

Let's Get Crafty: The Evolution and Challenges of Beer in the Southeast

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INTRODUCTION

Craft beer is a phenomenon that has slowly, but surely, captured the hearts of Americans across the country. Modern day craft brews and craft brewing companies have been around since 1980.¹ However, the existence of craft brews in America began long before the 1980s.²

American brewing was inspired by the European brewing tradition of beer having only four ingredients.³ The early American beer culture consisted of lagers and ales made by immigrants from Germany and the Czech Republic.⁴ Then came the Prohibition of the 1920s.⁵ The Prohibition period (1920–1933) drastically changed the way beer was produced.⁶ During this period, not only was beer more expensive, but the demand for it became less as there was more of a call for stronger spirits.⁷ Thus, it is believed that during this time, beer may have disappeared from the scene, with the exception of homemade beer and near beer.⁸ After the thirteen year prohibition ended, beer became overly simplified due

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¹ Robert Glennon, *Could Craft Breweries Help Lead The Way In Water Conservation?*, PAC. STANDARD: ENV'T. (Jan. 2, 2018), <https://psmag.com/environment/crafting-solutions-to-water-shortages-in-brewing> [<https://perma.cc/5F24-HF4L>].

² Aaron Goldfarb, *An Illustrated History of Craft Beer in America*, FIRST WE FEAST (Mar. 6, 2017), <https://firstwefeast.com/features/illustrated-history-of-craft-beer-in-america> [<https://perma.cc/5YD2-92QJ>].

³ *Id.*

⁴ *Id.*

⁵ *Id.*

⁶ Mark Thornton, *Alcohol Prohibition Was a Failure*, CATO INST.: POL'Y ANALYSIS NO. 157 (July 17, 1991), <https://www.cato.org/policy-analysis/alcohol-prohibition-was-failure#> [<https://perma.cc/2NNK-K6GK>].

⁷ *Id.*

⁸ *Id.*

to the grains being replaced by corn and rice.⁹ These simplified versions are the equivalent of the modern day “lite” beers.¹⁰

Though beer had virtually died out on a large scale after the Prohibition, the reemergence of beer came in the 1960s with the beginning of the craft beer revolution.¹¹ The revolution began with a man named Fritz Maytag.¹² Maytag was the great-grandson of the founder of the Maytag home appliance empire and the son of a dairy farmer.¹³ Despite his inherited fortune, he wanted to build his own legacy in a different industry.¹⁴ He found that industry when he learned that his favorite beer and brewery—Anchor Steam—was going out of business and decided to purchase a majority share in the brewery.¹⁵ Maytag bought the brewery with the intention of advising them financially, but he soon faced the harsh reality of debt collectors quickly coming for what they were owed.¹⁶ Subsequently, he had to find a way to make a profit.¹⁷ Maytag decided that to sell more beer, he needed to focus on improving the quality of the beer.¹⁸ At this time, America still consumed the simplified beer of the Prohibition period.¹⁹ Fritz Maytag changed the course of beer history when he began to create different styles of beer “that didn’t really exist in America just yet.”²⁰ His creation of different beer styles, such as the Anchor Porter, or the Liberty Ale—both created in the early 1970s—marked the beginning of the modern-day IPA.²¹ After Maytag’s success in the revitalization of beer, many brewers followed in his steps.²²

However, legislative change needed to happen in the United States, if other breweries were to follow in Maytag’s path. The homebrewing of beer with an alcohol content higher than 0.5 percent was illegal since the Prohibition.²³ At this point in time, it was 1978 and there were fewer than eighty-nine breweries in the

⁹ Goldfarb, *supra* note 2.

¹⁰ *Id.*

¹¹ *Id.*

¹² *Id.*

¹³ *Id.*

¹⁴ *Id.*

¹⁵ Goldfarb, *supra* note 2

¹⁶ *Id.*

¹⁷ *Id.*

¹⁸ *Id.*

¹⁹ Thornton, *supra* note 6.

²⁰ *Id.*

²¹ Goldfarb, *supra* note 2.

²² *Id.*

²³ *Id.*

United States.²⁴ In order for new breweries to emerge and the beer industry to blossom, amateur brewers needed to be able to refine their skills, which was not possible with the current laws in place.²⁵ As a result, in 1978 Congress passed a bill that repealed restrictions and taxes on homebrewing for the purposes of “personal or family use, and not for sale.”²⁶ This was a catalyst for the growth of the industry because, according to Charlies Papazian—the founder of the Brewers Association and the American Homebrewers Association—“90% of craft brewers start out as homebrewers.”²⁷

By the 1990s, the craft beer industry hit its stride and there was an increase in the number of microbreweries opening.²⁸ It was estimated that, “between 1985 and 1997, microbrewery growth was exploding at the rate of 20 percent per year minimum, with years like 1987 seeing a whopping 100 percent growth.”²⁹ During this period, a number of today’s major beer companies like Boston Beer Company (Samuel Adams), were created.³⁰ Due to the rapid rise of the industry, many investors were looking to get in on the success, which led to rushed operations and releasing poorly produced beer.³¹ This rush led to the establishment of about 1,396 breweries, and most of them were terrible.³² Over the next decade, many of those breweries closed and beer sales began to decline.³³

The demise of those breweries led to a new movement in craft beer history focused on the creation of “uniquely ‘American’ beer.”³⁴ This new era of craft brews, which started in the mid to late 1990s, was characterized by the creation of beers that were “incredibly hoppy or super boozy or overwhelmingly packed with oddball ingredients—or sometimes all three of those things!”³⁵ An industry that began with fewer than 100 breweries had transformed into a booming industry of more than 5,300

²⁴ *Id.*

²⁵ *Id.*

²⁶ *See id.*; H.R. 1337, 95th Cong. (1978).

²⁷ Goldfarb, *supra* note 2.

²⁸ *See id.*

²⁹ *Id.*

³⁰ *Id.*

³¹ *Id.*

³² *Id.*

³³ Goldfarb, *supra* note 2.

³⁴ *Id.*

³⁵ *Id.*

breweries.³⁶ By 2017, the industry accounted “for nearly 20% of America’s \$100 billion-plus market.”³⁷

However, the industry is now seemingly entering a potential decline due to the climate change crisis. Beer is made up of four basic ingredients: grain, hops, yeast, and water.³⁸ Barley is the most common grain used in the production of beer.³⁹ Primarily due to the changing climate, barley is becoming increasingly harder to produce.⁴⁰ In fact, in 2017 barley had the lowest production numbers on record in the history of the United States.⁴¹ Most of the barley used for the craft brewing industry is exported from states such as Idaho in the northwest and the upper Midwest.⁴² But, due to the increasingly warming climate and increase in severe weather events such as droughts and flooding, the production of barley has continued to decrease.⁴³ While there has been a move towards growing barley during the winter season, due to the increase in rain brought on by climate change—the winter growing season is considered to be very risky.⁴⁴

Hops producers are also facing similar environmental challenges to those of barley producers.⁴⁵ One of the primary issues both producers face is drought.⁴⁶ More than 75 percent of hops in the United States are grown in the Yakima Valley at the base of the Cascade Mountains in the state of Washington.⁴⁷ Hops producers primarily relied on the melting of the mountain snow as

³⁶ Glennon, *supra* note 1.

³⁷ Goldfarb, *supra* note 2.

³⁸ TAPVILLE SOCIAL, *What Four Primary Ingredients are Used to Make Beer?*, TAPVILLE, INC. (June 21, 2018), <https://www.tapvillesocial.com/craftbrewu/2018/6/19/what-four-primary-ingredients-are-used-to-make-beer>. [https://perma.cc/LRP7-DJRB].

³⁹ *Id.*

⁴⁰ Lucille Sherman, *Brews Bugger a Steep Decline in Production of Barley*, SALINA J. (Aug. 19, 2019), <https://www.salina.com/news/20190819/brews-buffer-steep-decline-in-production-of-barley>. [https://perma.cc/D3J8-4KYU].

⁴¹ Keith Gribbins, *2017 Will see the Lowest U.S. Barley Production on Record*, CRAFT BREWING BUS. (July 12, 2017), <https://www.craftbrewingbusiness.com/news/2017-will-see-lowest-u-s-barley-production-record/> [https://perma.cc/U8FU-G7F6].

⁴² Rob Cook, *Ranking of States That Produce the Most Barley*, BEEF2LIVE (Oct. 8, 2021), <https://beef2live.com/story-ranking-states-produce-barley-0-212342>. [https://perma.cc/YW5U-GY3A].

⁴³ Sherman, *supra* note 40.

⁴⁴ *Id.*

⁴⁵ Daisy Simmons, *IPAs and Other Hop-heavy Beers are Endangered by Climate change*, YALE CLIMATE CONNECTIONS (Sept. 14, 2018), <https://yaleclimateconnections.org/2018/09/climate-change-could-harm-your-hoppy-brews/>. [https://perma.cc/HBP4-DTL8].

⁴⁶ *Id.*

⁴⁷ *Id.*

their water supply.⁴⁸ However, due to climate change, the winters have gotten warmer and the runoff from the melted snow has substantially decreased causing water shortages.⁴⁹

The decline in these essential elements of beer—barley and hops—may change craft beer as we know it. It can change the taste, quality, and even the prices of craft beer.⁵⁰ As the climate change crisis has persisted and shows no signs of reversal, the question has become what can be done to save this industry, a culture that has captured the heart of America? Some brewers and producers decided a change of location was essential to save the craft beer industry.⁵¹ Thus, many producers moved—or started—their production in the southeastern part of the United States.⁵²

The move of craft beer to the southeastern part of the United States is one that intrigues many. One reason for intrigue is the southeastern region contains states such as Kentucky and Tennessee, which are the two states responsible for the majority of the United States' bourbon and whiskey.⁵³ Another reason is the warmer climate than that of Washington, or the northern region of the United States. This poses the question of how will the craft beer industry be impacted in a region that is already warm and continuously warming due to climate change?

This Note explores craft beer in the southeast United States from a historical and agricultural perspective, the environmental challenges faced by breweries due to climate change, legislation regarding beer, and possible solutions to mitigate the climate change crisis while also saving the quality of the craft beers that we have come to know and love. Part I will provide historical and agricultural context for the brewing of craft beer in the southeast. Part II will examine the environmental challenges faced by craft brewers in the southeast; explore the effects of climate change in the southeast generally; and then dive deeper, looking specifically at the state of climate change in Kentucky and the effects and changes it has on craft beer within the state. Part III will discuss

⁴⁸ *Id.*

⁴⁹ *Id.*

⁵⁰ Goldfarb, *supra* note 2.

⁵¹ Kat Campbell, *Changing Climate Brewing Trouble for the Craft Beer Industry*, WRAL (Sept. 22, 2019), <https://www.wral.com/changing-climate-brewing-trouble-for-the-craft-beer-industry/18647493/>.

⁵² *Id.*

⁵³ *A Brief Guide to the Whiskey Regions in the USA*, USA SPIRITS RATINGS (Dec. 23, 2020), <https://usaspiritsratings.com/en/blog/insights-1/a-brief-guide-to-the-top-whiskey-regions-in-the-usa-45.htm>. [<https://perma.cc/E227-8WXX>].

legislation that is in place to protect brewers from climate change; legislation geared towards sustainable practices; and specific legislation in the state of Kentucky. Finally, Part IV will discuss new and innovative sustainable measures being taken to prevent a decline in production, including legislation that can save the craft beer industry from its potential demise.

I. HISTORY OF BREWERIES IN THE SOUTHEAST

The history of brewing craft beer in the southeast is a rather recent phenomenon.⁵⁴ Despite beer predating the Prohibition period, craft brews were “slow to move into lower midwestern and southern states.”⁵⁵ In fact, craft beer was not in production in every state until 2001.⁵⁶ Historical geographic pattern maps done on the entry of craft beer brewers, show southern states (Kentucky, Tennessee, etc.) were far behind Pacific states (California, Washington, etc.).⁵⁷ This is thought to be due to the fact that Fritz Maytag began the revitalization of beer with his brewing company in San Francisco.⁵⁸ Another factor that has been considered is “small boutique wineries [have] proven successful” in the west and “there was no reason to think that boutique breweries could not do the same.”⁵⁹

A. *Breweries in Kentucky*

In the world of alcohol and spirits, Kentucky is known primarily for its tradition of distilling bourbon.⁶⁰ It is unsurprising, then, that Kentucky made its entrance into the modern craft beer industry later than most.⁶¹

⁵⁴ Kenneth G. Elzinga et al., *Craft Beer in the United States: History, Numbers, and Geography*, 10 J. OF WINE ECON. NUMBER 3, 242 (2015), https://liberalarts.oregonstate.edu/sites/liberalarts.oregonstate.edu/files/economics/pdf/faculty/tremblay-carol/tremblay_c_-_vol.10-issue03-craft-beer-in-the-united-states-history-numbers-and-geography-by-kenneth-g.-elzinga3.pdf [https://perma.cc/EZ33-K5GD].

⁵⁵ *Id.* at 258.

⁵⁶ *Id.*

⁵⁷ *Id.* at 260.

⁵⁸ *Id.*

⁵⁹ *Id.*

⁶⁰ *The State of American Craft Beer – Kentucky*, AM. CRAFT BEER LLC., <https://www.americancraftbeer.com/the-state-of-american-craft-beer-kentucky/> [https://perma.cc/LW3G-J8B7].

⁶¹ Elzinga, *supra* note 54.

The Kentucky craft beer tradition began in 1870 with the establishment of the George Wiedemann Brewing Company,⁶² which subsequently became the largest brewery in the state.⁶³ During this time, Kentucky was known for a unique style of beer called the Kentucky Common Ale—which is no longer made commercially.⁶⁴ Following the repeal of the Prohibition, the company quickly reopened;⁶⁵ operating independently until its 1967 closure.⁶⁶ Kentucky was thrust into the craft beer scene again with the opening of the Bluegrass Brewing Company in 1993.⁶⁷

As of 2019, Kentucky ranks 31st in the nation in regards to total craft breweries in the state, also ranking 37th in breweries per capita with 2.4 breweries per 100,000 adults that are 21 and over.⁶⁸ Currently, the state produces 125,126 barrels of craft beer per year.⁶⁹ Additionally, there are currently seventy-nine craft breweries in the state, demonstrating substantial growth from the industry's humble beginnings.⁷⁰

B. Breweries in Tennessee

Tennessee, like Kentucky, already had a booming alcoholic beverage business.⁷¹ Before entering the craft beer business, Tennessee was well known for its production of whiskey.⁷² Prior to the 1850s, there is very little, “evidence of any commercial brewing in the state.”⁷³ In Tennessee's early history of craft brewing, there were few successful and long-lasting breweries.⁷⁴ The most

⁶² *Id.*

⁶³ *Id.*

⁶⁴ *Id.*

⁶⁵ *Id.*

⁶⁶ *Id.*

⁶⁷ AM. CRAFT BEER, LLC, *supra* note 60.

⁶⁸ *State Craft Beer Sales & Production Statistics*, (2019) BREWERS ASS'N <https://www.brewersassociation.org/statistics-and-data/state-craft-beer-stats/> [<https://perma.cc/E6QY-5PWG>].

⁶⁹ *Id.*

⁷⁰ *Id.*

⁷¹ *A Brief Guide to the Whiskey Regions in the USA*, *supra* note 53.

⁷² Warren Wills, *The State of American Craft Beer – Tennessee*, AM. CRAFT BEER LLC. (Jul. 21, 2017), <https://www.americancraftbeer.com/state-american-craft-beer-tennessee/#:~:text=The%20oldest%20craft%20brewer%20in,the%20now%20defunct%20Bannon%20Brewing> [<https://perma.cc/R8EU-6U6W>]. *See also*, Scott Mertie, *Tracing Nashville's German Brewing Heritage*, CRAFTBEER.COM (Apr. 30, 2018), <https://www.craftbeer.com/craft-beer-muses/nashvilles-german-brewing-heritage> [perma.cc/PS3H-QKUP].

⁷³ Wills, *supra* note 72; *see also* Mertie, *supra* note 72.

⁷⁴ Wills, *supra* note 72; *see also* Mertie, *supra* note 72.

successful and longest running brewery in the state is the Nashville Brewery.⁷⁵ The Nashville Brewery was open on and off from 1859 until 1890.⁷⁶ The Nashville Brewery was founded by Jacob Stifel and kept open until its operation was stopped by the Civil War in 1863.⁷⁷ After the Civil War, the brewery struggled due to increased competition and, as a result, changed ownership five times, eventually changing its name to William Gerst Brewing Company.⁷⁸ In 2016, the original name returned, and it was once again the Nashville Brewery.⁷⁹ Most of the state's other major brewing companies did not last past the mid-1950s after being "forced out by the larger, nationally distributed brewers, leaving the state brewery-less from 1954 until 1988."⁸⁰

In 1994, craft breweries made their return to the state with the opening of the Blackstone Restaurant and Brewery.⁸¹ Today, Tennessee has 122 craft breweries which is the 23rd most in the United States.⁸² The state produces 166,129 barrels of craft beer per year and currently ranks 38th in the United States for the number of breweries per capita.⁸³

II. ENVIRONMENTAL CHALLENGES

Craft breweries in the United States have faced, and will continue to face, a variety of environmental challenges.⁸⁴ Many of these challenges are caused by the global climate crisis. The global climate crisis is a result of, "billions of tons of CO₂," that "are released into the atmosphere every year as a result of coal, oil and gas production."⁸⁵ The past four years have been four of the hottest

⁷⁵ Wills, *supra* note 72; *see also* Mertie, *supra* note 72.

⁷⁶ Wills, *supra* note 72; *see also* Mertie, *supra* note 72.

⁷⁷ Wills, *supra* note 72; *see also* Mertie, *supra* note 72.

⁷⁸ Wills, *supra* note 72; *see also* Mertie, *supra* note 72.

⁷⁹ Wills, *supra* note 72; *see also* Mertie, *supra* note 72.

⁸⁰ Wills, *supra* note 72; *see also* Mertie, *supra* note 72.

⁸¹ Wills, *supra* note 72; *see also* Mertie, *supra* note 72.

⁸² *State Craft Beer Sales & Production Statistics, 2019*, BREWERS ASS'N <https://www.brewersassociation.org/statistics-and-data/state-craft-beer-stats/> (last viewed Oct. 18, 2021) [perma.cc/GQ7D-548V].

⁸³ *Id.*

⁸⁴ Caitlyn Kennedy, *Climate & Beer*, NAT'L OCEANIC & ATMOSPHERIC ADMIN. (last updated Sept. 10, 2021), <https://www.climate.gov/news-features/climate-and/climate-beer> [https://perma.cc/25BR-YB48].

⁸⁵ *The Climate Crisis – A Race We Can Win*, UNITED NATIONS <https://www.un.org/en/un75/climate-crisis-race-we-can-win> (last viewed Oct. 18, 2021) [perma.cc/XK4R-6JHP]; David Herring, *Are Humans Causing or Contributing to Global Warming?*, NAT'L OCEANIC & ATMOSPHERIC ADMIN. (Oct. 29, 2020),

in history due to the high emissions of greenhouse gasses produced by human activity.⁸⁶ The rising temperatures have caused, “environmental degradation, natural disasters, weather extremes, food and water insecurity, economic disruption, and terrorism.”⁸⁷ Included in these natural disasters and weather extremes are droughts, water insecurity, and wildfires—which all directly affect the craft brewing industry.⁸⁸

First, is the issue of the impact of droughts on the craft brewing industry. In the summer of 2020, about a third of the country was experiencing “at least a moderate level of drought.”⁸⁹ However, most states in the western part of the United States are nearing extreme drought conditions.⁹⁰ Per NASA, some of the effects of a severe drought include “stunted and browning crops, limited pasture yields, dust storms, reduced well water levels, and an increase in the number and severity of wildfires.”⁹¹ Droughts impact the production of craft brewing in two ways: (1) the ability to produce the grains needed to make beer and (2) the ability to produce water to create beer.⁹² As the availability of water strongly relates to water insecurity, this note will emphasize the impact of droughts on the production of grains.⁹³

Hops, one of the main ingredients of beer, is primarily produced in the state of Washington.⁹⁴ In 2015, 73 percent of American hops were produced in the state, and almost completely by way of the Yakima Valley alone.⁹⁵ In addition to reasonable weather, hops production is greatly dependent on the availability of water; a single hops plant “requires up to three gallons of water per day.”⁹⁶

<https://www.climate.gov/news-features/climate-qa/are-humans-causing-or-contributing-global-warming> [perma.cc/K5UR-923E].

⁸⁶ Press Release, NAT. AERONAUTICS & SPACE ADMIN., 2020 Tied for Warmest Year on Record (Jan. 14, 2021), (<https://www.nasa.gov/press-release/2020-tied-for-warmest-year-on-record-nasa-analysis-shows>) [perma.cc/82C8-YL3V]; see UNITED NATIONS, *supra* note 85.

⁸⁷ UNITED NATIONS, *supra* note 85.

⁸⁸ *Id.*

⁸⁹ Michael Carlowicz, *A Third of the U.S. Faces Drought*, NASA: EARTH OBSERVATORY (Aug. 11, 2020), <https://earthobservatory.nasa.gov/images/147118/a-third-of-the-us-faces-drought?src=ve> [perma.cc/5NN9-5YJ8].

⁹⁰ *Id.*

⁹¹ *Id.*

⁹² Kennedy, *supra* note 84.

⁹³ *Id.*

⁹⁴ Jeff Daniels, *Drought, and Hot Weather Cause Trouble for Hops Growers*, CNBNC (July 24, 2015), <https://www.cnb.com/2015/07/24/drought-and-hot-weather-cause-trouble-for-hops-growers.html> [perma.cc/FR3P-XW9Y].

⁹⁵ *Id.*

⁹⁶ *Id.*

However, due to the increase in temperature resulting from the climate crisis, the state of Washington has been experiencing severe drought during growing season.⁹⁷ As previously stated, severe drought can cause limited pasture yields and stunted and browning crops.⁹⁸ Though most hops crops can survive on a reduced water supply, certain varieties of the crop—such as Centennial, Simcoe, and Amarillo—do not do well in extreme weather conditions such as drought.⁹⁹ Alternatively, barley is able to grow with significantly less water.¹⁰⁰ Barley can grow in drought-like conditions but it grows best in “fertile loams or light, clay soils.”¹⁰¹

Another issue caused by drought—which hops producers face—is water insecurity. In 2015, the state of Washington, the main U.S. hops producer, experienced severe “hot and dry conditions and one of its worst mountain snowpacks on record.”¹⁰² A lack of mountain snowpack indicates that there will not be sufficient runoff to “replenish reservoirs.”¹⁰³ In order to survive the shortage of water during 2015, many hops producers purchased water or used emergency water supplies.¹⁰⁴ In the event that neither of those options were sufficient, hops farmers would have to take parts of their fields out of production.¹⁰⁵ As a result of water insecurity, many farmers in Washington took on additional expenses in order to overcome the water shortage.¹⁰⁶ Consequently, brewers have to pay more due to the decreased supply of hops. These production changes ultimately impacted, and will continue to impact, beer enthusiasts everywhere, as beer prices will continue to rise. Water insecurity issues were also seen later in Colorado.

In 2018, Colorado faced its worst drought since the Dust Bowl of the 1930s.¹⁰⁷ The U.S. Bureau of Reclamation predicted

⁹⁷ *Id.*

⁹⁸ Carlowicz, *supra* note 89.

⁹⁹ *Id.*

¹⁰⁰ *Barley*, SUSTAINABLE AGRIC. & RSCH. EDUC. (2007), <https://www.sare.org/publications/managing-cover-crops-profitably/nonlegume-cover-crops/barley/> [<https://perma.cc/FQ38-DQX5>].

¹⁰¹ *Id.*

¹⁰² *See* Daniels, *supra* note 94.

¹⁰³ *Id.*

¹⁰⁴ *Id.*

¹⁰⁵ *Id.*

¹⁰⁶ *Id.*

¹⁰⁷ Lindsay Fendt, *Craft Breweries in Colorado Brace for Less Water*, BLOOMBERG CITYLAB (Sept. 7, 2018), <https://www.bloomberg.com/news/articles/2018-09-07/what-western-water-shortages-would-mean-for-craft-beer> [<https://perma.cc/L982-BZZG>].

that by 2020, reservoirs along the Colorado River would reach critical lows, causing water shortages in most of the western United States.¹⁰⁸ This impending crisis has led to many breweries joining together and fundraising to support water conservation initiatives.¹⁰⁹ Colorado breweries are particularly sensitive to water insecurity because many of them use city water to craft their brews.¹¹⁰ The use of city water is problematic because in the event that water shortages were to happen, the breweries would be placed under the same restrictions as all other commercial users of the city water supply.¹¹¹ However, the possibility of restrictions only impacts small breweries, as large names in the beer industry—such as Coors—have purchased rights to withdraw water directly from the river, eliminating the negative impacts that small brewers would face.¹¹² Water insecurity and potential shortages ultimately leave few options for brewers.¹¹³ These options include purchasing water or utilizing recycled water.¹¹⁴ One brewery in Colorado—Declaration—used recycled water in April 2018 in order to brew beer for a special event, but it found this method was much costlier than normal due to the treatment of the water in order to increase its quality.¹¹⁵ In September 2020, the Bureau stated that, based off its operations and continued drought, there was an increased chance of water shortages by 2025.¹¹⁶ If the water shortages were to occur by 2025, this would impact about 40 million people who depend on the Colorado River for water and their beer.¹¹⁷

Another issue that impacts the production and availability of beer are wildfires.¹¹⁸ Climate change has served as a major factor in the increased occurrence and severity of wildfires in the

¹⁰⁸ *Id.*

¹⁰⁹ *Id.*

¹¹⁰ *Id.*

¹¹¹ *Id.*

¹¹² *Id.*

¹¹³ Fendt, *supra* note 107.

¹¹⁴ *Id.*

¹¹⁵ *Id.*

¹¹⁶ *Reclamation Projects Colorado River Drought Operation for the Next 5 Years*, BUREAU OF RECLAMATION (Sept. 15, 2020), <https://www.usbr.gov/newsroom/newsrelease/detail.cfm?RecordID=72523> [perma.cc/3DA3-5E9W].

¹¹⁷ *Id.*

¹¹⁸ *Wildfires and Climate Change*, CTR. FOR CLIMATE & ENERGY SOL. <https://www.c2es.org/content/wildfires-and-climate-change/> (last viewed Nov. 10, 2021) [https://perma.cc/SE4N-CBJC].

United States, specifically the Western United States.¹¹⁹ The risk of wildfires is dependent on various factors including: temperature, the presence of potential fuel, and soil moisture.¹²⁰ These factors are all strongly tied to the climate change crisis.¹²¹ The Center for Climate and Energy Solutions explained that the increase in wildfire risk is due to the “changes in climate that create warmer, drier conditions, increased drought, and a longer fire season.”¹²² According to the United States Department of Agriculture, if climate change resulted in “an average annual 1 degree temperature increase” then that would cause an increase in “the median burned area per year as much as 600 percent” in the western United States.¹²³ These changes have already resulted in significant impacts as the number of large fires has doubled in the western United States between 1984 and 2015.¹²⁴ The growing issue of wildfires not only impacts beer production, due to the destruction of hops and barley fields, but it also contributes to the issue of water insecurity.¹²⁵ Wildfires contribute to water insecurity by way of contamination.¹²⁶ Contamination is caused by the byproduct of fires.¹²⁷ The ash and other burned materials—such as soil—can enter surface water sources and flow downstream, ultimately causing contamination.¹²⁸ Another manner in which water sources are contaminated is through the chemicals used by firefighters to stop wildfires.¹²⁹ Water sources can also be contaminated from the heat of wildfires.¹³⁰ The heat from wildfires can release dangerous compounds by “degrad[ing] and melt[ing] plastic pipes,” of water distribution networks, which are within the reach of wildfires thereby compromising the

¹¹⁹ *Id.*

¹²⁰ *Id.*

¹²¹ *Id.*

¹²² *Id.*

¹²³ *Id.*

¹²⁴ *Wildfires and Climate Change*, CTR. FOR CLIMATE & ENERGY SOL. <https://www.c2es.org/content/wildfires-and-climate-change/> (last viewed Nov. 10, 2021) [<https://perma.cc/SE4N-CBJC>].

¹²⁵ Jodi Helmer, *Wildfires Can Spark Widespread Contamination of Public Water Supplies*, NAT. RES. DEF. COUNCIL (Oct. 22, 2020), <https://www.nrdc.org/stories/wildfires-can-spark-widespread-contamination-public-water-supplies> [perma.cc/RLL8-H6QR].

¹²⁶ *Id.*

¹²⁷ *Id.*

¹²⁸ *Id.*

¹²⁹ *Id.*

¹³⁰ *Id.*

integrity of the entire network.¹³¹ Many of the chemicals that are released into the water sources are considered “forever chemicals” which can be found and continue to spread in the water for decades, leading to long-term water security challenges.¹³² The city of Fort Collins, Colorado lost about half of its “yearly water supply when the largest wildfire in Colorado history contaminated the Poudre River” in 2012.¹³³ This caused the city to drain all of its reservoirs in order to meet the city’s water demands.¹³⁴ The wildfire also impacted the taste of the water used by the New Belgium brewery.¹³⁵ As a result, the brewery had to taste-test the water for *years* to determine if there was any smokiness before using it to produce their beer.¹³⁶

Brewers across the country have been moving their operations and adapting to the effects of climate change, this leaves the question: how are brewers who have decided to move from the prime brewing locations and producers, faring in other parts of the United States? The next portion of this Note will provide an overview of how the climate change crisis has impacted the southeastern part of the United States.

A. The Effect of Climate Change in the Southeast

As in most parts of the United States, the effects of the climate change crisis can be seen in the southeastern part of the country.¹³⁷ The rising temperatures in the southeast have caused scientists to predict extended warmer weather in the region.¹³⁸ It has been predicted that both urban and rural areas should expect to gain up to 100 additional “warm nights per year by the end of this century.”¹³⁹ This increase has negative implications for many cities in the Southeast which suffer from the heat island effect, which is when urbanized areas “experience higher temperatures

¹³¹ Jodi Helmer, *Wildfires Can Spark Widespread Contamination of Public Water Supplies*, NAT. RES. DEF. COUNCIL (Oct. 22, 2020), <https://www.nrdc.org/stories/wildfires-can-spark-widespread-contamination-public-water-supplies> [perma.cc/RLL8-H6QR].

¹³² *Id.*

¹³³ Fendt, *supra* note 107.

¹³⁴ *Id.*

¹³⁵ *Id.*

¹³⁶ *Id.*

¹³⁷ See Grist Staff, *We Broke Down What Climate Change will do, Region by Region*, GRIST MAG. (Nov. 29, 2018), <https://grist.org/article/we-broke-down-what-climate-change-will-do-region-by-region/> [https://perma.cc/M6QU-KS84].

¹³⁸ *See id.*

¹³⁹ *See id.*

than outlying areas.¹⁴⁰ One of these negative implications is an impact on labor productivity.¹⁴¹ Socio-environmental geographer Kirstin Dow, from the University of South Carolina, stated that it is possible that “the Southeast could see losses of 570 million labor hours, amounting to about \$47 billion per year—one-third of the nation’s total loss.”¹⁴²

The southeastern region, because of the warmer temperatures, has also been experiencing wildfires, drought and water insecurity like the rest of the United States.¹⁴³ The National Cohesive Wildland Fire Management Strategy collaborative provided that about 45 thousand wildfires and 1 million acres burn yearly in the southeastern United States.¹⁴⁴ Scientists predict that there will be a 300 percent increase in these numbers by the middle of the century.¹⁴⁵ This increase becomes more alarming due to the fact that unlike other regions, the southeast has a year-long wildland fire season.¹⁴⁶ While some of these wildfires can be attributed to human mistake and controlled burns to prevent future fires, most of these fires are attributable to certain effects of climate change like drought.¹⁴⁷

While most of the United States has gone through stages of severe drought, the southeast has increasingly been experiencing flash droughts.¹⁴⁸ A flash drought occurs during “relatively short periods of warm surface temperature and anomalously low and rapid decreasing soil moisture.”¹⁴⁹ Flash droughts fall into two separate categories: (1) heat wave and (2) precipitation deficit flash droughts, both of which will cause damage to crops.¹⁵⁰ In 2019, the

¹⁴⁰ See *id.*; see also, *Heat Island Effect*, U.S. ENV’T PROT. AGENCY, <https://www.epa.gov/heatislands> [<https://perma.cc/RA3P-CDP7>].

¹⁴¹ Grist Staff, *supra* note 137.

¹⁴² *Id.*

¹⁴³ See *Wildland Fire in the Southeast*, NAT’L COHESIVE WILDLAND FIRE MGMT. STRATEGY (last viewed Nov. 10, 2021), <http://www.southernwildfire.net/about> [<https://perma.cc/Z7DC-MQDS>].

¹⁴⁴ *Id.*

¹⁴⁵ *Id.*

¹⁴⁶ *Id.*

¹⁴⁷ Tom Di Liberto, *Flash Drought Engulfs the U.S. Southeast in September 2019*, NOAA CLIMATE.GOV (Oct. 9, 2019), <https://www.climate.gov/news-features/event-tracker/flash-drought-engulfs-us-southeast-september-2019> [<https://perma.cc/GAB4-GWWM>].

¹⁴⁸ *Id.*

¹⁴⁹ Dennis P. Lettenmaier & Kingtse C. Mo, *Flash Droughts over the United States*, NOAA (Oct. 26–29, 2015), <https://www.nws.noaa.gov/ost/climate/STIP/40CDPW/40cdpw-KMo.pdf> [<https://perma.cc/SJ3S-5522>].

¹⁵⁰ *Id.*

Southeast was riddled with flash droughts.¹⁵¹ These flash droughts were able to occur due to record dryness in the region despite no extreme temperature highs.¹⁵² At the beginning of September 2019, around 6 percent of the southeast as a whole was experiencing drought.¹⁵³ By the end of the month about 44 percent of the region was affected by drought.¹⁵⁴ More notably, Kentucky went from experiencing no drought to 91 percent of the state experiencing the effects of drought.¹⁵⁵

Lastly, there is the issue of water insecurity in the Southeast. Water availability has been described as one of the top three major environmental challenges in the Southeast by the United States Global Change Research Program (hereinafter “USGCRP”).¹⁵⁶ USGCRP Scientists have stated that there is a “reasonable expectation that there will be reduced water availability” in the region “due to the increased evaporative losses resulting from rising temperatures alone.”¹⁵⁷ In addition to this, rising sea levels are accelerating the contamination of the freshwater sources by saltwater, which ultimately contributes to the issue of freshwater scarcity.¹⁵⁸ The various conditions that have led to water insecurity in the Southeast are expected to cause a substantial decrease the net water supply availability.¹⁵⁹

In addition to the previously discussed environmental challenges, the Southeast also experiences unique challenges due to the region’s geographic location.¹⁶⁰ These key issues—as highlighted by the USGCRP—include increasing temperatures and the rise in the sea level.¹⁶¹ Increasing temperatures has been cited as a major environmental challenge in the Southeast due to the increasing possibility that it will bring disease carrying organisms.¹⁶² USGCRP scientists predict that the warming

¹⁵¹ Di Liberto, *supra* note 147.

¹⁵² *Id.*

¹⁵³ *Id.*

¹⁵⁴ *Id.*

¹⁵⁵ *Id.*

¹⁵⁶ *Southeast and the Caribbean*, U.S. GLOBAL CHANGE RSRCH. PROGRAM (Oct. 2014), <https://nca2014.globalchange.gov/report/regions/southeast#statement-16982> [<https://perma.cc/7VVG-HGMN>].

¹⁵⁷ *Id.*

¹⁵⁸ *Id.*

¹⁵⁹ *Id.*

¹⁶⁰ *Id.*

¹⁶¹ *Id.*

¹⁶² *Southeast and the Caribbean*, U.S. GLOBAL CHANGE RSRCH. PROGRAM (Oct. 2014), <https://nca2014.globalchange.gov/report/regions/southeast#statement-16982> [<https://perma.cc/7VVG-HGMN>].

temperatures will bring malaria carrying mosquitoes—and other disease-carrying insects—which could negatively impact labor and crop production in the region.¹⁶³ Additionally, it could also lead to further water insecurity and higher production costs as warming temperatures would allow for certain bacteria, dangerous water borne algal blooms, and other “disease-causing agents” to move further inland.¹⁶⁴

Then there is the issue of the rising sea levels; this environmental challenge is particularly worrying for a variety of reasons.¹⁶⁵ A large number of water supplies are situated at low elevations, making their water susceptible to contamination.¹⁶⁶ Moreover, rising sea levels can also lead to inland inundation which can cause loss of cropland and crop failure if flooding were to occur during growing season.¹⁶⁷

1. Effects of Climate Change in Kentucky and Tennessee

Despite being situated at the northern part of the southeastern region, Kentucky still faces substantial negative impacts from the climate change crisis.¹⁶⁸ The environmental challenges that the state suffers from the most are extreme heat, drought, wildfires, and inland flooding.¹⁶⁹ The state of Tennessee faces similar climate issues as the States at Risk database found that the primary issues faced by the state are extreme heat, drought, wildfires, and inland flooding.¹⁷⁰

The challenge of extreme heat has caused a variety of negative impacts in Kentucky.¹⁷¹ Scientists working with the independent organization Climate Central are predicting a substantial rise in the amount of heat wave days in the coming

¹⁶³ *Id.*

¹⁶⁴ *Id.*

¹⁶⁵ *Id.*

¹⁶⁶ *Id.*

¹⁶⁷ *Id.*

¹⁶⁸ *Kentucky*, STATES AT RISK, <https://statesatrisk.org/kentucky/all> (last viewed Oct. 12, 2021) [<https://perma.cc/2W5N-8QB7>].

¹⁶⁹ *Id.*

¹⁷⁰ *Tennessee*, STATES AT RISK, <https://statesatrisk.org/tennessee/all> (last viewed Oct. 12, 2021) [<https://perma.cc/C9YY-KB3L>].

¹⁷¹ *Kentucky*, *supra* note 168.

years.¹⁷² In fact, they are predicted to increase from the fifteen days a year that we presently experience, to as many as seventy days by 2050.¹⁷³ In addition to this, the extreme warming has caused the mosquito season to extend.¹⁷⁴ In looking at the city of Paducah, scientists found that mosquito season grew from 117 days in 1989 to 139 in 2006.¹⁷⁵ Furthermore, this increase in the frequency of extreme heat could also serve as an opening for more destructive tropical pests to migrate north.¹⁷⁶

Like in Kentucky, the extreme heat conditions in Tennessee have substantially increased the mosquito season.¹⁷⁷ The increasing temperatures have also caused the overall climate of the state to change—the city of Chattanooga is the “6th fastest-warming city” in the United States.¹⁷⁸ Scientists have predicted that the rising temperatures will result in the dangerous days increasing to fifty-five days, from the current ten days, by the year 2050.¹⁷⁹

Drought is another consequence of the climate change crisis. It is predicted that Kentucky will see a 95 percent increase in statewide summer drought by the year 2050.¹⁸⁰ This will prove to be severely harmful to the state as past years of substantial drought caused a billion-dollar revenue deficit from the loss of crops, such as corn and soybeans.¹⁸¹ The increase and severity of droughts in the state, as previously discussed, have already been seen in the flash droughts of 2019.¹⁸² Droughts, being an effect of climate, caused further negative environmental challenges such as threats to drinking water systems, which could cause production issues for industries that use water, and the growth of toxic algae

¹⁷² *Kentucky Extreme Heat*, STATES AT RISK, <https://statesatrisk.org/kentucky/extreme-heat> (last viewed Oct. 12, 2021) [<https://perma.cc/96BL-RMLM>].

¹⁷³ *Id.*

¹⁷⁴ *Id.*

¹⁷⁵ *Id.*

¹⁷⁶ See Alison Doody, *Pests and Diseases and Climate Change: Is There a Connection?*, CIMMYT (Feb. 27, 2020), <https://www.cimmyt.org/news/pests-and-diseases-and-climate-change-is-there-a-connection/> [<https://perma.cc/9A38-YZ5Q>] (discussing how “destructive insects. . . [are] moving north as temperatures rise.”)

¹⁷⁷ *Tennessee Extreme Heat*, STATES AT RISK, <https://statesatrisk.org/tennessee/extreme-heat> (last viewed Oct. 12, 2021) [<https://perma.cc/63WD-TANA>].

¹⁷⁸ *Id.*

¹⁷⁹ *Id.*

¹⁸⁰ *Kentucky Drought*, STATES AT RISK, <https://statesatrisk.org/kentucky/drought> (last viewed Oct. 12, 2021) [<https://perma.cc/UXW7-77QY>].

¹⁸¹ *Id.*

¹⁸² Di Liberto, *supra* note 147.

in the rivers which would cause water contamination.¹⁸³ On the other hand, scientists have predicted that Tennessee will see a 65 percent increase in statewide summer drought by 2050.¹⁸⁴ This is due to the increase in rain during the winter months and a decrease in rain during the summer months.¹⁸⁵ The lack of precipitation will also lead to a shortage of groundwater sources and ultimately result in water insecurity.¹⁸⁶ This would force producers to reduce their production of barley and hops during growing season.¹⁸⁷

Both states also suffer from wildfires.¹⁸⁸ The number of large fires across the country has increased substantially due to extreme drying caused by climate change.¹⁸⁹ In Kentucky, approximately 34 percent of the population resides in areas that have an increased risk of wildfires.¹⁹⁰ In Tennessee, about 37 percent of the population resides in areas that have an increased risk of wildfires.¹⁹¹

Lastly, both states suffer from inland flooding due to climate change.¹⁹² In Kentucky, over 160 thousand people live in areas that have an increased risk of inland flooding.¹⁹³ There has also been a 27 percent increase of heavy downpours from the late

¹⁸³ Ryan Van Velzer, *Kentucky Facing 'Unprecedented' Drought*, WFPL NEWS (Oct. 3, 2019), <https://wfpl.org/kentucky-facing-unprecedented-drought/> [<https://perma.cc/GDT7-54QR>].

¹⁸⁴ *Tennessee Drought*, STATES AT RISK, <https://statesatrisk.org/tennessee/drought> (last viewed Oct. 12, 2021) [<https://perma.cc/YES4-BVGJ>].

¹⁸⁵ *Id.*

¹⁸⁶ See *Drought*, NAT'L GEOGRAPHIC (Jan. 21, 2020), <https://www.nationalgeographic.org/encyclopedia/drought/> [<https://perma.cc/X25H-UTXH>].

¹⁸⁷ See Jeff Daniels, *Drought and Hot Weather Cause Trouble for Hops Growers*, CNBNC (July 24, 2015, 2:50 PM), <https://www.cnbc.com/2015/07/24/drought-and-hot-weather-cause-trouble-for-hops-growers.html> [<https://perma.cc/W6JY-DU95>].

¹⁸⁸ See *The Best & Worst States for Climate Change in the U.S.*, SAFEHOME.ORG (June 31, 2021), <https://www.safehome.org/climate-change-statistics/> [<https://perma.cc/QP56-B2P6>].

¹⁸⁹ See *Wildfires and Climate Change*, CTR. FOR CLIMATE & ENERGY SOL. <https://www.c2es.org/content/wildfires-and-climate-change/> (last viewed Oct. 12, 2021) [<https://perma.cc/8GZV-7CFH>].

¹⁹⁰ *Kentucky Wildfires*, STATES AT RISK <https://statesatrisk.org/kentucky/wildfires> (last viewed Nov. 18, 2021) [<https://perma.cc/PRK6-EQ6W>].

¹⁹¹ *Tennessee Wildfires*, STATES AT RISK <https://statesatrisk.org/tennessee/wildfires> (last viewed Nov. 18, 2021) [<https://perma.cc/E358-RH6U>].

¹⁹² See *The Best & Worst States for Climate Change in the U.S.*, *supra* note 188.

¹⁹³ *Kentucky Inland Flooding*, STATES AT RISK <https://statesatrisk.org/kentucky/inland-flooding> (last viewed Oct. 12, 2021) [<https://perma.cc/QJN3-ZKGC>].

1950s to 2012 in both Kentucky and Tennessee.¹⁹⁴ In Tennessee, the inland flooding issue is slightly more severe. The increasing heavy downpours in the state have had disastrous effects. For example, in 2016 the city of Memphis experienced a forty-eight hour downpour which resulted in more than four inches of rainfall.¹⁹⁵ This event caused 350 million gallons of sewage to overflow into the city.¹⁹⁶ In addition to the rising amount of rain, 270 thousand of the state's residents reside in areas that have a heightened risk of inland flooding.¹⁹⁷

(a) Effects of Climate Change on Craft Beer in Kentucky and Tennessee

Extreme heat, drought, wildfires, and inland flooding all have different effects on craft beer at both the production and consumption stages.¹⁹⁸ Despite affecting craft beer differently, the consequences of climate change will be felt similarly in both Kentucky and Tennessee.¹⁹⁹ The overall result is that beer will become more expensive and less accessible to the public if these issues are not mitigated.²⁰⁰

Extreme heat plays several different roles related to beer production. Primarily, extreme heat can cause conditions that will not allow crops to grow properly.²⁰¹ One of the crops impacted by this is barley. Barley is integral to the production of beer; however, most barley grown in both Kentucky and Tennessee is usually used for livestock feed.²⁰² Barley is also primarily imported into the

¹⁹⁴ *Kentucky Inland Flooding*, STATES AT RISK, <https://statesatrisk.org/kentucky/inland-flooding> (last viewed Nov. 18, 2021) [<https://perma.cc/XCD8-3ZZM>].

¹⁹⁵ *Tennessee Inland Flooding*, STATES AT RISK, <https://statesatrisk.org/tennessee/inland-flooding> (last viewed Oct. 12, 2021) [<https://perma.cc/MD9E-A74Q>].

¹⁹⁶ *Id.*

¹⁹⁷ *Id.*

¹⁹⁸ See Campbell, *supra* note 51.

¹⁹⁹ See *The Best & Worst States for Climate Change in the U.S.*, *supra* note 188.

²⁰⁰ See Daniels, *supra* note 94.

²⁰¹ See Lynne M. Carter & James W. Jones, *Southeast and the Caribbean*, NAT'L. CLIMATE ASSESSMENT, <https://nca2014.globalchange.gov/report/regions/southeast#statement-16982> (last viewed Oct. 12, 2021) [<https://perma.cc/3PHH-RE7K>].

²⁰² See Lizzy Alfs, *Could Locally Grown Barley Boost Tennessee Farms and Breweries?*, THE TENNESSEAN (July 3, 2019, 4:34 PM), <https://www.tennessean.com/story/money/2019/07/03/could-locally-grown-barley-boost-tennessee-farms-and-breweries/1320511001/> [<https://perma.cc/T32H-MCT7>].

states.²⁰³ In Kentucky, unless barley production increases and is expanded to brewery use, extreme heat would result in a negative impact on beer production. In Tennessee, however, there are small quantities of barley being grown on farms for use by Tennessee breweries.²⁰⁴ For example, Batey Farms grows 250 acres of barley on their 2,300-acre farm.²⁰⁵ Tennessee farmers also grow malting barley, during the winter season.²⁰⁶

Though all is well now, increasing temperatures could eventually cause Tennessee to become an unviable location to produce barley, leaving it to the northern-most states.²⁰⁷ Extreme heat conditions, paired with a lack of rainfall, can also cause drought.²⁰⁸ Drought is the more concerning issue when it comes to beer production in Kentucky and Tennessee. Water is used in both the growing and production aspects of making beer.²⁰⁹ Despite barley not being grown in large quantities in either state, drought could cause reductions in the total amount of barley produced.²¹⁰ This could lead to the prioritization of barley for livestock over beer and result in local farms losing business.²¹¹

Wildfires, caused by extreme heat conditions, could also be severely detrimental to beer production in Kentucky and Tennessee in more than one way.²¹² First, with the increasing number of wildfires, there is potential that entire supplies of barley grown and stored in the state could be wiped out.²¹³ Secondly, as previously discussed, wildfires can cause water contamination leading to water insecurity.²¹⁴ Breweries would then have to either import water—which increases costs—or use sources that weren't

²⁰³ *Id.*

²⁰⁴ *Id.*

²⁰⁵ *Id.*

²⁰⁶ *Id.*

²⁰⁷ See *The Best & Worst States for Climate Change in the U.S.*, *supra* note 188; see Campbell, *supra* note 51.

²⁰⁸ See *Drought and Climate Change*, CTR. FOR CLIMATE & ENERGY SOL. (Oct. 7, 2021, 8:00 AM), <https://www.c2es.org/content/drought-and-climate-change/> [<https://perma.cc/YC9Z-QBRA>].

²⁰⁹ See Daniels, *supra* note 94.

²¹⁰ See Campbell, *supra* note 51.

²¹¹ See *Could Climate Change Cause Global Beer Shortages?*, CORNELL UNIV.: CORNELL BEER BLOG <https://blogs.cornell.edu/beerblog/tag/beer-supply/> (last viewed Oct. 12, 2021) [<https://perma.cc/QX33-6BTG>].

²¹² See *Wildfires and Climate Change*, *supra* note 189.

²¹³ See Lakshmi Supriya, *Ecosystems Could Once Bounce Back from Wildfires. Now, They're Being Wiped Out for Good*, SCIENCE (Dec. 19, 2017), <https://www.science.org/content/article/ecosystems-could-once-bounce-back-wildfires-now-they-re-being-wiped-out-good> [<https://perma.cc/C7VR-XG98>].

²¹⁴ See Helmer, *supra* note 125.

within the reach of the fires and potentially suffer the consequence of their product tasting differently.²¹⁵

Lastly, is the risk of inland flooding. The impacts of inland flooding are very similar to those of wildfires in that it can cause water contamination and crop destruction.²¹⁶ The effects of water contamination are detrimental in both states.²¹⁷ Contamination can occur due to soil and other debris floating into water sources.²¹⁸ Another source of contamination is sewage water containment sites, which overflow into groundwater sources as a result of heavy rain.²¹⁹ Both forms of contamination would cause breweries to have to either purchase water or purify water.²²⁰ Both options result in a cost increase for brewers and consumers.²²¹

Then there is the issue of crop destruction, which primarily applies to Tennessee as it produces barley for beer.²²² Flooding in crop lands can destroy or severely damage crops through oxygen deprivation.²²³ Inland flooding waterlogs the soil, depleting the oxygen in the soil and ultimately drowning the crops.²²⁴ This is dependent on local conditions, but the general rule is that thirty-six to forty-eight hours is the time limit that crops can sustain submersion.²²⁵

However, farms that produce barley in Tennessee grow during the winter season.²²⁶ Despite this, winters in the state are

²¹⁵ See Daniels, *supra* note 94; see Matt Shipman, *Climate Change Will Make Beer Taste Different (Yes, Really)*, N.C. STATE UNIV. (Aug. 18, 2020), <https://news.ncsu.edu/2020/08/climate-change-is-changing-beer/> [<https://perma.cc/JHP6-ZNQJ>].

²¹⁶ See Bill Wiebold, *Flood Effects on Grain Crops*, UNIV. OF MO.: EXTENSION (Mar. 2009), <https://extension.missouri.edu/publications/agw1014> [<https://perma.cc/88M2-CXH5>].

²¹⁷ See Adrian Mojica, *Report: Two of Worst Coal Ash Contamination Sites in Tennessee, Kentucky*, WZTV FOX 17 NASHVILLE (Mar. 5, 2019), <https://fox17.com/news/local/report-two-of-worst-coal-ash-contamination-sites-in-tennessee-kentucky> [<https://perma.cc/L7CL-8MPN>].

²¹⁸ See Helmer, *supra* note 125.

²¹⁹ See Abdon Atangana, *Groundwater Pollution*, ELSEVIER PUB. HEALTH EMERGENCY COLLECTION (Jan. 5, 2018), <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7149999/> [<https://perma.cc/9JZC-D38U>].

²²⁰ See Glennon, *supra* note 1.

²²¹ See Campbell, *supra* note 51.

²²² See Alfs, *supra* note 202.

²²³ See Bill Wiebold, *Flood Effects on Grain Crops*, 17 INTEGRATED PEST & CROP MGMT. NO. 9 (May 18, 2007), <https://extension.missouri.edu/publications/agw1014>.

²²⁴ *Id.*

²²⁵ *Id.*

²²⁶ See Alfs, *supra* note 202.

mild and experts predict winters to gradually warm.²²⁷ There are, however, some winter weather events that could prove to be problematic. For example, in February 2021 the state experienced a winter weather storm followed by rain.²²⁸ Yet meteorologists did not expect serious flooding.²²⁹ Though previous winters in Tennessee have seen flooding and flash flooding, it has primarily affected lowland areas.²³⁰

III. CURRENT BEER REGULATIONS

The beer industry is primarily regulated by the Alcohol and Tobacco Tax and Trade Bureau (“TTB”).²³¹ The TTB regulates various aspects of beer—from its measurement to its concentration.²³² There are also provisions in the United States Code that address beer and alcohol.²³³ Aside from federal guidance, the regulation of beer is primarily left to states.²³⁴ Within the states there has been an increase in beer legislation raising production limits.²³⁵ Despite this, there isn’t much legislation surrounding the mitigation of climate change through sustainable practices.²³⁶

²²⁷ See David Nolan, *Tennessee Winters Not as Cold as They Used to Be*, WKRN (Jan. 28, 2021, 5:03 PM), <https://www.wkrn.com/weather-headlines/weather-stories/tennessee-winters-not-as-cold-as-they-used-to-be/> [<https://perma.cc/3VEY-LJL6>].

²²⁸ See Brett Kelman, *As the Winter Storm Ends, Rain and ‘Spring-Like’ Weather in Middle Tennessee Forecast*, NASHVILLE TENNESSEAN (Feb. 21, 2021, 10:20 AM), <https://www.tennessean.com/story/news/2021/02/21/winter-storm-ends-tennessee-forecasts-rain-spring-like-weather/4532608001/> [<https://perma.cc/H7XJ-7A2H>].

²²⁹ *Id.*

²³⁰ See *Past Weather Events & Storms*, NAT’L WEATHER SERV., <https://www.weather.gov/ohx/weatherevents> (last viewed Oct. 18, 2021) [<https://perma.cc/KJ6J-TP88>].

²³¹ *Beer Laws, Regulations, and Public Guidance*, ALCOHOL & TOBACCO TAX & TRADE BUREAU, <https://www.ttb.gov/beer/laws-regulations-and-public-guidance> (last viewed Oct. 18, 2021) [<https://perma.cc/MP74-ZFDB>].

²³² *Id.*

²³³ *Id.*

²³⁴ *US States with the Most (and Least) Beer Regulations*, AM. CRAFT BEER, <https://www.americancraftbeer.com/us-states-with-the-most-and-least-beer-regulations/> (last viewed Oct. 18, 2021) [<https://perma.cc/292E-444Y>].

²³⁵ Ryan Van Velzer, *Some States Increasing Production Caps for Microbreweries*, TYLER MORNING TELEGRAPH, (Apr. 1, 2015), https://tylerpaper.com/news/business/some-states-increasing-production-caps-for-microbreweries/article_d3f7b84e-3593-58fb-83bf-6406a22d76ba.html [<https://perma.cc/YPN5-MACA>].

²³⁶ Keith Robinson, *Breweries: Here’s How to Get Environment, Health, and Safety Compliance Right*, CIV. & ENV’T CONSULTANTS, INC., (Sept. 16, 2019), <https://www.cecinc.com/blog/2019/09/16/breweries-heres-how-to-get-environment-health-and-safety-compliance-right/> [<https://perma.cc/L6TS-CQAL>].

A. Regulations Across the Southeast

Present day regulations and legislation affecting beer—and alcohol in general—in the south are reflective of Prohibition era laws.²³⁷ In fact, there are several southern states that currently use laws from the Prohibition period to regulate alcohol.²³⁸ However, states have been moving towards more progressive measures which include expanding distribution possibilities.²³⁹ For example, in Georgia it is still considered illegal to go to a “production brewery” and actually purchase a beer.²⁴⁰ To circumvent this, if a person were to pay for the tour, then the beer is considered “complimentary.”²⁴¹

1. Regulations in Kentucky and Tennessee

The current regulations in Kentucky are some of the most progressive in the Southeast.²⁴² KY microbreweries used to only be allowed to produce 25 thousand barrels a year.²⁴³ Today, that number has been amended, now allowing KY microbreweries to produce 50 thousand barrels a year, a win for craft brewers all over the state.²⁴⁴

This law, as well as all other Kentucky beer laws, can be found in Title XX on Alcoholic Beverages in the Kentucky Revised Statutes.²⁴⁵ The statutes within this Section detail administrative, tax, and other regulatory issues concerning alcohol.²⁴⁶ KRS 241.030 also places the Alcohol Control Board in charge of all licensing processes in the state.²⁴⁷ However, absent from Title XX

²³⁷ C. Jarrett Dierterle, *Think Prohibition Is Over? Nope. It's Still Making Booze Pricy and Hard to Get*, FEDERALIST (Oct. 19, 2016), <https://thefederalist.com/2016/10/19/think-prohibition-nope-still-making-booze-pricy-hard-get/> [<https://perma.cc/3ZUH-JVDR>].

²³⁸ *Id.*

²³⁹ *Id.*

²⁴⁰ *Id.*

²⁴¹ *Id.*

²⁴² Will McGough, *Southern Beer Laws are Improving, but There's Still a Long Way to Go*, CRAFT BEER.COM (June 14, 2016), <https://www.craftbeer.com/craft-beer-muses/southern-craft-beer-laws> [<https://perma.cc/KE27-SATU>].

²⁴³ *Id.*

²⁴⁴ *Id.*

²⁴⁵ *You Want to do What?! A Primer on Helping Your Client Set Up a Kentucky Brewery*, KY. BAR ASS'N. (June 23, 2017), <https://cupdf.com/document/you-want-to-do-what-a-primer-on-helping-your-client-cymcdncomresmgr2017conventionpdfscraft.html> [<https://perma.cc/JN36-R6RY>].

²⁴⁶ *Id.*

²⁴⁷ KY. REV. STAT. ANN. § 241.030 (West 2017).

are regulations addressing the sustainability of alcoholic beverage producers, such as breweries.

Like Kentucky, Tennessee has also had an amendment to state law that allows for an increase in barrel production. Tennessee is now allowed to produce more than 25 thousand barrels a year per T.C.A. 57-5-201.²⁴⁸ All other codes relate to taxation and other administrative matters.²⁴⁹ Tennessee also has in place a Tennessee Alcoholic Beverage Commission to aid in the regulation of alcohol in the state.²⁵⁰ In relation to beer, the Commission has established a Responsible Beer Vendor Program to train all employees to ensure state regulatory compliance.²⁵¹

IV. THE SOLUTION

The current state of the beer industry is riddled with inefficiency issues that do not mitigate the impacts of the climate change crisis or the impacts that the climate change crisis has on consumers (i.e., increased price and change of taste). While some breweries are enacting measures to mitigate the harmful effects of climate change, it is simply not enough. There needs to be a larger push for breweries in the Southeast, and across the country, to adopt methods more suited to the changing climate. The craft beer industry can only be saved by new regulations that insulate the beer industry from climate change's potentially disastrous impact.

As previously stated, to save the beer industry, breweries need to go green. In both Kentucky and Tennessee, the governments have created sustainability initiatives for alcohol producers. The Kentucky Energy and Environment Cabinet, through the Division of Compliance Assistance, created a Sustainable Spirits Initiative in 2011.²⁵² This initiative provides a summit for breweries, distilleries, and wineries to gather and discuss sustainable practices being used in the industry and how

²⁴⁸ *Tennessee Alcoholic Beverages and Beer Tax Guide*, TENN. DEP'T. OF REVENUE, <https://www.tn.gov/content/dam/tn/revenue/documents/taxguides/alcbevguide.pdf> (last viewed Oct. 18, 2021) [<https://perma.cc/574D-WB7X>].

²⁴⁹ *Id.*

²⁵⁰ *Id.*

²⁵¹ Tenn. Comp. R. & Regs. 0.100-09.01-.05 (2016) <https://publications.tnsosfiles.com/rules/0100/0100-09.20160529.pdf> [<https://perma.cc/G4CH-UCZH>].

²⁵² *Sustainable Spirits Initiative*, KY. ENERGY & ENV'T. CABINET, <https://eec.ky.gov/Environmental-Protection/Compliance-Assistance/Pages/sustainable-spirits.aspx> (last viewed Oct. 18, 2021) [<https://perma.cc/SJR4-4Q5T>].

to further those efforts.²⁵³ The initiative also provides a variety of resources to assist alcohol producers in their sustainability efforts.²⁵⁴ Tennessee's Department of Environment & Conservation has a similar initiative called the Tennessee Sustainable Spirits Program.²⁵⁵ This program was made to assist alcohol producers in the state with improving their "operational sustainability by promoting best practices."²⁵⁶ The issue with the programming provided by both states, however, is that both programs are completely optional.²⁵⁷

In order to effectively mitigate the impacts of climate change, the state and federal regulatory departments that oversee the beer industry need to create—or amend—laws and regulations that enforce and incentivize sustainable practices. Currently, the largest quantity of energy spent by breweries is from the electrical energy used to power their machinery.²⁵⁸ The Environmental Protection Agency ("EPA") has Greenhouse Gas Emission requirements that could have a direct impact on breweries.²⁵⁹ The EPA has a mandatory Greenhouse Gas accounting rule that requires facilities from "specific industries that directly emit 25,000 metric tons of carbon dioxide equivalent or more per year" to reduce their emissions over a certain time period.²⁶⁰ As it is now, the rule does not apply to breweries unless the EPA were to lower the threshold.²⁶¹ Another option would be for the states to regulate brewery emissions by creating regulations stricter than those of the EPA.

Incentives such as tax incentives, subsidies, and other financial incentives could also help preserve the beer industry. Often, it may be costly to initiate sustainable practices, especially practices involving energy usage and water. The federal

²⁵³ *Id.*

²⁵⁴ *Id.*

²⁵⁵ *Tennessee Sustainable Spirits*, TENN. DEPT. OF ENV'T. & CONSERVATION, <https://www.tn.gov/environment/program-areas/opsp-policy-and-sustainable-practices/business-and-private-sector/tennessee-sustainable-spirits.html> [https://perma.cc/3XR5-K5YC].

²⁵⁶ *Id.*

²⁵⁷ *Id.*; KY. ENERGY & ENV'T CABINET, *supra* note 252.

²⁵⁸ *Energy Usage, GHG Reduction, Efficiency and Load Management Manual*, BREWERS ASSOC. https://www.brewersassociation.org/attachments/0001/1530/Sustainability_Energy_Manual.pdf (last viewed Nov. 11, 2021) [https://perma.cc/XJ6B-G4K4].

²⁵⁹ Clean Air Act, 42 U.S.C. § 7401 et seq.

²⁶⁰ *Energy Usage, GHG Reduction, Efficiency and Load Management Manual*, *supra* note 258.

²⁶¹ *Id.*

government, or individual states, could provide incentives to breweries that switch to renewable energy sources—as most breweries use fossil fuels as their energy supplies.²⁶² This would aid in mitigating all climate change impacts as fossil fuels directly contribute to greenhouse gas emissions. There could also be incentives provided for breweries that utilize water caught during rain cycles, utilize recycled water, or recycle water onsite through technologies that they invested in or received through specialized programs.²⁶³ This would actively help combat water insecurity as water is used in just about every phase of the brewing process.

CONCLUSION

The climate change crisis is slowly, but surely, impacting the beer industry. Across the country, the southeast, and particularly in Tennessee and Kentucky, breweries are facing increased challenges due to climate change. Water insecurity and crop destruction caused by wildfires, flooding, drought, and extreme heat torment the nation's breweries. To keep the industry from keeling over from the pressures of climate change, the industry must adapt. Though current sustainability efforts are voluntary, there must be mandatory measures in place to ensure that everyone is doing their part. These measures include requiring that every brewery meets an energy-efficiency standard set by the Environmental Protection Agency. State governments must also be willing to provide incentives to breweries for engaging in water conservation practices like recycling water. For Kentucky and Tennessee, this key as the primary issues are water. However, widespread implementation is key in securing the future of the beer industry.

²⁶² *Id.*

²⁶³ Glennon, *supra* note 1.