So, What Does It Feel Like to Be an Ax Murderer?

November 2017

The commitment to deal with the problems from centuries of fire suppression, abuse, and neglect can save a conifer forest.

Refusal to deal with old problems and “let Nature take its course”
after a centuries of fire suppression, abuse. and neglect, is a way to kill one.

Wildergarten 6.2

This book was originally produced under the name *The Responsible Party* for which there were two revisions, 1.0 & 2.0. Major revisions are for complete rewrites. Decimal revisions are for revised chapters or navigational changes and are not archived. Back revs are viewable by the numbered links below.

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Other writings by Mark Edward Vande Pol:

Natural Process: That Environmental Laws May Serve the Laws of Nature, ©Wildergarten Press, 2001, 454pp, ISBN: 0-9711793-0-1, LOC Control #2001092201.

Shemitta: For the Land is Mine: ©Wildergarten Press, 2009. Contains: 217pp text, 980pp overall, 14 picture books, 2 tables, 963 photographs, 9 maps, 2 drawings, 2 charts, 145 footnotes, 358 citations, and 216 other source references, not including external Internet links. ISBN 978-0-9711793-1-8

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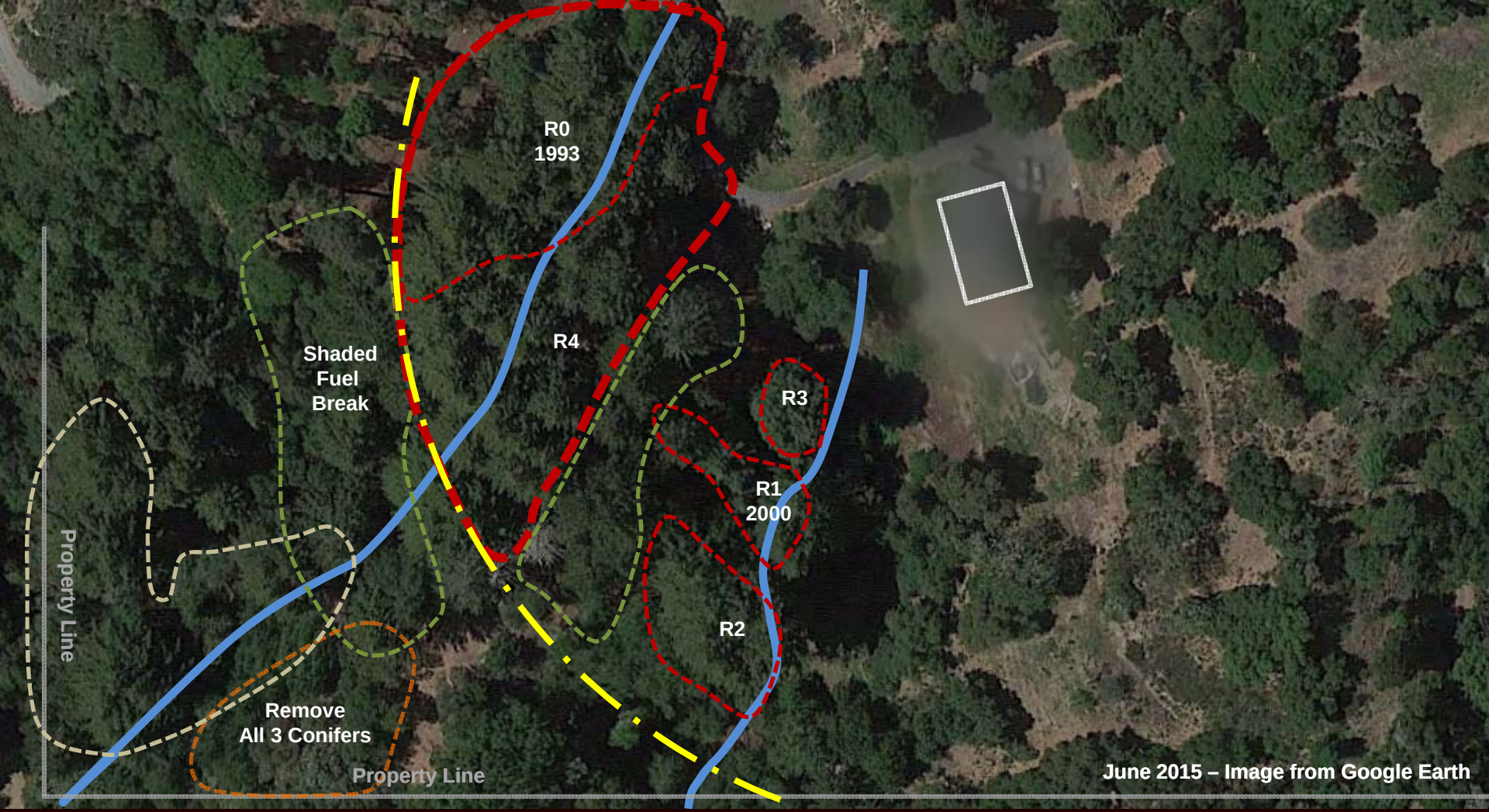


Our conifer stands grow within the dashed curves (blue lines are Class III drainages). **Redwood** and **Douglas fir** stands logged or planned to be logged total about 110,000 board feet on 3 acres (laid flat). All are on slopes nearly 100' high, some with an over 200% slope (60°). In 1993, I cut about 10,000 board feet (bft) of redwood (**R0**), for stand improvement and fire hazard reduction and milled the logs for landscaping. In 2000, I documented the R1 logging job as part of writing *Natural Process* with the same purposes but also to reduce the risk of slope failure and to improve riparian drainage. I gave away that 10,000bft. The regulatory climate has since improved such that we can now sell logs from within 300ft of the house. This will be split into two jobs. R2+R3 will be milled here for house siding we need badly and would otherwise have to buy. For R4 we will sell the logs to pay for getting the equipment here to deal with our monoculture redwood stand to improve its biodiversity. As part of this final job, I will also remove about half of the fir. Within **the tan line** redwood will remain untouched as they can't be sold and are not so overstocked. In the orange area I will remove all three conifers atop the south-facing slope, to retain hardwood structure. Those logs will stay here. But why log redwood at all?

Unnaturally Aspirated Combustion

June 2021 – The prospects for the hardwood that burned are even worse.

This is after the 2020 CZU Complex Lightning Fire. Note the density of this redwood stand as compared to our R4 stand in the next slide. The common belief that redwoods tolerate fire easily is a myth of the "fire-retarded." *How* a redwood forest responds to fire depends upon the conditions when it burns**:** air moisture, winds, species composition, soil microbial composition, stand density, age distribution, solar aspect, slopes, and histories of weather and the underlying seed bank then subject to weather conditions thereafter. The few **clusters** of trees from 19th Century clear-cut stumps are at the bottom. Most of what is on the slope above those clumps represent what seeded after the usual slash fire, as followed by a century of fire suppression (didn't work, did it?). You will note that some of the trees are sprouting crown sprouts at stumps and branches on the far sides. That means the near side is likely dead. New growth will wrap around a damaged core that can rot (weak tree) that will compete with the sprouts. Now, imagine what this will look like in 20 years. Indians never tolerated a stand structured like this. Should you?

November 1989*- Not a thing alive on the ground

This stand is ours, as we bought it in 1989. This is worse than what burned on the previous slide: way too many trees and NO biodiversity. I don't want what happened to the previous stand to "happen" here.

So, how do stands like this develop?

As discussed in the site history chapter, a detailed study of the pattern of stump diameters, buried logs in landslides, and a ring cluster probably originating from a stump buried in the center of a drainage channel, together indicated that, when the Indians had this place, there were only **three** (**3**) redwood trees on our property. We also know from recovering plants that at that time, most of our property was grassland.

Indian fires kept redwoods in drainages. When the Spanish banned Indian burning in 1793, the conifer forest started to escape its former limits, moving from the drainages up the slopes. In about 1890, this property was logged, probably by Charlie Martin. The slash was burned and the fire spread, leaving a perfect seed bed for redwood germination. The size, spacing, and ring counts of these trees have all suggested that they all started at about that time. The redwood grew up through competing brush, shaded it out, and VOILA! Monoculture redwood forest.

Did I know all of that when I started logging? No. I learned it by getting in there with a chainsaw and doing a lot of study work. Now, it should be obvious if you've read this far that my goal is not to turn this back into a grassland. But this isn't what I want either because there are so few redwood understory species. So let's take a look at this learning process and the way it happened.

The first thing I did was to take out the “junk.” These were thin, scraggly, bent, broken, or obviously structurally defective trees. One had a nest on top (probably great horned owls) so I left that until it came down by itself. The goal of that process was to reduce “ladder fuels,” eventually to preclude a crown fire. At that point, a couple of old stumps were evident. Most of those I cut flush with the slope to reduce the chance of breaking a log that might hang up on it when falling or yarding. Then I brought in a bulldozer and backhoe to repair an existing road that crossed the drainage and wrapped around the stand and to install a new culvert. For the privilege of doing all that work, I spent a lot of money and got a lot of crown sprouts.

December 2015 – This is in R0, just after I had brush cut the crown sprouts coming up around the callus

Pursuant to my suspicions, we found and measured some 26 old stumps in our largest stand (within R4). None is bigger than this. Almost all of these stumps are still alive and totally rotten inside (which with redwood takes many years). Sadly, it is impossible to get ring counts off them as the heartwood is rotted out but it is evident that, at the time this "old growth" tree was cut, my guess is that it was about 16" in diameter at breast height (dbh). The 130-150 year old tree beside Diane wasn't there when this was first logged!

This cluster (R2) was originally 21 trees, and are the largest on our property. The tallest measured at 205 feet. Twenty-five years ago, I removed the “junk” to line the stream bed immediately below them and cut up the 4ft thick pile of dead branches lying around them to reduce the fire hazard. Inside were the burned remains of four old stumps. These trees, estimated at 130-150 years old, are larger than those old stumps, logged in the mid-late 19th Century. Hence, those “old growth” stumps were from trees that MUST have started after the Spanish governor’s burn ban of 1793. There were at only a very few redwoods on this property at that time.

November 1989 – Again, nothing alive on the ground.

This cluster, dead center in the drainage, was photographed the first day we saw the property. There is obviously no stump from “logging old growth.” What was really interesting about it is that the drainage is not incised here, as are most of our drainage channels; it is nearly flat at the bottom extending some 80 feet back up the channel.

Below the cluster the channel drops off the stump wad into a large hole that again runs out to the next (much smaller) cluster of redwoods, after which the channel does not drop again. It is apparent that these stump wads makes a “stair step” grade in the channel bottom reducing the forward momentum of runoff and therefore reducing erosive energy.

There are two reasons why I think there was an old stump here that sprouted this circle from the root crown. The first is that when I toured the local chief of forestry for CalFire (then CDF) here to see my prospective logging job (tiny by his standards), he asked me (possibly rhetorically) why the channel had this profile. “Why” had not yet occurred to me, so it took a day for the question to sink in to get out of my bias of thinking of forests as permanent things to realize what had happened. Whether he knew and asked me to prompt my thinking or whether he was simply curious, he has not since let on. He can be subtle that way.

So the hypothesis is that, if there is a large buried stump here, then after the tree fell, there were probably a great many sprouts, so many that the could act as a filter capturing sediment. They grew, and have since died from competition, fallen, and rotted away or were buried in silt. Redwood is an unusual tree species in that it can suffer a landslide burying its root crown without suffocation and will simply sprout roots from up the trunk and continue on, *sempervirens*, meaning “lives forever.”

To confirm whether this hypothetical process can be substantiated underground would require either excavation or possibly ground-penetrating radar.

Kinda different now, isn't it? One big redwood was removed. I can't repeat the photo exactly because there are so many trees in the way… and roses, and hazelnuts, and lilies, and larkspur, and violets, and grasses… and more of those damned crown sprouts.

The reason I was able to guess at that connection between a buried stump and the channel grade is that I had seen that “filter” effect here after logging R1 in 2000 (discussed later). There were so many crown sprouts that, when I went in to cut them back in 2006, they had captured almost a foot of sediment and caused the stream channel to revert to its old grade before logging (See forestry chapter on drainage). But the real reason I could infer this crown-sprout-acting-as-a-sediment-filter process is far more subtle**:** If I had not lived here, fooling around with how things worked for 30 years, cutting trees and watching what happened, I would never have recognized the consequences of the process long after the cause was gone. Local, multigenerational knowledge is something few urban environmentalists appreciate. It may be occasionally mistaken, but their collected observations do matter.

November 1989*- Not a thing alive on the ground

February 2022 – Only Trees, still no grouncvovers

At right is what the R4 stand density looks like after removing the “junk” (the photo is not an exact repeat of the original because now there are many young trees in the foreground). Note all the crown sprouts: While the fire hazard is reduced, it won’t stay that way.

As to the foreground, it is obviously past time for me to make choices, but the pending removal of dead and dying fir trees due to water competition and shading from the redwood will do a lot of damage to these saplings, making selecting keepers problematic. Originally, there were no groundcovers in here at all. Now they are luxuriant and diverse. This situation points out an obvious long term problem: How do I keep the groundcovers and reduce the rate of invasion of tree seedlings? I am suspecting grasses may be that answer. In here, we have *Melica torreyana* and could support both *Calamagrostis spp.* and *Festuca californica* without posing any fire hazard.

This “buried stump” inference can be tricky to apply if one is looking at just the arrangement of stems. This is a second “ring” of trees in this drainage from what appears to be another buried stump (I have no plans to log this) yet you’ll note that the stream channel doesn’t drop off the same way after leaving the cluster. My guess is that these are trees from seed, for which there is an evident reason after stepping back a bit with the site history and geology in mind.

December 2015 – Looking down Spanish Gulch from midway up

The soil masses on which both the faux cluster prior and the next stand downstream are sitting are what geologists “colluvial lenses” from multiple landslides that had come down from the road above. Landslides too provide the bare mineral surface of disturbed soil in which redwoods germinate readily. It is hard to visualize the loss of the 30,000 cubic yards that made this channel, but that story will be covered in the forestry chapters on drainage and roads. There has been no stream here since the road grade was changed.

Why is this seed v. cluster distinction important? It has to do with how I would manage stumps if I to need to thin this cluster. If this is in fact a clone, the stumps might have to be ground out, which is so expensive one best make a non-destructive determination.

The stand below is much more evidently atop a slide that crossed the channel which then cut through the toe of the slide mass. Again, these are not old trees but they are from seed. As to the buried log I promised…

Our **buried log** under the slide is holding the toe, with trees atop it (only to the left) 70-90 years old. From its radius, I'm guessing the age of the buried log at 150 years old (I really should buy a core drill). Hence, my inferred scenario is that Spanish fire suppression and road construction above shed water inducing channel incision that caused a series of many landslides off the walls of the incision into the channel below. That process left exposed soil which allowed redwoods to start up above and get big. Then the slope failed again into the channel, carrying down the log. The landslides continued until the County changed the road grade in the 1960s.

Anti-Social Climber

May 1992 – My first climb in R0. I'm still clinging to the trunk just after topping. Nobody had taught me how to top a tree, so I didn't know what would happen when the top came off (!!!) Note how tangled these trees were.

Now we get to the actual "logging." Like the rest of the place when we started, our redwood stands were all at serious risk of a catastrophic crown fire. Like hardwoods, thinning conifers here starts with clearing the junky trees to see the others well enough to make choices. "Junky" is usually either unbalanced, strongly curved, forked, severely kinked, has a major defect weakening the tree, or multiple tops, which eventually blow apart. Again, like hardwoods, once that first phase of thinning junk is done, there is then more room to drop others for proper spacing without getting hung up or crunching into anything you want to keep. That entails climbing.

March 2022

At the apex of “junky” conifers Douglas fir easily takes the cake in this climate. They grow so fast here that the ring structure is weak compared to the Pacific Northwest (half-inch rings are not unusual). They grow so much taller than hardwoods that they keep their lower branches which can then get huge, making trunks producing very weak and knotty lumber, not even good for posts.

But the worst thing that happens is that fir trees easily lose their central leader (topmost stem) in winds, at which point multiple branches just below the top bend upward to in the great race for light as “co-dominant leaders”.

These “c-dom” trees are often infected with rot at the crotch where they eventually blow apart, doing considerable damage on the way down. The one at left did that a decade ago at least, at which point it went for a second round. It does illustrate magnificently all the features just described.

It’s a lot of work dealing with a tree like this (on a neighbor’s land). I didn’t have any photos of one of ours, because they were down before I realized they should have been documented.

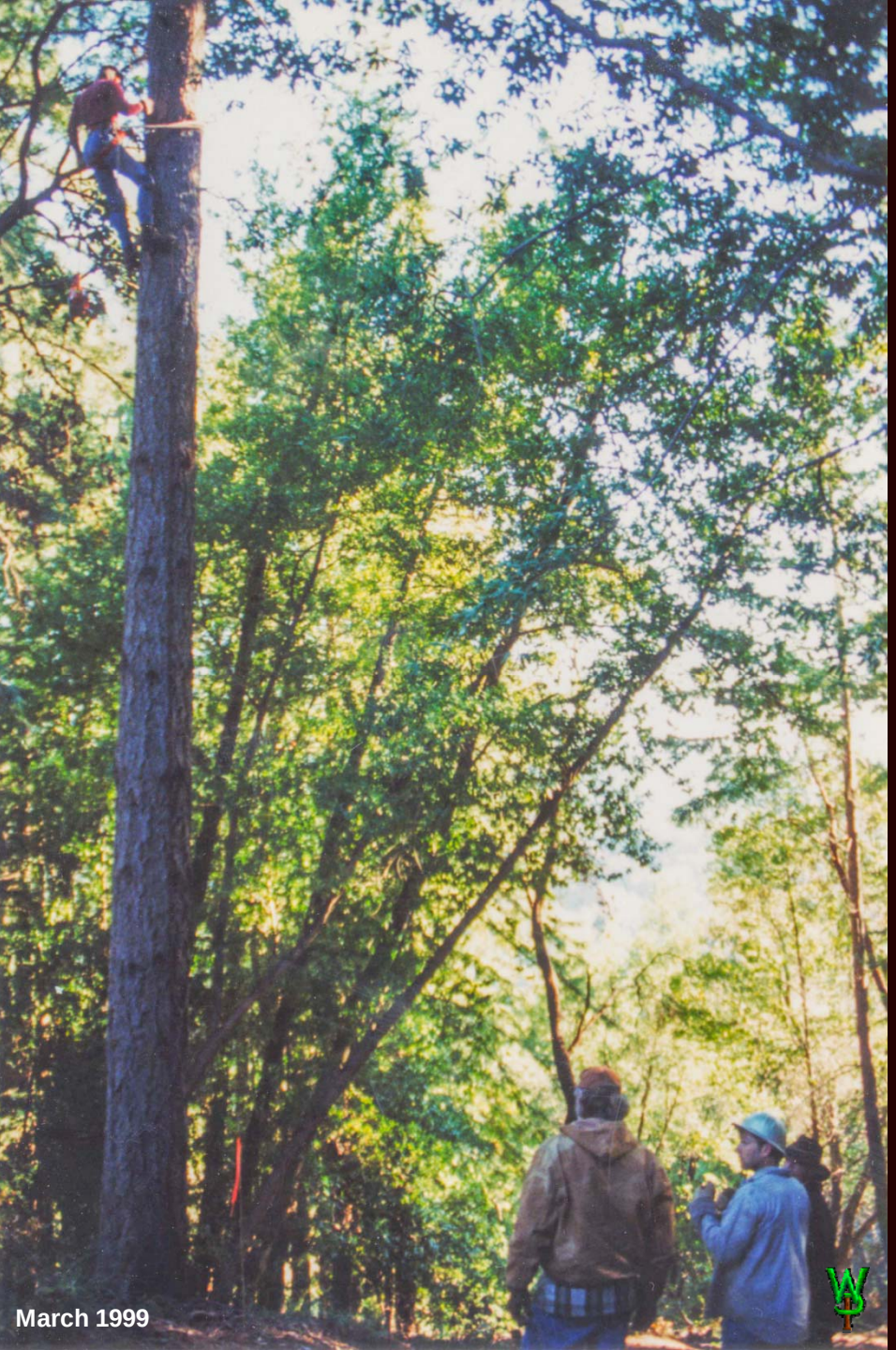
I'm guessing I was about 8 when Mom took this picture.
Yeah, I was crazy about climbing trees even then.

The goal Is to remove "junky" trees in a manner that minimizes injury to the keepers. This often involves putting on spikes and a cable-belt, climbing 80 to 100 feet up one of these weak spindly beasts to cut the top off in a way that is safest for the trees. What can happen is that the falling junk can hang up in the branches of other trees instead of going to the ground. Lacking the force available from heavy equipment to pull them down, one then has the option of climbing said keepers to cut off the branches retaining the troublemaker, as working from underneath a "widow maker" is a poor choice of options.

They say that topping it higher is safer. They say that when they are standing on the ground. You see, when one tops a tree there is this little matter of Newton's Third Law**:** When the top starts to fall, its center of mass shifts to the side in the direction of the fall. The trunk responds to that lateral force, bending like a big leaf spring (pun intended). Once fully loaded, it whips back and tosses off the top, with the perpetrator (hopefully) still up there waving around like a flag on what's left. The Doppler-shifted warble of miscellaneous expletives echoes through the forest…

Then you clamber down (shaking) and get out the trusty felling saw. Now drop the trunk where you can get it out and not hurt anything. Often that process involves setting a choker cable on it to pull it over, and once it falls, bless you if you can keep it from sliding back down the hill (pulling the truck after it)! Rather than harm a "leave tree," at times you drop it in such a way that you know it will shatter. For your trouble and risk it is not unusual to get a kinked log, with cracks, lots of knots and… a rotten core inside that tree you just climbed. It really gives you a warm feeling about the risk you just took and gets you all jacked up for swinging around on top of the next one!

So, although I do love climbing trees, there is always a certain amount of trepidation involved. Then there's the labor dealing with the top**:** removing the branches, bucking the stem, and piling it all for burning once it's dried out. Then there's getting the logs out.



March 1999

By far, most of the few pictures taken of me while working here have been while climbing. I really have no idea why, as I'd never asked for anyone to take them. Makes one wonder what they were thinking to document (I don't want to know).

Logging is a dangerous business, by far the most dangerous profession on land in the United States. What most people think of as "logging" is the guy with the big saw dropping the tree. It is an important job that does get people killed, and demands both demanding skills and physical strength, but the fun part is by no means the most dangerous. In my experience, the most hazardous job isn't the climbing, topping, and felling, it's in the work on the ground after the trees are down**:** bucking, and branching logs, setting cables, and hauling them out ("yarding"). The forces involved are so much higher and more unpredictable in a tangle of logs with big cables from bigger winches tied to huge equipment far away. The work day is long, repetitive, and physically exhausting. So climbing and felling get lots of glamour (and yes both are a thrill), but I really do wish the guys on the ground got more credit for what actually makes things go.

This climb was to set a block up in this fir tree to pull out small (6-10") redwood logs from the stump wad down the slope below and to the left (later to become R1). We were donating the logs to be used to restore an historic cabin at the Brookdale Lodge. Why the gang came from 14 miles away all the way up here to get the logs wasn't clear to me, but we did have a substantial number of very skinny "junky" redwoods with very tight grain and almost no taper in the understory of our larger trees. A typical timber property in production doesn't have any trees like that left (they clear the junk just like I do and their trees grow faster). So in a way, for a very limited quantity, in this job the "junk" was highly prized. I made fence posts out of the rest for a decorative fence "someday."

It was very neat to go to the Lodge for breakfast one Sunday, see them in the wall, and remember this very pleasant day with friends, all volunteers, just doing something good to help a small but enduring local business.

April 2000 – There will be a repeat photo of this slope

By the time the junk was gone, 3-5% of the wood was down or about 1/3 of the trees by number. Count the rings; one was 90 years-old and seven inches in diameter, bark and all. Those with rotten cores were simply cut up on the forest floor and laid across the slope to slow the rainwater and build some topsoil (we do have steep, left). Those that were sound were carried out in 12' pieces to become said fence posts, maybe.

After junky trees are removed, the “next ones” are usually bigger. The lower stump at left is almost four feet across. I want you to think about wielding a saw that big felling a log that big, a log sure to come back down a slope this steep. I let a professional cut these two. If it is so nasty to do, then why take these? Big trees on steep slopes weigh enough to cause landslides. Logging them makes big logs to get up the hill.

The purpose for this work was not to get logs; it was to improve the forest. There was no plan to use the wood. Now that the logs were on the ground, before they were bucked off into lengths and pulled up the hill, the next job was to come up with a legal set of uses. At that time, it was illegal to sell the logs, not even in trade for the work; the State holds barter as illegal commercial logging. It used to be that one could get a permit and *then* sell the logs, but the cost of the permit has grown such that it exceeds the proceeds from the legal limit of what I could have logged ($60,000 in 2010). So why so many rules?

People get all worried that thinning these trees on steep slopes can cause erosion. It’s a theory. It’s wrong here. In fact, careful logging of this second growth redwood forest should help to *prevent* landslides.

Consider the example at left**:** I estimate that 250 years ago, a single redwood on this slope became large enough to break loose and slide to the bottom of the ravine. It was buried by the landslide that came down after it. The log sprouted and grew into two trees, each about 24” dbh. Somewhere around 1890, white guys with steel tools came along and whacked them both. Up sprouted 31 trees in a 20 ft diameter circle.

October 1999 – This wad supplied the logs for the Brookdale Lodge

It looked like this (left). A third were dead; 16 were under 8” and 9 over 20.” There were 3-5 in the process of fusing together being undercut by a drainage channel through the alluvial substrate. It was a wall of wood with half a foundation.

What did I do with this mess? In 2000, (7 years after my first logging job), I got some help from my friend, Steve, whose family had been working these trees for 60 years. Steve needed a low-key practice job to help figure out if he had a career left after back surgery from a serious fall. After I had whacked out the runts, the two of us set up to fell about a third of the larger trees. We planned to drop them all through a fifteen-foot gap between two trunks 40 and 60 feet away. One of those two would have been snagged and broken by the ones we were felling through the gap, so I climbed one (twice) to set a rope where it was about 5” across. Then Steve bent it about 25' out of the way. I climbed each of the others in turn and set the chokers. Steve pulled them back over center through the gap on a 300-foot-long, 5/8" high-lead cable over a snatch block in a fir we used as a gin-pole up on the ridge.

Once the trees were down, I got to climb that slope, buck the tangled logs, and set chokers. There was no winching or skidding because Steve could back the loader down the ridge as a counterweight with the cable over the block in the fir. Once the logs were out, then came the hard part**:** a week spent digging out that old double stump. There had been two trees perched on its twin tops, one held with but a few cable-like roots winding through rotting wood and the other was perched on top of the solid half of the old stump held by an arc of roots grown together down one side. I removed four feet of dirt with a hand shovel and a Pulaski (a combo ax and adz) to cut the roots, redirecting the water away from the unsupported alluvium into the middle of the cluster where all the roots are. Then we sucked out the stump with a double purchase gun-tackle on said 5/8" cable, and popped out a dozen or more root suckers the same way. I set a choker 40' up a tree with a block on the end and we swung the stump out of the cluster.


Cable Block
Fir Tree
Loader
Logs went this way
Trees felled this way
6
5
4
3
2
1
October 1999, The Wall of Wood (Before)
April 2000 , The Wall of Wood (After)

Now, how did I know about that 250-year history starting with the landslide? How did I know why these trees ended up where they did, and why did I think that the action I was taking had a good chance of preventing a problem? I dug out that old stump and learned that history while I was doing the job. When that stump popped out, **I found that old log** from that original landslide still under the alluvium, dead, but still sound. That is how I know what happened 250 years ago.

From what I have seen, the environmentalists have it dead wrong. They demand no logging on steep slopes because the soils would be disturbed, which might cause a little sluffing that they fear will release sediment. That may be true, but the real question is, how much erosion is caused by thinning compared to not thinning? If we don't log those slopes, the trees get large and heavy enough to apply sufficient load to the slope to break loose, just like that tree 250 years ago on my place. Landslides like that are all over these mountains (you'll see one later, with a log underneath just like this one). They choke with weeds and weep silt for years. Nor are they all stable. By contrast, a redwood stump cut to the ground line will sprout, thus making a living retaining wall. In other words, the biggest risk of sedimentation in streams from redwood is if we NOT log big trees on steep slopes.

On the other hand, because I thinned that cluster that grew from that old stump, with the weaker trees removed, those that remained sprouted new branches into the gaps on the side that needs the weight. They thickened and straightened. The bark will continue to thicken to protect the trees from future fires. They will be more capable of forcing roots around their perimeter. Six years later, it looked like this…

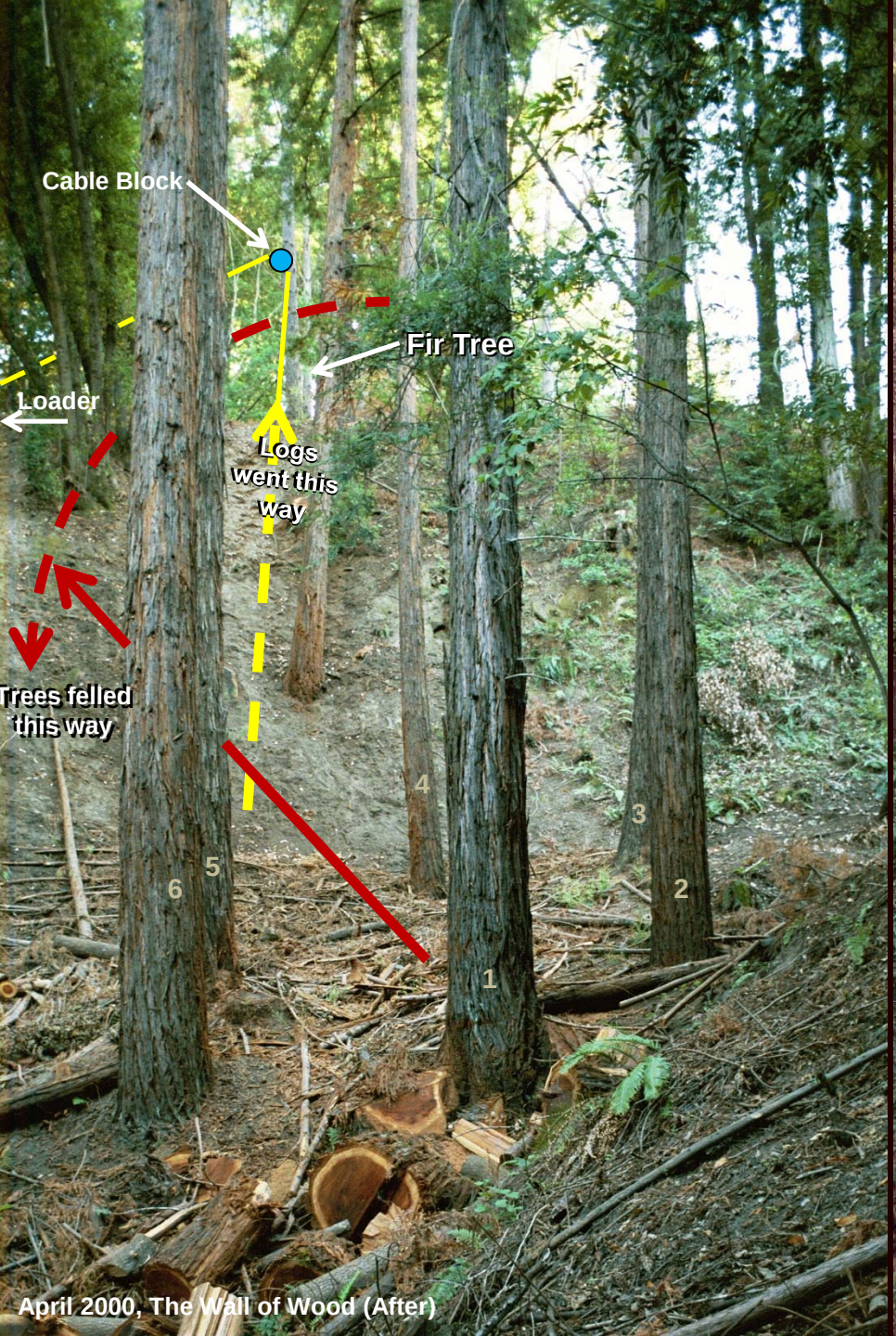
This is the same cluster from above (this second photo was taken from about 75 feet farther down the ridge to the right). One of the six trees is behind one of the two trees in the foreground that are not part of the sprouted cluster in the story.

This is only nine years after the job. For those of you who might be worried about logging releasing silt downstream, recall the amount of groundcover we had before starting. Look at the stream channel. Does this look like something that releases silt or is it a stream channel that captures silt? Does this look more like a healthy forest than when I started?

Yes, this is the same cluster looking up (taken with different lenses) showing the recovery. In 2001, I wrote in *Natural Process* that these trees would sprout branches and straighten, but in 2009 I could hardly believe the change! They even realigned themselves to a degree in their race for light. In another decade or two, this cluster should be thinned down to three but at that time I can also allow a few of the sprouts to develop. Then it can probably go for another hundred. Slower growth makes better trees and better lumber.

Competition among crown sprouts makes them bolt for light into tall, skinny trees. When the wind blows, they sway big distances. Shearing and collision breaks off branches between trees while a lack of light starves branches toward the middle of the cluster. The branches they retain are either at the very top or directed away from the center of the original tree in the same direction in which they lean. That puts stress into the wood. The right thing to do was to thin them but that increases windage and allows them to swing farther. If the trunk doesn't break off entirely, the movement makes stronger wood. Variation in both sheltering hills and other trees makes the degree of thinning redwood can tolerate a site-dependent balance, a matter of judgment, experience, and pure luck.

Steve got some nice logs to mill for his house. When the job was done, I wrote it up for *Natural Process*. When the book published, I sent a copy to a forester at the California Department of Forestry and Fire Protection. I was later told that she had to pore through the books to figure out how to make all this legal and put it down to “research” (which it certainly was), but she also apparently gave Steve a word or two about how this trade was going “too far.” Upon more than one occasion since, I have been thanked by CDF personnel and management both for doing the kind of forestry research that they are just not allowed to do. It doesn’t take long working in a forest to know that the politics have made a mess of things. I was just happy that the logs were gone and I had a healthier forest.



April 2000, The Wall of Wood (After)

November 2017 , The Wall of Wood (After) Note the groundcovers

April 2000

November 2017 – Same slope above the cluster 17 years later
To repeat the shot exactly, I would have to stand in the downed bay at the bottom right

August 2003 - Hoh River Rainforest, Olympic National Park

So what is the point of all this? Obviously, I had goals in mind before I started, yet my preferences in forests are probably much like yours. This 'primeval' forest has never been logged. Note the spacing here. Note how much light there is. A "forest" is so much more than just trees! Even if the path wasn't there, this is a forest that just invites you to take a walk to enjoy being immersed in life. The ferns are obvious, but did you note the shrubs and low groundcovers? I like them too. Now, this being the Olympic Peninsula, there is a lot more rain, but what I am trying to tell you is that we WON'T get a forest with rich groundcovers and shrubs like this by simply waiting. The site history here is different and so is the biology. Sitka Spruce doesn't crown sprout. Redwoods won't stop.

Getting Stumped

October 2013
Nearby, but not our property

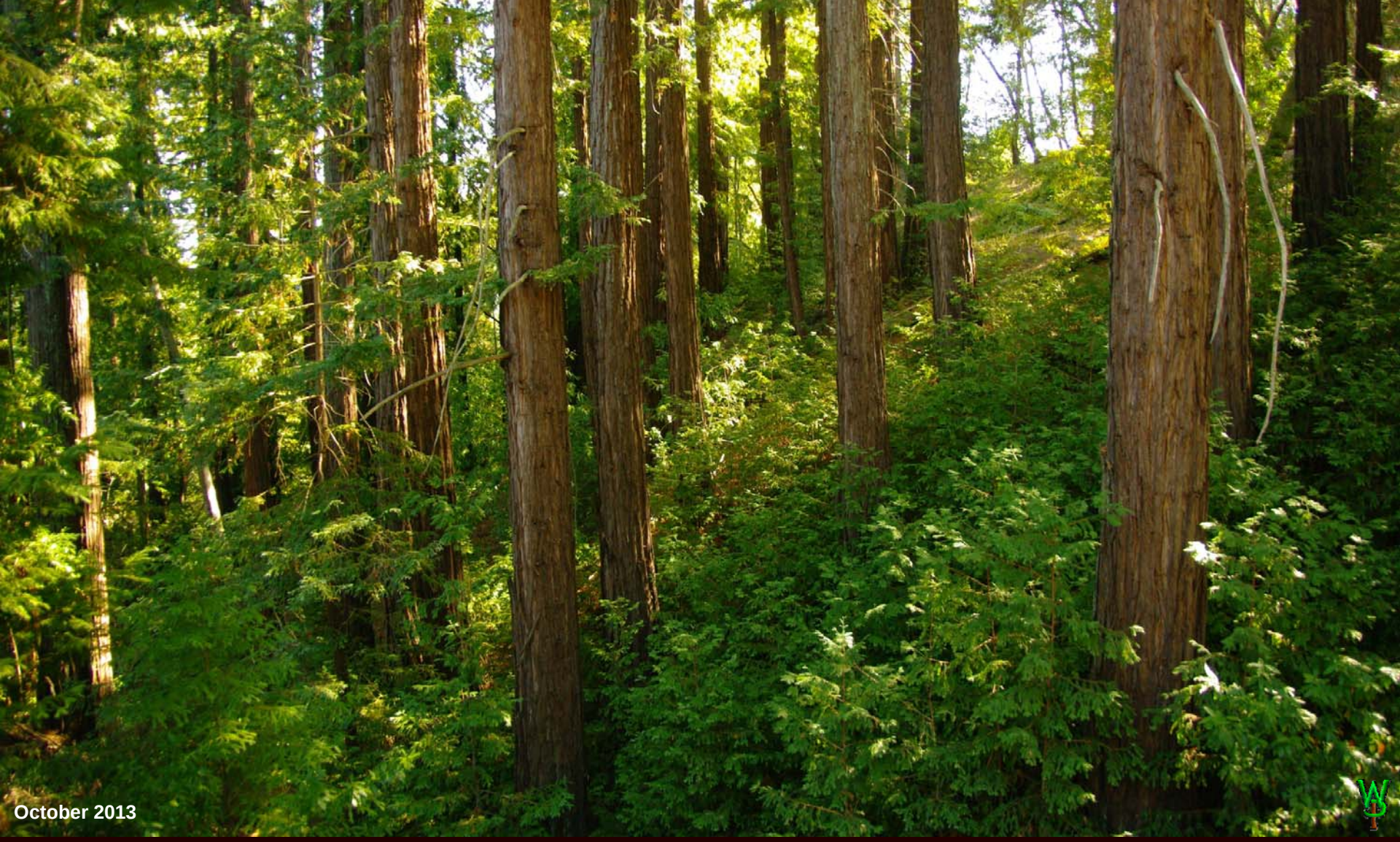
In the first logging in this area (1860~1910), they didn't cut trees to the ground, but they didn't get much crown sprouting because they burned the slash so hot that it killed the buds on the stump itself. That way, new trees sprouted farther from the stump with a better opportunity to develop structural support around their bases. You can infer from the hump behind it how much soil was lost.

The State banned slash burning, in part because people had not been burning as frequently as the Indians, thus allowing significant fuel accumulations to blow up into some huge fires. After the burn ban, redwoods that were not cut low enough, then sprouted shoots out of the side of the stump, bending upward in search of light, growing away from each other while hanging from a rotting foundation.

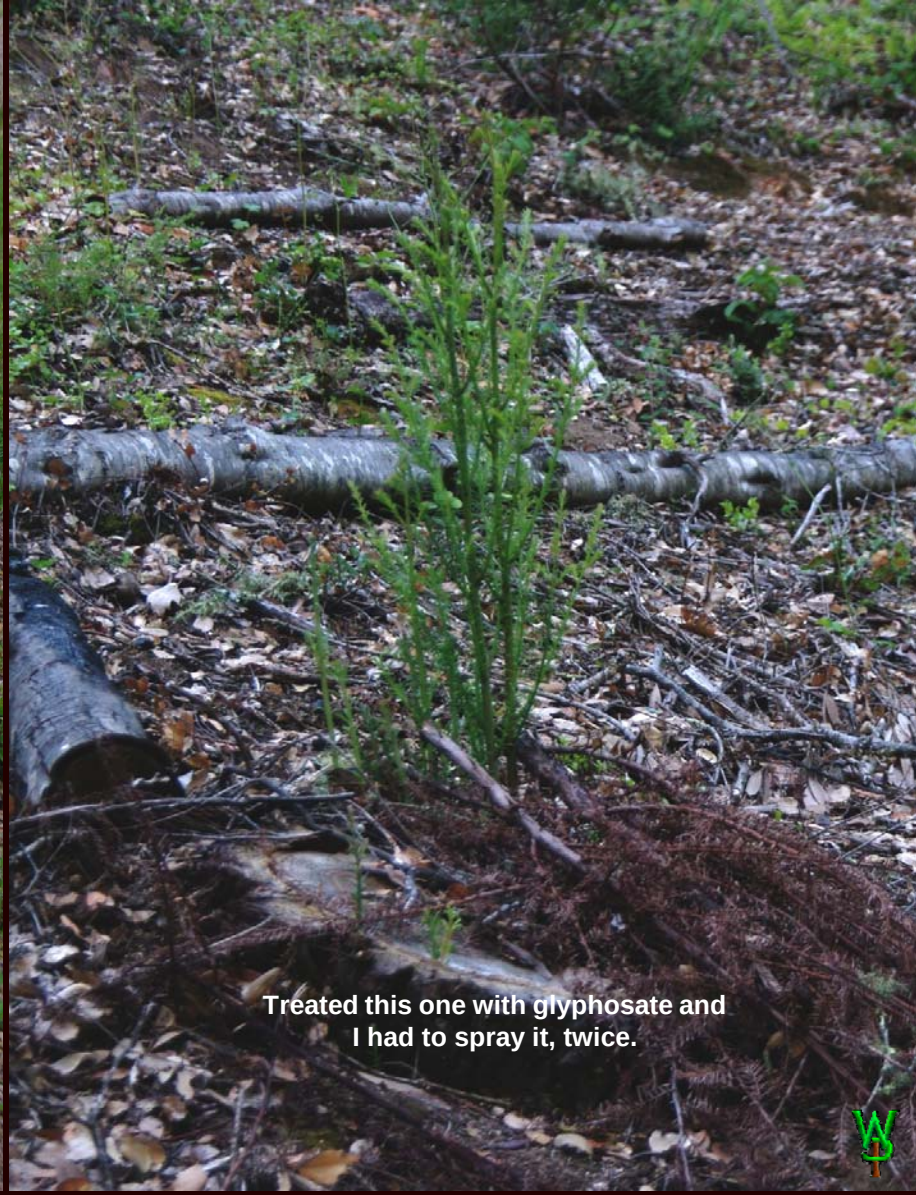
This burned stump holding this unstable tree is eight feet across. Fixing these old problems typically consumes 20% of the total revenue from a timber harvest. Worse, the wood from gravitationally stressed logs like these is apt to curl when it is milled. Lumber is what pays for timber management. Better lumber pays for better forestry.

October 2013 – This is a lot steeper than it looks

Off a single stump of what were crown sprouts 100 years ago I now have 10 trees over 100 feet in height within a 12-foot circle perched atop a minor cliff about 15 feet high (R3). Their weight on a slope this steep of loose fluff on hard sandstone and their leverage from wind is such that the hillside will eventually fail. To correct that, I plan to remove trees, leaving less weight on a root wad capable of holding ten trees this big. It will be very tricky to log without damaging the uphill trees or losing them into the gully below. The reason I have not fixed this problem yet is that I can't afford it. I may if I can sell enough logs.



This is R0, the part of our biggest stand I logged in 1993 primarily to reduce the fire hazard. It's a pretty picture and the trees are healthier, but it is still a MESS of a "forest". So by now you should see what the problem is**:** Redwood sprouts from the root crown, making WAY too many trees to be sustainable as a forest. Crown sprouting is a problem neither industrial nor academic forestry takes seriously enough. As the stump sprouts grow, they will become "ladder fuels" capable of carrying a fire into the canopy to become a crown fire. I cut them with a brush cutter every 5-7 years. I want fewer trees, growing more slowly making wonderful fine-grained lumber, with lots of other kinds of life on the ground. I want a healthy and beautiful forest. That means I needed to learn how to kill crown sprouts with minimal damage to anything else. But you know, *Sequoia "sempervirens"* is really hard to kill.



Glyphosate (Roundup) is the only chemical treatment that seems to work on redwood, but not terribly well. The best time to cut and treat is in the fall. Yet one can't always treat the stumps because some are connected to other trees by roots underground. Yet in the case of the seed trees I have here, translocation of the herbicide to others trees is not much of a risk. Even so, since I don't like taking chances with my forest, I am seeking alternatives to chemical treatment. At left I am trying a bit of used billboard material with the cutoff stump set on top to keep it from blowing away. So far, it's working, but it isn't very pretty. The real test will come when I remove it and let the sun hit the surface.

There are variations on this problem**:** Besides trees connected underground, redwoods sprout suckers from the root crown without cutting or burning the tree (drought stress is the most common cause). If they are allowed to grow, the sprouts can fall and tear out a chunk of trunk, opening the tree to pest attack and damaging the roots anchoring the tree. As they grow, they also force the parent tree to deflect from vertical, which puts stresses into the wood causing the lumber to bend into a curve when sawn. The regular burning Indians did likely cleaned them off. We can’t do that, so I do experiments to learn how to kill suckers without killing the tree.

As redwoods go, this is not a healthy tree**:** It sits in a dry spot with more sun from outside of the stand. It is strongly tapered with a bad top and a great many large low branches. Any lumber it produces will be knotty with a high percentage of waste. For diversity purposes, I am trying to keep redwood off of south-facing slopes like this anyway. I would rather grow a fir here to shade the redwoods from morning sun to keep them from sprouting new branches lower down and to protect them from wind (fir being stronger than redwood). So I will probably remove this one once I have bigger fir trees established here.

Hence, this was a free opportunity to see what this individual can tolerate when treating crown sprouts. It once had a great many between 2-3” in diameter. In 2015, I cut all of the smaller suckers (maybe 20) and daubed them with glyphosate. That summer, I saw a little browning on the tips of the branches, but it greened up the next year. The suckers have not rebounded the way one would otherwise expect. I suspect it worked because the glyphosate did not girdle the cambium.

There are still two larger suckers left (red) on opposite sides. Hence, this tree presents an opportunity to see if I can get away with cutting them off, treating one on the outside half of the circumference and the other around the full perimeter of xylem and cambium tissues OR treating one and covering the other.

We’ll see. Experiments are how we learn. First timid but coarse, then more adventurous to learn the limits, and then more refined to optimize the process.

The next step is to treating sprouts on stumps I cut for thinning purposes within R0. Again, we are lucky that I am dealing with seed trees that cannot translocate the herbicide to others although this experiment yielded hope there. The challenge was that chemical treatment could not be done when it is most effective (one attack from forest yellow jackets is enough to cure you of that ambition!)

The next step is to treat sprouts on stumps I cut for thinning in R0. Again, we are lucky that I am dealing with seed trees that cannot translocate the herbicide to others. The challenge is that chemical treatment is best done in fall when it is most effective, but one attack from forest yellow jackets is enough to cure anyone of that ambition! To make that job logistically tenable, I need a tool to make daubing glyphosate on all those stubs take something less than a week. After years of looking and almost inventing one, I finally found a marginally acceptable commercial dauber as an attachment to a backpack sprayer. We'll see how it works.

So far, all I have done is to take a brush cutter to coppices, but do that in fall (when treatment works best) and one can be mercilessly attacked by the aggressive, nasty, and tenacious forest yellow jacket(s) *(Vespula acadica)*. Hence, before beginning any serious timber job later in summer to fall, I take out the nearby nests. I have refined a process for that using a modified commercial yellow jacket trap, removing the interior cone, replacing it with **screen**, and drilling 3/8" holes in the top. I lace the bait (shredded chicken) and wet the screen with fipronil at a low concentration such that they escape the trap to take the poisoned bait to the nest. It kills the whole swarm in a couple of days. Since I am allowing them to escape the trap on the left, I place a second un-modified trap to validate that the first one is being visited. The treatment kills only yellow jackets, usually only one nest, and only for one year.

The six-tree cluster on the left (R1) was logged in 2001, described above as once 31 trees sprouted from one stump. Note the crown sprouts, which have been cut twice. At right is a larger cluster (R2) of what were originally four trees, now just under 20 along with some smaller groups and individuals above it (R2*). Correcting this overstocking and improving the health of the trees is the goal. I will be milling much of it on site into siding and trim for our house, and other timbers for landscaping and infrastructural purposes.

R2 has the largest redwoods on our property. With some over 50”dbh and 205 feet tall, they outsize the 4 trees removed in the 19th Century. They are also exposed to more windage than R2 (prevailing winds are from behind). On this side I plan to remove two trees (red) to allow those that remain (**green**) more room to grow (hopefully) still slowly. Water competition being the likely limitation.

On the other side of R2, we have another pending “wall of wood.” Hence, the total plan is 6 removals and 11 keepers. Besides more room to get bigger, the goal is to remove the two in the middle so that the remaining trees can build broader support against those winds. I want to fall them away from the camera. Note that the right tree of the two in the middle is jammed against going that way.

When I first got down to this R2 cluster 20 years ago, there were no groundcovers here at all (not even ferns). The resulting pile of broken branches from winds slamming trees into each other on this side of the cluster was four feet thick, plenty of fuel for fire to have scarred the trunks on the side supportting trees leaning that way. I just chopped up the pile and it has since rotted down.

February 2022

Inside was and is a total mess, including the four stumps I mentioned earlier. I cut them up as much as was reasonable (above is the only one left because the slope is so steep I'd have had to bury the chainsaw into dirt to cut it out). You can still see the fire scarring.

When trees are this close together their branches tangle, making a complex question when logging, in which big branches can be a benefit, a big problem, or both. They obviously tangle, inhibiting pulling just one of them over. If one can pull the stem through the cluster on a cable, branches slow the fall and cushion the impact, but they also add top weight carrying momentum in falling that can break the tree when it hits, all depending upon the direction of the fall with respect to the branches and the surface topography. There is also the question of where I want the branches to be when the job is done to reduce the labor to process them.

February 2022 – Note the dead branches intermixed with fresh growth

On the far side of the cluster, the branches are opposite the direction of fall, both inhibiting the pull and adding weight without a cushion. The hillside where they'll land is very steep, which reduces the speed of the fall at impact. The top flat is small, reducing the area both to process the branches and tops and mill lumber. That indicates cutting them off first. That means climbing to reduce the weight and keep the material at the bottom of the hill. The trees are somewhat jammed in there. In order to open up the path for falling, we will have to remove one and climb another (again twice) to set a rope and bend it out of the way so that it doesn't tangle with others when falling them through that path. If I cut off most of the branches on that leave tree, it will slow the growth and also reduce the windage. When they swing, they will grow stronger wood to resist it, actually improving the future lumber (called "wind hardening"). On the other hand, they will put out new branches in what was potentially clear wood. That's a tradeoff one can get when growing a better forest over the long run but we will get a healthier forest for it.

November 2017
From South – From East

This cluster (R3) is a coppice of one of the (not) “old growth” trees removed around 1890. It has a double stump, the larger of which is 36”. That indicates the original tree had germinated some time around 1810, 20 years after the Spanish burn ban of 1793.

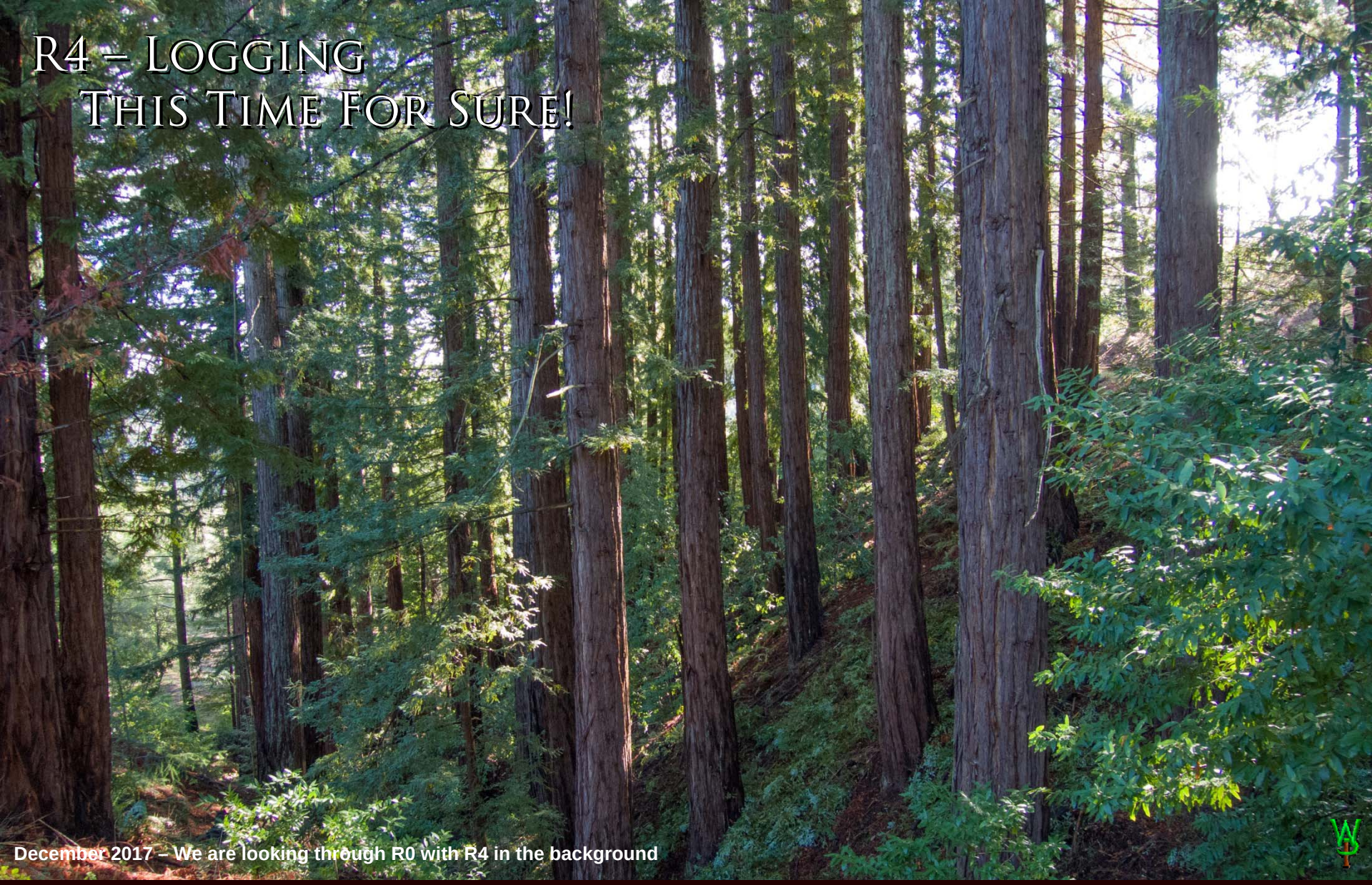
The problem with letting this go is that it is somewhat isolated, with high wind exposure, and it sits on an average slope of some 200% (rise over run) that is nearly vertical below it. In other words, high windage with little support.

It is a landslide waiting to happen with trees tall enough to reach the house. Not good.

Hence, the plan is to remove the trees on the lower side of the cluster where there is the least support from the hillside. The problem is that this is CLEARLY a coppice, with all the trees sharing a common root mass. That means I cannot treat the stump with chemicals without harming what I want to keep. In other words, it may be VERY difficult and dangerous to manage the resulting crown sprouting in this location.

I would prefer to have buckeye, maple, and hazelnut growing here eventually, but that is not in the regulatory cards just now.

R4 – Logging
This Time For Sure!



December 2017 – We are looking through R0 with R4 in the background

R4 is the last conifer timber job I will be doing here (the drainage to the south of R2 & R3). The goal is to thin the remaining trees (marked with a **white** stripe) for fire resiliency and to help get a groundcover going. Unless I am still short of clear material to make siding, trim, and deck for the house, these logs will be sold. Hence, this next discussion will center on preparations made of benefit to both the forest and the job. I have done the bulk of road work, removed the suckers in 1991, started thinning the fuel break in 2015 and have removed some of the “dead and dying” fir. As a bonus, these trees are 30 years bigger than when we started

This is the half of R4 farther downstream (in the background of the prior photo). The only thinning done in here was removing the junky trees. This photo was taken while clearing the shaded fuel break (the lighter area just beyond the stand on the left).

So now that we've covered the history, goals, physiological principles, and got you oriented, let's get to preparations for the logging job for R2-4. Trees are to be removed are at the bottom of both sides of this ridge, R2 and R3 on the left; R4 on the right. The first problem is that *everything* here grew in overstocked conditions; i.e., fir and redwood invaded a hardwood forest. Junky firs have been removed. The ridge is still populated with skinny madrone trees that tangled seeking light hanging over the slope. This makes a very dangerous situation, as their direction of fall is down the hill and obviously hazardous for the feller working there.

The small firs came out in 2010. In 2017, it was the madrone and two 80-year-old bay coppices. The larger dead and dying firs will go out on the log truck under an emergency exemption attached to the R4 job, with a couple more from the shaded fuel break.

It takes a lot of space to deck logs, load them into the mill, stack lumber, and accumulate scrap. This ridge top is very close to the job, and was fine for the last R0 milling operation but it is not enough space for the next job for the house siding because the plan is to mill timbers and trim with a Lucas chainsaw mill and the siding with a Woodmiser® band-saw. Although the Lucas Mill is capable of quarter sawing, I want the band-saw is much less wasteful for clapboard siding. So the Lucas will cut 8” timbers to be resawn into siding on the Woodmiser. So that means we need space for the associated extra scrap and separate stock piles for both the 8” and siding materials. Recall this image of the ridge from the repeat photos chapter taken in 1991. Note the redwood sapling above. I flattened it with a tree and my wife and I had stood it back up. It was about 1-1/2” in diameter and maybe six feet tall.

When I cut that same 1-1/2” redwood sapling 23 years later, it was 16” at the butt and over 60 feet tall (red arrow).
One thing different about the way I log here is the extent to which I prepare the forest to create room for dropping logs with minimal damage to the trees I want to keep. Timber companies prefer to drop lumber trees into hardwoods to cushion the fall and thus minimize damage to the log to be sold. Unfortunately, when one drops a log that way, it can catch other trees and slam them into each other, then making cleanup a tangled mess then requiring a bulldozer or lopping the slash, leaving it to rot for about 15 years. That suppresses groundcovers and inhibits future weed control. So I thin the surrounding forest first and deal with the trash before beginning conifer removal and then climb the log trees (if I must) to reduce their tendency to tangle as they fall and take the hit when it comes to yield. The thinning will also make a nice spot for loading the logs onto trucks or milling what I mean to use. Both of the small oaks that gave reference to these repeat photos will go for that reason. So I’ll have to photograph it again after the job.

Both the hardwood and maybe half of the dead and dying fir has been dropped, bucked, split, and burned. Seems a shame to burn the fir, doesn't it? The price they would fetch as timber would not pay for the cost of getting a log truck and a loader up here because this area does not sell enough logs that the heavy equipment to move them or portable mills to convert them directly into lumber would be all over the place. Instead, houses built in this area use lumber coming from logs from as far away as Canada. Why is there no market? Regulatory costs convert timberland to residential housing. So, yes, it is a shame, but it isn't mine, and it sure as hell costs a lot of labor. I have probably a half dozen more fir trees to go but questions remain about how many should be processed before v. after the redwood logging and milling jobs. On the right side of this spur and below the redwood stand, is a south-facing slope of hardwood being invaded by both 3 10-14"dbh firs and one double-stem redwood at 24"dbh (not shown). My intent is to remove all of the conifers on that slope. This being beyond the legal limit of permits, I must keep the logs on site. They will be used to make a bridge across the face of a rotational failure (a type of landslide) in the slope of R4 for a trail through the redwoods to be built when the logging is done. Hopefully, we can get that placement done during that job. If not, it will take a helicopter (OUCH!).

The main barrier to R2 removals was a large cluster of 10-16” bay trees, coppiced by fire in 1941. The usual practice is to use them to cushion the fall of the redwood. These could catch and break the redwood, turning the tops into “widow makers” or break themselves to then fall down that 200% slope. As described in the previous chapter on hardwood forestry, I am coppicing these trees such that they will grow back. Removing the stems was no fun (i.e., it scared the #$%* out of me). The slope above is too steep to walk and below is near vertical. There is no place to get out of the way of a sliding or falling trunk, but worse, how would you like to climb one??? They are loaded, brittle, and…

This is R2 looking down the line of fall before coppicing the bay (why the bay had to go). All of this (with the exception of three stems in the right foreground just up the hill) came from said four stumps.

In a photo like this, it is hard to appreciate how big these trees are. In the photo, they look skinny, because they are so very tall. Yet most are over 48” dbh.

When one of my forester buddies came here to scale these for logging potential, all he could say (over and over), “This is big wood.”

He was shaking his head that this area had so much of it despite that it is second growth. Needless to say, The redwood we have in Santa Cruz County is a huge amount of capital value compared to his business taking pine and fir in Siskiyou County. Why it is that the only measurable value is as lumber is one of the things I have been seeking to redress for 25 years. House appraisers usually don’t care about redwoods at all.

So I coppiced them and will cut them flush again just before the job. As is obvious, the access for yarding the R2 cluster is now excellent, albeit it is going to take a lot of tree climbing and a long bull-line to a massive high lead block in a fir behind where this photo was taken used as a “gin pole” (spar tree). The weight of these logs will require back-stays on the fir. As to the three trees in the foreground, It depends upon what the feller thinks as to whether I will remove them. If I do, I will treat the stumps, taking the Indians’ lead that redwoods are better in drainages with light shrubs of relatively low fuel value above. Hazelnuts are starting here.

…imagine climbing one of those leaning bays to top it to be so as to pull the log onto the ridge as it falls. Where I parted it, I was 40 feet up overhanging a slope with the ground 100 feet below. This defect was on the *upper* side of one of those leaners, the kind of rot that can run ten to twenty feet UNDER the bark. Would you know how far below you the internal rot extended while climbing it from below? Now, this is going to be hard for some people**:** I didn't find it up there; I was **told** to stop climbing below this defect; I wanted to go higher to reduce the force of spring-back when the weight was released. I couldn't see this until I had the tree down and had pulled out the log and bucked it. Then I rolled it over and found this. There are just so many things that can go wrong when doing this kind of work one cannot know in advance. To pretend one can just apply force or technology in all cases is simply not tenable. Some people think they're too smart to be people of faith. Some of us have learned that we're not that smart. I pray before dropping it and give thanks when I get it done safely in one piece. There is no way to know for certain, but this kind of defect can happen naturally when a tree falls onto one of these bays and scars it, then to grow the defect with the top weight hanging from the end, possibly to fall on somebody, unpredictably, someday. It's yet one more reason to coppice them before the logging job.

The biggest consideration before logging in earnest is the relationship between equipment and the job, which is all about human relationships. If the logger uses a fork loader to carry 20' logs sideways up the hill, fir trees alongside the road make that difficult. If on the other hand, if I can pull them from the other side or can get a truck with an auto-loading arm, then leaving these is fine. The forester marked them for removal as "dead and dying," but unless they are infested, a damaged tree like this is desirable because they have no low branches and grow slowly, shading the ground to slow everything else coming up. I want to retain the fir marked "Spar Tree" for pulling out the redwood and others as a wind barrier to protect the redwood because fir is a stronger tree. The 28" tree with the red spot will stay until all of these jobs are almost over because its weight helps hold down the larger fir tree.

R4 is on the left side of the road. In essence, both conifer and broadleaf forest at right are being configured to facilitate thinning the redwood by two means. First, the two firs to the right of the road are to be “spar trees” (aka “gin poles”) each capable of supporting a cable block placed about 40 feet up with which to pull the redwood logs up the slope to be bucked and loaded out by an articulated log loader. The hard part is to find trees behind them to rig backstays to oppose the force from the straps holding the block.

Second, “felling pockets” are have been cut into the hardwood stand into which to drop, buck and branch the redwood then pull the logs to the loader. I left no hardwood logs or stumps in these pockets so as to reduce redwood breakage when they fall and to preclude snagging when dragging logs down. This is what I would like to do. All of this plan is subject to the equipment available.

Hencforth, I want to keep a few fir trees on ridge tops and south-facing conifer slopes for several reasons.

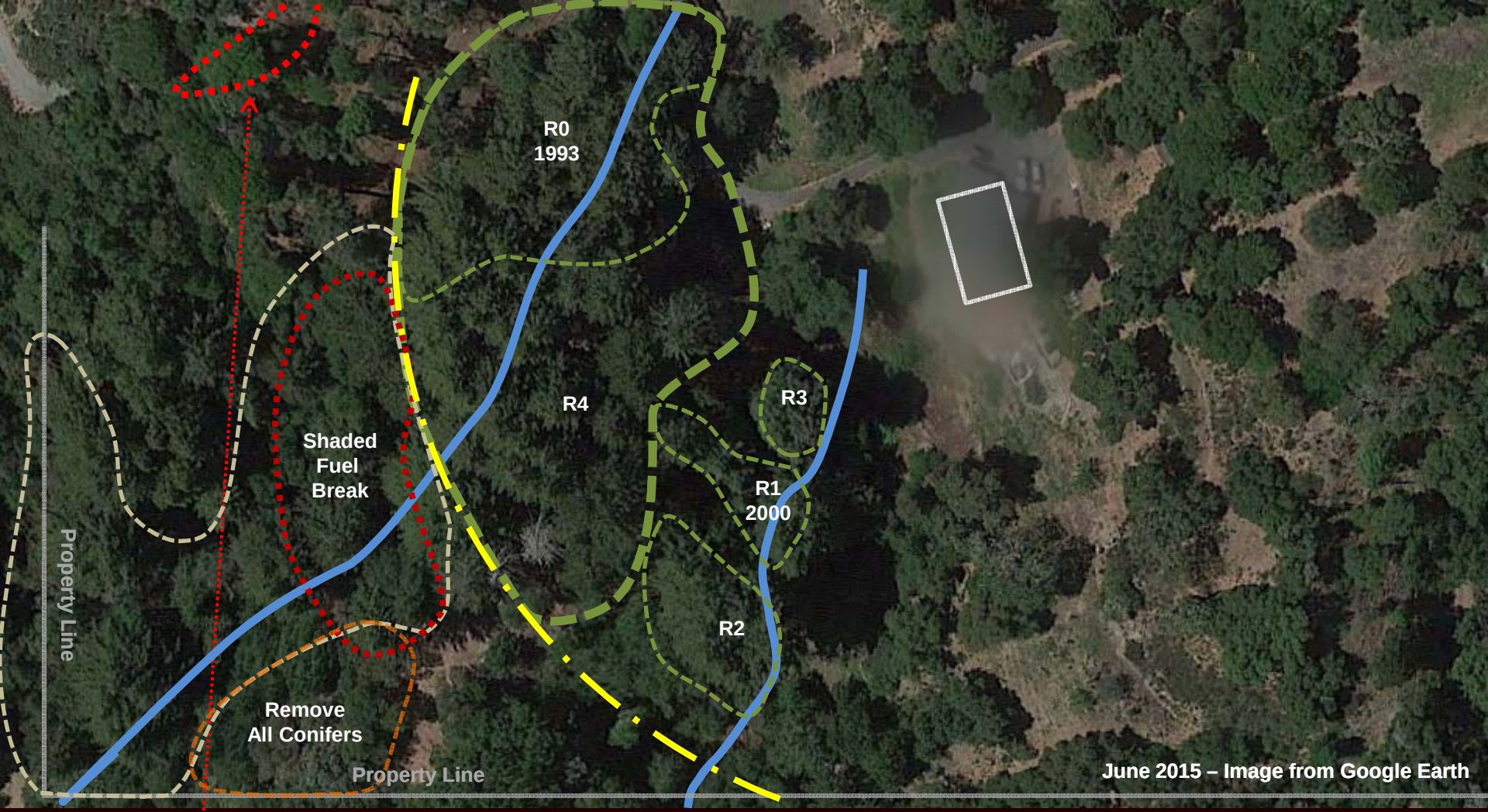
1. Fir trees grown in this area are not worth any money. There are too many big knots such that the log usually does not attain structural grade. They cost more to remove than they are worth.
2. Fir is somewhat more drought tolerant than redwood.
3. Fir trees are stiffer than redwood and offer them some protection from violent winds which can break off redwoods as they extend their tops above an adjacent ridge line.
4. I want the redwood to grow slowly for finer clear ring structure, better lumber, and greater strength, so the shade from the fir would help do that.
5. I do want a diverse forest.
6. Firs can serve as “spar trees,” a sort of mast from which to mount a block (pulley) to cable out the redwood logs from below and reduce the damage to the slope.

So, firs are to be kept as spars, shade, and windbreaks both on the ridge between R0-3 and R4, and just outside the R4 across a road for all three purposes. Redwood will be restricted to shaded north facing slopes.

Spar trees eliminate the need for a big bulldozer and only requires only an articulated fork loader with to pull the cable and load the trucks or to deck the logs for a truck with a grapple on a loader arm (which are hard to come by).

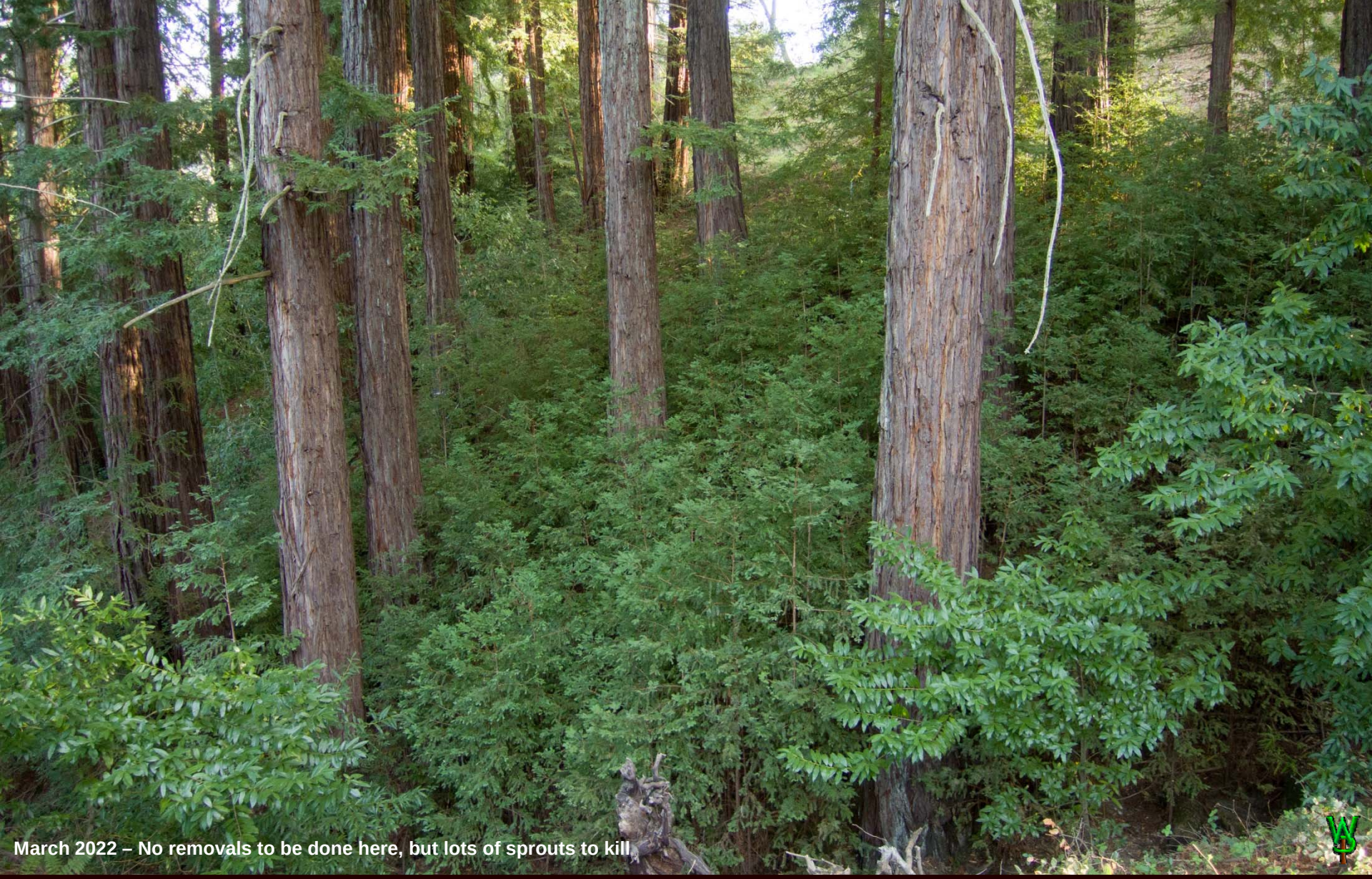
The job could also be done with a bulldozer with a winch at considerably lower cost, possibly close to break-even. The downside is that a cat will tear up the ground placing more weed and erosion management requirements on me. Of course, depending upon how that is handled, soil disturbance can be beneficial. No decision there yet. It will probably hinge on what the Licensed Timber Operator is willing to do and what that costs.

March 2022 – The ridge is all fir, with at least three more dead and dying removals



R4 is where the end meets the beginning, as the job area includes a few trees in R0 from which I removed 25% back in the 1990s. Originally, I was planning to do R2, R3, and R4 all at the same time. That plan may split because I can do the milling on the first two here, thus keeping the material onsite. That means no permits are required. R4 will require a permit, but being within 300 feet of the house that will avoid that $60,000 minimum cost of a full Timber Harvest Permit. There were other reasons for splitting that original job having to do with the equipment needed. If we do go with a big bulldozer, the planning and preparation for that are considerable. Both the County road and our driveway are paved with a mere skin of oil and slurry-aggregate a big bulldozer would simply wreck. I don't want to bear the cost of repair. It is possible to unload one onto used tires, but one wouldn't want to go very far that way. At $250 an hour, once the dozer is here, one wants to do all the work that could be done with it, such as dressing roads or cutting a turnout on the County road, a spot where it could be good to offload as it is just above the job location and would give drivers on the County road a place to pull off that one-lane road at a blind curve to facilitate opposing traffic or emergency vehicles.

This is part of R4, where I thinned R0 in 1993. Despite the more open spacing, the canopy has since closed. Being seed-trees started at about the same time, the R4 stand has a fairly uniform age-distribution. The reason for the large number of tanoak seedlings at the bottom despite the lack of light is that at one time there were two large and very tall tanoaks at the bottom of the channel among the few oaks we have lost to Sudden Oak Death Syndrome *(Phytophthora ramorum).* They died in about 2014.



March 2022 – No removals to be done here, but lots of sprouts to kill

This too is R0, upstream of the prior photo. Here you can see by the crown sprouts that I had removed more trees from this part of the stand. At that time I did not know that these were seed trees and therefore suspected they were connected underground. Hence I did not treat stumps even if I knew how (which I didn't). I have brush-cut the sprouts three times since then, the most recent in 2017, thinking I was going to get to logging it back then. In 5 years they are 10 feet tall. Now that I know these stumps were seed trees, and have a developed process for treating them, I will cut and kill the sprouts before logging to make a better place to do good work.

Finally, one needs an appropriate place to deck R4 logs and load trucks. This flat opposite the house would do, especially if I get this dirt pile out of the way. The “if” is that it has three bunches of a very desirable grass species long thought to be extinct in this area. I need to be able to transplant and establish these grasses before taking the pile. The problem there is lack of rain this year. They may end up in pots. The hard bend in the driveway remains a problem as does the County road.

Going a Bit Fir There

June 2014

In about 2013, Douglas firs on this ridge started dying. When sap rot *(Cryptoporous volvatus*- inset) appeared, I called a forester friend and he told me they were probably infested with bark beetles. Sure enough, there were streaks of sap down the trunk. The culprits were water competition, drought and shading from the redwood. While they are still sound, I should be able just to call the mill and have them come get the logs as they drive by from some other job (that doesn't exist because we have virtually killed the local timber industry). Instead, I must file for an "emergency exemption" under which to effectively give away the logs; else they would cost me $2,000 per log to remove. Ask the environmental activists**:** Who owns the fire hazard as a result of this policy they foisted?

Beyond the end of the R4 redwood stand was one of two remaining areas on the property that by 2015 I had not yet thinned at all (Phase 0). The fuel on this slope represented a severe fire hazard liable to cause a crown fire in R4. The goal is a "shaded fuel break" to protect the redwood to the left. Unfortunately, decent trees adequate for shade were and are still few there.

With nothing on the ground one does not just thin heavily, for several reasons. First, this is a VERY steep slope, most of it over 100% (45°), so it needs cover on it to break the impact of rainfall. Second, although all the visible vegetation is native, there is probably also an exotic weed bank in the soil. Weeding a steep slope like this adds to more than I can handle in total. So my goal is to keep it as forest, but with fewer trees so as to allow an herbaceous groundcover and a few shrubs of low fuel value such as hazelnut, toyon, coffeeberry, or huckleberry as food for wildlife, but without much grass unless it is *Calamagrostis rubescens* , *Festuca californica*, *or Melica spp.,* of which I don't have much to spare for introduction elsewhere.

Here, I am starting at the top with light, inducing groundcovers that will spread down the slope, essentially a Phase 2 thinning. At the top, dead brush (mostly Ceanothus) was chopped up and scraggly and dead oaks and madrones were thinned out. What I am hoping is to gain some tree seedlings from which to select and thin as I reduce canopy and build groundcovers from the top downward.

In this case what was first to come up looks like an odd form of grass. Those are *Iris fernaldii* (lilies are a family of plants that have germinated successfully from the native seed bank here). Iris are perennials more accustomed to shade than most post-disturbance forbs. That meant that they were able to keep producing seed long after the forest began to take over from what had been burned off here in the 1940s. It also suggests that the cows found this area a bit steep for their liking (iris are poisonous). Usually, once the groundcovers are growing securely at a spacing of one every one to two feet or so, I can then start taking down the large and unsound trees. This one is much worse than it looks.

After 30 years of observation, I was amazed this Douglas fir was still standing. This leaning tower, starting at <45° from horizontal, dominates the slope, shading hardwoods below and abetting both redwood and other fir trees. This “fuel break” to be is in transition between hardwood and conifer, so it is going back to hardwood and low brush. Again, the solution here is shrubs and (for now) a madrone coppice because it holds soil so well. I’ll start with a few bay trees (despite their flammability) until the shrubs are established.

The cut was 30”. Heck of a hinge, wasn’t it? Yes, there was a big risk of a “barber chair.” I try to get to things eventually, but dealing with a 30” fir is a big job without heavy equipment. Just gathering material for burning on a slope like this is mildly arduous.

November 2015 – It's a lot steeper than it looks in the photo.

The slope is as steep as it looks. It's one thing to cut trees down without crunching all sorts of others or shattering them to bits, but it's quite another to get the logs up a 60° slope to where equipment can get them out, and yet *another* thing to get them to a truck and load them on. This is especially true when said log worthless weighs upwards of five tons. Doing virtually anything with logs this big is very dangerous. This one was a leaner, so stressed that it would never make good lumber. So I bucked it into chunks, and rolled those down the hill into the drainage as rip rap to slow the water down. Let them rot.

We really did need a fuel break here. This was a chimney, nor was it the worst we have. To protect the redwood, the conifers here must go. When thinning a slope like this, gravity wins; if I can't yard it up to one of the gin poles (which I did with the top third), there is only one direction for the wood to go. It ended up being a lot.

Looking down from the same spot, again, it's steeper than it looks. The cluster at the bottom is the same as in p7. While it still doesn't look like a "fuel break" there is now enough light to start a groundcover. Once that is established, I will go back in again. Keeping one's footing while wielding a chainsaw on a slope like this is not for most people pushing 70, but that's the job.

The hardwood on the top third was yarded out on one of the farthest of the “gin pole” trees on p56. That worked great. The rest went downhill into the drainage to slow the water down (gravity works great too). If there is a fire here, this material would burn for days.

August 2021 – This fir grew from 8”dbh to 24” in 20 years.

In two cases, where I have had fir trees standing well above the surrounding hardwood canopy, in an exposed location, not subject to lightning, and with a good overlook, rather than allowing them to become huge trees that do a lot of damage coming down to require massive equipment to process, I am converting them into snags. These are standing dead trees that, once dead, become great perches for raptors to sit, survey the scene, and launch (hopefully to kill gophers!!). This conversion is accomplished by girdling the tree**:** Making 2 circumferential cuts with a chainsaw about a foot apart, well into the xylem tissue, and peel the bark. If it does fall, at least rotting branches will break more easily, do less damage, and the whole mass will be much lighter to handle having lost the water and much of the cellulose in the trunk to bugs and rot. The standing log makes lots of food for bugs that attract smaller birds as well.

Log Truck Crossing Watercourse

August 2021 – This fir grew from 8”dbh to 24” in 20 years.

Conifer forestry of course involves more than cutting trees, removing logs, and dealing with tops and branches. It takes roads to get the equipment up here, not just our roads, but County roads capable of supporting big trucks. Maintaining fixed infrastructure is a challenge when cutting in roads destabilizes a landscape that is not fixed. In a range of mountains this steep, receiving occasionally upwards of 50 inches of rain in just 2 months, that involves stabilizing unstable slopes and managing drainage and erosion control, both for people and for fish and wildlife. Until transportation and housing technology changes completely, functional fixed infrastructure is absolutely necessary for sustaining biodiversity; else people won’t live here to reverse exotic invasions and uninterrupted succession otherwise resulting in mass extinctions. Drainage and roads are where our forestry chapters go next.

Other Books by Mark Edward Vande Pol

Quick Read Picture Books

Range Management

Zion National Park

Canyonlands National Park

Deseret Ranch

Fuels Management, Succession Run Amok

The Cone Fire (the benefits of active forestry)

The Warm Fire (what happens without it)

Fire Aftermath: Mesa Verde National Park (weeds)

The Croy and Summit Fires (the wildland urban interface)

Socio-Ecological Paradigms

Environmental Consequences

Meadow Encroachment in Yosemite Valley

Why we can't accept how the original forest as it once was got that way

Living Sheepishly

Why we need a culture of animal husbandry

Sustained Development

Cities are becoming prisons

Katrina: What Did You Expect?

Environmental bureaucracy can be deadly

Natural Process: That Environmental Laws May Serve the Laws of Nature, ©Wildergarten Press, 2001, 454pp, ISBN: 0-9711793-0-1, LOC Control #2001092201. http://www.naturalprocess.net

Shemitta: For the Land is Mine: ©Wildergarten Press, 2009. Contains: 217pp text, 980pp overall, 14 picture books, 2 tables, 963 photographs, 9 maps, 2 drawings, 2 charts, 145 footnotes, 358 citations, and 216 other source references, not including external Internet links. ISBN 978-0-9711793-1-8. http://www.shemitta.com

Articles at Wildergarten Press: collected writings on Constitutional history and regulatory racketeering by tax-exempt "charitable" foundations. http://www.wildergarten.com/wp_pages/articles.html

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