Exploring the Barriers to Entry to Agriculture: Challenges Facing Beginning Farmers in North Carolina

by

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Executive Summary

Agriculture is inextricably linked to issues of hunger, food security, and the environment. As our global population grows, food demand grows with it. Modern food systems—which are dominated by industrial agriculture—are ill-equipped to meet global food demand. Industrial farming operations pollute surrounding communities, deplete natural resources, emit greenhouse gases, degrade the land and soils, and harm biodiversity. The net result is widespread food insecurity, hunger, malnutrition, and intensifying pressures on the environment.

American agriculture—embedded in this larger global context—faces its own set of challenges. Our farmer population is aging and our reliance on industrial agriculture is taking a toll on farmland, soils, and natural resources. Yet, a growing local food movement offers hope for a more sustainable future and fuels the possibility of a shift away from industrial agriculture. By localizing our food systems and using agroecological principles to guide the development of sustainable farms, we can create agricultural systems that enhance food security while simultaneously building farmland resilience. To do this, we need an influx of new, conservation-minded farmers.

Recognizing this need, conservation and agriculture professionals are working to equip a new cohort of beginning farmers with the tools, knowledge, and resources they need to farm sustainably and, in doing so, change the course of agriculture in this country. To be most effective, these professionals must understand the barriers beginning farmers encounter when transitioning into the profession. This paper investigates the barriers beginning farmers face and explores the programs and resources that help them overcome these barriers. It also explores the various policies and programs that encourage and incentivize sustainable farming practices.

I begin this paper with a broad look at studies that examine the barriers to entry to agriculture in the United States. I then narrow my focus—using interview and survey research methods—to investigate more in depth the experiences of beginning farmers in North Carolina. Using insights gleaned from the literature and my own research, I offer programmatic recommendations to the Triangle Land Conservancy and other conservation land trusts in North Carolina.

My literature review revealed that access to affordable land is consistently cited as the greatest barrier to entry to agriculture. Other significant barriers include startup capital, limited experience with farming, lack of knowledge about business planning, discrimination, student loans, access to markets, affordable housing, affordable healthcare, labor, climate change, farm policies, and need for off-farm income. How these barriers were ranked in terms of significance, however, varied from study to study.

From my survey of 138 North Carolina farmers (95 beginning farmers and 43 experienced farmers), I found that most identified access to affordable land and startup capital as the most significant barriers to entry to agriculture. Ranking at a somewhat distant third was lack of experience with farming. I found no statistically significant difference between beginning farmers and experienced farmers in terms of what they identified as the most significant barrier.

When asked about their participation in various farm programs, beginning farmer respondents indicated high rates of participation in sustainable agriculture workshops, on-the-farm trainings, and business planning workshops. There were lower rates of participation in apprenticeship programs, NRCS cost share programs, mentoring programs with experienced farmers, farm incubator programs, multi-farm CSAs, and farm equipment share programs. Regardless of participation numbers, however, beginning farmer respondents rated all but one of these programs (the multi-farm CSA) as either "crucial" or "very helpful" in their transition into agriculture, indicating they perceived these programs to be very valuable.

Survey results also indicated that most farmer respondents (beginning and experienced farmers) use a variety of sustainable farming practices on their farms. More than 70% use crop rotation (82%), organic growing practices (76%), cover cropping (75%), natural buffers (73%), and/or pollinator habitats (71%) on their farms. The high percentage of respondents who use sustainable practices is unsurprising given that all respondents were on listservs of sustainable agriculture and conservation organizations. However, the literature indicates that beginning farmers generally demonstrate higher levels of commitment to building farmland resilience and are more likely to use sustainable farming practices than their more experienced counterparts. Further, small-scale, first-generation farmers—who comprise the majority of beginning farmers—place high importance on sustainable agriculture and sustainable local food systems and are more likely than multi-generational farmers to use ecological values to guide their farm management practices.

Based on my literature review and survey results, I offer the following recommendations to conservation land trusts in North Carolina:

1. **Connect with Similar-Missioned Organizations.** Sustainable food system work requires collaboration, and partnerships encourage organizations to share resources and ideas and to identify community needs that are not being met.
2. **Consider Implementing Incubator Farms, Farm Apprenticeship Programs, Mentor Programs, and/or Farm Equipment Share Programs.** All four of these programs address several significant

barriers to entry to agriculture, and all were deemed “crucial/essential” or “very helpful” in beginning farmers’ transition into agriculture.

3. **Outreach to Beginning Farmers**. Outreach can take many different forms—such as hosting workshops, community events, or farm visits—and should be inclusive.
4. **Engage the Community Around Local Food Issues**. This can be a powerful way to maintain or increase the salience of local food and sustainable farming issues.
5. **Improve Market Access for Beginning Farmers.** Ways to enhance market access include establishing farmers markets, organizing multi-farm CSAs, overseeing food hubs, or helping farmers develop value-added goods.
6. **Provide Long-Term Lease Arrangements**. Most beginning farmers have short-term leases (1-5 years) but desire longer leases (10 years is the ideal lease length according to my survey results).
7. **Work for Structural Change.** Programming must be designed in a way that acknowledges the larger structural forces at play and reinforces and complements other work being done to break down barriers.

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Introduction

Global agriculture is inextricably linked to issues of hunger, food security, and the environment. With a global population of 7.7 billion, and a projected increase of over two billion by 2050, there is high and growing demand for food (Horrigan et al. 2002). Modern food systems, which are largely unsustainable, are not meeting this global food demand. Industrial agriculture—a central component of unsustainable food systems—depletes natural resources, degrades the environment, and exacerbates food injustice (Horrigan et al. 2002). The result is widespread food insecurity, hunger, malnutrition, and intensifying pressures on the environment (FAO 2018). According to the 2018 Food and Agriculture Organization of the United Nations' State of Food Security and Nutrition in the World (SOFI) report, 821 million people currently experience chronic hunger and malnutrition. Additionally, two billion people suffer from micronutrient deficiencies (Beck et al. 2016). The 2018 SOFI report points to global conflict and climate change as two primary drivers of food insecurity, and, by extension, hunger and malnutrition. The report sheds new light on the linkages between climate change and hunger, asserting that "climate variability and extremes are also a key force behind the recent rise in global hunger…[and are]…one of the leading causes of severe food crises" (FAO 2018). Other studies show that climate change-induced weather extremes and extreme weather events can have devastating impacts on agricultural productivity and threaten food systems that are already stressed (e.g. Lipper et al. 2014).

It is in this context that global agriculture has reached a critical juncture, and societies are faced with an important choice. We can continue to develop conventional industrial farming systems that use toxic chemical inputs, pollute surrounding communities, deplete natural resources, emit greenhouse gases, degrade the land and soils, and harm biodiversity (Gliessman 2015). Alternatively, we can localize our food systems and use agroecological principles to guide the development of sustainable farms. By choosing the latter path, we can create agricultural systems that enhance food security while simultaneously building farmland resilience. Such systems can build and nourish soils, prevent erosion, provide habitat for pollinators, conserve water and natural resources, protect and promote biological and landscape diversity, and restore and protect important ecological functions (Gliessman 2015). How we choose to grow food today will profoundly impact the well-being of our global population both now and in the future and could "become central for human survival on this planet" (Beck et al. 2016).

American agriculture—embedded in this larger global context—is also at a crossroads. The confluence of several factors has launched agriculture onto the American public agenda. First, the farmer population in the United States is aging. As older farmers transition out of the profession, they are not being replaced in equal numbers by new farmers. Second, the American food system is

dominated by industrial agriculture, which degrades the environment, depletes natural resources, and is unsustainable. Expanding awareness of the perils of industrial agriculture has heightened the salience of this issue, leading to the third factor: there is a great deal of public interest in and enthusiasm for locally and sustainably grown foods in the United States.

Given this combination of factors, there is both a need and an opportunity for an influx of new and conservation-minded farmers in the United States. Organizations, agencies, and sustainable agriculture professionals are working across the country to support a new generation of conservation-minded farmers by engaging in farmland conservation and by developing programs that help beginning farmers transition into farming. By developing a better understanding of the experiences of beginning farmers, agriculture and conservation professionals will be better equipped to provide helpful resources and services to these farmers.

In this paper I take a deeper look at American agriculture, with its need for new, conservation-minded farmers. I explore the barriers that beginning farmers face as they transition into agriculture, the resources that help them overcome these barriers, and the ways that various policies and programs encourage and incentivize sustainable farming practices. I also present findings from my survey research that investigated the experiences of beginning farmers in North Carolina. Using insights gleaned from my in-depth review of the literature and survey research, I make recommendations to the Triangle Land Conservancy and other North Carolina land trusts interested in developing programming for beginning farmers.

Background

The American Agricultural Context

Four important factors currently shape the American agricultural context: an aging farmer population, food systems dominated by industrial agriculture, climate change, and a growing local, sustainable food movement. The following subsections explore each of these contextual factors.

Aging Farmer Population: According to the 2012 Census of Agriculture report, the average age of farmers in the United States is over 58 (Calo 2017), and the fastest growing age group of farmers is the 65+ category (Obudzinski 2016). Additionally, most farmland owners (non-operators) are 65 and older (Carolan 2018). In fact, farmers under 35 account for only 6% of principal farm operators (Katchova & Ahearn 2016). This may be due, in part, to the fact that many farmers opt to earn college

degrees and work off-farm jobs before launching their farm businesses. These choices delay their entry into farming and impact the number of younger farmers in operation (Katchova & Ahearn 2016).

As the American farmer population ages and retires from the profession, the USDA's National Agriculture Statistics Service estimates that close to 100 million acres of land—nearly 10% of American farmland (Jablonski et al. 2017)—will transfer to other farmers (Obudzinski 2016; Ackoff et al. 2017). Longer-range estimates indicate that close to 70% of farmland will change hands by 2031 (Carolan 2018). An influx of new farmers will be required to farm these lands.

Industrial Agriculture and Climate Change: Over the last century, and particularly since WWII, American agriculture has become increasingly industrialized (Dimitri et al. 2005; Union of Concerned Scientists n.d.a). Industrial agriculture is energy- and resource-intensive and is heavily reliant on synthetic inputs (pesticides, herbicides, and fertilizers) that pollute the land, water, and air. It is dominated by large-scale, monoculture operations that cause biodiversity loss (Union of Concerned Scientists n.d.a; Horrigan et al. 2002). It is characterized by unsustainable management practices that can lead to erosion, soil nutrient depletion, and desertification. It is responsible for significant greenhouse gas emissions and, therefore, is a major contributor to climate change (Horrigan et al. 2002). This creates a destructive two-way exchange, whereby industrial agriculture contributes to climate change, and climate change wreaks havoc on agriculture (e.g. Lipper et al. 2014).

Given this context, there is a clear need to build farmland resilience to ensure that farmland remains viable long into the future. Sustainable farming practices can help build resilience, as they can protect biodiversity, curb greenhouse gas emissions, restore ecological functions, prevent erosion, minimize pollution, and conserve natural resources.

Local, Sustainable Food Movement: As awareness of the devastating impacts of industrial agriculture on the environment, human health, and rural economies has grown, so too has public interest in sustainable food systems. In recent years, the local food movement has gained traction and momentum in the United States (Schupp 2017; Beckett & Galt 2014), resulting in an increase in demand for locally-sourced, sustainably-grown food. With this expanded interest and demand, new, alternative markets have emerged. The numbers of farmers markets, farm stands, and CSAs (community supported agriculture) have grown (Brown & Miller 2008). Restaurants are tapping into this local energy by featuring local, sustainable foods on their menus. There is also a greater interest in small-scale,

diversified, sustainable farms, specialty mid-size farms (Gillespie & Johnson 2010), and urban agriculture (Castillo et al. 2013).

Barriers to Entry to Agriculture

If stakeholders are going to address the need for new, conservation-minded farmers, they must understand the barriers these farmers encounter when transitioning into the profession. A review of the literature revealed a number of barriers—most of them structural—to entry to agriculture. While each barrier is distinct, they are all interconnected. Though not an exhaustive list, the following barriers are ones that were most frequently mentioned in the literature.

Access to Affordable Land: Studies consistently identify access to affordable land as the greatest barrier to entry to agriculture (e.g. Ackoff et al. 2017; Frost 2017). A 2017 survey conducted by the National Young Farmers Coalition found that 61% of young (under 40) farmers identified land access as the greatest barrier to entry (Manning 2019). When beginning farmers search for farmland, they frequently find that it is either prohibitively expensive, lacking necessary infrastructure, or situated in an undesirable location. Sometimes they are not even aware of available farmland, since land transfer occasionally occurs through channels that are virtually closed off to small-scale beginning farmers (Calo & De Master 2016).

According to the USDA's Economic Research Service (ERS), most beginning farmers start small, with 97% of beginning farms considered small-scale operations (USDA-ERS 2017). Many small-scale beginning farmers sell their products direct-to-consumer through markets such as CSAs and farmers markets (Low et al. 2015; Jablonski et al. 2017). These markets typically are in or near urban areas. Unfortunately, finding affordable land in urban and peri-urban areas is particularly challenging because this land is valued extremely high and is priced beyond what many beginning farmers can afford (Calo & De Master 2016; Harper 2015). Converting less expensive urban land, such as vacant lots or brownfield land, to farmland can also be prohibitively expensive (Castillo et al. 2013).

When land purchase is not a viable option, many beginning farmers consider leasing land. However, leasing arrangements can be very tenuous, and many leases are short-term, both of which disincentivize farmers from making important investments in the land (Ackoff et al. 2017; Calo & De Master 2016; Manning 2017). When a farmer leases land instead of owning it, the farmer's incentive to improve the quality of the land (e.g. better crop yield, farm business growth, etc.) is tempered by the

disincentive of not being able to take that investment with them if they are forced to establish their farm elsewhere (Calo 2017; USDA-ERS 2013).

Startup Capital: Studies also point to lack of startup capital as a major barrier to entry to agriculture. Young, beginning farmers oftentimes lack the requisite funds to establish a farm business, and many find it difficult to get loans (Calo 2017).

Lack of Agricultural Knowledge and Experience: Lack of knowledge about and/or experience with farming is another major barrier to entry to agriculture. One reason for this is that most beginning farmers in the United States do not come from farming backgrounds; thus, they do not get the type of experiential exposure to farming that comes from growing up on a farm (Carolan 2018; Ackoff et al. 2017). Though this absence of a farming background does not preclude beginning farmers from developing the knowledge, skills, and certifications necessary to successfully establish and grow a farm business, it does make it more challenging (Castillo et al. 2013).

Lack of Knowledge about Farm Business Planning: Many beginning farmers lack deeper knowledge about or experience with farm business planning, record keeping, and accounting (Manning 2017). These skills are extremely important for successfully running a farm business.

Discrimination: Decades of discriminatory practices by the USDA and Farm Service Agency (FSA) have effectively prevented many farmers of color from becoming farm owners (Ackoff et al. 2017). To this day, FSA loans continue to favor white, English-speaking, male farmers of certain socioeconomic statuses (Calo & De Master 2016; Calo 2017). The number of black farmland owners is declining, and Latinx farmers—who make up the majority of farm labor—oftentimes are denied the means to start their own farm businesses (Ackoff et al. 2017).

In their study of immigrant farm workers in California, Calo and De Master (2016) found that structural barriers, more than insufficient farming knowledge and experience, impeded many immigrant farmers from starting their own organic farms. Though these farmers were highly motivated to start farm businesses and had deep, specialized experience with organic farming, they encountered land access and sociocultural barriers that effectively prevented them from starting their own organic farms (Calo & De Master 2016). For example, Calo and De Master (2016) found that the ways landowners

perceived immigrant farmers—making assumptions about the farmers' trustworthiness or reliability—profoundly limited these farmers' ability to buy or lease land.

Student Loans: More farmers than in the past are choosing to pursue higher education before entering agriculture (Katchova & Ahearn 2016). Many of these future farmers take out student loans to complete their studies. This means that many beginning farmers are saddled with student loan debt, making it much more difficult for them to get farm loans. Without access to startup capital and the ability to get farm loans, starting a new farm business may be virtually impossible (Ackoff et al. 2017; Manning 2017).

Limited Access to Markets: Many beginning farmers start as (and oftentimes remain) small-scale, specialty farm operators. As such, they oftentimes seek direct-to-consumer markets to sell their products. These types of markets are found in greater numbers in urban and peri-urban areas, where the cost of agricultural land is much higher than in rural areas. Thus, many beginning farmers face a near-impossible situation where the most affordable land is farthest away from the most desired markets.

Affordable Housing and Affordable Healthcare: For many young, beginning farmers, finding affordable housing and affordable health insurance pose significant challenges to becoming and remaining a farmer (Ackoff et al. 2017).

Labor: Many beginning farmers say that they lack the means to employ the number of skilled farm workers necessary to maintain and grow farm operations (Ackoff et al. 2017)

Climate Change: Climate change is causing an increase in unpredictable weather extremes and extreme weather events, and most farmers have experienced the impacts of these changes (Ackoff et al. 2017). Changes in seasonal temperatures impact how farmers grow food and what foods they choose to grow. Increases in drought and flooding events threaten to destroy crops and reduce yields. These climate change-induced extremes have created less favorable conditions for beneficial insects and more favorable conditions for pests. Collectively, the impacts of climate change are increasing the risks associated with agriculture and potentially diminishing the attractiveness of entering the profession. For

beginning farmers trying to establish and grow their farm businesses, climate change presents a formidable challenge.

Farm Policies: Historically, farm policies in the United States have favored large-scale, monoculture farming operations (Carolan 2018). Farm policies today still generally favor these types of operations, but some headway has been made to support farmers that have been excluded from government support in the past. However, while recent farm bills have carved out funding for programs that target beginning, historically underserved, organic, and conservation-practicing farmers and ranchers, many of these farmers and ranchers lack familiarity with, knowledge about, and trust in federal farm programs. Thus, many are not accessing these resources (Ackoff et al. 2017).

On a local scale, many cities lack clear, agriculture-inclusive ordinances (Castillo et al. 2013). This can translate into ordinances that are too specific and confining for farmers to feasibly establish farms in urban areas (Castillo et al. 2013).

Need for Off-Farm Income: For many beginning farmers, farm revenue is not enough to allow them to farm exclusively. Rather, many small- and mid-size farm operators require off-farm income to make ends meet (Gillespie & Johnson 2010). A 2017 survey conducted by the National Young Farmers Coalition found that 61% of farmer respondents require off-farm income to make ends meet (Ackoff et al. 2017). This issue is compounded by the fact that the costs of urban farming or farming near urban centers is (oftentimes prohibitively) high (Castillo et al. 2013), health insurance and housing can be very expensive, startup costs for farms are enormous, and unpredictable and extreme weather can make farming too risky without an additional income.

Programs that Address the Barriers

Stakeholders across the country are using a variety of approaches to address the barriers to entry to agriculture. Many approaches—such as providing workshops and trainings—focus on equipping beginning farmers with the knowledge and skills necessary for running a successful farm operation. Other approaches aim to address the deeper structural barriers that impose unfair disadvantages on certain groups of farmers.

Given the focus of this paper, this section begins with a review of the types of programs that conservation land trusts are implementing to help beginning farmers transition into agriculture and encourage them to adopt sustainable practices. The programmatic focus of this section is not to

diminish the critical importance of the role that land trusts play in farmland conservation: well-designed conservation easements can help protect farmland, promote conservation farming practices, ensure land affordability, and encourage the transfer of land to beginning farmers (Obudzinski 2016; Ackoff et al. 2017). Rather, the intent of this section is to explore beginning farmer programs that complement this important conservation work.

Workshops and Trainings: Many land trusts and sustainable agriculture organizations offer a variety of workshops and trainings aimed at equipping farmers with knowledge about organic growing practices and sustainable farming techniques. On-the-farm trainings and demonstrations give beginning farmers opportunities to try different conservation farming techniques, practice using farm equipment and implements, learn how to construct hoop houses, gain knowledge about composting, try their hands at beekeeping, learn how to install irrigation and water catchment systems, etc. These workshops and trainings also provide farmers invaluable opportunities to learn from and teach each other and cultivate long-lasting relationships with their peers (Carolan 2018).

Land trusts and other organizations also offer farm business planning workshops that give farmers opportunities to learn how to write business plans, get feedback from professionals about the viability of business plans, learn effective record-keeping techniques, gain accounting skills, and learn about effective marketing strategies. While participation in these knowledge enhancement programs can be very beneficial to beginning farmers, they may continue to face structural barriers that make entry into agriculture extremely challenging (Calo 2017).

Incubator Farms: Incubator farm programs—which address the need for new, sustainably-minded farmers—are becoming more prevalent as more funding (particularly from USDA's Farming Opportunities Training and Outreach program, formerly the Beginning Farmer and Rancher Development Program and the Outreach and Assistance for Socially Disadvantaged and Veteran Farmers and Ranchers Program) becomes available (Calo & De Master 2016). Incubator farm programs offer beginning farmers opportunities to lease small parcels of land at affordable rates and access shared farm resources and equipment, while also offering these farmers a variety of learning opportunities. Incubator farms provide low-risk contexts in which farmers can learn about and practice sustainable growing techniques. They enable farmers to grow their farm businesses—find markets, cultivate relationships with customers, develop marketing and business strategies, gain expertise in growing a

variety of foods, experiment with innovative growing techniques, etc.—while also building relationships with and learning from both experienced and beginning farmers (Calo & De Master 2016).

Incubator farms oftentimes serve diverse and socially disadvantaged farmers, such as immigrants, farmers of color, veterans, refugees, and women. In doing so, incubator farms can shield farmers from the structural barriers they will encounter once they leave the program (Calo & De Master 2016). Thus, incubator farms can offer farmers incredible, immersive learning opportunities in which farmers can grow their farm businesses; however, they may fall short of helping farmers overcome structural barriers, such as access to land and discrimination (Calo & De Master 2016).

Apprenticeship Programs: Farm apprenticeship programs provide aspiring farmers with intensive, hands-on farming experiences. Apprentices work alongside experienced farmers and learn about all aspects of running a farm business. Apprenticeship programs offer a window into farm life and, in doing so, help aspiring farmers determine whether they want to pursue farming as a profession. Apprenticeships can also serve as a stepping stone to incubator farm programs. As the sustainable food movement has gathered momentum in the United States, there has been a parallel increase in the number of apprenticeship-type programs (Perez et al. 2010). Apprenticeship programs vary, but a common theme among the successful programs is their commitment to providing whole-farm education and training for the apprentice, integrating aspiring farmers into planning decisions and troubleshooting conversations, and offering these farmers a structured and formalized farm education (Adams 2018; Zasada n.d.; NSAC 2016)

Urban Agriculture: Some land trusts have established urban farms that serve as CSA, volunteer, teaching, and farm stand sites. Urban farms restore and protect important ecosystem functions, provide landscape diversity, promote biological diversity, provide habitat for pollinators, and benefit the environment in numerous other ways. They provide green spaces, which bolster community and public health (Castillo et al. 2013). They address food desert and community malnutrition issues and enhance food security (Horrigan et al. 2002). They help people build meaningful connections to their food and to the land (Castillo et al. 2013).

As education sites, urban farms help beginning farmers learn about and practice conservation farming techniques while networking with other farmers. As CSA and farm stand sites, urban farms bring healthy, whole foods to the surrounding neighborhoods, which can be especially beneficial when the

urban farm is in a food desert. As volunteer sites and community green spaces, urban farms can rally the community around the development of sustainable local food systems.

Food Hubs: Many beginning farmers have small-scale farms and, thus, lack the operational capacity to market and sell foods to large institutions, such as schools or hospitals. To remedy this, some land trusts oversee (oftentimes grant-funded) food hubs, where food is aggregated from many local farmers and then sold to institutions. Food hubs can also provide cold storage and other types of infrastructure that beginning farmers lack. The 2018 Farm Bill allocated money for the development of local food systems, and food hubs fall within the scope of fundable projects (NSAC 2018). Food hubs, thus, make it feasible for small farmers to sell to institutions and earn additional revenue (Hamilton 2013).

Food hubs can also be instrumental in shifting food system dynamics so that local food systems are more just and inclusive. As noted in a 2018 Race Forward and Center for Social Inclusion report, "Food hub and good food systems work is often much more than just meeting market demands—it's rooted in countering dispossession, building power, reclaiming culture, improving health conditions, growing economic opportunities, and dreaming and reclaiming alternate realities. It is about meeting immediate needs that the larger food system ignores and about contributing to the well-being of vulnerable communities, including communities of color" (Cooper 2018). Land trusts can play an integral role in this important work.

Community Commercial Kitchens: Like with food hubs, access to affordable commercial kitchen space can give small farmers an opportunity (which they might not otherwise have) to expand their revenue streams. Farmers can use commercial kitchens to produce value-added goods, which can carry high dollar values. When land trusts oversee commercial kitchens, they can ensure that beginning and underserved farmers have access to this resource, which might otherwise be prohibitively expensive (Hamilton 2013).

Farmer Outreach: Many land trusts are well-positioned to engage in outreach to local farmers. Farmer outreach can serve to connect farmers to resources and programs, equip them with the resources necessary to apply for federal programs, connect them to other farmers in the area, and connect them to new markets.

Farmer Networks: Land trusts and other organizations can also play a role in building farmer networks. Farming can be an isolating profession, and farmer networks provide pathways for beginning farmers to get to know each other, share ideas and troubleshoot problems that arise, learn innovative and effective conservation farming techniques and strategies, and establish resource-sharing channels. A study by Carolan (2018) found that farmer networks can be an invaluable way for farmers to transfer knowledge, which is especially important for first generation farmers. And, especially as farmer demographics shift, farmer networks that are inclusive and that welcome and embrace all farmers are playing an increasingly important role in connecting beginning farmers (Carolan 2018).

Connecting Farmers to Farmland: Land trusts can play an important role in connecting beginning farmers to high quality, affordable land (Beckett & Galt 2014). They facilitate these connections by developing strong conservation easements that keep land prices affordable and prioritize transfers to beginning farmers; offering long-term lease arrangements on land trust farmland; offering transition support (e.g. transitioning from incubator farmer to farmland owner); and/or facilitating farmer-landowner linking programs (Ackoff et al. 2017).

Community Engagement: Another approach to dismantling barriers to entry to agriculture is to harness the energy of the local food movement to increase consumer access to and demand for locally and sustainably grown foods. Conserving farmland and building sustainable food systems are partner goals, and land trusts can work on both simultaneously. Ahearn (2011) notes that "small farms, whether beginning or established, are more likely to be involved in local foods and agritourism than larger farms. Development of these local niches may prove to be an avenue to entry and sustainability for beginning farmers."

Land trusts can engage the community in a variety of ways. They can manage urban farms and engage the community by hosting farm volunteer days and farm tours. They can establish farmers markets in low food access neighborhoods. They can secure funding to double SNAP dollars for locally grown foods. They can help facilitate farmer cooperatives and the establishment of multi-farm CSAs. They can connect farmers to local restaurants, which can feature local farms and farmers on their menus. They can host community workshops and farm-to-fork events to pique public interest in growing and cooking farm fresh foods. By engaging in these types of activities, land trusts can connect people to their food in meaningful ways and, in doing so, link healthy, whole foods to land conservation goals (Beckett & Galt 2014).

Youth Engagement: Farm to School and youth farmer programs help connect young people to their food. Through Farm to School programs, students grow food in school gardens, use school garden-grown foods to make nutritious snacks and meals, learn about the entire farm-to-fork process, and eat locally grown foods in their school cafeterias. Youth farmer programs provide immersive farm experiences to young people, connecting them to their food and to the land, exposing them to farming as a career choice, teaching them about sustainable growing practices, and inspiring nutrition-related behavior change.

All the programs described above can greatly benefit beginning farmers and help them navigate the transition into farming as a profession. However, the benefits of these programs are not always equally distributed, instead favoring "those who are highly educated, well-resourced, and white" (Calo 2017). As such, many beginning farmers find the existing programs to be "insufficient" and "unjust" (Calo 2017). Additionally, many programs emphasize developing farmers' knowledge and skills, while doing less to address the structural challenges that many small-scale, beginning farmers face (Calo 2017). Programs that support historically underserved farmers or that target underserved communities begin to dismantle some of these structural barriers, but more work is needed on this front.

Policy Context

On the policy front, there are many farm programs designed to support beginning farmers, reduce barriers to entry, and advance conservation goals. The farm bill is the primary policy instrument for federal agricultural policy in the United States. First introduced in 1933 as part of FDR's New Deal legislation, the farm bill is an omnibus law that encompasses the entire food system (NSAC n.d.). Renewed approximately every 5 years, the farm bill's initial focus was on commodities support, but subsequent farm bills have evolved to include conservation, nutrition, horticulture, and bioenergy programs (Johnson & Monke 2017).

The most recent farm bill, the Agricultural Improvement Act of 2018, was signed into law on December 20, 2018 (Farm Aid 2018). This bill represents some important wins for beginning and socially disadvantaged farmers, farmland conservation, healthy food access, and sustainable food systems. The following subsections briefly outline these gains and acknowledge some losses, as well.

Beginning and Socially Disadvantaged Farmers: The 2018 Farm Bill combined the Beginning Farmer and Rancher Development Program (BRFDP) and the Outreach and Assistance for Socially

Disadvantaged and Veteran Farmers and Ranchers Program (also known as the 2501 program) to create the Farming Opportunities Training and Outreach (FOTO) program. In doing so, the 2018 Farm Bill gave the FOTO program permanent and increased funding (Bahrenburg et al. 2018; Farm Aid 2018). Of particular import to land trusts is the fact that FOTO prioritizes nonprofit and community-based organizations for grant funding (NSAC 2018).

The 2018 Farm Bill also includes policies that help beginning farmers make important financial investments in their farm businesses. The bill ensures that any beginning and socially disadvantaged farmers who are awarded EQIP funding can receive, up front, 50% of their cost-share award for installing a conservation practice (NSAC 2018). It also reauthorizes individual development accounts for beginning farmers and ranchers, although it does not mandate funding, nor does it allocate any money for this initiative (Bahrenburg et al. 2018; NSAC 2018).

In a huge victory for the National Coalition of Young Farmers, who worked tirelessly for the inclusion of such a mandate, the 2018 Farm Bill establishes a national Beginning Farmer and Rancher Coordinator. It also creates Beginning Farmer and Rancher Coordinators for each state "to improve outreach and assistance to new farmers, develop new strategies to support them, and connect the dots among service providers and USDA offices." (Bahrenburg et al. 2018). The bill also "includes a new data initiative on Land Access and Farmland Ownership to ensure that policymakers and the public have access to important trend data on farmland ownership, tenure, transition, barriers to entry, profitability and viability of beginning and [socially disadvantaged] farmers" (NSAC 2018).

Recognizing land access as a major barrier to entry to farming, the 2018 Farm Bill "allows for so-called 'Buy-Protect-Sell' transactions within ACEP, in which a land trust purchases vulnerable farmland, protects it with a conservation easement, and then transfers it to a farmer. This is an innovative and critical tool in getting young farmers on the land because, by enabling land trusts to add a conservation easement at the point of sale, it can significantly reduce the total price of the farm and make it accessible to younger producers. It also allows land trusts to move quickly in getting priority farmland off the open market, where it's often sold to non-farmers, and then find a farmer or rancher to sell it to" (Bahrenburg et al. 2018). The bill also enables land trusts to place stronger easements on farmland that keep farmland affordable for new and beginning farmers (Bahrenburg et al. 2018).

Urban Agriculture and Innovative Growing Techniques: The 2018 Farm Bill makes some important investments in urban and sustainable agriculture. It establishes the USDA Office of Urban Agriculture and Innovative Production, giving this office authority to create an advisory council, pilot

compost and food waste reduction programs, and award grant funding for innovative forms of production, such as aquaponics, hydroponics, urban agriculture, indoor growing, vertical growing, rooftop gardening, nonprofit farms, and community gardens (Filipowich 2018). The bill also expands funding for urban agriculture and innovative production research (Bahrenburg et al. 2018).

Conservation, Soil Health, and Climate Action: While representing only incremental changes to previous farm conservation policy, the 2018 Farm Bill does offer some important conservation policy improvements. The bill increases funding for the Agricultural Conservation Easement Program (ACEP), makes this funding mandatory, and includes new policy components to make the program more favorable to beginning farmers (Bahrenburg et al. 2018; NSAC 2018). It increases funding for the Conservation Reserve Program's (CRP) Transition Incentives Program, which helps connect retiring farmers to beginning and socially disadvantaged farmers (NSAC 2018). It makes National Organic Certification Cost-Share Program (NOCCSP) funding mandatory (Farm Aid 2018). It increases funding for organic and soil research (Farm Aid 2018) and makes funding for the Organic Agriculture Research and Extension Initiative (OREI) permanent and mandatory (NSAC 2018).

While the bill extends funding set aside for beginning and socially disadvantaged farmers through the Conservation Stewardship Program (CSP) and the Environmental Quality Incentives Program (EQIP), it does not increase this amount (NSAC 2018). Further, the bill reduces the total amount of funding allocated to CSP and EQIP by about $4 billion (Bahrenburg et al. 2018). Still, the bill acknowledges (without explicitly naming climate change) the need for building farmland resilience by placing greater emphasis on resilience-building in the major conservation programs (Bahrenburg et al. 2018). On the flip side, the bill fails to make climate change research a priority (Farm Aid 2018).

Healthy Food Access: In a win for healthy food access, the 2018 Farm Bill extends funding for the Supplemental Nutrition Assistance (SNAP) program and reauthorizes the Food Insecurity Nutrition Incentives (FINI) program. On the downside, it cuts funding for the Community Food Projects (CFP) grant program and fails to increase funding for or make programmatic improvements to the Farm to School Program (Farm Aid 2018).

Local Food Systems: The 2018 Farm Bill combines the Value-Added Producer (VAPG) program and the Farmers Market and the Local Food Promotion Program (FMLFPP) to create the Local

Agriculture Market Program (LAMP) and gives this program permanent funding (Farm Aid 2018; Bahrenburg et al. 2018).

Beginning Farmers and Sustainable Agriculture

Given the state of agriculture at local and global scales, it is imperative that we find ways to reduce barriers to entry to agriculture while simultaneously encouraging beginning farmers to adopt sustainable agricultural practices, such as cover cropping, crop rotation, integrated pest management, reduced/no till, soil and nutrient management, integrated farming, and crop and landscape diversification (Union of Concerned Scientists n.d.b). When farmers use sustainable farming practices, they can conserve natural resources, reduce greenhouse gas emissions, foster biodiversity, preserve ecosystem functions on farms, prevent soil erosion, build healthy soils, and build farmland resilience (Gliessman 2015). Building farmland resilience is crucial for protecting the health of the planet, enhancing social and environmental justice, and feeding people into the future (Gliessman 2015).

This paired imperative—reducing barriers to entry and promoting sustainable agriculture—is reflected in the missions and work of many organizations that serve beginning farmers (Calo 2017). In fact, in a review of 33 beginning farmer programs across the country, the overwhelming majority prioritized sustainable agriculture (Niewolny & Lillard 2010). Additionally, many sustainable agriculture organizations "like the National Young Farmer Coalition, Land for Good, the Farmer's Guild, Stone Barns Center for Food and Agriculture, and the New Entry Sustainable Farming Project, are targeting new farmers in outreach, networking, training, and policy advocacy events" (Calo 2017).

Not only are land trusts and sustainable agriculture organizations prioritizing sustainable agriculture programming for beginning farmers, but beginning farmers are also demonstrating greater commitment to building farmland resilience. This is due, in part, to the fact that beginning farmers are directly experiencing the negative impacts of climate change on agriculture, making them more likely to see climate change as a threat to their livelihoods and more likely to adopt practices to mitigate those impacts (Stuart 2018). According to a 2017 National Young Farmers Coalition survey, "the majority of beginning farmers, particularly those coming from non-farm backgrounds, are more likely than the general farming population to grow organically, limit pesticide and fertilizer use, diversify their crops or animals, and be deeply involved in their local food systems through community supported agriculture (CSA) programs and farmers' markets" (Carolan 2018).

Beginning farmers' commitment to farmland resilience is evidenced by other studies, as well. A study by Carolan (2018) found that small-scale, first generation farmers—who comprise the majority of

beginning farmers—placed high importance on sustainable agriculture and sustainable local food systems. In fact, the first-generation farmers in this study indicted their primary motivation to farm stemmed from ecological values and a sense of environmental stewardship. These farmers were also significantly more likely than multi-generational farmers to use ecological values to guide their farm management practices (Carolan 2018).

Sustainable agriculture programming is important in the larger American agricultural context. It can usher in a new wave of farmers who are committed to sustainable farming practices. Widespread adoption of sustainable agriculture can build the resilience of farmland and human communities. The same can be said of agricultural programming and sustainable agriculture at local levels. This paper now focuses on the experiences of beginning farmers in North Carolina, using interview and survey research to understand the barriers facing these farmers, identify the types of programs they are accessing to help them overcome the barriers, and get a sense of their commitment to and use of sustainable practices.

Methods

Period of Study

My initial meetings with the Triangle Land Conservancy (TLC) took place in late 2017. From my conversations with TLC staff, I solidified my research questions and drafted a research proposal. Once my proposal was approved in January 2018, I began my literature review. I continued working on my literature review through January 2019. In February and March 2018, I interviewed conservation and agriculture professionals in North Carolina to gather information about the barriers to entry to agriculture as well as the programs and resources being accessed by North Carolina farmers to help them transition into farming.

I used the information I collected during my interviews and literature review to inform the development of my survey tool. I completed the first draft of my survey in March 2018. I used conventional pretesting methods and expert review to refine my survey and submitted my revised draft to Duke University's Institutional Review Board (IRB) in June 2018. My survey was approved by IRB on June 19, 2018. In mid-July 2018, my interviewee contacts distributed my survey to their farmer networks. To increase response rates, they sent follow-up email reminders two weeks later. I collected survey data in July and August and began analyzing my data in September 2018.

Research Site

Because the focus of TLC's farmland conservation work is in North Carolina, their primary interest was in the experiences of beginning farmers within the state. Thus, the interview and survey components of my research focused on farmers and farm resources in North Carolina. To gain a broader perspective and identify programmatic best practices, I expanded my literature review to include farmers and resources from across the country.

Interview Component of Study

To better understand the barriers to entry to agriculture faced by North Carolina farmers as well as the programs and resources helping these farmers transition into agriculture, I interviewed agriculture and conservation professionals across the state. I spoke to program managers and directors at nonprofit organizations and state agencies, including Carolina Farm Stewardship Association, Southern Appalachian Highlands Conservancy, Triangle Land Conservancy, and North Carolina Cooperative Extension. I also spoke to farm managers at several North Carolina community and incubator farms, including Good Hope Farm, Raleigh City Farm, Transplanting Traditions, Lomax Incubator Farm, and PLANT @ Breeze Farm Enterprise Incubator.

My interviews were semi-structured, each lasting approximately 45 minutes. I began each interview with an overview of my research project and my interview objectives. I then asked interview participants their thoughts about the challenges facing beginning farmers. I also asked them for details about the programs they facilitated to help farmers transition into agriculture. We discussed the feasibility of sustainable farming for small-scale farmers and whether the impacts of climate change were influencing farmers' decision-making. I also asked my interviewees where they saw gaps in resource provision for beginning farmers. I closed my interviews by asking my interviewees for references to others in their professional networks who might have valuable insights to offer my study. I also asked them about their willingness to distribute my survey to their farmer listservs and networks. All agreed to do so, and all requested access to my results upon the completion of my project.

Survey Component of Study

Survey Type and Design: The purpose of my survey was to gain insight into (1) the challenges encountered by North Carolina farmers along their paths to becoming professional farmers, (2) the types of programs and resources that helped these farmers transition into agriculture, and (3) the conservation farming practices these farmers use on their farms. I used Qualtrics software to develop a

web-based survey containing 24 close-ended questions. Using the Tailored Design Method as a guide (Dillman et al. 2014), I developed a combination of multiple choice and Likert scale questions, beginning my survey with the easiest to answer questions and closing with demographic questions. I structured my questions to ensure their reliability, as well as the validity of my survey measures. In designing the questions, I used concise, simple language and sentence structure, avoided double-barreled questions and linguistic ambiguity, (Fowler 2014) and kept questions at a 6th to 8th grade reading level (Fink 2013). I also designed my questions to be relevant to respondents and avoided asking questions in ways that required respondents to do any unnecessary cognitive work (Dillman et al. 2014).

My survey opened with an introductory paragraph that included the purpose of the survey, the estimated time it would take to complete (5-8 minutes), information about the Triangle Land Conservancy, and a confidentiality and consent statement. To incentivize survey participation, the introduction also stated that respondents would have the option of being entered in a drawing for a $50 gift card at the end of the survey.

After the introduction, the first set of questions aimed to gather general information about respondents' farming experiences, including number of years in farming, family background in farming, and land ownership or lease arrangements. The bulk of the survey focused on collecting information about respondents' participation in farm programs, any barriers they had experienced in their path to becoming a farmer, and the conservation practices they used on their farms. The survey closed with demographic questions about race, age, income, and education and the option of participating in the drawing for the $50 gift card (for full survey, see Appendix B).

Survey Pretesting: Once I developed a complete draft of my survey, I used several pretesting methods to refine my survey. First, using the expert review method (based on information from R. Kramer, Survey Pretesting lecture, February 15, 2018), I asked several social scientists and sustainable agriculture professionals to review my survey and flag any issues. My expert reviewers included two Duke University researchers, two food and agriculture specialists, and three farmers. These experts reviewed my survey to determine whether I included all necessary questions, whether I had any extraneous questions, and whether my questions would help me answer my research questions. They also flagged syntax issues and made wording and design recommendations.

Second, combining a conventional pretesting method with cognitive interviews (based on information from R. Kramer, Survey Pretesting lecture, February 15, 2018), I asked five volunteers to go through the process of taking my survey and to flag any issues they encountered. By reviewing their

responses, I aimed to identify any questions that respondents did not understand or were unwilling to answer. After they completed the survey, I also guided the volunteers through a reflective debrief, during which time I solicited feedback about question wording, missing or superfluous questions, appropriateness of answer choices, etc. I also used this opportunity to gauge the effectiveness of the survey process (delivery, interface, and data collection) and to identify any glitches in the process before implementing the survey.

Throughout the survey design process, I solicited feedback from TLC to ensure that I was developing my survey in a way that would best meet the needs of the organization. My survey went through many revisions and was finalized and IRB-approved in June 2018.

Sampling Design and Survey Implementation

Without a complete list of beginning farmers in North Carolina, I asked my interviewee contacts to email my survey link to their farmer networks. My sample frame included the Carolina Farm Stewardship Association's member listserv (700+ people), the North Carolina Cooperative Extension's Growing Small Farms listserv, TLC's beginning farmer contact list, Raleigh City Farms small-scale farmer contacts, Good Hope Farm's Urban Agriculture Collective (58 beginning and sustainable farmers), and Lomax Incubator Farm's small-scale farmer contacts. Most of my contacts could not tell me the exact number of farmers my survey reached, so I do not know the aggregate number of farmers in my sample frame. Given that my survey was sent to farmers connected to organizations serving small-scale, sustainable farmers, it is likely that my sample frame consisted primarily of small-scale, sustainable farmers.

My interviewee contacts distributed my survey link to their farmer networks in mid-July and sent follow-up email reminders at the end of July.

Data Analysis

I collected survey data in July and August and began analyzing the data in September 2018. I reviewed my data in Qualtrics and deleted those respondents who clicked on the survey link but failed to respond to any survey questions. I then downloaded the remaining survey responses from Qualtrics to Excel. I visually reviewed my data in Excel and flagged respondents who did not complete the survey. I removed the respondents whose responses were insufficient for any type of analysis (i.e. those respondents who only answered one or two survey questions). Of the remaining list of respondents, I flagged seven others for item nonresponse, although I included these respondents in my analyses, since

they responded to all but the demographic questions. I used Excel and R Studio to analyze my data. I used the Wilcoxon-Mann-Whitney nonparametric test to compare differences between the responses of beginning farmers versus those of experienced farmers.

Error Structure

Although I aimed to minimize bias and error in my research, I acknowledge that my sampling and survey methods introduced three potential sources of error: coverage error, nonresponse bias, and sampling error. This section explores the implications of those sources of error for my results.

Coverage Error

I used convenience and snowball sampling methods and, in doing so, only included farmers connected to organizations with sustainable agriculture programs. Additionally, my decision to distribute surveys by email limited my sample to internet-using farmers. In these ways, my sampling and implementation methods likely favored a subset of farmers who may have been systematically different from the larger beginning farmer population. These non-probability sampling methods introduced bias into my survey research and are problematic for doing inferential statistics.

Nonresponse Bias

Since respondents self-selected to take my survey, my sample may have been biased toward farmers who were particularly interested in my survey topic and/or who had greater availability to take my survey. Additionally, while I cannot calculate exact response rates, my estimated response rates were relatively low, creating “great potential for important error” (Fowler 2014).

Sampling Error

Anytime a researcher selects a sample from a population of interest, they introduce sampling error (Fowler 2014). Since I did not survey all beginning farmers in North Carolina, I automatically introduced sampling error.

Scope of Inference

The primary limitations of my survey research stemmed from my nonprobability sampling methods. Without access to a complete list of beginning farmers in North Carolina, I had to rely on a patchwork of farmer listservs from conservation and agriculture organizations to disseminate my survey.

In doing so, I sent my survey to farmers already connected in some capacity to the programs and resources of these organizations. This likely skewed my results in the direction of small-scale farmers active in—or at least connected to—sustainable farming programs and engaged enough in the farming community to know how to access resources.

My narrow sampling frame and nonprobability sampling methods limited the scope of inference for my results. Though my results might not be generalizable to the larger beginning farmer population, my sample does reflect the subset of the farmer population of most interest to the Triangle Land Conservancy.

Results

Interviews

Barriers to Entry to Agriculture. My interviews yielded consistent results regarding barriers to entry to agriculture. Based on their experiences working with beginning farmers, everyone I interviewed agreed that lack of access to affordable (and desirable) land and insufficient startup capital were the two greatest barriers to becoming a farmer. Lack of experience with and knowledge about agriculture were two other barriers frequently mentioned. My interviews also revealed that most beginning farmers require off-farm income when transitioning into farming. Because farming can be very time- and labor-intensive, maintaining another job while launching a farm business can be very challenging. In a similar vein, my interviewees also reiterated that profit margins for small-scale beginning farmers are relatively small, so the extreme weather events and weather extremes associated with climate change can devastate their farm businesses. Limited access to markets was another barrier discussed during my interviews, and several interviewees expressed a particular need for more farmers markets. Student loans, competition with other farm businesses, and zoning laws were also mentioned as barriers.

Programs and Resources for Beginning Farmers. During my interviews, I learned about several North Carolina programs and resources designed to address the above-mentioned barriers and help beginning farmers transition into agriculture. The programs and resources discussed here are those currently being offered by my interviewees' organizations. Since I spoke to multiple incubator farm managers, it is not surprising that incubator farms emerged as a very promising program for beginning farmers. Incubator farm programs offer beginning farmers small parcels of land to launch their farm businesses. My interviewees' incubator programs offer (1) on-the-farm trainings, demonstrations, and workshops; (2) farm equipment share opportunities; (3) business planning support and education; (4)

infrastructure, such as hoop houses, high tunnels, wash stations, cold storage, fencing, and irrigation hookups; and/or (5) assistance with transitioning out of the program. Interviewees spoke about the importance of formally establishing farm standards (i.e. requirements around organic farming practices, cover cropping, soil and water conservation practices, etc.) so that incubator farmers can be held to desired standards.

All the professionals I interviewed spoke about the importance of sustainable agriculture education workshops and on-the-farm trainings and demonstrations for beginning farmers. As such, these types of educational opportunities were integrated into the program offerings of all the organizations I interviewed. Many of my interviewees emphasized the importance of providing longer term, tiered educational programming, with workshops and trainings that are designed to match the farmers' levels of knowledge and experience.

Several of the organizations I interviewed offered farm business workshops or partnered with organizations that provided business-planning and economic development educational opportunities. Other programs and resources offered by the organizations I interviewed include:

- Commercial kitchen access
- Farm volunteer opportunities
- Assistance connecting farmers to markets
- Assistance creating a farmer network and/or multi-farm CSA

Gaps in Resource Provision for Beginning Farmers: Only three gaps in resource provision were mentioned during my interviews. One interviewee expressed a need for additional programming for linking farmers and landowners. Another expressed a need for more sustainable agriculture workshops and demonstrations on production farms. Another indicated a need for more "exit ramps" from the profession to help farmers successfully transition from farming to another profession when desired.

Conservation Farming Practices: All the incubator and community farms I interviewed required that farmers use a variety of sustainable practices on their farms. Some required that farmers use organic growing practices, while others required that farmers abide by OMRI (Organic Materials Review Institute) guidelines. All required that farmers do some combination of cover cropping, crop rotation, integrated pest management, composting, and water and resource conservation techniques. Many provided water catchment systems and drip irrigation infrastructure. The other organizations and

agencies I interviewed provided sustainable farming education in the form of workshops, on-the-farm trainings, and business planning workshops.

Other Notable Interview Findings: Almost all interviewees stressed the importance of cultivating partnerships with other organizations to ensure holistic resource provision for beginning farmers. The following organizations were mentioned as having the potential to be great partners for TLC: North Carolina Farm School, Growing Small Farms (for record keeping support), Small Business Association (as a business planning resource), North Carolina State University (as a business planning resource), Urban Agriculture Collective, Organic Growers School, the Collaborative Regional Alliance for Farmer Training (CRAFT) program (regarding educational opportunities for farm apprentices), and WNC FarmLink (as a resource for linking farmers and farmland owners). Federal grants to consider include USDA-National Institute of Food and Agriculture grants, Beginning Farmer and Rancher Development Program (now called Farmer Opportunity Training and Outreach—FOTO—program) grants, and Farmers Market and Local Food Promotion Programs (now called Local Agriculture Market Program—LAMP) grants.

There was also consensus among my interviewees regarding the importance of maintaining some sort of engagement with farmers. This engagement could be hosting regular meetings, providing regular educational opportunities, or hosting farm-to-table events, to name a few. My interviewees emphasized that regular engagement helps combat the isolating nature of farm work by facilitating connections between farmers, providing regular educational opportunities, and encouraging farmers to stay connected to organizational resources.

Interviewees also emphasized the importance of engaging the community around local food issues. Many spoke about the current social trend of supporting locally, sustainably grown foods, and they stressed the wisdom of tapping into this local food movement and energy. Interviewees mentioned several ideas for community engagement, including Farm to School programs, Farm to Table events, partnerships with local restaurants to feature local farms on menus, farm tours, and farm volunteer days. Engaging the community can be a powerful way to maintain (or increase) the salience of local food and sustainable farming issues, and high issue salience is important for food and agriculture policy change (Egan & Mullin 2017; Kingdon 1995).

Interviewees discussed their experiences with incubator farms; and, they all agreed that, in order to be eligible for participation on an incubator farm, farmers should have some experience with farming. Some incubator farms offer tiered educational workshops and trainings to help get farmers ready for farming on an incubator. Some incubator farms offer scaffolded farming experiences (e.g.

starting a farmer on a small plot of land, such as a quarter acre, and graduating that farmer to larger plots of land). When asked about the length of leases for incubator plots, the consensus was that longer leases were preferable to shorter leases. This gives farmers more time to grow their farm businesses and find affordable farmland.

One interviewee suggested that it would be beneficial for an organization (such as TLC) to host "conversations" that formally bridge the thoughts and ideas of conservation groups and small-scale, diversified farmers. This interviewee indicated that these formalized discussions—which could take the form of a series of summits, workshops, conferences, etc.—would help conservation groups better understand the needs of small-scale, diversified farmers and help these farmers better understand the goals and visions of conservation groups.

Finally, several interviewees suggested that conservation and agriculture organizations could help beginning farmers by working with them to develop creative ideas for generating additional revenue. This could include the development of value-added products, growing flowers or specialty items, running a CSA, hosting pick-your-own events, etc.

Survey

I received a total of 156 survey responses. I deleted 18 respondents for survey nonresponse, leaving me with 138 usable survey responses for my analysis. Of the remaining 138 responses, 95 were from beginning farmers and 43 were from experienced farmers. I differentiated between the two groups using the United States Department of Agriculture (USDA) definition of a beginning farmer, which states that "a Beginning Farmer or Rancher means an individual or entity who: a) Has not operated a farm or ranch, or who has operated a farm or ranch for not more than 10 consecutive years…[and] b) Will materially and substantially participate in the operation of the farm or ranch" (USDA-NRCS 2010).

Given TLC's interest in the experiences of beginning farmers in North Carolina, I focused on collecting data from this population. However, my survey sample did include both beginning and experienced farmers, so I have included comparisons between the two groups in my results.

Demographics: Most respondents were white farm owners with at least a bachelor's degree (Appendix Fig. A.1, A.2). Most identified vegetables or livestock as their primary sources of farm income (Appendix Fig. A.3). Unsurprisingly, beginning farmer respondents were younger than their more experienced counterparts, with most beginning farmers being between the ages of 26 and 45 and most experienced farmers being over the age of 55 (Appendix Fig. A.4). The gender gap was more pronounced

among experienced farmers (35% female, 65% male) than among beginning farmers (47% female, 53% male) (Appendix Fig. A.5). Only about a quarter of respondents grew up on a farm (Appendix Fig. A.6, A.7). Most respondents owned rather than leased their land (Appendix Fig. A.8, A.9). For those who did lease their land, most had lease terms for five or fewer years (Fig. 5a). When asked what they considered to be an ideal lease term, however, most respondents indicated preferences for longer-term leases, with ten years being the most desired lease term (Fig. 5b).

The median income range for both beginning and experienced farmers' households was $60,000-$69,999 (Appendix Fig. A.10). When asked what percentage of their total household income came from farming, most respondents indicated 0-24% (Appendix Fig. A.11).

Barriers to Entry to Agriculture: Based on a review of the literature and the results from my interviews with North Carolina agriculture and conservation professionals, I identified 13 common barriers to entry to agriculture: limited access to affordable land, limited access to markets, insufficient startup capital, insufficient knowledge about farming, student loans, insufficient knowledge about farm business planning, too much competition with other farm businesses, discrimination, historical policies and programs that have shaped current land ownership practices, limited access to affordable health care, limited access to affordable housing, limited access to affordable labor, and limited credit access. Survey respondents were asked the degree to which they considered each of these items barriers to farming and were given the response options of "not a barrier," "slight barrier," "moderate barrier," and "significant barrier."

Most beginning farmer respondents considered limited access to affordable land and insufficient startup capital to be significant barriers to entry to agriculture, and most considered access to markets and insufficient knowledge about business planning to be moderate barriers. On the other end of the spectrum, most respondents perceived competition with other farm businesses and discrimination as only posing slight barriers if at all. Respondents were fairly evenly divided in the degree to which they considered insufficient knowledge about farming, land policies, labor, and credit access to be barriers to farming. Respondents mostly identified three other potential barriers – student loans, affordable health care, and affordable housing – as either not a barrier or a significant barrier, with little gray area in between. Respondents were given the option of adding additional barriers they had experienced, and these barriers included poor soil, equipment access, government regulations, access to veterinary services, the farm lobby, and family farm transition planning.

When comparing the responses of beginning farmers to those of experienced farmers, I found no statistically significant differences between the two groups for any barriers except for access to markets and student loans. Beginning farmers were significantly more likely to consider student loans (P=0.005) and limited access to markets (P=0.047) as barriers than were their experienced counterparts.

When asked what they believed to be the most significant barrier to becoming a farmer, the overwhelming majority of respondents (both beginning and experienced farmers) identified access to affordable land and startup capital as the most significant barriers. Ranking at a somewhat distant third was lack of experience with farming (Fig. 1). I compared the responses of beginning farmers to those of experienced farmers and found that there was no statistically significant difference between the groups in terms of what they identified as most significant barrier (P=0.3).

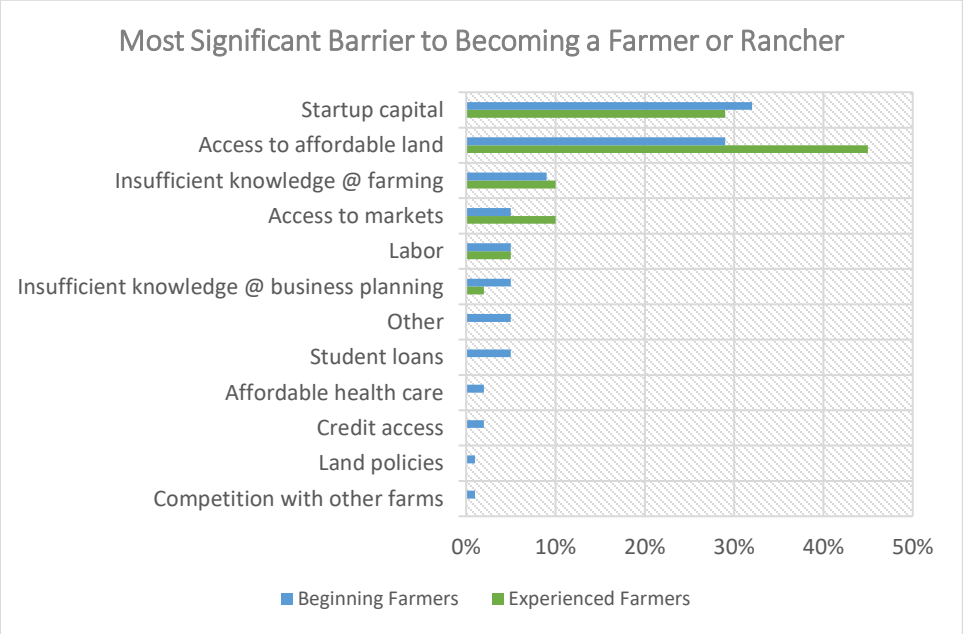

Figure 1. Survey respondents were asked the following question: "In your experience, what is the most significant challenge to becoming a farmer or rancher?" This figure shows the percentage of beginning and experienced farmers who rated each barrier as the "most significant."

Farm Program Participation: Survey participants were asked about their participation in a variety of farm programs, including sustainable agriculture education workshops, on-the-farm trainings and workshops, business planning workshops, farm apprenticeship programs, NRCS cost share programs, mentor programs with experienced farmers, farm incubator programs, CSAs with other farms, and farm equipment share programs. Results showed that respondents participated in these farm programs in relatively high numbers. By far, the most attended programs were sustainable agriculture education workshops, on-the-farm trainings, and business planning workshops (see Fig. 2). High

participation numbers are unsurprising given that my survey went out to farmers already connected to conservation and agriculture organizations. There were no statistically significant differences in program participation between beginning and experienced farmers apart from participation in farm apprenticeship programs: beginning farmers participated in apprenticeship programs in much higher numbers than did experienced farmers (P=0.008).

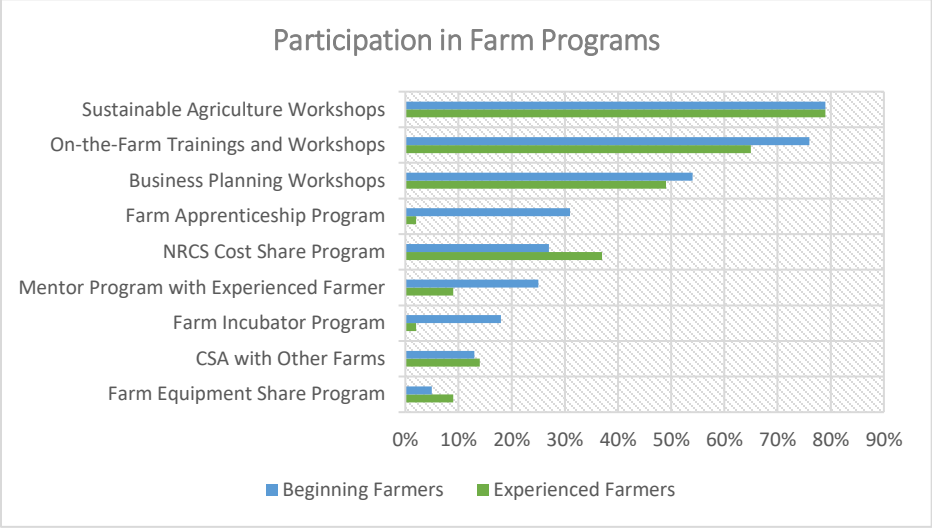

Figure 2. Survey respondents were asked the following question, "In which of the programs listed below have you participated? *Please mark all that apply.*" This figure shows participation rates for beginning and experienced farmers for each of the programs listed.

Survey participants were also asked whether they considered their participation in these programs to be helpful in their transition into agriculture. The majority of beginning farmers rated all but one of these programs (CSA with other farms) as either crucial or very helpful in their transition into agriculture, indicating high perceived value for these programs (Fig. 3).

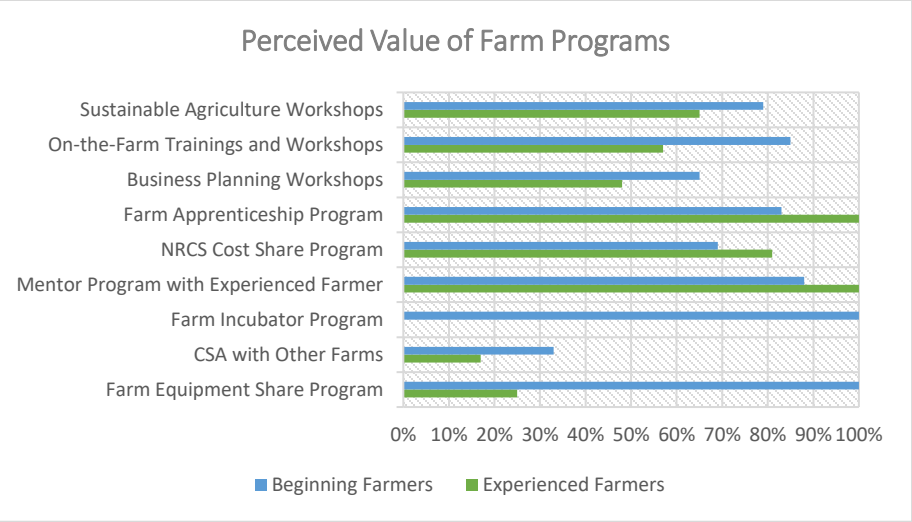

Figure 3. Survey respondents were asked the question, "Of the programs you identified [from the previous farm participation question], how helpful were they in your transition to farming as a profession?" This figure shows the percentage of respondents who answered either "crucial/essential" or "very helpful." The higher the percentage, the higher the perceived value of the program.

Beginning and experienced farmers placed similar value on each of the programs except for on-the-farm trainings and workshops. Beginning farmers found these trainings and workshops far more helpful than experienced farmers (P=0.021). Participation numbers among experienced farmers in incubator farm programs, farm apprenticeship programs, mentor programs, and equipment share programs were too low to make any statistical comparisons to beginning farmers' participation in these programs.

Sustainable Farming Practices: I found that the sustainable farming practices of beginning farmers do not differ significantly from the sustainable practices of experienced farmers. Thus, the results reported here are for all farmers, beginning and experienced.

Survey results indicated that most respondents use a variety of sustainable farming practices on their farms. More than 70% of farmers use crop rotation (82%), organic growing practices (76%), cover cropping (75%), natural buffers (73%), and/or pollinator habitats (71%) on their farms. The only sustainable farming practice listed on the survey used by fewer than half of respondents was water catchment systems (28%); and, of those respondents who did not use this practice, 60% said they would use it if they had additional resources (Fig. 4).

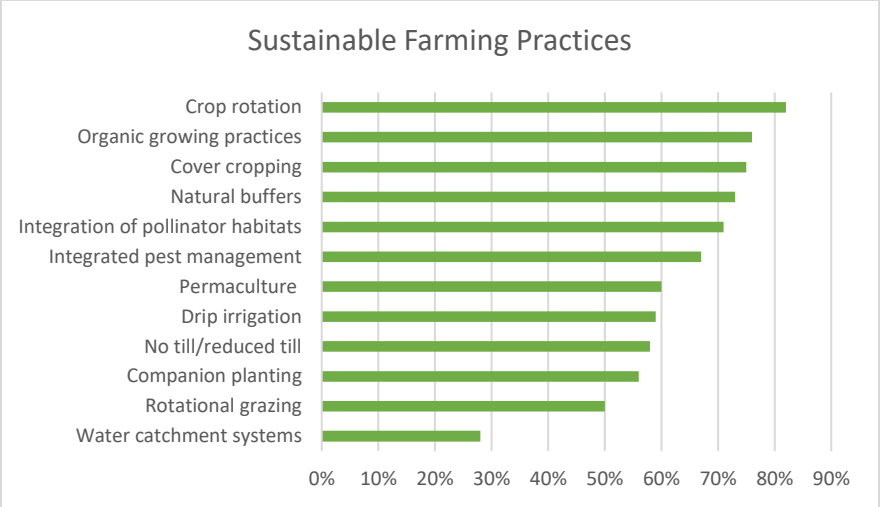

Figure 4. Survey respondents were asked the following: "For each of the conservation farm practices listed below, please indicate whether you use the practice, do not use but would like to if you had additional resources, do not know enough about the practice to use it, or have no interest in using the practice." This figure shows the total percentage of respondents who use each of the practices listed.

Recommendations

Given everything we know about the state of agriculture both locally and globally, it is clear that TLC's work to conserve working farmlands is extremely important, and it is imperative that this work remain a priority of the land trust. Ackoff and colleagues (2017) note that "by utilizing stronger, innovative conservation easements that require land to be sold to a working farmer, land trusts can help to keep land prices relative to agricultural value and land in the hands of farmers." Land trusts can also play an integral role in developing conservation easements that encourage the transfer of farmland to beginning farmers (Obudzinski 2016).

To complement this farmland conservation work, TLC and other land trusts can implement programs that support beginning farmers and promote sustainable farming. The remainder of this section offers programmatic recommendations based on my project findings.

1. Connect with Similar-Missioned Organizations

There are many organizations in North Carolina that are engaged in sustainable food system and farmland conservation work. Of the professionals I interviewed, all of them emphasized the importance of cultivating partnerships with organizations doing similar work. In a context of limited resources and complex solutions, sustainable food system work requires collaboration. Partnerships encourage organizations to share resources and ideas and to identify community needs that are not being met. They make it more likely that, collectively, organizations will be able to provide a full suite of services and resources (as opposed to organizations working in isolation and leaving gaps in service coverage).

2. Consider Implementing Incubator Farms, Farm Apprenticeship Programs, Mentor Programs, and/or Farm Equipment Share Programs

When asked about their participation in various farm programs, survey respondents indicated low participation rates in mentor programs, incubator farms, apprenticeship programs, and farm equipment share programs. However, when beginning farmers who had participated in these programs were asked whether they considered these programs to be helpful in their transition into agriculture, almost all respondents rated these programs as either crucial or very helpful. This combination of low participation rates and high perceived value could indicate that expanding these types of programs would be a sound investment for land trusts.

All four of these programs address several significant barriers to entry to agriculture. Incubator farms offer beginning farmers affordable leases on farm plots, provide necessary infrastructure and equipment, and offer a variety of educational opportunities. Some incubator farms offer transition support, as well. Incubator programs have the potential to address the top three barriers to entry to agriculture by giving beginning farmers without land and startup capital an opportunity to establish and grow their farm business in a relatively low-risk farm context, where they can practice conservation farming techniques, gain important skills, expand to new markets, and grow their customer bases.

Farm equipment share programs can reduce the amount of startup capital required to establish a farm business and can be paired with incubator programs for added benefit. Apprenticeships and mentor programs primarily address barriers around lack of agricultural and business planning knowledge. However, these programs can also be invaluable networking tools that may, indirectly, help beginning farmers find affordable land and carve out market niches.

3. Outreach to Beginning Farmers

My survey results suggest that farmers who connect with land trusts and sustainable agriculture organizations take advantage of the programs and resources these organizations offer. Additionally, farmers who connect with these organizations are inclined to use conservation practices on their farms. These results suggest that an important first step in cultivating a new cohort of conservation-minded farmers is for organizations to reach out and engage beginning farmers. My interviewees reiterated the importance of farmer outreach and indicated that, because farming can be a very isolating profession, keeping farmers engaged is also very important.

Outreach and engagement can take many forms. Organizations can host events, such as farm-to-table meals, to gather local farmers and share information about their programs and resources. They

can host educational events, such as workshops and on-the-farm trainings, to offer farmers opportunities to learn about and practice sustainable farming techniques, refine business plans, brainstorm ideas with other farmers, make resource-sharing arrangements, and solicit expert feedback. My survey results indicate that beginning farmers participate in educational programs—which address knowledge deficit barriers—in high numbers, and they perceive these programs to be extremely or very helpful. High demand for educational programs plus high perceived value indicates that these programs are likely worth the investment.

Organizations can also coordinate farm visits—perhaps in conjunction with agricultural demonstrations—to local farms. Farm visits give beginning farmers an opportunity to host other farmers and receive valuable feedback from them, to see other farm operations, to ask other farmers questions about techniques and practices, and to network with each other.

When doing outreach work, it is important that organizations keep in mind the structural barriers to entry to agriculture and design outreach events that are inclusive. Regardless of the type of engagement, the importance of farmer outreach is that it can keep beginning farmers connected to resources and to each other.

4. Engage the Community Around Local Food Issues

In addition to engaging farmers, my research also indicates that it is important to engage the community around local food issues. As one of my interviewees stated: "there's a social trend right now of people being interested in local, sustainably grown food and food waste reduction. It's important to tap into this energy." There are many ways a land trust can do this, including hosting Farm to Table events, partnering with local restaurants to feature local farmers, offering farm tours at farms with conservation easements, and hosting volunteer days.

Some land trusts also engage the community through youth programs, such as Farm to School, school garden, and youth farmer programs. These types of programs typically require building partnerships with local schools. There is federal money (e.g. USDA Farm to School and USDA-NIFA Community Food Projects grants) to support these types of programs. FoodCorps is another organization that supports Farm to School programs.

Though the engagement strategies employed by organizations will vary based on organizational capacity and mission, the important piece is that engaging the community can be a powerful way to maintain or increase the salience of local food and sustainable farming issues. Studies show that high

issue salience is important for food and agriculture policy change (e.g. Egan & Mullin 2017; Kingdon 1995), which will be necessary if we want to see a widespread shift to sustainable food systems.

5. Improve Market Access for Beginning Farmers

My survey results show that most beginning farmers rate limited access to markets as a moderate barrier to entry to agriculture. This indicates a need for more direct-to-consumer markets, such as farmers markets and CSAs. Some land trusts aim to meet this need by establishing and overseeing farmers markets. Some land trusts with production farms offer CSAs or partner with other small-scale farms to offer multi-farm CSAs. Other land trusts oversee food hubs that enable small-scale farmers to sell products to institutions. Still other land trusts provide support—in the form of infrastructure, shared equipment, food safety trainings, etc.—to beginning farmers so that they can develop value-added goods with high retail values. These types of programs aim to address barriers to entry by addressing challenges on the producer *and* consumer sides of the equation.

6. Provide Long-Term Lease Arrangements

Land trusts that lease farmland to farmers should consider longer-term lease arrangements. My survey results indicate that most beginning farmers have short-term leases (between one and five years) but desire longer leases, with ten years being the ideal lease length (Fig. 5a, 5b).

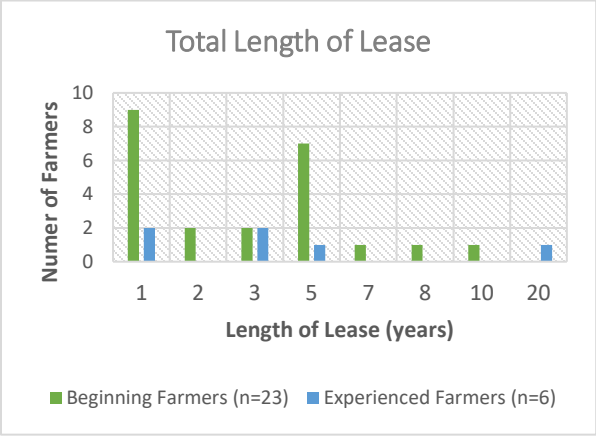

Figure 5a.

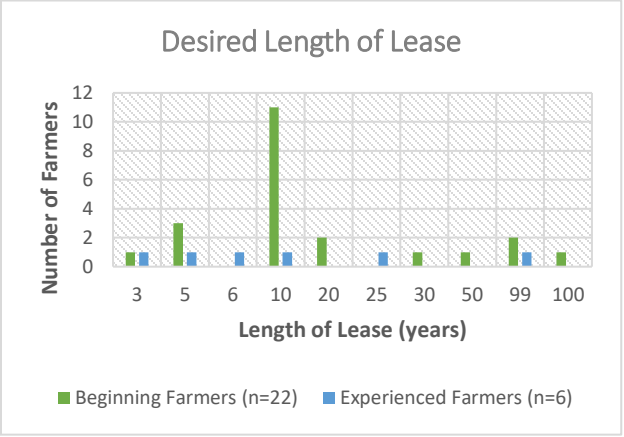

Figure 5b.

Figure 5. All survey respondents who indicated that they leased their farmland were asked the following: (1) "What is the total length of your lease term (in years)?" and (2) "If you had the option of a long-term lease, what would be your desired length (in years)?" Figure 5a shows the actual length of respondents' lease terms (in years), with most leases being between 1 and 5 years. Figure 5b shows the desired lease length (in years), with the most desired lease length being 10 years.

7. Work for Structural Change

Structural barriers will likely require multi-dimensional solutions. Though it is possible for programs to help *individual* farmers overcome certain structural barriers, such as access to land, the dismantling of these barriers will require policy change and collaboration with other sectors. It is important to keep this in mind when developing and implementing programs. Land trusts should take a farmer-in-context approach to working with beginning farmers—farmers are not attempting to launch farm businesses in a vacuum but rather must contend with contextual forces that can present monumental challenges not easily overcome by hard work and dedication. Land trust programs can be powerful tools to help beginning farmers navigate the challenges of becoming a farmer; however, programming must be designed in a way that acknowledges the larger structural forces at play and reinforces and complements other work being done to break down barriers.

Overall, these recommendations are one element of the work that must be done if we want to see broad, structural changes in our food and agricultural systems. Yet, because they address many barriers to entry to agriculture, they are an important element. Because of this, TLC and other land trusts are well positioned to be leaders in the sustainable food system movement.

Conclusion

The United States is poised for an agricultural shift. The farmer population is aging, and a new cohort of farmers is on the horizon. As industrial agriculture continues to harm the environment and threaten community well-being, more and more people are demanding an alternative, sustainable farming system. In this context, land trusts can play an important role in helping beginning farmers find a foothold in the profession and facilitating a shift toward conservation farming and a more sustainable future.

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Appendix A
Survey Results: Demographics

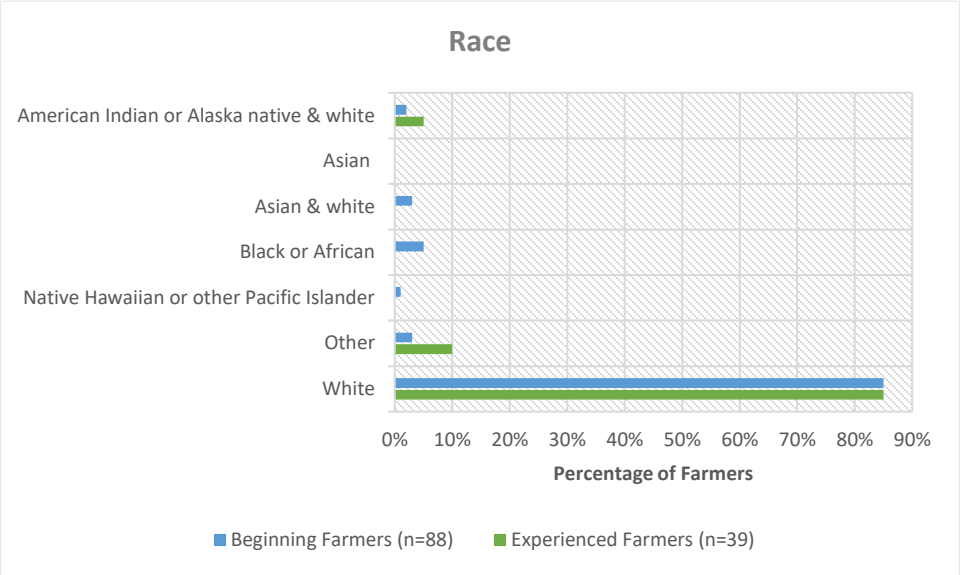

Figure A.1. Respondents were asked "What is your race?" and most indicated "white."

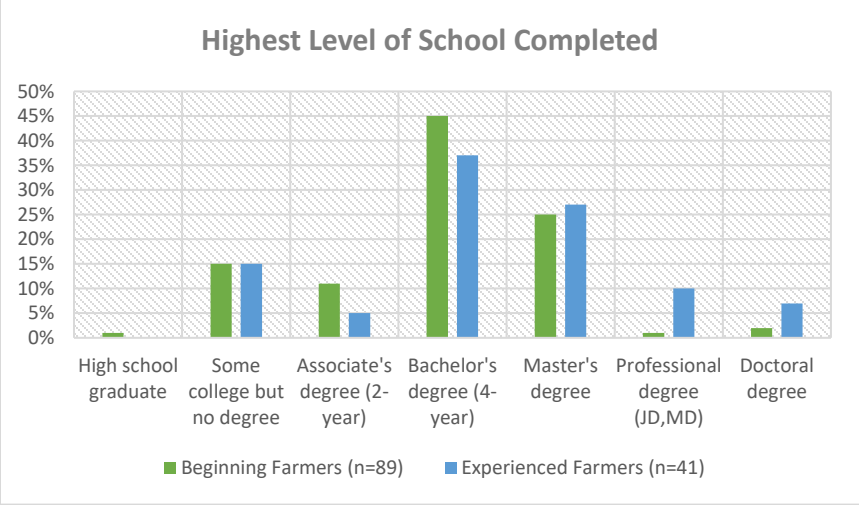

Figure A.2. Survey respondents were asked, "What is the highest level of school you have completed or the highest degree you have received?" This figure shows responses from both beginning farmers and experienced farmers.

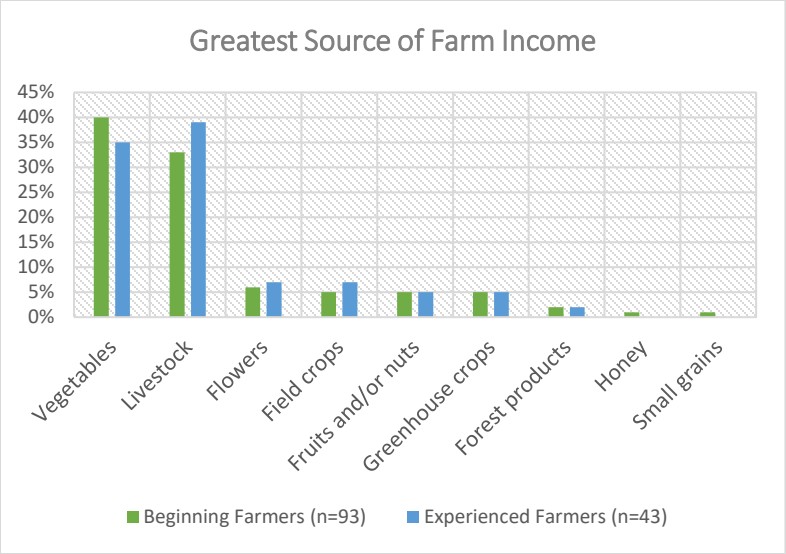

Figure A.3. Survey respondents were asked about their greatest source of farm income. Most indicated vegetables or livestock as their greatest sources of farm income.

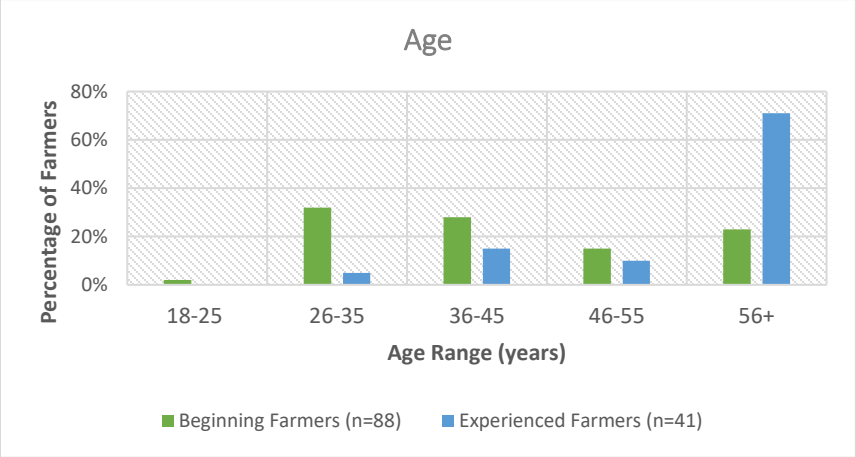

Figure A.4. Survey respondents were asked their age and given the age ranges listed in the figure. This figure shows that beginning farmers are younger than their more experienced counterparts.

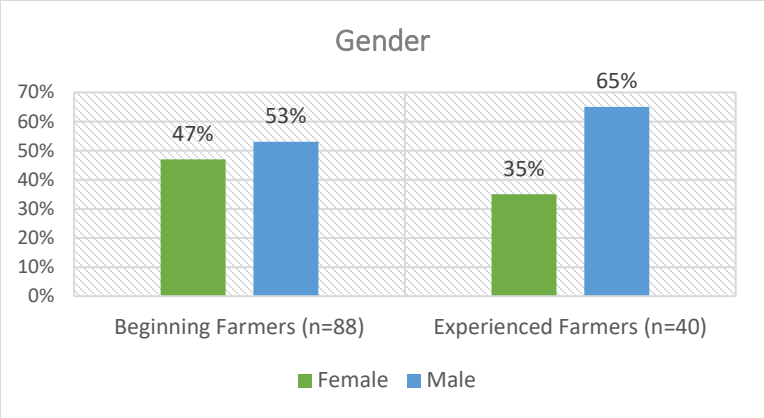

Figure A.5. Survey respondents were asked to indicate their gender and given the choices, "female," "male," "non-binary / third gender," "prefer to self-describe," and "prefer not to say." Experienced farmers are skewed toward "male," while beginning farmers are more evenly split between "female" and "male."

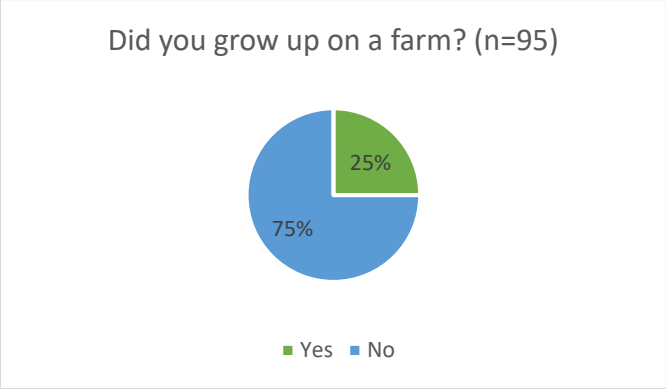

Figure A.6. This figure shows the percentage of beginning farmers who did (25%) and did not (75%) grow up on a farm.

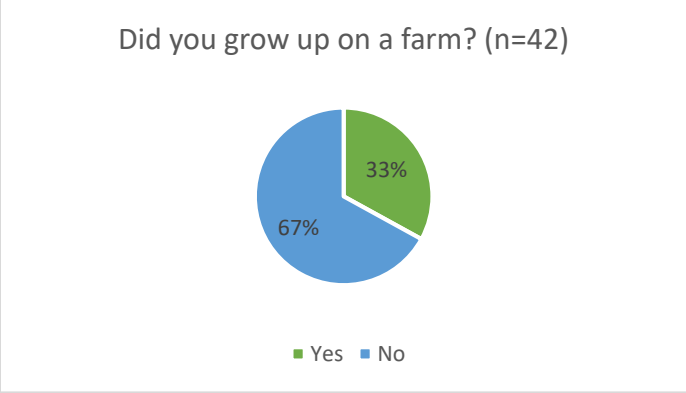

Figure A.7. This figure shows the percentage of experienced farmers who did (33%) and did not (67%) grow up on a farm.

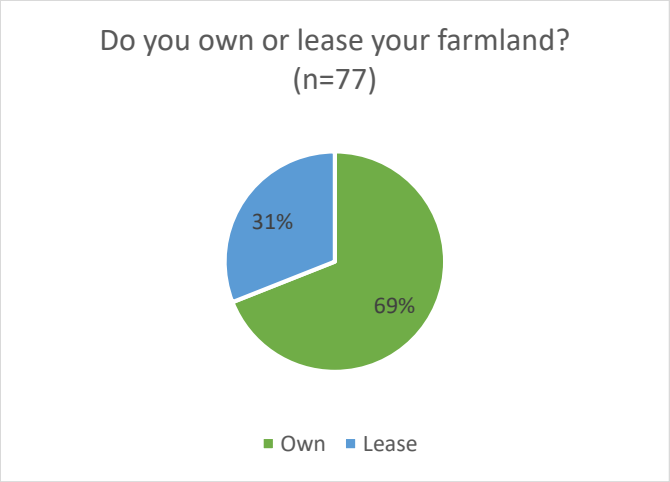

Figure A.8. This figure shows the percentage of beginning farmers who own (69%) and lease (31%) their land.

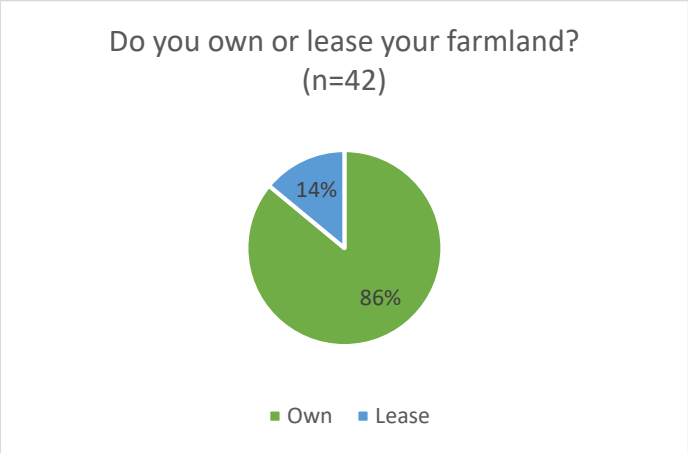

Figure A.9. This figure shows the percentage of experienced farmers who own (86%) and lease (14%) their land.

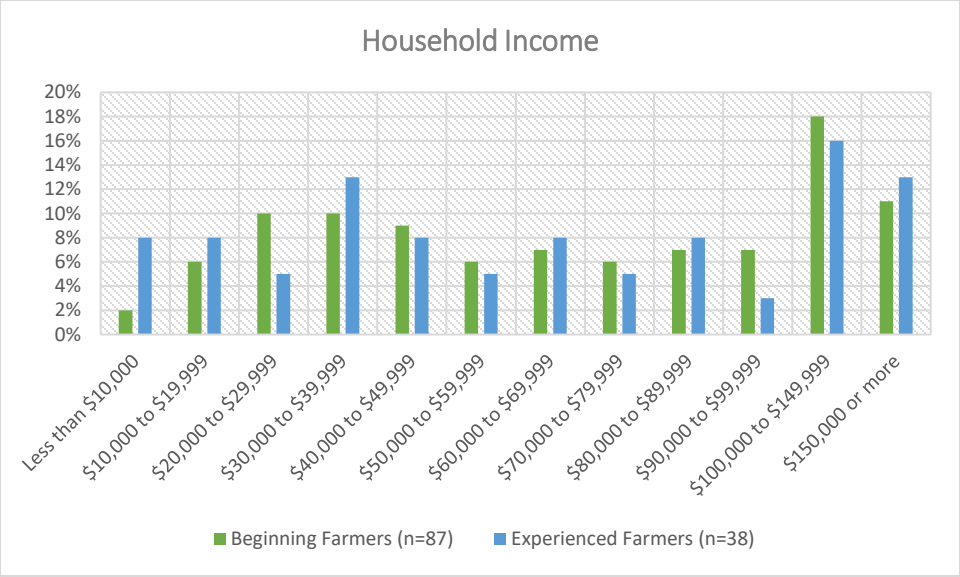

Figure A.10. Survey respondents were prompted, "To the best of your ability, please indicate your entire household income in 2017 before taxes." This figure shows the income ranges of both beginning and experienced farmers.

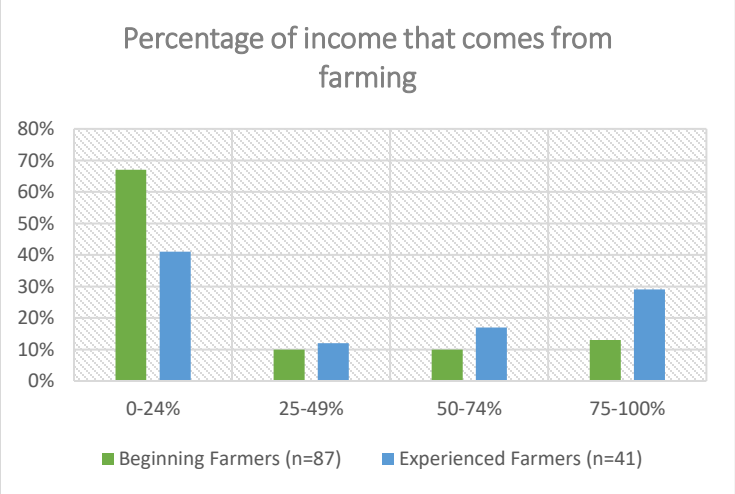

Figure A.11. Survey respondents were asked, "Approximately what portion of your household income comes from farming?" Most farmers (beginning and experienced) indicated that less than a quarter of their total household income comes from farming.

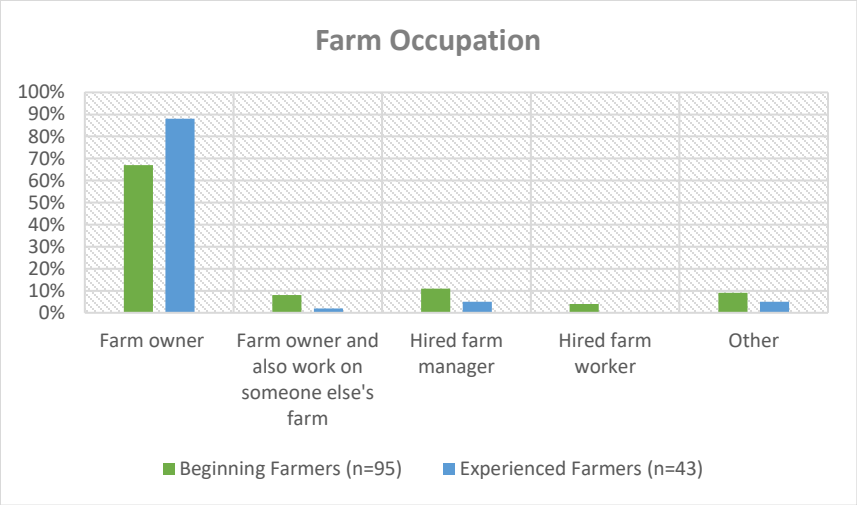

Figure A.12. Survey respondents were asked to "Please mark the statement that most applies to you" and were given the options shown in the figure. This figure shows that most respondents considered themselves farm owners.

Appendix B
Farmer Survey

Barriers to Entry to Farming

This survey is being conducted on behalf of the Triangle Land Conservancy (TLC). Through your responses, TLC hopes to better understand the barriers to entry to farming. The information collected through this survey will be used to inform the development of TLC farm programs. This survey should take approximately 5-10 minutes. While any question can be skipped, we would greatly appreciate your being as complete in your answers as possible. All information will be kept confidential and no personal information will be used. By pressing the ">>" button, you are confirming your voluntary participation in this survey. At the end of the survey, you will be offered the option of being entered in a drawing for a $50 gift card to Great Outdoor Provision Company. The drawing is separate from this survey and will not be connected to your survey responses. Thank you for volunteering your time.

How many years have you been farming?

- Less than 1 year
- 1-2 years
- 2-5 years
- 5-10 years
- More than 10 years

How many products do you grow/raise?

- 1
- 2
- 3
- 4
- 5 or more

Which of the following types of products do you grow/raise? Please check all that apply.

- Vegetables
- Livestock
- Flowers
- Fruits and nuts
- Field crops
- Honey
- Greenhouse crops
- Small grains
- Forest products

Which of the following is your *greatest* source of farm income?

- Vegetables
- Livestock
- Flowers
- Fruits and nuts
- Field crops
- Honey
- Greenhouse crops
- Small grains
- Forest products

Do you use permaculture practices on your farm?

- Yes
- No
- Don't know

Did you grow up on a farm?

- Yes
- No

Please mark the statement that most applies to you.

- Farm owner
- Hired farm worker
- Hired farm manager
- Farm owner and also work on someone else's farm
- Other _____

In which of the programs listed below have you participated? *Please mark all that apply.*

- Farm incubator program
- On-the-farm trainings/workshops
- Business planning workshops
- Record keeping workshops
- Sustainable agriculture educational workshops
- Farm apprenticeship program
- CSA with other farms
- Mentor program with experienced farmer(s)
- NRCS cost share program
- Farm equipment share program
- Other _____
- None

Of the programs you identified, how helpful were they in your transition to farming as a profession?

	Not at all helpful (1)	Somewhat helpful (2)	Very helpful (3)	Crucial / Essential (4)
Farm incubator program (1)	○	○	○	○
On-the-farm trainings/workshops (2)	○	○	○	○
Business planning workshops (3)	○	○	○	○
Sustainable agriculture education workshops (4)	○	○	○	○
Farm apprenticeship program (5)	○	○	○	○
CSA with other farms (6)	○	○	○	○
Mentor program with experienced farmer(s) (7)	○	○	○	○
NRCS cost share program (8)	○	○	○	○
Farm equipment share program (9)	○	○	○	○
Other (10)	○	○	○	○

Do you own or lease your farmland?

- Own
- Lease
- Not applicable

(if answers lease) What is the total length of your lease term (in years) _____

If you had the option of a long term lease, what would be your desired length (in years) _____

Think about any barriers you have experienced in trying to make farming your profession. The items listed below may or may not be barriers to farming. *For each item, please indicate whether that item has not been a barrier, has been a slight barrier, has been a moderate barrier, or has been a significant barrier to entry to agriculture.*

	Not a Barrier (1)	Slight Barrier (2)	Moderate Barrier (3)	Significant Barrier (4)	Not Applicable (5)
Access to affordable land (1)	○	○	○	○	○
Access to markets (2)	○	○	○	○	○
Startup captial (3)	○	○	○	○	○
Not enough knowledge about farming (4)	○	○	○	○	○
Student loans (5)	○	○	○	○	○
Not enough knowledge about business planning (6)	○	○	○	○	○
Too much competition with other farm businesses (7)	○	○	○	○	○
Discrimination (8)	○	○	○	○	○
Historical policies and programs that have shaped current land ownership patterns (9)	○	○	○	○	○
Affordable health care (10)	○	○	○	○	○
Affordable housing (11)	○	○	○	○	○

Labor (12)	○	○	○	○	○
Credit access (13)	○	○	○	○	○
Other (14)	○	○	○	○	○

In your experience, what is the most significant challenge to becoming a farmer or rancher? *Please choose only one.*

- ○ Access to affordable land
- ○ Access to markets
- ○ Startup capital
- ○ Not enough knowledge about or experience with farming
- ○ Student loans
- ○ Not enough knowledge about or experience with business planning
- ○ Too much competition with other farm businesses
- ○ Discrimination
- ○ Historical policies and programs that have shaped current land ownership patterns
- ○ Affordable health care
- ○ Affordable housing
- ○ Labor
- ○ Credit access
- ○ Other _____

For each of the conservation farm practices listed below, please indicate whether you use the practice, do not use but would like to if you had additional resources, do not know enough about the practice to use it, or have no interest in using the practice.

	Currently use this practice	Do not use but would if I had additional resources	Do not know enough about this practice to use it	Have no interest in using this practice	Do not know
Cover cropping	○	○	○	○	○
No till / Reduced till	○	○	○	○	○
Crop rotation	○	○	○	○	○
Integration of pollinator habitat(s) on farm	○	○	○	○	○
Drip irrigation	○	○	○	○	○
Organic growing practices	○	○	○	○	○
Integrated pest management	○	○	○	○	○
Water catchment system	○	○	○	○	○
Rotational grazing	○	○	○	○	○
Companion planting	○	○	○	○	○
Natural buffers	○	○	○	○	○
Other	○	○	○	○	○

From the time that you started farming until now, have you experienced any of the following issues? *Please mark all that apply.*

- o Unpredictable weather
- o More severe storms
- o Increased pest pressure
- o Increased uncertainty in water supply
- o Increased rate of disease (i.e. tomato blight)
- o Other environmental changes
- o None of the above

What is your zip code? *Please enter your 5-digit zip code.*

_____

What is your age?

- Under 18 years old
- 18-25 years old
- 26-35 years old
- 36-45 years old
- 46-55 years old
- More than 55 years old

What is the highest level of school you have completed or the highest degree you have received?

- Less than high school degree
- High school graduate (high school diploma or equivalent including GED)
- Some college but no degree
- Associate degree in college (2-year)
- Bachelor's degree in college (4-year)
- Master's degree
- Doctoral degree
- Professional degree (JD, MD)

What is your gender?

- Male
- Female
- Non-binary / Third gender
- Prefer to self-describe _____
- Prefer not to say

What is your race? *Choose all that apply.*

- American Indian or Alaska Native
- Asian
- Black or African
- Middle Eastern or North African
- Native Hawaiian or Other Pacific Islander
- White

How many people (including you) live in your household?

- 1
- 2
- 3
- 4
- 5
- More than 5

To the best of your ability, please indicate your entire household income in 2017 before taxes.

- Less than $10,000
- $10,000 to $19,999
- $20,000 to $29,999
- $30,000 to $39,999
- $40,000 to $49,999
- $50,000 to $59,999
- $60,000 to $69,999
- $70,000 to $79,999
- $80,000 to $89,999
- $90,000 to $99,999
- $100,000 to $149,999
- $150,000 or more

Approximately what portion of your household income comes from farming?

- 0-24%
- 25-49%
- 50-74%
- 75-100%