



Woodland NOTES

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Payments for Forest Carbon Sequestration

Jay O'Laughlin and Ron Mahoney



In a previous article "Forests and Carbon" we described the relationship between carbon and forest management. Here, we focus on how forest landowners can receive payments for storing carbon, and offer two cautions. First, the carbon trading market is in its infancy. Secondly, today's rules may change tomorrow. As best we can tell only one forest landowner in Idaho has entered the market with an actual contract for payment. However, there are a lot of developing activities centering on carbon payment. The

City of Moscow, Idaho has recently completed an urban forest inventory and calculated the carbon sequestration capability of its trees using a process that includes a plan to aggregate city forest's carbon storage across the U.S. and sell it on the emerging carbon market. These urban forests are poised to enter the carbon market as it develops.

Forests provide many benefits to society. Forest landowners absorb the costs of managing forests and gain direct financial benefits primarily through markets for the goods and services forests provide. Although good stewardship can be its own reward, markets exist for timber products and in some locations recreation opportunities. Markets for "ecosystem services" like clean water and wildlife habitat are developing that landowners may be able to "monetize" in the future (i.e., receive cash payments for). Currently, opportunities to obtain payments for sequestering carbon are emerging more rapidly than other ecosystem services.

How can you monetize the carbon your forest captures and stores? How much might you make? The carbon market in the United States is voluntary. Demand is created by firms that emit greenhouse gases, such as electric utilities operating coal-fired power plants. For a variety of reasons, these firms may want to reduce their carbon emissions. Instead of installing emissions-reducing technology, an emitting firm may purchase credits from owners of projects that promise to capture and store atmospheric carbon that will "offset" the firm's emissions. Such a "cap-and-trade" system was instituted in 1995 to reduce acid rain-causing sulfur dioxide emissions, and it proved quite successful.

Some firms want to reduce carbon emissions to prepare for possible mandatory regulation of carbon emissions in the U.S. Both major party candidates for the U.S. presidential election in November, 2008 have promised to institute a cap-and-trade system to reduce carbon emissions, and several bills were considered by the current Congress. Under a cap-and-trade system, firms in regulated industries that emit carbon would be required to keep emissions under a ceiling level assigned to them by a regulatory agency. To reduce excessive emissions, a firm could either install emissions-reducing technology or purchase carbon credits that offset their excessive emissions. The cap-and-trade system essentially establishes a tax on carbon, with the tax rate established not by a governmental administrative decision, but by markets. The Chicago Climate Exchange (CCX), where carbon credits are bought and sold, currently performs this function.

An "average" acre of Idaho forest can sequester approximately one metric ton of carbon per acre per year (actually, one metric ton of

"CO₂ equivalent"). On the CCX carbon currently trades at \$3.80 per ton, and has ranged from less than \$2 to almost \$7 during the past twelve months. At best, carbon payments, less the fees for registering and selling carbon credits, might cover annual property taxes.

Most analysts expect the value of carbon to increase after a mandatory cap-and-trade system is instituted. Consider that on the European Climate Exchange (ECX) carbon has traded for €15 to €28 (\$22 to \$42) per ton during the past six months. Why the difference? The Kyoto Protocol of the International Convention on Climate Change, ratified by 36 developed nations that have committed to greenhouse gas reductions and imposed caps on their emitting industries, has created demand for offset projects. In 2007, the ECX traded more than 900 million tons, or more than \$30 billion in carbon transactions. In addition, other markets and over-the-counter trading account for a similar amount of international trade in carbon credits. Trade on the CCX is a small fraction of trade elsewhere, but a not insignificant 20 million tons in 2007. Some analysts estimate the U.S. carbon market could be three times larger than European markets after a cap-and-trade system is instituted.

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Extension Forestry
University of Idaho
P.O. Box 441140
Moscow, ID 83844-1140

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Ten tips for burning slash piles

Chris Schnepf

Slash treatment is often necessary after harvesting in Idaho forests, to reduce fire hazard and comply with Idaho slash management laws. Piling and burning is the most common slash treatment method. Here are a few pointers on effectively reducing slash hazard through piling and burning:

1. *Do you need to pile and burn? Right away?* Some landowners pile and burn slash almost automatically, but for light thinning or other treatments that produce relatively small amounts of slash, lopping and scattering may be all that is needed, especially on small units. Where piling and burning is required, leaving the slash distributed across the site for one winter will capture more of its nutrients for the site, if feasible.
2. *Locate the pile in a good place.* Avoid building piles within 10-20 feet of trees you want to keep. Trees too close to a pile can be scorched and either killed outright or stressed and subsequently killed by insects taking advantage of that stress. Trees need more space from larger piles than smaller piles. Slash piles can also damage the soils underneath them. While a very small percentage of the site is usually damaged by pile burning, if you have areas that have already been impacted by past burn piles, using them again will reduce potential impacts, much as re-using designated skid trails reduces soil compaction. Machine piling on dry or frozen soils also reduces soil impacts.
3. *Build piles tall and compact.* A given amount of slash will burn more completely in a tall, small foot-printed pile than a broader, looser pile. Building the pile tightly (little air space), also results in a more complete burn.
4. *Keep the dirt out of the pile.* Slash piles with a lot of dirt in them are hard to burn. They can hold smoldering fires long after they are ignited – even into the next fire season! Building piles by hand, using excavators, or piling with a brush blade all help reduce the amount of soil in a pile. Building a 2-10 foot wide fireline (scrape away the duff down to mineral soil) around each pile also helps to insure against fire escape.

5. *Avoid putting coarse woody debris in the pile.* Under Idaho law,

the only slash that has to be treated to reduce fire hazard is material smaller than 3 inches in diameter. There can be some fire hazard associated with larger materials, depending on the volume, but it is the small stuff that ignites and carries a more fire more readily. It can be difficult to keep all large diameter material out of piles, especially when slash is piled mechanically, but leaving the coarse woody debris out of piles, means fewer, smaller piles. Leaving coarse woody debris scattered across the woods benefits both forest soils and wildlife. It can also provide micro-site advantages to seedlings and inhibit cattle and big game browsing.

6. *Keep the tinder dry.* Slash piles are often burned when the adjacent forests are too moist to burn, to reduce forest fire risk. Putting some plastic or tar paper on a third or more of top of the pile insures some dry material to get the pile burning.
7. *Got a permit?* Depending on the time of year and current fire conditions, you may need a permit to light your piles. Permits are required by Idaho code May 10-Oct 20. Local jurisdictions may have additional requirements. Permits are usually secured through your local fire protection district office.
8. *Got the necessary tools?* On the day you light piles, it is important to have firefighting tools (e.g., Pulaski, shovel, and ideally, at least 100 gallons of water in a tank) to deal with any spot fires that might escape from the piles.
9. *Is it a good day to burn?* Most piles are burned in the fall, when the piles are dry and the coming wet, cold weather will help to make sure the fire is out after most of the fuel is consumed. Avoid especially windy days, to make sure fire stays in the piles. Beyond the season of burning, ask your local fire protection district or the fire warden at your local IDL office about current burn conditions, as these offices are working with other forest owners who are burning slash piles as well. Also ask them if it is a good time to burn regarding air quality. Many in the forestry community are concerned they may not be able to burn in the future because of air quality concerns. To the extent prescribed fires reduce wildfire risk, public health risk is reduced (a little smoke, when we can control it vs. a lot of smoke filling a whole valley weeks at a time), but in the short term, some environmental conditions are better than others for air quality risk from pile burning.
10. *Multiple piles?* If you have many piles to burn, don't light them all at once. Just light enough of them for you to handle, in case anything gets out of hand. Since fires usually burn up-hill, it is also a good idea to light the piles on the top of

the hill first, then work your way down to the lower piles. Lighting the piles on the perimeter of the unit first is also helpful because once they are consumed they provide some fire break between the interior piles and the rest of the forest.

With the growing interest in bio-fuels it is becoming feasible on some sites to pile, then chip the piles and haul them off to a site purchasing biomass fuel. However, even with growing use of slash for bio-fuel, there

will probably be times and places where the economics do not work out and forest owners will still end up piling and burning.

References

- Bennett M. and S. Fitzgerald. 2008. Reducing hazardous fuels on woodland property: disposing of woody material. Extension Bulletin 1574-E. Oregon State University Extension Service. 5p.
- Shiplett, Brian M. 2005. Take the risk out of slash-burning. IDL State Forester Forum - Fire Management #2 <<http://www.idl.idaho.gov/ForestAssist/forestforum/firemngmt2.pdf>>.



Figure 1. Covering slash piles will keep your tinder dry.

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Extension

*Strengthening
Forest
Stewardship
Skills
2008-2009*



Strengthening Forest Stew

Landscaping for Fire Prevention

This program helps forest homeowners make their homesite less likely to burn and easier for firefighters to access, in the event of a local forest fire.

Sessions of this program can be scheduled for interested groups of 10 or more.

Forestry Shortcourse

This multi-session program enriches family forest owners' basic understanding of forest ecology, silviculture, insects, disease, goal setting, record keeping, and other forest stewardship issues. In the process, participants work on a management plan for their forest (2 UI credits available).

Coeur d'Alene, Six Tuesday evenings, November 4 - December 9, 2008 (6:30 pm to 9:30 pm)

Orofino, Six Tuesday afternoons, January 20 - February 24, 2009 (1:00 pm to 4:00 pm)

Sandpoint, Six Wednesday mornings, June 10 - July 15, 2009 (9:00 am to 12:00 pm)

Carbon Sequestration: Understanding it, Owning it, Trading it

This workshop will bring together agricultural and forest landowners seeking information on carbon credit trading in today's market. Topics include: the fundamentals of carbon sequestration, how your current practices can make you eligible, and how to select the right aggregator.

Orofino, Wednesday, November 5, 2008 (9:00 am to 3:00 pm)

Current Topics in Forest Health

Animals, plants, insects, and fungi can sometimes impede forest stewardship goals. This annual program updates forest owners, operators, and natural resource professionals on methods to manage these organisms. Pesticide recertification credits will be available.

Coeur d'Alene, Friday, December 5, 2008 (8:00 am to 3:30 pm)

Orofino, Thursday, December 11, 2008 (8:00 am to 4:00 pm)

Backyard Forests

This program will help homeowners with less than five acres of forestland apply basic forest management concepts to "home landscape" forests.

Orofino, Tuesday, December 16, 2008

Bonnerr Ferry, Wednesday, June 10, 2009 (6:30 pm to 9:30 pm)

Family Foresters Workshop

This annual program, offered jointly by the UI and WSU Cooperative Extension systems, updates consulting foresters, state-employed service foresters, and other natural resource professionals on emerging technology and knowledge applicable to family forests (also known as non-industrial private forests).

Coeur d'Alene, Friday, January 23, 2009 (8:00 am to 5:00 pm)

An Introduction to Conservation Easements

This 2-hour program will feature a short introduction to conservation easements followed by panel of representatives from public and private institutions that set up conservation easements and a landowner who has enrolled in one.

Moscow, Thursday, February 12, 2009

Sandpoint, Saturday, February 14, 2009 (1:00 pm to 3:30 pm)

LEAP Update

This program is designed to deepen and expand the training provided in Logger Education to Advance Professionalism (LEAP). LEAP updates are co-scheduled with spring first aid training, so participants can get all 16 credits required by the Idaho Pro-Logger program within 2 days. Specific program details will be announced this winter.

Orofino, March 3-4, 2009

Post Falls, March 10-11, 2009

Troy, March 12-13, 2009

St. Maries, March 17-18, 2009

Bonnerr Ferry, March 24-25, 2009

Family Forest Owners & Managers Conference

This annual conference brings together family forest owners, consulting foresters, agency program managers, and other partners to learn about and discuss current trends and topics in the world of sustainable stewardship management of our forest resources. The Idaho Forest Owners Association and Idaho Tree Farm Program conduct their annual meetings in conjunction with this conference.

Moscow, March 23-24, 2009 (8:00 am to 5:00 pm)

For more specific information on these and other UI Extension Forestry programs in your locale

Ron Mahoney

Extension Forester

Extension Forestry

P.O. Box 441140

College of Natural Resources

Moscow, ID 83844-1140

Tel (208) 885-7642

E-mail: rmahoney@uidaho.edu

Yvonne Barkley

Associate Extension Forester

Extension Forestry

P.O. Box 441140

College of Natural Resources

Moscow, ID 83844-1140

Tel (208) 885-7718

E-mail: yvonnec@uidaho.edu

Leadership Skills 2008 - 2009

“Ties to the Land” - Your Family Forest Heritage

This facilitated workshop will explore planning for an orderly transition through succession planning and the human side of estate planning. It will focus on: maintaining family ties to the land from generation to generation; building awareness of the key challenges facing family businesses, and; motivating families to address the challenges.

Moscow, Wednesday, March 25, 2009 (8:00 am to 3:00 pm)
Coeur d’Alene, Saturday, April 18, 2009 (9:00 am to 4:00 pm)

Using your GPS

A Global Positioning System or “GPS” is becoming as common to work and play in forests as a compass. This one day program will introduce participants to the science underlying GPS use, and feature field exercises to acquaint them with basic tasks that can be done with a GPS, such as measuring acreages of tree planting units.

Hayden, Friday, April 10, 2009 (9:00 am to 4:30 pm)
Sandpoint, Friday, April 24, 2009 (9:00 am to 4:30 pm)
Bonniers Ferry, Saturday, April 25, 2009 (9:00 am to 4:30 pm)
Orofino, Friday, May 8, 2009 (9:00 am to 4:30 pm)
St. Maries, Friday, July 10, 2009 (9:00 am to 4:30 pm)

Logger Education to Advance Professionalism (LEAP)

Logger Education to Advance Professionalism (LEAP) is a nationally acclaimed Extension program that helps loggers improve their skills related to forest ecology, silviculture, and water quality through presentations, discussion, videos, and other learning experiences.

Hayden, April 15-17, 2009
Moscow, April 22-24, 2009

Adaptive Silviculture on the McGovern Forest

Dr. Karol Stoszek is an emeritus professor with the UI Dept. of Forest Resources who has long advocated approaches to silviculture that maximize flexibility in response to small scale variations in stand and site conditions. He has been experimenting with these approaches on the McGovern Forest, a property donated to the University of Idaho to demonstrate family forest management alternatives. This field day will be spent in the woods with Karol observing and discussing his adaptive silviculture treatments.

Coeur d’Alene, Friday, May 15, 2009 (8:00 am to 5:00 pm)

Measuring your Trees

Woodland owners may have dealt with bushels of grain or tons of hay per acre but still not know how to measure the volume and value of their timber. This program will feature 2-3 hours indoors learning how to measure trees, with the rest of the day spent outdoors conducting hands-on measurements to estimate timber volume and value.

Moscow, Friday, May 1, 2009 (8:00 am to 5:00 pm)
Coeur d’Alene, Saturday, May 9, 2009 (8:00 am to 5:00 pm)

Pruning to Restore White Pine

This indoor/field program will help you reduce white pine mortality from blister rust. It will cover blister rust disease cycles, blister rust hazard assessment, canker identification, and blister rust pruning methods.

Coeur d’Alene, Friday June 19, 2009 (8:00 am to 4:00 pm)

Thinning and Pruning Field Day

This program will feature 2-3 hours indoors discussing basic concepts of thinning and pruning, followed by a hands-on field tour, to learn about thinning, pruning, forest genetics, and chainsaw safety firsthand.

Orofino, Friday, June 26, 2009 (8:00 am to 5:00 pm)
St. Maries, Saturday, June 27, 2009 (8:00 am to 5:00 pm)

Managing Forest Organic Debris

There is growing discussion about leaving more material in the woods for forest nutrition. But how do you minimize fire or insect hazards? This program will feature cutting-edge science on forest organic debris, followed by a tour of slash treatment experiments on the historic Priest River Experimental Forest.

Orofino, Friday, July 17, 2009 (8:00 am to 5:00 pm)

Forest Insects & Disease Field Day

This program will feature a full day giving participants first-hand contact to the variety of insects and diseases that can affect forest growth and health, integrated with discussions of related management strategies.

Moscow, Friday, July 24, 2009, (8:00 am to 5:00 pm)
Bonniers Ferry, Friday, July 31, 2009 (8:00 am to 5:00 pm)

, go to www.cnr.uidaho.edu/extforest on the World Wide Web, or any of the contacts listed below:

Chris Schnepf

Area Extension Educator - Forestry
University of Idaho Extension
Kootenai County
1808 North 3rd Street
Coeur d’Alene, ID 83814-3407
Tel (208) 446-1680
E-mail: cschnepf@uidaho.edu

* serving Benewah, Bonner, Boundary,
and Kootenai Counties.

Randy Brooks

Extension Educator - Forestry
University of Idaho Extension Clearwater County
2200 Michigan, Box E
Orofino, ID 83544
Tel (208) 476-4434
E-mail: rbrooks@uidaho.edu

* serving Clearwater, Idaho, Latah, Lewis, and
Nez Perce Counties.

Strengthening Forest Stewardship Skills 2008-2009

Idaho has abundant forest land. Many people do not realize that over 2 million acres (11% of Idaho's forests) are owned and managed by thousands of family forest owners.

Each landowner has unique goals for his or her forest property, ranging from timber income to simply "a place to get away from it all". However, one goal common to most forest landowners is to steward their forest land, for their own goals and future generations.

The educational programs listed herein are designed to help private forest owners and those who work with them strengthen their forest stewardship skills.

All programs require pre-registration (including a small fee to off-set program costs). To register for a program, contact the UI Extension office in the county where that program will be held. For specific program information, dial www.cnr.uidaho.edu/extforest on the World Wide Web, or see the contacts listed inside this flyer.



These educational programs are being supported in part by the Idaho Forest Stewardship Program, a cooperative effort of the following agencies and organizations:

*University of Idaho Extension
Idaho Department of Lands
Idaho Department of Fish and Game
U.S.D.A. Forest Service
U.S.D.A. Natural Resources Conservation Service
U.S.D.I. Fish and Wildlife Service
Consulting Foresters
Idaho Association of Soil Conservation Districts
Idaho Forest Owners Association
Idaho Riparian Cooperative
Idaho Nature Conservancy
Idaho Tree Farm Committee
Idaho Association of RC&D Councils
Intermountain Forest Association
Nez Perce Tribal Forestry
Idaho Native Plant Society
Idaho Forest Products Commission
Idaho Sustainable Forestry Initiative State Implementation Committee
Associated Logging Contractors of Idaho*

A Primer on Pre-Commercial Thinning

Randy Brooks

Got dense stands or clumps of young trees (“dog-haired” thickets)? Don’t feel alone, too many trees per acre is a common problem in Idaho forests. How do we manage these stands, and when do we start managing them? Good question, so let me try to answer that in 1500 words or less!

Whether or not timber production is a land management objective, dense conifer stands should be thinned when they are young. Thinning concentrates growth on the trees left behind and reduces the time they take to grow to a merchantable size. This kind of thinning, called pre-commercial thinning (PCT), produces no income because it must be done before any of the trees are large enough to be merchantable – hence the “pre-commercial” descriptor.

PCT is a silvicultural treatment in which young trees are selected and released by removing less promising neighboring trees hindering their growth. PCT reduces the density of crowded trees and gives the residual trees plenty of room to grow. It is also an opportunity to favor the best trees for the site. Trees that are kept should be free of deformities and harmful insects and diseases. The end result is a healthier and better quality forest with a faster diameter growth rate.

Numerous studies have shown that PCT is a sound investment. Three methods of PCT are common across the U.S. The first method is mechanical thinning, which uses heavy equipment to mow wide strips, leaving narrow strips of saplings. The second method, called hand thinning, entails the use of saws, axes, weed eaters, etc., to cut all trees except those preselected for size and spacing. The third method uses chemicals, often called hack & squirt, to kill trees. Hand thinning and chemical use tends to get the best results because these methods leave an optimum number of desirable tree species that are evenly spaced for better growth.

A PCT will likely be the first silvicultural practice you implement in a young stand, aside from planting, and is often the first of several thinnings that take place in that stand. It is a practicable means of substantially increasing merchantable growth, and can shape the final composition of a forest intended for timber, wildlife, recreation or other uses.

PCT is best suited to young, dense stands where more space is required between the trees. It is performed in stands that are anywhere from 10-20 years old, where all the trees are more or less

the same age, better known as even-aged stands. Ideally, stands should be thinned when leave trees are anywhere from 10 -15 feet tall and 10 - 15 years old. PCT should be delayed only long enough for trees to express their growth and quality characteristics and to be above problems like brush competition and animal browsing. Further delaying PCT can result in loss of production and will often result in increased thinning costs. A 10 -15-year period of growth is usually sufficient to show potential growth rate, stem and branching characteristics, and susceptibility to various types of insects and diseases. It is best to thin before the crown ratio (the percentage of the tree’s height with green branches) is less than 40%.

On better sites, dominant trees will average about 15 feet tall at this age, and the stands will be ready for PCT. However, on poor sites, 10-15 year-old trees will be shorter so PCT can be delayed to about age 15-20 or so. Ages and heights of trees on intermediate sites will fall between these extremes.

PCT is usually more economic and efficient when trees are small. Excess trees can then be easily cut or felled with few problems. Take care to cut stumps below the lowest live branch, if possible. If thinning excess trees is delayed until trees become larger, it will create a larger amount of slash, which may have to be abated, and may damage residual trees.

The trees remaining after PCT have more rapid height and diameter growth and will not give in-growth seedlings an opportunity to become competitors. Likewise, brush encroachment generally should not be a severe problem. Where severe brush problems exist prior to PCT, consider controlling the brush.

The number of trees left after PCT should depend on when the first commercial thinning will be made in terms of tree size at that time. A guide to the desired number or spacing of trees is provided in Table 1. This generalized stocking guide is intended to be used for spacing, not for absolute number of trees per acre.

Most stands contain openings with no trees. Do not maintain a dense stand in one spot to offset the lack of trees in another. Extra trees left to compensate for an opening should be left only around the immediate perimeter of that opening. They should not be crowded into other parts of the stand.

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Table 1. Pre-commercial thinning guidelines for some PNW species*.

Species	Age	Height	Trees/ac	Spacing (ft)	Ingrowth potential	Sunscald problems
Douglas-fir	10-15	10-15	360	11x11	low	moderate
ponderosa pine	10-25	10-20	260	13x13	low	low
western larch	8-15	10-15	300	12x12	low	low
grand fir	15-20	15-20	300	12x12	moderate	high
lodgepole pine	10-25	10-20	600**	6x6**	moderate	high
western hemlock	10-15	15-25	430	10x10	high	high

Excerpted from “Using precommercial thinning to enhance woodland productivity”, OSU publication EC 1189. Available on-line at: <http://extension.oregonstate.edu/catalog/html/ec/ec1189/>

*Assuming that first commercial thinning occurs when average stand diameter is 10” d.b.h.

**Lodgepole will need to be thinned more than once as they tend to retain many branches if spacing is too far apart. Final spacing for a 10”.

How can you receive payments for carbon sequestration? Forestry so far has a limited role on the international Kyoto-driven trading platforms, where only afforestation or reforestation projects have been considered acceptable. Besides that, the U.S. did not ratify the Kyoto Protocol agreement, so U.S. landowners are not allowed to participate in international trades. Most of the information that follows was gleaned from the CCX website <<http://www.chicagoclimatex.com/>>.

The CCX recognizes that forest management activities may lead to additional forest carbon stocks by planting after harvest or natural disturbances, engaging in harvest systems that maintain partial forest cover, reducing soil erosion, or avoiding destructive harvesting practices. CCX rules call for robust, stringent measurement and inventory techniques and require that landowners be third-party certified for sustainable management. All projects undergo a standardized registration, verification, and crediting procedure. The basic specifications for obtaining Carbon Financial Instrument (CFI) offset credits for managed forest projects on the CCX are as follows:

- Eligible projects may earn offsets for the additional net carbon sequestered in their forest stocks from the previous year (i.e., carbon sequestered from additional forest growth less carbon lost due to harvesting activities).
- Forest owners must provide evidence that all of their forest holdings are sustainably managed through certification from agencies or certification schemes that have been approved by the CCX Committee on Forestry; these include the Forest Stewardship Council, Sustainable Forestry Initiative, and American Tree Farm System.
- Projects must quantify sequestered carbon either using a growth-and-yield model or by calculating inventory on an annual basis.
- Projects can be registered by the offset project owner or by aggregators. Projects involving less than 10,000 metric tons of CO₂ equivalents per year should be registered and sold through an offset aggregator, who then must also have the project verified. The CCX maintains a list of aggregators; two that provide services for registering forestry offsets are Forecon Ecomarket Solutions, LLC <<http://www.foreconinc.com/ecomarket/>>, and the National Carbon Offset Coalition <<http://www.ncoc.us/>>. The terms of the business and legal relationships between aggregators and offset project owners are left to the discretion of those parties.
- Projects initially must be verified by an agency or organization approved by the CCX Committee on Forestry. The CCX website provides a list of these organizations. Projects are also subject to annual verification.
- The CCX Committee on Forestry must review and approve all projects on a case-by-case basis.

Want to get started? You will need to have your forest land certified by a third party as meeting their requirements for sustainability. This involves a careful inventory and some costs. Then you will need to work with an offset aggregator, as mentioned above, and pay for the registration and verification services they provide. In turn, the aggregator pays fees to the CCX for the privilege of using the CCX market platform to offer the credits from your forest carbon offset project for sale.

Have forest landowners done this in Idaho? Yes, the Nez Perce Tribe has registered some reforestation and afforestation projects for carbon credits. The tribe sold reforestation carbon credits recently and will sell its afforestation credits when the price of carbon is higher. The rest of the forestry community seems to be in a wait-and-see mode. Here's what we foresee. In the near future, landowners can expect a cap-and-trade system at the federal level and the development of financial institutions to compete with the CCX for carbon trades. The value of carbon credits from forests will likely be higher in the future than today. The CCX offers a variety of financial instruments. If they are chosen carefully, carbon credits can be sold today at one price and then again in the future when the price may be higher. Like any other commodity market, carbon traders reap benefits along with commodity buyers and sellers. Carbon traders will likely have more knowledge about how these financial instruments work than anyone else, so select your aggregator carefully.

PCT at the ideal stage should strive for uniform size of trees as well as spacing. Select leave trees that are in a dominant or co-dominant position, have at least 30 percent of their total height in crown, have small branches, straight boles, and little taper, lack broken, forked, or damaged tops, and have little or no insect and disease problems.

It's better to choose well-formed, healthy trees of a less desirable species than poorly formed, weak trees of the most desirable species. Also, consider your management objectives. For instance, if you plan for natural regeneration, be sure to leave a species adapted to producing seed, germinating, and growing under the prevailing site conditions.

If PCT is delayed, trees will be substantially older when they reach the desired size for commercial thinning. Leave trees will be smaller at the time of PCT than they would be at that age if the stand had been thinned earlier. They will also continue to grow more slowly for the next few years than they would if the stand had been thinned earlier. Obviously, the ages for both unmanaged stands and stands receiving PCT will vary somewhat with initial stand density, and other factors like site, slope, topography, etc.

PCT is an essential management practice that will help you get the most from your forest. You can use PCT to accomplish a number of objectives, including timber, grazing, wildlife, and recreation.

Don't be unrealistic in your expectations. For practical purposes, your stand doesn't have to look "perfect" or "park-like." Expect some damaged trees, imperfect spacing, and holes to appear. No one has a crystal ball they can peer into to predict weather, insect and disease outbreaks, prices for different species, etc to help them manage their stands.



Figure 2. Residual trees after precommercial thinning.