Uses of Forestland and Motives for Conservation Among Landowners in North-Central Florida

Matthew Cooper
Department of Geography
University of Florida

Introduction

It is becoming increasingly clear that in order to protect biodiversity, endangered species and critical habitat, conservation efforts must be directed not only at public lands but also towards protecting privately owned natural areas. In the USA, private land is often more productive and at a lower elevation than public land (Rissman et al. 2007), leaving crucial habitat unprotected. Some or all of the habitat for 85% of federally listed endangered species is found on private land (Rissman et al. 2007), and fewer than 10% of endangered species are found only on public land (Kiesecker et al. 2007). Furthermore, private land can act as a corridor connecting two pieces of public land or act as a buffer from development around public land.

Privately owned land is rapidly changing, especially in Florida. From 1985/1989 to 2003, for both private and public land in Florida, "about 611,845 hectares of natural and semi-natural cover types were converted to urban or other developed uses, and 703,292 ha were converted to agricultural uses" (Kautz et al. 2003). In that time period, 9.2% of Florida's pinelands (93,938 ha) were converted, as well as 11.32% of upland forests (130,491 ha) and 15.49% of Florida sandhill (53,356 ha)(Kautz et al. 2003). It can be difficult to monitor and administrate these privately owned lands that are being converted to urban development and agriculture, so often remote sensing is the only way to gather environmental data (Matta et al. 2009). Nevertheless, much of this private land is not owned by large agro-corporations or companies: it has been estimated that 60% of the forestland in the Southern United States is non-industrial private forests: in other words, family forests (Wiens et al. 2009).

There are a wide variety of types of forestland in north-central Florida. A USGS survey found 14 major forest types in the Suwannee river floodplain (Darst et al. 2003), consisting of upland oak and pine as well as lowland forests. According to GIS data from the Florida Fish and Wildlife Conservation Commission, the more common forest types in Alachua and Levy County are pinelands, mixed wetland forest, hardwood hammocks and sandhill. Much of the forest in north-central Florida was once pastureland or agriculture, and is now second-growth. Although planted pine is found on land that has been highly affected by human activities and is to some extent agricultural, it makes up a significant portion of the forests in north-central Florida and provides habitat for wildlife, especially compared with cleared land. For this reason, it will be regarded as forest throughout this study.

Figure 1: Second-growth forest taken near Williston, Florida

Source: Author, February 21, 2010

Figure 2: Pine plantation near Williston, Florida

Source: Author, February 21, 2010

Today in Florida, many owners of family forests harvest pine on their property, since maintaining a pine farm is one of the only ways to own forested land profitably. It is being encouraged above other highly profitable land uses like agriculture, cattle raising or urban development, because pine farms create wildlife habitat and encourage more biodiversity than these other land uses. Pine farms have also been shown to help sequester carbon (Markewitz et al. 2002), at least when compared to cleared land. Furthermore, raising cattle among pine, or silvopasture, has been shown to protect water quality and the environment more than just raising cattle (Michel et al. 2007).

One tree species that is being aggressively encouraged in both public lands and by many pine farmers is the longleaf pine (Pinus palustrus). The longleaf pine used to be the dominant pine tree found in Florida, and many endemic species rely on it for survival. It has been estimated that, prior to European settlement, the longleaf pine-based ecosystem covered 37 million hectares in the southern USA (Freeman 2008). It relies on fire ecology for renewal and propagation, so, due to fire suppression, it has largely been outfought by other pine species like the loblolly pine (Pinus taeda) and the slash pine (Pinus elliotti). Today, efforts are underway to restore longleaf pine, using techniques like herbicide and mulching to suppress under story growth in the place of fire (Brockway et al. 2009). These techniques support the entire fire-based ecosystem rather than just one individual species, an approach that is being recommended (Matta et al. 2009).

Figure 3: Recently planted Slash Pine seedlings near Williston, Florida

Source: Author, February 21, 2010

It is becoming increasingly common to protect private land through conservation easements. An easement is a voluntary agreement between a private landowner and a governmental body or an environmental nonprofit, stipulating that the land can no longer be developed on or converted from its natural state, although the specific terms of easements vary greatly. Many states offer tax breaks and other financial incentives to landowners that have easements. Today in the US, over 6.2 million acres have been given to easements (Rissman et al. 2007).

There have been, however, some questions as to the efficacy of easements in achieving conservation goals. Some people argue that there is little being done to ensure that the rules and stipulations of easements are being upheld, and few scientists have looked into their biological and ecological impact. There have been calls for increased regulation, more clear stipulations and more research into ecological efficacy (Rissman et al. 2007). There is, however, some evidence that they are working: in one survey, it was found that 92% of easements sampled had been monitored legally, and 19.2% had been monitored biologically and quantitatively (Kiesecker et al. 2007). Increasingly, easements are being established with identified biological targets and clear conservation strategies (Kiesecker et al. 2007), and there is a trend of larger easements being purchased, instead of donated (Kiesecker et al. 2007).

Research has shown that some landowners are getting easements for tax breaks and financial reasons rather than for ethical reasons, leading some to worry that easements don't have biologically effective conservation stipulations (Rissman et al. 2007). In one survey it was found that financial incentives ranked behind conservation identity, subjective norms and attitude as a predictor for whether or not people would get an easement (Brain 2007). Some people fear too much government control over their land, making it difficult to persuade them to get easements (Brain 2007).

Aside from easements, landowners have varied incentives as far as conservation goes. Some have few incentives to conserve and in fact are affected by onerous and unfair environmental regulations without due compensation, such as those imposed by the Endangered Species Act (Matta et al. 2009). These laws provide poor motivations for landowners to be active in conservation. One study conducted across a wide range of demographics found highly varied results for landowners' willingness to participate in conservation programs (Matta et al. 2009). The study found that "younger forest owners with higher incomes, educations, and more years of forestland ownership would be more willing to adopt the suggested forest practices" (Matta et al. 2009). There was also increased willingness to participate in conservation programs if the landowner actually lived on the forested property, suggesting that a greater use of the property would correlate with a greater incentive to conserve.

Methods

In order to get into contact with people owning forested land, I met with the Department of Forestry at the University Florida. There I was able to get into contact with Mr. Chris Demers, the director of the Forest Stewardship Program, and he gave me the addresses of every member of the program living in Levy, Marion, Bradford and Alachua County. I sent a letter of introduction to every member of the program in Levy and Alachua County (253 people) along with the survey. I was told by Dr Timothy Fik at the geography department to expect a 30% return rate, or about 76 surveys, although I ended up receiving 101 responses (39.9%).

The survey asked four questions, and the first was about what the respondents use their land for. It suggested hunting, firewood, wildlife viewing, timber, and watershed protection, although the question was open-ended and respondents could write in other uses. The next question was about whether or not they were interested in selling or developing their land, a possible indicator of their personal connection to their land and their desire to conserve it. The third question was similar to the first. It asked the survey participants, if they weren't interested in selling or developing their land, why they weren't interested and why they kept it in a forested state. The question was also open ended. The final question was a Likert Scale, asking survey participants, on a scale of 1 to 5, how much they agreed with the statement "my use of the forest encourages me to conserve it."

After collecting all the data, I paired up the respondents' answers to various questions as well as factors like where their mailing address is listed and the number of different uses listed. I then subjected these pairings to a correlation test in order find different patterns within the data. I also conducted a Z-test on the Likert Scale question, testing the data against a null hypothesis where $\mu 0=3$, which would signify that most landowners feel neutrally about whether or not their land use encourages them to conserve it.

In addition to the surveys, I visited the properties of two landowners who I contacted through the Conservation Trust for Florida. I visited their properties' and talked to them, asking about the different things they use their land for, the different species they see there, and how they feel about conservation.

Finally, I did a GIS analysis to determine the amount of land in Levy County and Alachua County that is forested or not forested, as well as the amount that is privately owned or publicly owned. I did that using raster data from Florida Fish and Wildlife Conservation Commission consisting of a land cover survey dividing the land cover into different categories. I also used a shapefile of public lands in Florida provided by the Florida Department of Environmental Protection and a shapefile of the counties of Florida provided by the Florida Natural Areas Inventory. In my analysis, I counted the following categories given in the raster as forest: coastal strand, xeric oak scrub, sand pine scrub, sandhill, mixed hardwood-pine forests, hardwood hammocks and forests, pinelands, cabbage palm-live oak hammock, tropical hardwood hammock, cypress swamp, cypress/pine/cabbage palm, mixed wetland forest, hardwood swamp, hydric hammock, bottomland hardwood forest, mangrove swamp, scrub mangrove, and shrub and brushland. I did not count the following categories as forest: beach/sand, dry prairies, freshwater marsh and wet prairie, sawgrass marsh, cattail marsh, shrub swamp, bay swamp, salt marsh, tidal flats, open water, grassland, bare soil/clearcut, improved pasture, unimproved/woodland pasture, sugarcane, citrus, row/field crops, other agriculture, exotic plants, Australian pine, melaleuca, Brazilian pepper, high impact urban, low impact urban, and extractive. Using different spatial analysis techniques, I was able to determine the number of raster cells of both private and public land as well as forested and non-forested land in Alachua and Levy County. Knowing that each raster cell represented a 30m x 30m piece of land, I was able to determine how much of each piece of land fell into each category.

Results

253 surveys were sent out, and 101 were returned; of those returned, 3 reported that their land was already sold. Although those who had sold their land already did answer some of the questions, most of the analysis was done based on the 98 surveys returned by people who still owned forested property.

Based on the addresses of people who own forested land in Alachua or Levy county provided by the Forest Stewardship Program, more than half (54.5%) of the survey participants do not actually live on their land in Alachua County of Levy County. Most of the landowners who do not live in Alachua or Levy County had addresses in more urban parts of Florida, such as Tampa, Jacksonville, or south Florida, although some lived as far away as Oregon, Indiana or Pennsylvania. Of the returned responses, 14 (14.14%) said that they would be interested in selling or developing some or part of their land.

Of the things that the landowners reported using their land for, the most widely reported activities were wildlife appreciation and tree farming/timber production, with 63.3% of landowners reporting doing each of these activities. For other activities, 56.1% of landowners reported that they use their land for hunting, 19.4% use it for either watershed protection or firewood collecting, 14.2% use it for recreation, 12.2% use it for restoration and encouraging native plants, 8.1% use it for selling pine straw, 5.1% use it for camping, 4.1% use it for either hiking or as a getaway, and 3.1% lease the land for hunting. Uses that were reported only one time are education, horseback riding, picnicking, dog training, photography, ATVing, and harvesting shitake mushrooms.

Figure 4: Reported uses of forested land

Activity	Tree Farming or Timber	Wildlife Viewing	Hunting	Watershed Protection	Firewood	Recreation
Number Reported	62	62	55	19	19	14
Percent	63.12%	63.12%	56.12%	19.39%	19.39%	14.29%

Figure 4 continued

Restoration/Encouraging Native Species	Pine Straw	Get Away	Camping	Hiking	Hunting Leases
12	8	5	4	4	3
12.24%	8.16%	5.10%	4.08%	4.08%	3.06%

Source: Survey

I also decided to look at the number of different things the landowners reported using their land for. 18 landowners (18.6%) only use their land for one thing, 23 (23.7%) use their land for two things, 24 (24.7%) for three things, 15 (15.5%) for four things, 10 (10.3%) for five, four (4.1%) for six and three (3.1%) for seven.

Of the landowners' reported motivations for keeping their land forested, 43.9% of respondents said that a motivation was their use of the land. The next most frequently reported motivation was an ethic of conservation, with 40.8% of respondents mentioning things like a feeling of stewardship, a desire to keep Florida in a more natural state, or a desire to keep their land in a suitable habitat for wildlife. Financial motivations like tax incentives or income from the land were mentioned by 34.7% of respondents. In addition, 15.3% mentioned family or future generations in their motivations, 8.1% said they were in a conservation program or had an easement, and 7.1% said it was simply easier at the present to keep their land forested than do something else with it.

Figure 5: Reported motivations for keeping land forested

Motivation	Uses	Conservation	Financial Reasons	Family/ Future Generations	In a Program	Easier
Number Reported	43	40	34	15	8	7
Percent	43.88%	40.82%	34.69%	15.31%	8.16%	7.14%

Source: Survey

In addition to surveying landowners for the uses of their land and their motivations for preserving it, they were asked to what degree they agreed with the statement "my use of the forest encourages me to conserve it." They selected their answers on a scale of 1-5, with 1 being "Strongly Agree" and 5 being "Strongly Disagree." 68.7% of respondents said that they strongly agreed with the statement, 14.1% said that they somewhat agreed, 6.1% were entirely neutral, 2.0% somewhat disagreed and finally 9.1% strongly disagreed.

Figure 6: Responses to the statement "My use of the forest encourages me to conserve it"

Response	Strongly Agree	Somewhat Agree	Neutral	Somewhat Disagree	Strongly Disagree
Number	68	14	6	2	9
Percentage	68.70%	14.14%	6.06%	2.02%	9.09%

Source: Survey

Conducting a Z-test on the responses given to this question yielded a p-value of 1.05x10-20, rejecting the null hypothesis at an alpha level of 1%, suggesting overwhelmingly that a statistically significant amount of landowners feel that their use of the land encourages them to conserve it.

Finally, in order to deduce patters from the data, a correlation coefficient was found between a variety of items in the data. The number of reported uses of the land was matched with whether or not the landowners live in Alachua or Levy County (r2=0.0168), with the responses on the Likert scale question (r2=0.0494), and with whether or not they were interested in selling or developing their land (r2=0.0131). None of the correlation coefficients found were statistically significant, suggesting that there is little relation between the number of different uses of the land and various proxies for estimating the owners' commitment to conservation.

The GIS Survey found that of the land in Alachua and Levy counties, 2,564 square kilometers are privately owned forest, 11,772 square kilometers are privately owned non-forest, 789 square kilometers are publicly owned forest, and 303 square kilometers are publicly owned non-forest.

Figure 7: Land in Alachua and Levy County (in square kilometers)

	Forest	Non Forest	Total
Private	2,564 (16.6%)	11,729 (76.3%)	14,336 (92.9%)
Public	789 (5.1%)	303 (2.0%)	1,092 (7.1%)
Total	3,353 (21.73%)	12,075 (78.3%)	15,428 (100%)

Source: Florida Fish and Wildlife Conservation Commission, Florida Department of Environmental Protection, Florida Natural Areas Inventory

Discussion

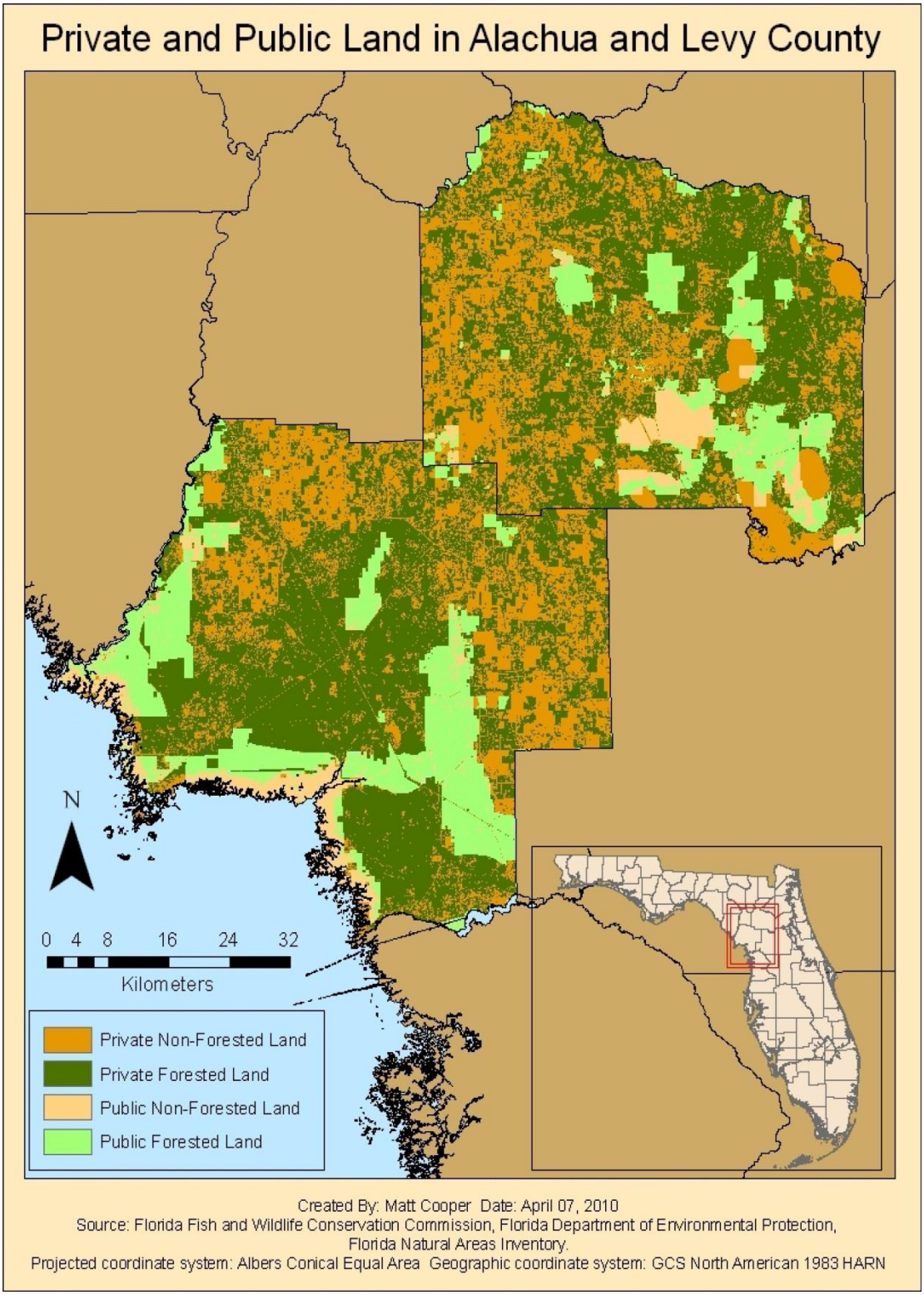
The survey brought to light a variety of useful information about what landowners use their forested land for. Wildlife viewing was tied as something that the landowners use their land for the most, probably because it is one of the most accessible and pleasant things to do on forest property. Planting pine, on the other hand, also tied as the most common use of forested land probably because it is a very lucrative thing to do with forested property in Florida. Hunting was also practiced widely on forested properties – over half of respondents reported hunting on their property. The high prevalence of hunting, along with other activities like camping and hiking or recreation suggest that for most landowners their forested property is a luxury, a get away, and probably not their main source of income or sustenance. This is also supported by the fact that, aside from pine farming, none of the other uses mentioned by respondents are highly self-sustaining or income generating. Many respondents specifically brought up conservation and sustainability in their responses, mentioning things like restoring a sandhill ecosystem, protecting watersheds or even offsetting their carbon emissions. Conservation is probably very significant to these landowners since things like encouraging native species isn't even a use of their property, strictly speaking, but they chose to mention them anyway.

It must be noted that, in the survey, hunting, firewood, wildlife viewing, timber, and watershed protection were all suggested as things the landowners might use their land for, while the landowners themselves mentioned anything else listed. This distorted the results, and would explain why something like watershed protection was a more widely reported use than recreation.

It was surprising to find that more than half of those surveyed did not have a mailing address in either Alachua or Levy County. It is also possible that, of those with addresses in Alachua or Levy County, at least a few do not live exclusively on their property. Thus, a great portion of people who own forested land own it as a second property, and it is indeed a luxury and recreation getaway for them and not an integral part of their income.

Few of the landowners reported being interested in selling their land. Many of those that were interested in selling or developing their land included a note in response to the question, saying things like “yes – sell parts in order to stay on the rest longer.” This suggests that land is a personal investment for the landowners; it is not just a commodity they are interested in for its fiscal value.

Figure 8: Map of public and private, forested and non-forested land in Alachua and Levy County



Source: Florida Fish and Wildlife Conservation Commission, Florida Department of Environmental Protection, Florida Natural Areas Inventory

The most frequently mentioned motivation people gave for wanting to keep their property forested and not selling it was the things they use it for – hunting, camping, viewing wildlife and growing pine. These are the things that give the land value to many of the landowners. Conservation and finances were also two motivations mentioned very frequently by the landowners, suggesting both that most landowners are very mindful of conservation and that tax incentives are aiding in conservation. Many respondents also mentioned family or future generations in their responses, showing that there is an earnest desire to preserve the land in its natural state well into the future and a recognition that our generation has a responsibility to keep forests in a natural state for coming generations. The question about respondents' motivations for keeping their land forested was open-ended, and no possible responses were suggested to the landowners.

Nevertheless, these conclusions are drawn solely based on those who were willing to return a survey and who were already enrolled in the Forest Stewardship Program, so they may not be entirely representative of the typical owner of forestland. Of the landowners that received my survey and returned it to me, probably a disproportionately large number were owners of small family forests already interested in conservation.

The GIS analysis done was very telling. It shows that the most land in north-central Florida is not forested and privately owned, and that, of the forested land in the area, only a small proportion is publicly managed. It is a possibility that if private landowners were suddenly motivated to clear their forested land, say because of a certain crop suddenly becoming very valuable, only 5.1% of land in Alachua and Levy County would remain forested, not including land under easements. This would be an ecological tragedy, and shows why greater encouragement needs to be placed on easements and conservation.

It was proven by the respondents' agreement with the statement given that landowners in Florida do feel that their use of the forest correlates with their desire to conserve it. Whether or not this is actually true remains to be seen. A statistically significant correlation could not be found between the number of uses listed by landowners and various proxy data suggesting how strong their feelings of conservation are. This could be because the survey was not thorough enough in assessing landowners' use of their land. For example, it could have asked landowners to estimate how many hours a week they spend using their land, or asked what their annual income is from uses such as planted pine, harvesting wild plants, or selling hunting leases.

First-Hand Survey

I visited two different forested properties during my firsthand survey, both of which were located near Williston, Florida. The first, owned by Ms Deborah O'Neil, is 200 acres in total, and is currently under an easement with the Conservation Trust for Florida. The property consists of natural forest, planted pine and pasture. Her family bought the property in the 1960's and cleared most of it, turning it into pasture to raise cattle. Over the years, the family has been letting the forest naturally reclaim what had been cleared away, increasing the amount of wildlife visible on the property.

Today, she often sees deer, small mammals, and a wide variety of birds. She recalls hearing coyote from her property a few years ago, and even had an infestation of wild pigs recently until she had them trapped and relocated. Ms O'Neil has seen her neighbors clear away parts of their forested land a few times over the years, and recalls that, after a clearing, the number of wildlife on her property tends to increase briefly, but then returns back to the levels it was at before the clearing. This suggests that the wildlife from the recently cleared land has taken refuge in Ms O'Neil's land because it is still forested, but that her land cannot support this new influx of wildlife, so the wildlife dies off until the population reaches a level sustainable on Ms O'Neil's land. She is actively trying to connect the disparate parcels of forested land on her property so that the wildlife has a "corridor" to travel through; she hopes this will further increase biodiversity. She mostly just uses the forested land for walking its trails, observing the wildlife. Ms O'Neil aims to restore the forest on her property to a natural sandhill ecosystem – the way it was before Europeans settled it. To that end she removes invasive plant species and does things like manually clearing away underbrush – just as a wildfire would have five hundred years ago – in order to encourage the growth of endemic species.

Ms O'Neil also has about a quarter of her property in planted pine. She has planted only longleaf pine, since it is natural to the state of Florida. This helps to encourage native plants and animals since many species, especially birds, are particularly well-adapted to living on and among longleaf pines. She says that many people who have planted pine chose loblolly or slash pine since it grows faster and thus has a return on the investment sooner. For example, the pines shown below are exactly the same age, although the slash pine is already considerably larger.

Figure 9: A young Longleaf Pine (left) and a young Slash Pine (right). The two trees are both the same age, but the Slash Pine is already considerably larger.

Source: Author, February 21, 2010

The other property I visited was owned by Mr. Charles Meier. He owns about 25 acres, all of which is in planted pine except for the small part of the property his house is on. Although Mr. Meier is casually looking into easements, he hasn't made any major decisions yet. All of his property was cleared when he bought it a few years ago, except for a single oak, which he hopes will help encourage wildlife. He planted a mix of slash and longleaf pine, although he says he is disappointed in the longleaf pine. Some of the longleaf pines on his property haven't left the "grass stage" and still sit on the ground in small green balls of pine needles, years after being planted. He says that when pine farmers plant, they put the pines close to each other, and as they grow the pines are thinned and sold for pulpwood, providing a small short-term return on a long-term investment. The pines are thinned periodically as they grow, returning increasingly more money as they become bigger and bigger. After a while they reach a point where they are all marketable, but the owner may often wait to sell them, as they will continue to grow and continue to be more valuable. Mr. Meier talked about how pine farmers must keep a close eye on the market, waiting for a good year to thin their pines or sell them all off as timber.

Both showed me a very real side of forest ownership. If someone has 200 acres of property, it is nice to be able to leave some of the land forested, or to plant native pine species that are less productive. On the other hand, if someone only owns a few acres they often must clear away any forest and plant nonnative pine species with higher yields in order to make a living. Of course neither Ms O'Neil nor Mr. Meier left their land in a perfectly natural state; nevertheless, they both showed a genuine love for their land and sincere interest in conserving Florida's natural areas.

Conclusions

There were some limitations to this study. Due to selection bias, it could be that the uses and motives for conservation reported are representative of only a small minority of landowners. Also, the survey could have been designed better, asking landowners directly to rate, quantitatively, how much they use their land and how strong their feelings of conservation are. That way, a correlation between the two could have been easily tested, rather than tested for using proxies for intensity of land use like the number of reported uses, and proxies for feelings of conservation like owners' desire to sell their land.

Nevertheless, this survey has given insight into what landowners use their property for and their motives for keeping their land forested. It has revealed a mix of recreational, financial and ethical aspects that come into play when landowners consider conservation. For many landowners, keeping their land forested is central to their recreational use of it and for others, conservation is a major ethical issue. To these people, no incentive would have them clear their land. For other landowners, however, different factors come in to play: they are interested in conservation and in preserving Florida's forested areas, but they need to make a living off of their land, and will clear their land or plant non native pine species if necessary. It is towards these people that incentives should be directed. Efforts like tax incentives for seeking easements or subsidies for longleaf pine timber could lead to significantly more conservation. Although the survey responses could not establish a correlation between landowners use of land and their desire to conserve it, they overwhelmingly reported that they felt their use of their land encouraged them to conserve it. For this reason, policy should seek to reward landowners who use their property, perhaps by offering financial incentives to landowners that live on their

property. Programs could also be initiated encouraging landowners to use their property for recreation, so that it becomes valuable to them in a forested state and is seen as more than just an investment.

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