

WSU Extension Puget Sound Forest Stewardship E-Newsletter

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In this issue:

- [Forester's Notes](#)
- [Forest Stewardship Coached Planning](#)
- [New Forest Stewardship Videos](#)
- [2013 Conservation District Plant Sales](#)
- [Family Forest Expo](#)
- [Partner Events](#)
- [Market Update](#)
- [Introduction to Advanced Hardwood Biofuels Northwest](#)
- [Tidbits](#)
- [Focus On: Wood-Based Bioenergy](#)
- [Subscription and Contact Info](#)

Forester's Notes

I am a bit amazed that this issue begins Volume 6. With five years' worth of newsletters now in the archives, I am looking forward to the next five years of writing this. I hope, when it comes time to start Volume 11, that some things will still remain unchanged. I hope there will still be upcoming Coached Planning classes, date announcements for field days, and new resources to tell you about that will help support you in your stewardship mission. I also hope that there will be exciting new programs and initiatives that I can't conceive of right now, just as there are new programs and initiatives that I could not have conceived of five years ago.

In this newsletter I will be introducing you to one such program that I would not have imagined when I started this gig, which is a cutting-edge research project to develop a woody biofuels industry here in the Pacific Northwest. Biofuels, and bioenergy in general, is a topic that has really come to the forefront. Fossil fuels are a finite resource, and their extraction both domestically and abroad have impacts on our environment, economy, and national security.

There is a lot of emphasis on the benefits of locally-grown food, but what about locally-grown fuel? Is this critical commodity something that could be grown rather than extracted? What would it mean for our nation if our fuel was produced domestically in a renewable and sustainable manner? What would it mean for our economy to have a reliable supply of fuel at low, stable prices? Could this reinvigorate the economies of rural communities that have suffered the decline of natural resource-based industries?

The first question is whether growing fuel is actually possible. The short answer is yes. Fossil fuels originated as organic (plant) materials, so we just need to speed the process up by a few million years. Thanks to the wonders of modern chemistry, we can actually do that. The question then becomes whether this is economically viable at a large commercial scale. There are other questions to be considered as well, such as whether this type of shift in energy source would indeed have a net positive impact on the environment, whether we have the land base to support production, and how fuel crops would impact other important land uses like forests and food production. Will there be unintended consequences to what otherwise seems like a win-win-win situation?

These deeper questions are what we are trying to answer in a huge new research initiative called Advanced Hardwood Biofuels Northwest (AHB). This initiative is led by the University of Washington and includes five teams: feedstock, conversion, sustainability, education, and extension. The extension portion is where I come in. This sub-team is led by WSU, and I am the principle investigator overseeing it. My time is now split between forest stewardship and biofuels. To support the biofuel effort and to keep me free to still be predominantly focused on forest stewardship, we have hired three new faculty and a staff person dedicated to the biofuel project. These four are an amazing all-star team of people based here in Everett and serving a four-state region.

In addition to the AHB project, there are other consortiums of university and industry partners throughout the nation as part of the USDA's Bioenergy Research and Development Initiative. Each consortium is looking at the viability of different potential biofuel sources, such as switchgrass, oilseeds, forest residuals, sorghum, algae, animal and agricultural wastes, and others. One of these other consortiums is the Northwest Advanced Renewables Alliance (NARA), which is also based here in Washington and is led by WSU. Watch for more information on NARA in a future newsletter. In the meantime, there is some additional information on AHB in this edition, along the final installment of our four-part "focus on" series about forests and carbon, which is all about bioenergy. There is also the usual assortment of events and resources to tell you about.

Kevin W. Zobrist
Regional Extension Specialist, Forest Stewardship
Serving the North Puget Sound Area

Forest Stewardship Coached Planning

There are still a few spaces available in our next Coached Planning class, which starts on February 6th. This class is being offered online as live, interactive webinars. It still includes the big notebook of materials (which will be shipped to you), a field day, and a site visit to your property by a state forester. Anyone with property in Western Washington and a broadband internet connection (i.e. not dial-up) can participate.

This class will teach you everything you need to know about stewarding your forest. Topics include ecology, soils, forest health, wildlife, silviculture, invasive species, regulations, special forest products, and others. The most common feedback I get from even experienced landowners who take this course is "I didn't know what I didn't know." People who take this class frequently find that things they thought were beneficial to their trees and wildlife are actually harmful, and things they thought were harmful are actually beneficial.

Many people use this class to qualify for current use taxation, with participants reporting an average savings of \$1,600 per year (as always, individual results will vary depending on the size of the property). Participants frequently tell me that this is one of the best classes they have taken and one of the best bargains they have received.

Want to see firsthand why this is our most popular class? Join us! Sign up at <http://snohomish.wsu.edu/forestry/CP13Online.htm>, or call me at 425-357-6017. The cost is \$200 per family which includes the materials, site visit, and a family admission to the summer field day.

Not convinced that this is a good use of your money and time? I'll make you this deal: If you sign up for the class and after a few sessions you conclude that it's not what you're looking for and not worth your investment, tell me and I'll refund your tuition no questions asked (I'll even pay to have your materials shipped back to me). I offer this deal to people for every class, and no one has ever asked for a refund. In contrast, they tell me they would have spent more and done it sooner if they really understood what they were getting.

Do you know of any other state agency that takes this sort of satisfaction-guaranteed approach? Come give us a try.

New Forest Stewardship Videos

We have posted several short educational videos on our YouTube Channel over the past few months:

- Growing a shiitake mushroom log: <http://www.youtube.com/watch?v=WOWCS5qbTOY>
 - Bonus – blooper reel: <http://www.youtube.com/watch?v=wVYentMnzjQ>
- Making an autumn wreath: <http://www.youtube.com/watch?v=r4m0PsMdkQ4>

- Making jam from salal berries: <http://www.youtube.com/watch?v=BrgFOCPle4c>
- Building a bat detector: <http://www.youtube.com/watch?v=7bpfWbHklbo>
 - Bonus – bloopers reel: <http://www.youtube.com/watch?v=7jh8sP0CrGk>

2013 Conservation District Plant Sales

This is the best source for native trees and plants. Pre-order deadlines are approaching quickly.

- King: March 1st and 2nd at the KCD office in Renton. Pre-order deadline February 8th. 425-282-1912 or http://www.kingcd.org/pro_native.htm.
- Skagit: March 21st (pre-order pick-up), March 22nd-23rd and April 13th (open sales) at the Plant Materials Center in Bow. Pre-order deadline March 1st. 360-428-4313 or http://www.skagitcd.org/native_plant_sales.
- Snohomish/Camano: March 2nd at the Evergreen State Fairgrounds in Monroe. Pre-order deadline February 18th. 425-335-5634 ext. 4 or <http://snohomishcd.org/plant-sale>.
- Whatcom: March 22nd (pre-order pick-up) and March 23rd (open sale) at Whatcom Community College in Bellingham. Pre-order deadline March 11th. 360-354-2035 ext. 3, or <http://www.whatcomcd.org/plant-sale>.
- Whidbey Island: March 1st (WICD office in Coupeville) and March 2nd (Island County Fairgrounds in Langley). Pre-order deadline was January 30th. 360-678-4708 or <http://www.whidbeycd.org/plant-sale-order-page.html>.

Family Forest Expo

The Fourth Family Forest Expo will be March 23, 2013 at Green River Community College in Auburn. This is a hands-on, interactive educational event for families who own forestland in Washington. It is basically an indoor/winter version of our summer field day. Whether you live on your land in the Puget Sound area, or are an absentee owner with land in Eastern Washington, this is a great opportunity to learn how to gain more benefits from your family forest no matter where it is located in the state.

Come to the Expo and:

- Get practical, “how-to” advice on simple stewardship practices
- Talk with agency and natural resource professionals from Eastern and Western Washington who are available to assist you in meeting your family’s goals

- Meet other landowners (maybe a neighbor!)
- See equipment displays and speak to vendors
- Get your forestry questions answered at the resource center

Each hour, you will attend a different class, demonstration, or tour. Throughout the day, over two dozen topics will be presented for you to choose from! By the end of the day, you will have attended six sessions. In addition, there will be a resource area featuring equipment vendors and public, private, and nonprofit organizations that provide landowner assistance. Whether you are a “novice” to family forestry, or your family has owned land for many generations, there is something new for everyone to learn at the Fourth Family Forest Expo.

Details and registration information are available at <http://extension.wsu.edu/forestry/Documents/4th%20Forest%20Expo%20Lo.pdf> or by calling WSU Chelan County Extension at 509-667-6540.

Partner Events

Note: partner events are not WSU events. Partner events are listed for informational purposes only and do not imply any endorsement by WSU.

- **Where Cows Meet Clams Farm and Forest Sustainability Program** – The forestry workshop is offered twice: February 23rd and March 9th. The workshops are held in Carnation. The workshops are sponsored by NNRG and Cascade Harvest, with funding support from the EPA and Washington Department of Ecology. The workshop is designed to provide an integrated, hands-on approach to operating a successful and sustainable farm or forest. The holistic approach will combine stewardship, succession planning and marketing/economic development that taps into trends in restoration, buy-local, and experience-based tourism. For details and registration information visit <http://www.brownpapertickets.com/event/319702> or call Lindsay Malone at 206-971-3709.

Market Update

Here is the latest news on log prices in Western Washington based on data provided by our friends at DNR in their monthly Timber Sale Query reports.

Log prices have been pretty strong for conifers (Douglas-fir, whitewoods, spruce) these past couple months. In contrast, hardwood prices have been relatively weak.

For an updated price graph, please visit <http://snohomish.wsu.edu/forestry/documents/LogPrices.pdf>

Introduction to Advanced Hardwood Biofuels Northwest (AHB)

Advanced Hardwood Biofuels Northwest is a project to develop biofuels from woody feedstock to support more sustainable air and ground transportation, create jobs, and support rural economies in the Pacific Northwest region. The project is funded by a \$40 million AFRI CAP (coordinated agricultural project) grant from the USDA. The project is led by the University of Washington and includes a broad consortium of universities and industry partners who will be working together to develop a system to convert hybrid poplar into biofuel.

The goal of the hybrid poplar biofuel project is to generate liquid biofuels, including gasoline, diesel, and jet fuel, that are fully compatible with existing infrastructure. These fuels will be direct replacements for existing fossil fuels and will be certified to run in existing car, truck, aircraft, and other types of engines. The target is to produce 400 million gallons of biofuel per year from 400,000 acres of hybrid poplar plantations around the Pacific Northwest. The Pacific Northwest is an ideal location to develop this system because of the availability of suitable land for growing poplar and the existing collaborations between universities and industry partners in the region. The region is also isolated from other U.S. fuel pipelines, making it imperative to develop a regional source of renewable energy. The biofuel production from this project will meet 75% of the region's target for the 2022 renewable fuel standard (RSF2).

Hybrid poplar is an excellent crop for biofuel production. It is fast-growing and highly adaptable to a wide range of sites. Marginal lands, currently unproductive or underproductive for other types of crops, will present good opportunities for hybrid poplar production.

The cultivars being developed are not genetically engineered. Rather, they are bred through traditional cross-pollination methods that have been used for thousands of years. The poplar cropping system being developed is also very different from the other types of hybrid poplar systems that have been in use for pulp and paper production over the past several decades. Those systems were grown on 12- to 15-year rotations and were harvested using conventional logging equipment and methods. Residual stumps, because of their size, made it challenging to convert the land back to other crop uses. In contrast, the poplars being developed for biofuel production will be grown on very short (2-year) rotations, using a coppicing method that promotes multiple shoots of re-growth at the stump for subsequent harvest. Harvesting is done with a combine-like machine that cuts and grinds the saplings as it moves down the crop rows, feeding the chips into a truck that moves alongside. Residual stumps are small; after several rotations of poplar, the land can be tilled for other agricultural crops without requiring expensive stump removal.

This project is organized into five teams:

1. Conversion and Distribution - This team is led by Colorado-based ZeaChem Inc. ZeaChem is developing the chemical conversion process and is adding process modules to its existing 250,000 gallons per year integrated biorefinery in Boardman, OR for this project. Supporting research will develop new sensors for biorefinery processes.

2. Feedstock - This team is led by GreenWood Resources, which manages 25,000 acres of Forest Stewardship Council (FSC) -certified poplar in Boardman that supplies logs to its Boardman sawmill along with the supply of biomass to ZeaChem's biorefinery. GreenWood is developing the breeding, growing, and harvesting technology. Regional demonstration plantations will be used to quantify biomass yields and economics along with an assessment of the impacts of growing poplar on wildlife, water quality and availability, land productivity, and other environmental factors to ensure the process is environmentally sustainable. Research projects at the University of Washington, University of Idaho, Washington State University, and University of California, Davis are supporting development of superior feedstock systems.

3. Sustainability - This team, co-led by the University of Washington and University of California, Davis, will be doing a comprehensive life cycle assessment (LCA) of the entire process of growing, harvesting, conversion, and distribution. This effort also includes extensive modeling and analysis of alternative development scenarios and system optimization. Economic assessments will evaluate economic viability for landowners and determine other potential socioeconomic impacts. A comprehensive social impact evaluation using surveys, focus groups, and interviews will complete the sustainability assessment.

4. Education - This team is co-led by Oregon State University and the Agriculture Center of Excellence (WA network of Agriculture-based community college programs serving the Pacific Northwest from Walla Walla Community College). The team will develop high school, community college, four-year college, and master's level curricula and programs to ensure that a skilled workforce is available to meet the bioenergy needs of the region well into the future.

5. Extension - This team, led by WSU Extension, will develop education and outreach materials and build capacity within the region's land grant universities to ensure that farmers and forest owners have access to necessary technical assistance for growing hybrid poplar feedstock. This Extension capacity is essential to the success of growers, who are the supply link needed for successful biorefineries. The Extension component will be carried out by a dedicated team of agriculture and natural resource faculty that will provide support to Extension programs throughout the Pacific Northwest region.

The project is scheduled to last for five years. Currently, there are no opportunities for local landowners to begin growing hybrid poplar for biofuel production, as this is the beginning of the research and development process. The goal is to be ready for commercialization at the end of the five-year process, at which point there will be opportunities for landowners around the region. More information will become available as this project progresses.

To receive updates about this project, please sign up for our email newsletter at <http://lists.wsu.edu/mailman/listinfo/ahb-nw> or visit our Facebook page at <https://www.facebook.com/AHBNW>.

You can also contact the WSU Extension biofuel team:

- Jim Funck, Extension Project Manager: 425-388-9334 or jim.funck@wsu.edu
- Shiba Kar, Extension Specialist: 425-388-9139 or Shiba.kar@wsu.edu
- Patricia Townsend, Extension Specialist: 425-388-9336 or patricia.townsend@wsu.edu
- Nora Haider, Program Specialist: 425-388-9163 nora.haider@wsu.edu
- Kevin Zobrist, Extension PI: 425-357-6017 or kevin.zobrist@wsu.edu

Tidbits:

- Sources for Forest Stewardship Supplies and Materials: Ever wonder where to buy things like seedlings, seedling protector tubes, increment borers, wildlife seed forage mixes, seedust, pruning saws, rare natives like Pacific Yes, etc., etc.? Check out our new "where to buy" info sheet: http://snohomish.wsu.edu/forestry/documents/Forestry_Supplies.pdf
- Interested in a job in forestry? Join our list serve of job announcements by sending a blank email to join-forestjobs@lyris.cahnrs.wsu.edu
- Save the date – the 2013 Forest Owner Field Days will be June 22nd in Okanogan County, and August 17th in Forks. There will also be a North Puget Sound Forest Owner field day in Whatcom County (tentative date is July 27th).
- The King Conservation District is now accepting applications for the 2013 Landowner Incentive Program (LIP). The program provides King County forest owners with cost-share assistance to implementation of conservation practices on private property. For details visit <http://www.kingcd.org/programs-landowner-incentive.htm> or call Rachel Konrady at 425-282-1907.

Focus On: Wood-Based Bioenergy

This is the fourth and final installment of our Focus-On series on forests and carbon. If you have not read the first three installments, you can find them here:

Part 1—Carbon Sequestration and Release:

http://snohomish.wsu.edu/forestry/documents/Newsletter_04_04.pdf

Part 2—Carbon Sequestration and Forest Management:

http://snohomish.wsu.edu/forestry/documents/Newsletter_04_05.pdf

Part 3—Carbon Credits:

http://snohomish.wsu.edu/forestry/documents/Newsletter_05_04.pdf

Much of our nation's energy (both liquid transportation fuels and electric power) is derived from "fossil fuels," which include oil, coal, and natural gas.

There are several drawbacks to these energy sources:

- They are non-renewable resources. Once existing deposits are used up, they are gone. Though new technology we have gotten better at finding and/or accessing more of these deposits, which has kept supplies plentiful, but ultimately they are finite.
- Their use converts carbon stored the earth to carbon dioxide which is released into the atmosphere. Rising concentrations of carbon dioxide in the atmosphere changes global climate, with a myriad of consequences (see Part 1 of this series).
- Prices are unstable and usually climbing, impacting all areas of our lives and economy and our nation's foreign policy.
- Extraction (e.g. mining, offshore drilling, fracking, etc.) can harm the environment, especially if there is an accident.

The advantages of bioenergy is that it can be renewable, locally produced, and possibly "carbon neutral," though there is disagreement on this last point. It can also utilize what would otherwise be waste products, thus solving two problems at once (waste disposal and energy source). Bioenergy is of particular interest in the forestry sector, as forests are a huge potential source for the needed raw material (referred to as "feedstock").

There are two key types of forest-based bioenergy. They are often mistakenly referred to interchangeably, when in reality they represent two very different approaches with different implications. The first type is usually referred to as biomass. This is where woody material is gathered and burned in a controlled environment (e.g. a boiler). The heat from burning biomass can be used in and of itself (e.g. to heat a building or support some industrial process), as well as to produce electricity by heating water to generate steam to drive a turbine. When both heat and electricity are desired outputs, the process is called cogeneration because it is simultaneously generating two different usable forms of energy.

The other type of forest-based bioenergy is biofuel. This is where woody material is chipped up and processed in a biorefinery where it is chemically converted to a combustible liquid fuel that can be used to power internal combustion engines. The refining process is fairly complex.

With either biomass or biofuel, the energy is captured through a combustion process, thus releasing carbon dioxide into the atmosphere just like burning fossil fuels. However, there is a fundamental difference. With wood-based sources of energy, carbon from the atmosphere is sequestered in the trees, released back into the atmosphere by burning the wood, re-sequestered in new trees, re-released by burning that wood, etc. This is why wood-based bioenergy is often referred to as "carbon neutral," because it is a sustainable cycle that results

in no net change in atmospheric carbon when looked at over the course of a rotation of trees.

In contrast, with fossil fuels the carbon released into the atmosphere came from deep in the earth. Granted, this carbon also originated in the atmosphere at some point. However, this is only carbon neutral if looked at over a time span of millions of years rather than a few decades (or even just a couple years for hybrid poplar).

The carbon neutrality of wood-based bioenergy has been called into question by some scientists for several reasons. One reason is that the production of wood-based bioenergy includes carbon emissions (e.g. from trucking the material from the forest to the energy plant, the biofuel refining process, etc.) such that the total carbon that is released over the course of a cycle is more than what is sequestered. Another reason cited is that harvesting woody material disturbs the ground, which releases carbon that is stored in the soil.

A report released recently that is particularly critical of wood-based bioenergy asserts that the carbon re-sequestered from new trees is only a fraction of what is released, thus being far from carbon neutral. Since woody material produces much less energy per unit of carbon compared to fossil fuels, the report suggests that wood-based bioenergy is actually worse than fossil fuels relative to carbon emissions. In contrast, reports supporting wood-based bioenergy assert that the process is nearly carbon neutral and that by displacing fossil fuels there is a significant net benefit relative to carbon emissions.

How can different reputable scientists come to such different conclusions about wood-based bioenergy? It is all a matter of the assumptions used in the analysis. For instance, the report showing that the carbon re-sequestered in new trees is far less than what is released is looking at a very short time horizon that doesn't allow enough time for trees to re-grow. In contrast, analyses showing equivalent sequestration and release are looking at it over the course of a complete rotation of trees. The timeframe considered makes a profound difference.

There can be several other key differences in assumptions when analyzing carbon emissions from wood-based bioenergy. For instance, there can be different assumptions about the amount of soil disturbance during harvest or the quantity of emissions from transportation and production. There can also be differences in the types of wood material that are assumed to be harvested for bioenergy. Harvesting old-growth trees vs. young plantation trees vs. residuals from lumber production has profoundly different implications. Another key difference can be the assumptions about what would otherwise happen to the woody material if not used for bioenergy. Some analyses may assume that the carbon would otherwise stay sequestered in the wood indefinitely. Others may be looking at material like logging slash that would otherwise decompose (releasing the carbon) quickly. Still others may be looking at trees thinned out of overstocked forests that otherwise would likely have burned in uncontrolled wildfires. Again, these assumptions result in profoundly different conclusions.

Factors beyond carbon neutrality should also be considered. Removing woody material from the forest could negatively impact wildlife or result in nutrient losses (though most of the nutrients are in the tree needles, so if the needles are left and only the woody parts are removed there may not be much of a nutrient issue). Or removing woody material could positively impact wildlife, forest health, and fire risk if it involves thinning overstocked stands. A bioenergy market could make thinning and forest health improvements more economically feasible. Or it could economically motivate over-harvest.

To summarize, the benefits of wood-based bioenergy all depend on what is harvested, where it is harvested from, how it is harvested, how it is transported, how it is utilized as an energy source, the time horizon considered, and the alternative fate of the feedstock material. The question society will need to address is whether, despite some potential drawbacks, an energy portfolio that includes wood-based bioenergy is a better long-term strategy than other viable alternatives. This may ultimately be a question more of social values than of scientific analysis.

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The WSU Extension Puget Sound Forest Stewardship Program is made possible in part by Snohomish County Surface Water Management, the Snohomish Conservation District, King County, Skagit County, Island County, and Whatcom County.

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