#### University of Idaho



# Woodland NOTES

#### www.cnr.uidaho.edu/extforest

UI College of Agricultural and Life Sciences and UI College of Natural Resources - Supported by RREA - *The Renewable Resource Extension Act* Fall/Winter, 2009-2010, Vol. 21, No.1

# End of an Era? Woodland NOTES May Go to Electronic Format Only

For many years you have received a copy of *Woodland NOTES* in the mail. Unfortunately, we may no longer able to afford to mail future hardcopies of *Woodland NOTES* to our 10,000+ readers.

This publication has been available as both hardcopy and electronic formats for eight years now. We will continue to produce *Woodland NOTES* electronically, and are looking for ways to continue mailing one hard copy of *Woodland NOTES* and the Forest Stewardship Calendar every fall, but this could be the last time. Regardless, it will be available on our website at <a href="http://www.cnr.uidaho.edu/extforest/Woodland%20NOTES.htm">http://www.cnr.uidaho.edu/extforest/Woodland%20NOTES.htm</a>. If you do not have a computer at home, you can log on at your local public library or contact us and we will print a copy of the latest edition and mail it to you.

Our web site is updated daily and, along with publications and web links, features What's in the News, Article of the Month, Calendar of Events, and the Strengthening Forest Stewardship Skills calendar, program descriptions, and on-line flyers. There is also information about the Idaho Big Tree Program, UI Extension Forestry Tree Clinic, Where to Find Help, and How to Contact Us.

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#### Don't Let Water Quality Bug You Out Randy Brooks

Using insects to monitor water quality may sound like something from a *Far Side* cartoon, but in reality, bugs are a "quick and dirty" method of assessing water quality. The traditional water quality monitoring approach has been to collect stream water samples and have them analyzed for physical and chemical contaminants. Since water sampling and analysis is expensive, insect monitoring is a more economical and quicker method of determining water quality. In the U.S., much as canaries are used in mineshafts, the use of stream organisms as biological indicators of water quality has become widespread over the past few decades.

Biological monitoring is used to assess a water body's environmental conditions. One type of biological monitoring is a biological survey or biosurvey (also called stream insect survey if only monitoring aquatic insects). This involves collecting and analyzing aquatic organisms (fish, bugs, and algae) to determine the health of an aquatic biological community.

Aquatic insects are termed benthic macroinvertebrates (BMI's). Benthic means bottom dwellers, and macroinvertebrates are organisms that are large (macro) enough to be seen with the naked eye and lack a backbone (invertebrate). BMI's inhabit all types of running waters, from fast-flowing mountain streams to slow-moving muddy rivers. Examples of aquatic macroinvertebrates include insects (in their larval or nymph form), crayfish, clams, snails, and worms. Most live partly or nearly all of their life cycle attached to submerged rocks, logs, and vegetation.

There are three groups (taxa) of BMI's:

- Group one BMI's are pollution sensitive and found in good quality water. This group includes stonefly larvae, caddisfly larvae, water pennies, riffle beetles, mayfly larvae, gilled snails, and dobsonfly larvae.
- Group Two BMI's are somewhat pollution tolerant organisms that can be found in good or fair quality water. This group includes crayfish, sowbugs, scuds, alderfly larvae, fishfly larvae, damselfly larvae, watersnipe fly larvae, crane flies, beetle larvae, dragon fly larvae, and clams.
- Group Three BMI's are pollution tolerant organisms that can be found in any quality water (from good to poor). This group includes aquatic worms, midge fly larvae, black fly larvae, leeches, pouch snails, pond snails, and other snails.

Aquatic BMI's are good indicators of stream water quality because:

- They are affected by the physical, chemical, and biological conditions of the stream.
- They cannot escape pollution and show the effects of shortand long-term pollution events.
- They may show the cumulative impacts of pollution.
- They may show the impacts from habitat loss not detected by traditional water quality assessments.



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#### Small Scale Forestry Technology

Chris Schnepf

#### The trend towards larger scales.

The trend in agriculture and forestry for the last 75 years has been towards larger and larger scales of technology – bigger farms, bigger forest treatment units, bigger tractors and combines, and so forth. The main goal was to lower unit costs and get better economies of scale.

That approach can fit fairly well with large, even-aged stands common in Pacific Northwest forests. But for family forest ownerships, machines designed to efficiently process large quantities of consistently-sized timber may not be appropriate, particularly where the landowner is doing a light thinning from below that only produces a few logs. Even on larger industry or public forests, large scale forest activities and the equipment used to implement them are less acceptable to the public than they may have once been. Consequently, there is more interest in smaller-scale projects that use smaller equipment with less dramatic site disturbances.

#### The return of small-scale.

The term small scale forestry technology can be applied to various devices and methods to log, make forest improvements, or process wood that generally aren't designed to process large quantities of material quickly. In additional to lower equipment costs, there are a number of potential benefits to smaller scale technologies, including flexibility, maneuverability in tight stands, and potentially less impacts to leave trees and the site.

Many studies of forest owners have identified landowners' desire to do some of their own work in their forests - as a way of experiencing their forests in a more personal way, get outdoor exercise, and handcraft their forests. These forest owners are typically interested in technologies that can be used for multiple activities (e.g. moving logs, firewood, hay, and snow) and a number of small scale forestry technologies meet this criterion.

Many of these technologies are not necessarily new. Logging with horses and smaller crawlers has long been a part of forestry in the U.S., though they are not as common now as in the past. Small scale technologies have been used extensively in Europe and to a lesser extent in Canada for many years – particularly where there are markets for small logs (e.g., pulp logs), or where forest ownership is strongly comingled with farm ownership. With U.S. family forest parcel sizes getting smaller on average, and markets for small diameter timber improving, there is growing interest in small scale technology here.

#### I can't get production.

Many loggers tend to dismiss small-scale technology out of hand because they can't "get the production" (measured in thousands of board feet produced in a day) that they can with other technologies. In part that is because larger scale technologies can be very expensive and loggers must move larger quantities of timber to make their monthly equipment payments and still make a living.

Small scale logging technologies often require some changes in thinking of forest operators who have been immersed in larger scale technologies. Where small scale technologies are less expensive than larger scale technologies, loggers who use them do not have to produce as many logs to make their payments. If operators determine their bottom line accordingly, small scale technology can be competitive, particularly for people who are logging part-time, working on smaller parcels (e.g. many landowners), or working on specialty products such as cedar products or firewood. Tree services are more accustomed to budgeting their work this way and working with clients who value aesthetics over production and are willing to pay for it. They have been among the first in the Northwest U.S. to adopt small scale forest technologies. Many of those tree services and firms who are implementing contracts to reduce fire risk around wildland urban interface homes are using small scale forestry technologies to branch into logging and performing other forestry services such as pre-commercial thinning & pruning.

#### Small scale may require new skills.

More training and skill is usually required to be efficient with small scale forestry technologies. These methods are not necessarily easier

on the forest. For example, a wheeled tractor driven repeatedly all over a sensitive forest site in the spring, could easily cause more soil compaction than a conventional crawler-tractor used more discretely on the same site in the fall. Specialized ergonomic techniques can be important with small scale technologies because some require more human power - working smarter prevents back and other injuries. Prior planning can be critical to care for both operators and the forest.

In addition to learning how to use small scale forestry tools effectively, forest owners who are considering doing some of their own logging or thinning should not attempt this until they have received training in chainsaw and felling safety. It doesn't take a very large tree or even branch to cause serious injury to someone working in the woods. Most states have organizations or agencies that offer logging safety classes every year.

#### Types of small scale?

Small scale forestry technologies are used for a range of activities, from moving logs, to creating biomass fuel, to forest fuel reduction. Small scale technologies can involve any of the following broad categories used alone or in combination:

Farm tractor-based systems. Farm tractors are the most popular small scale technology used by forest owners in the U.S., because they are often less expensive, easier to get parts for than machines designed exclusively for logging, and can be used for a variety of other tasks, particularly for forest owners who also own agricultural lands. Standard farm tractors must be modified to for woods use; these costs must be accounted for when considering tractors for logging. A variety of logging attachments have been designed specifically for farm tractors, ranging from logging winches (the most popular), to grapple loaders, to log processors.

ATVs. All-terrain vehicles ("ATVs" or "four-wheelers") can be very useful in moving small diameter logs. They are also very easy on soils, due to the relatively light weight of the machine and low ground-pressure tires, particularly when ATVs are used with accessories to reduce the friction of logs with the ground (e.g. skidding arches, trailers, or plates). They can be limited as to the terrain they are used on though, and they have some serious safety considerations that must be addressed.

**Cable Systems.** Cable logging systems are widely used in the Pacific Northwest, and many people associate them with large scale harvests, in part because they are so visible there. But a variety of small-scale cable logging systems are available as well

**Horses.** Horses are still used on a limited basis in the U.S. but they are used more frequently in other parts of the world. Horses can be particularly effective when used in combination with other small scale technologies. Like tractors, horses can also be used for tasks in addition to logging.

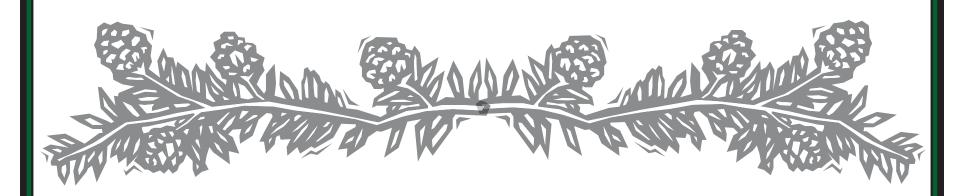
**Wood Processing Technologies.** These are items that can be used to treat slash from forestry operations or add value of material harvested in the woods. Machines include chippers, grinders, masticators, portable post peelers, firewood processors, and portable sawmills.

Small Scale Accessories. Small scale logging often requires specialized techniques to aid effectiveness. These include: felling bars and arches, manual log moving devices, mini forwarding trailers (some with grapple or other types of loaders), mini-skidders ("motor-manual skidders") skidding cones, sleds or pans, snatch blocks and straps, specialized cables and ropes, remote controls, skidding grapples and tongs, tire chains, tire fluids, counter-weights, protectors for "bumper" trees while skidding; clearing saws for pre-commercial thinning, and many other devices.

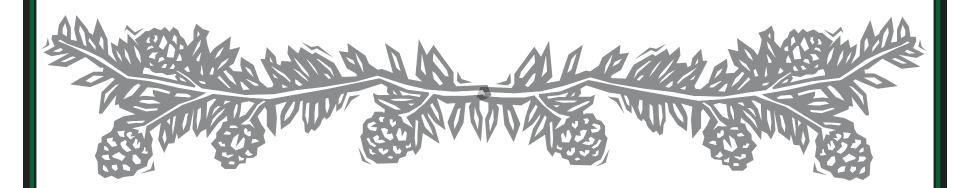
Before purchasing equipment, forest owners and contractors should become familiar with the range of different technologies, so they can chose the pieces that best fit their situation. The publications cited at the end of this article can provide more information on the strengths, limitations, and relative costs these devices and techniques. Detailed

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**University** of Idaho Extension



# Strengthening Forest Stewardship Skills 2009-2010



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#### 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).

> Rathdrum, Six Thursday evenings November 5 - December 17, 2009 (6:30 pm to 9:30 pm) Sandpoint, Six Wednesday mornings June 9 - July 14, 2010 (9:00 am to 12:00 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.

> Orofino, Thursday, December 10, 2009 (8:00 am to 4:00 pm) Coeur d'Alene, Friday, December 11, 2009 (8:00 am to 3:30 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).

> Spokane Valley, WA. Friday, January 22, 2010 (8:00 am to 5:00 pm)

#### An Introduction to Conservation Easements

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

> Coeur d'Alene, Thursday, February 11, 2010 (6:00 pm to 9:00 pm) Plummer, Friday February 12, 2010 (1:00 pm to 4:30 pm)

#### **Backvard Forests**

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

> Coeur d'Alene, Monday, February 22, 2010 (6:00 pm to 8:00 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 two days. Specific program details will be announced this winter.

> **Orofino**, March 3-4, 2010 Coeur d'Alene, March 9-10, 2010 **Troy**, March 11-12, 2010 **St. Maries**, March 16-17, 2010 Bonners Ferry, March 24-25, 2010

#### 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.

> Coeur d'Alene, Monday, March 8, 2010 (6:00 pm to 8:00 pm)

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

#### 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 22-23, 2010 (8:00 am to 5:00 pm)

#### "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 these challenges.

> Moscow, Wednesday, March 24, 2010 (8:00 am to 3:00 pm) Coeur d'Alene, Saturday, April 17, 2010 (9:00 am to 4:00 pm)

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

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#### 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 you with basic tasks that can be done with a GPS, such as measuring acreages of tree planting units.

> St. Maries, Friday, March 12, 2010 (9:00 am to 4:30 pm) Sandpoint, Friday, April 9, 2010 (9:00 am to 4:30 pm) Bonners Ferry, Saturday, April 10, 2010 (9:00 am to 4:30 pm) **Orofino,** Friday, April 16, 2010 (9:00 am to 4:30 pm)

#### Thinning and Pruning Field Day

This program will feature two to three 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, April 9, 2010 (8:00 am to 5:00 pm) Kellogg, Saturday, May 15, 2010 (8:00 am to 5:00 pm) Bonners Ferry, Saturday, June 5, 2010 (8:00 am to 5:00 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.

> Coeur d'Alene, April 21-23, 2010 **Orofino**, April 28-30, 2010

#### Measuring your Trees

Good decisions require good information on your forest - whether you are preparing for a timber sale, determining how much or what species to thin, or managing for other values. This program will feature two to three hours indoors learning how to measure trees, with the rest of the day spent outdoors conducting hands-on measurements to estimate a variety of forest characteristics.

> Orofino, Friday, May 7, 2010 (8:00 am to 5:00 pm) Coeur d'Alene, Saturday, May 8, 2010 (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, silvicultural strategies in young white pine stands, and blister rust pruning methods.

> Kellogg, Friday June 14, 2010 (8:00 am to 4:00 pm)

#### Idaho-Washington Forest Owners Field Day

This one-day program will feature a wide variety of exhibits and short educational sessions for both new and experienced forest owners. It is held cooperatively between a variety of agencies and organizations that support family forest owners.

> Rathdrum Prairie, Saturday, June 12, 2010 (8:00 am to 5:00 pm)

#### Adaptive Silviculture on the McGovern Forest

Dr. Karel 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 Karel observing and discussing his adaptive silviculture treatments.

> Coeur d'Alene, Friday, June 18, 2010 (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.

> Sandpoint, Friday, July 16, 2010 (8:00 am to 5:00 pm) Orofino, Friday, July 23, 2010 (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\*

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\* Serving Benewah, Bonner, Boundary, & Kootenai Counties.

#### G. Kirk David\*

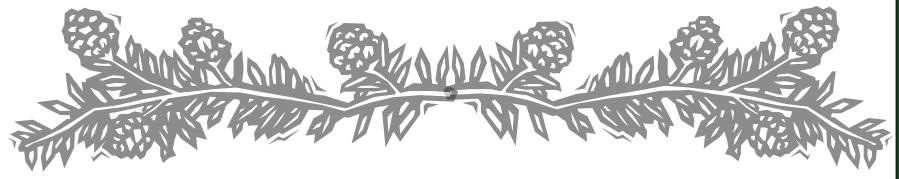
Assistant Extension Educator - Forestry University of Idaho Extension Kootenai County 1808 North 3rd Street Coeur d'Alene, ID 83814-3407

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# Strengthening Forest Stewardship Skills 2009-2010

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 Nature Conservancy

Idaho Tree Farm Program

Idaho Association of RC&D Councils

Intermountain Forest Association

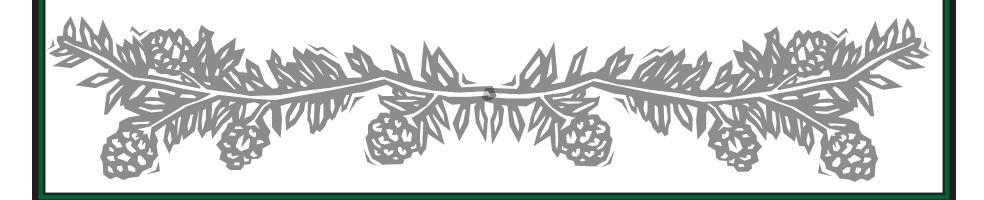
Nez Perce Tribal Forestry

Idaho Native Plant Society

Idaho Forest Products Commission

Idaho Sustainable Forestry Initiative State Implementation Committee

Associated Logging Contractors of Idaho



### Killer Found- Mystery Solved: Thousand Cankers Disease on Black Walnut.

Yvonne Barkley



This story begins in the summer of 2005. A landowner in Emmett, ID reported black walnut (*Juglans nigra*) trees dying. The tree would look fine until the hot weather hit, and then the foliage would quickly wilt and the tree would die. The symptoms progressed rapidly, with some trees dying in as little as one month. Another call came in that same year

from Meridan, ID – same thing. The next year, the same patterns of symptoms began to be reported in Boise. Initially, the common thought was that trees had suffered many years of drought stress and had finally succumbed to the lack of sufficient moisture. But as landowners and resource managers began to look more closely at the affected trees they found that there were large numbers of very small holes in the bark, which were initially thought to be ambrosia beetles.

Samples were collected and brought back to the University of Idaho for identification of the insect involved. Dr. Stephen Cook, University of Idaho Insect Ecologist, and Frank Merikel, Manager of the University of Idaho William Barr Insect Museum, concurred that the insect involved was NOT ambrosia beetles, but instead was the walnut twig beetle (*Pityophthorus juglandis*), a native bark beetle on black walnut in New Mexico and Arizona.

While searching for information on this beetle, I came across an article describing a problem on black walnut from Boulder, CO, and the description and photos matched what we were seeing here exactly. I contacted Dr. Ned Tisserat, Plant Pathologist at Colorado State University, and the story he told me was the same as ours.

In March of 2008 I went to Boise to meet with the folks at Boise Park and Recreation and Jim Hoffman, Forest Pathologist, USDA Forest Service. Samples were collected and sent to Ned in Colorado. We were all pretty sure by now that there was a fungal associate that produced the wilt-like symptoms and rapid death. By June, 2008 Ned had our results – the newly named thousand cankers disease on black walnut.

#### The insect - walnut twig beetle.

Native to North America, the walnut twig beetle's (*Pityophthorus juglandis*) primary range is New Mexico, Arizona, and Chihuahua, Mexico, and coincides with the natural distribution of Arizona walnut (*Juglans major*), a likely native host.

Attacks by adult walnut twig beetles primarily occur on branches greater than two centimeters in diameter. Very large branches and even the trunk can be colonized during advanced stages of thousand cankers disease. Adults lay eggs in the summer and larvae tunnel under the bark feeding on the phloem as they grow. Larvae feed for four to six weeks in meandering tunnels that run perpendicular to the egg gallery and pupate at the end of the tunnel. The life cycle is complete by late fall and adults (mostly) spend the winter under the bark in the galleries made by the larvae. The following spring (late-April), the first adults emerge and fly to near-by branches to mate and lay eggs. More adults emerge to produce a second generation in early summer. Peak flight activity of adults occurs from mid-July through late August and declines by early fall as the beetles enter hibernation sites. A small number of beetles produced from eggs laid late in the season may not complete their development until November.

#### The pathogens – Geosmithia morbid and Fusarium solani

Ned Tisserat and Whitney Cranshaw of Colorado State University have observed two different types of cankers on dying black walnut trees. The first pathogen identified is an unnamed fungus in the genus *Geosmithia* (a currently proposed species name for this fungus is *Geosmithia morbid*). This fungus is introduced to the tree as beetles are tunneling and grows in advance of the bark beetle. The branch cankers are not visible until the bark is peeled back – only then does one see the small, dark brown cankers. It is not the size of the canker that kills, it's the sheer numbers of cankers per limb that cause the rapid wilt and death of the effected tree – hence the name thousand cankers.

The second pathogen associated with this disease is the fungus *Fusarium solani*. In association with the walnut twig beetle and *Geosmithia* fungus, these cankers can commonly be two meters or more in length and can wrap around more than half the circumference of the trunk. These *Fusarium* cankers are subtle and can be identified by cracks in the bark or dark brown to black stains. When the bark is peeled back, the cankered area (the inner bark and cambium) is water-soaked and dark-brown to black. The importance of the *Fusarium* fungus in the development of these large cankers is still being studied.

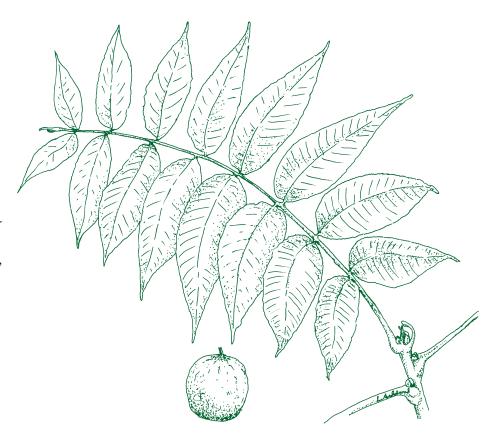
#### Diagnosis and management.

We have a name and know what causes it, but unfortunately we have not identified any effective controls for thousand canker disease. We do know that stopping the spread of the disease is vital. In Idaho, black walnut is the only reported susceptible species of tree. The disease currently ranges from Emmett east to the Boise area and up into the Boise foothills. Bark beetles are traditionally not very strong flyers, and so the spread of the insects, and the associated fungi, is partially dependent on prevailing winds.

Thousand cankers disease most likely spreads through the transportation of infested wood material (logs) and perhaps thorough nursery stock. Logs should not be moved from infested areas unless they have been dried for at least three years, kiln-dried, or all of the bark has been removed from the log.

For more information, or if you think you have a black walnut that has been infected with thousand cankers disease, please contact Yvonne Barkley at the UI Extension Forestry office by phone (208) 885-7718 or e-mail yvonnec@uidaho.edu.

Parts of this article have been excerpted from *Walnut Twig Beetle* and *Thousand Cankers Disease of Black Walnut* by Ned Tisserat and Whitney Cranshaw, Colorado State University, Boulder, CO.



#### WATER QUALITY CONTINUED

- They are a critical part of the stream's food web.
- Some are very intolerant of pollution.
- They are relatively easy to sample and identify.

The basic principle behind surveying BMI's is that some are more sensitive to pollution than others. If a stream site is inhabited by organisms that can tolerate pollution (those from Group Three) and the more pollution-sensitive organisms are missing (those from Group One) - a pollution problem is likely.

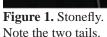
For example, stonefly nymphs (see Figure 1) are very sensitive to most pollutants and cannot survive if a stream's dissolved oxygen falls below a certain level. If a biosurvey finds no stoneflies present in a stream that used to support them, a conclusion might be that dissolved oxygen has fallen below the point that keeps stoneflies from reproducing - or has killed them outright.

In this example, the absence of stoneflies might indeed be due to low dissolved oxygen. But is the stream under-oxygenated because it flows too slowly or because pollutants in the stream are damaging water quality by using up the oxygen? The absence of stoneflies might also be caused by pollutants discharged by factories or running off the watershed, high water temperatures, habitat degradation such as excess sand or silt on the stream bottom that has ruined stonefly sheltering areas, or other conditions. When changes are noticed a biosurvey is best accompanied by an assessment of habitat and water quality conditions (such as a stream reach inventory) in order to help explain biosurvey results.

Because BMI's are stationary and sensitive to different degrees of pollution, changes in their abundance and variety illustrate pollution impact on the stream. Loss of BMI's in a stream, or better yet, loss of trees along a stream bank, are environmental impacts that society can relate to. Similarly, when a pollution control activity takes place - say, a fence is built to keep livestock out of the stream - a biosurvey may show that the sensitive BMI's have returned and a habitat assessment might find that the formerly eroded stream banks have recovered and trees now shade the stream.

BMI's are quantified by species richness (number of unique types of invertebrates found in a sample), abundance (total number of invertebrates in a sample), relative abundance (number of invertebrates in a sample from one species relative to another), and species diversity (distribution of total individuals across species in the sample). Once counted, the invertebrates can be compared to samples taken in the same stream at earlier times, such as before and after a suspected pollutant has entered the stream. One popular index for monitoring species richness is the "EPT index". This measures the total number of species within the three most pollution sensitive aquatic insect orders: Ephemeroptera (mayflies, Figure 2), Plecoptera (stoneflies, Figure 1), and Trichoptera (caddisflies, Figure 3). This index assumes that streams showing high EPT richness/numbers are less likely to be polluted than streams showing relatively low EPT richness in the same region. If a stream has few EPT's (compared to other streams in the region), water quality has likely been impacted. This will warrant further investigation however, to discern the reasons for the lack of EPT's.







**Figure 2.** Mayfly. Note the three tails.

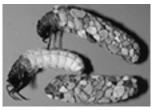


Figure 3. Caddisfly (aka periwinkles).

In summary, BMI's are a useful indicator of water quality in northwest streams. Most all of Idaho's streams have good water quality conditions and support healthy populations of BMI's and EPT's. Next time you're along or in a stream, pick up a rock off the bottom and see what's crawling on it. You might be surprised to find several of these beneficial, indicator species.

Proper protocol exists for sampling aquatic BMI's in Idaho, and can be found at http://www.deq.idaho.gov/water/data\_reports/surface\_ water/monitoring/burp\_field\_manual\_2007\_entire.pdf

#### SMALL-SCALE CONTINUED

information about specific machines, prices, etc. is usually available from the device manufacturers.

#### References.

The following publications provide more detail on the technologies described here:

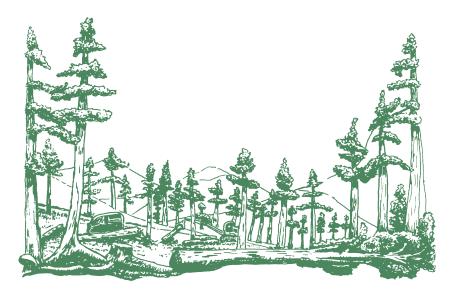
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## **Balancing Biomass**

Chris Schnepf

There is a growing discussion about forest biomass (also known as forest organic debris) in Idaho. Forest organic debris includes tree limbs, boles (trunks), needles, leaves, snags, and other dead organic materials. Common reasons for removing organic debris include reducing bark beetle hazard, preparing a site for tree planting, harvesting forest biomass for energy, reducing fire risk, and aesthetics.

All these issues are important. But forest organic debris left on site is not necessarily wasted. Organic debris protects soil from excessive moisture loss, recycles nutrients for trees and other forest plants, adds structure and organic matter to the soil, reduces soil erosion, and provides food and habitat for a wide variety of wildlife. Many forest owners are unclear on how to reconcile the potentially c flicting objectives related to forest organic debris on their site.

A new UI Extension publication titled Managing Organic Debris for Forest Health - Reconciling Fire Hazard, Bark Beetles, Wildlife, and Forest Nutrition Needs (PNW 609) is designed to help forest owners think about a strategy that fits their unique forest and site conditions and values and goals.

This publication is 60-pages, and spirally bound for field use. It includes over 70 color illustrations that outline the role of forest organic debris in Inland Northwest forests and provides general management strategies to help forest owners and those who work with them ask better questions to plan the best treatment strategy for each site in order to keep forests and wildlife more healthy and sustainable, while keeping risk from fire and insects within acceptable limits.

The publication is available through local University of Idaho Extension Offices and can also be downloaded as a PDF file at http://info. ag.uidaho.edu/pdf/PNW/PNW0609.pdf