

# ASPEN

## *A Vanishing Resource*

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In Utah alone, we need to treat **100,000** acres of aspen each year for the next 20 years to restore what has been & is being lost! Unless something changes soon, one of the Earth's most ancient forests will be ***gone forever.***

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B Y D R . C H A R L E S K A Y

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I have conducted scientific research on aspen for more than 25 years. During that time, I have personally measured more aspen stands in a greater number of locations than any other ecologist, living or dead. I have also personally measured more aspen exclosures than any person who has ever lived. In addition, I have made more than 800 repeat photosets depicting aspen.

My research, as well as that for others, has documented a major decline in aspen throughout intermountain North America since European settlement. Historical research and repeat photographs indicate that declines of 60% to 90% are common. My home state of Utah, for example, once contained over two million acres of aspen, but today there are less than 800,000 acres and aspen are still being lost. Moreover, many western aspen stands contain old-age or single-age trees and have not successfully regenerated for 80 years or longer.

Colorado and other areas in the West have recently experienced the demise of large blocks of aspen -- termed Sudden Aspen Decline Syndrome. All this should be of critical concern to readers and members of MDF because aspen provides ideal habitat for mule deer. IDEAL! Or, at least, it once did.

Before we can understand why aspen has declined, why aspen is still in serious freefall, and what we and the land management agencies can do to reverse that trend, a short lesson in aspen autecology is in order. We also need to dispel some serious myths about aspen. First, as any textbook will tell you, aspen is the most widely distributed tree in North America. Second, aspen is a clonal species and what we commonly call trees are actually ramets, having risen from a common root source via suckering. This means that the clone is the individual, not each tree. Moreover, many western aspen clones are quite large, often an acre or more in size, and one clone on Utah's Fishlake National Forest, named Pando, has been identified as the largest living organism on Earth—a fact recently confirmed by genetic analysis. Pando covers approximately 106 acres, contains an estimated 50,000 trees (ramets), and weighs approximately 6,000 tons.

In a landscape dominated by large blocks of aspen, individual clones are easiest to spot during spring leaf-out or during autumn, as different clones produce new leaves at slightly different rates and turn color, or different colors, at slightly different times. One would have to be very cold-hearted not to appreciate aspen in all its golden fall splendor! This is why, when asked, I tell everyone that I study charismatic megaFLORA! There is nothing quite like hunting mule deer, or elk, in aspen during autumn, expect perhaps chasing gray ghosts in the lowveld.

In most years, aspen produces millions of viable seeds, but seedlings and clonal establishment from seed are virtually non-existent. To survive, aspen seedlings need bare mineral soil, no competing vegetation, and high soil moisture throughout germination and the first summer of life. Conditions that simply do not exist in the West today. Given aspen's demanding seedbed requirements, it is thought that the environment has not been conducive to seedling growth and the widespread establish-

NOT establish from seed, as will coniferous species. If aspen is lost, there are NO proven means of reestablishing those clones. You cannot plant aspen seedlings and get an aspen forest, as is commonly done with conifers, because the planted aspen seedlings will not survive, even when planted in riparian areas. All such experiments have resulted in failure.

So why has aspen been in decline since European settlement and why have most aspen stands not success-

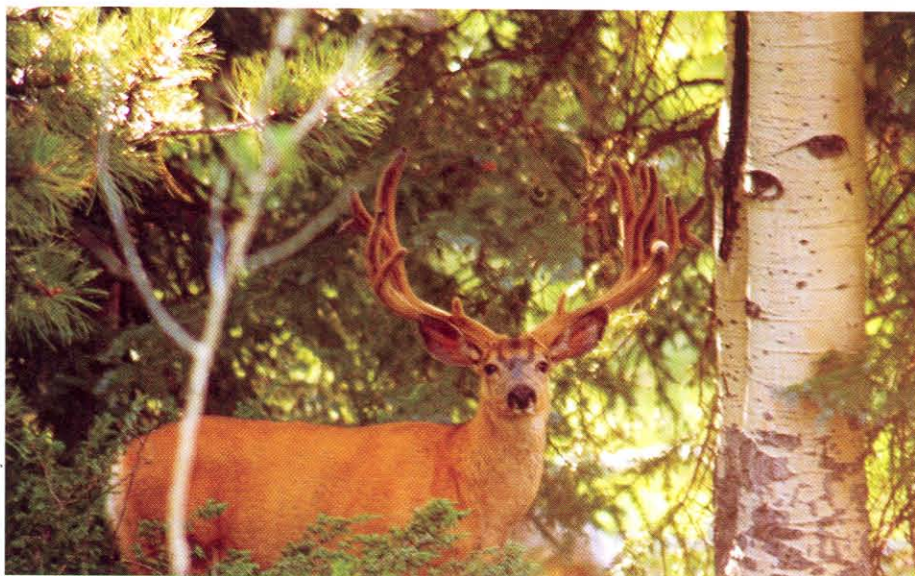
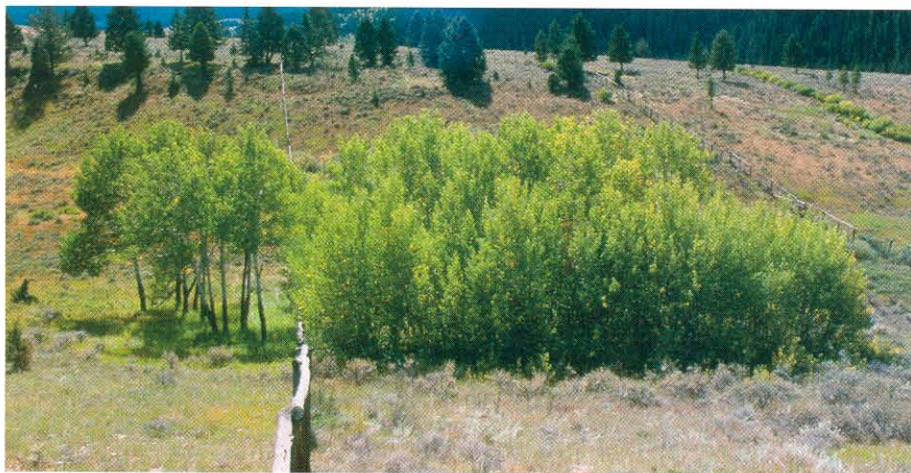


Photo ~ Ryan Hatch

ment of new clones since shortly after the glaciers retreated 10,000 or more years ago. This means that the clones you see in the West today have likely survived for thousands of years via vegetative, also called asexual, reproduction or regeneration.

Some clones in the southern Rockies are thought to be a million years old. Thus, western aspen represents old-growth, ancient forests, and is not a seral plant community, as commonly believed. A wooden stake needs to be driven through the heart of the seral myth. If you burn a coniferous forest, you will not get an aspen forest unless aspen was already present. Aspen will

fully regenerated in 80 or more years? At first it was thought that auxins and apical dominance were the problem. Auxins are chemicals produced in aspen's uppermost branches that are then translocated to the roots where the auxins suppress suckering. While auxins do suppress aspen root-sprouting, they do not eliminate suckering. Where aspen is protected by game-proof and/or livestock-proof fencing, termed exclosures—please see an article I did in MuleyCrazy Magazine's Jan/Feb 2009 issue regarding range reference areas—aspens successfully regenerate and produce stands in which the stems (trees, saplings, ramets) are multi-aged. Thus, the even-



*An aspen enclosure on elk winter range in Montana. Aspen to the right of the fence, where it is protected, has successfully regenerated. While on left, aspen has not regenerated due to repeated browsing by wildlife.*

aged stands common in the West today are NOT a biological attribute of aspen. Instead, they are the result of excessive ungulate grazing, where herbivores have repeatedly browsed the aspen suckers, and thereby prevented the growth of aspen saplings and trees.

In most places where I have conducted research, the problem has been too many elk—either no hunting in national parks or not enough hunting on national forests. I spent three summers measuring nearly 400 aspen stands on BLM lands in north-central Nevada and there the problem was improper livestock use. As soon as any new aspen suckers appeared, they were repeatedly browsed by cattle and/or domestic sheep. It was amazing how many aspen saplings you could produce with a simple, three or four-strand barbed wire fence. The areas I studied in Nevada had no elk and mule deer numbers were exceedingly low.

Elk can be especially damaging to aspen, because in addition to browsing aspen suckers, elk also like to eat the bark of mature aspen trees. Elk do this by digging the front teeth of their lower jaws into the soft aspen bark

and then moving their heads upward, gouging out large sections of bark. Any injury to the bark of aspen exposes that stem to increased attack by a host of pathogens. Needless to say, this hastens stem mortality and clonal decline. Moose will also strip aspen bark, but mule deer do not. Aspen responds to elk bark-stripping, or any other bark damage, by producing black scar tissue. Where elk concentrate, especially during winter, all the normally white-barked aspen are black the lower six feet. Thus, if large numbers of elk always occupied western ranges, as some would have you believe, then late 1800's photos should show that aspen was as heavily bark-damaged in the past as it is today. Well, I and my colleagues in Canada have searched all the major photographic archives and not one aspen tree in any of the earliest images shows any sign of elk bark damage. NONE!

Although individual trees within a clone are relatively short-lived, usually less than 150 years, the long-lived aspen clones thrive on periodic disturbance, such as fire. By top-killing all the mature aspen trees, auxin production is eliminated, releasing a flood of new suckers—up to 100,000 or more

per acre. Fire not only stimulates suckering, but it also reduces conifer competition. Fire-return intervals of 20 to 130 years are necessary to maintain aspen, and as fire cycles lengthen due to fire suppression, aspen declines. Thus, many people believe that as conifers have increased under a policy of suppressing all fires, aspen has declined because aspen cannot survive in the heavy shade of conifers—termed shade intolerance. Unfortunately, this is another myth! Now, there certainly is no denying that conifers have replaced aspen on millions of acres in the West, or that aspen does not do well with an over-



story of conifers, but that is not the whole story.

Once again, we need to turn to range reference areas for guidance. There is a three-part enclosure on the shoulder of Fishlake Hightop in central Utah in what was once a pure aspen stand, but which today is heavily invaded by spruce and subalpine fir. But contrary to everything you can find in the scientific literature, where aspen is protected by a high fence, it has successfully regenerated without fire or other disturbance despite an estimated 70% conifer canopy cover. Inside the low-fenced, adjacent plot, where domestic sheep are excluded,

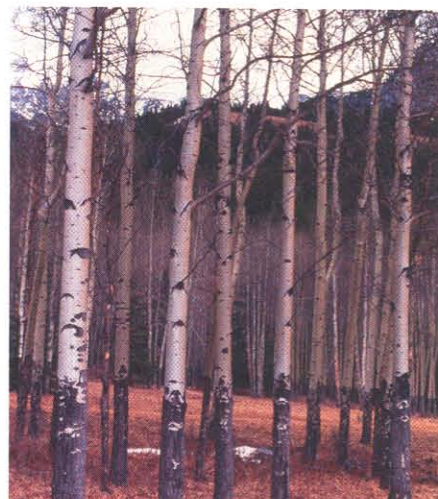


*This aspen stand successfully regenerated when Utah's mule deer populations crashed during the 1970's. As the deer herd recovered, the animals consumed all the lower branches on the new aspen saplings creating a browsing high-line. If large numbers of deer and/or elk historically grazed western ranges, then early photos of aspen should show a similar highline, but they do not.*

but where mule deer and elk graze, there is no aspen regeneration. And as you might expect, where both domestic sheep and wildlife graze, there is also no aspen regeneration. So, is the problem shade intolerance, or is it excessive ungulate browsing?

For an answer, we need to look at what I call the ultimate enclosure—the Timbered Cinder Cone Research Natural Area on the Dixie National Forest in southern Utah. The cinder cone sits at an elevation of nearly 10,000 feet and is surrounded by a large, unvegetated field of massive lava boulders. Access via foot is extremely difficult and the cinder cone has never been grazed by either livestock or wildlife. It is covered by a spruce-fir forest and, as near as we can tell, has not burned in several hundred years, if ever. According to conventional “wisdom,” aspen on the cinder cone should have been replaced by conifers long-ago, but aspen is virtually everywhere! Why? Because the suckers are not browsed.

But isn't browsing by deer and elk “natural”? Yes, but excessive browsing is not. Recall what I said about there being no elk-induced, aspen-bark damage in any of the earliest historical photographs, well elk and deer also like to browse the lower branches of aspen saplings. When that browsing becomes excessive, as it is on many ranges today, all aspen's lower branches are browsed-off producing a distinctive high-line, as high as the animals can reach. Now if that level of browsing were normal, then aspen photographed during the late 1800's should show a readily visible high-line, but they do not. Again, I and my colleagues in Canada have searched all the major historical archives and none of the aspen depicted in the earliest images show any evidence of browsing. NONE! Which begs the question of what kept deer and elk populations from overgrazing aspen in the past? As I have explained in various scientific publications—hunting by native people. Hunting is a natural process and areas, such as national parks,



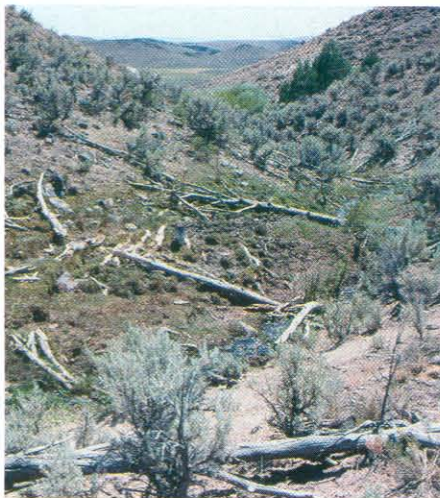
*Heavily browsed aspen in Canada's Banff National Park. The black scar tissue on the aspen's lower trunks is a result of elk bark damage. Single, stem-age aspen stands, such as this, are not a biological attribute of aspen. Instead, they are an indication of excessive ungulate herbivory, in this case by elk.*

where hunting is banned, are entirely unnatural.

According to the National Park Service, it was supposedly a proven fact that if you burned aspen, the clones would send up so many suckers that the stands would successfully regenerate despite heavy ungulate browsing. Well, that little experiment was tried in Yellowstone during 1988 when approximately a third of the park's aspen went up in flames. I established 865 research plots in Yellowstone's burned aspen and the following year, those stands sent up large numbers of suckers, which the elk repeatedly browsed to the ground killing out clones that had survived for thousands of years under aboriginal management.

If you have an ungulate herbivory problem, you cannot burn or cut your way out of it—aspen also regenerates via root-suckering if it is logged. In fact, you should NOT treat aspen until ungulate herbivory is controlled. Doing so will only HASTEN the

decline of aspen since all the new suckers are within the reach of browsing animals and there are no large overstory trees to maintain the clone. The Rocky Mountain Elk Foundation, for instance, has spent untold thousands of dollars burning aspen on elk winter ranges, under the guise of regenerating aspen, when all they have really done is accelerate clonal decline. From the perspective of an aspen clone, there is such a thing as too many elk, and dare I say, too many mule deer. And as I have



*A Nevada aspen stand destroyed by improper livestock grazing. All the downed logs were once living aspens.*

already mentioned, improper livestock grazing can create a similar situation.

It is clear from multiple sources of evidence that western aspen burned at frequent intervals prior to the arrival of Europeans. In fact, it is difficult to find an aspen tree in historical photographs. Instead, what you find are dense stands of unbrowsed, regenerating, aspen suckers and saplings. Now, many ecologists assume that those fires were started by lightning, but in that they are sadly mistaken. Yet another myth. Research and experience have proven that pure aspen is extremely difficult to burn. Terms such as "asbestos type" and "firebreak" are often used by firefighters to describe aspen. Raging

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crown fires burning under extreme conditions in conifers spread only short distances into pure aspen. I know it sounds odd, but for a supposedly "seral, fire-dependent" species, you can not readily burn aspen!

Aspen will typically burn only when the trees are leafless and the understory dry enough to carry a fire. Those conditions, though, occur only early in the spring, after snowmelt but prior to green-up, and late in the fall after leaf-drop and the understory has cured following a hard frost. Before

May 15th and after October 1st, when aspen is normally dry enough to burn, however, there are few lightning strikes and virtually no lightning-started fires in the West. So, if aspen burned at frequent intervals in the past, as all evidence suggests it once did, then the only logical conclusion is that those early spring and late fall fires must have been set by Native Americans, who made extensive use of fire to manage their environment. By serving both as keystone predators and keystone fire-starters, native people created western landscapes



*A burned aspen stand in Wyoming that failed to regenerate due to excessive elk browsing.*

heretofore thought to have been “untouched by the hand of man.” As I have said more than once, the only “wilderness” that existed was in the minds of Europeans.

As part of my research on long-term ecosystem states and processes, I compared known lightning-ignition rates on every national forest in the continental United States with potential

aboriginal-ignition rates based on estimates of aboriginal populations and the number of fires each native person set per year. Those data show that aboriginal-set fires were 270 to 35,000 TIMES more frequent than known lightning-ignition rates. Lightning fires, it turns out, are entirely unnatural.

Who would have thought that one could learn all this by studying aspen

and keeping an open mind? Even if you personally do not care about mule deer, we still need to reverse aspen’s decline because those communities support an array of other wildlife and have the highest biological diversity of any upland vegetation type. The decline of aspen impoverishes every American, be they mule deer hunters, or not. In short, we need to learn from America’s original land managers. Kill elk, manage livestock so as to not impact aspen, and once that is done, fill the spring and fall sky with smoke! If you are worried about burning down your, or someone else’s cabin, logging will also work, if done correctly. What is needed, are more disturbances, not less. Letting nature take its course, as advocated by many environmentalists, will only consign aspen to extinction. Management is NOT a dirty word, instead it is essential!

In Utah alone, we need to treat 100,000 acres of aspen each year for the next 20 years to restore what has been and is being lost. Habitat is of little value if it is not properly managed. At current rates of burning, it has been estimated that it will take 12,000 years to rejuvenate all the aspen in the West. Unless, something changes soon, and changes dramatically, one of the Earth’s most ancient forests will be gone forever. To say nothing of millions of acres of once prime mule deer habitat. Treating a few acres here and a few acres there, as is the case today, is simply not going to get the job done. Again, management, and a lot of it, is not something to be avoided, but an absolute necessity! Doing nothing is NOT a viable option.

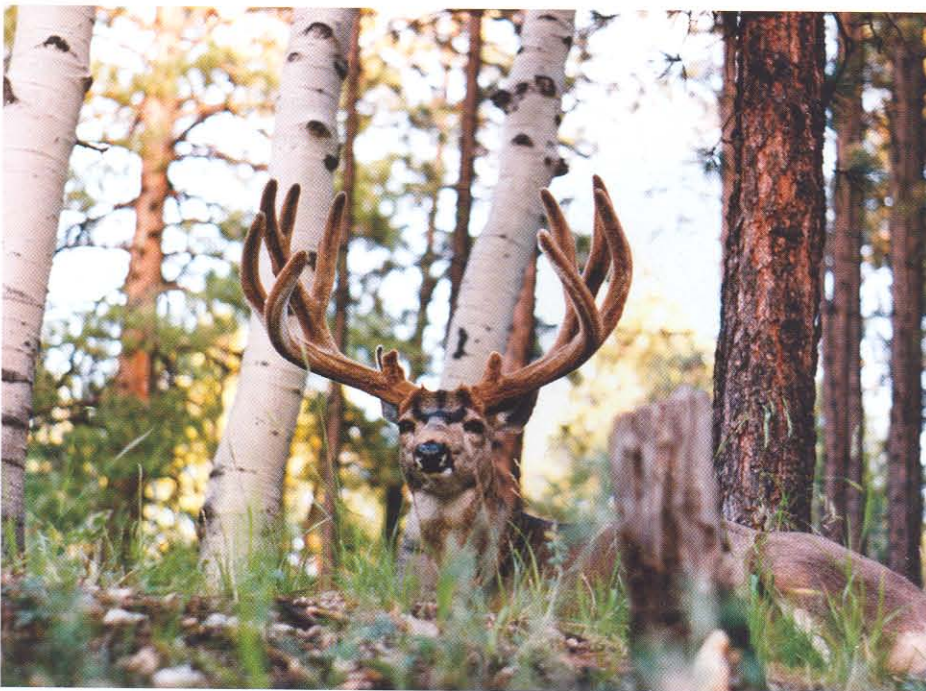


Photo ~ Ryan Hatch

