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March 27, 2024

Farming in the Storm:
Exploring Alternative Risk Management Strategies Amid Winter Storm Elliott

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Abstract

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This thesis examines the impact of Winter Storm Elliott on alternative farmers in Metro Atlanta. While it is widely documented that alternative farmers typically do not use crop insurance, there is limited research on the alternative risk management they use. This study aims to fill this gap by investigating the impact mitigation strategies utilized by farmers during Winter Storm Elliott. The findings of this study reveal that alternative farmers in Metro Atlanta use adaptive on-farm strategies and are involved in a civic agriculture system that creates local networks which function as support systems during periods of crisis.

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Introduction

Friday, December 23, 2022. I've had my knees dug into the dirt for hours pulling plants out of the ground. On my slightly cramped hands, I'm wearing cloth gloves to keep warm, underneath green plastic ones to keep everything dry. The outer layer of fabric around my knees has become so dirty you can no longer tell it was once white.

Currently, I'm inside a hoop house at the farm I've been working at for seven months.¹ The flapped doors are closed but it's still freezing. Typically, even though it is the middle of winter, after an hour of working in here, the heat and humidity has built up, and I am down to leggings and a t-shirt. Today, as the hours pass, I acquire more layers and now I'm wearing two pairs of leggings, linen pants, a t-shirt, two sweaters, and a thick coat. Even with all of this, the cold seeps through. The other farmworkers and I are pulling row after row of Bok choy and tatsoi. Usually, we would clip the plant above the root to have a clean bunch to sell at the farmers market on the weekend, but today we are ripping them out root and all, brushing off as much dirt as possible, and laying them into a basket to go into cold storage.

In just a few hours a winter storm is going to hit Atlanta, GA and the temperatures are expected to be in the single digits for days. Despite being protected by the hoop house, none of these plants are prepared for the kind of frigid weather that is coming, so the plan is to pull all of them out now. Hopefully they will survive in cold storage for a week or two when the farmers markets open again. Then we will soak them in water, aiming for them to return to something of

¹ A hoop house is a growing space with a series of arched poles covered in plastic. The design is intended to allow sun to penetrate and warm the interior creating a growing environment to extend the growing season into the colder months. Unlike greenhouses, hoop houses are semi-permanent structures that are typically more affordable. Additionally, while they do have some greenhouse-like insulating effects, hoop houses do not offer the same level of temperature control as a traditional greenhouse.

their former glory. With no other protections, this is the only chance of not completely losing the sales from this crop.

This freezing winter day was my experience preparing a small sustainable farm for the now infamous, Winter Storm Elliott. The storm was an extratropical cyclone or a bomb cyclone with heavy winds, extremely low temperatures, and blizzards: essentially a winter hurricane. Storm Elliott hit the entire Middle and Eastern United States from Colorado to Florida. It is estimated that the storm cost \$3.5 billion in losses, making it one of the costliest winter storms since the 1950s. In Georgia, temperatures dropped from the mid 40s to single digits in just a few hours and caused many farmers to lose much of their winter crops.

In the past decades, Georgia farmers have been grappling with the impacts of climate change (Lin 2011). Warming temperatures have caused a change in seasons, most notably in the winter. Winter months has become warmer and wetter causing a lot of challenges, but also some new opportunities. For some farmers, warmer winters have caused massive crop loss, but for others it has become an opportunity to extend the growing season (Vittekk 2023).

While an extended growing season has provided many benefits to some farmers, the reliance on the winter season was also why some were impacted by the storm so badly. They had significant investments in winter crops like kale, cabbages, and radishes. These crops can handle lower temperatures, but not a several day freeze. The storm caused challenges for livestock farmers as well, who struggled to provide sufficient feed, keep their animals warm, and even experienced animal losses. In the days leading up to the storm, farmers tried to harvest what they could, or gather row cover to shield crops from the storm.² Some farmers already had these

² Row cover is a protective material farmers use for frost protection, insect control, UV protection, and to shield from wind and rain. It is typically a lightweight polyester fabric that is draped over plants.

resources, while others tried to use connections to source extra row cover. Despite attempts to prepare for the storm, it was still devastating for the farming community in Georgia. At some farmers markets, farms were missing for months as they struggled from the devastation of their crop plans. Some farmers still sold at farmers markets with storage crops, but still were suffering significant financial losses.³

Experiencing the impact of the storm firsthand made me aware of the harsh realities faced by small farms. When disasters strike, farmer livelihoods can hang in the balance and there are limited support systems to assist them. Witnessing the vulnerability of the farm I worked on prompted this project to explore the experiences of other farmers in the Metro Atlanta region during the storm. My focus was on exploring the experiences of other farmers in the Metro Atlanta region, particularly those like the farm I worked on, that prioritize sustainability and local food systems. I sought to understand the support mechanisms and risk management strategies available to them, as it was not immediately clear to me what those were. I observed that while there were some fundraisers and grants the farm could apply for, federal relief seemed elusive. Curious about this, I casually asked farmers if receiving federal support was an option. Often, the conversation concluded with them expressing skepticisms about its effectiveness and whether it would be worth their time to pursue. These preliminary discussions sparked my interest in delving deeper into the options available to farmers and why government assistance wasn't commonly pursued.

Reconsidering my experience working on an alternative farm during a destructive storm, I was interested in looking into risk management as an area where federal support might be lacking for alternative farmers and research what they are doing instead. As such, this study

³ Storage crops are grown for the purpose of long-term storage. Many farms will grow these crops to have a shelf stable and reliable crop to sell throughout the year. Some examples are cabbages, carrots, sweet potatoes, and potatoes.

evolved to ask three primary research questions: what are the barriers to using crop insurance? How do farmers mitigate risk on their farms? How can farmers be better supported in these endeavors? To answer these questions, I decided to use Winter Storm Elliott as a case study. I interviewed farmers about their experiences during and after the storm to understand how they navigated the challenges of the storm.

From these interviews, I found that alternative farmers are implementing unique and diverse strategies to mitigate risk. Based on the findings, I conclude that alternative farmers in Metro Atlanta use adaptive on-farm strategies and are involved in a civic agriculture system that creates local networks which function as support systems during periods of crisis. To make this claim, I draw on several theoretical tools including agricultural paradigms, a cultural theory of risk, and civic agriculture. These three theories allow us to understand the case study of Winter Storm Elliott as an example of larger trends in agriculture.

Agricultural paradigms identify two prominent types of farming that characterize farming in the United States: conventional and alternative. I argue that the farmers I spoke to represent the alternative paradigm. Additionally, I apply a cultural theory of risk that proposes the alternative paradigm has differing assumptions about and solutions to addressing risk. This paper aimed to better understand those solutions and came to discover it was through adaptive on-farm strategies and strong civic networks that farmers were able to remain resilient even during a weather crisis.

Agricultural Paradigms

In this paper I will be discussing issues of access to federal support systems and the alternative strategies farmers use to protect their businesses when federal support is not readily available. To understand the situation of the farmers I will be writing about; it is important to

contextualize them in the larger agriculture systems of the United States. To do this, I will explain two agriculture paradigms in the United States: a conventional and an alternative paradigm (Martínez-Torres and Rosset 2010; Rissing and King 2022).⁴ These categories offer a conceptual framework to understand the actions, business logics and accessibility for the farmers operating in these respective paradigms.

Conventional Paradigm

The idea of a conventional farmer is often associated with large-scale, mechanized operations of industrial agriculture. Imagery of a massive green combine driving over sprawling fields of neatly lined rows comes to mind. This image represents the conventional paradigm in agriculture. The conventional paradigm represents the version of neoliberal, industrial agricultural system that developed in the 20th century. This paradigm operates under a goal to create the “most productive farms possible” to “feed the world” (King and Rissing, 2022).⁵ To serve global food necessities, this paradigm requires farming strategies that can maximize production. The result of this are often commodity row crops that are genetically modified for maximum yields.⁶ In the past century, conventional farmers have become the mainstream across the United States as the number of smaller family farms has declined (USDA 2024).

While the number of smaller family farms still outnumber their larger counterparts, the bulk of agricultural production and sales are dominated by the larger, conventional operations (USDA 2024). In 2023 only 9.7% of all farms had sales of \$500,000 or more, however 49.8% of

⁴ Alternative and conventional paradigms are adapted from the concept of the dominant and food sovereignty paradigms introduced by Martínez-Torres and Rosset, 2010, and further developed in Rissing and King 2022.

⁵ Terminology adapted from Rissing, 2021. “We feed the world” to the idea of conventional agriculture being the world’s best hope to defeat hunger and the idea that without it, there would be mass famine. Rissing argues this is a story that serves three narrative functions: defending industrial agriculture systems, justifying the pursuit of higher yields, and delegitimizing alternative agricultural production.

⁶ Row crops are a category of traditional commodity crops such as corn, soybeans, rice, potato.

all farmland was operated on by farms with sales of \$500,000 or more (USDA 2024). This discrepancy indicates the consolidation of land and resources among a smaller group of wealthier farmers.

There are several concerns about the environmental consequences of conventional agriculture (Carson 1987; Nowell 2024). To maintain high yields, conventional agriculture opts to address risk factors such as pests, disease, and weeds with solutions like pesticides, herbicides, and heavy tilling. These practices have been shown to have negative impacts on the environment and human health causing conventional agriculture to come under criticism in the past few decades (Dang 2015; Smith 2007; Kanissery et al 2019).

Despite, the criticism, the conventional paradigm remains dominant. Most federal agricultural programming, funding, and attention revolve around it. As I will elaborate on in “Chapter 1: Crop Insurance and the Development of Risk,” dominant farming developed in tandem with federal programming for agriculture. Many of the goals of the United States Department of Agriculture (USDA) align with this vision, which is one reason that it is difficult for farmers in the alternative paradigm to get access to federal programs.

Alternative Paradigm

The alternative paradigm offers a departure from the conventional by centering environmentally conscious, sustainable growing practices including crop diversity, and little to no pesticide and fertilizer usage. Farms based on this paradigm tend to be smaller scale and rely on local rather than international markets.

The alternative paradigm represents hundreds of movements in opposition to conventional agriculture. Rather than being a cohesive movement, alternative farmers operate under different ethics, ideologies, and practices. It is the search for a different food system that

defines the alternative paradigm, not one cohesive movement. Despite its diversity, in Table 1, I have attempted to clarify the differences between the dominant and alternative paradigms by showing the general decisions around different topics in agriculture.

Table 1: Conventional vs. Alternative Paradigms (adapted from Martinez-Torrez and Rosset (2010) and Chappell et al (2013)).

Issue	Dominant	Alternative
Technology	Industrial, monoculture, Green Revolution, uses GMOs and chemicals.	Agroecology, low-input, diverse, specific to local needs and characteristics.
Markets	Food is a commodity and sold at national and international markets. Through supermarkets and large-scale distribution.	Food is a right and sold through localized distribution. Through localized markets such as farmers markets, CSA boxes, and restaurants.
Crop Specializations	Commodity crops (corn, wheat, soy). Low levels of agro-biodiversity.	Specialty Crops (fruits, vegetables, nuts). High levels of agro-biodiversity.
Farmers	Commercial farmers on large and medium sized farms.	Typically small to medium sized, family run operations.
Government Subsidies	Directed towards production and favors large scaled, high yield, industrial farms.	Directed to small and medium scale farmers to support conservation and diversification practices.
Knowledge base	Scientific information disseminated through extension services.	Combination of scientific and local/traditional knowledge disseminated through farmer-to-farmer and civil society networks.

Conventional and alternative paradigms represent major trends in the American agricultural system today. These paradigms provide a framework to understand the circumstances of the farmers who I interviewed in this project. By aligning these farmers in the alternative paradigm, we can understand the nuances that make these farmers unique and important to talk about. Alternative farming is often discussed as a necessary sustainable

different form of farming, but there are many challenges facing these farmers. This thesis expands on the viability of alternative farming strategies.

Interpretations of Risk

To address the various needs of a food system, the USDA and many other institutions have recognized the need to support both conventional and alternative farming paradigms. The USDA calls for a system of coexistence where different types of farming should be protected and thrive together to support global and domestic food necessities (USDA 2024). According to the USDA, they are unequivocal in its support for all forms of agriculture to meet all the different needs of a food system. The USDA has invested into many programs to expand support for alternative farmers; including the Sustainable Agriculture Research and Education program that funded this project. Through increased programming and funding for research, the USDA has made efforts to increase its support for alternative farmers, however, the success of this expansion has been varied as the USDA is still seeped in the conventional paradigm.

Because the conventional and alternative paradigms have different philosophies and logics, the needs of the alternative paradigm are not as prominently considered in federal programming. Despite there being expanded programming for alternative farmers, their differing needs have left many alternative farmers without effective and relevant support systems through the federal government. This problem extends to risk management where risk concerns of conventional farmers are better addressed in federal programming, while those of alternative farmers are less so.

I define risk in line with Mary Douglas' definition, as "the probability of an event combined with the magnitude of the losses and gains that it will entail" (Douglas 1992, 23). However, the interpretation of an acceptable level of risk, or even what is at risk, is intertwined

with political and cultural biases (Douglas 1922). Risk does not have a set formula. Instead, these interpretations are determined by unique set of rationalities unique to various actors (McEvoy 2017).

For conventional farmers, factors like production activity, financial success, and marketing variability are perceived as the most pressing risks (Thompson 2018). Each of these factors a concern about a farmer's ability to maintain the financial success of their business. Production refers to the ability to maintain sufficient yield outputs for sale. Financial risks refer to threat to financial health, such as the availability of capital or ability to absorb financial shocks. Finally, marketing concerns revolve around the farmer's access to the means of selling their products. Variability in prices or demand can create situations where farmers have the products to sell but will not receive adequate compensation or insufficient demand from consumers. All of these concerns revolve around a farmer's ability to maintain financial stability. This is reflected in the risk management programs that are available to conventional farmers. As I will discuss in depth in the following chapter, conventional risk management is focused on maintaining financial stability for a farmer by providing opportunities for guaranteed monetary coverage in the event of crop failure. With a perception of risk that centers financial security, conventional risk management has developed strategies that mitigate the risk of instability through coverage policies known as crop insurance.

However, it is well documented that most alternative farmers do not use these risk management strategies. Thompson (2018) found that that there is significant heterogeneity in farmer perceptions of risk which leads to different mitigation strategies. Further research is needed to understand alternative farmers perceptions of risk, which is beyond the scope of this study.

My early observations after Winter Storm Elliott revealed to me that alternative farmers use a wide range of risk management strategies outside of crop insurance. This paper identifies several differing risk management strategies used by alternative farmers, including on-farm strategies such as season-extending infrastructure, crop diversity, and proper scheduling, and outside support systems that provide additional security in periods of crisis. Reviewing these strategies help us see that alternative farmers are engaged in local communities that provide services and supports that alternative farmers are not receiving elsewhere. I call these communities, civic agriculture.

Civic Agriculture

Thomas Lyson first coined civic agriculture to describe a locally organized agricultural system where networks are bound together by place and relying on local resources and markets (Lyson 2004). The main tenant of civic agriculture is the cooperative nature of the community rather than individual competition.

I argue that in the wake of Winter Storm Elliott the actions of farmers and their community indicate a thriving civic agriculture network in Metro Atlanta. Without federal support systems, Metro Atlanta farmers develop on farm strategies that mitigate the risk of crop or animal loss and draw on personal and organizational networks to withstand the disruptions caused by such events.

In this paper, I review these at two levels: the on-farm adaptations adopted by farmers, and the ways that farmers engaged personal and organizational networks in the wake of the storm. On-farm strategies create the conditions where farmers consider the environment's impact on their farms and consistently adapt to these conditions. However, when there is crop loss, or their individual efforts are not enough, farmers used their connections to other farmers and local

organizations to offer support to each other. Farmers provided resources for each other, and local organizations create funds to provide financial relief to impacted farmers. It was through a thriving civil network, that farming community in Metro Atlanta was able to navigate the damage from the storm. While Lyson focuses on the networks in rural areas, this paper shows an urban example where sites such as farmers markets creates spaces for different stakeholders within the food system to create the conditions for these actors to develop relationships that intertwine the interests of the community. There is incentive to support each other, which is what I found in this project. By considering the case study of Winter Storm Elliott, we can see the unique ways alternative farmers navigated risk both individually and within their community.

Methods

This study uses data collected from an ongoing study of the relationships between management strategies at farmers markets across the Southeast, and the quality of life and economic viability of the farm vendors who sell at those markets. This project received funding from the James Harrison Hill, Sr. Young Scholar Enhancement Grant through the Southern Sustainable Research and Education Program. With this funding I was able to add a second section to 9 of the Managing Markets interviews and 2 additional interviews with farmer support organization representatives to complete the data collection. Farmers received an honorarium of 25 dollars for their participation. In total, I completed 11 interviews.

The interviews were semi-structured interviews that ranged from 45 to 60 minutes. The interviews explored the reflections, and opinions of the farmers experiences with Winter Storm Elliott. This included their risk management strategies before the storm, the effectiveness of those strategies during the storm, experiences receiving access to support systems and how the storm impacted their future risk management plans. I also interviewed two food system

representatives, who work at civil society organizations that are deeply involved with alternative farmer livelihoods about their experiences providing support to farmers during after the storm and their ideas about the role of civil society in alternative agriculture.

The interview guides are in the Appendix C and D. The interviews were conducted on Zoom and recorded to make transcripts for analysis. I used Otter Ai to create an initial transcription, and then corrected any mistakes manually. Using Dedoose, an online qualitative data analysis software, I coded the transcripts using structural coding to pull out themes from the data. Over the course of the analysis process, I continually developed my codebook, inspired by ground theory approach. The final version of my codebook is located in Appendix E. All of farmers and food systems representatives were anonymized during the transcription process.

Participants in the study were selected from the participants in the Managing Markets study. I chose to interview farmers who were working at farmers markets in and around Metro Atlanta. Farmers who had agreed to the Managing Markets interview were asked if they would be willing to offer more of their time in exchange for an honorarium. Farmers that agreed were interviewed about their experiences and I was able to organize the other interviews based on my own and Dr. Hilary King's networks in the alternative food system community in Atlanta. I was not interested in creating a generalizable sample, but to gain insights of some of the prominent farmers in the Metro Atlanta region. Rather than an interest in the representativeness or uniqueness of this case, I was interested in the contribution of this example to elaborate existing theory (Burawoy 1998) about why alternative farmers do and do not use federal crop insurance, and what they do instead to navigate risk.

Chapter Summaries

Chapter 1, “Crop Insurance and the Development of Risk,” explores the historical background of crop insurance and the notion of risk for the dominant and alternative paradigms. The history of the crop insurance program helps illuminate why it continues to be the main federal option for risk management for conventional farmers, documents the disconnects of this program for alternative farmers, and explores why different strategies would better serve alternative farmers.

Chapter 2, “Experiences of Winter Storm Elliott,” engages with the stories of farmers with Winter Storm Elliott as well as analyzes the factors that might have influenced levels of impact. Drawing from the data collected for this project, this chapter attempts to understand the current strategies for risk management on alternative farms and how those impacted during the storm.

Chapter 3, “Resilience and Support for Alternative Farmers” continues with the acknowledgement that there is no on-farm risk mitigation strategy that is universally effective, and it is still necessary to consider outside support. I consider how farmers drew on personal and organizational networks to help them navigate the impacts of Winter Storm Elliott and reflect on what these examples can teach us about the possibilities of a supportive food system.

Chapter 4, “Conclusion.” considers the findings of this project and begins to conceptualize a way forward.

Chapter One: Crop Insurance and the Conventional Concept of Risk

Agriculture is generally considered risky business. Farmers livelihoods are inherently linked to fickle factors like weather, pests, market prices and natural disasters. There are many strategies to deal with these, but ultimately forces of the environment are bigger than anything that can be fully prevented. Particularly in midst of climate change, these factors are only becoming more difficult. As pest cycles, weather patterns and frost dates become increasingly unpredictable, farmers face the brunt of these changes (Castellano and Moroney 2018). Farmers have encountered severe crop loss due to extreme weather across the United States (Dunn 2023; Secaira 2023; Ferazzi 2023). Extreme weather events are projected to increase, and crop losses along with it (Rowhani and Ramankutty 2016). Dealing with the circumstances of outdoor labor makes the yields and security of a farmer's livelihood uncertain. Considering this as the condition of farming, it is unsurprising that risk management is a huge concern for the agricultural industry.

Federal spending reflects this concern. The Risk Management Agency (RMA) is consistently the second most expensive part of the Farm Bill. The RMA holds jurisdiction over the Federal Crop Insurance Corporation (FCIC) and is in partnership with private crop insurance companies. Originally introduced in the 1930s to protect wheat farmers from the devastating impacts of the Dust Bowl and the Great Depression, crop insurance has evolved to become the government's main risk management program for farmers. Crop insurance is a recurring contract between a farmer and an insurance provider that agrees to protect a farm from losses occurring during that crop year. The insurance will usually cover a loss of yields exceeding a deductible. Traditionally, farmers were covered if losses exceeded 15% of their expected revenues, and

coverage was capped at 85%. However, as the program has been expanded and more heavily relied on in more recent years, coverage and rates have increased and farmers can be covered up to 95% of normal levels. (Smith, Goodwin 2023). Unlike most other federal programs, the RMA has a partnership with private crop insurance agencies to run the program. In the partnership, the RMA is a regulatory body and runs some private crop insurance options, but private insurance companies also receive funding from the government to run the program (U.S. Government Accountability Office 2023)

Understanding the context of crop insurance in the United States is crucial for this study. The program serves as the primary federal option for risk management, but as I will explain in greater detail later, alternative farmers generally find the program ineffective for their business models and do not use it. In the following section of this chapter, I will delve into the historical context of crop insurance and its evolution alongside conventional agriculture. I argue that coevolution of crop insurance and conventional agriculture shows us why the program is primarily suited to the needs of conventional farmers. Crop insurance's historical focus on appealing to conventional explains why alternative farmers tend to have lower participation rates.

History of Crop Insurance

In 1938 Franklin D. Roosevelt passed the Agricultural Adjustment Act (AAA). A continuation of his earlier New Deal policies for agriculture, the AAA was meant to stabilize the rural economy by providing farmers subsidies to limit their production. White, conventional farmers were the main beneficiaries of AAA programs, while the Act cost the livelihoods of many tenant farmers, particularly African Americans in the south. Land-owning farmers had the

subsidies to mechanize their farms, resulting in the displacement of tenant farmers and sharecroppers (Depew 2013). The displacement of tenant farmers is just one example of how the AAA was instrumental in agriculture's path towards mechanization and the development of the conventional paradigm (Alston 1981). Alongside changes to farm labor, the AAA transformed the assessment of risk in agriculture with the introduction of crop insurance.

Title V of the AAA created the Federal Crop Insurance Corporation (FCIC) to “promote the national welfares by alleviating the economic distress caused by wheat-crop failures due to drought and other causes” (Agricultural Adjustment Act 1938). However, the program was originally not very successful. Crop insurance was not considered a necessity to most farmers who believed risk to be a part of farming.

The USDA implied that crop insurance was the equivalent of “the unemployment insurance for industrial populations provided for in the Social Security Act” (Hamilton 2020). This language led to farmers to interpret the program as more like a social program rather than a traditional insurance contract and were upset when they realized this was not the case. Some farmers were angry they could not cancel their insurance after a rain had restored the soil to better condition and their uncertainty had diminished (Hamilton 2020). Backing out of an insurance policy because the risk had subsided was clearly a violation of a traditional insurance policy, but it shows the farmer's early interpretation of the program as a federal support system rather than an insurance policy. Due to this confusion, the FCIC struggled to gain widespread support (Kramer 1983).

Another problem was the programs inability to sustain itself. After the first decade, payouts far outweighed the premiums, and the program was rapidly running out of money. The FCIC was on the verge of dissolving because farmers because farmers were not accepting high

premiums. Many disagreed with the approach to risk, and capped the amount they were willing to pay for insurance. In a 1942 FCIC survey, they found that most counties were suffering from drought, hailstorms, and other disasters, but even the farmers working in statistically risk prone conditions disagreed that this meant paying for certainty was the best option (Kramer 1983).

In 1944, Congress switched gears to save the FCIC. They began to advertise crop insurance as a business strategy rather than a New Deal social program. This appealed to conservative members of Congress as it required farmers to pay into the program and function more like a traditional insurance policy. To test this new version, the FCIC significantly reduced its scale to a few counties. Part of the changes included reworking its risk assessment research to ensure they were not losing as much in payouts every year. They also began encouraging farmers to purchase three-to-five-year contracts. This prevented farmers from purchasing on expected bad years and dropping the program on good years. These changes were successful and over the next two decades the FCIC expanded to be nationwide again as income from premiums soared, outweighing the payouts.

Over the next decades, FCIC expanded and became the main farm support program in partnership with the private crop insurance industry. While the program was originally meant to expand federal government to stabilize the rural economy, today it is an example of the “simultaneous reliance on highly individualized market logics and on an expansive and expensive role for the federal government to make that “common-sense” market logic work” (Hamilton 2020). In the 2023 Farm Bill, the program was budgeted to receive \$101.3 billion dollars. However, the majority beneficiaries of crop insurance remain wealthy conventional farmers. In 2019, 94% of policies were sold for row crop protection and only 3% for specialty

crops.⁷ Conventional farmers being the main users of crop insurance indicates its ability to meet their needs, while missing the needs of alternative farmers.

Limited Crop Insurance Adoption by Alternative Farmers

In 2020, the USDA said that 74% of organic farms did not purchase crop insurance (Eric Belasco 2022). A study published in 2022, used surveys to find that most organic farmers who were not using crop insurance tended to attribute this to their farm being too small and their crop too diversified as their reason for not using crop insurance (Belasco 2022). Although there is limited literature addressing crop insurance use among non-organic certified alternative farmers, the reasons given by certified organic producers match the farm styles of alternative farmers, suggesting all alternative farmers might have a similar reluctance to engage with crop insurance. The USDA many made efforts to bridge this gap and make crop insurance more accessible to alternative farmers. In 1996, the Noninsured Crop Disaster Assistance Program (NAP) was introduced in the Farm Bill. The bill was intended to protect previously non-insurable crops, mainly specialty crops. However, the program originally could only cover 50% of crop loss, which was not enough for most to justify purchasing a policy (Astill and Skorbiansky 2023). In 2014, the program was expanded to allow higher coverage rates up to 65%. This expansion did increase participation in the program as organic specialty crop policies grew from around 1,700 farms to over 2,500 (Astill and Skorbiansky 2023). Organic crops covered by crop insurance also increased. In 2011, over 3000 to 4000 acres of organic tomatoes, sweet corn and almonds had insurance policies, but by 2022 12,000 acres of tomatoes, 13,000 acres of sweet corn, 19,000

⁷ Row crops are considered traditional commodities crops such as corn, soybeans, rice, potato. Specialty crops are fruits and vegetables such as blueberries, apples, okra, carrots, etc. Generally alternative farmers grow specialty crops, while conventional farmers most commonly grow row crops. This statistic suggests that most crop insurance policies are being bought by conventional farmers. (Munch 2022)

acres of potatoes, and 22,000 acres of almonds were covered under FCIC (Astill and Skorbiansky 2023). However, to put this into perspective, under 5% of organic farmers were applying for NAP polices in 2022 (Astill and Skorbiansky 2023). While there was an increase in usage, it is still a small minority of farmers using the program.

The Failure of Knowledge Deficit Models

After recognizing the minimal participation of alternative farmer, the literature often encourages further educational programming and outreach to improve participation (Kim et al 2019; Jamanal and Natikar 2018). In my initial plans for this research project, I thought my purpose was to identify barriers to participation and provide informed recommendations to how the RMA could improve access. Over time, it became clear my preconceptions were guiding me towards a deficit-oriented model that assumed the crop insurance was a solution to risk, and access to it was the solution. Instead, through my interviews and further consideration of the literature, it became clear to me that crop insurance was serving as a mechanism that embodies political rationalities based on government presumptions about reality (Rose and Miller 1992). Governments design programs to address assumption about problem, without always understanding the source of the problem.

One manifestation of this tendency is the knowledge deficit model, which attributes environmental and social challenges to the public's lack of education or misunderstanding of science principles (Calo 2018). For example, in James Ferguson's, "The Anti-Politics Machine," Lesotho is considered as a case study for how narrative can impact action. In his paper, Ferguson explains how the international development community characterized Lesotho as an isolated agrarian society, filled with farmers in need of agricultural training (Ferguson 1990). However, Lesotho's problems were complicated and deeply political to the point that the agencies had far

less control over (Ferguson 1990). One of the issues that Ferguson introduces, and I want to reintroduce to this paper, is that rather than assessing the Lesotho's reality as a nation impoverished due to geopolitical factors, the development agencies chose to organize around a false narrative of Lesotho being an isolated, agrarian nation.

This can be seen in this case where the USDA and researchers continue to encourage alternative farmers to use crop insurance, rather than considering that the differing needs of these farmers, might require new solutions. Alternative farmer's minimal use of crop insurance is attributed to a misunderstanding or a limitation of the farmer, which requires an educational correction. In this way the farmer is "treated as passive receptacles of information and as having no role in helping produce or evaluate the knowledge" (Calo 2018). After realizing this shortcoming in my research plans, I decided to reframe it as a project attempted to fill the gaps of the literature. The literature has well-documented alternative farmers not using crop insurance, and there has been some investigation towards why that is, but there is little research looking at the strategies that alternative farmers are already using to mitigate risk. In the remainder of this paper, I will consider the data I gathered through my interviews with farmers in the aftermath of Winter Storm Elliott to consider these alternative strategies and develop recommendations based on these experiences to where more support could be provided. Rather than assuming the universal effectiveness of crop insurance, this project assumes the expertise of its participants and seeks to reach explanations through engagement (Burawoy 1998). I aim to consider the experiences of the farmers in this study as the evidence to form recommendations for improved support systems.

Chapter Two: Alternative Farmer Responses to a Changing Climate

Climate change is undeniably causing the environment to change (Anderson 2020). This has resulted in a multitude of problems including a rapidly rising average temperature and the rise in extreme weather events (Anderson 2020). In 2023 the Earth was 2.45 degrees Fahrenheit warmer than it was in the late 19th century (NASA 2023). This rapid change in the environment, poses direct consequences for agriculture (Smith 2007). Farmers are finding themselves facing the brunt consequences of climate change. As they strive to adapt, Georgia farmers are confronted with both new opportunities and difficult challenges.

Opportunities

In Georgia, the winter season has been a sight of rapid change. In the past decades, Georgia winters have been growing warmer faster than any other season (NOAA 2020). While this is a drastic change has many consequences, farmers have also adapted to meet the new opportunities this warming provides.

For many alternative farmers, warmer winters have allowed for an extension of the growing season. A moderate winter allows for farmers to maintain production through the year rather than taking a break during winter. This can have several benefits.

Firstly, during the winter season, there is less need for some of the labor-practices needed during the summer. Hot and humid Georgia summers, allow for the proliferation of pests, diseases, and weeds and without the use of herbicides and pesticides, alternative farmers can be at a disadvantage to handle these problems (Gaskin 2023). To address these pressures, alternative farmers use cultural practices like crop rotation, tilling, and integrated pest management. While these can be effective practices, these are labor-intensive and not fool-proof. However, these

pressures are reduced in the cooler months giving the opportunity for crops to thrive (Gaskin 2023).

Secondly, a year-long growing season allows for a more diversified farming schedule. Rather than having highly intensive growing periods, farmers can space out their farming across the year. This lessens the dependence on the summer months. To meet the needs of a year-long growing season, Atlanta has many year-round farmers markets that provide a consistent sales outlet. Ultimately farmers can spread out their earnings to have a more consistent and stable income across the year. For many alternative farmers, winter is an integral part of their farm operation not just as a time of planning for the next growing season, but as a time of production as well.

Challenges

While the changing seasons have opened new opportunities, climate change is also presenting pressing challenges for farmers. Climate change has altered weather patterns and disrupted the traditional cycle of the seasons (Anderson 2020).

For fruit farmers, the warming temperatures are costing them entire harvests. Some fruit varieties, like peaches, require a period of cold dormancy in the winter. Without this period, farmers have experienced the losses of entire harvests due to ecodormancy (Pechan 2023).⁸ Peaches typically need a minimum of 500 to 800 hours below 45-degrees Fahrenheit every year (Thompson 2017). In the winter of 2023, limited chill hours combined with a late frost, cost Georgia farmers up to 95% of the normal peach harvest (Mehta 2023). This also happened in 2017, when farmers lost 85% of their crop under similar circumstances (Atlanta Journal

⁸ Ecodormancy is when adverse weather impacting the buds on a woody perennial plant. While ecodormancy typically refers to low temperatures, in Georgia warm temperatures have also been impacting the plant's ability to produce buds (Leida et al 2011).

Constitution 2017). For these farmers warming winters are making their livelihoods more precarious than ever. Another problem has been the uptick in extreme and unpredictable weather (Anderson 2020). Risk and uncertainty are inherent parts of farming, but changing seasons are causing pronounced unpredictability.

Winter Storm Elliott serves as an important example of an unexpected weather event that provides an opportunity to explore the risk management strategies of alternative farmers. In the following sections of this chapter, I will delve deeper into the specific experiences of alternative farmers during Winter Storm Elliott exploring the challenges and innovations facing farmers trying to build resilient farms in the face of a changing climate. This chapter focuses primarily on on-farm strategies that show the adaptability of alternative farmers.

Case Study of Winter Storm Elliott

From December 21st to the 26th, Winter Storm Elliott pounded the United States with record low temperatures, and destructive winds. Nationwide, the storm triggered widespread power outages and tragically cost dozens of lives. In Atlanta, the storm brought several days of sub-freezing temperatures, a stark contrast to the city's typical moderate winter climate.

Alternative farmers in and around Metro Atlanta were hit particularly hard by the storm. With significant investments in the winter season, the severity was unexpected and devastating for many farmers. The immensity of the impact could be visualized by the emptiness of the farmers markets in the weeks and months following the storm. Gone were the usual tables brimming with seasonal staples like kale, sweet potatoes, and cabbages, replaced empty spaces adorned with A-framed signs. These signs briefly detailing the farmers' background and explaining their temporary absence from the market due to the storm. The imagery of the market served as a reminder of the storm's severity.

Winter Storm Elliott serves as an example of the inherent risks faced by alternative farmers. In the aftermath of the storm, I interviewed nine farmers in the Metro Atlanta region about their experiences during and after the storm. None of the farmers I spoke to use any form of crop insurance, instead they used various other risk management strategies. Among those interviewed were fruit and vegetable farmers, as well as livestock farmers, whose farm plans further illustrate the variability in how farmers manage and respond to risk. While each of the farmers are fall into the category of alternative, they run diverse farms with different growing practices and product specialties. When interviewing these farmers, I found their experiences during the storm equally diverse and by delving into the narratives of these farmers, I aim to understand the circumstances contributing to the devastating impacts faced by some farmers and the successful mitigation of others.

I have categorized the experiences of the farmers I interviewed into high impact, medium impact, and low impact. These categorizations represent my interpretations of their descriptions of the loss they perceived. By combining the material losses shared by farmers in the interviews with my interpretations of the emotional stain and reflections shared by the farmers, I was able to categorize the level of impact for each farmer. By delving into these narratives, I want to convey the complex ways storms are reshaping the agricultural landscape, ultimately contributing to a broader understanding of resilience and adaptation in the face of environmental challenges.

Table 2: Farmer Interviewee Information

Farmer #	County	Primary Products Sold	Level of Impact	Acres in Production	Race
1	Carroll	Meat	Medium	62	White
2	Fulton	Poultry	Low	10	White

3	Meriwether	Vegetables and Fruits	Medium	3	White
4	Clayton	Dairy Products	Low	40	White
5	Clarke	Vegetables and Fruits	Medium	12	White
6	Wilkes	Meat, Poultry and Eggs	High	74	Black
7	Henry	Vegetables and Fruits	High	30	White, Asian
8	Dekalb	Vegetables and Fruits, Meat, Poultry	Low	30	White
9	McDonough	Vegetables and Fruits	High	6	Black

Low Impact

Three farmers communicated having little to no impact from the storm. Farmer 8 happened not to be in production at the time. However, the other two farmers were in full production during the storm and despite the severity of the storm, experienced no losses.

Farmers 2 and 4 attribute this resilience to them being livestock farmers. Farmer 2 specializes in poultry and said that “chickens are hardy enough that nothing bad ever really happens. If it’s raining really hard or its cold weather, we have the infrastructure for our animals to go inside at all times.” Farmer 4 felt similarly. She said that all she had to do was put a couple extra t-shirts on the shivering cattle, and add some more hay to the barn, but she was more worried about a bursting pipe than any of her animals. Both believe that their animals are far more resilient simply because they can withstand fluctuations in weather better than vegetables. By the nature of animal’s ability to internally regulate their body heat, these farmers feel like they just have to ensure they have proper shelter.

While the factor of animal resilience is important, Farmers 2 and 4 also had robust infrastructural set ups that allowed for the security of their animals. Farmer 2 has mobile hoops houses with tarps made to withstand years of winds, and varying weather events. Additionally, Farmer 4 has a barn with insulation where her cattle could shelter during the storm. While it is true that both are uniquely resilient to the temperature because of their production niches, it was their investments in infrastructure that allowed for minimal preparation before and during the storm.

Medium Impact

Three farmers said while the storm caused some damage, they did not consider it hugely problematic for their farm business. Farmer 1 remarked that while the storm was undoubtable a stressful time, it felt “no different than regular issues that happen on a day-to-day basis.”

The biggest issue Farmer 1 encounter was access to nutrition for her cattle. Due to a change in operations, her cattle were uncharacteristically vulnerable to the storm, and she needed to source peanut hay to provide nutrition quickly. After reaching out to everyone she knew including all her previous business exchanges, she attempted to source peanut hay from Florida, but this fell through as well. Ultimately, she resorted to buying peanut meal, however, when it arrived, she discovered it was peanut butter. An inconvenience, but not a disaster.

Farmers 3 and 5 said the storm did cause some significant crop loss. Both are diversified vegetable farmers and often struggle to fully mitigate production risk during extreme weather. Farmer 3 grows in hoop houses and in the fields. Before the storm, she decided to harvest as much as possible in the fields and sell it at the farmers markets after the storm. When the storm came, the wind ripped the plastic off one of the hoop houses and the cold penetrated several

others. She lost 75% of the crop in the hoop houses, and most of what was in the fields died. Despite the infrastructure of the hoop houses, Farmer 3 still found many of her crops destroyed because of the storm, but she did not perceive this as a major damage to her farm. However, two weeks after the storm she was shocked to see some kale growing back. She has saved the seeds of this variety and is hoping to grow it next year because of its resilience. While her infrastructure did not fully work, crop diversity allowed for experimentation and found a resilient variety of kale.

Farmer 5 also had some loss, but said her scheduling prevented anything from being too destructive. Farmer 5 has been farming for over 20 years. She remembers times when the winters were colder, and farmers could not grow the entire season. She says the past eight winters have been warmer allowing for farmers to push the boundaries of what they produce in the winter months, but she still tries to avoid winter growing. While she does grow some crops in the winter, her business does not rely on winter success. During Winter Storm Elliott, she used frost blankets and greenhouses to cover the priority crops. For everything else she harvested as much as she could. While there was some loss, she considered this part of the gamble of farming.

I believe this is a similarity among these farmers who all had some loss but viewed it as a normal part of farming. Each of the farmers mentioned that farming was risky, but they spread out their reliance between different seasons and crops so they could never lose it all in one go.

High Impact

I identified three farmers who experienced exceptionally high impact compared to the other farmers. These farmers not only faced significant financial losses due to the storm damage, but experienced operational challenges that persisted for months. The narratives of these farmers highlight the various challenges facing alternative farmers. However, despite all these farmers

facing tremendous difficulty because of the storm, their narratives also hint towards the strategies that farmers can use in face of increasing extreme weather events.

Farmer 6 raises pork, poultry, and eggs on her farm in Meriwether County with the upmost care and diligence towards the care of her animals. However, when the storm came, the harsh conditions outmatched her farm's ability to protect the animals. Lacking adequate shelter for an event like this, Farmer 6 struggled to shield the pigs from the biting cold. Though there was a small barn, its wooden boards, and confined space offered little protection.

To make matters worse, during the storm one of the pigs gave birth to a litter of 7 piglets. Despite her efforts, only 4 piglets survived. To prevent the deaths of the remaining 4, the farmer chose to bring them into her own house along with another struggling pig. Wrapped in blankets and towels, the remaining piglets lay shivering, trying to recover from their traumatic birth.

Other pigs also struggled to survive the conditions, and after everything, 12 pigs had died.

Farmer 6 estimates the loss of these 12 pigs, resulted in a loss of \$48,000 in revenue.

Despite this loss, they still had products to sell at the farmers markets. They continued attending, but found the customer attendance was so low, they were unable to earn enough to cover the bills. Having to pay multiple late fees only further cemented the financial stress of the time. The financial losses didn't just hurt Farmer 6's bottom line, they also disrupted their entire schedule. Without the necessary funds they typically would have earn from the winter market, they could not afford to invest in a new flock of chickens. As a result, one of the most crucial parts of their business remained stagnant for months. What started out as a week-long storm, evolved into a month's long period of recovery. When I interviewed Farmer 9, seven months later, they were still grappling with the aftermath of the storm, but she says they are already working on improving their infrastructure to become more resilient to fluctuating weather.

Differing from Farmer 6, Farmer 9 is a diversified fruit and vegetable farmer operating south of Atlanta. At the time of the storm, they were in the full swing of their production season. There were winter crops in the fields, perennial peppers in a greenhouse and in the weeks before the storm they had also planted strawberries, onions, and garlic in preparation for the spring harvest. Despite being aware of the incoming storm, the farmer said they had underestimated the potential damage and underprepared. He explained that they “had been preparing for the Spring harvest already when the storm came through and it was so severe. We lost 80 to 90% of what we had in the fields and 80% of what was growing in the greenhouse.” He estimates this to have amounted to an astonishing overnight loss of \$80,000 to \$90,000.

He said the reason for this severe loss is likely due to a scheduling mistake. The unprecedented intensity of the storm caused the loss of winter crops which was unfortunate. However, it was the loss of his spring crops that was devastating. Typically, the spring crops he planted a few weeks before the storm are planted in the fall. This is so they can root properly before the first frost. He explained that due to the moderate winters, they had let the typical planting deadline fall behind, but when the storm came, it meant they were exposed to greater risk and suffered for it. By the end of December, it is too late to replant. Due to the time of the storm, there was no recovery for these crucial spring crops. The storm not only impacted the current winter production but stretched into the next season as well.

The last farm that suffered from major destruction, was another diversified vegetable farm. At the time of the storm, Farmer 7 was in the process of moving locations. The production had moved to the new site, but there was no hoop houses or greenhouses and so everything was in the field. While they were able to receive extra row cover from another farm, it wasn't enough. He said,

“we quite simply did not have enough row cover to cover everything, and we’re talking about nearly 10 acres of plants in the ground with rows as long as 600 feet. It’s an extremely hard task to cover that much so we did have we could, but we still suffered quite a bit. Though it wasn’t a complete and total loss for everything.”

While the row cover was able to help some, there was not enough of a labor force or row cover material to protect everything. Though they were able to protect some of the crops with the resources provided by the other farm, the storm was still incredibly destructive. Farmer 7 estimated that he lost \$60 to \$80,000 worth of produce due to the storm.

High Impact Conclusions

Each of these farmers are examples of the devastating impact Winter Storm Elliott had on alternative farmers in Metro Atlanta. While each of these people were impacted by an unprecedented and damaging storm, none of them expressed helplessness in preventing the destruction of their farms in the future. I will discuss this in further detail the following sections of this chapter, but farmers had theories as to why they were severely impacted and were already adjusting to address these factors. The experiences of these farmers suggest that alternative farmers are grappling with the consequences of extreme weather events such as Winter Storm Elliott, but there are identifiable factors that influenced the level of impact experienced by these farmers.

Beyond Winter Storm Elliott

During every interview, farmers raised concerns about the repercussions of various storms and weather events in recent years. Even farmers unaffected by Winter Storm Elliott

expressed unease regarding the escalating frequency of extreme weather events and the shifting patterns of seasons. During the interviews fruit farmers expressed concern around the shifting temperatures in later winter and spring that have resulted in losses several years in a row, while others worried about increasing heat in the summer.

Spring Frost

On March 20th, 2023, the temperature in Atlanta dropped to 28°F resulting in the loss of up to 95% of the Georgia peach crop (National Weather Service 2023; Mehta 2023). After three of some of the warmest winter months on record, the freeze caused the unacclimatized peach buds to be irrevocably damaged (National Centers for Environmental Information 2023). This hit national attention because the peach state did not have any peaches.

Two farmers I interviewed said March 2023 was a particularly damaging time for their farms. While most people were focusing on the peach loss, these two farmers pointed out that many other fruits require cold periods as well and farmers are struggling with several other fruit varieties. Farmer 9 said they “lost 90% of blueberries for the season as well. We lost 90% of the persimmons and several of the persimmon trees died. There was also damage to our fig trees and we lost all the peaches, pears, apricots, plums, and more.” Not only did they lose the majority of their crops for the season, but the frost killed the trees themselves, destroying years of work. Farmer 5 spoke about how these types of losses are started to seem to be becoming regular occurrences. She said “we’re losing all our blueberries every year. We get a warm February and then a late spring breeze and it’s all over. We can’t cover all our blueberries. Now we’ve lost the vast majority of our blueberries three years in a row.” While both of these farmers have diversified crops, and fruits are not all they produce, it is distressing to see a once reliable and profitable crop becoming a greater risk.

In response to this precarity, both farmers are seeking alternative varieties. Farmer 9 has planted 140 blackberry bushes and is considering options for peach replacements. Farmer 5 is also planning to replace her blueberry bushes but is still experimenting to see what crop that will be. Just in the past few years, both farmers have found increased precarity prompting the search for new varieties.

Summer Heat

This paper has mainly focused on challenges farmers face in the winter, but several farmers said that summer was far more concerning. Farmer 2 said that summer has always been a difficult time because of the “crazy storms” that can be just as intense of the winter. He is always aware the summer will likely cause difficulty with the storm. Several said the heat was becoming an unescapable challenge. Farmer 5 said “it’s always hot in July, but this summer it’s just not letting up. I was thinking out loud the other day and I said I should just cancel the CSA for the month of September, so I don’t have to go so hard in July. The heat is taking a toll on the staff and so it will keep everyone motivated and moving. We reduce the hours in the winter, so why don’t we just reduce the hours a little in July and go harder in the spring?” Historically, Georgia is peaking growing season, but with rising temperatures, farmers are starting to reconsider their growing schedules. This reflects both the evolving challenging due to climate change, and the flexibility of alternative farmers to meet these challenges.

Risk Mitigation Strategies

Based on farmers experiences with Winter Storm Elliott, and other weather events, I have identified several trends associated with the variables that impacted loss for the farmers I interviewed. When reflecting on their experiences, farmers shared the strategies and tools that

they had been implementing for risk management. They also reflected on future plans to increase durability for their farm. From the narratives of farmers experience with Winter Storm Elliott, and the plans, I have identified three on-farm strategies that farmers use for risk management. These are season-extending infrastructure, crop portfolio, and scheduling.

Season-Extending Infrastructure

Every farmer I spoke to said improving infrastructure was either already a priority or had become a priority after Winter Storm Elliott. Farmers recognized growing in the winter required infrastructure to maintain stability. Hoop houses, greenhouses, and row cover were some of the most common tools farmers mentioned. Farmers who have already invested in these structures highly recommend other alternative farmers to do so. One farmer said that her long-term investments in insulated hoop houses and row cover were instrumental in protecting her crops during the storm. Another said she started using hoop houses decades ago. She says that “back in the day I was a laughingstock. There were no hoop houses.” At the time, season-extending infrastructure was not a common investment, but she is excited that people have begun to recognize the value of it.

The importance of infrastructure was echoed by the most impacted farmers as well. Farmers 6 and 7, attributed their losses to inadequate infrastructure. Farmer 7 said they lack of hoop houses and row cover meant that the majority of their crops were exposed to the full extent of the storm, which is something they are working to ensure never happens again. Farmer 6 is also working on this but rather than building, she is optimizing the preexisting elements of her land. When she realized her pigs lacked the adequate shelter during the storm, resulting in loss of 12 pigs. Farmer 6 decided to relocate the pigs to the woods, where they could benefit from the space and natural resources available. By leveraging this resource, she said her pigs are far healthier and more

resistant to storms in the future, and this is supported by some literature on regenerative agriculture (Shiva 2022). While is it different than an expected investment into a barn or other structural shelters, Farmer 6 believes this lost cost strategy is even better for her pigs and even the quality of her products.

Despite the different types of infrastructure they used, every farmer I spoke to reflect that it could significantly improve their chances of maintaining stability throughout the seasons. The literature supports this and encourages farmers to utilize these strategies to improve the resilience of their farm (Pfeffer et al. 2015).

Crop Diversification

Crop diversification is a main tenant of alternative farming (Kremen 2012). Farmers will grow diverse crop species and then many will also experiment with genetic diversity within species. Variety is not only beneficial for the environment but allows farmers to have a spread of investments so there is typically not a complete loss if there is a disease outbreak, or unfavorable weather.

Crop diversification worked in Farmer 3's favor. After the storm she said, "everything looked dead, but then when it got warmer a lot of things started resprouting and growing back, which was very surprising." The initial shock of the storm seemed to have wiped everything out, but she was shocked to find the resilience of her plants. She decided to save the seeds and plans to continue experimenting with them. She said that "we have security in diversity. The fact that we grow so many different things all year and all the time that at least something will do something. It sucks when you have crop loss because of weather, but sometimes other things survive." Her experience with Winter Storm Elliott reconfirmed that crop diversification can be incredibly beneficial because it allows for consistent trial and error. As farmers find some crops

struggling, they already have another variety growing to see if that will fare better. The ability to adapt by using diverse crop plans allows them inherent resilience to unpredictability (Lin 2011).

Scheduling

Crop scheduling was another frequently mentioned variable of impact. Planting crops at the right time can increase its sturdiness in the face of pressures (Jordan 2019; Krell 2022). This exercise in time management is one of the many reasons crop diversity can be difficult to maintain, but makes all the difference for the success or failure of a crop.

The importance of scheduling was highlighted by the severity of impact for Farmer 9. His late planting caused his plants to be less resilient to the freeze when it came. While this resulted in an astonishing loss at the time, it is also something that he feels can be addressed. In the future, he plans to keep better track of the planting schedule to offer the best chances for his plants to survive.

Other also mentioned scheduling was an important risk management strategy. Despite moderate winters, Farmer 5 continues to avoid growing throughout the year so that she does not get caught in unexpected storms like Winter Storm Elliott. And others spoke about even changing their schedule during the summer. These measures suggest the role careful planning plays in mitigating risk on farms. Through a deep knowledge of their crops and environment, farmers can maximize the chances a crop has as thriving by planting it at the right time.

Navigating the Inevitable Precarity of Farming

Winter Storm Elliott was an exceptionally intense storm and is just one example of the myriad ways farmers are facing environmental challenges due to climate change. The farmers I spoke to gave examples of the types of challenges they are facing but also shared the various

strategies they were implementing. There was a constant determination to keep innovating. No one expressed plans of quitting. Farmer 6 says “We have a point to prove. It can be done. It’s going to be difficult, but things need to change. We knew it was gonna be a struggle, but we’re in this for the long haul.” In the face of climate change, alternative farmers are using a variety of adaptive strategies to mitigate loss and continue farming.

However, despite on-farm strategies, farmers will inevitably experience loss. Climate change has increased the level of unpredictability making farmers vulnerable to environmental factors. In response to escalating unpredictability, farmers are investing in infrastructure, diversified products, and scheduling. Yet, some are still concerned about the future. There is only so much one farmer can do. Ultimately, farming involves an unavoidable element of randomness. Calling back to Farmer 5’s striking remark, “didn’t anyone ever tell you this is a gambling business we’re in?” shows farmer’s understanding of the intrinsic risk of their careers. Farmers know that there is always the chance their wager doesn’t win.

Chapter Three: The Resilience of Civic Agriculture

The previous chapter explored farmer's experiences during Winter Storm Elliott and the various on-farm strategies used to handle the storm. These strategies proved effective for several farmers, and were something everyone I spoke to deemed valuable to invest in. Yet, inevitably, weathering environmental challenges are beyond individual capacities. Access to on-farm risk mitigation strategies is important but not enough.

In this chapter, I will explore the various examples of external support systems that were mentioned in the interviews. Three primary forms of external supports emerged: support between farmers, organizational support, and government support. This chapter examines farmers, as well as two local food organization representatives', involvement with these various support systems and ultimately finds that the local supports from farmers and organizations proved the most effective. I argue this is because the farmers whom I interviewed are a part of a civic agriculture system that benefits from local relationships to maintain resilience for the community.

Thomas Lyson introduced civic agriculture to explain the occurrence of local food systems that are developed through the creation of local markets. These systems provide opportunities for social organization that develops the basis for a self-sustaining economy. In this paper, I think it is also helpful to consider Monica White's ideas about community resilience. She posits that a community's capacity to rebuild after catastrophe, is one of the essential building blocks for a successful food system (White 2018). She also emphasizes the importance of the collective when considering resilience and says that communities outside power can utilize resilience to self-preserve (White 2018).

In the face of climate change, capacity for resilience is particularly relevant. Alternative farms are typically smaller, with limited income, creating riskier enterprises. I invoke White's work because her explanation of the importance of community resilience is applicable to civic agriculture for alternative farmer. A self-sustaining economy, that Lyson describes, needs to be able to rebuild.

This chapter examines evidence of a resilient civic agriculture system that successfully provided supports for the entire farming community. The farmers interviewed in this case study had formed relationships with each other and the community primarily through farmers markets, and other spaces of local markets spaces. Over the years these relationships have strengthened and developed into layers of organizational elements of an alternative food system in Atlanta. This case study reveals that one of these elements is the capability to function as a support system in times of need. Rather than individualism, the interviews revealed several instances of organized collective responses between farmers and local organizations. These responses indicate the community's ability to withstand immense challenges, such as those caused by Winter Storm Elliott, and therefore shows the resilience of the system. Additionally, this chapter explores farmer's explanations for not using crop insurance. Their explanations reaffirm the importance of relationships and suggest this factor led to the success of the local supports and relative failure of federal supports.

Support Between Farmers

All the farmers I interviewed worked at farmers markets in and around Metro Atlanta and shared that from their connections to these spaces, they had formed relationships with other

farmers in their areas. When the storm came, the relationships they had formed proved beneficial.

Several farmers spoke about the importance of the friendships they had made with other farmers. In preparation for the storm, Farmer 7 was able to borrow row cover from another farm. He explains that this kind of exchange is a regular occurrence because over the years they had grown to be close colleagues and friends. After the storm, Farmer 7 said that another farm they had grown close to was completely decimated. With only sweet potatoes to sell, it was not worth it for this farmer to come to the farmers market, so Farmer 7 decided to bring the sweet potatoes and sell them on this farm's behalf. He explained that over the years the resources between these farmers are shared as needed. While other farmers did not have specific examples of support between their peers, many said they had heard of farmers supporting each other in this way and believed that they had peers who they could rely on. Sharing resources is common and fits into the idea that alternative farmers thrive when maintaining collaborative and reciprocal economic strategies (Rissing 2016).

Farmers also expressed that aside from their peers being important social supports, they relied on the success of other farmers for their own financial stability. Particularly farmers relying on the farmers market, spoke about the importance everyone succeeding. When Farmer 1 saw that five farmers were missing from her main farmers market after the storm, she immediately worried about the stability of the entire market. She saw that the absence of so many farmers were confusing customers, resulting in lower sales. She explained that "news about the storm was everywhere, even on news outlets and on farmers markets' and farmers' social media pages. However, there was still a disconnect with the customers and I really had to tell them don't give up on us. Keep coming back." Farmer 1 pointed out that rather than seeing

other farmers at the market as competition, she believes it is essential to her business. She is incentivized to support and hope for the prosperity of her peers because they are all working together to create a successful local market. In this civic agricultural system, farmers depend on mutual prosperity to maintain access to markets and resources.

Organizational Support

In Atlanta, civil society organizations that organize community-building activities like farmers markets, farmer training events, and provide programs encouraging universal access to healthy and affordable food. These activities facilitate the establishment of networks among various stakeholders, such as farmers, customers, and organization representatives.

In the aftermath of the storm, several organizations worked closely together to provide support to farmers in need. The two organizational representatives I spoke to were involved in this coordinated effort that had two main strategies. One was establishing a financial safety net to assist local farmers overcome the impacts of the storm. The second initiative aimed to further support to farmers in navigating bureaucratic hurdles within the food systems.

In this case study, the Farmer Fund was the main strategy organizations used to support alternative farmers. It was originally started in 2015 by Peachtree Road Farmers Market and the local restaurant, Farm Burger, to provide a financial support to farmers facing increasingly unpredictable natural disasters. In 2018, Georgia Organics in partnership with six organizations, Food Well Alliance, Community Farmers Markets, Global Growers, Wholesome Wave Georgia, The Common Market, and The Conservation Fund, took over running the Farmer Fund. In the past, the fund was used to assist farmers during Hurricane Michael in 2018, and the COVID pandemic in 2020. When Winter Storm Elliott hit in 2022, the partnering organizations decided

to meet. One organization representative described that, “when the storm came, we reached out to a bunch of other organizations saying, ‘hey this is a collective impact of all the people that we’re serving in a bunch of different ways, so can we come together and fundraise?’” During this period, they met every week to organize and capitalize on their respective areas to include a variety of audiences to support the fund. Through these collective efforts, they were able to raise \$230,000 for Winter Storm Elliott relief. A total of 57 farmers applied, and every applicant receive an average of 70% of their requested amount. Four of the farmers I spoke to received financial support from the Farmer Fund. Farmer 1 said, “I did apply to the Farmer Fund, and we got significant help from that. It was a really nice time because the winter revenue was low. It was very helpful to have that support at that time.”

What made the Farmer Fund successful seems to have been the previous connections with farmers. Farmer 1 mentioned that the market manager at her farmers market assisted her during the application process by contacting the fund organizers when she missed the deadline. Her previous connections to the organizations, and the connections between the organizations themselves created an environment where support was accessible. Another organizational representative I spoke to said accessibility was important from the start. It had been important to them to create an application that could easily be filled out, unlike many other relief funds that can be confusing and difficult for farmers.

The Farmer Fund was a success, mainly because the organizations were able to use the previous connections built through civic agriculture networks and use these to organize quick and effective support systems based on previous work. It is important to point out that just like the relationships between farmers, these networks had been built over years. It is through consistent interaction and cooperation that the Metro Atlanta local food system has been built.

Government Support

Every Farm Bill in the last several decades has directed billions of dollars toward risk management. However, as I explained in Chapter 1, federal risk management agencies have long been focused on crop insurance as the main risk management option for farmers. The most funding, programming, and attention goes towards crop insurance, but due to the ways different farm businesses operate, this only benefits conventional farmers and explains why the majority of alternative farmers do not use crop insurance. The conversations I had in my interviews supported this literature and added some insight to why farmers are not using these resources. From my analysis, I identified two main trends that I argue explain why farmers are reluctant to federal risk management. First, there is a lack of relevant risk management options tailored to the needs of alternative farmers. Second, I discovered a trend where farmers perceive that the government lacks concern for their welfare, indicating a broader level of distrust.

The Lack of Relevant Government Support Options

Overall, farmers were dissatisfied with the government risk management and support options. Farmers felt that everything from crop insurance to relief loans were difficult and confusing to acquire. None of the farmers used crop insurance. Several said this was because crop insurance did not match their business needs. One farmer said “we do not have crop insurance. I know that is something that is being pushed for small farms to look into, but every time I’ve looked into it, it’s not built for us. It could be the paperwork is easier now. I’ve talked with our FSA agent about this a few times, but it’s not created for small farmers. We grow so many different things throughout the year. It’s not like we just grow two crops a year. We grow on a smaller footprint compared to some of the larger farmers and we grow so many things, so it’s hard to figure out the crop insurance aspect.” Despite, having considered it several times, this

farmer still felt that there was little evidence crop insurance would benefit their farm. Farmer 1 said that even with significant monetary reward, they felt insurance was not a good use of their money. She says “if the whole place burns down, they’ll write me a check for \$20,000. I could have just been putting a check in the bank every year and that would be better.” Rather than annually investing in insurance, she says she is better off saving money. None of the farmers believed that crop insurance as it is today, would benefit them.

However, farmers felt there should be more robust relief options for disasters. After the storm, Farmer 9 received an email offering automatic registry to NAP to that could provide coverage for specialty products. There were no federal relief fundraising or funds available at the time so Farmer 9 hoped that joining NAP could offer some financial relief for his estimated \$80,000 to \$90,000 loss. However, he was disappointed to discover that the program would not be providing any coverage for Winter Storm Elliott. While he was disappointed, he reflected that NAP would likely not have helped that much even if he had the program. He said “I’m a little sadden by that situation. But I’m an organic farm and the rates of return on those things are not great. They’re doing it for large-scale commodity farms. I probably would have only gotten \$2000 to \$3000.” Even among the programs specifically designed for farmers like Farmer 9, there is a lack of relevance for his needs. Another farmer explained that even if they did receive relief funds, the timeframe would not work for a small farm. They explain that “any kind of government support happens about two years after the event, and they’re open about that. They say that’s just how it happens, but that’s just not helpful. Especially if you’re a small operation that can’t wait two years to get relief from a disaster. It just seems like anything with the government is too slow and inefficient to be helpful for really small operations.” Concerns about

the ability for the government to meet the needs of alternative farmers were common and amongst all the farmers I spoke to.

Limited Trust

Another trend was a sense of distrust towards the government. Some of the farmers believed the lack of relevant risk management options was a sign of a larger issue of apathy towards the businesses of alternative farms from the government. Farmers were hesitant to seek federal support because they believed that in the eyes of the USDA, their operation was not worth considering. Some farmers shared personal stories of the disrespect they had received during their interactions with USDA offices. The result of these interactions leads farmers to seek other options because they do not believe that the USDA will support them.

When I asked Farmer 4 if they had sought or received government support through her time farming, she laughed and said,

“they're [the USDA] not interested in speaking with me. I'm inconsequential. They don't care. Or, you know how do I find that person who cares? No, I mean, as far as that goes, somebody came and shot an animal in the face. She was one of my best livestock, but there was nothing to do but slit her throat and put her in a hole. Because you can't prove who came and shot her point blank in the face. All you have to do is move on. And we don't discuss that very much. But you talk about crop insurance and animal insurance. Just keep going. There's no backup. There's, quote, “industry respect.” No, I'm a small cheesemaker. I'm not out there burning up the show ring.”

This rather intense example showcases some of the deep distrust that was present in the interviews. Farmers felt completely unseen and uncared for in the eyes of the USDA.

Farmer 6 said when they were beginning their farm “We tried to get an FSA loan and they called us jokers” It was only after sending an email titled, “Are We Victims of a Broken System?” that they received any response from the USDA. This farmer felt that this was yet another example of the limited respect the USDA has for alternative farmers. However, she hopes this changes and there are better opportunities for farmers to receive federal support in the future.

With limited relationships to USDA agents, many farmers could only assume through a lack of federal support or believe based on unpleasant experiences that the USDA does not care about their businesses. This is resulting in a lack of trust which fuels hesitations to engage with federal support systems. It should also be mentioned, that while this project did not focus on this issue, the legacy of discriminatory practices that led to the foreclosure of many Black farmer’s land, has also led to a deep sense of mistrust. This is an important factor to consider in future research.

Takeaways

A community’s resilience is reliant on their capacity to respond to a challenge. To assess a community’s resilience, there must be evidence of endurance through a challenge and that there are effective strategies for “intentional, organized, collective response” to challenges (White 2018). I propose that the strategies of the Metro Atlantan community of farmers and organizations in aftermath of Winter Storm Elliott provide an example of a resilient community. Throughout interviews with farmers and organization representatives there were instances of collaborative efforts that supported the entire agriculture community. Farmers shared resources and organizations provided financial support that made a difference for many farmers’ ability to

handle financial pressures. I argue that these cases of collaboration are evidence of a civic agriculture system. The establishment and maintenance of local markets spaces have created communities that have the capacity to provide social and economic benefits. Over time, relationships develop into a complex civic agriculture system where the success of the local food movement is reliant on the collaborative efforts of the entire community.

The key takeaway is that relationships are essential. The connection between farmers and between the organizations, created networks that could quickly organize when there was a challenge. The network of the civic agricultural system allows for consistent interaction creating opportunities for built trust and understanding. The organizations are in communication with farmers about their needs and know how to organize to meet them.

In contrast, farmers do not have consistent relationships with USDA agents, which I believe is contributing to the sense of mistrust. Without communication, farmers are left with a system that is confusing and difficult to navigate. Federal support systems need to consider this limitation in there are going to continue building their support systems for alternative farmers.

Civic agriculture is a model that helps imagine alternative models for farm businesses other than the conventional paradigm. The collaboration within the alternative food system in Metro Atlanta is not just an example of the resilience of this community, but an indication of the resilience of civic agriculture and the effectiveness of alternative risk management strategies. In an era of increasing precarity, this case study can offer hope for the possibility of new ways to deal with the incoming challenges presented by climate change through the development of community networks.

Conclusion

Environmental risks pose ongoing concerns for farmers across paradigms, particularly amid projections of increased extreme weather events. Academics and farmers share apprehensions regarding the impacts of climate change on agriculture (Crane-Droesch et al 2019). Amongst concerns of the environmental repercussions of conventional farming, many advocate for the consideration of alternative agriculture (Goh 2012).. Therefore, investigating the strategies of the alternative paradigm is important.

My findings align with the literature, revealing that despite governmental efforts to promote crop insurance and provide options like NAP, alternative farmers are not interested in using these programs (Belasco 2022). The farmers I interviewed still believed that crop insurance was not an effective risk management strategy to match the size of their farms and the diversity of their production. They continue to perceive the cost and paperwork involved in securing insurance as disproportionate to the benefits.

However, my findings showed amazing adaptability and resilience among alternative farmers. Alternative farmers are constantly experimenting and implementing new strategies to reduce risk. They are developing approaches and experimenting with crop varieties to bolster their resilience against extreme weather events, which could have broader applicability given global challenges posed by climate change. Further research is warranted to evaluate the effectiveness of these strategies across different contexts.

Despite effective on-farm strategies, farmers remain concerned about increasing extreme weather events and changing seasons. In response, alternative food systems establish localized networks that support collective resilience. I refer to these as civic agriculture systems, and my

findings showed that due to the long-term development of relationships in this local system, farmers and local organizations were able to quickly create effective support systems for the Metro Atlanta farm community in the aftermath of Winter Storm Elliott. However, there is need for further research into how to facilitate and sustain these networks. While farmers had nothing but positive things to say about the efforts of civil society organizations in this study, concerns exist among some farmers about the overreliance on such organizations as aid distributors (Newman 2020).

Overall, my research offers insights into alternative solutions within the food system. As agriculture grapples with mounting pressures from climate change, exploring novel organizational approaches provides an opportunity to imagine new futures. Further investigation into the methodologies of alternative farmers is essential as we collectively navigate the future trajectory of food systems.

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Appendices

Appendix A: Initial Contact Email

Dear [Farmer],

I hope this email finds you well. My name is Isabel Staton and I am writing to follow up and invite you to participate in an interview as part of the SSARE research project Managing Markets, which focuses on how farmers market management impacts farmer vendors.

Through the study, we're aiming to better understand how different farmer's markets across the southeast are run and how these differences impact farmers. The project's purpose is to identify management practices that will improve the experience of being a market vendor. Based on your experience [selling or stopping selling] at [Name of Farmers Market], we think that you can contribute valuable insights to this research.

Here is some information about the interview:

- The interview is expected to **last about 75 minutes** and can be conducted via phone, online, or in person, depending on your preference and schedule.
- **We are able to offer you \$50** (via an electronic Visa gift card) for your time. This will be provided after the interview. During the interview, we will ask open-ended questions about you and your farm, how you think about quality of life and economic viability, your experiences at farmers markets and with market management, a bit about your future goals, and a 13-question multiple choice survey that we will send you a link to via email related to your farm business. We hope to record the interview so that we can analyze your responses as part of the study.
- **For an additional \$25, there is a second section** that will last about 30 minutes. In this section we will ask open-ended questions about your experience with Winter Storm Elliott this past December. Topics will cover risk management strategies and the support systems you were or were not able to access at the time.
- Your answers will be confidential. You can learn more about how we protect your privacy in the attached information sheet and consent form.

We hope to schedule the interview to take place in the next two to three weeks. You can schedule your interview by giving me a call at _____. You can also reach me by text at that number; or reply to me here.

Thank you for considering this invitation. We hope to hear from you soon. If you have any questions, please contact me by phone, text or email.

Sincerely,

Isabel Staton
Undergraduate Research
Emory University

Appendix B: Interview Introduction Script

Hello, thank you so much for meeting me today to complete this interview.

I'm Isabel, an undergraduate researcher in Anthropology going into my senior year at Emory. I also have been working at a sustainable farm, Snapfinger for a year now. We're doing this interview as part of my honors thesis project that I will be completing this year.

Before we get into questions, I wanted to give you a quick summary of my project. So, this is under the same IRB as a larger project that Hilary talked to you about called Managing Markets that is funded by Southern Sustainable Agriculture Research and Education (SSARE) program.

Extreme weather events have been increasing around the world, and farmers are seeing the impact of this in Georgia as well. In the past few years there have been several extreme weather events including Winter Storm Elliott this past December with record lows for several days. This storm caused major disruptions for farmers across Georgia and resulted in the loss of many people crops.

I'm seeking to understand some of the impact of storms like these on farmers, and some of the practices used to handle these situations, as well as considering the role and impact of potential support systems meaning anything from the government, NGOs, or local communities.

Appendix C: Verbal Consent Questions

Do you have any questions about anything I just said? Were there any parts that seemed unclear?

Do you agree to take part in this study?

Do you agree to be recorded?

May we contact you at a later study phase to discuss publishing your data with identifiers, such as your organization's name?

If yes: Name of Participant _____

Signature of Person Conducting Informed Consent Discussion: _____

Appendix D: Interview Questions for Farmers

1. Let's get started with how long you've been farming and where your farm is located.
2. How did you get to where you are as a farmer? (What got you started, why did you like it?)
3. What products do you sell?
4. Are there aspects to your farm's location or general layout that provide advantages or disadvantages to weather?
5. What are some of the goals you have for your farm?

This project is funded by Southern Sustainable Agriculture Research Education (SSARE), and one of their pillars is thinking about farmers' quality of life. But what that means and what it

includes is something that SSARE has had a hard time defining. We are trying to understand how farmers define quality of life and what shapes it.

6. Would you list a few of the things that shape *your* quality of life as a farmer? Which of these matters most to you? Can you list things that detract from your quality of life as a farmer?
7. How would you define quality of life for a farmer?

Another pillar of SSARE concerns farm economics. We know that people have many economic goals for their farms. We hope to understand these through these interviews.

8. How would you define economic viability for a farmer? Thinking about yourself, how do you know whether your farm is economically successful?
9. Would you list a few of the things that shape *your* economic viability as a farmer [*probe: off-farm income, family labor*]? Which of these matters most to you?
10. How do you currently sell your product? (Farmers markets, wholesale? CSAs?)
 - a. What you do think is the most important outlet?

This interview focuses on the impact of Storm Elliott on small-scale farmers. This section asks about your experiences related to the storm.

11. Can you tell me a bit about how Winter Storm Elliott (or the Dec 2022 deep freeze) impacted your farm?
 - a. Production capacities? Sales?
12. What changes to your activities did you have to make due to storm impacts?
 - a. Changes to participation in sales outlets? Changes to business plans?
13. If you continued to sell at farmers markets, can you tell me about your experience selling during the weeks following the storm?
14. What, if any, actions did market management take to support you or other farmers during this period?
 - a. How did these policies affect you?
 - b. Can you recall specific examples of the things that market management did.
15. Where there any other supports your farm was able to receive? (Insurance payments, labor swaps, grants, anything else?)
 - a. If yes: For X, where you receiving support from, how you were able to find it, and what it helped your farm? (Government, Farmers market organization, local community?)
16. Are there any supports you wish that you had received?
 - a. If so, what are they and how might they have helped?

I'd also love to hear about your thoughts about how you are thinking about future risk management related to weather.

17. How did the storm impact your ability to meet the goals that you have for your farm?
18. Are you taking any steps to mitigate against future extreme weather events? If so, what are these?
19. How does diverse production play a role in your farm business?
20. As weather events become more extreme, are you considering plans to protect against losses?
 - a. Do you use crop insurance?
 - b. Weather prevention methods?

21. Looking towards the future, are there changes you would like to see in the food system that could help support sustainable farmers during disaster situations? (from the government, NGOs, other farmers, customers).
22. As we're wrapping up, do you have any other stories of experiences with other natural events or things that impacted the farm's ability to produce that you would like to share?

Appendix E: Interview Questions for Organizations

1. Could you tell me a bit about yourself and your background? (How did you start working with farmers markets?)
2. What is your job title and role at [organization]?
3. Could you tell me about your work with farmers through the farmers markets?
4. And could you tell me a bit more about your organization?
5. Where does it receive funding from?
 - a. Government programs?
6. What would you say the major goals of your organization are? If you had to rank these what would be most important?
7. Under normal circumstances how would you describe the relationship between your organization and farmers?
8. How would you describe your relationship with farmers and vendors?

Interview Script: This next section is getting more into the Winter Storm this last December.

9. Could you tell me a bit about how Winter Storm Elliott impacted your work?
 - a. Impacted the market?
10. Do you have any specific stories about this period?
11. How long were you seeing this impact?
12. As extreme weather events like this become more common, has your organization planned other policies to have in place in case another event like the cold front occurs?
13. What do you perceive the role of your organization in supporting farmers?
14. Did the cold front change this interpretation at all?
15. Do you wish anything could have gone differently in the reaction to the cold front?
16. Looking towards the future, are there changes you would like to see in the food system that could help support sustainable farmers during disaster situations? (From the government, NGOs, farmers, customers.)
17. Thank you so much for your time today, if I have any further questions, may I contact you again?

Appendix F: Codebook

Parent Code	Child Code	Grandchild Code	Code Definition
Change	Crop decline		Farmer speaking about crops struggling when they used to not. Not referring to an expectation of the future, but observations of changes that have already occurred, or are present changes.
	Weather events		Farmer speaking about weather events changing frequency. Not referring to an expectation of the future, but observations of changes that have already occurred, or are present changes.
	Increased Heat		Farmer speaking about increasing heat. Not referring to an expectation of the future, but observations of changes that have already occurred, or are present changes.
Outside Support	Government		The government providing a service or money to help a farmer. Including, but not limited to crop insurance, emotional support, or extra labor.

	Farmers Market Management		The market providing a service or organizing something to help farmers. This can include things that are financial, emotional, or extra labor.
	Civil Society Organizations		Organizations providing a service or organizing something to help farmers. This can include things that are financial, emotional, or extra labor.
Relationships	Farmer to Farmer		When a farmer or group of farmers has an interaction between each other.
		Collective Reliance	Some farmers express the belief that the success of other farmers also leads to their success. This code is meant to capture that believe.
	Farmer to Customer		Anytime a farmer and customer have an interaction, or express general opinions of one another.
	Farmer to Market Manager		Anytime a farmer and market management have an interaction, or express general opinions of one another.
	Farmer to Government		Interactions between government agencies and agents with farmers. Also applies to farmers expressing

			opinions about their relationships with these agencies.
Risk Management	Crop Insurance		Farmer either having or not having crop insurance. Not referring to future plans to get crop insurance. Must have crop insurance before or during the interview.
	Crop Diversity		There are many reasons why a farmer might have diverse crops but if they mention that it partly has to do with preventing the destruction of their entire farm if one gets destroyed. Not meant to capture future plans.
	Infrastructure		Current or past practices used to reduce susceptibility to weather events on the farm. This can include things like barns, hoop houses, etc. Not meant to capture future plans.
	Schedule		Plans around when to plant, harvest, weed, or do other farm activities. Not meant to capture future plans.
	Cultural Practices		Farmer identifying using cultural practices such as cover cropping, or crop rotation as a risk management

			strategy. Not meant to capture future plans.
Impact of the Storm	Animal Death or Illness		Animal loss due to the storm.
	Crop Loss		Crop loss due to the storm.
	Destruction of Equipment		Destruction of equipment due to the storm.
	Market Attendance		Farmer mentioning impact to farmers market attendance because of the storm.
	Loss of Sales Outlet		If a farmer was unable to sell during the impact of the storm this will capture that. Includes any mentions of being unable to sell whether that outlet was not open or accepting or if they did not have enough to sell.
	Access to Necessary Supplies		Impact to a farmer's ability to get the resources they need for the farm.
Future Plans and Expectations	Environment		Farmer reflections on the future changes in the environment that might be impacting the way they are running their operation.
	Risk management		All the plans, ideas, and possibilities discussed. What someone might be doing in the future. What they worry might have in the future.
		Crop Insurance	Future plans to enroll in crop insurance
		Crop portfolio changes	Farmer is going to change the

			types of crops they grow in a season because it will be more risk averse.
		Infrastructure	Anything on the farm that is structural that they will be adding or getting rid of for the
		Changing growing schedule	Farmer mentioning, they are planning on changing the time of year they do certain activities on the farm.
Food system literacy	Customer perceptions of the food system		Customers do not always have full awareness of the experiences of the farmers and market managers. This is meant to capture customer knowledge. Whether this is mentions of high knowledge and interest, or lack of.
	Farmer navigation of support systems		Farmers have a variety of knowledge about the options available to them in the support system area. This is meant to identify a farmer's knowledge of how to find these.
Desired Changes	Government		Recommendations for government changes that the farmer thinks would help them.
	Civil society		Recommendations for civil society changes that the farmer thinks would help

			them.
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