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Monitoring Tree Health on Private Woodlands

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The trees that make a forest a forest are not the only concern when monitoring forest health, but they are usually primary to other concerns, no matter what the forest owner's objectives are, because trees are the dominant forest life form.

When to Monitor. Most woodland owners are going to monitor tree health when they have the time or when a problem becomes apparent. A late spring check will find storm-damaged trees that can encourage bark-beetle outbreaks. Spring monitoring also gives you time to plan dry season activities including road building, timber harvesting, salvaging unhealthy trees, and improving growing conditions for the remaining trees. Early fall monitoring can give you even more lead time but cannot foresee winter/spring storm damage that can dramatically change your plans. An early fall check will show abnormal crown (foliage) color and fruiting bodies of many fungal infections. Fall is the best time to look for abnormal color in current season growth because the needles are all mature, and it is also a great time to plan winter thinnings on snow-covered ground to reduce soil impacts, fire-hazard of slash, and in-growth of competing trees and shrubs.

What To Look For. Dead trees do not necessarily indicate an unhealthy forest, but they may indicate a problem. Most mixed-species forests will have some dead trees, perhaps 2-5 per acre, resulting from competition, species differences in shade tolerance, age, drought tolerance, growth rate, and other factors that are involved in the normal processes of succession – where different plant and animal communities gradually replace each other in a predictable process. While some individual species may be lost, the diversity of a mixed-species forest gives it resilience. The private owner of a small acreage may, however, be concerned over the death of any tree, and will be particularly concerned about the potential to lose additional trees. Consequently, monitoring should focus on the health of living trees and on the current tree species mix.

Bark beetles, defoliators, and other insects as well as root and stem decays and infectious cankers are generally *symptoms* of trees that are stressed by drought, competition, age, or physical damage. Death often results from a complex of insects, disease, and stress rather than a single factor. The condition of the crown is the best early indicator of an unhealthy tree that can incur and spread additional damage and tree mortality from various agents. Crown color, needle retention and length, and crown ratio – the proportional length of the live crown compared to total tree height – are the conditions to monitor.

Normal crown color of northwestern conifers varies from the pale yellow-green of lodgepole pine to the darker forest green of Douglas fir and the blue-green of white pine. Normal color also can vary for the same species growing in different environments, so it is important to confirm what normal is for your forest stand by looking at nearby, similar environments with the same species. Color is usually lighter and more yellow when a tree is suffering form a root disease or physiological root problem (heat, drought, soil texture or chemistry). Abnormal reddening or browning of the crown in patches is often from insects or needle disease but widespread color changes usually indicate a problem with the cambium of the tree – the living, growing layer just under the bark. Cambium problems can be due to heat or drought alone or are often

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caused by bark beetle feeding and their associated fungi, or by fungi alone with systemic decay or girdling cankers. Late afternoon sunlight makes abnormal color more visible, and wearing polarized sunglasses, especially with a red tint, greatly enhances your ability to see abnormal crown color many months before it is visible to the unaided eye.

Northwestern conifers vary in needle retention from 1-2 years for ponderosa pine to 5-6 for grand fir. Needle length usually parallels retention and can be less confusing to monitor. Trees with abnormally short needles are relatively easy to spot. Their crowns will usually appear thinner than average due to reduced needle retention. These characteristics usually indicate trees predisposed to further poor health and early death from insects or disease, or to gradual decline and death from physiological stress alone.

Crown ratio is as variable among local conifers as needle retention. Maintaining at least 30 percent of the total tree height in healthy, green crown is one common rule-of-thumb. Because crown ratios vary genetically within and among species, as well as across environments, they are difficult to interpret in terms of individual tree health. However, trees with reduced crown ratios, compared to same-species neighbors, are good candidates to evaluate for other indicators of poor health.

Lichens and mosses usually have little or no impact on the tree itself. Conks – the fruiting bodies of fungi – are readily visible and more serious. While a few fungi species that produce conks are inconsequential, most are associated with stem or root decays that seriously impact tree health. Damaged needles and boring dust on the bark are often noticed more readily than the insects that caused them, and should also be investigated. Many insects and diseases are inconsequential at low levels, but landowners nonetheless need to know their identity and potential to increase to a health-threatening level or to predispose the trees to subsequent, more harmful damaging agents.

What To Do. General and specific tree health conditions should be recorded in new or updated forest management plans. This information is essential to management decisions for maintaining forest health. Past harvest practices and nearly a century of fire prevention have led to forest stands with unprecedented percentages of late successional species that are naturally prone to catastrophic events such as insect/disease epidemics or wildfire. Replacement of some forests, either through natural catastrophe or clearcutting and planting, is sometimes inevitable.

There are many sources to help landowners manage unhealthy trees. Written materials and educational programs are available through your local Cooperative Extension System office. On-the-ground advice and monitoring assistance is available through the Idaho Department of Lands. More complete management services that include tree health monitoring as well as planning and timber harvest are available from professional forestry consultants.

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