

CRAFTING CONSERVATION: PRO-ENVIRONMENTAL ACTIONS AMONG  
CRAFT BREWERIES IN THE CENTRAL TEXAS HILL COUNTRY

by

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## **DEDICATION**

For Molly – Thank you for your unending support

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-Cheers

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## **ABSTRACT**

The craft brewing industry has expanded greatly over recent decades across the United States as well as in Texas. Craft breweries have the ability to enact or influence recognizable environmental issues in their communities, though there has been little research to date on the topic. Central Texas provides an excellent backdrop for such a study due to its large count of breweries and unique environmental issues. Building on previous research across the United States on advocacy in brewing, this project examines craft breweries in the Texas Hill Country and presents a comprehensive overview of not only what these breweries are doing but why, delving into both brewer motivations for and barriers to pro-environmental activity. Using a mixed-methodology approach, including a web analysis, online surveys, and in-person interviews, this study includes both a review of breweries' actions and motivations more broadly and four qualitative case studies of craft breweries in the region. These contrasting, and at times similar, experiences show that there is complexity and nuance behind craft breweries' motivations for environmental advocacy and their barriers and opportunities for action. This study contributes to the growing body of literature on fermented landscapes, provides a bedrock for further research, and, most importantly, provides guidance and insight for craft breweries who are interested in enacting change in their own communities.

## I. INTRODUCTION

The robust and booming economy of craft brewing is well understood; numerous studies have now covered the topic (Sorenson, Morgan, and Furniss 2012; McLaughlin, Reid, and Moore 2014; Watson 2019). Less familiar is the industry's impact on place, society, and the environment. In considering community and identity, craft breweries in the Texas Hill Country and around the world have the ability to foster a sense of place amongst its drinkers via branding, activism, community relations, and atmosphere (Fletcher 2016; Gatrell, Reid, and Steiger 2018; Schnell and Reese 2014). Branding and marketing strategies, such as place-based naming and logo design, are common ways in which breweries forge a connection to place (Gatrell, Reid, and Steiger 2018; Fletcher 2016; Baker 2019). However, it can be difficult to distinguish greenwashing efforts from real impacts to the local environment. Beyond branding and marketing strategies, the literature on advocacy within the craft brewing sphere is sparse.

While emerging research demonstrates how breweries connect with their community through local food, music, and events (Gatrell, Reid, and Steiger 2018; Dillivan 2012), less is known about how breweries contribute to their local environment through their prosocial activities. Little research to date has focused on how breweries engage in on-site and off-site actions that are considered sustainable or environmentally beneficial (Hoalst-Pullen et al. 2014; Ness 2018). Even less research details the motivations behind such actions (Fletcher 2016). We do not know why breweries might be implementing pro-environmental practices or how effective they may be. Indeed, despite a large and growing literature on beer and brewing, there nevertheless remains much to study in terms of craft breweries' environmental practices and how those actions

impact their local environments, cultures, and place-based identities. This is especially important when considering the detrimental impacts to the environment that are implicit in brewing. The process consumes large amounts of water, 6-7 gallons per gallon of beer, and produces both wastewater and solid by-products that pose problems for the local environment (Olajire 2018).

This project fills some of these gaps by examining how Central Texas breweries engage in environmentally sustainable practices, the motivations for doing so, and the barriers affecting breweries' ability to implement their desired environmental practices. The research is driven by three main questions: 1) In what ways are craft breweries in the Central Texas Hill Country practicing environmental sustainability? 2) What are the motivations for breweries to practice environmental sustainability? 3) What barriers do craft breweries face in implementing environmentally sustainable practices? This research establishes the types and foci of environmental conservation and sustainability related activities that are supported or undertaken by Central Texas breweries in order to build a more comprehensive understanding of which activities are most commonly undertaken and how these activities relate to brewery size and classification, location, and visitor demographics.

Importantly, this research captures not only *what* breweries are doing, but also *why*. Accordingly, the research investigates the motivations of brewers to engage in environmental conservation and sustainability practices. Much of the research which addresses pro-environmental activity frames the action purely in terms of offsetting negative environmental impacts, yet the motivations of craft brewers are much more nuanced. Further, brewers face social and financial as well as spatial and temporal

barriers that may limit or prevent their efforts. Thus, this research also explores the constraints brewers face in their pro-environmental pursuits. The information gleaned from this work contributes to academic knowledge in terms of understanding how craft brewers positively impact their environment and conduct sustainable business practices, and, from the industry standpoint, this research will inform breweries on how to improve upon their environmentally-oriented actions and practices.

Pro-environmental and sustainable actions and activities being undertaken by breweries across the country range from donating a portion of profits, to hosting environmentally focused events, to re/up-cycling grain and water involved in beer production (Myles et al. in press). Though one recent study surveyed a representative sample of craft breweries across the US on this topic as part of a wider effort to assess advocacy in craft brewing more widely (Myles et al. in press), this is the first comprehensive overview of such activities in the Central Texas Hill Country. In addition, although it represents a narrower geographic range, this study deepens the scope of the research insofar as it moves beyond identifying the possible range of actions undertaken by breweries in order to identify which environmental issues are most commonly engaged with by brewers and *why*. There are many possible reasons a brewery would advocate for environmental issues or implement sustainable practices on-site, and this study explores what those reasons might be. In sum, this research generates a deeper understanding of how and why breweries support pro-environmental and sustainable actions and how those relate to the local community.

## II. LITERATURE REVIEW

### Fermented Landscapes Framework

The *fermented landscapes* framework (Myles 2020), makes space for analyzing the physical and cultural changes associated with the landscapes of production, consumption, and distribution of fermented products such as beer, wine, cheese, and chocolate. At the heart of this framework is a focus on processes of transformation carried out by many actors, not all of them human. Although still young, the framework has already been utilized in such varied research pursuits as: an ethnographic investigation of the culinary culture of Bloody Mary cocktails from various U.S. regions, an examination of the physical and cultural landscapes of new craft bourbon distilleries, and an exploration of English cider using actor-network theory (Zunkel 2020; Weaver 2020; Furness and Myles 2020). Among the many functions of the fermented landscapes framework is the Brewing Change project (Myles et al. in press) which is a precursor to this thesis. Using a random sample of 400 craft breweries across the United States, the team, which included myself, analyzed their websites and established a typology of advocacy along three axes: economic, social, and environmental. Along these three axes, we identified three dozen techniques and two dozen themes of action amongst craft brewers. These instances of advocacy included such varied techniques as partnerships with local municipalities to build hiking trails, adopting charitable business models, and recycling on-site (Myles et al. in press).

Naturally, as is the case with all research, this study has its limitations. Since the project only analyzed brewery websites, and the messages breweries choose to include on

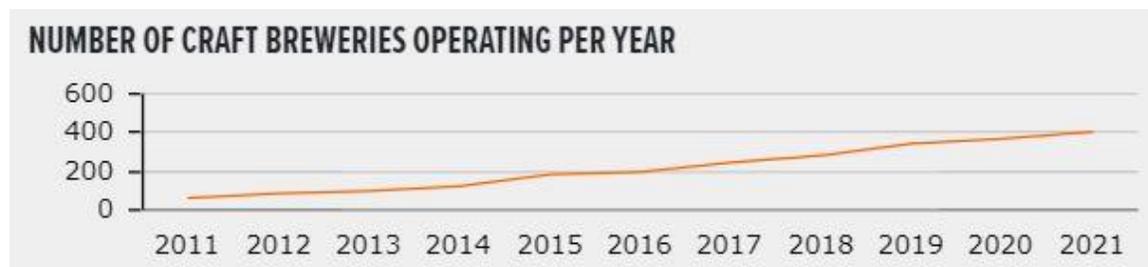
them, the full scope of brewery advocacy was not represented. Additionally, while the study establishes the most common axes, themes, and techniques for brewery advocacy, it is not able to capture the drivers of these efforts. Even within the larger body of craft brewing literature, the motivations behind advocacy efforts are not well understood. Are motivations consistent across the industry, or do they vary by some unknown factor? By focusing on a single axis of advocacy and narrowing the geographic scale of focus, this thesis builds upon the Brewing Change project to investigate not only *what* craft breweries are doing but *why*.

### **The Craft Beer Industry**

The Brewers Association defines a craft brewery as a business that is small, independent, and one that brews beer: Small, meaning an annual production limit of 6 million barrels of beer; Independent, meaning less than 25% of the brewery is controlled by a non-craft brewer; And while brewing beer is a given, craft brewing is often associated with innovation, tradition, and individualism (Association 2022). This definition excludes beers like Blue Moon whose parent company, Molson Coors North America, is both a non-craft brewer and well over the six million barrel production limit. In the last few decades, the U.S. craft brewing industry has experienced remarkable growth, even during the pandemic. It is important to note here that although there has been overall growth in the industry throughout the pandemic, there have been declines and many closures as well (Association 2022). Over the past 40 years, the total brewery count in the United States has exploded with total numbers leaping from just 92 in 1981, to 9,247 in 2021 (Association 2022). Craft breweries, rather than traditional breweries,

account for much of the observed growth (Association 2022). This can be attributed to an increased desire for both consumers and brewers to reconnect with community and place (Flack 1997). Additionally, there has been an increased push for craft and local products both inside of the fermentation industry and beyond (Patterson and Hoalst-Pullen 2014). This is evidenced by the fact that in the past six years alone, the number of craft breweries in the United States nearly doubled from 4,803 craft breweries in 2015 to 9,118 in 2021, including a 4.4% increase from 2020 (8,905 craft breweries) to 2021 (Association 2022). It may be important to note here that most of that growth seems to have come from new taprooms and regional breweries. Microbreweries show a decline from 2019 to 2021 and brewpubs showed only a 0.2% increase (Association 2022).

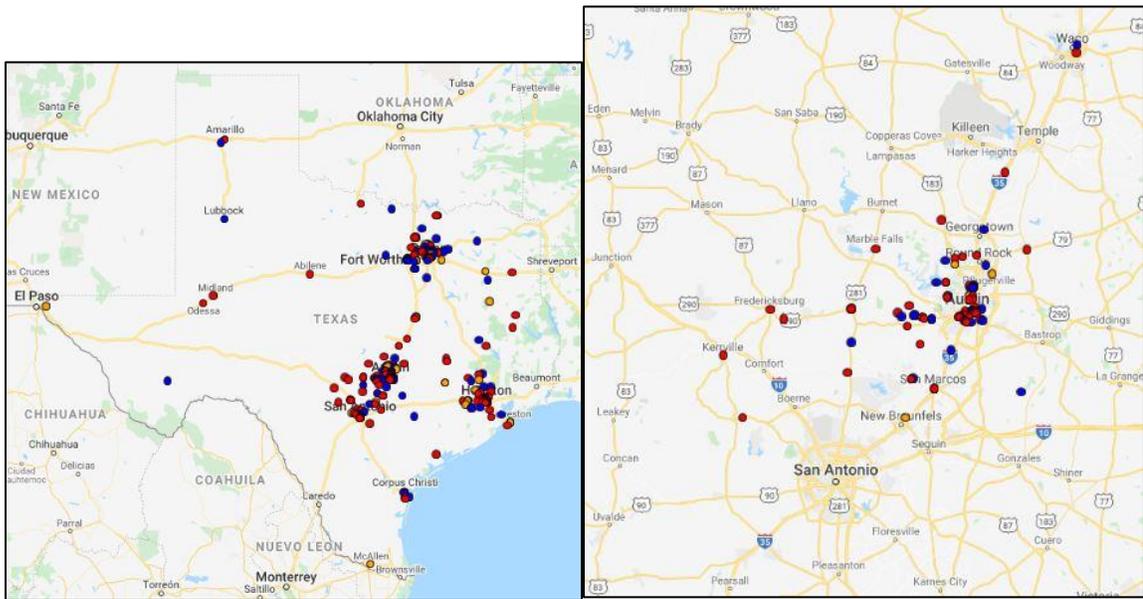
Despite the numbers, growth across the country has not been equal. Craft brewing growth in the U.S. south has lagged behind that of other regions, however, there are several states, including Texas, which have experienced massive growth in recent years. Craft brewery growth in the state of Texas has followed that of the nation, increasing from 189 craft breweries in 2015, to 406 in 2021 (Association 2021), an increase of 115%, including an 11.5% increase from 2020 (364 craft breweries) to 2021 (Figure 1).



**Figure 1. Number of Craft Breweries Operating Per Year.** A graph depicting the number of craft breweries operating per year in the state of Texas, indicating 59 breweries in 2011 and 406 in 2021 (Association 2021).

According to the Texas Craft Brewer’s Guild (TCBG) website (Figure 2), most of

the state’s craft breweries are concentrated around three distinct metro areas: The Dallas-Fort Worth metro area, Houston metro area, and the San Antonio/Austin metro areas (Guild 2020). The TCBG separates Texas into four distinct regions: Central Texas, Houston, North Texas, and San Antonio.



**Figure 2. Craft Breweries in Texas.** Images from the Texas Craft Brewer’s Guild website depicting craft breweries, brewpubs, and retail members. Breweries are depicted in blue, brewpubs in red, and retail members in yellow. **Left:** A map of all craft breweries, brewpubs, and retail members in Texas, grouped into four distinct regions: Central Texas, Houston, North Texas, and San Antonio. **Right:** A map depicting the craft breweries, brewpubs, and retail members of the Central Texas region. (Guild 2020)

In a study on brewery growth, Baginski and Bell (2011) concluded that the southern United States – defined by the U.S. Census Bureau as the states of Alabama, Delaware, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, West Virginia, and The District of Columbia – ranked last among the four census regions in the total amount of breweries, number of breweries per state, and breweries per 100,000 people. These statistics were attributed to a lack of demand for specialist producers, the higher presence

of “dry” counties, lower levels of highest education attainment, the conservative nature of the region, and the dominant religious views on alcohol in the region (Baginski and Bell 2011). So, why does Texas have such high numbers?

The state of Texas has an unusually high concentration of brewing activity, which can, in part, be attributed to its high population (McLaughlin, Reid, and Moore 2014). While this explanation seems straightforward, the reality is more nuanced. According to Baginski and Bell (2011), an increased ratio of craft breweries per capita in southern metropolitan statistical areas (MSAs) can be best predicted by a higher cost of living, provision of healthcare, and an overall ranking of a population’s tolerance and acceptance of diversity. The authors also found that tourism in the region is a driver for the relative success of craft brewing in southern MSAs (Baginski and Bell 2011).

### **Community, Identity, and Place**

Community, identity and place factor heavily into the operations of the craft brewing industry. In a landmark study, Schnell and Reese (Schnell and Reese 2014) attributed the growth of American microbreweries to an increased desire for both consumers and brewers to reconnect with community and place. Community and place also play a role in marketing strategies for many craft brewers. This is evidenced by studies which examine place-based themes in beer names and logos. In a case study of Montana breweries, Fletchall (2016) identified three broad categories with which to organize place-based names: physical environment, local history, and town/state names. In a study of U.S. breweries, Schnell and Reese (2014) similarly identify place-based naming trends which fall into the categories of local history, seasons and cycles, and

nature (especially on the West Coast). The survey portion of Fletchall's case study provides insight into customer perceptions of place-based themes among breweries. Several of the survey questions were concerned with perceptions of place-based or local themes (Fletchall 2016). When online and in-person survey participants were asked to indicate the factor most important in selecting a brewery, only 4% chose "theme" (name of brewery, beer names, décor, etc.). Fletchall (2016) reported an "overwhelming response" of "no" to the question of whether visitors were more likely to select a brewery with a place-based or local theme. However, when describing a typical Montana craft brewery, there was an apparent connection in the minds of brewery attendees between craft breweries and community.

While there is some data on the links between breweries and their communities, some questions still remain. For example, Smith et al. (2017), summarizing research gaps in the literature surrounding the craft brewing industry, calls for additional studies on craft beer tourism and the economic impact of craft beer on local communities. And Eberts (2014), drawing from the Canadian craft brewing scene, recommends further research to explore both the marketing motivations of brewers and the influence of local identity on the purchasing decisions of beer consumers. It is important to note that craft brewing is not always viewed as a benefit to the community. Craft breweries have often been accused of being complicit in gentrification efforts and are often located in rapidly changing urban settings like that of east Austin. Indeed, many of the breweries in this study are located in the east Austin region, an area often criticized for gentrification practices. In studying the actions, motivations, and barriers to pro-environmental activity amongst craft brewers, we can better understand what these breweries are doing and why.

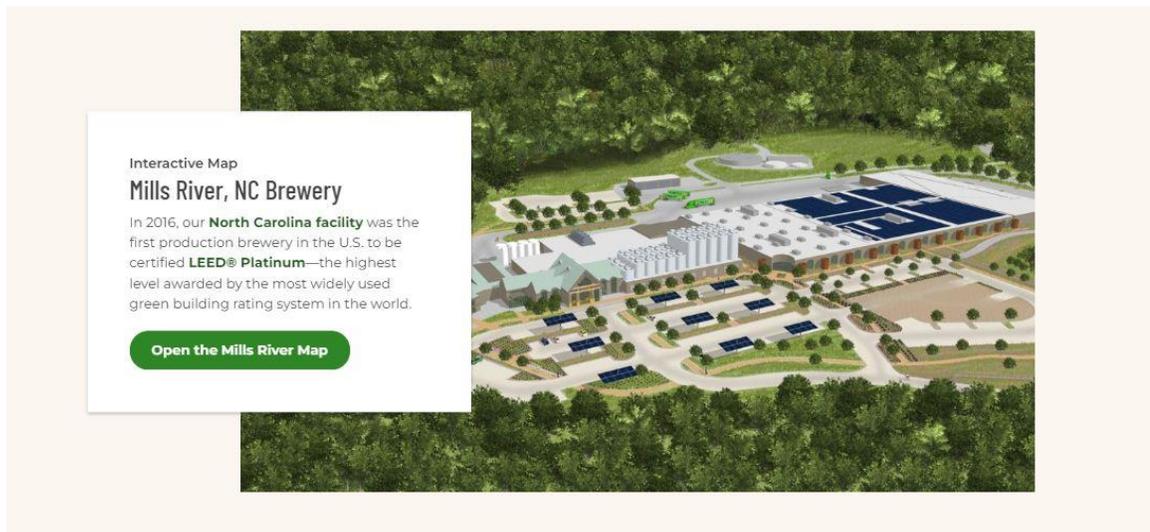
## **Sustainability and Pro-environmentalism**

The brewing industry's negative impacts upon the environment are well documented, and the craft brewing industry faces many of these same challenges. One of the most critical challenges is the brewing industry's relationship with water resources. A report by Olajire (2018) reviews the many environmental issues faced in the brewing industry, stating that "the most significant environmental issues associated with the operation phase of breweries include water consumption, wastewater, solid waste and by-products, energy use and emissions to air."

By-products of the brewing process include wastewater, solid materials, and chemicals associated with the cleaning process. On average 6-7 gallons of water required to produce a gallon of beer. The wastewater is the largest by-product of the brewing process. It is nutrient rich and filled with organic material and chemicals, all of which are harmful to the ecosystem and a strain on wastewater treatment plants. Solid by-products include yeast bodies, spent grain, hop material and other additives. Spent grain production is massive. Energy use and emissions also pose problems in the brewing process.

An environmentally sustainable business participates in environmentally friendly activities, addresses current environmental concerns, and operates with minimal to no impact on the global or local environment. Within the industry there are a handful of breweries which stand out above the rest in terms of their sustainability efforts. One of these industry leaders is Sierra Nevada Brewing, a very recognizable regional craft brewery based out of California. Both their Chico, CA and their newer Mills River, NC locations feature on-site wastewater treatment plants, solar arrays, CO<sub>2</sub> recovery, rail

systems, heat recovery, and much more. Many of these features are either the first or largest of their kind in the industry. 99.8 percent of Sierra Nevada's solid waste is diverted from the landfill, they compost on-site, and they have invested in anaerobic digesters. They also have several staff positions which directly pertain to sustainability and multiple web pages dedicated to explaining their sustainable operations via infographics and site maps (Figure 3)



**Figure 3. Sierra Nevada Sustainability Site Map.** A screenshot from Sierra Nevada's website depicts the sustainability site map for their Mill's River, NC brewery. The attached caption notes that the facility is the first production brewery in the United States to achieve LEED Platinum certification.

As a business foremost, craft brewers must keep their customers in mind, however, research indicates that consumers are interested in buying sustainably when it comes to beer. A 2018 willingness-to-pay study by Carley and Yahng revealed that among 1,094 respondents, 59% would be willing to pay more for a sustainable beer. On average, the respondents were willing to pay about \$1.30 more for a six-pack of sustainable beer. This again brings up Blue Moon and the question of craft beer. A lawsuit filed against the company by consumer Evan Parent in 2015 alleged that

customers were unfairly paying higher prices because of the expectation that the product was craft beer. And although craft and non-craft beer may likely be distinguished by taste, study authors Carley and Yahng make an interesting point that consumers likely cannot distinguish a sustainable vs non-sustainably brewed beer by taste alone. This would imply that a brewery's front-facing messages such as a website or social media page, are important in conveying brewery practices.

At the other end of the spectrum, studies show that many craft breweries have concrete sustainability goals and practices. A 2014 study surveyed 94 U.S. regional craft breweries on their on-site sustainability practices (Hoalst-Pullen et al. 2014); questions in the survey related to the Three Pillars of Sustainability, conceptualized as Economy, Environment, and Equity. While the researchers received only 21 responses, the research indicates a trend amongst regional craft breweries. Using a four-point Likert Scale for ranking, respondents' average score was 3.3 out of 4 when asked if they had environmental sustainability goals of reducing the use of materials, reusing waste materials, and/or increasing recycling rates (Hoalst-Pullen et al. 2014). Furthermore, most brewery respondents agreed that they had goals related to reduction of water and energy use, with 76% claiming to reduce water use and another 10% who state they had plans to do so (Hoalst-Pullen et al. 2014). Most respondents also agreed that their breweries supported sustainability policies and sustainability education, although notably, less than half of respondents indicated that they used sustainability as a marketing tool (Hoalst-Pullen et al. 2014).

A more recent study by Rosburg and Grebitus polled Iowa craft breweries on their sustainability practices, goals, and tracking processes (2021). Out of the approximately

30 respondents in their study, 86% indicated that they conduct water use tracking, 82% conduct energy tracking, and 64% conducts wastewater tracking. When asked to subjectively rate their brewery's efforts towards various sustainable practices, many indicated fair (3 out of 5) or better effort levels for nearly every practice. Notably, efficient lighting systems averaged a 4.4/5 ranking and diversion of spent grains from landfill averaged a 4.8/5 ranking (Rosburg and Grebitus 2021).

Aside from on-site sustainability practices, there is some research which documents off-site environmental advocacy initiatives. One such example is the Great Lakes Brewing Company (GLBC) in Cleveland, Ohio, as documented by Gatrell, Reid, and Steiger (2018), wherein, between 2007 to 2018, the brewery-owned Burning River Foundation donated over \$400,000 to support programs aimed at creating sustainable waterways. The donated funds contributed to the protection of the brewery's namesake, the Great Lakes, which also functioned as the brewery's water supply. According to Gatrell, Reid, and Steiger (2018), water stewardship and advocacy are significant in the GLBC's plans, along with energy conservation and commitment to local food (Gatrell, Reid, and Steiger 2018). Despite this research, we still lack a comprehensive overview of pro-environmental activities and engagement with environmental issues by craft breweries in their communities. Furthermore, we lack an understanding of what is driving their environmental engagement. There have been a few recent exploratory studies which have sought to understand the drivers of pro-environmental activity among craft breweries.

A recent study by Sozen, O'Neill, and Rahman (2022) used a combination of qualitative semi-structured interviews and a quantitative online survey to rank

preidentified motivational factors driving environmental engagement amongst craft brewers. They concluded that the factor most influential in implementing sustainable practices was the attitude and education of top management. Their study showed that owners who felt that sustainability was a personal or moral responsibility and those who were more knowledgeable of environmental issues tended to have higher levels of employee engagement and on-site implementation of sustainable practices. They also found that factors such as government regulation and cost drove pro-environmental activity. Though not a focus of the study, the authors also discovered several barriers to pro-environmental activity during their interviews. Those include financial issues, lack of information, lack of incentives, and excessive bureaucracy and paperwork. Although this study will not use any predetermined factors when evaluating the motivations and barriers of brewers, this project does confirm several findings made in previous research projects.

Here's what we know. Craft breweries can advocate for and enact change in their communities regarding economic, social, and environmental issues. There is little comprehensive overview of any of these topics but the Brewing Change team and a few others have taken a stab at it. Most of these studies are large national surveys or analyses. We have a range of advocacy techniques that we know breweries participate in, but we do not know if this is replicable across brewing communities. We also now have a set of factors driving pro-environmental activity but this is only one study with a small response rate. No studies have specifically focused on barriers preventing breweries from doing sustainable activity. My thesis sits in that crossroads, following on several recent studies and contributing to growing research of how breweries ferment their landscapes.

### III. METHODS/METHODOLOGY

#### Site and Situation

The Central Texas Hill Country overlaps with multiple ecoregions although most of it falls within the Edward's Plateau ecoregion. The area is characterized by a hilly karst topography filled with features such as caves, springs, and sinkholes. Porous limestone bedrock underlies this region and facilitates massive amounts of groundwater drainage and storage via these karst features. Much of the population relies on groundwater resources for personal use and agricultural purposes, especially those in rural areas (Texas Groundwater Protection Committee 2022). In fact, the region has been populated dating as far back as 15,000 years ago, though advancements in archaeological techniques continue to push this date further back in time. These early inhabitants were nomads who relied on abundant populations of grazing wildlife and spring-fed waterways which emerge from the limestone (Griffith et al. 2007).

Fire was once an important factor of control on the vegetative landscape. In recent centuries, human suppression of fire has allowed species such as Ashe Juniper, once confined to steep slopes and canyons, to become widespread, reducing the extent of the grassy savannas that once existed there (Griffith et al. 2007). The current patterns of vegetation here are also a result of grazing, and overgrazing, which has remained the dominant use of land in the area for centuries (Griffith et al. 2007).

Central Texas experiences cyclical periods of drought and flood. Oftentimes, floods will directly follow periods of extreme drought. For example, from 1950 to 1957 Texas experienced the worst drought ever seen, which is known to this day as the

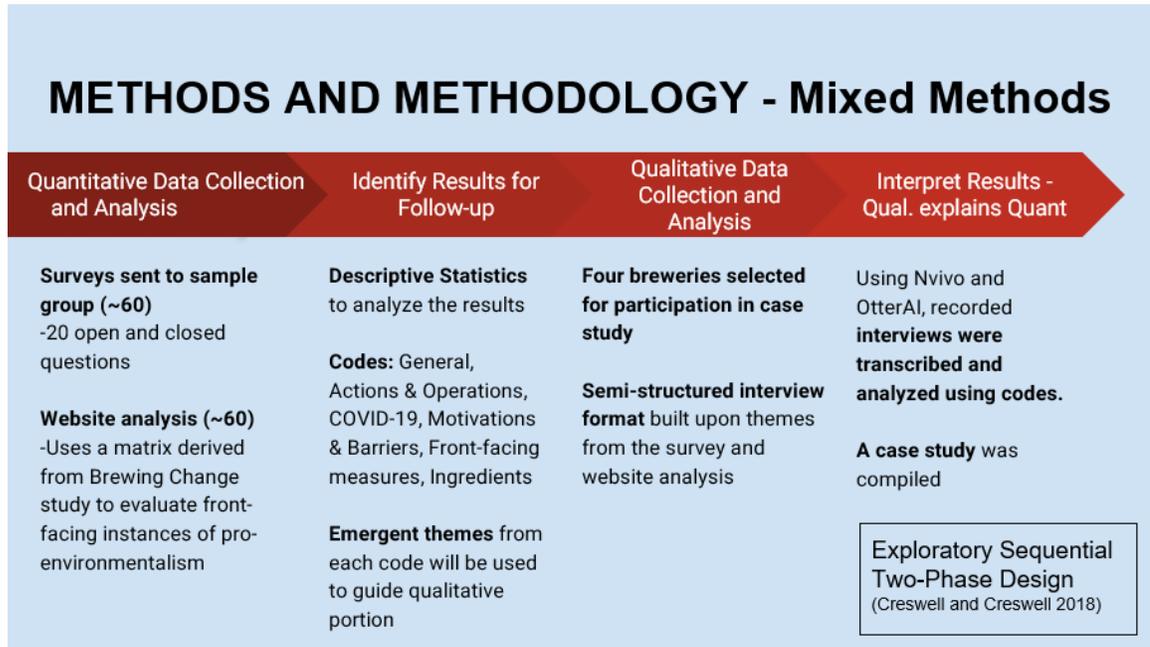
‘drought of record’. This period of drought ended abruptly, on April 24<sup>th</sup> of 1957, when storms dropped ten inches of rain in a matter of hours. Those rains reportedly did not cease for thirty two days, resulting in massive flooding which displaced thousands and took the lives of twenty two people. The Hill Country is often referred to as Flash Flood Alley due to its propensity for flooding. This is a result of thin soils, steep slopes, and a tendency for rain events to bring large amounts of rain all at once like that of the flooding in 1957 as well as in 2015. The latter event saw portions of Central Texas receive upwards of thirteen inches of rain in a short span of time which caused devastating flooding and loss of life. For reference, the region receives an annual total rainfall of 25 to 35 inches (Griffith et al. 2007). It is this “all or nothing” climate which makes water such an important resource for Central Texas.

There is no definitive boundary for the Hill Country region of Central Texas; best described as a vernacular region, its boundary is based on people’s perceptions of place and can vary from person to person to include a variety of physical and cultural landmarks. Nevertheless, the Texas Hill Country is recognized as distinct to residents and visitors alike. While the term “Hill Country” can evoke a mental image of a pastoral landscape, portions of what is commonly called the Hill Country are growing quickly and experiencing rapid urbanization. The U.S. Census Bureau identifies Hays, and the neighboring Comal, Williamson, and Kendall Counties as being among the top ten counties in percentage growth over the past decade (Bureau 2020). This region, with its sometimes-extreme weather events and, thus, particular relationship to water resources, provides an ideal site for research on human-environment interactions given its unique environmental resources and context—including a significant increase in craft breweries,

which serve as the focus of this study.

## Methodology

This project applies a mixed methodology and follows the exploratory sequential two-phase design. Phase one consisted of a quantitative website analysis and online survey. Phase two consisted of qualitative follow-up interviews with several breweries who participated in the survey. Together, this information was used to create a case study comparing and contrasting four craft breweries’ pro-environmental actions, motivations, and barriers through brewery case studies (Figure 4). The initial phase is intended to capture broad and generalized information about brewery activity while the secondary phase expands upon and delves deeper into emergent themes from phase one.



**Figure 4. Methods and Methodology Diagram.** A depiction of the proposed research methods which follow the exploratory sequential two-phase design, wherein an initial quantitative phase is administered and then followed up with a qualitative portion which is used to expand upon the former (Creswell and Creswell 2018).

## **Data Collection**

The initial population for this study consists of breweries, brewpubs, and retail members belonging to and listed by the Texas Craft Brewer's Guild under the Central Texas Region. The Houston, North Texas, and San Antonio regions are not included in this study. Of the initial 83 such entities listed, several locations have been excluded from the study pool. Five breweries were eliminated due to their location being outside the traditionally accepted Hill Country region of Texas (Johnson, Smith, Moran 2015). Four additional locations listed by the Brewer's Guild were removed from the pool as they were listed as retail members, rather than breweries or brewpubs. In the time since the initial list of brewers was compiled, there were a number of breweries that have permanently closed, including Two Wheel Brewing, the first and only craft brewery in Buda, TX. This is likely a result of the ongoing COVID-19 health crisis, which has impacted many businesses. In addition, several breweries did not list an identifiable email address on their website or Facebook page. These, too, were excluded from the population. In total, 58 breweries, out of an initial 83, were contacted for the survey. Several forms of data collection and analysis were applied to this population, with sampling and techniques described below.

Website Analysis: A comprehensive review of brewery websites, using a tested evaluation matrix (Myles et al. in press) examined the pro-environmental messaging and reported actions of all included breweries in the region. Using this tool, all front-facing messages on a brewery's website were recorded and catalogued by technique type, theme, and axis of environmental advocacy. Advocacy, here, refers to a brewery's efforts to enact or influence recognizable social, environmental, or economic issues (Myles et al.

in press). Of those three axes, only environmental advocacy or activity was recorded. Each “instance” of advocacy was entered into its own row in an excel spreadsheet, where pivot tables could easily be created to analyze the data.

Survey: The survey instrument was designed and distributed via the secure Qualtrics platform. The survey itself consisted of 22 open and closed questions. This includes both an introductory question of consent and a concluding question asking for participants’ consent to be contacted for and participate in a follow-up interview. The topics of the remaining 20 questions can be broken down into six categories: **General, Actions and Operations, COVID-19, Motivations and Barriers, Front-facing Measures, and Ingredient Sourcing**. Questions in the **General** category ask the type of brewery, location, age, visitor count, as well as the role of the participant at the brewery. The **Actions and Operations** addresses the breweries level of environmental sustainability, their sustainability goals, dedicated sustainability staff, and pro-environmental and advocacy actions that are currently being carried out by the brewery. Brewery actions will be assessed using a tested evaluation matrix (Myles et al. in press). Questions in the **Motivations and Barriers** category are all open-ended and ask participants to describe the motivations behind, and barriers to, carrying out pro-environmental practices like the ones listed on the survey. A third question asks which environmental issues the business is passionate about. The **COVID-19** category asks two questions about the impact of the COVID-19 pandemic on their business. The first question is closed and asks participants to select the extent to which their business was impacted. The second question is open and allows participants to elaborate on how those impacts were noticed and felt. Two questions are included in the **Front-facing Measures**

category in order to assess whether the brewery's pro-environmental actions and operations are accurately reflected on their frontward facing media such as their website and/or social media pages. The responses to the survey can then be directly compared to the public-facing messaging of the breweries, as gleaned from their websites. Finally, one question is included in the survey which inquires about **Ingredient Sourcing** for the brewery's main ingredients. The full list of survey questions can be found in the appendix.

Follow-up Interviews: After collecting and organizing the quantitative survey data and following an exploratory sequential mixed-methodological pattern (Creswell and Creswell 2018) interviews provided a mechanism for deepening the analysis. Several breweries were invited to participate in semi-structured interviews, which were guided by the emergent themes from the first phase of the project. The semi-structured interview model (Creswell and Creswell 2018) allowed for consistency across interviews while still allowing interviewees to organically discuss the topics they felt were relevant. The participation of interviewees was voluntary, but attempts were made to select a range of breweries which represent different sizes, types, locations, settings (i.e. rural and urban), and visitor demographics in order to accurately reflect the many different experiences of Hill Country breweries.

## **Data Analysis**

Website Analysis: 70 brewery websites were analyzed using a tested evaluation matrix (Myles et al. in press). The evaluation matrix, initially tested on a population of approximately 400 craft breweries nationwide, provides a list of possible advocacy

techniques, themes, and axes which were derived from the websites of the initial group. Any technique or theme that does not fall under one of the already created categories receives the designation of ‘other’ and its description will be noted. Using an excel spreadsheet, each brewery receives one entry row per instance of advocacy where the axis (in this case environmental), theme, and specific technique are recorded. Many breweries had multiple entries each as multiple techniques were observed.

Surveys: As mentioned previously, the survey response data can be broken up into six main categories, or codes: **General, Actions and Operations, COVID-19, Motivations and Barriers, Front-facing Measures, and Ingredient Sourcing**. These codes were used to evaluate the survey response data and compare across responses. Review of survey data took place within the secure Qualtrics platform.

In-person interviews: Each interview was recorded, and audio files were saved onto a passcode secured personal computer. With the assistance of Otter and NVivo software, interview files were transcribed, coded, and organized thematically using semi-structured coding methods (Cope 2010) and grounded theory (Carmaz 2015) to generate further understanding of brewers environmentally sustainable practices, motivations, and barriers to sustainability. As mentioned previously, this portion of the research was guided by the quantitative survey phase. However, while the initial codes and themes from the first portion were used to structure the interviews, analysis of the interview results followed a mixed inductive and deductive style, remaining open to any codes or themes not originally captured (Creswell and Creswell 2018). This best captured the nuanced and overlapping ways in which motivations and barriers impact the carrying out of environmentally sustainable practices.

## **IRB Management**

IRB: #7881 CRAFT BEER AND CONSERVATION: AN EXPLORATION OF THE ENVIRONMENTAL ACTIONS AND ASPIRATIONS OF CRAFT BREWERIES IN CENTRAL TEXAS was approved on September 21<sup>st</sup>, 2021. Research procedures for this project will not place participants under any unnecessary risk. Actions taken to minimize any possible risks include secure storage of data on a One Drive share point file for a minimum of three years in order to protect the privacy of participants.

## IV. RESULTS AND DISCUSSION

### Website Analysis

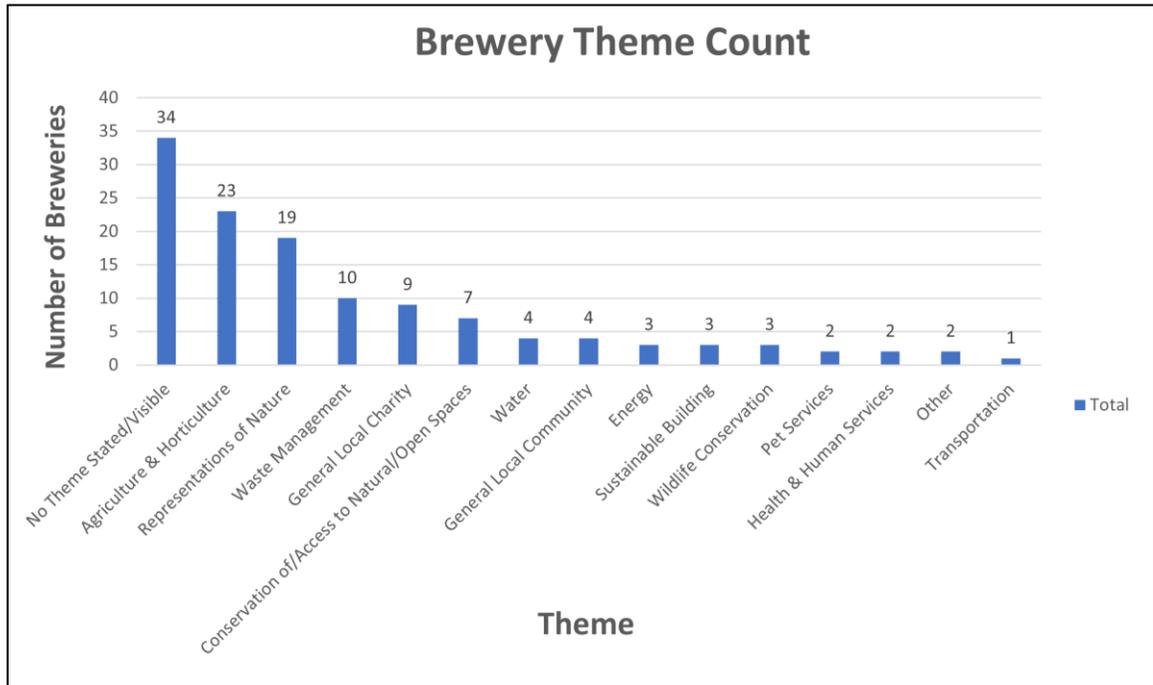
The results of the website analysis can answer my first thesis question which is:

#### **In what ways are craft breweries in the Central Texas Hill Country**

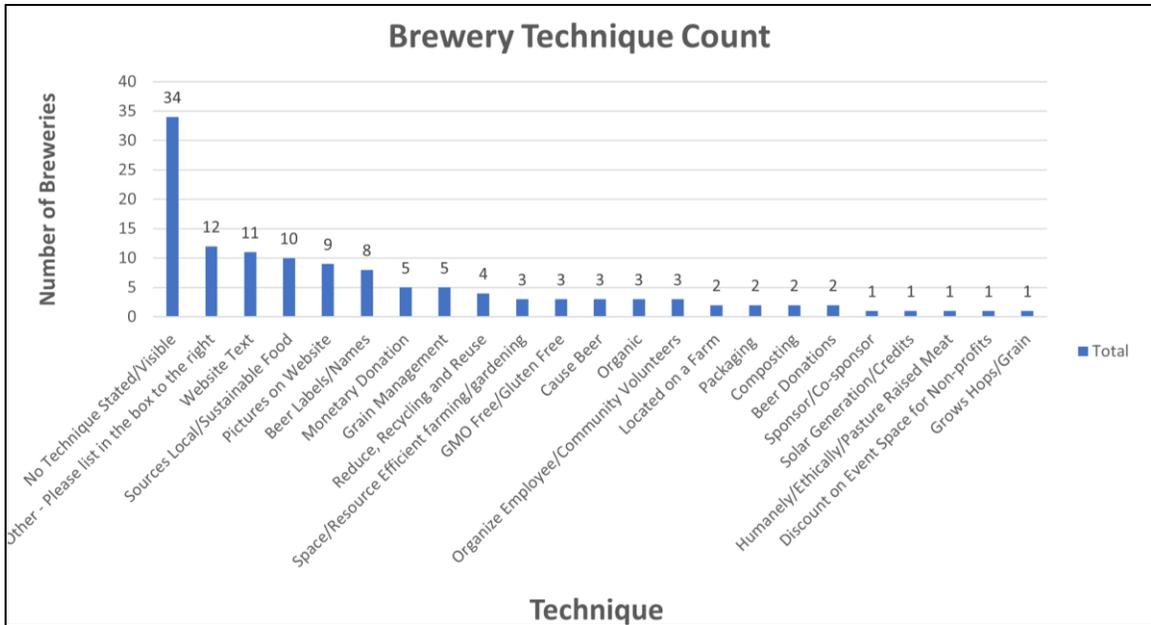
**practicing environmental sustainability?** By analyzing the brewery's website only, we can see which aspects of a brewery's operations are deemed important to share with the public and which are most prevalent. Of the 70 breweries analyzed in this section, 7 breweries had closed permanently since the data had been acquired, including Two Wheel Brewing, Buda's first and only craft brewery. Additionally, upon further inspection, two locations appeared not to be breweries after all but a bar and a liquor distillery respectively. This left 61 breweries for analysis. Disappointingly, thirty four breweries showed no sign of environmental advocacy on their website. While nine of these breweries showed signs of notable economic or social advocacy/activity, they did not seem to engage with any form of pro-environmental activity.

Of the breweries that did indicate some form of pro-environmental action, the most common themes were Agriculture & Horticulture (23 instances), Representations of Nature (19 instances), General Local Charity (10 instances), and Waste Management (10 instances) in that order (Figure 5) The most common techniques observed were Website text (15 instances), Other (14 instances), and Sources Local/Sustainable Food (11 instances) (Figure 6). The 'Other' category represents techniques that were not captured by the evaluation matrix and include CO2 reclamation, an on-site apiary, a 100% PVC-free draft system and having pickleball, disc golf, or a nature trail on the brewery

property.



**Figure 5. Pro-environmental themes on Hill Country Craft Brewery Websites.** The most commonly observed themes after ‘no theme’ were Agriculture and Horticulture, Representations of Nature, and Waste Management.



**Figure 6. Pro-environmental Techniques on Hill Country Craft Brewery Websites.** The most commonly observed themes after ‘no techniques’ were Other, Website Text, and Sourcing Local/Sustainable Food respectively.

### Online Survey

Survey response rate was devastatingly low with just nine responses. This could be due to a variety of reasons. During the initial data preparation, there were several breweries whose email address I could not find using their website, social media, or other websites. In addition, it appears that several emails bounced during the initial survey launch. Nevertheless, the nine breweries that did participate had a 100% survey completion rate and took an average of twenty-nine minutes to complete it. The survey response questions and resulting data can be broken up into six main categories, or codes: General, Actions and Operations, COVID-19, Motivations and Barriers, Front-facing Measures, and Ingredient Sourcing. I will use these categories to discuss the results below.

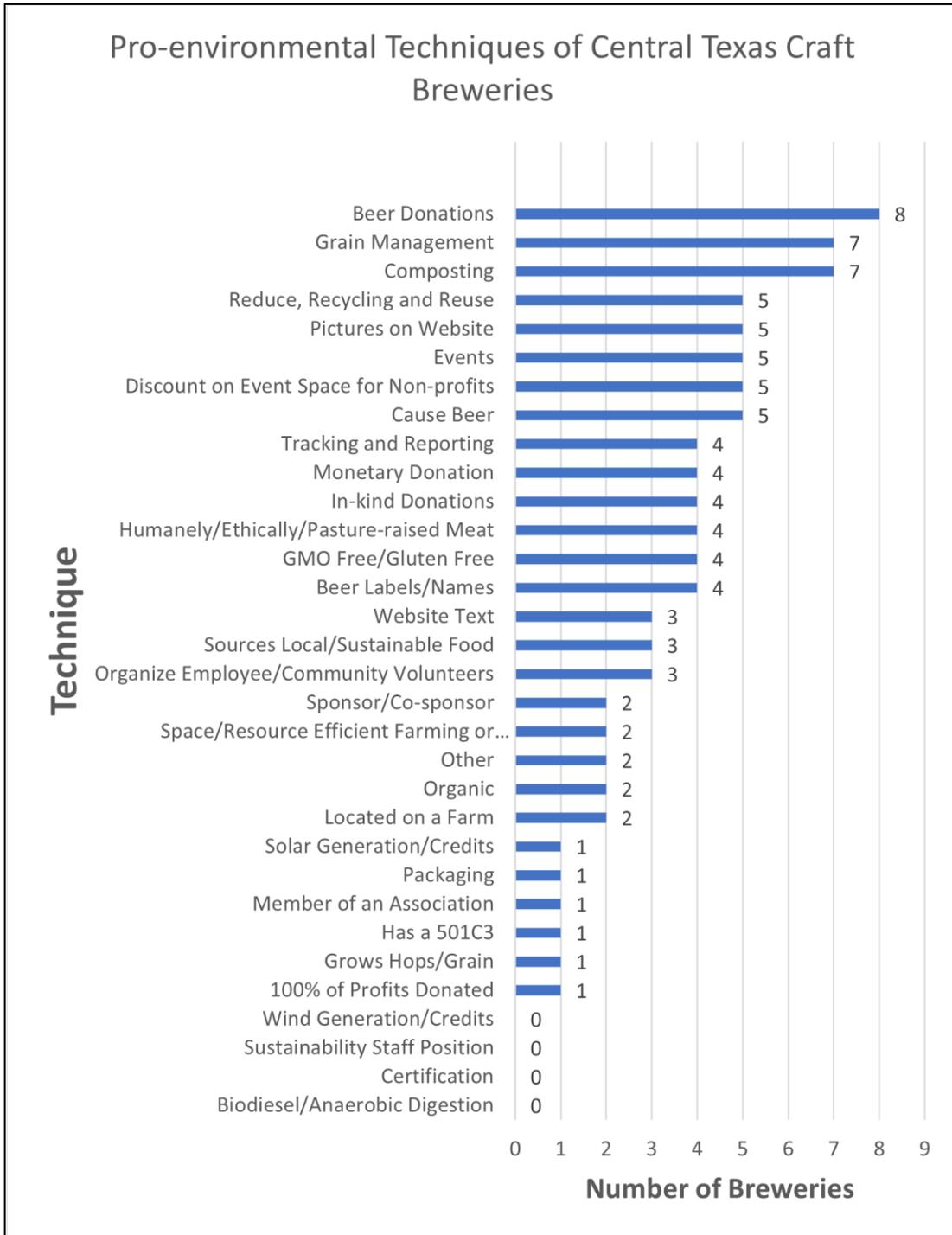
General: Questions in the General category ask the type of brewery, location,

business age, visitor count, as well as the survey participant's role at the brewery. Of the nine participating breweries, all are located within the Texas Hill Country representing five different cities, some rural some urban. Brewery age ranges from three years to twenty-five, with an average age of 8.1 and a median age of four. Reported annual visitation for the participants ranged from 5,000 to 100,000+. Among the participants were one regional brewery, five brewpubs, one microbrewery, one nanobrewery, and the final brewery did not provide an understandable response. The respondents themselves were comprised of five owners, two head brewers, a taproom manager, and one employee whose role is to order beer.

Actions and Operations: The Actions and Operations category addresses the breweries' level of environmental sustainability, their sustainability goals, dedicated sustainability staff, and pro-environmental and advocacy actions that are currently being carried out by the brewery. When asked if their business was environmentally sustainable, four breweries responded, 'definitely yes', two responded with 'probably yes', and three responded with 'might or might not'. However, when asked if environmental sustainability was important to their business, all nine answered positively with two responding 'a moderate amount', two responding 'a lot', and five responding 'a great deal'. Six of the breweries indicated that they had definite sustainability goals. While none of the breweries have a dedicated sustainability staff member, one indicated this as a future goal.

Survey question number ten listed each of the pro-environmental techniques derived from the evaluation matrix and used in the previous website analysis. Participants were asked to select all that applied to their business (Figure 7). The most common

technique was beer donations, wherein beers are donated to a non-profit for free, which was selected by eight of the nine breweries. The second most common techniques (selected by seven of the nine) were composting, defined as purposeful breaking down of organic waste on site, and grain management, which involves utilizing grain byproduct in some way instead of discarding it immediately. Several techniques were not represented in the original list but were captured in the write-in portion. These included rainwater catchment and participation in regulatory meetings and sustainability conferences.



**Figure 7. Online Survey of the Pro-environmental Techniques of Craft Breweries.** The most commonly practiced techniques amongst the 9 respondents included Beer Donations, Grain Management, and Composting.

When asked to specify some of their activities, one participant responded “I provide herb walks where I identify native plants that are used in our brewing process; we have permaculture gardens for the local habitat and for brewing; we participate in the BA Sustainability Tracking system; we source all our ingredients locally or ethically/sustainably or both; we recycle as much as possible and compost all our food and solid brewery waste through Grubtubs”. Another responded “We have received Good Food Awards two years in a row for using local ingredients and employing sustainable practices”.

COVID-19: The COVID-19 category asks two questions about the impact of the COVID-19 pandemic on their business. The results of these questions were not unexpected, still, they were hard to read as they reflected the widespread impacts of the still ongoing COVID-19 pandemic. When asked how much the pandemic had impacted their business all nine breweries indicated that they had been impacted to some degree. Seven breweries (78%) answered ‘a great deal’, while one (11%) selected ‘a lot’ and one (11%) selected ‘a moderate amount’. When asked to elaborate, one brewery’s response was simple: “It’s been bad, very very bad”. Loss of revenue and jobs, impacted supply chain and raw ingredient costs, and closures were all mentioned by respondents. One respondent indicated that their ability to do sustainable activity was “significantly derailed” in that on-site farming operations were forced to halt and waste-generation increased due to an increased use of single-use and pre-packaged materials. Notably, one respondent stated that although there were setbacks, the pandemic caused an increase in on-site sales and allowed them to expand their open days from three to seven days a week.

Motivations and Barriers: Questions in the Motivations and Barriers category are all open-ended and ask participants to describe the motivations behind, and barriers to, carrying out pro-environmental practices like the ones listed on the survey. Motivations behind brewery activities included climate change, wanting to do “what is right” for the land and demonstrating that it can be done, and a mission to positively influence the way people live their daily lives. When asked what environmental issues their brewery was passionate about, the responses were broad. Interests included conservation, climate change, recycling, local ingredients, local agriculture, sourcing local, native ecology, native ingredients, restoring native habitats, drinking water, water usage, and river and land cleanup. The main barriers to carrying out environmentally friendly activities were related to cost and government policy. Interestingly, one brewery indicated that their customers were a barrier.

Front-facing Measures: These questions assess whether the brewery’s pro-environmental actions and operations are accurately reflected on their frontward facing media such as their website and/or social media pages. These responses will be compared with those of the website analysis in the following discussion section. Survey question 19 asked if the brewery’s environmental sustainability practices are accurately reflected on their website and social media accounts. One brewery (11%) answered, ‘definitely yes’, four breweries (44%) answered ‘might or might not’, two breweries (22%) answered ‘probably not’, and two breweries (22%) answered ‘definitely not’. When asked to elaborate, one brewery’s response was that their strategy is more subtle: “We believe that leading by example; demonstrating these practices as normal and the way it “should be” helps to influence a much broader audience”. Another brewery stated that while they

could spend more time advertising their practices, they believe that much of what they see from other breweries constitutes green washing practices. Several others stated that this question did not apply or that the front-facing information simply wasn't there.

**Ingredient Sourcing:** The Ingredient Sourcing category contained one question which asked participants to list where the four main ingredients of their beer, water, grain, hops, and yeast, and any relevant additives, are sourced from. Two breweries did not respond to this final question.

**Water** – Four breweries indicated that their water was sourced from an on-site well, while the other three participants receive their water from their city water supply.

**Grain** – Grain for beer production was sourced from the following locations: The Texas Panhandle, Brewery Direct (x2), Europe, Calgary, Dusseldorf, Pilsen, Texas, and Central Texas.

**Hops** – Hops for beer production came from Europe and the United States. Hops from the United States came from the Pacific Northwest region, Washington, Idaho, Montana, and Michigan. Hops from Europe came from Germany and the Czech Republic.

**Yeast** – Yeast was sourced from the following mentioned locations: The property where the brewery is located, local retailers and brewery shops, the Central Texas region, Texas in general, and North Carolina.

**Additives** – Two breweries indicated that they add fruit into their beers. Both breweries source fruit from the Texas Hill Country and one sources additional fruit, which don't grow in the Hill Country, from the Rio Grande Valley region of

Texas. One brewery indicated that they use native plants and another brewery simply stated that their additives come from Central Texas.

### **Limitations**

There are several limitations to this work. The website analysis provides only a surface-level look at brewery activity. Some breweries do not have a website, and others simply do not include much of their sustainable activity. As a result, there is a very limited understanding of advocacy to be gained. Furthermore, these activities are often viewed out of context and without explanation. This makes it difficult to determine the validity and extent of any activity observed. The online survey had several limitations as well. The most notable limitation was a very poor response rate, which impacts the validity of the data. The survey was sent out to over sixty breweries, yet only nine responded. This may have been due to the method of delivery, length of survey, the time in which this project took place, or any number of other reasons. The COVID-19 pandemic, during which this project took place, posed many issues. Temporary and sometimes permanent closures plagued breweries at this time. Visiting and interacting with these breweries was difficult and posed setbacks to the project timeline. It would be interesting to perform another survey of breweries now, in a post-COVID-19 world, to see if there are any differences in results.

### **Quantitative Synthesis**

When evaluating the websites of breweries, it is important to keep in mind that these are businesses that operate with the goal of making a profit. Websites and social

media pages are created for consumers and, therefore, there is always an element of marketing present. It can, therefore, be difficult to differentiate between pro-environmental action and greenwashing techniques. Two of the most common instances of advocacy on brewery websites were website text and pictures on website. This was also the case at the nationwide level using a random sample of 400 breweries (Myles et al. in press). Simply put, these websites feature pictures or text that relate to the environment but make no specific claims as to an action or practice they are doing. Beer labeling/naming, referring to label artwork or names of beers with environmental themes, was also a commonly observed technique amongst Hill Country brewers. The technique is popular amongst breweries across the country as well (Myles et al. in press) (Schnell and Reese 2014). But while beer names and labels can forge connections to the local environment for consumers, they do not achieve anything further. It is important to note that while cause beers, a different technique, may feature an environmentally themed label or name, they are brewed for specific environmental causes and often occur alongside monetary or beer donations or event support.

Cause Beers as a technique was only observed on the websites of three breweries, however, five of the nine breweries surveyed indicated that they did in fact brew cause beers. This type of advocacy is more quantifiable, and perhaps more easily distinguished from mere greenwashing efforts. Myles et al. give us the useful designation of active vs passive advocacy when analyzing websites and survey responses (in press). The terms are subjective and consider the input of time, money, labor, and other resources to achieve the objective (Myles et al. in press). Passive advocacy would imply a low cost or effort level and includes such techniques as pictures and text on websites and beer labeling.

Myles et al. also include sourcing local/sustainable food under this designation as it is often a relatively low effort action (in press). Passive advocacy efforts are more related to marketing and branding strategies and are difficult to separate from greenwashing techniques. Active advocacy techniques involve a higher level of cost or effort on behalf of the brewery. This type of advocacy includes events, cause beers, and monetary donations.

Motivations for environmental advocacy are not well studied. The survey and the following qualitative of this portion of this study capture the motivations of brewers via open-ended questions. As part of the survey, brewers named environmental issues which they were passionate about including conservation, recycling, drinking water, water usage, and river and land cleanup. When directly asked what motivated them to carry out specific pro-environmental practices, brewers' answers fell along the lines of wanting to do the right thing or positively influence community members. This is in line with the findings of Sozen, O'Neill, and Rahman which found personal morals or values to be a motivating factor to pro-environmental activities (2022). Investigating the motivations behind such activity is important for several reasons. As an extension of the Brewing Change project featuring only a web analysis, this project adds another dimension to our understanding of advocacy in craft brewing. Evaluating motivation allows us to verify (in)consistencies amongst craft brewers, giving us a way to better categorize and understand their activity. It also allows us to better determine whether greenwashing is at the heart of this activity or if it is something more. Are these breweries doing this for a financial incentive or are they truly acting as environmental stewards? Brewing, by nature, is an environmentally detrimental process especially with regards to its water

consumption, wastewater, and solid by-products Olajire (2018). Understanding the context in which these breweries operate can perhaps even predict the typology, passive or active, and level of advocacy present at craft breweries.

A single open-ended question asked brewers what barriers their business faced in implementing environmentally friendly practices. Answers included cost, government policy and, interestingly, one brewery indicated that their customers were a barrier. The former two are supported by the findings of Sozen, O'Neill, and Rahman who found financial issues and excessive bureaucracy, among other things, to be barriers to environmental engagement (2022). The latter answer, customers as a barrier, comes from a brewery which has been open for 15 years yet selected just 3/32 pro-environmental techniques in the survey. This answer can be interpreted in many ways: Is this referring to objections by the individual customers or does this boil down to a financial issue? It is difficult to know without making assumptions as this brewery was not one selected for a follow-up interview.

The actions, motivations, and barriers to pro-environmental activity thus far are in line with the findings of others, though the pool of research is small. The website analysis revealed many passive forms of advocacy, while the survey indicated a wider range of more active techniques being practiced. Motivations come from wanting to do the right thing or be impactful within their communities, though barriers to achieving these goals come in the form of policy and cost. The next segment of this thesis is a case study of four breweries who participated in the survey. I followed-up with staff members from each of the businesses to gain insight into their survey responses.

## Case Studies

### Vista Brewing



**Figure 8. Vista Brewing in Driftwood, TX.** A photograph of the front entrance of Vista Brewing, located on a 22 acre farm.

Vista Brewing opened its doors in Driftwood, TX in 2018. The brewery sits on 21 acres and includes event spaces, a farm, apiary, restaurant, and scenic views. Vista opened a tasting room in Bee Cave in 2020 and another in San Antonio in 2021. The Bee Cave location closed its doors in January of 2022 ([Vista Brewing - Bee Cave Pop-Up Beer Garden - Vista Brewing \(vistabrewingtx.com\)](#)), but the San Antonio location remains open at the time of writing. In this case study, I focus on the original brewpub located within the study area. Vista Brewing is located just outside of Austin in the city of Driftwood. While the population of Driftwood is 106, according to the 2020 U.S. Census, Vista Brewing expects that its 2022 visitation will top 100,000 visitors to its brewpub. They call themselves a destination brewery and are located within the heavily tourism-driven Texas Hill Country. Interestingly, they estimate that more of their visitors

are ‘locals’ as opposed to tourists. The brewery was founded by husband and wife duo Karen and Kent Killough. Karen, the resident beekeeper, oversees Vista’s brand and social media. She also sits on the board of the Texas Craft Brewer’s Guild and is a member of the Pink Boots Society. Kent, a fourth-generation Texan, sits on the Tourism Advisory board for the Dripping Springs Visitors Bureau. He’s also active with the Hays County Friends of the Night Sky. In the fall of 2022, Kent and I sat down to chat during one of their Tap Takeovers at the local San Marcos hangout Zelick’s Icehouse. There, we were joined by the head of the Fermented Landscapes Lab and advisor to this project, Colleen Myles, as well as the head brewer and founder of Roughhouse Brewing, Davy Pasternak.

When Kent filled out the survey in fall of 2021, Vista was still feeling the impacts of the COVID-19 pandemic. Their main goal was simply to get ‘back on track in the continued pandemic/endemic world’. However, when Kent and I spoke in-person in the fall of the following year, the outlook was more positive. The first question of my thesis asks: In what ways are craft breweries in the Central Texas Hill Country practicing environmental sustainability? For Vista Brewing there are many. On the survey they selected twenty-two of the thirty-two provided activities and wrote in a couple of their own. Included among those are composting, tracking and reporting metrics, creating cause beers, and advocating at regulatory meetings. Being located on a farm, they can do resource efficient gardening and source local foods. In fact, Vista Brewing has received the Good Food Awards – which awards winners based on responsible practices and superior taste – two years in a row now for using local ingredients and employing sustainable practices. The farm itself, twenty one acres in size, is a working farm

meaning the site is actively being used to grow crops and/or raise livestock. It features little impervious cover, allowing for high levels of groundwater recharge across the property.

Vista also supports a number of pro-environmental events and non-profit organizations. They do this via beer and monetary donations, in-kind donations, events, discounts on event space for non-profits, and cause beers. A notable example is their participation in the Texas Brewshed Alliance, which Vista is a founding member of. The Texas Brewshed Alliance is a multidisciplinary coalition of craft breweries and conservation minded individuals who have come together with the purpose of improving land and water stewardship across the state. The TBA forges links between brewers and community members and the watersheds they are a part of and encourages participants to take an active role in protecting them and the surrounding land. This link between brewers and water is crucial, because as they say, good beer requires good water. But beyond flavor, the brewing process is highly consumptive when it comes to water, and their wastewater can pose environmental issues as well. Vista is trying to change that.

In speaking with Kent, we do a great deal of talking about water. Not only is it one of the main ingredients of beer, it's also the largest by-product. Vista Brewing tracks several metrics of the brewing process on-site including water input and output. Kent points out that if you can't track it, you can't manage it. He makes a good point. The average brewery consumes about six to seven gallons of water to brew a gallon of beer. Vista consumes about five and a half gallons of water instead, and they hope to drop that number even lower. They've currently got a project in the works which would allow them to treat the water on-site and use it to irrigate on-site crops. In addition to

minimizing water waste, they could eliminate the need to ship their water to Del Valle for treatment. Moving that much water by truck consumes energy and produces emissions. It's also costly. In this case, there are both environmental and financial reasons to take on the project.

Spent grain is another output of the brewing process. Instead of sending it off to a landfill many breweries, including Vista, choose to upcycle. Six other survey participants indicated that they also do some sort of grain management. At Vista, once a beer – Let's say a pilsner – has been brewed, the grain goes to Double J Ranch down the road. There, it is used to feed mini Aberdeen cows. Some of these cows will end up being consumed as hamburgers back at the brewery. Those burgers may even be paired with the pilsner from this beginning of this story, bringing us full circle.

Another full circle moment comes in the form of trees, 641 of them to be exact. When brewery construction began, there were 657 large oaks and elms on the property. Large trees are those with an 8 inch diameter or larger trunk as designated by the City of Austin. Kent very proudly informed me that they've only removed sixteen of these throughout the entire process. Most of the wood, he adds, was reused for other purposes on the property, minimizing waste yet again.

When it comes to motivating factors, Vista's owner stated that they strive to positively influence the ways in which people live their daily lives and for them, sustainability is a part of that influence. For Kent, his own personal values drive him. As a fourth-generation Texan, he's spent a lot of time with the land here and taking care of it is important. This translates to his business endeavors as well. When it comes to the rest of the team at Vista, it seems that the owners attract staff with similar values, making for

a team who's all on the same page when it comes to sustainability. It is important to note that Vista Brewing is, foremost, a business. This obviously and understandably factors into decision-making processes when it comes to implementing sustainable practices. This isn't a problem for Kent and his team. For them, economic and environmental sustainability go hand-in-hand. You can't have one without the other. In this case, financial and environmental considerations inform each other.

Of the barriers holding Vista Brewing back, the COVID-19 pandemic has been a big one. Vista opened in the fall of 2018. The brewery had just made it through the first year, which Kent points out is rough for every brewery, when the United States was thrown into chaos. Kent noted across the board issues resulting from the pandemic which they are still trying to recover from. This has, understandably, derailed their sustainability efforts. One of the first things they noted was the increased generation of waste resulting from a shift to single-use and pre-packaged items. The pandemic also caused a halt to farming for almost a year although they were able to maintain some small-scale gardening operations. Regarding staffing, they're only now, in the fall of 2022, at a point where they can hire who they want to hire again. Staffing shortages rocked the service industry during the height of the pandemic and Vista was no stranger to the phenomenon.

Financial and political barriers hold Vista back from implementing environmentally friendly practices. Beyond the influence of COVID-19, issues of scale keep them from pursuing next level phases of sustainability.

When asked if their environmental practices were accurately reflected online, Kent responded with a might or might not. Their strategy is a little more subtle than that. "We believe that leading by example; demonstrating these practices as normal and the

way it ‘should be’ helps to influence a much broader audience”. At Vista, rather than post every sustainable venture on their website or social media page, they’d rather host classes on sustainable farming practices or staff booths at local farmers markets. Across the board they “endeavor to educate and inspire [the] community to embrace local and sustainable agriculture” without making broad stroke statements. One activity that doesn’t make it onto their website is their legislative outreach and participation/hosting of local town hall events related to environmental issues.

## Middleton Brewing



**Figure 9. Middleton Brewing in San Marcos, TX.** A photo from the front porch of Middleton Brewery.

Middleton Brewing is a ten barrel brewpub established in 2011 and located along Ranch Road 12 between San Marcos and Wimberley, Texas. The brewery is also home to a cat named Dunkel and a food truck which came to be during the pandemic, a time when many Texas breweries added food to the menu to stay open under TABC's restrictions. The small site hosts live music acts, food and beer pairing nights, and other happenings. On occasion, they do collaborations with breweries like Roughhouse Brewing, located just down the road, on beers and events.

During a visit to Middleton I spoke with Armando, their Taproom Manager, Events Coordinator, and 'Social Media Guy', as he put it. Armando wears a lot of hats. Armando sat down with me – over a beer, of course – and spent about thirty minutes

going through the survey with me, giving me greater insight into operations at the brewery. At eleven years old, Middleton Brewing is one of the older participants in the survey and one that seems to be quite established with the locals. Founded by Dennis and Kim Middleton, the brewery started out as a small half-barrel system in a smaller location but has since upgraded to a larger space and brewing capacity.

As mentioned previously, Middleton is located along Ranch Road 12. The name appears bucolic – and the road is scenic, no doubt about it – but it is also one of the few roadways into the Texas Hill Country, which has become a massive tourist destination. On their way out towards spring-fed rivers, hills, dance halls and BBQ, many drive right past Middleton and more than a few stop by. The brewery is seemingly in a perfect location.

After getting some of the housekeeping questions out of the way, I asked Armando about environmental sustainability. I defined an environmentally sustainable business as one that participates in environmentally friendly activities, addresses current environmental concerns, and operates with minimal to no impact on the global or local environment. He told me that not only is Middleton Brewing an environmentally friendly business, but it is also quite important to the business as well. Some of the sustainability goals of the brewery include getting recycling going on-site, distributing more spent grain, and installing solar panels on-site.

Recycling has been a big issue for Middleton, and it is something that Armando feels very passionate about. When we last spoke in January, Armando was still trying to get recycling bins for the site. He had been trying for a while and it should have happened by now, he explained. Solar power is another goal, but one they have yet to achieve.

Like many other breweries Middleton upcycles their spent grain, the most abundant by-product of the brewing process. It is nutrient heavy and as a result, it can upset sensitive ecosystems when disposed of or take up space in landfills. Middleton does several things with their grain already. Another member of the staff uses a portion of the spent grain to make dog treats while a restaurant in nearby San Marcos, The Root Cellar, takes some as well. A majority of their grain, however, goes to cows. Spent brewer's grain makes for a good low-cost livestock feed and like many others, Middleton sends much of the spent grain off to a local farmer. Partnerships like these are common in the Hill Country, where livestock production is a major land use. Still, Armando wishes they could find more people to give grain out to. "There's always, always a lot of grain to give", he tells me. In addition to their grain management, Middleton minimizes waste generation by filling growlers at the bar, whether by accident or on purpose.

Much of Middleton's environmental advocacy comes in the form of events and monetary support. This was also the case in the original Brewing Change study (Myles et al. in press). Like many breweries, they make use of "cause beers." Cause beers are usually brewed for a specific environmental advocacy cause and then a portion, or all, of the profits are donated, often to a non-profit organization or similar group. Middleton also donates beer for events and offers discounts on event space for environmentally oriented non-profits.

Water for the brewing process comes from the city currently. They have a well on-site and when we last spoke in January, they were working with the city to make it public water. Similar to their recycling plight, it has been an ongoing struggle there. Grain and hops mostly come from Brewer Direct and their yeast comes from several

locations in and out of state. While most of their ingredients wouldn't be considered local products, there is one that is, and it's found in their Light n' Peachy beer. Their most recent batch was brewed with 300 lbs of peaches from the nearby city of Fredericksburg. And yet, Armando said, it came out to be only "a whisper". They'd need to use maybe 500 lbs or more next year, he joked. The sourcing of ingredients for beer can be costly and environmentally damaging, especially here in Texas where hops do not grow and transport from out of state is unavoidable. There are examples of efficient ingredient transfer out there from breweries that lead the pack in sustainability. One in particular is the Sierra Nevada Brewery. At both their California and North Carolina locations, the brewery owns and operates rail transfer facilities to receive their malt. This system helps to eliminate packaging waste, use less fuel, and keep more vehicles off the roads. This level of sustainable infrastructure is not something that many breweries can implement, as we will come back to later.

An interesting portion of this project looked at breweries' front-facing displays of sustainability and advocacy. Using a test tool/matrix developed by Colleen Myles and the Fermented Landscapes team, brewery websites were evaluated for any mention of sustainable operations or events (Myles et al. in press). An evaluation of Middleton's website using the tool, revealed no front-facing instances of environmental advocacy. When I asked Armando if their environmental sustainability practices were accurately reflected online, he confirmed that they were probably not.

So why does Middleton Brewing do what they do? I wanted to know why they would take on the fight for recycling or supply non-profits with beer and event space. For Armando, it comes down to customers and community: "we're a part of the community"

he says and follows up with “it’s always good to give back to the people that help us stay in business”. This then begs the questions, ‘what’s stopping you’? The answer seems to be staffing, which would ultimately boil down to cost. Middleton Brewing does not employ a sustainability coordinator, which Armando says impairs their ability to implement more sustainable practices. As I learned earlier, Armando and most of the other management fill multiple roles, leaving them with little time to take on much else.

Another important barrier to note was the COVID-19 pandemic. Many breweries in the Hill Country were effectively sidelined in 2020, and more than a few were forced to close their doors in the height of the pandemic. Like all the others, Middleton was forced to close in the spring of 2020 though they were able to offer to-go beers to the public. Keg distribution plummeted as a result of restaurant closures, which had accounted for about one third of their profits. The loss of profits would have severely limited their ability to pay extra staff or implement costly infrastructure like solar panels. To top it all off, the rapidly changing guidance from the Texas Alcoholic Beverage Commission (TABC), which sometimes varied week-to-week, made it hard for Middleton and many other breweries to keep up with what was allowed. Armando described the whole ordeal as rough and unnecessary. Things are seemingly better now, they’ve gotten “back into the swing of things” and they haven’t received any major updates from TABC recently.

## Central Machine Works Brewery



**Figure 10. Central Machine Works Brewery in Austin, TX.** A photo of the beer garden and beer hall of Central Machine Works Brewery.

Central Machine Works Brewery opened in November of 2019 in east Austin. The microbrewery resides inside of a repurposed airplane hangar and was the former place of business of Capitol Machine Works, a metal fabrication shop. The site features an open concept Beer Hall, Taproom, Beer Garden, and a full-service bar and kitchen. They are well set up to host live music acts and other events. Central Machine Works was opened just five and a half months before the pandemic was upon us, but they weathered the storm and are now coming up on their three year anniversary. I had the chance to sit down with their Head Brewer back in February and his passion for brewing and sustainability was evident. Scott, once a graduate student himself, has a microbiology background and previously worked with Oasis, Texas Brewing Company.

Immediately after sitting down, we jumped right into the world of wastewater

treatment and CO2 recapture as it pertains to brewing. While our conversation took us all over the map, Scott kept coming back to themes of recycling and reuse. As he put it “nothing here is new”. If he does buy new things, he is going for durability. It’s either been here for one hundred years, or he intends for it to be here for one hundred years. The building that houses the brewery was built in the 1940’s, and much of that still remains today. The floor and walls are the very same. Looking around, Scott points out that much of what we see is old. Eighty to one hundred years old perhaps, save for the refrigeration, electrics, and stainless steel. Their bar is repurposed and so are the lights in the taproom. Their efforts have even earned them a historic preservation award from Preservation Austin, a local nonprofit organization.

Central Machine Works actively strives to minimize waste on-site. As Scott puts it, they “collect everything”. They compost, where even yeast and spent hops from the brewing process end up. They have someone who comes to pick up, and presumably use, all of their organic waste. They also have a grease trap and recycling pickup. Like Vista and Middleton, their spent grain, all of it, goes to a local farmer. The farmer, a man by the name of Roberto, comes and picks up the brewery’s grain and that of a brewery around the corner which he feeds to his couple hundred pigs and goats. Central Machine Works was able to serve one of those pigs, that ate their grain for months, at their second anniversary pig roast a while back. It is fun to see these types of full-circle moments happening within the craft beer community, and people like Kent and Scott certainly thing so too.

The only thing that does go down the drains at Central Machine Works is water. Really. The largest output of the brewing process is wastewater. Brewing wastewater is

nutrient-rich because of the brewing process. Nutrient-rich water fuels algae growth, which requires oxygen. Too much algae growth and hypoxic conditions can persist. Central Machine Works has a way of avoiding this situation. They have a reverse osmosis (RO) system which treats their wastewater before sending it into the city sewers. Reverse osmosis is a water purification process wherein applied pressure forces water through a semi permeable membrane, thus removing sediment and excess nutrients. So, the water that leaves the RO system is just water. Scott theorizes that their water may actually help downstream wastewater treatment plants by diluting the rest of the runoff.

Central Machine Works also supports sustainability efforts via events, beer donations, and cause beers. Unfortunately, none of the previously mentioned efforts are mentioned on their website.

When asked what drives the team to minimize waste and reuse what they can, it came down to a moral responsibility for Scott. On the survey, he simply wrote climate change, but it's a bit more than that. It's about "making the bad not so bad". Maybe avoiding buying plastic as an individual doesn't do much, he acknowledges, but he'd rather just do something, especially if cost is the same. Why not reuse parts of the old building, then? Or redistribute their waste by-products? This mindfulness not only guides Scott's current decisions, but his future considerations as well. One big issue stemming from climate change is the potential impact to beer ingredients, like hops, which have a big impact on the aroma and flavor of a beer. Hops grow well in the pacific northwest, a region prone to wildfires, which may be getting worse due to climate change. Because of this, Scott is looking at hop blends to ensure that they can continue to replicate the same flavor in their beers moving forward.

Like the other breweries I talked to, cost is one of the biggest barriers for Central Machine Works in achieving sustainability goals. Scott is vehemently against cans. Aluminum isn't great for the environment and it's expensive. The returns on a can of beer are also much less than on a pint. In an ideal world, everyone would just refill their glass growlers or order pitchers, but that's not realistic, says Scott. A year ago, Scott cracked and got a single head canning line. It's the smallest canning machine available, filling eight cans per minute. Still, it doesn't fit in with Scott's overarching environmental goals for the business. The small machine represents Scott's hesitation when it comes to balancing environmental and financial considerations for the business. There are other pieces of equipment that Scott does wish they had, but he just can't justify spending the money on, like a CO2 recapture machine, which costs upwards of \$150,000, according to Scott. And while some of this equipment is potentially affordable for CMW, the money would be better spent on other things. As one would expect, the brewery is expanding, and production has increased. There may even be plans in the works to open a second location.

COVID-19, too, has been a massive barrier for the brewery. Following the shutdowns in March of 2020, Central Machine Works became what Scott describes as the strictest brewery in town, which caused backlash from some of their visitors. This was hard on the staff, who were also dealing with a public health crisis as individuals. Another impact of the pandemic was rising costs across the board. One example being aluminum, which became both difficult to find and costly when available. Raw ingredient prices also increased. Loss of revenue also hurt the brewery. Like all other breweries in town, they were initially required to close. Then, slowly, they were able to progress to a

25% capacity and then higher still. They took to imposing reservations and limits on length of stay, which brought them bad reviews as well.

Aside from cost, policy, and pandemics, there was one other barrier that Scott mentioned to me and that was education. “It’s not that people don’t care, it’s that people just don’t know,” he said as we were wrapping up the interview that day. It’s good insight, and a good reminder that the struggle for sustainability in the craft brewing industry is nuanced and not very straightforward at all.

## Roughhouse Brewing



**Figure 11. Roughhouse Brewing in San Marcos, TX.** A photo of the front of the Roughhouse Brewing taproom.

Roughhouse Brewing opened its doors in San Marcos, Texas in January of 2019. Roughhouse is a microbrewery: The exact definition is up for some debate, but most agree that this means their production is at or below a maximum of 10,000 – 15,000 barrels per year. Additionally, the term implies that much of the produced beer is consumed off-site. The founders are husband and wife duo Davy and Alex Pasternak. Andy Pasternak, Davy’s brother, is also an owner and part of the operation. The team operates the brewery on their family’s fifty acre ranch, which happens to be located just down the road from Middleton Brewing. On-site, Roughhouse offers a large, kid-friendly, outdoor space with picnic tables, pavilions, and a stage where live music acts are hosted. There’s also an on-site kitchen and a cave that, while closed to the public, is still being excavated and used to age beer. Located just off the heavily trafficked Ranch Road 12 corridor, Roughhouse estimates they receive 13,000 to 15,000 visitors a year to their site, which is open Thursday thru Monday. As mentioned previously, they’re

located right down the road from Middleton Brewing and have done collaborations with them, and other breweries.

Above all else, breweries contribute to environmental advocacy efforts via participation in events and beer donations. This was true in both the 400 brewery nationwide sample and the 60 brewery central Texas sample, and Roughhouse is no exception. They indicated that, pertaining to environmental advocacy, they do beer donations, monetary donations, in-kind donations, cause beers, events, discounts on event space for non-profits, and donate 100% of the profits to organizations during certain events. As a reminder, a full list of definitions can be found in the appendix. They also coordinate volunteer events for employees and community members. Some of their projects have included river cleanups, highway cleanups, and minority engaging events as well. Like Vista Brewing, Roughhouse is a member of the Texas Brewshed Alliance. They recently launched a small batch cause-beer, the Clear Springs Lager, in partnership with the Texas Brewshed Alliance to benefit watershed awareness, with a portion of proceeds going to the Watershed Association. In tandem with the release, they hosted the Hill Country Water Talk event which included a discussion panel and research study (Figure 8).



**Figure 12. A Facebook Post Detailing Roughhouse Brewing’s Cause Beer, Clear Springs.** The cause beer benefited the Wimberley Valley Watershed Association and the event detailed also included a water conservation research study and discussion panel involving local stakeholders.

In addition to some of those more common techniques, Roughhouse has a few other activities that they carry out. They recycle on-site, which is something that Middleton just down the road, has been unable to setup thus far. The Pasternaks also maintain their family farm as a wildlife habitat. This entails maintaining and gaining

topsoil, maintaining various ecosystems, and providing food/water/shelter for wildlife. Produce from on-site gardening and other local sources are used in the kitchen and in the beer. Roughhouse is all about sourcing local. Even their yeast, a spontaneous culture system, is collected right there on-site every time. Water for Roughhouse's beer comes from an on-site well which taps into the Trinity Aquifer. While they hope to produce their own grain someday, their current supply comes from the Texas Panhandle. Additional inputs to the beer, like fruit, are predominately sourced from the surrounding Hill Country region and from the Rio Grande Valley region of Texas.

The team at Roughhouse consider their brewery to be an environmentally friendly business and they also feel that environmental sustainability is important. They also have sustainability goals for the future that they hope to achieve. Production of solar and wind power are two of those goals. They'd also like to collect rainwater on-site and grow their own grain. All of this is driven by a love of Texas and a desire to be a force for good in the community. "As a brewery and brewer...you're not really in it for a huge financial gain, just to be clear" Davy notes. Indeed, I've heard this before. Quite a few brewers, either in-person, or on their website, mentioned leaving a high-intensity or high-salary job to open a brewery. This is a job that stems from passion. For Davy, that passion naturally leads him to act sustainably and think about beer more critically and as a reflection of himself. This in turn drives Roughhouse to use Texas ingredients, when possible, as it is in line with their personal beliefs and associations with their local environment.

Equipment needed for projects like solar or wind power can be expensive, but not in the case of rainwater collection. It is relatively easy to afford and setup collection tanks

and gutter systems to funnel and store the water. For Roughhouse, the issue comes in the form of policy and regulations put forth by the state's environmental agency, the Texas Commission on Environmental Quality (TCEQ), which limits the ways in which they can treat and use both collected water and wastewater. Davy points out that TCEQ restrictions end up limiting the creativity of businesses like his when it comes to implementing sustainable practices. The rationale behind such policy makes sense, it is in place to protect the public and ensure a safe and uniform product, however, it leaves much room for improvement. "They are just operating out of the framework that they know", Davy says, but "there needs to be some change". It seems as though there is room to develop new policy in response to the changing landscape. The subject comes up whilst Davy and I, as well as Colleen and Kent, are talking at Zelick's Icehouse. A dream that both Kent and Davy agreed that they share would be the ability to even treat their brewing wastewater and use it to flush toilets on site, rather than send it down the drain, so to speak. Roughhouse also faces financial barriers to implementing environmentally friendly practices. They wish that they had more capital to dedicate to rain, wind, and solar projects on-site, but at this time they do not. COVID-19, too, has been an immense speed bump for the brewery. "From supply chain issues, to staffing issues, to a detrimental degradation in customer comfort, COVID-19 has drastically affected our business", Davy wrote in the survey. Fortunately, Roughhouse has a large outdoor area, which allowed for social distancing once the site was able to open to the public again. Still, the pandemic has caused lasting setbacks that have impacted the financial stability of craft breweries, thus, limiting their ability to implement environmentally friendly practices that have an added cost.

Roughhouse does not have a position on the staff dedicated to sustainability, but they feel that all of the founding members of their business are advocates for sustainability. Unlike other breweries surveyed, Roughhouse feels that their environmentally friendly practices are well reflected on their website and social media pages. Indeed, their sourcing of local and sustainable foods was captured in the website analysis and both images and text displayed advocacy via representations of nature. There were many environmentally friendly practices, however, that were not reflected on the website, though they are being carried out on-site and may be of interest to potential customers.

**Table 1. A Facebook post detailing Roughhouse Brewing’s cause beer, Clear Springs.** The cause beer benefited the Wimberley Valley Watershed Association and the event detailed also included a water conservation research study and discussion panel involving local stakeholders.

Brewery	Actions	Motivations	Barriers
Vista Brewing	9 website mentions 22/32 survey techniques <u>Beer donations, Grain Management</u> <b>Legislative outreach, Located on a working farm</b>	Personal Values, Cost, Invested Owners	Cost, Policy, COVID-19
Roughhouse Brewing	3 website mentions 18/32 survey techniques <u>Beer donations, Grain Management</u> <b>Property maintained as wildlife habitat, Local sourcing</b>	Personal Values, Community Good	Cost, Policy, COVID-19
Middleton Brewing	0 website mentions 12/32 survey techniques <u>Beer donations, Grain Management</u>	Community Good	Cost, Lack of Staff, COVID-19
Central Machine Works Brewery	0 website mentions 10/32 survey techniques <u>Beer donations, Grain Management</u> <b>Reverse osmosis water treatment system, Recycling and Reuse</b>	Personal Values	Cost, COVID-19, Education

## **Qualitative Synthesis**

Actions:After following up with each of the four breweries via interview, it becomes apparent that there are many pro-environmental activities being undertaken in the Hill Country. The most common activities from the online survey were more active techniques including beer donations, grain management, and composting. Somewhat in-line with those findings, waste management, recycling, and reuse were common themes among all the breweries that I spoke to. Interestingly, while water resources are a critical issue here in central Texas, there is less activity dedicated to water conservation than one would expect. Water consumption is one of the most critical environmental issues when it comes to brewing beer. However, Vista brewing was the only brewery to mention that they were actively trying to reduce their water consumption. Several breweries interviewed are members of the Texas Brewshed Alliance, though this membership does not require the breweries to meet any standards at this time.

Location plays a factor in the types of activities being undertaken. Vista Brewing and Roughhouse are located on farms where they are able to actively grow produce, which in turn, is cooked on-site. The farm space also allows them the opportunity to manage the land as a wildlife habitat, raise bees, manage trees, and more. Middleton and Central Machine Works, on the other hand may be more limited due to smaller site sizes. Vista Brewing and Roughhouse, both located in rural areas, ranked highest in total instances of advocacy while Central Machine Works, located in urban east Austin, ranked the lowest in total instances. Central Machine Works, however, manages their wastewater to a higher degree than those breweries in rural settings.

Motivations:One of the top factors revealed in Sozen, O'Neill, and Rahman's

study of the drivers of environmentally friendly practices by craft breweries came down to ownership (2022). Specifically, they found that personal beliefs and environmental concerns of top management influenced organizational decision-making. At Middleton, without a sustainability coordinator, the rest of the team has a hard time effecting change when they all wear so many hats. Down the road at Vista Brewing, they've got room to spread out and make more of an impact on their 21 acre working farm. Plus, the owners and founders, Kent and Karen, are passionate about sustainability and instill that in their team. Kent is a fourth-generation Texan and feels a connection to the land here. Central Machine Works over in east Austin devotes themselves to reuse and waste minimization. Why? Because they can. Scott is a passionate guy, and he brings that to work with him every day. Roughhouse is no different. Davy built the brewery on their family farm. Like Vista, they are uniquely tied to the land. But Davy and Kent both point out that their values as owners tend to attract employees with those same values. Not only is this drive coming from management but also from the rest of the team. Similarly, education is a motivating factor for pro-environmental activities. Those that are educated, when it comes to environmental issues, are more likely to engage in pro-environmental activity. It is much easier to identify environmental issues in brewing, like water consumption or wastewater disposal, and address them, with the proper resources.

Cost also factors into the motivations of craft breweries when implementing environmentally friendly practices. At Vista Brewing, they're working on sustainability projects that will allow them to treat wastewater on-site and use it as crop irrigation – a move that will save them the added cost of shipping the water via truck for treatment an hour away. However, Davy points out that this is not the case across the board and that

breweries who are environmentally friendly may be taking a financial hit for it instead.

Barriers: Of the barriers to sustainability cost, of course, it one of the largest and most varied factors. This is also in line with the findings of the exploratory study as well (Sozen et al. 2022). Nearly all of the respondents of this projects online survey indicated that financial barriers prevented them from implementing environmentally friendly practices. This comes in the form of not being able to invest in CO2 recapture, solar power, and anaerobic digestors. The larger regional breweries like Sierra Nevada can manage this while smaller craft brewers cannot. This is not to say that all breweries do not have the money to make changes to their systems. It is important, as always, to note that these breweries are businesses with other priorities and motivations outside of sustainability. These competing priorities pose as a barrier to sustainable efforts as well.

Public health events like the COVID-19 pandemic have been a major setback as well. Every portion of craft brewing operations was impacted in some way. Closures and tight restrictions from TABC caused a direct loss of revenue but also an indirect loss from keg distributions due to local restaurant closures. For some, like Middleton, this was disastrous as keg sales made up one third of their profits. Some breweries thrived, enjoying an increase in visitation due to their large outdoor areas like 12 Fox Brewing. But for most, this marked a decline in profits and much more. Brewers also saw the cost of raw ingredients go up at this time and felt the impacts of supply chain issues that still plague us today.

Along that same vein and overlapping with COVID-19 in some cases are issues of policy from the likes of groups like TABC and TCEQ, which can box breweries in. This, too, is in line with the findings of Sozen et al. who found bureaucracy and excess

paperwork to be barriers for brewers (2022). Throughout the COVID-19 pandemic, wavering guidance from TABC caused loss of revenue for breweries due to closures and quickly changing policies. Aside from the pandemic, governing bodies like TCEQ make enacting sustainable measures difficult due to the requirements and restrictions. Goals of using rainwater or treated wastewater for various operations is off-limits due to rigid policies. If these policies were more flexible, perhaps breweries would have more success in achieving sustainable goals.

A final notable factor impacting pro-environmental practices was education, or a lack thereof. While being educated on environmental issues can act as a motivation, lack of education forms a barrier. Without the proper toolkit, it can be difficult to set environmental goals or identify issues in the first place. This finding was in line with the exploratory study of craft brewer motivations (Sozen et al. 2022). As Scott mentioned, “It’s not that people don’t care, it’s that people just don’t know”.

## V. CONCLUSION

This project sought to fill gaps in the research surrounding craft breweries and environmental advocacy. In order to broaden our understanding of craft brewers as actors both in and on the landscape I asked: 1) In what ways are craft breweries in the Central Texas Hill Country practicing environmental sustainability? 2) What are the motivations for breweries to practice environmental sustainability? 3) What barriers do craft breweries face in implementing environmentally sustainable practices? An analysis of craft brewery websites revealed that Website text (15 instances), Other (14 instances), and Sources Local/Sustainable Food (11 instances) were the top mentioned pro-environmental activities mentioned. These findings were in line with previous analyses of advocacy on brewery websites. It was difficult to ascertain whether these instances constituted greenwashing practices or true environmental stewardship. A second round of verification produced nine survey responses. Of the nine participants, the top listed activities were beer donations, composting, and grain management. These activities only scratch the surface in describing the multi-faceted approach to sustainability in the Texas Hill Country. Craft breweries here are reclaiming CO2 condensate, building hiking trails on their property, collecting rainwater, advocating in regulatory meetings, and much more.

Motivations for practicing environmental sustainability were varied but much of it boils down to personal beliefs and education. Those that believe that acting sustainably is a moral responsibility and those that grew up here, on the land, feel that it is their duty to address these environmental issues. Both connection and understanding cause people to advocate for and implement environmentally friendly practices. Passionate owners, in

turn, attract passionate employees, creating teams of environmentally minded people with more ability to effect change.

Though there may be some financial benefits to implementing sustainable practices on-site, most breweries find cost to be major barrier in achieving environmental goals. Another barrier that craft brewers face is policy. Current standards prevent brewers from implementing sustainable practices, like reuse of wastewater, or make it very hard to do so. Lack of education, one of the reasons for this study, also holds brewers back from implementing more environmentally friendly practices. Some people just don't know how to do it. And lastly, major events like the COVID-19 pandemic create unpredictable barriers to sustainability. Unknown future events like natural disasters and climate change can and will impact the industry's attempts at sustainability.

Breweries wishing to increase their pro-environmental activity face many barriers. Setting explicit goals, staffing a sustainability coordinator, or tracking and measuring inputs and outputs may make these goals more attainable. Investment in these goals by owners is key. Brewers should also consider seeking out education opportunities so that they may better identify and address areas of improvement in the brewing process. Brewers may also want to consider getting more involved in local policymaking as Vista Brewing does. However, policymakers need to make changes to existing policy to become more flexible and inclusive of creative ways to minimize environmental impact. Similarly, tax breaks, vouchers, or other financial rewards could be offered to incentivize sustainable operations and assist brewers in offsetting the cost of expensive equipment. This, too, could be brought about by local policymakers.

**APPENDIX SECTION**

**Survey Instrument Questions**

1. By continuing with this survey, you are consenting to participation in this research project. If you do not want to participate, you may stop now or exit this survey at any time.

Yes or no

1. What type of business is this (Please select one)?

- a. Brewpub   b. Regional brewery   c. Microbrewery   d. Nanobrewery   e. Brewstillery
- f. Other, please state

2. Where is the business located?

3. How long has this business been in operation?

4. What is your role in the business?

5. Approximately how many visitors does your business receive per year?

6. An environmentally sustainable business participates in environmentally friendly activities, addresses current environmental concerns, and operates with minimal to no impact on the global or local environment. Is this brewery environmentally sustainable? (Please select one):

- a. Not at all   b. To a small extent   c. To some extent   d. To a moderate extent
- e. To a large extent

7. Environmental sustainability is important to this business (Please select one):

- a. Not at all   b. To a small extent   c. To some extent   d. To a moderate extent
- e. To a large extent

8. Checklist: Please select all advocacy activities/characteristics that are relevant to your brewery. Please only indicate the activities which relate to the environment in some way:

<b>Check if Applicable</b>	<b>Activity Type</b>	<b>Definition</b>
	100% of Profits Donated	All profits are given to non-profit(s)
	Beer Donations	Beers are given to non-profits for free
	Beer Labels/Names	The artwork and name given to a beer have environmental themes

	Biodiesel/Anaerobic Digestion	Energy is created from organic byproduct by the brewery
	Cause Beer	A beer is brewed for an environmental advocacy cause, usually as a fundraiser
	Certification	The brewery has obtained an environmental certification that is verified by a third party
	Composting	Purposeful breaking down of organic waste occurs on site
	Discount on Event Space for Non-profits	A lower price for a rentable space at your brewery is offered to non-profits
	Events	On-site or external planned gatherings are hosted by the brewery for a specific reason
	GMO Free/Gluten Free	The brewery offers products that are GMO or Gluten Free
	Grain Management	Grain byproducts are utilized in some way other than being immediately discarded
	Grows Hops/Grain	Hops and/or grain used for beer production is grown on land owned by brewery
	Has a 501c3	The brewery has a legal non-profit designation
	Humanely/Ethically/Pasture Raised Meat	The brewery offers meat products that are free range, grass fed, etc.
	In-kind Donations	The brewery has donated something other than beer or money
	Located on a Farm	The brewery is designated as a farm brewery, or exists on acreage of land and grows food or plants

	Member of Association	*Other than the Brewers Association/ Texas Craft Brewers Guild
	Monetary Donation	The brewery gives money to a non-profit but not 100% of profits
	Organic	The brewery offers products that are organic
	Organize Employee/Community Volunteers	The brewery creates ways for the community or employees to volunteer
	Other - Please list in the box to the right	
	Packaging	The brewery provides a reason for using cans vs bottles, or other ways of storing beer
	Pictures on Website	Images used on the website relate to the environment, can be photos or drawings
	Reduce, Recycling and Reuse	The brewery commits to reducing, recycling, or reusing a resource or item
	Solar Generation/Credits	The brewery creates energy from the sun or buys into a co-op
	Sources Local/Sustainable Food	Can be ingredients used for any product produced by the brewery. Includes wild yeast, foraging, and partnerships with local businesses and farms
	Space/Resource Efficient farming/gardening	The brewery conducts activities such as vertical trellising or rooftop gardening
	Sponsor/Co-sponsor	The brewery specifically uses these words to describe involvement in a planned organized gathering

	Sustainability Staff Position	A Coordinator, Director, Team, etc. is present whose main focus is on sustainability
	Tracking and Reporting	The brewery provides a measurable way to quantify their actions
	Website Text	Environmentally suggestive words are present on the website
	Wind Generation/Credits	The brewery creates energy from wind or buys into a co-op

9. Please offer some specific examples of the activities you selected above:
10. What motivates you/your business to carry out the practices you have selected above?
11. What barriers does your business face in implementing environmentally friendly practices?
12. The COVID-19 pandemic has impacted your business (Please select one):
- a.** Not at all **b.** To a small extent **c.** To some extent **d.** To a moderate extent  
**e.** To a large extent
13. If you indicated that COVID-19 has impacted your business please describe the impacts you have noticed/felt:
14. This business has concrete sustainability goals: (Please select one) Yes or No
15. What could your brewery do differently, or in addition to current operations, in order to achieve your sustainability goals?
16. This brewery has a staff position dedicated to promoting/enacting sustainability measures: (Please select one)
- a.** Yes, one member **b.** Yes, more than one member **c.** No **d.** No, but we plan to
17. Do you feel like your business' environmental sustainability practices are accurately reflected on your website/social media pages? (Please select one)
- a.** Not at all **b.** To a small extent **c.** To some extent **d.** To a moderate extent  
**e.** To a large extent
18. Why is that (Please explain your answer to question #17)?
19. What environmental issues, if any, are you and your business passionate about?
20. Where are your ingredients sourced from?

- a. Water: \_\_\_\_\_
- b. Grain/malt: \_\_\_\_\_
- c. Hops: \_\_\_\_\_
- d. Yeast: \_\_\_\_\_
- e. Any other additives (as/if relevant): \_\_\_\_\_

22. Do you consent to being contacted for and participating in a follow-up interview via zoom?

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