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## Circling the Drain: Regulating Nutrient Pollution from Agricultural Sources

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**CIRCLING THE DRAIN:  
REGULATING NUTRIENT POLLUTION FROM  
AGRICULTURAL SOURCES**

WILLIAM GUTERMUTH, J.D.\*

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## CIRCLING THE DRAIN: REGULATING NUTRIENT POLLUTION FROM AGRICULTURAL SOURCES

*DO NOT DRINK THE WATER.* Alternative water should be used for drinking, making infant formula, making ice, brushing teeth and preparing food. Pets should not drink the water.

*DO NOT BOIL THE WATER.* Boiling the water will not destroy the toxins – it will increase the concentration of the toxins.

Consuming water containing algal toxins may result in abnormal liver function, diarrhea, vomiting, nausea, numbness or dizziness. Seek medical attention if you feel you have been exposed to algal toxins and are having adverse health effects. Skin contact with contaminated water can cause irritation or rashes. Contact a veterinarian immediately if pets or livestock show signs of illness.<sup>1</sup>

### I. INTRODUCTION

How often do Americans think about the fresh water that comes from their faucets? Those living in rural areas who have their own wells and filter their own water may think about it quite frequently, but for the enormous number of Americans living in urban cities and suburbs, tap water is a bit of an enigma. For example, it is commonly known that as long as the water bill is paid, clean water will be readily available; however, where the water came from, the treatment process it may have undergone, and the path it took to reach the specific faucet are all questions that few Americans could answer with confidence.

For Americans, access to clean tap water is the norm.<sup>2</sup> Tap water has become an essential part of everyday life in the United States as it is used for numerous daily tasks such as bathing, cooking, and drinking.

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<sup>1</sup> Sara Gates, *Toledo Warns Area Residents Not To Drink Water After City Supply Tests Positive For Toxin*, THE HUFFINGTON POST (Aug. 2, 2014, 2:03 PM), [http://www.huffingtonpost.com/2014/08/02/toledo-water-advisory-do-not-drink-microcystin\\_n\\_5644228.html](http://www.huffingtonpost.com/2014/08/02/toledo-water-advisory-do-not-drink-microcystin_n_5644228.html) (quoting, City of Toledo (@cityoftoledo), FACEBOOK (Aug. 2, 2014), <https://www.facebook.com/cityoftoledo/posts/738905586173078>); The City of Toledo tweeted this statement after a nearby water treatment system revealed an excessive amount of microcystin, a hazardous toxin produced by blue-green algae, in the fresh water supply. *Id.*

<sup>2</sup> As of 2015, 99% of people in the United States have access to an improved drinking water source. An improved drinking water source “includes piped water on premises (piped household water connection located inside the user’s dwelling, plot or yard), and other improved drinking water sources (public taps or standpipes, tube wells or boreholes, protected dug wells, protected springs, and rainwater collection”). *Improved water source (% of population with access)*, THE WORLD BANK, <http://data.worldbank.org/indicator/SH.H2O.SAFE.ZS> (last visited Apr. 10, 2017).

Therefore, it could be said that the United States would be a very different society than what exists today without clean tap water.

Yet, despite its importance and widespread usage, tap water is rarely given the consideration it deserves. Rather, it is only when tap water becomes unavailable that people are reminded of what a luxury it really is. Take Toledo, Ohio in 2014, for example. Toledo, the state's fourth largest city, was forced to issue a large scale ban on all municipal tap water because of high concentrations of a toxin that could not be filtered out.<sup>3</sup> As a result, approximately 500,000 people were left without fresh water and a rush to obtain bottled water ensued.<sup>4</sup> In response, Ohio Governor John Kasich declared a state of emergency, activating the Ohio National Guard and an estimated 33,000 gallons of drinking water were immediately transported to the region.<sup>5</sup>

The Toledo tap water ban has, at least temporarily, put a spotlight on United States water supplies.<sup>6</sup> Consequently, many Americans have begun to take a closer look at the quality of the fresh water bodies being used to supply tap water to their homes. Therefore, this Note analyzes the problems currently threatening the lakes, rivers, and other surface waters which are the source of fresh drinking water for huge populations in the United States. Part II examines the problem of nutrient pollution and explains the harmful effects it has on human health. Part III provides an overview of the current laws governing nutrient pollution and tap water quality. Part IV analyzes the source of the problem and demonstrates that agriculture is largely responsible. Lastly, Part V suggests that the problem of nutrient pollution can be resolved through a reinterpretation of the Clean Water Act's definition of a point source.

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<sup>3</sup> Alexandra Sifferlin, *Toledo's Contaminated Water: Here's What Went Wrong*, TIME HEALTH (Oct. 4, 2014), <http://time.com/3079516/toledos-contaminated-water-heres-what-went-wrong/>.

<sup>4</sup> See Emma G. Fitzsimmons, *Tap Water Ban Continues for Toledo Residents*, N.Y. TIMES (Aug. 3, 2014), [http://www.nytimes.com/2014/08/04/us/toledo-faces-second-day-of-water-ban.html?\\_r=1](http://www.nytimes.com/2014/08/04/us/toledo-faces-second-day-of-water-ban.html?_r=1).

<sup>5</sup> *Id.*

<sup>6</sup> Most recently, the city of Flint Michigan has continued keep American's focused on tap water supplies. Tests of local resident's tap water revealed that the city's tap water supply was highly contaminated with lead which leached from old pipes. As a result, on January 5, 2016, Michigan Gov. Rick Snyder declared a state of emergency for Genesee County. See generally, Sara Ganim, *5 months later in Flint, high lead levels remain*, CNN, (last updated Mar. 5, 2016, 8:38 AM), <http://www.cnn.com/2016/03/04/us/flint-update-five-months-later/>; see also Julie Bosman, Monica Davey & Mitch Smith, *As Water Problems Grew, Officials Belittled Complaints From Flint*, N.Y. TIMES, (Jan. 20, 2016), <https://www.nytimes.com/2016/01/21/us/flint-michigan-lead-water-crisis.html> ("state officials finally conceded what critics had been contending: that Flint was in the midst of a major public health emergency, as tap water pouring into families' homes contained enough lead to show up in the blood of dozens of people in the city.").

## II. TOO MUCH OF A GOOD THING: HOW PHOSPHORUS AND NITROGEN HAVE HARMFUL EFFECTS ON TAP WATER SOURCES

### A. Then and Now

On June 22, 1969, the Cuyahoga River in Cleveland, Ohio burst into flames.<sup>7</sup> For years, sewage and industrial waste were dumped directly into the river making it highly contaminated and practically uninhabitable.<sup>8</sup> Although this was not the first time the river had caught fire, *Time* magazine used the fire of 1969 to shed light on the national problem of water pollution in the United States at that time.<sup>9</sup> Ohio quickly became the face of water pollution as the fire spurred efforts to enact sweeping federal environmental legislation.<sup>10</sup> In response, Congress enacted the Clean Water Act (“CWA”) in 1972,<sup>11</sup> and the Safe Water Drinking Act (“SWDA”) in 1974.<sup>12</sup>

After nearly half a century, Ohio has returned to once again be the poster child of water pollution in the United States. This time, however, there is no oil, industrial waste, or burning river. Rather, in recent years, Ohio and Toledo more specifically, have become representative of the nation’s battle against the newest threat to water quality – nutrient pollution.<sup>13</sup>

Similar to the Cuyahoga River Fire of 1969, Toledo’s tap water ban garnered national media attention.<sup>14</sup> While both events were merely local in nature, their significance extended far beyond Ohio’s borders.

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<sup>7</sup> E.g., Jonathan H. Adler, *Fables of the Cuyahoga: Reconstructing a History of Environmental Protection*, 14 *FORDHAM ENVTL. L. J.* 89, 90 (2002).

<sup>8</sup> See *id.* at 99.

<sup>9</sup> See generally *id.*

<sup>10</sup> See generally *id.* (for the importance of the Cuyahoga River Fire to the enactment of environmental legislation in the 1970’s.). The CWA and the SWDA are just two environmental laws, among many others, passed by Congress during this time. *Infra* note 11.

<sup>11</sup> 33 U.S.C.S. §§ 1251-1387 (LexisNexis, Lexis Advance through PL 115-22).

<sup>12</sup> 42 U.S.C.S. §§ 300j (f) (LexisNexis, Lexis Advance through PL 115-22).

<sup>13</sup> Howarth, R. et al., *Nutrient Pollution of Coastal Rivers, Bays, and Seas*, Ecological Society of America, *Issues in Ecology* No. 7 (2000); see also *Nutrient Pollution – Eutrophication*, NAT’L OCEANIC & ATMOSPHERIC ADMIN., (Mar. 25, 2008), [http://oceanservice.noaa.gov/education/kits/estuaries/media/supp\\_estuar09b\\_eutro.html](http://oceanservice.noaa.gov/education/kits/estuaries/media/supp_estuar09b_eutro.html) (“Nutrient pollution is the single largest pollution problem affecting coastal waters of the United States.”).

<sup>14</sup> See Fitzsimmons, *supra*, note 4; see also Robin Erb, *Toledo drinking-water ban lifted, but residents wary*, USA TODAY (Aug. 4, 2014, 8:51 PM), <http://www.usatoday.com/story/news/nation/2014/08/04/toledo-mayor-says-water-is-safe/13602357/>; see also, Michael Muskal, *Water ban over, Toledo drinks from tap again; Erie algae a big problem*, LA TIMES (Aug. 4, 2014, 9:27 AM), <http://www.latimes.com/nation/nationnow/la-na-nn-toledo-lifts-ban-drinking-tap-water-20140804-story.html>.

For example, to this day, the image of the burning river “endures as a symbol of rampant environmental despoliation prior to the enactment of federal environmental laws.”<sup>15</sup> Likewise, Toledo’s tap water ban has been symbolic of the current threat that nutrient pollution poses to the sources of United States tap water.

### B. What is Nutrient Pollution?

Nutrient pollution can be defined broadly as “the process where too many nutrients, mainly nitrogen and phosphorus, are added to bodies of water and can act like fertilizer, causing excessive growth of algae.”<sup>16</sup> Nitrogen and phosphorus are natural nutrients in most aquatic ecosystems, but when too much enters the water, it creates problems for drinking sources all over the country.<sup>17</sup> Currently, “nutrient pollution is one of America’s most widespread, costly and challenging water quality problems.”<sup>18</sup>

#### 1. Eutrophication

Eutrophication is the process by which a body of water becomes enriched in dissolved nutrients that stimulate the growth of aquatic plant life.<sup>19</sup> In other words, eutrophication is the ecosystem’s response to the presence of excessive nutrients, mainly dissolved phosphorus and nitrogen, in the water.<sup>20</sup> Eutrophication is particularly evident in slow-moving rivers and shallow lakes where water temperatures are ideal for plant growth.<sup>21</sup> The process occurs naturally, but it transpires over multiple centuries as nutrient concentrations in aging lakes and rivers gradually build up over time.<sup>22</sup> However, eutrophication can also be

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<sup>15</sup> See Adler, *supra* note 7, at 92.

<sup>16</sup> See *What is nutrient pollution?*, NAT’L OCEANIC & ATMOSPHERIC ADMIN. (last updated Mar. 20, 2014), <http://oceanservice.noaa.gov/facts/nutpollution.html> (explaining that phosphorus causes algae growth in fresh water and that nitrogen causes algae growth in sea water).

<sup>17</sup> See generally *The Problem*, ENVTL. PROT. AGENCY (Aug. 3, 2015), <http://www2.epa.gov/nutrientpollution/problem>. Phosphorus leads to harmful algal blooms and cyanotoxins which are harmful to people when consumed. See discussion *infra* Parts II.C.2, II.C.3., II.C.4. Nitrate, a form of nitrogen, is also harmful to people when consumed. See discussion *infra* Part II.D.2.

<sup>18</sup> See *The Problem*, *supra* note 17.

<sup>19</sup> MERRIAM-WEBSTER, <http://www.merriam-webster.com/dictionary/eutrophication> (last visited Jan. 2, 2016).

<sup>20</sup> See *Nutrient Pollution*, *supra* note 13.

<sup>21</sup> See *Blue-Green Algae*, WISC. DEP’T OF NAT’L RESOURCES, <http://dnr.wi.gov/lakes/bluegreenalgae/> (last accessed Apr. 24, 2017) (“Blue-green algae generally grow in lakes, ponds, and slow-moving streams when the water is warm and enriched with nutrients like phosphorus or nitrogen.”).

<sup>22</sup> E.g., *Eutrophication*, OR. ST. UNIV. (last updated Oct. 29, 2012), <http://people.oregonstate.edu/~muiir/eutrophi.htm>.

human-caused,<sup>23</sup> in which case, waters can become eutrophic very quickly as human activity greatly increases the flow of nutrients into the water.<sup>24</sup>

*C. Phosphorus: It's What Plants Crave*

Phosphorus is an essential nutrient for plant growth.<sup>25</sup> For plants in fresh water, phosphorus is an especially important nutrient because the functions of it cannot be performed by any other nutrient.<sup>26</sup> Also, it exists naturally in the least amount in comparison to how much plants could use.<sup>27</sup> Consequentially, plant growth in fresh water is usually limited to the amount of phosphorus that is available in the water for plants to utilize.<sup>28</sup>

Phosphorus can be found in nature in different forms.<sup>29</sup> The nutrient can either be attached to sediment (“particulate” phosphorus) or dissolved in water (“dissolved” phosphorus).<sup>30</sup> The form that phosphorus is important because it dramatically affects its overall usefulness for plants.<sup>31</sup> In comparison, dissolved phosphorus is much

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<sup>23</sup> *Id.*

<sup>24</sup> *About Eutrophication*, WORLD RES. INST., <http://www.wri.org/our-work/project/eutrophication-and-hypoxia/about-eutrophication> (last visited Dec. 7, 2015) (“[H]uman activities have resulted in the near doubling of nitrogen and tripling of phosphorus flows to the environment when compared to natural values.”).

<sup>25</sup> See Sheila Murphy, *General Information on Phosphorus*, CITY OF BOULDER/USGS WATER QUALITY MONITORING (April 23, 2007), <http://bcn.boulder.co.us/basin/data/NEW/info/TP.html> (“Phosphorus is a nutrient required by all organisms for the basic processes of life”) [hereinafter *Murphy Phosphorus*]; see also *Factors influencing aquatic plant abundance*, MINN. DEP’T OF NAT. RES., <http://www.dnr.state.mn.us/shorelandmgmt/apg/abundance.html> (last viewed Apr. 24, 2017) (“Like their land-based cousins, aquatic plants need sunlight, water, carbon dioxide, and nutrients—including phosphorus, nitrogen, and potassium to grow.”).

<sup>26</sup> *Functions of Phosphorus in Plants*, 83 BETTER CROPS 6, 6 (1999), [https://www.ipni.net/ppiweb/bcrops.nsf/\\$webindex/ECBABED567ABDCDD852568EF0063C9F4/\\$file/99-1p06.pdf](https://www.ipni.net/ppiweb/bcrops.nsf/$webindex/ECBABED567ABDCDD852568EF0063C9F4/$file/99-1p06.pdf) (explaining the role of phosphorus in plant growth).

<sup>27</sup> See Murphy, *supra* note 25, (“In freshwater lakes and rivers, phosphorus is often the growth limiting nutrient, because it occurs in the least amount relative to the needs of plants.”).

<sup>28</sup> In contrast, nitrogen is the growth limiting nutrient in sea water. Therefore, nitrate pollution has created problems in coastal waters analogous to the problems created by phosphorus in fresh water. The Gulf of Mexico is the most notable example. Ari Massefski & Kara Capelli, *Dead Zone: The Source of the Gulf of Mexico’s Hypoxia*, USGS SCI. FEATURES (June 21, 2012, 11:08 AM), [http://www.usgs.gov/blogs/features/usgs\\_top\\_story/dead-zone-the-source-of-the-gulf-of-mexicos-hypoxia/](http://www.usgs.gov/blogs/features/usgs_top_story/dead-zone-the-source-of-the-gulf-of-mexicos-hypoxia/).

<sup>29</sup> See generally Murphy, *supra* note 25.

<sup>30</sup> See generally Kenneth Kilbert, Tiffany Tisler & M. Zack Hohl, *Legal Tools for Reducing Harmful Algal Blooms in Lake Erie*, 44 U. TOL. L. REV. 69 (2012) [hereinafter *Toledo*].

<sup>31</sup> Until recently, phosphorus was thought to only exist in particulate form, meaning attached to sediment, but it is now known that phosphorus can also be dissolved in water. See

more bioavailable, or usable.<sup>32</sup> For this reason, when excessive amounts of dissolved phosphorus make its way into fresh water bodies, it can lead to massive plant growth.<sup>33</sup>

### 1. Algae

The term “algae” is a scientifically informal term that is used to categorize a diverse range of aquatic plants.<sup>34</sup> Algae, like other plants, are broadly characterized by their ability to photosynthesize, make chlorophyll, and use sunlight as an energy source for growth.<sup>35</sup> Additionally, like other plants in fresh water, the growth of algae is limited by the amount of phosphorus available.<sup>36</sup> Thus, when sunlight and phosphorus are abundant and readily available in fresh waters, algae has the potential to “bloom,” or multiply very rapidly.<sup>37</sup>

### 2. Harmful Algal Blooms

In general, algae are not harmful whatsoever, but rather, they are crucial to a healthy fresh water ecosystem since they form the base of aquatic food webs.<sup>38</sup> While most algae are not harmful, some types, such as blue-green, can produce hazardous toxins<sup>39</sup> that can be very harmful to humans when touched or consumed.<sup>40</sup> When these toxin producing blooms occur, they are known as harmful algal blooms

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The City Club of Cleveland, *Jeffrey M. Reutter 11.11.15*, YouTube (Nov. 11, 2015), <https://www.youtube.com/watch?v=dUbl0bxePbU>.

<sup>32</sup> See generally *Toledo supra*, note 30. As a result, dissolved phosphorus can be used much more effectively by plants compared to its sedimentary counterpart. *Id.*

<sup>33</sup> *Id.*

<sup>34</sup> See *Beneficial Freshwater Algae*, ST. OF WASH. DEP’T OF ECOLOGY, <http://www.ecy.wa.gov/programs/wq/plants/algae/lakes/OtherFreshwaterAlgae.html> (last visited Dec. 5, 2015), (“Thousands of species of algae occur world-wide in both fresh and marine waters.”).

<sup>35</sup> See *Algae vs. “harmful algae” – what’s the difference?*, Nat’l CTR. FOR WATER QUALITY RESEARCH, <http://lakeeriealgae.com/algae-vs-harmful-algae/> (last visited Oct. 12, 2015).

<sup>36</sup> See generally *Toledo, supra* note 30.

<sup>37</sup> See generally *See Algae vs. “harmful algae” – what’s the difference?*, *supra* note 35 (“when conditions are right – sunny days with lots of phosphorus and nitrogen in the water – algae can multiply very rapidly, causing algae “blooms.”).

<sup>38</sup> See *Food Chains and Food Webs*, EPA.GOV, <http://www.epa.gov/sites/production/files/documents/foodchainsandfoodwebs.pdf> (last visited Nov. 18, 2015).

<sup>39</sup> *Harmful Algal Blooms*, OHIO DEP’T OF HEALTH, <https://www.odh.ohio.gov/~media/ODH/ASSETS/Files/eh/HABS/2015/ODH%20HABS%20General%20Fact%20Sheet.pdf> (last visited Nov. 20, 2015). The classifications of cyanobacterial toxins are: “neurotoxins, which affect the nervous system; hepatotoxins, which affect the liver; and dermatotoxins, which affect the skin.” *Id.*

<sup>40</sup> See generally *Toledo, supra* note 30.

(“HABs”).<sup>41</sup> HABs have been documented as a problem in waters across the United States,<sup>42</sup> but nowhere has received more attention than Ohio and Lake Erie.<sup>43</sup> Since the 1990s, HABs have become a reoccurring problem in Lake Erie and they have come to be particularly intense and extensive in recent years;<sup>44</sup> however, HABs are not new to Lake Erie or the region.<sup>45</sup> In the 1960’s, Lake Erie’s coast was full of foul-smelling algae that scientists identified as “blue greens.”<sup>46</sup> As a result, drinking water developed taste and odor problems, and beaches along the northern shore of Ohio had to be closed because of high levels of bacteria.<sup>47</sup>

### 3. Cyanobacteria

In the United States, and worldwide, the majority of the freshwater HAB problems that are reported are due to one group of algae, the cyanobacteria.<sup>48</sup> Though technically classified as a bacteria, cyanobacteria is commonly known as blue-green algae because of

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<sup>41</sup> *Id.*

<sup>42</sup> Jennifer L. Graham et al., *Monitoring Recreational Freshwaters*, 29 LAKELINES 18 (2009), [http://ks.water.usgs.gov/static\\_pages/studies/water\\_quality/cyanobacteria/LLsummer-graham2.pdf](http://ks.water.usgs.gov/static_pages/studies/water_quality/cyanobacteria/LLsummer-graham2.pdf), (“cyanobacterial toxins (cyanotoxins) in freshwaters have been implicated in human and animal illness and death in over 50 countries, including at least 36 states in the United States”); see generally 2014 Harmful Algal Bloom State Survey, RES. MEDIA & THE NAT’L WILDLIFE FED’N (2014), <https://s3.amazonaws.com/wateratlasimages/The-2014-Harmful-Algal-Bloom-State-Survey.pdf> (summarizing a 50 states survey conducted by the National Wildlife Federal in which every state that completed the survey acknowledged HABs as an issue, with the majority calling the issue “serious.”).

<sup>43</sup> See *Toledo*, *supra* note 30, at 1.

<sup>44</sup> *Id.*; see also *Ohio Lake Erie Phosphorus Task Force Final Report*, OHIO ENVTL. PROT. AGENCY, 16 (Apr. 2010), [http://www.epa.ohio.gov/portals/35/lakeerie/ptaskforce/Task\\_Force\\_Final\\_Report\\_April\\_2010.pdf](http://www.epa.ohio.gov/portals/35/lakeerie/ptaskforce/Task_Force_Final_Report_April_2010.pdf) (“In 1995, *Microcystis*...blooms began to occur in [Lake Erie] and recurred with varying intensity through 2002. In August 2003, a massive bloom of *Microcystis* formed in the western basin and persisted for nearly a month. Blooms also occurred in 2004, 2005, and 2006, with particularly extensive blooms in 2007 and 2008. The 2009 bloom extended into the central basin.”) [hereinafter *Task Force*].

<sup>45</sup> See *infra*, note 46.

<sup>46</sup> Lakewide Management Plans, *A Primer on Phosphorus in Lake Erie*, U.S. ENVTL. PROT. AGENCY, <http://www3.epa.gov/greatlakes/lakeerie/primer.html> (last updated July 2, 2012) (“Scientists from the U.S. and Canada...identified the importance of phosphorus as an algal nutrient. An oversupply of phosphorus was causing a huge excess of growth of algae”). Presumably, this is the same algae creating problems in Lake Erie today.

<sup>47</sup> *Id.*

<sup>48</sup> E.g., C.B. Lopez et al., *Scientific Assessment of Freshwater Harmful Algal Blooms*, Interagency Working Group on Harmful Algal Blooms, Hypoxia, and Human Health of the Joint Subcommittee on Ocean Science and Technology, 1 (2008), <https://www.whitehouse.gov/sites/default/files/microsites/ostp/frshh2o0708.pdf>.

distinct characteristics it shares with algae.<sup>49</sup> Like algae, cyanobacteria are “aquatic and photosynthetic, that is, they live in the water, and can manufacture their own food.”<sup>50</sup> Additionally, cyanobacteria are analogous to microalgae<sup>51</sup> in that they are too small to be seen individually, but during a bloom, both cyanobacteria and microalgae can form visible colonies that float to the surface where they form scum layers or floating mats.<sup>52</sup>

Cyanobacteria HABs produce toxins, commonly referred to as cyanotoxins, which are very harmful to humans.<sup>53</sup> In United States tap water, there are three commonly found cyanotoxins,<sup>54</sup> but the most widespread are microcystins.<sup>55</sup> There are at least 80 known microcystins, but Microcystin LR is generally considered to be the most toxic type.<sup>56</sup>

#### 4. The Harmful Effects of Cyanotoxins

Drinking contaminated water is the single most common and harmful type of exposure to cyanotoxins, but skin contact can also cause significant discomforts.<sup>57</sup> Cyanotoxins are very difficult to filter from

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<sup>49</sup> See *Algae vs. “harmful algae” – what’s the difference?*, *supra* note 35 (“Blue-green algae or cyanobacteria possess characteristics of algae – they make chlorophyll-a and use sunlight as an energy source for growth, but have bacterial cells (prokaryotic) rather than algal cells (eukaryotic)”); see also *Toledo*, *supra* note 30, at 1.

<sup>50</sup> *Introduction to the Cyanobacteria*, <http://www.ucmp.berkeley.edu/bacteria/cyanointro.html> (last visited Nov. 24, 2015).

<sup>51</sup> *What is Microalgae*, HULAB, <http://hulab.ucf.edu/microalgae/introduction/what-is-microalgae> (last visited Jan. 2, 2016) (“Microalgae are unicellular organisms... [and their] unicellular structure allows them to easily convert sunlight into chemical energy.”).

<sup>52</sup> See *Harmful Algal Blooms*, *supra* note 39 (“Some of these HABs are visible as thick mats or scum on the surface of the water. These mats can vary in color, including bluishgreen, bright green, or even red or maroon.”); see also *Blue-Green Algae*, *supra* note 21.

<sup>53</sup> *Toledo*, *supra* note 30, at 31; see also *Graham*, *supra* note 42 (“The cyanobacteria produce a diverse group of toxins with potentially severe human health effects, including acute hepatoenteritis and neurotoxicity...”). *Id.*

<sup>54</sup> *Cyanobacteria and Cyanotoxins: Information for Drinking Water Systems*, U.S. ENVTL. PROT. AGENCY, 1 (Sept. 2014), [http://www2.epa.gov/sites/production/files/2014-08/documents/cyanobacteria\\_factsheet.pdf](http://www2.epa.gov/sites/production/files/2014-08/documents/cyanobacteria_factsheet.pdf) [hereinafter *Cyanobacteria*]. The three most common and toxic cyanotoxins are: microcystin, anatoxin-a, and cylindrospermopsin. *Id.*

<sup>55</sup> *Id.*

<sup>56</sup> *Id.*; Microcystin LR is more toxic than other more well-known toxic chemical such as cyanide. See *The City Club of Cleveland*, *supra* note 31.

<sup>57</sup> *Health Effects Support Document for the Cyanobacterial Toxin Microcystins*, U.S. ENVTL. PROT. AGENCY, xii (June 2015), <http://www.epa.gov/sites/production/files/2015-06/documents/microcystins-support-report-2015.pdf> (“Drinking water is an important source of potential exposure to cyanotoxins. Exposure to cyanobacteria and their toxins may also occur by ingestion of toxin-contaminated food, by inhalation and dermal contact during bathing or showering, and during recreational activities in waterbodies with the toxins.”); see also *2015 Drinking Water Health Advisories for Two Cyanobacterial Toxins*, U.S. ENVTL. PROT. AGENCY,

drinking water and the toxins themselves do not have a taste or odor.<sup>58</sup> As a result, “blooms of toxigenic cyanobacteria pose a particular threat if they occur in drinking water sources.”<sup>59</sup> Moreover, unlike most bacteria or harmful contaminants in fresh water, cyanotoxins are not killed when the water is boiled.<sup>60</sup> Instead, boiling water contaminated with cyanotoxins only increases the toxic concentrations because as water evaporates, the amount of toxins remains the same.<sup>61</sup>

There are several factors that determine the impact cyanotoxins can potentially have on the human body. The concentration of cyanotoxins, the type of exposure a person has, and the length of time a person is exposed are all significant factors, but the type of exposure (i.e. whether the toxins are consumed or merely in contact with the skin) is the single most determinative factor.<sup>62</sup> For example, swimming in contaminated water could cause “eye irritation, rashes, and blisters around the mouth and nose.”<sup>63</sup> Meanwhile, ingesting contaminated water over extended periods of time can lead to much more severe health effects such as liver damage and dysfunction.<sup>64</sup> According to the United States Environmental Protection Agency (“EPA”), high levels of cyanotoxins in recreational water and drinking water may cause a wide range of symptoms in humans including:

fever, headaches, muscle and joint pain, blisters, stomach cramps, diarrhea, vomiting, mouth ulcers, and allergic reactions. Such effects can occur within minutes to days after exposure. In severe cases,

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2 (June 2015), <http://www.epa.gov/sites/production/files/2015-06/documents/cyanotoxins-fact-sheet-2015.pdf>.

<sup>58</sup> Cyanotoxins in Drinking Water, *General Information About Cyanotoxins and their Health Effects* (June 17, 2015), <https://public.health.oregon.gov/HealthyEnvironments/DrinkingWater/Operations/Treatment/Documents/algae/BMP-HABs-Exhibit1.pdf> (“However, cyanobacteria often (though not always) produce other non-toxic chemical by-products that have a strong taste and odor... Because cyanobacteria can and sometimes do produce toxins without causing taste or odor problems, you cannot tell whether or not cyanotoxins are present by smelling or tasting the water.”) [hereinafter *Public Health Oregon*].

<sup>59</sup> See Lopez, *supra*, note 48, at 1.

<sup>60</sup> *Id.* at 26.

<sup>61</sup> *Id.*; see also *Public Health Oregon*, *supra* note 58.

<sup>62</sup> See *Blue-green Algae/Cyanobacteria Harmful Algal Blooms (HABs)*, OHIO DEP’T OF NAT’L RES. DIV. OF WATERCRAFT (2016), <http://watercraft.ohiodnr.gov/education-safety/safety-library/health-safety/harmful-algal-blooms>.

<sup>63</sup> *Water-related diseases: Cyanobacterial Toxins*, WHO (2016), [http://www.who.int/water\\_sanitation\\_health/diseases-risks/diseases/cyanobacteria/en/](http://www.who.int/water_sanitation_health/diseases-risks/diseases/cyanobacteria/en/).

<sup>64</sup> See generally *Health and Ecological Effects*, U.S. ENVTL. PROT. AGENCY (last updated June 17, 2015), <http://www.epa.gov/nutrient-policy-data/health-and-ecological-effects>. Dysfunction is defined as an “abnormality or impairment in the function of a specified bodily organ or system.” OXFORD DICTIONARIES, [http://www.oxforddictionaries.com/us/definition/american\\_english/dysfunction](http://www.oxforddictionaries.com/us/definition/american_english/dysfunction) (last visited Jan. 8, 2016).

seizures, liver failure, respiratory arrest, and (rarely) death may occur...There is evidence that long-term exposure to [cyanobacteria] may promote the growth of tumors and may cause cancer.<sup>65</sup>

While skin contact with cyanotoxins can create some considerable discomforts, it does not pose a severe threat to humans. Admittedly, consumption of cyanotoxins is not particularly threatening to human health either as the symptoms will likely resemble flu so long as cyanotoxins are only consumed in relatively low concentrations.<sup>66</sup> However, the effects of cyanotoxins on the human body are such that prevents people from using of the affected water. In turn, water supplies contaminated with cyanotoxins can result in enormous numbers of people losing access to the fresh tap water.<sup>67</sup>

*D. Nitrogen: Reduce, Reuse, Recycle*

Nitrogen is a dynamic element that can take on many forms.<sup>68</sup> Nitrogen gas makes up 78% of the earth's atmosphere making it the most common form of nitrogen.<sup>69</sup> However, nitrogen gas is just one form of the element.<sup>70</sup> Through a process known as the nitrogen cycle, nitrogen is continually recycled and transformed by plants and animals.<sup>71</sup> The cycle starts with nitrogen in its gaseous form and follows it as it undergoes a series of transformations before ultimately reaching its final form called nitrate.<sup>72</sup> Nitrate is eventually reduced back to nitrogen gas, thereby completing the nitrogen cycle.<sup>73</sup> Understanding the cycle is important because nitrogen, like phosphorus, is essential for

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<sup>65</sup> See *Cyanobacteria*, *supra* note 54, at 3.

<sup>66</sup> *Id.*

<sup>67</sup> See Fitzsimmons, *supra* note 4.

<sup>68</sup> Tai McClellan, *Nitrogen*, UNIV. OF HAW. AT MANOA, [http://www.ctahr.hawaii.edu/mauisoil/c\\_nutrients01.aspx](http://www.ctahr.hawaii.edu/mauisoil/c_nutrients01.aspx) (last visited Dec. 13, 2015) (discussing the forms of nitrogen including: nitrogen gas, ammonium, ammonia, nitrates, nitrite, and organic nitrogen).

<sup>69</sup> Sheila Murphy, *General Information on Nitrogen*, CITY OF BOULDER/USGS WATER QUALITY MONITORING (April 23, 2007), <http://bcn.boulder.co.us/basin/data/NEW/info/NO3+NO2.html>.

<sup>70</sup> See McClellan, *supra* note 68.

<sup>71</sup> See Murphy, *supra* note 69.

<sup>72</sup> *Id.*

<sup>73</sup> See McClellan, *supra* note 68.

plant growth.<sup>74</sup> However, nitrogen can only be used by plants in its forms of ammonium and nitrate.<sup>75</sup>

### 1. Nitrogen Fertilizers

After World War II, nitrogen fertilizers became widely used in the United States.<sup>76</sup> Nitrogen fertilizers provided an inexpensive source of usable nitrogen for farmer's crops and their use resulted in dramatic increases in agricultural productivity.<sup>77</sup> As nitrogen fertilizers break down, the resulting byproduct is nitrate which is readily used by crops.<sup>78</sup> Since the 1950s, "nitrogen fertilizer use has increased over five-fold in the [United States]."<sup>79</sup>

### 2. Blue Baby Syndrome

Nitrate is highly soluble in water and it can easily be transported in rivers and streams.<sup>80</sup> For this reason, nitrate concentrations are often abnormally high in fresh waters with nearby agricultural land.<sup>81</sup> While nitrate may be great for plant growth, it can be very harmful when consumed by people. Once consumed, nitrate is broken down inside the stomach where it is transformed into nitrite.<sup>82</sup> The nitrite then reacts with the hemoglobin in human blood to produce methemoglobin which limits the body's red blood cells' ability to carry oxygen.<sup>83</sup> The result is

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<sup>74</sup> See Murphy, *supra* note 69. ("Nitrogen is required by all organisms for the basic processes of life to make proteins, to grow, and to reproduce."); see also McClellan, *supra* note 68. ("Photosynthesis occurs at high rates when there is sufficient nitrogen. A plant receiving sufficient nitrogen will typically exhibit vigorous plant growth.").

<sup>75</sup> *Nitrogen and Water*, THE U.S. GEOLOGICAL SURVEY WATER SCI. SCH. (Dec. 02, 2015), <http://water.usgs.gov/edu/nitrogen.html> ("Nitrogen, in the forms of nitrate, nitrite, or ammonium, is a nutrient needed for plant growth."); see also McClellan, *supra* note 68 ("Although atmospheric nitrogen gas (N<sub>2</sub>) makes up approximately 78% of the air, it cannot be directly used by plants.").

<sup>76</sup> Mary H. Ward, *Too Much of a Good Thing? Nitrate from Nitrogen Fertilizers and Cancer: President's Cancer Panel - October 21, 2008*, 4 REVIEWS ON ENVTL. HEALTH 357(2009), <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3068045/pdf/nihms-281252.pdf>.

<sup>77</sup> *Id.*

<sup>78</sup> *Id.*

<sup>79</sup> *Id.*

<sup>80</sup> See Murphy, *supra* note 69.

<sup>81</sup> See Ward, *supra* note 76; see also Water Sanitation Health, *Water-Related Diseases: Methaemoglobinemia*, WHO (2016), [http://www.who.int/water\\_sanitation\\_health/diseases/methaemoglob/en/](http://www.who.int/water_sanitation_health/diseases/methaemoglob/en/).

<sup>82</sup> See Murphy, *supra* note 69.

<sup>83</sup> *Id.*

a medical disorder known as methemoglobinemia – more commonly known as “Blue Baby Syndrome.”<sup>84</sup>

Blue Baby Syndrome, as the name implies, primarily affects infants under six months of age,<sup>85</sup> although, older people may also be at risk as well.<sup>86</sup> Infants are born with relatively low stomach acidity which allows the growth of certain bacteria that can convert nitrate to nitrite.<sup>87</sup> As an infant ages, stomach acidity increases and, subsequently, the number of nitrate-converting bacteria decrease.<sup>88</sup>

Infants are usually exposed to nitrate through bottle feeding when water contaminated with nitrate is used to make baby formula.<sup>89</sup> When an infant consumes nitrate, they will typically begin to develop blueness around the mouth, hands, and feet.<sup>90</sup> If nitrate consumption continues, infants may begin to experience trouble breathing, vomiting, or diarrhea and in severe cases, the consumption of nitrate can result in seizures and even the death of bottle fed infants.<sup>91</sup> Since nitrate is tasteless, odorless, and colorless, it can pose very serious threats if left unfiltered from tap water.<sup>92</sup> Due to the swelling levels of nutrient pollution from agricultural sources, Americans living in dense agricultural regions have become increasingly vulnerable to consuming nitrate contaminated drinking water.<sup>93</sup>

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<sup>84</sup> *Methemoglobinemia*, U.S. NAT'L LIBRARY OF MED. (last updated Dec. 2, 2015), <https://www.nlm.nih.gov/medlineplus/ency/article/000562.htm> (“Methemoglobinemia is a blood disorder in which an abnormal amount of methemoglobin -- a form of hemoglobin -- is produced. Hemoglobin is the protein in red blood cells that carries and distributes oxygen to the body.”).

<sup>85</sup> *See* Water Sanitation Health, *supra* note 81.

<sup>86</sup> *Id.* (“Older people may also be at risk because of decreased gastric acid secretion...Others at risk for developing methaemoglobinaemia include: adults with a hereditary predisposition, people with peptic ulcers or chronic gastritis, as well as dialysis patients.”).

<sup>87</sup> Gregory D. Jennings & Ronald E. Sneed, *Nitrate in Drinking Water*, N.C. STATE COOP. EXTENSION SERV. (Mar. 1996), <https://inspiredliving.com/water-pollution/nitrates-drinking-water.htm>.

<sup>88</sup> *Id.*

<sup>89</sup> *See* Water Sanitation Health, *supra* note 81.

<sup>90</sup> *Id.*

<sup>91</sup> *Id.*

<sup>92</sup> *See* Jennings & Sneed, *supra* note 87.

<sup>93</sup> *See* *Methemoglobinemia*, *supra* note 84. *See also* Water Sanitation Health, *supra* note 81 (“The natural level of nitrites and nitrates from the environment is normally a few milligrams per litre, although high levels may occur naturally in some areas. Intense farming practice may increase this to more than 50 mg/litre.”).

### III. THE LONG ARM OF THE LAW IS NOT LONG ENOUGH: THE CLEAN WATER AND THE SAFE WATER DRINKING ACT

#### A. *The Ins and Outs of the Clean Water Act*

In 1948, congress enacted Federal Water Pollution Control Act which was the first major law in United States history to address water pollution.<sup>94</sup> Then, in 1972, growing public awareness and concern for controlling water pollution<sup>95</sup> led to the enactment of sweeping amendments which significantly reorganized and expanded Act.<sup>96</sup> As amended “the law became commonly known as the Clean Water Act (“CWA”).<sup>97</sup> The CWA declared its objective as the restoration and maintenance of the chemical, physical, and biological integrity of the Nation’s waters.<sup>98</sup> The Act established the basic structure for regulating discharges of pollutants in United States waters and this structure has remained largely unchanged ever since.<sup>99</sup>

Sources of water pollution fall into one of two categories: a point source<sup>100</sup> or a nonpoint source (“NPS”).<sup>101</sup> Since point sources were thought to be primarily responsible for the Cuyahoga River Fire in 1969, and the nation’s polluted waterways in general, the CWA sought to reduce water pollution by specifically focusing “its regulatory firepower on pollution from point sources.”<sup>102</sup> As a result, the CWA “made it unlawful for any person to discharge any pollutant from a point source

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<sup>94</sup> *History of the Clean Water Act*, U.S. ENVTL. PROT. AGENCY (last updated June 1, 2015), <http://www.epa.gov/laws-regulations/history-clean-water-act> [hereinafter *CWA History*].

<sup>95</sup> The growing concern was largely attributed to the Cuyahoga River Fire of 1969. See Adler, *supra* note 7.

<sup>96</sup> See *History of the Clean Water Act*, *supra* note 94; see also *Summary of the Clean Water Act*, U.S. ENVTL. PROT. AGENCY, <https://www.epa.gov/laws-regulations/summary-clean-water-act> (last viewed Apr. 24, 2017) [hereinafter *CWA Summary*].

<sup>97</sup> 33 U.S.C.S. §1251 (LexisNexis, Lexis Advance through PL 115-22, approved 4/3/17). The Act is commonly referred to as the Clean Water Act.

<sup>98</sup> *Id.*

<sup>99</sup> See *CWA Summary*, *supra* note 96.

<sup>100</sup> See generally *Categories of Pollution: Point Source*, NAT’L OCEANIC & ATMOSPHERIC ADMIN. (last updated Mar. 25, 2008) <http://oceanservice.noaa.gov/education/kits/pollution/03pointsource.html>.

<sup>101</sup> *What is Nonpoint Source?*, NAT’L OCEANIC & ATMOSPHERIC ADMIN. (last updated Jan. 5, 2016), <http://www2.epa.gov/polluted-runoff-nonpoint-source-pollution/what-nonpoint-source> (“The term “nonpoint source” is defined to mean any source of water pollution that does not meet the legal definition of “point source” in section 502(14) of the Clean Water Act.”); see also Jan G. Laitos & Heidi Ruckriegle, *The Clean Water Act and the Challenge of Agricultural Pollution*, 37 VT. L. REV. 1033, 1035 (2013) (“The Clean Water Act (CWA) assumes that those responsible for water pollution may be divided into two categories: point and nonpoint sources.”) [hereinafter *Vermont*].

<sup>102</sup> *Toledo*, *supra* note 30, at 4.

into navigable waters, unless a permit was obtained under its provisions.”<sup>103</sup>

#### 1. Point Sources

The most important term in the CWA is the definition of a “point source.” This is because most of the effective regulatory provisions in the Act only apply to discharges originating from point sources.<sup>104</sup> The CWA defines a point source as “any discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged.”<sup>105</sup> The definition of a point source also states “[the definition of a point source] does not include agricultural storm water discharges and return flows from irrigated agriculture.”<sup>106</sup> This second part of the definition is commonly referred to as the “agricultural exemptions.”<sup>107</sup>

Because the CWA makes it illegal to “to discharge any pollutant from a point source,” the Act also defines all of the ambiguous terms. For example, the “discharge of a pollutant” is defined as “any addition of any pollutant to navigable waters from any point source.”<sup>108</sup> Likewise, a “pollutant” is defined to include, “among other things...agricultural waste.”<sup>109</sup> Moreover, “navigable waters” is defined as “the waters of the United States.”<sup>110</sup> Although agricultural waste is specifically identified in the definition of a “pollutant,”<sup>111</sup> the agricultural industry has been able to discharge nutrients, a type of

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<sup>103</sup> See *CWA History*, *supra* note 94; see also 33 U.S.C. § 1342(a)(1) (“the Administrator may, after opportunity for public hearing issue a permit for the discharge of any pollutant, or combination of pollutants.”).

<sup>104</sup> See generally *What is Nonpoint Source?*, *supra* note 101.

<sup>105</sup> 33 U.S.C.S. §1362(14) (LexisNexis, Lexis Advance through PL 115-22, approved Apr. 3, 2017)).

<sup>106</sup> *Id.*

<sup>107</sup> *Clean Water Exclusions and Exemptions Continue for Agriculture*, U.S. ENVTL. PROT. AGENCY (2014), [http://www.epa.gov/sites/production/files/2014-03/documents/cwa\\_ag\\_exclusions\\_exemptions.pdf](http://www.epa.gov/sites/production/files/2014-03/documents/cwa_ag_exclusions_exemptions.pdf).

<sup>108</sup> Clean Water Act § 502(12) (codified as 33 U.S.C. § 1362(12) (2014)).

<sup>109</sup> Clean Water Act § 502(6) (codified as 33 U.S.C. § 1362(6) (2014)).

<sup>110</sup> Clean Water Act § 502(7) (codified as 33 U.S.C. § 1362(7)). There has been considerable legal disputes in recent years about what waters are subject to the CWA. This has prompted the EPA to issue a new rule in 2015 to clarify the definition of “waters of the United States.” James M. Taylor, *EPA Defies Supreme Court, Proposes Unprecedented Water Regulations*, HEARTLAND (July 5, 2014), <http://news.heartland.org/newspaper-article/2014/07/05/epa-defies-supreme-court-proposes-unprecedented-water-regulations>.

<sup>111</sup> See body text, *supra* note 109.

agricultural waste, due to the agricultural exemptions and the CWA inability to effectively regulate NPS pollution.<sup>112</sup>

## 2. Nonpoint Sources

Since its enactment, the CWA has been amended multiple times. Congress made fine-tuning amendments in 1977, revised portions of the law in 1981, and enacted further amendments in 1987.<sup>113</sup> In particular, the 1987 amendments, known as the Water Quality Act, have been the most significant change to the Act since its enactment.<sup>114</sup> The 1987 amendments created a new section titled “Nonpoint Source Management Programs.”<sup>115</sup>

The amendments were enacted as a direct response to a growing concern for pollution coming from NPS.<sup>116</sup> Originally, the CWA attempted to provide federal funding to incentivize individual states to control NPS pollution, but it was unsuccessful and few states participated.<sup>117</sup> As a result, the 1987 amendments created section 319 in order to combat the growing concerns for NPS pollution.<sup>118</sup> The provisions of section 319 instruct states to work together with the EPA to develop and implement Best Management Practices (“BMP”).<sup>119</sup> Because these practices are not mandated, federal spending continues to attempt to incentivize voluntary participation even decades after the enactment of the Water Quality Act.<sup>120</sup> In general, the 1987 amendments have been successful in reducing NPS pollution to some

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<sup>112</sup> Edwin D. Ongley, *Control of Water Pollution From Agriculture*, FAO IRRIGATION & DRAINAGE PAPERS 55 (Apr. 30, 2004), <http://www.fao.org/docrep/w2598e/w2598e04.htm>.

<sup>113</sup> Claudia Copeland, *Clean Water Act: A Summary of the Law*, CONG. RESEARCH SERV., at 1 (Oct. 30, 2014), <http://nationalaglawcenter.org/wp-content/uploads/assets/crs/RL30030.pdf>.

<sup>114</sup> See *Toledo*, *supra* note 30, at 19. (“In 1987, in response to the perceived failure of section 208 and the growing problem of nonpoint source pollution, Congress amended the CWA by adding section 319.”) *Id.*

<sup>115</sup> Clean Water Act § 319 (codified as 33 U.S.C. § 1329). This section is still the primary means of regulation NPS pollution.

<sup>116</sup> See Copeland, *supra* note 113, at 4. (“Prior to 1987, programs were primarily directed at point source pollution... In contrast, except for general planning activities, little attention had been given to nonpoint source pollution... despite estimates that it represents more than 50% of the nation’s remaining water pollution problems.”).

<sup>117</sup> *Id.*

<sup>118</sup> *Id.*

<sup>119</sup> *Toledo*, *supra* note 30, at 20.

<sup>120</sup> See Copeland, *supra* note 113 (“Federal financial assistance was authorized to support demonstration projects and actual control activities. These grants may cover up to 60% of program implementation costs.”).

extent,<sup>121</sup> but they have done little to affect nutrient pollution from agricultural sources.<sup>122</sup>

### 3. National Pollutant Discharge Elimination System

Because the CWA prohibits any discharge of pollutants by a point source, the Act created a permit program to allow some conditional discharges.<sup>123</sup> If a point source intends to discharge any pollutant at all, it must request a National Pollutant Discharge Elimination System (“NPDES”) permit<sup>124</sup> from the EPA. This permit authorizes the discharge of pollutants from a point source into waters of the United States that would not otherwise be allowed.<sup>125</sup> Yet, “some types of activities are exempt from permit requirements, including certain farming, ranching, and forestry practices” because the permit program only applies to discharges from point sources.<sup>126</sup>

A NPDES permit contains limits on what can be discharged, how it must be monitored and reported, and other provisions which are meant “to ensure that the discharge will not hurt water quality or people's health.”<sup>127</sup> An issued permit also specifies the acceptable level of a pollutant in a discharge.<sup>128</sup> The individual permittee can choose which technologies to use to achieve that level, but some permits however, “do contain certain generic 'best management practices' (such as installing a screen over the pipe to keep debris out of the waterway).”<sup>129</sup>

#### B. The Safe Water Drinking Act

The Safe Drinking Water Act (“SDWA”) was originally passed by Congress in 1974 to protect public health by regulating the nation’s

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<sup>121</sup> *Nonpoint Source Success Stories*, ENVTL. PROT. AGENCY, <http://www.epa.gov/polluted-runoff-nonpoint-source-pollution/nonpoint-source-success-stories> (last updated Jan. 6, 2016).

<sup>122</sup> *See* Ongley, *supra* note 112; *see also* Toledo, *supra* note 30.

<sup>123</sup> *Id.* at 5 (“To achieve its objectives, the CWA embodies the concept that all discharges into the nation’s waters are unlawful, unless specifically authorized by a permit.”).

<sup>124</sup> *Id.* at 5 (“To achieve its objectives, the CWA embodies the concept that all discharges into the nation’s waters are unlawful, unless specifically authorized by a permit.”); *see also* Clean Water Act § 402 (codified as 33 U.S.C. § 1342).

<sup>125</sup> CWA Summary, *supra* note 99.

<sup>126</sup> *See generally* Ongley, *supra* note 112.

<sup>127</sup> NPDES Frequent Questions, *How do NPDES Permits Protect Water?*, U.S. ENVTL. PROT. AGENCY, available at <http://www.epa.gov/npdes/npdes-frequent-questions> (last updated on Dec. 9, 2015).

<sup>128</sup> *Id.*

<sup>129</sup> *Id.*

public drinking water supply.<sup>130</sup> Thus, the SWDA has an inherent relationship to the CWA. The SWDA was established to “protect public health by regulating the nation's public drinking water supply and its sources: rivers, lakes, reservoirs, springs, and ground water wells.”<sup>131</sup> This Act is the key federal law for protecting tap water supplies from harmful contaminants.<sup>132</sup> Congress enacted the SWDA in response to nationwide studies of tap water which revealed “widespread water quality problems and health risks resulting from poor operating procedures, inadequate facilities, and uneven management of public water supplies in communities of all sizes.”<sup>133</sup>

#### 1. Contamination Standards

The SWDA “authorizes [the] EPA to establish minimum standards to protect tap water and requires all owners or operators of public water systems to comply with these primary (health-related) standards”<sup>134</sup> In other words, the Act authorizes the EPA to promulgate national drinking water regulations for contaminants that may pose health risks and that are likely to be present in public water supplies.<sup>135</sup> To date, the EPA has issued regulations for the acceptable levels of more than 90 contaminants in drinking water.<sup>136</sup> For example, the federal drinking water standard for nitrate is 10 mg/L which provides newborns with reasonable protection against blue baby syndrome.<sup>137</sup>

#### 2. Tap Water Coverage

SDWA applies to every public water system in the United States.<sup>138</sup> There are currently more than 170,000 public water systems providing

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<sup>130</sup> *Understanding the Safe Drinking Water Act*, U.S. ENVTL. PROT. AGENCY (June 2004), <http://www.epa.gov/sites/production/files/2015-04/documents/epa816f04030.pdf>.

<sup>131</sup> *Accord Summary of the Safe Drinking Water Act*, U.S. ENVTL. PROT. AGENCY, <http://www.epa.gov/laws-regulations/summary-safe-drinking-water-act> (last updated Oct. 8, 2015) [hereinafter *SDWA Summary*].

<sup>132</sup> Mary Tiemann, *Safe Drinking Water Act (SDWA): A Summary of the Act and Its Major Requirements*, CONG. RESEARCH SERV., 1 (Feb. 5, 2014), <https://www.fas.org/sgp/crs/misc/RL31243.pdf>.

<sup>133</sup> *Id.* at 3.

<sup>134</sup> *SDWA Summary*, *supra* note 131.

<sup>135</sup> *See generally Health Concerns Related to Nitrate and Nitrite in Private Well Water*, CAL. DEPT. OF HEALTH SERV. (Feb. 2000), [http://www.atsdr.cdc.gov/HAC/pha/reports/pacificgaselectric\\_04222003ca/pdf/apph.pdf](http://www.atsdr.cdc.gov/HAC/pha/reports/pacificgaselectric_04222003ca/pdf/apph.pdf).

<sup>136</sup> Tiemann, *supra* note 132, at 4.

<sup>137</sup> *See generally* N. Beaudet et. al., *Nitrates, Blue Baby Syndrome, and Drinking Water: A Factsheet for Families*, PEDIATRIC ENVTL. HEALTH SPECIALTY UNITS, <http://depts.washington.edu/pehsu/sites/default/files/PEHSU%20nitrates%20NATIONAL%20NET%20Aug%2015%20final.pdf> (last updated July 2014).

<sup>138</sup> *See Understanding the Safe Drinking Water Act*, *supra* note 130.

water to almost all Americans at some time in their lives.<sup>139</sup> As of 2014, the drinking water regulations under the SWDA applied to approximately 51,000 public water systems that provide piped water for human consumption to the same residences year round.<sup>140</sup> These water systems account for the tap water that is received by approximately 299 million people.<sup>141</sup> This means that the overwhelming majority of Americans receive their tap water from the same place each and every time they turn on their faucet.<sup>142</sup>

#### IV. TILE DRAINAGE SYTEMS: THE DOUBLE EDGED SWORD

##### A. Agriculture as a Nonpoint Source

Overall, the CWA has been effective in limiting the amount of nitrogen and phosphorus that enter the water via point sources, but the Act has been much less effective in controlling nutrient pollution from nonpoint sources.<sup>143</sup> Consequently, NPS nutrient pollution is currently the leading source of United States fresh water quality impairments as “states report that nonpoint source pollution is the leading remaining cause of water quality problems.”<sup>144</sup> The EPA has identified several specific causes of NPS nutrient pollution,<sup>145</sup> however, agriculture has been identified as the single largest source of fresh water nutrient pollution.<sup>146</sup> Surprisingly, the EPA has identified agriculture as the number one source of NPS pollution in general for more than twenty

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<sup>139</sup> *Id.*

<sup>140</sup> Tiemann, *supra* note 132, at 3.

<sup>141</sup> *Id.*

<sup>142</sup> The population of the United States is approximately 323 million. U.S. & WORLD POPULATION CLOCK, <http://www.census.gov/popclock/> (last visited Jan. 10, 2015).

<sup>143</sup> *Toledo*, *supra* note 30, at 3 (“Overall, regulation of nonpoint sources has been much less effective than regulation of point sources, and the amount of phosphorus entering Lake Erie and its tributaries from nonpoint sources now is far greater than the amount discharged from point sources.”).

<sup>144</sup> See *What is Nonpoint Source?*, *supra* note 101 (explaining the effect of NPS pollution on fresh water quality). “We know that [NPS] pollutants have harmful effects on drinking water supplies.” *Id.*

<sup>145</sup> *Types of Nonpoint Source*, ENVTL. PROT. AGENCY, <http://www2.epa.gov/polluted-runoff-nonpoint-source-pollution/types-nonpoint-source> (last updated Oct. 31, 2015). The major sources of NPS pollution are agriculture, forestry, hydromodification, mines, and urban areas. *Id.*

<sup>146</sup> *Nonpoint source: Agriculture*, ENVTL. PROT. AGENCY, <http://www2.epa.gov/polluted-runoff-nonpoint-source-pollution/nonpoint-source-agriculture> (last updated Oct. 31, 2015) (“agricultural nonpoint source (NPS) pollution is the leading source of water quality impacts on surveyed rivers and streams, the third largest source for lakes, the second largest source of impairments to wetlands, and a major contributor to contamination of surveyed estuaries and ground water.”).

years,<sup>147</sup> but nevertheless, agriculture has largely escaped federal regulations<sup>148</sup> “because of [the] political, administrative, and technical difficulties.”

Agriculture is a NPS of nutrient pollution because considerable nutrients originating from land used for agriculture make its way into rivers, lakes, and other bodies of water via surface runoff.<sup>149</sup> Specifically, “[f]ertilizers and animal manure, which are both rich in nitrogen and phosphorus, are the primary sources of nutrient pollution from agricultural sources.”<sup>150</sup> Unlike industrial facilities and sewage systems, agriculture does not have discharge points satisfying the definition of a point source.<sup>151</sup> Therefore, while it may be evident that nutrient pollution is originating from agricultural land, the lack of a point source makes reducing nutrient pollution very difficult under the current CWA regulations.<sup>152</sup>

### B. Changes in Farming Practices

The increasing level of nutrient pollution in fresh waters across the United States<sup>153</sup> is an indication that something has changed which the CWA currently does not take into account. Therefore, in order to understand why agriculture is the leading cause of nutrient pollution in United States fresh water, it is important to have a basic understanding of the advances in agricultural practices.

#### 1. No-Till Farming

Since the 1987 amendments to the CWA, farming practices have changed significantly. One of the most widely adopted agricultural BMPs, especially in the Midwest, has been no-till farming.<sup>154</sup> Tilling, or churning up the land before planting, is a process that has been used

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<sup>147</sup> See Ongley, *supra* note 112 (“the economics of further increases in point source regulation are being challenged, especially in view of the known impacts of non-point sources of which agriculture has the largest overall and pervasive impact... [I]t is relevant to note that agriculture is regarded as the main non-point source issue.”). *Id.*

<sup>148</sup> *Toledo*, *supra* note 30, at 18.

<sup>149</sup> See generally *The Sources and Solutions: Agriculture*, ENVTL. PROT. AGENCY, <http://www.epa.gov/nutrientpollution/sources-and-solutions-agriculture>.

<sup>150</sup> *Id.* (“Excess nutrients can impact water quality when it rains or when water and soil containing nitrogen and phosphorus wash into nearby waters or leach into ground waters.”).

<sup>151</sup> See generally *Nonpoint source: Agriculture*, *supra* note 147.

<sup>152</sup> This is because the CWA has been largely unsuccessful in regulating NPS pollution in general. See Ongley, *supra* note 147; see also *Toledo*, *supra* note 30.

<sup>153</sup> See Graham, *supra* note 42.

<sup>154</sup> See generally Larry Brown et al., *Agricultural Best Management Practices*, THE OHIO ST. UNIV, <http://ohioline.osu.edu/aex-fact/0464.html> (last visited Jan. 3, 2016) (listing the commonly used agricultural BMPs).

by famers for centuries to control weeds and enhance plant growth.<sup>155</sup> However, science has shown that the process disrupts organic material in the soil, increases erosion, and causes sediment and nutrients to run off the land in much higher rates.<sup>156</sup>

Rather than turning the field, in no-till agriculture, the farmer uses a disk or chisel plow to prepare the field for seeding.<sup>157</sup> The plows create a narrow opening in the soil that is just large enough for the crop's seeds to be injected.<sup>158</sup> Tractor attachments then inject the seeds along with fertilizer and covers them up after they have been planted. "With these new plows, the farm field can be seeded with minimal disturbance of the soil."<sup>159</sup>

## 2. Tile Drainage Systems

The most important change in farming practices has been the implementation of tile drainage systems. "Subsurface tile or artificial drainage is the practice of placing slotted drain tubes beneath the soil surface well below tillage depth to help lower the water table of poorly drained fields and/or wet areas within fields."<sup>160</sup> The practice involves installing perforated pipes several feet under the ground with a slight grade so water can flow into pipes and be transported to an area away from the field.<sup>161</sup> Since most crops will not grow in wet or swampy soil, tile drainage helps ensure soil does not become over saturated. The root systems of plants grow downward in order reach water, so if the ground is too wet, plants do not grow effectively.<sup>162</sup>

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<sup>155</sup> See generally John Horowitz et al., "No-Till" Farming Is a Growing Practice, ECON. INFO. BULLETIN NO. 70 (Nov. 2010), <http://www.ers.usda.gov/media/135329/eib70.pdf>. ("Tillage—the plowing of land for weed and pest control and to prepare for seeding—has long been part of the cropland farming enterprise."). *Id.* at iii.

<sup>156</sup> *Id.* Most agricultural BMPs are primarily aimed at reducing erosion and sediment runoff. See generally Brown, *supra* note 154.

<sup>157</sup> See *No-Till Agriculture: Good for the Soil and the Bottom Line*, FAIRFAX CTY. VA. (Sept. 2005), <http://www.fairfaxcounty.gov/nvswcd/newsletter/notill.htm>.

<sup>158</sup> *Id.*

<sup>159</sup> *Id.*

<sup>160</sup> Steve Mahoney et. al., *Subsurface (Tile) Drainage Benefits and Installation Guidance*, 57 AGRONOMY FACT SHEET SERIES 1 (2011), <http://nmsp.cals.cornell.edu/publications/factsheets/factsheet57.pdf>.

<sup>161</sup> Telephone interview with Jeffery M. Reutter, Ph.D., The Ohio State University, Director, Ohio Sea Grant College Program, Stone Laboratory, Center for Lake Erie Area Research, and Great Lakes Aquatic Ecosystem Research Consortium. [hereinafter *Telephone Interview*] Usually, tile drains are installed anywhere from 18 inches to 4 feet deep in the ground. *Id.*

<sup>162</sup> This phenomenon is known as Hydrotropism which is defined as "the growth or turning of plant roots toward or away from moisture." *Hydrotropism*, OXFORD DICTIONARIES,

Modern production agriculture in much of the central and eastern United States would not be possible without the extensive drainage network that has been built up starting [around] 1870...[However because] of its distributed nature, extended installation history, incomplete maps of subsurface drains, and the lack of a systematic survey in recent years, the current extent of drained cropland in the US is poorly known.<sup>163</sup>

Thus, tile drains have been utilized in the United States throughout the past century and though the concept and its benefits are ancient, it continues to be an important practice for modern agriculture.<sup>164</sup>

Early on, tile drainage systems were expensive and difficult to install.<sup>165</sup> However, in the latter half of the twentieth century, cheap plastic piping was introduced and industrial tractors to install the pipe became widely available.<sup>166</sup> Consequently, tile drainage systems have been installed extensively.<sup>167</sup> Moreover, “changes in input prices and crop values has made subsurface drainage an even more valuable investment.”<sup>168</sup>

Recently, places where tile drains have already been installed are being retiled so that pipes are closer together.<sup>169</sup> This is because yield benefits are well-established through improved and more densely spaced tiling systems.<sup>170</sup> Therefore, the trend of improving tiling systems and increasing tile drainage density on agricultural lands is expected to continue.<sup>171</sup> While subsurface tile drainage can provide

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[http://www.oxforddictionaries.com/us/definition/american\\_english/hydrotropism?q=Hydrotropism](http://www.oxforddictionaries.com/us/definition/american_english/hydrotropism?q=Hydrotropism).

<sup>163</sup> See D.B. Jaynes & D.E. James, *The Extent of Farm Drainage in the United States*, USDA, <http://www.ars.usda.gov/SP2UserFiles/Place/50301500/TheExtentofFarmDrainageintheUnitedStates.pdf> (last visited Nov. 20, 2015).

<sup>164</sup> See Mahoney, *supra* note 160.

<sup>165</sup> See generally Sherene Baugher, *What is it? Archaeological Evidence of 19th-Century Agricultural Drainage Systems*, 30-31 *NORTHEAST HISTORICAL ARCHAEOLOGY* 31, 23-40 (2001) <http://digitalcommons.buffalostate.edu/cgi/viewcontent.cgi?article=1115&context=neha>. (“Until the development and availability of mechanical ditching devices in the late 19th century and the commercial production (in the US) of tiles, tile drainage remained too costly for most farmers.”). *Id.*

<sup>166</sup> *Id.*

<sup>167</sup> See Jaynes, *supra* note 164.

<sup>168</sup> See Mahoney, *supra* note 160.

<sup>169</sup> Dr Ruetter, *supra* note 161. Tiles drain pipes are being laid as close as 16 feet apart from each other compared to fifty or more feet apart that they had been laid in the past.

<sup>170</sup> Task Force, *supra* note 44, at 56.

<sup>171</sup> Mark Parker, *Tiling Boom Creates Business Opportunities For No-Tillers*, NO-TILL FARMER, <http://www.no-tillfarmer.com/articles/121-tiling-boom-creates-business->

some reductions in nutrient pollution by reducing surface runoff, they can also have the adverse effect of transporting water-soluble nutrients (i.e. dissolved phosphorus and nitrate) from the field to sources of drinking water.<sup>172</sup>

*C. Dissolved Nutrients; Out of Sight, But Not Out of Mind*

Despite the efforts to reduce nutrient pollution by controlling erosion and subsurface runoff, concentrations of water soluble nitrate have been trending upward in fresh water.<sup>173</sup> As a result, public water systems in cities with nearby agriculture have struggled to provide tap water in compliance with the Federal Drinking Water standard for Nitrate.<sup>174</sup> For example, Des Moines, Iowa has “been forced to use expensive energy-intensive treatment systems to remove nitrates from drinking water.”<sup>175</sup>

Likewise, in Lake Erie, HABs have become particularly intense in recent years due to increases in dissolved phosphorus loads.<sup>176</sup> Data shows that as HABs continue to worsen in Lake Erie, the amount of total phosphorus in the Lake has remained relatively consistent.<sup>177</sup> However, there has been a change in the ratio of particulate to dissolved phosphorus in the total phosphorus concentration.<sup>178</sup> Scientists have found that the presence of particulate phosphorus has decreased –

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[opportunities-for-no-tillers](#) (posted Feb. 1, 2013 (High crop prices and the ability to expand production without expanding acres have driven demand for tiling installation to an all-time high, says Ohio State University agricultural engineer Larry Brown.”).

<sup>172</sup> See Madeline Fisher, *Tile Drains a Major Path For Phosphorus Loss, Studies Find*, AM. SOC’Y OF AGRONOMY (Oct. 3, 2014), <https://www.agronomy.org/science-news/tile-drains-major-path-phosphorus-loss-studies-find>. (“[N]early 50% on average of both dissolved, “bioavailable” phosphorus and total phosphorus left fields via the tile system—a percentage much higher than previously thought.”); see also Eileen J. Kladviko, *Nitrate Leaching into Tile Drains at SEPAC*, <https://www.agry.purdue.edu/drainage/AY-04-01.pdf> (last visited Jan. 3, 2016) (“Although subsurface drainage has many benefits, it also may increase nitrate-N losses through the rootzone and out to surface waters.”).

<sup>173</sup> See Heidelberg, *supra* note 32; see also *Des Moines Water Works v. Drainage Districts*, No. 5:15-cv-04020 (N.D. Iowa Mar. 16, 2015) (arguing that the tile drainage discharges of nitrate pollutants into the Raccoon River without obtaining a NPDES permit is a violation of the Clean Water Act).

<sup>174</sup> See Ward, *supra* note 76.

<sup>175</sup> *Id.*

<sup>176</sup> See generally Toledo, *supra* note 30.

<sup>177</sup> *Id.* at 2 (“Although total phosphorus (TP) levels in Lake Erie have remained relatively consistent since the mid-1990s, levels of DRP have been rising rapidly since the mid-1990s and are now at the highest levels since monitoring began in the 1970s.”); see also Task Force, *supra* note 44, at 16 (“[The] “re-eutrophication” of Lake Erie has occurred during a time in which total phosphorus loading has remained relatively constant”). Total phosphorus is the amount of particulate and dissolved phosphorus in the water. Heidelberg, *supra* note 32.

<sup>178</sup> Heidelberg, *supra* note 32 (“The increasing dissolved [phosphorus] loads are very evident from the 5-year running averages.”).

primarily due to efforts by farmers to reduce erosion – while the amount of dissolved phosphorus has increased.<sup>179</sup> Therefore, “the upward trends in dissolved [phosphorus] have been linked to the return of serious algal blooms.”<sup>180</sup>

#### V. THE ANSWER LIES WITHIN: A CLOSER LOOK AT THE DEFINITION OF A POINT SOURCE

##### A. Agriculture: Can it be Regulated?

While agriculture, in general, is largely understood to be the dominant cause of nutrient pollution, there is no consensus about how it can be limited. Some scholars believe that the voluntary BMPs are to blame and suggest that, instead, there should be mandated agricultural practices that can be enforced.<sup>181</sup> In theory, this would go a long way towards reducing nutrient pollution. Unfortunately, this is entirely unrealistic as it would require the enactment of new legislation which is highly unlikely given agriculture’s considerable political clout.<sup>182</sup>

Other scholars suggest that more aggressive interpretations of the CWA’s current provisions could provide a solution.<sup>183</sup> This is the most realistic means of reducing nutrient pollution from agricultural sources since it does not require the enactment of new legislation. However, the “more aggressive” interpretations must attempt to do more than grant the EPA the authority to force the upstream cleanup of agricultural runoff.<sup>184</sup> While giving the EPA this authority would result in a temporary improvement in fresh water quality, it would not be an effective long term solution.

Lastly, since the enactment of the 1987 amendments, others have been arguing that it is impossible to effectively control NPS pollution

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<sup>179</sup> *Id.* (“Over this same time interval, the overall trend in particulate P and suspended solids loading has been downward, thanks to efforts by farmers to reduce erosion.”).

<sup>180</sup> *Id.*

<sup>181</sup> *E.g.*, Douglas R. Williams, *When Voluntary, Incentive-Based Controls Fail: Structuring a Regulatory Response to Agricultural Nonpoint Source Water Pollution*, 9 WASH. U.J.L. & POL’Y 21 (2002), [http://openscholarship.wustl.edu/cgi/viewcontent.cgi?article=1431&context=law\\_journal\\_law\\_policy](http://openscholarship.wustl.edu/cgi/viewcontent.cgi?article=1431&context=law_journal_law_policy).

<sup>182</sup> E-mail from Pat Parenteau, Director, Vt Law School’s Env’tl. Law Ctr. and of the Env’tl. and Natural Resources Law Clinic (Nov. 22, 2015) (“Assuming Des Moines wins I would expect an immediate move in Congress to amend the CWA to exclude tile drains with broad bipartisan support from the farmbelt and other states”).

<sup>183</sup> *See generally* Vermont, *supra* note 101 (suggesting that more aggressive interpretations of the CWA sections 303 and 402 could provide a solution).

<sup>184</sup> *Id.* (“Section 303 holds the promise of state water quality standards becoming a receiving water requirement that could force upstream improvements to, and cleanup of, polluted agricultural runoff.”). *Id.* at 1046.

under the current regulatory framework.<sup>185</sup> While section 319 of the CWA has successfully reduced NPS pollution from some sources,<sup>186</sup> it has done very little to reduce nutrient pollution from agricultural sources. Therefore, the suggestion that the current incentivized voluntary BMPs for the agricultural industry simply do not provide an effective method for actually reducing nutrient pollution is incredibly accurate.

*B. Tile Drainage Systems are the Key*

The solution to the problem of nutrient pollution from agricultural sources lies within the definition of a point source in the CWA. The Act has proven effective in reducing pollution from point sources.<sup>187</sup> However, agriculture is currently not considered a point source under the CWA definition, since much of nutrient pollution is thought to come in the form of surface runoff.<sup>188</sup> Moreover, the definition of a point source provides an express exemption for agricultural storm water discharges which is currently being exploited as a way to excuse all agricultural pollution.<sup>189</sup>

There is no arguing that considerable nutrient pollution comes from precipitation and its subsequent surface runoff. However, substantial nutrient pollution also originates from the discharges of subsurface tile drainage systems as well.<sup>190</sup> The tile drains act as conduits for dissolved phosphorus and nitrate which can result in high concentrations being discharged away from the field. However, discharges from tile drainage systems are currently exempt from the CWA under the Act's point source regulations.<sup>191</sup>

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<sup>185</sup> Daniel R. Mandelker, *Controlling Nonpoint Source Water Pollution: Can It Be Done*, 65 CHI.-KENT. L. REV. 479 (1989), available at <http://scholarship.kentlaw.iit.edu/cgi/viewcontent.cgi?article=2776&context=cklawreview>.

<sup>186</sup> See Ongley, *supra* note 112; see also Toledo, *supra* note 30.

<sup>187</sup> Eric D. Stein & Greg S. Lyon, *How effective has the Clean Water Act been at reducing pollutant mass emissions to the Southern California Bight over the past 35 years?*, ENVTL. MONITORING & ASSESSMENT (July 2008), at 1, available at [https://www.researchgate.net/publication/5286991\\_How\\_effective\\_has\\_the\\_Clean\\_Water\\_Act\\_been\\_at\\_reducing\\_pollutant\\_mass\\_emissions\\_to\\_the\\_Southern\\_California\\_Bight\\_over\\_the\\_past\\_35\\_years](https://www.researchgate.net/publication/5286991_How_effective_has_the_Clean_Water_Act_been_at_reducing_pollutant_mass_emissions_to_the_Southern_California_Bight_over_the_past_35_years).

<sup>188</sup> See *The Sources and Solutions: Agriculture*, *supra* note 149.

<sup>189</sup> The exception to this statement is concentrate animal feeder operations which is grouped together with farming as agricultural activity. See generally Toledo, *supra* note 30. Concentrated animal feeding operations are beyond the scope of this Note.

<sup>190</sup> Madeline Fisher, *Tile drains a major path for phosphorus loss, studies find*, AM. SOC'Y OF AGRONOMY, available at <https://www.agronomy.org/science-news/tile-drains-major-path-phosphorus-loss-studies-find> (posted Oct. 3, 2014) ("In research in Ohio and Indiana led by USDA-ARS scientists, nearly 50% on average of both dissolved, "bioavailable" phosphorus and total phosphorus left fields via the tile system—a percentage much higher than previously thought.").

<sup>191</sup> Clean Water Act § 502(14) (codified as 33 U.S.C. § 1362(14) (2014)).

### 1. Tile Drains as a Point Source

From a textual standpoint, the definition of a point source surely encompasses tile drainage systems. The CWA states that a point source is “any discernible, confined and discrete conveyance, including but not limited to any pipe...from which pollutants are or may be discharged.”<sup>192</sup> Tile drainage systems consist of pipes which have been laid below the surface in order to convey water away from an agricultural field. Moreover, the nutrients are a type of agricultural waste that constitutes a pollutant under the CWA definition<sup>193</sup> and they are discharged from tile drainage outlets.<sup>194</sup> Although discharges may not be continuous, there is no doubt that pollutants “may be discharged” from tile drains.<sup>195</sup> Therefore, tile drainage systems should be considered a point source based on the definition in the CWA.

### 2. The Agricultural Exemption

Though tile drains satisfy the definition of a point source, they remain exempt from the NPDES program and other point source regulatory provisions. The agriculture exemptions in the CWA definition of a point source state “[the term NPS] does not include agricultural storm water discharges and return flows from irrigated agriculture.”<sup>196</sup>

Although “storm water” is not defined in the CWA, it is defined in the Federal Code of Regulations.<sup>197</sup> The Code states, “[s]torm water means storm water runoff, snow melt runoff, and surface runoff and drainage.”<sup>198</sup> In this definition, storm water does not include any subsurface waters and the definition expressly uses the term “runoff” to describe the water it encompasses.<sup>199</sup> But the term “runoff” is defined as “water from rain or snow that flows over the surface of the ground into streams.”<sup>200</sup> This indicates that water which has seeped beneath the surface of the ground should no longer be considered “storm water.”

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<sup>192</sup> Clean Water Act § 502(14) (codified as 33 U.S.C. § 1362(14) (2014)).

<sup>193</sup> Clean Water Act § 502(12) (codified as 33 U.S.C. § 1362(12) (2014)).

<sup>194</sup> See Telephone Interview, *supra* note 161.

<sup>195</sup> *Id.*

<sup>196</sup> Clean Water Act § 502(14) (codified as 33 U.S.C. § 1362(14) (2014)).

<sup>197</sup> 40 C.F.R. § 122.26(b)(13) (2015), available at <https://www.gpo.gov/fdsys/pkg/CFR-2015-title40-vol22/pdf/CFR-2015-title40-vol22.pdf>.

<sup>198</sup> *Id.*

<sup>199</sup> *Id.*

<sup>200</sup> *Storm Water*, OXFORD DICTIONARIES, [http://www.oxforddictionaries.com/us/definition/american\\_english/storm-water](http://www.oxforddictionaries.com/us/definition/american_english/storm-water) (last accessed Jan. 5, 2016). Since the term “runoff” is not defined in the CWA or CFR, the dictionary was used to define the term.

Therefore, any water discharged from tile drains should not be considered agricultural storm water discharges according to the Act.

However, there is still an agricultural exemption excluding “return flows from irrigated agriculture.”<sup>201</sup> The term “irrigation return flow” is not defined in the CWA, but it could be defined as the “part of artificially applied water that is not consumed by evapotranspiration and that either drains to the water table or runs off to a surface-water body.”<sup>202</sup> Unlike storm water, return flow can include surface and subsurface waters. But tile drainage systems should not satisfy this exemption as the purpose of the installing tile drains is primarily to lower the water table.<sup>203</sup> Furthermore, once irrigated water drains to the water table, it should longer be considered return flow from irrigated agriculture. Rather, once the irrigated water makes it to the water table, it has gone beyond the scope of the definition and, at this point, the irrigated water should be considered ground water which is not covered under the agricultural exemption.

According to the CWA, a NPDES permit is not required for “a discharge composed entirely of return flows from irrigated agriculture.”<sup>204</sup> Although tile drains may transport return flows in some instances, the tile drains discharge a great deal of water that is not return flow. Logically, since tile drainage systems are used to lower the water table and remove excess moisture from the soil for farming, the tile drains have to discharge ground waters as well. Moreover, tile drains are not installed or intended for purposes of conveying irrigation return flows. Therefore, tile drainage systems should satisfy the “return flow” exemption.

Up to this point, the agricultural exemptions have granted the agricultural industry a free pass on tile drainage systems, and they have forced water treatment facilities down steam to clean up the mess. However, if tile drains are interpreted as a point source, they would no longer enjoy the agricultural exemptions. As a result, tile drainage discharges could be subject to the NPDES permit program, which has proven to be effective in reducing pollution from point sources. Therefore, because tile drains are known to transport dissolved phosphorus and nitrate, interpreting tile drains as point sources would dramatically reduce concentrations of the nutrients that are threatening the quality of United States tap water sources.

### *C. Influencing Change: The Role of the Court*

In an ideal world, the EPA would propose a new rule for the reinterpretation tile drainage systems under the definition of the point

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<sup>201</sup> Clean Water Act § 502(14) (codified as 33 U.S.C. § 1362(14) (2014)).

<sup>202</sup> *Description of Irrigation Return Flow in the WRIA 1 Study Area*, U.S. GEOLOGICAL SURVEY, available at <http://wa.water.usgs.gov/projects/wria01/data/textWU1.htm> (last visited Nov. 19, 2015).

<sup>203</sup> See Mahoney, *supra* note 160.

<sup>204</sup> Clean Water Act § 402(l)(1) (codified as 33 U.S.C. 1341 (2014)).

source in the CWA. The proposed rule would reinterpret tile drainage systems in such a way as classify them as point sources, which are unprotected by the agricultural exemptions. A proposed rule would provide an opportunity for a public commenting period and give those with a vested interest the chance to weigh in. Unfortunately, the EPA has recently demonstrated in a new rule regarding the CWA, that they will only propose a new rule after considerable challenges are brought in court.<sup>205</sup>

In 2014, the EPA proposed a new rule to reduce the confusion and complexity over what waters the Clean Water Act applies to specifically.<sup>206</sup> The proposed rule stated, “any normal farming activity that does not result in a point source discharge of pollutants into waters of the [United States] still does not require a permit.”<sup>207</sup> Moreover, the final rule, which was issued in 2015, preserved the agricultural exemptions for normal farming,<sup>208</sup> storm water discharges, and return flows from irrigated agriculture.<sup>209</sup> Furthermore, the proposed rule expressly stated that it would not apply to: groundwater, shallow subsurface flow and tile drains.<sup>210</sup> This demonstrates that the EPA is aware of the problem caused by tile drainage systems, but suggests the EPA does not believe the issue ripe at this time.

However, the issue of tile drains may be ripening quickly. In 2015, the Des Moines Water Works, the city’s water treatment facility, filed a complaint in federal court arguing that neighboring tile drainage systems are point sources and in violation the CWA by failing to obtain a NPDES permit.<sup>211</sup> The plaintiff, Des Moines Water Works, is a regional water treatment facility supplying water to roughly 500,000 people and they claim that if the facility is to continue to provide clean and safe water at a reasonable cost, the problem of nitrate pollution from

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<sup>205</sup> Clean Water Rule: Definition of Waters of the United States, 80 Fed. Reg. 37054 (June 29, 2015) (to be codified at 33 C.F.R. pt. 328).

<sup>206</sup> *Clean Water Act Exclusions and Exemptions Continue for Agriculture*, ENVTL. PROT. AGENCY, available at [http://www.epa.gov/sites/production/files/2014-03/documents/cwa\\_ag\\_exclusions\\_exemptions.pdf](http://www.epa.gov/sites/production/files/2014-03/documents/cwa_ag_exclusions_exemptions.pdf) (last visited Jan. 10, 2016) (summarizing the proposed rule).

<sup>207</sup> *Id.*

<sup>208</sup> “Normal farming” activities include plowing, seeding, cultivating, minor drainage, and harvesting for production of food, fiber, and forest products. *The Clean Water Rule for: Agriculture*, ENVTL. PROT. AGENCY, available at [http://www.epa.gov/sites/production/files/2015-05/documents/fact\\_sheet\\_agriculture\\_final.pdf](http://www.epa.gov/sites/production/files/2015-05/documents/fact_sheet_agriculture_final.pdf) (last visited Jan. 10, 2016).

<sup>209</sup> *Id.*

<sup>210</sup> *Id.*

<sup>211</sup> *See generally* Complaint, Board of Water Works Trustees v Drainage Districts, No. 5:15-cv-04020 (N.D. Iowa Mar. 15, 2015), available at <http://www.circleofblue.org/waternews/wp-content/uploads/2015/03/Board-of-Water-Works-Trustees-CWA-Lawsuit.pdf>.

tile drainage discharges must be addressed.<sup>212</sup> Moreover, the plaintiff essentially argues that interpreting the tile drainage systems as point sources is necessary to protect the State of Iowa and the United States from a further environmental and health crisis.<sup>213</sup>

A favorable ruling for the Plaintiff, Des Moines Water Works, will undoubtedly open the flood gates for municipal water facilities around the country to bring federal lawsuits against agricultural operations that employ tile drainage infrastructure. This would place extreme pressure on the EPA to propose a new rule clarifying their interpretation of a point source in the CWA. But regardless, unless the issue of nutrient pollution from agricultural land continues to garner national media attention from tragic events such as the one in Toledo,<sup>214</sup> the problem will not be resolved. Rather, Congress will likely move to amend the CWA in order to broaden the agriculture exemptions and the agriculture will continue to get a free pass as the problem swept beneath the rug for a future generation.<sup>215</sup>

#### VI. CONCLUSION

The quality of lakes, rivers, and other surface waters from which most large urban areas obtain fresh drinking water has improved significantly since the enactment of the CWA, however, substantial impairments still remain. In the case of the Cuyahoga River Fire in 1969, the abominable quality of the water was apparent by look alone as oil slicks and debris coated the surface. But today, the United States is battling against a much stealthier opponent; one that is quickly making itself known as a real threat to the quality of the fresh water which so many millions of American's rely. Therefore, this note has demonstrated the United States is facing a new threat to fresh tap water supplies – nutrient pollution.

This note has reveal that phosphorus and nitrogen are currently the leading sources of fresh water quality impairments in the United States. Subsequently, these nutrients pose the greatest threat to the quality of tap water for millions of Americans. In the case of phosphorus, high concentrations of the nutrient spur massive algal blooms which can produce extremely hazardous toxins. On the other hand, nitrogen itself is harmful to humans when it is in the form of nitrate.

Unfortunately, both phosphorus and nitrate are the nutrients that plants require for growth. This means that these nutrients are the spread on fields by farmers across the country in the form of manure and fertilizers. Additionally, both phosphorus and nitrogen are water soluble which allows them to be easily transported into our fresh water supplies. But while it is clear that agriculture is largely responsible for

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<sup>212</sup> *Id.* at 3.

<sup>213</sup> *Id.*

<sup>214</sup> See Fitzsimmons, *supra* note 4; see also footnote text, *supra* note 6.

<sup>215</sup> See Parenteau, *supra* note 182.

polluting excessive nutrients into fresh water, the agricultural industry has managed to remain almost entirely unregulated.

Over time, as agricultural practices have changed. As agriculture continues to advance, so too should the way agriculture is interpreted under the CWA. Specifically, as tile drainage systems have become more prevalent, the way in which the drains are interpreted should also be changed. Based on a textual analysis of the definition of a point source in the CWA, tile drains should be interpreted as a point source.

It is understandable why agriculture would be exempt from the CWA when it was enacted in 1972 primarily because it was, and still it, virtually impossible to regulate water that runs-off a field. However, tile drainage systems are a different story. Tile drainage discharge points are discernable and can be identified. Moreover, the amount of pollutants being discharged from a tile drain is quantifiable much in the same way that a municipal storm sewer discharge is. Therefore, there is no reason that tile drainage discharges should be exempt from the CWA. Transitioning to an interpretation that classifies tile drains as a point source would allow the effective CWA regulatory provisions to apply. This would solve the problem of nutrient pollution nationally on a national level.

In the words of Ohio governor John Kasich: “What’s more important than water? Water’s about life.”<sup>216</sup> Clean tap water is vital to the American society and, more importantly, to the health of individuals and communities. It is essential that the problem of nutrient pollution from agricultural sources is addressed because it is a necessary step for ensuring United States tap water will continue to be clean and readily available for generations to come.

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<sup>216</sup> *Behind the Rhetoric of the Toledo Water Crisis*, FRESH WATER ACCOUNTABILITY PROJECT, available at <http://www.fwap.org/behind-the-rhetoric-of-the-toledo-water-crisis/> (last visited Dec. 20, 2015).