

FAZED FORESTRY



February 1994



In addition to the dead and sickly, the first trees to go were the “weeds,” some of which were rather large (the guy in the photo is 6’-6” and the butt is sunk in the ground). Logging out a big eucalyptus is an undertaking, one requiring heavy equipment. The saw had a five foot bar with extra oil squirted on it while cutting. This was one of three such monsters on our property. In this and one other case, we needed a medium-sized bulldozer with a 3/4” cable winch and an anchored block to pull it down going uphill. Then we brought in a skip loader to get the pieces into a dump truck. Gaining access entailed improving both roads and drainage.

This is a neighboring property to the north of ours.

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).

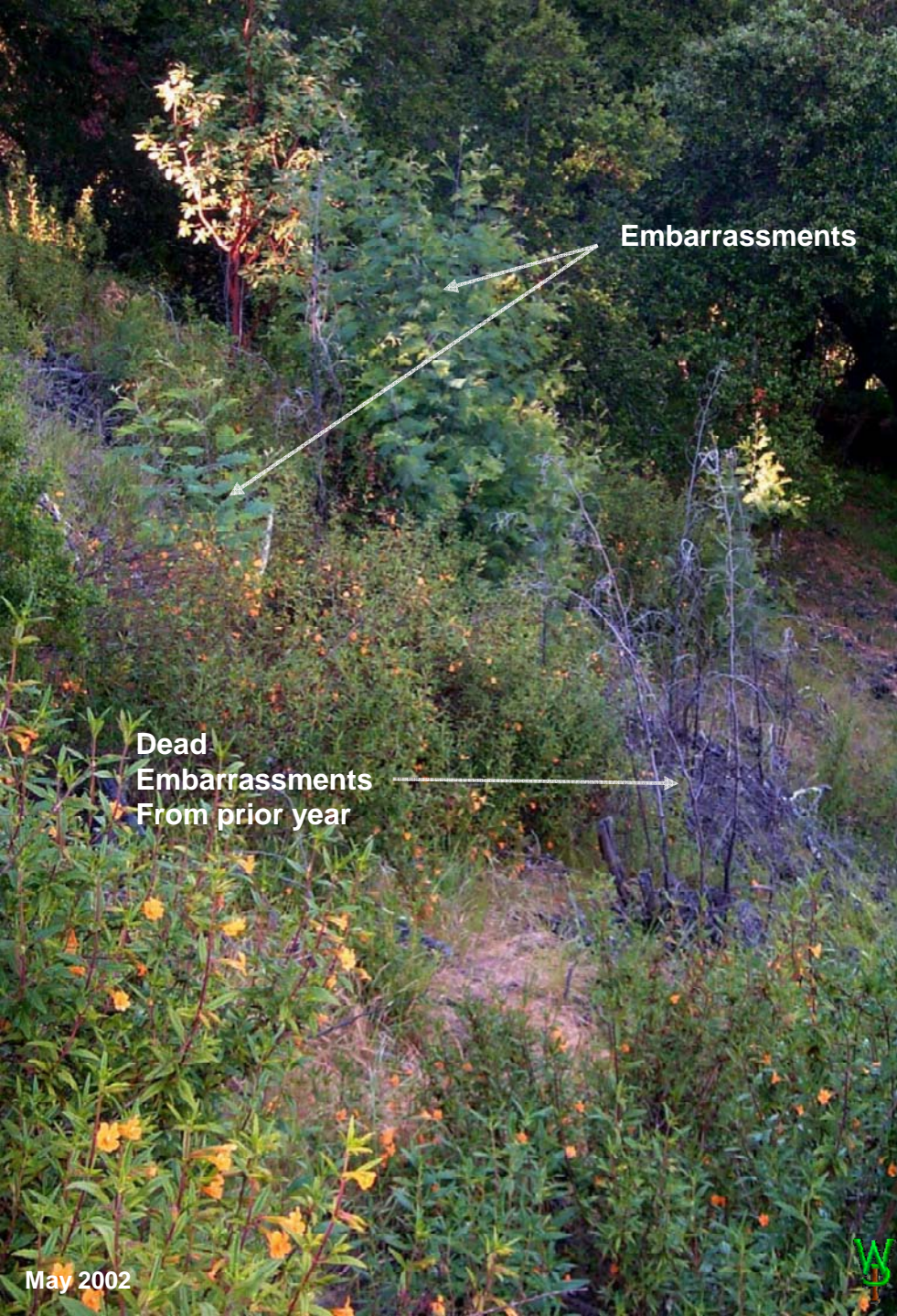
The only thing that did well here under the acacia was *Oxalis pes caprae*, a South African exotic of considerable virulence that took five years to get under control.



October 2013



The other “weed” tree here was acacia, also from Australia. In the case of acacia, I cannot fathom a legitimate reason for the original introduction; they simply make lousy trees. They bolt immediately, fall atop each other, and spend the rest of their lives dropping trash, making people sneeze, and seeding (it is a legume). Cutting up a stand of these is dangerous, as they lay atop each other with slippery “spring-loaded” trunks. The loads on the trunks are complex and the likelihood of being be hit by a sliding tree is considerable.



Embarrassments

Dead
Embarrassments
From prior year

At left, this newly established patch of almost entirely native scrub was once a stand of acacia. This was a monoculture forest; nothing else was alive inside the stand. Monkey flower (*Diplacus auranticus* used to be *Mimulus*) and yerba santa (*Eriodictyon californicum*) both colonized this newly exposed site aggressively.

Needless to say, the acacia trees keep trying to make a comeback from their dormant seed and I get to pull, cut, and daub the seedlings every year (going on 18 years now). Occasionally one escapes my notice (it is easy to miss a naked grey stem when weeding on the ground crawling in a chaparral), so they get to embarrass me when they poke their heads above the brush and then require a chain saw.

This site would be easier to maintain as a forest, but I do not have many good places for brush that do not constitute a fire hazard. I usually maintain brush in horizontal bands no more than 60-80 feet up a slope 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 fuel buffer above them. Goats would probably help here.

So as restorations go, this acacia clear-cut was fairly easy. Just whack the bad trees, haul the wood away, burn the tops, and watch the native brush grow while weeding out the bad stuff (primarily grass weeds (*Festuca myuros* and *bromoides*). It is usually not that easy. 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 it and deal with the consequences. Fire is an inevitability; our choices are limited to how to manage it. I *would* like to burn this some day soon.

Now, on to native forests.



This tree... →



June 2010

This is the beginning of the “phased” thinning process in an evergreen oak/madrone woodland wherein native trees are removed selectively in a series of steps. The primary purposes of the process are to sustain a stable fire-safe condition until I can get back to it, weed control, and to minimize the loss of organic matter for topsoil. Above is what I call a Phase 1 thinning, wherein I remove the dead undergrowth and dead or dying trees to reduce the fire hazard and to be able to move around freely. The canopy is still closed and there is very little groundcover. This is a very stable configuration because there is insufficient light for rapid growth.



...is this tree

September 2013



Phase 1 bought time while I got control of the grasslands. In this Phase 2 thinning (same area), I removed enough canopy that broadleaf groundcovers can begin to express themselves. The purposes are (1) to develop the more mature trees I want to keep, allowing them to recover from over-crowding and (2) to produce enough groundcovers such that when I expose the surface to more light in Phase 3, they will quickly cover the soil to suppress weeds without becoming grasslands that are much harder to manage. Again, both Phases 1 & 2 are fairly stable configurations. The wood strategically laid across the slope is to retain leafy duff that adsorbs rain impingement, slows runoff, feeds fungi, and builds topsoil.



Stumps



June 2010

Here you can see a Phase 2 treatment from about 8 years prior with said sparse groundcovers retained as stunted individuals 0-3 feet apart, as planned. Unfortunately, the treatment does nothing to stop scads of oak seedlings from taking over the groundcovers (upper right). I had also left a substantial number of stumps untreated. Having since learned better, both of those problems are on the wane.



August 2012

Yes, one of the consequences of thinning is that the trees breed. Remember: People once consumed large amounts of acorns and madrone berries in this region. No more. Guess what happens? You get LOTS of seedlings that kill off those groundcovers. In one spot (not here), I counted the equivalent of 18,000 oak seedlings per acre. It can be a fire hazard too. One either needs animals to eat more acorns and berries (and therefore management of their predators) or a way to cull the seedlings. Oak is hard to kill with sprays that are deadly to non-target plants. So, I invented a tool that is faster and more effective than spraying. Wanna buy one?



November 2013

In addition to stomping seedlings, I do what I can to attract acorn grazers. Deer are under pressure from coyotes around here, about which I can do relatively little considering their numbers (I bought a caller, but so far I don't make a terribly convincing wounded rabbit). Yet we do have acorn grazers in acorn woodpeckers, squirrels, and band tailed pigeons. I just lost a fir tree to a root fungus, so I plan to convert that to an acorn woodpecker roosting hostel cutting nesting pockets with a chainsaw. As to the band tails, upon occasion, we have those aplenty when the oaks drop or the madrones have berries (above). More elderberries would help keep them year-round.



October 2013

One of the consequences of trees breeding is that they *all* want to grow. I counted about a dozen oaks on the left about six to eight feet tall in a space of about five feet. The groundcovers in the foreground are because I whacked up to this point last year. Once the stems get over 2" in diameter, they are hard to thin. Only fifteen years before, this was a road.



September 2014

So I thinned it. Note that I saved an oak instead of conifers. That is because I intend to thin the area around it after the trees (2) that I left get over the shock of thinning. If you look carefully, you'll see that the top scorched a bit with the extra sun and drought. I'll be working down the slope uphill and to the left of this spot this winter.



In the background is the only remaining area on the property that has not yet been thinned at all (Phase 0). Although all the visible vegetation is native, there is probably exotic seed in the soil. The fuel on this slope represents a severe fire hazard. Unfortunately, with nothing on the ground one does not just thin precipitously, for several reasons. First, this is a VERY steep slope, most of it over 100% (45°). So it needs either mulch or something growing on it to break the impact of rainfall. Second, weeding a remote slope like this would be quite laborious. Third, it is adjacent to a redwood stand I want to keep. So my goal is to maintain this as a forest, but with fewer trees to allow an herbaceous forest groundcover and a few shrubs of low fuel value such as hazelnut, toyon, coffeeberry, or huckleberry as food for wildlife, but without much grass (unless it is *C. rubescens* or *F. californica*). The goal is what is called a “shaded fuel break.” Unfortunately, adequate trees for that purpose are few here.

What you see in the foreground is essentially a Phase 2 thinning. I chopped up the dead brush (mostly Ceanothus) and thinned out the scraggly and dead oaks and madrones in order for groundcover to establish. In this case what came up was what looks like an odd form of grass. Those are *Iris fernaldii*. Lilies are a family of plants here that have returned successfully from the native seed bank. Iris are perennials more accustomed to shade than most post-disturbance forbs. That meant that they were able to keep producing seed long after the forest began to take over from what had been burned off here in the 1940s. It also suggests that the cows found this area a bit steep for their liking (iris are poisonous).

Once the groundcovers are growing securely in place at a spacing of one every one to two feet, I can then start taking down the large and unsound trees. Unfortunately, in this case there aren't any decent seedling trees. So, what I am hoping will happen is to gain some fir seedlings from which to select and then thin it. There are plenty of nesting sites nearby, so that is not a consideration here.



June 2010

This patch is in Phase 3 (about 60yds away). I opened it up enough for patches of perennial groundcover and some shrubs with annual lotuses, clovers, blue dicks, and sanicle. There are two grasses that usually populate at this point: pine grass (*Calamagrostis rubescens*) and blue wild rye (*Elymus glaucus*), both are well suited to shade. The pine grass is low-growing, thick enough to make weeding easy, and a tremendous erosion control (my favorite grass here). There are also sedges (*Carex globosa & tumulicola*), irises, lilies, and numerous herbs. Just keep the brush and tree seedlings down and the other grasses out and it's OK. Note that the trees are putting out new growth lower down. Their crowns will spread and a few of them will make decent trees as we thin out the rest.



July 2011

Phase 3 focuses upon developing the few trees we have with a decent future. In this case, I retained this small oak in the foreground because its lower branched structure gives it a better chance to be a sound mature tree than most of what I had. When I removed the adjacent leaning and top-heavy oaks and madrones, it recovered immediately. I may yet take the top out of it and head off a couple of branches, because even with this degree of thinning, it is likely to bolt. The question relates to how many trees over what type of groundcover makes for the best combination of easy maintenance and productivity. The groundcovers can take 4-5 years to develop.



June 2010

Grasslands are 4-10 times more demanding to weed than woodland groundcovers. I maintained these pockets of groundcovers between what I call a “dark barriers,” stripes of dense tree cover to reduce the chance weeds will spread from one pocket to the next. These open patches are shady enough to keep the grasses down somewhat. In some instances I plant new trees, but I prefer to start brush first because the brush offers tree seedlings protection from browsers and induces them to develop straight trunks.



June 2010

Sometimes, the easy way to get the brush going is a burn pile. Where there is seed, up comes Ceanothus! This pile produced twenty seedlings for transplanting, yet there are still more than this spot can sustain. There are already small madrone trees starting inside. Note that, if this whole area burned, all I would have is a bigger patch of brush, a completely unmanageable situation. This is safer, provides the necessary browse for deer, cover for quail, food for rodents, and flyways for raptors. Over decades, this process will produce an uneven aged stand of oak and madrone with small patches of fire-adapted brush in between. This is the start of Phase 4.



June 2010



We're back to that ridge with this repeat photo. To recap, I was losing grassland to the broadening canopy of oak / madrone woodland. I took out a couple of trees on the right, the grease bush (*Baccharis pilularis*- a male), and thinned the slope at left.

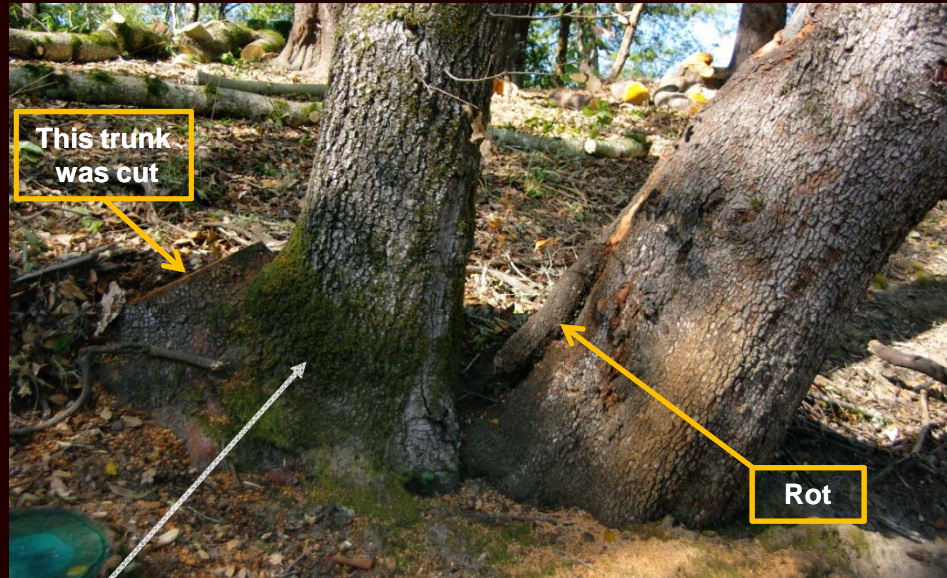


May 2012

I thinned it, a lot. Now that I have the grasslands under more control, I can afford to get a little more aggressive about forestry. The flags represent a multivariable soil experiment we'll discuss later.



Do you see a problem? It is a serious one and way too common. Well I didn't see it, and neither did the foresters contracted to the power company who walked these lines every year looking for adequate clearance. This tree has adequate clearance, but it also has a very weak crotch with co-dominant trunks tall enough to take out the lines and enough windage to put a heavy moment-load on that crotch. The reason nobody noticed it is that there were so many trees one could not see it easily. Nor was that the only critical problem on this one span.



This oak is holding down a nearby madrone like a big staple. It is the only thing keeping the madrone from falling on the line. The madrone trunk had internal rot. When an inspector is looking up at wires a bad stump is easy to miss. So, removing hazards to the power line was another reason for the thinning.

The third reason is that the distance between the ridge and the power-line right-of-way is so short that there really isn't room for a forest. The fourth is that the slope is so steep and shady that the trees don't grow straight. Instead, they will fall toward the lines and tear out a hunk of soil. An open chaparral is the plan.





October 2013

These shots are from either end of the same span.

The power company spends enough to manage their rights-of-way to make my electricity effectively free. So the operational goal is to make that unnecessary. The aesthetic goal is to make the rights-of-way so much a part of the landscape that they are invisible, which can take a decade or two to realize as the process must be done gradually; I have to wait for the trees to become a hazard before the power company will remove them. Yet there are simple tools in the palette. One can train an oak to be spreading when growing in a deeper draw under a span. One can blend a chaparral from the forest onto the ridge. It just takes the willingness to play with it.

Sometimes thinning produces unpredictable results partly due to the vagaries of weather. In the case of these two trees, I wanted the same thing: Both were way too tall and skinny and both were along power lines. So they either must regenerate from lower down or be removed.

I thinned both areas same year. Yet just as they were leafing out, we had a 105° heat wave. Both trees apparently suffered from "sun scald," a condition in which a tree accustomed to shade is suddenly exposed to sun and the bark is too thin to tolerate it. I've only seen this once before in oaks and the recovery was very slow. It is quite common with madrone.

The one on the left put out new growth on the side where I wanted it and sacrificed a branch where I did not want it. In other words, it did what I wanted it to do.

The one on the right lost everything and was too far gone to save.



New Growth

This branch died back



October 2013





May 2012

This heavy Phase 3 cut under that line was because the eventual goal is a band of brush. I will be planting *Ceanothus papillosus*, black sage (*Salvia mellifera*), coffeeberry (*Rhamnus californica*), and manzanita (*Arctostaphylos tomentosa*). There was already a groundcover lower down as well as a few large toyon bushes (*Heteromeles arbutifolia*). What you cannot see is the impressive response of the forbs at the top. Most of that wood was loaded out by hand. So now we come to reason #5 for thinning this so heavily: I am now pushing 60 years old. I can only do such work for so long at this scale. I want to get done what I can within my lifetime (interdependence between land and a human is not a normal idea for most people). OK, so what do I do with all that wood?



October 2013



Some of it I use to slow down the runoff from rain. Some of it is left in place to retain organic matter, feed bugs, and build topsoil. I use less than two cords as firewood to heat my home and I donate a few more to families in need. The rest gets a highly-accelerated process with which to return it to the soil, and here is where things get a little “out there” for most restoration people.



April 2013



I split it, stack, it and burn it. Considering all the work it took, it looks rather wasteful, doesn't it? What the hell is he doing?



April 2013

Making charcoal, lots of it, as a soil amendment. We'll get to why a bit later.



October 2011



A word on stumps. When we thin a lot of forest, we get a lot of stumps. It simply makes life easier for me to treat them properly because I then don't have so many wads of stems to dodge. It takes a powerful saw on a short bar to cut stumps, as the sap is falling into the bar trying to gum up the chain. I use a wedge, making a clean cut as low as I can working the saw from inside to avoid dirt dulling the chain. I brush off the chips and treat it as soon as possible, twice, with a 3:1 mixture of turpentine to **Turflon**[®] along with a dye. Then I rub dirt on the face to get the fungal spores going and cover it with leaves to provide shade and retain moisture.



October 2011

If the terrain allows, when I'm done, it looks like this. With stumps that are hard to treat (such as madrone or bay), the efficiency of the process improved if it was performed in the fall when the phloem is moving downward into the roots (the flow of sap in the spring can really gum up a saw). Triclopyr does not work on conifers. I would have to use glyphosate and sever the roots between trees first.



October 2013



Treated properly, the stump won't ever look like this. Left alone, these wads can be ten feet across and six feet high (which is how I learned that I should treat stumps), then requiring a *very* expensive dose of Roundup[®], often twice. Sometimes it is actually useful to let a stump sprout, particularly if I need a temporary bush or simply wish to regenerate a new tree from one that has adventitious buds on its roots, such as a madrone.

PHASED FORESTRY OVERVIEW: AN EXPLANATION OF THE GRAPH

Parts of the next graph are the same, but much of it is completely different in concept. The first two lines again display emphasis upon forestry activities by type: conifer or hardwood. There is an important reason conifer work is included in our treatment of oak madrone woodland because large firs (and in places redwoods) are commonly found invading oak madrone woodland here because of fire-suppression. Unfortunately, I do not possess the equipment to deal with large fir logs at will; they are way too big. Hence, that type of “logging” is an activity specific to having the equipment on hand and therefore on a separate line from hardwood management. Yet the log removal had to be lumped in with actual redwood logging elsewhere.

For example, the redwood timber job I did in 2000 was almost exclusively for the purpose of illustration for writing *Natural Process*, albeit I learned a lot more from that job than expected, as you shall see. At that time I had several large fir trees removed from hardwood forests on other parts of the property.

Fir is usually treated here as an artifact of fire suppression higher up on ridges. None were older than 80 years while the larger redwoods I’ve cut were about 110. Hence, as little as 50 years ago, Douglas fir trees were probably not found where oak madrone woodland is today, then again as the site history pointed out, oak madrone woodland may not have been there that long ago either. That choice is made primarily because woodlands are so much easier to maintain than are grasslands of which I can only handle so much depending upon conditions.

Said lines of emphasis are there to show that from 2003 to 2010 I did relatively less hardwood forestry while I was focused upon getting control of our grasslands. During those “middle” years, I harvested 2-6 cords of firewood per year, not the 30 of the first year or the 18-20 cords per year typical since 2010 (a cord is 128 cubic feet of tightly stacked firewood). During that time, the status of the phases below do not change much.

The other lines lower on the graph roughly depict Phase status as a function of time; i.e., any particular line depicts the approximate fractional area in that particular phase. The top two lines of the graph map onto those below them as does the time available at the bottom.

And all of that is why we call it a “convolution.”



PHASED FORESTRY OVERVIEW

If these graphs don't work for you, [please let me know](#).

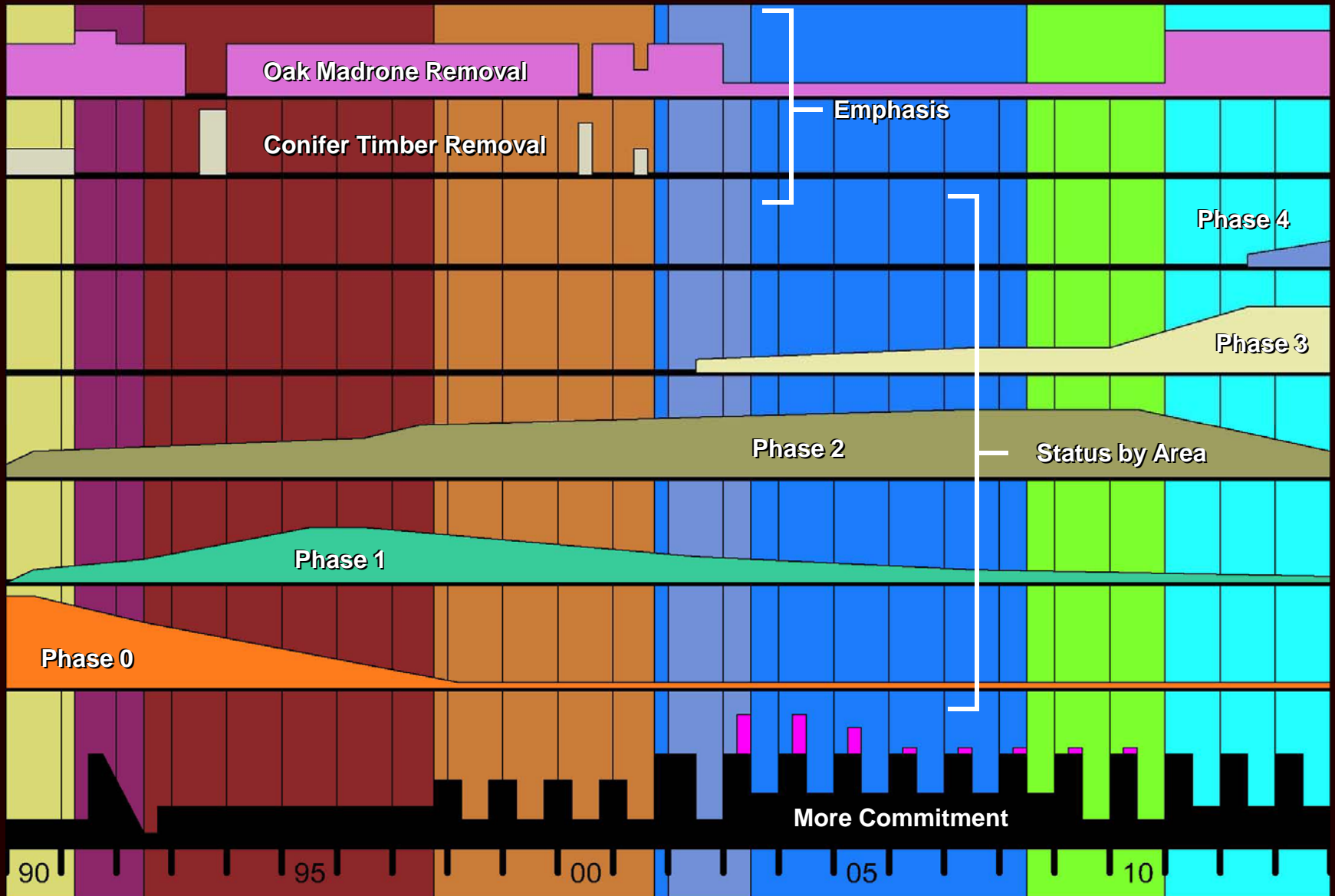


TABLE OF CONTENT

Each line in the TOC is a link that opens the corresponding chapter in a new file.

Part I - Introduction

1. Wildergarten
2. Why Native Plants?
3. Native Is Not Enough
4. Site History
5. Repeat Photography
6. Germination of Native Annuals
7. Project Overview

Part II – Forestry

1. Phased Thinning of Broadleaf Forest
2. Control of Understory Weeds
3. Conifer Forestry
4. Drainage
5. Roads
6. Aerial Photographs over 25 Years

Part III - Grasslands

1. War, Famine, Disease, and... What?
2. Colonization Behavior of Native Annual Forbs
3. Sand Hills
4. Meadow Variety
5. Grassland Restoration and Soils Rehab
6. Weeding Technique
7. Cleansing the Weed Bank
8. Pre-Emergence Selection for Native Germination
9. Drought Tolerance

Part IV - Miscellaneous

1. The Vegetable Garden as a Research Tool
2. Pollinators and Native Forbs
3. Fungi (not yet)
4. Specialized Tool Development

Part V – Project Context

1. Periodic Disturbance and Feed-Forward Stability
2. Weeds: A Tragedy of the Commons
3. Control Boundaries
4. Central Planning
5. Our “Ownerless” Backyard

Next

