

Best Management Practices

Northern California Farmers Guide



*A Prosperous Economy
and a Healthy Environment*

*Seeking Balance and Sustainability
in Northern California's "Green Rush"*

Identifying the Issues

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The Northern California Farmers Guide is a community-based collaborative project that was written for the benefit of our communities and the watersheds we thrive in. We would like to acknowledge and thank the many community members, farmers, environmentalists, advocates, and sponsors who have contributed to the writing, designing, and funding of this still evolving project. Enjoy!

Northern California watersheds are faced with an agricultural boom: *causing threats to our communities.*

In recent years the cannabis industry has grown exponentially. This agricultural boom, or “Green Rush,” is presenting new threats and challenges to our communities and the natural environment that sustains us. Northern California watersheds have already been damaged by years of boom and bust cycles including logging, ranching, and development. The legacy impacts of these cycles have seriously degraded the integrity and health of the natural environment.

Northern California is a land of ancient redwood groves, annual salmon runs, steep mountain valleys, expansive wilderness, scenic rivers, and is a refuge for many rare and endangered species.

Northern California is also home to rugged and resilient communities and modern homesteads built off-the-grid focusing on recreating a stewardship ethic that has largely been lost over recent centuries. For decades our communities have had an active relationship with cannabis, pioneering growing methods and producing buds that are known around the world.

This guide is meant to complement the unique do-it-yourself culture and spirit which has long been established here on the North Coast of California. This is simply a starting point in the process of identifying and creating viable solutions to the environmental problems our agricultural activities may be exacerbating. Our intention is to address them directly and effectively, on our own farms and within our own communities. We believe that our proactive efforts will help prevent law enforcement and resource agencies from trying to solve these problems for us.



Concerns

Water is undoubtedly the most crucial resource issue related to rural residential health and quality of life.

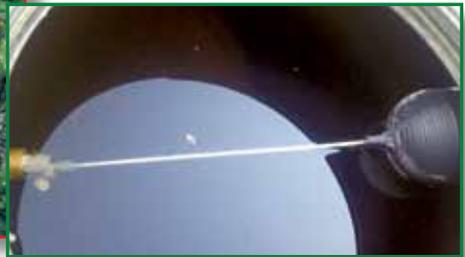
Diverting and/or pumping water from springs, creeks, and rivers during the summer months reduces streamflows and increases water temperatures. This contributes to blue-green algae blooms in our rivers, affects the quality of water for human and animal consumption, and threatens the survival of endangered salmon, steelhead, and other aquatic life. Anytime you are taking water from a seasonal or year-round waterway such as a creek, stream, or river you are creating a water diversion.



Poorly done excavation work leaves a Class II stream buried in debris, left. Instream excavation work has turned this headwaters stream into a “pond” which is immediately drained out of the stream, eliminating aquatic life, right.



Overflowing water from a tank— a waste of diverted water.



Float valves installed inside of tanks keep water from overflowing.

Solutions

- ✓ Every spring, inspect your entire water system for leaks and repair leaky faucets and connectors, all the collective drips add up!
- ✓ Install float valves on all tanks to keep water from overflowing onto the ground. (Visit: www.sanctuaryforest.org for details).
- ✓ Reduce water use by installing multi-cycle water timers and drip irrigation systems. By watering for short durations, 2-5 minutes 2-4 x a day, you can keep soil moist without wasting water or leaching nutrients.
- ✓ If hand watering, water during the evening or early morning hours. Watering while it's still cool outside helps to reduce evaporation.
- ✓ Mulch plants and all cultivated areas, even your pots! Drip lines and emitters go under the mulch.



- ✓ If the ground between and around your cultivated areas is disturbed or lacks vegetation, seed and mulch these areas as well. Vegetation around cultivated areas helps with overall water retention as well as temperature reduction.

Water

- ✓ Cover pots/containers on the south and west sides with burlap or another suitable material to keep containers cool.
- ✓ Be sure to not overwater your garden! Overwatering not only wastes water but is also a contributor to diseases such as root rot, root aphids, white flies, fungus gnats, etc.
- ✓ Signs of overwatering-
 - Your soil doesn't dry out between watering.
 - Water is running out of the bottom of potted plants (use saucers to collect excess water and give root balls the time they need to absorb it).
 - The pathway between beds or plantings is wet or develops puddles.





- ✓ Collect and store water during the rainy season in tanks, bladders, or engineered ponds.
- ✓ You can avoid the use of groundwater by installing rainwater catchment systems and tanks.



*Rainwater catchment tank, above.
Rooftop rainwater catchment system, left.*

Erosion and Sediment

Concerns

Poorly maintained or badly constructed roads and excavation sites are a major source of sediment pollution in our watersheds. The heavy winter rains experienced by our bioregion put a tremendous amount of water onto road systems, transferring vast amounts of loose sediment into our creeks and rivers. Poorly maintained or plugged culverts can lead to catastrophic failures that can severely damage roads and nearby streams. This degrades or eliminates habitat essential to fish and other aquatic life and can cause sediment dams to occur leaving isolated pools that fish can't get to or escape from.



Buried stream and riparian buffer resulting from the excavated flat showing deep gullies where sediment has washed down hill in the heavy winter rains, above. A partially obstructed culvert, right.



Solutions

- ✓ Reduce erosion by maintaining waterbars and keeping culverts clear, especially during heavy rains. Slow down water runoff and catch sediment where muddy water leaves the road by building simple check dams out of rocks, logs, brush, etc.
- ✓ Be aware that choosing to use heavy equipment to develop your property has serious short- and long-term impacts. Be sure to hire experienced and reputable operators instead of doing it yourself! Un-permitted grading and/or road construction is illegal and can lead to heavy fines.
- ✓ Put gravel on all dirt roads and be sure to seed and mulch all disturbed areas and bare soil prior to the rainy season.
- ✓ Do not incorporate slash, brush, branches, or tree trunks into road prisms, sidecast material, clearings, landings, etc. This organic material will quickly rot and the overlying soil will slump and create additional sedimentation problems.
- ✓ You can find more practical tips by downloading *Rural Roads: A Construction and Maintenance Guide for California Landowners*. (see page 18 for link.)



*A graded area that has been mulched with straw and grass seed to prevent erosion and runoff, above.
A well-maintained culvert, left.*

Potting Soil

Concerns

Importing potting soil is very energy intensive in its production and transportation to our region. The production of potting soil depletes natural resources, such as peat moss, perlite and pumice. Plastic soil bags also create an exorbitant amount of landfill. Dumping used potting soil is illegal and can be a source of pollution to local rivers.



A 10-foot plus cut in the earth, a result of the peat bog mining.



Discarded potting soil left exposed to the winter rains will leach remaining nutrients into the environment and possibly waterways.

Solutions

Buying soil is a serious financial investment and it is not a “disposable” commodity. Protect your investment and the environment by following these basic suggestions.

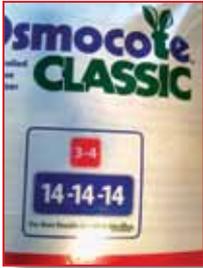
- ✓ Maintain and improve your soil each year by planting cover crops (fava beans, vetch, winter rye, clover, etc.) in the fall to boost soil fertility naturally. Planting a mix is best. Turn cover crops back into the soil in the spring, 30-60 days before planting. Cover crops hold your investment (soil & nutrients) on-site by preventing them from eroding or leaching into the watershed during winter rains.
- ✓ If using bagged soil be sure to empty the bags completely and recycle them by bringing them to a local recycling center or garden store that recycles.
- ✓ Purchase bulk soil. This requires no plastic bags, saves you money, and reduces landfill trash.
- ✓ What to do with used potting soil? If you need to replace your potting soil, consider reusing it to develop new garden beds or giving it to gardeners who want it. If you're experiencing salt build-up, consider layering the soil in compost bins with straw or hay, inoculating with beneficial bacteria and mycorrhizal fungi and letting it compost for a year or two before reusing. Potting soil can be legally disposed of for a small fee at Freshwater Farms or W. Green Landscaping.



Amendments and Fertilizers

Concerns

We can all do our part to keep fertilizers out of creeks, rivers, and waterways. Over-fertilizing with both synthetic and organic nutrients is a much too common practice. Excess nitrogen and phosphorous from agriculture can pollute waterways and may contribute to toxic algae blooms in our local rivers and streams. Additionally, synthetic fertilizers often contain copper sulfate, an ingredient that is extremely toxic to aquatic life, even in small doses.



Synthetic chemical-based time-release fertilizer will leach nutrients into the environment for an extended period of time.



Synthetic chemical-based water soluble fertilizer can easily enter streams and waterways. Even a small amount can have serious environmental impacts.



A homemade compost tea brewer

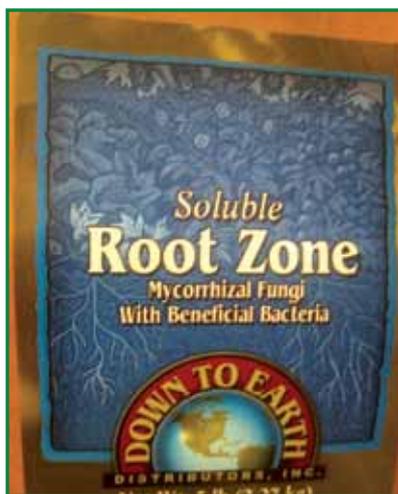


Homemade Compost

Solutions

Healthy soil is living soil! Soil that is teeming with beneficial microorganisms will help to reduce your garden's need for amendments and fertilizers while increasing your yields. Additionally, healthy soil holds moisture longer, reducing plant stress during the dry heat-intensive summer months.

- ✓ When amending your garden soil or fertilizing during the growing season, choose natural and/or organic products to reduce the chances of salt build-up. Always follow the manufacturer's suggested application rates. You may even want to use less than recommended. This is not a case of more is better! Remember, plants can only absorb so much at one time.
- ✓ Try using compost and compost teas or adding beneficial microorganisms to your soil and tea tanks. Utilizing such products encourages healthy biological activity in soils and increases nutrient uptake while enhancing your garden's natural immunity against pathogens, such as mold and fungus.



*Mycorrhizal Fungi
with Beneficial Bacteria*



*A bio-swale with a filter strip of
native vegetation*

- ✓ Leave buffer strips of native vegetation downslope of all garden areas to help catch and cleanse runoff before it has an opportunity to enter creeks and streams.
- ✓ Excess nutrients and water can also be captured by constructing earthen basins called "bio-swales" below your grow site.
- ✓ See references for naturally produced and organic fertilizers and amendments, soil-building classes, and do-it-yourself compost tea brewing.

Disease and Pest Control

Concerns

Powdery mildew, root rot and root aphids, spider mites, white flies, and various garden viruses are potential problems for farmers in our region. Pesticides and fungicides used to treat these problems can contaminate the soil, water, and the crop they are applied to. They also don't discriminate, often killing the beneficial insects and microorganisms that are nature's defense against plant disease and pest issues. Improper handling and storage of pesticides and fungicides can be harmful to the environment, humans, and animals that come into contact with them.



Dangerous fungicides and miticides contrasting with sunflowers and beneficial insects.

Solutions

A garden with soil teeming with beneficial microorganisms and beneficial insects will be far less susceptible to disease and pest issues. Be a proactive gardener, not a reactive one! Take steps ahead of time to reduce the risk of pest and disease infestation. Most garden disease and pest issues are brought into the garden by contaminated plant starts that are acquired from outside sources.

- ✓ Consider breeding and sprouting your own seeds! Seed plants tend to have increased vigor and resilience to disease and pests. Seeds that are produced on-site and/or in the same bioregion are preferable as they are more likely to be acclimated to the weather, subtle light changes, and have increased immunity to the bioregion's various disease and pest issues.
- ✓ When purchasing plant starts from seed or clone, examine them closely for signs of disease and pest issues. Check the underside of leaves for spider mite eggs and/or adults. Squashes, melons, cucumbers, and dahlias are all highly susceptible to powdery mildew so take the extra time to give them a thorough examination before bringing them home from your local nursery.
- ✓ Garden viruses such as Verticillium and Fusarium wilt are easily transferred through clone cutting and contaminated soil or mediums. Choose plant starts that have healthy hairy white roots, avoid plant starts with roots that are undeveloped, browning, or lack a vigorous appearance.
- ✓ Know your plant and clone source! Clones are cut from mother plants, meaning the clone you take home is highly likely to have the same disease and/or pest issues as its mother plant. Additionally, clones may also contain fungicide and pesticide residues if the mother plant was treated prior to the clones being cut.
- ✓ Attract beneficial insects to your garden by inter-planting a mix of yarrow, cilantro, parsley, dill, or coreopsis. This will help to combat spider mites and other pests.
- ✓ Prevent the onset of powdery mildew by using natural remedies as a preventative during the plant's vegetative life cycle. If powdery mildew persists, spray your garden with a weak solution of baking soda, neem oil, or H₂O₂ (hydrogen peroxide.) You can also spray or dust with sulfur products to deter the onset of powdery mildew.
- ✓ If purchasing pesticides or fungicides, choose the most natural or organic ones available at your garden supply store. Always follow the manufacturer's recommendations and never apply more than recommended.



*A Beneficial Insect,
the Predatory Wasp,
on Bronze Fennel*

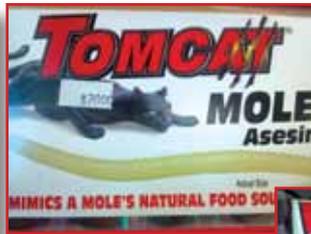
Rats, Mice, and Other Critters

Concerns

Remember that poison kills! Rodenticides used to exterminate garden pests such as rats, mice, gophers, and moles can move up the food chain and cause secondary kills of family pets and predators such as owls, bobcats, foxes, and fishers. The improper use and storage of rodenticides can also contaminate soil and water supplies.



A Fisher, an endangered species, killed by rat poison. Credit: PLOSONE-Gabriel et al. 2012



A Barn Owl killed by rodenticide.

Solutions

Water is what the animals are looking for when they chew the base of plants, so give the critters what they want! Put out bowls of fresh water or use livestock water feeders.

- ✓ Protect the base of plant stalks with plastic pipe, wire mesh, or Tanglefoot to keep rodents such as rats, mice, and voles from chewing on plants. These are easy solutions that can be implemented long before rodent issues become a problem.
- ✓ Be creative if you have a rat or mouse issue. Try placing a ramp up the side of a trashcan that leads to a length of plastic pipe rigged on a pivot point. Bait the far end of the plastic pipe with a smear of peanut butter. The rat or mouse will walk up the ramp and into the pipe, only to be tipped into the trashcan. These can be live traps (so as not to drown critters you want around) or filled with enough water to drown the rodents.



- ✓ While traps (rats, mice, gophers, voles, etc.) are better than poisons and often very effective, they can also kill or injure critters and pets that are not threatening your garden! Consider using Havahart traps. These are wonderfully effective and allow the user to relocate wildlife instead of terminating it.

- ✓ To defend your garden from larger animals, use rabbit and deer fencing or heavy-duty deer fencing. Both of these options have small enough squares to keep out larger animals.
- ✓ Avoid using plastic bird netting as a critter fence. It can kill snakes, birds, and other wildlife that easily become entangled in it.

For More Information

Recommended Resources:

- ✓ www.sanctuaryforest.org
- ✓ Freshwater Farms (707-444-8261)
- ✓ W. Green Landscaping (707-822-8035)

Suggested Reading:

- ✓ *Gaia's Garden: A Guide to Home-Scale Permaculture*, Toby Hemenway
- ✓ *The Rodale Book of Composting*, Rodale Inc.
- ✓ *Teaming with Microbes: The Organic Gardener's Guide to the Soil Food Web*, Jeff Lowenfels & Wayne Lewis
- ✓ *The Compost Tea Brewing Manual*, Dr. Elaine Ingham
- ✓ *Design for Water*, Kinkade-Levario
- ✓ *Rainwater Harvesting for Drylands and Beyond*, Brad Lancaster
- ✓ *Natural Enemies Handbook: The Illustrated Guide to Biological Pest Control*, Mary Louise Flint and Steve H. Dreisdadt
- ✓ *Handbook for Forest and Ranch Roads*, Mendocino County Resource Conservation District, William E. Weaver and Danny K. Hagans, available on the web as a PDF file at: www.krisweb.com/biblio/gen_mcrd_weaveretal_1994_handbook.pdf
- ✓ *Rural Roads: A Construction and Maintenance Guide for California Landowners*, <http://anrcatalog.ucdavis.edu/pdf/8262.pdf>

For More Information Please Contact:

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Conclusion

A fundamental motivation for presenting this “growers guide” to the community is our belief that—even in the midst of the recent “green rush”—most people want to do the right thing. By outlining and describing Best Management Practices it is our hope that we will encourage dialogue, raise awareness, and empower farmers to safeguard the unique environmental qualities of our bioregion because we all care about cool clean water to drink, clean air to breathe, wildlife in abundance, and a safe community to live and grow in. This guide is a celebration of what we have achieved and recognition of a basic fact: we can do better!

We have the opportunity to utilize the prosperity of the current agricultural boom, combined with the knowledge and ability to grow the highest quality cannabis in harmony with our local environment. Thankfully, growing in balance with the natural environment will also produce a better, safer product for consumers, and will ensure that the “Humboldt” brand stands for higher quality, sustainably produced product.

The challenge is to protect our environment while maintaining the prosperity and natural resources we depend on. Things don’t have to be perfect, but we can all make improvements.





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paper, processed chlorine free, and
printed with plant-based ink.