last visited May 4, 2022).

[34] Washington State Environmental Justice Task Force Final Report at Appendix C (Fall 2020).

[35] *Id.* at 64, Appendix C.

in what people can tell them about their experience, and a willingness to allow that information to impact its decision-making.

We recognize that the agency will continue to work through the more fundamental structural and cultural barriers to achieving environmental justice. Related to this, however, Ecology must do a much better job of reaching out to the communities most impacted by pollution from CAFOs. Below are some of the first steps we expect to see from Ecology as it develops the CAFO general permits.

A. <u>Provide better information.</u>

As described above, Ecology has not provided easy access to or effective communication of information about the CAFO permitting process, including how Ecology will consider comments from community members. **Ecology should improve the website, as described above, and host community events, whether virtual or in-person, to provide basic, jargon-free information about the problem, process, and potential for engagement.** Optimally, this information would be provided in English and languages other than English, and delivered through a variety of media, recognizing that providing information only through the written word often presents a barrier in and of itself.

B. <u>Use a variety of platforms and media to communicate information.</u>

Currently, Ecology's failure to widely distribute information across different platforms disenfranchises members of the impacted community. **Ecology must distribute information about CAFOs, their impact, the permits, the permitting process, and opportunities to engage, both online and via meetings, across platforms, to those individuals in regions affected by the permits through electronic and other means (such through churches, colleges, community centers, groceries, food banks, feed stores, hardware stores, the Yakima Herald Republic, Cascadia Weekly, and Radio KDNA).**

C. <u>Coordinate internally to identify groups and individuals in the communities impacted by CAFOs to invite them into the conversations about the CAFO permitting process.</u>

As discussed above, Ecology is already conducting outreach and listening sessions consistent with the Climate Commitment Act in regions also affected by entities covered by the CAFO general NPDES permit. By failing to coordinate internally, the agency disenfranchises members of the communities by failing to make a reasonable effort to reach out to them about CAFO impacts and additionally burdening the local communities with trying to understand the agency's role in the region. **Ecology should therefore coordinate with those agency employees developing the Air Quality in Overburdened Communities Initiative to identify common regions of concern and reach out to people already engaged with the agency in these areas.**[36]

[36] For example, the agency now has a list with addresses and phone numbers of individuals who had expressed concerns about Yakima air quality over the years as a result of efforts on the part of Friends of Toppenish Creek. This is exactly the sort of resource that should be shared within the agency. It is an obvious first step to mail information about the CAFO permitting process, in multiple languages, to these people.

D. Convene organizations and individuals to gather input on how best to reach out to and communicate with those directly impacted by CAFOs

People and organizations in Whatcom County and Yakima are experts in their experience of the impact of CAFOs. They are also knowledgeable about each other and how to communicate with people living and working in these regions. Yet, Ecology has not made an effort to gather input on outreach from these groups and individuals. Instead, it expects the communities and individuals to do the outreach that it should be doing. This further burdens groups and individuals already stretched thin by multiple overlapping crises[37] and ensures that barriers to access are strengthened rather than dismantled. **Given the wealth of expertise available and recognizing the burdens already faced by organizations and individuals, Ecology should convene these groups and individuals and collect information from them regarding how best to conduct outreach. These meetings should follow best practices in recognizing barriers to participation in meetings and Ecology should communicate how it intends to use the information. It should also provide follow-up demonstrating that it relied on the information as a way to establish the value of the input of these organizations and individuals.**

E. Host more frequent and more accessible meetings that empower members of the community.

Ecology's approach to meetings creates barriers to access. **Ecology should provide more opportunities for the impacted community to discuss their lived experience of CAFOs with the agency.** Optimally, these opportunities would be in person, although we recognize that the pandemic continues to make this difficult. Regardless, these events must be organized to ensure that people feel empowered rather than excluded. **At a minimum, Ecology must provide the information participants need to feel comfortable speaking up in such a space. Further, participants must be able to see one another, the discussion must be sensitive to different abilities and languages, and Ecology should make sure that, when members of the regulated community provide inaccurate information, that information is challenged.**

VI. Conclusion

Ecology has a moral and a legal duty to engage people impacted by the entities they regulate, particularly members of those communities harmed by a history of discriminatory environmental decision-making. Yet, in the process of developing its general CAFO NPDES permit, the agency has, time and again, failed to make even the most basic attempt to include impacted community members. We urge Ecology to comply with law and policy as it moves forward in the process.

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[37] Isabel Carrera Zamanill, Covid-19 Gap Analysis, Front & Centered Report (February 2021) available at https://frontandcentered.org/wp-content/uploads/2021/02/FC-COVID-19-Gap-Analysis.pdf; Alison Saldanha and Elise Takahama, Graphics tell story of COVID's unequal toll across WA, Seattle Times (April 12, 2022) available at https://www.seattletimes.com/seattle-news/health/tracking-covids-unequal-unpredictable-toll-across-washington/; Brandi Fullwood and Libby Denkmann, Whatcom County in Recovery Braces for More Floods, KUOW (February 3, 2022) available at https://www.kuow.org/stories/whatcom-county-in-recovery-braces-for-more-floods.

People most impacted by CAFOs in the state are themselves currently dealing with ongoing emergent situations ranging from the COVID-19 pandemic to flooding.[38] Indeed, COVID-19 has had a particularly harmful impact on the lives of people in Yakima Valley.[39] These multiplying crises mean that, rather than using COVID-19 as an excuse for its failure to engage the people impacted by CAFOS, the agency must redouble its efforts to protect these communities and empower their members in the process of permit development.

We look forward to supporting Ecology in these efforts. If you have questions or would like to talk with us further please feel free to reach out to Jennifer Calkins, at calkins@westernlaw.org or (206) 607-9867.

Sincerely,

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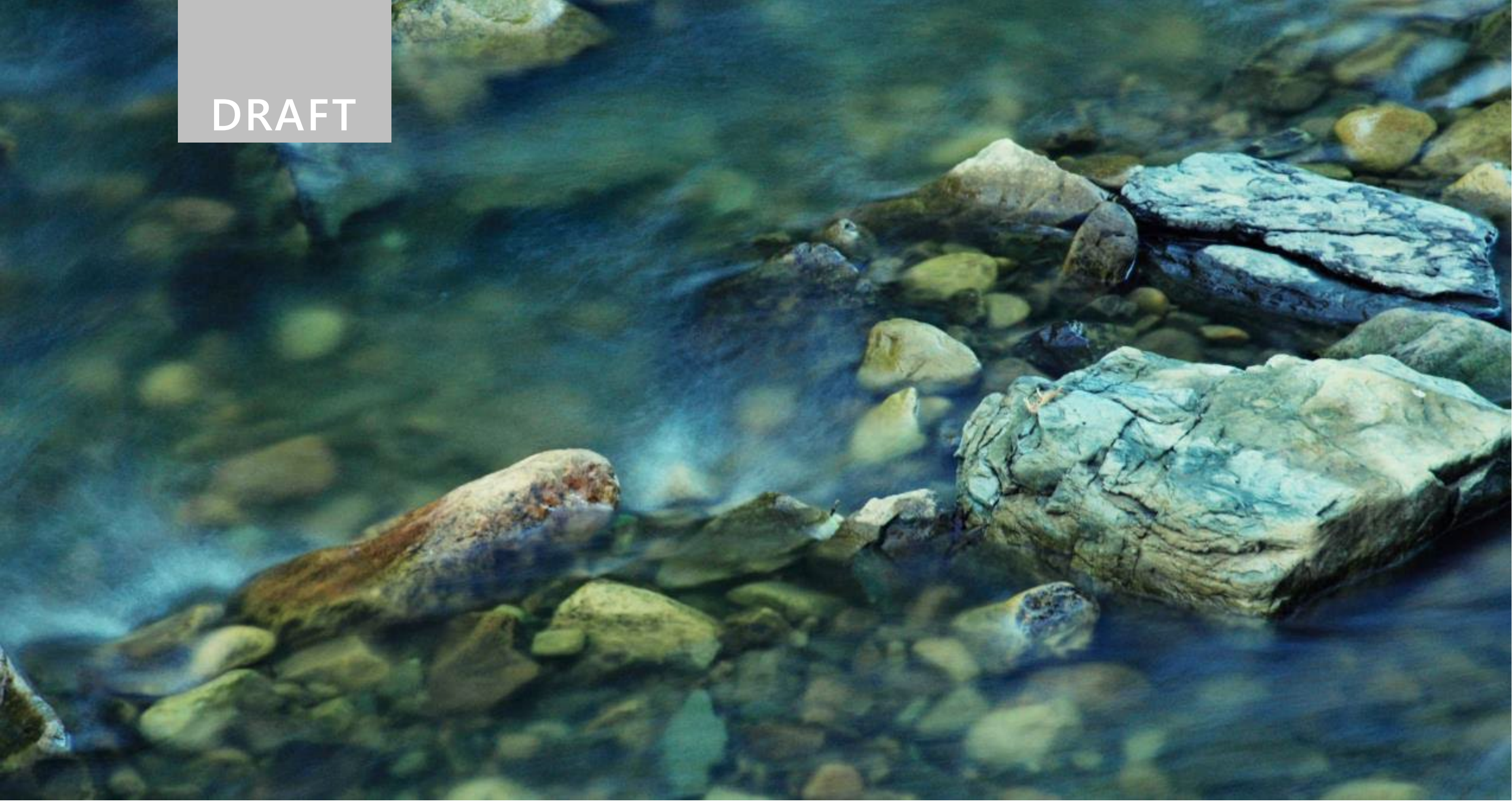
[38] Isabel Carrera Zamanill, Covid-19 Gap Analysis, Front & Centered Report (February 2021) available at https://frontandcentered.org/wp-content/uploads/2021/02/FC-COVID-19-Gap-Analysis.pdf; Alison Saldanha and Elise Takahama, Graphics tell story of COVID's unequal toll across WA, Seattle Times (April 12, 2022) available at https://www.seattletimes.com/seattle-news/health/tracking-covids-unequal-unpredictable-toll-across-washington/; Brandi Fullwood and Libby Denkmann, Whatcom County in Recovery Braces for More Floods, KUOW (February 3, 2022) available at https://www.kuow.org/stories/whatcom-county-in-recovery-braces-for-more-floods.

[39] Isabel Carrera Zamanill, Covid-19 Gap Analysis, Front & Centered Report (February 2021) available at https://frontandcentered.org/wp-content/uploads/2021/02/FC-COVID-19-Gap-Analysis.pdf; Alison Saldanha and Elise Takahama, Graphics tell story of COVID's unequal toll across WA, Seattle Times (April 12, 2022) available at https://www.seattletimes.com/seattle-news/health/tracking-covids-unequal-unpredictable-toll-across-washington/ .

Exhibit 24



January 18, 2022

H&S Bosma Dairy Lagoon No. 3

Administrative Order on Consent Docket No. SDWA-10-2013-0080

ANCHOR QEA

H&S Bosma Dairy
Lagoon No. 3 Abandonment Plan

Prepared for H&S Bosma Dairy

January 18, 2022
H&S Bosma Dairy Lagoon No. 3
Administrative Order on Consent Docket No. SDWA-10-2013-0080

H&S Bosma Dairy
Lagoon No. 3 Abandonment Plan

Prepared for
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Project Number: 210996-01.01

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ABBREVIATIONS

Consent Order	Administrative Order on Consent SDWA-10-2013-0080
Dairy	H&S Bosma Dairy
EPA	U.S. Environmental Protection Agency
H:V	horizontal to vertical (ratio)
mg N/kg	milligrams nitrogen per kilogram
Plan	Lagoon Abandonment Plan
SVID	Sunnyside Valley Irrigation District
WA NRCS	Washington State Natural Resources Conservation Service

1 Introduction

This Lagoon Abandonment Plan (Plan) was prepared by Anchor QEA, LLC, on behalf of H&S Bosma Dairy (the Dairy) as required by the U.S. Environmental Protection Agency (EPA) Region 10 Administrative Order on Consent SDWA-10-2013-0080 (Consent Order). The abandonment work described in this plan has been initiated in 2021 and will be completed according to the schedule described in this Plan.

The Dairy is completing the abandonment of Lagoon No. 3 as part of a larger group of lagoon lining and abandonment projects outlined in the *Final Modified Lagoon Work Plan* (Anchor QEA 2016). Lagoon No. 3 was previously used to collect and store stormwater and manure generated from the Dairy's operations. However, the use of the lagoon has been terminated and it has been emptied of manure and associated liquids. The lagoon will no longer be required due to implemented storage and waste management improvements.

As part of lagoon abandonment, the lagoon will be regraded to support crop production. Two active lagoons (Lagoon Nos. 1 and 2) remain to the south of Lagoon No. 3. The abandonment and regrading of Lagoon Nos. 1 and 2 will be addressed in a separate abandonment plan to be prepared during 2022.

This Plan implements the requirements of the *Final Modified Lagoon Work Plan* (Anchor QEA 2016) as approved by EPA. It also exceeds the requirements of Washington State Natural Resources Conservation Service (WA NRCS) *Conservation Practice Standard 360 – Waste Facility Closure* (WA NRCS 2013a) and demonstrates compliance with nutrient management requirements of WA NRCS *Conservation Practice Standard No. 590 – Nutrient Management* (WA NRCS 2013b).

1.1 Report Organization

The remaining sections of this Plan are organized as follows:

- **Section 2 – Existing Conditions.** This section reviews the current conditions of the Dairy and presents the approximate pre-abandonment dimensions of Lagoon No. 3.
- **Section 3 – Abandonment Procedures.** This section discusses the removal of liquids and organic solids and initial soil testing procedures, both of which have been completed. The section also discusses the proposed treatment of elevated soil nutrient levels, confirmation soil testing, and submission of the final completion report.
- **Section 4 –Schedule.** This section outlines the abandonment timeline.
- **Section 5 – References.** This section provides references for the materials cited in this Plan.

2 Existing Conditions

The Dairy is located at 5860 East Zillah Drive Road in Granger, Washington. Figure 1 shows the location of Lagoon No. 3. The estimated dimension and capacity of the lagoon prior to abandonment are provided in Table 1.

The lagoon was originally created within a natural depression in the topography, bounded by Kirks Road and the Sunnyside Canal (owned by the Sunnyside Valley Irrigation District [SVID]), with the addition of earthen berms at the southern ends of what would become Lagoon No. 3. The lagoon is constrained by SVID drainage easement to the west, cropland to the east, Kirks Road to the north, and Lagoon No. 2 to the south.

Lagoon No. 3 has historically been used to store stormwater runoff and manure waste generated from Dairy operations. Liquid collected within the lagoons is stored and then pumped to application fields or to the existing lagoon system.

Table 1
Lagoon No. 3 Approximate Dimensions and Capacity

Lagoon	Length (feet)	Width (feet)	Depth (feet)	Capacity (million gallons)	Capacity (acre-feet)	Approximate Interior Side Slope
3	580	120	10	2.3	7.2	3H:1V

3 Abandonment Procedures

This section describes the lagoon abandonment procedures, including the following:

- Liquids and organic solids removal (completed 2021)
- Initial soil testing (completed 2021)
- In situ soil treatment and testing
- Interim reporting
- Completion report submittal

Most of the lagoon abandonment activities will be performed by Dairy personnel and equipment. Soil confirmation testing, irrigation sensor maintenance, interim reporting, and completion report submittal will be performed by Anchor QEA and Agrimanagement, Inc. The abandonment efforts will be completed consistent with the schedule presented in Section 4.

3.1 Liquids and Organic Solids Removal

Prior to sampling, the liquids and organic solids were removed from the lagoon. Liquids contained within the lagoon were transferred to an in-service, lined lagoon. After liquid removal, organic solids were removed and placed in the composting area. Solids were removed down to the current lagoon soil foundation material. The condition of the lagoon after manure removal is shown in Photograph 1.

Photograph 1
Condition of Lagoon No. 3 in December 2021 Following Manure and Liquids Removal

3.2 Initial Soil Testing

Following removal of the manure, soil testing was conducted within the lagoon to document the ammonia and nitrate concentrations in the subsurface soil. Confirmation testing was conducted at six locations within Lagoon No. 3, including one sample from the lower portion of each sidewall and two samples from the lagoon bottom. Figure 2 shows the actual sampling locations.

Soil sampling from the lagoon interior was performed using the following methods:

1. A backhoe was used to excavate test pits to a depth of 10 feet deep at each testing location. Soil samples were removed with the backhoe bucket at each sampling interval for sampling.
2. Initial soil samples were collected from a depth interval of 0 to 12 inches below ground surface.
3. Subsequent samples were collected at each of nine 1-foot intervals to a depth of 10 feet below ground surface.
4. Sampling personnel recorded the location and depth of each soil sample.
5. After samples were collected, the samples were placed in appropriate containers, and a custody seal bearing the sampler's name or initials and date were placed on the container.

Laboratory analysis of the soil samples was performed by SoilTest Farm Consultants, Inc., a State of Washington-certified analytical laboratory and a North American Proficiency Testing-accredited laboratory located at 2925 Driggs Drive, Moses Lake, Washington. Sample management, packing, shipment, analytical testing, and quality assurance/quality control were consistent with those defined in the *Dairy Facility Application Field Management Plan* (Anchor QEA 2018) as follows:

- Ammonium (as nitrogen) by Western Coordinating Committee S-3.50
- Nitrate (as nitrogen) by Western Coordinating Committee S-3.10

Soil samples were analyzed in a single phase. Results of testing are summarized in Table 2. Results of soil testing demonstrated that ammonia and/or nitrate concentrations in excess of the target level (45 milligrams nitrogen per kilogram [mg N/kg]) were present at depths between 3 and at least 10 feet below ground surface, with an average depth of just over 6 feet. Depths exceeding the target level were greatest for the east and west sidewalls, both of which exceeded the target level at the deepest depths (10 feet below ground surface) sampled.

Table 2
Results of Initial Soil Testing

Station ID	Depth Range (inches)	Nitrate-N (mg N/kg)	Ammonia-N (mg N/kg)	Available N (mg N/kg)	Exceeds 45 mg N/kg?
S-01 (North Sidewall)	**0–12**	147.7	1.7	**149.4**	**Yes**
	12–24	89.5	ND (u)	**89.5**	**Yes**
	24–36	47.7	2.6	**50.3**	**Yes**
	36–48	93.8	3.1	**96.9**	**Yes**
	48–60	18.3	3.6	21.9	No
	60–72	17.3	2.9	20.2	No
	72–84	14.2	3.1	17.3	No
	84–96	28.8	2.6	31.4	No
	96–108	20.3	3.5	23.8	No
	108–120	30.4	3.6	34	No
S-02 (West Sidewall)	**0–12**	26.8	97.5	**124.3**	**Yes**
	12–24	1.0	30.8	31.8	No
	24–36	1.0	23.1	24.1	No
	36–48	1.8	25.0	26.8	No
	48–60	28.5	25.2	**53.7**	**Yes**
	60–72	39.9	1.9	41.8	No
	72–84	51.6	3.3	**54.9**	**Yes**
	84–96	67.0	8.5	**75.5**	**Yes**
	96–108	41.7	ND (u)	41.7	No
	108–120	45.6	7.2	**52.8**	**Yes**
S-03 (East Sidewall)	**0–12**	83.3	ND (u)	**83.3**	**Yes**
	12–24	188.2	ND (u)	**188.2**	**Yes**
	24–36	103.1	ND (u)	**103.1**	**Yes**
	36–48	85.5	ND (u)	**85.5**	**Yes**
	48–60	131.3	4.2	**135.5**	**Yes**
	60–72	56.6	ND (u)	**56.6**	**Yes**
	72–84	44.6	2.3	**46.9**	**Yes**
	84–96	69.5	ND (u)	**69.5**	**Yes**
	96–108	76.7	1.8	**78.5**	**Yes**
	108–120	113.1	2.7	**115.8**	**Yes**

Station ID	Depth Range (inches)	Nitrate-N (mg N/kg)	Ammonia-N (mg N/kg)	Available N (mg N/kg)	Exceeds 45 mg N/kg?
S-04 (South Sidewall)	**0–12**	5.9	67.9	**73.8**	**Yes**
	12–24	ND (u)	81.7	**81.7**	**Yes**
	24–36	ND (u)	61.6	**61.6**	**Yes**
	36–48	2.9	10.7	13.6	No
	48–60	21	21.6	42.6	No
	60–72	1.8	6.0	7.8	No
	72–84	6.6	5.0	11.6	No
	84–96	6.8	6.1	12.9	No
	96–108	3.4	4.5	7.9	No
	108–120	6.9	2.4	9.3	No
B-N (North Bottom Sample)	**0–12**	23.7	251.3	**275**	**Yes**
	12–24	1.9	139.7	**141.6**	**Yes**
	24–36	15.4	128.6	**144**	**Yes**
	36–48	0.8	208	**208.8**	**Yes**
	48–60	ND (u)	20.5	20.5	No
	60–72	4.8	18.5	23.3	No
	72–84	1.1	32.6	33.7	No
	84–96	ND (u)	14.3	14.3	No
	96–108	1.4	10.1	11.5	No
	108–120	0.7	8.2	8.9	No
B-S (South Bottom Sample)	**0–12**	176.8	109.5	**286.3**	**Yes**
	12–24	6.0	92.8	**98.8**	**Yes**
	24–36	24.4	6.6	**31.0**	**Yes**
	36–48	11.2	65.2	**76.4**	**Yes**
	48–60	11.8	118.7	**130.5**	**Yes**
	60–72	45.6	10.3	**55.9**	**Yes**
	72–84	19.8	5.7	25.5	No
	84–96	9.8	5.6	15.4	No
	96–108	21.0	7.8	28.8	No
	108–120	15.4	10.1	25.5	No

Notes:

ND: Not detected

Bolded available nitrogen values exceed the target value of 45 mg N/kg.

3.3 In Situ Soil Treatment

This section describes how nutrients will be extracted from the soils beneath the lagoon using in situ treatment. Soil treatment will be performed agronomically using a combined forage crop including alfalfa and chicory. Alfalfa and chicory were selected to maximize nitrogen extraction rates, particularly from deep soil horizons, and details are provided as follows:

- **Alfalfa:** Alfalfa is a perennial forage crop that is well suited to deep rooting and high dry matter production (resulting in high nitrogen extraction rates). Research has shown that alfalfa can extract nutrients up to a depth of 120 centimeters (approximately 4 feet) within the first year after establishment. Roots can continue to push deeper through Years 2–4 until extraction has been observed up to a depth of 270 centimeters (over 8 feet) (Entz et al. 2001). In addition to crop age, soil and irrigation conditions can affect the depth of rooting. Even though alfalfa can obtain nitrogen for growth via symbiotic nitrogen fixation, it is also very effective in removing inorganic nitrogen from the soil (Russelle 1991). Research shows that alfalfa is an excellent crop for extraction of inorganic nitrogen from soil (Russelle et al. 2001). At a mono-crop yield of 9 tons/acre per year, alfalfa can typically extract nitrogen at a rate of up to 585 pounds nitrogen/acre per year.
- **Chicory:** Chicory is a deep-rooted, broad-leafed perennial that is very drought tolerant and hardy and responds well to higher levels of nitrogen within the soil. It can send roots over 3 meters (over 9 feet) deep within the first 3 months of growth and extend to 4 meters deep (over 13 feet) by Year 2 (Rasmussen 2020). At a mono-crop yield of 5.5 tons/acre per year, chicory can typically extract nitrogen at a rate of up to 185 pounds nitrogen/acre per year (Ditsch and Sears 2007).

As a mixed crop, the nitrogen extraction rate will likely be between 525 and 585 pounds per year. The mixed crop can be managed and harvested together efficiently. The mixing of the two crops is intended not to drive up overall nitrogen extraction, but rather to optimize the following: 1) the rate of extraction throughout the lagoon area; and 2) the removal of nitrogen from deeper soil horizons. The mixed crop can be expected to recover available nitrogen from depths at and below 10 feet. Removal rates can be expected to be highest in the upper soil horizon. Deeper soil extraction will likely increase over time as shallow soil reservoirs are exhausted.

Advantages of the soil treatment approach in comparison to other methods (e.g., soil excavation, export and backfill with clean soil) include the following:

- **Ability to treat all lagoon areas:** The western portion of Lagoon No. 3 is located adjacent to SVID irrigation infrastructure located within an SVID easement. Excavation of nutrient-rich soils would be precluded within this area, whereas in situ treatment is not.

- **Soil conservation:** The in situ treatment approach will not damage the food production value of the existing soils in comparison to an excavation approach and will not require import of clean soil.
- **Lower fuel consumption:** Overall fuel consumption (and associated production of greenhouse gas emissions) will be much lower for the in situ treatment approach in comparison to an excavation and backfill approach.
- **Incidental treatment of soils below the treatment target:** Though not required to complete lagoon abandonment, the in situ treatment approach will be applied throughout the Lagoon No. 3 footprint with the same deep-penetrating crop mix. This means that nutrient extraction will occur in all lagoon areas, even those that currently are below treatment objectives.

The treatment crop will be planted throughout the former lagoon footprint. Agrimanagement will install an irrigation sensor within the former lagoon bottom to help optimize both yields and deep root penetration while minimizing potential downward flux of nitrogen through soil leaching. Deep root penetration is achieved best by establishing a healthy crop and then restricting its moisture to drive roots deeper in a search for water. This restriction must not, however, be excessive or nutrient extraction rates will fall off.

The irrigation sensor will be consistent with those used to monitor shallow soil moisture levels in the existing nutrient application fields at the Dairy. However, the soil sensors will be installed at the following adjusted depths: 1 foot, 3 feet, and 5 feet below ground surface.

Irrigation will be provided as necessary to support optimal crop growth and root penetration. The irrigation will be provided using solid sets or equivalent. Irrigation will follow irrigation needs estimates provided by Agrimanagement. Irrigation records will be maintained to document the dates and duration of irrigation, and these will be summarized in interim annual reports and in the completion report.

Treatment is expected to require between 3 and 4 years to complete. A single planting with multiple harvests each year is expected to be sufficient for soil treatment. The forage mix will be harvested periodically consistent with standard agronomic practices to remove the extracted nutrients from the treatment area.

At the end of an initial 2-year treatment period, soil confirmation testing will be completed using the same locations, depths, and procedures as described in Section 3.2. Sampling shall be repeated adjacent to each of the six initial testing locations. Testing will document soil ammonia-nitrogen and nitrate-nitrogen to depths of 10 feet at each location and will be used to update the expected treatment duration.

If testing confirms that the target nitrogen concentrations have been reached after 2 years, then treatment will be considered complete. If nitrogen concentrations remain in excess of the treatment target, then treatment will be conducted for an additional 1- or 2-year period. The duration will be estimated based on observed nitrogen extraction rates and soil testing data.

Final confirmation testing will be implemented at the end of the 3- or 4-year treatment period. Final confirmation testing will be completed using the same locations, depths, and procedures as described in Section 3.2. Sampling shall be repeated adjacent to each of the six initial testing locations. Testing will document soil ammonia-nitrogen and nitrate-nitrogen to depths of 10 feet at each location and will be used to update the expected treatment duration.

3.4 Interim Reporting

During the treatment period, an interim treatment report will be submitted to EPA following each calendar year. The report will summarize the following:

- Results of soil moisture monitoring
- Crop yield achieved during the calendar year harvests
- Estimated nitrogen extraction rates
- Results of soil confirmation testing (Year 2 only)
- Recommended final treatment duration (Year 2 only)

3.5 Completion Report

Following completion of soil treatment and final confirmation testing, Anchor QEA will prepare and submit a completion report. That report will include the following information:

- A short narrative describing the lagoon abandonment work completed, including a discussion of crop yields and nutrient extraction accomplished during the treatment period
- Copies of construction photographs showing the lagoon after emptying and during soil treatment
- Results of all soil testing
- Results of soil moisture monitoring
- Statement that the closure followed WA NRCS *Conservation Practice Standard 360 – Waste Facility Closure* (WA NRCS 2013a) practices
- Documentation of site conditions following soil treatment

4 Schedule

The abandonment activities described in this plan are partially complete (manure removal and initial soil testing). Crop planting and soil moisture sensor installation will be completed following EPA approval of this plan. Planting will be conducted during spring or fall months. Planting during the summer months is not recommended for crop health and nutrient extraction performance.

Interim reports will be submitted at the end of each calendar year until treatment is complete. The reports will be submitted to EPA by February 15 following the treatment year.

The completion report will be submitted to EPA by February 15 of the year when treatment targets have been achieved as documented through final confirmation testing. The current expected treatment duration is between 3 and 4 years.

5 References

Anchor QEA (Anchor QEA, LLC), 2016. *Final Modified Lagoon Work Plan*. Prepared for Liberty Dairy, LLC/H&S Bosma Dairy. December 2016.

Anchor QEA, 2018. *Dairy Facility Application Field Management Plan*. Prepared for Cow Palace, LLC, George DeRuyter & Son Dairy, LLC/D&A Dairy, LLC/George & Margaret, LLC, and Liberty Dairy, LLC/H&S Bosma Dairy. February 2018.

Chicory Factsheet. https://keys.lucidcentral.org/keys/v3/pastures/Html/Chicory.htm.

Ditsch, D.C., and B. Sears, 2007. *Chicory: Alternative Livestock Forage*. University of Kentucky Extension Service. AGR-190. 2007.

Entz, M.H., W.J. Bullied, D.A. Foster, R. Gulden, and J.K. Vessey, 2001. "Extraction of Subsoil Nitrogen by Alfalfa, Alfalfa-Wheat, and Perennial Grass Systems." *Agronomy Journal* 93(3): 495–503. DOI: 10.2134/agronj2001.933495x

Rasmussen, C.R., 2020. "Uptake of Subsoil Water Below 2 m Fails to Alleviate Drought Response in Deep-Rooted Chicory (*Cichorium intybus* L.)." *Plant Soil* 2020(446): 275–290. DOI: 10.1007/s11104-019-04349-7.

Russelle, M.P., 1991. "The Environmental Impacts of N2 Fixation by Alfalfa. USDA-ARS-Plant Science Research Unit and US Dairy Forage Research Center (Minnesota Cluster)." *Proceedings, National Alfalfa Symposium, 13–15 December 2004, San Diego, CA, UC-Davis Cooperative Extension*.

Russelle, M.P., J.F.S. Lamb, D.W. Elsenheimer, B.S. Miller, and C.P. Vance, 2001. "Alfalfa Rapidly Remediates Excess Inorganic Nitrogen at a Fertilizer Spill Site." *Journal of Environmental Quality* 30 (January-February 2001): 30–36.

Pennington, 2019. Forage Chicory-Cichorium intybus. Pennington Seed Inc. 2019. https://www.pennington.com/all-products/wildlife/resources/forage-chicory-cichorium-intybus

WA NRCS (Washington State Natural Resources Conservation Service), 2013a. *Conservation Practice Standard No. 360 – Waste Facility Closure*. January 2013.

WA NRCS, 2013b. *Conservation Practice Standard No. 590 – Nutrient Management*. December 2013.

Figures

SOURCE: Aerial from Microsoft (Bing) 4/11/2018
HORIZONTAL DATUM: Washington State Plane South, NAD83, U.S. ft

0 600
Feet

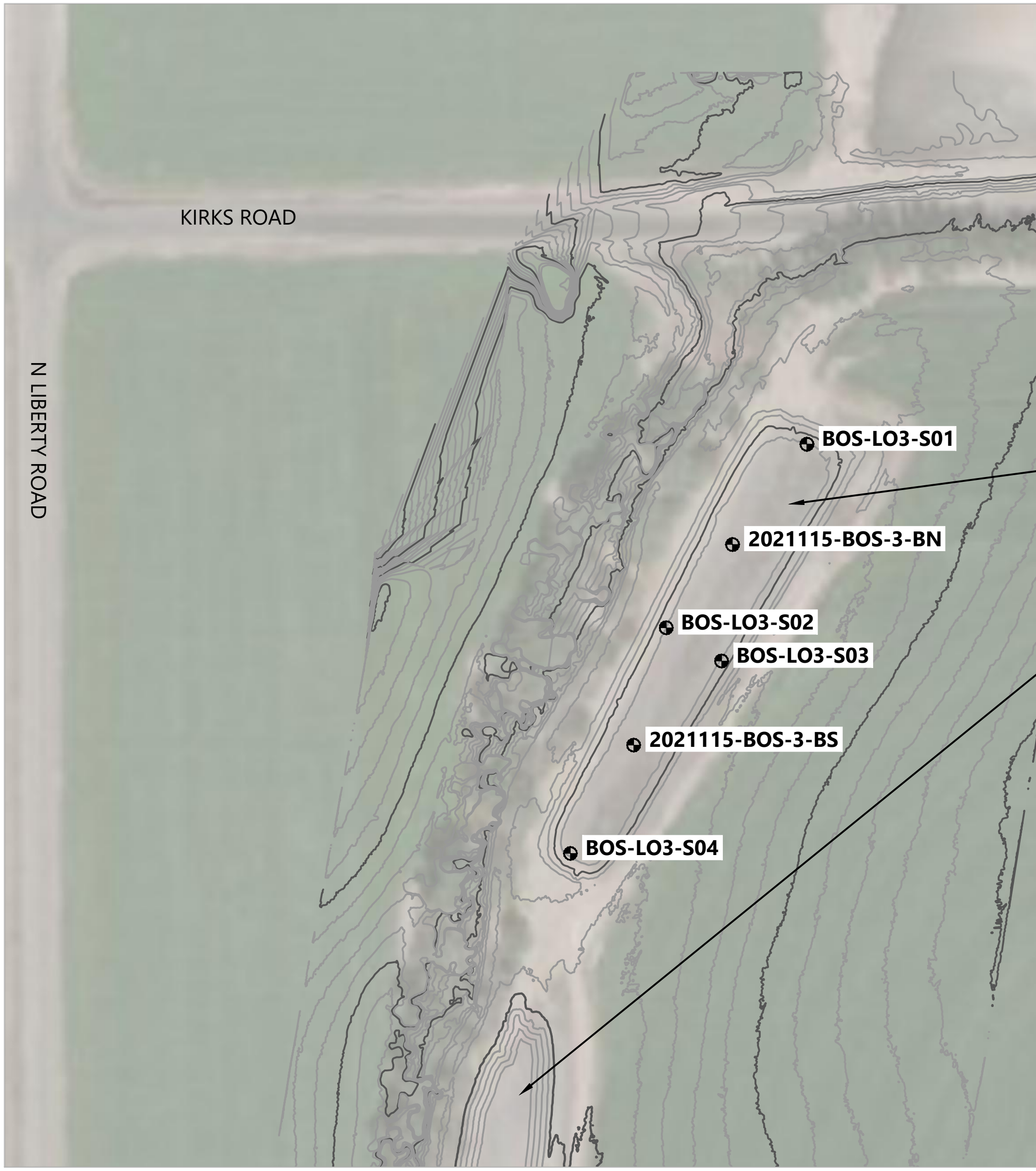
Publish Date: 2021/05/24 10:04 AM | User: jsexton
Filepath: K:\Projects\0996-Perkins Coie\Yakima Dairies Project\Reports\Bosma_1_2_3\0996-RP-001-Bosma.dwg Bosma-1_2_3

ANCHOR QEA

Figure 1
H&S Bosma Dairy Lagoon Map

Lagoon No. 3 Abandonment Plan
H&S Bosma Dairy

DRAFT



NOTE:

1. Existing contours generated from DroneDeply Photogrammetry. Drone topography was not collected by a licensed surveyor and should be used for informational purposes only and not for construction.

LEGEND:

Sampling Location

Drone-Generated Contours

Publish Date: 2021/11/22 1:13 PM | User: rpetrie
Filepath: K:\Projects\0996-Perkins Coie\Yakima Dairies Project\Lagoons - 2021\Figures\0996-RP03-2021 (Bosma 1_2_3_Abandonment)_recover.dwg Figure X

ANCHOR QEA

Figure 2
Sampling Locations

Lagoon No. 3 Abandonment Plan
H&S Bosma Dairy

Exhibit 25

DEC Region	County	Town / City	Farm Name	SPDES ID	Incident Description	CAFO	Non-CAFO	Farm Size	Date of Incident
4	Albany	New Scotland	Hill Top	NYA000576	Complaint of manure stockpile in a field possibly contaminated a private well	X		Medium	29-Mar-14
	Montgomery	Florida	STONY BROOK, INC.	NYA000144	Reported that manure spread on a snow covered field ran off into a neighbor's pond during snow melt	X		Medium	Mar-14
	Montgomery	Root			Reported that manure spread on a snow covered field ran off into a neighbor's pond during snow melt		X		Mar-14
	Montgomery	Palentine			Complaint of possible manure contamination of private well.		X		Mar-14
5	Clinton				Report of manure runoff from a field to a roadside ditch. No discharge to surface water or groundwater has been reported.		X		Mar-14
	Clinton	Beekmantown	Fessette Farm	NYA000313	Pt Au Roche Road, 1 well positive for bacterial contamination, other wells in the area were not impacted. Further investigation showed that the well had a surface connection with water infiltrating around the perimeter of casing	X		Medium	3/27/14
	Clinton	Champlain	Leduc's Green Acres	NYA000086	Reported manure spreading incident near Eden Lane. 6 wells were positive for bacterial contamination.	X		Medium	3/31/14
	Clinton	Champlain	Giroux's Poultry Farm	NYA000460	Same as above	X		Large	3/31/14
6	Oneida	Chadwicks	Collins Knoll Farm	NYA000063	Self reported manure runoff event. No water quality violation	X		Large	3/11/14
	Lewis	Harrisville	"Larry Atkin's Farm"		Complaint of manure runoff to surface water		X		12/27/13
	St. Lawrence	Hermon	Gebarten Acres	NYA001325	Complaint of manure runoff to surface water	X		Large	1/13/14
	Jefferson	Adams Center	Porterdale	NYA000038	Self reported manure runoff event. No water quality violation	X		Large	4/3/14
	Jefferson	Adams	Hy-Light	NYA001459	Complaint of manure runoff to surface water	X		Medium	4/1/14
	Jefferson	Clayton	Woods Farm	NYA000351	Complaint of manure runoff to surface water	X		Large	3/4/14
7	Onondaga	Marietta	Ralph Volles	NYA000548	Report of manure runoff into a neighbor's basement through a window.	X		Large	3/11/14
	Onondaga	Marietta	Ralph Volles	NYA000548	Report of an additional runoff event at this farm	X		Large	3/11/14
	Cayuga	Scipio	Allen Farms	NYA000323	Report of manure runoff and well contamination event including runoff to a tributary of Owasco Lake (drinking water source for the City of Auburn)	X		Large	3/11/14

	Cayuga	Locke	Pine Hollow Dairy	NYA00621	Cayuga County Health Department staff reported ponded manure-contaminated water approximately 100 ft from a private well.	X		Large	3/11/14
	Cayuga	Genoa			ECO observed foam and manure odor in Salmon Creek.		X		
	Cayuga	Venice	Willet Dairy	NYA000002	Reported manure spill from charging drag hose, most contained, some discharged to L. Salmon Ck.	X		Large	5/3/14
	Cortland	Homer	New Hope View Dairy	NYA000636	Reported manure spill during drag line start up due to frozen line. Most contained and cleaned up. Some material entered drainage ditch.	X		Large	3/17/14
	Cortland	Truxton	Whey Street Dairy	NYA000094	Report of manure runoff from frozen field onto neighboring property. Contained, diverted and cleaned up.	X		Medium	3/25/14
	Madison	Canastota	Springwater Farms	NYA000545	Madison County Soil and Water Conservation District responded to a manure runoff event. Runoff was contained. No discharge to surface water	X		Medium	03/20/14
8	Livingston	Caledonia	Stein Family Farms	NYA000241	Manure and septic contamination confirmed for 2 private wells.	X		Medium	2/24/14
	Livingston	Caledonia	D&D Dairy (Stein Family)	NYA000578	Complaint of possible contamination of shallow (26') well with no casing above the ground surface.	X		Medium	3/17/14
	Livingston	Leicester	Thornapple Farms	NYA000242	Reported manure runoff event. No discharge, berms in place to contain runoff.	X		Medium	3/12/14
	Ontario	Seneca Castle	Hemdale Farms	NYA000490	Reported manure runoff event. DER responded and contained	X		Large	3/7/14
	Genesee	Oakfield	Lamb Farms	NYA000123	Reported manure contamination of private wells on Batavia-Oakfield Townline Rd.	X		Large	3/14/14
	Genesee	Oakfield	Lamb Farms	NYA000123	Reported manure runoff incident with impact to a tributary of Oak Orchard Creek.	X		Large	3/7/14
	Monroe				Complaint of manure contamination of private well.				2/28/14
	Steuben	Bath	Leo Dickson and Sons	NYA000178	Discharge of manure from land application. ECO ticket issued to farm for contravention of water quality standards.	X		Medium	3/13/14
	Steuben	Bath	Wilkins Dairy	NYA001520	Complaint of over application of manure, stockpiling of solids and runoff.	X		Medium	12/13; 2/14
	Steuben	Prattsburg	Damin Farms	NYA000121	Complaint of well contamination	X		Large	3/11/14
	Steuben	Prattsburg	Damin Farms	NYA000121	Complaints of manure runoff into Keuka Lake.	X		Large	3/11/14

	Wayne	Wolcott	Merrell Farms	NYA000120	Complaint of manure runoff, manure flowed onto the property of a church, and may have impacted the basement. .	X		Large	3/31/14
9	Wyoming	Perry	Dueppengiesser Dairy Co	NYA000130	Report of manure discharge to Little Beards Creek.	X		Large	Mar-14
	Allegany	Scio			Non-CAFO farm that is not operating under a CNMP made a manure application on a frozen snow covered field, resulting in alleged manure runoff onto a neighboring yard and into their basement and possibly a nearby creek.		X		3/11/14
	Chautauqua	Ellington	Breeze Acres	NYA000248	Failure in manure transfer pipe resulted in discharge of approx. 6,000 gal. to road ditch. Manure was absorbed into snowpack with minimal impact to Clear Creek. Contaminated snow was collected and field applied.	X		Medium	3/12/14
	Cattaraugus	Freedom			Complaint of milkhouse waste runoff into creek		X		unknown
	Chautuauqa	French Creek			Alleged manure lagoon failure and discharge into trib. of French Creek		X		Apr-14

Exhibit 26

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING

JENNIFER M. GRANHOLM
GOVERNOR

STEVEN E. CHESTER
DIRECTOR

April 4, 2008

U.S. Environmental Protection Agency Docket Center
EPA West, Room B102
1301 Constitution Avenue, NW
Washington, DC

ATTENTION: Docket ID No. EPA-HQ-OW-2005-0037

SUBJECT: Revised National Pollutant Discharge Elimination System Permit Regulations for Concentrated Animal Feeding Operations; Supplemental Notice of Proposed Rulemaking

The Michigan Department of Environmental Quality (MDEQ) has reviewed the proposed rule published in the March 7, 2008, Federal Register and has several comments. We appreciate the fact that the U.S. Environmental Protection Agency (USEPA) has attempted to respond to the Waterkeeper Decision, and that the USEPA is contemplating various permitting options to deal with both the decision and the practicalities of permitting concentrated animal feeding operations (CAFO) and protecting the nation's waters.

Self-Certification Process

We strongly recommend that the USEPA withdraw the proposal for the voluntary option for CAFOs to certify that the CAFO does not discharge or propose to discharge. We believe that this option as proposed is seriously flawed. This provision appears to have been advanced by the lobbyists for the factory farms as a self-serving means of exempting factory farms from regulation, contrary to any other sector regulated under the Clean Water Act. Instead, we recommend that the USEPA refocus its efforts on clearly identifying the attributes that will constitute a discharge or proposal to discharge, and how these would be determined. We have this recommendation based on the following:

(1) The proposed rule is contrary to the plain language of the Clean Water Act; not responsive to the Waterkeeper Decision in that it does not define what constitutes a proposal to discharge; sets a minimum design, operation, and management scheme that will not prevent discharge; does not provide a clear defined process for determining when a nonpermitted CAFO must apply for a permit; and has the sole purpose to provide liability protection for those who chose not to enter the permitting process.

The self-certification provision is not needed and serves no purpose other than to provide a safe haven for CAFOs that will likely discharge but do not want to apply for a permit. CAFOs should have to decide either to obtain a permit and thus obtain the liability protection for duty to apply that goes along with being permitted; or not obtain a permit and take their chances with the compliance/enforcement actions that may follow a discharge. It is unfair to those CAFOs that do obtain permits to give the same liability protection to those that simply decide to self-certify.

The self-certification process, through the liability protection from the duty to apply, would make it much more difficult to compel CAFOs that have had a discharge or discharges to take the appropriate steps to correct the problems that lead to the discharges. This would be further complicated by the lack of any requirement for self-certified CAFOs to report discharges and a three day period to simply report that they no longer met the certification requirements, which would result in most discharges being dissipated before the agency even knew about them. Also, as written, the certification and recertification process after a discharge would encourage a discharging CAFO to maximize its illegal discharge to acquire more operating capacity to provide time to "correct" a noted problem and then recertify in lieu if obtaining permit coverage.

The immunity from the duty to apply provision is most likely not legal, except to the extent that the USEPA desires to exert enforcement discretion, because it is in conflict with the Clean Water Act. Notably, the immunity from the duty to apply provision is only mentioned in the preamble and is not a part of the regulation *per se.* In fact, we find no authority in the Clean Water Act that allows the USEPA to establish a self-certification process in lieu of a permit for dischargers, let alone to arbitrarily establish such a process for a select group of dischargers contrary to how all other dischargers are regulated. This proposal, if enacted, would undoubtedly result in additional litigation and the resulting confusion that it would bring. This provision also attempts to negate the citizen rights to sue provisions of the Clean Water Act by eliminating a statutory provision by administrative regulations.

The proposed USEPA criteria to be used to determine if a CAFO qualifies for the self-certification are not detailed enough to be useful in specific situations. The criteria need to be much more specific and established by appropriate state or similar regions. Michigan has established criteria in national pollutant discharge elimination system permits for CAFOs with discharges, but the criteria are much more specific than the proposed criteria, and are more specific to the particular conditions in Michigan. It is unlikely that the proposed USEPA criteria will serve any meaningful test to certify that there is no discharge; instead, these criteria will only show that the discharges are less frequent.

The USEPA frequently uses the phrase "in an unlikely event of a discharge from a certified CAFO." We do not agree that such a discharge would be "unlikely." Michigan's experience is that virtually all CAFOs with lagoons and/or land application have discharges. In fact, in administering the CAFO program in Michigan for about 200 CAFOs, we have found that only about five percent of the CAFOs can be determined to have No Potential to Discharge. Michigan has received 17 requests for a no potential to discharge determination. Of these, nine have been determined to meet this determination; however, four other CAFOs who thought they had no discharge were found to be discharging at the time of inspection. To date, the CAFOs in Michigan determined to not discharge are those that are not proximate to surface waters, have their CAFO waste sheltered from the elements (either under barn or in dry storage), and have particularly well managed facilities. Even these situations must be carefully assessed on a facility specific basis, as we have found some operations that met these criteria, did in fact have a discharge. For one such poultry CAFO with dry manure stored inside and no land application, we documented a discharge twice in one month as a result of exhaust of dust and subsequent storm water run off, with high pollutant concentrations in the discharge (especially biochemical oxygen demand, *E. coli* and ammonia). This serves to point out the difficulty of CAFOs self-certifying that they will not discharge, particularly without very specific criteria to use in making the evaluation.

The proposed certification process essentially gives CAFOs a license to discharge with no consequences, and ties the hands of enforcing agencies. The self-certification process also creates a significant work load for the states without any commensurate additional environmental protection. The burden of handling all of the additional paperwork associated with the certification would be substantial. In addition, considerable additional resources would be required to determine if each facility was actually in compliance with their certification and whether there were discharges or not. The only apparent result of finding a facility not in compliance with their certification or having a discharge would be for the facility to "fix" the problem causing the discharge and then to reapply for a new certification.

In addition, the certification process eliminates the ability of the public to comment on the appropriateness of certifying a facility. Often public comment can be valuable in identifying CAFOs that have had discharges.

This proposal will severely undermine the efforts of those states that have implemented programs to adequately regulate CAFOs. The USEPA has encouraged states to do this in the interim time period between the Waterkeeper Decision and the final promulgation of regulations consistent with that decision by the USEPA. Despite the argument that the USEPA will make that the states are free to implement requirements more restrictive than the federal requirements, the reality is that the states will be under increasing pressure to change their requirements to be "consistent with" the federal requirements. This would result in not only significantly reduced effectiveness of controlling pollution from CAFOs, but also a waste of scarce state resources in the effort to redo their regulations.

If the USEPA persists in this wrong headed effort to have CAFOs self-certify, we recommend the following modifications to at least mitigate some of the worst features of the proposal. However, we must note that even with these changes we find the provision inadequate, contrary to law, and not protective of the environment and public health:

A. All documents related to the certification should be signed by a registered engineer (for structural issues) or a National Resource Conservation Service (NRCS) certified technical service provider (for other Comprehensive Nutrient Management Plan [CNMP] issues).
B. Any Nutrient Management Plan (NMP) developed for certification must not only meet NRCS standards but also any standards or conditions established by states that permitted CAFO's must comply. The CAFO must also specifically certify to this fact.
C. The rule needs to define what constitutes lands "under the control" of the CAFO.
D. The rule needs to clearly state that before a CAFO could be certified, it must have in place and operating all required elements of the design, operation

and maintenance plan, and the NMP. A certification cannot be "conditional" based on a schedule.

E. The rule needs to provide that the certification is null and void if the permitting authority finds that a certified CAFO has or has had a discharge, does not have required records onsite or available, or in any way is not in conformance with the certification conditions.
F. The proposed rule states that if the conditions at a certified CAFO change, the CAFO "should" make the necessary adjustments to accommodate the changes. This duty should be a mandate. The word "should" needs to be changed to "shall."
G. The certification statement has 5 conditions. Condition 5 should be changed to include, "an official signature that.....make the CAFO legally responsible for its representations to the Director regarding the design, construction, operation and maintenance of the CAFO ***and the NMP."***
H. Add a requirement for the certified CAFO to notify the permitting authority whenever a change is made to certifying documents, procedures, or designs.
I. All documents related to the certification should be submitted to the Director and available to the public.
J. A CAFO that has had, or has a discharge should not be eligible for certification or re-certification.
K. A certified CAFO that has had a discharge should be required to report that discharge to the Director immediately, but no later then 24 hours. The report must detail the date, time, volume, duration of the discharge, what actions were taken to minimize the discharge, and the cause of the discharge.
L. The immunity from the duty to apply should be eliminated from the proposed regulations.

(2) The use of CNMPs alone to control discharges is not acceptable. In Michigan, we have found that CNMPs similar to the NRCS CNMPs are not sufficient to prevent discharges to surface waters. Also, CAFOs with such CNMPs tend to ignore their CNMPs unless there are specific permit requirements associated with these documents. As such, using CNMPs without associated permit requirements will likely result in improper waste, management, and subsequent discharges.

Instead of self-certification by CAFOs, the USEPA should establish criteria as to what constitutes a discharge. This would include using information that clearly shows discharges occur with lagoons and land application of CAFO waste if there are surface waters nearby. The proximity of surface waters would be a clear criterion for this determination.

(3) The self-certification program should be withdrawn. CAFOs are like other discharges associated with wet weather, such as combined sewer overflows, municipal separate storm sewer system overflows, and industrial storm water discharges. These discharges are inherently different than continuous point sources, like publicly owned treatment works. Wet weather discharges only occur during certain precipitation or snowmelt events, which are uncontrollable. This country has a relatively long history of dealing with continuous point sources, but a relatively short history with wet weather discharges. As such, we do not have a strong technical development of necessary controls and/or numerical effluent limits for wet weather discharges.

Nor do we have a strong understanding on how and when discharges occur. As such, when dealing with wet weather facilities, a strong understanding of when and how discharges occur is needed before deciding to allow a "self-certification" program that discharges do not occur. We sincerely doubt that the USEPA has such an understanding in regards to CAFOs, and in particular doubt that this has been developed with any rigor for the entire United States. Therefore, we have no confidence in the proposed "self-certification" program, and strongly recommend that it be withdrawn at this time.

Terms of the Nutrient Management Plan

We believe that the three prong approach described in the Preamble has merit. However, it is impossible to thoroughly comment on this issue without having actual draft regulations. We request that the USEPA not act on these rules until such time that the actual draft regulations covering this topic have been public noticed and an opportunity for public comment provided.

We appreciate the opportunity to comment. If you have any questions on these comments, please contact Mr. William Creal, Chief, Permits Section, Water Bureau, at 517-335-4114, or you may contact me.

Sincerely,

Richard A. Powers

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Water Bureau
517-335-4176

cc: Mr. Jim Sygo, Deputy Director, MDEQ
Mr. James K. Cleland, MDEQ
Mr. Frank Baldwin, MDEQ
Mr. William Creal, MDEQ
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