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Florida Forest Landowner Preferences for Carbon Offset Program Characteristics [1]

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This publication explains how carbon-offset programs operate and examines the benefits of these programs, both to landowners and the environment. We review recent studies and address questions and concerns about these carbon-offset programs in Florida and the southeast US. A summary of a recent study of Florida forest landowners is used to better reveal landowners' views and preferences on forest carbon-offset programs in relation to their key characteristics such as: 1) contract length, 2) compensation amount, 3) penalty for ending the contract, and 4) methods of dealing with the risks associated with these types of forest projects. This publication also provides estimates on landowners' willingness-to-accept (WTA) monetary compensation for their enrollment in such programs. The information provided by this publication should be of interest to Extension agents, consultants, and policy makers interested in promoting forest landowner participation in carbon markets. Key terms are italicized and defined in Box 1.

Introduction and Carbon-Offset Program Characteristics

Based on an Environmental Protection Agency (EPA) deadline, the state of Florida has until July 2016 to submit plans to cut 38% of carbon dioxide emissions from the power sector by the year 2030 (http://www2.epa.gov/carbon-pollution-standards). One approach to mitigate these emissions is through the use of forests to offset *greenhouse gas* (GHG) emissions by *sequestering,* or capturing, atmospheric carbon dioxide. This approach has been promoted as a cost-effective policy to deal with climate change. In Florida, there are a number of programs designed to provide incentive to landowners to improve management of their lands to maintain or enhance *ecosystem services* by their forests. Incentives include *land rental payments*, *cost-share agreements*, and *conservation easements*. Given the amount of forestland in Florida (Timilsina et al. 2013), payments for carbon (C) offsets could encourage landowners to manage their forests to sequester carbon in exchange for monetary compensation.

Although there are no existing federal or state programs that provide direct incentive for increased C sequestration, the previously mentioned EPA ruling allows one way for Floridians to consider the use of forests to meet their emission reduction goals of 2030. The use of C markets in similar initiatives, such as California's Assembly Bill 32 (http://www.arb.ca.gov/cc/ab32/ab32.htm) has allowed forest landowners elsewhere to participate in climate change policy by sequestering C. Currently there are several voluntary C markets in which landowners could participate by providing C offsets (Soto et al. 2014). These include three major national programs: Climate Action Reserve (CAR), American Carbon Registry (ACR), and Voluntary Carbon Standard (VCS). These non-profit C offset certification programs differ from one another slightly in

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requirements, but all encompass similar types of forest management related activities that result in C offsets (Soto et al. 2013). These programs are primarily based on *contract commitments* that range from 20 to 100 years and monetary compensation that ranges from $2.50 to $30 per ton of C offsets or *carbon-dioxide equivalent* (Soto et al. 2014). Risks associated with these contract commitments—windstorms, drought, or fire, or intentional or unintentional *reversals*—are managed with a series of accountability measures. Participants may propose insurance products, C *risk pools* (Please see Box 1 for definition), and in some cases buy-out options. Risk pools work in the same way home or auto insurance works: by spreading the risk of reversals among all registered producers. The pool of C offsets is then used to cover C-emission losses from unexpected events, such as wildfires, or hurricanes (American Carbon Registry 2010).

These programs are complex, and landowners' confusion and concerns about them can make them reluctant to participate in the programs or see them develop. To better inform and guide policy makers on strategies to craft C-offset programs that will appeal to landowners, we address the following questions:

- How much compensation will convince private forest landowners to participate in C-offset programs with different contract durations?
- What aspects of forest C-offset contracts appeal to landowners, and what aspects drive landowners away?
- Do landowners prefer some C-offset-program risk-mitigation strategies over others?
- What are some of the tradeoffs associated with different institutional aspects of forest C-offset programs such as penalties for early withdrawal or reversals?

A National Review of Forest Landowners' Preferences for Carbon-Offset Programs

Without an established regional or national C-offset market, it is difficult to acquire sufficient information on market transactions to assess local C-offset demand and price conditions or landowner preferences for specific features of these C-offset programs. A few studies outside of Florida have explored some of the institutional aspects of US C markets. These surveys of C-offset brokers and certification programs do provide some evidence of market demand and prices (e.g., Peters-Stanley and Hamilton 2012), but they lack the specific and local focus needed to inform regional C-offset studies.

A study in in Massachusetts by Fletcher et al. (2009) surveyed 17 respondents, randomly selected from a list of private landowners owning 3 or more parcels. Results were used to assess forest landowners' preferences for six different types of C-offset programs with four different aspects: eligibility (formal forest management plan or no plan), time commitment (5 or 10 years), expected payment ($5, $15, or $30 acre-per-year), and penalty for reversals (none or $10 per acre). All programs assumed that projects were verified by a professional forester. The study found that more of the 17 people were willing to participate in programs with higher payment and commitment length, but that they were less willing to do so with programs that included a penalty for reversals. The estimated WTA compensation was about 5% with $15, 13% at $30, and 33% at $50.

Another study by Markowski-Lindsay et al. (2011) surveyed 402 Massachusetts family forest owners for seven C-offset program features: existence of a forest management plan (required or not required), contract length (15 or 30 years), percent of land required to enroll (50% or 100%), monetary compensation ($10, $100, $1000), *additionality* (would the activity have occurred if it were not implemented as part of the C-offset project), penalty for reversals (no penalty or repay earnings plus 20% fee), and institutional involvement (was the program implemented by a public or private institution). Overall, respondents preferred programs with higher net revenue, no penalty for reversals, shorter contract lengths, and no additionality requirements.

Closer to Florida, a survey of 1,032 non-industrial forest landowners in Texas explored the WTA at different levels of contract duration (Li 2010). Participants were asked, "Would you ever consider selling environmental credits generated from your forestlands?" If they answered yes, a hypothetical C-offset program was presented; otherwise, they were asked to rate factors that would prevent them from selling C offsets. The hypothetical C-offset program consisted of a contract with three different time-commitment levels and corresponding annual per-acre compensation (annual at $8; 5 years at $9; and conservation easement status for $10). The program also included an option for timber harvesting and an *additionality* requirement. The survey found that awareness of C credits, size of forest landownership, current cost-share participation, and importance of managing forestland for producing income affected the likelihood of landowner participation as well as their WTA compensation.

In 2011 a survey was conducted with 920 Florida Forest Stewardship Program (FSP) participants and affiliated members to identify their preferences for specific

characteristics and attributes of C-offset programs (Soto, 2013). The survey included questions using two economic techniques known as discrete choice experimentation. The two methods were used to assess WTA and landowner preferences for other C-offset program characteristics such as: contract length (5 to 100 years), annual compensation ($5 to $30 per acre), penalty for reversals (penalty, or no penalty), and the type of risk tool (insurance or risk pool) (See Table 1). These advanced experimental survey techniques and the two methods used by Soto (2013) in Florida provide an idea of how to better assess the role of C-contract compensation and institutional factors (risk-management tool, contract length) in a landowner's decision to participate —or not—in forest C-offset programs. Thirty-four percent of the landowners responded to the survey, which is high compared to similar studies (e.g., 20% in Li, 2009). For specific methods used in the Florida survey see Soto (2013).

What preferences do Florida forest landowners have for carbon-offset programs?

The Florida survey results (Soto 2013) show that a hypothetical program offering compensation after initial enrollment costs of $5 or $10 per acre per year had a negative or less desirable effect than a program offering $20 or $30. Landowners also preferred contract durations of 5 to 40 years and strongly disliked 100-year commitments. Statistically analyzing the effects of program features on WTA can predict the likelihood of program participation or indicate how much more, or less, compensation would be needed for landowners to enroll in the program (Table 2).

The survey also found that landowners would require a compensation of $43.43 per acre per year to switch from a program with a 40-year contact to one with a100-year contract, and the average respondent would give up $9.87 per acre per year in compensation to move to a 10-year from a 40-year contract. Likewise, moving to a C-offset program with no penalty for reversals would elicit a decrease in compensation cost of $12.92 per acre per year. Soto (2013) also investigated whether demographic characteristics such as the landowners' zip codes or the distance from the landowners' homes to their enrolled forest lands had any effects on WTA compensation, but found no statistically significant demographic variables.

Recommendations and Use of this Information

The state of Florida is home to more than 16 million acres of forest land, with much of it managed as working forest lands. Although Florida has not yet created a C-offset program or participated in a regional C market, soon it will need to consider the use of C offsets to comply with the state's EPA goal of reducing 38% of C emissions from the power sector by 2030. Florida forest landowners could potentially participate in several voluntary C-offset programs that are being implemented or developed (Soto et al., 2014). Landowners in several other states are currently being paid to manage their forest land to sequester additional C; similarly, Florida landowners could generate additional income through participation in programs like these.

Overall, results from the Florida 2011 survey show that landowners are willing to participate in forest C-offset programs, but they also have strong preferences for specific institutional attributes. For example, the study found that Florida forest landowners are very sensitive to contract length, but not very sensitive to use of risk-pooling. However, while Soto et al. (2014) provides Florida-relevant information on the technical feasibility of various C-offset programs, we know little about Florida forest landowners' perceptions of these programs. Stein et al. (2013) in a survey of Florida landowners and managers found that 46% of landowners were not familiar with the ability of forests to store C and only 36% of land managers surveyed considered C storage an important ecosystem service. But Mulkey et al. (2008) estimate that increased management intensity on pine plantations would generate $116.8 million per year (using 2008 dollars and assuming $20 per metric ton CO_2e). Timilsina et al. (2013) discuss common forest management practices that increase forest C stocks in Florida and also identify specific forested areas in the state with above-average C stores and their related economic value.

Results from these types of surveys of forest landowners can be used to improve the design and implementation of a state-based forest C-offset program or policies that are designed for local conditions and landowner demographics. This information can be useful to Florida policymakers at the state and regional levels, environmental interest groups, and others interested in improving C sequestration via forest C offsets and other incentives such as payments for ecosystem services, which are likely to play a role in the July, 2016 EPA deadline to submit plans to cut C emissions from the power sector.

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Box 1. Description and definition of terms that are regularly used in carbon (C)-offset programs.

Additionality – The requirement that new C offsets produce additional C sequestration that would not have happened without the C-offset program.

Carbon dioxide equivalent – A standard unit of measurement for the global warming potential of greenhouse gases (GHGs) over a specified time period, standardized to the effects of carbon dioxide (EPA 2013).

Carbon offset – An increase in sequestered C (or reduction in greenhouse gas emissions) that offsets GHG emissions produced elsewhere (CAR 2010).

Carbon sequestration – Process of trees, plants, and soils absorbing CO_2 and storing the carbon in biomass and organic matter. Sequestration is measured in kilograms per year as opposed to stores or stocks (the amount of carbon stored in trees, plants, and soils over their lifetime) that is measured in kilograms or tons (EPA 2013).

Conservation easement – A legally binding agreement between a landowner and another party to restrict land use for an agreed-upon period of time.

Contract commitments – In the context of carbon offsets, contract commitments are the length of time that the forest landowner is subject to the carbon offsets contract.

Cost-share agreements – Agreements, usually by state or federal entities, to help pay landowners' costs for projects that include developing and/or implementing changes in land management, building structures, and maintaining land in a certain condition.

Ecosystem services – Benefits generated by nature and its ecosystem processes that directly and/or indirectly benefit humans and are typically undervalued by markets.

Greenhouse Gases (GHG)– Atmospheric gases that trap heat, including CO_2, methane, nitrous oxide, and others (EPA 2013).

Land rental payments – Direct payments to landowners for changing or maintaining environmentally friendly land management and/or production practices.

Reversals – Carbon released accidentally or intentionally, for example from wildfires, hurricanes, and pest outbreaks.
Risk Pool – Similar to risk pools in home and auto insurance, but premiums are paid in the form of a percentage of carbon offsets (e.g., 10%) paid to the pool.

Willingness to accept (WTA) – In a C-offset context, it is the minimum amount of money that will convince a landowner to sign a C-offset contract.

Table 1. Survey program attributes used to identify Florida forest landowner preferences for specific characteristics of carbon-offset programs.

Attribute	**Definition**	**Level**
Risk-management tool	Options for risk reduction in forest project	Insurance Risk pool
Penalty	Fines for leaving the program early	No penalty Penalty
Time	Commitment period	5 years 10 years 40 years 100 years
Revenue	Carbon-credit payment after costs (per acre per year)	$5 $10 $20 $30

Table 2. The influence of program features on minimum average payments needed for landowners' participation in a Florida C-offset program.

Change in program feature	Change in payment ($)
Insurance → risk pool	-$2.52
No penalty → penalty	+$12.92
5 → 10-year contract	+$2.88
10 → 40-year contract	+$9.87
40 → 100-year contract	+$43.43