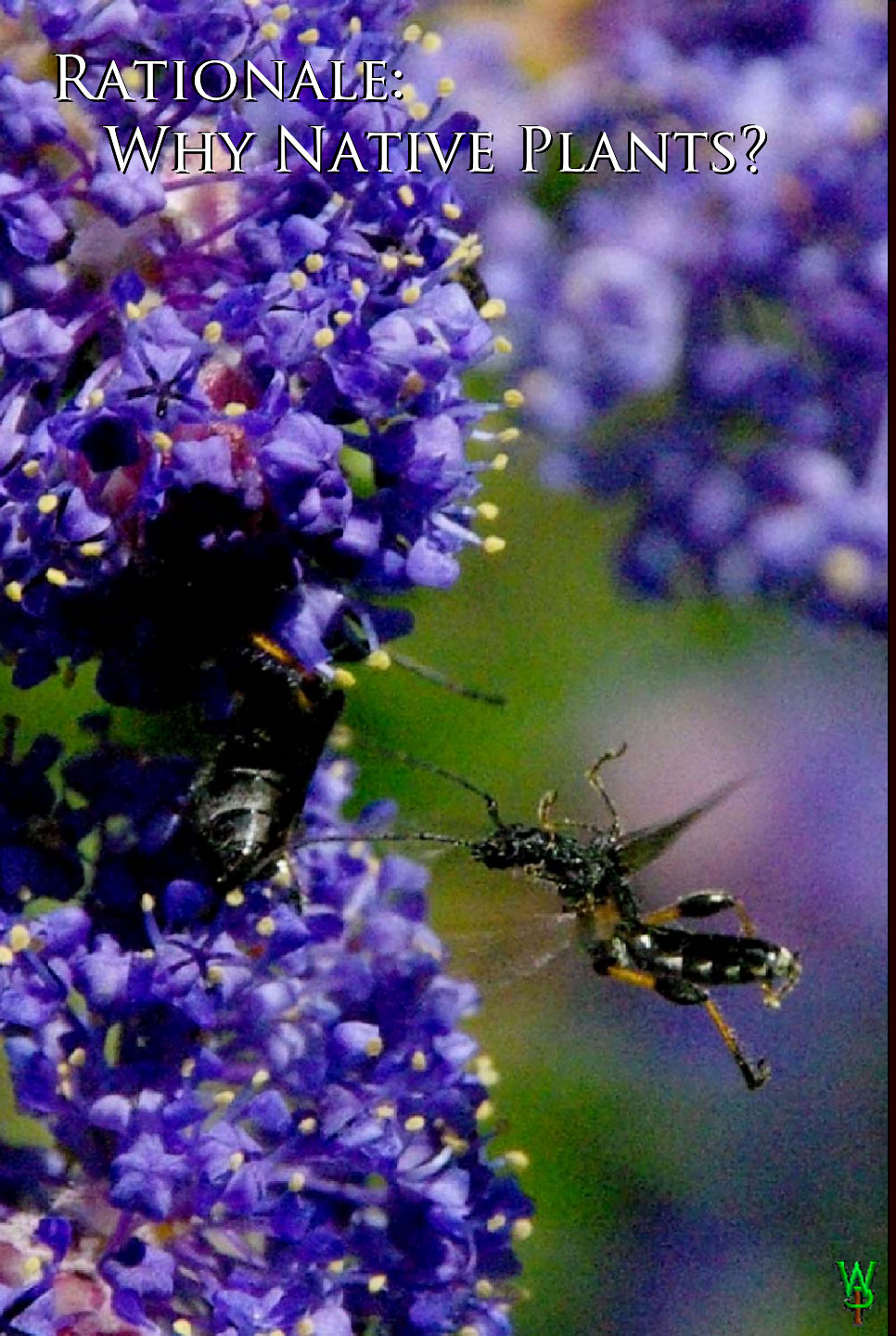
Rationale: Why Native Plants?



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 food and materials for insects, people, and animals, they process nutrients for rivers and lakes that feed the estuaries that breed so much marine life. The ocean in turn processes 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 set up the soil for the perennial systems that succeed 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 among insects and plants are symbiotic: pollination in return for food for insect larvae accustomed to the toxins the host plant produces. Soil bacteria upon which we depend for processing nitrogen also have specific relationships with various native hosts, and not their exotic counterparts. Migratory birds not only consume insects, but many require plants that produce the fruits or seeds for which they are suited. Hence, if that botanical foundation changes composition, the basis of the food pyramid 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, only cat's ear (on this row) is non-native.

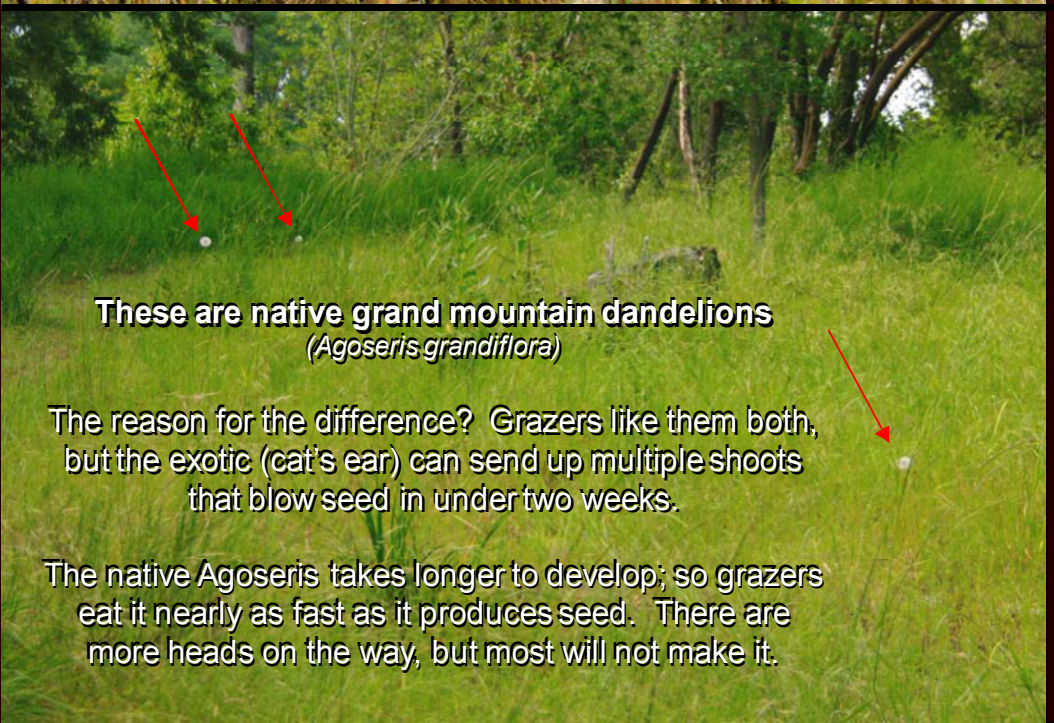
If you think that native v. exotic is a distinction without a difference, please consult the images on the next page


grand mountain dandelion *(Agoseris grandiflora)*

People often ask me how we even know whether or not a plant is native. In some cases the determinants are easy: Some plants, such as redwoods, occur without human propagation in only one region of the world. Some evidences are more subtle but still definitive, such as fossils or pollen 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 possible errors in the botanical record. Still, I would hazard that the determination of whether a species is native or not is probably over 99% accurate overall. Unfortunately, that less than1% was nearly disastrous for us and continues to be an annoyance.

As an extension of that question, it is certain that we do ***not*** know how native plant systems were configured before European colonization. We do know which plants we tend to find together, but as regards how they might have appeared under aboriginal management, there is very little data beyond archaeological analyses and oral traditions. The records of first encounters by the Spanish are very sketchy but do offer inferences I will discuss. Brewer's diary of the 1860's US Geological Survey was more detailed but by that time the system had already changed radically. Upon those and similar bases, how *could* we reconstruct whole systems, much less assess their value, given the many unknowns and the degree to which these lands have been converted by 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 or develop associations with fungi and microflora. 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 associations 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 denotes mining, which is finite. Biological sources regenerate from plentiful atmospheric gases but still require trace minerals to work. However, even native species vary considerably in their productivity with site conditions and over time. Improving our understanding and our results then requires having the genetic raw material with which to research site-specific behavior. That means somebody has to have a place to do that research with full compliments of native plants with minimal disruption from exotics. In this region of California, the Wildergarten is as close as it gets.

As you look at these photographs, you will see that native plants usually form complex arrays of numerous species, whereas non-native plants tend toward monocultures. Diverse systems are thought to be more adaptive, as with 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, pathogen, or pest attack. For multiple species to get along in one spot, no one native can be exclusive in its niche (there are exceptions). It is that lack of dominance leaves them wide open to invasion.

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.

First among native successional 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 exotic species.

Cat's ear was such a disaster that I wanted you to appreciate this mess. 25-50 seeds per head. Imagine acres of it. It's toxic too.

Besides, I just like the grand mountain dandelion better.

I guess I’m just prejudiced.

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, scrub/chaparral, and the unique "Santa Cruz Sand Hill" habitat. It is a wonderful laboratory for observing dynamic behaviors among these plant communities over long periods of time. The only thing we're missing is a pond or running stream.

All told, as of 2014 we manage 351 observed plant species, of which 227 are native, an impressive degree of "species richness" for only 14 acres. 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 the purest collections of native plants to be found anywhere on the Central Coast of California and perhaps in North America. Virtually every park, preserve, or "pristine area" 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. Hour after hour, day after day, year after year.

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 soil that are not described in the literature.


Verbena lasiostachys


Stachys bullata

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 most 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 soil minerals leave the site as products 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). Although it is a perennial, it has the property of dying back every winter, leaving massive amounts of soil organic matter in the form of decaying roots and vegetation. Every spring, annual forbs germinate in that soil and die, leaving processed nitrogen, then to be covered over by the verbena. It then becomes a powerful moisture-retention blanket during the summer while providing an important source of pollen to hordes of bees for months. It is however not a palatable forage or competitive with weeds.

Consider hedge nettle *(Stachys bullata)*. This genus is known to have associations with nitrogen fixing bacteria in the root zone (rhizosphere). It too makes beautiful soil and doesn't sting. Such relationships may explain why we see so much growth here despite the fact that our nitrate numbers are pitifully low and the soil lacks sufficient molybdenum for those nitrogen fixing bacteria (diazotrophs) commonly found in legumes.

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 each other without weeds and especially in soil where microbial associations are very poorly understood.

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

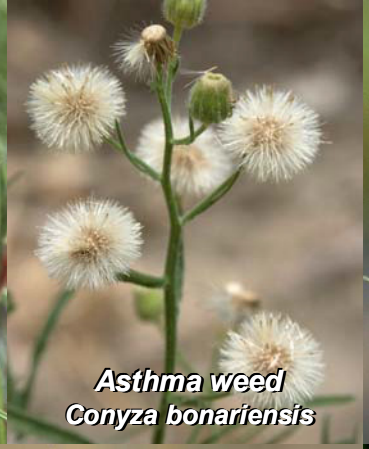
Well, of the 124 exotic species we have seen here, I have classified only ten (10) as benign, meaning that they do not displace natives and tend to stay put within the system; in the vernacular, "they know how to get along." Examples are relic landscaping plants on the property: oleanders, a mission olive tree, a periwinkle years or two, a juniper shrub, and a patch of "naked ladies" *(Amaryllis belladonna)*. 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 the natives seek to colonize.

A good example is at left. Obviously, *Filago californica* (native, top) and *Filago gallica* (endemic to France, below) are related. The former lives only in sand hills. The latter lives anywhere there is full sun and bare soil. The non-native almost fully displaces the native, but it also displaces native clovers, lotuses, and navarretias elsewhere too. The non-native once outnumbered the native in its preferred habitat, 50:1. After eight years of weeding, that ratio is now even. There is currently no way to separate the two other than by hand.

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

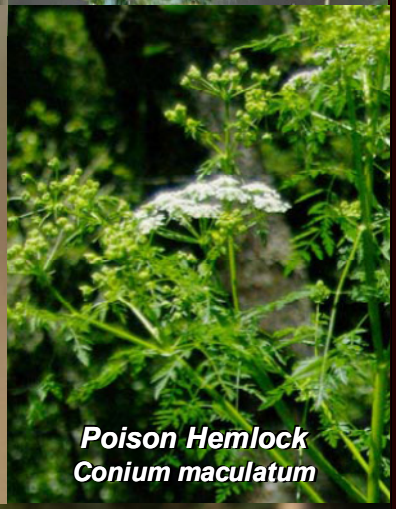
- If we want systems capable of sustaining numerous species of insects and birds, the answer is no.
- If we do not want to displace numerous native plants in the wild, the answer is no.
- If we want varietal cohort species (such as soil bacteria) with which they are symbiotes, no.
- If we want the plants to get along with each other such that systems can perform multiple functions in the same spot, no.
- If we want adaptable systems as a whole, probably not.


Spanish Brome
B. madritensis


Asthma weed
Conyza bonariensis


Italian Thistle
Carduus pycnocephalus


Maltese Star Thistle
Centaurea melitensis


Poison Hemlock
Conium maculatum


Fox Tail Barley
Hordeum marinum


Rip Gut Brome
Bromus diandrus

As a final element to this, “Are non-natives always bad?” question, almost all of the plants we *are* talking about are those that people have already found to be undesirable for residential or agricultural use. In fact, most would be considered bad plants just about anywhere.

They are:

- Inedible to humans, beasts, or insects,
- Allergenic irritants,
- They displace forbs that produce protein in forage,
- Many are toxic,
- Very destructive to soil fungi and microflora,
- Many cause mechanical injury to animals,
- Most have poor forage value,
- Many produce irritating burs,
- Most are water hogs,
- They are all virtually uncontrollable, and
- Most are fire hazards (at least they are here).

This does not mean that they have no *potential* use, as the examples of various vetches and poison hemlock (to come) demonstrate. One can make honey from star thistle. However, in this region, I really don’t know why anybody would *want* large amounts of them given their native alternatives.

Most people find exotics 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 preferences.

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… Well, it certainly worked for that.

… but other invasive exotics came in accidentally, facilitated at an increasing rate by global trade with neither inspections nor treatment.

September 2008, along SR 198 east of King City, CA

Some are subtle because we are so accustomed to their presence. “The Golden Hills of California” may be beautiful, but neither are these grasses native nor are they as productive for forage as others could be. Twenty-two million acres of annual grasses, particularly slender oat *(Avena barbata),* “poverty grass,” *(Vulpia spp.*), and several exotic bromes such as rip-gut and Spanish brome *(B. diandrus & B. madritensis)* have displaced the perennials that would do as well or better here. There now very few annual forbs.