The Responsible Party

Four Leaved Allseed
(Polycarpon tetraphyllum)

Common Groundsel
(Senecio vulgaris)

Catchfly, *(Silene gallica)*

Persian Speedwell
(Veronica persica)

Mouse-eared chickweed
(Cerastium glomeratum)

There really are serious environmental problems out here. Weeds like these may seem insignificant to most people, but if I let any of these little pests go, they can ruin native plant communities. Exotic plants are seriously damaging the productivity of farms, ranches, and forests, worldwide.

Isn't it time we learned:

- **What is at stake,**
- **What it may take to fix it, and**
- **How to reduce that cost?**

Isn't it time we let people get started?

Smooth Cat's Ear
(Hypochoeris glabrosa)

www.wildergarten.com

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This is the last picture book in ***Shemitta: For the Land Is Mine***. It became a book in its own right (and an ongoing project) to be published free online later this year (2010). This story is about our local environmental problems and what we are doing about them. It is far more detailed and technical than the others. It follows this table of contents:

How to Help

This started the last picture book in ***Shemitta: For the Land Is Mine***. It became a book in its own right (and an ongoing project). This is about our local environmental problems and what we are doing about them. It is far more detailed and technical than the others. For the last thirteen years, the author has labored without compensation to stem the ecological, economic, and political damage wrought by a corrupt corporate/government "environmental" juggernaut. That project has taken three forms**:**

Restoring his own property,

1 As an example of freedom in thought and action

2 As a scientific project to improve native plant restoration technology and harmonize the interface between human settlement and "wildland" habitat

3 To establish precedents in law for freedom of action in demonstrably-responsible habitat restoration research and process development toward establishing TRULY free-market environmental management (**Our Patent**)

Publications

1 *Natural Process: That Environmental Laws May Serve the Laws of Nature* (2001), an exposition on corporate and governmental corruption in environmental regulation, and what to do about it.

2 Articles at Wildergarten Press: Mr. Vande Pol's collected writings on Constitutional history and regulatory racketeering by tax-exempt "charitable" foundations.

3 *Shemitta: For the Land Is Mine* (2009), an amazing discovery of the original purpose of the Biblical Sabbath for the Land (includes 14 picture books demonstrating the damage to wildland habitat inflicted by government environmental "preservation").

4 This project, to be a free online book.

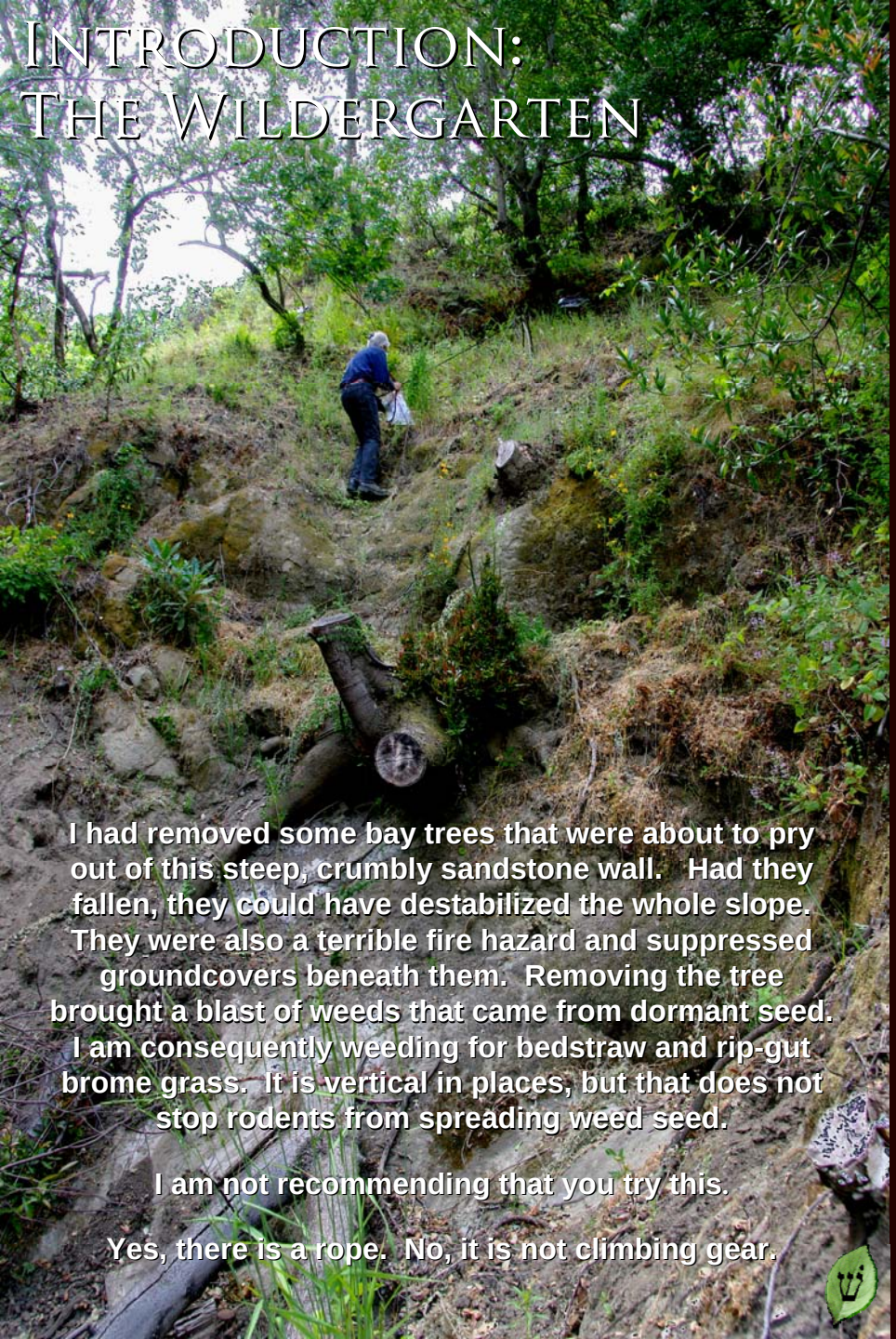
5 *Saving Seed:* Our next picture book documenting voluntary urban and suburban micro-projects in native plant restoration

Video Media (to come)

Seeking Abel: Assuring Our Survival – The criticality of urban connections with America's rural & pastoral communities

This has been an unrelenting, expensive, and physically arduous process. Mr. Vande Pol has no time for or interest in managing yet another 501-c3, but will gladly accept assistance you wish to offer**:** temporal, professional, or financial. We have a need for many hands, both on the land and in producing the communications to come. We have two new projects in the works, one about growing and foraging wildland foods, and the other about the people of America's rural/pastoral communities. Anything you can do to facilitate these projects would be appreciated. Please contact us at **Wildergarten Press**. Thank you.

Introduction: The Wildergarten



I had removed some bay trees that were about to pry out of this steep, crumbly sandstone wall. Had they fallen, they could have destabilized the whole slope. They were also a terrible fire hazard and suppressed groundcovers beneath them. Removing the tree brought a blast of weeds that came from dormant seed. I am consequently weeding for bedstraw and rip-gut brome grass. It is vertical in places, but that does not stop rodents from spreading weed seed.

I am not recommending that you try this.

Yes, there is a rope. No, it is not climbing gear.

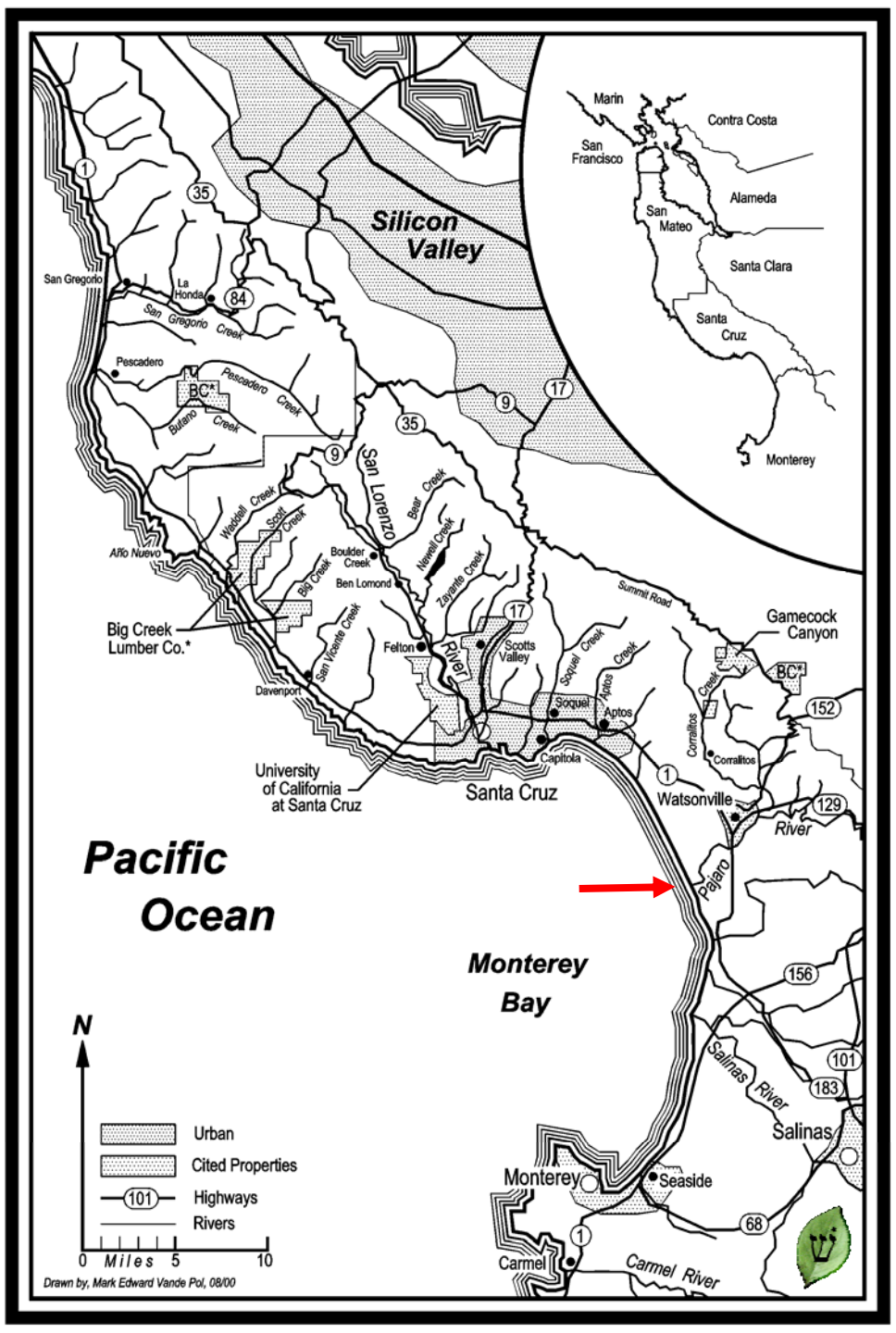
This book is not the usual green alarmism. It is not a call for more government control and wildland preservation. I am not suggesting more laws, mandates, rules, regulations, permit conditions, or subsidies; indeed, quite the opposite. This is about restoring damaged land, not about "preserving Nature."

This is a story about what drove me to quit a successful engineering career, the desire to do something about what I perceived to be the most dangerous mindset in human history**:** the false belief that "nature takes care of itself." Over my lifetime, I have witnessed that belief destroy the vitality of literally millions of acres, while crowding people into unlivable cities, rubbing shoulders until they hate themselves and each other. Meanwhile, the land falls into either abuse or no use, abandoned, overgrown, and overwhelmed with exotic weeds. Once the greatest nation on earth, now impoverished with an oppressive bureaucracy claiming to "protect the environment" from distant offices, seems to welcome it. It is insanity.

This is a love story about our little piece of the Santa Cruz Mountains on the Central Coast of California. It contrasts our restoration of native plant habitat with the "preservation" ethic common in the surrounding area and characteristic of regulatory government in general. The purpose is to impart the importance of individuals taking action to improve the total productivity of *their* land for two principle purposes**:**

1. To restore and sustain living constituents of a functioning native system and
2. To optimize the interplay of human use with native habitat, no matter how large or small, rural or urban that property may be.

This is about sustained efforts to learn-by-doing on an ongoing basis, of how to undo the damage of neglect, to accomplish something important. It is a process of discovery of how the world around us really works. It is a wonderful motivator for both children and young adults. Join me in this walk, as we explore how things look in our back yard.



The setting for this story is in the Santa Cruz Mountains of California. This is a range of steep and densely faulted hills parallel to the ocean extending from San Francisco south to the Pajaro River (see arrow on map at left). The seismic activity of the area produces a complex array of soil types which vary frequently from crumbly sandstone, to clay, to shale, or even decomposed granite. The steep canyon walls receive a wide range of sun and shade conditions depending upon orientation.

The climate is coastal Mediterranean. Summers are almost entirely dry with temperatures often varying 50°F the same day. The coastal hills complicate onshore flow, inducing inland summer temperatures on a ridge that often rise to over 100°F, while a canyon 100' below (in elevation) can have a marine climate 15° cooler. The winters can produce anything from 8.5 to 125 inches of rain in five months (30-50 inches being usual). It is a highly erosive and geologically active system.

This region is one of the great biodiversity reserves of the world. The North Coast redwood ecotype ends at the southern tip of the range overlapping the Central Coast ecotype which terminates in San Francisco. There is even an island of Sierra Nevada foothill species not far from our place. These three genetic overlays produce unique vegetative combinations that can change completely in but a few feet. Habitats include meadows, chaparral, forests, rivers, and an ocean interface with beaches, sand dunes, rocky tide pools, and estuaries.

The favorable weather conditions and a history of mining, timbering, farming, abandonment, and residential development have resulted in a long-established and still spreading series of infestations of noxious weeds. Our property alone once hosted over 110 exotic plant species. Fire-suppression has allowed forest to cover over much of that exotic seed bank, making the situation for native post-disturbance forbs particularly dire. This biological system is far more damaged than is commonly understood and it is rapidly getting worse.

For over twenty years, out of what at this point could be called Pyrrhic sentimentality (or extreme hubris), our family has been converting our mere 14 acres back to native plant habitat (the name “Wildergarten” was on our plot plan when we applied for a grading permit in 1990).

Habitat restoration is an all-consuming multidisciplinary occupation, sometimes as much engineering as it is biology. It is a physically, mentally, and financially demanding enterprise. Most of what little has been attempted has been confined to very expensive government or corporate-funded projects, most of which show debatable results, or worse.

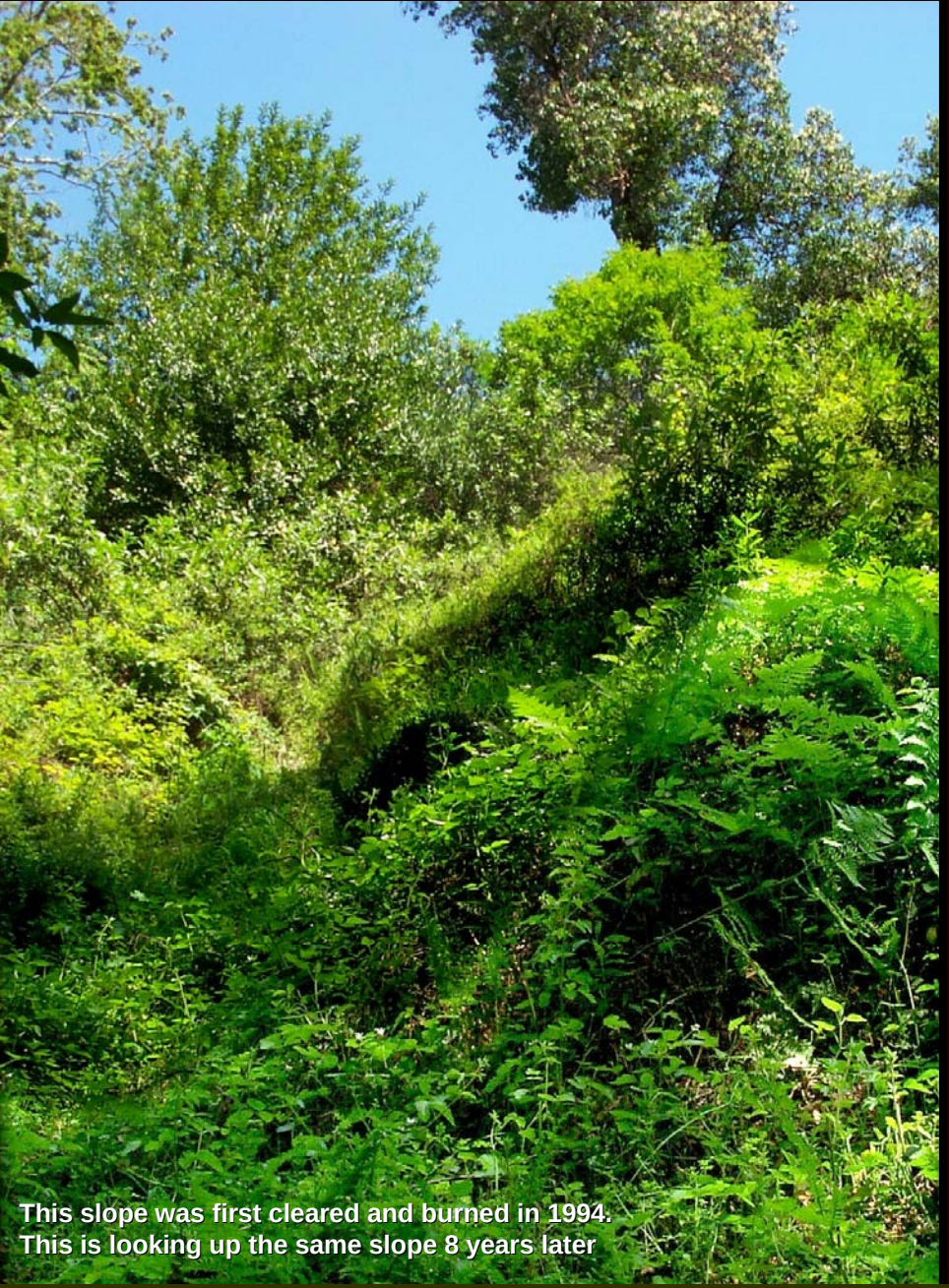
When we began this project, I was not what any rational person would call an expert in restoration ecology. We began not long before formal classes in restoration ecology had ever been offered and long before they were commonly available.

As things are now, experts in the field have brought their students here to see what can be accomplished. You see, with the **billions** of dollars tax-payers have spent on “restoring Nature” in California, there is only one (1) place in this region that has returned native vegetation down to the small forbs, and it hasn’t cost you a dime. That place is the Wildergarten.

This view is from my office window. It represents a small part of twenty years of arduous work. I know every inch of it intimately, having individually planted, pruned, or spared every tree, shrub, grass, and forb in this picture. Virtually all of them are native.

There are “Santa Cruz Sand Hills” here, spread with a quilt of clover and strange little annuals with names like filago, fairy mist, navarretia, claytonia, cammissonia, miniature lupines, and tiny madia… In an area like this there are over fifty plant species.

The meadows too contain an impressive variety of small forbs. By the time weed season is over, it is hard to find a non-native plant here, but that only represents a starting point for further study in what might be done to make it ever more productive. This meadow now produces enough *Lotus micranthus* seed to be useful in helping other meadows repopulate after removing weed infestations.



This slope was first cleared and burned in 1994.
This is looking up the same slope 8 years later

May 2010, overlooking the same slope from the side
4 years after a reentry to remove bay trees in 2006

There are steep hillsides shrouded in berries where once you could not even see the valley below. Twenty years ago, a dense canopy of fallen exotic acacia trees interspersed with eucalyptus and fir prevented any groundcover. It was a fuel bomb. Now we are introducing various herbs and berries that will provide food for wildlife while retaining the soil and managing fire hazards.

These being the Santa Cruz Mountains, we have redwoods, but unlike many places in this county, the forest has been thinned enough that there are numerous groundcovers that work wonders against the erosive forces of rainwater. The crowd of trees in the mid ground are over four feet in diameter; they make wonderful lumber, but are expensive to remove for thinning.

We have oak woodlands with fragrant herbaceous groundcovers. There are even possible returning relics of Indian farming! There are spices here unknown to the culinary arts, and they are heavenly in food. This is the Wildergarten.

Background: Why Native Plants?

Plants are the most accessible means for people to manipulate the biological world. They have few defenses, stay put, and are relatively easy to propagate, develop, and multiply. Besides providing the bulk of our food and habitat for people and land animals, they provide nutrient and structure for rivers and lakes that feed the estuaries that breed so much marine life. The ocean in turn process 80% of the oxygen in the atmosphere, mostly along coastlines. Learn to manipulate plants and one can indeed hold sway over every bird of the air, fish of the water, and insect crawling on the earth, for better or for worse.

Native plants and especially post-disturbance annuals are like the foundation of a house in that they shape the entire perennial system that succeeds them. Insects and animals need them for food while the plants need the bugs for pollination and animals for soil fertility. Many of these host/consumer relationships are species-specific, especially among insects that need a single plant species to reproduce because their larvae are accustomed to the toxins that plant produces. In return, the plant needs that insect to seek its fellows for pollination, thus making a mutually dependent system.

Migratory birds not only consume insects, but many require plants that produce the fruits or seeds for which they are specifically suited. Hence, if that botanical foundation changes composition, their migratory travels will be disrupted significantly over the long run, particularly if non-native plants take over after a disturbance such as a major flood or fire.

This Ceanothus papillosus (a.k.a. "tick bush") is a fruit-bearing shrub popular with birds during the fall migration. When we bought our place, between overcrowded forests and weeds it had been suppressed so completely that none were left alive. They came back when we thinned the forest, removed the non-native brush, and burned the piles. The Ceanothus came up and I transplanted them. The bugs seem to like the idea.

annual agoseris *(A. heterophylla)*

silver puff dandelion *(Uropappus lindleyi)*

smooth cat's ear *(Hypochoeris glabrosa)*

Of these dandelions, cat's ear (here on this row) is non-native.

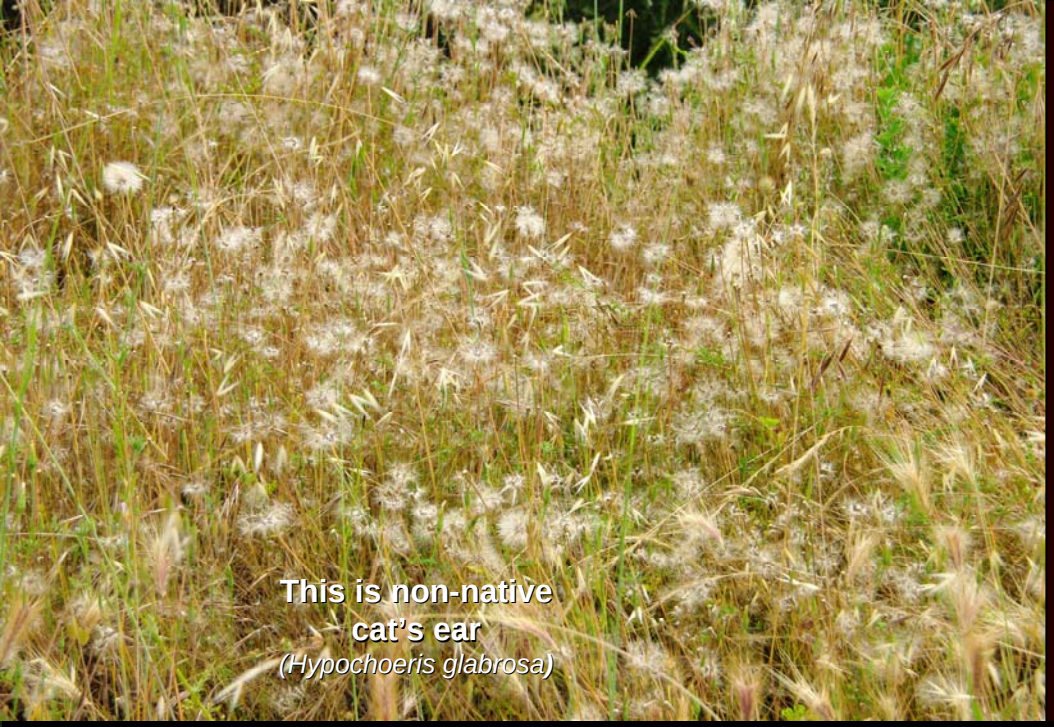
If you think that native v. exotic is a distinction without a difference, please consult the images on the next page.

grand mountain dandelion *(Agoseris grandiflora)*

People often ask me how we even know whether a plant is native or not. The answers to that are fairly straight-forward. In some cases the determinants are simple. Some plants, such as redwoods, occur without human propagation in only one region of the world to which they are obviously native. Some evidences are more subtle but still definitive, such as those determined by fossils or pollen recovered deep in annual mud strata found in stable ponds and lakes. A few cases are not much more than educated guesses; in fact, I have identified a couple of errors in deeming nativity in the local botanical record myself. Even after that, I would still hazard a guess that the knowledge of whether or not a species is native is better than 95% accurate, overall. Unfortunately, that 5% was nearly disastrous for us.

As an extension of that question, it is certain that we do not know how native plant systems were configured. We do know which plants we tend to find together, but as regards how they might have been configured in response to aboriginal management methods, there is virtually no data beyond captured oral traditions. The records of first encounters by the Spanish were very sketchy (I've read them) and of dubious quality. Father Juan Crespí was no botanist (much less a soil scientist) under pressure to issue a good report to the king of Spain. Upon that basis, how could we reconstruct such systems given both the many unknowns and the degree to which these lands are contaminated with numerous species of obviously dominant exotic plants?

We are addressing that latter question. By ridding so much of the property of introduced plants, we not only get to witness how natives congregate, but how they colonize an open niche, for in many cases, the native seed bank had long been exhausted and we had to wait for birds and animals to bring something in. In most cases, those "somethings" had long been known to be local natives. The arrangements they form are qutie different from what you see with exotic plants.



There are two ways to amend a soil: chemical and biological. Chemical amendment requires mining, which is finite. Biological materials regenerate from plentiful atmospheric gases. However, those genetic materials vary greatly with site conditions and changes over time. Improving our results therefore, requires having the genetic raw material with which to research site-specific effects. That means somebody has to have a place to do that research with full compliments of native plants with minimal disruption of exotics. Well, in this region of California, the Wildergarten is as close as it gets.

As you look at some of these photographs, you will see that native plants form complex arrays of numerous species, whereas non-native plants tend toward patchy monocultures. Diverse systems are thought to be more adaptive, because among the many elements there is a higher probability that some will be more suited to respond to a change in environmental conditions, whether light and soil chemistry after a fire, inundation by flood, or pathogen or pest attack.

Non-native plants, by contrast, are hardy and do form stabile systems, but they are also more subject to the risk of catastrophic failure because their lack of variants leaves them less adaptive to a significant change in external conditions. Most of them wreck soil productivity.

Critical among native plant systems are post-disturbance annual forbs. These are among the most genetically adaptive elements of these systems. They prepare the chemical, bacterial, and mechanical conditions for the perennials to succeed them. Unfortunately, post-disturbance annuals are also the most likely to be displaced by infestations of exotic species.

Over the last eight years, re-establishing post-disturbance forbs and native grasses has been the focus of our work.

Cat’s ear was such a disaster for us, that I wanted you to appreciate this picture. 25-50 seeds per head. Imagine acres of it.

Our property is amazingly varietal even for this region, and especially for a parcel this small. It is home to five distinct types of habitat**:** redwood conifer forest, oak and madrone woodland, native meadows of several types, chaparral, and the unique “Santa Cruz Sand Hill” habitat. It is the perfect laboratory for observing dynamic behaviors among native plant communities over long periods of time. The only thing we’re missing is a pond or running stream.

All told, we now manage 343 plant species, an impressive degree of “species richness” for only 14 acres. Of these, 228 are native. According to at least seven local botanists and restoration experts (three of whom had been presidents of the Northern California Chapter of the California Native Plant Society), the Wildergarten now has among the most purely native collections of plants to be found anywhere on the Central Coast of California; virtually every park, preserve, or “pristine area” to be found in the region is significantly infested with exotic plants by comparison.

Much of this book centers upon what it took to achieve these results. Not surprisingly, it has demanded a huge investment of time, money, and labor that is not over by any means.

Consider this little meadow close-up. Within ten feet, I have counted over twenty species (there are seven in the photo; several more have been weeded out). When I started the project, there were four species in this area, total. Now, imagine looking for 10-15 different target weeds amid this tangle, as fast as you can go. That is what it takes.

The goal here is simply to see how full compliments of native plants behave with minimal exotic intrusion. It has never been done on this scale before. What we have learned is that this system is quite different than the usual landscape in California. These plants exhibit complex interactions with each other and the soil that are not described in the literature.

Another typical question is if there is anything intrinsically superior about native plants. To the surprise of many, I would argue that, on an individual basis, in many cases the answer is no. However, when one looks at how individuals behave within total systems, I would argue natives are generally better. The reasons are subtle and demand some explanation.

There are but two ways to provide the material with which to produce the physical products you buy**:** agriculture and mining. The first is in some respects the second, in that whatever minerals leave the site in the produce are also effectively mined. So, any process that tends to increase the productivity of soils or makes them more resistant to problems would seem to be a good thing.

Consider the verbena at left (top). This plant is an amazing topsoil builder. It is also a very effective pollinator. It makes a wonderful moisture-retention blanket during the summer. Although it is a perennial, it has the property of dying back every winter, leaving massive amounts of decaying organic matter already in the soil in the form of dying roots. Every spring, annual forbs germinate in that soil and die, leaving their nitrogen, then to be covered over by the verbena.

Consider stinging nettle. This very unpleasant native plant has no apparent productive use. However, it turns out that it makes a superior “compost tea,” a foliar application of non-burning fertilizer “brewed” by inoculating green matter in water. Stinging nettle doesn’t grow up here because it is too hot this far from the coast. Perhaps a similar high-protein local native plant might jump-start that brewing process with the local bacteria? The (related) hedge nettle (at left) may be just such a candidate. It too makes beautiful soil and they don’t sting.

There is a lot of research to do, yet these and similar plants are in trouble. If you now realize that we do not know much about them, more significant is that we know a lot less about how they interact with soil.

So, do I think non-native plants always bad?

Well, of the 110 exotic species we have here, I have classified only eight (8) as benign, meaning that they do not displace natives and tend to stay put within the system. In the vernacular, “they know how to get along” without being obnoxious. The rest of the non-native plants we have here universally crowd out natives, in part because they can tolerate a far broader range of habitat conditions than natives.

But, don’t we want plants that are widely adaptable?
Well, not necessarily**:**

- If we want complex systems capable of sustaining numerous species of insects and birds, the answer is no.
- If we do not want each of those adaptable plants to displace numerous native plants in the wild, no.
- If we want a complex array of numerous other plant species with which to experiment, no.
- If we want the plants to get along with each other such that systems can perform multiple functions in the same spot, no.
- If we want plants that exhibit wide variability within the region, each adapted to specific locations, no.
- If we want an adaptable system as a whole, no.

A good example is the “small” difference between *Filago californica* (native, top) and *Filago gallica* (endemic to France). Obviously, they are related. The former lives only in sand hills. The latter almost anywhere there is full sun. The non-native almost fully displaces the native, but it also displaces native clovers, lotuses, and navarretias too. The non-native once outnumbered the native 50:1. Before weeding, that ratio is now even. To get there by hand has taken five years.







As a final element to this, “Is non-native always bad?” question, few of those 110 species on our non-native list are crop plants or horticultural ornamentals. In fact, of the 8 that aren’t a problem, three were planted here for ornamentation of a cabin that burned down (I have left them in place for historical reasons). So in general, the plants we *are* talking about are those people find undesirable for residential or agricultural consumption. In fact, most would be considered bad plants just about anywhere. They are:

- Inedible to humans, beasts, or insects,
- Allergenic irritants,
- Many are toxic,
- Destructive to soil productivity,
- Many cause mechanical injury to animals,
- Most have poor forage value,
- Many produce irritating burs,
- They are all virtually uncontrollable which makes them an aesthetic problem, and
- The big ones are all fire hazards.

This does not mean that they have no *potential* use, as the examples of stinging nettle and hemlock (to come) demonstrate. However, in this region, I really don’t know why anybody would want large amounts of them given modern alternatives. Most people find them undesirable, but would seem equally unwilling to do what it takes to bring them under control. In general, most people either do not know or care what is native versus exotic or do not possess the means to exercise their preference.

John D. Byrd, Mississippi State University, Bugwood.org

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As a special subset of “bad plants,” *invasive* exotics build massive monocultures, meaning that they tend to exclude all other plants. These pests are displacing native plants, worldwide. The US Soils Conservation Service introduced kudzu as an erosion control…

John D. Byrd, Mississippi State University, Bugwood.org

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… but other invasive exotics came in accidentally, facilitated at an increasing rate by global trade.

Some are subtle. “The Golden Hills of California” may be beautiful, but neither are they native nor are they nearly as productive for forage as they might be. Twenty-two million acres of annual grasses, particularly “poverty grass,” *(Vulpia bromoides*), slender oat *(Avena barbata),* and several exotic bromes have displaced the perennials that were here. There now very few small forbs.

One third of all extinctions in the US to date are solely because of introduced species. Of those plants threatened or endangered today (that are not unique adaptations in harsh and inaccessible locations), most are small forbs. The principal threat they face is not development, but exotic non-native plants. Yet there is a more insidious threat they face, one that goes almost completely unnoticed.

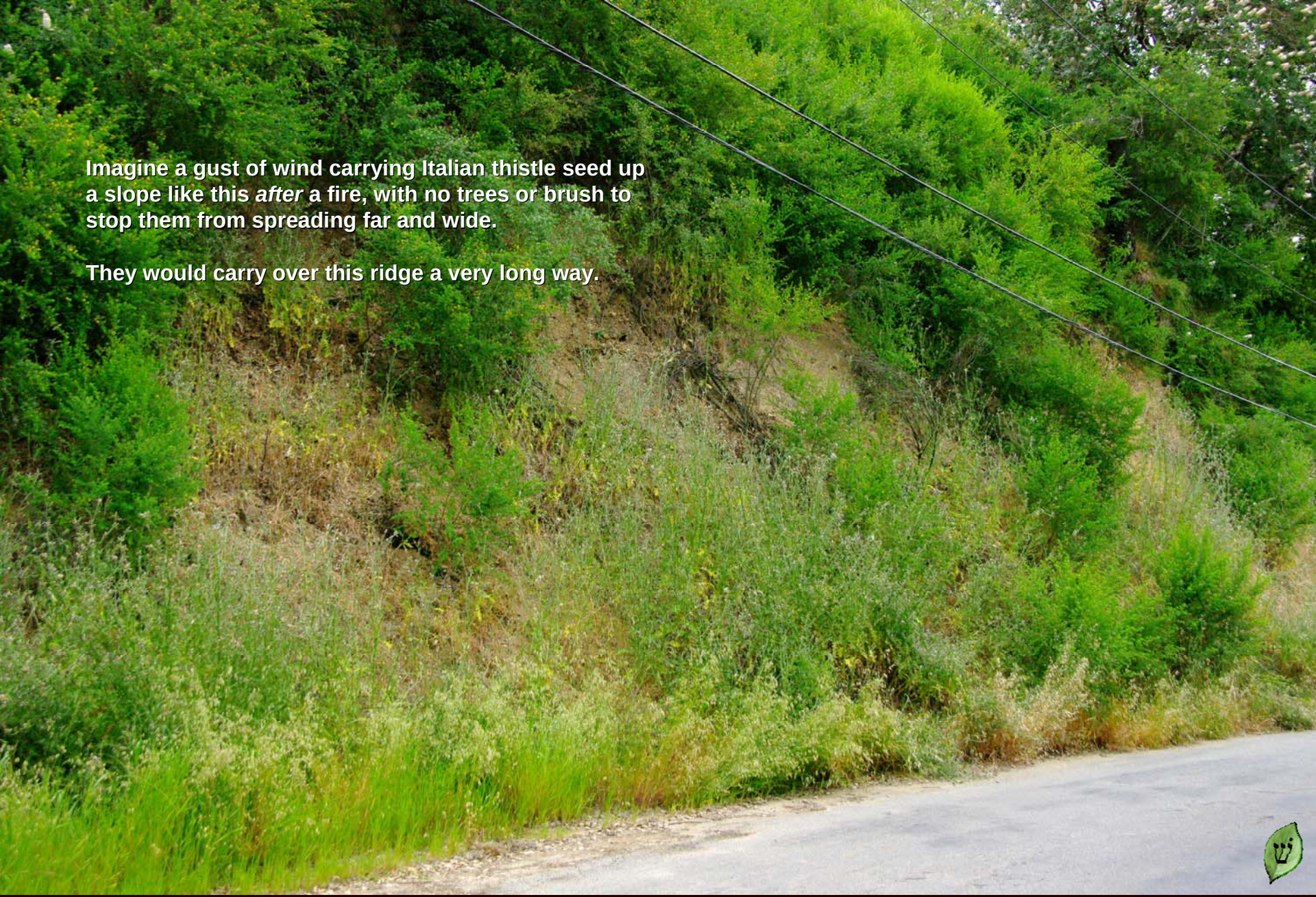
Even if there were no weeds, fire suppression has prolonged succession toward perennial cover, which suppresses the expression of native annual species. As with our place, wide areas have gone so long without such a disturbance that dormant native annual seed in the soil has long lost its viability. Hence, even if one disturbed the site specifically to find out what might be there, it is hard to know all of what species “should” be there if the seed is no longer viable, or if the exotics are so dominant that they cannot germinate.

In even-aged stands, the forest goes through a phase called “exclusion,” in which it basically inhibits other competition. Although this process is described in the literature as “Natural,” it is an unlikely condition under the fire-management style of the aboriginal inhabitants. These trees are similar to the way ours were, in that they developed in such a dense configuration that they grew tall, slender, and unstable. Note also the vestiges of a cattle fence are still visible in the foreground. In the 1940s, this was a grassland.

Habitat-succession is typically characterized (and grossly over-simplified) as a process by which forbs are replaced by grasses, then brush, and then broadleaf forest, finally stabilizing as conifer forest. In this region, the process persists as a matter of public policy in the form of fire-suppression to protect residential development. I thin our forest to establish groundcovers and burn the tops, thus at least partially simulating a fire. Thereafter, I stave off succession by culling seedlings (especially fir) to protect the forests.

The reason these native seeds are long gone is that the native post disturbance system was crushed with new introductions long before we even knew what was in it (the first Spanish expedition marked its path with mustard seed; note that the mustard above *intensifies* its monoculture with the annual disturbance of plowing). Don't you think people should make an effort to learn how the native system works on a limited basis before walking away and declaring it unrecoverable? We might just learn something useful.

Since the turn of the 20th Century, most of that first set of agricultural land uses have been gradually abandoned. Today, much of that land is being forcibly maintained in that abandoned state, upon the presumption that human beings are so intrinsically destructive that 'Nature is best able to recover when left alone.' I am here to tell you that abandoning our role in the land may be the most destructive thing humans have ever done, both to the land and to ourselves. What you see is not what you will get.



Succession and the spread of exotic species are the two key reasons why this paradigm is so terribly destructive. After the resulting catastrophic fire, the exotics are likely to dominate the area, displacing the few remaining viable seeds of native annuals remaining before they can establish. At that point, the system is broken. Weeds don't stop by themselves.

By writing this book, it is my hope to inform you of the challenges we face and their terribly misunderstood causes, to convince you that “Nature takes care of itself” simply does not work, for people, native habitat, or wildlife. I will show you what we did about it, why, and the results, hopefully to inspire you to discover more about how things work in your own back yard, no matter how small or urban. I don’t at all expect everyone to do things the way we have. Every situation is unique; people’s values and capabilities are unique. That is the beauty of individual freedom, because by trying different things and sharing what happens we all learn more, to do the best we can, to free ourselves from this mass-psychosis, learning that how Nature really works is in our hands.

Disturbing History

So, this WAS the Wildergarten. OK, so people like “before” pictures, but unfortunately, most of it was so thick that it was virtually impossible to photograph. This is what our land *used* to be like except that ours was worse and this is right across the road. Few do anything about such disasters because to them, “It’s Natural.” In reality, it’s a an overgrown forest infested with French Broom.

This area is beautiful, but very steep and erosive, making profitable use a challenge even for the aboriginal tribes. There are indications that Ohlone Indians may have farmed it for bulbs and herbs. It is also fairly clear that it was burned frequently, both for agricultural purposes and to make it easier to just get around.

Since the arrival of the Spanish, the region has endured a tumultuous botanical history. The most common land use was grazing, which introduced exotic annual grasses almost immediately over wide areas of the Coastal region, abetted by Spanish grazing practices.

The big changes started when the first road through these mountains was “built” in 1863. Settlements sprang up alongside it, both to facilitate transportation and to take advantage of it. This place was used for everything from manufacturing redwood moldings and harness repair to an apple orchard (the eroded terraces and trashed equipment are still visible). It was logged and burned some time around 1910. To slow the resulting erosion they tossed their trash into the gullies (including a truck). It even sheltered hippies growing marijuana, during which time the cabin burned down in 1979. There are also signs of sand quarrying.

All through that first seventy years, every horse, ox, and logging crew that came by deposited their contributions of seed from the valleys below, native or not. Those seeds found the tilled and fertilized soil a wonderful medium in which to establish. For decades, the farmers kept sowing and tilling in cover crops. The animals kept tracking and fertilizing. The weeds just kept right on multiplying and spreading. Somewhere about 1920, the orchard was abandoned. Brush took over and then trees.

After the orchard went out of business, our neighbor grazed it with cattle until a dispute ensued. Because the land had been tilled and cattle grazed on it, once the grazing stopped, everything took off at once in the fertilized ground..

At that time, the dominant native brush species were Ceanothus and manzanita. Fire-suppression instituted an unprecedented form of succession that progressed unimpeded for decades. Oak and madrone trees sprang through the brush, but in a density only appropriate to an open area with small trees. They all bolted competing for light, many only a few feet apart as spindly, weak, leaning trees with included bark crotches. In classic succession, then came Douglas fir, retaining massive dying branches all the way to the ground.

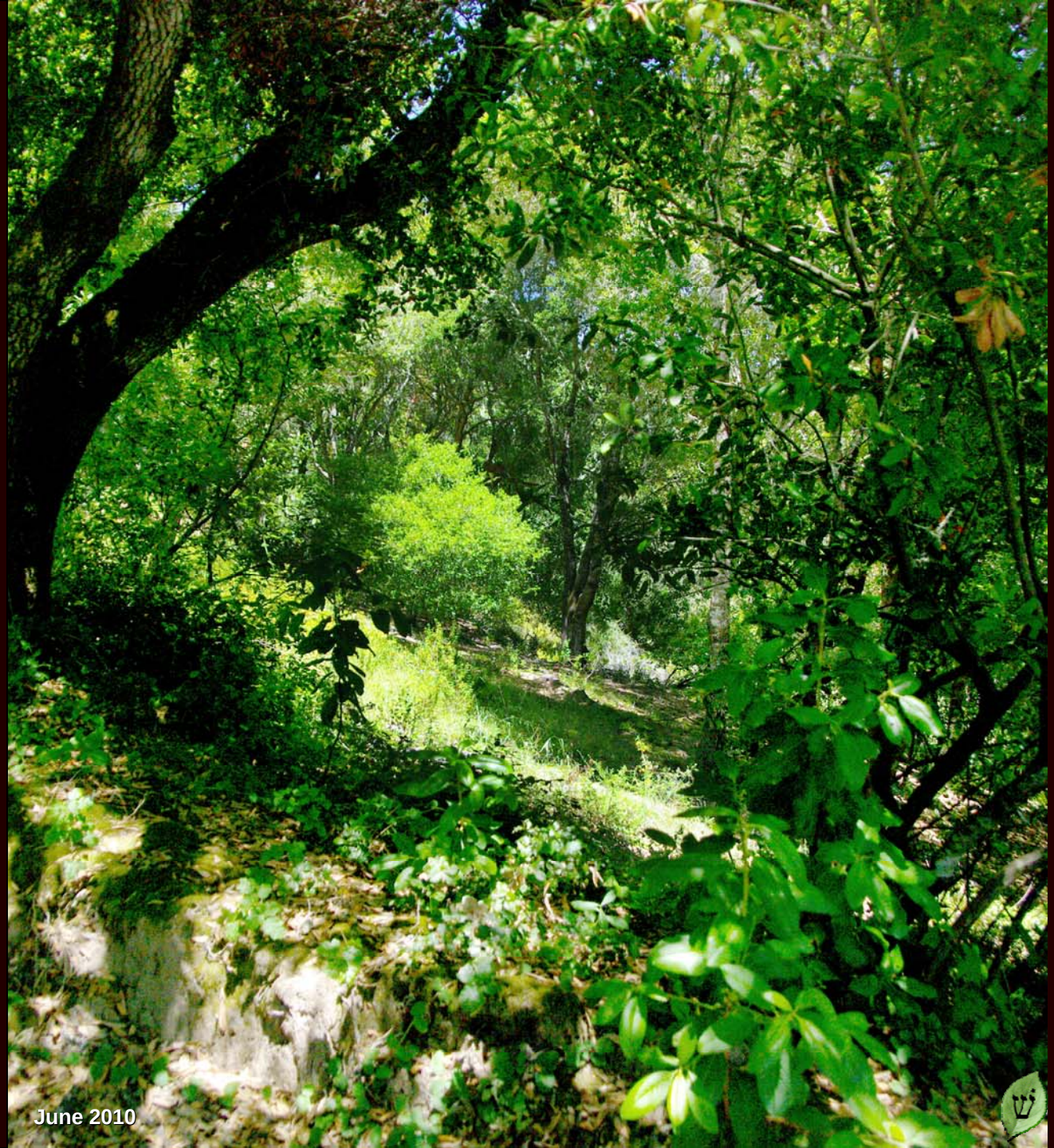
It was a fire bomb.

Lacking a profitable use, the owners wanted to sell it. So from time to time they cleared a “house site” on the top of the hill without any takers (the view was of a power pole and not much else). In one off these instances some time around 1960, someone probably brought in a bulldozer with French broom seed on it *(Genista monspessulanus)*. The weed took off and spread throughout the forest (with the exception of redwood stands).

With the exception of old, large oaks like this (which I tend to leave), I usually remove roadside trees because their roots heave the pavement, cause pot-holes, and their branches are a collision hazard to cargo trucks that encourage the County to mow. I encourage chaparral shrubs to grow far enough off the edge to make mowing unnecessary, but close enough to hold the soil and form a sort of fence to animals to safer crossings.

In this case, I lacked structurally decent trees *behind* those on the road edge. So I devised a plan to reverse that situation over a couple of decades. I thinned the meadow behind this manzanita to encourage a new line of trees, planted some, trimmed another couple, and exposed a third to light on its lower branches before pruning it. Once those trees develop sufficiently to keep the meadow from succeeding to chaparral, I can then remove those on the roadside, or let the power company do it when they interfere with the lines, whichever comes first. Or so I thought.

It succeeded to chaparral anyway in only 3-4 years. So now I get to manage the brush *and* the weeds. So to me, although it is native and will eventually perform its intended functions, this is a failed experiment, albeit one birds and deer appreciate.



A young man looking to speculate in real estate bought it and cleared that “house site” on top of the hill near the road. The following November he showed it to us. The green stuff on the ground are French Broom seedlings. There is no other groundcover here.

Here it is today. No broom, native grasses, deer-weed (on the left), lotuses, clovers, sedges, iris, grand mountain dandelions…

By February, with the addition of new seedlings, the broom will have made a carpet, by May that carpet was a blanket, three feet tall.

The area looks so open in the prior picture that I had to go looking for this tree, because I honestly did not recognize where it was even though it was seemingly in an obvious location (they grow that fast). The branch scar at the lower left was there. I had planned to thin out about four trees up here anyway. Nearby there are blue dicks popping up. More on that story later.

You are looking up the cleared path toward the hilltop. The eventual house site is 300 feet downhill on the right, where it is dark. Even though it was a cloudy day with low contrast, it was impossible to photograph the brush, still so thick with scraggly trees I had to crawl through it, leaving survey tape tied to branches to find my way. I got lost within 20 feet of the County road, finally realizing where I was when I heard a car. It was for sale. It was a disaster. The moment we saw it, we were in love.

You are looking up the cleared path toward the hilltop. The eventual house site is 300 feet downhill on the right, where it is dark. Even though it was a cloudy day with low contrast, it was impossible to photograph the brush, still so thick with scraggly trees I had to crawl through it, leaving survey tape tied to branches to find my way. I got lost within 20 feet of the County road, finally realizing where I was when I heard a car. It was for sale. It was a disaster. The moment we saw it, we were in love.

When we started clearing, the prior owner had brush-whacked that bulldozed hilltop and immediately below it. The rest of the place was almost entirely forested and impacted with French broom. There were virtually no groundcovers left except for a little blackberry. The poison oak and honeysuckle had long since taken to the trees. I have no idea where this is for a repeat photo.

November 1989

I estimate that when we first moved onto the property, there were perhaps 60 active plant species (as opposed to 343 today).

There were perhaps twice as many more as dormant seed in the soil (mostly weeds).

However, those numbers understate the problem in terms of producing populations. If one had counted only the species with any substantial presence (as opposed to a few isolated individuals), the total number of dominant species when we arrived falls to about 20.

Our largest second-growth redwood stand is a good example of forest exclusion. It was logged about 110 years ago. When we got here, there was no ground cover at all. Biodiversity was virtually non-existent.

I logged about 25% of this stand by total volume, but 50% by number of trees, so now I do not know where the original photo was taken.

I left the big trees, as I prefer fine-grained timber, both as lumber and as stronger trees more resistant to blow-down (the fir is on the outsides of the stand for the same reason). I do wish there was a good way to inhibit crown-sprouting. Although you can't see it here, there is a developing groundcover of fern, hedge nettle, and oxalis with trilliums, violets, and Solomon seal in spring.

Note the broom seedlings. These steep hillsides had substantially succeeded to acacia, fir and bay. All three burn like crazy. All three are exclusive of groundcovers. Half a dozen of the eucalyptus were 4' diameter monsters.

Clear-Cut Objectives

The first order of business was removing the fuel before it blew up into a total catastrophe. Just clearing the house site and thinning 2 acres thereabout generated 35 cords of firewood and the equivalent of thirty dump trucks worth of tree tops and French broom. **Note that there is no groundcover here other than broom sprouts.** We gave away the firewood and burned most of the trimmings in some truly spectacular piles (one of which took a week for the coals to burn out). The fire captains of that time were more tolerant of such behavior; thank you Hank Epling, Steve Beechman, and Mike Biddle (all retired).

I had to move for this photo because of the road. Note the concrete drain; the driveway needed a hard channel because it is just a skin of extra fine chips on base-rock sealed with oil (oil works well here on a hard base if one maintains it). The County road, although of poor original construction, has been there for 150 years, paved for the last 40 with but ¾" of oil and screens on bare dirt.

The areas outlined in red were burn piles. The one in the foreground was a pile 60' long that a bulldozer had made out of broom years before. The hillside behind is all broom sprouts because it had been cleared the prior summer and the seeds had germinated in the fall. We cleared this draw in the winter. The pile in the middle was several. We had some monster fires in here.

I moved back and panned right for this repeat to show more of the change in vegetation and less driveway. This is a mix of about 15-20 different groundcovers, about a quarter of them annual. Some of the best soil on the property is down the middle of this draw.

Due to succession, there were quite a few large Douglas firs. We removed them on steep slopes, in oak forest, and on peak ridges; we kept them on the edges of redwood stands where it is drier. As chance would have it, at least three of the firs had split tops, all over 30 feet long and all adjacent to power lines (the power company does not trim more than ten feet away from wires). The tree eventually splits at the fork and the tops would then have fallen on the lines (which would have been disastrous in summer). This area almost looks flat, doesn't it? Keep that in mind noting how dense that vegetation is on the right, as you look at the next photo.

Yes, it is the same area. The prior photo is from the left foreground (arrow). The slope averages 25%, until you move about twenty feet to the right of the trees, where it drops off at well over 100% (over 45°). Our house is in the way of repeating this photo.

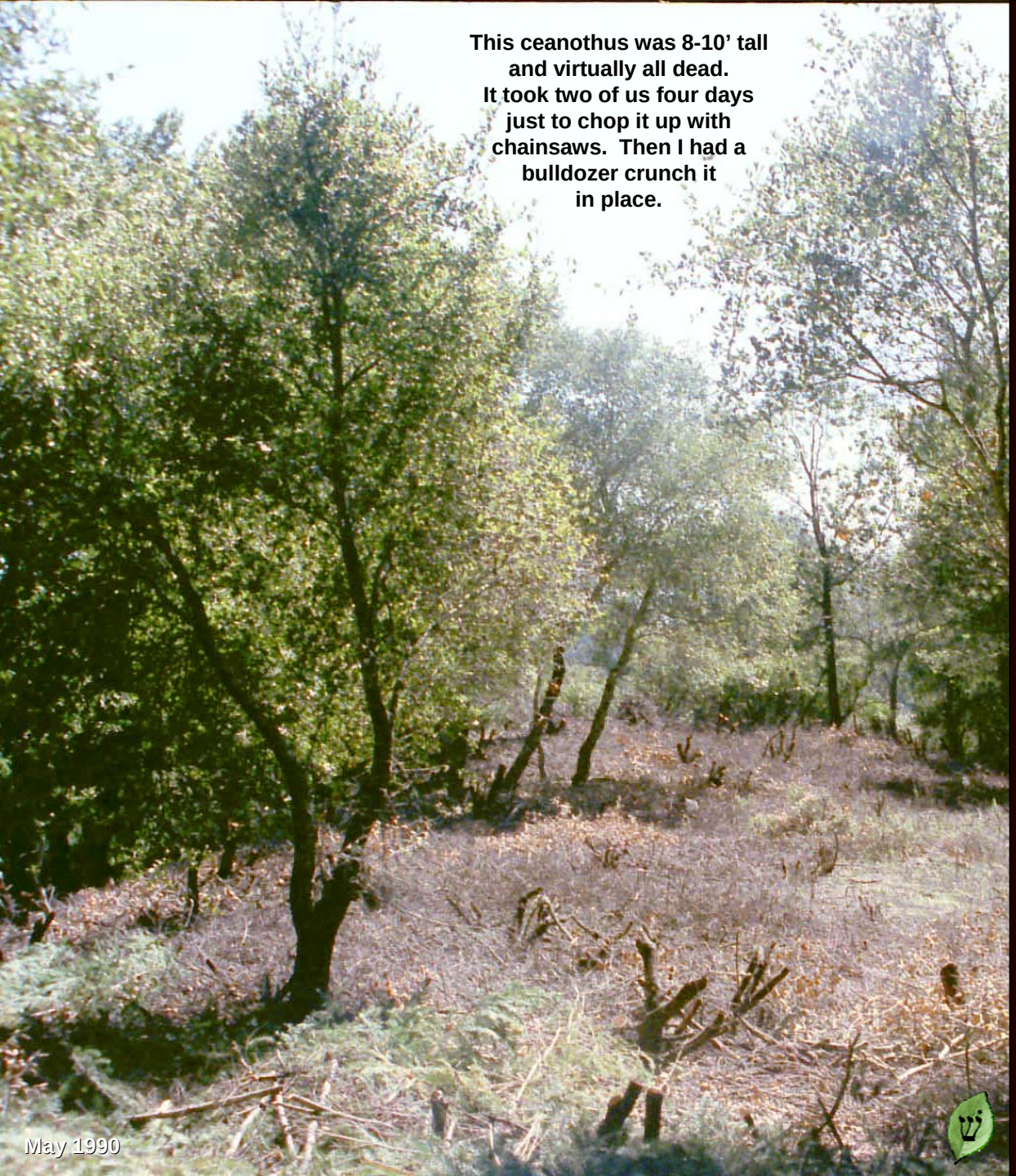
It gets just a bit steeper as you move down the slope (this photo was taken about a hundred feet to the right of the one prior). That dense vegetation (mostly fir and acacia) went all the way down this slope, all of it over 100%. Some of it is vertical sandstone wall about 18-20' tall. I would ask you to imagine the kind of fire that would have come up this slope with that much fuel, but I don't even want to imagine it. The 160 foot tall eucalyptus just to the right of the text box is now gone, as you will see in a few more slides.

It is too bad I cannot get a wider image now, because there are so many sapling trees and shrubs on this ridge (I'll thin it soon and get a better retake). The remaining eucalyptus are on our neighbor's land hold up the road in the prior slide. Note the buckeye that moved in (arrow). They store a great deal of water in their tissue and lack much fuel value while they shade out grasses.

The green “groundcover” is French broom. Note how fire stimulated it. Within four months it was far denser and 2 feet tall, 4-5 feet in six months when I whacked it. Sometimes it is hard to recognize the same spot after 20 years, so this is an easy one. Sort of.

I removed a fair number of trees in the background, but one couldn't tell that from this photo. Instead of broom, the foreground is primarily Spanish lotus *(L. purshianus)* and needle grass *(N. cernua and lepida)* from planted plugs. The grass was harvested, and the straw with seed still on it spread on top of a patch of small-flowered lotus *(L. micranthus)* in the mid-ground.

This was one of three large eucalyptus in this area on our side of the property line. Once the smaller trees were out of the way, it was time to deal with these monsters. Logging out a big eucalyptus is an undertaking requiring heavy equipment. In this and one other case, we used a large dozer with a 3/4" cable winch and an anchored block to pull it uphill. That required improving road access and drainage. The guy in the photo is 6'-6". The saw needed a five foot bar with extra oil squirted on it while cutting.



This being an environmental book, a few words on clearing in principle are necessary. A lot of people believe forests should remain unbroken. Others argue that wildlife benefits from "edge effects," with chaparral cover near openings containing forbs as a source of food. Although I belong to the latter camp, there are a couple of related points I want to make about clearing this place, one which is subtle.

First, most of this forest was composed of exotic trees that had to be removed before they spread any further. So, similar to a commercial clear cut, I had to manage the weeds that came in after taking them out.

Second, every system needs its full compliment of plant and insect constituents present or it loses those species which historically responded first to events, whether fire, flood, massive pest attack, or catastrophic climate change (such after as an asteroid collision). Periodic clearings maintain the viability of those constituents by reproducing fresh seed.

Third, given this history of this site, the fuel all around it, and the weeds present, both surrounding it and in the seed bank, if anybody wants an original compliment of plant and insect life to continue to express itself, SOMEBODY familiar with it must disturb small areas periodically or those plants and insects will eventually lose the opportunity to express themselves. The area will succeed to the weeds that infested it before. Guaranteed.

Here is that area today from slightly lower down to avoid the tree tops. There were no such groundcovers on this ridge at all; it is even more extensive behind the redwood saplings on the right. The groundcover is primarily native blackberry *(Rubus ursinus),* yerba buena *(Satureja douglasiana)*, Torrey's melic grass *(M. torreyana)*, Melica imperfecta, and poison oak *(Toxicodendron diversiloba;* it's fine here as long as it stays on the ground), with a single small patch of skullcap I have yet to figure out how to replicate by fire. The shrubs are occasional ferns, roses, pitcher sage, and hazelnuts, with toyon and manzanita having large burls, indicating that this was once a site subject to occasional hot fires. Down the middle are mostly clovers and lotus. Although very clean and seemingly remote, this site requires vigilant weeding because it is so close to our neighbors. If the ceanothus guarding this ridge on its end burns, there would be no protection from blowing seed or wandering animals loaded with weedy burs.

As you read this story**,** you will be shown that the twin requirements for (1) an enormous amount of site-specific knowledge and (2) the ability to effect immediate decisions, is way too great for someone in a remote office to manage it without making a mess of it, even if the seed bank is eventually purged of weed seed. It is an impossibility.

As a direct result of that reality, there is one other environmental reason for a clear-cut, one that occurs to almost no one**: The person who cares for the land needs a place to live on it.** I could go on and on about how building codes must change to reduce wildland impact (I’ve even dreamed of designing walking houses), but no matter what, and for the foreseeable future, there will be a need for immediate proximity to the work at hand to respond to numerous and rapidly changing conditions. That detailed knowledge can only be acquired by living here.

Then there is the not infinitesimal matter of paying for it all, and it is not cheap.

I am the keystone species on this land (one that, without it, the system fails). Sometimes it feels like a burden, others like a unique privilege. I hope to record, teach, and impart as much as I can of what I have learned, but the fact remains**:** If I stop doing this work, things will get worse, very quickly. The Wildergarten is not “Natural” and never should have been in the first place.

I know, your brain is probably pounding with what you think are exceptions, but in my, now long-experienced opinion, it is universally true.

A Thin Argument

June 2010

The thinning process continues, albeit on a much smaller scale (I'm maxed out managing the consequences of what has already been exposed to light until the weed bank is used up and the canopy extends more fully). The goal is producing dense forest groundcovers interspersed with the better multi-aged trees and occasional shrub thickets. We use two processes**:** either clear small patches (such as for a power line right of way) or thin larger areas in a series of steps. We'll describe the latter approach first. What you see above is what we call a Phase I 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. At this point, the canopy is still closed and there is very little groundcover.

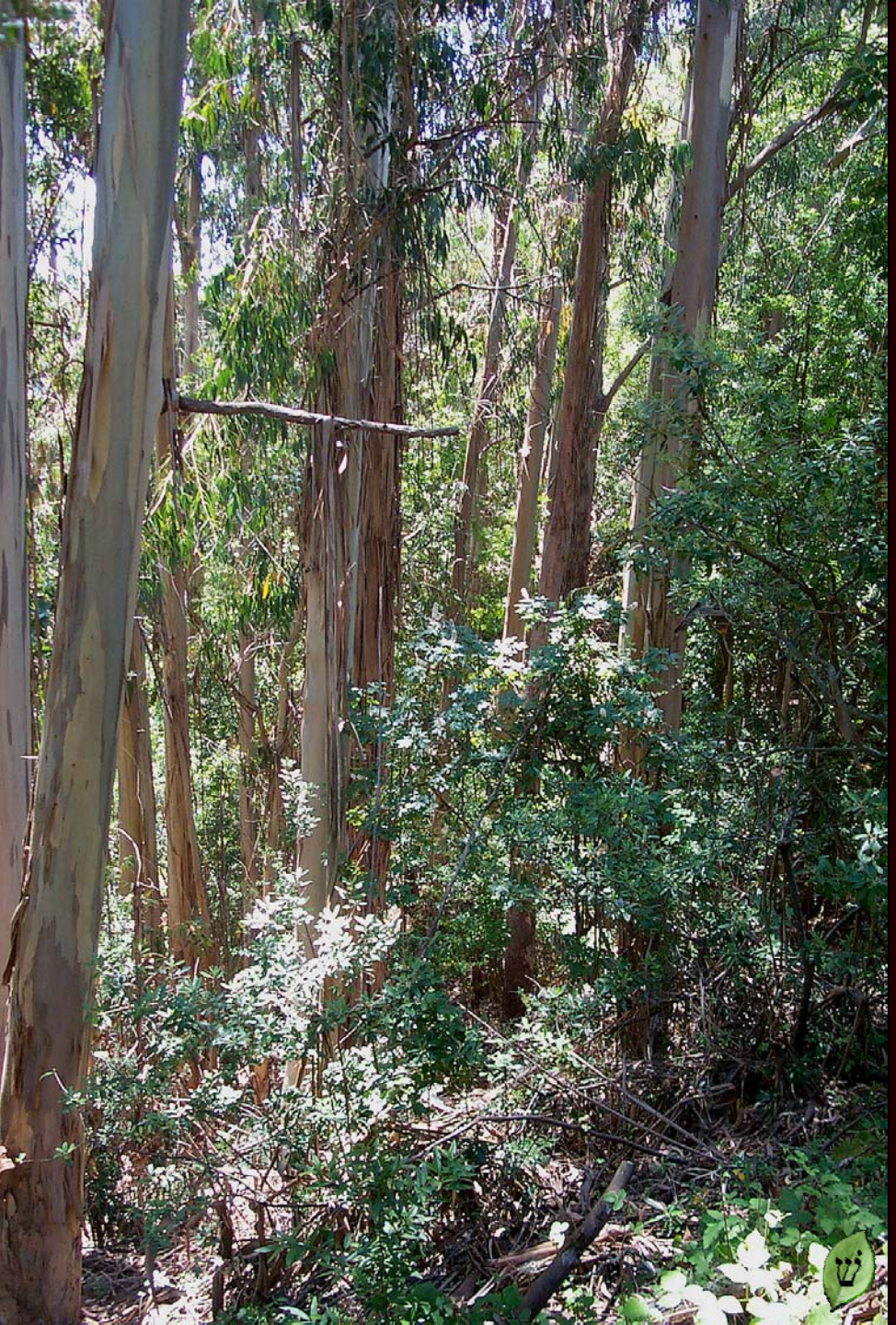
In a Phase II thinning, I remove enough canopy that the groundcovers can begin to express themselves as stunted individuals 1-2 feet apart. The purpose is to distinguish and start to develop the trees I want to keep, to allow them to begin to recover from over-crowding, and to produce enough groundcovers such that when I expose the ground to light they will quickly cover the soil to suppress weeds. I left it this way to buy time while I get control of the meadows. In the meantime this is a stable configuration.

This patch about 50yds away is in Phase III. I opened it up enough for patches of perennial groundcover and some shrubs with annual lotuses, clovers, and sanicle. There are two grasses that usually populate at this point: pine grass *(Calamagrostis rubescens)* and blue wild rye *(Elymus glaucus)*, both well suited to shade. The pine grass is low-growing, thick enough to make for easy weeding, and a tremendous erosion control (my favorite grass). There are also sedges *(Carex globosa* & *tumulicola),* irises, lilies, and numerous herbs. Just keep the brush 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.

Phase III focuses upon developing the few trees with a decent future. In this case, I retained the small oak in the foreground early on because its lower branched structure gives it a better chance to be a sound mature tree than most of what I had. I kept the trees around it until it started to show signs of losing its vitality to shade. When I removed the adjacent leaning and top-heavy oaks and madrones, it recovered immediately, but up came the grasses. Until it grows enough to shade them out, I harvest the grass seed for use elsewhere to keep them under control while weeding the bare patches now exposed to light.

In instances where there were no trees worth saving because they were so spindly and leaning that they will eventually fall and tear out a hunk of soil, I maintain these pockets within what I call a “dark barrier,” a thin section of tree cover sufficiently dense to reduce the chance weeds will spread from one pocket to the next. In some instances I plant new trees, but I prefer to start brush first because the brush offers the tree seedling protection from browsers and induces the tree to develop a straighter trunk.

The easy way to get the brush going is to make a burn pile. Up comes the Ceanothus. This pile produced twenty seedlings for transplanting, yet there are still more than this spot can sustain. There is already a small tree starting inside. Note that, if the whole area burned, what I would have is a continuous belt of brush, a completely unmanageable situation. This is safer, provides the necessary browse for deer, cover for quail, and owl food (rodents). Over decades, this process will produce an uneven aged stand of oak and madrone with small patches of fire-tolerant brush in between. Of course if you don't like my process…

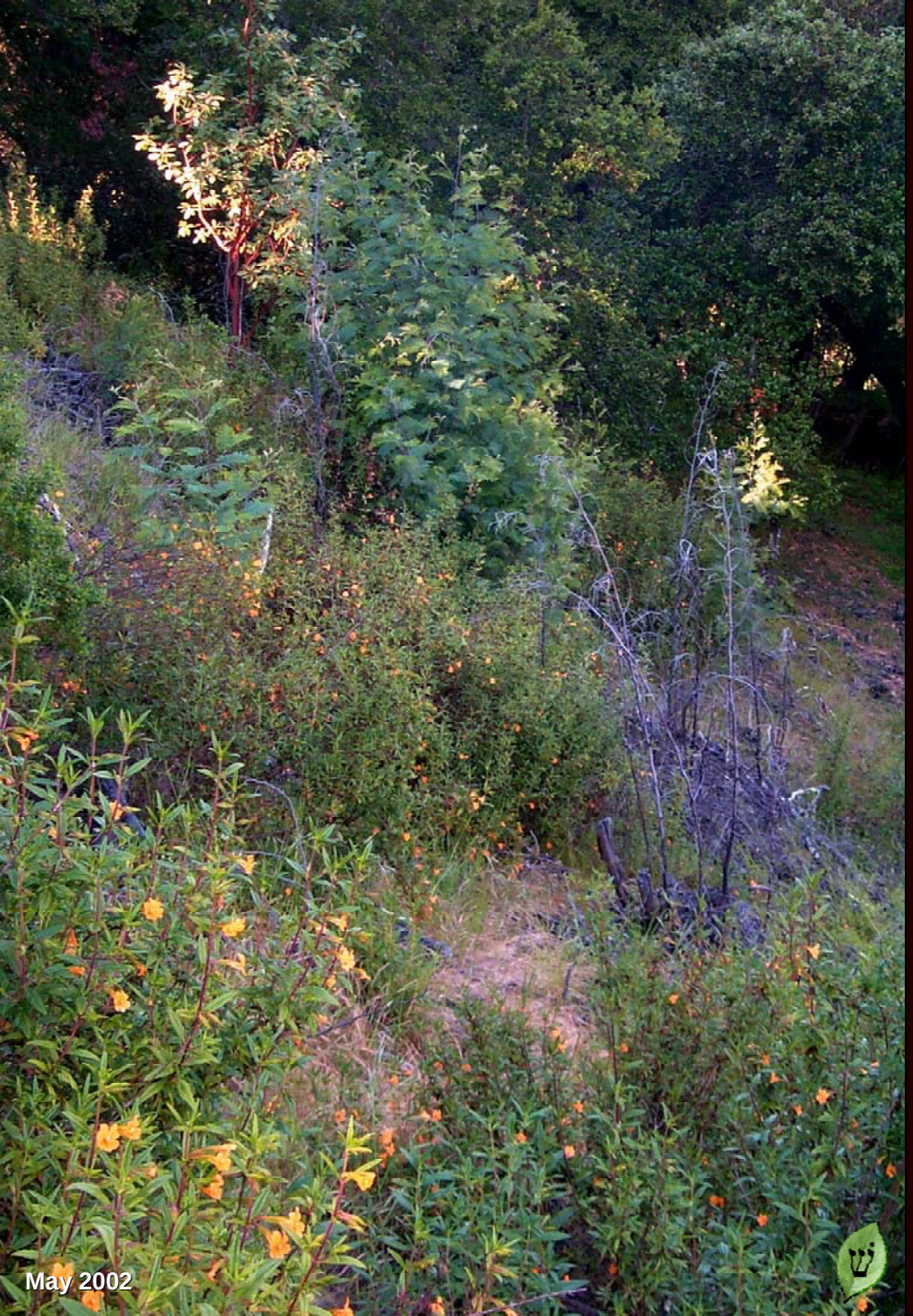


There's still lots of "Natural" left in this neighborhood! This is eucalyptus grove is just across a road along the north end of our property. Eucalyptus is from Australia. It was originally imported to make railroad ties. They grow fast, but when it grows in California, it twists and cracks, making lousy lumber. The people who imported it, failed to test it first. Nobody paid the total cost of the negligence because the project was blessed by the United States government, which then made matters worse by pitching the trees to farmers as wind breaks. They work for that, and even make an excellent fuel wood. Unfortunately, in addition to the cost of trucking, environmental laws make it very difficult to set up and operate a biomass power plant because of the difficulty of obtaining a steady supply of fuel, even if it is an invasive weed (albeit rather large).

These trees exclude almost all other plants with a hormone their roots inject into the soil as well as with the mass of bark and branches they drop. About the only species that seem to survive in the understory are bay and broom. Hence, when (not if) it blows up in a fire, the eucalyptus seed can easily spread a quarter mile (just as it did when this five-acre grove was created after a house burned down with just a few of these trees around it). The landowner does nothing about the situation because the risk these trees pose on their surroundings does not impose a cost upon him, nor is there profit in getting rid of them.

Much of the native seed that had a chance to express itself in the last fire is long since dead. Even if it was still alive, it would have a hard time germinating and reproducing because of the residual hormone in the soil and the presence of many other invasive exotic plants nearby.

This model of introduction, establishment, disturbance, and further spread is what is usually seen with invasive exotic species. Virtually nothing of the native groundcovers survives this kind of infestation for more than one or two disturbance cycles. The introduction of exotic species usually represents a permanent conversion of native habitat.



In any case, there are really only two choices about what to do with a disastrous fuel load loaded with weeds**:** Wait until it eventually blows up in a massive and catastrophic fire or remove it and deal with the resulting blast of weeds. Fire is an inevitability; our choices are limited to how to manage it.

At left, this newly established patch of native chaparral on our property was once a stand of acacia (another fire-adapted exotic from Australia)**. T**his was once a monoculture forest with nothing else at all living inside the stand. The native monkey flower and yerba santa you see here were both fairly aggressive about colonizing this newly exposed site.

Needless to say, the acacia trees keep trying to make a comeback from their dormant seed. I get to pull, cut, and spray acacia seedlings every year, going on nine years now. Occasionally one escapes my notice (they are easy to miss in a chaparral; all you see is a bare grey stick when weeding small forbs on the ground), so they then require a chain saw.

I usually maintain chaparral in horizontal bands no more than forty to sixty feet up or down slope to reduce the risk of a fire building sufficient draft to gather momentum. 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 above them.

This site would be easier to maintain as a forest, but I do not have many good places for chaparral that do not constitute a fire hazard. One needs open space above and below.

So as restorations go, this clear cut was fairly easy. Just cut the bad trees, haul them away, and watch the native brush grow while weeding out the bad stuff (primarily bedstraw and rat-tail). It is usually not that easy. After covering what happened after similar clearings, we'll now discuss what it takes to make a meadow.

May 2002

In the background is the one remaining steep section on the property that has not yet been thinned to Phase II.

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% (calculated as rise over run). So it needs 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 sparse trees allowing an herbaceous forest groundcover and few shrubs of low fuel value such as hazelnut or huckleberry as food for wildlife, what is called a "shaded fuel break." Adequate trees for that purpose are few here.

What you see in the foreground is essentially a Phase II thinning. I chopped up the dead brush (mostly Ceanothus) and thinned out the scraggly and dead oaks and madrones in order to get enough light on the ground for groundcover to establish. Once they are growing securely in place at a spacing of one every one to two feet, 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 restart the process. There are plenty of nesting sites nearby about for owls and raptors, so that is not a consideration here.

In the foreground you will note what looks like an odd form of grass. Those are *Iris fernaldii*, one of the few plants here that returned successfully from the native seed bank (see inset). 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.

This is the goal on the prior spot, my favorite fire-tolerant ground cover for this fuel-break purpose (it is adjacent to another redwood stand). Here are yerba buena, iris, sedge, pine grass, snow berry, and wood ferns. It is very easy to maintain, but that does not mean it is not under serious attack. I weed it every year, usually twice, or in two to three more years it would be totally destroyed.

Just above the prior photo, is this enormous bay tree (the base is eight feet across). Our property line is delineated by the posts on the right, so this is another neighbor's land. Just above the base of this tree, nearly fifty yards from the County road, or any other exotic infestation there was a small patch of French broom. I took it out about five years ago and return to pull the seedlings every year. The broom was probably brought in by rabbits, as there was evidence of them nibbling off broom seedlings. Once here, it made a patch about thirty feet across, so I estimate the age of the infestation at three years. Five years since first pulling it, it takes about fifteen minutes to weed it twice a year.

This is along a browsing path for deer (arrow). It is a nice bedding spot for them: level, sheltered, with a good view of the surroundings, and brush to rub on above it. How do I know they are using it? When deer get burs on them, they either rub on brush or drop and slither. Immediately after removing the broom, in came two weeds with bur seeds: bedstraw and hedge parsley. The thinned forest surrounding this spot is about an acre. As you will see in the next section, this entire area would be destroyed if I did not weed this bedding spot every year.

But there is more to this story. Above it is a decadent chaparral (it needs a disturbance badly). Within that chaparral is similar bedding spot I'll show on the next slide.

Effectively, the way I protect the entire southwestern quadrant of our property from weeds brought in by burs is to maintain these two bedding spots along this browsing path amid with what is effectively a dark barrier above to the left and a dense chaparral above right. This glade takes about thirty minutes to weed. It is a precious example of the diversity of native vegetation in these mountains...

…because it is only forty feet off the County road (the arrow is pointing at the opening), beneath an open, rocky, sandy, slope that is so arid that the two seem completely alien. The wall of chaparral between this slope and the prior glade might be only ten feet. So, I ask you: Even though that beautiful little opening is only forty feet from the county road, how would they EVER know that there was an easy control point by which to protect a large area and contain an infestation? There is just no way. If what you want is healthy native habitat, you will not get it from an public official in a remote office. You will not get it by "preserving Nature." There is just too much site-specific information necessary to manage a problem this complex. Collectivize control of land use, and what you'll get is…

Weeds: a Commons Problem

This is typical of what visitors to the Santa Cruz Mountains come to see.
Do you see a problem here? Well, in fact, this scene exhibits is a social problem that is the *cause* of the environmental problems we will now discuss. When the consequences manifest in our neighborhood, we have to deal with them in order to succeed with our restoration projects. Unfortunately, those same social archetypes combined to destroy much of this beautiful scene.

Have you ever noticed how much time, money, and energy people expend to get away from where they pay a lot to live in order to see “Nature”? Whole industries are built upon that drive: clothing, travel, equipment, retailing, photography, publishing, and communications. So, what do the users spend to help maintain the thing they came to see? The answer is obviously, “Nothing, because, it’s Natural.” Do you really think that caring for land is free? Worse, the customers either don’t know native from exotic, or don’t care because it’s not their responsibility. Effectively, they wouldn’t know anything about the services for which they should be paying anyway. Most see weeds as something the County should mow if they get in their way.

“Oh, but the users didn’t have anything to do with the weeds being there in the first place.” Oh yes they did, and the landowner is paying for it. Traders have never taken responsibility for the cost of introduced pest species that entered the country with their products, nor therefore, have their customers, the vast majority of whom are urban. In fact, the very idea of such inspections is antithetical to “free trade.” As a consequence, landowners bear the full cost of managing those pests. The urban public also plays an important role, to this day, in accelerating the rate of introduction of unambiguously destructive pest species into the wild.

This is a more typical view along our typical rural-suburban bicycle path… er… County road. Humped shoulders channel water to eroding gullies that destabilize whole slopes, per County specification. The vegetation is dominated by of various weed monocultures. On the right, is French Broom. On the left are patches of foxtail barley, tall oat, Italian thistle... They all share several things in common: They were introduced from abroad, they have crowded out native plants, they sit poised to spread into the surrounding woods after a fire, and it takes money and labor to get them under control and keep them from coming back.

Broom in bloom, about 12 feet tall

Which they do. This is French broom *(Genista monspessulanus)*. It grows to 6-20 feet tall in as little as four years, depending upon soil and sun. As they grow they get top-heavy and lean into the roadway. The County cannot spray them because environmental activists (users of that scenic product), object almost violently to use of even the most benign herbicides. So the Department of Public Works dutifully mows every mile.

Each broom flower produces about eight seeds. These plants are yellow with flowers every spring (left). Each mature bush produces between 500 and 5,000 seeds every year. Unfortunately, the seed can remain viable in soil perhaps as long as a **century**. County mowing spreads that seed along the roads for miles. Thus, to introduce broom seed into a new area creates a need for annual control for as long as 100 years. It may be a terribly expensive thing to do, but it does help make for full employment for County road workers (and they have said as much to me).

Broom is a legume, so it fertilizes the soil with nitrogen. Nitrogen facilitates germination which favors other fast spreading annual weeds that are pre-positioned all along the roads, constrained only by competition and shade of existing overgrown forests.

Broom rapidly fills a forest understory with a dispersion of highly combustible fuel. Once the inevitable finally happens, the combination of sun, ash, and nitrogen provides a fertile seed bed for both broom and other weeds. With no vegetation to catch blowing seed, deflect starving animals, or slow winter runoff, there would be no barrier or competition to constrain the rapid spread of every other weed in the region. This turns the prospect of a ground fire into a certain catastrophe, **even with a fire frequency of but a few years**. Even if the frequency was annual, some of the broom would still breed.

This French broom sprouted on our neighbor's property last spring, after five years of control. After but one year, it is now 4 feet tall. On our land, ten acres had been infested with broom for over 30 years. I brush cut it, gathered it in piles, and burned it all by 1991. The seedlings came up as thick as 200 plants per square yard. I sprayed acres of it 2-3 times 2-3 years apart with mowing in between (which is what this patch will get this year) until the natives had filled in to bury the seed. It took but 2-1/2 gallons of Truflon Ester to control of a 10-acre disaster. Since then, our broom is controlled almost entirely by hand-pulling, unless there is a disturbance, such as thinning the forest. Even so, it is a relatively manageable problem compared to other challenges we face.

I also use non-ionic surfactant, an indicator dye, and a non-extensive thickener (xanthan gum). The big jugs are to reuse the spray tank rinse water.

Oh my G-d, he uses CHEMICALS!!! How much? Well, on our 14-acre property this year, we used 6 oz. of **Turflon Ester®** (1,1,1 triclopyr, selective for woody plants such as broom), three cups of **SpeedZone®** (a selective for chickweed and crane's bill), one and a half cups of **Surflan®** (oryzalin, a pre-emergent), 1-1/2 oz. of **Transline®** (clopyralid, selective for thistles), and about a quart and a half of generic glyphosate (equivalent to **RoundUp®**, it kills most anything). Does that sound like a lot to you on 14 acres? It used to be more than that, but that's all we need now. At no time have we ever used enough to affect runoff water deleteriously. All that time, we have grown, harvested, and sown native seed to offset the effects. Next year, we'll do a fair bit more of the pre-emergence treatment but less of the others, in part for research purposes, but also to drive some of our nagging problems into easy hand control.

Using herbicides is almost exactly analogous to an antibiotic treatment. Antibiotics are NOT good for you, but they can save your life. You start a course of treatment and then end it. During the treatment and after, you should reintroduce beneficial bacteria to get the gut going again. Weeds are often far more toxic than the materials we use to kill them, and they manufacture ever more of those toxic chemicals as they reproduce. Natural toxins evolved to be as deadly as possible. They work despite ages of opportunity for pests to develop resistance. By contrast, herbicides are developed by people who truly care about making them as benign as possible (I used to work with people who had done R&D work in that industry). In rat-feeding toxicity studies for these chemicals, the most common cause of death is drowning. Even so, our regulatory system makes it far cheaper to deem them hazardous, simply because the cost of proving that they are non-toxic is simply unaffordable even for the largest chemical companies.

To reduce the need for mowing, I simply planted shrubs along the road, located and sized such that they do not need it (I pull the broom that still comes up). I also removed trees along the edge so that their roots would not heave the less than 1” of pavement. This photo is just after removing the berm at the edge of the road such that the water would sheet into the forest instead of running down the road to the turn where a County culvert had blown out decades ago and then cut a channel downstream. There are shrubs under the burlap teepees to form a sort of fence by which to direct animal entry points.

By forming the shrubs into a pocket at animal entry points, each with an exit, they come in and rub themselves on the bushes to clean off the seeds, especially burs (they hate them too). That way, many of the incoming weeds are confined to one spot instead of being spread out over the entire property. This trick saves considerable hand labor and directs the deer toward safer crossing points.

Similarly, when the County road crews clean the ditches, environmentalists dictate that they haul the dirt 20 miles to the nearest landfill. Meanwhile, subsidence due to that blown culvert had caused the road bank to blow out. So, I got the DPW to fill it with ditch cleanings and I built a side-outlet drain out of recycled concrete slabs to replace the culvert. I rocked in the ditch at the culvert entry. They paved it next time they came in with a patch crew making a spot where cars could pass in a corner. I got free fill dirt to repair the damage the culvert had done; they saved money on trucking dirt and reinforcing the road. I planted sedges to hold the channel.

When the highway is blocked with an accident, this tortuous one-lane road is the only alternative. Most of the pavement is less than an inch of oil and screens on bare dirt (hold that thought). There are few places to get cars off the road to allow emergency vehicles to get by or large trucks to pull over. Hence, I built three turnouts along that County road at a cost of less than $2,000. No, I did not ask their permission. No, the pavement is not up to their driveway specifications (12" of compacted base rock with 2" of asphalt!!!), but the Department of Public Works appreciates them anyway when they need a place to load or park heavy equipment. So, why did I pave it? Paving almost eliminated the weeds that were coming off the trucks and workers that stop here. Behind this spot is an old road cut I also got the DPW to fill with ditch cleanings. The problem isn't the DPW; it's the political players who order them around.

Equally important to maintaining roads to the property is access *within* the property to get equipment in and material out for forest thinning or brush and weed control. To that end, I changed the grade when I repaired this existing road from in-sloped to an out-sloped drainage configuration without culverts. It has worked beautifully to reduce the flow in the channel below, and has required no maintenance other than weeding. The seasonal stream crossing nearby is set up as a test bench to determine the best performing native plants for crossings… uh… was this about roads or weeds?

It was about commons. County roads are a form of commons, or property "owned by everybody." Commons are typically subject to over-use and under-investment because when "everybody" owns something, nobody takes direct responsibility for investing in its maintenance and improvement. So, the public pays for ridiculously repetitive pothole filling, mowing and ditch cleaning along a road of completely inadequate and archaic design and construction, while being forced to construct ridiculously over-built driveways. The County gets to repair the inevitable failures with monstrous retaining structures that do nothing to correct the flaws that cause the failures even if that would be vastly cheaper (Federal disaster funding guidelines prohibit improvements). Meanwhile, detailed vegetation management is obviously not on the list. It is left to the property owner to undo the damage done by the methods road workers MUST employ as ordained by people with little-to-no knowledge of or accountability for the outcome.

On this ridge, the driveway on the left limits how far over the road can go, while the slope on the right slipped out behind the guard rail. Instead of grading straight across the hump which would have widened the workable area, they built an expensive retaining wall with pilings into the weak substructure with rods connected at the top under the pavement anchored into concrete blobs on the other side. The net effect holds this spine of sand in the air because FEMA will not allow changing the grade because that is improving the road. The whole ridge is only 30 feet across at the top. The reason the County made the disaster application is that it is cheaper than the $10-15 grand it would have cost to grade and pave it into a more stable configuration, but for one thing… What do you do with the dirt from grading off the ridge? They cannot just ask the people if they want it to solve some other problem like retiring an old road cut because of their own bureaucratic requirements to do a fill. So, they would have had to truck 300 yards of dirt 20 miles to a landfill, per environmental regulations. You can thank the County planners for a waste like this.

Here is one result. On County roads like this, scads of urbanites ride their bicycles for miles, dodging the potholes between retaining structures, never realizing that the reason the weeds are there is that environmentalists protest the County spraying the roadside. So the road crews use flail mowers, smearing the seed along the roadside for miles. Up come the weeds. The landowners didn't want them. So, whose plants are these now? Will the protesters pay to control them? Was this because they are afraid of poison?

Well, apparently poison isn't a problem, as long as it is a **Natural** poison. This is hemlock *(Conium maculatum)*. These plants are deadly. Ingesting a large amount is not necessary for a fatal dose; children have died chewing on the stems for the numb sensation it brings to their mouths. Even the pollen is harmful. It is far more toxic than RoundUp®, but the chemical is feared because it is man-made. So here it is, poison spreading along roadsides pursuant to the demands of the Sierra Club, and poised to spread into every watershed if the conditions allow. All would take is a catastrophic fire. The Sierra Club says those are Natural too. I pull the flowers off these plants over two miles from my home, simply because I do not want the County spreading them any farther.

This infestation is almost entirely Italian thistle (with patches of hemlock down the road). The forest (at right) is so dense that little can germinate and in the duff and shade beyond the roadside. So, for the most part, the forest is containing weed problems like this one, for now.

When it gets too big or presents a fire ignition hazard, the County just mows, effectively distributing the seed along the top edge of the watershed from which it can be blown far and wide.

The appearance of this condition severely understates the threat this system actually faces. After a fire, there will be no shade, no mulch, nothing to block the seed from blowing long distances, and little competition for species as aggressive as Italian thistle.

With the nitrogen broom leaves behind, the ash from a fire, and rain splatter to cover the seed with soil, the germination bed will be perfect. Once these thistles or succeeding weeds establish and blow seed, the native annuals will lose. The loss of remaining viable native seed would require little but repetition.

Why this little digression about roads? Road management, design, drainage, and vegetation all have a great deal to do with whether our plant restoration efforts succeed. Without roads, the effort would be impossible. Yet because of how they are managed, the spread and multiplication of weeds is abetted enormously. What I have shown you is indication of what must be done to reduce and repair historic damage at minimal cost. That's where you come in when it comes to taking action, both influencing politicians and doing the repair and maintenance work yourselves if you are a landowner.

County roads are in disastrous condition. Meanwhile, County specifications for private road design and construction are an outrage. I know one neighbor who had to provide a turnaround on his driveway for a hook-and-ladder fire truck that could NEVER make it up the County road to his property, much less get up the rest of the driveway. One would think the politicians who approve these rules and the bureaucrats who enforce them are insane… until you realize how much money the local quarry operators and contractors make because of this insanity and how much those same vendors underbid jobs for the County.

The private roads on our property (the ones the activists want to eliminate) could use a few improvements, but in general they are vastly better than the County road and no problem when it comes to weed propagation and drainage water quality. However, I spend considerable effort on "our" roads against the onslaught of seed being blown in and carried in by animals because "our" road mowers have vastly increased their range. Similarly, State revegetation specifications for erosion control on road construction projects have abetted the largest single cause of endangered plants and insects**:** exotic grasses and noxious weeds (particularly star thistle). These disparities have taught me something.

Please, make it stop. Landowners on rural County roads should be responsible for their vegetation, not the County, and not the State. Set up a fund equal to the current road budget for vegetation management. Pay the owners their share by frontage if the County right-of-way is clear and not an ignition hazard. If they owner does not get it done, send in a contractor to do it and bill the owner. If they don't pay the bill, put a lien on the property.

This is not about owners making money. A lot of us have done this work on the County road for years for free. I have adsorbed some of their drainage problems. I do a better job managing the vegetation for nearly one mile of that road on other people's land (with permission). I get as much done in a day or two with power hand tools as a road crew of six using heavy equipment (with less damage to the land). The County saves thousands every year because of it, and the weeds have taken longer to reach us in quantity than they might have done otherwise.

Still, twenty years of arduous work, developing the only parcel on the Central Coast fully restored to native plants, is in jeopardy because a distracted and uninvolved general public believes a bogus story about herbicides, silt, and drinking water without having checked it out carefully and objectively. I use less than one pint of herbicides annually on that whole mile, while many or the weeds the mowers spread are more toxic than the pesticides. Pesticide bans have more to do with patent protection to increase corporate profits than they do with public safety anyway (if you don't believe that, do a little Googling on the difference in toxicity between DDT and organophosphate). As to silt, the entire case for listing steelhead and trout in this watershed is completely fraudulent. Nitrate standards are an even worse instance of blatant political corruption.

As shown on the ***Fire Aftermath, Mesa Verde National Park*** picture book, the disastrous consequences of the fires were due primarily to only two (2) weeds**:** cheat grass and musk thistle. Within the 25 acre area I manage, I have identified over **110** exotic weed species, posing varying degrees of threat. Today, nearly all of them are under control on our property, meaning that they are almost entirely precluded from breeding. Elsewhere, those weeds and more continue to rage amid roads and developments waiting for a disturbance. To give you a sense of what might happen after a fire (or if people clear out some of the excess fuel), I'll go over what happened after we thinned our forest and the cleared the areas over-run with French broom.

So, to recap, I'd built a house, got a job in the middle of a recession, we'd had two kids, and I'd made the company money. I'd killed the broom, graded the roads, put in culverts, removed the eucalyptus and acacia, and written my first book.

I thought I'd done a good job. Then, I got nailed.

January 2003

By this.

I was busy, you know. I had a career as a product research and development engineer with international project responsibilities. My wife worked too as a nurse manager. We carpooled with two small children, both in daycare. I'd worked my tail off on thinning the forest. Then I quit my career to write a long and involved book about environmental policy, so I wasn't about to pay any heed to something as pedestrian as a small dandelion.

This is no dandelion; this is cat's ear, of which we have two varieties. The first *(Hypochoeris glabrosa),* is a small annual. This weed is a monster on our land, but at first appearance, it doesn't seem like a huge problem to most people because virtually all the native meadows in this region are long gone, principally due to fire suppression and exotic grasses. Other weeds keep it from dominating. It doesn't look like much, does it? It is easy to miss.

This is the other form of this genus, *hairy* cat's ear, *(H. radicata)*. My neighbors have this too.

It gets almost two feet tall and makes lots of heads. It is also perennial, which gives it the potential to be the dandelion from hell.

I've counted as many as 70 heads in the making on one plant, each capable of producing about 50 seeds.

So, you are probably wondering why I regard the little guy as so much more of a serious threat. Well, left alone, it might be true that the bigger weed is more of a problem. Under management however, this one matures far more slowly.

So hairy cat's ear is both easier to detect and I have more time to find it before it blows all that seed. The serious problem with smooth cat's ear is getting rid of enough of it that you don't wind up right where you were. It can be very hard to find.

The smooth cat's ear on the right had been treated with 2,4-D. As you can see, it seeded anyway (and how). The real keys to getting control of this little beast are knowledge, proximity, and a demanding accuracy spot-spraying with RoundUp®. Then it's hand-weeding.

Places with more sun develop the weed more quickly. Steeper ground facing neighbors acquires more seed (I've been unable to get my neighbor to the east to control his vineyard). Think about finding them all, hidden in clumps of other plants over 5 acres. So, why bother?

We either take action to control weeds or there won't be any native habitat, anywhere. Thus the only choice we really have is to get to work, else we must admit that what the land becomes is unimportant.

Cat's ear often starts underneath other plants, which means that your first notice is the flower-bearing stalk. The yellow bloom is only about 2-4mm and only open in warmer parts of the day. The specimen at right has about 15 heads, each supporting 15-25 seeds. Published germination rates are above 90%. In sunny spots, we have two weeks to find them all from the time the shoot first appears to when they blow seed. So, if you have a 95% discovery and weeding efficiency, that means you are losing. If you try for better efficiency, that means you slow down, a lot. If you fail to cover it all, the seed blows over your head and you lose anyway. So, if the best one can do in a weeding session for cat's ear is 95%, one needs to weed 5 acres thee times in two weeks, about every 4-5 days in order to win. One has to know where they are likely to be from the prior year, how mature, how many there are at any one time and place, how much sun has been on each spot, *and* the weather forecast in order to cover enough ground fast enough to win. If you want any "Natural" left, that is what it takes.

Weeds in Sand Hills

April 2002

While I was in the crush of finishing up *Natural Process*, the cat's ear was quietly colonizing this sand hill from pioneer seed blown in from our neighbor's land. Up until then, my principal enemy had been broom, followed by rip-gut brome that went crazy on the nitrogen the broom had left behind. I had no idea of the magnitude of this problem. When I first saw this from a distance, I thought it was grass. This is similar to how my neighbor's vineyard looks today, except that he has exotic grasses and thistles too.

Same time, same spot from above. I estimate this infestation to be in its third year. When the seed heads opened, the land looked like it had snowed. Having written a book claiming to have a better way to manage the environment, it wasn't as if I could let this go. It took me three years to control this disaster at great cost to our meadows. Note all the bare sand; there wasn't much diversity here.

This is what we had, and worse. Think what this means to ranching and meat production. It is hard to appreciate what this did to our property, but when I say cat's ear destroyed our meadows, I mean it.

But did we really have to spray it with RoundUp? That stuff kills everything! The surfactants ruin your ground!! NOOOO!!!!

This patch, about four years in the making, is almost entirely cat's ear. Let us assume there are an average of 10-15 plants per square foot. It is too steep and erosive here to till. So, if one is going to hand weed, let's say one can find, move to, and remove ten plants per minute on average over an eight-hour day, which works out to nine days per acre. You have five acres to treat and (in May) two weeks to get them all. All winter and spring, as one removes them, more of them germinate. Do the math.

The herbicide manufacturer *said* we could kill it without killing grass with 2,4-D, but it didn't work; the leaves browned, curled up, and then it seeded anyway (from what I can tell, the claim was wishful thinking in pursuit of the golf course market). The only thing that worked was RoundUp. Now that the patent has expired, if Monsanto succeeds in ruining that product with RoundUp Ready genes…

This is a mix of exotic cat's ear and mouse-eared chickweed *(Cerastium glomeratum)* among native small-flowered and Spanish lotus *(L. micranthus & purshianus)* and slender tarweed *(Madia gracilis)*. The chickweed is an immediate problem as the seed is fertile inside that small, whitish tube (pseudo-cleistogamous), but the cat's ear demands attention now anyway, even though it is too cold for it to mature and blow seed. If I wait on the cat's ear, the lotus will cover it, leaving it both numerous and hard to find when it is about to blow seed. So I have to keep the biology of each weed in mind and the treatment method for each while I plan my hand weeding. In this case, I must dedicate the time to deal with them both.

There are fewer now (there are 8 cat's ear plants in this photo) and they're bigger, but they are still hard to find. Think of this as analogous to "Hidden Pictures." These California brome grasses get four feet tall. At that point, small weeds such as cat's ear or wall bedstraw become difficult to detect. In May, I have two weeks to find a cat's ear stalk and kill the plant. The wall bedstraw sets in June, is much more numerous, makes more seed, and is harder to pull in late season. So, the sooner I find them, the better things go. That slows me down in March and April while I'm removing plants that drop seed sooner, such as cat's ear or chickweed.

One key to winning is extending the control area to as far as the weed could reach us in large numbers. So, I not only need to clear *our* property of cat's ear, but also places like this one from which it blew in. That means broadening our control area. This is a vertical sandstone promontory down the road. Cat's ear is so tough it can root under moss on a rock just as easily as it can ruin a meadow. The significance is this**:** from a ridge like this, seed can disperse over our entire property. The vineyard is below our property so its seed tends to concentrate closer to the property line. Anybody in for weeding the face of a cliff overhanging a road below a blind corner? I do, but I don't recommend it.

Once I had control, maintenance was a matter of vigilant spraying at the edges of the control area (on this side of our property, yet another quarter mile down the road), plus policing our own property for cat's ear manually while looking for other weeds. Were we done? Not hardly. There were two problems**:** other weed infestations and my own ignorance.

At the beginning of this process, I did not know much more than most people re what was a weed and what was native. I had grown up in the Bay Area, so I was able to distinguish plants I did not recognize, but as it turned out in some cases, the "experts" were not exactly certain about the difference either. So, as soon as I had a handle on cat's ear, I spent a year allowing some weeds to spread while I reduced my ignorance, photographing everything so as to get it identified. At that time, the public information was confined to botany books and a few online pictures. Were our environmental academics actively focusing upon learning and teaching how this system works (instead chasing grants to do research to justify "preserving" ever more land), that knowledge would have been readily available. As it was, the consequences of ignorance (both mine and theirs) in making identifications cost me about three years of total hell, over seven months per year, or at least $200K worth of arduous labor.

Here is that same wall today. With my newfound knowledge I had made sure all the plants were native! So, am I done?

There is no such thing as “done” when it comes to caring for land. All I *had* done was isolate the constituents of a system. I had not in any way optimized a total system in a manner representative of what the Indians might have done, never mind learned what its potential might be. Worse, the continuing demands of weed control severely limits experiments I might do. Still, I now have choices**:** The wire lettuce *(Stephanomeria virgata)* is inedible, obnoxious (up to 6 feet in height), sends seed on the wind, and looks at first like a dandelion. So, I’ll let somebody else grow wire lettuce. The Cammissonias and silver puffs make more food for wildlife. So, for now, I’ll grow more of those until I learn what else might be done with it.

That is what the Indians did with this land. Later, you will see what may be recovering relics of their land management processes. This return of native crop plants is a direct result of knowing the land intimately, but that does not mean we know how to grow them. NOBODY has done enough restoration work for long enough to truly understand how the various native systems were managed. There isn’t even an organized effort to collect the necessary base data to make weed management more predictable to facilitate getting there (such as how many seeds per propagating body, the term of possible dormancy, expected germination rates, degree-days to maturity…). There isn’t any grant money in it.

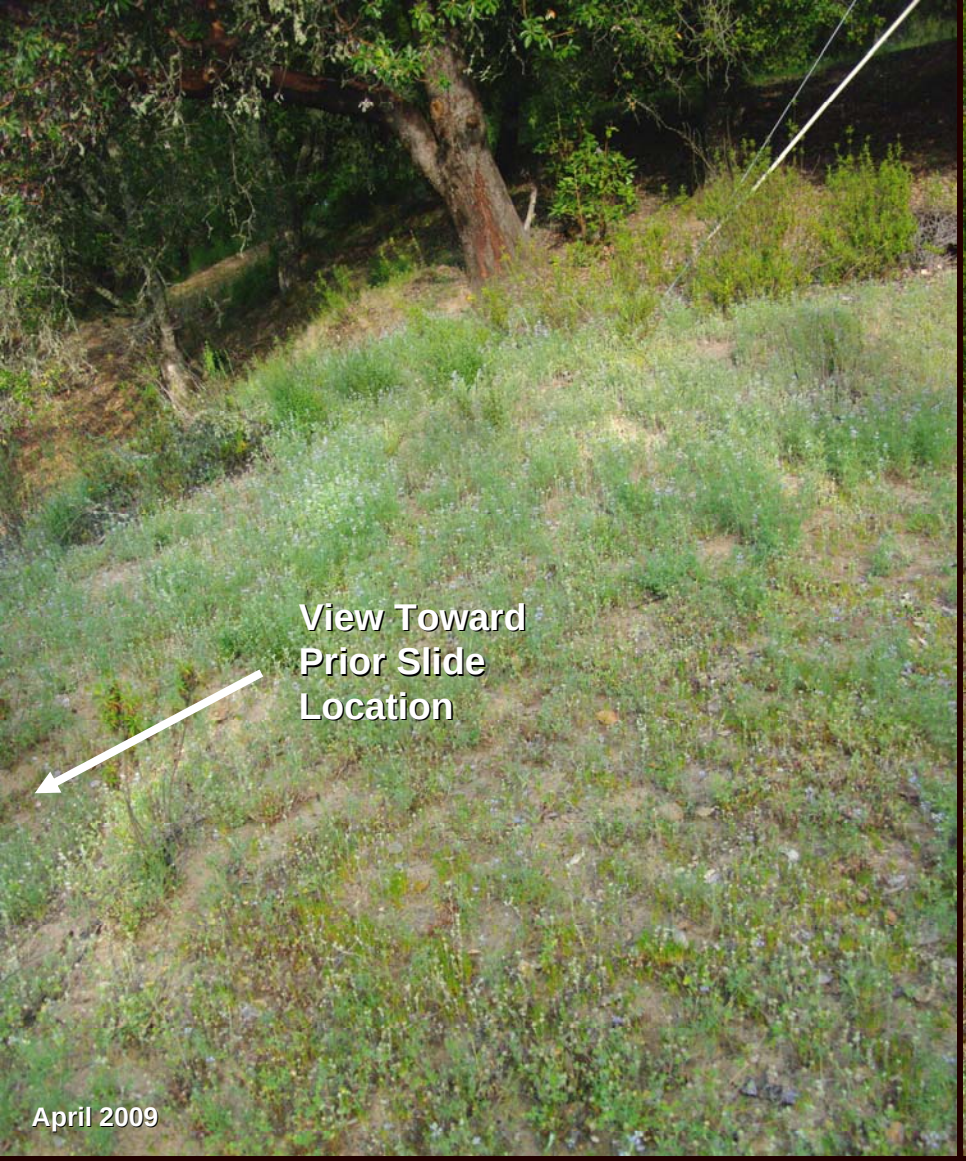
As weird as it may sound (and frankly, it’s sad), I am told that we are farther along than just about anybody on the entire Central Coast of California, parks, conservancies, and “pristine areas” included. I wish it wasn’t that way, but apparently that’s just how it is. There is an enormous amount of scientific work that needs to be done just to understand how the living elements of our immediate surroundings get along. What better living laboratory could there be than a purely native plant habitat?

This was the same place I had thought was grass in 2002. Why is it so sparse? Well, first of all, it is almost pure sand, so it is relatively infertile. Then there is the continuing process of control. The cat's ear seed bank was gone within three years, but then, up came Chilean brome, red brome, rattlesnake grass, catchfly, horseweed, *Filago gallica,* wall bedstraw, and scarlet pimpernel (in that order). Each species in the "weed bank" suppresses others until it its "account" is depleted, much like peeling layers of an onion. Each requires its own process. Early on, our control efforts were by species, to deal with the speed at which they spread. As we gained control, we were able to manage by location, but that meant dealing with the maturation rates of many species on each spot.

Same area in 2010. As the natives repopulated, the area increasingly became a complex mix of numerous species. In this immediate area, the more commonly represented native groundcovers are *Filago californicia,* three clovers, miner's lettuce (2), two tarweeds, miniature lupine, two camissonias, stonecrop, fairy mist, lotuses (3), cottonweed, three species of *Navarettia, Sagina,* and not a few more, totaling about 40 species within this photo. Interestingly, although it might appear that the increasing groundcover (especially clovers) over the prior year might be indication of an increasing native seed bank. The reality is more complex.

If you noted that the distribution of shrubs in the prior photo was not the same as the one before, your observation skills are excellent. Why? This sand hill system requires occasional disturbance or it eventually goes back to chaparral and then forest. So for now, I am keeping this a sand hill, because weeding out bushes is so arduous. So, I pull the bushes and burn them every year. In the pulling, I have noted the development of hunks of amazing fibrous networks of mycorrhizae. Pulling bushes constitutes that disturbance. Note also that the clover seems to have disappeared, leaving bare sand! Where did it go? From what I can tell, ants ate a lot of it and stored the seed. Now that the clovers are done, we're getting slender tarweed *(Madia gracilis),* and various Navarretias.

This the same area back in April 2010, a little closer to the surface. Go ahead and zoom the image to appreciate the complexity. This is an optimal time of day for weeding as the flat lighting enhances contrasts and edge effects with lower reflective glare. What it means is that I can distinguish individual grass blades or wall bedstraw rapidly and get them all. What it doesn't facilitate is getting the understory weeds. That takes overhead lighting, but removing a top layer of weeds also helps to see them.



This is the ridgeline 75' above the location of the prior slide. On the left is 2009 and on the right is the same spot in 2010. Although the bumper crop of lupine in the left slide bred successfully last year, their seedlings did not appear this year. 2010 was not a good year for lupine in general, which seems to prefer a drier spring, but it was a GREAT year for clover (prior slide). However, you don't see the clover up here, except in a few dense patches near the back (red outline). This distribution, plus the fact that I stirred up this patch with a hoe five years ago, is strong indication that the clover seed bank on this ridge was exhausted. The dense clover patches in the red-outlined area are the scions of the few colonizers up on top from recent years. **Santa Cruz Sand Hills** are especially demanding because they are wide open for weeds. As it turned out, we had bigger challenges than sand hills.

Weeds in Meadows

April 2010

In these mountains, fire-suppression has allowed forests to become overgrown. Meadows end up as very occasional openings, usually made by a bulldozer and maintained by machinery or grazing animals. Meadows with large quantities of native forbs are virtually non-existent. Here at the Wildergarten they are maintained by hand. Native meadows are by far more challenging to maintain than any other type of habitat. Larger plants hide tiny weeds, requiring time-consuming inspection and removal at least five times per year (they crop up after rain). The soils are tangled with roots, making removal more difficult. Meadows are also wildly varied; their management requires adapting to each individual system.

This meadow is a mix of small-flowered lotus, Spanish lotus, pinpoint clover *(T. gracilentum)*, thimble clover *(T. microdon),* small-flowered needlegrass *(Nassella lepida)*, blue wild-rye *(Elymus glaucus)*, California brome *(B. carinatus)*, hedge nettle (*Stachys ajugoides;* they don't sting), and about 20 others. Interestingly, this meadow is succeeding to grasses, while the one on p6 is going the other way. Note the three native shrubs, Yerba santa *(Eriodictyon californica the* leafy thing in the mid-ground*)*, monkey-flower *(Mimulus aranticus,* at the tip of the shadow*),* and deerweed (*Lotus scoparius*, in back of my trusty dog). If I don't remove them too, this meadow would succeed to chaparral in about five years. Now, that isn't a bad thing in terms of native plants, but it is a bad thing in terms of management. It is a lot easier to keep the weeds out of a meadow than a chaparral.

Although this site is cleaner than some other locations on our property, any disturbance brings up non-native Dwarf Wood Sorrel *(Oxalis laxa),* bur clover *(Medicago polymorpha vulgaris),* and French Broom, even though they have been under control here for several years.

Native meadows are beautiful. This close-up is within 50 yards of the first, mostly lotus, needle grass, and purple cudweed *(Gnaphalium purpureum)*. Unlike the prior meadow, after broom the dominant weeds here were wall bedstraw *(Galium parisiense)* and dwarf hop clover *(T. dubium)*. So, besides solar aspect, soil, and drainage, adjacent seed sources, seed vectors, relative isolation from wind, distance from water for animals, or whether it is on an animal path (all of which are important), if what you want is native plant habitat, **weed bank composition** may be the most important information a landowner can acquire. For it is the type, number of species, age, and quantity of dormant exotic seed which shapes both how the system will respond to disturbance and how long it will take to clean out. Usually the botanical details of that history are unknown. That produces a need for limited experiments.

Native meadows are varied too. This one is a mix of California brome *(B. carninatus)*, purple needle grass *(N. pulcra)*, blue wild rye *(Elymus glaucus),* Western fescue *(F. occidentalis),* Santa Barbara sedge *(Carex barbarae)*, and the usual lotuses.

The natives include multiple clovers, miniature lupine, a Navarretias (commonly known as “skunk weed”), perhaps two madia species, and a weird little succulent thing called “pigmy stonecrop,” This image is printed in high resolution as well.

Along with meadow variation there is also variation within species. Three of the four photos are notch leaf clover *(T. bifidum)*. The funny thing is that the two that appear to be most similar are actually different species! The first (1) was the first pioneer. It is at least four times the size of the other two notch leaf clovers here (2 & 4). It has either subsequently differentiated or the property was simultaneously colonized by other varieties. Each subsequent variant has since bred true. The oddball is (3), *T. microdon*.


1

Trifolium bifidum


3

Trifolium microdon


4


5

Clover (3) is a variant of thimble clover *(T. microdon).* To the casual observer, in may ways (3) resembles the notch leaf variant (4) more than either resemble their respectively more common varieties (1 & 5). Meanwhile, the latter two share several attributes not shared with the smaller flavors of each. So, why does the taxonomy work this way? The traditional distinguishing features are the attributes of the flowers, whether or not there is hair, etc. Also interestingly, they are unlikely to be hybrids because clovers breed VERY narrowly. In fact, they are more exclusive of other varieties within their species than without! Still, it would seem that there might either be gene blocks or conditional branches in the gene algorithm that interact with environmental factors (“junk DNA” anyone?) at work here. Interestingly, I have seen similar behaviors not only within clovers but within the everlasting tribe

All this variety has its consequences when one is making decisions about what to keep and what to weed. This area is entirely native forbs**:** red maids *(Calendrinia sp.)*, stonecrop, skunkweeds (3), and 3 lotuses (insets). It is a considerable difference from what was here before…

This is the same spot the way it used to look. Other than a few red maids at the top, it is all exotic.

Native meadows full of forbs can get downright weird looking. This is purple cudweed *(Gnaphalium purpureum)* in the rain.

There are even meadows deep in the forest on steep hillsides. This one used to be a broom patch with bare ground. It now has Torrey's melic *(M. torreyana)*, pine grass *(Calamagrostis rubescens)*, and small flowered needle grass surrounded with roses, hazelnuts, and ferns. But as remote as it is, this meadow shares one thing in common with all the others… weeds, no matter what.

Meadows are also complex, REALLY complex. To most people, this looks like it's just grass and a few bushes. To me, this represents an awful lot of work. Out of this area of maybe 25 X 40 feet), I had taken a 40 pound rice bag of weeds the same day.

To give you an idea of what weeding here is like, consider this photo. This needle grass seedling, in the **second meadow in this picture book,** is infested with wall bedstraw (*G. parisiense* circled) from the "weed bank." Wall bedstraw is quite problematic**:** It is relatively inedible, difficult to kill with herbicides selectively, hides easily, and can seed when less than 1cm tall. They can grow up to two feet across. Each makes a huge amount of minute seed that can travel long distances as burs. The seed can remain viable in soil for 30 years. The root goes deep as it matures and breaks easily when pulled, except at about this stage of development. At this density, wall bedstraw can produce about 100 seeds per plant (thousands when they are big). If I don't get them ALL, they will grow to about six inches in height and take over this needle grass completely, producing a carpet nothing wants to eat (it's coarse and mildly toxic). This spot has been hand weeded for 7 years. I count 9 species here.

In Golden Yarrow
Eriophyllum confertiflorum

In Small-Flowered Lotus
Lotus micranthus

In Deerweed
Lotus scoparius

Perhaps you have heard that “old wives’ tale” about how weeds can hide. This is wall bedstraw in three different types of plants. In this instance, I’ve pushed the contrast to help you see them. The bedstraw has a whorl of five leaflets around it (like the one in the inset), while the lotus has three leaflets. We have about five acres infested with it to varying degrees. We had to develop specific techniques to separate them efficiently when weeding that differ with the mechanical attributes of each host species. Remember at the beginning of this picture book that high visual acuity was a must? There is more to it than that, as you will see.

Here was a wad of tiny wall bedstraw seedlings *under* that deer-weed bush (the third one on the prior slide). Deer-weed gets about 5-6 feet across and about 2-1/2 feet tall. It's a tangled mess of wiry strands. Can you imagine weeding tiny bedstraw plants, one-by-one, out of a hundred or so shrubs like that, some full of ticks, and about a quarter of them with Lyme disease?

No? Frankly, neither can I. So, I pull the whole bush, frequently. The reason is that it is prolific. Deer-weed run amok would make such a mess of this place it is no wonder the Indians would just light it on fire. So, if that bothers you, consider, the bureaucratic approach to this pull-or-not-to-pull decision:

1. Call a botanist and get an appointment to assess the situation.
2. $500 (at least) later, send the botanist's written opinion to the bureaucrat for approval.
3. Meet with said local public official for a site inspection.
4. If all goes well, pay another $350 for a removal permit.
5. Put up a $1,000 bond just in case something bad happens.
6. Wait two months for approval to remove the plant (they're really busy because of budget cutbacks).
7. Meanwhile (of course), the weed has bred.
8. Get a final inspection to verify that there was no other harm to the environment.
9. Oh, and your bond money will be returned (eventually) without interest.

Now, if that seems a bit far-fetched to you, just remember**: This is exactly how things work in many communities subject to the California Coastal Commission**, especially if the plant in question is a tree. Now, before protesting about how different a case that is, please consider the results of what I did to care for my land, especially by thinning it. By the time this picture book is done and you witness the comparison, I think you will realize the absolute futility of managing such a complex problem the bureaucratic way. It is not only unaffordable, it cannot work.

Now that you know what it looks like, find it in here! This isn't like weeding in a suburban back yard; this is serious work requiring at least intimate guidance by an educated professional. This is mostly California brome with the usual clover/lotus groundcover.

This (foreground of the prior slide) is the way it looks when weeding. Finding a few 6” tall bedstraw plants, or any of the other 110 weeds we manage in a half-acre of this is a challenge, but if you want a native meadow, this is what must be done until we have better processes (more on that later). It may *look* impossible to do by hand, but there are ways that takes it from virtually impossible to merely painful. First, the grasses mature before the bedstraw. The latter tends to bolt upright and branch out just before dropping seed, making them easier to find, but starting that late doesn’t give you time to get them all. Meanwhile, we *want* the native groundcovers and grasses to drop seed. So, reduce the bedstraw to a few per yard *before* the native annuals are ready to seed. At that point the amount of mayhem one inflicts while looking for that last bedstraw is of little consequence. As you will see, we have more powerful processes in the works that, once we have enough seed, may make this type of effort far less necessary.

These 1-2” tall bedstraw plants are from dormant seed (as opposed to newly imported). The seedlings are evenly dispersed over large areas, as opposed to clustering around a spot where an animal may have bedded down for the evening or a plant was missed the prior year and bred successfully (what we call an “incidental error”). We had a lot of rain this fall, followed by warm temperatures. This spring we had a succession of warm rains. These events made the blast from the weed bank especially virulent. Here, the stem is strong enough to pull the root, but the root is not too deep. Optimal weeding conditions are after rain but then deteriorate within hours (yet another reason why it is important that a land steward live on-site). The red dot is for location reference.

Remember that I said wall bedstraw can wreck a meadow? This is about the same spot, **six days** later (see red spot). It has almost doubled in size. I promise you**:** the roots have grown just as much. These plants are now at the extreme limit of what one could weed by hand with effective yields… in this hard packed soil. Elsewhere, in looser soil, this size is just big enough. Once it seeds, one can tear the root, but one does not want so much left that it drops before getting it all. So, because we need to get a lot of it early and are at the size limit *here* and because we have many spots just like this one only vastly bigger in area, and with other weeds just as bad, do we spray it or weed it?

In this case, the answer is “both” because a black plastic tarp over a compost pile had precluded bedstraw germination across the top left of the photo. We do not yet have much groundcover seed here, so we hand-weed around native plants (the tree clover (blue) and lotuses (yellow)); then spot-spray the area inside the line. Next year, I expect a similar problem where the tarp had been. Note the difference between the area treated similarly last year at the bottom and the sparse lotuses in the weeded area (with all the dots).

Once the bedstraw seed bank (prior slide) is mostly depleted, that spot will start to express scarlet pimpernel *(Aganalis arvensis;* red). Only ten feet away from the last slide we had a sparse weed bank "layer" of pimpernel, with two non-native clovers and some random grasses. Some, such as small-seeded rattlesnake grass (*Briza minor;* green) are imported annually, while others, such as this remnant of nit grass *(Gastridium ventricosum;* blue) are from the weed bank (on land dominated by weeds, the Gastridium is not very competitive, so there isn't much seed to carry here). I need the few natives to breed. Pimpernel is easier to remove than bedstraw, but more toxic and harder to wet with herbicides. The pimpernel is often the last broadleaf weed layer in the onion, so now clovers and lotuses are doing their thing. Typically, the first clovers are exotic, either hop clover *(T. dubium,* not in photo*)* or rose clover *(T. hirtum,* yellow*)* (as we saw, the native clover seed bank was exhausted). Then the natives slowly colonize the area from elsewhere. The pimpernel is a much slower developing species than the wall bedstraw, so it won't drop seed until late June. So, do I weed or spray? If so, when? Weed, NOW. Why? The natives and weeds are closely mixed with two cat's ear plants starting to put up stems (white; just one in the photo). At that stage, it will blow seed in three weeks. The small seeded rattlesnake grass will drop seed almost as fast but the Gastridium won't seed until June. So, once I started, and with so many species calling for varying processes, I finished. If the spot had been larger, I'd have addressed the immediate needs and come back later. It's all about speed.

When the lotuses and clovers first colonize an unoccupied area, they are often huge (this *L. humistratus* is well over a foot across). In the second generation, after they have seeded, they germinate in huge numbers, but are much smaller, usually about four inches across with three to six flowers. I speculate that the pioneer seed has a thinner coat with which to establish many scions to control the spot. Once established, the strategy becomes to hold the spot. So, the same hormonal signals that make them smaller (Ludlow 2008) also have them produce seeds with a thicker coating that makes them capable of extended dormancy. We are looking for PhD candidates who want to do their graduate experimental work here. There is a lot of research to do that can only be done here because when the exotics are under control and the natives come back, amazing things start to happen.

The stuff on the left might seem to be grass, but they are blue dicks *(Dichelostema capitata),* one of the few species on our property whose seed survived buried under weeds for hundreds of years. Now that the weeds have been removed the blue dicks have started to express their seed in patches extending over 70 feet. In fact, that breadth and density might be indication of historic Indian farming on this site. It takes a few years for them to express their flowers (right). Also present in the left photo is Pacific sanicle (Sanicula crassicaulis), also farmed by Indians for roots. We believe sanicle seed might make a nice cooking spice.

Note the difference between the size of the blue dick blades on the ground from the photo on the left in the prior slide; they have doubled in size from last year and are showing up in an increasing density over a large area. The patch extends from open meadow to deep forest shade with big differences in soil and light. Why are they suddenly appearing at once over a large and varied area?

Over a hundred soap lilies, a species also once farmed by Indians for food, are just down the slope from the band of blue dicks. The two hardly mix at all; the patches have a well defined boundary extending at least seventy, but perhaps a hundred feet. It simply has the look of a human arrangement. From what I can tell, this slope grew camus, sanicle, soap lilies, and blue dicks. There are plenty of herbs present, but they are farther down the slope. How these plants might have started expressing themselves simultaneously after all these years and over such a distance containing both meadow and forest soils represents another research opportunity.

Of all the groundcover types found here, the herbaceous oak forest understory is my favorite, particularly yerba buena *(Satureja douglasiana)*. This understory takes about a quarter of the time required to maintain even a pristine meadow. To keep it this way, I must remove even native plants**:** coyote brush, numerous fir trees, and many of the grasses that come in while slowly thinning trees; else it would soon become overgrown. An acre a day three times a year is about all that is necessary to keep it like this, except for...

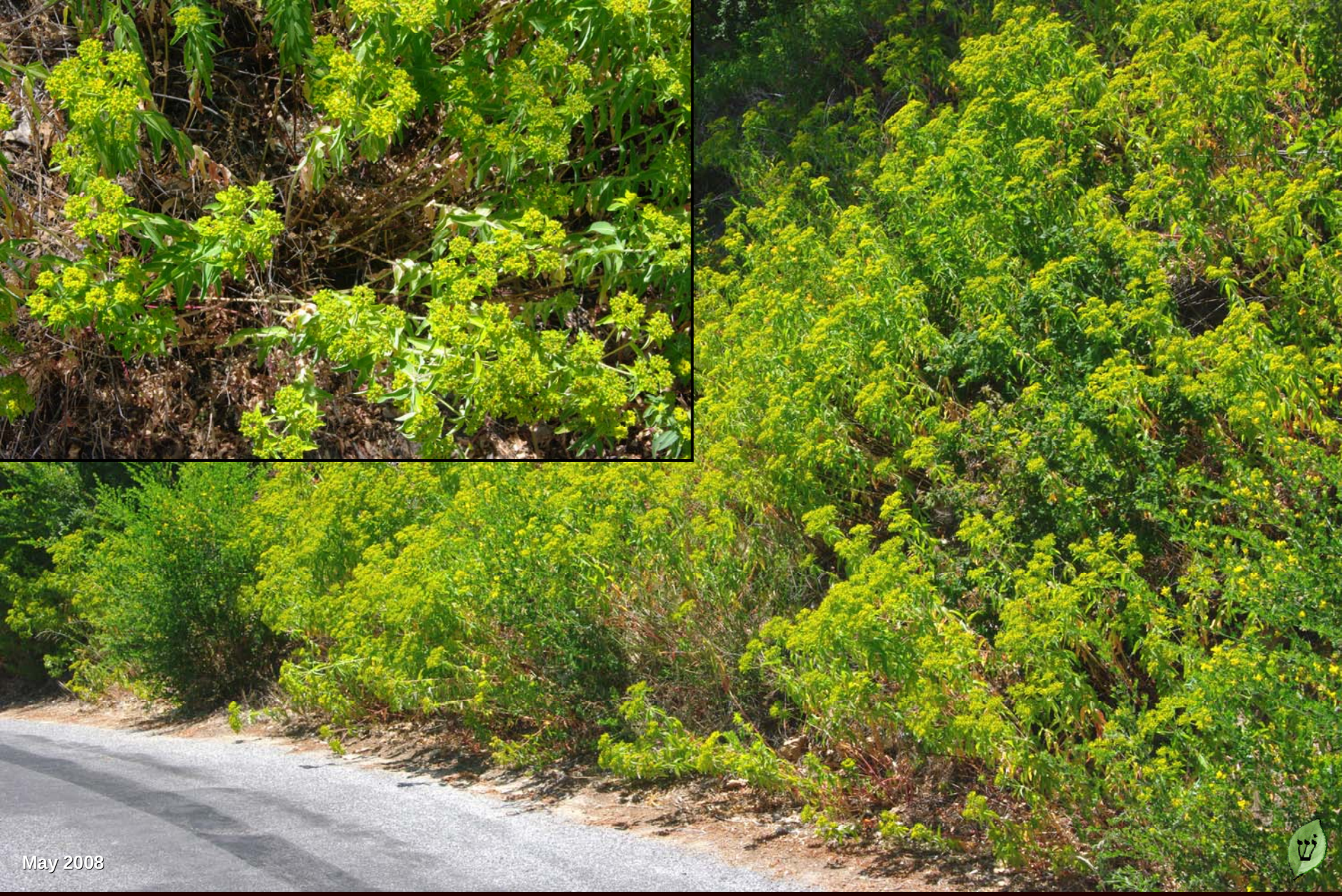
Torilis arvensis. Hedge Parsley burrs are tenacious and get into everything (see inset). I really feel for every mouse, squirrel, and deer that has to deal with this stuff, but I'm not exactly thrilled when they come here to clean themselves off (which they do).

Hege parsley. There are a number of weed infestations of which I do not have good pictures. That is because it is so hard to photograph small plants dispersed over large areas among other vegetation, and/or they are usually sparse or tangled in other plants and require high contrast lighting to see well in a forest with patchy light intensity. Once you get a shot close enough to show the plant, you can't show the infestation over a large enough area to communicate the magnitude of the problem. Sorry, but I don't have a better way to give you a feel for it until I get HD video requiring both optimal lighting and very expensive interchangeable lenses. Photos to capture the magnitude of the problem were unaffordable. Photos for identification were all I could afford.

Now, you may wonder about that, but here it is**:** Any weed you miss reproduces and spreads next year. The closer you get to zero the more you gain in terms of how much less there is in subsequent years. In the heat of this fight, there was no time at which it was not a desperate battle. In the case of hedge parsley (at left), my two girls and I took out 37 garbage bags of this little beast in one year, by hand. Hedge parsley was a family victory (my wife hates it).

Thus, many of the photos to come were taken away from our property, typically along public roads where there is access. However, those pictures do not express the power these weeds express when invading a native habitat because in these outside locations they are in competition both with other weeds and an overgrown forest. Effectively, **what little is left of the native biodiversity of this area is beneath multiple "layers" of powerful enemies**, each capable of taking over, each of which must be removed for several years before what is left begins to express itself.

The situation is that bad. So forgive me if some of these pictures do not communicate the degree of threat I describe, because that's just how things are.



This is leafy spurge *(Euphorbia esula)*, which is so chemically aggressive it suppresses even broom germination. Little else grows in it. It can regenerate from roots that can extend thirty feet and has waxy leaves, making for a very difficult kill with herbicides. It produces a somewhat toxic and caustic sap. County mowers have spread it nearly a half mile since this photo was taken.

This is Italian thistle, an annual that also readily forms monocultures. Italian thistle can breed while very small (see inset with flower). It also easily adapts to shade, making it capable of sparsely colonizing a forest until it gets to the next opening. It matures early enough that it is transported by roadside flail-mowers very efficiently, so this is yet another pest our neighbors and the County would inflict upon us but for efforts we expend on other people's land, every year. I once took out two garbage bags of just the heads from a patch that had colonized a bed of poison oak (see how small they are in the inset). How many people would or could do that?

Most people recognize foxtail barley *(Hordeum murinum* red*)*. We have almost eradicated this pest within our control boundary (even from our neighbors' land). There is rip-gut brome in here too *(Bromus diandrus* blue*)*, which actually tends to be more aggressive. These grasses have very little forage value and are injurious to grazing animals.

Exotic grasses like these, particularly rip-gut, “poverty grass” *(Vulpia spp.)*, and slender oat *(Avena barbata)*, dominate much of California. The native grasses are so long gone **nobody** knows how those grasslands looked or even if they were grasslands at all. Annual burning might well have kept those landscapes in forbs, not grasses, a distinction with real consequences.

Bee Attitude

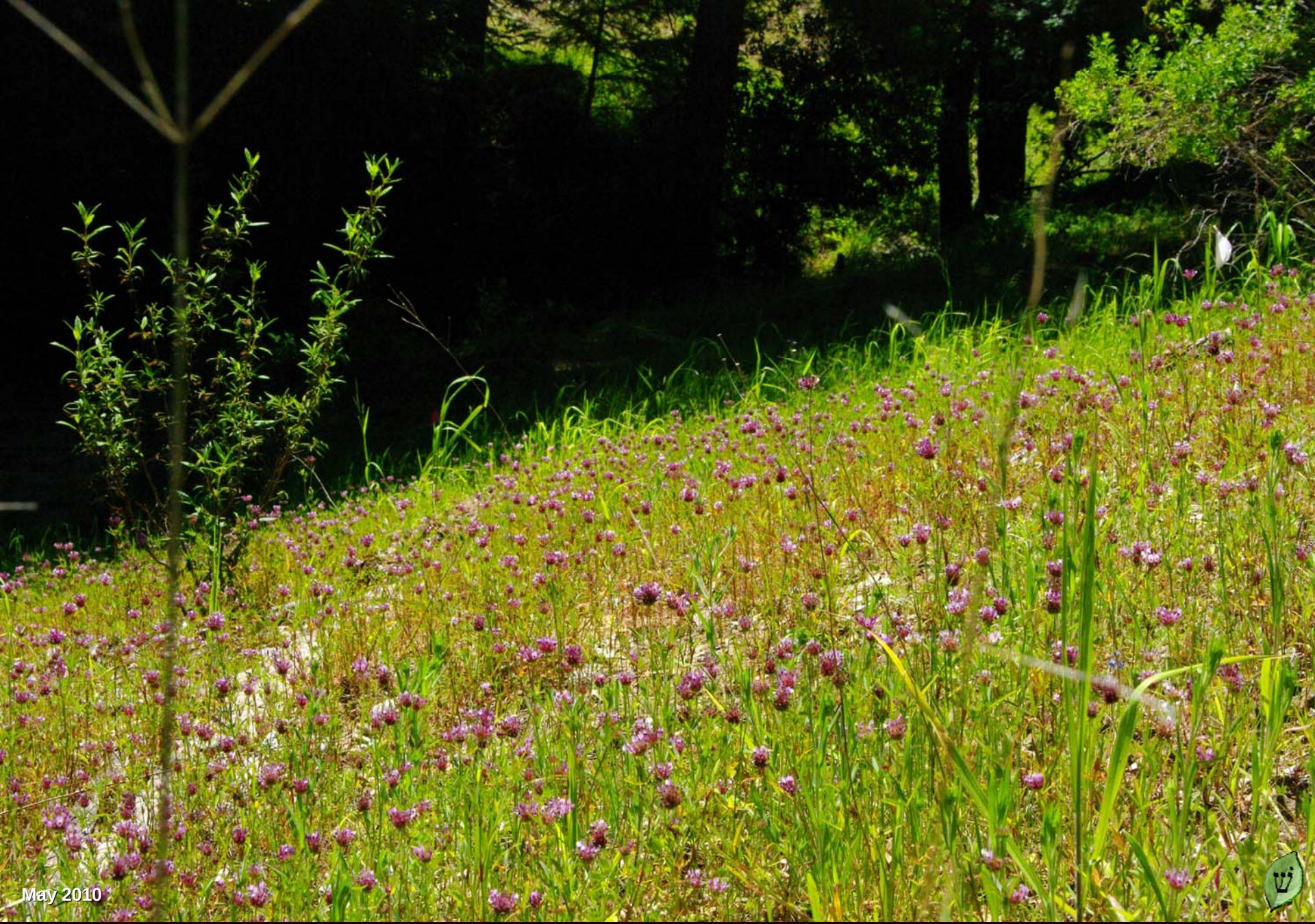
Blue curls *(Trichostema lanceolatum)* germinate relatively late in the rainy season, around mid-March (this photograph was taken at the beginning of April when these seedlings (2) were about an inch across). When weeds dominate the landscape, tiny seedlings starting in late season don't have a chance, so much so that this species was listed in the botanical record as belonging in our County, but the local herbarium didn't have a specimen.

So we sent them a pressing (botanists traditionally keep a plant squeezed between two pieces of cardboard for documentation purposes with the collection information thereon). This is late August. These amazing plants grew to nearly two feet tall and stayed bright green without ANY rain, despite many days over 100°F. So, besides drought tolerance, why are blue curls a big deal?

Insects (and especially bees) go nuts for blue curls, because they are one of the few local native sources of late-summer pollen.

People need bees to pollinate food crops. California has 1,200 species of native bees. Unlike European honeybees, native bees do not make honey. While this may sound like European honeybees are superior, the natives have a survival advantage in that, as solitary insects living in burrows they are less subject to the hive diseases and parasites which now threaten European honeybees. Native bees need pollen all year to survive and breed. Weeds and development crowd out the plants they need to survive.

When we got here, the place was so overgrown for so long there was not a single *Ceanothus papillosus* bush left (it's a type of lilac, so it smells wonderful). We transplanted 20-30 Ceanothus bushes that germinated at the edges of our burn piles and about 70% of them made it. Every April you can hear the bees from a hundred feet away. There may be a dozen species.



When the Ceanothus is done, the bees hit the clover, especially bumble bees. These are tomcat and few-flower clovers *(T. wildovenii and T. ogliganthum)*. Among the non-native plants, native bees do seem to like vetch (which we remove anyway).

June 2008

By June, verbena is bee-heaven. It is a wonderfully hardy plant. It flowers like this until August. It dies back during winter freezes and then grows to about ten feet across in spring. Root die-back is fantastic for soil and the verbena cover keeps it moist. My guess is that the way the system worked was that forbs grew and set seed around it, then to get covered over later in the spring. Unfortunately, weeds love it under there. Weeding a plant full of bees in 90°F+ heat is a bit touchy for a guy with an allergy to stings.

By August, few plants are so attractive to bees as blue curls. The plants in domestic gardens make a poor substitute source of pollen as native insects show a marked preference for native plants. Without late-season flowering plants, such as blue curls, the bees upon which we may have to depend for food have a harder time. Interestingly, in spring the bees are out all day, but when this photo was taken in August, only in the evening. So my apologies for the photo as I had to push the limits of the camera to get it.

Similar to the first blue curls photo, you can see that there is bare dirt around these plants. Blue curls need bare dirt because they germinate late in the spring; they are a post-disturbance species. They do have the unpleasant property of smelling strongly like vinegar when you bruise them, which is why these plants are intact at the end of August despite the animals. Another plant with the same defense is the brown, dead stuff around them: "skunkweed" *(Navarretia spp.),* of which we have three species on this property.

This is the same “orchard” area as the prior photo, the next spring. We not only have lots of both skunkweed and blue curls, but red maids, native clovers… Grasses, and toad rush are also making their way in. Left alone, I suspect the latter three natives will exclude the blue curls. So, what to do? Do I exclude the grasses, skunkweed, and toad rush to keep blue curls?

Skunkweed, although native, is truly an unpleasant plant. Like the name suggests, it smells of “L’air du skunk” from quite a distance. The spines break off in your skin and fester painfully, so I **hate** weeding in it. Then why have it? Well, there are scads of tiny “sweat bees” *(Halictus sp.)* that go nuts on it in July. So, skunkweed is a big deal too, even though nobody in his right mind would like it.

Skunkweed can be aggressive. If you've got bare dirt because you got rid of the weeds, you'll get a lot of it. So, we use it along with those equally stinky blue curls in places where we do want bees but don't want browsing animals to eat our fruit trees. Unfortunately, what you'll need to grow either skunk weed or blue curls is truly short in supply around here: Bare dirt. Bare dirt is open for weeds.

Vine Intervention

This is Maltese star thistle. We get lots of star thistle, sow thistle, cat's ear, and other weeds blown in every year from our neighbor's vineyard, (with our bees probably pollinating his grapes). These seeds slowly dissipate over about ten acres, sometimes inches apart, even when over 300 yards from the fence. The cost of controlling them has been incalculable, but if I had to contract for it, it would have been in excess of $250,000 and maybe twice that (it is where the cat's ear came from). Why is there no law against this? Guess who are the biggest and most negligent weed owners around? Small vineyards are are common weed incubators because they are frequently-disturbed and often with minimal weed control, while government agencies and heavy equipment operators introduce the seed to these sites. Note that deer like to munch on cat's ear (spot) but not star thistle. They are picky eaters.

This is the vineyard where these airborne weeds originate. It is about three times the size of our property almost entirely populated with annual weeds. It is about seven years old, on land that had been grazed for many decades.

To the average viewer, this probably looks quite attractive. It is a beautiful area in general and this is a fairly representative view, primarily residential with a touch of agriculture. The grass, primarily oat, is about five feet tall, yet sparse and without much food value. Before the vineyard was put in about seven years ago, it was grazed regularly and was primarily native perennial bunch grasses. From here, it is hard to see the impact of annual grasses, cat's ear, thistles, flax, and various bedstraws.

Here, amid the morass of oat, rat-tail, and Chilean brome is a small group of “mule’s ears” *(Wyethia helenoides),* one of the half-dozen or so remaining survivors of this deepening infestation. It is one of the few native sunflowers we have in this area and the only specimen I’ve seen for miles. I’ve wished to collect the seed and save it, but I have the owner’s permission to weed, not to collect.

Look down. It is very hard to appreciate how much seed this represents, in part because some the majority of the seed heads are still yet to open. Go ahead and zoom it and pan around to get a feel for how much there is, because for me, this is an annual disaster.

The meadow above the vineyard is probably 1-2 acres. The prevailing winds come across the vineyard from the right, hit this slope and rise, carrying the seed high into the air to rain over our entire property. What you may not recognize is the counterstrategy. Note the broom at the top of the slope. I used to bushwhack it, until I learned that I could use it to knock down the seed, much like a filter (I still keep the broom down once under the trees). The tall grass too limits the seed flight somewhat. So, if I mow it or graze it, the seed goes farther. If I spray it, there will be erosion. So without the owner having a motive to do something, there is little more I *can* do other than to beat the heads with a wand to make the seed fall to the ground before they blow up the and over the trees.

Behind that front line of defense (the broom filter) the next battle begins. Here is the Italian thistle that made it through along with a mix of bedstraw and tall oat. The material on the right is a mat of bedstraw that collapsed the oat into the broom. What happens with the bedstraws you know about, the annual grasses are another matter.

Now, I *want* this landowner to succeed and he is obviously not made of money. If he would just stop dumping more seed on me from his vineyard every year, I just might be able to get control of the meadow and we'd be set. Unfortunately, his options are few because his organic farming certification holds that he cannot use herbicides. Further, he has been taught by "experts" that weeds are a way to reduce erosion (as if native plants could not do as well). In effect, weeds may be cheap seed, but they are not good for the soil for his grapes. Sheep can be taught to eat weeds without harm to the vines and I am willing to offer technical assistance and perhaps seed or grass plugs, so we'll see. What I don't want is to see this land abandoned. It is bad enough as it is.

Splendor In the Grass

The problem is that, besides airborne weeds, others come in on animals as mud on feet or burs in hair. In addition to hedge parsley and bedstraws, the most numerous are annual grasses, which dissipate over about seven acres. The challenge is when they infest native perennials with similar visual attributes. Realize, that in the pictures you have seen of native meadows, we have removed exotic annuals from **within** every one of the perennial bunches. Here is an example of annual rat-tail fescue *(Vulpia myuros)* and squirrel tail fescue *(Vulpia bromoides;* neither are true fescue grasses*)* among perennial slender hair grass *(Deschampsia elongata)*.

In this case, early distinctions between native and non-native are often almost indiscernable until the squirrel tail seed head opens or the slender hair grass nods. This makes easy separation too late in the game to control the annual Vulpia over large areas. So, what I have to do is suppress the native perennial Deschampsia until the annual weed is brought under control. In the future, we will probably do this with pre-emergence herbicides that kill only the seed as it attempts to germinate, which favors perennials. The problem is that weed seeds can accumulate over a number of years before suddenly germinating in huge numbers under favorable weather conditions (as they did this year). That means they might not all try until after I’ve halted the treatment. This increases the risk with disturbance (such as thinning more forest), as I cannot know accurately how much weed germination to anticipate.

Here we have an instance in which I must separate native perennials from exotic annuals of the same genus. Here, at the end of the season, and because I've been removing the exotics as they crop up with the spring rains, I have the benefit of a color difference to make the distinction rapidly from a distance. Before there is seed, the differences are far more subtle, shape and texture being chief. To cover acres, they must be distinguished rapidly. Early on, I need be only 70% accurate, because that is good enough to reduce the problem to a manageable level at the end of the season when everything is maturing rapidly, sometimes over only a few days.

Do not let the color difference fool you; they'll both be red in a matter of days. In fact, Spanish brome *(Bromus madritensis)* is also known as "red brome." Each of these brome patches must be inspected almost weekly to get the bad stuff out often enough to make it possible to see the exotics amid the natives. The annuals mature so rapidly that if I waited, the more mature would be dropping seed before the later germinators even headed out. That is why the native is redder; the red brome here is a late bloomer.

Here we have the results of our first grass-selection trial using pre-emergence herbicide. On the right you see where I sprayed it last fall. The blue wild rye *(Elymus glaucus)* is just fine and the Vulpia, chickweed, and annual bluegrass are **all** gone. Had I not done it, with all the grass we got this year I would have had to kill it all and start over with plugs from precious hand-collected seed. The good news is that we now have so much native annual clover and lotus we will have no trouble reseeding this area after the treatment. Meanwhile, my dear sweet wife weeds the remains of the chickweed on Mother's Day (her idea). God bless her, I love her so.

Not a few of the exotic grasses on our property were introduced and spread as required by law for State road projects like this one. This brings us to the other problem with bare dirt: Bureaucrats and environmentalists have a multi-BILLION dollar “clean water” business enforcing books full of specifications to “control” erosion (you will see later how destructive that idea gets). Today, these rules mandate very expensive native plantings on all freeway projects, such as you see here. So, isn’t this an improvement? Well, it could be, but note the exotic weeds in the foreground across the road (still on State highway land): foxtails, starthistle, sow thistle, slender oat... This expensive grass monoculture will be wrecked in three to five years because capital budgets do not fund adequate weed control. The gas tax money for maintenance has been diverted (illegally) to fund mass transit to… “protect the environment.”

This artistically textured and colored retaining wall project is just up the hill a few miles, completed a bit over five years ago. On this slope the State planted wonderful (and expensive) lupines and grasses that are long taken over. Of course, they did nothing about the French broom above the retaining wall showering seed down the hill. Meanwhile, the Italian thistle is busy making its way up the hill. Eventually, as the perennials establish and the madrones above grow into decadence, the fuel load will just like this…

If you let it all go, this is one form this system eventually takes**:** dying madrone *(Arbutus menziesii)* and broom. This the top of a ridge, so fire coming uphill would be catastrophic, after which there would be erosion anyway… "Oh, but that's an Act of God," as if nobody could have done a thing about the fuel and environmentalists suddenly got religion (they have one, but they won't cop to it). Interestingly, the reason the madrone looks so bad is yet another imported exotic pathogen by the name of *Botryosphaeria dothidea*.

HOWEVER, removing such disastrous fuel loads is what made our weed problem such a big deal. Thinning put enough light on the ground to germinate that dormant seed. Unfortunately, weeds nearly always appear first. So, if what you want is native habitat, it's going to take careful, tedious, consistent, and sometimes arduous labor, no matter what. Lots of it. That's just how things are.

This is an example of just such a case. I had cut a tree nearby. When the sun hit the ground up came catchweed bedstraw *(Galium aparine,* ***supposedly*** a native plant, but I profoundly disagree for a whole slew of reasons). This crop represents what I call "drag-in," seed that accumulated from other people's property. The photo was taken in a spot where the deer like to clean themselves as they enter our property. I've deliberately built such "cleaning stations," by developing "fences" of shrubs along the property line with "seed traps" shaped like pockets. The deer drop to the ground to rub and roll off the burs as they come in (they hate them too).

This is catchweed bedstraw just getting started among native blackberry, snowberry, hedge nettle, and rough leaved aster. This infestation was probably brought in originally by the garbage company. My weed book, *Weeds of the West,* said it was native. So, I let it go. Only one year later, we had acres of mats of 6-10ft long tendrils. We rolled it into 3ft balls with rakes while slashing roots. It later turned out that this one is supposedly different than the native. That small difference turned an annoyance into a monster. Unfortunately, I had to nuke a lot of it with RoundUp, which took a lot of natives with it. Recovery took several years.

As to this “native v. exotic” question, consider this example.

Among the madder tribe (which includes all bedstraw species) we have two natives and four exotics. At right is one of the natives, Sweet California Bedstraw *(G. trifidum)*.

This bedstraw is no problem; it is about a quarter the size of the weed, tends to stay put in shady spots, and does not displace other species.

Among the four exotic madders, three just cannot get along. At left is a single *G. aparine* (the photo spans about two feet). It’s definitely not fine, grows just about anywhere, and buries most natives.

This plant was not anywhere within miles of when we arrived. When it did, it took over in just a couple of years (until we went to war)

The two exotics are Field Madder *(Sherardia arvensis)* and Wall Bedstraw, *(G. parisiense)*, both lying dormant in the soil until we started thinning. When they did come up, they wiped out ALL of the native groundcover in two meadows and a chaparral.

This photo was taken on another neighbor's property. Only two or three years ago, a tree went down. Back then the areas on either side of the line were the same (I used to weed broom in there). It may be hard to see in this photo (unless you increase the screen magnification), but the foreground has a mix of bedstraw and hedge parsley while the background, not yet infested, has a diverse mix of perennials. The ferns and snowberry in the background are now nearly missing in the foreground. They lost. You should see the difference in soil as a result. All other factors are equal at the transition.

I had to find and treat this breeding ground to reduce the rate of infestation of our property. It represents a source of the "drag in" I was talking about, but there is a more important point**:** Clearings like this from decadent trees finally dying create openings where the weeds go nuts, even in an overgrown forest. Like roadsides, they are poised to infest the surrounding area should a major disturbance occur. Here, there are bedstraw, hedge parsley, and bull thistle, each easily capable of colonizing the area for over a mile the first year after a fire.

Give it another year or two and the background will join the foreground, unless somebody does something about it.

Here's your big chance to "be somebody" in your neighborhood!

Here is the same patch this year from a wider perspective (the first photo was in the red box) . The infested area with bedstraw grew slightly (as expected) but within the prior boundary there is little bedstraw but instead hedge parsley. In my experience, bedstraw is the dominant germinator. Behind me, there are now both native California brome grasses and exotic rattlesnake grass *(Briza major),* along with mouse-eared chickweed. Together, this distribution suggests that this may represent my having removed overlapping "layers" of that weed-bank onion with the grasses as "drag-in." This winter, I plan to hose the area with a pre-emergence herbicide. to kill the annual seed as it tries to germinate, while allowing native perennials to penetrate the area. Snowberry in particular spreads by sub-surface roots while the herbicide sticks to soil particles at the surface. There are also buckeye shrubs crushed by that fallen tree (I'm standing on the log) that have sprouted new branches. They will shade this area back to normal in a few more years. Now, one might think that this pre-emergence method is harsh, but its use in such a forest is no longer merely experimental here.

June 2004

This could have been a horror story, but turned out to be a success. This is Sticky Eupatorium, *(Ageratina adenophora)*. This plant grew 5ft tall the first year. It had colonized in a drainage and was starting to seed, which blows on the air (see inset). After getting it identified the same day (thanks to a digital camera, email, and Dr. Grey Hayes), I wrote the local control expert in Monterey for advice. He told me they were losing. Perhaps you can guess why.

After almost 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 too great. So, after bagging all the seed I could, I hosed the area with a pre-emergence herbicide, then ran 500 ft of polyethylene tubing, tie-wrapped a sprinkler-head to a fence post, and watered it occasionally for a couple of months.

Next spring there was none, done, zero, nada...

ERADICATED!!!

After treatment, the natives perennials were completely unharmed. 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. Most natives produce dormant seed that requires cold weather to germinate. Eupatorium is a tropical plant, so I did the process in summer. By the winter, most of the herbicide had already decomposed. I'm sure our "expert" is still collecting a government pay-check for fighting it. He might even know that the weed is toxic to animals.

Pre-emergence herbicides do have a potential down-side**:** they are very destructive to a native seed bank. However, when the native component is nearly destroyed, and the seed bank consists mostly of weeds, the consequences are less drastic. Inside the red curve was just such a situation, where I had so much annual bluegrass (a very exclusive weed) that it warranted treatment the year before. To you, this photo might not look like much. To me, this is an indication of hope for a returning foundation, but also a serious warning. This is Few-Flower Clover *(Trifolium oliganthum)*. It came in from a spot it had colonized about thirty feet away. This photo represents a rebuilding process that takes many years because the supply of native seed left in the soil was so depleted. Clover seed can last a century, but development has been here for 140 years. **If a clover seed bank was that depleted, so are a great many other species** (there's your warning cry). This year has about ten times more plants in it than last year, but also spread into the treatment area. The key was separating tiny mouse-eared chickweeds and rat-tail fescue from these thread-like clovers.

It is very hard for most people to understand how detailed weed problems can be in a meadow, or how difficult it is to grow patches of clover such as you have seen in these picture books. Here you have silver hair grass *(Aira caryophyllea)* among native pinpoint clover *(T. gracilentum* purple) as well as a non-native hop clover *(T. dubium* yellow*)*. Note that the grass stems are thicker and have a whitish streak when they still have the seed inside. When they open, they almost disappear. The work of separating the two can be incredibly tedious. The herbicides selective for grasses don't work on silver hair grass, so it must be done by hand. These individuals are from the weed bank, so eventually I will win and attain the bare dirt the annual forbs need… unless the rate at which the seed comes in exceeds the rate at which I can detect and remove them. It could happen.

This is the job**:** Clear the soil of weed seed by using up the "weed bank" while propagating native annuals. It's the hard way, but until I had developed the pre-emergence technique, it beat sterilization and seeding with collections, in part, because we just didn't know what might be there (we still use primarily spot treatments with pre-emergence herbicides). The visual demand of weed control is intense, especially when spot-spraying (it takes so much concentration that after a few hours, you want to run for the exits, drained). In this picture are (weeds in red)**:** **Mouse-ear chickweed *(Cerastium glomeratum)***, the few-flowered clover *(T.oliganthum),* pinpoint clover *(T. gracilentum),* Notch leaf clover *(T. bifidum),* **little hop clover *(T. dubium)***, small-flowered lotus *(L. micranthus),* Spanish lotus *(L. purshianus),* California brome *(B. carinatus,* which I have been pulling until I get the foundation put back; brome grasses have a fairly powerful allelopathic chemistry that excludes other plants), small-flowered needle grass *(N. lepida),* **rat-tail fescue *(Vulpia myuros)***, pop-weed *(Cardamine ogliosperma,* supposedly native, but I hate it), **wall bedstraw *(G. parisiense)*, two non-native vetches *(V. disperma and V.tetrasperma)***, slender madia *(M. gracilentum),* and **coast tarweed *(M. sativa,* of disputed origin)**.

The worst are the wall bedstraw and the rat-tail, but the chickweed is not far behind. We're getting rid of the chickweed first, because it is the earliest to germinate and set seed.

So, is this just an aesthetic exercise for a would-be intellectual with nothing better to do? Are the non-natives really so bad? After looking at this and the other picture books, I hope you share my opinion that the damage weeds do is far beyond the mere aesthetic. If exotic species are truly responsible for one third of all extirpations in North America, and I promise you, THEY DO NOT STOP SPREADING ON THEIR OWN, then this is the most critical environmental issue we face. If all the greenies in your area can offer is futility, they need to be shamed, loudly and publicly. It is time to take the moral high ground away from the environmental movement and **GET TO WORK!!!**

This is the same spot two years after treatment **before** weeding. Not only is there few flowered clover, but also *T. gracilentum, T. wildovenii,* & *T. bifidum* (of which we have four varieties). The great news is that although there are annual grasses, the wall bedstraw and chickweed are almost gone. The threat from the grasses is still intense, but we are obviously winning here.

This is an experimental portable shade-house for growing grass plugs. It has an irrigation line under the ridge.
It works great as long as the rabbits don't find it.

Once a meadow is fairly clean, we install plugs on about 12-18" centers. This is heresy among restoration people because they want the grass to suppress the weed seeds they are leaving in the soil. They just accept the fact that the plot will have non-native plants in the grass understory. Some restoration contractors plant on 6" spaces, but they can only hope that native plants other than grasses will come back on their own or that the remaining ruderal weeds don't eventually crowd out their new grasses. We hold the patches sterile for 2-3 years. Then we plant grass sparsely enough to see how it will behave among its friends. After that, as the natives come in, we mask and spray, thus acquiring fresh seed and building a foundation of native annual forbs. Sometimes it reverts to forbs (p6).

These pots are for masking native plants for foliar application of glyphosate (RoundUp®) in what we call transitional habitat (the tall pots are for grasses). This is a painstaking process. In the long run it is a lot faster and has a higher yield than hand weeding. We seldom have to do it more than two years in a row. The idea was that once enough weed has been used up and the natives are more numerous and well enough established, then we can hand-weed. From beginning to end, meadow transitions typically take 4-7 years. The exception is when a year with unusual weather abets the expression of one particular weed. That 4-7 year term also depends upon how many “layers” of weed seeds there are to remove during which we broadcast or spot spray and kill most everything. This is why we can only handle so much transitional habitat in any one year. It is far more labor intensive than maintaining either a fairly pure area or a heavily infested patch. There are now no areas left on our land that require broadcast spray.

Same spot, two years later. How they grew depended almost totally upon the soil. The grasses are dense here and about 3 feet tall. In other places, they remain distributed exactly as they had been planted at half that size. This patch is less complex than it was, but is cleaner than ever of weeds. We have been harvesting the seed from here for similar projects elsewhere and mow it to mulch the surface, reduce thatching, and make early weeds more visible. This year, we did not harvest grass seed per the Shemitta year.

Interestingly, the native stuff is now colonizing the sterile area where I stood for this photo. In other words, it is going transitional before I was really ready. This hill is a place where I burn piles of tree tops and stock piles of tree chips.
This grass is about three feet in height. So, are we done? By now I hope you know that land management does not have an “end.”

Here they are today (opposite side of the same hill top), almost five feet tall and with a dense ground cover of Spanish Lotus *(L. purshianus)* in the grass understory. We had a long damp winter with some warm spells and what do you know but we got an unexpected blast of Wall bedstraw and scarlet pimpernel *(Aganalis arvensis)* from the "weed bank" covering much of the property. It was war, but we're winning it. How? We harvested almost 30# of seed by hand. That way we could see the smaller weeds.

When I burned in this meadow, most of the bunch grass *(Nassella lepida)* died. Then the filaree and madders went nuts. These grass plugs I planted have not spread in three years but have shown themselves incredibly hardy, surviving without rain from the end of February to October with over 40 100°+ days and most of the rest in the 90s. However, the lupine, purple spoon-leaf cudweed, various clovers and three lotuses have increased in density considerably with deer weed *(lotus scoparius)* and monkeyflower trying to cut in. I'm not thrilled with the idea of a chaparral here. I try to keep the chaparral in transverse belts for fire management reasons, so I pull them here, with the secondary goal of disturbance to germinate the weed seeds to remove them from the seed bank. This is a very sandy soil within 100' of my sand hill. **The point is:** if we burned this spot regularly as the Indians did, there might not be grass at all. A confirming indication of possible farming is blue dicks coming up in dense patches, definitely from surviving seed. I have not seen it germinate where there is dense growth, but once the bulb is established, it seems to tolerate competition. There are a couple of Clarkias in the area too, which the aboriginal tribes also farmed. So, was this spot such a clarkia farm too? There is no way to know. Blue dick seeds seem to remain viable for a long time. I am told Clarkia seeds are good for only three years.

So, what is ”Natural” for these meadows? The most common understanding of the early Spanish journals suggests that these ridges were usually verdant meadows comprised of annual forbs and perennial grasses. Unfortunately, our understanding is derived not only from fertile imaginings, but from the 17th Century Castilian Spanish of a very amateur botanist. More recent readings of Juan Crespi’s record of the 1769-70 expedition, along with lab analyses of pollen strata in pond mud and bricks from Spanish missions and an improving understanding of the aboriginal diet suggest fields of annual wildflowers, especially buckwheats, and roots, with patches of grasses where there was more water. Guaranteed, there were more people where there was summer water.

Nobody knows for certain how these systems worked. From what I can tell, nobody is *going* to know unless they develop areas populated only with native plants and then run trials over a wide range of soil and micro-climate conditions over a considerable time under a variety of conditions. I can tell you for certain it would be totally unaffordable with the bureaucratic overhead we have now. Our project is an exploratory exercise in developing restoration methods and tools while stirring things up and observing how these systems work. Simply learning what it takes to create native plant habitat is useful knowledge. Another goal is to provide a refuge for producing native seed, which is critical. The amount of viable native seed left in the ground is severely depleted.

My own experiments suggest that the way the land not under cultivation might have worked might be patches of various groups of plant species moving among each other with patterns of disturbance, usually fire set intentionally by Indians. If the patch was something the Indians liked, they’d tend and extend as appropriate to what they were growing. After that disturbance, whatever colonized first successfully held that patch until the next disturbance. Unless I miss my guess, fires probably were also patchy.

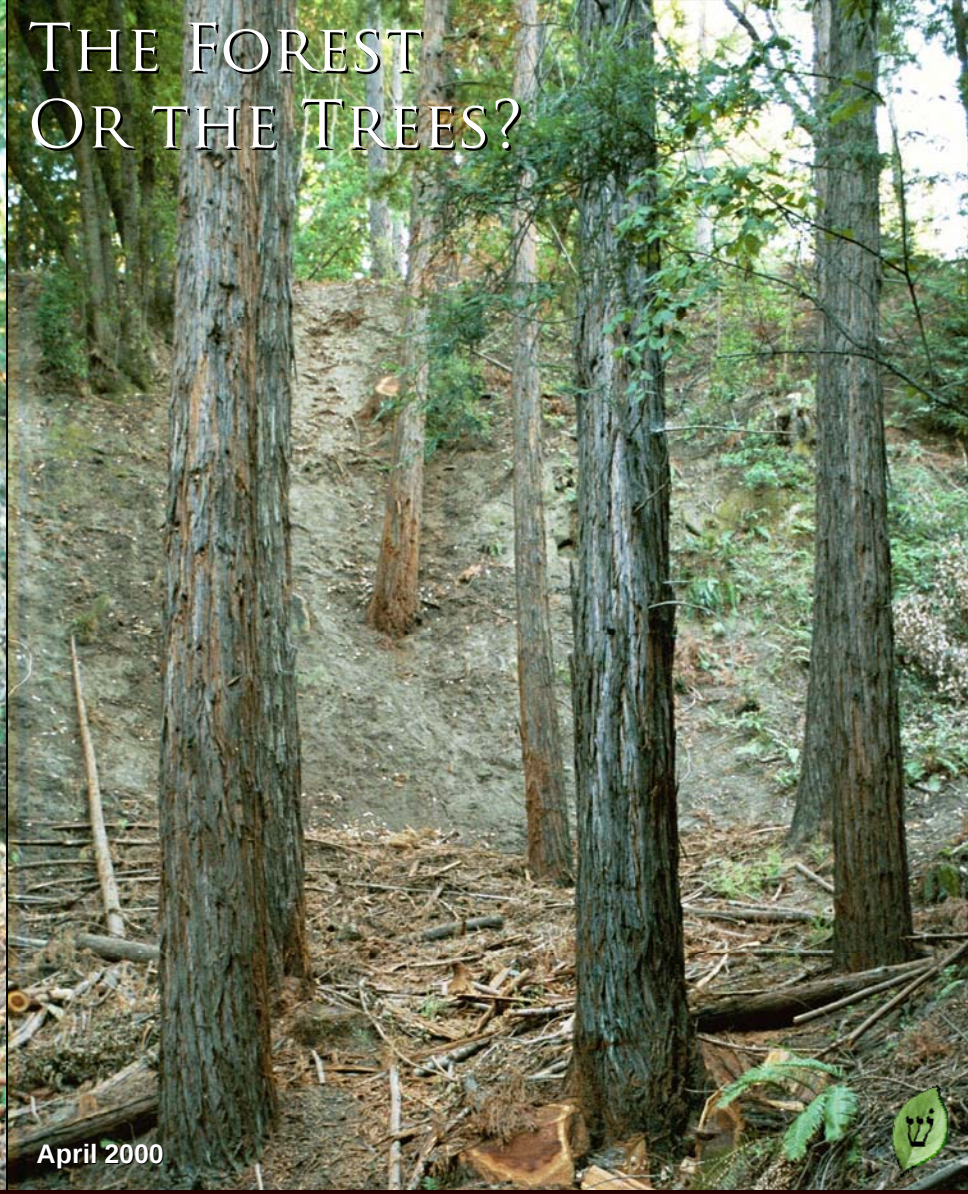
Generally speaking, meadows were more common on ridges and wet bottomland, with chaparral on the top slopes succeeding downhill to oak woodland and then redwood in the gullies (or wherever there was a spring, of which these mountains have many, even on ridge tops). The meadows and chaparral were probably patchy too because they’d burn off together when a sufficient fuel load met a hot enough fire. It’s almost impossible to kill a mature redwood except by hard freezing.

As to animals, there probably weren’t very many (with the exception of gophers and squirrels). Other than grizzlies and mostly in the Santa Barbara area, neither Crespi’s journal nor Indian middens indicate bounteous wildlife (except grizzly bears). The Indians hunted them mercilessly.

Even if we did know how things once were, there is still a more important question as regards “sustainability”**:** Is what the Indians did the best that could have been done? I doubt it, at least around here. The tribes didn’t have good animals with which to build deep organic soils. They burned so often that on steep ground like this, the nutrients would wash off in the first heavy rain. The plants they used for food required VERY time and energy intensive harvesting and processing techniques. Having extirpated so many megafauna after the end of the Pleistocene, the tribes had a very limited array of options compared to an industrialized society.

That doesn’t mean Europeans have done such a hot job; we have yet to deal with the legacy of our processes and subsequent neglect over the last two centuries. We do have better tools. Indians would have killed for a chainsaw or a good shovel, never mind herds of cows and horses. Human vegetation management played a significant role in shaping these mountains and should do so consciously once again, instead of pretending this will all will fix itself. So the next chapter is an example of forestry in our back yard**...**

The Forest Or the Trees?



That runoff has to go somewhere, so now I'm going to show how logging can REVERSE channel erosion that would progress without it, perhaps catastrophically. On the left is a cluster of redwood I somehow discerned needed thinning. The stream from the prior slide ran right in front of them and was starting to undercut their support (you will soon see what happens should that process progress). This was once a pair of trees that had sprouted from a log buried under an old landslide at the bottom of the ridge behind them. Then white guys cut them and "left it alone" for 90 years until the sprouts grew into this tight clump at left. Then I whacked it and, (because of "the rules") gave away probably $10,000 worth of logs, ten grand that could have been spent improving our land.

Here is the same cluster from above (the second photo was taken from about 75 feet farther down the ridge to the right). Where there were 31 trees from that double stump, there are now six, which is still a dense spacing of 8-10 feet. The stream now runs through the middle of the clump with no apparent effect. There isn't much groundcover because below these trees it was too dark. The important thing in this comparison as regards logging and stream bed erosion is **the change in canopy density**. Huh? How does the density of treetops effect stream erosion??? Simple**,** it's all about getting light on the ground.

Here is the same cluster looking up (taken with different lenses). In 2001, I wrote in *Natural Process* that these trees would sprout branches and straighten, but in 2010 I could hardly believe the change! They even realigned themselves to a degree in their race for light. In another decade or two, this cluster should be thinned down to three but at that time I can also allow a few of the sprouts to develop. Then it can probably go for another hundred. Slower growth makes better trees and better lumber.

Feeling Drainage

February 2004

In steep sand-”stone” mountains like these, reversing the damage from poor drainage control is a high priority. The slope up the hill had originally been cleared and terraced for an orchard that was eventually abandoned. The resulting down-cutting required repair, else the slope below our house would have been destabilized.

Drainage control projects to reverse historic damage are usually expensive and protracted, especially because bureaucrats, engineers, and contractors have colluded on permit specifications that make local vendors, consultants, and contractors very happy. Hence, the usual landowner response is to do nothing while the consequences grow. That mechanism has wrecked havoc with timber harvests in particular.

In this project we collect the water into the stream to preclude surface rills, typical of civil engineering designs over the last 100 years. However, this slope was shaped like a watershed, with alternating side channels. It works, although it does require monitoring for damage from gophers and ground squirrels just as “natural” slopes also do.

The plastic was stapled and wrapped around battens then screwed to timbers that were in turn screwed to steel stakes. This tarp system has survived 50mph winds undamaged, a design that could allow work to be done in the dead of winter between deluges when the soil is damp enough for good compaction.

So far after six years, no problems and no maintenance other than clearing the channel of February 2004 plant debris annually.

In parts of this project I used the equivalent of a half-sack mix of cement in the soil to reinforce the structure to simulate the attributes of the parent rock and withstand tunneling by ground-squirrels without caving in. It is steep here. Interestingly, the grasses seem to prefer the calcium in this cemented fill.

2004

This slope is steeper than it looks. The extra dirt was brought down in buckets. Footing was treacherous.

The tamping marks on the face are visible. I don't think I'll ever forget slamming that iron plate into it over and over. Day after day, wrestling that thumper out of the way and on top of the pile, starting it up and getting control on a tiny bench like that. This was one heck of a lot of work.

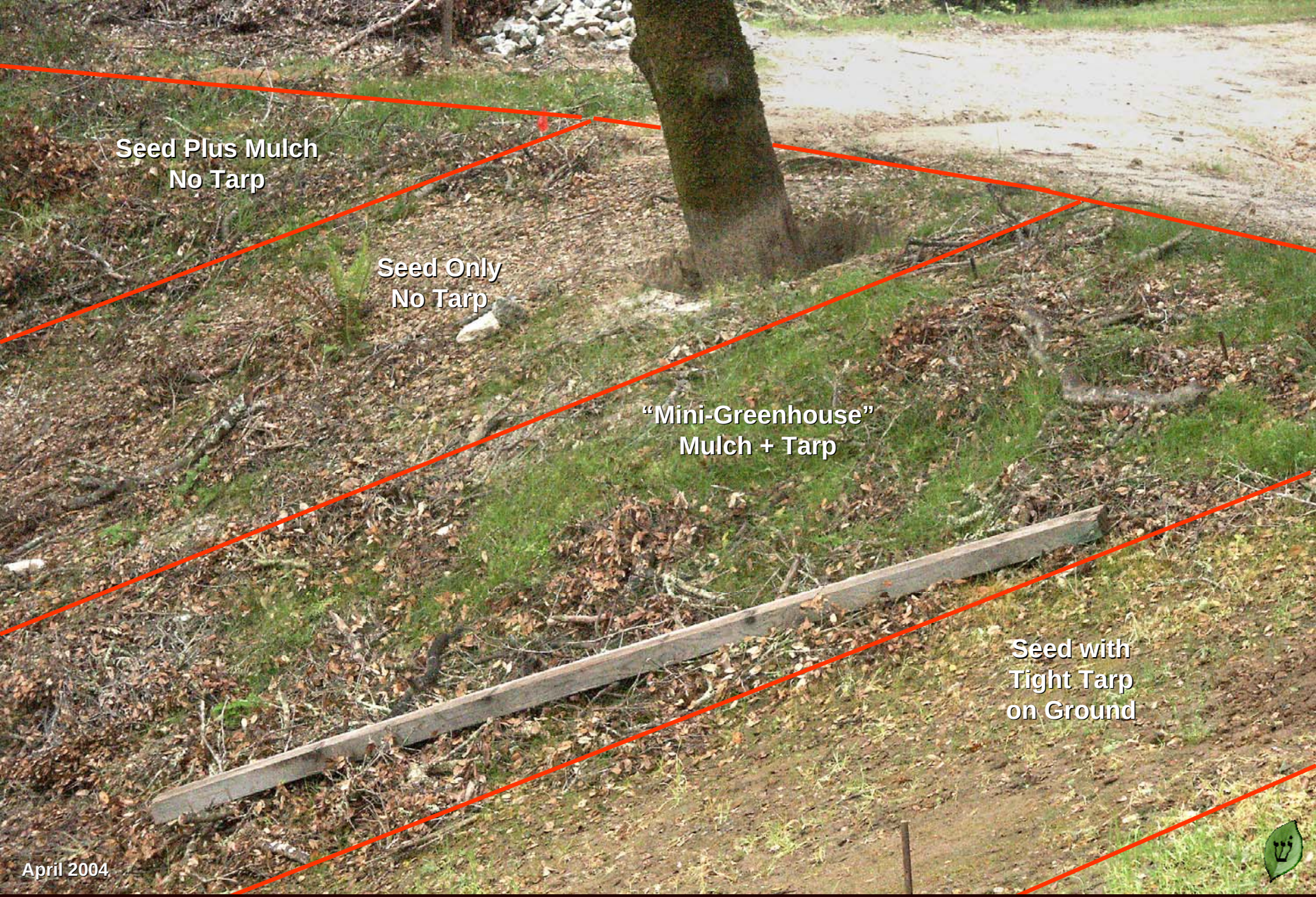
The 5 X 10 rock is set in filter fabric with periodic dams of rocks set into concreted cross ditches about every ten feet. Dry sack concrete was poured into the gaps as a "mortar."

By the time the job was done, that yellow shovel was worn down to the point that the blade had a reversed curve where it had been pointed. When it finally cracked, I retired it, in honor.

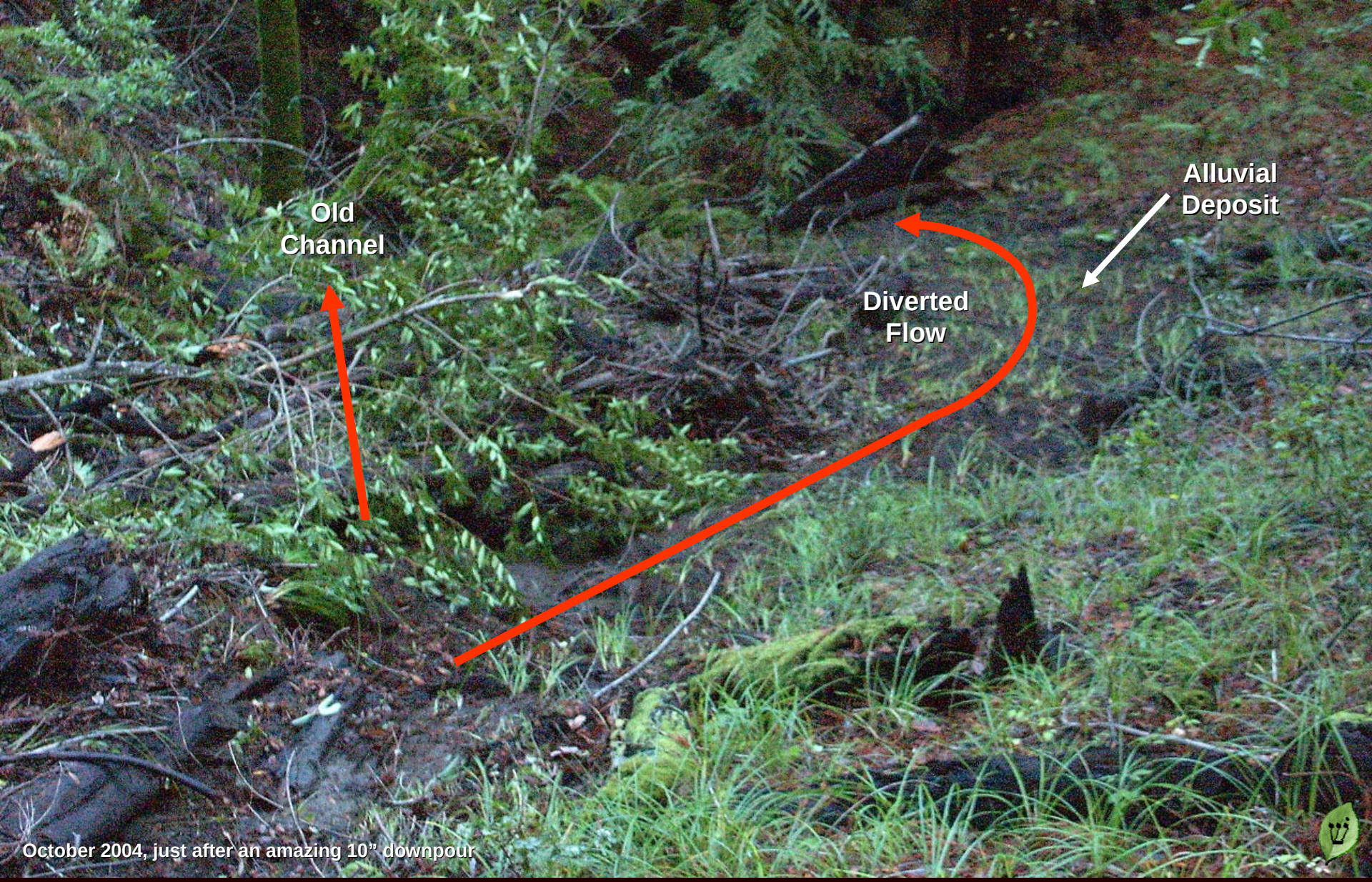
Several years prior, I had attended the "Klamath Bucket Brigade" protest in support of the farmers of the Klamath Basin in their struggle to keep their land from the "green" activists for a bogus suckerfish listing (operating as witless agents of developers). There, I had noted a collective memento: shovels, all donated by farmers from around the West in support of a similar protest of a Jarbridge, NV road closure. Some of those shovels had been a lot more worn than mine. I realized at the time how much work it had taken to wear them that far. What I hadn't considered was what an attachment one develops to such a simple tool. You remember the projects that you did with it. Those shovels were princely gifts.

The vegetation on the far side is now native blackberry. So the primary maintenance is keeping it out of the channel so that it won't catch material.

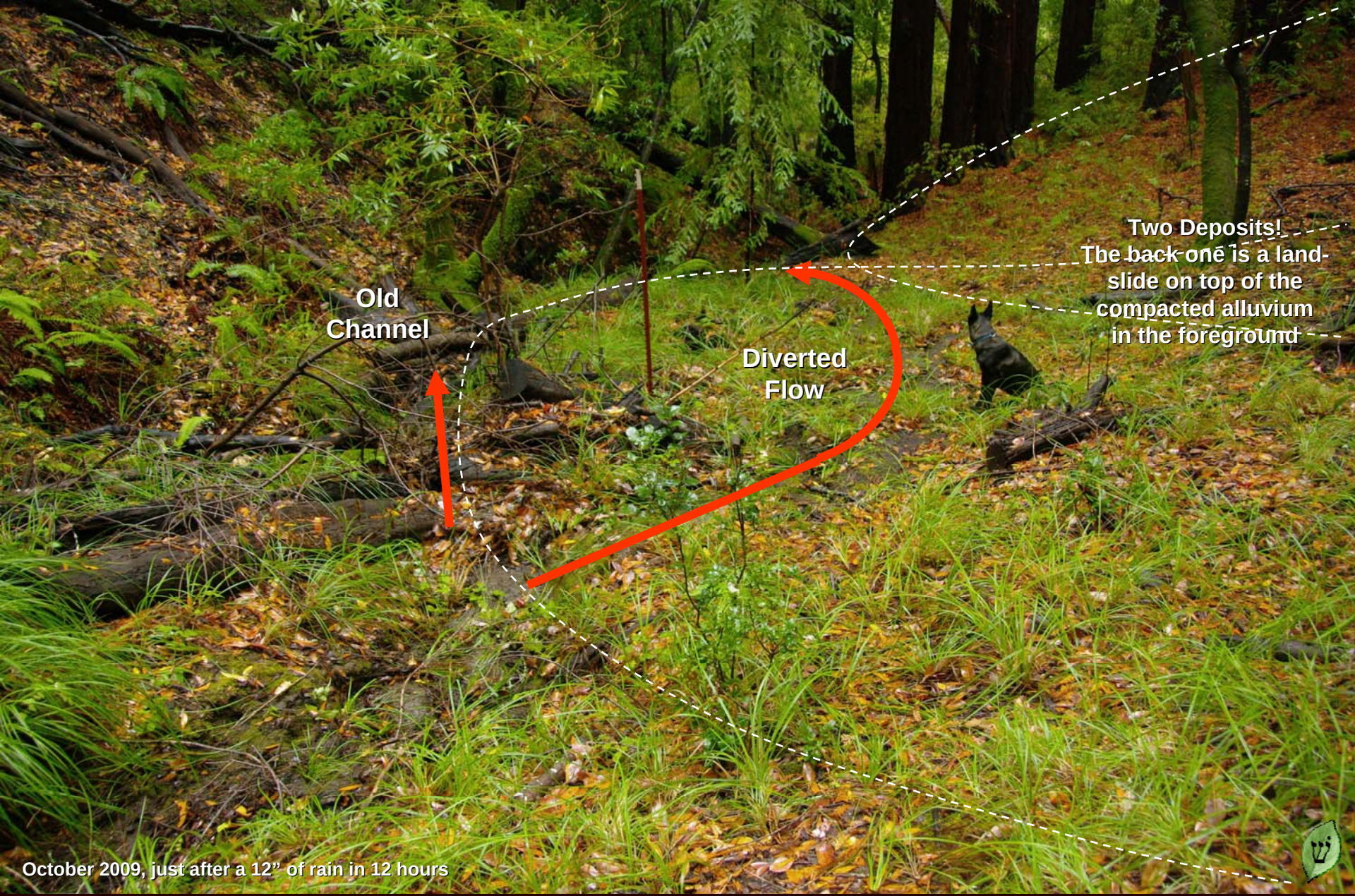
In parts of this project I used the equivalent of a half-sack mix of cement in the soil to reinforce the structure to simulate the attributes of the parent rock and withstand tunneling by ground-squirrels without caving in. It is steep here. Interestingly, the grasses seem to prefer the calcium in this cemented fill. The arrows indicate alternating benches to catch and redirect sheet wash to the channel.



The plastic was part of an experimental array for revegetation. It was either tight on the surface or held aloft by a “mulch” of chopped tree branches forming mini greenhouses to improve the establishment of the grasses. As long as one doesn’t use too much mulch and there is enough moisture getting under the plastic to keep the grasses going, these tarp-houses at least **triple** grass growth.



One of the ways in which the environmental industry had driven the timber industry into ruin has been claims that logging releases fine sediments into streams, thus harming “endangered" fish. A logging job surely does release sediment, just as not logging can do also. This Santa Barbara Sedge *(Carex barbarae)* is an amazingly erosion resistant plant but it needs light to grow. Thinning bay trees on the ridge to the left was what got the sedges growing on the bottom of this drainage. The runoff was diverted to the right by a fallen madrone log and the biggest rain event in decades went right over the top of the sedge.



The activists tell everybody that “we need monitoring,” so here it is after five more years of winter rains. So, NO erosion because I had logged out the bay to get light on the bottom of the channel, but there is much more to this story. If you look carefully, you’ll see deposited sediment in the foreground at the tails of the two red arrows. That material is from all over our property, from the my neighbors across the road, various stumps from fallen trees, etc, but probably the biggest source is gophers and moles.

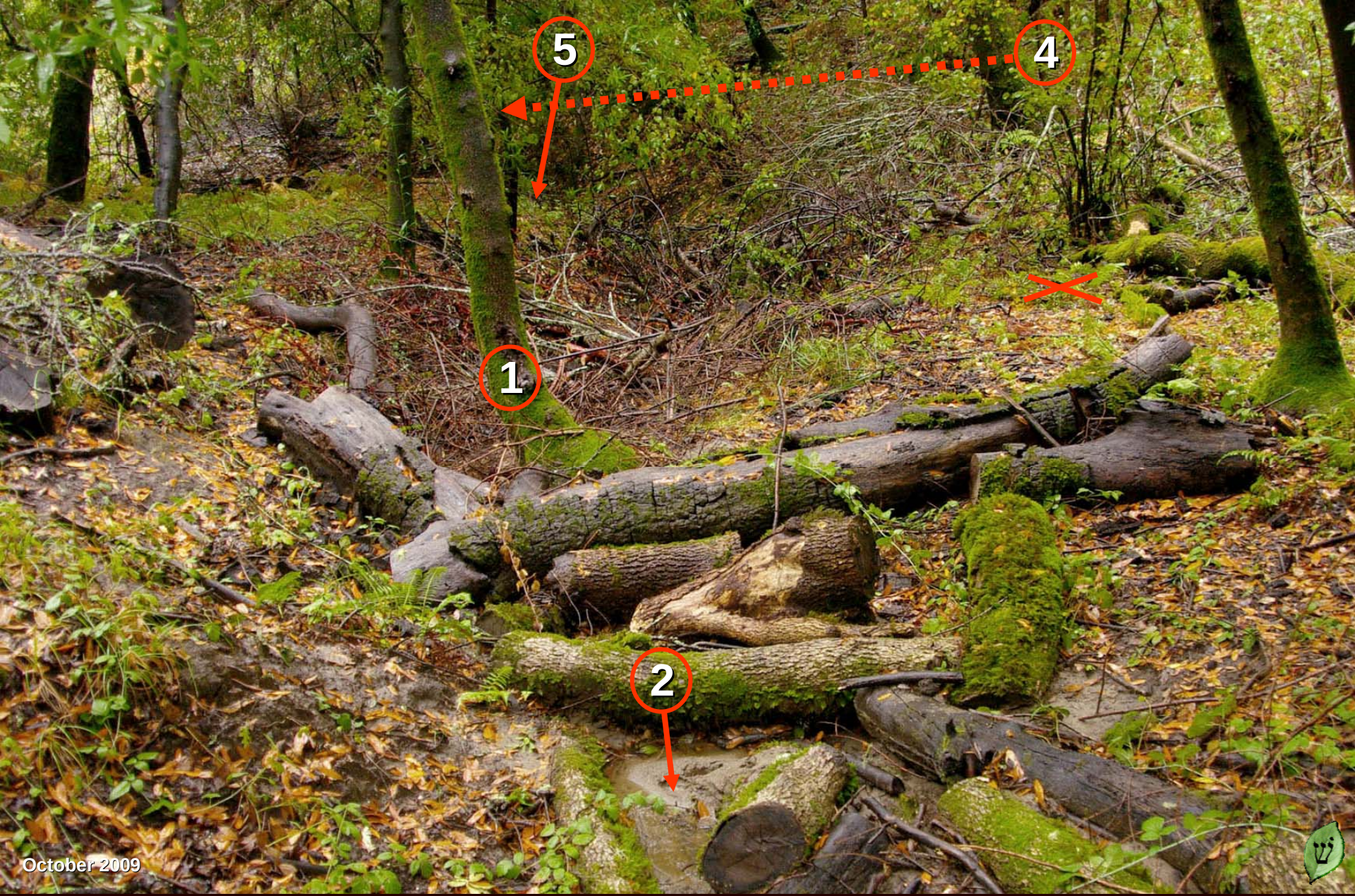
All those tiny sources add up to a fair bit of material lost off the property every year. So, I decided to solve a problem with it. This photo was taken six years after my original redwood logging job in 2000. These interlocked structures of left-over logs form stepped weirs with vertical drops and slow runs to trap that sediment, and raised edges to contain the flow. The sediment has started filling in a stream that was 6-8 feet wide and 2-4 feet deep. Note the circled structure above for reference from slide to slide.

This is the same channel today from a little wider view. Logging made the material to line the bed and collect the annual deposition. Logging thinned the slopes so that light could reach the canyon bottom to stimulate the vegetation. It's working (slowly), but more thinning is needed for the sedges to really take. More sediment will help too. Note the tree with the white arrow for location.

Another view, L+6, same channel. I thinned bay trees above the left background that year and put more into the stream along the dashed line down to the circled tree (1).

Here it is last spring from a spot just to the right (vegetation was in the way). Thinning the hillside on the left allowed in a lot more light. The stream bed is still filling in and more plants are taking root.

Here it is just downstream on the way to that (1) tree, immediately after a 12” deluge in as many hours. The logs are chocked to make “mini-meanders” which cause the material to drop. When a section fills in, the water carries the sediment down to the next trap. From this storm, the additional buildup was a maximum of about 3” thick. The trees anchor the system but they make it dark. I want to get the sedges going soon, so I’ll be thinning them next spring.



The (1) tree on this photo is the same as that two slides prior. Note deposition beneath the log in the foreground (2). This photo was taken the same day after that 12" downpour. Just beyond the logs, the channel is 4+ feet deep X about 10 ft wide (about what it was when we started). I just lost a decadent black oak to the left, so that will make material to continue the project downstream. The next photo was taken from the "X" with the camera at (4) looking over the mini-promontory below (5).

The channel now averages fifteen feet wide and 6-8 ft deep, with a secondary embankment two thirds of the way down upon which the tree (5) is sitting. The cross section stabilizes from here at about 20-30 ft wide and 10-15 ft deep. What you can't see is a pocket to the left. This spot has probably lost about 60 cubic yards of soil. No thinning, no groundcovers. Without treatment, the down-cutting here will only get worse. But what if I hadn't done anything? You have only to wait; that experiment is easy to find.

Let's take a look at the "Natural" method of erosion control and drainage management in a local redwood grove. I did not have to go looking for this mess in order to make people look bad; it's the first one I found down the road from our place.

This process is called "recruitment of large woody debris." The belief is that runoff will cause logs to fall into the channel and do things similar to what I did artificially on our place. The activists' goal is to ban all logging near seasonal streams 'to prevent release of silt and maintain shade to keep the water cold for endangered salmon' (actually introduced). One has to wonder why shade matters so much where there is no summer water.

The culvert in this photo is 24" in diameter, so this represents a fairly small flow in these mountains. There hasn't been logging here for at least fifty years. So this channel represents how an average seasonal drainage might look if the activists get the "riparian buffers" they are demanding along seasonal streams.

As you can see, it's very shaded here, so they've got their canopy, thus, there is no green vegetation in this channel. See how the root mass on the left is undercut? When the erosion causes the walls to collapse under the weight of the trees, they fall and hit the opposite bank, **bridging** the channel. Then the water runs underneath and the stream keeps cutting. The fallen trees do virtually nothing to halt the flow or armor the channel.

The channel here is 30-40 feet wide and well over 20 feet deep. That it is cut this deeply, with roads at both the top *and* bottom, means that the average slope has *decreased* with no apparent reduction in scouring collapsing the banks. This particular spot has unusually gentile slopes for this area, so it is an ideal location for such a trial. Were it at the bottom of a canyon, there would be significant risk of undercutting the slopes above the channel, thus destabilizing an entire hillside.

Despite the culvert modifying the flow, if this method worked, then the water would eventually slow down and the "Natural" method would start to take effect. It doesn't.

This is about 100’ below the culvert outlet, looking downstream. Again, there are no effective groundcovers because it is way too dark. The logs bridge the channel so the stream is still down-cutting underneath them. **Nothing** was done here to cause this channel, including logging. In fact, the flow was diverted away from its old location into this one long after this area was logged. This is “preservation,” “recruitment,” and “canopy protection” in action. What you see is what you will get.

This drainage channel is only about 75 yards long. There isn't ANY part of it where "recruitment" or dark canopy are working. These regulations are just as dumb as was fire suppression and for the same reasons**:** Suppress fire and you get fuel; suppress surface erosion and channel the water and what you get is hillsides collapsing into excised channels. At right is the bottom of the channel at the lower county road, which effectively limits the cutting by making a hard bottom. Here you see a root wad spanning the bottom of the channel. If "recruitment" was going to work, you would see it here. It did not.

Neither fuel, nor drainage problems, nor weeds care a bit if we don't like the choices we face. To pretend that there is "some other way" when there is clearly not only makes things worse.

So, if I'm willing to take these risks, why are public agencies making it ever more expensive, difficult, and even dangerous to do this work, all in the name of environmental health and public safety? Who faces the occupational risk of using chemicals? Who is going to do this with mountain lions, bears, wild boar, or wolves running around, overpopulated and hungry because nobody is allowed to hunt them (you can shoot the boar but it takes a permit that has to be renewed annually)? A heavily compensated and unionized bureaucracy on full benefits now kills more mountain lions than the voluntary hunt ever did, but with one difference**:** the State used to make a profit selling the hunting tags that funded wildlife management.

That is how stupid this gets.

It's one thing to risk death because of my own mistakes; it is quite another to risk being killed because ignorant urbanites don't want to face unpleasant choices. Until we have technologies that are species specific, weeding *must* be done. Without it, we can expect extirpation of plant species with their seed rotting in the soil because of witless policies that abet continued infestation.

Why harass, deprive, disarm, threaten, and fine the people who do the work city people will not? Who else is going to do it? Can you imagine the OSHA rules for repetitive stress injury if unionized bureaucrats were writing rules about wildland weeding? It would be unaffordable even if California wasn't already bankrupt.

I suspect (although I do not know) that you are sensing I want something out of photographing, writing, and publishing this free on the Internet.

You bet I do.

From this information, it should be self-evident that these results are to be an example of independent research by which to restore some sanity to land management. So, if I am willing to do all this work, for nothing, then I want your public agents to leave me alone. Pull the bureaucrats, consultants, lawyers, and their myriad dependents off my back and let me run my land as I see fit. If I want to sell some native seed, I shouldn't need an agricultural permit. If I want to take out a few trees, I should be able to sell them without fronting $60K for a permit and another hundred grand for a "water quality" bond. I don't need their out-of-date specifications and endless inspections and consulting supervision; I know what to do better than they do anyway.

Leave me alone. I'll put the money I earn back into research. That is what I want.

Sad, isn't it, that in the "land of the free and the home of the brave" a person should have to spend two decades working to justify the public privilege of asking his fellow "free people" to simply stop running everything? Nobody else knows our land well enough to do what we do, nor would they take the time, spend the money, and deprive their families just to take care of what obviously needs care here. The public agents don't have a clue either; they care more about "funding" than the land in their charge anyway, and it will never be enough. Isn't that obvious? Hence, control of private property by popular whim CANNOT work, neither for people nor for plants and animals. It is nothing more than simple covetousness. Worse, it builds a bureaucracy capable of bankrupting the public and controlling their every move.

So, if a landowner can get an attestation from numerous experts, public or private, stating that he or she has done an outstanding job of management, does original research, seeks peer consultation, and publishes valuable information, please, help call off the bureaucrats and make it clear that they are to leave that person alone, in law. We simply cannot allow politics to dictate how to restore habitat when nobody really knows how, nor would government agencies willingly allow the latitude to find out by experiment.

Things just don't work the way they appear on Animal Planet or National Geographic, because humans are integral to the way these systems work. In fact, many of the environmental problems we now see in undeveloped countries have slowly resulted from removing the hunting populations of those countries. So consider for a moment**:** What do the sponsors and "donors" to this kind of "educational television" really have in mind? Is it really charity, or is it tax-exempt advocacy to get people off the land for their personal benefit?

I have documented quite enough of the latter to be virtually certain of its likelihood. Manipulating regulations for fun and profit was what "limited government" and natural law competition were supposed to preclude in the first place here in the United States. Unfortunately, public debt has unraveled those limitations. So, how is it possible that Americans so commonly fail to understand this?

Well, it is taught, and oh how it is taught.

Prison Plan-It

Remember how I said that much of this scene was destroyed? At the time, I didn't show you what happened, how, or why.
I took these pictures, because I knew just by looking at it what would come.
I suspect most readers already know what happened.

May 2002

The developers in this area have been after this property for a long time. The botanists I know considered it precious, not because it was “Natural” but because the way disturbance was managed here induced the expression of several rare plants and insects. Not one of them wanted the owner to stop grazing it.

June 2010

It's not as if I was clairvoyant or anything in knowing it was going to happen. The local school district had proposed a new high school across the street. So, the handwriting was on the wall for the meadow.

The rancher who had owned it had never made a dime off this use of his property because all of his potential customers expected to enjoy it for free. That disinvested the source of this view, rendering it into a public commons (activists call it “view-shed”). So, he sold it to “Chop” Keenan, a developer, who had the connections and experience to put this land use into something more profitable. Unfortunately, the control freaks of this world wouldn’t let him build the 145 homes he wanted to put on it. So, he cut a deal.

Mr. Keenan was well versed in “Sustainable Development”**:** He “donated” 9.74 acres to the City for a “dog park,” and agreed to set aside 167 acres as “open space” in return for approval to build. This “conservation easement” would be managed by the Land Trust of Santa Cruz County, funded with a stingy $1,000,000 “endowment” to cover the maintenance. Stingy? Think about that for a minute**:** Do you really believe that the investment return on a million bucks covers the management, personnel, and operating costs for 167 acres, including liability for fire??? I don’t. The Land Trust has only one full-time professional “steward” for all its holdings. Mr. Keenan will never again have to pay for property taxes on that land either.

So, knowing how environmentally valuable that meadow was, they obviously built passive solar houses into the hillsides, right? That way, the owners would have a great view of the meadow! Well, obviously not, because flat ground is a far cheaper place to build. Now, if you are thinking that I believe the owner **should not** have the right to do what he wants with his land, you would be dead wrong. However, what I also believe is that owners should be free to market ALL their assets undistorted by political whim. The array of uses would have been different and the rancher would probably still be in business selling view opportunities, hiking access, gardening space, emergency shelter and remote food storage contracts, rainwater collection and transport services, hunting access, noise dissipation… **all** assets. If people had to manage for all the **liabilities** induced by our sue-happy judiciary system prodding the whims of incompetent juries the consequences would be equally different. Instead, we pass decisions about those risks onto the only entity with the legal muscle to rig a way to stiff the litigant or capable of shaking down taxpayers for the effective premiums without the customers having a clue about the deal. Once government takes control of those markets, what you get is a “planned” economy, with socialized risks suffering from inadequate or absent risk mitigation services for flood and fuel control among others.

So, the houses end up in the middle what was an occasionally swampy meadow until they drained it, “wetlands” and all.

Once the years of deal-making, protests, and negotiations were done, two years later and VOILA! **Welcome to Glenwood!**

A modern “planned community,” and how. Ponderosa Homes, Inc. thought of everything. If you have read the picture-book, *Sustained Development*, you would have witnessed the same sort of symbolism, that you will see here**:** architectural elements that *mimic* history and permanence, while their substance subtly reminds you that they are fake. This “rustic” rail fence is made of recycled plastic, the “weathered” pattern identical on every board (here in a County that grows five times more redwood than it harvests). The rocks on the pilaster are stained concrete. Even the name “Glenwood” is borrowed from a long-abandoned winery and resort about four miles up the road from here on the old rail line to Los Gatos.

The whole thing was so expensive that, in order to make the project work, the developer really had to pack those houses in there. The back yard is tiny, with improvements subject to the Homeowner's Association. But there is another reason this is so tight…

This project is set on the only “buildable” land between two creeks. The watershed behind it is too narrow for the creek, streets, and houses, at least the way “modern” codes and ordinances allow them to be built. So despite the apparent generosity of Mr. Keenan (or his willingness to cave in if you like), for the price of a mere million, NOBODY will ever pay property taxes, detailed maintenance, or insurance costs on that land. Although the homeowners on the ridge above own adequate clearance to manage a fuel buffer, with the probable accrual of brush due to the lack of animal impact, who owns the liability for the fuel is a very interesting question. Look at all the vegetation in the creek bed in the foreground. If a storm washes out the banks and trees, a downstream culvert plugs, and the creeks back up with deadfall, who owns the liability for the resulting flood is a very interesting question.

Note the transition in the grass median at the base of the streetlight. You can see within inches where the landscaping contract ends and “Nature” begins (no, I’m not kidding, a homeowner told me that this was exactly the excuse he was offered on this very question). That must be some amazing “weed-n-feed” chemical and the sprinkler heads equally precise.

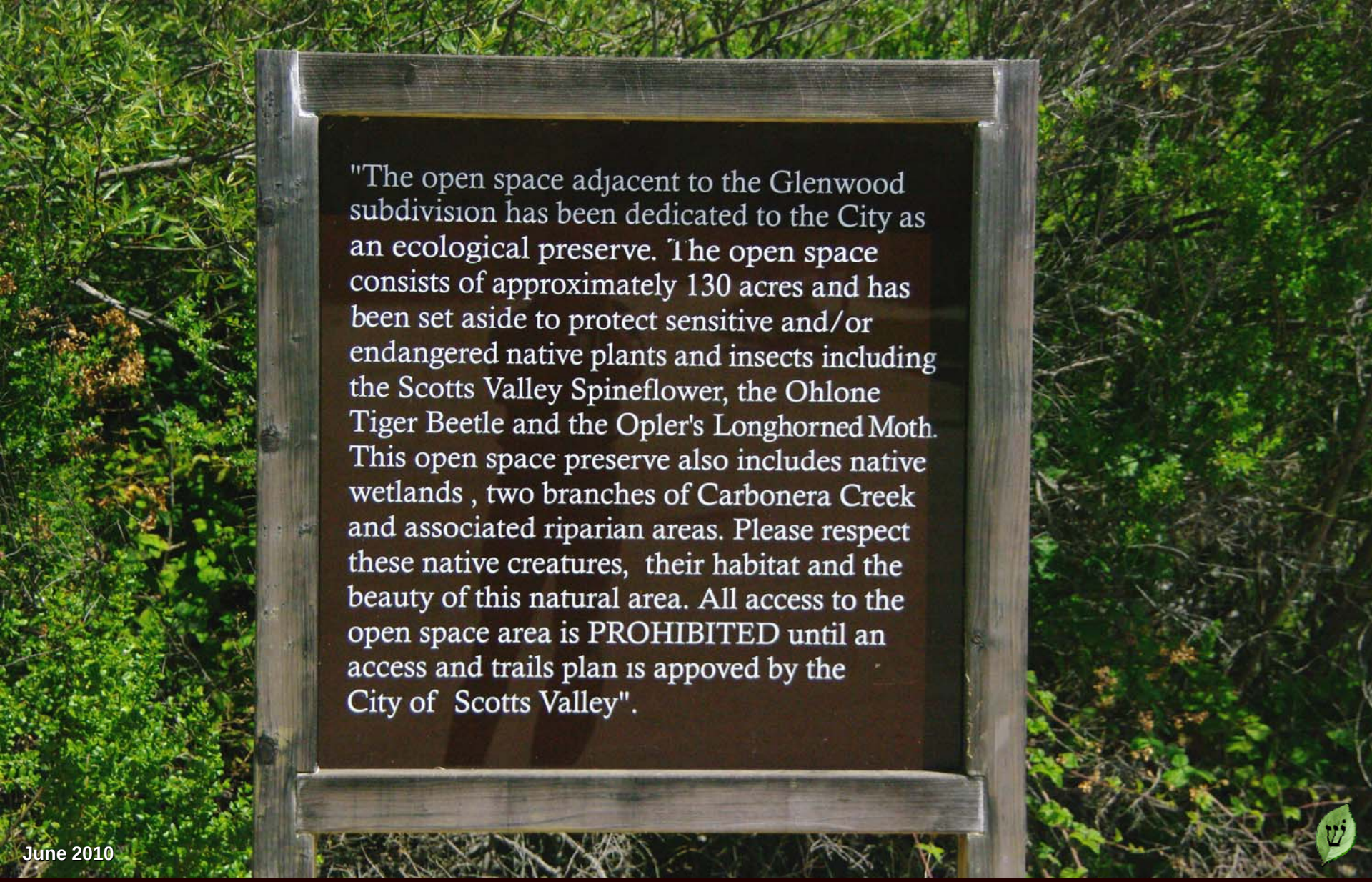
But I think there is a simpler, and more interesting answer to that question of why the landscaper cannot use the lawn chemicals in this area**:** The road crosses a “riparian corridor,” where State and Federal regulations re use of said chemicals apply with serious fines for the most miniscule of transgressions. What do you bet there are people who live here that worry about herbicides affecting water quality from County roads miles away? Note also that the road crosses the corridor, probably with a large culvert.

The view itself is of a hillside that will no longer be grazed. The lupines and wildflowers it exhibited a few years prior are now largely gone as slender oat has largely taken over. Coyote brush *(Baccharis pilularis)* is also slowly colonizing the area, and will constitute quite the fire hazard. Italian thistles are moving in too (the grey green in the foreground by the fence). Hillsides nearby are where "Scotts Valley polygonum" also lives, a Federally listed endangered plant, of which there were six (6) total patches left.

Here along Glenwood Drive there was a volunteer project to install native landscaping. It was typical of many "habitat restoration" projects today. The plants were from a nursery down in Monterey County, but the varieties were not local. I doubt anybody knew how to care for them, but then, native plants are Natural. So, when they didn't do well, the landscaper brought in the usual cultivars.

Inside our “planned community,” every house is oriented in the same fashion: living spaces face away from their neighbors and toward the “Nature area” on the opposite hillside. The side of their homes they show each other is maintained by the same landscaping company, with no alternatives beyond a fixed menu. Every house is finished with a similar mix of concrete reinforced and stucco materials, no maintenance necessary. The play area is on the inside of the development, not on the land for which they pay the checks every month on a 30-year mortgage. What they get is a private view of the “Natural open space.”

This home, adjoining the entry to the “open space,” exemplifies how sharply the transition from urban to “wild” is to be in the minds of Ponderosa Homes’ community architects. Interestingly, there is Spanish lotus in these untended grasses, representing the seed bank in the graded soils, a legacy of the horse grazing in this part of the meadow. I suspect that the owners hold this proximity to the entry to the promised trail system as an added benefit of feeling closer to the wild. One problem though…



This is the REAL deal. Look at this sign. How old is it? How permanent is its construction? Note that we went from 167.02 acres of "open space" to "approximately 130 acres." Note also that access to the "open space" is PROHIBITED, until the City of Scotts Valley approves an unspecified plan. When? This development has been here over five years and that "open space" is still officially closed. Why? The FEDERAL government has to approve the Santa Cruz Land Trust's plan which then becomes Scotts Valley's plan. If you think the Land trust isn't charging the planning time against that million… The land itself will get it eventually though, right?

So, on one side, “open space,” on the other side, is “human habitat,” where even the trees are carefully groomed. It is as if every aspect of their lives must be completely alien from their surroundings. That without, for which they long and have paid so dearly, is forbidden within. Mother Nature is for viewing only, “Look, but don’t touch.”

Again, similar to urban Sustainable Development, we have the obligatory “meandering footpath.” Here again there are boundaries, where children are not to walk among the plants. ‘People are harmful you know. The experts take care of those things.’ There is no community garden, there is no orchard, there are no vines or edible berries. Those are messy; people are too busy to pick them.

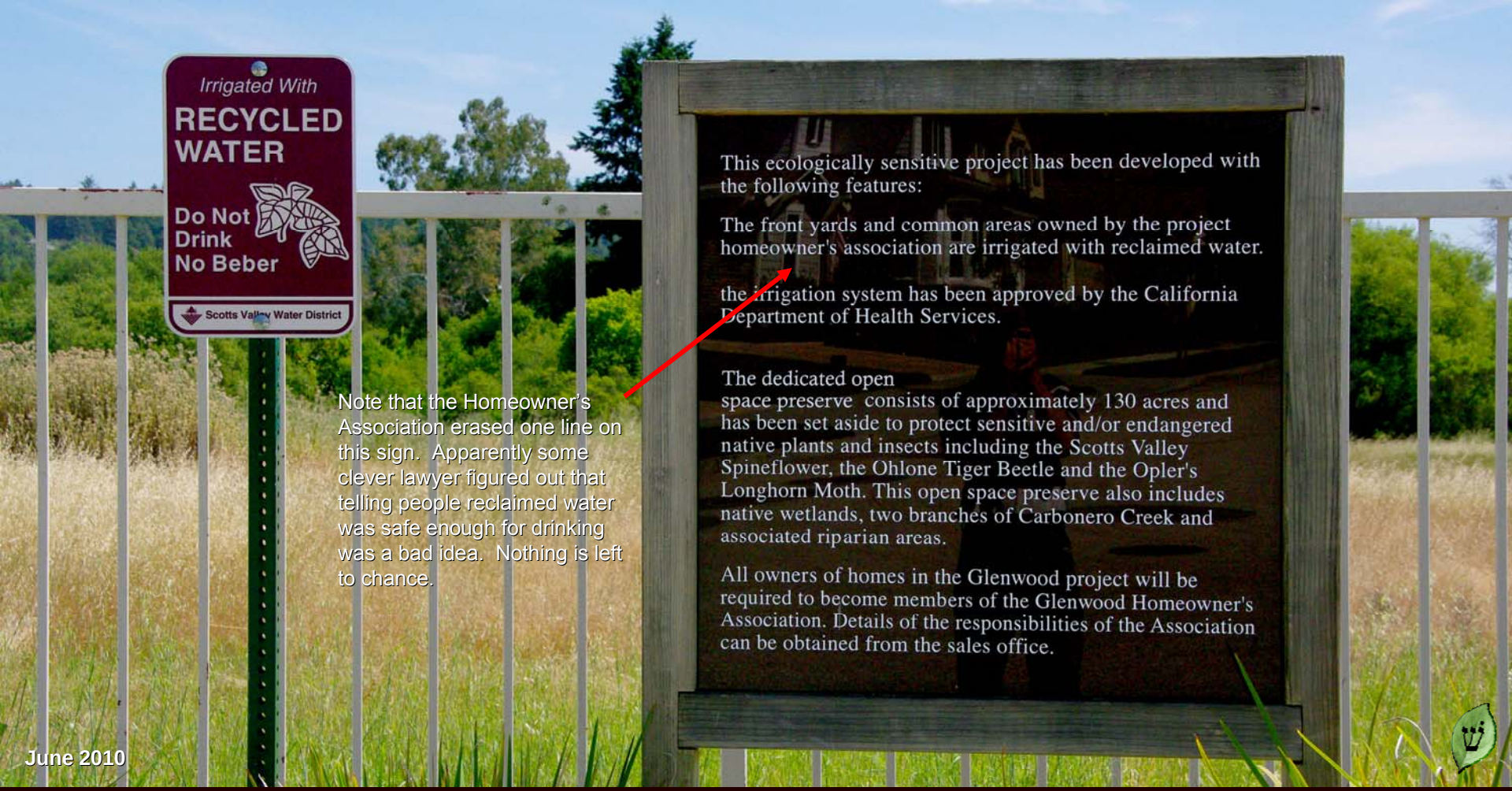
Once these trees get big enough, the “tree-lined street” will offer not a hint of the outside world. It is a bimodal reality, one as seen from their cars as they approach their homes. They’ll view “Nature” from their windows. It might as well be a big-screen TV.

I couldn't stand it. Most of these people work their Silicon Valley lives in a total frenzy, aching to get home for a respite, the one thing for which they spent all that professional effort so tantalizingly close, but absolutely forbidden. They get their food from a store. Soon, it may be ordered from all over the world with delivery coordinated by software and the food coming off a truck along with everything else they buy. This is an alienation from everything upon which they depend, totally, so complete it is akin to madness.

Here, at the end of the street, is your Human-Nature Interface (HNI), graced with a stately pair of pilasters, and fenced for your protection (a mountain lion could hop it without a blink). It's your gateway!

June 2010

Except that it's locked. If a kid lost his basketball over the fence, could he or she go get it?



There is no promise when this part of the "open space" (the 9.74-acre "dog park") will be open to the public (given Federal protection of these listed species there may even be a fine for trespassing). Sadly, for the foreseeable future the deal is all for show. The plan includes but ONE acre for species protection. Worse, the Scotts Valley Spineflower *(Chorizanthe robusta var. hartwegii)* needs disturbance to provide habitat in which to germinate. It did just fine in this wet bottomland when it was grazed. The Ohlone Tiger beetle needs disturbed sandy spots near native grasses. Without grazing, the slender oat you see here will continue to establish dominance over both the spineflower and the few native bunch grasses that are left. Sadder still is that the sign does not mention the Scotts Valley polygonum at all! Yet the construction of this very development destroyed one of but six remaining patches of this Federally-listed endangered plant, with the water reclamation plant directly adjacent to another. If you asked the residents if they care about rare and endangered plants, they would probably answer yes. It would probably take very little to get these same people all up in arms to protect some endangered plant or animal on somebody else's land. But if you asked them to be responsible to GROW some polygonum, you would probably get a blank stare. Don't worry, it's illegal to even try.

Through the fence is your 9.74 acre “future dog park.” They mow the annual grass to reduce the fire hazard. After seven years, it is still closed. Nothing will happen here until the Federal government agrees to it. Don’t hold your breath.

If you remember from the first sign, it mentions “wetlands.” Well, here’s one, a drainage ditch with cat-tails!

This is another “wetland,” a collection pond for flood control deep enough to help drain the historic swampy meadow. Although there are native cat-tails in the bottom, the surrounding dry-land plants are nearly all exotics, predominantly Italian thistle and slender oat.

To me, this was the scariest view of all. This is one of only two exits to this community. Across the street is the entry to Scotts Valley High School (the elementary school is on the other side of the development to the southwest). Effectively, a child raised in Glenwood need never leave. Work, work, work (play basketball, there's your view of Nature), work, work, work (watch Nature TV), cross the street, learn about Nature from the mouth of Authority, work, work, work… This architecture effectively guides a child to grow up without ever having felt the soil, pulled a weed, or planted a seed.

The control is total. "Nature" is to be left untouched.

These folks obviously pay a lot to live this way. Unfortunately, the mortgage-payers typically stay at a job only a few years and then move, too soon to truly come to understand the local ecology. Virtually none of them has any tangible or extensive knowledge about how the land works as learned from the ends of their arms. They believe what they are told according to Authority, in most cases, the mass media, “Experts say that…” Lacking any direct contact with the land, when they are prompted, some get stressed about what is supposedly happening to it. They “get involved,” feeling entitled to agitate, direct their leaders, and decide what is to be done with roads, land, water, air… most of it belonging to somebody else. Just as they were told.

Hopefully, now you know why this segment is in this book. I am educating you, the reader, to help save my land from what we have all been taught, years of conditioning that “Nature is separate from people,” from which I still find the occasional need to free myself.

I met a few of these homeowners while I was taking pictures. These are nice people. I know they don't mean anybody any harm. They have no idea why or how their beliefs are manipulated by the wealthy and powerful to destroy financially the very people who did more than anybody to keep those rare and endangered plants reproducing. Most know they do not understand as much about these issues as they are led to believe. When shown a few details, they listen politely, acknowledging that condition. I really do hope someday to help them consider their possibilities, to care for and learn from their surroundings **with** their children... IF we can get the Federal and City officials to cooperate. Haven't we all had enough of this?

As to the condition of the meadow, the story is strongly bifurcated. The hillsides will not be grazed, so they have only to wait before it blows up in a fire to be followed by successive waves of weed infestations. This portion of the flatland is dedicated to the remaining 23 houses yet to be built. Needless to say, Ponderosa Homes isn't exactly in a rush to build them now. Yet this area remains completely closed to either humans or heavy grazing animals. There is no disturbance to stimulate native forbs; instead, thistles and annual grasses are taking over. Yet that the plan is for it to be developed presents an opportunity for **the residents** to provide that disturbance, learning how to manage this space around them; with the blessing that whatever mistakes they might make would be of no consequence at all. They could even grow some native herbs for dinner! Where to get the seed? That is why what we are doing in the Wildergarten is important. Restoring reproduction of those native sources wouldn't take much in the grand scheme of things.

These homes are above what is now the “open space.” If the vegetation under homes like these is not grazed and becomes heavily loaded with brush, will the owners have any recourse against the Land Trust of Santa Cruz County in the event of a fire? The assumptions pursuant to both Federal and State regulations protecting “critical habitat” for endangered species suggests probably not, even when the rules are demonstrably counterproductive for those “species of concern.” I would bet that there are provisions that protect the Trust from liability for negligence in fuels management as well. There is absolutely no way a $1,000,000 endowment can fund both management and adequate indemnification for fire hazards. As you can see, some of these slopes are very steep.

The remainder of the meadow is still grazed by the horse stable, effectively the one undeveloped element of the 130 acres still under intense anthropogenic influence. Here, the thistles and annual grasses are less prevalent and the brush is obviously under control. There is some friction between the “horse people” and those wishing to see this land put to other uses, so what that means for the vegetation in the long run is anybody’s guess. In no case is the Land Trust or anybody else marketing its wildland attributes or developing processes to enhance production of those endangered plants and insects. That just isn’t done. It’s Natural.

"Our" Ownerless Back Yard

The popular faith that "Nature" is separate from people, that the designation "wilderness" denotes that nothing humans would do or *could* do will make anything better for plants and wildlife, is an abomination far greater than its impact upon the land. It is an idea that leads directly to the common belief that humans are "a cancer upon the earth," *consumers* (as if human beings had no inherent productive value). This belief system renders otherwise intelligent people capable of ignoring the obvious evidence that the resulting policies are *not* working. Its adherents pretend no accountability for the massive consequences of inaction. It is a perspective that therefore possesses no claim to scientific objectivity, wherein total alienation from the land, even succumbing to death, becomes an act of nobility, upon behalf of a deified earth "defiled" by people. On a cultural scale, it is suicidal.

I beg you, having seen the inklings of what *can* be done if we would just get to work, please, refuse to entertain this wretched mental trap. The land is a place for work, and there is nothing so liberating as to admit that we truly do not know much about it. All we ever could do is do our best to take account of our history while we work for a future of vitality, balancing the risks of taking action with those we would otherwise assume by inaction. This is not just about us as people, it is for that for which we know we are inherently accountable (the flip side of unalienable rights if you will). You and I didn't cause these problems, but we are accountable to respond, not to tie our own hands in a mutually destructive incapacity for ourselves and the land. It is our nature to be creative; it is in our nature to be responsible.

It is liberating to accept that responsibility, to labor and repair problems caused by others as the sweat dangles from the end of your nose, but be aware: Doing the independent research by which to set the standards for successful habitat restoration could make you an enemy of the state.

I fully expect to be attacked and possibly harassed for this, having created at great expense an example: Not of perfection, but of process. Not wild and alien, but familiar and intimate. Not helpless and passive, but a vigorous and active participant. Not with grants in a public park, but on our own in our own back yard.

We have toiled here without reward, not just because we thought it would be pretty, but because, knowing what we did, that it was the right thing to do. Our family chose to share with you this story of our land, because we know and wish to share the possibilities within your grasp. My bet is that there is a back yard within your reach. This isn't about taking over and telling people what to do; it is learning, discovery, and sharing. It is about love and health that begins with our hands in direct contact with that which keeps us alive. There is simply an enormous amount of work to do because…

We've got trouble in "our" public back yard.

Not far form our place is this carpet of "sour-grass" (*Oxalis pes-caprea* from South Africa), for which there is no known mechanical control method. Oxalis makes dandy monocultures and is terribly invasive. It re-sprouts from bulblets deep in the soil (a cubic meter of soil has been known to produce a five gallon bucket of bulblets). Nothing eats oxalis willingly as it is mildly toxic. An infestation like this produced bulblets that floated on runoff through the eucalyptus stand on the north end of our place and infested a couple of acres nearby. Although I've rid the downstream areas of almost all the oxalis, it isn't easy to find them all deep in a forest.

Farther from home, this hillside on the coast is covered with poison hemlock *(Conium maculatum)*. This plant is so toxic, the pollen is known to cause birth defects in animals. This photo is to show you the potential for this weed to colonize former grasslands. Wilder Ranch State Park is now seriously infested with it. To give suggest the prognosis, the infestation progressed something like this…

These headlands probably once looked much like this…
although when the Indians came in, they burned it bare every year.

Then came the Spanish, who grazed intensively with cattle that spread the annual European grasses they were fed on the ship. Then came farmers, who used poison hemlock as fences to keep neighboring cattle out of their vegetable patches, just like they had in the land from which they came. It worked, as long as there were plows on one side and cattle on the other.

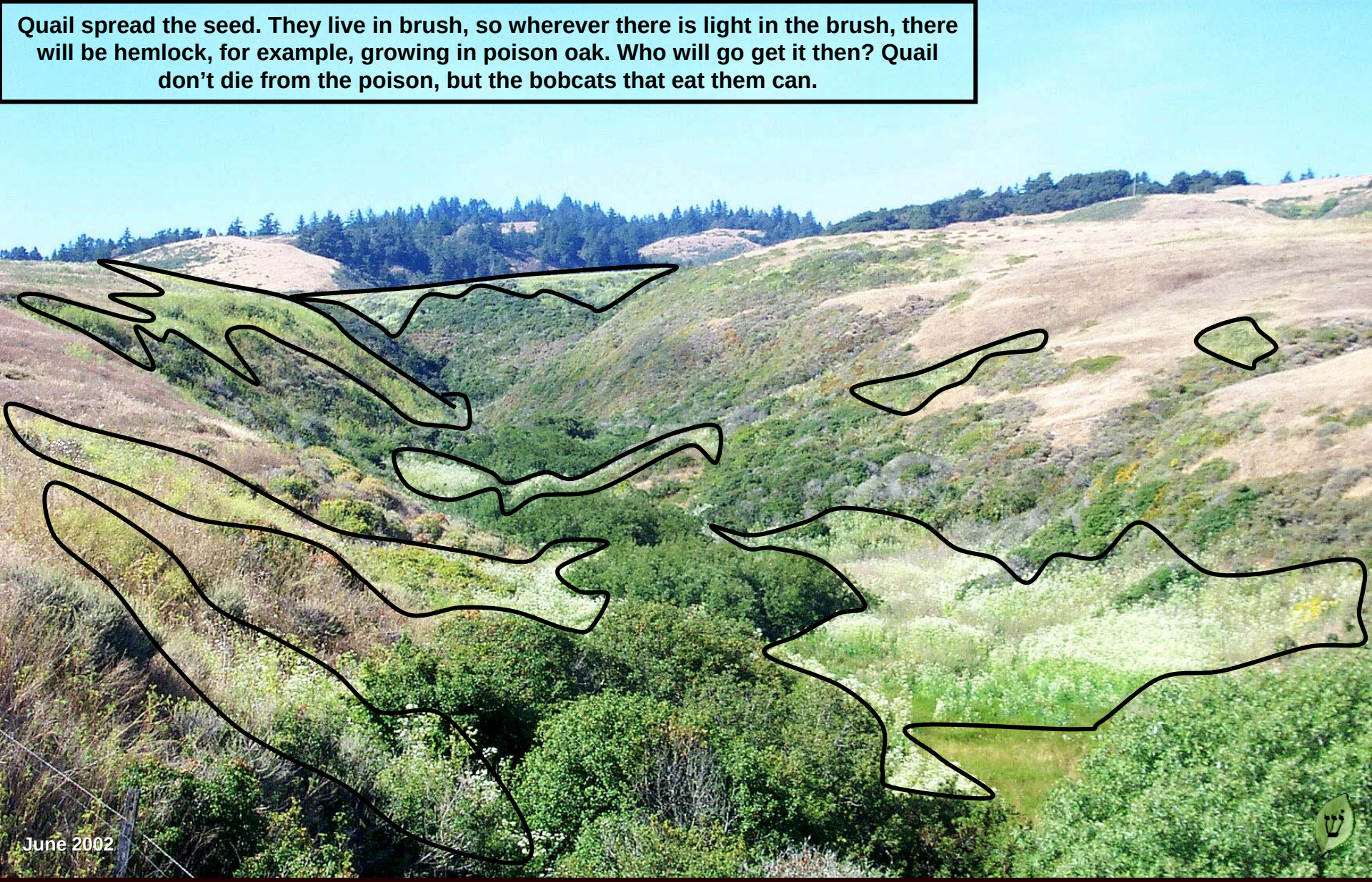
The California State Parks and various land trusts took over local farms and the Coast Dairies property with the promise that they would keep it as a working ranch. The weeds took off on the ranch just as soon as they stopped grazing, which was hardly before the ink was dry. The lime colored landscaping for their pretty sign is poison hemlock.

This is a State Park, so this is **YOUR** back yard. There is a lot of this poison, and it has been spreading, although the open spaces are somewhat better this year (2009) because the Coastal Conservancy put cows on it! So, what was so bad about the dairy?

You can see where it was still grazed when I took this picture seven years ago. I am told the hemlock is now reaching the farthest hilltop. Frankly, it's hard to make myself go back to look. I get terribly angry, having controlled it in our neighborhood. It wasn't hard to do early on, simply picking off the flower heads and putting them in a bag. Then the mowers came. I get to do it again.

Well, this abandoned field isn't all hemlock… it has thistles too (the dark red in the foreground).
Who is going to weed all that poisonous trash when it goes over the cliff? It's all yours, protected for you!

Quail spread the seed. They live in brush, so wherever there is light in the brush, there will be hemlock, for example, growing in poison oak. Who will go get it then? Quail don't die from the poison, but the bobcats that eat them can.



Maybe it is being protected *from* you, but by whom and to what end? I can't blame activists for wanting to save these headlands, but when they took control of this land using an ideology that holds human activity as inherently destructive, they were bound to manage it by the same rationale. The result is to abet the spread of a massive and self-replicating source of poison. Should they reverse course now, what was the justification for their having "saved" it in the first place, if it wasn't greed to acquire it from people who had loved it for generations, while using other people's money? If so, to what end? Follow the money.

“Preserving Nature” without people while socializing the business of enjoying the natural world replaces local food with factory food. It replaces local resources and jobs with foreign resources and jobs (often destroying foreign habitat). It degrades biodiversity. It ruins soil productivity. It places our lives and our freedom at peril. It blinds science with ideology. It breeds hatred, arrogance, ignorance, and bureaucracy. It leaves our children deep in debt. It alienates people from the land. It is time for this to stop.

This story was about my “back yard,” so it is subjective. Still, I have no doubt things here bear a certain similarity to yours because… this is a moral problem.

If we cannot afford to tolerate these results on “public lands,” why are we collectivizing ever more of them? The wealthy socialists who fund the environmental movement want control of markets and people as a way to make money and secure power. They clearly do not care what happens as a consequence; all the pompous wailing we see in mass-media notwithstanding. The results will be “Natural,” no matter what the outcome.

Unless people, by their actions, demonstrably take the moral high ground out from under the witless agents of these self-righteous crooks, the damage they are doing may become irreversible, because too many plants and animals will be gone forever. They are there for us to care for, to make fruitful and to multiply, to fill the earth with life, not to let them kill each other off or let their seed rot in the ground unseen. At least now you know better, and hopefully, after reading this book, you know what that means:

You are The Responsible Party, charged to care for life in the land that provides us life itself, working with your own hands if you are able, to make it ever more productive and beautiful.

Welcome to a worthy struggle, one that will take all our might to accomplish! People must take care of the land to save it and each other from arrogance, ignorance, apathy, greed, and fear. We have a responsibility to learn how to turn the knobs and we’d better get started.

Cain, meet Abel. Seek out your brothers and sisters in your back yard. We need each other now more than we know.