



REPORT

CAFOS: WHAT WE DON'T KNOW IS HURTING US



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Table of Contents

Introduction	4
The Existing Regulatory Regime	6
CAFOs and Their Pollution	6
Manure Management	7
Impact on Communities	7
Monitoring	10
The CAFO Data Void	10
Research Methodology	11
What We Found (and Didn't Find)	11
Conclusion	13
Transparency Table	15
Methodology	16

Introduction

Corporate livestock facilities, known as concentrated animal feeding operations (CAFOs), threaten the health of communities and pollute the air and water.¹ CAFO-related pollution is more than a nuisance; it is dangerous. Manure from CAFOs contains more than 150 pathogens that have the potential to contaminate water supplies, while fumes and particulate matter elevate rates of asthma, lung disease, and bronchitis among farm workers and people living nearby.^{2,3} Nitrates from animal manure poison drinking water sources and contribute to epic dead zones in sensitive aquatic habitats.⁴ Confining large numbers of animals in close proximity requires routine antibiotic regimens, and this, in turn, exacerbates the global crisis of antibiotic resistance.⁵

The animal agriculture industry comprises hundreds of thousands of individual animal feeding operations (AFOs)—facilities that raise animals in confinement.⁶ CAFOs are a subset of AFOs distinguished by their large size or their designation as significant polluters of surface waters.⁷ CAFOs have become more prevalent as part of a decades-long trend of corporate consolidation and vertical integration across the livestock industry. Today the pork, broiler chicken, and beef sectors are all “highly concentrated” in the hands of three or four companies that exercise enormous market power—and control the practices used across these facilities.⁸

This power extends to the regulatory sphere as well. Although the Clean Water Act requires the U.S. Environmental Protection Agency (EPA) to regulate CAFOs, pressure from the corporate livestock industry led to a series of dubious administrative and court decisions in the 2000s that raised serious concerns about the EPA’s willingness and capacity to effectively carry out this responsibility.⁹

A decade ago, the nonpartisan Government Accountability Office concluded that the EPA could not fulfill its regulatory duties under the Clean Water Act without accurate and facility-specific information about CAFOs.¹⁰ The EPA, for its part, has admitted that “unlike many other point source industries, the EPA does not have facility-specific information for all CAFOs in the United States.”¹¹

This report and the accompanying resources are the culmination of NRDC’s decadelong effort to understand just how much—or how little—the EPA knows about the



animal agriculture industry that it is supposed to regulate. Fearing that the EPA lacked even basic information about CAFOs—their location, how many animals they confine, how much waste they produce, and how they dispose of that waste—in 2010 NRDC and other environmental organizations reached an agreement with the EPA, which was designed to collect the missing data needed to start cleaning up our waterways and protecting public health from CAFO pollution.¹² When that effort stalled under industry pressure in 2012, NRDC turned to compiling available data using Freedom of Information Act requests and public databases (see “The Search for CAFO Data”).

THE SEARCH FOR CAFO DATA

When the EPA's effort to survey CAFOs stalled under industry pressure in 2012, the agency claimed it could get the information it needed from existing sources.¹³ Skeptical of this claim, NRDC filed Freedom of Information Act (FOIA) requests to discover how much information regulators actually had.

To comply with NRDC's FOIA request, in early 2013 the EPA released records to NRDC on CAFOs, including information that the EPA had collected from individual states.¹⁴ After the EPA's compliance, industrial livestock interests went on the attack. A lawsuit filed by the American Farm Bureau Federation and the National Pork Producers Council in the summer of 2013 challenged the EPA's decision to release this public information.¹⁵ The corporate livestock industry also sought to shut down the release of any state-gathered information received by the EPA since its initial response, and to prevent the EPA from releasing data in response to future FOIA requests for updated information.

A federal district court dismissed the case in 2015 after ruling that the industry groups did not have standing.¹⁶ On appeal in 2016, however, the Eighth Circuit sided with agribusiness, the court finding that certain information about animal agriculture facility operators fell under a FOIA provision exempting the release of "personnel and medical files and similar files" if disclosure "would constitute a clearly unwarranted invasion of personal privacy."¹⁷ The circuit court sent the case back to the district court to decide whether the EPA had the authority to release this information at its own discretion. The parties settled before the case was resolved, as discussed below.¹⁸

While the livestock industry was fighting to keep important information under wraps, NRDC undertook the monumental task of compiling and organizing the revised data it had received from the EPA and supplementing that information with additional information gleaned from publicly available databases on state websites.¹⁹ The process of developing the database ran from 2013 until 2016, spanning the same period as the litigation over the FOIA requests. Although the database was completed in 2016, NRDC held out hope that it would be able to update the database using more recent and complete data released by the EPA after the litigation concluded. However, in 2017, under former EPA administrator Scott Pruitt, the EPA signed a settlement agreement with industry groups severely limiting the scope of any future information releases.

As a result, some of the data used in this report date to 2013 or even earlier, depending on when they were gathered. In many cases they are old and incomplete, but they are the best that NRDC is aware of—and that is exactly the problem. Unfortunately, given the Eighth Circuit's decision and the subsequent settlement agreement, the data from the EPA, despite their numerous limitations, are likely more comprehensive than anything the agency will release in the foreseeable future. After years of uncertainty about the EPA's intentions, NRDC decided to move forward in the knowledge that it already had the best data it could get.

Analysis of these records shows pervasive gaps in the data about the size, type, and location of CAFOs and the pollution control measures they are using. NRDC found at least some data on 7,595 CAFOs in 40 states. That leaves more than half of the 17,000-plus CAFOs the EPA estimated to exist in 2012 completely unaccounted for in the agency's own data.²⁰ Further clouding the situation, NRDC's analysis suggests that the EPA may have significantly underestimated the number of CAFOs and that the true number of undocumented operations is even higher.

Drilling into the existing data reveals stark disparities among the states. NRDC found no information for nine states that the EPA determined housed CAFOs. Where data were available, both the quantity and nature of the data were highly variable from state to state. States are responsible for collecting information and reporting it to the EPA, but there is no standardized collection or reporting requirement. Moreover, many states that appear to have an accurate count of the number of CAFOs nonetheless lack critical data about operations' size, permit status, location, method of storing manure, animal type, and ownership. Regulators and the public need this information to protect communities from CAFO pollution and hold the agriculture industry accountable for its impacts under the law.

States have the opportunity to fill the CAFO data void. Toward that end, NRDC has created a Clean Water Act permit based on some of the better approaches in several states and lessons learned from developing this report. The permit would allow states to collect and share critical data on the CAFOs within their borders. The permit would also improve public accountability by making information more available. It would require all but the smallest AFO facilities to obtain a permit, inform neighbors about their operations, and disclose their location and nutrient management plans to the state, the EPA, and the public. NRDC's permit would clarify that every CAFO's nutrient management plan—which enumerates the permit holder's responsibilities for handling animal waste—is a public record that communities have a right to understand and enforce. Finally, the permit would expand notice requirements so that neighbors are fully informed when a new CAFO wants to open down the road, or when existing operations are planning to expand, thereby increasing their production of waste.

It is time for states to step up where the federal government has failed. This report shows how the EPA's acquiescence to industry demands leaves the agency in the position of knowing little about the facilities it is supposed to hold accountable. Given the dangers posed by CAFO pollution, what the EPA doesn't know can hurt all of us.

WHAT IS A CAFO?

CAFOs are livestock farms distinguished by their large animal population or their significant contribution to water pollution, or both. CAFOs are a subset of Animal Feeding Operations (AFOs) as defined by the Clean Water Act. An AFO is a “lot or facility” where animals are confined and fed for at least 45 days per year, and where the confinement takes place on a surface other than pasture or vegetated ground.²¹ Whether an individual facility is designated as a CAFO is often at the discretion of individual state regulators. CAFO status can be determined purely by size, if the number of animals meets specific thresholds set out in federal regulations, with the number depending on the type of animal being confined—e.g. hogs, cattle, or chickens.²² However, an AFO can also be designated as a CAFO if it is discharging animal waste into surface waters, either directly or via a man-made channel, to the extent that regulators determine it is “a significant contributor of pollutants to waters of the United States.”²³

THE EXISTING REGULATORY REGIME

The Clean Water Act (CWA) is the primary law regulating the pollution of U.S. waters, including rivers, lakes, and wetlands.²⁴ The law, passed in 1972, requires that all “point sources” discharging pollutants be subject to permitting requirements under the National Pollutant Discharge Elimination System (NPDES).²⁵ These permitting requirements set strict discharge limits intended to help eliminate pollution in waterways by 1985.²⁶ The Act is enforced primarily by the EPA and through cooperative federalism with the states.²⁷

Since the original Act, the definition of “point source” has included “concentrated animal feeding operation[s].”²⁸ Despite this very clear language, actual regulation of CAFOs under the CWA started slowly. In 1974, the EPA issued water-quality protection rules called effluent limitation guidelines (ELGs) for feedlots, which are a specific subset of AFOs used for finishing livestock prior to slaughter.²⁹ Substantial exemptions excluded smaller facilities, those that discharged only under extreme storm conditions, and chicken operations with dry-manure handling systems.³⁰ Though all exemptions for point sources were struck down soon after in federal court, the newly formed EPA designated CAFOs as a “low enforcement priority” in light of other pressing environmental challenges facing the new agency; regulation was largely left to the states, with limited federal oversight.³¹ This arrangement left certain states with standards that fell well below the requirements imposed by federal law. With little oversight from the EPA, some states with high numbers of CAFOs simply ignored their duty to issue permits well into the 2000s.³²

Congress exacerbated this passive regulatory approach when, in 1987, it amended the CWA to exempt “agricultural

stormwater discharges” from the statutory definition of a point source.³³ A stormwater discharge occurs when rain washes contaminants off a surface and into waterways. Since it is common to apply CAFO manure directly to the surface of agricultural fields, the amendment made it harder to regulate industrial livestock operations. Despite evidence that the amendment was not intended to impact how preexisting regulations applied to CAFOs, these operations began claiming coverage under the exemption.³⁴

The EPA addressed this and other issues in 2003 when, in response to a lawsuit brought by NRDC and Public Citizen, the agency finalized its first comprehensive rule governing CAFO regulation under the CWA.³⁵ This rule—the high-water mark in federal CAFO regulation—obligated all CAFOs to apply for an NPDES permit unless they could demonstrate that they had “no potential to discharge” pollution. However, a federal court disagreed that the CWA supported such an obligation and struck down that element of the rule.³⁶ (The rule also included standards relating to manure handling, nutrient management plans, and facility design.) In response, the EPA released a new rule in 2008 that limited the permitting obligation to CAFOs that “propose to discharge,” but even that circumscribed requirement was struck down.³⁷ The EPA’s 2012 CAFO rule then cemented the loophole by officially exempting from permitting requirements any CAFO that was not actively discharging.³⁸

The 2003 rule contained an important additional loophole as well. It specified that discharges from CAFOs qualified as exempt “agricultural stormwater” if they were precipitation-related discharges from the land application area (rather than the production area) and if manure had been “properly” applied.³⁹ A 2013 district court decision made matters worse. It held that even discharges from the production area were covered by the exemption, contradicting decades of case law.⁴⁰ Such discharges include manure, litter, and feathers blown out of poultry houses by a ventilation system. The EPA appealed the decision but later dropped its appeal while maintaining the position that it could require a permit for such discharges in the future.⁴¹

CAFOs AND THEIR POLLUTION

A relentless tide of consolidation has swept across animal agriculture over the past half century.⁴² As technological advances allowed farmers to raise huge numbers of fast-growing animals in close quarters, large industrial operations proliferated while small farms struggled and generally failed to compete on the industry’s new terms.⁴³ This rise in consolidation and the growth of CAFOs go hand in hand.⁴⁴

CAFOs are tailored to produce vast quantities of meat, eggs, and dairy that can be sold to consumers at low prices. For example, Americans pay only about \$1.50 for a pound

of fresh chicken, something made possible by facilities that raise tens of thousands of birds in a single building and take advantage of breeding and feeding refinements that allow chickens to reach slaughter weight in about six weeks.^{45,46} However, these low consumer prices hide the true costs of production.⁴⁷ Supermarket prices do not account for the fact that the public heavily subsidizes CAFOs, including manure management and feed costs, through the United States' vast system of agricultural price supports and subsidies.⁴⁸ And supermarket prices do not reflect the environmental and human health costs of CAFOs, which can threaten neighboring communities, pollute waterways, and exacerbate antibiotic resistance. Neither the market nor existing safeguards compel CAFOs or the big businesses that operate them to cover those costs.⁴⁹

MANURE MANAGEMENT

A CAFO raising 82,000 laying hens can produce 2,800 tons of manure in a year, and a single CAFO raising 10,000-head of beef cattle can produce up to 117,000 tons of manure annually.⁵⁰ How animal manure is handled, stored, and disposed of affects human and environmental health, but practices vary widely across facilities. "Handling" is the process of getting manure from the facility floor into some kind of storage container, where it sits until it is "disposed." Dry manure handling systems, which are commonly used in poultry operations, release substantial amounts of nitrous oxide and particulate matter into the air.⁵¹ In contrast, wet handling systems, most commonly found on swine and dairy farms, use water to wash manure into storage structures or lagoons, where it releases methane and hydrogen sulfide as it is anaerobically digested.⁵² Wet systems can also attract and breed insects, contributing to mosquito and fly problems in communities, and research indicates that leakage from wet storage lagoons can contribute to increased concentrations of nitrate, ammonium, bacteria, and other contaminants in groundwater.⁵³

Storing such vast quantities of manure presents one set of problems; disposing of it is another matter entirely. There are no sewage treatment requirements for animal manure, in stark contrast to the requirements that apply to human waste management, and the majority of manure from CAFOs is never treated.⁵⁴ Instead, CAFO waste is generally disposed of on land in solid, slurry, or liquid form, depending on the type of animal and the practices of the individual facility.⁵⁵ There are several ways to dispose of manure on land, but among the least expensive and most common is applying it directly on top of soil as fertilizer.⁵⁶ Manure is an important source of natural fertilizer, but given the immense volumes of manure generated at CAFOs, facilities often apply it in concentrations that far exceed the nutrient requirement of their crops or the holding

capacity of the underlying soil.⁵⁷ This nutrient overloading commonly causes contaminants to leach from manure into groundwater, or to run off into streams and rivers after a heavy rain.⁵⁸

Although Clean Water Act regulations place some restrictions on manure application within the boundaries of the CAFOs themselves, these do not extend to the application of manure that is shipped off-site.⁵⁹ And in some areas of intensive CAFO farming, like Maryland's Eastern Shore, facilities ship up to 85 percent of their manure off-site where federal rules no longer regulate its application to open fields.⁶⁰

MARYLAND'S MANURE PROBLEM

A 2014 analysis by the Environmental Integrity Project found that poultry operations on Maryland's Eastern Shore spread three times more manure on agricultural land than crops planted there could reasonably use.⁶¹ The study examined records from 62 poultry operations across five counties—a fraction of the 404 poultry operations that raised nearly 218 million chickens in those counties in 2012.⁶² These 62 operations alone applied 482,000 pounds of phosphorus, contained in chicken manure, in a single year.⁶³ The excess nutrients run off into nearby streams and then into the ecologically fragile Chesapeake Bay, where the phosphorus and nitrogen fuel algal outbreaks that can make the water uninhabitable for fish and blue crabs.⁶⁴ Outbreaks of cyanobacteria, in particular, have increased in the Chesapeake Bay, and these can damage not only ecosystems but also human health.⁶⁵

The pollution, from CAFOs as well as other point sources, grew so bad that in 2010, after decades of failed efforts to clean up the bay and the surface waters that feed into it, the EPA put the Chesapeake Bay on a "historic and comprehensive 'pollution diet.'"⁶⁶ The plan set pollution limits, known as a total maximum daily loads (TMDLs), on nitrogen, phosphorus, and sediment within the Chesapeake Bay Watershed.⁶⁷ There are signs that the diet is working: The overall health of the Chesapeake Bay ecosystem is the best it has been in decades, improving from "moderately poor" in 2010 to "moderate" in 2017.⁶⁸ However, meeting the EPA's goal of restoring full ecosystem health by 2025 will require further steps to rein in CAFO pollution across the Chesapeake Bay Watershed.

IMPACT ON COMMUNITIES

From what we know, CAFOs tend to be located near populations that lack the political clout to successfully oppose their construction.⁶⁹ Thus, low-income and minority populations suffer disproportionately from proximity to CAFO pollution and waste.⁷⁰ Localized harms include impaired drinking water, antibiotic resistance, air pollution, and waste spills and associated fish kills.

IMPAIRED DRINKING WATER

CAFOs can pollute local water on a massive scale. According to an analysis of EPA records, “the drinking water of millions of Americans living in or near farming communities across the country is contaminated by dangerous amounts of nitrates and coliform bacteria from fertilizer and manure widely used in agriculture.”⁷¹ Tens of thousands of times, nitrate and coliform levels have exceeded the federal limits on contaminants in public water systems set by the Safe Drinking Water Act (SDWA).⁷² CAFOs contribute much of this contamination: Both the EPA and the National Cancer Institute trace human health hazards associated with elevated nitrate levels in drinking water to animal waste.⁷³

SDWA regulations limit nitrate concentrations to 10 parts per million in municipal drinking water.⁷⁴ Regulators chose this limit to protect infants from blue baby syndrome, a potentially fatal condition that prevents blood from carrying sufficient oxygen.⁷⁵ However, nitrate levels at even half the legal limit increase risk for colon, kidney, ovarian, and bladder cancers in otherwise healthy adults.⁷⁶ Rural residents located near CAFOs are particularly vulnerable because many rural residents draw water from private wells, which are not covered by the SDWA.⁷⁷ About 4 percent of private wells in the United States have nitrate levels above the SDWA standards, and that number is much higher in farming communities.⁷⁸

In addition to nitrates, animal manure is a significant source of pathogens that flow or leach into drinking water sources. More than 150 pathogens are found in animal manure.⁷⁹ Six of these, *Campylobacter*, *Salmonella*, *Listeria*, *E. coli O157:H7*, *Cryptosporidium*, and *Giardia*, account for 90 percent of all human foodborne and waterborne diseases.⁸⁰ Though healthy people who are exposed to these pathogens often recover after a bout of diarrhea, more vulnerable groups like infants, pregnant women, the elderly, and those with weak immune systems are at risk of severe illness and death.⁸¹

ANTIBIOTIC RESISTANCE

As industrial animal facilities increasingly rely on antibiotic drugs to suppress disease in their facilities, microbes begin to develop immunity—meaning that the drugs that we depend on to treat serious human infections become less effective. Experts from the World Health Organization (WHO) and the Centers for Disease Control and Prevention (CDC) identify antibiotic resistance as one of the top public health threats in the world.⁹⁰ According to the WHO, “Antimicrobial resistance threatens the effective prevention and treatment of an ever-increasing range of infections caused by bacteria, parasites, viruses and fungi.”⁹¹

In 2017, producers fed their cattle, pigs, and poultry over 12.3 million pounds of antibiotics that are “medically important,” meaning they are extremely similar or identical to antibiotics that humans depend on to combat infection.⁹² CAFOs routinely feed low doses of antibiotics to animals that are not yet sick in order to prevent disease, a need that arises from the dirty and stressful conditions of close confinement.⁹³ While the antibiotics will kill some bacteria, resistant bacteria remain in the gut, multiply, and are excreted in manure—along with substantial amounts of the antibiotics themselves—and enter the surrounding community’s air, soil, and water.⁹⁴ When antibiotics-laden runoff from CAFOs spills into the surrounding environment, these drugs further promote antibiotic resistance and can also be toxic to soil microflora and fauna.⁹⁵ The problem stretches to meat products as well: A 2015 analysis found that antibiotic-resistant bacteria were present in approximately 35 to 80 percent of raw meat from the supermarket.⁹⁶

AIR POLLUTION

CAFOs can also threaten local air quality by releasing ammonia, hydrogen sulfide, and other gases and particulate material into the atmosphere.⁹⁷ For instance,

GROUNDWATER IN KEWAUNEE COUNTY, WISCONSIN

In Kewaunee County, Wisconsin, which has experienced a substantial increase in the number of CAFOs over the past two decades, a 2017 study found fecal microbes in 60 percent of sampled wells.⁸² Researchers estimated that one of those microbes, *cryptosporidium*, was infecting 140 county residents each year.⁸³ *Cryptosporidium* symptoms include diarrhea, dehydration, stomach cramps, and vomiting.⁸⁴ In October 2014, local environmental groups petitioned the EPA to use its powers under the Safe Drinking Water Act to investigate the sources of the groundwater contamination—which in some cases was turning people’s tap water brown—and to order alternative water supplies be made available to Kewaunee County residents.^{85,86} In May 2017, under continuous pressure from residents and advocates, the state began supplying bottled water to residents whose wells tested positive for bacteria from livestock manure.⁸⁷ In a ruling on a separate petition filed by local residents opposing removal of certain clean water protections from a state permit issued to a dairy CAFO, Administrative Law Judge Jeffrey Boldt noted that “the proliferation of contaminated wells represents a massive regulatory failure to protect groundwater” by the Wisconsin Department of Natural Resources, the state permitting authority.⁸⁸ Since the ruling, the petition has been wending its way through the appeals process; in January 2019 the case reached the Wisconsin Supreme Court, which must now decide whether to consider the state’s claim that it lacks authority to implement commonsense requirements such as groundwater monitoring at manure-spreading sites.⁸⁹



it has been estimated that the average broiler chicken emits between 0.27 and 0.54 grams of ammonia each day in its manure.⁹⁸ These seemingly small numbers add up: An average broiler facility raising 90,000 birds at a time may release more than 15 tons of ammonia a year, causing respiratory problems and chronic lung disease as well as chemical burns to the respiratory tract, skin, and eyes of nearby residents.^{99,100} Ammonia, in particular, also contributes to algal outbreaks in nearby bodies of water.¹⁰¹ Algae outbreaks disrupt oxygen availability, creating dead zones devoid of aquatic and marine life.¹⁰² In some cases, the algal blooms are themselves toxic.¹⁰³

The release of hydrogen sulfide and toxic particulate matter can be equally damaging, with devastating impacts on workers and neighboring residents, particularly children.¹⁰⁴ As many as 30 percent of industrial livestock farmworkers experience occupation-related asthma and chronic bronchitis.¹⁰⁵ Asthma rates are higher among children living near animal operations: One study found that 46 percent of children living on large swine farms (500-plus swine) had asthma, compared with 26 percent of those living on farms without livestock.¹⁰⁶ Beyond asthma, lengthy exposure to the particulate matter and gases can have other deleterious effects including lung disease and heart attacks.¹⁰⁷ Odors from these emissions can also harm a community's quality of life, preventing people from spending time outside and even, according to some studies, impacting mental health.¹⁰⁸

SMITHFIELD FOODS AND NORTH CAROLINA

The CAFO construction boom began in North Carolina in the 1970s and took off in the 1980s after a series of state laws eliminated sales tax on swine farm equipment and preempted local officials from using zoning powers to limit swine facility construction.¹⁰⁹ Today, North Carolina's approximately 2,500 permitted swine operations raise about nine million animals at any given time, with some individual facilities capable of housing up to 60,000.¹¹⁰ A series of cases brought by neighbors against Smithfield Foods, a swine producer with operations in North Carolina, allege that the facilities' excessive odors, flies, and noise from truck traffic interfere with nearby residents' use and enjoyment of their property.¹¹¹ The CAFOs at the center of the lawsuit are disproportionately located in low-income black communities that lacked the political power to resist their construction.¹¹² Thus far, juries in four trials have awarded 26 plaintiffs more than half a billion dollars in combined damages, and 22 suits involving another 500 or so residents are still pending.¹¹³ However, this important moment in holding facilities accountable looks to be short-lived: A judge has already substantially decreased several of the awards based on a state law limiting punitive damages.¹¹⁴ To further shield Smithfield, the North Carolina legislature recently passed legislation—over the governor's veto—limiting plaintiffs' ability to bring similar suits in the future.¹¹⁵

SPILLS AND FISH KILLS

Although CAFOs can cause significant environmental risks even when all goes according to plan, unforeseen events or errors can compound the problems, causing manure to leak or spill into surrounding ecosystems. These leaks and spills can have a number of causes, including accidents during transport of manure, willful discharges made in an effort to avoid regulatory requirements, leaking lagoons, and rainstorms that cause storage containers or lagoons to overflow or burst. The sheer scope of the spillage can be staggering: The Wisconsin Department of Natural Resources determined that more than three million gallons of manure were spilled in the state in 2013 and 2014.¹¹⁶ With so much waste in one place, a single mistake or a single unethical operator can wreak havoc on neighboring communities.

CAFO spills are a common cause of fish kills. In 2017, three large spills killed close to 67,000 fish in Ohio.¹¹⁷ Other states have dealt with similar issues: In Minnesota, which experiences an average of 20 manure spills each year, approximately 700,000 fish died in a single incident when hog waste washed into Beaver Creek.¹¹⁸ Spilled manure from a dairy CAFO in Lewis County, New York, killed 375,000 fish.¹¹⁹ These events can devastate local wildlife and ecosystems.

FISH KILLS IN ILLINOIS

In July 2012, manure from a hog confinement facility in Illinois leaked from fields into a creek, where it reportedly polluted more than 20 miles of the waterway and killed nearly 150,000 fish and 18,000 freshwater mussels.¹²⁰ Two years later, biologists could not locate any examples of nine fish species that had been in the creek prior to the discharge.¹²¹ According to one man whose family fished in the creek, “It looked like ink, the water. It had fish all over the place, dead. It wasn’t fit for nothing. Not even a wild animal could drink out of it.”¹²²

MONITORING

As described in more detail below, CAFOs are formally regulated for their environmental impact by the EPA, which generally delegates its responsibilities to state and local environmental agencies.¹²³ The EPA and state regulators conduct facility inspections, which serve as the primary monitoring mechanism to uncover violations. If a facility is out of compliance, regulators can initiate an enforcement action. However, inspections and enforcement actions occur remarkably infrequently. In the 2017 fiscal year, the EPA conducted 125 inspections and concluded 18 enforcement actions.¹²⁴ For context, the EPA estimated in 2017 that there were 19,961 CAFOs in the United States, which means that the EPA inspected 0.6 percent of all facilities.¹²⁵ Between 2008 and 2013,

the EPA averaged about 260 inspections annually with an average of 60 enforcement actions across a similar number of CAFOs; remarkably, this still-low figure reflects a period of time when CAFOs were identified as a national enforcement priority.¹²⁶

These figures do not account for inspections conducted by state agencies, which run their own inspection programs.¹²⁷ However, the lack of consistent and complete data at the state level raises serious questions about how comprehensively states are keeping tabs on the CAFOs within their borders. The nonpartisan Government Accountability Office (GAO) attributes these state failures, at least in part, to poor oversight by the EPA.¹²⁸ Although states must submit annual updates to the EPA on their CAFO permitting programs, reporting standards are insufficient to ensure that the EPA has site-specific data to hold facilities or their state regulators accountable. The GAO concluded that the EPA cannot fulfill its regulatory duties under the Clean Water Act without accurate and facility-specific information about CAFOs.¹²⁹ The EPA, for its part, admits that in contrast to its oversight of other major emitting industries, it does not have comprehensive, facility-level information for CAFOs.¹³⁰

THE CAFO DATA VOID

Despite the ongoing harms caused by CAFO pollution, no federal agency collects and maintains the kind of comprehensive data about CAFO size, location, and operations that would be prerequisite to an effective environmental enforcement strategy.¹³¹ Instead, regulators must rely on the patchwork of state-level information that forms the basis for this report. Moreover, regulators rely heavily on self-reporting: Although some proactive states impose a stricter duty on operators to apply for permits, under federal law CAFOs are obligated to apply for a permit only if they discharge.¹³² This means the government must demonstrate that a CAFO is discharging into waters if it wants to compel the facility to apply for a permit—a difficult task, especially if the EPA does not even know that the CAFO exists. Given the costs of permitting and the relatively low likelihood of an enforcement action, it is not surprising that many CAFOs operate without a NPDES permit.¹³³ And even where permits are formally requested, permit standards in some states lag well behind those of the EPA.¹³⁴

NRDC and other groups have repeatedly pressed the EPA to take steps to fill gaps in their information. In 2008, federal officials acknowledged that:

...[the] EPA does not have data on the number and location of CAFOs nationwide and the amount of discharges from these operations. Without this information and data on how pollutant concentrations vary by type of operation, it is difficult to estimate the actual discharges occurring and to assess the extent to which CAFOs may be contributing to water pollution.¹³⁵

The EPA cannot currently execute its congressionally imposed duty to protect human health and the environment. Specifically, the EPA's blind spots make it difficult or impossible to evaluate the effectiveness of the NPDES program, identify and permit CAFOs that discharge, promote best management practices, locate and address sources of water quality impairment, estimate the amount of pollution entering water bodies, and efficiently target resources at areas of concern.¹³⁶

The EPA initially responded to these findings, along with pressure from NRDC and other groups, by agreeing to circumvent the states and directly survey the industry. In 2011 the agency proposed the "CAFO Reporting Rule" or "308 Rule."¹³⁷ The proposed rule would have leveraged the EPA's authority under Section 308 of the Clean Water Act to require all CAFOs to report certain data.¹³⁸ Specifically, the EPA proposed to collect the following basic information about animal operations:

- Name and address of the owner/operator
- Facility location
- NPDES permit status
- Animal type and number
- Location and total number of acres under control of the owner available for land application of manure

The proposed inventory would have replaced the EPA's inconsistent and patchy information with a much-needed national database of animal facilities. At the same time, the proposed information collection was extremely modest; the EPA decided not to collect numerous pieces of data urged by environmental and public health advocates—including the type and capacity of available manure storage, the presence of a nutrient management plan (or lack thereof), and information on off-site transfer of manure.¹³⁹ The agency also proposed to limit data collection to once every 10 years. However, under industry pressure, the EPA withdrew the proposed rule in 2012.¹⁴⁰ Instead of collecting the information directly, the EPA stated it would pursue "an approach that relies on a range of existing sources of information, other regulations, and other programs at the federal, state, and local level to gather basic information about CAFOs."¹⁴¹

In scuttling the survey, the EPA claimed that it could obtain the missing data by working more closely with states, erroneously asserting that the states and other government entities already have that data.¹⁴² Unfortunately, this approach failed to produce the information that the EPA needs to assess and regulate CAFOs nationwide. Rather, the quantity and quality of data on industrial livestock operations has historically varied widely across states, with some states leading and other lagging.¹⁴³ Concerned that the EPA's new approach would fail to address data gaps and inconsistencies, NRDC set out to assess what information was in fact available about these operations across the country.

RESEARCH METHODOLOGY

Following the EPA's failure to act, NRDC attempted to collect publicly available data to better understand just how much (or how little) information the EPA had about CAFOs in the United States. By recreating the EPA's database and then comparing it with the EPA and USDA estimates of the total number of industrial animal facilities, NRDC sought to determine whether existing facility-specific data were sufficient for informing and protecting communities or holding the agriculture industry accountable for its pollution impacts.

NRDC created a database using facility-specific CAFO data obtained from four sources between 2012 and 2015. First, we obtained data from the EPA after filing FOIA requests in 2012. In response to these requests, the EPA provided the CAFO data it had collected directly from the states.¹⁴⁴ Second, NRDC searched the EPA's Permit Compliance System (PCS) and Integrated Compliance Information System (ICIS) for all animal facilities.¹⁴⁵ Data were collected for all animal agricultural facilities in every state with active NPDES permits. Facilities that did not meet the regulatory definition of a CAFO (such as aquaculture operations) were excluded. Third, we conducted an independent search of publicly available data on state permitting websites.¹⁴⁶ These searches took place in the spring of 2015. NRDC extracted all readily available information from these websites on AFOs, regardless of whether they were NPDES permitted, and added this information to the database.¹⁴⁷ Finally, we added data for all NPDES-permitted CAFOs from the EPA's Enforcement and Compliance History Online (ECHO) database in the spring of 2015.¹⁴⁸

Once we added all the information we could find to the database, we took additional steps to improve the data quality. First, facilities with inactive or expired permits were removed, along with facilities whose permit status indicated they were no longer operational. Second, duplicates were identified and consolidated into a single entry. Where duplicate entries contained different types of data, the information in both fields was retained, and where duplicate entries contained information that conflicted across the same field, NRDC prioritized the most recently collected data.

WHAT WE FOUND (AND DIDN'T FIND)

Overall, NRDC identified 7,595 CAFOs in 40 states. By comparison, the EPA estimated in 2012 that there were 17,329 CAFOs in the United States.¹⁴⁹ This means that we—and, by extension, the public regulators from which NRDC obtained the data—have information for fewer than half of the CAFOs that the EPA estimated to exist. Moreover, the EPA's estimate should be viewed cautiously; in nine states, NRDC found *more* facilities than the EPA estimated. In Maryland, for example, the agency estimated that there were 150 CAFOs, but NRDC's data indicate that there were



at least 789.¹⁵⁰ The problems and inconsistencies in the EPA's data make it impossible to know when the agency is overestimating or, more likely, underestimating the number of CAFOs in a state.

The most defining characteristic of the information we gathered is perhaps the inconsistency among the states in terms of data availability. NRDC found no data for nine states that the EPA determined housed CAFOs. These include Idaho, South Carolina, and Washington, each of which, according to EPA estimates, has more than 100 CAFOs within its borders. Even more striking, California has an EPA-estimated 1,028 CAFOs, but NRDC found data on only a single CAFO.

When data on CAFOs were available, both the quantity and nature of the data were highly variable from state to state. For some states, like Texas, Florida, and Iowa, a wide range of data was available about a limited number of CAFOs, including operations' permit status, location, method of storing manure, size, animal type, and ownership, but there were no data at all for many of the CAFOs that the EPA estimated are located in these states. In other states, such as Arizona, Montana, New York, Pennsylvania, South Dakota, and Utah, it appears likely that all or almost all CAFOs were accounted for, but only a very limited amount of data was available about each.

On balance, the state for which data appeared to be the most complete was, by a fairly wide margin, Tennessee. No other state had data available on permit status, location, method of storing manure, size, animal type, and ownership of more than 5 percent of EPA-estimated operations. For Tennessee, NRDC was able to obtain each of these data points for more than 70 percent of all estimated operations. Other states with relatively high numbers of CAFOs that did relatively well in terms of both the breadth and depth of available data included Alabama, Colorado, Indiana, and Maryland. The section below describes how the states lined up in terms of the particular types of data that were collected.

PERMIT STATUS

Overall, NRDC could identify the permit status of 4,234 CAFOs. This makes up about 24 percent of the EPA's estimate of total CAFOs in the country (and 56 percent of the CAFOs NRDC could identify). The data are skewed heavily toward several states. In 13 states—Colorado, Florida, Kansas, Maryland, Montana, New York, North Dakota, Oregon, Pennsylvania, Tennessee, Texas, Wisconsin, and Wyoming—NRDC found data on permitting for 50 percent or more of estimated CAFOs. These states contain 3,180 of those 4,234 CAFOs for which NRDC has data—more than 75 percent. On the other hand, for 18 states NRDC could find permitting data on less than 1 percent of estimated CAFOs. Several of these states—Arkansas, Arizona, California, Idaho, Louisiana, Nebraska, South Dakota, and Washington—have more than 100 CAFOs, according to EPA estimates.

OWNER/OPERATOR

NRDC found information identifying the owner or operator of 4,248 CAFOs, or roughly 25 percent of the EPA's overall estimate (and 56 percent of the CAFOs NRDC could identify). Though the total number of CAFOs for which NRDC has ownership data is nearly identical to that for permitting status, the list of states for which substantial ownership data are available is quite different. In 16 states—Alabama, Arizona, Delaware, Florida, Georgia, Indiana, Maryland, Michigan, Montana, Nebraska, New Jersey, North Dakota, Pennsylvania, Tennessee, Utah, and Wyoming—NRDC found data for 50 percent or more of estimated CAFOs. For 25 states, NRDC could find no data on ownership.

TYPE AND NUMBER OF ANIMALS

The data point that was most commonly available was information on the type of animal confined at a facility. Since, for example, a single hog produces far more manure than a single chicken, knowing the type of animal in confinement is necessary in order to assess the pollution potential of a CAFO. NRDC was able to determine this for 37 percent of the EPA's estimated number of CAFOs (and 84 percent of the CAFOs NRDC could identify). Knowing the number of animals confined is equally important, but NRDC could determine this for only 29 percent of the EPA's estimated number of CAFOs. This data void is particularly troubling; without knowing a CAFO's size, it is impossible to assess its impact on the community.

States that provided the most complete data on animal type and animal numbers included Alabama, Delaware, Georgia, Indiana, Maryland, North Dakota, South Dakota, Tennessee, and Utah. NRDC found data about the type and number of animals for more than 70 percent of estimated CAFOs in each of these states. Perhaps the most notable

laggard in animal type/number reporting is Pennsylvania. Although there are some data available for 356 CAFOs in the state, the type of animal is reported for only 51 of these, and there is no information about facility size. This is particularly concerning given that Pennsylvania is known to be a diverse CAFO state, housing cattle, dairy, hog, broiler, and egg layer operations.¹⁵¹

LOCATION

NRDC's database includes the location of 34 percent of CAFOs the EPA estimates exist (and 77 percent of the CAFOs NRDC could identify). Location is a crucial data point as it informs regulators and the public where concentrations of animals have become sufficiently high to warrant increased scrutiny, greater monitoring, or development of individualized permit conditions. Geographic data serves other important purposes, such as advancing our understanding of how CAFOs create disparate impacts on communities of color. For example, facility location data informed a complaint to the EPA under Title VI of the Civil Rights Act alleging that North Carolina's Department of Environmental Quality's permitting process had a racially discriminatory impact.¹⁵² (see "Smithfield Foods and North Carolina.")

The states where NRDC could find location data for 80 percent or more of estimated CAFOs were New Jersey, Indiana, Colorado, Delaware, Montana, Michigan, Oregon, New York, and Maryland. While the southeastern United States generally performed well in terms of data availability, it lagged in facility location information. Across this region, NRDC found location data for more than half of all estimated CAFOs only in Georgia, Tennessee, and Alabama.

WASTE MANAGEMENT PRACTICES

Despite the crucial importance of waste management for the impact of CAFOs on neighboring communities, NRDC could find less information about waste management practices than for any other data category included in this report. Our database contains waste management information for 5.6 percent of the EPA's estimated number of CAFOs (and 13 percent of the operations NRDC could identify). NRDC could find this data for more than 2 percent of CAFOs in only seven states: Alabama, Florida, Iowa, North Carolina, Tennessee, Texas, and Wyoming. Some of the states with the most troubling records on waste management are notably absent from this list.

CONCLUSION

The fight for clean water and breathable air in communities neighboring industrial animal facilities stands at a crossroads. Efforts to improve how CAFOs are regulated have stagnated over the past decade, and the current administration has attacked federal environmental protections across the board, including the CWA. Yet in the absence of federal leadership, some states are seizing the opportunity to step up.

Recent developments suggest two directions in which regulators could move in the years to come. On the one hand, the current administration has pursued a path that weakens clean water protections and could allow more CAFO pollution to enter streams and other bodies of water. In this connection, the EPA recently reversed its longstanding interpretation that some subsurface discharges might trigger permitting under the CWA.¹⁵³ For decades, the EPA has maintained that point source discharges to subsurface waters with a direct connection to surface waters are subject to CWA permitting requirements.¹⁵⁴ In these circumstances, contamination from manure lagoons, especially unlined lagoons, can leak into subsurface water and then migrate to surface waters. The EPA's interest in reopening this issue signals its intent to exempt even more facilities from scrutiny and enforcement under the law. Weakening the interpretation discounts one of the primary routes by which CAFOs pollute bodies of water. Ultimately, this move will leave the EPA and the public with even less information about polluting facilities.

On the other hand, some states are taking a different path toward better regulation, more data collection, better transparency, and healthier communities. For example, the New York Supreme Court recently ruled that the state's dairy CAFO permit must be revised to reflect the CWA's rule that pollution-handling practices at permitted facilities are a matter of public record.¹⁵⁵ In the CAFO context, this means nutrient management plans must be available for public review, which is critical to holding facilities accountable and ensuring that the best management practices are used when and where they are required.

The CWA provides minimum regulatory standards for New York and the 45 other states that currently run their own CAFO permitting program.¹⁵⁶ States are free, however, to go above CWA standards to protect their local waters and the health of their local communities, and NRDC is working to empower states to do so.¹⁵⁷ To facilitate the process, NRDC scoured state permitting programs from across the nation to identify best practices and synthesize them into a permit that states can adopt under their existing powers.

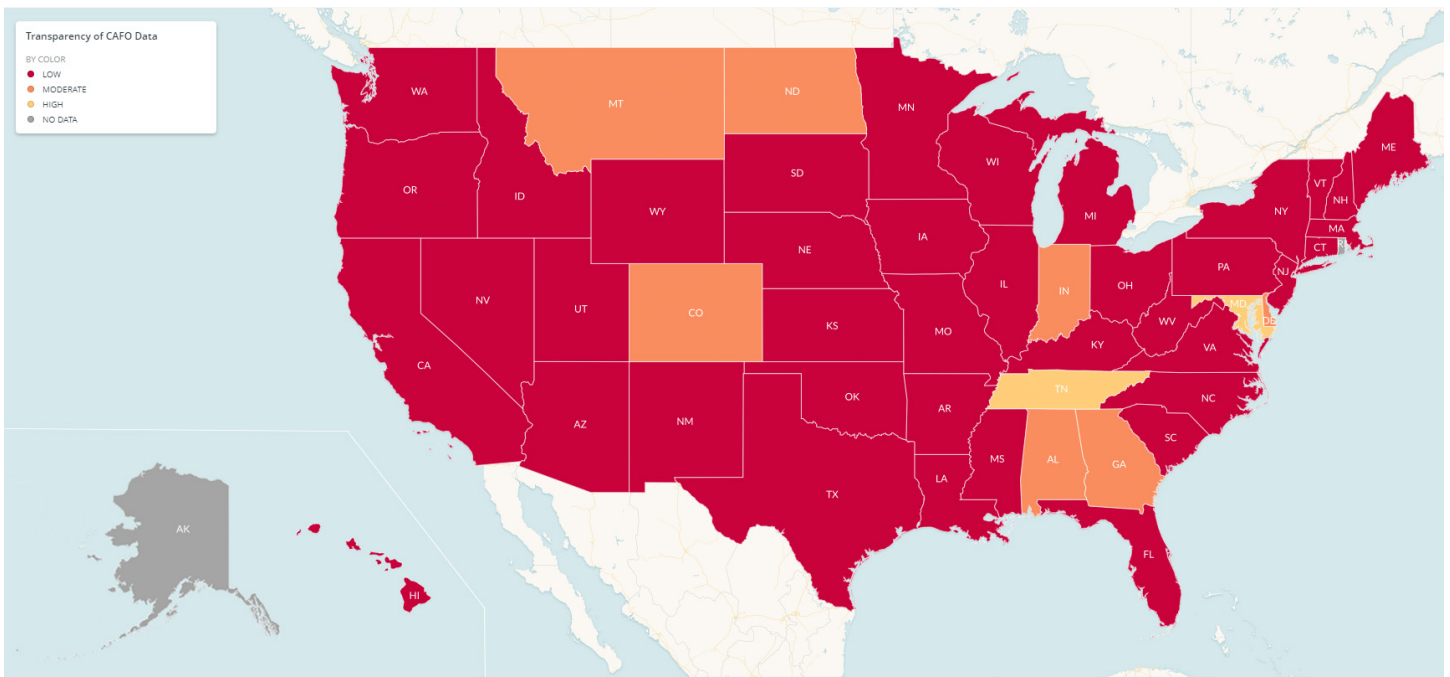
NRDC's CAFO permit goes above and beyond the current federal minimum NPDES requirements in some ways. For example, many facilities avoid their duty to obtain a CWA permit by claiming not to discharge. The permit expands coverage to all confined animal operations within a state, so that every facility above a certain size threshold has a duty to obtain a permit. It requires that basic information on each facility, like location, size, and waste management practices, be available in a public database, as well as reported directly to the state and the EPA. It is important for regulators and the public to have this information in order to understand how CAFOs are distributed over the landscape and which water bodies are threatened by high concentrations of polluting facilities. The permit addresses the data collection void that has hobbled the EPA and the states in meeting their regulatory duties. The permit also improves transparency and accountability more generally.

Collecting and sharing basic information on facilities is only part of the battle. Communities deserve to know the conditions and standards that apply to nearby facilities, and those same communities need the power to hold facilities accountable when they violate the terms of their permit. In order to obtain a permit, CAFO operators currently must develop a nutrient management plan that specifies how the facility will live up to its obligations under the permit. NRDC's permit clarifies that the nutrient

management plan must be public information. It also expands notice requirements so that nearby residents are fully informed when a CAFO wants to expand its facility or open a new one, or when existing operations are making changes that will increase the production of waste. To further empower communities to hold neighboring CAFOs accountable, the permit affirms the right of individual citizens to bring a civil action against any person found to be in violation of CWA standards or limitations.

There is a long road ahead in the fight to clean up industrial animal operations and hold them accountable for their pollution. As a first step, the EPA, states, and communities must understand the true scope and scale of the agriculture industry. That understanding requires comprehensive and reliable CAFO data that are currently not available. To remedy this, federal policymakers should reintroduce the reporting requirements they dropped under industry pressure in 2012. In the absence of federal action, states must use their existing authority to demand transparency and accountability of the CAFOs within their borders. Citizens concerned with the environmental and health threats that CAFOs pose to their communities must demand much more from their representatives at both the state and federal levels.

TRANSPARENCY OF CAFO DATA



STATE TRANSPARENCY RATINGS							
State	Overall Transparency Rating	Transparency of Permit status	Transparency of Location	Transparency of Manure storage	Transparency of Type of Animal	Transparency of Count of Animal	Transparency of Owner Information
Alabama	Moderate	Low	Moderate	Moderate	Moderate	Moderate	Moderate
Alaska	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Arizona	Low	Low	Low	Low	High	Low	High
Arkansas	Low	Low	Low	Low	Low	Low	Low
California	Low	Low	Low	Low	Low	Low	Low
Colorado	Moderate	High	High	Low	High	Low	Low
Connecticut	Low	Low	Low	Low	Low	Low	Low
Delaware	Moderate	Low	High	Low	High	High	High
Florida	Low	Low	Low	Low	Low	Low	Low
Georgia	Moderate	Low	Moderate	Low	Moderate	Moderate	Moderate
Hawaii	Low	Low	Low	Low	Low	Low	Low
Idaho	Low	Low	Low	Low	Low	Low	Low
Illinois	Low	Low	Low	Low	Low	Low	Low
Indiana	Moderate	Low	High	Low	High	High	High
Iowa	Low	Low	Low	Low	Low	Low	Low
Kansas	Low	Moderate	Low	Low	Moderate	Low	Low
Kentucky	Low	Low	Low	Low	Low	Low	Low
Louisiana	Low	Low	Low	Low	Low	Low	Low
Maine	Low	Low	Low	Low	Low	Low	Low
Maryland	High	High	High	Low	High	High	High
Massachusetts	Low	Low	Low	Low	Low	Low	Low
Michigan	Low	Low	High	Low	Moderate	Low	High
Minnesota	Low	Low	Low	Low	Low	Low	Low
Mississippi	Low	Low	Low	Low	Low	Low	Low
Missouri	Low	Low	Low	Low	Low	Low	Low
Montana	Moderate	High	High	Low	Moderate	Low	Low
Nebraska	Low	Low	Low	Low	Low	Low	Low
Nevada	Low	Low	Low	Low	Low	Low	Low
New Hampshire	Low	Low	Low	Low	Low	Low	Low
New Jersey	Low	Low	High	Low	Low	Low	High
New Mexico	Low	Low	Low	Low	Low	Low	Low
New York	Low	Low	High	Low	Low	Moderate	Low
North Carolina	Low	Low	Low	Low	Low	Low	Low
North Dakota	Moderate	Moderate	Moderate	Low	Moderate	Moderate	Moderate
Ohio	Low	Low	Moderate	Low	Moderate	Moderate	Low
Oklahoma	Low	Low	Low	Low	Low	Low	Low
Oregon	Low	High	High	Low	Low	High	Low
Pennsylvania	Low	High	Low	Low	Low	Low	High
Rhode Island	No Data	No Data	No Data	No Data	No Data	No Data	No Data
South Carolina	Low	Low	Low	Low	Low	Low	Low
South Dakota	Low	Low	Low	Low	High	High	Low
Tennessee	High	High	Moderate	High	High	High	High
Texas	Low	Low	Low	Low	Low	Low	Low
Utah	Low	Low	Low	Low	Moderate	Moderate	Moderate
Vermont	Low	Low	Low	Low	Low	Low	Low
Virginia	Low	Low	Low	Low	Low	Low	Low
Washington	Low	Low	Low	Low	Low	Low	Low
West Virginia	Low	Low	Low	Low	Low	Low	Low
Wisconsin	Low	High	Moderate	Low	High	Low	Low
Wyoming	Low	Moderate	Low	Low	Low	Low	Moderate

Methodology

DATA SOURCES

We obtained the data on the CAFOs that we used for our analysis, map, and Table 1 from four sources:

SPREADSHEETS OF DATA ON CAFOS OBTAINED FROM THE U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

Pursuant to a Freedom of Information Act (FOIA) request filed by NRDC in 2012, we obtained spreadsheets containing data on CAFOs that had been supplied by states to the EPA, as well as a few spreadsheets containing information about CAFOs gathered by the EPA from publicly available sources. Although the EPA initially provided us with unredacted data from states, we returned those documents and based our analysis on subsequent, redacted versions of the EPA's data.

We did not use spreadsheets produced by the FOIA request that contained data gathered from the EPA's own PCS/ICIS systems in order to avoid duplication; we gathered updated versions of those data from the EPA's Envirofacts and ECHO databases later. We also did not use most of the data that were compiled by the EPA from publicly available state web sources, again to avoid duplication; we later gathered updated versions of publicly available information from state CAFO permitting websites.

PCS/ICIS SEARCHES ON THE EPA ENVIROFACTS WEBSITE

On the EPA Envirofacts website, we conducted searches of the Permit Compliance System (PCS) and Integrated Compliance Information System (ICIS) databases at <http://www3.epa.gov/enviro/facts/pcs-icis/search.html>. We searched in every state for animal agricultural facilities with Standard Industrial Classification codes starting with "02," the code for Agricultural Production—Livestock. These searches were conducted in April and May 2014.

From our searches in Envirofacts, we added to our database those facilities that had active National Pollutant Discharge Elimination System (NPDES) permits. We excluded facilities that had NPDES permits but did not appear to be CAFOs, based on their animal types. For example, we excluded aquaculture facilities from our list.

STATE CAFO PERMITTING WEBSITES CONTAINING INFORMATION ABOUT CAFOS WITHIN THE STATE

In April 2015, we conducted searches of state websites that contained publicly available information about CAFOs. We extracted all readily available information from these websites on AFOs regardless of whether they were NPDES-permitted, and we added this information to our database.

We considered information about CAFOs to be "readily available" if it was downloadable in a batch CSV or Excel file, or if we were otherwise able to copy and paste it from the website en masse. Some state websites contained additional pieces of information about CAFOs on separate pages for each facility, or linked to PDFs of permitting documents for facilities. We did not consider this type of information to be readily available due to the substantial amount of time it would have taken to manually extract information about each facility, one by one. We did not include information that was not readily available in our database, except in the cases of Iowa and Texas. The websites for these states had a substantial amount of important information about CAFOs on separate sub-pages for each facility. Our web contractor was able to write code to extract this information about the facilities from the separate sub-pages.

The state websites from which we gathered data for our database were these:

- Alabama Department of Environmental Management, "Animal Feeding Operations," <http://www.adem.state.al.us/programs/water/cafo.cnt>.
- Arkansas Department of Environmental Quality, "ADEQ Facility and Permit Summary," <https://www.adeq.state.ar.us/home/pdssql/pds.aspx>.
- California Environmental Protection Agency, State Water Resources Control Board, "Regulated Facility Report," <https://ciwqs.waterboards.ca.gov/ciwqs/readOnly/CiwqsReportServlet?inCommand=reset&reportName=RegulatedFacility>.
- Florida Department of Environmental Protection, "Wastewater Facility Information," <http://www.dep.state.fl.us/water/wastewater/facinfo.htm>.

- Indiana Department of Environmental Management, “Confined Feeding Operations,” <http://www.in.gov/idem/landquality/2349.htm>.
- Iowa Department of Natural Resources, “Animal Feeding Operation,” <https://programs.iowadnr.gov/animalfeedingoperations/FacilitySearch.aspx>.
- Maryland Department of the Environment, “Permit Application Database Search,” <https://mde.maryland.gov/programs/permits/pages/sb47.aspx>.
- Mississippi Department of Environmental Quality, OPC Environmental Permits Division, “Active Permit & Coverage Search,” http://opc.deq.state.ms.us/search_ai_alt.aspx#grid.
- New Jersey Department of Environmental Protection, “NJPDES Excel Reports,” http://datamine2.state.nj.us/dep/DEP_OPRA/NJDEPexcel.htm.
- North Carolina Department of Environmental Quality, “Animal Feeding Operations: Permits,” <http://portal.ncdenr.org/web/wq/aps/afo/perm>.
- Tennessee Department of Environment and Conservation, “Heritage WPC Permits in Tennessee,” [http://environment-online.tn.gov:8080/pls/enf_reports/f?p=9034:34001:0: .](http://environment-online.tn.gov:8080/pls/enf_reports/f?p=9034:34001:0:)
- Texas Commission on Environmental Quality, “Water Quality General Permits & Registration Search,” http://www2.tceq.texas.gov/wq_dpa/index.cfm .
- State of Washington Department of Ecology, “Facility/Site Search,” <https://fortress.wa.gov/ecy/facilitysite/SearchData/ShowSearch.aspx?ModuleType=FacilitySite&RecordSearchMode=New>.
- Wisconsin Department of Natural Resources, “CAFO Permittees,” http://dnr.wi.gov/topic/AgBusiness/data/CAFO/cafo_all.asp?FULL=1.

THE EPA ENFORCEMENT AND COMPLIANCE HISTORY ONLINE WEBSITE

We conducted a search on April 9, 2015, of all NPDES-permitted CAFOs in the EPA Enforcement and Compliance History Online (ECHO) website, <http://echo.epa.gov/?redirect=echo>. We added this data to our database by state and included all NPDES-permitted facilities, regardless of their permit status. We later filtered out facilities whose permit status indicated that they were no longer operational, as discussed below.

For a complete listing of each source of data collected for each state, please see our Source List [\[link to source attribution\]](#).

TYPES OF DATA COLLECTED

From the sources listed above, we compiled data about AFOs across 24 categories:

- State
- Permit type
- Permit number
- Permit status
- CAFO name
- CAFO address
- Name of the owner and operator
- Address of the owner and operator
- If contract operation, name and address of the integrator
- Longitude of the operation
- Latitude of the operation
- Type of facility
- Type of animals

- Number of animals (or range)
- Number of animal units
- Type and capacity of manure storage
- Available acreage for land application
- Quantity of manure, process wastewater, and litter generated annually by the CAFO
- Whether the CAFO land-applies (Y/N)
- If the CAFO land-applies, whether it implements a nutrient management plan for land application
- If the CAFO land-applies, whether it employs nutrient management practices and keeps records on site consistent with 40 CFR 122.23(e)
- If the CAFO does not land-apply, alternative uses of manure, litter, and/or wastewater
- Whether the CAFO transfers manure off site
- If the CAFO transfers manure off site, quantity transferred to recipient(s)

ELIMINATING DUPLICATION OF DATA

We took steps to limit the amount of duplication in our database. However, given our multiple sources, there were duplicate entries for many facilities in our database when our collection was complete. To accurately analyze “readily available” data about CAFOs, we had to eliminate this duplication. First, we identified duplicate facilities using the following metrics independently:

- Latitude and longitude to four decimal places
- Permit number
- CAFO name within a state
- CAFO address
- CAFO owner within a state

After duplicates were identified, we consolidated information for those CAFOs across duplicate entries instead of eliminating duplicates entirely, because different entries contained different pieces of information. Thus, where duplicate entries contained information in different fields, the information in both fields was retained. Where duplicate entries contained information that conflicted within the same field, we chose which information to retain on the basis of the source. We created a hierarchy of sources according to how recent their data were and whether they were state or federal sources. We prioritized the latter because federal sources contained consistent and reliable information on NPDES permits that we wanted to retain. This hierarchy was as follows:

1. ECHO (more recently gathered than Envirofacts)
2. Envirofacts
3. State public databases (more recently gathered than FOIA)
4. State data from FOIA request

We used this hierarchy as our default and diverged from it only for a few states in order to ensure that we were capturing the most precise information on animal types, which was contained in the state sources.

Finally, we did a manual review of our data to identify any remaining duplicate entries and consolidated their information as described above.

REFINEMENT OF DATA

After ensuring that there was just one entry for each facility, we limited the facilities that appear in the database to CAFOs that either had a NPDES permit or contained enough animals to qualify as a Large CAFO per federal regulations.

We reviewed state permitting schemes to determine which permits were NPDES permits and included all NPDES-permitted facilities for which we had information in the database.

For facilities without NPDES permit information, we reviewed our data on the number of animals (or range) at each facility to determine whether the facility would qualify as a Large CAFO. We possessed information from a few states on the animal units at each facility rather than the number of animals, but we did not use animal unit data in our analysis because current federal CAFO regulations categorize facilities on the basis of animal numbers, not units. Further, we did not attempt to convert animal unit data to animal numbers because of a lack of information on the specific types of animals contained. We included in our database only those facilities that would qualify as Large CAFOs and did not include facilities that might qualify as a Medium or Small CAFO. We made this decision because in order for a facility to be a Medium or Small CAFO per federal regulations, it must also meet other conditions relating to its pollution or be specifically designated as such by an appropriate authority. Because Large CAFOs are the only category of CAFO defined as such on the basis of animal numbers alone, we could confidently categorize as CAFOs only those facilities with enough animals to be considered Large CAFOs. Therefore, we only included facilities in our CAFO database on the basis of animal numbers alone that would qualify as Large CAFOs.

We used the following definitions of Large CAFOs from the federal regulations:

An AFO is defined as a Large CAFO if it stables or confines as many as or more than the numbers of animals specified in any of the following categories:

- 700 mature dairy cows, whether milked or dry
- 1,000 veal calves
- 1,000 cattle other than mature dairy cows or veal calves. Cattle includes but is not limited to heifers, steers, bulls, and cow/calf pairs
- 2,500 swine each weighing 55 pounds or more
- 10,000 swine each weighing less than 55 pounds
- 500 horses
- 10,000 sheep or lambs
- 55,000 turkeys
- 30,000 laying hens or broilers, if the AFO uses a liquid manure handling system
- 125,000 chickens (other than laying hens), if the AFO uses other than a liquid manure handling system
- 82,000 laying hens, if the AFO uses other than a liquid manure handling system
- 30,000 ducks, if the AFO uses other than a liquid manure handling system
- 5,000 ducks, if the AFO uses a liquid manure handling system

We assigned the animal types that were described in our data to the animal categories in the federal CAFO regulations. When we did not have enough information about the type of animal contained at a CAFO to assign it to an animal category under the federal definitions, we were conservative in assigning it to a category. For example, if we knew that a facility contained swine but did not know the size of the swine, we would assign the swine at that facility to the category “swine each weighing less than 55 pounds.” Similarly, if we did not have information on a poultry facility’s manure handling system, we would conservatively assume that it used something “other than a liquid manure handling system.” By doing so, we avoided designating facilities as large CAFOs when they actually were not.

Using this conservative approach, we classified the following animal types that were present in our data as the following animal types under the CAFO regulations for the purpose of determining whether the number of animals the facility contained put it over the threshold for Large CAFOs.

ANIMAL TYPE IN CAFO REGULATIONS	ANIMAL TYPE FROM DATA
Mature dairy cows, whether milked or dry	Cattle–Milk Cow; Dairy; DAIRY; dairy; Dairy Cattle; dairy cattle; Dairy Cattle (Mature); Dairy Cow, Dry; Dairy Cow, Milking; DAIRY FARMS; Dairy Farms; Mature Dairy; Mature Dairy Cattle; milking; milking/dry
Veal calves	Calves; Cattle - veal; Veal Calves
Cattle other than mature dairy cows or veal calves. Cattle includes but is not limited to heifers, steers, bulls, and cow/calf pairs.	Beef; Beef calf; Beef calves; Beef Cattle; beef cattle; Beef cattle; Beef Cattle Feedlots; BEEF CATTLE FEEDLOTS; Beef Cow; Beef Feeder; Calves; calves and heifers; Cattle; CATTLE; cattle; Cattle – Beef Brood Cow; Cattle – Beef Feeder; Cattle – Beef Stocker Calf; Cattle – Dairy Calf; Cattle – Dairy Heifer; Cattle – Dry Cow; Cattle – includes heifers; Cattle (All except Mature Dairy Cattle and Veal Calves); Cattle (includes heifers); Cattle (Not Mature Dairy/Veal); cows; Dairy calf; Dairy Calves; Dairy Heifer; Dairy Heifers; Dairy Heifers/Calves; heifer; heifers; Heifers; Heifers/Calves
Swine each weighing 55 pounds or more	Boars; finisher swine; Finishers; Finishers-pigs; Pigs, Boar; Pigs, Finishing; Pigs, Gestating; Pigs, Lactating; Sows; sows; Swine – Boar/Stud; Swine (Greater than 55 Lbs.); Swine >= 55 lbs; Swine >= 55 pounds; Swine – Large; Swine Lg; SWINE LG; Swine over 55 lbs.
Swine each weighing less than 55 pounds	farrow to finish swine; grow to finish swine; HOGS; Hogs; Nursery Pigs; nursery swine; nursery swine, finisher swine; Piglets; Pigs, Grower; Pigs, Nursery; production swine; production, finisher swine; Swine; swine; Swine – Farrow to Feeder; Swine – Farrow to Finish; Swine – Farrow to Wean; Swine – Feeder to Finish; Swine – Gilts; Swine – Med; Swine – Other; Swine – Wean to Feeder; Swine – Wean to Finish; Swine (Less than 55 Lbs.); Swine < 55 lbs; Swine < 55 pounds; SWINE LG/MD; Swine Md; SWINE MD; Swine Sm; SWINE SM; Swine under 55 lbs
Horses	Horse; Horses; horses; Horses – Horses; Horses – Other; Horses And Other Equines; Horses and other equines
Sheep or lambs	Sheep; Sheep or Lambs
Turkeys	Turkey; turkey; Turkeys; turkeys; Turkeys and Turkey Eggs
Laying hens or broilers, if the AFO uses a liquid manure handling system	Chickens with liquid manure handling; Layer (Wet); Wet Poultry – Layers; Wet Poultry – Non Laying Pullets; Wet Poultry – Other
Chickens (other than laying hens), if the AFO uses other than a liquid manure handling system	Breeder; Broiler; BROILER; broiler; BROILER FRYER ROAST CHICKENS; Broiler, fryer, and roaster chickens; Broiler, Fryer and Roaster Chickens; Broilers; chicken; Chickens; chickens; Chickens (All except Layers); Chickens (other than laying hens) with dry manure handling; Chickens-not laying hens-dry; Poultry; poultry; Poultry and Eggs; POULTRY AND EGGS NEC; Poultry Hatcheries; Poultry – Breeders; Poultry – Broilers; Poultry – Pullets; Poult; Pullet; PULLET; Pullet Poultry; Pullets
Laying hens, if the AFO uses other than a liquid manure handling system	Chicken Eggs; CHICKEN EGGS; Chicken Eggs, Poultry and Eggs; Chicken, Layer; Chickens (Layers); Dry Poultry – Laying Chickens; Layer; Layers; layers; Laying Hens; Laying hens – dry manure; Laying Hens (dry); Laying hens with dry manure handling; Poultry – Breeder layers; Poultry – Layers; Poultry, layers
Ducks, if the AFO uses other than a liquid manure handling system	Duck; Ducks
Ducks, if the AFO uses a liquid manure handling system	Ducks – liquid manure

Any listed animal types other than those in the table above were logged as either “other” or “unknown,” and their animal numbers, to the extent they were provided, were not used to qualify a facility as a Large CAFO.

FILTERING OF PERMIT STATUSES

We further limited the data in our final data set of CAFOs by filtering out facilities whose permit status clearly indicated that it was no longer operational. We filtered out facilities with the following permit statuses:

- Expired
- Closed
- Termination
- Voided
- App Terminated
- CFO Approval Expiration - Date Issued 03/13/2015
- CFO Approval Expiration - Pending
- CFO Approval Voidance - Date Issued 03/27/2015
- CFO Approval Voidance - Pending
- Historical
- Inactive
- Number was skipped
- Permit Terminated
- REVOK

We encountered other permit statuses indicating that a facility was potentially no longer permitted, and we excluded these facilities as well under the following conditions: 1) if the facility was in the database only because it had an NPDES permit, and 2) if we did not have information indicating that the number of animals the facility contained met the threshold to qualify it as a Large CAFO. We filtered out facilities that met those conditions and had the following permit statuses:

- Incomplete
- No
- NOT
- Not given
- Not issued
- not permitted
- sold
- Transferred
- UNPERMITTED
- WITH
- Withdrawn

FILTERING OF ANIMAL TYPES

We also filtered out of the database facilities that were NPDES-permitted but had the following animal types that indicated they were not CAFOs. These animal types were:

- ANIMAL AQUACULTURE
- Animal aquaculture
- BEEF CATTLE EXCEPT FEEDLOTS
- Beef Cattle, Except Feedlots
- Beef cattle, except feedlots
- Beef Cattle, Except Feedlots
- Beef Cattle, Except Feedlots, Livestock
- Beef; Beef cattle, except feedlots
- Fish hatcheries
- FISHFARM
- Fishing preserves
- LOCAL TRUCKING WITHOUT STORAGE
- Tropical fish farm
- Trout farm

CREATION OF CAFO MAP AND TABLE 1

In the map and Table 1, “Level of Transparency” was determined based on the amount of “readily available” data.

SCORING

The following six categories of information were chosen to assess the transparency of CAFO data in each state. NRDC considers this information to be necessary to protect communities from CAFO pollution and hold industry accountable if they fail to meet their responsibilities under the law:

- Location
- Permit status
- Type of manure storage
- Count of animals
- Type of animal
- Owner information

For each of these six categories for each state, percentages were calculated using the number of CAFOs for which we have the relevant information, divided by the EPA’s estimate of the total number of CAFOs in the state at the time the information was gathered.^a Each category received a score of 0 to 5 points, based on the percentages:

- 0% = 0 points
- Less than 20% = 1 point
- 20% to <40% = 2 points
- 40% to <60% = 3 points
- 60% to <80% = 4 points
- 80% and above = 5 points

^a U.S. Environmental Protection Agency, *NPDES CAFO Rule Implementation Status—National Summary, Midyear 2012*, June 30, 2012, https://www3.epa.gov/npdes/pubs/tracksum%20midyear2012_publish.pdf (accessed July 22, 2018).

The points from each of the six categories were added for the final score. The maximum score was 30. The final score determined the final transparency rating, based on the following ranges:

High Transparency = 24–30 points.

80% or more of all CAFO sites in the state are accounted for with readily available data.

Moderate Transparency = 18–23 points.

About 60% to 80% of all CAFO sites in the state are accounted for with readily available data.

Low Transparency = 1–17 points.

60% or fewer of all CAFO sites in the state are accounted for with readily available data.

No Data = No data were readily available for CAFO sites in the state.

DISCREPANCY IN DATA

For the following states, NRDC found data for more sites than the EPA estimated to be present in the state, which we used as our denominator when calculating percentages. Due to the discrepancy in data, we will make a note of this in the map and table for the following states: Delaware, Maryland, Michigan, Montana, New York, Oregon, Pennsylvania, Utah, and Wisconsin.

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