Santa Clara Law Review

Volume 60 | Number 2 Article 3

7-3-2020

REGULATED AND HYDRATED: A CASE FOR REGULATING BOTTLED WATER

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Water is considered the most important substance in the world. Without it, humans would not be able to survive, ecosystems could not be sustained, and major aspects of our economies, such as manufacturing products or the oil and gas sector, would not exist. The importance of water can be seen through its commodification by major industries, specifically the bottled water industry. The bottled water industry has taken a product and commodified it to great success. With the growth of the industry, also came governmental oversight of bottling practices. The U.S. Food and Drug Administration has regulatory control over monitoring the bottled water industry for product safety. While various local and state governmental organizations monitor how the water is extracted from the environment. There is a broad legal doctrine for the bottled water industry which exists through federal regulation and state and local law.

This Note discusses regulation of the bottled water industry as a whole and how these regulations can, and should, be improved to promote consumer welfare, safety, and environmental sustainability. Specifically, this Note discusses how the lack of sufficient regulation allows various contaminants, such as cryptosporidium, perchlorate, BPA, and microplastics, to be included in bottled water supplies at levels that are potentially harmful. In addition, the lack of regulation over water extraction has a significant impact on groundwater depletion. As climate change progresses and water supplies deteriorate, it is vital that water systems are appropriately managed in order to maintain access to clean and safe water. Despite the complexity of regulating groundwater extraction across the United States, action is necessary to prevent critical

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overdraft of groundwater basins leading to issues with water availability. Since the bottled water industry relies heavily on groundwater extraction, the safety of bottled water and the protection of groundwater resources are dependent on each other. In total, this Note lays out recommendations for federal regulatory changes to promote consumer safety and legal changes to groundwater extraction to promote environmental sustainability and human health.

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"I aimed at the public's heart, and by accident I hit it in the stomach."
– Upton Sinclair[1]

1. Upton Sinclair, *What Life Means to Me*, COSMOPOLITAN MAG., Oct. 1906, at 591, 594 (Sinclair's describing how he initially aimed to portray a picture of the harsh working conditions on the industrial class but instead spurred outrage against the meat-suppliers of the world).

I. INTRODUCTION

The early 1900s were plagued by dangerous foods such as candy colored with toxic metals, rotten canned meat, and jams containing coal tar dyed with food coloring.[2] The failure of the federal government to regulate American commerce during this time was a monumental tragedy that allowed individuals and corporations to market faulty foods dishonestly to increase profit.[3] Upton Sinclair exposed the horrendous conditions of meat packing industries and the unsanitary conditions of food production in his 1906 work, *The Jungle*.[4] Sinclair's work and the resulting public condemnation ultimately pushed the government to enact the first Pure Food and Drugs Act of the United States.[5] Along with this bill, the U.S. Food and Drug Administration ("FDA") was created to protect public health by ensuring the safety of the U.S. food supply.[6]

FDA's consumer protection role is just as important now as it was in the early 1900s. FDA's role has expanded to include specialty food groups such as dietary supplements, food additives, infant formulas, and, most importantly for this discussion, bottled water.[7] FDA is tasked with ensuring that bottled water fulfills statutory requirements and is safe for public consumption.[8] In recent years, bottled water's popularity has

2. *I Aimed for the Public's Heart, and Hit It in the Stomach*, CHI. TRIB. (May 21, 2006), https://www.chicagotribune.com/news/ct-xpm-2006-05-21-0605210414-story.html; Ben Panko, *Where Did the FDA Come From, and What Does it Do?*, SMITHSONIAN MAG. (Feb. 8, 2017), https://www.smithsonianmag.com/science-nature/origins-FDA-what-does-it-do-180962054/.

3. CHI. TRIB., *supra* note 2; Panko, *supra* note 2.

4. *See* Arlene Finger Kantor, *Upton Sinclair and the Pure Food and Drugs Act of 1906*, 66 AM. J. PUB. HEALTH 1202, 1204 (1976). *See generally* UPTON SINCLAIR, THE JUNGLE (1906).

5. See Kantor, *supra* note 4, at 1203-05; CHI. TRIB., *supra* note 2.

6. *What We Do*, U.S. FOOD & DRUG ADMIN., https://www.fda.gov/AboutFDA/WhatWeDo/ (last visited Jan. 29, 2019).

7. *What Does FDA Regulate?*, U.S. FOOD & DRUG ADMIN., https://www.fda.gov/AboutFDA/Transparency/Basics/ucm194879.htm (last visited Jan. 29, 2019). As originally enacted, the Pure Food and Drugs Act focused on branding of materials and preventing adulterated foods from traveling in interstate traffic. It was later replaced by the Federal Food, Drug, and Cosmetic Act that gave FDA the authority to oversee the safety of food, drugs, and cosmetics. *Compare* Pure Food and Drugs Act of 1906, Pub. L. No. 384, ch. 3915 (1906), https://www.loc.gov/law/help/statutes-at-large/59th-congress/session-1/c59s1ch3915.pdf, *with* Federal Food, Drug, and Cosmetic Act of 1938, Pub. L. No. 717, 52 Stat. 1040 (1938), https://www.loc.gov/law/help/statutes-at-large/75th-congress/session-3/c75s3ch675.pdf.

8. *See FDA Regulates the Safety of Bottled Water Beverages Including Flavored Water and Nutrient-Added Water Beverages*, U.S. FOOD & DRUG ADMIN., https://www.fda.gov/food/buy-store-serve-safe-food/fda-regulates-safety-bottled-water-beverages-including-flavored-water-and-nutrient-added-water (last visited Jan. 29, 2019) [hereinafter *FDA Regulates*].

increased substantially, emphasizing the importance of FDA's regulatory and supervisory roles.[9]

Outside FDA's mandate, the bottled water industry is also governed by state and local regulations which play an important role in regulating the industries' water withdrawals. With decreasing water availability due to climate change, the bottled water industry will have to grapple with obtaining safely sourced water to fulfill the increasing product demand.[10] For an industry that built its entire market around bottling a single resource (water), climate change will cause immense issues as its main source of revenue will literally dry up.[11] Rising temperatures cause decreased surface water availability, which forces bottling companies, municipalities, agricultural entities, and individuals to rely on groundwater.[12] Although access to adequate clean water supplies are not often concerns of citizens, as many have immediate access to municipal water, climate change and over-pumping of groundwater sources will make

9. *See Press Release: Bottled Water Becomes Number-One Beverage In the U.S.*, BEVERAGE MARKETING CORP., https://www.beveragemarketing.com/news-detail.asp?id=438 (last visited Jan. 29, 2019) (explaining that, with the exception of 2008 and 2009, "bottled water volume grew every year from 1977 to 2016"); *see generally* John G. Rodwan, Jr., *Bottled Water: 2017 Staying Strong*, BOTTLED WATER REP. (2018), https://www.bottledwater.org/public/BMC2017_BWR_StatsArticle.pdf (discussing bottled water statistics through 2017).

10. *Water and Climate Change*, UN WATER, http://www.unwater.org/water-facts/climate-change/ (last visited Jan. 29, 2019); Somini Sengupta & Weiyi Cal, *A Quarter of Humanity Faces Looming Water Crises*, N.Y. TIMES (Aug. 6, 2019), https://www.nytimes.com/interactive/2019/08/06/climate/world-water-stress.html ("From India to Iran to Botswana, 17 countries around the world are currently under extremely high water stress, meaning they are using almost all the water they have" and "Mexico's capital, Mexico City, is drawing groundwater so fast that the city is literally sinking. Dhaka, Bangladesh, relies so heavily on its groundwater for both its residents and its water-guzzling garment factories that it now draws water from aquifers hundreds of feet deep.").

11. *See* FOURTH NAT'L CLIMATE ASSESSMENT, CHAPTER 3: WATER (2018), https://nca2018.globalchange.gov/chapter/3/ ("Significant changes in water quantity and quality are evident across [the United States]. These changes, which are expected to persist, present an ongoing risk to coupled human and natural systems and related ecosystem services. Variable precipitation and rising temperature are intensifying droughts, increasing heavy downpours, and reducing snowpack. Reduced snow-to-rain ratios are leading to significant differences between the timing of water supply and demand. Groundwater depletion is exacerbating drought risk. Surface water quality is declining as water temperature increases and more frequent high-intensity rainfall events mobilize pollutants such as sediments and nutrients.").

12. *Id.* Most municipal water comes from surface water sources such as rivers, lakes, or reservoirs but when these sources become limited water districts must switch to groundwater use. With increased climate change and decreased surface water availability, reliance on groundwater will increase. *See generally* THE NATURE CONSERVANCY OF CALIFORNIA, WHERE DOES CALIFORNIA'S WATER COME FROM? (2012), https://www.nature.org/media/california/california_drinking-water-sources-2012.pdf.

every drop of water less accessible and more costly, including water that is bottled.[13]

This Note discusses regulation of the bottled water industry and how these regulations can, and should, be improved to promote consumer welfare, safety, and environmental sustainability. Specifically, this Note discusses how the lack of sufficient regulation allows various contaminants to be included in bottled water supplies at levels that are potentially harmful. In addition, the lack of regulation over water extraction has a significant impact on groundwater depletion. As climate change progresses and water supplies deteriorate, it is vital that water systems are appropriately managed in order to maintain access to clean and safe water. Despite the complexity of regulating groundwater extraction across the United States, action is necessary to prevent critical overdraft of groundwater basins leading to issues with water availability. The depletion of groundwater basins leads to contaminants, such as arsenic, leaching into the basin and ultimately polluting water sources.[14] Since the bottled water industry relies heavily on groundwater extraction, the safety of bottled water and the protection of groundwater resources are dependent on each other. As groundwater resources become more limited, the safety of bottled water becomes imperiled.

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13. *See* Terry Gross, *Fresh Air: The Worldwide 'Thirst' For Clean Drinking Water*, NPR (Apr. 11, 2011), https://www.npr.org/transcripts/135241362. It's not just access to water that is going to have major impacts. This paper will not discuss these issues but the environmental risks are only part of climate change. With increased water scarcity also comes the threat of increased risks of terrorism, infectious disease, global poverty, and food shortages. *See* Coral Davenport, *Pentagon Signals Security Risks of Climate Change*, N.Y. TIMES (Oct. 13, 2014), https://www.nytimes.com/2014/10/14/us/pentagon-says-global-warming-presents-immediate-security-threat.html?searchResultPosition=30. In addition to the larger security risks, there are major risks to the economy ranging from impacts of raging fires (as seen in Australia and northern California), to crop failures, failing infrastructure, or the variety of issues that are yet to be foreseen. Coral Davenport & Kendra Pierre-Louise, *U.S. Climate Report Warns of Damaged Environment and Shrinking Economy*, N.Y. TIMES (Nov. 23, 2018), https://www.nytimes.com/2018/11/23/climate/us-climate-report.html?action=click&module=MoreInSection&pgtype=Article&region=Footer&contentCollection=Climate%20and%20Environment; Jack Ewing, *Climate Change Could Blow Up the Economy. Banks Aren't Ready*, N.Y. TIMES (Jan. 23. 2020), https://www.nytimes.com/2020/01/23/business/climate-change-central-banks.html?searchResultPosition=1.

14. *See Groundwater Decline and Depletion*, U.S. GEOLOGICAL SURV., https://www.usgs.gov/special-topic/water-science-school/science/groundwater-decline-and-depletion?qt-science_center_objects=0#qt-science_center_objects (last visited Apr. 30, 2020) (explaining how one effect of groundwater depletion is deterioration of water quality from saltwater contamination); *see generally* Ryan Smith, Rosemary Knight, & Scott Fendorf, *Overpumping Leads to California Groundwater Arsenic Threat*, 9 NATURE COMM. 1 (2018) (finding a correlation between groundwater pumping and higher arsenic concentrations), https://www.nature.com/articles/s41467-018-04475-3.pdf.

II. THE HISTORY OF BOTTLED WATER REGULATION

In 1974, Congress enacted the Safe Drinking Water Act ("SDWA") which sought to protect public health by regulating the nation's supply of drinking water, including municipal and tap water.[15] Under the SDWA, the Environmental Protection Agency ("EPA") monitors maximum contaminant levels ("MCLs") of various contaminants in municipal drinking water.[16] The SDWA contains only a short provision regarding bottled water, as the Act was created to focus on municipal tap water, not bottled water.[17]

The EPA focuses its resources towards regulating municipal water systems, while they defer regulatory power over bottled water to FDA.[18] In 1979, the EPA acknowledged FDA's jurisdiction and responsibility over bottled drinking water in the Federal Food, Drug, and Cosmetic Act ("FFDCA").[19] Under the FFDCA, FDA has broad statutory authority to ensure that bottled water "sold in interstate commerce is safe, wholesome, and truthfully labeled."[20] In furtherance of this objective, FDA established regulations for bottled water that prescribe quality management standards, standards of identity, and current good manufacturing practices ("GMP") for the bottling industry.[21]

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15. Safe Drinking Water Act of 1974, Pub. L. No. 93-523, 88 Stat. 1660 (1974) (codified as amended at 42 U.S.C. §§ 300f to 300j-27 (2000)).

16. *See id.* at § 300f; *see also* Joyce S. Ahn, *Uncapping the Bottle: A Look Inside the History, Industry, and Regulation of Bottled Water in the United States*, 3 J. FOOD L. & POL'Y 173, 184 n.85 (2007).

17. Ahn, *supra* note 16, at 184-85; *see* Safe Drinking Water Act § 410 ("Whenever the Administrator of the Environmental Protection Agency prescribes interim or revised national primary drinking water regulations under section 1412 of the Public Health Service Act, the Secretary shall consult with the Administrator and within 180 days after the promulgation of such drinking water regulations either promulgate amendments to regulations under this chapter applicable to bottled drinking water or publish in the Federal Register his reasons for not making such amendments.")

18. Ahn, *supra* note 16, at 184 n.85 ("Municipal water is regulated by the EPA, while bottled water is regulated by the FDA."); *FDA Regulates the Safety of Bottled Water Beverages Including Flavored Water and Nutrient-Added Beverages*, U.S. FOOD & DRUG ADMIN., https://www.fda.gov/food/buy-store-serve-safe-food/fda-regulates-safety-bottled-water-beverages-including-flavored-water-and-nutrient-added-water (last visited Jan. 30, 2020).

19. *Memorandum of Understanding, MOU number 225-79-2001*, U.S. FOOD & DRUG ADMIN. (June 22, 1979), https://www.fda.gov/AboutFDA/PartnershipsCollaborations/MemorandaofUnderstandingMOUs/DomesticMOUs/ucm116216.htm ("FDA will have responsibility for water, and substances in water, used in food and for food processing and responsibility for bottled drinking water under the FFDCA."); *see also* Ahn, *supra* note 16, at 185.

20. U.S. GOV'T ACCOUNTABILITY OFFICE, GAO-09-610, BOTTLED WATER: FDA SAFETY AND CONSUMER PROTECTIONS ARE OFTEN LESS STRINGENT THAN COMPARABLE EPA PROTECTIONS FOR TAP WATER, 3 (2009) [hereinafter GAO-09-610].

21. *Id.*

A. The Bottled Water We Know Today

In the 1990s, bottled water's popularity increased as it became a convenient, sophisticated, safe, and healthy alternative to tap water.[22] Since its emergence, bottled water companies fought to succeed in the market by classifying themselves as supplying water that is the healthiest, the cleanest, or the most environmentally sustainable.[23] As consumption of bottled water increased, companies became increasingly creative with their descriptions of bottled water, ranging from "de-ionized," "smart," "alkaline," or even "raw water."[24] Bottlers now claim that consumers can live smarter, healthier, and overall better lives by simply increasing their consumption of the product.[25] According to some bottling companies, the magical qualities of bottled water, not just the boring old tap water, now serve as a weight loss tool, as a way to increase oxygen levels in one's body, or even as a way to increase intelligence.[26] Their marketing has proven successful as bottled water is now

22. Ahn, *supra* note 16, at 178-79. For a detailed look at the origins of bottled water in the early 1900's see *Rotten: Troubled Water*, Season 2, Episode 3 (Netflix Oct. 4, 2019).

23. *See, e.g.*, DASANI, *DASANI PlantBottle® :30 Commercial*, YOUTUBE (Apr. 18, 2013), https://www.youtube.com/watch?v=WvCRRBx0-ZE ("Everyone knows water is good for you. But did you know that DASANI is also better for the environment? Our innovative bottles are made from up to 30% plants and are 100% recyclable."); FIJI Water, *Where does FIJI Water come from?*, YOUTUBE (Feb. 14, 2015), https://www.youtube.com/watch?v=juHtVC60Kuo ("Starting in clouds high above the South Pacific, our water falls as tropical rain on the pristine islands of Fiji. There it is slowly filtered by volcanic rock until it collects in a natural artesian aquifer, where it is protected and preserved from external elements. Untouched by man, it truly is Earth's Finest Water.").

24. *See* PETER H. GLEICK, BOTTLED AND SOLD: THE STORY BEHIND OUR OBSESSION WITH BOTTLED WATER 114, 118-22 (Island Press 2010); *see, e.g.*, Alice Callahan, *Is Alkaline Water Really Better for You?*, N.Y. TIMES (Apr. 27, 2018), https://www.nytimes.com/2018/04/27/well/eat/alkaline-water-health-benefits.html; The Daily Show with Trevor Noah, *Deep Dive into the "Raw Water" Craze*, YOUTUBE (Apr. 23, 2018), https://www.youtube.com/watch?v=WjJJeFDk8Ok (presenting a hilarious take on the dubious benefits of the emerging trend of "raw water").

25. *See* GLEICK, *supra* note 24, at 114, 118-22. Essentia Water, *Essentia Water – That Thing*, YOUTUBE (Apr. 18, 2019), https://www.youtube.com/watch?v=8tFFi9EseGA (advertising Essentia as "overachieving H2O" that allows for better rehydration than regular water); The Coca-Cola Co., *what makes my water so smart? – smartwater*, YOUTUBE (Jan. 3, 2018), https://www.youtube.com/watch?v=7GvdA1Mjz3A (advertising smartwater as made by "cloud science" and "nature's own innovation"); Voss Water, *About*, FACEBOOK, https://www.facebook.com/pg/vossworld/about/?ref=page_internal (last visited June 1, 2020) ("The bottle has become a fashion icon – seen in luxurious hotels, restaurants, and nightclubs, at festivals and events, and in the homes of connoisseurs, celebrities and VOSS enthusiasts worldwide."). *See also Rotten: Troubled Water*, *supra* note 22, at 58:00.

26. *See* GLEICK, *supra* note 24, at 118, 121; Alice Callahan, *Is Alkaline Water Really Better for You?*, N.Y. TIMES (Apr. 27, 2018), https://www.nytimes.com/2018/04/27/well/eat/alkaline-water-health-benefits.html; Leah Messinger, *The Dubious science of Dr. Luke's Core brand: inside the premium bottled water industry*, THE GUARDIAN (Apr. 9, 2016), https://www.theguardian.com/lifeandstyle/2016/apr/09/dr-luke-core-bottled-water-likely-not-better-kesha.

the number one consumed beverage in the United States, with 12.8 billion gallons being sold in 2016 and 13.7 billion gallons sold in 2017.[27]

B. FDA's Standards for Bottled Water

FDA bases the maximum level of contaminants allowed in bottled water on the EPA's national primary drinking water regulations.[28] When the EPA implements a national drinking water regulation about a specific contaminant, FDA is required within 180 days to issue a regulation for that contaminant or make a finding that the regulation is not necessary.[29] In some cases, FDA's regulation may be more restrictive than the EPA regulations if the contaminant is contained in public water systems but is not significantly present in water used for bottled water.[30] For example, the EPA standards for lead in tap water are set at 15 parts per billion in more than 10% of samples collected, but FDA standards for bottled water are 5 parts per billion.[31] Most municipal water is delivered through lead piping, which allows lead to leach into the water during transportation.[32] Bottled water does not travel through extensive lengths of piping, so it is easier to keep lead out of bottled water than out of municipal water.[33] For most contaminants, FDA's regulation cannot be more lenient than the EPA's maximum contaminant level or less protective of public health.[34]

FDA's standard of identity defines bottled water as water "that is intended for human consumption and that is sealed in bottles or other containers with no added ingredients except that it may optionally contain safe and suitable antimicrobial agents."[35] The standard provides uniform definitions for specific types of bottled water as to how they are to be described and identified, not including the commercial brand name.[36] For example, Nestlé subsidiary Poland Springwater previously

27. BEVERAGE MARKETING CORP., *supra* note 9; Rodwan, Jr., *supra* note 9, at 12-13.

28. 21 U.S.C.S. § 349(a); *see* GAO-09-610, *supra* note 20, at 3.

29. 21 U.S.C.S. § 349(b)(1); *see* GAO-09-610, *supra* note 20, at 3-4.

30. 21 U.S.C.S. § 349(b)(3) (2018); *see* GAO-09-610, *supra* note 20, at 3-4.

31. 40 C.F.R. § 141.80(c) (2019) (explaining that allowable concentrations of lead in more than 10 percent of tap water samples collected may not be greater than 0.015 mg/L); 21 CFR § 165.110(b)(4)(c)(4)(iii)(A) (2019) (explaining that allowable concentrations of lead are 0.005 mg/L); *see also* GLEICK, *supra* note 24, at 36-37.

32. GLEICK, *supra* note 24, at 36-37.

33. *Id.*

34. 21 U.S.C.S. § 349(b)(3); GAO-09-610, *supra* note 20, at 4.

35. 21 C.F.R. § 165.110(a)(1); *see also Bottled Water Everywhere: Keeping it Safe*, U.S. FOOD & DRUG ADMIN., https://www.fda.gov/consumers/consumer-updates/bottled-water-everywhere-keeping-it-safe (antimicrobial agents can include substances such as chlorine).

36. Uniform definitions exist for "artesian well water," "ground water," "mineral water," "purified water" (also known as "distilled water", "deionized water", and "reverse osmosis water" depending on how the water is processed), "sparkling bottled water," "spring water,"

came from a spring located in Poland, Maine, but now comes from a variety of springs across Maine.[37] The company is able to keep the brand name "Poland Spring" even though the water does not actually come from that spring.[38]

Furthermore, the standard of identity requirements dictated by FDA do not require bottlers to display where the water supply actually comes from.[39] For example, Coca-Cola's Dasani water comes from dozens of different municipal water supplies, yet Coca-Cola must only state that the water comes from a municipal water supply.[40]

FDA also promulgates general GMPs that are applicable to all foods sold in the United States, as well as GMPs that are specific to bottled water.[41] These GMPs cover the design of bottling water plants, sanitation, equipment design, and how bottled water is packaged and produced.[42] Within these GMPs, FDA also prohibits the adulteration of

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"sterilized water," and "well water." 21 C.F.R. §165.110(a)(2) (2019); *see also* GLEICK, *supra* note 24, at 55.

37. *Frequently Asked Questions*, POLAND SPRING, https://www.polandspring.com/faq (last visited Apr. 19, 2020); *Poland Spring Brand Natural Spring Water*, NESTLÉ WATERS, https://www.nestle-watersna.com/en/bottled-water-brands/polandspring (last visited Apr. 19, 2020); Matt Stevens, *Is Poland Spring Water Really From a Spring? 'Not One Drop,' Says a Lawsuit*, N.Y. TIMES (Mar. 29, 2019), https://www.nytimes.com/2019/03/29/business/poland-spring-water.html.

38. POLAND SPRING, *supra* note 37. Bottled water companies engaging in marketing schemes such as this may open themselves up to actions for unfair competition and false advertising under the Lanham Act. Though there is not a private right of action for citizens to enforce specific regulatory terms under the FDCA, "mere regulation of a term does not necessarily bar all false advertising claims relating to that term." Vt. Pure Holdings, Ltd. v. Nestlé Waters N. Am., Inc., No. 03-11465-DPW, *5-6 (D. Mass. 2006). These cases tend to revolve around falsely advertising bottled water as "spring water" when it comes from wells or other non-spring sources. *See, e.g.*, Vt. Pure Holdings at *1-2, 5-6; Patane v. Nestlé Waters N. Am., Inc., 369 F. Supp. 3d 382, 385-86 (D. Conn. 2019); Frompovicz v. Niagara Bottling, LLC, 337 F. Supp. 3d 498, 503 (E.D. Pa. 2018); Me. Springs, LLC v. Nestlé Waters N. Am., Inc., No. 2:14-cv-00321-GZS, *2-3 (D. Me. Mar. 18, 2015) (dismissed for lack of standing).

39. GLEICK, *supra* note 24, at 54, 56; Stevens, *supra* note 37.

40. GLEICK, *supra* note 24, at 56. For example, DASANI states only that water comes from a "local water supply" that is later "filtered for purity." *FAQ*, DASANI, https://www.dasani.com/faq/ (last visited Jan. 30, 2020). But what if that local water supply comes from a municipal system facing extreme drought or polluted water systems such as Flint, Michigan, the poster child for failure of municipal water systems? If that were to be the case, it is highly unlikely that consumers would flock to their product. Monica Davey, *Flint Officials Are No Longer Saying the Water is Fine*, N.Y. TIMES (Oct. 7, 2015), https://www.nytimes.com/2015/10/08/us/reassurances-end-in-flint-after-months-of-concern.html.

41. Ahn, *supra* note 16, at 186; *see also* 21 C.F.R. § 110.3 (2019) (defining terms for good manufacturing practices); 21 C.F.R. § 110.5 (2019) (explaining current good manufacturing practice); 21 U.S.C. § 393 (2019) (providing an administrative framework for the FDA).

42. Ahn, *supra* note 16, at 186 ("The general GMPs contain an extensive array of rules governing such factors as the design and construction of bottling plants, plant maintenance, sanitation, equipment design and maintenance, defect action levels, and quality control for manufacturing, packaging, and storing of food.").

foods.[43] Food, including bottled water, is considered adulterated if it "bears or contains any poisonous or deleterious substance which may render it injurious to health."[44] Bottled water is "deemed to be adulterated" where it contains "a substance at a level considered injurious to health under [section 342(a)(1)]," or where it "consists in whole or in part of any filthy, putrid, or decomposed substance, or that is otherwise unfit for food under [section 342(a)(3)] of the [FFDCA]."[45] Most importantly, bottled water can be considered an adulterated substance if its container is composed "in whole, or in part, of any poisonous or deleterious substance which may render the contents injurious to health."[46]

C. FDA Requirements for Testing of Bottled Water

FDA expanded GMPs to include water testing requirements and guidelines.[47] The bottler's source water must be tested at least once a year for chemical contaminants and once every four years for radiological contaminants.[48] If the water contains contaminants above the level proscribed by FDA, the water is deemed adulterated and injurious to health.[49] In order to prevent contaminants from entering the bottled water, FDA requires bottlers to use water sources—such as wells, springs, or municipal drinking water systems—that have been approved by government agencies with the appropriate jurisdiction.[50] Usually, state or local government agencies approve the systems.[51] FDA also inspects domestic bottling plants for proper operating practices, inspects labels to confirm that the labeling complies with regulations, and requires bottlers to periodically test their source water to ensure compliance with the standard of quality.[52]

In most cases, the actual testing of bottled water for contamination is left to the bottlers.[53] Bottlers must test their water once a week for microbiological contaminants, unless the water comes from a municipal source since such sources are subject to EPA regulation.[54] The bottlers

43. 21 C.F.R. § 165.110(d) (2019) (explaining when bottled water is adulterated under the FDA); 21 U.S.C.S. § 342 (2018) (explaining when food is adulterated under the FDCA).
44. 21 U.S.C.S. § 342(a)(1) (2018); 21 C.F.R. § 165.110(d).
45. *See* 21 U.S.C.S. §342(a)(2)-(5) (2018); 21 C.F.R. § 165.110(d).
46. 21 U.S.C.S. § 342(a)(6) (2018); 21 C.F.R. § 165.110 (d).
47. GAO-09-610, *supra* note 20, at 4.
48. *Id.* at 4-5.
49. *Id.* at 5.
50. *Id.*
51. *Id.*
52. *Id.*
53. *See* GAO-09-610, *supra* note 20, at 4-5.
54. *Id.* at 4-5.

may use approved test methods and must maintain records of their testing for at least two years.[55]

D. Contaminant Regulations for Bottled Water Differ from Corresponding Regulations for Tap Water

FDA regulates for some contaminants, but they do not regulate for cryptosporidium, bisphenol A, perchlorate, or microplastics.[56] Each of these contaminants carry different concerns. Cryptosporidium is a waterborne parasite that lives in animals and can be passed into surface water through animal waste.[57] Municipal water, as regulated by the EPA, must contain zero traces of cryptosporidium, while FDA has not established any rule regarding its presence for bottled water.[58] The EPA's zero tolerance policy for cryptosporidium originates from a 1993 outbreak in Milwaukee, where one hundred people were killed and hundreds more were sickened, leading to strict tap water filtration rules.[59] FDA's definition of bottled water states that groundwater must not be in the direct influence of surface water, so cryptosporidium is not expected to be found in groundwater; if the water is taken from a municipal

55. *Id.*; *see generally* 21 C.F.R. § 129.80 (2019) (providing for regulation of processes and controls to treat and produce water).

56. *See* 21 C.F.R. § 165.110 (providing FDA contaminant regulations which do not include cryptosporidium, bisphenol A, perchlorate, or microplastics); GAO-09-610, *supra* note 20, at 39, 41.

57. *Parasites – Cryptosporidium (also known as "Crypto")*, CTRS. FOR DISEASE CONTROL & PREVENTION, https://www.cdc.gov/parasites/crypto/general-info.html (last visited Jan. 29, 2019) [hereinafter CTRS. FOR DISEASE CONTROL & PREVENTION, *Cryptosporidium*].

58. GAO-09-610, *supra* note 20, at 39, 39 n.1; *see* 21 C.F.R. § 165.110(b)(4)(C)(4)(iii) (2019) (providing for chemical quality controls of substances such as barium and cyanide but not cryptosporidium); *National Primary Drinking Water Regulations*, U.S. ENVTL. PROTECTION AGENCY, https://www.epa.gov/ground-water-and-drinking-water/national-primary-drinking-water-regulations#three (last visited Jan. 29, 2019).

59. GLEICK, *supra* note 24, at 76; The Associated Press, *Water Parasite Linked to 6 Milwaukee Deaths*, N.Y. TIMES (Apr. 25, 1993), https://www.nytimes.com/1993/04/25/us/water-parasite-linked-to-6-milwaukee-deaths.html; *see also* Tristan Balagtas, *Two Pflugerville residents blame failed water treatment system for parasitic infection*, CBS AUSTIN (Jan. 14, 2020), https://cbsaustin.com/news/local/two-pflugerville-residents-blame-failed-water-treatment-system-for-parasitic-infection (water filtration system not properly treated for cryptosporidium contamination in Pflugerville, Texas); Courtney Sherwood, *Cryptosporidium Found Again in Portland Water*, OR. PUB. BROADCAST (Oct. 25, 2019), https://www.opb.org/news/article/portland-oregon-cryptosporidium-bull-run-watershed/././ (cryptosporidium in tap water in Portland, Oregon). It's not just in your drinking water: be very weary of public pools as they appear to be cesspools of cryptosporidium. Press Release, Ctrs. for Disease Control & Prevention (June 27, 2019), https://www.cdc.gov/media/releases/2019/p0627-outbreaks-diarrhea-summertime.html.

source, the parasite is already regulated.[60] Therefore, FDA has not promulgated a MCL that applies to the bottled water industry.[61]

FDA also does not regulate the presence of bisphenol A ("BPA") in bottled water.[62] BPA is a hardening agent used in plastic products, such as the bottles used to contain water.[63] FDA stated that they have concerns about BPA but they have not taken any action to monitor the levels or presence of BPA in bottled water.[64] Thirteen states have taken it upon themselves to limit or ban BPA in bottled water.[65]

FDA and EPA regulations do not require bottlers to monitor the presence of perchlorate in water sources.[66] Perchlorate occurs naturally in the arid regions of the United States and is also found in fireworks, rocket propellants, and fertilizers.[67] Massachusetts and California are the only states that adopted enforceable perchlorate standards and twelve other states have established non-enforceable guidelines regarding perchlorate standards.[68] Thus, companies such as Nestlé, which sell water to all fifty states, have to monitor bottled water for the chemical.[69] However, local bottling companies in states that do not have requirements

60. *FAQS*, INT'L BOTTLED WATER ASS'N, https://www.bottledwater.org/content/faqs (last visited Jan. 30, 2020).

61. U.S. ENVTL. PROTECTION AGENCY, *supra* note 58; INT'L BOTTLED WATER ASS'N, *supra* note 60.

62. *See* 21 C.F.R. § 165.110. *See also* Food Additives & Petitions, *Bisphenol A (BPA): Use in Food Containers*, U.S. FOOD & DRUG ADMIN. (June 27, 2018), https://www.fda.gov/food/food-additives-petitions/bisphenol-bpa-use-food-contact-application; *What Is BPA?*, INT'L BOTTLED WATER ASS'N, https://www.bottledwater.org/health/container-safety/what-is-bpa (last visited May 8, 2020). *But see* Michelle Greenhalgh, *FDA Sued for Failure to Regulate BPA*, FOOD SAFETY NEWS (July 6, 2010), https://www.foodsafetynews.com/2010/07/nrdc-sues-fda-for-failure-to-regulate-bpa/; *NCSL Policy Update: State Restrictions on Bisphenol A (BPA)*, NAT'L CONF. OF STATE LEGISLATURES (Feb. 2015), http://www.ncsl.org/research/environment-and-natural-resources/policy-update-on-state-restrictions-on-bisphenol-a.aspx.

63. NAT'L CONF. OF STATE LEGISLATURES, *supra* note 62.

64. *Id.*

65. *Id.* (States that have restrictions regarding BPA include California, Connecticut, Delaware, Illinois, Maine, Maryland, Massachusetts, Minnesota, Nevada, New York, Vermont, Washington, Wisconsin, and the District of Columbia.)

66. *Perchlorate in Drinking Water Frequent Questions*, U.S. ENVTL. PROTECTION AGENCY, https://www.epa.gov/dwstandardsregulations/perchlorate-drinking-water-frequent-questions#where-found (last visited June 1, 2020); *Perchlorate Questions and Answers*, U.S. FOOD & DRUG ADMIN., https://www.fda.gov/food/foodborneillnesscontaminants/chemicalcontaminants/ucm077572.htm (last updated Dec. 27, 2017).

67. *Perchlorate in Drinking Water*, U.S. ENVTL. PROTECTION AGENCY, https://www.epa.gov/sdwa/perchlorate-drinking-water (last visited June 1, 2020).

68. U.S. ENVTL. PROTECTION AGENCY, *supra* note 66.

69. Caroline Winter, *Nestlé Makes Billions Bottling Water It Pays Nearly Nothing For*, BLOOMBERG BUSINESSWEEK (Sept. 22, 2017, 2:04 PM), https://www.bloomberg.com/news/features/2017-09-21/nestl-makes-billions-bottling-water-it-pays-nearly-nothing-for.

regarding perchlorate do not have to test for the contaminant.[70] In June 2019, EPA proposed a drinking water regulation for perchlorate and opened the proposed rule for comment.[71] But, in May 2020, EPA determined that it was not in the public's interest to regulate perchlorate, meaning they would not impose any limits in public water systems.[72]

Lastly, the presence of microplastics is an emerging concern for bottled water.[73] Microplastics are pieces of plastic smaller than one-fifth of an inch.[74] Since these plastics are so small, they can be easily ingested and can even cross into the gastrointestinal tract of living organisms.[75] A recent study, conducted at State University of New York at Fredonia, discovered roughly twice as many plastic particles within bottled water as compared to tap water.[76] The study analyzed microplastic contamination in 27 different lots of bottled water, from 11 different brands, purchased in 19 locations, across 9 different countries.[77] Out of the 259 bottles tested, 93% showed signs of microplastic contamination.[78] In one extreme instance, a bottle of Nestlé Pure Life contained as many as 10,000 microplastic particles per liter of water.[79] Though the study did not specifically focus on how the microplastic contamination occurred, the data suggested that at least some of the contamination was coming

70. *Id.*

71. *EPA Seeks Comment on Proposed Options for Regulating Perchlorate in Drinking Water*, U.S. ENVTL. PROTECTION AGENCY (May 23, 2019), https://www.epa.gov/news-releases/epa-seeks-comment-proposed-options-regulating-perchlorate-drinking-water; *Drinking Water Regulations Under Development or Review*, U.S. ENVTL. PROTECTION AGENCY (Feb. 15, 2020), https://www.epa.gov/sdwa/drinking-water-regulations-under-development-or-review.

72. Lisa Friedman, *E.P.A. Opts Against Limits on Water Contaminant Tied to Fetal Damage*, N.Y. TIMES (May 14, 2020), https://www.nytimes.com/2020/05/14/climate/trump-drinking-water-perchlorate.html?searchResultPosition=1.

73. *See generally* David Shukman, *Plastic: WHO launches health review*, BBC NEWS (Mar. 15, 2018), https://www.bbc.com/news/science-environment-43389031; Kieran D. Cox et al., *Human Consumption of Microplastics*, 53 ENV. SCIENCE & TECH. 7068 (2019); Laura M. Hernandez et al., *Plastic Teabags Release Billions of Microparticles and Nanoparticles into Tea*, 53 ENVTL. SCI. & TECH. 12300 (2019).

74. Elizabeth Royte, *We Know Plastic is Harming Marine Life. What About Us?*, NAT'L GEOGRAPHIC MAG. (June 2018), https://www.nationalgeographic.com/magazine/2018/06/plastic-planet-health-pollution-waste-microplastics/.

75. Sherri A. Mason et al., *Synthetic Polymer Contamination in Bottled Water*, 6 FRONTIERS IN CHEMISTRY 1, 2 (2018).

76. *Id.* at 13.

77. *Id.* at 14.

78. *Id.* at 15 (meaning only approximately 18 of the 259 bottles tested were found free of plastic).

79. *Id.* at 8. The study also concluded that on average, bottled water bought from Amazon.com contained 2,277 microplastic particles per liter. Interestingly, the waters bought from Amazon.com appear to have a much higher density of microplastic particles than bottles purchased from other locations. *Id.*

from the bottling process.[80] In addition, the researchers hypothesized that fragments were breaking off the cap upon opening and entering the water.[81]

There is not a consensus concerning microplastics effects on human health. For example, after the Fredonia study, the World Health Organization conducted a study on microplastics effects and ultimately determined that there was not enough evidence to conclude that microplastics posed a risk to human health.[82] Yet other studies show that under heightened concentrations, microplastics can cause inflammatory lesions, neurodegenerative diseases, immune disorders, and heightened risks of cancers.[83] Though there is disagreement concerning the impacts, researchers emphasize the need for additional research to understand microplastics impacts on human health.[84]

E. Bottlers' Extraction of Groundwater and the Environmental Consequences

There has been an outburst of legal activity surrounding groundwater extraction, as localities claim that bottlers' excessive extraction has had detrimental effects on water availability and overall environmental conditions of local communities.[85] In order to harvest the water, also known as groundwater, that meets FDA standards for bottling, companies must sink high capacity wells[86] to extract water located in aquifers.[87] Aquifers are deep geologic formations which contain water that has

80. Mason et al., *supra* note 75, at 13.

81. *Id.* The transfer of microplastics or their toxic substances into the water may even happen if the water bottles are heated. For example, tea, in plastic teabags, that is brewed above 90 degrees Fahrenheit leaches materials into water. Hernandez et al., *supra* note 73.

82. Scott Neuman, *WHO Study Finds No Evidence of Health Concerns from Microplastics in Drinking Water*, NPR (Aug. 22, 2019), https://www.npr.org/2019/08/22/753324757/who-study-finds-no-evidence-of-health-concerns-from-microplastics-in-drinking-wa.

83. *See* Joana Correia Prata et. al., *Environmental exposure to microplastics: An overview on possible human health effects*, 702 SCI. OF THE TOTAL ENV'T 6 (2020); *see also* Madeleine Smith et al., *Microplastics in Seafood and the Implications for Human Health*, 5 CURRENT ENVTL. HEALTH REP. 375, 380 (2018); Shivika Sharma & Subhankar Chatterjee, *Microplastic pollution, a threat to marine ecosystem and human health: a short review*, 24 ENVTL. SCI. & POLLUTION RES. 21530, 21542 (2017).

84. *See* Correia Prata et al., *supra* note 83; Smith et al., *supra* note 83; Sharma & Chatterjee, *supra* note 83.

85. DAN A. TARLOCK, LAW OF WATER RIGHTS AND RESOURCES § 4.36 (John Damico, Esq. et al. eds., 2015 ed.).

86. *Id.* § 4.36 ("A high capacity well is a well that has the capacity to withdraw more than 100,000 gallons per day, or a well that, together with all other wells on the same property, has a capacity of more than 100,000 gallons per day."); *High Capacity Wells*, WIS. DEP'T OF NAT. RESOURCES (Jan. 30, 2020), https://dnr.wi.gov/topic/Wells/HighCap/.

87. TARLOCK, *supra* note 85, § 4.3.

filtered through the surface of the earth where it is ultimately stored underground.[88] When bottled water companies sink these high capacity wells, the water extracted can have a significant impact on the local area's watershed.[89]

After wells are sunk into these formations and water pumped for use, aquifers become depleted. Some aquifers are able to recharge themselves through the hydrological process of rain descending and filtering through the ground while others are not.[90] The speed by which an aquifer replenishes its water supply varies on a variety of geologic conditions and some aquifers, once pumped, will refill extremely slowly or not at all.[91] Therefore, groundwater supplies are considered both renewable and non-renewable resources as they are able to replenish but can also be pumped so heavily that they are unable to recharge; or are so heavily depleted that aquifer storage is eliminated.[92] Issues with resources and local watersheds occur when aquifers are not able to be fill fast enough or there are not adequate surface supplies such as reservoirs or lakes.[93]

As there is a huge reliance on groundwater in the United States, with nearly one-half of the population relying on it as its primary drinking source, there then leads to issues with the larger watershed.[94] If an

88. *Id.*

89. *See, e.g.*, Glen Moberg, *Study Details Impact of High-Capacity Wells on Little Plover River*, WIS. PUB. RADIO (Apr. 13, 2016), https://www.wpr.org/study-details-impact-high-capacity-wells-little-plover-river (describing impacts of high capacity wells used for agriculture in Wisconsin); Wis. Groundwater Coordinating Council, *Report to the Legislature on Groundwater/Surface Water Interactions* (2019), https://dnr.wi.gov/topic/Groundwater/documents/GCC/gwQuantity/SurfaceWaterImpacts.PDF (describing groundwater pumping impacts on various Wisconsin counties).

90. TARLOCK, *supra* note 85, § 4.3.

91. *Id. See also* BARTON H. THOMPSON, JR. ET AL., LEGAL CONTROL OF WATER RESOURCES: CASES AND MATERIALS 451 (6th ed. 2018).

92. *See* TARLOCK, *supra* note 85, § 4.3. Using mass amounts of groundwater not only impacts the water, but also can cause land subsidence. This occurs when there is "a loss of support below ground. In other words, sometimes when water is taken out of the soil, the soil collapses, compacts, and drops. This depends on a number of factors, such as the type of soil and rock below the surface." *Groundwater Decline and Depletion*, U.S. GEOLOGICAL SURV. (Feb. 3, 2020), https://www.usgs.gov/special-topic/water-science-school/science/groundwater-decline-and-depletion?qt-science_center_objects=0#qt-science_center_objects.

93. TARLOCK, *supra* note 85, § 4.4 (explaining that surface supplies of water such as lakes or reservoirs are often used first for water supplies, but if these run out or are contaminated, groundwater serves as a backup).

94. PETER FOLGER ET AL., CONG. RESEARCH SERV., R45259, THE FEDERAL ROLE IN GROUNDWATER SUPPLY: OVERVIEW AND LEGISLATION IN THE 155TH CONGRESS (2018); TARLOCK, *supra* note 85, § 4.4 ("More than two-thirds of the groundwater extracted in 2010 was used for agricultural irrigation. In fact, groundwater accounts for more than 40% of all water used in irrigation agriculture," and "greater volumes of groundwater tend to be used in the West. California accounts for nearly one-fifth of the national total, followed by Texas, Nebraska, Arkansas, Idaho, Florida, Arizona and Kansas. More than two-thirds the total national volume of groundwater withdrawal is in these eight states."); THOMPSON, JR. ET AL.,

aquifer is continually pumped, with no time to refill itself, there becomes issues with water users in the overlapping watersheds and to the overall ecosystem surrounding the aquifer.[95] As the aquifer water levels remain low, discharges from the groundwater into streams decline, streams or rivers can reverse in direction, and rivers or streams can completely disappear.[96] Ultimately mismanaged systems can lead to issues with bird and animal populations, riparian habitats for aquatic organisms, downstream rivers or streams, and can also cause nearby wells to dry up leading to water access issues.[97]

Although bottled water extraction is relatively small across the United States, as compared to municipal uses, groundwater and surface water are hydrologically interconnected so any increased pumping has localized effects on the water system.[98] The interconnectedness between surface and groundwater "takes place in three basic ways: streams gain water from inflow of ground water through the streambed (gaining stream), they lose water to ground water by outflow through the streambed (losing stream), or they do both, gaining in some reaches and losing in other reaches."[99]

These hydrological changes can expressly be seen in communities who are home to bottling companies. For example, officials in Maine, Michigan, New Hampshire, and Vermont (where the climate tends to be rainy with heavy snow pack) stated that "large-scale groundwater extraction can adversely impact local groundwater availability, surface

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supra note 91, at 448, 448 n.15. *See, e.g.*, Scott Neuman, *Nestlé Offered Permit to Continue Taking Water from California Watershed*, NPR (June 28, 2018), https://www.npr.org/2018/06/28/624156334/nestl-offered-permit-to-continue-taking-water-from-california-stream ("Nestlé had been operating under a permit issued to the Arrowhead Puritas Waters Inc. in 1988."); Greg Allen, *The Water Is Already Low at a Florida Freshwater Spring, But Nestlé Wants More*, NPR (Nov. 8, 2019), https://www.npr.org/2019/11/08/776776312/the-water-is-already-low-at-a-florida-freshwater-spring-but-nestl-wants-more ("For the past 20 years, Seven Springs, the company that owns the land around Ginnie Springs, has had a permit allowing it to take nearly 1.2 million gallons a day from its wells.").

95. ROBERT GLENNON, UNQUENCHABLE: AMERICA'S WATER CRISIS AND WHAT TO DO ABOUT IT 46 (Island Press, 2009).

96. Inge E.M. de Graaf, *Environmental flow limits to global groundwater pumping*, 574 NATURE 90, 90 (2019).

97. GLENNON, *supra* note 95, at 46.

98. *See* THOMPSON, JR. ET AL., *supra* note 91, at 453. It's not just localized impacts: "[M]ore than 2% of the observed rise in global oceans level during 2001-2008 can be attributed to groundwater depletions in the United States alone." *Id.* at 448. In addition, "[m]ore than 350 miles of streams have been lost since 1950 because of groundwater withdrawals in the Great Plains." *Id.*

99. *Id.* at 453 (quoting Thomas Winter, et al., Ground Water and Surface Water: A Single Resource 9-14 (U.S. Geological Survey Circular #1139, 1998)) (internal citations omitted).

water flows, and dependent resources."[100] In addition, the U.S. Geological Survey concluded that when aquifers were shallow and connected to nearby streams, pumping can diminish the availability of surface water because through pumping, the surface water is diverted away from streams and rivers.[101] Ultimately, changes to the surface water can cause changes in oxygen levels, temperature, and nutrient concentrations, which prompt issues with aquatic life.[102] The large scale impacts on surface water from groundwater extraction depend on a variety of factors including the rate of withdrawal, how quickly the aquifer can replenish, rain rates, and the connection between the aquifer and the surface water.[103]

The large scale impacts of unsustainable groundwater extraction are starting to be seen across the world, not just in the United States.[104] As groundwater extraction has been improperly managed, "between 15 and 21 percent of watersheds that experience groundwater extraction [in the world] have slipped past a critical ecological threshold."[105] The critical ecological threshold occurs "when water levels drop to less than 90 percent of their average flow during the dry season."[106] Estimates show that

100. GAO-09-610, *supra* note 20, at 26. State officials clarified that existing groundwater extraction had not adversely impacted state waters yet, but this report was conducted in 2009. *Id.*

101. *Id.* at 27.

102. *Id.* at 27. Dissolved oxygen is the amount of oxygen present in water. When there are low or no levels of dissolved oxygen in the water animals may migrate elsewhere, decline in health or die. *Indicators: Dissolved Oxygen*, U.S. ENVTL. PROTECTION AGENCY (Jan. 30, 2020), https://www.epa.gov/national-aquatic-resource-surveys/indicators-dissolved-oxygen. Higher temperatures, in streams, rivers, or oceans, can reduce levels of dissolved oxygen in the water, can speed chemical reactions causing excess nutrients, and influence the salinity of the water. CLIMATE CHANGE INDICATORS IN THE UNITED STATES: STREAM TEMPERATURE, U.S. ENVTL. PROTECTION AGENCY 1 (Aug. 2016), https://www.epa.gov/sites/production/files/2016-08/documents/print_stream-temperature-2016.pdf. High amounts of nutrients such as phosphorus or nitrogen decrease dissolved oxygen, allow for increased algal blooms, and impede water quality. VOLUNTARY ESTUARY MONITORING MANUAL, U.S. ENVTL. PROTECTION AGENCY 10-1 (Mar. 2006), https://www.epa.gov/sites/production/files/2015-09/documents/2009_03_13_estuaries_monitor_chap10.pdf.

103. GAO-09-610, *supra* note 20, at 27.

104. *See, e.g.*, Brian Clark Howard & Alejandra Borunda, *8 mighty rivers run dry from overuse*, NAT'L GEOGRAPHIC (May 9, 2020), https://www.nationalgeographic.com/environment/photos/rivers-run-dry/ (describing rivers that have run dry from overuse not only in the United States, but also in China, Australia, and India).

105. Alejandra Borunda, *We pump too much water out of the ground-and that's killing rivers*, NAT'L GEOGRAPHIC (Oct. 2, 2019), https://www.nationalgeographic.com/science/2019/10/groundwater-pumping-killing-rivers-streams/; *see also* Graaf, *supra* note 96, at 91 fig. 2 (portraying how global issues of environmental water flows, such as rivers in streams, will be impacted by groundwater pumping).

106. Borunda, *supra* note 105. If the lack of water remains for more than 3 months in a year and repeats for at least 2 years in a row, the dry system critically endangers flora and fauna of the watersheds. *Id.*; Graaf, *supra* note 96.

by 2050, 40 to 79 percent of watersheds will slip past the critical ecological threshold.[107] In the United States, significant portions of the Midwest and the West Coast have hit or will begin to hit the critical ecological threshold by 2030.[108] Endangered aquifers include the High Plains or Ogallala Aquifer, the Mississippi Embayment section of the Gulf Coastal Plain aquifer system, and the Central Valley in California.[109]

F. The Legal Framework of Groundwater Extraction

The common law doctrines surrounding groundwater extraction are complex and scattered amongst various jurisdictions. There is no federal legislation that determines how groundwater resources are managed; instead, this is left to the states to determine.[110] Some jurisdictions combine various frameworks, while others apply traditional common law. Within the common law framework, some jurisdictions also adopt specific legislative or administrative devices that are used along with the traditional framework. Regulatory systems typically include elements from five broad categories. These categories include (1) the traditional common law framework of capture, (2) the reasonable use doctrine, (3) correlative rights, (4) the Restatement of Torts approach to reasonable use, and (5) prior appropriation. Many states and local jurisdictions draw on regulations from multiple categories, leading to a complex framework for analysis.

First, the traditional common law doctrine of capture allows landowners to draw as much groundwater as they desire, regardless of purpose.[111] This doctrine is followed in the fewest states, but of importance, the Supreme Court of Texas affirmed its legitimacy under state law.[112] In *Sipriano v. Great Spring Waters of America*, the court reaffirmed that the rule of capture allowed landowners to take as much groundwater as they wanted, with a low potential of liability to their neighbors, even if

107. Borunda, *supra* note 105; *see also* Graaf, *supra* note 96.

108. Graaf, *supra* note 96, at 91 fig. 1a (describing that portions of the United States, and areas around the world, will hit critical ecological threshold by 2030).

109. THOMPSON, JR. ET AL., *supra* note 91, at 448. The Central Valley aquifer is considered the fourth-most-stressed in the world. *Id.* at 449.

110. The federal government plays a role in managing groundwater quality through the Comprehensive Environmental Response, Compensation, and Liability Act ("CERCLA") and the Safe Drinking Water Act. These focus on regulating injection wells that can be used to promote aquifer recharge. FOLGER ET AL., *supra* note 94, at 1. *See also* 42 U.S.C. §§ 9601-9675 (CERCLA); 42 U.S.C. §§ 300f to 300j-27 (Safe Drinking Water Act).

111. THOMPSON, JR. ET AL., *supra* note 91, at 472.

112. *Id.* at 473. Also known as the "absolute dominion" or "absolute ownership" rule, the traditional common law doctrine of capture is followed in Connecticut, Georgia, Indiana, Louisiana, Maine, Minnesota, Massachusetts, Mississippi, Rhode Island, Texas, and Vermont. *Water Law: An Overview*, THE NAT'L AGRIC. L. CTR., (Jan. 30, 2020), https://nationalaglawcenter.org/overview/water-law/.

their pumping depleted their neighbor's wells.[113] The Siprianos brought suit against a local water bottling company for negligently draining their wells.[114] The bottling company pumped about 90,000 gallons of water a day, for seven days a week, causing the Siprianos wells to completely dry up quickly thereafter.[115] The court ultimately upheld the law of capture, preventing the Siprianos from receiving any remedy for their dried up well, and left any further changes to groundwater regulation to the legislature.[116] The law of capture still applies in Texas, as the legislature has failed to make any changes.[117]

Second, the reasonable use doctrine builds upon the rule of capture by requiring that groundwater consumption must be put to reasonable use and must be used on the tract overlying the groundwater extraction.[118] Reasonable use is usually interpreted broadly, requiring only that water is used on the land above the aquifer.[119] If the use is not on the property above the location of groundwater extraction and it causes injury to a water user of the same aquifer, the injuring extractor is usually liable.[120] This doctrine tends to protect rural farmers and residents from larger organizations sinking wells that would pump groundwater for exportation for municipal or bottling purposes.[121]

Third, the correlative rights doctrine requires "an equitable sharing of the available groundwater among overlying landowners who are using

113. The ability to take as much groundwater as desired is limited only by acts of malice or willful waste, which heavily reduces claims for groundwater users. Sipriano v. Great Spring Waters of America, 1 S.W.3d 75, 76 (Tex. 1999). For a summary of *Sipriano*, see also THOMPSON, JR. ET AL., *supra* note 91, at 473-74.

114. *Sipriano*, 1 S.W.3d at 75.

115. *Id.* at 75-76.

116. *Id.* at 80-81.

117. *See* Tiffany Dowell Lashmet, *Basics of Texas Water Law*, TEXAS A&M AGRILIFE EXTENSION 1 (Jan. 2018), https://cdn-ext.agnet.tamu.edu/wp-content/uploads/2019/05/EAG-050-basics-of-texas-water-laws.pdf. It is also important to note that Texas has extremely complex laws surrounding groundwater because of the heavy oil, natural gas, and mining industry. Groundwater is vital to these industries; therefore, any well pumping plays a role. *See generally id.*; Judon Fambrough, *Yours, Mine, or Ours? The Rule of Capture and Subterranean Flued*, TEXAS A&M REAL ESTATE CTR., (Jan. 2015), https://stpra.org/wp-content/uploads/2018/06/2079.pdf; Deborah Gordon & Katherine Garner, *Texas's Oil and Water Tightrope*, CARNEGIE ENDOWMENT FOR INT'L PEACE (Mar. 11, 2014), https://carnegieendowment.org/2014/03/11/texas-s-oil-and-water-tightrope-pub-54879.

118. THOMPSON, JR. ET AL., *supra* note 91, at 473. States that use this system include Alabama, Arizona, Delaware, Illinois, Kentucky, Maryland, Michigan, Missouri, New Hampshire, New Jersey, New York, North Carolina, Oklahoma, Pennsylvania, Virginia, and West Virginia. THE NAT'L AGRIC. L. CTR., *supra* note 112.

119. THOMPSON, JR. ET AL., *supra* note 91, at 473, 481.

120. *Id.*

121. *Id.* at 481.

(or who seek to use) it on their overlying tracts."[122] This doctrine was first promulgated in California in *Katz v. Walkinshaw*, in which the court held that groundwater usage by landowners on the overlying tract of land is "paramount to that of one who takes the water to distant land."[123] The doctrine provides that landowners must equitably share water resources, but if a landowner withdraws water that is then exported for use off tract, then that use is subordinated in times of low water.[124]

Fourth, The Restatement of Torts, combining the rule of capture and the reasonable use rule, places liability on groundwater extractors that cause unreasonable harm.[125] Groundwater users are liable for injuries associated with using shares of water that lower the water table, withdraw water at a level that exceeds a "reasonable share of the annual supply or total store of groundwater," or withdraw water and cause "a direct and substantial effect upon a

watercourse or lake and unreasonably causes harm to a person entitled to the use of its water."[126] The Restatement does not distinguish between water usage on or off the overlying tract, therefore if you were to pump water from one property and transfer it to another you may still be liable for harm.[127]

Lastly, the rule of prior appropriation follows the phrase "first in time, first in right."[128] Landowners obtain water rights by taking water and putting it to "beneficial use."[129] After they do this, the first user who began to put the water to use has the highest priority of usage.[130] Subsequent users have a lesser priority and are the first to be curtailed in times of drought.[131] Beneficial uses are interpreted broadly and can include domestic, municipal, agricultural, or recreational uses.[132]

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122. *Id.* States that use this system include California, Minnesota, Iowa, Arkansas, Vermont, and Oklahoma. Nebraska follows a combination of the correlative rights doctrine and the reasonable use doctrine. THE NAT'L AGRIC. L. CTR., *supra* note 112.

123. *See* Katz v. Walkinshaw, 141 Cal. 116, 135 (1903).

124. THOMPSON, JR. ET AL., *supra* note 91, at 472. *But see id.* at 487 (quoting Orange Cty. Water Dist. v. City of Colton, 226 Cal. App. 2d 642, 38 Cal. Rptr. 286, 290 (1964) ("[I]f a city acquires the right to store and extract groundwater by deed from overlying landowners, those grantors may be estopped from objecting to the city's pumping, but the deed 'does not authorize such use over objection by other overlying land owners.' ")).

125. THOMPSON, JR. ET AL., *supra* note 91, at 472. This system is used in Wisconsin and Ohio. THE NAT'L AGRIC. L. CTR., *supra* note 112.

126. RESTATEMENT (SECOND) OF TORTS § 858.

127. THOMPSON, JR. ET AL., *supra* note 91, at 472.

128. *Id.* This rule is followed in Idaho, New Mexico, Utah, Kansas, the Dakotas, Nevada, Oregon, Wyoming, and Montana. *Id.* at 490; NAT'L AGRIC. L. CTR., *supra* note 112.

129. THOMPSON, JR. ET AL., *supra* note 91, at 472, 490-91.

130. NAT'L AGRIC. L. CTR., *supra* note 112.

131. *Id.*

132. *Id.*

G. The Legal Difficulties of Groundwater Extraction

The frameworks to address and regulate groundwater are varied and inconsistent. Because many jurisdictions lack a clear structure for groundwater litigation, there are issues that arise in protecting these rights and assuring protection of groundwater resources. Frameworks for federal and statewide causes of action regarding excessive extraction of surface water exist, but equivalent causes of action do not exist for groundwater.[133] Specifically, for claims alleging unlawful groundwater extraction by bottling companies, plaintiffs frequently have difficulty establishing standing or demonstrating that their injuries were actually caused by groundwater pumping in the surrounding areas.

First, proponents of claims relating to groundwater extraction often have difficulty demonstrating actual causation for injuries. Nestlé, as the largest supplier of bottled water in the United States, has been the subject of repeated litigation by environmental advocacy groups in order to limit Nestlé's pumping rate at various groundwater sources.[134] For example, residents of Mecosta County, Michigan, brought suit against Nestlé Waters North America in an attempt to prevent Nestlé from constructing a new bottling facility and to limit the amount of groundwater that could be extracted.[135] The Supreme Court of Michigan determined that the plaintiffs' standing was limited to claims regarding water sources in which they enjoyed riparian rights or landowners who had land abutting the waters in question, rejecting the idea that plaintiffs have standing due to interconnectedness of water systems.[136] The court denied standing to individuals without riparian rights, as they could not show that their aesthetic or recreational enjoyment of the waters were being negatively impacted by Nestlé's pumping.[137]

133. These frameworks include causes of action for the Endangered Species Act or citizen suits under the Clean Water Act. *See* Endangered Species Act of 1973, 16 U.S.C. §§ 1531-1544 (1973); 33 U.S.C. §§ 1251-1387 (1972) (Clean Water Act).

134. Winter, *supra* note 69.

135. Mich. Citizens for Water Conservation v. Nestle Waters N. Am., Inc., 479 Mich. 280, 287 (2007), *overruled by* Lansing Sch. Educ. Ass'n v. Lansing Bd. of Educ., 487 Mich. 349 (2010) (overruling Michigan's standing doctrine and finding its presence where "plaintiffs have a substantial interest in the enforcement of [a statute] that is detrimentally affected in a manner distinct from that of the general public if the statute is not enforced").

136. *Id.* at 298-99, 309-10.

137. *Id.* at 299. The case was remanded and ultimately settled. Winter, *supra* note 69. Nestlé agreed to reduce pumping from 400 gallons per minute to 218 with additional restrictions based on the seasons. *Id.*

In contrast, Osceola County, Michigan, was successful in its groundwater extraction litigation against Nestlé.[138] In order to gain access to municipal and non-municipal wells, Nestlé promised to provide funds to the local high school and funds to upgrade well houses.[139] Once pumping rights were granted, the company attempted to raise their extraction amounts but the local zoning board denied their permit.[140] Nestlé's appeal landed in the Court of Appeals of Michigan, which determined that the zoning board appropriately refused the request because commercial bottling is not an essential public service.[141] Simply because water itself is essential, does not mean that bottled water is also essential.[142] The court established that local counties had the ability to prevent additional pumping.[143]

Ultimately, these cases establish that municipalities are pushing back against bottling companies both successfully and unsuccessfully. In cases where municipalities and environmental advocates are unsuccessful, they either lack standing or are outmatched by corporate resources. Large national or multi-national commercial organizations often have more sophisticated legal teams and more financial resources than do local municipalities and environmental advocates.[144] As bottlers attempt to expand their businesses, they will seek larger withdrawals, ultimately causing major environmental issues to communities.

III. REGULATORY AND LEGAL ISSUES THE BOTTLED WATER INDUSTRY PRESENTS

Federal, state, and local agencies have failed to adequately regulate bottled water to protect consumer safety and promote groundwater sustainability. FDA's insufficient enforcement and monitoring of contaminants combined with state and federal agencies' failure to monitor groundwater pumping are two major issues that impact the bottled water industry.

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138. Winter, *supra* note 69; *see also* Nestlé Waters N. Am. North, Inc. v. Twp. of Osceola, No. 3341881, 2019 WL 6499586 (Court of Appeals of Mich. Dec. 3, 2019) (per curiam) (unpublished opinion).

139. Winter, *supra* note 69.

140. *Id.*

141. Nestlé Waters N. Am., Inc. v. Twp. of Osceola, No. 3341881, 2019 WL 6499586, at *2 (Court of Appeals of Mich. Dec. 3, 2019) (per curiam) (unpublished opinion).

142. *Id.* at *3.

143. *See id.* at *11.

144. *See, e.g.*, Tom Perkins, *The Fight to Stop Nestle from Taking America's Water to Sell in Plastic Bottles*, THE GUARDIAN (Oct. 29, 2019) (discussing Nestle's "predatory" tactics to procure water rights in struggling communities), https://www.theguardian.com/environment/2019/oct/29/the-fight-over-water-how-nestle-dries-up-us-creeks-to-sell-water-in-plastic-bottles.

First, FDA has not promulgated sufficient maximum contaminant levels nor has it banned certain contaminants that are injurious to human health. Specifically, there are no FDA guidelines or regulations concerning cryptosporidium, BPA, perchlorate, and microplastics. FDA also lacks the capabilities or incentive to inspect bottling companies for bottling violations, raising concerns that FDA is not effectively conducting oversight on these facilities. Though there is a specific regulatory framework for inspections, including confirmation that water is drawn from an approved source, inspection of the bottling operation, and sanitization procedures, FDA has conducted relatively few inspections on facilities.[145] Even if bottling agencies conduct sufficient testing without FDA oversight, there is no public reporting requirement if contaminants are later discovered again leading to issues of consumer safety.[146] If bottling requirements for these contaminants are not put into place, and if legislative changes do not occur, there could be outbreaks of disease or the presence of harmful contaminants within water could cause negative long-term human health effects.

Second, lax state regulations and outdated groundwater pumping legal frameworks allow bottled water companies to prey on low income areas in order to gain bottled water permitting.[147] The failure of federal, state, and local governments to limit groundwater pumping must be addressed in order to prevent destruction of local water systems. If this does not occur, these areas will become reliant on the good that caused the issue in the first place, bottled water. The continued unsustainable pumping of groundwater resources will cause substantial impacts to the environment unless sustainability is promoted. As climate change progresses and water becomes a more valuable resource, litigation concerning pumping rights will increase.

Furthermore, lax and inconsistent groundwater regulations combined with FDA's dereliction of enforcement will ultimately converge into a larger issue—health effects. As groundwater aquifers become

145. *See* Lauren M. Posnick & Henry Kim, *Bottled Water Regulation and the FDA*, FOOD SAFETY MAG., Aug./Sept. 2002, https://www.foodsafetymagazine.com/index.cfm/magazine-archive1/augustseptember-2002/bottled-water-regulation-and-the-fda/ ("Because FDA's experience over the years has shown that bottled water has a good safety record, bottled water plants generally are assigned low priority for inspection. The agency, however, inspects violative firms more frequently.").

146. *See* ELIZABETH ROYTE, BOTTLEMANIA 146 (Bloomsbury, 2008) (questioning the lack of reported illnesses caused by bottled water in the U.S. given that there are plenty of such illnesses reported in other countries); *see also* Ryan Felton, *The FDA Knew the Bottled Water Was Contaminated. The Public Didn't.*, CONSUMER REP. (Nov. 21, 2019), https://www.consumerreports.org/bottled-water/the-fda-knew-the-bottled-water-was-contaminated-the-public-didnt/ [hereinafter Felton, *FDA Knew*].

147. *See, e.g.*, Perkins, *supra* note 144.

strained, contaminants seep into the water, which is then pumped and bottled with little oversight. Failure to adequately monitor, protect, and limit extraction will lead to contaminants that cause health consequences to enter into the bottled water that are not monitored appropriately.

IV. WHY IT MATTERS

A. Contaminants in Bottled Water

Though most bottled water is safe, or at least as safe as municipal water, the failure of FDA to enact appropriate standards and monitoring requirements for contaminants such as cryptosporidium, BPA, perchlorate, and microplastics could expose bottling companies and consumers to health hazards.[148] Misconceptions surrounding bottled water's health and safety are increasing as the beverage has risen in popularity. Many consumers believe bottled water to be safer than municipal water, even though the contaminants allowed in both are similar.[149] FDA allows the same pesticides, by-products, heavy metals, and radioactive materials in bottled water as in tap water.[150] The major difference is that municipal water utilities are required to annually report contaminants that are contained in the water but bottlers are not held to the same standard.[151] Bottlers are not required to report contaminants, order recalls, nor are they subject to adequate oversight of their operations.[152]

148. *See* ROYTE, *supra* note 146, at 143 (explaining that water testers find most bottled water to be safe by government standards). *But see* Mitch Smith, *Miles From Flint, Residents Turn Off Taps in New Water Crisis*, N.Y. TIMES (Nov. 24, 2017), https://www.nytimes.com/2017/11/24/us/michigan-water-wolverine-contamination.html?searchResultPosition=1 (showing that some areas have such poor water quality that they must resort to using bottled water or municipal water that is high in contaminants); Eric Lipton & Julie Turkewitz, *E.P.A. Proposes Weaker Standards on Chemicals Contaminating Drinking Water*, N.Y. TIMES (April 25, 2019), https://www.nytimes.com/2019/04/25/us/epa-chemical-standards-water.html?searchResultPosition=4 (describing how EPA is attempting to weaken standards for contaminants in municipal water).

149. *See* ROYTE, *supra* note 146, at 143-46.

150. *Id.* at 143.

151. *Id.* at 143-44.

152. *See id.* at 144-46. *See, e.g.*, Press Release, U.S. Attorney's Office Cent. Dist. of Cal., Bottler of Crystal Geyser Water Pleads Guilty to Illegally Storing and Transporting Hazardous Wastewater Contaminated with Arsenic (Jan. 9, 2020), https://www.justice.gov/usao-cdca/pr/bottler-crystal-geyser-water-pleads-guilty-illegally-storing-and-transporting-hazardous (demonstrating the contaminants that exist in the water used for bottling and what happens to them after they are pumped out).

i. The Lack of Contaminant Inspections

Though FDA established manufacturing processes for bottlers, there is little to no enforcement of standards or testing of the product.[153] Based on a 2009 Government Accountability Office ("GAO") study, FDA, on average, devoted approximately 2.6 full-time equivalent positions per fiscal year to inspecting bottled water facilities from 2000 through 2008.[154] When FDA conducts inspections, it verifies that the water used by the plant comes from an approved source, checks the labeling requirements, and inspects the sanitation procedures.[155]

Generally, inspectors test the water only "for cause," such as if the inspectors observe a possible problem or there are past instances of contamination at the plant.[156] The GAO was unable to provide a determinate number or percentage as to the frequency of bottled water inspections.[157] Also of note, FDA only has the ability to inspect bottled water facilities that ship water in interstate commerce, meaning a local bottled water supplier is not subject to FDA's regulations.[158] The GAO concluded that when FDA does inspect facilities, it is often to determine the facilities' compliance with manufacturing regulations and quality control procedures, not to analyze the actual water being sold.[159]

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153. FDA provided that bottled water facility testing was usually "low priority." Ahn, *supra* note 16, at 190. But there may be a turning tide on lack of large-scale review. As of March 3, 2020, the Subcommittee on the Environment in the United States House of Representatives sent a request for information concerning Nestlé's bottling practices, including information regarding their extraction, bottling, and selling of groundwater for financial gain. Letter from Representative Harley Rouda, Chairman of the House Subcommittee on Environment, and Representative Rashida Tlaib, Vice Chairwoman of the House Subcommittee on Environment, to Fernando Merce, President and Chief Executive Officer of Nestlé Waters North America (Mar. 3, 2020), https://oversight.house.gov/sites/democrats.oversight.house.gov/files/2020-03-03.Rouda%20Tlaib%20to%20Merce-Nestle%20re%20Bottled%20Water%20FINAL.pdf.

154. GAO-09-610, *supra* note 20, at 9. For an $18.36 billion industry, the devotion of around 3 full-time equivalent positions to review seems rather low. Emma Bedford, *Revenue of bottled water production in the United States from 2014 to 2018*, STATISTA (May 12, 2020), https://www.statista.com/statistics/290547/revenue-of-bottled-water-production-in-the-us/; John G. Rodwan, Jr., *Confronting Challenges: U.S. and International Bottled Water Developments and Statistics for 2008*, INT'L BOTTLED WATER ASS'N 13 (April/May 2009), https://www.bottledwater.org/public/2008%20Market%20Report%20Findings%20reported%20in%20April%202009.pdf.

155. GAO-09-610, *supra* note 20, at 9.

156. *Id.* at 9-10.

157. *Id.* at 10.

158. GLEICK, *supra* note 24, at 40.

159. *Id.*; *but see* Felton, *FDA Knew*, *supra* note 146.

> The government's May 2018 report on Sweet Springs Valley Water Company, a bottled water manufacturer in West Virginia, was alarming. An inspector from the Food and Drug Administration, during a review of Sweet Springs' test records, found that several months earlier the company had bottled and distributed water from a source contaminated with E. coli, a potentially deadly bacteria. When E. coli

Critiques of bottled water testing focus on the frequency and reporting of the testing. Source water and finished products are only required to be tested weekly for biological contaminants and annually for chemical contaminants.[160] Critics believe that this frequency of testing is too low to ensure reliable quality or to catch problems.[161] In addition, there is no mandatory requirement that the test results be sent to FDA or independently reviewed by FDA.[162] Bottlers are supposed to maintain records for at least two years and make the files available for FDA review "at reasonable times."[163] Some bottled water companies, such as Nestlé, do provide water quality reports in an "aim to be transparent," but there is little independent oversight to ensure the accuracy.[164]

Though bottled water has a low inspection priority, this does not mean that the industry is immune from inspections nor that the industry does not violate regulations. From the minimal inspections that state inspectors conducted, there were potential problems identified in about 35% of the inspections conducted between 2000 and 2008.[165] A majority of inspection problems were designated as "voluntary action indicated," meaning that the district office determined such problematic conditions did not warrant any administrative or regulatory action.[166] Between 2008 and 2018, FDA inspections of bottled water facilities declined by 33%, meaning that FDA devotes even less inspection power towards bottling facilities, which raises major concerns about the products' safety.[167]

As bottlers are often not required to order recalls or report contamination, there is little to no oversight by the government to assure safety. Bottled water companies, along with all other producers under FDA jurisdiction, *may* voluntarily initiate a recall at any time in order to protect public health.[168] Bottlers *may* also institute a recall if FDA, or a state agency, requests one.[169] If FDA becomes aware of any contamination

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> is detected in source water, companies must cease bottling until they produce five E. coli free samples over a 24-hour period . . . . [T]he company had not stopped production. Nor had it conducted any follow-up tests of the source water.
>
> *Id.*

160. 21 C.F.R. § 129.80(g) (2009).

161. GLEICK, *supra* note 24, at 41.

162. *Id.*

163. 21 C.F.R. § 129.80(h) (2009).

164. *Water Quality Reports*, NESTLÉ WATERS NORTH AM., https://www.nestle-waters-na.com/en/bottled-water-brands/water-quality-reports (last visited Jan. 29, 2019).

165. GAO-09-610, *supra* note 20, at 12.

166. *Id.*

167. Felton, *FDA Knew*, *supra* note 146.

168. *Recall Procedures, in* Regulatory Procedures Manual, U.S. FOOD & DRUG ADMIN. 4, https://www.fda.gov/media/71814/download [hereinafter Recall Procedures].

169. *Id.*

issues, they have the ability to issue mandatory recalls but often do not because the risk posed by these hazards doesn't reach the required threshold.[170] Between the years 2002 and 2008, bottled water was recalled only 23 times.[171] Most often, water is recalled for high levels of contaminants such as arsenic and bromate.[172] Since 2008, water bottles have been recalled for arsenic and polyfluoralkyl substances, more commonly known as PFAs, which both cause issues to human health.[173] There are also situations where bottlers and FDA are aware of contaminants, such as *E. coli*, but do not issue recalls.[174]

ii. Cryptosporidium, BPA, Perchlorate, and Microplastics Lack of Regulation

FDA does not monitor cryptosporidium, BPA, perchlorate, or microplastics as contaminants.[175] The failure of FDA to monitor these contaminants is problematic because each of them can cause significant health concerns for consumption.

First, cryptosporidium causes diarrhea, stomach cramps, dehydration, and vomiting and is usually found in surface water.[176] Bottlers claim that cryptosporidium cannot be found in groundwater sources,

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170. Felton, *FDA Knew*, *supra* note 146; *see also* Recall Procedures, *supra* note 168, at 4-5.

171. GAO-09-610, *supra* note 20, at 12.

172. *Id.*; *see, e.g.*, Ryan Felton, *Arsenic in Some Bottled Water Brands at Unsafe Levels, Consumer Report Says*, CONSUMER REP. (June 28, 2019), https://www.consumerreports.org/water-quality/arsenic-in-some-bottled-water-brands-at-unsafe-levels/ [hereinafter Felton, *Arsenic*]; *Import Alert 29-02*, U.S. FOOD & DRUG ADMIN., https://www.accessdata.fda.gov/cms_ia/importalert_97.html (last visited Jan. 29, 2019) (concerning bottled water and flavored water beverages that contain high arsenic content issued April 5, 2018); *Import Alert 66-41*, U.S. FOOD & DRUG ADMIN., https://www.accessdata.fda.gov/cms_ia/importalert_190.html (last visited Jan. 29, 2019) (concerning bottled water and a variety of imported goods that contain unapproved drugs issued on January 8, 2019); Chris Mercer, *FDA to Recall More Bottled Water in Bromate Scare*, BEVERAGEDAILY.COM (Aug. 23, 2006), https://www.beveragedaily.com/Article/2006/08/24/FDA-to-recall-more-bottled-water-in-bromate-scare (concerning recall of bottled waters from New York due to bromate contamination).

173. Felton, *Arsenic*, *supra* note 172; Sadie Housberg, *PFAS found in bottled water sold in Vermont recall*, BURLINGTON FREE PRESS (Aug. 2, 2019), https://www.burlingtonfreepress.com/story/news/2019/08/02/recall-bottled-water-sold-vermont-due-pfas-harmful-chemical-found/1898154001/; David Abel, *Tainted bottled water is being sold at supermarkets throughout New England*, BOSTON GLOBE (July 29, 2019), https://www.bostonglobe.com/metro/2019/07/29/tainted-bottled-water-being-sold-supermarkets-throughout-new-england/ysV33ushxsPBBouMkUqLTO/story.html. The United States isn't the only one facing issues with contaminants. *See, e.g.*, BBC News, *Irish bottled water recalled again over arsenic levels*, BBC NEWS (Aug. 3, 2019), https://www.bbc.com/news/world-europe-49222262.

174. *See* GLEICK, *supra* note 24, at 37-39.

175. *See supra* notes 56-81 and accompanying text; 21 C.F.R. § 165.110 (2019).

176. CTRS. FOR DISEASE CONTROL & PREVENTION, *Cryptosporidium*, *supra* note 57.

such as springs or artisan wells, because they are not exposed to surface water intrusion; therefore, bottled water does not need to monitor for the contaminant.[177] But, as the water process as a whole revolves around water being cycled through the environment, it is logical that cryptosporidium could enter a groundwater source.[178] Specifically, surface water, including runoff that could contain particulates such as cryptosporidium, percolates downward through the earth in order to reach aquifers, thus reaching the groundwater that is being extracted.[179] Researchers confirmed this hypothesis by finding that cryptosporidium was present in Minnesota wells and was substantially independent of whether the groundwater was influenced by surface water.[180]

Second, BPA has been shown to disrupt estrogen receptors causing disorders such as infertility, early onset puberty, and hormone tumors.[181] Over time and with heat, BPA can seep from the bottle into water.[182] FDA views BPA as "safe at the current levels occurring in foods" and states that current investigations "continues to support the safety of BPA for the currently approved uses in food containers and packaging."[183] But, critics argue that the current exposure to BPA causes adverse effects in humans, and public pressure prompted many bottling companies to remove the chemical bottles.[184] Most bottling companies still use BPA alternatives in their bottles, such as bisphenol S, but even these

177. INT'L BOTTLED WATER ASS'N, *supra* note 60.

178. GLEICK, *supra* note 24, at 76-77.

179. *See id.* at 67-68, 76.

180. Am. Chem. Soc'y, *Cryptosporidium parasite detected in Minnesota groundwater*, SCIENCEDAILY (Mar. 21, 2019), https://www.sciencedaily.com/releases/2019/03/190321092220.htm.

181. Aleksandra Konieczna et al., *Health Risk Exposure to Bisphenol A (BPA)*, NAT'L INST. PUB. HEALTH 7 (2015).

182. *See* Maya Wei-Haas, *Why 'BPA Free' May Not Mean a Plastic Product is Safe*, NAT'L GEOGRAPHIC (Sept. 13, 2018), https://www.nationalgeographic.com/science/2018/09/news-BPA-free-plastic-safety-chemicals-health/ (explaining that once BPA was everywhere, "as people drank from their water bottles and ate their microwaved dinners, they were unknowingly dosing themselves with small amounts of BPA that leached from the plastic containers into their food and drink"); *see also* Sarah Gibbens, *Exposed to extreme heat, plastic bottles may ultimately become unsafe*, NAT'L GEOGRAPHIC (July 19, 2019), https://www.nationalgeographic.com/environment/2019/07/exposed-to-extreme-heat-plastic-bottles-may-become-unsafe-over-time/.

183. *Bisphenol A (BPA): Use in Food Contact Application*, U.S. FOOD AND DRUG ADMIN., https://www.fda.gov/food/food-additives-petitions/bisphenol-bpa-use-food-contact-application (last visited March 20, 2020).

184. Laura N. Vandenberg, *Human exposure to bisphenol A (BPA)*, 24 REPROD. TOXICOLOGY 139, 140 (2007); Gibbens, *supra* note 182. *But see* Jon Hamilton, *Plastic Additive BPA Not Much of a Threat, Government Study Finds*, NPR (Feb. 23, 2018), https://www.npr.org/sections/health-shots/2018/02/23/588356360/plastic-additive-bpa-not-much-of-a-threat-government-study-finds.

alternative chemicals have also been found to act similarly in leaching into water and causing harmful human health effects.[185]

Third, perchlorate can disrupt the thyroid gland's function causing issues with metabolism, hormone creation, blood pressure, and body temperature.[186] Perchlorate is naturally occurring in some arid regions and can also be found in rocket fuel, fireworks, explosives, and fertilizers, which enter the water system through runoff.[187] In 2019, the EPA was reviewing a proposal to establish a MCL for perchlorate which, if passed, would have required FDA to establish a MCL for the contaminant in 180 days.[188] In May 2020, after heavy lobbying from organizations such as Lockheed Martin and Northrup Grumman, the EPA determined that they would not establish a MCL for perchlorate.[189]

Lastly, there is not a consensus concerning microplastics effects on human health. For example, after the Fredonia study,[190] the World Health Organization conducted a study on microplastics effects and ultimately determined that there was not enough to conclude that microplastics posed a risk to human health.[191] Yet other studies show that under heightened concentrations, microplastics can cause inflammatory lesions, neurodegenerative diseases, immune disorders, and heightened risks of cancers.[192] Though there is disagreement concerning the

185. Gibbens, *supra* note 182 (According to University of Missouri scientist Julia Taylor, " ' BPA free' does not necessarily mean safe."); *see, e.g.*, University of Guelph, *BPA Replacement, BPS, hinders heart function, study reveals*, SCIENCEDAILY (Jan. 9, 2020) (explaining that replacement chemical bisphenol S (BPS) could damage the heart and be more potent), https://www.sciencedaily.com/releases/2020/01/200109130211.htm.

186. *Perchlorate in Drinking Water Frequent Questions*, U.S. ENVTL. PROTECTION AGENCY, https://www.epa.gov/dwstandardsregulations/perchlorate-drinking-water-frequent-questions#where-found (last visited Jan. 29, 2019).

187. *Perchlorate in Drinking Water*, U.S. ENVTL. PROTECTION AGENCY, https://www.epa.gov/sdwa/perchlorate-drinking-water (last visited May 1, 2020).

188. *See* 21 U.S.C.S. § 349(b)(1); GAO-09-610, *supra* note 20, at 3-4.

189. Lisa Friedman, *E.P.A. Opts Against Limits on Water Contaminant Tied to Fetal Damage*, N.Y. TIMES (May 14, 2020), https://www.nytimes.com/2020/05/14/climate/trump-drinking-water-perchlorate.html?searchResultPosition=1. Under the Trump administration, there has been repeated instances of the EPA failing to ban various contaminants including chlorpyrifos (a pesticide linked to health problems in children) and asbestos (a known carcinogen). *Id.*

190. *See supra* notes 73-84 and accompanying text.

191. Scott Neuman, *Who Study Finds No Evidence of Health Concerns from Microplastics In Drinking Water*, NPR (Aug. 22, 2019), https://www.npr.org/2019/08/22/753324757/who-study-finds-no-evidence-of-health-concerns-from-microplastics-in-drinking-wa.

192. *See* Correia Prata et al., *supra* note 83, at 2-3; Smith et al., *supra* note 83, at 380-81; Sharma & Chatterjee, *supra* note 83, 21542.

impacts, researchers emphasize the need for additional research to understand microplastics impacts on human health.[193]

B. Environmental Impacts from Groundwater Extraction

Lax state and federal regulations have allowed bottled water companies to obtain permits to extract groundwater at an alarming rate, which in turn causes substantial environmental problems to local areas.[194] The GAO determined that even though the amount of extracted groundwater that is used for bottling is small relative to other uses across the country, the extraction can have significant impacts on local groundwater availability, surface flows, and dependent resources.[195] Municipal water sources, though at times guilty of the same sins as bottled water such as over-extraction, have greater diversity in their water sourcing, including pulling from surface water rivers, lakes, reservoirs, or even from the ocean through desalination plants.[196] This diversity can spread negative impacts across multiple areas, minimizing the effects and ensuring a more stable water management portfolio, rather than with bottled water where the impacts are larger and localized as the sources are less diverse.[197]

Without clearly defined limits to over-extraction, either established through litigation or state regulations, there will continue to be over-extraction of groundwater sources. For example, in Michigan's Mecosta County, after lengthy litigation between environmental groups and Nestlé, the state attempted to remedy the issues surrounding the litigation by amending the state's Safe Drinking Water Act.[198] The state now requires a permit for bottling operations of more than 200,000 gallons per day.[199] The law now requires permitted groundwater withdrawals of more than 2 million gallons per day to not cause an adverse impact to local streams or rivers.[200] Although Michigan enacted this statute, there are still substantial loopholes, as bottled water companies have not been

193. *See generally* Correia Prata et al., *supra* note 83; Smith et al., *supra* note 83; Sharma & Chatterjee, *supra* note 83.

194. *See* ROYTE, *supra* note 146, at 58-60 (describing how pumping water from aquifers has damaged various surrounding environments).

195. GAO-09-610, *supra* note 20, at 27.

196. *See* Zhai Yun Tan, *How Do We Get Our Drinking Water In The U.S.?*, NPR (Apr. 14, 2016), https://www.npr.org/2016/04/14/473806134/how-do-we-get-our-drinking-water-in-the-u-s.

197. ENVIRONMENTAL PROTECTION AGENCY, EPA 816-F0130005, WATER AVAILABILITY AND VARIABILITY STRATEGIES FOR PUBLIC WATER SYSTEMS, 6 (2013).

198. GAO-09-610, *supra* note 20, at 28.

199. *Id.*

200. *Id.* at 28.

denied permits for groundwater withdrawals and "adverse impact to local streams or rivers" is not clearly defined.[201]

In addition, there have been troubling instances in which corporate bottling companies have expanded their bottling practices into jurisdictions in which they know slack water regulations exist with high rates of poverty.[202] For example, in Siskiyou County, California, bottled water companies descended on the small towns close to Mount Shasta in order to bottle water and take advantage of towns that are in economic decline.[203] Some residents of these towns want to encourage the bottling practices in order to bring necessary jobs into the community, while other residents want to preserve their local environment and their access to water.[204] Balancing water access and environmental conservation interests with corporate employment interests is a major issue for these bottling companies and local environmental activists.

Often bottlers enact agreements with local governments in exchange for funding various measures to incentivize the agreements. Critics argue that these incentivizing agreements are problematic as they neglect to include environmental concerns in discussions.[205] For example, in 2003, Nestlé came to Siskiyou County and the local government rushed into enacting an agreement for a 50-year contract, with a guaranteed right of renewal for an additional 50 years, which granted Nestle 1,600 acre feet of water per year, the same amount that the entire town used per year.[206] The Siskiyou County Superior Court ruled the agreement null and void, but this decision was overturned at the Court of

201. Kathleen Gray, *Michigan Oks Nestlé Permit for Increased Water Withdrawal for Bottled Water Plant*, DETROIT FREE PRESS (Apr. 2, 2018), https://www.freep.com/story/news/2018/04/02/michigan-oks-nestle-permit-increased-water-withdrawal-bottled-water-plant/479896002/; Garret Ellison, *More pumping could harm wetlands, suggests Nestle's own study*, MLIVE (Apr. 9, 2017), https://www.mlive.com/news/2017/04/nestle_evart_wetlands_impact.html.

202. *See, e.g.*, Winter, *supra* note 69 (explaining how Evart, a small locality where 44 percent of residents live below the poverty line, depends on Nestlé to finance community improvements).

203. Jane Braxton Little, *Below Mount Shasta, a Fight Burbles Over Bottled Water*, HIGH COUNTRY NEWS (May 28, 2018), https://www.hcn.org/issues/50.9/communities-challenge-companies-over-bottling-mount-shastas-water. The Siskiyou Superior Court ultimately heard arguments by an environmental group and the Winnemem Wintu Tribe challenging Crystal Geyser the validity of an Environmental Impact Report, which would allow the company to bottle water in Mount Shasta. The case was dismissed in August 2019. Skye Kinkade, *Court dismisses lawsuit against Crystal Geyser, county*, THE SISKIYOU DAILY NEWS (Oct. 11, 2019), https://www.siskiyoudaily.com/news/20191011/court-dismisses-lawsuit-against-crystal-geyser-county.

204. Braxton Little, *supra* note 203; *see also* Concerned McCloud Citizens v. McCloud Cmty. Servs. Dist., Respondent's Opposition Brief at 8, 147 Cal. App. 4th 181 (2007).

205. Braxton Little, *supra* note 203.

206. *Id.*; *Concerned McCloud Citizens*, 147 Cal. App. 4th at 186.

Appeal.[207] Ultimately, Nestlé stopped their legal and lobbying efforts and gave up on the contract when faced with significant negative public pressure.[208] Nestlé also gained pumping rights in Osceola County, Michigan, where 44% of the 1,500 residents in Evart, the town in which the pumping station would be placed, live below the poverty line.[209] As an incentive, Nestlé would provide funding for local projects and would create jobs for locals, which is a common occurrence for large bottling companies.[210]

Litigation surrounding groundwater extraction will continue especially as climate change heightens. In California, residents of the San Bernardino mountains were extremely upset that companies such as Nestlé continued to pump water while the state was subject to limitations from a historic drought.[211] Critics argued that the state must establish a maximum pumping level for these groundwater sources, should track the amount that is being pulled from each pumping site, and should reassess permits more frequently.[212] In Nestlé's case, the company was operating on a permit from 1988 which allowed them to draw up to 162 million gallons of water from the forest each year.[213] In 2015, various environmental advocacy groups brought suit to challenge the permit.[214] Ultimately, the District Court granted summary judgment allowing Nestlé to continue water operations until a new permit was decided.[215] The environmental advocacy groups appealed the permit but ultimately settled allowing Nestlé to proceed with a three-year permit only when water was available to protect natural resources.[216] As climate change accelerates

207. *Concerned McCloud Citizens*, 147 Cal. App. 4th at 188, 197.

208. Braxton Little, *supra* note 203.

209. Winter, *supra* note 69.

210. *Id.*

211. Katie Lobosco, *Drought Turns Californians Against Bottling Companies*, CNN BUS. (Mar. 26, 2015), https://money.cnn.com/2015/05/26/news/companies/california-bottled-water-drought/; Associated Press, *U.S. Allows Nestle to Keep Taking Water From Southern California Forest*, L.A. TIMES (June 28, 2018), https://www.latimes.com/business/la-fi-nestle-water-20180628-story.html.

212. *See* Lobosco, *supra* note 211; Associated Press, *supra* note 211.

213. Mike Cruz, *Group Says Settlement Reached Over Nestlé's Water Permit for the San Bernardino National Forest,* THE SUN (June 6, 2018), https://www.sbsun.com/2018/06/06/group-says-settlement-reached-over-nestles-expired-water-permit-for-the-san-bernardino-national-forest/; Ian James, *Bottling Water Without Scrutiny*, DESERT SUN (Mar. 5, 2015), https://www.desertsun.com/story/news/2015/03/05/bottling-water-california-drought/24389417/.

214. Ctr. for Biological Diversity v. United States Forest Serv., No. EDCV 15-2098-JGB (DTBx), 2016 U.S. Dist. LEXIS 139309, at 2-3 (C.D. Cal. Sep. 20, 2016).

215. *Id.* at 26-28.

216. Christopher Weber, *U.S. allows Nestle to keep taking water from California forest*, CHI. TRIBUNE (Jun. 28, 2018), https://www.chicagotribune.com/business/ct-biz-nestle-water-san-bernardino-national-forest-20180628-story.html; Ctr. for Biological Diversity v. United

and droughts become more common place, many local advocates will question corporate impacts on watersheds, such as occurred in the San Bernardino mountains.

C. The Overlap Between Groundwater Extraction and FDA Oversight

FDA regulation and state or local groundwater regulation overlap when extraction becomes so problematic that the groundwater source becomes polluted. Heavy extraction can lead to significant pollution issues in aquifers. For example, in the Central Valley of California, where there is one of the most burdened aquifers on the planet, groundwater users are seeing incredibly high concentrations of arsenic.[217] Depending on the region, or use of the land above the aquifer, there are a variety of contaminants that can be present in aquifers. With these aquifers being diluted, contaminants will appear in higher concentrations, causing major issues to groundwater quality; if this groundwater is not heavily treated, it can cause negative human health impacts.[218] Though groundwater can be filtered in order to make it safe for drinking, various filtration systems have different levels of effectiveness in removing contaminants and these systems can be expensive to maintain.[219] In addition, once contaminants are removed they have to be stored or disposed of

States Forest Serv., No. 16-56717, 2018 U.S. App. LEXIS 25751 (9th Cir. Aug. 29, 2018); *see* Associated Press, *supra* note 211.

217. Josie Garthwaite, *Stanford researchers find groundwater pumping can increase arsenic levels in irrigation and drinking water*, STANFORD NEWS SERV. (June 5, 2018), https://news.stanford.edu/press-releases/2018/06/05/overpumping-groundwater-increases-contamination-risk/; Phillip Dube, *Overpumping California Groundwater Could Lead to Dangerous Arsenic in Water and Food*, YALE ENV'T REV. (June 6, 2019), https://environment-review.yale.edu/overpumping-california-groundwater-could-lead-dangerous-arsenic-water-and-food ("When over-pumping stress the aquifer system, wells pull more water from deeper clay soils. When pumps have to pull from deeper soils, the arsenic buried in the soil comes with it, mixing with the groundwater."); Ryan Smith, et al., *Overpumping leads to California groundwater arsenic threat*, 9 NATURE COMM. 1, 2 (2018).

218. Emmanouella Remoundaki, et al., *Groundwater Deterioration: The Simultaneous Effects of Intense Agricultural Activity and Heavy Metals in Soil*, 162 PROCEDIA ENGINEERING 545, 546 (2016).

219. *See generally Drinking Water Program Fact Sheet: Recommendations for Arsenic Removal from Private Drinking Water Wells in Oregon*, OR. HEALTH AUTHORITY, https://www.oregon.gov/oha/PH/HealthyEnvironments/DrinkingWater/SourceWater/Documents/gw/arsenicremoval.pdf (last visited June 1, 2020) (describing arsenic removal options for private wells); Nina Ricci Nicomel et al., *Technologies for Arsenic Removal from Water: Current Status and Future Perspectives*, 13 INT'L J. ENVTL. RES. & PUB. HEALTH 1 (2016), https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4730453/ (describing various arsenic removal options broadly); Jose A. Del Real, *They Grow the Nation's Food, but They Can't Drink the Water*, N.Y. TIMES (May 21, 2019), https://www.nytimes.com/2019/05/21/us/california-central-valley-tainted-water.html (detailing the difficulties in providing arsenic free water in the Central Valley).

which can lead to issues with hazardous waste.[220] Ultimately, as groundwater extraction leads to higher concentrations of contaminants, federal and state oversight, combined with adequate testing, becomes even more important.

V. STEPS TOWARD A SOLUTION

Regulations of the bottled water industry are ineffective in promoting consumer welfare, safety, and environmental sustainability. In order to remedy these deficiencies, there should be increased oversight of the bottled water industry by FDA. The increased oversight should focus on increasing oversight of water quality standards and regulating for additional contaminants. FDA should prioritize regulation of cryptosporidium and perchlorate while also creating frameworks to research and develop standards for BPA and microplastics, as they are emerging concerns for human health.

Next, the lack of regulation regarding groundwater extraction leads to unsustainable aquifer management systems. States should enact stricter groundwater management laws that prevent aquifers from reaching critical overdraft. In enacting legislation, states should look to California's Sustainable Groundwater Management Act for guidance as to how a variety of groundwater users can seek aquifer sustainability. As the bottled water industry relies on groundwater sources, they must be included in implementing sustainable groundwater practices.

A. Increased FDA Oversight

Requirements that bottlers report contaminants contained in their water should be enacted, and these requirements should establish stricter limitations on contaminants included in bottled water. Though some bottlers do report their testing online, there is no requirement that the bottlers share these findings with FDA, nor is there a requirement that these reports be independently reviewed for accuracy.[221] FDA, or state

220. In January 2020, the company that produces Crystal Geyser Natural Alpine Spring Water pleaded guilty to one count of unlawful storage of hazardous waste, which was created from filtering arsenic out of spring water. For about 15 years they discharged arsenic wastewater into a manmade pond which when tested was 8 times above the hazardous waste limit allowed by the federal government. News Release, Department of Justice, Bottler of Crystal Geyser Water Pleads Guilty to Illegally Storing and Transporting Hazardous Wastewater Contaminated with Arsenic (Jan. 9, 2020), https://www.justice.gov/usao-cdca/pr/bottler-crystal-geyser-water-pleads-guilty-illegally-storing-and-transporting-hazardous.

221. *See generally* 21 U.S.C.S. § 349; *see also* Felton, *Arsenic*, *supra* note 172 (explaining that FDA does not test individualized finish bottled water during inspections, and instead relies on companies to produce their own results).

agencies depending on the availability of jurisdiction, should put into place mandatory reporting requirements whereby bottlers are required to report annually their water quality. The EPA has a similar program in place where Consumer Confidence Reports from community water systems are considered public information.[222] Annual reports should include information from all testing conducted by bottlers, and the testing should be in conformity with the requirements required under 21 C.F.R. § 165.110.[223] This information should be made public and reviewed by FDA in order to ensure that customers safety is maintained and inappropriate contaminants are not included in the water supply.

In addition, FDA should prioritize bottled water facilities for inspections in order to check for violations. FDA's current "for cause" standard allows bottling companies to rarely undergo inspections, so much so that FDA is ineffective in ensuring oversight.[224] Additional bottling inspections by FDA are likely useful in that they ensure additional oversight, but the way these inspections are conducted is not helpful to promoting water quality. As most FDA inspections focus on ensuring that the water comes from an approved source, checking labeling, and sanitation procedures, the actual investigation should be modified to focus on water quality. FDA should prioritize inspecting water quality which could be done without a substantial burden on the bottlers or FDA. FDA could institute additional regulations which require that sampling be sent to third-party labs for testing. As the bottlers are supposed to be conducting these tests already, the only change would be sending samples to a third party for testing. FDA should also institute regulations that this information be made public, as it is for municipal water samples. This would ensure that consumers were aware of the quality of water they are consuming as well as establishing a level of oversight on bottlers' testing process.[225]

FDA should also create regulatory standards for cryptosporidium, BPA, perchlorate, and microplastics while expanding contaminant guidelines to include emerging contaminants. First, FDA should create an MCL for cryptosporidium that is consistent with that of the EPA. The EPA currently accepts no cryptosporidium in municipal water

222. *Consumer Confidence Reports*, U.S. ENVTL. PROTECTION AGENCY, https://www.epa.gov/ccr/ccr-information-consumers (last visited Jan. 29, 2019).

223. 21 C.F.R. §165.110 (detailing testing requirements for contaminants required by the FDA).

224. GAO-09-610, *supra* note 20, at 10-11 (finding that frequency of bottled water inspections varied and that FDA is relying on states more often to inspect bottled water facilities).

225. Felton, *Arsenic*, *supra* note 172 (describing how difficult it is for consumers to come by information about bottled water companies' own testing).

sources,[226] and this standard should be adopted by FDA. The dangers of cryptosporidium are so great that requirements should be established for the parasite in order to protect public health. As studies have shown that cryptosporidium can enter into aquifers even when they are not connected to surface water it is vital that FDA and bottlers monitor for cryptosporidium.[227] Failure to do so could cause a similar situation to the 1993 Milwaukee outbreak causing the death of a hundred people.[228]

Next, the EPA and FDA should enact a standard for perchlorate. There have been various determinations as to what an appropriate standard for perchlorate would be, ranging from 15 micrograms per liter all the way to 56 micrograms per liter.[229] The failure of the EPA to promulgate a rule for perchlorate will likely spur a court battle with unknown results. Ultimately, due to the health consequences that perchlorate causes, the EPA should establish a MCL which protects public health and subsequently, FDA should adopt the same standard.

Lastly, FDA, bottling companies, and state legislatures should promote innovative technologies to alleviate BPA and microplastics in plastic bottles, and they should take reduction strategies to reduce the use of plastics in the industry. Difficulties arise in the regulation of BPA and microplastics because the presence of these contaminants are likely from the plastic container, not the water sources.[230] One immediate solution would be to change all bottled water containers from plastic to cardboard, cans, glass bottles, or even more innovative packaging such as seaweed.[231] Alternatively, bottlers could switch to BPA-free plastic bottles, though studies have shown that even replacements to BPA can lead to health issues and a switch to a different type of plastic does not eliminate issues from microplastics.[232] Ultimately, it is unlikely that bottling

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226. *Ground Water and Drinking Water Regulations*, U.S. ENVTL. PROTECTION AGENCY, https://www.epa.gov/ground-water-and-drinking-water/national-primary-drinking-water-regulations#three (last visited Jan. 29, 2019).

227. *See supra* note 180 and accompanying text.

228. GLEICK, *supra* note 24, at 76.

229. Lisa Friedman, *E.P.A. Opts Against Limits on Water Contaminant Tied to Fetal Damage*, N.Y. Times (May 14, 2020), https://www.nytimes.com/2020/05/14/climate/trump-drinking-water-perchlorate.html?searchResultPosition=1.

230. Laura Parker, *How the plastic bottle went from miracle container to hated garbage*, NAT'L GEOGRAPHIC (Aug. 23, 2019), https://www.nationalgeographic.com/environment/2019/08/plastic-bottles/.

231. *See, e.g.*, NOTPLA, https://www.notpla.com/technology (last visited Feb. 3, 2020) (for water packaged in material made from seaweed and plants which biodegrades in 4-6 weeks); *Coca-Cola Planning to Sell Dasani in Aluminum Cans and Bottles*, CBS PITTSBURGH (Aug. 13, 2019), https://pittsburgh.cbslocal.com/2019/08/13/dasani-alumninum-bottles-cans/.

232. *Are your plastic bottles BPA-Free?*, NESTLÉ WATERS NORTH AM., https://www.nestle-watersna.com/en/who-we-are/frequently-asked-questions/are-your-plastic-bottles-bpa-free (last visited Jan. 29, 2019); Parker, *supra* note 230.

companies will make the change to safer packaging materials without government regulation.[233]

To promote change, state legislatures should enact legislation forcing the bottling industry to move towards safer materials. Some cities have taken it upon themselves to ban the sale of single use plastic bottles.[234] Though this strategy would completely eliminate the issues of exposure to BPA and microplastics through bottled water, it would also completely handicap and possibly eliminate an industry. Instead of completely banning the product, state legislators should create legislation that would phase out plastic use over time allowing companies to modify their packaging to reduce health risks.[235]

If there is no commercially viable replacement to plastic bottles or their presence is not reduced, then FDA should at minimum promulgate disclosure requirements for bottled water to disclose potential health risks. Consumers purchase bottled water because they believe it is clean and safe, but if bottlers are providing water that negatively impacts human health through BPA or microplastics, then this information should be provided to the consumer.[236] In addition, if BPA or microplastics injure human health, FDA's failure to monitor the contaminants would be a dereliction of their duty to promote human health. BPA's impacts and presence in bottled water are known, so if bottlers are unable to remove the contaminant, users should be warned of its presence. Conversely, the impacts of microplastic are currently unknown with some agencies stating it is not injurious to human health while others state that it is. What is clear, is that additional studies are necessary to completely understand the human health consequences. FDA should take it upon themselves to conduct research to determine if microplastics qualify as

233. The huge outrage regarding plastic bottle pollution hasn't led to major change in the industry, making it unlikely that outrage due to health concerns will do so either. *See generally* Parker, *supra* note 230.

234. For example, San Francisco, California; Concord, Massachusetts; and New York City, New York have already passed laws restricting the sale of bottled water on city property. *See* Justine Calma, *New York City is cracking down on plastic bottles*, THE VERGE (Feb. 7, 2020), https://www.theverge.com/2020/2/7/21127981/new-york-city-single-use-plastic-bottle-ban.

235. *See* Maanvi Singh, *Most ambitious US law to tackle single-use plastics faces make-or-break moment*, THE GUARDIAN (Sept. 13, 2019), https://www.theguardian.com/us-news/2019/sep/13/california-plastics-legislation-single-use.

236. Though there is not time in this paper to have a full discussion of California's Proposition 65, it may be of note that microplastics could fall into labeling requirements under the initiative. If it is ultimately determined that water contaminated with microplastics causes cancer, birth defects, or other reproductive harm, the organization would be required to inform Californians about exposure to these chemicals. Additional research establishing microplastic effects likely must be done before states, including California, would leap to force bottlers to appropriately label. *Proposition 65*, CAL. OFF. OF ENVTL. HEALTH HAZARD ASSESSMENT, https://oehha.ca.gov/proposition-65 (last visited June 1, 2020).

a poisonous or deleterious substance, as the issue directly impacts their role to protect consumers of bottled water. Failure of bottled water companies and FDA to inform consumers of these contaminants in bottled water is a dereliction of their duties as producers and regulators.

Lastly, FDA should institute more aggressive programs to discover and monitor new contaminants in our water sources. For example, every six years the EPA is required to review national primary drinking water regulations and revise them if appropriate.[237] FDA should institute regular reports which weigh the likelihood that bottled water sources can be infected by these contaminants and whether systems should be put into place ensuring contaminants do not enter bottled water. With larger oversight of the bottled water industry and additional requirements concerning contaminants, FDA and bottled water companies can ensure that they are providing consumers with safe bottled water. In addition, consumers can feel confident that the bottled water they are purchasing is not laden with harmful contaminants.

B. Regulating Groundwater Extraction

As states are the primary mechanism for groundwater regulation, they must take action to create sustainable groundwater frameworks. The federal government has deferred most groundwater responsibilities to the states; therefore, it is unlikely that they will create an overarching plan to address groundwater issues. Instead, states must first impose limitations on water pumping from drought-stricken areas or areas in which local governments are unable or unwilling to protect the areas' natural resources. Possible avenues for limitations include a complete ban on bottled water extraction as it is detrimental to public welfare or states' creating sustainable groundwater management procedures through regulations. Both options are discussed, but the more feasible and productive process is likely creating regulatory frameworks that monitor and limit groundwater extraction while also ensuring aquifer sustainability.

Groundwater management practices do not just apply to states with problematic aquifers; even states in the wettest regions should create sustainable groundwater frameworks. Much of the United States will soon experience drought-like conditions and critical aquifer levels as climate change progresses.[238] With drought-like conditions and depleted aquifers brings unique issues to each area dependent on the local watershed.

237. *Six-Year Review of Drinking Water Standards*, U.S. ENVTL. PROTECTION AGENCY, https://www.epa.gov/dwsixyearreview (last visited Apr. 30, 2020).

238. *See* Graaf, *supra* note 96.

States that currently do not have groundwater issues may quickly approach problems with decreased surface water availability. Instead of reaching overdraft on groundwater aquifers, states should be proactive in creating water sustainability models. As the saying goes, an ounce of prevention is worth a pound of cure.

One possible solution to extensive groundwater extraction is to entirely ban the tapping of natural water by bottling companies. The state of Washington attempted to ban new bottled water extraction after a bottling company began exploratory drilling north of Seattle.[239] The bill as originally introduced, advocated that the use of any water for commercial production of bottled water is "detrimental to the public welfare and public interest."[240] Critics and bottling advocates responded that the ban would completely eliminate the industry, was not based on facts or science, and would ultimately fall against the public interest.[241] The bill ultimately died in the state legislature, but this bill stands as the first instance where a state sought to completely eliminate extraction for bottled water.[242] Complete elimination of bottling extraction would solve most of the issues concerning contamination and overpumping, as it would kill the industry. But even if bottling companies were completely eliminated, there are larger issues of unsustainable and unsafe practices groundwater extraction practices by municipalities. Ultimately, creating a sustainable framework for groundwater extraction is far broader than bottled water, as it protects interests for all uses of water.

A more feasible solution outside banning groundwater extraction by bottlers is enacting state regulatory frameworks. As jurisdictions employ a variety of common law doctrines for groundwater matters, it will likely be simpler and more effective for states to adopt regulatory frameworks to monitor groundwater extraction. These could include additional permitting systems or the creation of local districts with authority over groundwater. The traditional common law doctrines of capture, reasonable use, correlative rights, the Restatement of Torts, and prior

239. Jim Carlton, *Bottled Water Targeted in Washington State*, WALL ST. J. (Feb. 19, 2020), https://www.wsj.com/articles/bottled-water-targeted-in-washington-state-11582108201.

240. *See* S. 6278, 66th Leg., Reg. Sess. (Wa. 2020), http://lawfilesext.leg.wa.gov/biennium/2019-20/Pdf/Bills/Senate%20Bills/6278-S.E.pdf?q=20200512223725 (establishing that "any use of water for the commercial production of bottled water is detrimental to the public welfare and the public interest").

241. News Release, International Bottled Water Association, Statement Regarding Washington State Senate Bill 6278 (Feb. 20, 2020), https://www.bottledwater.org/statement-regarding-washington-state-senate-bill-6278.

242. Colton Dodgson, *Bill Preventing Commercial Water Extraction Dies in House*, THE DAILY CHRON. (Mar. 13, 2020), http://www.chronline.com/news/bill-preventing-commercial-water-extraction-dies-in-house/article_6a7db46a-6589-11ea-a71e-8358aff452c5.html.

appropriation are insufficient to adequately promote groundwater sustainability.[243] By creating and employing legislatively enacted regulatory frameworks, states are able to better monitor groundwater extraction and are more capable of limiting users who may overburden aquifers.

States should look to the Sustainable Groundwater Management Act ("SGMA") adopted in 2014 by California as a model for a potential regulatory framework.[244] California has been at the forefront of addressing groundwater mismanagement, not just because of the environmentally friendly population but because groundwater has typically supplied about 40% of the water used in California agriculture.[245] With the most recent drought, thousands of wells went dry and withdrawals of groundwater increased, allowing for mass depletion of groundwater resources and creating a system where aquifers will never recharge.[246]

SGMA provides a statewide framework that focuses on groundwater basins with major overdraft and recharge issues.[247] The legislation requires the creation of local groundwater sustainability agencies ("GSAs") to create and then implement groundwater sustainability plans ("GSPs") to manage GSAs' groundwater systems.[248] The GSAs are tasked with achieving a "sustainable yield" by a certain time period as

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243. *See* THOMPSON, JR. ET AL., *supra* note 91, at 472-73.

244. Sustainable Groundwater Management Act, CAL. WAT. CODE §§ 10720-10737.8 (effective as of Jan. 1, 2015).

245. *Just the Facts: Groundwater in California*, PPIC, https://www.ppic.org/publication/groundwater-in-california/ (last visited Feb. 3, 2020).

246. *Id.* ("Many basins have experienced long-term overdraft, and 21 of the [California's] 515 basins are now considered 'critically overdreafted.' "); *see also* THOMPSON, JR. ET AL., *supra* note 91, at 584-89 (describing SGMA's statewide applications and focus).

247. THOMPSON, JR. ET AL., *supra* note 91, at 584 ("SGMA applies state-wide, but it focuses most of its attention on groundwater basins with significant overdraft problems.").

248. *Id.* at 584-85; *see generally* Matt Weiser, *As California Groundwater Regulation Unfolds, Some Feel Left Out*, NEWS DEEPLY (Jan. 22, 2018), https://www.newsdeeply.com/water/articles/2018/01/22/as-california-groundwater-regulation-unfolds-some-feel-left-out. Some GSPs are starting to be submitted to the California State Water Resources Control Board. *See, e.g.*, PASO BASIN COOPERATIVE COMMITTEE AND THE GROUNDWATER SUSTAINABILITY AGENCIES: PASO ROBLES SUBBASIN FIRST ANNUAL REPORT (2020), https://www.slocounty.ca.gov/Departments/Public-Works/Forms-Documents/Committees-Programs/Sustainable-Groundwater-Management-Act-(SGMA)/Paso-Robles-Groundwater-Basin/Annual-Reports/Paso-Robles-Subbasin-First-Annual-Report-(2017-201.aspx; Yuba Water Agency, *Yuba Water Agency adopts Groundwater Sustainability Plan*, YUBANET.COM (Jan. 22, 2020), https://yubanet.com/regional/yuba-water-agency-adopts-groundwater-sustainability-plan/. For critically over-drafted high and medium priority basins, the deadline for their GSPs was January 31, 2020. As this is an unfolding process, these GSPs will be reviewed and the Department of Water Resources can approve the plans, request modifications, determine they are insufficient, and can even step in to make changes themselves. Molly Peterson, *Time's Up on Groundwater Plans: One of the Most Important New California Water Laws in 50 Years Explained*, KQED (Jan. 20, 2020), https://www.kqed.org/science/1955916/times-up-on-groundwater-plans-one-of-the-most-important-new-california-water-laws-in-50-years-explained.

determined by how critically endangered their systems are.[249] A "sustainable yield" is defined as "the maximum quantity of water, calculated over a base period representative of long-term conditions in the basin and including any temporary surplus, that can be withdrawn annually from a groundwater supply without causing an undesirable result."[250] Although SGMA has deficiencies such as the imprecise definition of "sustainable yield," the lengthy implementation plan, and difficulties in measuring outcomes,[251] it still stands as the most comprehensive undertaking to reduce groundwater mismanagement.

SGMA is intended to have all GSPs reach sustainable "compliance levels" within 20 years.[252] In order to accomplish the stringent goals set out, GSAs are able to institute well monitoring, well registration, well metering, and annual reports on the extraction, specific uses, and storage of water resources.[253] The GSAs are able to "control groundwater extractions by regulating, limiting, or suspending extractions from individual groundwater wells or extractions from groundwater wells in the aggregate, construction of new groundwater wells, enlargement of existing groundwater wells, or reactivation of abandoned groundwater wells, or otherwise establishing groundwater extraction allocations."[254] In addition to the local GSAs, the California State Water Control Board has oversight to ensure compliance, enforce its own interim plan, and even put groundwater systems on probation.[255]

SGMA is a monumental undertaking that will likely benefit California immensely, and it should be used as a model for other states to implement. The law currently requires compliance by only governments and water agencies of high and medium priority basins.[256] SGMA

249. THOMPSON, JR. ET AL., *supra* note 91, at 584-85.

250. CAL. WAT. CODE § 10721(w); *see also* THOMPSON, JR. ET AL., *supra* note 91, at 585.

251. THOMPSON, JR. ET AL., *supra* note 91, at 585; *see generally* John J. Perona, *A Dry Century in California: Climate Change, Groundwater, and a Science-Based Approach for Preserving the Unseen Commons*, 45 ENVTL. L. 641, 641-42 (2015) ("[T]he key standard imposed to meet these objectives, the sustainable yield, is fundamentally flawed because it specifies allowed withdrawals in terms of base periods representative of long-term conditions in each basin . . . . [T]he sustainable yield standard should be replaced with mandated, numerical criteria specifying defined levels of groundwater to be retained in each individual basin.").

252. THOMPSON, JR. ET AL., *supra* note 91, at 585.

253. *Id.*

254. CAL. WAT. CODE § 10726.4(a)(2); *accord* THOMPSON, JR. ET AL., *supra* note 91, at 585.

255. Weiser, *supra* note 248; TARA MORAN & AMANDA CRAVENS, CALIFORNIA'S SUSTAINABLE GROUNDWATER MANAGEMENT ACT OF 2014: RECOMMENDATIONS FOR PREVENTING AND RESOLVING GROUNDWATER CONFLICTS 13 (2015), https://waterinthewest.stanford.edu/sites/default/files/SGMA_RecommendationsforGWConflicts_2.pdf.

256. *SGMA Groundwater Management*, CAL. DEP'T OF WATER RES., https://water.ca.gov/Programs/Groundwater-Management/SGMA-Groundwater-Management (last visited Apr. 30, 2020).

excludes de minimus users, who extract water for domestic purposes and use two acre-feet per year or less, from participation.[257] If a user is not a de minimis extractor, the GSA in the region *may* require participation in the groundwater sustainability plan but participation is not required.[258] In order to combat the depletion of groundwater resources, all companies that pull water from groundwater sources, including and specifically bottled water companies, should be subject to the same sustainability reporting and requirements by either reporting themselves or joining a GSA. Though it would be expensive for bottling companies to comply with the regulations, the cost of compliance is minimal compared to the high rate of return profit for the bottling industry.[259] Bottled water companies have the funds and the capabilities to conduct tests that would comply with requirements similar to those of the SGMA.

State legislation should be enacted that would force bottling companies to comply with sustainable groundwater pumping practices in order to ensure that all citizens have continued access to water resources. This goal of sustainable groundwater management is lofty. As there are a variety of laws regarding groundwater management, housing all of these different legal paths under one framework would be complicated and unlikely to occur due to lack of government support for environmental measures. Legislative action is absolutely necessary as climate change progresses and groundwater resources continue to decline which will cause large issues regarding access to clean and safe water. The steps that can be taken to minimize impacts on groundwater pumping are appropriate and necessary steps towards a sustainable water management system.

VI. CONCLUSION

FDA's role since its inception has changed dramatically. The terrible working conditions exposed in *The Jungle* have been regulated to ensure public safety and health. FDA has taken upon itself a massive

257. *See* CAL. WAT. CODE § 10725.8(e); Cal. Dep't of Water Res., *Domestic Well Users and the Sustainable Groundwater Management Act*, CAL. ST. WATER RESOURCES CONTROL BOARD (2016), https://www.waterboards.ca.gov/water_issues/programs/gmp/docs/sgma/domestic.pdf.

258. Cal. Dep't of Water Res., *supra* note 257; CAL. WAT. CODE § 10725.8(c).

259. The average price of a gallon of tap water for residential customers in the U.S. is $0.01, yet the price for one bottle of water is around $1.33. The price for bottled water is marked up by around 133 times what can be received from the tap. The huge markup allows for bottled water companies to pocket significant profits. CHARLES FISHMAN, THE BIG THIRST: THE SECRET LIFE AND TURBULENT FUTURE OF WATER 18 (2011); Ryan Felton, *How Coke and Pepsi Make Millions from Bottling Tap Water, as Residents Face Shutoffs*, CONSUMER REP. (Apr. 23, 2020), https://www.consumerreports.org/bottled-water/how-coke-and-pepsi-make-millions-from-bottling-tap-water-as-residents-face-shutoffs/.

undertaking in promoting the safety of human health but there are still changes that can be to promote and uphold these ideals. Specifically, with the bottled water industry, FDA can promote public health through additional regulations to bottled water inspections and additional regulations to contaminants. Additional regulations should be put into place that require testing and elimination of perchlorate and cryptosporidium in bottled water. BPA and microplastics are more difficult to regulate for as they exist due to bottled water packaging, but FDA should pursue innovative strategies to eliminate these contaminants or alternatively to seek different packaging. If FDA does not pursue these strategies, state legislatures should seek to require replacements to the traditional single-use plastic bottle.

In addition to FDA, state legislatures must also take steps to limit bottled water groundwater extraction. State legislatures should enact regulatory frameworks that create sustainable practices for all water users, not just the bottled water industry. California's SGMA, as the largest undertaking to regulate groundwater extraction, serves as a model that would allow states to implement changes to groundwater extraction while also maintaining access to water. It is extremely important that water is preserved for later generations by adopting sustainable groundwater protection plans and appropriate regulations which protect consumer safety, both now and in future generations. In total, states should enact legislation to prevent exploitative and irresponsible groundwater pumping by bottled water companies and FDA should expand its regulatory abilities to ensure that bottlers are fulfilling their mission of protecting consumers in their consumption of bottled water.