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A Practitioner's Guide to Landowner Participation in the Longleaf Pine Restoration and the Conservation Reserve Program

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Executive Summary

The longleaf pine (*Pinus palustris*) ecosystem once dominated the southeastern United States, covering approximately 90 million acres from Virginia to Texas. Today, only 5% of this ecosystem remains, roughly 4.5 million acres with 61.8% under private ownership. **This dramatic decline resulted from** logging, agricultural conversion, urban development, and fire suppression policies.

This ecosystem is ecologically vital, supporting a **rich diversity of species**, including threatened and endangered ones. It is **fire-dependent**, relying on frequent, low-intensity burns to maintain its open canopy and species diversity. Longleaf pine forests also play an important role in **carbon sequestration**, **soil stabilization**, and **hydrological balance**.

Culturally, the longleaf pine has **deep historical roots** among Native American tribes and early European settlers. It shaped the southeastern states economies through the naval stores industry and inspired local traditions, including festivals and even the University of North Carolina's "Tar Heels" identity.

Despite its ecological and cultural importance, the longleaf pine ecosystem faces **ongoing threats** from **habitat loss**, **fire suppression**, and **climate change**. These pressures fragment habitats, suppress necessary fire regimes, and increase vulnerability to pests and extreme weather events.

Conservation efforts have ramped up through initiatives like the Conservation Reserve Program (CRP), America's Longleaf Restoration Initiative (ALRI), and the Longleaf Pine Initiative (LLPI), among others. These programs aim to **maintain**, **improve**, and **restore** longleaf pine ecosystems through partnerships with private landowners and proven land management techniques such as prescribed fire and afforestation. Since 2010, **over a million acres** of longleaf pine have been restored on private lands through these restoration efforts.

Among these efforts, CRP stands as one of the most successful and widely supported federal conservation initiatives on privately owned lands. The CRP, administered by the USDA FSA, provides agricultural producers with the opportunity to **retire environmentally sensitive croplands** for conservation purposes through contracts lasting 10 to 15 years. In return, landowners receive **annual rental payments** and **cost-share assistance** to help establish and maintain conservation practices.

Understanding what motivates or discourages landowners from participating in programs to restore longleaf pine like CRP is essential to improving their design and ensuring restoration efforts are successful. **Key factors influencing participation in conservation programs include**:

- **Financial considerations and market dynamics:** Financial incentives such as rental payments, cost-share assistance, and sign-up bonuses help motivate participation, whereas high costs of adopting management activities and insufficient compensation can discourage participation.
- **Knowledge and awareness:** Limited awareness of conservation programs and their benefits, influenced by socioeconomic factors and sources of information, can reduce participation. However, effective communication through trusted channels and access to technical assistance can encourage participation.
- **Land and landowner characteristics:** The presence of certain species on the land can encourage or deter participation (e.g., mature pine trees increased participation in the Safe Harbor Program). Additionally, demographic factors, land tenure, and property size also influence participation (e.g., younger landowners are more open to participation).
- **Program design:** While features like rental payments and soil and wildlife conservation can motivate participation in CRP, aspects such as long-term contracts and land-use restrictions can serve as obstacles to participation.
- **Socio-psychological factors:** Positive attitudes toward conservation, strong environmental values, social norms, and cultural traditions and emotional ties to land influence participation decisions.
- **Trust in government programs:** Distrust of government programs and their employees, along with concerns about potential loss of property rights, can limit participation. However, building trust can serve as a strong motivator for involvement.
- **Moral obligations:** Ethical concerns, such as conserving biodiversity and valuing ecosystem services, influence the likelihood of participation.
- **Regional differences:** Political factors, such as state representation on congressional committees, influence CRP acreage and payment allocations, which can lead to regional variation in program access.

Furthermore, to ensure that longleaf pine restoration efforts are effective and conservation programs such as CRP remain impactful, it is essential to address key challenges to participation in CRP. The literature highlights several **strategies to improve initial enrollment**:

- **Program design and implementation improvements:** Simplifying the administrative process, offering flexible contract options, providing adequate financial incentives and compensation, and tailoring incentives and restrictions to align with diverse landowner goals and land uses.
- **Education and outreach efforts:** Making information more accessible, relevant, and clear while using a variety of outreach methods such as peer-to-peer learning, regular meetings, and partnerships with trusted organizations.
- **Technical assistance and support:** Providing ongoing, customized, and personalized assistance, training staff to be more culturally competent, and increasing meaningful contact between landowners and involved agencies like FSA or NRCS.
- **Strengthen policy and partnerships:** Expanding collaborations with diverse partners, actively involving landowners as peer advocates, and integrating research insights into program policies.

- **Improving access and participation:** Promoting cross-sector collaboration, minimizing political influence, increasing transparency in program criteria, overcoming language limitations, and improving documentation of landowner demographics.
- **Future research and monitoring:** Identifying key lessons and monitoring outreach effectiveness through future research, developing clear metrics to track program success and conservation progress, and integrating social science research with applied practices to improve understanding of landowner motivations for participation.

When CRP contracts expire, landowners face difficult decisions balancing economic pressures with environmental stewardship. Alternative income sources like pine straw harvesting can provide revenue but may compromise ecological integrity if not managed sustainably. **Maintaining conservation outcomes beyond contract periods** depends on **persistence**: the continued adoption of conservation practices even after program participation ends and financial incentives are no longer available. **Key factors influencing persistence include**:

- **Landowner characteristics and cognition:** Environmental attitudes, pre-existing conservation values, trust in personnel and perceived benefits of conservation programs, and attachment to established behavioral patterns all contribute to persistence.
- **Economic factors:** Although finances are not the main determinants of persistence for many landowners, they can still play a role for some. Additionally, perceived economic consequences and other benefits of maintaining conservation practices are important considerations for others.
- **Social and cultural influence:** Social norms and peer learning, cultural acceptance and engagement in conservation behaviors within communities, and emotional or historical connections to the land can all play key roles in promoting persistence.
- **Program experience and satisfaction:** Positive past experiences with conservation programs and satisfaction with their outcomes can encourage persistence. Practices that are easy to implement, align with existing operations, and provide visible benefits are more likely to be continued.
- **Land characteristics and resource availability:** Access to essential resources, such as capital, labor, and technical assistance can positively influence persistence.

To increase persistence, it is recommended to enhance **program design** with **adaptive approaches**, provide **financial support** to continue longleaf pine restoration, expand **education and outreach efforts** to describe the benefits of continued restoration, and foster **community collaboration** by encouraging peer learning and mutual support among landowners.

Restoring and expanding longleaf pine habitats serves environmental, cultural, and economic needs. Success requires **strategic collaboration** among multiple partners, including private landowners, government agencies (including FSA, NRCS, ALRI, etc.), nonprofit conservation organizations (such as The Longleaf Alliance, The Nature Conservancy, National Fish & Wildlife Foundation, etc.), and other involved stakeholders. **This coordinated effort is essential for ensuring the long-term resilience of this iconic ecosystem.**

Introduction

At the beginning of the 17th century, the southeastern United States was home to an estimated 90 million acres of longleaf pine forests, which supported nearly 900 plant species. This forest also provided critical habitat for approximately 100 bird species, 36 mammal species, 29 endangered species, and 170 species of reptiles and amphibians (USDA NRCS, 2011). However, due to extensive logging, land conversion, and fire suppression, these forests were drastically reduced (Outcalt & Sheffield, 1996; Jose et al., 2006).

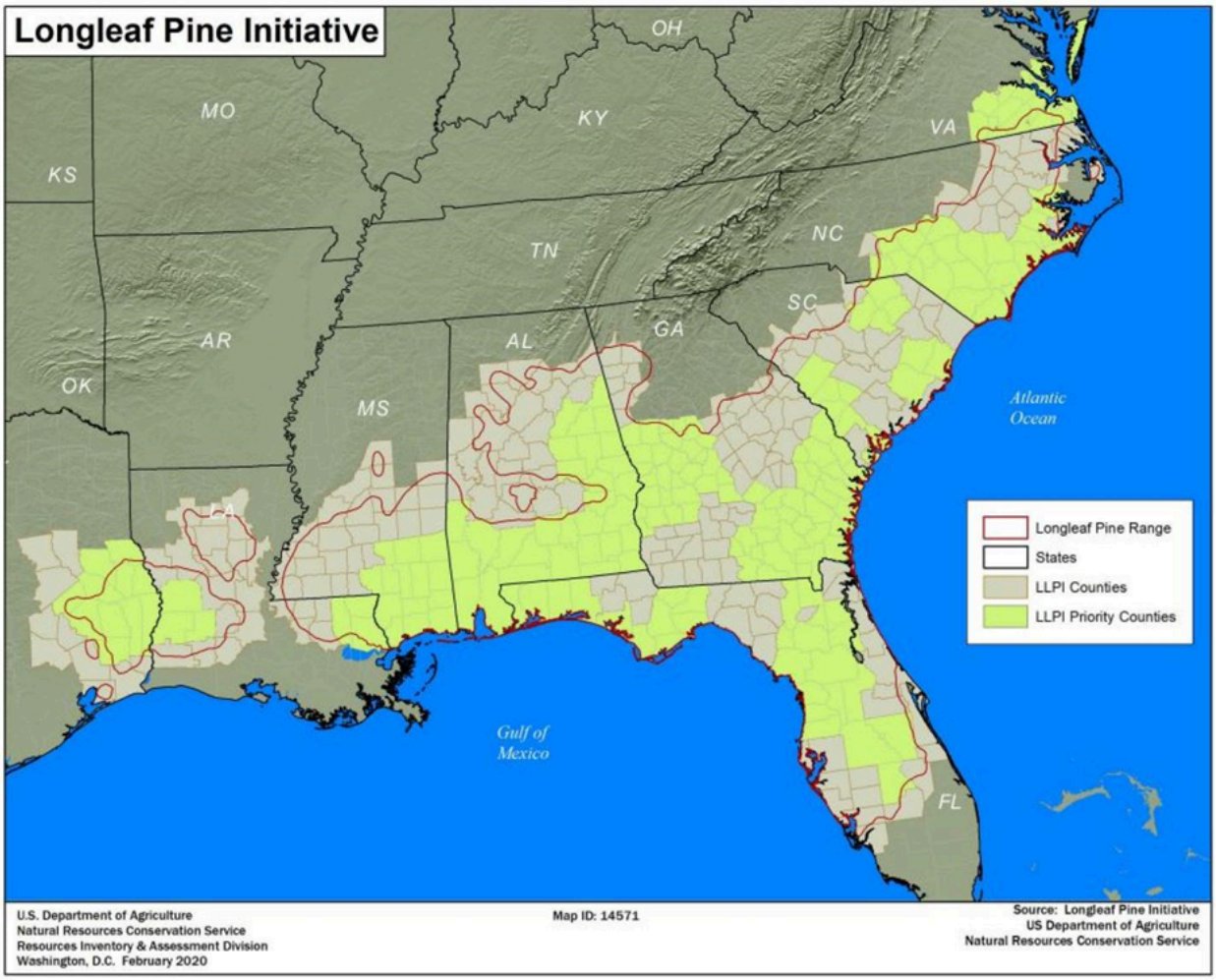
According to Stukes (2023), efforts to restore this critical ecosystem on private lands have been significantly supported by the Conservation Reserve Program (CRP). CRP was first authorized in the 1985 Farm Bill and designed to encourage private landowners and agricultural producers to convert marginal cropland to conservation covers, including longleaf pine (USDA FSA, 2020a). Participants receive cost-share assistance to establish conservation practices and annual rental payments, based primarily on the productivity of the soils offered to the program (USDA FSA, 2006; USDA FSA, 2020a). According to the United States Department of Agriculture (USDA) Farm Service Agency (FSA), which administers CRP, approximately 400,000 acres of longleaf pine have been restored through the program (USDA FSA, 2020a). In addition, the USDA Natural Resources Conservation Service (NRCS) Longleaf Pine Initiative (LLPI), launched in 2010 has supported producers in restoring over 870,000 acres of longleaf pine on private lands. Combined with other conservation efforts, these initiatives have increased the total area of longleaf pine forests from approximately 3.4 million acres to 5.2 million acres during this time, marking a significant reversal of a century-long decline across nine southern states (Albritton et al., n.d.).

Beyond USDA, many organizations such as The Longleaf Alliance are dedicated to longleaf pine restoration, expanding its footprint on the landscape and promoting improved forest management practices. Collectivity, more than 30 agencies, institutions, organizations, and landowners, have banded together under the umbrella of the America's Longleaf Restoration Initiative (ALRI) to work collaboratively toward restoring longleaf pine ecosystems across nine southern states (Van Lear et al., 2005). The goal of the ALRI is to reach a minimum of 8 million acres of functioning longleaf pine ecosystems across the historic range of longleaf pine, with a primary focus on expanding from key geographic areas containing the remaining large blocks of legacy longleaf pine forests.

This literature review aims to provide an updated overview of the longleaf pine ecosystem, and the role of conservation programs in ecosystem restoration, with a particular focus on CRP's contributions to longleaf pine restoration. It examines landowners' motivations and obstacles to participate in conservation programs, and explores post-CRP land use options, including the persistence of longleaf pine forest through CRP. The goal is to provide insights for practitioners involved in longleaf pine restoration on private lands while fostering a deeper understanding of

the challenges and opportunities inherent in conservation programs, specifically those related to CRP restoration efforts.

Longleaf Pine Ecosystem



Geographic distribution of the Longleaf Pine and LLPI in the southeastern United States. *(Credit: Longleaf Pine Initiative, U.S. Department of Agriculture, Natural Resources Conservation Service)*

Geographical Distribution

The longleaf pine (*Pinus palustris*) ecosystem was once one of the most extensive and diverse ecosystems in North America, covering an estimated 90 million acres across the southeastern United States (Van Lear et al., 2005; Jose et al., 2006). This ecosystem historically spanned from southeastern Virginia to central Florida and westward to eastern Texas, including parts of Alabama, Mississippi, Georgia, and the Carolinas (Outcalt & Sheffield, 1996; Jose et al., 2006; Noss et al., 2006). “It was once said that a squirrel could travel through longleaf pine tree tops

from Virginia all the way to Texas and never touch the ground" (Wrench, 2024, p. 19). Today it is estimated that only 5% of the longleaf pine forest remains (Jose et al., 2006). This reduction is due to factors such as extensive logging, land conversion to agriculture and urban areas, and fire suppression (Outcalt & Sheffield, 1996; Jose et al., 2006). According to Oswalt and Guldin (2021), there are 4.5 million acres of the longleaf pine forest remaining across the southern United States, with 2.8 million acres (61.8%) under private ownership[1]. The remaining acres of longleaf pine forest are managed by various public entities, including the U.S. Forest Service (16%), state agencies (9.9%), the Department of Defense (9.7%), Fish and Wildlife Service (1.2%), County and Municipal (1.1%), and Other Federal (0.2%). The proportion of privately owned longleaf pine forests varies significantly by state. For example, Virginia's 10,000 acres of longleaf pine forests are entirely (100%) privately owned, while private ownership accounts for 88.6% of longleaf pine forests in Georgia, 76.1% in Alabama, and as little as 44% in both Florida and Mississippi (Oswalt & Guldin, 2021). Among public landholders, the Department of Defense manages significant portions of longleaf pine and longleaf pine/oak forests, accounting for over 20% of these forest types in North Carolina and Louisiana, 14.2% in Florida, and 9.9% in South Carolina. State agencies also play a key role, overseeing 22% of these forests in Florida, 12.7% in North Carolina, and 10.8% in South Carolina. The U.S. Forest Service holds the largest share of longleaf pine and longleaf pine/oak forests in Mississippi (51%), Louisiana (48.3%), and Texas (40.7%). However, the total area in Texas is relatively small, with just 16,000 acres (Oswalt & Guldin, 2021).

[1] There is variability in published estimates regarding the remaining extent of longleaf pine.

Photos of the longleaf pine. *(Photos taken by Reyhane Rastgoo during longleaf pine field trip at Harris Lake County Park, North Carolina)*

Ecological Importance

The longleaf pine ecosystem plays a vital ecological role, offering crucial benefits such as supporting biodiversity, providing habitats for both endangered and non-endangered species, and enhancing soil and carbon health (Jose et al., 1991). Restoring these ecosystems is essential to protect the unique biodiversity and ecological resilience of the southeastern United States. Listed below are some key ecological benefits of the longleaf pine ecosystem.

Fire Ecology and Biodiversity

An important ecological function of the longleaf pine is its role in promoting fire-dependent ecosystems. Longleaf pine forests are adapted to frequent, low-intensity fires that maintain an open canopy and reduce competition from other species. This fire regime supports a wide variety of plant species, including rare and endemic species, such as wiregrass (*Aristida stricta*), which thrives in the open, sunlit understory created by regular fires (Peet, 2006). Without fire, the ecosystem becomes dominated by hardwood species, which can outcompete longleaf pines and reduce overall biodiversity (Van Lear et al., 2005).

A surface fire moving through a longleaf pine/wiregrass understory in southern Georgia. Prescribed fire is an essential ecological process for restoration and maintenance of longleaf pine ecosystems. *(Credit: Ron Masters in Oswalt et al., 2012)*

Habitat for Species

The longleaf pine ecosystem is a vital habitat for various wildlife species, showcasing its ecological significance. Endangered and threatened species like the red-cockaded woodpecker (*Picoides borealis*), gopher tortoise (*Gopherus polyphemus*), and eastern indigo snake (*Drymarchon couperi*) rely heavily on this environment. The red-cockaded woodpecker, for example, nests exclusively in mature longleaf pines, which provide the necessary bark structure and height for cavity construction (Conner et al., 2001). Similarly, the gopher tortoise finds optimal conditions for burrowing in the sandy soils of these forests, serving as a keystone species that supports over 300 other species that depend on its burrows for shelter (Auffenberg & Franz, 1982).

Beyond these species, the diverse understory of longleaf pine ecosystems supports a variety of other wildlife, including songbirds like the eastern meadowlark (*Sturnella magna*) and Bachman's sparrow (*Peucaea aestivalis*), which rely on ground-level vegetation for nesting and foraging (Brockway, 2005). White-tailed deer (*Odocoileus virginianus*) also thrive in these habitats, benefiting from the lush understory of grasses and forbs that provide ample foraging opportunities, thus supporting healthy populations (Auffenberg & Franz, 1982). Furthermore, the deep roots of longleaf pines enhance soil stability and water retention, contributing to the overall health and ecological balance of the ecosystem (Frost, 1993). Together, these elements highlight the critical role of longleaf pine ecosystems in sustaining diverse species and maintaining ecological integrity.

Some species (left: gopher tortoise, upper-middle: eastern indigo snake, upper-right: white-tailed deer, lower-middle: red-cockaded woodpecker, lower-right: fox squirrel) found in the longleaf pine ecosystem. *(Credit: U.S. Fish and Wildlife Services)*

Carbon Sequestration and Soil Health

Longleaf pine forests also play a role in carbon sequestration, storing significant amounts of carbon both in the trees and in the soil. The deep root systems of longleaf pines help prevent soil erosion and promote nutrient cycling, which enhances soil health and stability (Jose et al., 2006). Additionally, the open structure of longleaf pine forests allows for greater biodiversity in ground cover, which contributes to a more stable ecosystem capable of withstanding environmental stressors such as drought or disease (Bigelow et al., 2021).

Cultural and Social Importance

The longleaf pine is a cornerstone of cultural heritage and social identity in the southern United States, playing a vital role in the livelihoods and traditions of Native American tribes, early European settlers, and rural communities (Wrench, 2024). Native American tribes such as the Creek and Cherokee relied on the longleaf pine for ceremonial, and medicinal purposes, using its resin for wound treatment and its timber for manufacturing, tools, and weapons (Kuhn, 2021). The longleaf pine forest also supported the livelihoods of the early European settlers. They built homes, split rails for fences, and heated and lit their homes with the blazing light from a fire of turpentine pine. They cooked meals and read by its flame, with pitched-pine knots serving as an effective alternative to candles. From cradles to coffins and even grave markers, the heartwood

of the longleaf pine was an essential material for their everyday life (Wrench, 2024). Also, the longleaf pine forest provided forage for their livestock, as its open, grassy understory offered grazing land for cattle and sheep (Frost, 1993).

Furthermore, the longleaf pine has inspired local festivals. For instance, annual festivals like the Longleaf Festival in Wake County, North Carolina, celebrate the ecological and cultural significance of this ecosystem, drawing attention to its historic role and ongoing importance in rural communities (Wake County Government, n.d.). Similarly, in the spring of 2024, the North Carolina Botanical Garden launched *Saving Our Savannas: Stories of the Longleaf Pine*, a six-month series of programs and events exploring the natural, cultural, and historical significance of longleaf pine ecosystems (North Carolina Botanical Garden, n.d).

Also, longleaf pine forests on public lands serve as vital military training grounds. Installations like Fort Bragg (NC), Eglin AFB (FL), and Fort Stewart (GA) include extensive longleaf habitats that support drills, live-fire exercises, and aviation training due to their open-canopy structure and minimal underbrush (Dorminey, 2011; Minor, 2020).

Economically, the longleaf pine forest was essential for producing naval stores like tar, pitch, and turpentine, driving economic prosperity and shaping the agricultural and industrial landscapes of the southern United States (Wrench, 2024). These naval stores fostered the development of port towns and trading hubs (Kuhn, 2021). In North Carolina, sap from the longleaf pine was essential for producing turpentine, a key resource in the naval stores industry. This turpentine industry was closely tied to the exploitation of enslaved Black people and members of the Lumbee Native American tribe, who provided the labor necessary for the turpentine industry's success that fueled British empire-building (Kuhn, 2021).

Photo (left) showcasing how Black people were used as labor to extract turpentine. The middle and right photos show turpentine extraction. *(Credit: UNC at Chapel Hill, Wilson Library, NC Collection Archives)*

The success of the turpentine industry contributed to the nickname "Tar Heel" for North Carolinians (Davis, 2021). According to Wrench (2024), the nickname originated because "tar

dippers barefoot picked up patches of tar on their heels as they went about their business of making tar" (p. 8). Reiterating this history, the University of North Carolina at Chapel Hill's basketball team recently unveiled a striking new colorway for Luka Doncic's second signature sneaker, the Jordan Luka 2 'Origin Story.' This design pays tribute to North Carolina's rich history while also aiming to make a mark in sneaker culture. The vibrant yellow and green colors symbolize the pine sap that contributed to the "Tar Heels" nickname, while the Jumpman logo features needle-like designs that represent the longleaf pine's leaves. Additionally, the UNC and Luka logos on the tongue incorporate these needle motifs, further emphasizing the connection to North Carolina's cultural legacy (Benson, 2024).

Socially, the longleaf pine has been widely used in constructing essential community structures, from schoolhouses to churches, underscoring its practical importance in daily life (Wrench, 2024). However, the deforestation driven by the turpentine industry has led to a dramatic decline, with only 2% of the original longleaf pine forests remaining (Wrench, 2024). This reality has prompted ongoing restoration efforts aimed at both ecological and cultural recovery (Davis, 2021).

Longleaf Pine Forest Conservation Concerns

The longleaf pine ecosystem is still one of the most endangered ecosystems in North America. Conservation of longleaf pine ecosystems faces significant challenges that threaten the survival of this once-dominant southeastern forest type. Three primary conservation concerns have emerged as critical obstacles to successful ecosystem restoration and maintenance: habitat loss, fire suppression, and the ongoing effects of climate change.

Habitat Loss and Fragmentation

The primary cause of longleaf pine decline has been habitat loss due to agriculture, urbanization, and the conversion to industrial loblolly pine plantations (Brockway, 2005; Van Lear et al., 2005). The fragmentation of remaining longleaf ecosystems has resulted in isolated populations of plant and animal species, increasing their vulnerability to extinction (Means, 2006). Habitat fragmentation particularly affects species like the red-cockaded woodpecker, which depends on large tracts of mature longleaf pine for nesting and foraging (Conner et al., 2001).

Fire Suppression

Fire suppression policies implemented during much of the 20th century have also contributed to the degradation of the longleaf pine ecosystem. Fire is essential for maintaining the open, grassy understory that characterizes these forests (Kaplan, 2005). In the absence of fire, hardwood species such as oaks invade, altering the structure and composition of the ecosystem (Brockway, 2005). The challenge for conservationists is to reintroduce fire in a controlled manner to restore ecological balance, while avoiding the risks (e.g., biodiversity loss, vulnerability to soil erosion,

air pollution, damage to restored areas) associated with wildfires. This has made prescribed fire difficult to implement in many areas (Albritton et al., n.d.).

Climate Change

Climate change presents an additional threat to longleaf pine ecosystems. Rising temperatures and altered precipitation patterns can impact the growth and regeneration of longleaf pines, as well as the frequency and intensity of fires (Brockway, 2005). Warmer temperatures may also lead to increased pest infestations, such as bark beetles, which could further stress the trees (Diop et al., 2009). Shifts in rainfall patterns, including more intense storms (e.g., hurricanes and floods) and prolonged droughts, can reduce the availability of water necessary for pine regeneration. While longleaf pines are relatively drought-tolerant compared to other southern pines, the combined stresses of climate change, habitat fragmentation, and more frequent extreme weather events may limit the species' resilience (Bigelow et al., 2021). Additionally, the altered fire regimes caused by climate change may disrupt the natural cycles that these ecosystems depend on, affecting plant and animal species that rely on specific fire conditions (Brockway, 2005).

Longleaf Pine Restoration and Conservation Efforts: A Multi-Agency Approach

Restoration and conservation of the longleaf pine ecosystem have been ongoing for several decades, driven by both public and private sector initiatives aimed at reversing habitat loss and improving ecological health. Among these restoration efforts, CRP plays a crucial role in creating new longleaf pine forests on former cropped fields beginning in 2000 and continuing to this day (Stubbs, 2019).

Alongside CRP, early outreach and technical assistance led by The Longleaf Alliance helped focus attention on the decline of longleaf pine and how to address it (Adhikari et al., 2022a). Programs like ALRI have also been instrumental in uniting stakeholders, including government agencies, private landowners, and conservation groups, to work toward a common goal of restoring longleaf pine ecosystems across the southeastern United States (Van Lear et al., 2005; Brown, 2022).

In 2009, America's Longleaf Restoration Initiative (ALRI) aimed to increase longleaf pine ecosystems to 8 million acres by 2025 (Oswalt et al., 2012). The ALRI's 2009 Range-Wide Conservation Plan detailed strategies for achieving this goal, emphasizing not only restoration but also the maintenance of longleaf pine ecosystems, particularly through fire-dependent management to maintain ecological health (McIntyre et al., 2018).

In 2010, the USDA NRCS rolled out their LLPI, providing financial and technical assistance to landowners, covering up to 75% of planting and seedling costs for restoring longleaf pine (USDA NRCS, 2011). The assistance enables landowners to adopt various conservation practices to enhance longleaf pine forests through tree planting and ecosystem management using

prescribed fire or other techniques. This program was integral to encouraging the participation of private landowners, who own 61.8% of the land in the southeast (USDA NRCS, 2011; Oswalt & Guldin, 2021).

Also, the Longleaf Partnership Council (LPC) formed in 2011, brings together federal, state, private, and nonprofit stakeholders to coordinate longleaf pine restoration across significant geographic areas. The LPC monitors restoration progress, particularly in focal areas where longleaf pine restoration is concentrated. In 2012, the LPC created a 3-year strategic plan (2013-2015) to set annual targets for longleaf pine establishment, prescribed burns, and restoration activities (LPC 2012, 2014, 2015).

Additionally, the Longleaf Stewardship Fund was launched in 2012, providing over $4 million annually through a public-private grant program managed by the National Fish and Wildlife Foundation (NFWF) to support local restoration initiatives (LPC, 2012; NFWF, 2024). Starting in 2013, the LPC began tracking progress toward the ALRI goal, requiring an average of 250,000 acres per year, while acknowledging that initial goals would likely be lower (McIntyre et al., 2018). For 2013-2015, planting targets were set between 105,000 and 130,000 acres, with prescribed burns aimed at benefiting 1.4 to 1.7 million acres. These goals were largely achieved, with new longleaf pine plantations exceeding 150,000 acres annually, totaling nearly 460,000 acres over three years, and prescribed burning covering 3.9 million acres (LPC, 2012). McIntyre et al. (2018) report that while newly established longleaf pine plantations exceeded 150,000 acres annually from 2013 to 2015, amounting to nearly 460,000 acres over three years, much of this progress was counteracted by ongoing losses to land-use conversion, natural succession, and the transition of longleaf pine/oak forests to other forest types.

The ALRI has released the second iteration of its Range-Wide Conservation Plan, building upon the framework of the original 2009 plan. This updated 2025-2040 Conservation Plan continues efforts to expand longleaf pine forests to a total of 8 million acres across the southeast (Albritton et al., n.d.)

The plan focuses on three core goals:

- Maintain – Preserve approximately three million acres of longleaf forests already in good or excellent condition.
- Improve – Enhance longleaf forests currently in poor or fair condition, with the aim of upgrading them to the "Maintain" category.
- Restore – Establish nearly three million new acres of longleaf pine through afforestation (on land without recent forest cover) or reforestation (in recently harvested areas).

The 2025-2040 Conservation Plan is more than just a call to action; it is a commitment to ecological, economic, and cultural resilience. Collaboration stands at the heart of this effort, bringing together government agencies, private landowners, conservation organizations, and

local communities (Albritton et al., n.d.). Beyond these efforts, the plan champions the use of prescribed fire, sustainable forestry, and economic incentives to support landowners.

Furthermore, NRCS' Environmental Quality incentives Program (EQIP) also offers financial and technical assistance to agricultural producers and forest landowners (USDA FSA, n.d.). Through this, participants implement conservation practices that enhance forest health, promote biodiversity, mitigate against drought and extreme weather, and improve wildlife habitat.

Additionally, DoD contributes to longleaf pine conservation through its Readiness and Environmental Protection Integration (REPI) Program. This initiative addresses encroachment challenges that can limit military training and testing (DoD, 2016). By forming buffer partnerships with conservation groups and governmental entities, the REPI Program provides funding primarily for fee-simple acquisition and conservation easement purchases to protect existing longleaf pine habitat (Minor, 2020).

While these programs play a crucial role in supporting the longleaf pine restoration, this practitioner guide specifically focuses on CRP. The next section discusses CRP in detail.

Conservation Reserve Program (CRP)

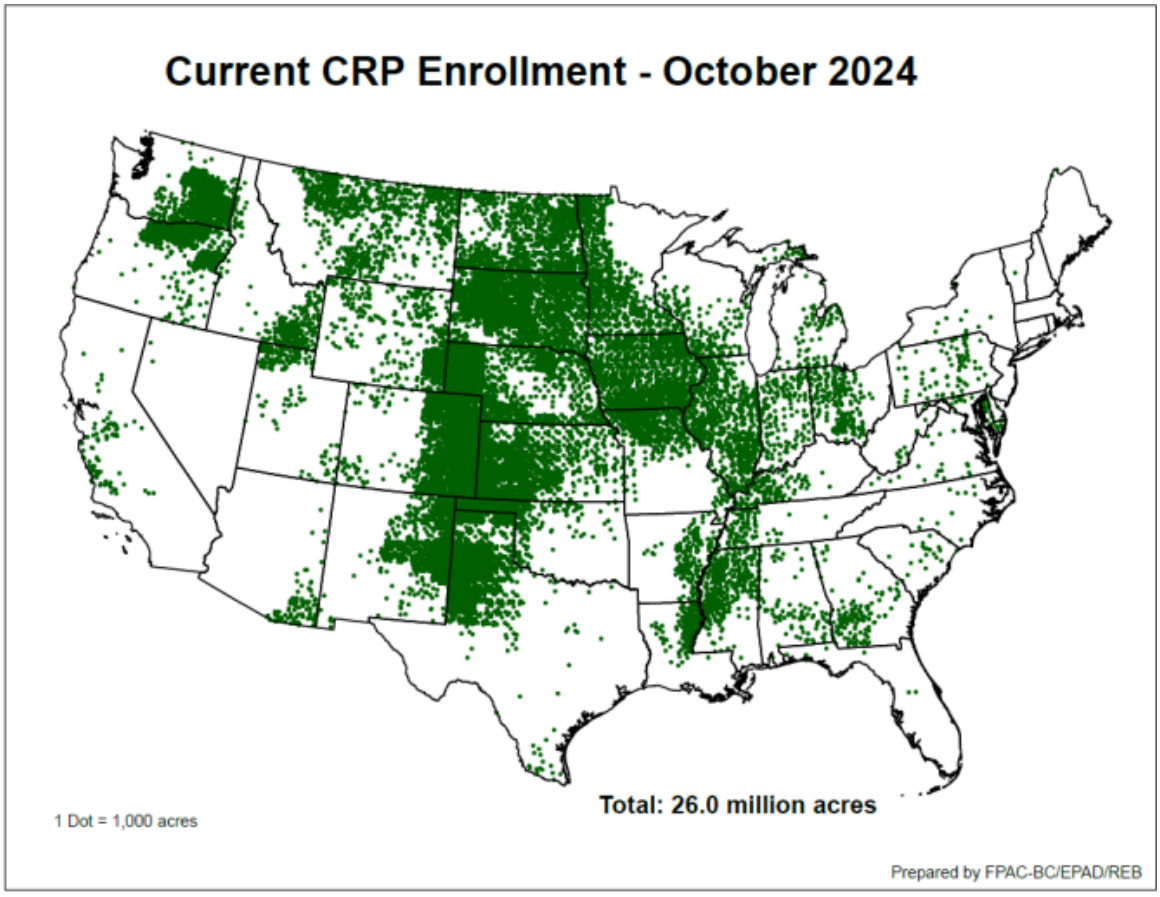
Background and Purpose

In parts of the United States where most land is privately owned, USDA Farm Bill conservation programs have become essential for advancing broader conservation goals. Among these, CRP stands as one of the most successful and widely supported federal conservation initiatives on privately owned lands (Stubbs, 2019; Stukes, 2023). The CRP, administered by the USDA FSA, provides agricultural producers with the opportunity to voluntarily set aside environmentally sensitive lands for conservation purposes. Most of the enrolled land is less productive cropland that is prone to erosion from wind and rain (USDA FSA, 2022a).

The program is rooted in the Food Security Act of 1985 and was reauthorized by the Agricultural Improvement Act of 2018, which includes specific regulations. The program aimed to reduce soil erosion on vulnerable cropland and control surplus commodity production. It also seeks to ensure the long-term capacity for food and fiber production, enhance water quality, support wildlife habitats, and offer financial support to farmers (USDA FSA, 2020a). By participating in CRP, agricultural producers contribute significantly to ecological preservation while also benefiting their local communities (USDA FSA, 2022a).

As of September 2024, CRP is the largest initiative dedicated to conserving private lands in the United States, protecting over 24 million acres of environmentally sensitive lands (USDA FSA, 2024). Additionally, the program facilitated the highest reforestation effort in U.S. history from 1987 to 1991, with over 1 million hectares of cropland planted with trees (Barker et al., 1995).

Participants in the program commit to planting species known as "covers" which includes approved grasses and trees, such as longleaf pine. These plantings are essential for reducing soil erosion, enhancing soil and water quality, and creating habitats for wildlife. In return for their efforts, participants receive annual rental payments and up to 50% cost-share assistance to help establish and maintain these conservation practices. CRP contracts typically last between 10 and 15 years to ensure a long-term commitment to environmental health (USDA FSA, 2022a).



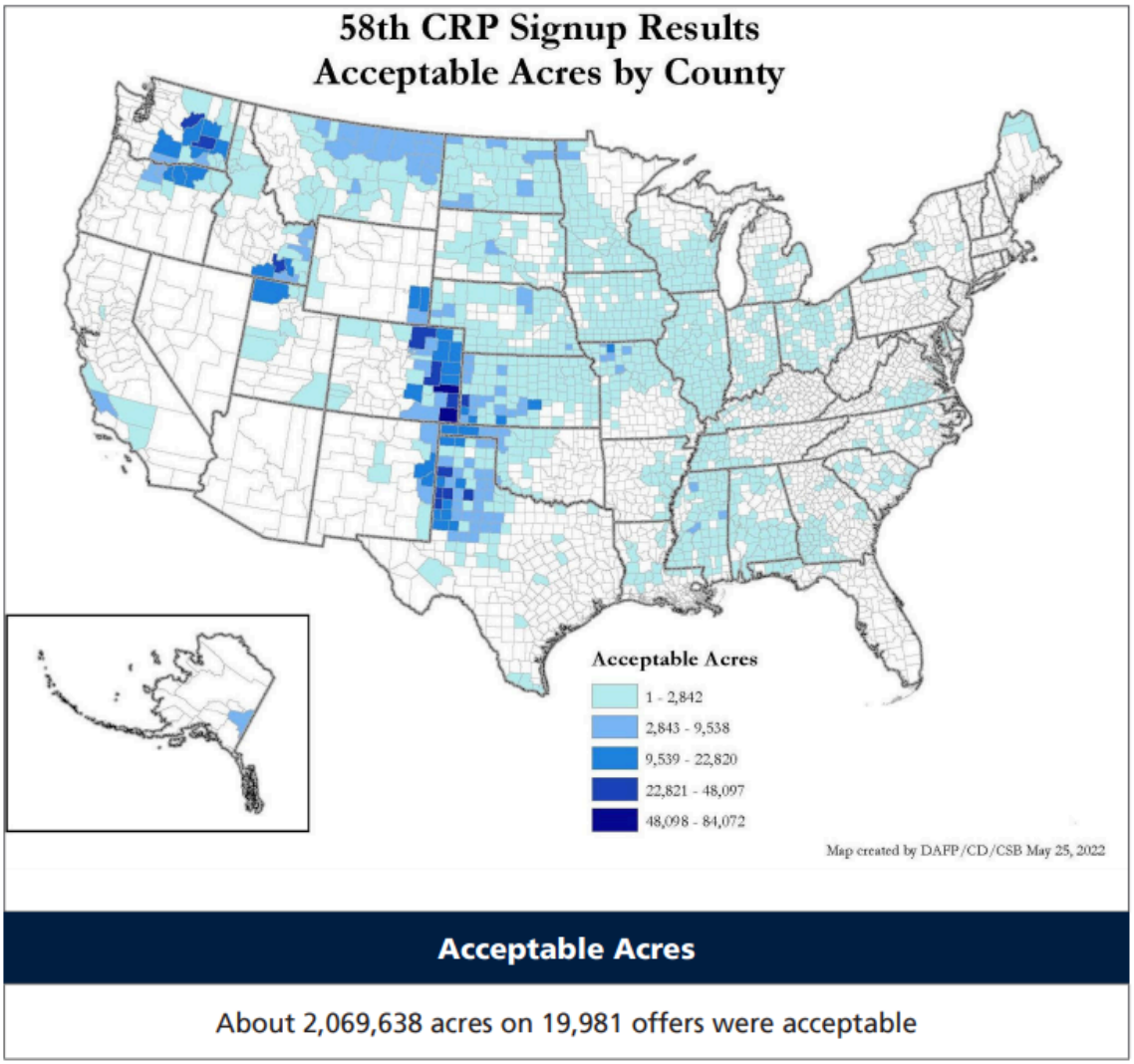
(Credit: USDA FSA, 2024)

Eligibility Criteria

Since the establishment of CRP, its eligibility criteria have evolved to achieve diverse environmental and agricultural objectives by enabling more lands to qualify for enrollment. Initially, eligibility was based on erodibility, with about 41 million hectares of cropland being eligible. The erodibility criteria required the land to be cropped 4 out of 6 years prior to current Farm Bill authority, and enrollment was limited to 25% of the cropland within each county (Ribaudo, 1989). For those CRP participants wanting to restore longleaf pine, the land had to be located within the CRP National Conservation Priority Area (CPA), with soil conditions suitable for longleaf pine growth. Additionally, each state was limited on total enrolled acreage for longleaf pine and could not exceed its designated allocation (USDA FSA, 2006).

Over time, additional types of land, such as floodplain areas vulnerable to erosion, became eligible for enrollment in CRP. The Environmental Benefits Index (EBI) was also modified by FSA to include wildlife benefits for evaluation of land offers, alongside soil erosion and water quality. Furthermore, new initiatives, such as the Transition Incentive Program (TIP), were introduced to further expand the program's impact (USDA FSA, 2020a).

Over the years, CRP has focused on croplands, especially those that are environmentally sensitive or prone to erosion that are used for agricultural production (Johnson et al., 2016). To enhance its benefits, USDA has expanded its conservation efforts by implementing more flexible eligibility criteria and broader goals, including wildlife conservation. This has allowed for the enrollment of additional acres of land, providing greater support for environmental initiatives while also offering economic support to landowners.



(Credit: USDA FSA, 2022b)

Overview of Benefits

The CRP provides various environmental benefits that support ecosystems and wildlife across the United States. The program reduces flooding by managing stormwater runoff and can benefit water levels in areas like the Ogallala aquifer, which faces significant declines (USDA FSA, 2017). Additionally, through vegetative cover, buffer strips, and reducing nutrient runoff and sedimentation, CRP has significantly improved water quality. In 2017, these efforts prevented about 521 million pounds of nitrogen and 103 million pounds of phosphorus from entering waterways (USDA FSA, 2017). This improved water quality can lead to increased property values, enhanced water-based recreation, such as increased opportunities for recreational fishing (Ribaudo, 1989), and lower costs for municipal water treatment (Hansen, 2007).

Another benefit of CRP is its contribution to enhancing wildlife habitats, leading to increased populations of numerous species, including several bird species (USDA FSA, 2017). In fact, 73% of CRP participants have reported noticing positive changes in wildlife populations on their lands (USDA FSA, 2020a). These improvements can provide better opportunities for wildlife viewing and hunting (Hansen, 2007). Furthermore, CRP supports pollinators, such as honey bees, by creating pesticide-free areas with diverse flowering plants (USDA FSA, 2017; USDA FSA, 2022b).

A key advantage of CRP is its effectiveness in reducing greenhouse gas emissions in both grassland and forest ecosystems, contributing to improved air quality. In 2017, it sequestered 34 million metric tons of carbon dioxide equivalent, making it the top federal program for carbon reduction on private lands. In addition to carbon sequestration, CRP may also provide carbon benefits through the production of biofuels, including ethanol and fuelwood (Barker et al., 1995). CRP also improves soil health and productivity by preventing over 9 billion tons of soil erosion on sensitive lands since its inception. The program has also produced significant unintended ecological benefits, such as reducing landscape fragmentation and preserving regional biodiversity (Dunn et al., 1993)

Other than environmental and ecological benefits, the program provides around $1.8 billion each year to landowners across the United States, offering economic support and a stable income source (USDA ERS, 2024). This funding through participation in the program supports landowners in maintaining or expanding their agricultural operations, preserving family ownership of their land, or transitioning into retirement from farming (Barnes et al., 2019).

With its wide range of benefits, CRP is a valuable tool for conservation and environmental improvement, making it easier for landowners to facilitate sustainable land management practices. For lasting conservation benefits, it is essential to consider land management options once the 10 to 15-year contracts end. At that time, landowners can choose to either return the land to crops or maintain grassland by re-enrolling in the program or continuing conservation practices outside the program (Barnes et al., 2020). When it comes to CRP contract expiration,

many of those fields established to grass are returned to crop production, other acreage is retained in grass and becomes part of a livestock grazing system (USDA FSA, 2020a). In contrast, a much higher percentage of expired CRP tree acreage is retained in forest cover (FNAI, 2023).

The Northern bobwhite, a threatened species that benefits from the Conservation Reserve Program. (*Credit: U.S. Fish and Wildlife Services)*

Role of USDA in the Restoration of Longleaf Pine Habitats

The ALRI was initiated to build upon the success of The Longleaf Alliance. At the time of its formation, the amount of longleaf pine remaining present on the landscape was estimated to be 3.4 million acres (Albritton et al., n.d.). The ALRI regional conservation plan provides guidance to facilitate the restoration of 4.6 million acres of longleaf pine ecosystems by 2025 across nine southern states: Alabama, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, Texas, and Virginia (USDA FSA, 2006; USDA NRCS, 2011). As a result, the area of longleaf pine forests is gradually expanding, and is estimated to be about 5.2 million acres, partly due to the efforts of ALRI and other conservation initiatives (USDA FSA, 2020b; USDA NRCS, 2024).

CRP longleaf pine restoration accomplishments, as one of the key contributors to these efforts, are reported to the ALRI to facilitate tracking of longleaf pine restoration progress. During the first 15 years of CRP, relatively little longleaf pine was restored. However, this changed significantly with the formation of The Longleaf Alliance and its advocacy in the late 1990s. Since 2000, FSA estimates that CRP has contributed to the restoration of nearly 400,000 acres of new longleaf pine forests (USDA FSA, 2020a). Additionally, since the launch of the LLPI in 2010, NRCS has collaborated with producers to restore nearly 1 million acres of longleaf forests on private lands, reversing a century-long decline (USDA NRCS, 2011).

Red-cockaded woodpecker, a threatened species that relies on longleaf pine habitats. *(Credit: U.S. Fish and Wildlife Services)*

Motivations and Challenges to Participation

Understanding the motivations and challenges to participation in conservation programs, including CRP, is crucial for improving program accessibility and efficacy. It helps to highlight challenges faced by landowners and provides valuable insights that can inform policy interventions aimed at reducing enrollment challenges and fostering better participation. These motivations and obstacles can be broadly categorized into distinct themes. Obstacles may be actual, such as financial limitations, or perceived, such as distrust of agencies. Both types of obstacles play an important role in limiting participation. Similarly, motivations, such as

stewardship goals can greatly encourage participation. The key categories mentioned in the literature that either encourage or hinder participation in conservation programs are outlined below. Where possible, we highlight literature specific to CRP. However, we also expand our insights beyond CRP, as the broader literature on program participation offers more comprehensive and applicable insights.

Financial Considerations and Market Dynamics

Financial considerations are often a key element of landowner incentive programs, as conservation programs often provide financial compensation, cost-share agreements, rental payments, and tax reductions to landowners (Cooper, 2011; Greene et al., 2013; Stubbs, 2014). This monetary support aims to partially or fully offset the potential loss of income from activities like agriculture or timber production, making conservation programs an economically viable option, particularly for landowners who rely on their land for income (Farmer et al., 2017; Adhikari, 2022a). However, landowners may be reluctant to change management practices if they perceive such changes could negatively impact their production and related income.

Research studies have also shown that financial benefits are a primary driver for landowners to participate in CRP (Reimer & Prokopy, 2014; Caldas et al., 2016; Barnes et al., 2019). CRP offers a range of financial benefits, including annual rental payments, cost-share assistance, and sign-up bonuses, which are pivotal in motivating landowners to voluntarily set aside environmentally sensitive lands for conservation purposes.

Annual rental payments compensate landowners for the income they forego by taking land out of agricultural production (USDA FSA, 2020a). The payment rates are determined based on the agricultural rental value of the land (e.g., the productivity of the soil within each county and the average dryland cash rent), which reflects local market conditions (Johnson et al., 2016; NSAC, 2023). These guaranteed payments make CRP financially attractive for many landowners (Garr, 2016; Stubbs, 2019; Stukes, 2023). Cost-share assistance further supports landowners by covering a percentage of the costs for implementing conservation measures. This support lowers the financial obstacle to entry, making participation in CRP more feasible (Stubbs, 2014). Research studies on CRP enrollment highlights that landowners are more inclined to enroll in CRP when they know that they can receive financial help for the upfront costs of conservation practices (Caldas et al., 2016; Barnes et al., 2019).

In addition, CRP offers sign-up bonuses, which amount to 32.5% of the initial rental payment, along with incentive bonuses for additional cost-share and for specific practices, such as buffers and wellhead areas (NSAC, 2023). These one-time payments can sway undecided landowners to consider the program, with upfront bonuses. A study by Johnson et al. (2016) found that sign-up bonuses were particularly influential in persuading younger, newer landowners to consider conservation as a viable practice, often serving as the crucial first step toward deeper involvement in environmental stewardship initiatives.

However, financial considerations can also act as an obstacle. As commodity prices rise, farmers become less interested in enrolling their land in CRP due to increased costs (Wallander et al., 2017). The high costs of adopting certain management activities can also discourage participation (Kreye et al., 2021), especially when the cost-share still requires significant investment from the landowner. Landowners with higher market rental rates and more productive land are less likely to enroll, as they might risk losing income from farming, and CRP payments may not fully compensate for that loss (Jacobs, 2010; Adhikari et al., 2022a). Many landowners may therefore require higher compensation to offset the loss of land use and production. As a result, limited funding and insufficient cost-share support can lead to high rejection rates for applicants and lower participation rates (Adhikari et al., 2022b).

Knowledge and Awareness

Limited awareness about the benefits of conservation programs and lack of familiarity with programs like CRP can lead to lower participation, as some landowners may doubt the real value or effectiveness of these programs (Schnur et al., 2013; Kreye et al., 2021). These obstacles are often influenced by socioeconomic factors such as income and gender, leading certain groups to face additional challenges (Mutandwa, 2015). Additionally, the sources and channels of information can also act as obstacles or motivators to participation (Mehmood & Zhang, 2005). Information sharing and effective communication through trusted channels like FSA can serve as a powerful motivator, helping landowners to better understand their available options, reduce uncertainty about eligibility and program requirements, and recognize the benefits of participation. This can have a positive impact on their willingness to participate, leading to increased participation and better conservation outcomes (Barnes & Dayer, 2021). However, even informed landowners may overlook important land use options, contributing to low participation (Wallander et al., 2017).

Furthermore, lack of technical assistance can hinder participation, as landowners may have limited knowledge on how to adopt the necessary practices or find the appropriate contractors to support them in carrying out the work on their land (Adhikari et al., 2021). Programs like CRP, EQIP, and the Agricultural Conservation Easement Program (ACEP) provide access to technical expertise and resources for implementing conservation practices, which help make conservation practices more accessible to landowners. This assistance often serves as a key motivator for landowners to participate, promoting broader adoption of sustainable land management practices (Stukes, 2023).

National Forest Stewardship Program Gathering, Maryland, September 2024: Bringing together landowners, practitioners, and academics. *(Credit: Reyhane Rastgoo)*

Land and Landowner Characteristics

Land characteristics can influence whether landowners choose to participate in conservation programs. For example, the presence of mature pine trees increased the likelihood of participation in the Safe Harbor Program, a voluntary conservation initiative aimed at protecting and improving habitats for endangered species on private lands. This program supports species such as the red-cockaded woodpecker, which relies on longleaf pine ecosystems in the southern United States (Mehmood & Zhang, 2005). However, some landowners may be hesitant to plant longleaf pine due to concerns that these forests could attract species protected under the Endangered Species Act (ESA), which could subject them to regulations and potential impacts to future timber harvests and land uses (Forest Landowners Association, 2020).

Furthermore, landowner characteristics, such as gender, race, age, and education are other crucial factors that can affect participation in programs like CRP. For instance, Black landowners often face additional challenges, such as legal challenges, including heirs' property, which can further reduce their participation (Hitchner et al., 2024). On the other hand, younger landowners, those who value conservation, and landowners with higher education tend to be more open to participation, possibly due to greater environmental awareness and more flexibility to adopt new practices (Cooper, 2011; Wachenheim et al., 2014). Land tenure and property size are also key factors, with landowners with larger properties being more likely to participate and adopt certain practices such as prescribed fire (Adhikari et al., 2022a; Clay et al., 2022). In contrast, those who

have had their land for a shorter period or do not reside on their land are less likely to participate in conservation programs (Cooper, 2011). This may stem from a lack of long-term investment or attachment to their land.

Program Design

While some features of CRP design, like annual rental payments and soil and wildlife conservation, can act as motivators for landowners by aligning with their goals and values, certain aspects of the program may also serve as obstacles. Similar to other conservation programs, landowners tend to prefer shorter-term contracts with fewer legal obligations, as these contracts offer more flexibility (Singh et al., 2016). The long-term commitment required by CRP is a key challenge for some landowners, making it less attractive to participants who want to avoid inflexible land management (Green et al., 2013). Landowners also favor minimal or no obligations to maintain habitat once the contract ends, highlighting their strong desire for flexibility in land management (Singh et al., 2016). The program's incompatibility with farm and ranch operations, along with land use limitations such as restrictions on haying and grazing, further diminish interest among landowners, particularly those who have productive soils or own livestock (Wachenheim et al., 2014; Barnes & Dayer, 2021).

Complexity and lack of understanding regarding program requirements and eligibility criteria can also impact intentions to participate (Greene et al., 2013). The CRP uses an Environmental Benefits Index (EBI) to score and rank land offers based on factors such as water quality and wildlife benefits. However, this system can be complex for landowners to understand, potentially discouraging participation. Additionally, the eligibility criteria that determine which types of agricultural lands are accepted have changed frequently over time, adding further complexity to the process for landowners (Jacobs, 2010). Finally, the risks and challenges associated with certain conservation practices and requirements can reduce participation. For example, the need for regular prescribed burns in longleaf pine ecosystems is a major challenge, along with other challenges such as management requirements and restrictions on land use (Barnes & Dayer, 2021).

Prescribed fire, a key tool that helps restore longleaf pine forests but can discourage participation due to perceived risks involved. *(Credit: Virginia Department of Conservation and Recreation)*

Socio-psychological Factors

Socio-psychological factors can greatly influence landowners' behavioral decisions regarding participation in conservation programs (Dayer et al., 2014; Floress et al., 2019). An example of this is the status quo bias, which refers to people's tendency to prefer the current behavioral patterns and resist change, even when it could bring benefits (Samuelson & Zeckhauser, 1988; Telesetsky, 2017). This reluctance to change may stem from the ease and familiarity with established practices. Additionally, attitudes toward conservation play a crucial role, with landowners who hold more positive attitudes toward stewardship being more likely to engage in conservation efforts as a way to contribute positively to the environment and preserve natural resources (Adhikari et al., 2021). Those with positive attitudes toward specific programs or practices are also more likely to participate, as they may perceive them as beneficial (Prokopy et al., 2008). For example, landowners who believed patch-cutting trees was beneficial for their land and wildlife were more inclined to adopt this practice (Dayer et al., 2016). Landowners' values can also influence their decisions, as those with strong environmental values tend to perceive the benefits of conservation activities to be greater than the actual outcomes (Epanchin-Niell et al., 2022).

Further, social norms and community networks can play an important role in influencing participation (Prokopy et al., 2008). For instance, neighbor participation in CRP motivates

non-enrolled landowners to join (Lambert et al., 2007). Taylor (2018) highlights that when CRP enrollment is visibly supported within a community, it creates a ripple effect, motivating others to enroll. Similarly, Gordon (2021) found that landowners are more likely to consider enrolling in CRP when they observe their peers benefiting from the program. Likewise, membership in environmental groups or game wildlife organizations has been associated with an increased likelihood of implementing conservation practices (Dayer et al., 2016; Clay et al., 2022). This dynamic, driven by a desire to align with community values and practices, helps normalize CRP as a respected activity within societies, encouraging broader participation (Lambert et al., 2007).

Beyond social norms, cultural traditions can also motivate landowners to engage with conservation initiatives by fostering a sense of place (Schelhas et al., 2019). Many farmers and landowners have strong emotional ties to their land, viewing it not only as a source of income but also as an integral part of their community and identity (Schelhas et al., 2019). Participating in CRP allows them to preserve the land's health and integrity while honoring their family's legacy and contributing to the cultural identity of their community (Sanders, 2005; Schelhas et al., 2019).

Status quo bias, a constraint to participation that keeps people from changing old habits. *(Credit: Getty Images, courtesy of Canva)*

Trust in Government Programs

People often have a general distrust of government employees and agencies, including CRP, and doubt the real value and long-term benefits of such programs (Gronewold et al., 2012; Wachenheim, 2019). Past experiences have further contributed to this mistrust (Hitchner et al., 2024). As a result, a lack of landowner interest in public programs and concerns about potential loss of property rights, further diminish trust and discourage participation in CRP (Mutandwa et al., 2016; Hitchner et al., 2024).

While distrust of government programs and employees can serve as a constraint, building trust can also act as a powerful motivator. For example, establishing trust is an essential step for effectively engaging landowners in programs like CRP, their collaboration with forestry agencies, and fostering better participation (Schelhas et al., 2017). However, building trust can take time and effort, as many landowners need support to involve family members, explore their options, and resolve land ownership issues.

Moral Obligations

Ethical concerns and moral obligation, such as the belief in conserving biodiversity, can influence the likelihood of participation in conservation programs (Mehmood & Zhang, 2005). Landowners who are concerned about environmental issues and ecosystem services are more likely to participate, whereas those who do not feel a responsibility to protect the environment may be less interested (Kreye et al., 2021). Based on the literature, those with larger agricultural lands or land focused on ecosystem services tend to be more environmentally conscious and more willing to participate (Adhikari et al., 2021). Furthermore, programs like ACEP offer easements that protect land from development or degradation, ensuring its ecological value is maintained for future generations (Phelps, 2022). For many landowners, particularly those who have inherited farmland, this aligns with their desire to preserve their family legacy or cultural ties to the land, further enhancing their motivation to participation (Taylor, 2018; Adhikari, 2022a). However, some landowners may prioritize economic use of their land over restoration goals or moral obligation, which can act as an obstacle to participation (Kreye et al., 2021).

Regional Differences

Political factors, such as state representation on relevant congressional committees, can influence the allocation of CRP acreage and payments (Jacobs, 2010). This can result in an uneven distribution of CRP benefits, potentially leading to regional differences in program access, with more people gaining access in regions that receive higher allocations of acreage and payments. The program has also been criticized for paying landowners higher rental rates compared to the land's actual value, resulting in excess payments and higher program costs in some areas. As a result, landowners in resource-limited areas may face additional challenges to enrollment (Jacobs, 2010).

Enhancing Initial Enrollment in CRP

Recommendations for Increasing CRP Participation Rates

To effectively address challenges and enhance participation among diverse landowners, it is crucial to develop strategies that are based on the specific limitations identified by landowners. This helps ensure that program designs are accessible and contribute to long-term conservation efforts. Below are common strategies from the literature to overcome these obstacles.

Program Design and Implementation

Participation in CRP can be improved by addressing landowners' concerns through better program design and a simpler administrative process (Wachenheim et al., 2018). Aligning the program's design with landowners' specific goals, such as stewardship-oriented attitudes, recreational interests, and non-economic motivations, can further encourage enrollment (Mutandwa et al., 2016; Mutandwa et al., 2019; Adhikari et al., 2022b). Since restrictions and long-term enrollment negatively impact participation, offering more flexible CRP contract options and management choices are needed. Offering varying levels of restrictions would better accommodate the diverse preferences of landowners, such as livestock owners who are discouraged by land use limitations (Atkinson et al., 2011; Wachenheim et al., 2018; Mutandwa et al., 2019). Additionally, allowing landowners to enroll in conservation practices on part of their land or on working lands would further encourage broader participation (Jacobs, 2010).

Adequate financial incentives should also be offered, as financial constraints were mentioned as a key challenge contributing to lower interest and participation among landowners (Atkinson et al., 2011; Mutandwa et al., 2016; Adhikari et al., 2022a). Compensation levels should be aligned with the level of management restrictions, as landowners require greater incentives for more restrictive practices (Mutandwa et al., 2019). Additionally, since many landowners are discouraged by concerns related to environmental risks, greater compensation may also be needed to protect lands that are vulnerable to such risks (Adhikari et al., 2022a). Moreover, adjusting cost-share rates or annual rental payments, particularly in areas with high land values, can help address financial challenges and encourage involvement in CRP (Megalos, 1999).

Education and Outreach

To increase conservation participation, it is recommended to improve the availability of information by making it more accessible, relevant, clear, and comprehensive to prevent confusion among landowners (Atkinson et al., 2011). Various outreach methods including publications, presentations, and social networks should be utilized to effectively reach and engage diverse landowners. These efforts can enhance familiarity with CRP and increase the likelihood of participation among landowners (Mutandwa et al., 2016). Outreach efforts should also emphasize the benefits of CRP such as its environmental and economic impacts and provide training on adopting specific conservation practices (Megalos, 1999; Cade et al., 2005; Jacob, 2010; Cheney, 2024). This will help address the lack of awareness and experience among landowners, while justifying the importance and value of CRP to both landowners and policymakers (Gudlin et al., 2019). Peer learning can also play a crucial role in promoting the adoption of conservation practices by addressing mistrust, providing ongoing and localized sources of information and support, and fostering a community of individuals with shared goals. By sharing their experiences, these networks build receptivity and strengthen landowners' self-efficacy by observing peers successfully implement conservation efforts (Castille et al.,

2016).

Outreach from trusted sources is vital for all landowners, including resource-limited groups and women landowners. These groups tend to have less familiarity with and trust in conservation programs, leading to lower levels of participation among them (Mutandwa et al., 2016). Effective outreach may involve peer-to-peer interactions through regular meetings, partnerships with trusted organizations such as the Center for Heirs' Property Preservation (CHPP) or the National Association for the Advancement of Colored People (NAACP), or through trusted gathering spaces such as schools and churches (Schelhas et al., 2017; Stukes, 2023). Building close relationships with landowners and their trusted organizations and integrating cultural practices into targeted outreach and education can further strengthen trust within these communities. Additionally, landowners with higher education should also be targeted, as they are more likely to participate (Adhikari et al., 2022a). Finally, since the majority of participants are older, developing strategies to engage younger landowners would further promote participation by involving younger generations (Atkinson et al., 2011).

Technical Assistance and Support

Providing better and ongoing technical assistance would enhance participation since many landowners lack the necessary knowledge, which can hinder their involvement (Atkinson et al., 2011; Adhikari et al., 2022b). Additionally, providing customized and personalized assistance is essential to ensure landowners' unique needs are met (Stukes, 2023). Training staff to be more culturally competent and delivering these training through known and trusted community organizations could enhance communication and engagement, further increasing participation (Stukes, 2023). Moreover, increasing meaningful contact between landowners and agencies like FSA or NRCS, along with partnering with community-based organizations, can serve as an effective channel for increasing awareness and engagement in CRP (Atkinson et al., 2011; Mutandwa et al., 2016; Adhikari et al., 2022a).

Policy and Partnerships

Leveraging partnerships and engaging landowners is essential for enhancing the program's effectiveness and broadening its impact through collaborative efforts (Gudlin et al., 2019). Expanding partnerships with private and state-level programs will strengthen conservation efforts and attract landowners with diverse needs to CRP by offering additional resources and support (Megalos, 1999). Additionally, since social norms and peer influence play an important role in participation, collaborating with those who have already adopted conservation practices or participated in CRP can help make the program more popular within their communities (Mutandwa et al., 2016). Finally, CRP policies should be informed by lessons from past and ongoing research to better achieve conservation success (Cade et al., 2005).

Improving Access and Participation

Addressing the unique concerns and persistent challenges faced by resource-limited communities, such as Black and Native American landowners dealing with heirs' property, is essential for improving access in conservation efforts. A practical approach to achieve this is by providing pro-bono legal and accounting services to help resolve ownership and succession challenges faced by these landowners. For instance, the HEIRS Property Act of 2024 (H.R.8127 - 118th Congress, 2023-2024), introduced by Congressman Sanford Bishop and Don Davis, is currently under consideration (at the time of writing this document in January 2025) for inclusion in future Farm Bills or federal budgets. This proposed legislation seeks to amend existing law to direct the U.S. Secretary of Agriculture to collaborate with nonprofit organizations to offer pro-bono legal and accounting assistance. These services would specifically target resolving ownership and succession issues for resource-limited heirs of farmland (Heirs Property Act, H.R.8127, 118th Congress, 2024). This approach will help overcome challenges that limit their participation in programs such as CRP and ensure that a diverse range of landowners benefit. Policies and assistance should also be tailored to local contexts to account for differences in landowners' motivations (Cheney, 2024).

To improve access and participation in CRP, strengthening interagency and cross-sector collaboration is also recommended, as this can create better support for diverse landowners. Furthermore, addressing unfair treatment, building trust through engagement with agencies and professionals, and overcoming language limitations are crucial steps (Stukes, 2023; Hitchner et al., 2024). Additionally, it is suggested that the USDA and FSA improve the documentation of landowner demographics, particularly regarding gender and types of land ownership (Hitchner et al., 2024). Promoting networking among resource-limited communities to share knowledge and information with peers can also help overcome obstacles related to information access, ultimately increasing participation in CRP. Moreover, allowing multiple individuals to be listed as landowners or producers would further enhance access and participation, particularly for women and Black landowners (Hitchner et al., 2024).

Finally, developing strategies to increase participation among resource-limited communities will contribute significantly to the overall success of CRP (Jacobs, 2010). Minimizing political influence and increasing transparency in the criteria for distribution of CRP resources across a wider audience and states will further improve CRP access and participation (Jacobs, 2010).

Future Research and Monitoring

Future research is recommended to identify key lessons, uncover gaps, and address research needs that can inform future decisions, adjustments, and policies related to CRP (Gudlin et al., 2019). Additionally, research should also be used to monitor the effectiveness of education and outreach, the success of CRP and progress toward its goals, ensuring the program achieves the maximum possible benefits (Mutandwa et al., 2016; Gudlin et al., 2019). Developing clear

measures to track conservation progress, would also help with setting clear conservation goals and evaluating program success (Cade et al., 2005).

Although forest practices tend to persist more, there are still gaps in understanding longleaf pine restoration. These include factors influencing enrollment in conservation programs and land management persistence, the impact of factors such as behavioral inertia on land use decisions, and challenges faced by resource-limited landowners. Additionally, limited data exists on participation in longleaf pine restoration efforts, particularly after incentives end. These can be addressed through approaches such as follow-up contacts and adaptive management strategies (Jackson-Smith et al., 2010). Future research should also address these gaps and provide better data to understand trends and reasons for participation in programs like CRP, helping to enhance long-term conservation outcomes. Moreover, to better understand landowners' decision-making in participating in CRP, it is recommended to conduct research that integrates social science with applied practices. This approach will provide valuable insights into the unique motivations of these communities in managing their lands and participating in CRP, helping to tailor incentives and program design that align with their needs (Stukes, 2023; Hitcher et al., 2024).

Post-CRP Land Management Options

Overview of Available Options

As CRP contracts expire, landowners face important decisions about how to manage their land going forward (Jacobs, 2010). Fortunately, several post-CRP land management options are available to landowners to promote sustainable use of longleaf pine forests. These options include re-enrollment in CRP, enrollment in other conservation programs, and persistence of longleaf pine land use.

Re-enrollment in CRP

Landowners often wish to re-enroll to maintain environmental and financial benefits (Barnes et al., 2019). However, eligibility criteria may restrict this option program-wide. Re-enrollment through continuous sign-ups is a viable pathway for landowners, particularly for lands with high ecological value (Hellerstein, 2017). The continuous sign-up guarantees enrollment for qualifying landowners, removing the competitive pressures often associated with the general sign-up, where acceptance depends heavily on evaluation against other offers (Jacobs, 2010). This flexibility makes it a valuable option for transitioning lands previously enrolled in CRP, aligning economic viability with ecological stewardship. However, it is worth noting that CRP longleaf pine acres are often not offered for re-enrollment. It may be that the value of longleaf pine straw is often a consideration in landowners' re-enrollment decisions, because selling it is prohibited by CRP policy on lands under contract (Hayes et al., 2009). There may also be a cap on the amount of land that can be enrolled in the continuous sign-up option within a given area

or time frame; however, the exact limitations will depend on the specific CRP guidelines and local FSA office regulations (USDA FSA, n.d.).

Enrollment in another Conservation Program

Following CRP exit, landowners can enroll in other conservation programs such as the Conservation Stewardship Program (CSP). Starting in the 2024 fiscal year, the CSP offers a payment ranging from $1,500 to $4,000 (USDA NRCS, n.d.). The CSP provides an excellent opportunity for landowners with longleaf pine forests to improve both the quality of their forest products and the surrounding environment. By adopting conservation activities, participants can enhance wildlife habitats and promote sustainable forest management (USDA FSA, 2020a). CSP also supports landowners in planning and implementing conservation practices and enhancements tailored to address natural resource concerns specific to their operations. Several enhancements are available to promote forest conservation and sustainable management. For longleaf pine forests, these options include ecosystem restoration, prescribed burning, and wildlife habitat management. Recent updates to CSP introduced new enhancements and bundles (e.g., planting longleaf pine seedlings in degraded areas, selective thinning, controlling invasive species) designed to benefit longleaf pine forest management (USDA FSA, 2020a).

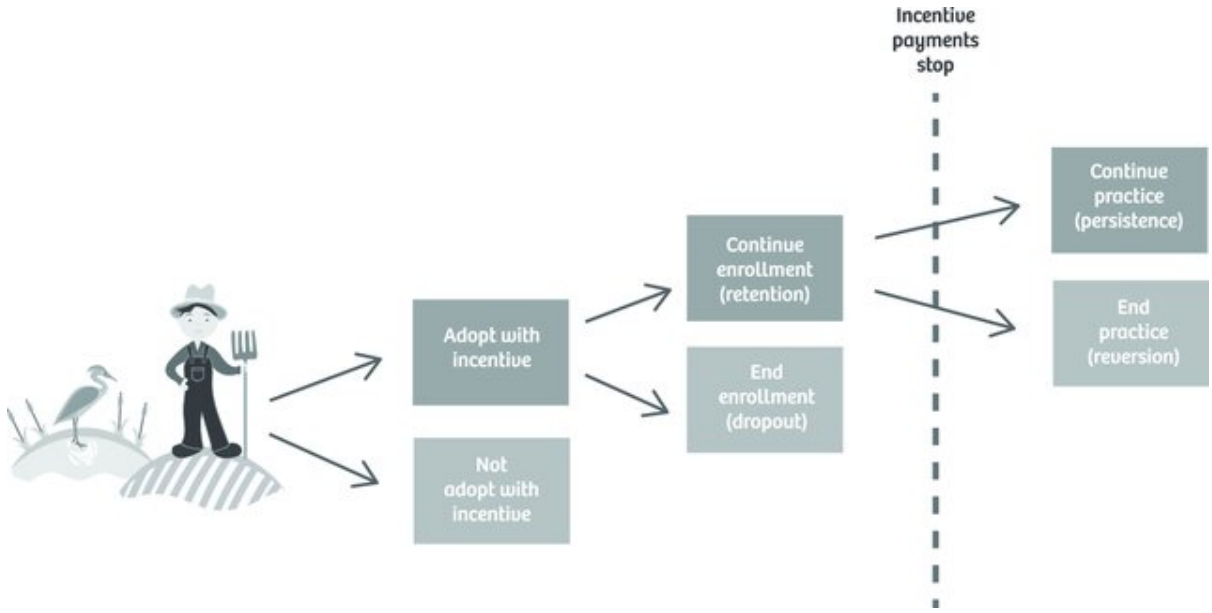
It is important to note that while other conservation programs may be potential options for landowners once they exit CRP, expressed interest in these programs does not always translate into actual enrollment. For example, the fact sheet by Barnes et al. (2019) presents a social science study that examines the persistence of grassland conservation and the reversion to cropland on fields currently or previously enrolled in CRP across 36 counties in the southern Great Plains. Their findings show that landowners' interest in enrolling in other conservation programs was higher than their actual enrollment. Similar data is needed in the context of the longleaf pine forests, as this area has not been studied.

Persistence of Longleaf Pine Land Use

Persistence refers to the continued adoption of conservation practices and land management by landowners to maintain the benefits of such practices, even after their enrollment in conservation programs ends and financial incentives are no longer available (Dayer et al., 2018). Persistence plays a vital role in improving the design, evaluation, and effectiveness of conservation programs and policies, while also supporting long-term conservation outcomes. A study by Barnes et al. (2020) found that over 66% of landowners with former CRP fields reported continuing grassland conservation after their contracts expired. Other studies have shown higher persistence rates for CRP forest covers following contract expiration (FNAI, 2023). This highlights the importance of gaining a deeper understanding of longleaf pine landowner behaviors beyond the initial enrollment, as well as the factors that influence this persistence. Despite its importance, most research has focused on landowner participation, with little study on the reasons landowners continue conservation practices after payments end (Swann & Richards, 2016). Addressing this gap could lead to more effective design and strategies for longleaf pine restoration through CRP.

Below are the key determinants of persistence and strategies to encourage this behavior to ensure lasting restoration efforts.

Determinants of Persistence and Long-Term Participation



Steps of landowner participation in incentive programs—the model for persistence. *(Source: Dayer et al., 2018)*

Landowner Characteristics and Cognition

Landowner cognitions, including environmental attitudes and pre-existing conservation values, play an important role in promoting persistence with land management practices (Dayer et al., 2018; Barnes et al., 2019). Landowners with strong environmental motivations, such as improving wildlife habitat, are more likely to sustain conservation practices without financial assistance. In contrast, a focus on maximizing profit from the land may reduce this persistence (Lutter et al., 2019a; Vaske et al., 2021).

Trust in USDA personnel and the perceived benefits of such programs are also critical factors influencing decisions to continue conservation practices (Lutter et al., 2019a; Rissman et al., 2023). Positive perceptions of program outcomes, such as improvements in bird populations or recreational opportunities, are associated with increased persistence in conservation behaviors (Lutter et al., 2019b). Practices with highly visible benefits are more likely to be maintained, as these positive outcomes motivate landowners to continue their efforts (Swann & Richards, 2016; Tan, 2024).

Behavioral inertia further reinforces persistence by fostering attachment to existing behavioral patterns and encouraging their maintenance through consistent and repeated adoption of conservation behaviors (Dayer et al., 2018; Barnes et al., 2023). For instance, behavioral inertia

has been shown to encourage CRP participants to maintain land in grass rather than revert to crop production due to its simplicity (Barnes et al., 2023). Pre-existing habits further contribute to persistence of conservation practices (Chia et al., 2024). However, factors such as landowners' beliefs in their abilities and skills to sustain these practices can hinder or enhance persistence (Vaske et al., 2021; Tan, 2024).

Economic Factors

Economic factors are the primary motivator for initial enrollment in conservation programs, but additional benefits beyond financial assistance encourage continued participation (Linder et al., 2023). For instance, financial motivations were negatively linked to grassland persistence, suggesting that lasting conservation requires a balance between conservation goals and financial needs (Barnes et al., 2023). In fact, landowners who were less motivated by receiving cost-share payments had higher intentions to continue management without availability of cost-share (Lutter et al., 2019a).

Although financial incentives are not the key determinants of long-term participation, they can still influence persistence for some landowners (Tan, 2024). The perceived economic consequences and benefits of maintaining conservation practices can influence long-term behavior (Epanchin-Niell et al., 2022). For instance, practices that are inexpensive to maintain or have long-term funding available are more likely to persist (Swann & Richards, 2016). Moreover, practices that received cost-sharing during the initial implementation were more likely to be sustained after enrollment ended (Tan, 2024).

Social and Cultural Influence

Social norms and peer learning can play a crucial role in maintaining conservation behaviors beyond initial participation (Dayer et al., 2018; Epanchin-Niell et al., 2022). For instance, neighbors who continue to maintain grasslands post-CRP can influence others to do the same behavior (Barnes et al., 2019). Moreover, the cultural acceptance and engagement in such behaviors within communities can influence landowners' persistence with pride in continuing traditional practices (Sketch, 2019; Barnes et al., 2023; Chia et al., 2024). Additionally, an emotional or historical connection to the land can further enhance landowners' commitment to sustaining conservation practices (Rissman et al., 2023).

Program Experience and Satisfaction

Prior experience is a key determinant that influences persistence of land management (Floress et al., 2019; Babin et al., 2024). Positive experiences with conservation programs can greatly influence landowners' decision to re-enroll and sustain conservation practices (Barnes et al., 2019). For instance, positive experiences with CRP have been significantly associated with intentions to continue grassland conservation, suggesting the importance of well-designed program processes in fostering persistence (Barnes et al., 2023). However, factors such as the

complexity and management costs may undermine the influence of positive program experiences on future management intentions (Lutter, 2018).

Moreover, landowner satisfaction with conservation programs and their outcomes has been shown to significantly increase the likelihood of re-enrollment intentions and persistence (Lutter et al., 2019a; Vaske et al., 2021). Practices that are simple to implement, easy to understand, compatible with existing operations, and provide noticeable benefits are likely to be continued, especially when they perform as intended and achieve expected outcomes (Swann & Richards, 2016; Linder et al., 2023; Pathak et al., 2024).

Land Characteristics and Resource Availability

Access to essential resources, such as capital, labor, and knowledge can positively influence persistence of conservation practices (Dayer et al., 2018; Barnes et al., 2019). This can stem from the support these resources provide that can boost landowners' confidence in their ability to maintain conservation practices. For example, the availability of resources has been positively correlated with grassland persistence among landowners with expired contracts (Barnes et al., 2023). In contrast, those who abandon practices often have fewer employees compared to those who persist with practices (Babin et al., 2024). Additionally, access to technical assistance plays a crucial role in promoting both adoption and persistence of conservation practices (Linder et al., 2023). Finally, land characteristics can also influence the decision to re-enroll in conservation programs. For instance, landowners are more likely to re-enroll on marginal or highly erodible lands that are unsuitable for farming (Barnes et al., 2020).

Strategies to Enhance Persistence

Program Enhancements

To enhance persistence rates among landowners, maintaining a simplified and accessible application process is crucial (Vaske et al., 2021; Babin et al., 2024). Additionally, demonstrating the ease of maintaining lands in their current state and promoting affordable management practices can encourage long-term conservation efforts (Barnes et al., 2019; Lutter et al., 2019b). Offering flexibility in program options and implementation of conservation practices further strengthens landowner commitment by allowing them to adapt practices to their specific needs (Swann & Richards, 2016). Providing opportunities to maintain land in grass through partnerships of FSA with other organizations and agencies, might also promote continued land management after CRP enrollment ends (Barnes et al., 2023). For example, FSA could connect landowners who do not qualify for CRP re-enrollment with other programs, such as CSP. Lastly, engaging landowners throughout all stages of the program, from planning to evaluation, where they can observe, document, and assess the outcomes of the practices is crucial. This promotes a sense of ownership and increases their knowledge and likelihood of long-term participation (Swann & Richards, 2016).

Financial Support

Adjusting rental rates and offering other incentives to remain competitive with commodity prices and offset increasing costs can encourage continued participation in CRP (Barnes et al., 2020; Linder et al., 2023). Additionally, prioritizing funding for longer-term contracts and practices with lower rates for re-enrollment can promote the ongoing adoption of conservation efforts (Dayer et al., 2018; Pathak et al., 2024). Furthermore, offering continuous incentives and recognition for continued conservation practices is essential to enhance persistence (Tan, 2024). Finally, framing financial assistance as a form of empowerment and emphasizing the financial profitability and long-term benefits of CRP can help sustain landowners' persistence (Linder et al., 2023; Chia et al., 2024).

Education and Outreach

Educating landowners about the long-term economic and environmental benefits of CRP can positively influence the persistence of conservation practices (Barnes et al., 2019; Pathak et al., 2024). For example, highlighting post-CRP benefits on their properties, such as bird detection or emphasizing the positive impacts on future generations, can reinforce continued land management (Lutter et al., 2019b; Vaske et al., 2021). Additionally, providing information on alternative conservation programs and guiding landowners through transitions between practices can further contribute to maintaining persistence (Barnes et al., 2020; Chia et al., 2024).

Moreover, developing targeted communication strategies that align with landowners' goals and motivations enhances the likelihood of ongoing conservation efforts. By clearly communicating the potential challenges and outcomes of CRP, landowners are more likely to feel satisfied and encouraged for future participation (Vaske et al., 2021). Lastly, personal interactions alleviate concerns about restrictions, helping to build trust and relationships that further support ongoing engagement in conservation efforts (Rissman et al., 2023).

Behavioral Approaches

There is a need for strategies that increase initial participation to enhance the likelihood of persistence. For instance, a study conducted in the Mississippi Delta region found that once individuals adopt conservation practices, they are likely to maintain some form of these practices over time (Pathak et al., 2024). Moreover, fostering a sense of environmental stewardship among landowners, preparing them psychologically for their role, and integrating conservation practices into their routines through interventions can increase the chance of persistence among them (Chia et al., 2024; Tan, 2024). Additionally, aligning these practices with landowners' existing operations and goals further promotes commitment to continued land management (Linder et al., 2023). Finally, targeting landowners who own or are part of groups or organizations, such as nonprofits, can lead to continued practice adoption, as they often have better access to resources and stronger motivations compared to others (Lutter et al., 2019a).

Post-CRP Transition

To increase the likelihood of persistence among landowners, efforts should prioritize maintaining engagement during the critical initial years following the expiration of CRP contracts (Barnes et al., 2020). Effective communication about available opportunities near the contract expiration is also essential, as some landowners may be unaware of their options (Barnes et al., 2023). Furthermore, allowing landowners to enroll in other programs during the final year of their contract and connecting them to these programs can ease the transition and enhance the likelihood of ongoing land management (Lutter et al., 2019a; Barnes et al., 2020). Lastly, providing access to technical experts who can assist landowners in navigating the transition would be beneficial (Barnes et al., 2020).

Support and Resource Access

Providing continued support and necessary resources to landowners can enhance the likelihood of ongoing land management. This support includes access to equipment, water, and technical assistance during enrollment and after payment ends (Dayer et al., 2018; Barnes et al., 2019; Tan, 2024). Expanding technical assistance and improving equipment access, particularly for smaller lands, can further facilitate engagement (Babin et al., 2024). Educating technicians in effective communication with landowners and providing training to enhance landowners' technical skills and knowledge can also encourage long-term management efforts (Lutter, 2018; Chia et al., 2024).

Community and Social Influence

Fostering community collaboration and social networks is essential for promoting long-term conservation practices (Barnes et al., 2023). Landowners can learn from their peers, support one another, and collectively commit to conservation goals, which reinforces persistence (Rissman et al., 2023; Chia et al., 2024; Tan, 2024). Highlighting successful examples of neighbors who maintained their practices post-CRP can further encourage adoption, possibly due to social and peer influence (Barnes et al., 2019). Furthermore, building long-term partnerships with landowners and fostering communication among landowners, practitioners, and policymakers can enhance sustainable conservation practices (Swann & Richards, 2016; Sketch, 2019; Vaske et al., 2021). Given the influence of social norms and peer-to-peer networks, it is vital to support and fund opportunities that facilitate landowner interaction and mutual learning to enhance long-term land management (Babin et al., 2024).

Adaptive Program Design

Designing conservation programs that incorporate behavioral persistence factors can lead to higher persistence rates (Dayer et al., 2018; Chia et al., 2024). To enhance effectiveness, it is essential to tailor programs to the specific needs and condition of landowners operations, target larger lands, as they are more likely to implement effective conservation practices, and consider

landowner characteristics when selecting program participants (Dayer et al., 2018; Sketch, 2019; Tan, 2024). Furthermore, offering landowners multiple conservation options and unlimited flexibility to re-enroll can further enhance persistence, particularly for programs with limited interested participants or those requiring continuous practice (Dayer et al., 2018; Lutter et al., 2019a). Lastly, structural elements such as land tenure and market conditions should be considered when designing programs to ensure long-term land management (Tan, 2024). For instance, programs could offer cost-sharing options for equipment and distinguish between owned and leased land by providing tailored incentives or longer-term contracts for leased properties to ensure long-term land management.

Land Use Trends Post-CRP Enrollment

According to Beutler (1994), most CRP acres are converted to cropland after their contracts expire. Storm (2020), in his article *Life After CRP*, reported that 81% of former CRP land across the United States was transitioned into some form of crop production. However, the Florida State University rapid assessment of both existing and expired CRP longleaf pine sites found that 91% of the acreage was still in longleaf pine (FNAI, 2023). More data is needed in the longleaf pine context to understand landowner decisions, track conservation program effectiveness, and design strategies that balance ecological goals with landowner needs.

Post-CRP Land Use Challenges and Benefits

Post-CRP land use options bring both challenges and benefits, necessitating careful consideration to maximize environmental and economic outcomes. Below are a few examples:

Economic Pressures: The Pull of Profitability

One of the most immediate challenges facing landowners post-CRP is the loss of steady payments (Bigelow et al., 2020). These annual payments have often been a reliable income source for participants, allowing them to manage their land without the financial risks associated with their activities (Reimer & Prokopy, 2014). Without these payments, many landowners feel compelled to return their fields to active agricultural production, often under less sustainable practices (Jacobs, 2010). Other landowners bale pine straw and sell it to contractors and garden centers who, in turn, sell it to homeowners (Dyer, 2012). This provides a valuable source of income for landowners to offset some of the costs of plantation establishment and pay for prescribed burning and other management practices to maintain and enhance longleaf forest habitat conditions (Bailey, 2015). However, repeated total removal of pine needles from the forest floor comes at a cost to water quality and wildlife. Intensive raking can also damage understory plants and remove decaying pine needles that contribute to soil nutrients and soil organic matter (Bailey, 2015).

Environmental Trade-offs: Sustainability at Risk

CRP lands, after years of conservation-focused management, have become ecological havens (Rissman & Sayre, 2012). These areas boast improved soil health, reduced erosion, and enhanced biodiversity. Returning such land to intensive agricultural use can rapidly undo these benefits (Jacobs, 2010). Tilling the soil, for example, not only disrupts the established ecosystem but can also lead to carbon release, undermining efforts to combat climate change (Bigelow et al., 2020). Alternatively, if landowners adopt sustainable practices like agroforestry or silvopasture, they can continue to balance productivity with ecological integrity. Such practices maintain biodiversity and contribute to long-term soil fertility, while providing an income stream (McCann & Claassen, 2016). However, adopting these approaches requires technical expertise and upfront investment, which are often out of reach for smaller or resource-constrained landowners (Stukes, 2023).

Social and Cultural Dimensions

For many landowners, the land holds more than economic value; it represents heritage and identity (Blue, 2019). Post-CRP decisions can help preserve these cultural ties by integrating traditional land-use practices with modern conservation strategies (Penniman, 2018; Adhikari et al., 2022a). For example, some farmers in the southeast have explored agroforestry systems that align with their historical practices, ensuring cultural continuity alongside environmental stewardship (Stukes, 2023). Yet, these communities often face structural challenges that limit their participation in post-CRP opportunities. Addressing these disparities requires intentional policy efforts, such as targeted outreach, grants, and capacity-building programs (Brown, 2022).

Conclusion and Next Steps

Participation in conservation programs is not only driven by immediate financial benefits, but also by a complex interplay of values, community dynamics, and a commitment to sustainable practices. Recognizing and supporting these motivations, while addressing the diverse constraints to participation in conservation programs is essential for increasing both participation rates and the effectiveness of these programs in achieving conservation goals. A deeper understanding of landowners' underlying needs, motivations, and challenges they face specific to CRP and longleaf pine practices can help tailor conservation programs to better engage landowners and reduce enrollment obstacles. This can lead to greater involvement and better support for long-term restoration of vulnerable ecosystems, including longleaf pine.

Post-CRP land use decisions are also critical to the overall success of CRP and longleaf pine restoration efforts. These decisions are not a simple binary between conservation and reversion; rather, they involve a spectrum of choices that landowners must navigate. Success lies in finding a balance that aligns with personal, economic, and environmental goals. Policymakers and conservation organizations play a critical role in facilitating this transition by offering incentives, technical support, and programs that encourage sustainable land use.

To ensure the continued benefit of CRP, strategies that enhance the likelihood of continued land management and long-term participation among landowners are essential to ensure its conservation benefits extend beyond the initial enrollment (Barnes et al., 2019; Tan, 2024). Future research is needed to explore the specific motivations and obstacles landowners face in the context of CRP and longleaf pine restoration, both before and after CRP contracts end. Gaining a deeper understanding of these factors can inform the development of more effective policies and program design that address the diverse needs of landowners to promote lasting conservation outcomes on private lands.

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