

PART II: FORESTRY

When one buys a forest choking with scraggly oak woodland being succeeded by conifers, occasional monoculture stands of exotic trees, and 10 acres of dense exotic brush (some whacked but still alive), you start with what you have. The first priorities, while not at all easy, were extremely simple: Remove the exotic brush and scraggly seedlings so that it was possible to move around, and then thin native trees while removing the exotics.

Simple in principle doesn't make for simple execution. Removing and disposing of ten acres of brush takes getting said brush to safe places to burn. Removing 180' tall trees requires similar disposal of lots of tops. Heavy logs can easily crush exhausted people in too much of a hurry. As a profession, logging is almost five times as deadly as law-enforcement. So far, I have been fortunate, but there have been close calls.

To remove logs on steep terrain requires equipment. That means repairing old roads and fixing drainage. Neither are simple or cheap. Both are major issues for those opposed to logging. Much of what I did here is definitely not legal on a commercial job. Other measures taken here wildly exceeded commercial standards. On balance, you'll be able to see that the results are far better than the policies preferred by either loggers, anti-logging activists, or regulators.

Converting the mess we bought back into healthy and diverse forests comprises Part II. There are chapters covering exotics and understory, broadleaf and conifer forestry, roads, drainage, maps, and aerial views. Yet once one gets such things under control, what kind of forests make the most sense for this land? Healthy forests are a lot more than just trees.



WILDERGARTEN 6.2

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Revision History [1.0](#) [2.0](#) [3.0](#) [3.1](#) [3.2](#) [3.3](#) [3.4](#) [3.5](#) [4.0](#) [4.1](#) [4.2](#) [4.3](#) [4.4](#) [4.5](#) [4.7](#) [5,2](#) [5.4](#) [5.5](#) [5.6](#) [5.8](#) [6.0](#) [6.2](#)

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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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MAKING "WOW": A STORY BRINGING A FOREST BACK TO LIFE

May 2015

This chapter is personal to me. I have loved forests since I was a small child. Back then forests were alive with birds, small animals, fungi, little flowers, bugs, and filtered sunlight on a hot day. My parents would have to tear me away. When we went camping, I got lost fairly regularly, which I also did at home (got some terrible cases of poison oak). One of the main reasons we bought this place was because of that love for forests. Yet this first chapter on forestry isn't so much about trees as it is about everything else that makes a stand of trees into a forest. I cut a lot of trees to make forests. Still do.

When we got here, there were obviously a lot trees, but other than exotic French broom, for the most part, there was nothing else. From the chapter, "*Native*" is Not Enough:

"Among the 145 native dicot herbs on our species list, only five (5) were still reproducing (barely) when we moved here. As our project progressed, an estimated 23 came up from the seed bank and 86 immigrated (each a guess based upon how they colonized). Over 15 years I found 6 more locally since propagated here. In other words, there are still 30 species recorded in this area I have not found, 8 of which have not been seen here since at least 1953, and of those 6 not since 1914. Most are probably locally extinct.

Among the 32 native shrubs on our species list, 15 were still here, of which 10 had fewer than 10 plants each. Once I thinned the forest and got our 10-acre broom infestation under control, 6 more species came up or in on their own (usually on the edges of burn piles). It took a decade to find the next four. As of today, I'd say that 7 of those that have established are still not well represented and thriving. I'd like to find the other 7 someday but none have been reported for a century."

Obviously, the stand at left does not resemble what we started with, but when we got here it certainly did! It was so dark down here even weeds could hardly live, with but one fern. The reason it came back is because I have a chainsaw and I know how to use it. OK, so it was more than that, but definitely a chainsaw!





July 2020



The above photo illustrates the great rewards found in a forest with a diverse native understory full of life. There are at least 20 species in the foreground of this photo. Getting there, takes time, and for reasons these forestry chapters will make apparent, the two major aspects of this project: reversing forest succession and weed control, are best done in parallel, not only because of the acreage involved but because it eventually gets to thinning trees, at which point up come the weeds. Winning this battle with these two causes of mass-extinction-in-progress-nobody-is-even-thinking-about is all about logistics. Wise use of time and money.



March 2017 – Maple in bloom

As a personal message, I wish to apologize in advance for the cursory nature of the technical aspects in this chapter, this despite its length. The reason for that is that there are so many species involved, each with its own propagation methods, relationships with both plant and animal life, seeding habits, and response to management, that there simply wasn't room for it all in this format. This is about forests, and what we did underneath, so that trees could express their vitality, while making habitat for their friends.



March 1990

We started with WAY too many trees, many of them exotic, and with both understory and grasslands choked with non-native French broom (*Genista monspessulana*). Hence the first priority was clearing to move onto the property, followed by clearing for the house and driveway. So we did that, while still doing what was possible to deal with generally insane fuel loading and get control of broom.

An early priority was electrical power and a phone (there was no cell service here at the time).



April 1990 – After first cutting in the corridor to the County road, I took this photo because I was so excited to be able to see that far.

This is looking up the power line corridor in 1990. I'd be lying if I said that logging alone was our first step in recreating a forest here. When we started, most of the property was overwhelmed with trees packed with French broom underneath so thick I had to crawl on my hands and knees in many areas. Hence, the first step was hacking broom to access a house site nobody knew was there and reduce the generally catastrophic fire hazard. Brush removal made enough room on the ground to process trees, a sequence that graduated from bottom to top proceeding outward from said habitable structure to this day.



June 1990 - After Phase 1 thinning

Service Pole

This tree... →



This was the same overcrowded forest between our house site and the County road, but without the broom, dying brush, and scraggly trees underneath (the power line corridor runs across the background). Just to get to this point took weeks of cutting, chopping, dragging, bucking, piling tops, chopping piles and burning... Yet after all that, it was still too dark for groundcovers. There were still too many trees and few were structurally sound. So once the critical ladder fuel load had been mastered near the house (making it possible to even see this far), then it was time for weeding in a big way. But first, I want you to see where this was going.



July 2019

The stand has since been thinned four times. The latest in 2014 removed the redwood that was behind the tree in the foreground. Where once there were perhaps 6-8 plant species now there are over 30. Note the new growth from the center of the oak. This one has a chance of attaining decent structure. Nor am I done. I'll be removing the trees along the County road (right). They are poorly structured and heave the pavement. I'll grow three mixed ranks of shrubs there instead (discussed later). Now, on to the big weeds!



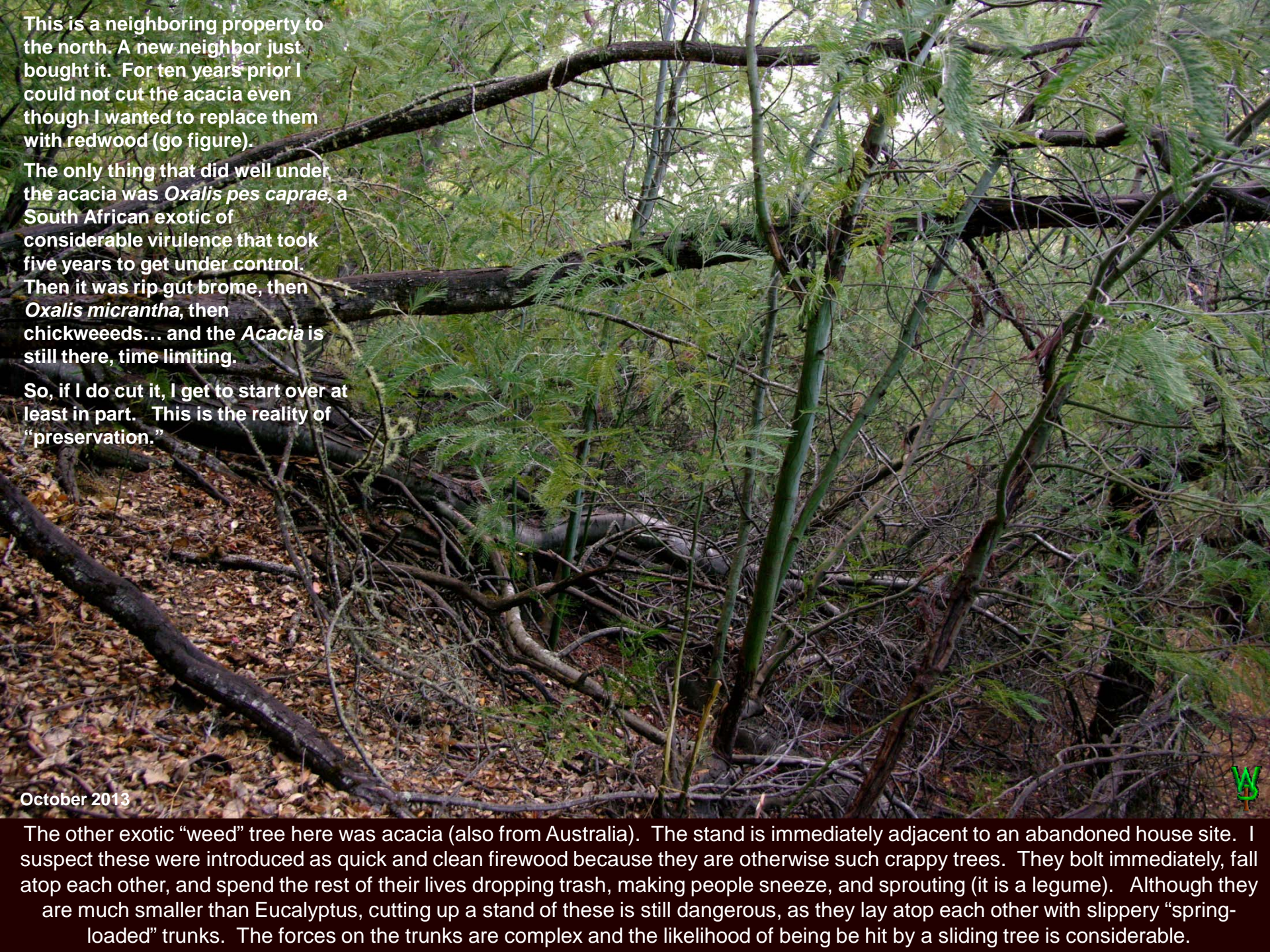
WEEDING IN A BIG WAY



February 1994



Logging a big *Eucalyptus* is an undertaking, requiring roads, heavy equipment, manpower, and time. In other words, **MONEY**. This was one of four such monsters on our property. The guy in the photo is 6'-6" and the butt is sunk in the ground. The saw had a five foot bar with a skip-tooth chain. I squirted extra oil on the far end to cool it while cutting. In this and one other case, we needed a medium-sized bulldozer with a 3/4" cable winch to pull it down, and guess who got to climb it to set the cable? The rounds were so heavy, it took a loader bucket to get them into a dump truck which thank Heaven went somewhere else to split them into excellent firewood. Gaining access for the loader entailed improving both roads and drainage. Weeding in a big way is expensive.



This is a neighboring property to the north. A new neighbor just bought it. For ten years prior I could not cut the acacia even though I wanted to replace them with redwood (go figure).

The only thing that did well under the acacia was *Oxalis pes caprae*, a South African exotic of considerable virulence that took five years to get under control. Then it was rip gut brome, then *Oxalis micrantha*, then chickweeds... and the *Acacia* is still there, time limiting.

So, if I do cut it, I get to start over at least in part. This is the reality of “preservation.”

October 2013

The other exotic “weed” tree here was acacia (also from Australia). The stand is immediately adjacent to an abandoned house site. I suspect these were introduced as quick and clean firewood because they are otherwise such crappy trees. They bolt immediately, fall atop each other, and spend the rest of their lives dropping trash, making people sneeze, and sprouting (it is a legume). Although they are much smaller than Eucalyptus, cutting up a stand of these is still dangerous, as they lay atop each other with slippery “spring-loaded” trunks. The forces on the trunks are complex and the likelihood of being hit by a sliding tree is considerable.



New "Embarrassments"

Prior year's dead
"Embarrassments"

This **was** a similar acacia monoculture forest covering about an acre. **Nothing** else was alive inside that stand. Getting rid of it was relatively easy: just cut the trees and burn the tops, give away the rest as firewood. Surprisingly, native scrub colonized the resulting "clear-cut" aggressively: monkey flower (*Diplacus* = *Mimulus auranticus*), coyote bush (*Baccharis pilularis*), and yerba santa (*Eriodictyon californicum*) were the first.

As legumes, acacia does keep germinating from dormant seed. I pull, cut, and daub seedlings every year, going on 27 years now. Occasionally, one escapes notice (it is easy to miss a naked grey stem when weeding the ground in a chaparral over your head), so they get to embarrass me when they poke their heads above the brush and then require either a chain saw or a basal herbicide treatment.

I do not have many good places for a scrub chaparral that do not constitute a fire hazard, so I tried to maintain flammable brush in horizontal bands no more than 100 feet up a slope and at least 300 feet from the house (and not below) to reduce the risk of a fire building sufficient draft to gather momentum (monkey flower burns like diesel). Unfortunately, the same properties that made these native shrubs so useful in colonizing this slope are a headache when it comes to keeping them from invading and converting the grassland buffer above. Goats reportedly don't like monkey flower. To keep the coyote bush from running amok, I cull the females.

So as restorations go, this acacia clear-cut was fairly easy: Just watch the native brush grow while weeding out the bad stuff (annual grasses *Festuca* spp. and bedstraws *Galium* spp.). If I want a forest here, it's easy to get one, as I now go in every few years to cull oak seedlings. In any case, there are really only two choices about what to do with a disastrous fuel load full of weeds: Wait until it eventually blows up in a catastrophic fire or remove the fuel and deal with treating weeds. Fire is an inevitability; our choices are limited to how to manage it. I *would* like to burn this some day but so far, CalFire has refused to cooperate.



June 2002

This is logging a Douglas fir. It may seem odd that that “big weeds” here included removing some natives, but there were NONE here when Europeans arrived. This tree was *the* first fir to arrive in 1931 and its scions were rapidly converting hardwood forests. Effectively their presence was a result of fire suppression (see [site history](#)). The “big weed” reason to take them out is that on ridges, they tend to lose their tops in high winds, leading to unstable double (or more) tops with rot developing in the crotches, thus causing them to fall. Several were close to power lines. Firs on ridges are big, invasive, exclusive, and unstable, posing a serious fire hazard.



July 2020 – This site is immediately adjacent to a public school

Yes, Douglas fir can be invasive and exclusive, because they are now inhabiting habitat where they have not been in thousands of years. Indian burning and animal disturbance kept them in gullies near water. So the objective here is to confine them to places where they have a benefit to their cohorts without becoming a fire hazard (as above). As to paying for removals, fir logs from this area are undesirable as a source of timber compared to logs with finer ring structure and fewer knots from farther north. Here they grow too fast with fat rings and many huge knots, making them unsuitable for structural lumber. Another problem with fir here is that it is susceptible to bark beetles in drought years, especially when they get over-crowded or are being shaded out by redwood.



The time and money necessary to big weeds under control is a commitment most landowners never attempt. Yet over the long term, there is little choice but to limit or reverse these invasions lest they come to your town. Yet the biological threat is wider than what fueled the firestorms of the Oakland Hills in 1991 (left) or Santa Rosa in 2017 (right). Over-crowded trees and weeds in the forest understory are just as deadly to the insect life that depends upon a diverse native forest, a huge problem, nationwide.

BRUSH BEGONE!



June 2012 – Just down the road

This is French broom (*Genista monspessulanus*). Our place once had 10 acres of this. Unfortunately, the “before pictures” don’t do the situation justice, because when we bought the property, about a third of it had already been whacked. The rest was too steep and dense to photograph under forest cover. Do not under-estimate this awful pest. I have seen broom grow to 27 feet tall in four years, producing thousands of seeds annually that can remain viable for over a century. Above is but three years’ growth, with decades worth of seed in the soil. “Walls” of broom line the County road as spread by County mowers as directed by environmental groups opposed to chemicals. Think of how it would burn with wind. Without advance notice, there is no escaping a fire on a road like this.



November 2020 – Along Porter Creek Rd., Sonoma County, CA

Nor is a fire the end of it. In fact, it's only the beginning. This French Broom borderline monoculture is in Sonoma County where the September 2020 Glass Fire burned in Napa Valley. Most of the trees are dead (the bark is falling off). It isn't hard to see what would happen if it went up again, nor is it hard to envision what would be growing here in the coming years as the trees start to rot and fall.



May 2000

By 1993, while building a house, helping with our first child, and working as an R&D project engineer, I had cut all 10 acres of standing broom and either chopped it in place or gathered it in piles and burned it. I brush-cut it for 1-2 years thereafter, allowing seedlings and recovering broom to shade incoming natives. In about 1995, I sprayed with triclopyr. Then I brush cut for 2-3 more years, allowing broom to sprout to cover the natives from the spray. I then sprayed again and from then on weeding or hand squirt bottles is all that has been necessary in most places ([broom control document here](#)). It took a total of but 3½ gallons of triclopyr concentrate to get control of this biological disaster (“control” meaning, it doesn’t breed). Although this is a suppression strategy that does little to clear the exotic seed bank, it worked for the purpose of controlling broom while promoting both perennial and annual native cover.



Whacked previous
year Four feet tall and
about to breed

Sprayed previous year
First year seedlings;
already a foot tall

Dax
RIP
sweetheart

May 2010 – One year's growth on a neighbor's property

When you cut it, you do get fuel reduction, but not for long! Here at the boundary of the infestation on a neighbors' land, I'm about to cut a year's growth after 5 years of mowing. I sprayed the foreground for the first time in 2009 (dead stems), yet there is more native groundcover than in the area not yet sprayed. Now in flower, I will repeat mowing before spraying again. Altogether, controlling French broom with this process is now relatively easy, but it must be done every year, or the clock starts again with more seed to kill.



June 2002

These are broom seedlings. This is how densely broom can germinate **for decades**. This soil is a sandy fill with at least two inches of oak leaf mulch. This is where the real scope of challenge first becomes evident. These seedlings may not look like all that much of a problem, but one has only to wait a year or so to learn what the above really means: **Either suppress it with native cover or kill that exotic seed bank**. With a hundred years or so, either strategy will work but the problem with suppression is that it must be implemented without fail for that entire time until ALL of the viable broom seed is depleted.



May 2000

This is 1 year's broom growth after 10 years of our 1990s "post-emergence" suppression process: whack it for at least 2-3 years to accumulate seedling density and provide cover for underlying natives, then spray (brush-cutting is 3 times faster than spraying). Here the cycle had been repeated at least 3 times, (twice on the whole property). When you look at [the timelines on this project](#), besides career work, broom sprouts are why there is not much change in those first 10 years. This was just using up broom seed, but at least it is starting to thin out. **Getting this far with that method took a decade with the prospect of more decades to come.**



July 2015 – (*Diplacus aurantiacus*)

After 25 years of the suppression strategy, we were still “getting there” with broom, but still not entirely done. I probably remove a dozen seedlings here every year, fewer on the grassland above. The monkey flower is getting decadent here and would benefit from whacking or burning. Were I to do this again, the process would be very different to get to this point, perhaps taking 5 years instead of 25, as you will learn in the grasslands chapters. **There is an alternative to a suppression strategy.**



This photograph depicts a process in which I beat the broom back in “stripes,” again, on a neighbor’s property. Every 2 years, I took another stripe and moved the control boundary backward toward a location of better long-term tactical advantage (under bay trees). Here, about 60 feet beyond and parallel to the property line, it is ranked in two heights: the front rank is about 3-4 feet tall and the back one about 6-8 feet tall. The face of the back rank is the point to which I had brush-cut the broom the prior year. The front rank is about 8-10 feet in depth, which is about how far they can pop seed.

I whacked it for a few years, allowing the natives to establish and then, in the spring when the broom is about 2 feet tall and covering the natives, I sprayed it with a weak triclopyr formulation of my own design. The reason you see grass (*Stipa lepida*) and not broom in the foreground is that triclopyr does not kill grasses. *Stipa* straw being allelopathic, it does a particularly good job of suppressing exotic germination. In this spot over the succeeding years, One spray application is all it took to get the numbers down where grasses were sufficiently successful that I could control the broom by hand. With good ground cover, there is little soil disturbance that might bring up new broom seed when I pull the seedlings.

As of 2013, the broom you see here was gone; I had chased it back under some bay trees where it is so dark that it does not do well and the bay puts out hormones that also suppress germination. This is a stable control boundary until the bay burns or dies.

Sometimes you get lucky and find a reasonable habitat gradient like this such that one can maintain a relatively stable barrier until there is a disturbance. Elsewhere, we are not so fortunate.



June 2015

This is that same eastern boundary 60' farther down the slope. The "broom wall" is in the background with a year's sprouts in the foreground. Beautiful oak tree, isn't it? If I don't take the broom down around it and take out that **rat's nest**, it's doomed in a fire. So, why don't I keep going? Here, the "broom wall" is almost 100 feet beyond the property line. If I cut it, I would get to battle far more dangerous weeds that would blow in as seed or come in on animals under the trees and into my forest grassland just behind this photo-point. The broom here effectively acts as a seed filter. As much as I hate it, there just have to be limits.



October 2013

No matter what, there will be a boundary beyond which the weeds are uncontrollable. So in that respect, the process is never "done"; one MUST find convenient "control boundaries." This image is on another neighbor's property. In the background is **French Broom**. I whack the foreground as a buffer annually with a brush cutter. Here you can see several **Douglas fir seedlings** that can reach **100 feet in height and 24" diameter in 40 years...** That close together? They'll try! The reason there are so many is that once the big weeds are gone, just as with weeds, fir trees are in the seed bank just as with the weeds. Given that Douglas fir is both invasive and burns like crazy, the compromise has been to remove it at the top of the property (where the winds and wires are) and confine it elsewhere.



March 2014 In process



March 2014 After

So why does the first chapter on forestry focus upon understory? **Trees habituated to overcrowding need room to recover.** Give them that room and what you get is weeds. Best one be prepared for that **before** starting (the main reason why hardwood forestry here is done in phases). Above is a hardwood stand (next slide will be a conifer canopy). It does help that native cover is so beautiful and varied it helps keep you going; they are the heart of the forest as food for wildlife.



This recovery took only 9 years

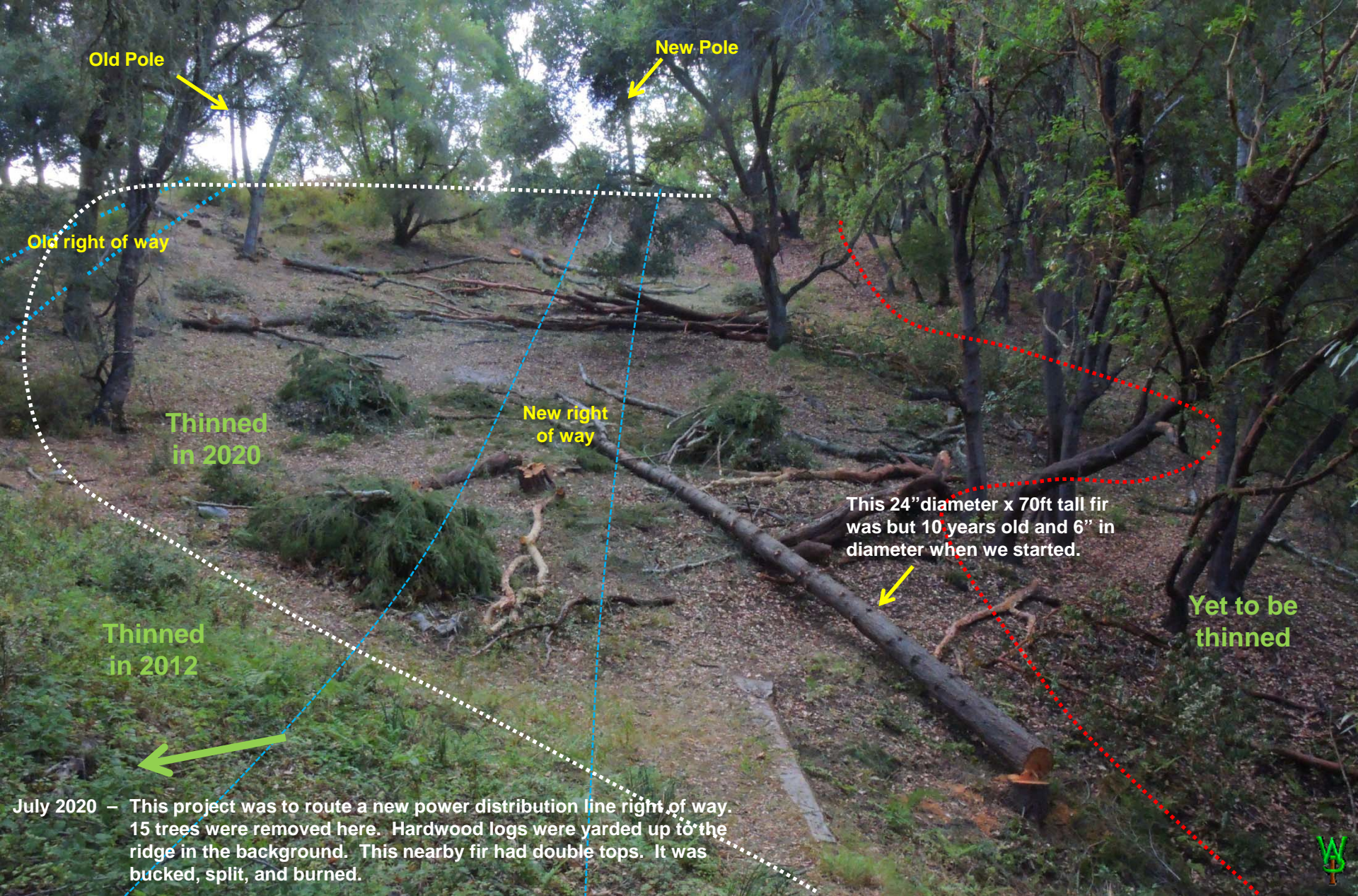
Trees habituated to overcrowding need room to recover

More on this is in the **conifer forestry** chapter

April 2000 – Just after logging

May 2009 – Think of logging as “chiropractic for trees”





Old Pole

New Pole

Old right of way

Thinned
in 2020

New right
of way

This 24" diameter x 70ft tall fir
was but 10 years old and 6" in
diameter when we started.

Yet to be
thinned

Thinned
in 2012

July 2020 – This project was to route a new power distribution line right of way. 15 trees were removed here. Hardwood logs were yarded up to the ridge in the background. This nearby fir had double tops. It was bucked, split, and burned.

While removing big weeds such as upland Douglas fir was a big job early on, the most extensive part of the forestry project has been thinning oak-madrone woodland, at first so dense there was no groundcover. This was done in phases (next chapter) because thinning invites weed invasion. This chapter is about the challenges and rewards of developing a diverse native forest understory, the character of which may be unfamiliar to most readers because most forests in North America are so dense or infested with weeds.



January 2021

The expected groundcover in this draw is grassland up the middle and in the foreground and along the edges, a perennial cover consisting primarily of yerba buena (*Satureja douglasiana*), *Iris fernaldii*, golden yarrow, blackberry, and annuals *Stachys rigida* and various other forbs. How do I know? On the slope to the left of the foreground, looking in the direction of the green arrow, over the prior 6 years I had done preliminary process experiments to be replicated at larger scale and with grass here in the bottom of the draw.



July 2020 – One of the few places I have left most of the logs behind after thinning

This slope recovered from its first serious exposure to native cover, including annuals, in only seven years. Dealing with an exotic seed bank can take many years unless one takes drastic measures this book describes in the grasslands chapters. Experiments in that development process continue. As of this writing, I am now developing means to take decades out of the process of clearing an exotic seed bank, thus allowing diffusion of native annuals. This is not to say that these methods make hand weeding unnecessary; indeed quite the contrary. It is to say that weeds produce sufficient seed to make anything less than virtually 100% control a waste of time. Yet no single control process is 100% effective. Hence, it is the *combination* of methods described in this book that make 100% weed control physically attainable. Hand weeding is simply an indispensable element of the total strategy.



June 2015

This entirely native forest groundcover is comprised of blackberry, yerba buena, some *Madia*, *Stachys*, an occasional gold back fern... the grass is *Calamagrostis rubescens*, which does an outstanding job of suppressing weed germination. Broom still needs pulling here every year. I went through this morning and found about a few between 4 inches and 2 feet tall, the lemon/mint aroma of yerba buena rising from my feet... Just terrible work! If the only thing to be removed was broom, this would have been easy.

THE 20 YEARS WAR



March 2004

Ground wars are messy, usually longer and bloodier than anyone anticipated. Most often they start because of a combination of factors, whether desperation, ambition, or simple mistakes, but in any case innocents suffer and die. Nor is that the end. Not much can be made of a smoking battlefield. Full recovery takes even longer, and may never come unless peace can be maintained, whether by accommodation or displacement. What you see above is exactly such an instance, and it wasn't the only one. This is **catchweed bedstraw** (*Galium aparine*) a supposedly native annual that probably isn't (see "mistakes"). Here, it is just getting started among native blackberry, snowberry, hedge nettle, and rough leaved aster, all of which were "collateral damage" in the removal of the malefactor. Realize that by this time I'd spent 14 years getting rid of broom, and cover like this was beginning to spread. It felt good to have "won" and cover like this was a great joy to me. But "victory" was an illusion for which the natives had to pay and in places, still do. In places I had to kill everything just to get it under control. Was it worth it? Why? The "experts" said bedstraw is native!!!



May 2010

Despite its dominant behavior here now, for the first 10 years, it was not anywhere to be seen **for miles**. When it did get here showing up where the garbage cans are emptied, I was busy dealing with other nasty weeds that were clearly exotic. Yet in just a couple of years it took over completely, choking out historic natives nearby (until I went towar) and has been since exhibiting similarly dominant behavior elsewhere along the County road. Native bedstraws don't do that. How do I know?



Among the madder tribe, which includes all bedstraw species, we have three definite natives. Above is Sweet California Bedstraw (*G. trifidum*). This bedstraw is no problem; despite that it is a perennial. It is about a quarter the size of the weed. It tends to stay put. And it “gets along” well with other groundcover species.



June 2019

California bedstraw (*G. californicum*) makes a stable and occasionally dense perennial groundcover that typically grows a few inches tall, here sharing space with its usual cohorts: yerba buena (*Satureja douglasiana*), blue wild rye (*Elymus glaucus*), honeysuckle etc. along with species thought to be more accustomed to grasslands, tomcat clover (*Trifolium wildenovii*) and Spanish lotus (*Acemispion californii*).



May 2017

This native bedstraw (*Galium porrigens*) builds infrequent 12-18" tall mounds about 4-6 feet across. These make great habitat for ground-nesting quail. While out weeding **hedge parsley** one day, a hen burst out from underneath, where she had this nest of 11 eggs! Note the number of species you've seen in each of these photos and the way natives mix together. In this image you have , *Galium porrigens* *Madia elegans*, *Sanicula crassicaulis*, *Stachys rigida*, and two exotics, *Torilis arvensis* and *G. aparine* (deceased).



February 2009

This is “native” *Galium aparine* germination after 15 years of control under the tree where it first showed up. Despite being supposedly native, extensive botanical surveys in the 1890s at the tourist resort down the hill show **no specimen record of it until 1931**. Had I known that the “experts” were suspect, I would have killed this bedstraw when it first appeared and saved myself over twenty years of hardship and massive damage to actual natives in getting it under control.



This is a wad of hedge parsley (*Torilis arvensis*), the first awful forest annual that came from the weed seed bank. It usually grows 6-12 inches tall but can grow to four feet. It produces tenacious burs that get into everything (inset). I really feel for every mouse, rat, squirrel, and deer that has to deal with this pest, but I'm not exactly thrilled when they come here from elsewhere to clean themselves off (which they do).

There are a several weed infestations of which I do not have good photos and this is one. It is simply very hard to get a distinctive photograph of a large number of small plants mixed with other vegetation dispersed over a big area. Photos of small plants require high contrast lighting one can get in a forest with patchy light intensity. But, once you get a shot close enough to show the plants, you can't show the infestation over a large enough area to show the scale of the problem because of said patchy lighting. Sorry, but until I get a way to pan big distances without vibration in HD video, with very expensive lenses and software, photos like this were all I could afford, especially in terms of time.

Now, you may wonder about that, but here it is: **Any weed you miss reproduces and spreads next year. It is only as one approaches zero that one reduces weed germination in subsequent years.** In the heat of this fight, there has never been a time in which it was not a desperate battle. With hedge parsley (at left), my two girls and I took out 37 garbage bags of this little beast (most under 8" tall) in one year, by hand, in addition to what I sprayed. Hedge parsley was a family victory. We no longer experience what you see at left.

Accordingly, some of these photos were taken outside our property, typically along public roads. However, those pictures do not express the dominance these plants exert invading a native habitat because in these outside locations they are competing with other weeds or an overgrown forest, along with regular disturbances of mowing and traffic. Thin forest and up they come. Then one gets to learn the unpleasant truth: **What little is left of the native biodiversity of this area is beneath multiple "layers" of powerful enemies in the weed bank.** Each is capable of taking over; each must be removed for years before what is left of native seed begins to express itself or colonizes from outside. It is a challenge and commitment not to be under-estimated.



Hedge
Parsley

Cicely

Bedstraw

March 2014

They are not any easier to see in full sun and with a place this big and with as fast as weeds mature, you don't have lots of time to wile away looking for the last one. Amid this hedge parsley infestation along with rip gut and bedstraw is a native lookalike: mountain sweet cicely (*Osmorhiza berteroi*). Glare is fatiguing, whether weeding or spot spraying. There are more in this picture.



January 2013



I have since learned that hedge parsley is simply the first *forest* weed from the seed bank to respond to exposure to light and decomposition of leaf litter. It is by no means the last weed in the forest seed bank. If I took it back to grassland, there would probably be the compliment usual for that system too. I can suppress hedge parsley with natives, and am doing so, but if there is ever a fire I should know what to expect and how to respond. Things might very well get very ugly for a while. In our forests, if I don't get bedstraw, removing hedge parsley is usually followed by scarlet pimpernel (*Anagalis arvensis*, now *Lysimachia arvensis*) and bitter cress. There is a possibility of *Oxalis micrantha* here too, but I have little doubt there are more. **The ultimate goal is to get them to come up and die.** How do I know what is there in order to prepare? Stimulate germination in small patches, dropping individual trees with sporadically located burn piles, and watch what comes up carefully. Give the surface enough light to grow the weeds. That way, I reduce the scope of the problem, develop more native seed to respond to a future event, and know more about what such a larger event might portend.



March 2017

That strategy works only to a point, when weather variation comes into play. This is **bitter cress** (*Cardamine hirsuta* – with the little upright pods), a pest of both grasslands and forest understory. Here, it lay hidden in the duff for at least 25 years until it sprouted after the enormous rains of 2016-17. Unlike bedstraw, this is a clear case of misidentification by the State of California, which **to this day still holds that this is native *Cardamine oligosperma***... How do I know that they're wrong?



March 2017

There is no question about the ID. The pest has four pollen anthers on the flowers, and the native five. This is negligence: Not a single expert at the State or University had taken the half-hour necessary to look and report so that BOTH species could be in the flora books when I went to first identify it. Look how small it can be when mature! Imagine trying to restore a native plant ecosystem for twenty-four years only to find that one of the most ubiquitous early successional plants that germinates in 3 days and matures in 4-6 weeks, was not a native at all! This plant is not obscure; it can RUIN habitat for other groundcovers. Further, it is an economically significant weed, causing massive damage to the nursery business for 50 years without being correctly identified (disturbances of older trees here have shown that the weed has been here at least that long). To remove it has required a retrenchment spanning the better part of a decade doing terrible damage to natives during which other important research became impossible.



June 2004

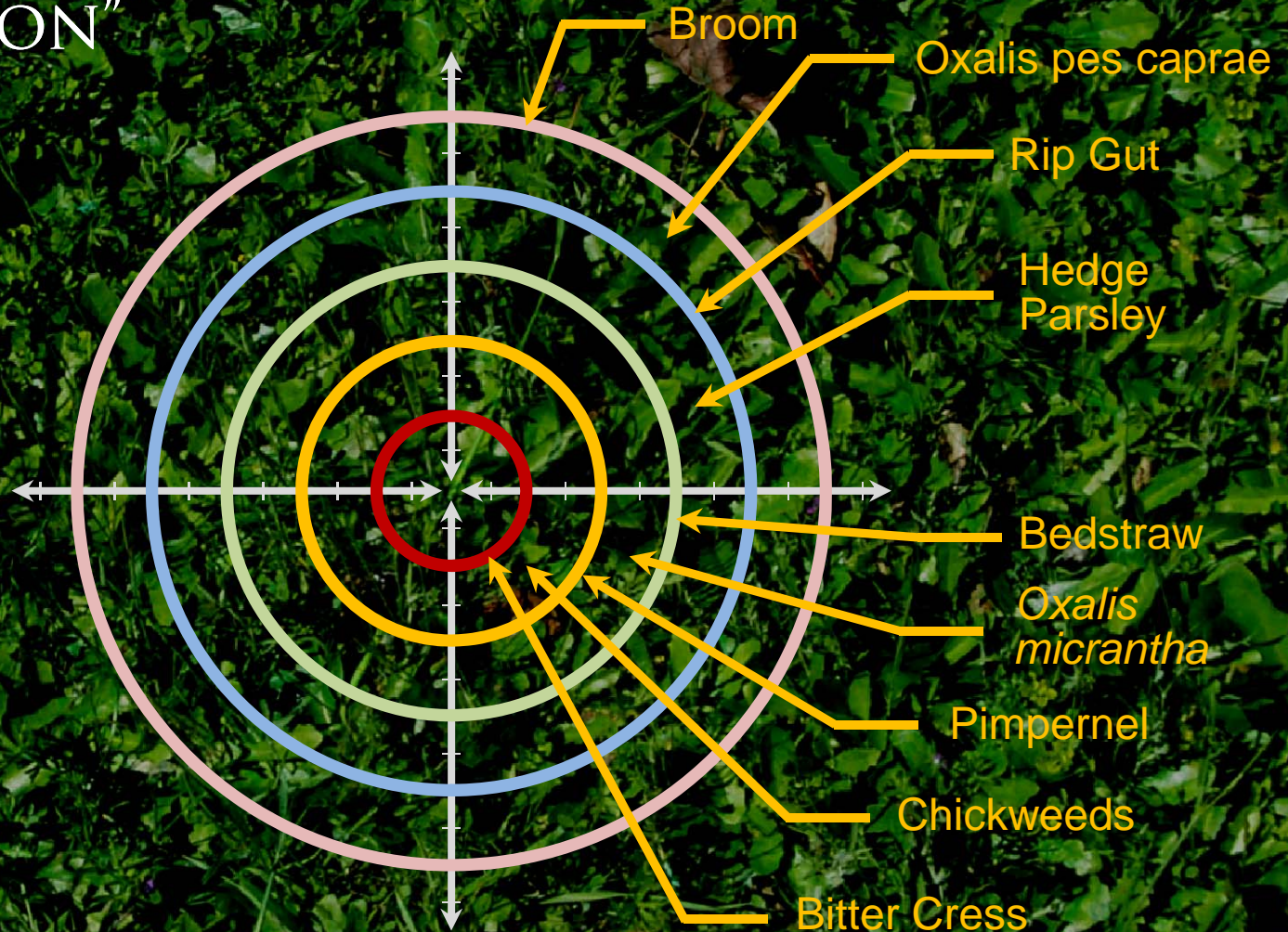
This is an instance in which early detection worked. This is Sticky Eupatorium, (*Ageratina adenophora*). This plant first appeared in a drainage amid a stand of redwood. It grew 5ft tall the first year and was starting to set wind-blown seed (see inset). After getting it identified the same day (thanks to a digital camera, email, and Dr. Grey Hayes), I wrote the local expert at State Parks in Monterey for control advice. He told me they were losing. Perhaps you can guess why.

After fifteen years' investment, I couldn't afford to lose; the risk of seed washing down the drainage in the first rain to germinate for the next half-mile was just too great. So I did some homework.

Eupatorium is a tropical plant, while most natives produce seed that require exposure to cold weather to germinate. So, after very carefully bagging all the seed I could (I lost some) and pulling the bush, I hosed the area with oryzalin, a pre-emergence herbicide that kills **germinating seed, only**. Then I ran 500 ft of polyethylene tubing, tie-wrapped a sprinkler-head to a t-post, and watered it occasionally over the summer.

Next spring there was none, done, zero, nada... **ERADICATED!!!** It has shown up since elsewhere, but they died right away. After treatment, there was no apparent affect to the native vegetation. So, I wrote the "expert" with my results. He intoned ominously that he could never use an herbicide because it might harm a native plant (as if native plants were not being harmed by the weed). By winter, most of the herbicide had already decomposed and it is not particularly mobile anyway. I expect he is still taking a paycheck to fight it. He might even know that the weed is toxic to animals.

INTRODUCING "THE ONION"



Back to ground level. When broom starts to recede, up comes the next weed, and the next, and the next... forming a non-uniform "onion" of layered dominance among weed species. In more forested areas, after broom came *Oxalis pes caprae*, then rip gut (*Bromus diandrus*) or Red Brome (*B. madritensis*), then bedstraw (*Galium parisiense*), then hedge parsley (*Torilis arvensis*), then *Oxalis micrantha*, then chickweeds *Stellaria media* and *Cerastium glomeratum*, then bitter cress (*Cardamine hirsuta*)... Yet in all cases, broom was first to express, as it continues to be to this writing (2021) over 31 years into the project.



June 2017 – *Solvia sessilis* and I've only seen one, ever. Thank you Dylan Neubauer!

I am not going to belabor further the causes of the understory weeds I battled because there is a more serious purpose to recounting this contrast between detailed stewardship and “preservation”: To curtail an exotic introduction, **early detection and control are everything** (above), because mistakes like tolerating *Galium aparine* multiply so very rapidly, but more importantly, exotics can be a difficult and costly problem for over A CENTURY if they are contested, and FOREVER with irreversible damage if they are not. Had I possessed or had ready access to **accurate** information about native plant identification, what was in the weed bank, and how to cleanse it **before** I began, much of what this job required would have been unnecessary. This represents yet another reason why I wrote this book.

BETWEEN & BETWEEN



June 2018

Up until soon after I started thinning again in 2012, our shrub population was under-represented for many reasons: (1) The understory brush was once virtually all broom. (2) Thinning forest and killing broom and other weeds had killed a few of the few sub shrubs we had. (3) The forest, although no longer a fire hazard, was still too dense to allow shrubs to germinate (this draw gets little sun on the bottom). (4) Some native shrubs are hard to propagate. (5) Where grasses dominate, they suppress shrub germination and seedling survival, both by water competition and allelopathy. Removing the X trees in this draw could change all that. Better to know more in advance!



April 1990 – After first cutting in the corridor to the County road, I took this photo because I was so excited to be able to see that far.

To recap: The first thinning when we arrived was for purposes of fuel reduction and constructing a home. This is looking up the same power line corridor as [the blue line](#) in the next photo ([line pole and transformer](#); [our pole](#)). The overhead distribution lines go right over the camera in this picture. With the exception of a very few leggy [toyon bushes](#), the entire understory was broom, poison oak, and a few dying Ceanothus. All of the manzanita was already dead except for two out on the end of a spur.



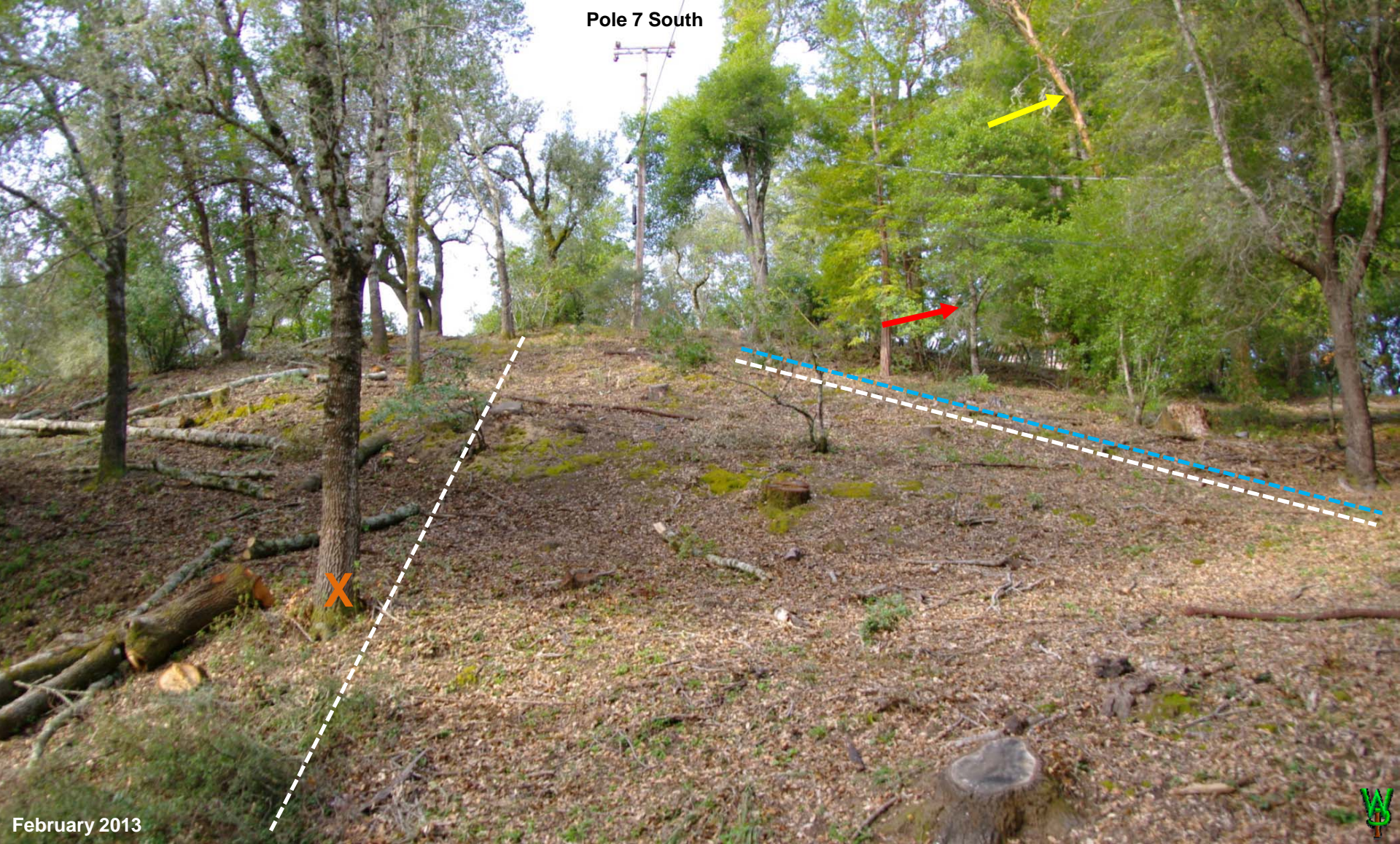


June 2015 – I hope those initial fuel loading conditions were as scary to you as they were to me

Once the weeds were under relative control, the purpose of thinning this power distribution line corridor ([axis dashed line](#)) was similar to removing single trees after the first two phases of thinning: I wanted to know more about establishing a productive groundcover and to get shrubs going. The goal is to learn to manage light for wildlife food production on the ground under the trees without an intensive weed battle or dealing with an excessive rate of fuel accumulation. It started as a two step process: (1) Thin enough to get shrubs established while getting **all** the weeds before they drop seed. Then (2) thin it the rest of the way while treating the shrubs in such a way that they provide both food and shade to slow down the grasses, blackberries, and tree seedlings.

Yet there were complications associated with that goal, the details of which are to follow.

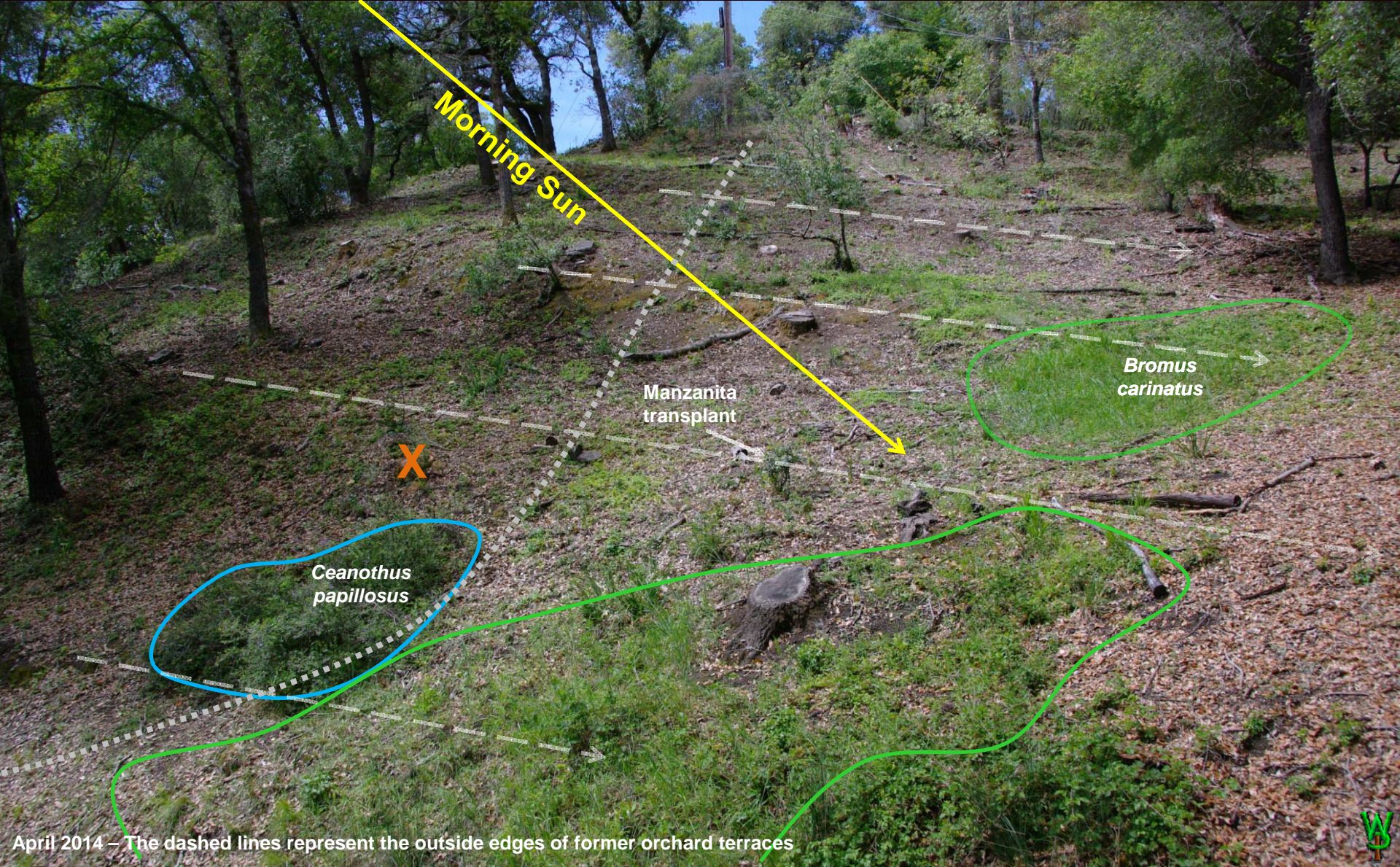
Pole 7 South



February 2013

Note: this corridor will also be discussed in the next chapter about forest restructuring for fuels and line clearances; this discussion is about establishing native groundcover in forests, most of which had become denuded due to canopy closure (above). This is the third time in the 30 years I've thinned this stand (to the right of the blue dashed line is yet to do). The virtual "clear cut" in this corridor is to learn the degree to which understory shrubs and forbs respond to light with the goal of keeping groundcovers reasonable to manage.

Shrubs might be an easier shading tool than trees with which to suppress grasses because most (not all) native shrubs do not germinate easily (hold that thought), make shade at a younger age, and aren't so hard to handle when thinning. This slope faces northeast (afternoon sun from behind the hill); most of the light falls toward the right. Note the tree marked X...



The loss of the **X** tree was due to sun scald (next chapter). The sun comes in from left to right, so the area at right gets more **morning sun**. The corresponding shade to the left of the gray line shows this photo was taken just before noon. That extra light started the California brome grass (*B. carinatus* at right) also due to the opening for the driveway just below the bottom of this photo. There was a bit of blue wild rye (*Elymus glaucus*) to the left of the dotted line and it is a more shade tolerant grass. I harvested **all** of the grass seed, as I did not want more, but this system had other ideas temporarily. Note the **prostrate Ceanothus** on the left, in the shady side of the corridor. **This shrub had been there for 10 years** before thinning this corridor. So far, so good. Watch what light can do.



*Ceanothus
papillosus*



May 2015

After water, warmth, and light, there are now half a dozen new *Ceanothus*, most of them on the right edge where there is more light. Toward the top right there are more and a few new manzanita seedlings I can move! At the bottom are more grasses I didn't want, despite having harvested all the seed the prior year. At the top where it's narrower, there are relatively few grasses, but more shrubs.



May 2015 – *Elymus glaucus*

Rye being relatively shade tolerant, these are on the left and six feet tall. Slowing down the grasses is critical to keeping the situation manageable but there are other native grasses among which it is more difficult to find and remove weeds.



This California brome (*B. carinatus*) is great for soil and a source of seed for birds and mice to feed raptors, but it is a problem to weed because there are more of them than the rye, but not as dense and erect. The brome is therefore a visual and physical barrier while also permitting more weeds to inhabit them than with most other native perennials. Gophers love it, which brings up more weed seeds to the surface. I wish I could deal with grazing it and would love to run targeted grazing experiments as long as somebody else deals with the animals. Getting them clean enough of weeds is problematic as is protecting them from coyotes and mountain lions.



Bromus carinatus

Madia gracilis

May 2015

Some grazing is free. One might think that tarweed would be problematic for weeding, and elsewhere it can be. But here, deer and rabbits like browsing it so much that it actually helps keep the grass cover down. I'll help that process by harvesting the grass seed.





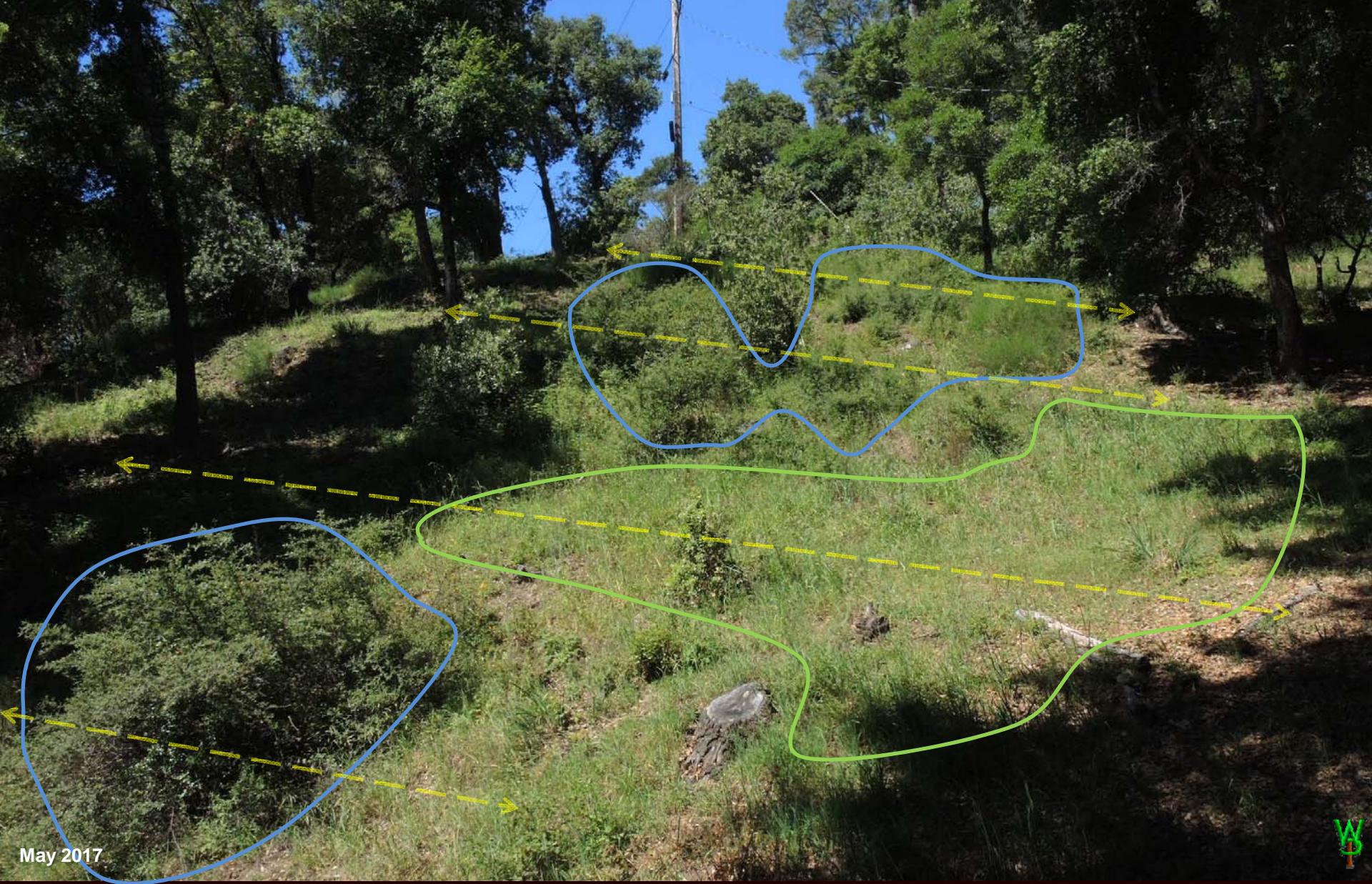
May 2015

This graduated response is what I wanted to see by which to learn how to manage the whole forest, although as you will see, this soon went awry, which is fine in terms of generating more information sooner. This question occurred to me because the groundcover at right had taken 15 years to develop while you see a denser groundcover in the corridor in only 2 years. By graduating light in the corridor, I can now infer more about what is ideal between those two extremes with more to come as the shrubs grow and as I change the composition of species in future years. I don't want much Ceanothus beneath the power lines because it burns like a torch.



June 2016

This is year 3. Note the increase in grassland area and species. This an undesirable (to me) but probably unavoidable phase as it increases the time required for weeding until the brush grows sufficiently to shade out the grasses, effectively replacing the shade trees once provided. Until then, the slender tarweed on the right is easier to maintain. Now, watch the *Ceanothus*.



May 2017

Year 4 started with 90 inches of rain, developing sufficient grasses that gophers started to move in. What this did was bring up weeds from seed buried from annual tilling in the **historic orchard terraces** 90 years prior. It became a battle with bitter cress (*C. hirsuta*), pimpinell (*Lysmachia arvensis*), and hedge parsley (*Torilis arvensis*), which were anticipated due to the weed experience encountered nearby. Note that the *Ceanothus* shrub on the left, which had been kept low for 10 years, is now starting to bolt upwards. Why?

There is now enough forage here that browsing deer *can't* keep it down. Watch what happens.



June 2018



Ceanothus is a nitrogen fixer. On the right, it had grown from but 2 feet tall (which was hardly a concern) to as much as 8 feet tall in only three years, sufficient fuel to pose a hazard to the aluminum power lines overhead. As *Ceanothus* ages, it develops into a mass of dry and oily twigs. To keep it fresh at this stage someone must trim (or eat) about **25% of the plant every couple of years**. **Monkey flower** moved in too. After 2-5 years, it too goes decadent and should be cut to the ground. Both of these shrubs burn like diesel. With the increased shrubs, the grasses are virtually gone, thus reinforcing the hypothesis about shrub competition suppressing grasses. Initially, I wanted to grow toyon (*Heteromeles arbutifolia*) or coffeeberry (*Frangula californica*) which grow slower and are not such a hazard, but they are hard to start. I did want to see how much faster *Ceanothus* would grow with more light. So I let this happen deliberately.



April 2021



Succession proceeds until I take action. The grasses are gone except by the driveway. There is no groundcover under the *Ceanothus* and they are becoming impassible. The older shrubs are getting woody and decadent. Time to take them down. Interestingly, I don't have a ton of tree seedlings, as has happened elsewhere. I plan to start some coffeeberry seed this year, but I don't have much available from which to get them. I do have toyon I can transplant. I'll probably keep a manzanita or two. And so on, but only if I take out the bulk of the *Ceanothus*, for which I've developed a mix of respect and dread. Then we'll all get to see what happens next!



May 2015

This corridor experiment taught me a lot about how fast successional response progresses and what I might do to slow it down, a total picture that surely includes species selection and/or herbivory as management tools. The slope above is the first application of those observations, albeit based upon gut feel at this point rather than quantitative analysis. One makes choices based more upon the prospects one has, with the “ideal” quantitative relationships as advisory considerations.

BETWIXT & BETWEEN



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I got tired of our “natural” front yard, because the miners’ lettuce hosted tedious understory weeds. So I’m trying native *Phyla nodiflora* (a relative of *Verbena*) because it forms a carpet. I may have to irrigate it a bit, but that means it won’t be invasive here.



The propagation and maintenance methods used here vary among species but fall into five broad categories: (1) stimulating the seed bank by disturbance, (2) seeding pots and plugs, (3) direct relocation, (4) rooting cuttings, and (5) air-layering in the field. Most native California species are hard to start from seed, but benefit from both pre-dormant germination and the use of “smoke water” (discussed in a bit). Direct transplants of “volunteer” seedlings have been the most common, the next being division of root mases. Most of the shrubs that will coppice (sprout vigorously after being cut to the ground) also start well from cuttings. Air layering (rooting a branch off the parent before parting it) works great at less risk, but it is confined to those few species that do it by those who are willing to wait.



Toyon
(*H. arbutifolia*)

Monkey Flower
(*D. aruntiacus*)

C. cuneatus

Ceanothus
papillosus

Manzanita
(*A. tomentosa*)

From a management perspective, there are generally two types of shrubs here: “seeders” grow only from seed while “regenerators” have adventitious buds that grow from the root crown or directly from root rhizomes. The key operational distinction is that regenerators respond well to coppicing (cutting them to the ground). Seeders generally do not. Yet by no means are management considerations the driving factors in choosing what type of shrub and how much is optimal for a particular spot. Each of the species found in this section will be discussed as arranged by the similarities in their properties so as to minimize repetition.

Trees & Shrubs as Bug Food

Big Leaf Maple	<i>Acer macrophyllum</i>	Mar
Oak	<i>Quercus</i> spp.	April
Tanoak	<i>Lithocarpus densiflorus</i>	April
Madrone (tree)	<i>Arbutus menziesii</i>	April
California Bay Laurel	<i>Umbellularia californica</i>	
Buckeye	<i>Aesculus californica</i>	May
Elderberry	<i>Sambucus nigra</i>	May-Jun
Chokecherry	<i>Prunus virginiana</i>	Apr-May
Hazelnut	<i>Corylus cornuta</i>	Feb
Wooly Manzanita	<i>Arctostaphylos crustacea</i>	Mar-Apr
Canyon Gooseberry	<i>Ribes menziesii</i>	Feb-Mar
California Huckleberry	<i>Vaccinium ovatum</i>	Mar-Apr
Red Huckleberry	<i>Vaccinium parvifolium</i>	Mar-May
Buck Brush	<i>Ceanothus cuneatus</i>	Mar-Apr
Wartleaf Ceanothus	<i>Ceanothus papillosus</i>	Apr
Poison Oak	<i>Toxicodendron diversiloba</i>	May
Coffeeberry	<i>Frangula californica</i>	May
Black Sage	<i>Salvia mellifera</i>	May
Yerba Santa	<i>Eriodictyon californicum</i>	May
Ocean Spray	<i>Holodiscus discolor</i>	May
Chamise	<i>Adenostoma fasciculatum</i>	May-Jun
Toyon	<i>Heteromeles arbutifolia</i>	Jun
Goldenbush	<i>Ericameria arborescens</i>	Aug-Sept
California Sagebrush	<i>Artemisia californica</i>	Sept-Oct

Sub-shrubs, & Vines

Blue Witch	<i>Solanum umbelliferum</i>	Jan-Jul
California Blackberry	<i>Rubus ursinus</i>	Feb-May
California Strawberry	<i>Fragaria vesca</i>	Feb-May
Snowberry (trailing)	<i>Symphoricarpos mollis</i>	May
Honeysuckle	<i>Lonicera hispidula</i>	Apr-Jul
Snowberry (trailing)	<i>Symphoricarpos mollis</i>	Apr-Jul
Pitcher Sage	<i>Lepechinia calycina</i>	Mar-Jun
Poison Oak	<i>Toxicodendron diversiloba</i>	May-Jul
Deerweed	<i>Acmispon glabra</i>	May-Jul
Thimbleberry	<i>Rubus parviflorus</i>	Mar-May
Sticky Monkeyflower	<i>Diplacus aurantiacus</i>	Mar-Jun

Note: These are shrubs and trees found here in open canopy forests, including some that require full sun typical of a scrub or chaparral
Source data for fruiting time is from CalFlora.org. Breeding times here are narrower



Grouping our list (including trees) by flowering time illustrates the first central point explaining why it is so important to maintain a full array of **native** forest understory plants: This composition of native shrub species produces pollen for insects continuously from January to November (in winter and early spring, rain produces earthworms and bugs as soft bird food). **Bug larvae are typically HOST SPECIFIC;** they cannot breed in shrubs like French broom. Effectively, urban residents (many of them environmental activists), having allowed or even abetted exotic plants and succession to take over only one urban area, have constructed a coastal region unsuitable for bugs to breed. 95% of bird species **require** caterpillars to feed their young. No plants, no bugs. No bugs, no birds.

Soft Fruits

Blue Witch	<i>Solanum umbelliferum</i>	May-June
Wooly Manzanita	<i>Arctostaphylos crustacea</i>	June-July
Coffeeberry	<i>Frangula californica</i>	July-Aug
Chamise	<i>Adenostoma fasciculatum</i>	July
Elderberry	<i>Sambucus nigra</i>	Aug
Chokecherry	<i>Prunus virginiana</i>	Aug
Thimbleberry	<i>Rubus parviflorus</i>	Aug
Poison Oak	<i>Toxicodendron diversiloba</i>	Aug
Honeysuckle	<i>Lonicera hispidula</i>	Sept
California Huckleberry	<i>Vaccinium ovatum</i>	Oct
Red Huckleberry	<i>Vaccinium parviflorum</i>	Oct
Canyon Gooseberry	<i>Ribes menziesii</i>	Oct
Snowberry (trailing)	<i>Symphoricarpos mollis</i>	Nov
Madrone (tree)	<i>Arbutus menziesii</i>	Nov
Toyon	<i>Heteromeles arbutifolia</i>	Dec

Nuts

Buckeye	<i>Aesculus californica</i>
Hazelnut	<i>Corylus cornuta</i>
Oak trees	<i>Quercus</i> spp.
California Bay Laurel	<i>Umbellularia californica</i>

Hard Seed

Warty-Leaved Ceanothus	<i>Ceanothus papillosus</i>
Buck Brush	<i>Ceanothus cuneatus</i>
Black Sage	<i>Salvia mellifera</i>
Pitcher Sage	<i>Lepechinia calycina</i>
Yerba Santa	<i>Eriodictyon californicum</i>
California Sagebrush	<i>Artemisia californica</i>
Ocean Spray	<i>Holodiscus discolor</i>
Sticky Monkeyflower	<i>Diplacus aurantiacus</i>
Goldenbush	<i>Ericameria arborescens</i>
Coyote Brush	<i>Baccharis pilularis</i>
Deerweed	<i>Acmispon glabra</i>

Plants preferred as edible leafy browse (as observed here) are in green

Note: Bay Laurel (avocado family) was not included in the list of soft fruits because I have never seen a bird work on a bay husk

Regrouping our list by fruit and date, we get to the next central point about why it is so important to maintain a full array of forest understory plants: This array of **soft** fruit native shrubs produces continuously from June to January (in winter and early spring, rain produces earthworms and bugs as soft bird food). **Birds equipped for eating soft foods, can't eat hard seed** (such as is produced by invasive shrubs like French broom. Birds that eat hard seed as adults have food all the time available off the ground... BUT they still feed caterpillars to their nestlings. Effectively, urban residents (many of them environmental activists) having allowed or even abetted exotic plants and succession to take over only one urban coastal region, have constructed a food desert amid the Pacific Flyway.

Regenerators

Root Crown

Wooly Manzanita*	<i>Arctostaphylos crustacea</i>
Coffeeberry	<i>Frangula californica</i>
Elderberry	<i>Sambucus nigra</i>
Chokecherry	<i>Prunus virginiana</i>
California Huckleberry	<i>Vaccinium ovatum</i>
Red Huckleberry	<i>Vaccinium parviflorum</i>
Honeysuckle	<i>Lonicera hispidula</i>
Snowberry (trailing)*	<i>Symphoricarpos mollis</i>
Toyon	<i>Heteromeles arbutifolia</i>
Chamise	<i>Adenostoma fasciculatum</i>
Coyote Brush	<i>Baccharis pilularis</i>

Rhizomes

Thimbleberry	<i>Rubus parviflorus</i>
Poison Oak**	<i>Toxicodendron diversiloba</i>
Yerba Santa**	<i>Eriodictyon californicum</i>
Blue Witch	<i>Solanum umbelliferum</i>
California Blackberry**	<i>Rubus ursinus</i>

Obligate Seeders

Nuts

Buckeye	<i>Aesculus californica</i>
Hazelnut	<i>Corylus cornuta</i>

Fleshy Fruits

Warty-Leaved Ceanothus**	<i>Ceanothus papillosus</i>
Buck Brush	<i>Ceanothus cuneatus</i>

Hard Seed

Deerweed	<i>Acmispon glabra</i>
Black Sage	<i>Salvia mellifera</i>
Pitcher Sage	<i>Lepechinia calycina</i>
California Sagebrush	<i>Artemisia californica</i>
Ocean Spray	<i>Holodiscus discolor</i>
Sticky Monkey Flower**	<i>Diplacus aurantiacus</i>

Airborne Seed

Goldenbush	<i>Ericameria arborescens</i>
Coyote Brush	<i>Baccharis pilularis</i>

Grouping the shrubs by their reproductive growth habits, all of the root crown regenerators (with the exceptions of coyote brush and elderberry) have thin bark. These are subject to sun-scald with reductions in canopy anytime other than fall. They should be coppiced (cut to the ground) when thinning trees. Most are tricky to germinate. Species marked with an asterisk (*) are capable of air-layering (later). Most seeders benefit from pruning depending upon the species ([pruning schedule here](#)). Species marked with a double asterisk (**) can exhibit invasive behavior in this area. The more prominent of these shrubs will be discussed by type of management.



May 2015

Today, there are too many shrub species here to discuss each in this format. Some are propagating more efficiently for reasons unknown while others remain in jeopardy because of my deficient propagation skills and/or time for detailed attention to constrain their native competitors. This chapter will focus upon those few species that have returned to the point that they require management or have some other important attributes prompting that focus. Within each type, they are in the order in which they have colonized the property.



WV

February 2002

When we started, there were NO seedlings of any native brush species on the property; what you see here had been maintained by the regular disturbance of County road equipment supposedly cleaning roadside ditches. As a result, this road edge originally had a berm I cut off with a shovel to disperse the flow of runoff that was channeling the draw behind. Burn piles from thinning below stimulated *Ceanothus* seedlings around the edges, too many to grow to maturity. So I transplanted those first, shading them with these burlap tips. I also transplanted poison oak (*Toxicodendron diversilobum*), black sage (*Salvia mellifera*), chamise (*Adenostoma fasciculatum*). Along this road, as the transplanted shrubs got larger and denser, they shaded groundcovers to deter the blackberry and poison oak down the slope to the north (to the right). Removing oak trees starting in the hedge is the only chronic hassle so far.



May 2015

We have two flavors of Ceanothus, *C. cuneatus* (white flowers in early March) and *C. papillosus* (blue flowers 2-3 weeks later). The former rarely germinates without fire, but the latter will after any disturbance. Both grow very fast unless cut back about 15-25% per year (it fixes nitrogen with symbiotic *Frankia* actinomycetes). It typically lives only 10-25 years but one can extend that lifetime considerably with pruning or animal browsing. This still-vigorous *C. cuneatus* shrub is at least 15 years old and stayed looking great until we had so much more that deer browsing could not keep up. So is the problem too many shrubs or too many predators? It's the latter.



May 2015

Ceanothus was likely a prime firewood for Indian cooking. The twigs light VERY easily and the wood burns VERY hot and lasts a long time. The structure of the shrub is such that a relatively cool ground-fire would flash through it consuming all the twigs, leaving medium-to-large branches behind. The shrub dies after fire because it does not regenerate from a root crown and the wood therefore dries out. What remained standing and dry was a perfect fuel resource for Indian women to gather, being small enough in diameter to break off and pack home. The hormones left behind the fire then germinate scads of new plants. As our [site history chapter](#) described, here along the Zayante tribal trail, a handy fuel resource like Ceanothus was probably cultivated in patches here for that purpose. My estimate of its pre-colonial distribution here is drawn as a map in the chapter on [Vegetative Maps and Aerial Photography](#).



May 2015

With enough light, *Ceanothus papillosus* germinates profusely. There are six in this photo within a space of about six feet. They transplant well, but until the groundcovers thicken, they will probably be as problematic as are oak seedlings. Why? Probably nobody but a hunter would notice in these photographs **the total lack of any sign of herbivory** on these shrubs despite the fact that this is one of the few sites in the entire area with gobs of fresh young plants to eat! Both *Ceanothus* and *Adenostoma* were favorites of browsing deer and antelope. Deer numbers in our immediate area have fallen precipitously, primarily because of overpopulated mountain lions, pigs, coyotes, and (other than suburban gardens) lack of food. Pronghorn are locally extinct, for which goats make a good substitute.



March 2020

Little grows under *Ceanothus*, a possible indication of allelopathy, but there is virtually nothing about it in the literature. The condition develops and seems to persist for at least two years after the shrub has been removed. Whether this is due to the *Ceanothus* itself or perhaps a symbiotic fungi remains unknown. Hence, I remove these shrubs on a regular basis to allow the weed seed bank to express such that I can cleanse that spot, artificially creating a turnover rate to maintain a younger age distribution of these flammable shrubs.



October 2013

These are two very old root crowns. On the left is manzanita (*A. tomentosa* left) and on the right is toyon (*Heteromeles arbutifolia*). *A. tomentosa* is unusual among manzanita species in that it will sprout shoots from the root crown, which are ideal for rooting (left). Both show large crowns indicating regeneration after severe fires. These plants are best cut to the ground (coppiced) when thinning forest.

These two are so old that I wasn't that brave, so I cut back a third or so of each and it worked fine.



Untreated

Headed

Coppiced



May 2015 – The untreated toyon bush is so thin it is hard to see. The headed toyon bolted but also has red leaves.

It took several failed attempts at trimming toyon to accept that it was better cut to the ground (coppiced) than trimmed. The reason is the same “sun scald” problem we have seen with oak trees suddenly exposed to light. The bark on shrubs grown in shade cannot protect the cambium sufficiently for the stem to survive and the shrub can die when trying to baby it. Better for the shrub to put that energy into new growth. So when I thin trees with toyon nearby now, the toyon now usually gets cut to the ground first. The new growth is amazing. Effectively, to maintain this “hedge” I’ll try more shrubs in higher density, as some will be growing out while others are cut back. My estimate is that, to maintain a roadside hedge like this, ideally mature shrubs should be coppiced on a 3-4 year rotation.



August 2021

Both toyon and coffeeberry may be started from seed by removing barely mature seed from the fruit (still green but turning slightly brown). I did this successfully with toyon at larger scale in a blender by cutting a section out the middle a of fuel hose and stretching it over the blades. Then I spread the morass on a paper towel to pick out the seeds. Plant immediately, preferably with bottom heat. Toyon should be collected in December and coffe berry in late-July–early-August. Wait longer and the seed goes dormant.



May 2015 – This is during step 4 of that process

Manzanita is very difficult to germinate from seed; almost all nursery plants are rooted cuttings. The problem is that rooting manzanita usually requires misting equipment, a process more suited to mass production than at home. This species of “wooly manzanita” (*Arctostaphylos crustacea* v. *Eastwoodiana*) is unusual in that it can be propagated by a simple air-layering process: (1) Scar a branch, (2) bend it down into a shallow trench in the soil, (3) cover it and it will root. (4) Wait a couple of years for the roots to develop, (5) cut back the foliage the roots support and cut the branch to part it off the main plant. (6) Late next winter it is ready for transplantation.



January
2021

This is one of our three remaining coffeeberry bushes, all are getting decadent and barely clinging to life. We did have a significant germination of scions after the deluge of 2017, but none of them made it, probably due to shade. Yet if I simply cut trees (particularly in spring), these may die of sun scald. if I take too long getting to thinning, they will surely die anyway. This one is also suffering from **deer rubbing their velvet off their antlers**. What to do? I have a neighbor with lots of coffeeberry. I'll get seed and try the pre-dormant germination. If the weather cooperates and they make it over the summer, I'll thin this stand in the fall.



May 2004 – Pitcher sage made a brief appearance here, now gone but not forgotten

This situation with under-represented brush species shows that, 30 years into this project, much of it full time, I'm still dealing with the remnants of initial conditions, barely able to help a plant in need, one I have long hoped to have play an important role here. There are two reasons they have not recovered sooner. First, they are difficult to propagate and don't always make it once transplanted. It takes time to develop the knowledge and infrastructure to succeed and then for seedlings to become bushes. Second, this work is a lot of work. Between the land, writing, and maintaining and improving infrastructure or tools, it takes virtually all my time. It takes patience, a thick skin, and tools to make it go faster. Otherwise, it never happens. Late beats never. So best it be late, lest it be not at all.



May 2003

There are some shrubs that did repopulate the understory requiring no effort on my part other than thinning. Hazelnuts (*Corylus cornuta*) are probably the best. They have mid-range fuel value, feed native insects, make tasty nuts that good for wildlife, lose their leaves for winter (thus stimulating groundcovers), coppice well, and don't tend to overpopulate. As a bonus, they are inarguably beautiful.



May 2021

So far, hazelnuts have not transplanted well after germination in tree pots; they do this on their own.





July 2021

Ocean Spray (*Holodiscus discolor*) has made it back. It spreads from seed, but it is not terribly invasive. It coppices well, producing hard, stiff canes Indians used as shafting for arrows. It is of intermediate fuel value. Yet its special value is as a pollinator for the tiny “sweat bees” one otherwise sees only rarely. Under the right conditions, they can form a virtual cloud around this shrub. It’s one of those things one never notices unless getting really close at the right time of year and with the right conditions.



July 2021

Like this.

Maybe some day I'll get a still photo that can capture it, until then, at least you get to appreciate what the bugs find so attractive.



May 2015

Buckeye (*Aesculus californica*) and elderberry (*Sambucus nigra*) share similar stature and tend to occupy the same sorts of spaces, but grow very differently. Elderberry grows VERY fast, stays green longer, and well, it makes elderberries. Both are good on steep terrain, as they don't grow tall enough to tear out much soil if they fall (although elderberry can get top heavy and fall quickly). Both coppice well, which reduces the top mass compared to the root mass, thus stabilizing the slope and the 'tree.' Buckeye is preferable toward reducing fuel value, as the wood is simply full of water even when it turns brown in summer. It is also the first to break buds in spring.



June 2010

This is chamise (*Adenostoma fasciculatum*) adorned with poison oak. Chamise (also called “grease bush”) seems to prefer extremely poor heavy soil. We don’t have much of that here, but it is a deer forage, regenerates after fire, and responds well to coppicing. “Grease bush” is known for burning very hot and also rendering deer meat less than desirable (hence the name).





April 2010 – The surrounding groundcovers are all native, clovers (3), lupine, madia (3), lotuses (2), iris, cudweed...

Poison oak (*Toxicodendron diversiloba*) grows as a shrub, a vine or a groundcover. It regenerates from roots, which spread like cables in soil, thus inhibiting soil movement. Its behavior ranges from benign to borderline predatory depending upon sun and maturity. In the area above, I keep it on the ground and kill it if it either attacks the other shrubs and trees or grows along footpaths (neither my wife nor visitors are immune). I also weave it into other shrubs along the county road, thus making a dandy fence that is also colorful in the fall.



July 2021

There are limits to everything, and what I learned was that poison oak can infringe local biodiversity. It will “lie in wait” building an enormous root system. Under the right conditions, said root system can suddenly expel 6’ tall stems, dominating the area in only months. At that point, it is no longer inhibited by fire or mowing; it instead sends a thank you note. Without goats, the only solution at this point was herbicides, chalking it up to an experiment I had no idea I was running and might have precluded but for my tolerance for its slow infusion. I suspect the only way to balance it out without chemicals is regular herbivory for which I do not have the facilities or the time because of the demands of weeding. Whether and how we might be able to incorporate intermittent animal brush control without introducing new pests and problems I do not know but have my doubts.



August 2021 – Note the vertical unbranched stems, indicating that it is ALL this year's growth up to 6'. This was sprayed 6 weeks prior.

Unfortunately, that “predatory behavior” has poison oak capable of taking down trees and other shrubs, as well as smothering other groundcovers. Once it does that, it then bolts into a solid brush-field that can cause firefighters to flee from the toxic smoke it makes, not to mention that it grows into the roadway causing cyclists to complain to the County, which then brings in the mowers spreading exotic seed everywhere. Beyond goats (which one can’t use on the roadside), there are few ways to beat it back other than herbicides. Hence, the best way to manage it is to sustain a vital native groundcover, particularly grasses such as *Calamagrostis rubescens* or *Festuca californica*, the latter of which exudes allelopathic chemicals that deter competition.



Garden Citrus Trees
within fenced yard

May 2015

W

By far, the easiest shrub to establish is monkey flower (*Diplacus aurantiacus*). It can become something of a pest and/or a hazard. With enough sun, this plant will form a solid wall of blooms. Do not grow it near a structure as it burns like gasoline, particularly when it gets old, dry, and scraggly within a few years. This stand was whacked to the ground three years ago. It will get it again this fall.



Golden Yarrow
(*Eriophyllum confertiflorum*)

Burned It Here

May 2015

This monkey flower was whacked in fall 2014. It came back lush and green next spring. Clovers (and weeds) came up on and below the spot where they were burned.



January 2020 – This specimen is about 25 feet across, and it's getting decadent. I let it go to function as a seed screen, but now it harbors that seed. I will remove it soon to expose that soil and deal with the weed bank underneath.

The outlier among regenerators is *Baccharis pilularis* (coyote bush). It has rough bark, burns like crazy, makes lousy firewood, and is inarguably invasive. To control their spread is simple, but timing is critical. Coyote bush is a dioecious species; i.e., there are only male and female plants. The easy way to have some around while keeping them under control is to **cull females**. No, this won't cause a problem; if you have coyote brush at all there **MUST** be females within seeding distances, which can be miles because (*Baccharis* being an aster) the seed rides on the wind like a dandelion. Unfortunately, the two sexes are distinguishable only by flowers (sorry), so the time-window for detecting and killing said females before they release their wind-blown seed is relatively short and during the time of year competing with forestry. I tend to cull all at once every few years. They can get big, and are then hard to kill. The best way to kill them is to cut them to the ground and treat the stump **immediately** in the manner described for trees (next chapter). It is a late season pollinator, so one should have at least some around. Male plants are effective as a filter to capture airborne weed seeds.



March 2016

Then there is **blue witch** (*Solanum umbelliferum*). I had high hopes for this plant. It is a member of the tomato/potato family, yet despite the toxicity of its seed, deer do seem to like it as a summer forage. It stays green, spreads easily underground in sandy soil, blooms all year, provides late season forage, and doesn't get so big that it presents a fuel problem. The problem with it is that its roots are more edible than the tops, making it a favorite of gophers. **Growing blue witch on steep slopes is to invite a landslide problem.**



January 2022 – This is as handsome as it gets. The fungus is attacking on the upper right.

Finally, there is yerba santa (*Eriodictyon californicum*), whose only saving grace is that it will establish where nothing else will grow. It gets big, burns hot, and it's an ugly plant hosting a black fungus that wrinkles the leaves as they mature. It also produces long runners that will erupt at some distance from the parent. It is reportedly medicinal, but functionally, undesirable except as a way to stabilize a loose slope. Yerba santa is invasive after a disturbance, but the seedlings pull easily in winter.

THE LOW BELOW



March 2015 – The grasses are *Elymus glaucus* and *Bromus vulgaris*

Atop the corridor had been newly exposed to light . The yellowish herb is yerba buena (*Satureja douglasiana*) which is wonderful, smells heavenly, and moved in quickly. If you look in the back you will see two bunch grasses I added just as I was finishing this job in the late winter of 2013: *Festuca californica* (red arrows). I first found these grasses in an established oak woodland like this one. The idea is to see how they do with more sun and if they will compete with the brome at lower fuel value. *Ceanothus* took over instead.



W
T

April 2015


This is the shady side of our corridor, populated largely with *Stachys rigida*. This plant is of the same genus as others proven to exude sugars that feed nitrogen fixing bacteria in soil. That such bugs would be in the rhizosphere loose in soil makes doing experimental work on them very difficult, as one cannot know all the relationships they require with other bacteria and fungi to function normally with existing technology. Nor could one justify the expense of such a study easily without evidence of a potential economic benefit. We are testing it here as a companion plant in the vegetable garden to see what it does.



June 2015



Calamagrostis rubescens (pine grass), although not terribly productive, is WONDERFUL to manage! It is quite shade tolerant. It spreads by rhizomes, holds steep soils, and does well from transplanted root nodes, albeit spreading slowly (it rarely seeds). It also seems to suppress the blackberry while allowing groundcover diversity. This stand has held stable like this for five years.



Blackberries

Raspberries in white root sedges

July 2015 – Yes, that is a calla lily, a legacy of the people who once lived here.

With enough sun, native blackberry can make a mounding mess and a rather unpleasant place in which to weed. It tends to deter deer browsing somewhat, thus abetting the proliferation of too many young trees, putting the successional system on steroids. Fortunately, it is adapted to frequent fire and antelope browsing (although at times Indians used it to shelter rabbits). In this case, I've separated it from the native raspberry it was choking, simply because I don't have much of the latter.



April 2015

Another favored forest groundcover here is snowberry (*Symphoricarpos mollis*, foreground), effectively a low-growing shrub that gets no more than 12" tall here. Snowberries, while not at all tasty, are food for wildlife. It can be slow to start, but spreads by both air layering and rhizomes. This species suffered terribly because spraying to remove bedstraw and hedge parsley, but is now making a comeback. Yet in the background it faces competition from *Sanicula crassicaulis*, a weedy native that I have since made some effort to control.



June 2015

Pacific sanicle (*Sanicula crassicaulis*) is a physically obnoxious native plant. It spreads like wildfire. It grows tall enough to get in the way while weeding. It produces sticky burs that get into everything. And it remains standing after it dies as a stiff branchy bunch of twigs. It is also potentially a valuable spice, producing a smell so wonderful one I was tempted to promote it in desserts in a manner analogous to clove. So, I let it go. There was no interest in sanicle seed from the local high-end restaurants out of fear of the FDA, and being sued. So I came to regret letting it go (just because it is a native plant does not mean that letting it run wild is a good thing, particularly because the system as a whole is so damaged). One reason it may be so invasive is that its parasites may not be present. There is a moth also known to be rare (*Greya reticulata*) that lays its eggs in both sanicle and *Ozorrhiza chilensis* (California Sweet Cicely, another truly wonderful herb). Unlike exotic hedge parley (*Torilis arvensis*), It took only 2-3 years to bring it back under control, pulling off the seed and spraying seedlings individually. Eradication is not the goal, but a strategy I call "resistance."



July 2015

Because it is so dense tight to the surface, perennial California bedstraw (*Galium californicum*) is far less obnoxious than its supposedly native cousin and may help keep the likes of sanicle under control.



June 2015

This is a pretty typical forest edge of blackberry (*Rubus ursinus*), rush (*Juncus patens*), coastal wood fern (*Dryopteris arguta*), slender madia (*M. gracilis*), strawberries (*Fragaria vesca*), monkey flower (*D. aurantiacus*), California brome (*B. carinatus*), sweet bedstraw (*G. triflorum*), and a sword fern (*Polystichum munitum*). I weed it passing by, but there is not much to do.

THE LOWEST OF THE LOW

Cardamine hirsuta

Stellaria media

Galium aparine



I would be remiss if I didn't mention that native annuals more typical of grasslands also show up as oak woodland groundcovers. Historically, this has been HARD to do, but since I restored grasslands on ridges, it has become much easier because the seed typically moves downhill into forested areas. Hence, as far as most restoration people would be concerned, the results attained by this 2012 project under a power line distribution right-of-way (left) were exemplary: Weed numbers were controllable largely by hand by 2020.

Yet if one looks at the 2019 image at left, one should wonder about that claim. Here you see bitter cress (*Cardamine hirsuta*), chickweed (*Stellaria media*), catchweed bedstraw (*Galium aparine*), hedge parsley (*Torilis arvensis*), and common vetch (*Vicia sativa*). All are persistent and most are aggressive weeds amid native perennials monkey flower (*Diplacus aurantiacus*), blackberry, California brome (*B. carinatus*), and hedge nettle (*Stachis rigidus* v. *adjugoides*). Nearby, various clovers and lotuses are starting to express.

What I had attained was purely native *reproduction* (including small annuals) but not yet native *germination*. Yet with a combination of hand weeding and my hand squirt-bottles, I could treat this patch in about five minutes. So, while this was hard, it turned out to be manageable in only the 7 years to this photo. It was much better in 2020 but I didn't get as good a picture and this spot was a worst case: a patch of alluvium retained by a "dam" consisting of a line of small logs at the bottom of a 100% slope.

Therefore, if all the weeds in the left hand image are intimidating to you, unless you are determined to have a FULLY native system, you are much better following a weed suppression strategy and focus upon the native perennials as described in this chapter.

The next image is from the same spot but from the opposite direction taken in 2021 after the 2020 North Draw Project but BEFORE weeding. If you know what you are looking at, you'll be blown away...



This is the same location with a line of logs to on the left retaining alluvium, but from the opposite direction of the prior slide also *before* weeding. This groundcover stand represents almost pure native germination. Yes, there's a little exotic *Vicia sativa* and *Torilis arvensis* yet to weed, and I did spray some *Cardamine hirsuta* this January. There is still occasional *Silene gallica* and a little rip gut around, but all that is easily managed for the next year or two.

So the story of the 2012 thinning above the 2020 North Draw Project is not only about restoration of native annual cover (almost never even a goal of a restoration project), but that it took me “only” 8 years to do! By comparison, the same level of nativity took me more than **20** years on the Main Ridge from the south now feeding seed down the slope above.

How this was accomplished gets to the second reason for attempting the North Draw Project having preconditions, goals, and scale that are each more challenging than the slope under the old right-of-way. Historically it had been bulldozed, terraced, seeded with legumes, and abandoned. It was grazed by cattle as recently as the 1950s. In 1990, it was 8 feet deep in French broom. The slopes above were treated 8 years ago. The bottom of the draw is bigger, it will have more sunlight, the soil will get stirred up pulling logs, and burn piles will release germination hormones into a deep and dense seed bank of broadleaf weeds capable of long-term dormancy. **Yet with this North Draw experiment, I hope to achieve the same goal of dominant native annual reproduction in only 5 years**, employing a new twist on the process.




These
rushes...



June 2019

The return of native annuals in forests benefitted greatly from the work in grasslands, but it was roads that were the “conduit” between them. Truck tires and dragging logs moved seed along the roads, the openings for which allowed sufficient sunlight to penetrate for the annuals to germinate and express seed in close proximity to hardwood forests. The annuals then invaded the woodland. Such “edge effects” are among the most interesting and diverse patches of plants on the property.



...are
these
rushes

June 2019

There are about 20 plant species in this photo. Would you believe I had graded this road only just over two years before?
The knowledge obtained in places like this is then applied to larger projects elsewhere.



November 2020 – These plants were treated with Neem oil to get them established, which as a systemic defeats the purpose of facilitating monarch butterflies. Oleander aphids don't seem to mess with food plants, so I may let them go to see what happens.

Hoping to introduce or spread these plants, in many cases I had to find seedlings and transplant them or learn other means of propagation involving direct horticultural experimentation. That started as developing necessary temporary nursery infrastructure scaled to the task at hand because I didn't have anything else. Today I can use the **vegetable garden as a test bed** to learn about a particular species, produce seed, or test propagation methods. This milkweed (*Asclepias fascicularis*) was started from seed obtained from a neighbor. I didn't know that it spreads by rhizomes, thus filling this bed with tenacious roots (not good for the next experiment). My understanding is that it doesn't transplant well, but I'm hoping to get it mixed in with the sedges. We also found that it is attacked by oleander aphids (*A. nerii*) which I happened to know that they definitely prefer milkweed to oleander. How? There is still one oleander on the property kept as a legacy to the house that was once here. Until now, there have been no visible aphids on it. But if I do take it out, would that help? Aphids can fly 20km to find a host, but that was tested on relatively flat and open terrain...



January 2021 – during a nasty drought

One finds that where plants first show up isn't necessarily where they do well, as determined by whether they reproduce [seedlings that survive](#). The solution is found in putting transplants in candidate spots and watching how they do. I once transplanted nearly 100 *Zauschnerias* (hummingbird flower) from seed obtained less than a quarter mile away, of which only two survived and none has reproduced. If they survive but don't reproduce or spread, they are culled or inter-planted with other species to allow that spot to be used for something else. A more recent experiment with California fescue (*F. californica* above) has been more successful.

TOO MUCH "MORE"



June 2018

In places, we were getting oak trees sprouting at a frequency of thousands per acre, thus producing an unsustainable monoculture fuel load. Madrones can sprout in equally appalling numbers. If allowed to continue, nothing good comes of this.





October 2013



Let that situation go and this is what happens in only three to five years. This obvious fire hazard is also disastrous to biodiversity. There are three solution sets: (1) encourage animals to eat seeds and browse seedlings, (2) take out seedlings manually, and (3; the most efficient and subtle) manage groundcovers and parasites such that they inhibit germination or establishment.



June 2018



One finds out that even with a small but voracious herd of hungry deer, scads of band tailed pigeons, acorn woodpeckers, and plenty of squirrels, all chugging acorns... they help a lot, but they don't eat enough to prevent the inevitable.

We need more herbivory here, and that means predator control, particularly coyotes, which do have a taste for fawns.



June 2018 – They'll pull up the whole seedling to get at the mast

Within two years of commencing this 'savannah strategy' there was a resident doe with twins. After four years the herd was 5-6. Despite the huge acorn crop we had last year, this year the oak seedlings are under control except when sprouting amid an inedible shrub (monkey flower being a prime example). Things are progressing to the point that the bucks may start fighting for territory, forcing the loser on and off the property. What then? Why won't my government let me take animals I've raised and fed? If they were goats I could but I would have to house them. These are less trouble and expense, albeit they are not as thorough browsers as goats.





November 2013

The first preventative step was to recruit something to eat the seed the trees produce every fall. Three principal candidates for oak acorns are deer, band tail pigeons, and acorn woodpeckers. The challenge is that acorns are seasonal, yet there needs to be enough food around for the rest of the year for the animals to stay. Without enough to eat, animals don't stay. That means they come in from somewhere else carrying seed, most of which is bad. Band tail pigeons are obviously not containable, although for the first time they wanted to stay here for about 8 months this year. As a bonus, they eat both acorns and madrone berries. To keep them over the summer, the answer may be more elderberry and coffeeberry.



July 2018

Acorn woodpeckers are easy to keep here because they store their food in granary trees. They are just getting started on this 30" dbh redwood (zoom and pan and you'll see a few acorns). One can also carve woodpecker nesting holes in the trees with a chainsaw, and yes, I asked the Cornell Laboratory of Ornithology for the specifications. Nobody from the Pacific Coast had ever done that before.



One simply cannot know if a preventative measure is working unless one has a clean slate free of the acorn seed bank. So my first move was to invent the root slicer. I sliced acres of seedlings (done in wet soil during winter). I can cover a 2-3 acres per day of very hard work. Killing that many seedlings manually is painful, but when the situation is out of control and one wants something preventative, the first step is to gain control by any means possible, and then work out ways of making things easier and safer.



As to our third strategy, managing for groundcovers such that acorns don't sprout almost seems like black magic. But I can assure you that it is possible, in part because of this "observation" that living in one place for so long can afford. Both of the photos above are under the same tree right beside our house. I had ample opportunity for years to notice the differences before it finally dawned on me. At left is deep duff where I remove gobs of seedlings every year. The same thing happens on a road behind the same tree next to the propane tank, a hard mineral soil. At right, is a patch that I planted with snowberry, blackberry, iris, and yerba buena. I have **NEVER** had to remove a single oak seedling in this patch. Sometimes it's hard to notice things you don't have to do.



May 2015

As to my personal preferences in groundcovers, this entire area takes me but a day or two per year to weed, less every year. Now I can start more shrubs for herbivory and trees to replace the unstable remnant as there is finally enough light to grow them.





May 2015

Dense stands of bay trees were a hazard. I thinned for more hazelnuts, toyon, coffeeberry, buckeye, and elderberry. Pitcher sage once grew here too. I would like to burn it in stripes to test for the differences in timing and see what comes up on a manageable basis.





May 2015

For now, the maintenance is not so bad. I almost never want to go anywhere else. It's good exercise too.
Why "work out" when you can work outside?



Power Lines Above



May 2015

If I can couple this type of thinning with the stimulate-weed-germination-into-short-duration pre-emergence-herbicide processes I am developing, I may have a way to restore a forest capable of responding positively to a fire event economically. I want productive shrubs and native groundcovers on much larger scale much more quickly, then to introduce herbivory once the system has established. I did this power line right-of-way on the north end the hard way in 2012 and it was (and is) still a lot of work. More on this North Draw



May 2015

So the next big job is overstocked clusters of redwood. Does it ever stop? Do I ever get to rest? Will it ever be "Natural" again? This is the Wildergarten: for the sake of the forest, hopefully never.



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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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