SIERRA NEVADA
YARD & GARDEN

A homeowner's guide to landscaping in the Sierra Nevada

SIERRA NEVADA ALLIANCE

SIERRA NEVADA ALLIANCE

Keeping light in the range.

The Sierra Nevada Alliance has been protecting and restoring Sierra Nevada land, water, wildlife and communities since 1993. The Alliance unites hundreds of individuals and conservation groups to protect Sierra Nevada resources. The Alliance is driven by a vision of a Sierra where natural and human communities coexist in harmony; a Sierra where residents and visitors alike understand and value the unique qualities of the range and protect the places they love.

For more information or to obtain a copy, visit the Sierra Nevada website or office:

www.sierranevadaalliance.org

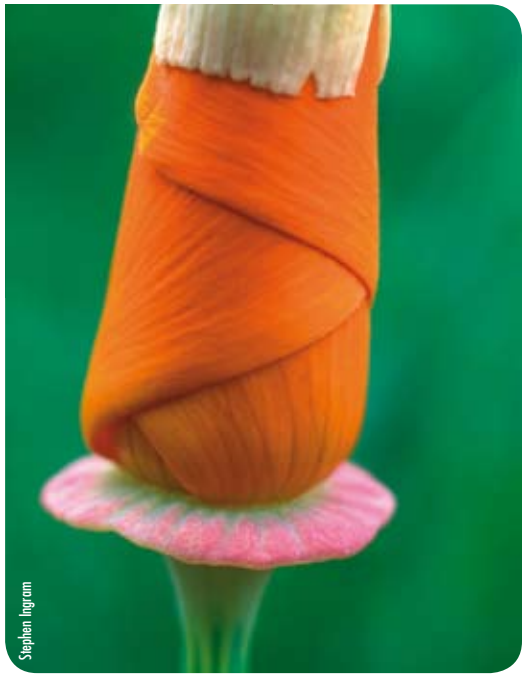
2489 Lake Tahoe Boulevard
South Lake Tahoe, CA 96158
Phone: 530.542.4546

SIERRA NEVADA CONSERVANCY

RESOURCE CONSERVATION DISTRICTS

University of Nevada Cooperative Extension

SIERRA NEVADA
YARD & GARDEN



A publication of the Sierra Nevada Alliance[1]
South Lake Tahoe, California

Editor: Michelle Sweeney

Assistant Editors: Joan Clayburgh, Genevieve Jessop Marsh

Authors: Chapter 1 – Joan Clayburgh and Genevieve Jessop Marsh, Chapters 2 and 3 – Michelle Sweeney, Chapter 4 – Gerald Dion and Sheri Brown Dion, Chapter 5 – John Cobourn, Gerald Dion, Megan Suarez-Brand, Michelle Sweeney and Michael Vollmer, Features – Genevieve Jessop Marsh and Michelle Sweeney

Editorial Advisors: John Cobourn, Sheri Brown Dion, Michael Hogan, Megan Suarez-Brand

Graphic Design: Steven Lee

Photography: Featured photography by Stephen Ingram, Michelle Sweeney, and the Nature Conservancy – John M. Randall, Barry A. Rice, Mandy Tu; contributed photography by Susan Bragstad, Cheryl Beyer, Peyton Ellas, Forest Jay Gauna, Marion Gee, Solomon Henson, Stephen Ingram and Do Lee

Sketches and Watercolors: John Muir Laws, Sandi Osterman

Cartography: Green Info Network and Gerald Dion, Tallac Applied Ecology and Design

Select content, sketches and photography contributed by: *The Home Landscaping Guide for Tahoe and Vicinity*, a University of Nevada Cooperative Extension publication, by John Cobourn

Project Visionary: Megan Suarez-Brand

Cover Photos:
Front top by Stephen Ingram, Back right: Stephen Ingram

Acknowledgements
This work was made possible by a grant from the State Water Resources Control Board, Lahontan Region.[2]

The Sierra Nevada Alliance is grateful for the support and involvement of the team that made this book a reality.

Our thanks to the reviewers of the manuscript, or portions thereof, including: John Cobourn, Bob Kingman, Tacy Curry and Bruce Warden. Thanks also goes to Shelly Barnes, Marsha Prillwitz, Sarah Trebilcock, Jason Brand, Jennifer Cressy, Nicole Cartwright, Deni Silberstien, Holly Warner, Emily Cunnison, Lynn Sadler, Roberta Lagomarsini, Jonathan Keehn, Lori Webber and Rebecca Bryson. Our gratitude goes also to Robie Litchfield, Lori Webber and Dean Cromwell for strategic advice for the project.

This project was fortunate to receive the generous contributions of photography and artwork by Stephen Ingram, John Muir Laws and *The Home Landscaping Guide for Tahoe and Vicinity*. Photo credits are found with each caption.

The features of local gardeners in Sierra Nevada communities were made possible by those who contributed their time and insight for the interviews: Susan Bragstad, Mary Burnside, Brad Carter, Catherine and Scott Cecchi, Valerie and Michael Nellor, and Tom Kraul and Diana Pietrasanta.

[1] The Sierra Nevada Alliance bears responsibility for any factual errors. Recommendations and views expressed are those of the Sierra Nevada Alliance and do not necessarily represent those of funders, reviewers or others who offered assistance to this report.

[2] "Funding for this project has been provided in full or part through an agreement with the State Water Resources Control Board. The contents of this document do not necessarily reflect the views and policies of the State Water Board, nor does mention of trade names or commercial products constitute endorsement or recommendation for use."

Stephen Ingram

Contents

Stephen Ingram

Introduction 7

How to use *Sierra Nevada Yard & Garden* 8
Guide elements 8
The Design Notebook 8
Feature topics 9

Feature: Eastern Slope, Bishop—native plants, wildlife habitat, community 10

1 My Yard in the Sierra Nevada 13

Sierra Nevada features 14
My yard and Sierra Nevada waters 15
My yard and Sierra Nevada soils 16
My yard and Sierra Nevada plants 17
My yard and Sierra Nevada wildlife 18
My yard and Sierra Nevada wildfire 19

Feature: Lower montane, Grass Valley—water conservation, wildlife habitat 20

2 Observe 23

Get to know your outdoor space 25

Feature: Lower montane, Quincy – low maintenance and local flavor 26
Water 29
Soil 31
Vegetation 36
Sierra Nevada zones & plant communities 42
Wildlife 52
Gauging wildfire risk 55

Feature: Modoc Plateau, Alturas—planning a low maintenance yard 58

3 Design 61

Clarify what you want from your outdoor space 64
Reality check 67
The zone and island approach to design 67
Design considerations 72
The Design Notebook 78
Sample site plans 79
Create your site plan 90
Draft a timeline and budget for your project 94

Feature: Southern Sierra, Springville – birds, blending the landscape with the surroundings 96

4 Plant Selection Guide 99

Regional plant recommendations 101
Plant descriptions 102

Feature: Lower montane, South Lake Tahoe – defensible space/fire prevention 108

5 Yard & Garden How-To 111

Creating access and securing permits 114
From design to implementation 114
Protecting water, preventing erosion 115
Protecting stream areas and water bodies 120
Removing invasive weeds 122
Irrigating efficiently and effectively 122
Preparing the soil, feeding the soil 128
Planting and the first season 130
Long term maintenance 137
Controlling pests without harming the environment: Integrated Pest Management 138
Living with wildlife 141
Clearing and wildfire defensible space 145

Feature: Foothills, Amador City—water conservation, landscape design 148

Appendices 150

A. Yard and Garden Resources by Sub-Region of the Sierra 150
B. Bibliography 154
C. Glossary 156

Index 158

Stephen Ingram

Introduction

Michelle Sweeney

A well-designed and maintained yard helps expand living space, suits your needs and contributes to the high quality of life found in the Sierra Nevada. It also gives back to the Sierra Nevada by:

- keeping water clean
- promoting native vegetation
- promoting the well-being of wildlife and
- maintaining the integrity of native soils.

To top it off, a well-designed and maintained yard can actually help protect human life and property because stewardship of outdoor space can reduce the risk of wildfire.

Great quality of life, giving back to the environment, and reducing risk to life and property—all of this provided by your own yard.

How to use *Sierra Nevada Yard & Garden*

Ultimately, how you use this book will depend on your specific needs and interests. The book is designed to be a companion in the creation and maintenance of a high quality, resource-efficient, sustainable and cost-effective landscape.

Chapter 2, Observe, advises initiating gardening endeavors by observing the natural environment in your yard and surrounding areas. Chapter 3, Design, provides sample site plans and sustainable, low-impact, wildfire-prevention gardening advice. Start your plant selection using Chapter 4, Select, which provides names of native and adapted plants for your Sierra Nevada environment. Chapter 5, Yard and Garden How-To, provides practical advice about yard and garden topics.

This book is intended to support the efforts of Sierra Nevadans to promote the ecological integrity of the Sierra Nevada region through domestic landscape management. The book is a resource for a wide spectrum of readers. If you simply want some practical advice on a particular topic, browse to find the information you need. Each chapter starts with a table of contents so you can use this book as a reference. Should you be looking to re-design your outdoor space, read the entire book for comprehensive guidance.

Guide elements

The guide has several elements to make it user-friendly for different applications and reading styles.

Call out boxes
Call out boxes, in tan, highlight specific questions about your yard. Information in these boxes helps you get involved in your garden.

It is a great idea to keep a Yard and Garden journal as your project thoughts and designs evolve. The journal symbol reminds you of this opportunity where it appears in the text.

Resource boxes
Resource boxes, in blue, present how and where to find out more about topics of interest. The contents of the boxes are websites, phone numbers, addresses and names of useful groups that can help you learn more about a topic.

Sierra notes
The Sierra Nevada is such a unique and dynamic region that there are libraries of books about it. This guide uses Sierra notes to bring you little tidbits of knowledge.

The Design Notebook

Just as garden tools are essential to your project success, a few basic design tools can make your outdoor projects run smoothly. Think of the Design Notebook as the toolbox for the design step of your outdoor project. The Design Notebook contains four important tools:

- Your site plan (a map in several layers)
- Your outdoor projects budget
- Your outdoor projects timeline
- Your Yard and Garden Journal

Organize your outdoor space design ideas in your Design Notebook using:

- A 3-ring binder
- 5 divider tab pages
- Paper

Your Design Notebook helps you organize your thoughts in terms of 1) a site plan, 2) a budget, 3) a timeline, and 4) a journal. The fifth divider tab reserves a space for miscellaneous information, such as vendor contact information. Keeping all of your yard and garden notes in this Design Notebook will help you stay organized. Ideas about what to include in the Design Notebook are suggested throughout the book.

Feature topics

In addition to the chapter topics, this book focuses on:

Water

Soil

Vegetation

Wildfire prevention

Wildlife

There is a section on each of these topics in each chapter of the book. The topic sections are each highlighted by a symbol. Browsing directly to the section topics may be efficient for those who do not intend to do a comprehensive revamp of a yard, but do want to be better informed about a particular topic.

A note on commitment
Yards and gardens can be a challenge, especially at high altitude. They also provide a great source of satisfaction and a window to exploration and adventure. Whatever your style or approach and whatever your project size, *Sierra Nevada Yard and Garden* can help you make informed decisions in the step-wise process of observing, designing, selecting plants and features, and managing your garden. As useful as this book may be, there is nothing more important to your Sierra Nevada landscape and gardening success than your commitment. So roll up your sleeves and enjoy.

Geneviève Jessop Marsh

Feature:

Diana Pietrasanta • Bishop, California

Sierra Nevada zone: Eastern Sierra
Conservancy sub-region: Eastern
Elevation: 4,100 feet
Watershed: Owens
Focus: Native plants
Yard size: 1/8 acre
Favorite resource: California Native Plant Society – Bristlecone Chapter & *High Country Gardens*

Diana Pietrasanta in her eastern Sierra front yard in the fall.

The local kids call her the Cactus Lady. There's a school up the block and every year a resident teacher takes her class to Diana Pietrasanta's garden for an introduction to desert plants. Then, in twos and threes, the students pass by on their way back and forth from school, seeing how things have grown. "My neighbors are also intrigued by the yard," Diana says. "They see things in my yard that they aren't used to seeing outside of a natural landscape."

Diana gets most of the plants for her eighth of an acre lot at the Native Plant Sale held by the California Native Plant Society – Bristlecone Chapter. The rest she grows from seed. Every spring the lupine send up their long purple tongues and orange and cream colored California poppies blink at the sky. She has buckwheat and ceanothus, apricot mallow and penstemon. She is most famous for her colorful cactus, though. The Mojave Prickly Pear (Opuntia erinaceae) blooms yellow in the spring, while the Santa Rita Purple Prickly Pear (Opuntia violacea) changes color according to season: purple in the winter to absorb the heat and lighter green in summer to reflect it.

Diana likes to see where the plants are happiest. For her, gardening is a kind of experiment. She has a degree in botany and just likes to, as she puts it, "dink around in the garden."

Even on an eighth of an acre, there are variations in soil and temperature and the plants have definite preferences. A favorite cactus died this past spring due to a deep freeze—losing that plant was sad. Diana says, the garden, like so many things in life, cannot be completely controlled or protected.—"I learned that—you know what?—the cactus died because I planted it in the wrong place. We learn from experience and improve as we go forward."

She always has a lot of bees and humming birds in her yard, attracted by an abundance of desert blooms. They particularly like the red yucca, lupine, buckwheat, autumn sage and penstemons. "Bees go crazy over any natives or aromatics that are blooming in my yard," she says. "I have bees from March until late November." Diana works to have it all fit together. She says, "When it does fit together, it feels good."

But Diana doesn't have to try too hard when it comes to daily maintenance. She waters maybe two to three times a month. The plants know how to live among the sagebrush and pebbled soil. She spends time in the garden because she likes to, not because it is a chore. "People ask me who my landscaper is" Diana says. But she doesn't have one. It is her hobby. It is a creative outlet. It is a way to get to know her neighbors. "My garden gives me a lot of happiness," she says with a grin.

Diana's yard in full bloom. Plants include lupine, California Poppy and Mojave Prickly Pear.

Genevieve Jessop Marsh

1 My Yard in the Sierra Nevada

Michelle Sweeney

If you are interested in how to do things, big and small, that can help your yard function in healthy connection with the Sierra Nevada, then this book is for you. This chapter is about how your yard is connected with Sierra Nevada:

- features
- water
- soil
- plants
- wildlife
- wildfire prevention

You may call the blue oak woodlands and chaparral of Jackson home. Perhaps the high desert sage of Bishop or the mixed conifers of Quincy surround you. Maybe you own a second home in Mammoth and retreat to the Jeffrey pines for that solace and calm that Sierra Nevada rural towns and scenery cultivate. Possibly the Modoc Plateau is your slice of heaven. This chapter highlights some of the unique characteristics of this amazing region.

Sierra Nevada features

The Sierra Nevada's glacier-carved profile, high peaks, deep canyons, stunning rivers and lakes and rich forests and woodlands provide inspiration and refuge. The Sierra Nevada is the longest unbroken mountain range in the lower forty-eight states and is considered by many to be a national and international treasure. The Sierra Nevada has more than five hundred peaks over 12,000 feet in elevation. Among them is the highest peak in the contiguous United States, Mount Whitney. The range stretches approximately 430 miles from north to south and nearly 70 miles in width in places. The range's 28,000 square miles include twenty-two counties in the states of California and Nevada. The north is bounded by Lake Almanor, where the granite batholith of the Sierra Nevada meets the active volcanic region of the Cascade Range. The southern Sierra Nevada boundary is marked by the Tehachapi and the Transverse ranges. The western slope becomes the Sierra Nevada foothills which flow to the alluvial plain of the Central Valley. The eastern slope drops dramatically to the Great Basin and range country of the Owens Valley, Mono Lake, Walker Lake, Carson and Truckee Rivers.

> "The Sierra Nevada has more than 500 peaks over 12,000 feet in elevation. Among them is the highest peak in the contiguous United States, Mount Whitney."

The Sierra Nevada is the boundary between the complex Mediterranean flora and fauna of the California ecoregion, the cold, dry, isolated ecoregion of the Great Basin and the hot dry southwestern deserts, making it a rich and complex place ecologically. The considerable latitudinal variation across the range also creates a large variety of ecological conditions and species. For any given latitude and elevation, local conditions of soils, slope, and aspect combine to create even greater variety. This proximity to diverse ecoregions contributes to the Sierra Nevada's richness in terms of biodiversity.

A Note on the Northern California Cascade—Modoc, Lassen and Shasta County

This book includes information useful for those living in the Northern California Cascade and Modoc Plateau regions. Maps in this book indicate the boundaries of the Sierra Nevada Conservancy which include Modoc, Lassen and Shasta county areas. Most of the tips and resources in this book are applicable to these areas. However, there are many unique characteristics of the volcanic and Great Basin ecoregions to discover in resources beyond *Sierra Nevada Yard and Garden*.

My yard and Sierra Nevada waters

The Sierra Nevada is home to 24 major river systems. There are over four thousand lakes, varying from depths of 2 feet, to Lake Tahoe at a depth of 1,685 feet (the largest alpine lake in North America). The major river systems carve mountains and provide water for drinking, fishing, swimming and habitat. Seventeen percent of plant species, twenty-one percent of vertebrate species and all aquatic species in the Sierra Nevada depend directly on habitat next to streams, lakes, and wetlands for survival.

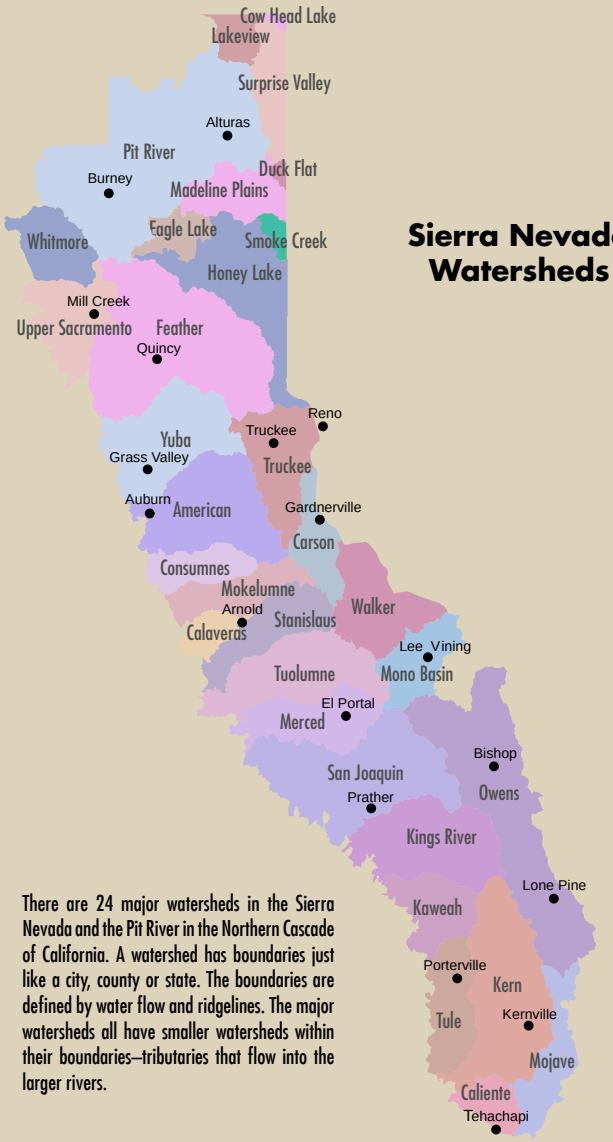
Two volunteers test water quality to ensure quality drinking water and habitat.

Sierra Nevada Watersheds

Western Slope:
Upper Sacramento
Feather
Yuba/Bear
American
Cosumnes
Mokelumne
Calaveras
Stanislaus
Tuolumne
Merced
San Joaquin
Kings
Kaweah
Tule
Kern
Caliente

Eastern Slope:
Eagle Lake
Honey Lake
Truckee
Carson
Walker
Mono Basin
Owens
Mojave

Northern Cascades:
Cow Head Lake
Lake View
Surprise Valley
Madeline Plains
Duck Flat
Pit River
Whitmore



There are 24 major watersheds in the Sierra Nevada and the Pit River in the Northern Cascade of California. A watershed has boundaries just like a city, county or state. The boundaries are defined by water flow and ridgelines. The major watersheds all have smaller watersheds within their boundaries–tributaries that flow into the larger rivers.

The Merced River

Healthy waters are the attraction for forty to fifty million visitors to the Sierra Nevada every year. Vibrant lakes, rivers and streams offer visitors fishing, boating and recreation opportunities. Tourism is the leading industry in the Sierra Nevada, and tourism is inspired in large part by the waters of the region.

The Stanislaus River

"Tourism is the leading industry in the Sierra Nevada, and tourism is inspired in large part by the waters of the region."

How does your yard connect to these Sierra Nevada waters? Your yard plays a role in water quality and water supply in your immediate vicinity and beyond. Sediments, nutrients and pesticides can originate from practices in yards and gardens and end up in rivers, lakes and streams. Water wise landscaping practices can play a large part in minimizing pollution levels. Sediment is a major pollutant in the Sierra Nevada—ending up in Sierra Nevada waters when soil is not properly anchored by vegetation, mulch or other measures. In a storm, bare soil can turn to muddy runoff and cause erosion. Pesticides and fertilizers are also major pollutants. Fifty percent of Sierra Nevada watersheds are affected by excess nutrients resulting from fertilizers washing from land to river, lake and stream. Nationally, over seventy million tons of fertilizer and pesticides are applied to lawns each year. Pesticides affect twenty-nine percent of Sierra Nevada waters.

Population growth and climate change are challenges to water supply systems. The population of the Sierra Nevada is projected to triple in the next twenty years. Climate change is projected to shrink the Sierra Nevada snowpack by twenty-five to forty percent by 2025 to 2050. What is ample water for Sierra Nevada communities today will need to support more people and be managed differently tomorrow. Water conservation is recommended as one significant strategy by the state of California to help ensure there is enough water for everyone in the future. More information on water conservation and minimizing water pollution is provided throughout this book in sections indicated by the water symbol.

Sprawl in El Dorado County

My yard and Sierra Nevada soils

Geologic history, starting two hundred million years ago, formed the soils present in Sierra Nevada yards today. Millions of years ago, the Farallon tectonic plate and the larger Pacific plate and the North American plate, began moving towards each other. The Farallon was forced under the North American plate. As the crust of the plate dove deep into the Earth's mantle, intense heat melted it. Over a period of three million years the molten rock cooled again and hardened into a solid mass called a batholith.

Then it was the Pacific plate's turn to interact with the North American plate. The northbound Pacific plate slid along the San Andreas fault at the edge of the North American plate. Rising heat pushed up the granite batholith. The rock riding the shoulders of the rising mass eroded, leaving the granite spires of the Sierra Nevada range. During the last ice age, numerous glaciers passed over the still-rising granite, sometimes scouring surfaces smooth, sometimes gouging wide valleys.

The far north of the Sierra Nevada was heavily assaulted by glaciers and thus the northern Sierra Nevada peaks only reach around 8,500 feet. Intense precipitation at the northern end of the range also contributed to greater erosion and lower elevation land forms in the north than what is found in the south. From Lake Tahoe south, Sierra Nevada peaks progressively get larger.

How does your yard connect to this rich geologic history? The soil types that now exist in the Sierra Nevada are derived from the granite and volcanic bedrock that geologic activity has provided over the centuries. You may have a mix of soil types in your yard. More information on soil types is provided in the Observe chapter. Soil serves many important functions, including storing and moving water toward streams, rivers and lakes. When water infiltrates into the soil, it helps plants grow. Soil provides nutrient cycling and water storage for healthy plants. But if soil is unprotected and mobilized it is a significant threat to water quality. For information provided throughout this book on the topic of soil, look for the soil symbol in each chapter.

A high Sierra lake late in the day.

My yard and Sierra Nevada plants

The Sierra Nevada is one of the most intact areas of native vegetation in the western United States. There are more native plant species in the Sierra Nevada than in the entire United States east of the Mississippi River. Over half of California's native plant species call the Sierra Nevada home. That translates to about three thousand five hundred native plant species, four hundred of which live exclusively in the Sierra Nevada and nowhere else in the world.

"There are more native plant species in the Sierra Nevada than in the entire United States east of the Mississippi River."

This book delineates Sierra Nevada zones along the length of the mountain range corresponding to elevation and microclimate (See Chapter 2, Observe). Some plants survive in one belt, others in many. Within each zone there are many niches, fostering variations in plant species. The niches are defined by things like streams, rock outcrops, sunny meadows, south facing slopes, and shady forests. There could be several niches within your yard.

Invasive species are an increasing issue in the Sierra Nevada. Invasive plants displace native plants and wildlife, increase wildfire and flood danger, consume valuable water, degrade recreational opportunities, and destroy productive range and timber lands. When plants that evolved in one region of the world are moved by humans to another region, a few of them flourish, crowding out native vegetation and the wildlife that feeds on it. These invasive plants have a competitive advantage because they are not controlled by natural predators, and can quickly spread out of control. In California, approximately three percent of the plant species growing in the wild are considered invasive, but they inhabit a much greater proportion of the landscape. Avoid planting invasive species. Removing invasive species helps protect the natural habitat of the Sierra Nevada. For information provided throughout this book on the topic of native, adapted and invasive species, look for the vegetation symbol.

How does your yard connect to the native vegetation? Purchasing native and adapted (non-invasive) plants can help provide habitat and minimize water use in the garden. While many Sierra Nevada native species are not cultivated in nurseries, the rising demand for native plants makes a number of them more widely available for purchase. Putting your purchasing power toward native species whenever possible helps the Sierra Nevada maintain its native plant habitats, and the riches associated with them.

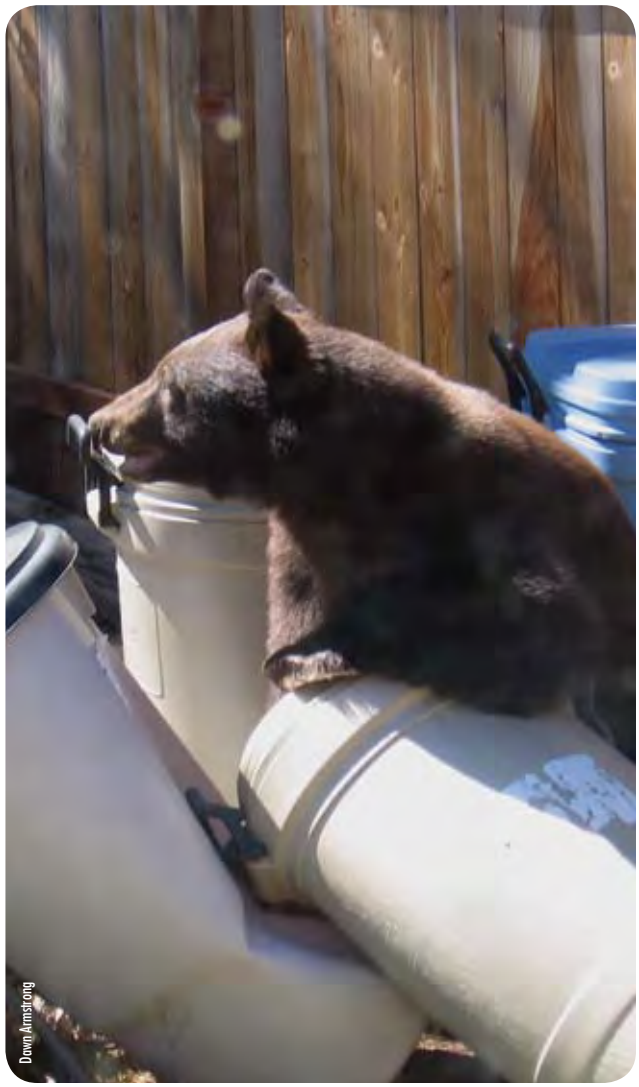
Aspens, native to the Sierra Nevada, provide both color and ease of maintenance.

My yard and Sierra Nevada wildlife

The Sierra Nevada is home to seven hundred twenty animal species. Four hundred of these are birds, mammals, reptiles and amphibians. It is estimated that thirteen of these species are found only in the Sierra Nevada. Forty native fish species call the Sierra Nevada home. Three hundred twenty-one types of aquatic insects live in and around Sierra Nevada waters. In other words, the Sierra Nevada is gifted with a great diversity of wildlife.

At the same time, sixty-nine plant and animal species in the Sierra Nevada are considered at risk by state or federal agencies, listing them as endangered, threatened, of "special concern", or "sensitive". It is estimated that only ten percent of the original Sierra Nevada native salmon population still exists. The Grizzly Bear, California Condor and Bell's vireo are extinct in the Sierra Nevada. In short, wildlife and the diversity of the Sierra Nevada today can not be taken for granted.

The way you manage your yard can help or hurt wildlife. On one hand, your outdoor space can provide support to wildlife. On the other hand, the way you manage your yard can present hazards to wildlife. Growing plants that attract butterflies is harmless and even beneficial. But inadvertently feeding a bear with your trash will likely lead to that bear's demise. As neighbors to wildlife, Sierra Nevada residents have the responsibility to be aware of the ramifications of their actions on wildlife. The sections of this book indicated by the wildlife symbol , provide initial considerations for those interested in the complex relationship between one's yard and garden and wildlife.



Bears are attracted to garbage, and once they find a source are likely to check back often.

A wildfire near June Lake

My yard and Sierra Nevada wildfire

Fire plays an integral role in the Sierra Nevada landscape. Before the arrival of Europeans, low-intensity ground fires were commonplace and rarely catastrophic. Several studies have shown that prior to 1875, Sierra Nevada fires occurred every eight to fifteen years in pine forest and every sixteen to thirty in wetter fir forests.

When fire was commonplace in the Sierra Nevada, forests, woodlands and chaparral areas looked quite different than they appear today. Forests were more open, with big, mature trees and carpets of grass and wildflowers, and much less woody brush and fewer small trees than are present today. In some cases, fire plays a specialized role in ensuring the health of Sierra Nevada ecosystems and even the survival of species. One example is the giant sequoia, which is the world's most massive living organism. Giant sequoias depend upon fire to release their seeds.

In 1905, fire suppression became the official policy of the Forest Service. In addition, most of the Sierra Nevada's national forests and private forestlands were clear cut regularly for decades. The results of a century of fire suppression and logging large, fire-resistant trees have been dramatic. Sierra Nevada forests and woodlands today are more crowded and shrubbier than those of the past. The likelihood of catastrophic fire has increased dramatically. Dense stands of young, small trees are very flammable. Accumulated brush and dead wood are also highly flammable. Taken together, small trees and brush and dead wood form a "ladder" that allows fire to climb from the ground into the canopy and spread quickly from tree to tree.

How does your yard connect to Sierra Nevada wildfire? The question is not *if* a fire will likely come to your neighborhood, but *when* it will come to your neighborhood. Making today's forest healthier and less prone to catastrophic fire usually involves removing brush and clumped small trees, in conjunction with prescribed burning on public lands. These actions are taken on a large scale. Actions are also taken by individual property owners.

Good defensible space acts as a line of defense for your property when wildfire roars into your community. There is no guarantee of immunity from a wildfire, but defensible space measures have proven to reduce or minimize property loss in some cases. Measures like trimming low branches of trees, keeping a Lean, Clean and Green zone within 30 feet of the house and storing wood away from the house can help minimize the risk of fire damage. Look for the fire symbol for defensible space measures in this book.

Feature:

Brad Carter • Grass Valley, California

Sierra Nevada zone: Lower montane
Conservancy sub-region: Central
Elevation: 2,500 feet
Watershed: Yuba
Focus: Water use, native plants, fire
Yard size: 2 acres
Favorite resource: Horticulturalist training

Solomon Henson

Brad Carter and his dog, Shadow, relax in his garden. Many of the plants are cultivated from gathered seeds.

Brad started gardening in wet places—places like Florida. He grew a whole garden of epiphytes, the plants that live on trees without typical roots and depend on air moisture rather than the soil. He also grew begonias, gingers, and other bright, yawning tropical flowers. If an infestation moved into the garden, he brought out a pesticide and killed it. When he moved to the Sierra Nevada his water well and fifty-gallon holding tank were unable to supply enough water for his past garden favorites. With two acres to fill (once he removed a great deal of fire-friendly Manzanita) the challenge of limited water changed the way he gardens.

Brad was working on a book on native California bulbs when he moved to Grass Valley. His research took him on long walks into the mountains and natural areas across California. As he started to explore his new home in the Sierra Nevada, he collected seed from his favorite plants, shrubs, and trees. Through these walks his garden began to take shape.

Joe Gillent

A section of Brad's native plant garden.

The seeds that he collected on his research walks were ready to grow in the sandy soil where he planted them. Because they hailed from a similar climate, they did not need much watering or fertilizer to grow. He also became very active in the local native plant society and bought plants from their annual sale. Some of his favorites include the yellow-flowered Shasta sulfur, eriogonum umbellatum, and the creeping mahonia, mahonia repens, that blooms simultaneously with his dark star *Ceanothus*—resulting in a contrast of yellow and dark purple. He has also cultivated a native dogwood from seed that has grown slowly but surely. He hopes to see it one day bloom. He also hopes that someday his canyon snow Douglas irises will cover the hillside with their white blooms like a big summer snow drift.

His garden is on drip line irrigation. Each plant has its own spray head or water emitter. This way the plant gets its water and none is wasted on bare dirt or concrete. He spreads mulch between the plants to hinder water from evaporating and keep the soil nutrient rich.

In addition to learning how to drastically reduce his water use, Brad also learned how to live with wildlife—specifically deer and rabbits. In Brad's experience, "As soon as you plant, the rabbits or deer will eat." Brad's first fence, a plastic deer fence, was quickly chewed through by the rabbits. So he added a metal one. He left about

Brad built this pathway himself over three summers, using more than sixty tons of rock. Not only does it provide a great tour around the garden, but also a firebreak.

a quarter acre unfenced, creating a corridor for wildlife. He considers putting up an owl nesting box to help with the voles that excavate his soil. He gets many visits from other wildlife. Birds and butterflies love the flowering natives, and the moths pollinate his evening primrose. He is especially happy to find a garter snake in his yard, for "they are rare and a visit should be taken as a compliment."

"Part of the pleasure of gardening is trying different things and making little discoveries," he says. Brad cannot stop tinkering in his garden, forever adding to his list of projects to try: an owl box, a rainwater catchment system, a new garden bed. "There is a personal satisfaction from the fact that I built this garden," he says. "And it feels good that I don't run for the pesticide and that I use water minimally."

Stephen Ingram

2 Observe

Observation is entertaining, fun and informative. Observe your Sierra Nevada yard and the surrounding neighborhood and wildlands to acquire knowledge for garden success. In your own backyard, observe how water, soil, vegetation, climate and wildlife interact. Your discoveries will not only inform your garden ventures, but will also make hikes and excursions beyond your neighborhood intriguing in new ways.

There is great opportunity to cultivate a beautiful and unique outdoor space reflecting and complementing the naturally-occurring features of your Sierra Nevada region. Look for plant communities that catch your eye and interest while on walks in the undeveloped wildlands in your area. Extending elements of these natural environments into your backyard can help maintain the ecological integrity of the Sierra Nevada range.

"There is great opportunity to cultivate a beautiful and unique outdoor space…"

If you are in a rush to make your design decisions for your yard then brief observation will do, but do not underestimate the pleasure and rewards of long-term observation. Spend time observing the patterns that shift with the seasons. If you have the opportunity, take a year to watch closely and record the nuances of your yard with the passing days. This full-cycle observation can help you clarify what you actually want from your outdoor space and check whether what you want is feasible. Start your yard or garden project with observation for long-term success.

Enjoy the exploration.

Opposite page: California poppy.

Observe

Michelle Sweeney

Contents

Get to know your outdoor space 25

Water 29

Water, shade, heat and evaporation 29
Trees and moisture 29
Water and slope 30

Soil 31

Soil types 31
Soil and drainage 32
Dry soils 32
Soil pH 33
Soil erosion 34
Soil compaction 35

Vegetation 36

Observe plants in your yard 36
Observe plants in your area 36
The role of vegetation in your yard 36
Existing vegetation health evaluation 37
Vegetation, water and soil relationships 39
Invasive weeds 39

Sierra Nevada zones & plant communities 42

Sierra Nevada zones 42
Sierra Nevada plant communities 45
Sampling of Sierra Nevada zones and plant communities combined 47

Wildlife 52

Backyard wildlife survey 52
People and wildlife relationships 54
Wildlife habitat requirements 54

Gauging wildfire risk 55

Defensible space 56
Island approach to design 57

Michelle Sweeney

Get to know your outdoor space

Getting to know your yard—its features and nuances—helps you create and maintain the outdoor space you desire. Observing your outdoor space helps you:

- Get to know your yard's natural assets, the things it is capable of and the ways in which it may need your help
- Think about what you want from your outdoor space—how you currently utilize it compared to how you would like to use it
- Understand the features that will help you use your yard in the way you desire
- Assess how much time, energy and money it will take to realize and maintain the outdoor space that you desire and,
- Work with the opportunities and nuances of gardening in the Sierra Nevada.

Your observation can include noting: regional climate patterns, microclimate patterns, and the topography, soil and natural features of your outdoor space. Talking to other neighborhood gardeners and local gardening experts is a great way to learn about your space.

Feature: Valerie & Michael Nellor • Quincy, California

Sierra Nevada zone: Lower montane
Conservancy sub-region: North Central
Elevation: 3,432 feet
Watershed: Feather River
Focus: Featuring references to local places and things, minimum maintenance
Favorite resource: Creativity and a good antique store

Valerie and Michael Nellor

Valerie and Michael Nellor run Ada's Place—a beautiful set of cottages for visitors to Plumas County. Their creativity is evident in every facet of these cottages and gardens dispersed on their quiet block in the downtown Quincy neighborhood. The unique décor of each cottage segways easily into the landscape just outside the door: the quiet trickle of water flowing into a pond graces one patio, while a deck at the next cottage offers a seductive array of shady and sunny places to just relax on a sunny day.

"Oh yes! We have learned and evolved around here," Valerie says emphatically as she stands up from weeding a planting bed. "When we plant a garden and set up a landscape these days, we go about it very differently than we did with our first gardens years ago. Now we start a project by thinking about maintenance and sustainability. We ask ourselves, 'How can we be water efficient?' or 'How much time will we have to maintain this?' Then we make it fun and inviting."

Valerie and Michael's creativity is evident everywhere on the site. Places to relax, nestled in among well-selected trees and flowers, invite visitors to sit and take in the eclectic collection of art and gadgets that hint at the cultural past of Plumas County. An Old Home bread box sits beside a 1930s cabinet on a porch. A bed of perfect tulips blossoms in the foreground of a wall proudly bearing a 1950s movie poster.

"We love to incorporate things that we find—little treasures—into the place," says Valerie. "These are what give a space a unique look and feel. Plus, we're recycling as we do it. One person's old stuff can be the next person's art if the item is fixed up and put in the right setting. You have to be tasteful and selective…" The art—a statue here, a fountain there, a lantern in just the right spot—graces the garden just as it does the interior of the cottages.

"When we started out we planted a lawn and dense perennial beds. Our newer landscapes use much less water and take a lot less work but get just as many compliments," says Michael. Valerie adds, "We use mulch and drip irrigation diligently. We intersperse potted plants onto decks for color and we plant for shade in the summer months and sunlight in the winter months. We are always learning, observing, trying to make the best use of our time and create spaces that our guests enjoy inhabiting. That way they want to return again and again."

A few flower heads bob at the corners of Valerie and Michael's porch.

As if they were in the middle of the woods—Valerie and Michael's native plants flourish in their yard with little maintenance.

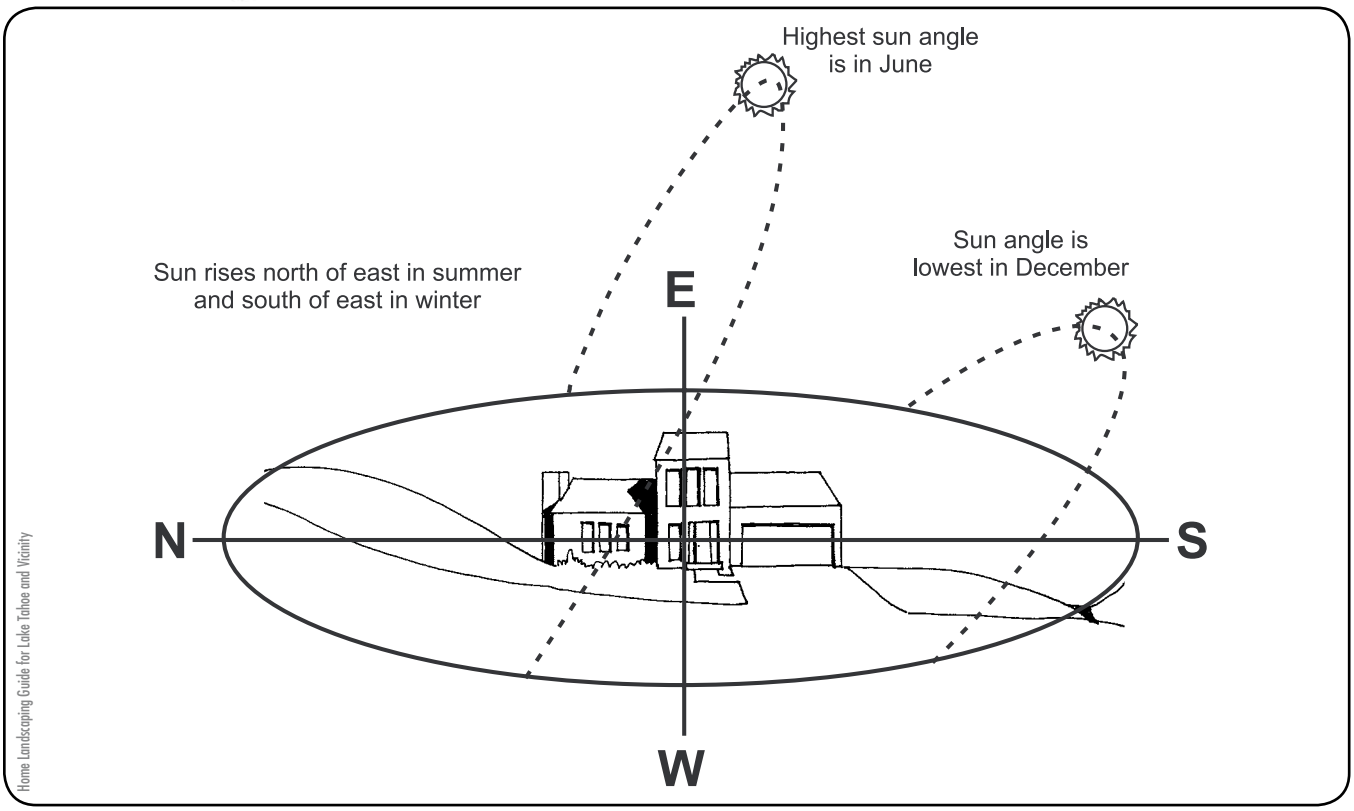
Microclimate—weather on a personal scale

The interaction of water, soil, temperature, wind, sun and slope creates microclimates—areas with their own unique climatic conditions. These areas may be as small as a few square feet. For example, a flat, raised planting bed in full sunlight may have climate and soil conditions different from shady, irrigated grass just a few feet away. Observe your yard for evidence of the microclimate conditions present. The following sections can help you identify some of the nuances of the weather, water, soil, sun and slope conditions in your yard. This will help when you are making decisions about what to plant, where, and when.

There can be an array of microclimate conditions in one yard and knowledge of these is an important planning tool. Topography and slope play a major role in determining microclimate. Winter temperatures in a valley or on a north-facing slope will be significantly colder than temperatures on adjacent hills or south-facing slopes for example. A yard with little sun exposure in the winter due to slope and vegetation may be fully and directly exposed to summer sun rays. Landforms affect microclimate. For example, as elevation increases, precipitation generally increases. Wind exposure is greater on ridges and exposed areas than on unexposed areas. The nuances of microclimate can affect the success or failure of a plant or modify its sun or shade needs. The microclimate features of your site are also something you may want to mitigate through design of features that add shade or sun to particular areas.

General regional climatic information is provided in the Sierra Nevada zones table later in this chapter. This information provides context for your yard. It is particularly useful to note when the first and last frosts occur, when the first snow generally falls and when to anticipate wet and dry season transitions particular to your altitude and location.

Observing the microclimate and habitat where a plant grows tells you what other types of plants might thrive there, and can give insight into how habitat modification might affect the vegetative composition of the area. Are there areas in your yard that support more vegetation than others? Is there something unique about these areas? Is there more shade or sun, more water available, less wind? Indicate the particular microclimate assets of these areas in your Yard & Garden journal.



The south and west sides of your house generally create warm microclimates because of greater sun exposure.

Water

Knowing how much water is present in your yard, and when, can help you:

- Choose vegetation that can do well
- Know when to plant
- Figure out where to plant
- Calculate your water supply design needs
- Determine whether your yard needs erosion controlling measures and
- Make your garden grow.

Precipitation

One example of a rain gauge.

Average annual precipitation amounts are provided in the Sierra Nevada zones table later in this chapter. Do you get more or less precipitation than is accounted for in this average? One way to tell is to place rain gauges at a couple of locations around your yard. Rain gauges are transparent tubes, usually made of plastic, with liquid measure markings on the side. These are available at most garden or hardware stores. You can also make your own using any receptacle that gives you an accurate measure of the water contained inside. Whenever there is a precipitation event, check the gauges and note how much rain you received in a log in your Yard & Garden journal.

Application

You can use the same rain gauges to measure the amount of water applied to your yard through irrigation. Place a rain gauge at regular intervals outward from the sprinkler and see how long it takes to fill the gauge with one inch of water.

Water, shade, heat and evaporation

The hotter the air, the faster water evaporates. Sunny grass and planting bed areas are hotter than semi-shady ones and lose more water to evaporation. An area that is beside a west-facing wall experiences more heat, and therefore more evaporation, than most other areas in a yard. In high altitudes, snow evaporates from these types of areas before others, making them good for spring blooms. However, during the height of the summer these areas will require significant irrigation if shade is not made available. Also, any area of the yard that is exposed to wind will have accelerated evaporation. Wind carries off moist air, causing plants to transpire water at a higher rate. More water evaporates into dry air than into humid air. Meanwhile, soil's ability to hold water can vary by more than fifty percent depending on the soil type and location.

Sierra Note: The Sierra Nevada is basically an arid environment and as elevation increases moisture in the air decreases.

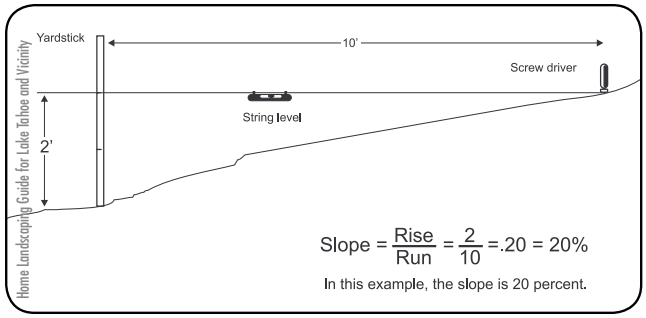
Trees and moisture

The effect of rain shadows may drastically alter the amount of water that different areas of your yard receive. Rain shadows occur in areas that are protected from the prevailing winds by structures or vegetation. These areas may receive less moisture than other areas. While trees may block wind-driven rain, sometimes the tree canopy holds moisture and delivers it to the soil over a different time span than a passing storm. Soils underneath trees often retain humidity much longer than soils exposed to sun and wind.

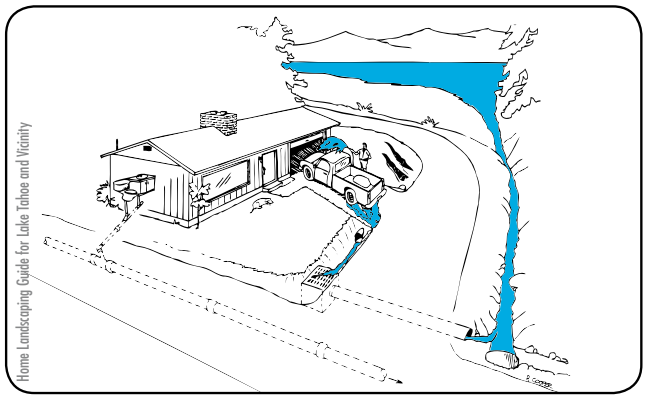
Water and slope

Hills and slopes vary from flat landscapes in their orientation to the sun and the wind, and therefore their water-holding capacity is something to observe closely. Cool air is heavier than warm air, so slopes tend to be cooler at the bottom and to collect cold air at night. These temperature gradients affect the amount of moisture available to vegetation at the top and bottom of a slope. Additionally, as water flows downhill, the top of a hill drains quickly and the bottom collects the water. If the same amount of water is applied to plants at the top of a hill as at the bottom, the plants at the top are likely not getting enough water, and those at the bottom are getting too much. Observe the slopes in your yard to evaluate the water dynamics that occur there.

Sierra Note: The pattern of water flowing from the top of the Sierra Nevada crest down to the major river systems defines the boundaries of the twenty-four major watersheds of the Sierra Nevada range. Your yard is an important component of one of these watershed systems.

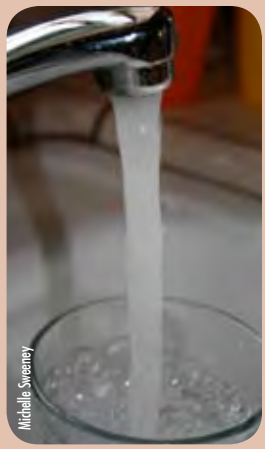


Measure the slope at various points on your property by using a ten-foot string and a yard stick.



Your yard connects to Sierra Nevada streams, rivers and lakes via the runoff that is carried into these waterways. Unlike household wastewater, water from your yard and garden is not treated. It goes directly into the nearest stream, lake or groundwater.

Where does your drinking water come from?


Michelle Sweeney

It may be that your yard is part of the supply network for your home water supply. If this is the case, the way you manage your yard can influence the cost of your drinking water supply. Water falls as precipitation, travels over ground or through the ground to wells, aquifers, streams and lakes. The water that ends up in your domestic supply is treated and supplied to homes as drinking water. Chemicals (from neighborhood waste, over-fertilizing etc.) and sediments (from erosion and bad management practices) contaminate drinking water and add to the cost of treating and cleaning the water to meet drinking water standards. If your water comes from a well that you are responsible for managing you are probably already familiar with the connectivity of your yard to your water supply. If your water is supplied by a municipal source, inquire with your drinking water supplier about the following topics to inform your garden and yard design decisions vis-à-vis your water supply.

- Ask whether your municipal source comes from ground or surface water.
- Inquire about whether there are septic systems within the supply area of your water source.
- Ask whether management practices in the supply watershed affect the amount, and cost of treating the water.
- Ask whether there are things residents can do in their landscaping to make supplying water less costly.

Soil

Soil is the medium for plant growth and as such, it is the foundation of your landscape. Soil holds water and nutrients, infiltrates water, cycles and delivers nutrients and recycles organic matter. Being knowledgeable about your soil can help you:

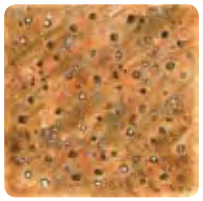
- Keep water in your yard longer
- Reduce flood danger
- Improve wildlife habitat and
- Help your garden excel and your vegetable garden grow more food.

Observation of soil (and of erosion and compaction patterns) over time, provides quality information on which to base your yard and garden design decisions. Understanding your soil is important to achieving your yard and garden goals and to being able to make adjustments when things do not go as planned. Take notes on the things you observe about your yard as you go through the guided observation in this section. These notes fit nicely into your Yard & Garden journal.

Soil types

Sandy soils contain lots of air and drain well. Sand particles can be very fine, medium or coarse in texture and size. The amount of soluble nutrients in sandy soils is lower than in clay soils, which means that sandy soils need watering and feeding more often. Sandy soils warm relatively quickly in the spring, but also dry out easily in the summer.

Sandy soils



Fine sand
Up to 1/250 inch

Medium sand
Up to 1/50 inch

Coarsest sand
1/12 inch

Loam soils contain a balance of all three particle types—clay, silt and sand—and are considered the best soil for gardens. Loam drains well but does not dry out too fast. It loses nutrients at a moderate rate and contains air for healthy root growth.

Clay soils are composed of flattened microscopic particles that pack closely together. These soils hold the greatest volume of nutrients of the three soil types. Drainage is slow in clay soils—they retain water longer and the loss of soluble nutrients is slow. Clay soils are slow to warm in spring.

Clay soils

Clay
Less than 1/12,500 inch

Silt
Up to 1/500 inch

What type of soil is in your yard?

Given the descriptions above, do you have?

- ☐ Sandy soil
  - Fine texture
  - Medium texture
  - Coarse texture

Or

- ☐ Loam soil
- ☐ Clay soil
- ☐ Silt soil

You may have a combination of the above. Write down your findings in your Yard & Garden journal.

Soil and drainage

Most Sierra Nevada yards are covered with a relatively thin layer of topsoil of moderate to good quality. Beneath topsoil lies a layer of subsoil that is generally low in nutrients. In the Sierra Nevada, the subsoil is most commonly sandy. This means it drains well, but maybe too well to hold much moisture. In some cases, topsoil is directly on top of impervious rock. This can be the cause of major drainage problems. If this is the case in your yard, you may want to seek professional landscaping advice or assistance. Adding water to problem locations only worsens the situation.

"Soil texture determines the potential infiltration and drainage capability of the soil as well as its overall stability."

Soil origins

Soil forms from different parent materials. In the Sierra Nevada, the parent material is composed of granite, volcanic, sedimentary or metamorphic material. The type of parent material will have a large influence on the texture of soil in your yard. Soil texture determines the potential infiltration and drainage capability of the soil as well as its overall stability. For instance, granites drain well, but are nutrient poor and prone to erosion. Meanwhile, volcanic soils tend to be more stable, hold more water and contain more nutrients.

Parent Material Type	Nutrients	Resistance to erosion	Water holding capacity	Prone to compaction
Granitic	Low	Light precipitation: high Moderate to heavy precipitation: low	Low	No
Volcanic	Med to high	Moderate	High	Yes, when wet
Metamorphic	High	Moderate	High	Yes, when wet
River deposits	High	Moderate	High	Yes

Sierra Note: Soil quality for growing generally decreases as altitude increases in the Sierra Nevada.

Dry soils

Observe whether soil type is uniform or varies in its water-holding capacity across your yard. During summer months, sandy soil, exposed to dry wind and sun can become so dry that it repels water. Experiment with small areas of your yard where you suspect this could occur.

Observing absorption versus evaporation on dry summer days

Apply approximately 1 gallon of water to soil and check to see whether that water disappears within a 15 to 30 minute interval due to absorption by the soil or due to evaporation. Digging an inch into the soil thirty minutes after application of the water shows whether the water actually enters the soil at all or simply pools and evaporates under dry conditions. Test this in different locations in your yard. Indicate variability in soil water holding capacity in your Yard & Garden journal as it is relevant.

Testing soil drainage

On a day when the soil is relatively dry, dig a hole about a foot deep and a foot across. Pour a bucket of water into the hole and watch what the water does.

- If the water drains out almost as fast as you can pour it in, your subsoil is probably sandy and drains too well to support vegetation with high water needs.
- If the hole fills with water, then drains within a few minutes, you have good drainage.
- If the water just sits there, you have poor drainage. Improving the soil with soil amendments may help, or you may want to consider installing raised beds filled with good topsoil for specific plantings.

Testing soil drainage.

Soil pH

Soil pH is a measure of how soil ranges from acid through neutral to alkaline. This characteristic is stated as a pH number. Soil with a pH of 7 is neutral—neither acid nor alkaline. A pH below 7 indicates acidity, while one above 7 indicates alkalinity. If the pH is extreme in either direction, key nutrients are chemically bound in the soil and not available to plant roots. The closer to neutral your soil, the better most plants will grow.

pH Diagram

```
                    - IDEAL +
0————————————— 7 —————————————+14
<7 Acidic          Neutral          >7 Alkaline
```

Testing soil pH

Many University Extension Services provide at least a soil pH or acidity test and some conduct a full analysis. The full analysis will outline not only acidity levels, but also the organic matter content, type of mineral matter (sand, clay, etc), and nutrient load. When requesting a soil analysis you want to:

- Collect samples from several locations around your yard. Place each sample in a separate plastic bag.
- Collect soil to a depth of about twelve inches into a sealable plastic bag, amounting to one to two cups total, per sample.
- Include written specifications to the testing service including:
  - Intended use of the yard
  - Types of vegetation you intend to establish
  - Request for amendment and fertilizer recommendations—specifically those that are organic in origin and not chemically based.

Most services provide recommendations for amendments for structure improvement—the balance of air, water, organic and mineral components—and fertilizers for nutrient supply. Plan ahead. Testing services can take two to six weeks to reply. There is generally a reasonable fee applied. While the initial cost of a soil test may seem expensive, if you are about to make a long term investment in your yard, it is a small price and may make all the difference in your level of success.

Michelle Sweeney

Resource: Soil testing services

UC Davis surveyed soil testing companies and provided the following list of California companies. Contact them for specific prices and details. Peaceful Valley Farm Supply is the only company that both focuses on organic and is focused within the Sierra Nevada.

If you would really like to dig deeper into soil testing, contact the National Sustainable Agriculture Information Service. Their website is: www.attra.org/attra-pub/soil-lab.html

Peaceful Valley Farm Supply
P.O. Box 2209
Grass Valley, CA 95945
888.784.1722
916.272.4769
916.272.4794 Fax
www.groworganic.com

Western Agricultural Laboratories
1311 Woodland Avenue Suite 1
Modesto, CA 95351
www.al-labs-west.com
Telephone: 209.529.4080
Facsimile: 209.529.4736

Soil and Plant Labs Inc.
PO Box 153, Santa Clara, CA 95052-0153
352 Mathew Street, Santa Clara, CA 95050
www.soilandplantlaboratory.com
Telephone: 408.727.0330
Facsimile: 408.727.5125

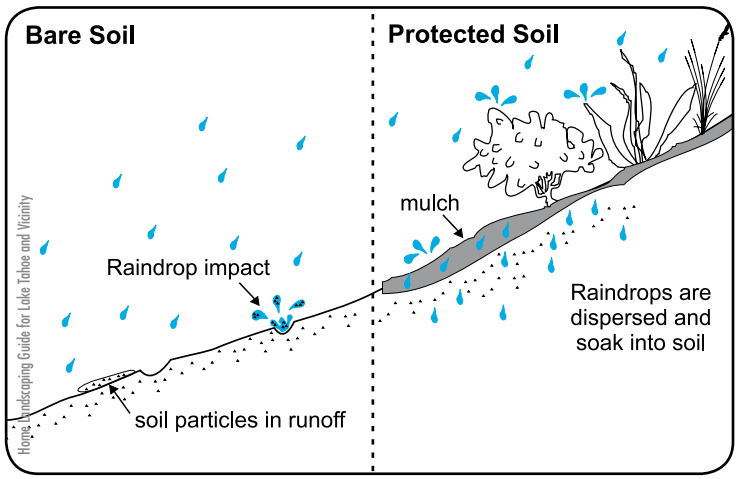
JMLord, Inc.
267 N. Fulton St.
Fresno, CA 93701
www.jmlordinc.com
Telephone: 559.268.9755
Facsimile: 559.486.6504

Monarch Laboratory
563 E. Lindo
Chico, CA 95926
www.monarchlaboratory.com
Telephone 530.343.5818

Wallace Laboratories
365 Coral Circle
El Segundo, CA 90245
www.bettersoils.com
Telephone: 310.615.0116
Facsimile: 310.640.6863

Soil erosion

Helping soil stay put is one of the most important things you can do for your yard or garden project. Soil erosion occurs as soil is carried away by water, wind or other means. Erosion removes the organic matter that your yard needs in order to sustain vegetation. Erosion may not always be obvious. Consider that low areas and swales (vegetated or unvegetated ditches typically found alongside roads) provide natural flow paths for water, and therefore are likely to show signs of erosion. Gullies, rills and dirty water are signs of erosion. As valuable topsoil is often the first victim of erosion, preventing erosion is one of the most important things you can do for your garden. Since soil is the foundation of your landscape, keeping soil in place is more cost effective than trying to replace or recover it.



Prevent "raindrop impact" from washing away your topsoil. Cover the ground with pine needles, mulch, grasses or shrubs.

Soil compaction

Compacted soil is very difficult to grow things in. Compaction occurs when soil is stepped on or traveled over by any means. Soil compacts more when it contains moisture. The more clay a soil contains, the more easily it compacts. A simple test for soil compaction is to dig a hole. If it is difficult to drive the shovel more than an inch or two, you may have compacted soil.

Soil compaction

Runoff cuts side yard channel

On the lookout for soil erosion and compaction

- Observe where there are areas of your yard that have become unintended paths for travel.
- Observe unpaved parking or driving space.
- Observe areas where there are gullies or rills.
- Observe areas where dirty water pools on or flows from your yard.

Jot down your observations as a rough sketch or in a few words.

Sierra Note: Use of natural areas and areas under restoration is discouraged during spring snowmelt because this is the time when the soils are most vulnerable to erosion and compaction. Significant soil compaction can occur with the first pass of a foot, hoof or bike wheel, not to mention a vehicle wheel.

Understanding source and composition of your soil

Take a look at the color and features of the soil in a nearby wildland or undisturbed area such as a forest, oak woodland, savannah etc. This observation will help you determine whether the soil on your yard is native to the area or has been imported. In some housing developments soils are imported wholesale from distant locations resulting in an entire neighborhood with soils that are not native to the area. In other cases, previous owners of your yard may have imported soils or amended soils so that they differ significantly from surrounding soils. Understanding the source and composition of your soil is important to yard and garden success.

Take care of your soil. Soil delivers essential nutrients to your plants over time. By supporting plants, soil holds fragile ecosystems together. Your soil also provides a tremendous service by cycling carbon and nitrogen and recycling dead organic matter. Gardens depend on soil, and the health of the soil in your yard depends on your landscape management decisions.

A wildflower meadow is a classic characteristic of the Sierra Nevada

Vegetation

John Muir Laws ©2007, used with permission.
White diffusa phlox

Observe plants in your yard

Observe plants and plant communities both inside your yard and in your Sierra Nevada region. Evaluate plant, shrub and tree health in your yard and look for examples of adaptation to microclimate conditions. Your existing vegetation provides insight essential to making the best design decisions for your yard. Observe plants in your yard in order to:

- Figure out where to plant, what to plant and when to plant it
- Calculate what elements of your current environment may need to be changed or supplemented in order to support healthy vegetation
- Evaluate what variations in your garden layout can reduce your fire vulnerability
- Understand how much effort will be required to realize your garden ambitions.

Observe plants in your area

Explore the open wildlands in your area of the Sierra Nevada. In particular, look to identify the naturally-occurring plant communities. Forest, woodland, grassland, riparian and meadow communities all have unique distinguishing features. Some of these features are appropriate to replicate in the yard setting. Extending features of a nearby plant community into your yard cultivates understanding and respect for the intricacies of the Sierra Nevada, celebrates place and challenges you to meet the high standards of the natural environment. Observe plants and plant communities in your area in order to:

- Learn about the dynamics and features of the plant communities that naturally occur in your climate, soil, altitude and environmental conditions
- Determine whether you can succeed in replicating appropriate elements of natural plant communities—such as a forest, woodland, grassland, riparian or wetland—in your yard
- Be informed about the microclimate requirements and contributions of different plant communities
- Choose plants that can do well in your yard.

"Explore the open wildlands in your area of the Sierra Nevada."

The role of vegetation in your yard

The trees, shrubs, plants, flowers and grasses present in your yard largely determine whether outdoor experiences in your yard are pleasant and inviting or uncomfortable and unappealing. Vegetation plays an important role in controlling heat, sun and wind and is also a major factor in what birds, insects and animals visit your yard. In short, your outdoor space is your habitat, as well as the habitat of the birds, butterflies and other wildlife you share it with. Keep in mind too that vegetation plays a role in maintaining soil integrity. Using plants and mulches prevents soil erosion and contributes to the long-term health and resilience of your garden. Paying attention to the health of your vegetation is a natural part of good house/habitat keeping. Well-kept outdoor space, designed to meet your needs, can have a great affect on your quality of life.

"Using plants and mulches prevents soil erosion and contributes to the long-term health and resilience of your garden."

Eastern Sierra lupine and mule's ear

Quincy garden at Ada's Place

Existing vegetation health evaluation

The architecture of vegetation is defined by the size of plants present, the growth forms of plants (tree, shrub, herb), and the leaf traits (evergreen or deciduous, needle-like or broadleaf). Sketching out the placement and identifying types of existing vegetation in your yard can give you a new appreciation for the architecture of your outdoor space. To get started, take a tour of your yard with a pencil and paper in hand. In a quick sketch of your yard indicate what kinds of vegetation are found, and where. Next, rate the vegetation areas generally as either healthy or unhealthy.

Evaluating microclimate and habitat

To draw a quick sketch of your existing vegetation you want:

- Pen or pencil
- Sheet of paper
- Clipboard or stiff surface for your paper so you can walk and draw

Draw perimeters of existing gardening areas, wild or open space areas and play areas in your yard. Indicate where trees and shrubs are present and whether they are deciduous or evergreen. In gardening areas, indicate characteristics of the existing vegetation. The following considerations may help refine your understanding of your yard:

- Indicate where there are perennials, annuals, shrubs, trees, etc.
- Indicate high/medium/low abundance of vegetation.
- Indicate vegetation density.
- Indicate average heights of the vegetation in different areas of the yard.

Microclimate evaluation

Indicate your sun and wind exposures:

- Sun
  - Morning sun, afternoon shade
  - Afternoon sun/morning shade
  - Deep shade areas
- Wind
  - All day
  - Protected from wind
  - Occasional wind

Plant habitat evaluation

Plants thrive in the habitats where their needs are met. A plant that is in its natural habitat requires significantly less care than a plant in a habitat that does not meet its needs. The plant distribution in your yard depends greatly on soil type, sun exposure, elevation and patterns of precipitation and temperature.

Clues that plant features provide about the habitat provided by your yard:

- Large leaf structure may indicate that water is plentiful and sun exposure is moderate to shady.
- Small leaf structure may indicate that water is scarce and sun intense.
- Leaf abrasions may indicate a lot of disturbance by animals or people.
- If your plants are different from the naturally-occurring ones in nearby wildland areas look into whether your plants are native or non-native species and whether they are invasive species (see the Invasive weeds section later in this chapter).

Plant health evaluation:

To evaluate whether vegetation is healthy or unhealthy, look for signs of disease or weakness in the trees and plants. Indicate where there are trees showing signs of parasites or disease. Trees with health problems are generally less robust and have less foliage than healthy trees. Likewise, with vegetation other than trees, indicate signs of attack by parasites or pests, wilting etc. For further information on plant health and signs of sickness see Integrated Pest Management in the Yard and Garden How-To chapter of this book.

Look at the plants in your yard to see whether there are signs of disease or attack by parasites. Catching plant health problems early, and addressing their root causes, gives you the best opportunity to halt their progression in your yard.

Redbud tree in the northern Sierra Nevada

Vegetation, water and soil relationships

Observing your naturally-occurring vegetation can give you clues about water and soil that may not be apparent in the season or particular moment of your observation. For example, there may be an area of dry soil that has abundant vegetation growing in it. This is an indication that the soil is not always as dry as what you are seeing. Figure out when water is present in that space, how much is available, and where the water is coming from. This knowledge will be useful as you go on to design that space or the areas around it. Likewise, naturally-occurring vegetation can reveal soils rich with the nutrients that plants need. Absence of any naturally-occurring vegetation might give you pause if you would like to grow something in a space. Ask yourself:

- Why are there no plants here now?
- What will it take to make this environment a better habitat for vegetation?
- What kinds of vegetation can survive despite the challenges this environment poses?

Invasive weeds

Just as weeds in your garden can choke out your vegetables and flowers, weeds in the wild choke out native plants, drastically reducing the ecological stability of wild habitats. Weeds in the Sierra Nevada get a foothold primarily by means of transport from domestic yards where they are intentionally planted. Your yard can be the source of significant ecological damage to surrounding areas if a weed escapes. Eighty-five million dollars is invested per year on weed abatement in California, but barely stems the tide of invasive weeds.

"Millions of dollars are invested in weed abatement per year on a state-by-state basis but this barely stems the tide of invasive weeds."

When observing your yard, look out for the invasive weed species identified on the following pages. If you find any of these species please eradicate them as soon as possible.

Resource: Invasive plant species in the Sierra Nevada

Weeds in your yard and weeds in the Sierra

Unwanted plants in your garden are weeds. The very name suggests an unwelcome visitor. Just as weeds in your garden can choke out your vegetables and flowers, weeds in the wild drastically reduce the value of habitats. Please search your yard for the plants listed on this page. If you find any of these species please eradicate them as soon as possible. To learn more about weeds and see photos of each of the plants listed go to the Cal IPC website. This website also offers excellent alternative plant suggestions.

Invasive plants that threaten the Sierra Nevada. The worst of the worst are in red.
Source: *California Invasive Plant Council 2007 Invasive Plant Inventory*

Common Name	Scientific Name
giant reed	*Arundo donax*
scarlet wisteria	*Sesbania punicea*
English Ivy	*Hedera helix*
Pampasgrass	*Cortaderia selloana*
yellow starthistle	*Centaurea solstitialis*
Scotch broom	*Cytisus scoparius*
Chinese tallow tree	*Sapium sebiferum*
Eurasian watermilfoil	*Myriophyllum spicatum*
saltcedar, tamarisk	*Tamarix ramosissima*
tree-of-heaven	*Ailanthus altissima*
red brome	*Bromus madritensis ssp. Rubens*
spotted knapweed	*Centaurea maculosa*
hydrilla	*Hydrilla verticillata*
perennial pepperweed or tall whitetop	*Lepidium latifolium*
Brazillian egeria	*Egeria densa*
leafy spurge	*Euphorbia esula*
fennel	*Foeniculum vulgare*
creeping water-primrose	*Ludwigia peploides*
purple loosestrife	*Lythrum salicaria*
Scotch thistle	*Onopordum acanthium*
Himalaya blackberry	*Rubus armeniacus*
medusahead	*Taeniatherum caput-medusae*
gorse	*Ulex europaeus*
annual false-brome, false brome, purple false broom, stiff brome	*Brachypodium distachyon*
yellow toadflax, butter and eggs	*Linaria vulgaris*
Russian knapweed	*Acroptilon repens*
ox-eye daisy	*Leucanthemum vulgare*
Dalmation toadflax	*Linaria genistifolia ssp. dalmatica*
crimson fountaingrass	*Pennisetum setaceum*
big periwinkle	*Vinca major*
black locust	*Robinia pseudoacacia*

scarlet wisteria

Yellow starthistle

English Ivy

Tamarisk or saltcedar

Further Resources—Don't Plant a Pest
California Invasive Plant Council has a good online resource about weeds. There are still a number of invasive plants being sold in nurseries. The Don't Plant a Pest program has region-specific information about weeds and alternatives. Their website is: www.cal-ipc.org/

California Invasive Plant Council
1442-A Walnut St. #462
Berkeley, CA 94709
510.843.3902

The California Invasive Plant Council has also teamed up with the horticultural industry to stop invasive plants from being sold in California. The program is called Plantright. The website is: www.plantright.org

Weed Identification Reporting and Treatment
A very comprehensive source of information about weeds is the Center for Invasive Plant Management. The center provides hundreds of articles and links about identifying and managing weeds. The website is: www.weedcenter.org.

Center for Invasive Plant Management
Montana State University
333 Leon Johnson Hall
P.O. Box 173120
Bozeman, MT 59717-3120
406.994.5557

Sierra Nevada zones & plant communities

Sierra Nevada zones

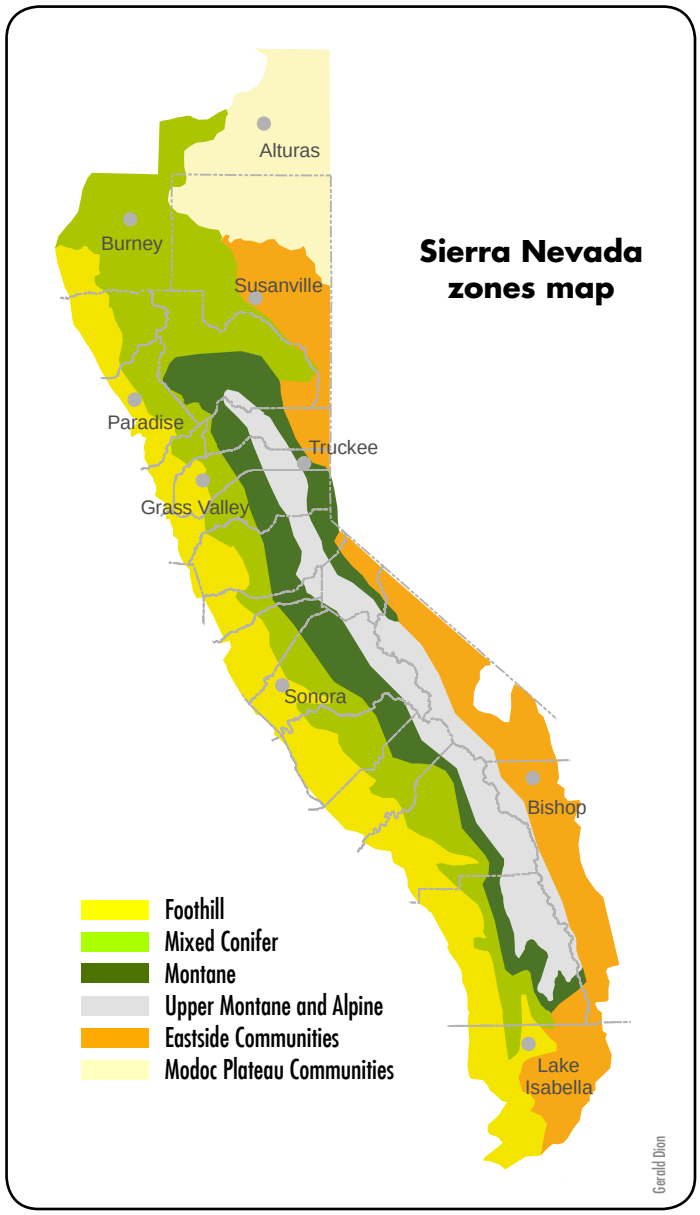
What characteristics of the plant life in your yard are determined by your location in the Sierra Nevada? Understanding where your yard fits in the context of the Sierra Nevada may help you set realistic expectations for what plants, shrubs and trees your yard is able to support. You can save yourself time and energy by working with the assets of your particular location. What is more, by reestablishing attractive features of the zone where your yard is located, you are restoring the ecosystem that was disturbed during land clearing and construction. This benefits the water quality and the wildlife of your neighborhood. Vegetation adapted for your setting will thrive and require little maintenance (other than defensible space work) after a season or two of irrigation to get it established.

The plant distribution in your area depends greatly on soil and aspect, elevation, and patterns of precipitation and temperature. Sierra Nevada plants are naturally distributed in a series of vegetative zones that roughly follow elevational contours along the length of the mountain range. From the standpoint of vegetation, every 1,000 foot climb in elevation is equivalent to moving 300 miles north. With increasing elevation comes low temperature, high precipitation, shallow soils, low concentrations of oxygen and carbon dioxide and high winds (compared to lower elevations). The boundaries of each Sierra Nevada zone are higher in elevation at the southern end of the range than at the northern end, and comparable belts occur at relatively higher elevations on the east slope than on the west.

This book uses four Sierra Nevada zones to help orient you to the region in terms of vegetation:

- Foothill
- Lower montane
- Upper montane
- Eastern slope

Sub-alpine and Alpine zones are not generally of interest for gardening purposes as these areas are above 7,500 feet and few people live above these elevations. So these zones are not referred to in this book. However the vegetation in these zones is fabulous to explore for its diversity and miraculous adaptability to harsh conditions.



Foothill

The foothill zone is the relatively warm, lower elevation zone on the lowest portions of the west slope. Summers are dry and hot, with average maximum temperatures 75 to 90 degrees F. Winters are moderate, with average minimum temperatures 29 to 42 degrees F. There is little fog and the growing season extends 6 to

10 months. In the foothill zone, species of oak, pine, ceanothus and manzanita are the dominant naturally-occurring vegetation in grassland, chaparral and open woodland environments.

Lower montane

The lower montane zone is the vegetative zone that occurs at the elevation between the foothill zone and the red fir and lodgepole pine forests of the upper montane. Summers are warm and dry, with average maximum temperatures of 80 to 93 degrees F. Winters are cool, with average minimum temperatures 22 to 34 degrees F. There is occasional summer rain. In the lower montane zone, diverse towering trees naturally feature in the landscape. Several conifers coexist and shift in importance throughout the range: ponderosa pine, sugar pine, white fir, Douglas fir, Jeffrey pine, incense cedar and giant sequoia, to name a few. Douglas fir are common in the northern part of the lower montane zone. In the upper elevations, sugar pine, Jeffrey pine and white pine dominate. In past centuries, when fire periodically burned lightly over the forest floor, more open, ponderosa pine forests dominated these slopes. The exclusion of fire from these areas has opened the way for additional species. For instance, white fir and incense cedar are found in this zone today. Naturally-occurring shrubs of this zone are particularly showy and colorful for the Sierra Nevada. These include gooseberry, thimbleberry, mountain misery, greenleaf manzanita and deerbrush. The overall aspect of the lower montane zone is a sunny, open, arid forest. This is a zone featuring deer, bear, squirrel and other wildlife.

Upper montane

The upper montane zone is the lower part of the high mountain forests, at elevations 5,500 to 7,500 ft at the northern end of the range, at 6,500 to 8,000 ft at the central portion of the range, and 8,000 to 10,000 ft at the southern end of the range. This zone occurs on both the west and east slopes, but at higher elevations on the east slope. The ecotone between the upper and lower montane zones is that elevation where air temperature drops below freezing during winter storms. Summers are cool, with average maximum temperatures of 73 to 85 degrees F. It is the zone of maximum snowfall in California. Winters are cold, with average minimum temperatures of 16 to 26 degrees F. Annual precipitation falls predominantly as winter snow. Long snowy winters and dry summers minimize the amount of growth that can occur. Summertime temperatures can be warm during the day and drop below freezing at night. Afternoon thunderstorms are not uncommon during summer months.

Forest vegetation is greatly influenced by the cool climate and the short growing season in the upper montane zone. Trees that are successful here can tolerate burial under snow until they are tall enough to stand above the snowpack. Red fir is naturally extensive here. It thrives in gravelly soil. Red fir is one of the largest firs in the world, and unlike white fir, is almost entirely limited to California. Lodgepole pine naturally grows along the edges of wet meadows or in well drained areas in this zone. There are stands of Jeffrey pine and western white pine. Jeffrey pine thrives in dry environments and is capable of rapid growth. Mature tree trunks commonly reach four to five feet in diameter and 160 ft. in height in 400 to 500 years. White fir is common in the lower elevations. Mountain hemlock extends toward the timberline. A wide variety of shrubs naturally occur in sunny openings in the forest including: spirea, serviceberry and wax currant. Meanwhile, prince's pine, white-veined pyrola, pinedrops, spotted coalroot and stripped coralroot are shrubs found in shadier areas of this zone.

Eastern slope

On the east slope of the Sierra Nevada range, at 4,200 to 5,600 ft in the north and 6,000 to 7,000 ft in the south, summers are dry and hot, with average maximum temperatures of 82 to 89 degrees F. Winters are cold, with average minimum temperatures of 10 to 20 degrees F. Most of the annual precipitation falls as snow. East-facing slopes are steep, rocky, and covered with a thinner layer of soil than west-facing slopes. The poor water-holding capacity of the soil magnifies the aridity of the eastern slope. Major tree species are mountain juniper, white fir, quaking aspen and Jeffrey pine. Downslope toward the desert these tree species sort themselves out differently from those on western slopes of the Sierra Nevada.

Quaking aspen and black cottonwood cover narrow corridors along the rocky banks of east-flowing creeks and short-lived snowmelt streams. Aspen seedlings require moist, open sites. They usually occupy riparian habitats, but they

can invade clear cuts. Once established, aspen produces horizontal roots in addition to vertical ones. The horizontal roots bear stems and roots along their length. Over many years a site can become dominated by tens or hundreds of aspen trunks, each one genetically identical to the next and all connected underground. Jeffrey pine is also dominant on the east slope of the Sierra Nevada. It creates beautiful, open park-like forests or woodlands. Some shrubs of the Jeffrey pine woodland—sagebrush, rabbitbrush and bitterbrush—have a cold-desert look and feel. Other shrubs in these woodland zones—greenleaf manzanita, squaw carpet, snowberry, and tobacco brush—have a mountain look and feel. Common herbs include squirrel tail, needle grasses, mariposa lily, lupine and mules ears.

Other notes on Sierra Nevada zones

These Sierra Nevada zones do not meet in narrow lines, or in straight lines on a map. Areas where zones mingle are broad and reflect local environmental conditions. In general, lower elevation zones extend upward on warm south-facing slopes, whereas higher ones descend on cooler or moister sites, as in shaded river canyons. For example, sun-facing hillsides of gray pines and associated plants in a canyon may stand opposite shadier slopes with ponderosa pines and Douglas firs. These differences make for significantly different habitats in close proximity to one another. Some plants occupy one zone. Others occupy two or three zones. A few plants are present in any zone where particular habitat needs are met. Within each zone are a variety of specialized niches that transcend elevation. This is further discussed in the plant community introduction that follows.

Sierra Nevada zones

Zone	Elevation (feet)	Annual precipitation (inches)	Growing season (months)	Habitat	Characteristic vegetation
Foothill	500 – 5,000	15 – 40	6 – 10	Grassland, chaparral, open woodland	Oak, pine, ceanothus, manzanita
Lower montane	5,000 – 6,300	25 – 80	4 – 7	Sunny, open, arid forest overall	Mixed conifers, notably tall trees, showy and colorful shrubs
Upper montane	6,300 – 8,000	35 – 65	3 – 4.5 (40 to 70 frost-free days)	Forest species that thrive in gravelly soil	Red fir, lodgepole pine
Eastern slope	5,000 – 7,000 (east slope only)	10 – 30	2 – 5 months	Steep and rocky slopes with thin soil cover	Mountain juniper, white fir, quaking aspen and Jeffrey pine, shrubs and herbs

Eastern slope stream environment

Sierra Nevada plant communities

Plant communities are repeatable assemblages of plants that grow together because of similar adaptations to microclimates, soils, slopes, and biotic factors. This book uses five plant community examples to orient you to a range of plant community features in the Sierra Nevada. Plant community examples used in this book include:

- Grasslands
- Woodlands
- Forests
- Meadows
- Riparian areas

These five plant communities are provided to illustrate some of the vegetation assemblages that naturally occur in the Sierra Nevada. Each of these plant communities can occur within any of the Sierra Nevada zones and will feature different plants depending on the zone.

While redwood forests, wetlands and deserts are not specifically explored in this book, these are important plant communities in the Sierra Nevada. If you live in an area that naturally features one of these plant communities make a study of your local unique environment for clues about what plants your yard might support.

Grasslands

Grassland landscapes are characterized by wildflowers and diverse green grass and herb species in the spring. In contrast to meadows, these naturally go dormant in the heat of the summer when they turn golden brown. Grassland landscapes are naturally dominant in much of the Sierra Nevada.

Grasslands

Woodlands

Woodland landscapes are characterized by dispersed woody vegetation. Oak woodlands are an archetypal landscape of the Sierra Nevada foothills. The magnificent oaks are accompanied by grasses and perennials whose assemblage facilitates wide open vistas. In contrast to oak woodlands, riparian woodlands feature deciduous hardwood forest of soaring trees mixed with abundant shrubs and vines. These landscapes are dense with forest vegetation, much of it deciduous, resulting in rich fall colors and complex vegetative architecture.

Woodlands

Forests
Forest landscapes dominated by tall trees are abundant and diverse in the Sierra Nevada. Mixed-conifer forests generally occur in the lower montane zone. Red fir, Lodgepole and Jeffrey pine forests are a feature of the upper montane zone. The understory of forests features shrub, perennial and fern species that vary significantly throughout the Sierra.

Forests

Meadows
Meadows can be considered grasslands that are generally low-lying in relation to the surrounding area. In contrast to grasslands, meadows generally border riparian areas and the abundance of water makes these plant communities prolific with wildflowers in the summer. These grasslands go dormant in the fall and winter. They are located at elevations above 4,000 feet and generally benefit from abundant snowmelt.

Meadows

Riparian areas
Areas relating to or located on the banks of rivers, streams, ponds and lakes abound in water and usually, plant life. Plants that thrive in these environments are often adapted to withstand a great deal of water—a challenge for many other native plants. Where soils are heavy or drain poorly, riparian-adapted plants often can thrive where others fail.

Riparian areas

Sampling of Sierra Nevada zones and plant communities combined

A sampling of backyard design illustrations are provided in the Design chapter. These illustrations are a practical way to think about Sierra Nevada zones in combination with plant communities. The context of these five design illustrations is provided in the following introductions.

The southern Sierra Nevada grassland

Grasslands are characterized by spring wildflowers and summer dormancy. The southernmost Sierra Nevada, the Tehachapi region, is home to spectacular grasslands. Bunchgrasses are the foundation of grasslands. These grow well in deep clay or silt soils and with lots of sun.

Southern Sierra Nevada grassland

The lower montane riparian forest

Year-round stream and river areas flourish with tall, deciduous hardwood trees and their associated understory plants. Vines and shrubs do well in these shady environments. The Feather River of the northern Sierra Nevada provides extensive domain where this habitat flourishes. This habitat is difficult to mimic unless your outdoor space hosts a naturally-occurring stream. Riparian plants require a lot of water year-round. These plants can handle heavy, poorly-drained soils.

Lower montane riparian forest

The foothill oak woodland

Oak woodlands, naturally occurring in the foothills, are open stands of trees on hills and uplands carpeted by native bunchgrasses and spring wildflowers. Sierra Nevada oak habitat is naturally dry and characterized by space and light.

Foothill oak woodland

Foorhill oak woodland

Upper montane meadow

The upper montane meadow

High altitude mountain meadows naturally occupy receding ponds and lakes as the water body gradually silts and dries up. The soils of meadows are therefore relatively deep and rich with organic material. Meadows need full sun and a lot of moisture.

Eastern Sierra Nevada riparian slope

Eastern Sierra Nevada riparian slope

The eastern Sierra Nevada riparian slope

In eastern Sierra Nevada riparian zones, stands of aspen bring shimmering green and shade to the zone in summer and astounding yellow, red and orange hues in the fall. These riparian zones are the exception on the eastern side of the Sierra Nevada range which is naturally home to high desert species of plants and flowers. In summer these hot, arid habitats seldom receive more than a few inches of precipitation, but in the spring these are host to wildflowers, blooming shrubs and trees as well as showy perennials.

"In eastern Sierra Nevada riparian zones, stands of aspen bring shimmering green and shade to the zone in summer and astounding yellow, red and orange hues in the fall."

Wildlife

The relationship between people and wildlife in territories that border wildlands is a particularly complex topic. People generally enjoy the presence of birds and butterflies in their backyards. But many of the same things that attract these small creatures (berries, flowers, green plants) are attractive to larger species as well, including deer, moles, and even coyotes and bear. Therefore teaching wildlife to look to your yard as a food source sets the stage for potential conflicts. Inviting wildlife into your yard and neighborhood can cause unintended conflicts (with neighbors, pets etc.). Frequently, wildlife is killed or injured in these conflicts. For example, a deer that is a welcome visitor to one yard may be considered a pest in the next yard. Further, the deer may attract predators such as coyotes and mountain lions to the neighborhood.

The best way to help wildlife is by protecting its natural habitat. In the Sierra Nevada, where increasing development annually contributes to dramatic loss of habitat, the responsibility is significant. Be an advocate for wildlife by supporting efforts to maintain vast open spaces. In the meantime, there are appropriate ways to implement practices in the home landscape that support wildlife. However, strategic planning and careful observation are the responsibility of the person who "invites" wildlife into domestic neighborhoods.

"Strategic planning and careful observation are the responsibility of the person who 'invites' wildlife into domestic neighborhoods."

Backyard wildlife survey

Canada geese feeding at Lake Tahoe

Begin by learning about the many kinds of animals that inhabit your neighborhood and the open spaces beyond. Learn about the local (and natural) availability of food, water and shelter. Knowing what landscape elements are inviting to wildlife helps you decide what to include, and to exclude, from your landscaping plans.

Do not lure wildlife into the domestic setting only to endanger those animals. Consider your tolerance, and your neighbor's tolerance, for wildlife. Carefully consider and look for unintended consequences of your actions. For an example of unintended consequences, consider birdfeeders. Birds are not the only ones who like birdseed. Squirrels and bears are two kinds of animals known to frequent birdfeeders. People have been known to poison squirrels (raccoons, opossums, skunks…) in order to be able to maintain a birdfeeder for birds. As for bears, the presence of birdfeed lures them into the domestic setting where they can also be mischievous and destructive (on a much grander scale than squirrels). The fate of a bear that repeatedly visits human neighborhoods is to be shot. It is better not to use the birdfeeder in the first place than to endanger wildlife. This is not to say that birdfeeders are strictly taboo, it is to say that inviting wildlife (intentionally or unintentionally) into a neighborhood is a big responsibility. Consider every action in your yard and garden in terms of its potential impact on wildlife and make decisions wisely.

Observe the wildlife visitors to your yard for a unique and exciting way to experience the nuances of your outdoor space. Wildlife observation gives you clues about features of your yard, and the functions these features provide, that you might otherwise not notice. Watching wildlife helps you:

- Recognize the role of your yard features and vegetation in supporting or excluding wildlife
- Design your yard and manage your vegetation to accommodate the wildlife species whose presence you enjoy and to make it unappealing to the species you do not want to attract
- Calculate what features of your yard you may want to change to encourage or inhibit wildlife guest behaviors
- Calculate what to plant, when to plant it, and what protections you may want to consider in order to keep the voles from munching the tulips, deer from eating the carrots, etc.
- Understand how much effort is required to realize and maintain your garden ambitions.

John Muir Laws ©2007, used with permission.

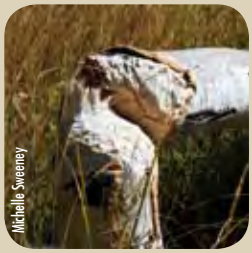
Montane vole

Wildlife observation

To get started, have a pencil and paper handy in a place where you can sit with a view of your yard. If possible, do your survey from inside, looking out, as many animals will not show up when you are present in the outdoor space. Try to observe at different times of day over the course of a week. If you have more time, watch at different times of day, for one week, once a month. You may have so much fun watching the chipmunks chase each other, the squirrels nibbling nuts and roots and the birds taunting one another that this little observation may turn into a new hobby! If you have children in the house enlist them in the project. They get really excited knowing the animals eat and play just like they do.

In your Yard & Garden journal make note of the following:

- Species of animals seen
- Stage of maturity of animals (adults, young, families) is an indication of whether their nesting sites are on site
- Sighting interval: Note whether the animal is a passerby that you only see once or twice, or whether it is there everyday and therefore lives full time in your yard or a neighbors
- Animal behavior: Is there competition between animals of the same species? Are there signs of relationship between the animals, i.e. playing or flirting? Is there competition or interaction among animals of different species? What is the cause or source of the interaction?
- Nocturnal animals: Observing nocturnal and stealthy animals relies on the evidence they leave behind. The best evidence is their tracks. One way to observe animal tracks is to create a sandy area where you expect nighttime animals pass by (the side of a building is a good place). You may be surprised what you find. Please do not be tempted to leave food to entice animals to your tracking sand. Feeding wildlife interferes with the animals' natural feeding patterns and often puts them in harms' way. (Also, food on the perimeter of the house may encourage them to try to find a way into the house!)
- Is the animal welcome or is it a nuisance? If a nuisance, is it because of a certain behavior of the animal and can that behavior be curbed—i.e. if you can protect your tulip bulbs from squirrel consumption do you actually like having the squirrel around? Or, is the animal a nuisance beyond something you can control?
- For those things that are a big nuisance and a problem, i.e. bears or coyotes getting into trash, or worse yet, into a house, consult experts for advice about all the things you can do to dissuade them. For this project, make note of the things you can do by designing your outdoor space and planning your uses to avoid encouraging nuisance animal behavior.



Beaver evidence

The remains of a meal

John Muir Laws ©2007, used with permission.

Tracks give evidence of wildlife behavior

A great resource for wildlife observation

John Muir Laws' new book, *The Laws Field Guide to the Sierra Nevada*, is a great way to start observing your home ground. In this innovative and meticulously field-tested guide, the rich variety of Sierra life—trees, wildflowers, ferns, fungi, lichens, fish, reptiles, amphibians, birds, mammals, and insects—comes alive.

People and wildlife relationships

Watching wildlife in action can be fun. Songbirds, butterflies, frogs and chipmunks can be endlessly entertaining. On the other hand, watching voles and ground squirrels pull up and eat your flower bulbs can be infuriating. Neighborhood and personal preferences play a big role in your individual decisions regarding your yard and garden. A few basic principles apply no matter what your tastes.

- Do not endanger wildlife.
- Install a wildlife proof bin or "bear box". (Even if you put your garbage out in the morning, many animals still have time to get in it.) Keep garbage bins closed and secured.
- Keep barbecue pits clean.
- Remove fallen and rotting fruit from around your yard.
- Keep pet food indoors.
- Be aware that domestic animals make an easy meal for coyotes who primarily hunt from dusk to dawn. Never keep an animal tethered or unable to escape predators outdoors.
- Secure livestock in fully-enclosed pens, especially at night.
- Apply Integrated Pest Management (IPM) practices (see Yard and Garden How-To chapter) instead of using poisons or pesticides to get nuisance wildlife out of your outdoor (or indoor) space.
- Defer to natural food types over domestically-provided types. For example for birds, provide berry-producing plants instead of birdfeeders containing syrup.
- Inviting deer and other animals into your yard also invites their predators.
- Once you invite an animal into your yard it is very hard to get rid of it. Prevention is the best option for avoiding conflicts.
- Poisoning a pest poses a risk to wildlife up the food chain and can pose a risk to humans inadvertently exposed to the poisons.

Wildlife habitat requirements

Animals thrive in the habitats where their needs are met just like plants and people. Where water, food and shelter are present, many animals will seek to make a home. Pay attention to food and water sources as well as places for cover. Then manage according to what makes sense for your space, your tastes and the amount of responsibility you are willing to take on. If you are not interested in accommodating wildlife, provide minimal water, food or shelter.

Michelle Sweeney

Wildlife food sources

For those who are ready to take on some responsibility for maintaining an appropriate level of neighborhood habitat, a few rules of thumb apply. Replacing turf grass with native wildflowers and trees enhances the beauty of your yard while providing a place for wildlife. Garden practices that help wildlife, like reducing the use of chemicals and helping to improve air, water and soil quality are not only good for wildlife, but are good for people too. Food sources for wildlife include native plants, seeds, fruits, nuts, berries and nectar. The right selection of plants can provide all of these things. Water sources can include bird baths, ponds, water gardens and streams. Places for cover include thickets, rock piles and bird houses. Shrubs, nesting boxes, ponds and certain vegetation can provide places to raise young. Apply this knowledge in good measure and in proportion to your ambitions for accommodating appropriate wildlife in your outdoor space.

If you attract wildlife to your outdoor space it is important to do so wisely and responsibly. According to a 1992 study by the Cornell Laboratory of Ornithology, in the yard setting 51 percent of bird deaths were caused by window strikes, thirty-six percent of bird deaths were caused by household cats, and 11 percent of bird deaths were caused by disease from ill-cared for bird baths and feeders.

California tiger salamander

John Muir Laws ©2007, used with permission.

Gauging wildfire risk

Wildfire can happen just about anywhere in the Sierra Nevada today. The close proximity of Sierra Nevada communities to open areas of wilderness—in combination with the state of most Sierra Nevada forests—make properties highly susceptible to wildfire. The good news is that by caring for your outdoor space and its trees and vegetation you can significantly lower your vulnerability to the effects of wildfire. There is no sure thing when it comes to preventing the effects of wildfire, but preventive measures that slow down a wildfire approaching your yard do minimize risk. Gauging the fire risk of your outdoor space helps you:

- Reduce the amount of flammable material near structures
- Use the zone and island design approach—emphasizing green vegetation and clean practices near structures. (More information on this is in the Design chapter.)

Angora Fire, South Lake Tahoe, California, 2007

Wildfire is a pervasive risk throughout the Sierra Nevada.

Flammable materials assessment

Evaluate the strengths and vulnerabilities of your yard in a wildfire situation. Start by observing the amount of flammable material in your yard and its proximity to structures. Record your observations on paper that you can add to your Yard & Garden journal.

To draw a quick sketch you want:

- Pen or pencil
- Sheet of paper
- Stiff surface for your paper so you can walk and draw

Draw perimeters of your outdoor space and the structures on it. Flammable materials to be on the lookout for and to include in your sketch are:

- Wood piles
- Decks and porches made of wood or other flammable materials
- Fences made of wood or other flammable materials
- Dead trees and shrubs
- Propane tanks
- Dry pine needle or leaf debris

Defensible space

There is no such thing as a yard that is completely immune to wildfire. But there is such a thing as space that is defensible. Defensible space refers to that area between a structure, such as a house, and an oncoming wildfire, where the landscape can reduce the wildfire threat. This space can provide an opportunity for fire fighters to effectively defend the yard and structures on it. The necessary distance for an effective defensible space around a structure varies by slope and type of native vegetation growing nearby. The greater the slope, the greater the distance flammable materials should be from structures.

This property shows some options for defensible space such as rock pathways and low growing plants near the house.

Fire requires three elements—fuel, heat and oxygen. If any of these is removed, there is no fire. The only one of these that people can control to any extent is the availability of fuel.

Cleaning up to reduce the risk of fire

Cleaning up is the first step in reducing the wildfire vulnerability of your yard. Removing dead limbs from trees, removing dead trees or shrubs, moving firewood away from structures etc. are all important. Look at the results of your flammable materials assessment. Simply by having done the assessment, you probably have an idea about how to begin. This checklist of activities can help you get started:

- Rake up dry leaves or pine needles within 10 feet of the house or structures
- Move firewood piles away from structures
- Remove any debris or dead or dying bushes or plant matter from your yard
- Tree limbs
- Remove dead or dying trees
- Replace old wooden fences with non-flammable fencing materials (if a fence is needed)
- Make sure wooden fences do not connect directly to structures
- Remove plastics, wood or anything flammable leaning on or near the outside of structures

Fire professionals recommend removing anything flammable (that cannot be removed entirely) to a distance of one hundred feet from structures.

Fire fuels

Island approach to design

During a major wildfire there are usually not fire fighting resources available to defend every home. Even with adequate resources, some wildfires may be so intense that there may be little that fire fighters can do to prevent a house from burning. The key is to reduce fire intensity as a wildfire nears the structure or home. This can be accomplished by reducing the amount of flammable materials surrounding the structure. As a wildfire approaches it is too late to do such work. Most people will be lucky to gather essential belongings and safely evacuate. Living in fire country, you are best off to do all you can to make your yard and property ignition resistant.

Fire professionals recommend creating islands of vegetation combined with small firebreaks in your yard. Given that even green vegetation can be flammable in a wildfire situation, designing your yard to include small firebreaks may be helpful in slowing down a fire. Firebreaks are areas without flammable materials or vegetation. A small firebreak may take the form of a short wall, small patio area or grass or rock garden area. Whatever you do, do not turn your yard into a desert, removing vegetation unnecessarily or paving over the entire space. Islands of vegetation are conducive to accommodating diverse uses of a yard, are aesthetically pleasing and reduce the potential vulnerability of your yard all at the same time. There is more on the island approach to design in the Design chapter of this book.

Michelle Sweeney

A stone wall can be a firebreak.

"Fire professionals recommend creating islands of vegetation combined with small firebreaks in your yard."

Michelle Sweeney

Islands combined with ground cover near this house mix beautiful vegetation with small firebreaks.

Feature:

Tom Kraul • Alturas, California

Sierra Nevada zone: Modoc Plateau
Conservancy Sub-region: Northern
Elevation: 4,500 feet
Watershed: Pit River
Focus: Low maintenance yard
Yard size: 4 acres, 1 landscaped
Favorite resource: Friends and the local nursery

Alturas sits on the banks of the Pit River, just east of the Warner Mountains, which form the western edge of the Great Basin. The Modoc Plateau is characterized on the east side by juniper and sagebrush and Jeffrey pine, white fir, mixed conifer, cedar, and aspen on the west side. It is also characterized by the volcanic activity so evident in the volcanic rock and cinder cones.

Tom Kraul, the Alturas town optometrist, has a magnificent shower of phlox blooming in the yard. Phlox are a native of the volcanic, high desert Modoc Plateau. So are several other plants, shrubs and trees in the yard outside Tom's office. Tom likes the yard he plants to transition easily into the larger landscape. He uses elements from that larger landscape, like lava rocks grouped in with the flowers or on islands of their own. He planned his office building to blend, using construction materials like cedar lap siding.

Tom's main objective in planting native plants is to have a yard that demands little maintenance. In the summer his water timer turns on the irrigation system about once a week for an hour. On his drip system that hour translates into about a gallon of water per plant. Tom enjoys getting out and doing things himself. He landscaped both his office and his home with native plants, shrubs and trees. He says installing the drip irrigation system was "kinda fun."

A rare plant which was found by a local plant biologist on Tom's property, *Penstemon janishiae*

In landscaping his yard, Tom took time to note where the sun rose and set, what areas were in full sun and which were shaded. He wanted there to be some color in all of the seasons, and chose his plants accordingly: red twig dogwood, phlox, sage brush and aspen. He does not have blooms in the winter, but the red in the red twig dogwood provides a stark contrast with the white of the birch bark. He has some adapted plants too, like Clara Curtis daisies, but nothing that would make his yard more labor intensive or require more water or fertilizer.

After planning, he tried out several things, noted what worked, and rearranged garden elements over the period of a year. He groups his plants, keeping those with similar water and soil preferences together. He has even studied the effects of lava rocks and the moisture level. He was careful not to put the lava rocks in the shade as they collect moisture and thus give mosquitoes a breeding ground. Tom says, "You've got to gauge where the sun is, take into account that rocks can both hold heat in the sun and trap moisture in the shade." With the low maintenance set up, he is able to play in the garden when he wants to, and leave it alone when he does not want to. "I just like to have fun with the garden," he says.

Dr. Tom Kraul's office in Alturas. He uses native vegetation to keep his property beautiful, blended with the surrounding landscape, and low maintenance.

Stephen Ingram

3 Design

Stephen Ingram

Your yard or garden design can reflect Sierra Nevada characteristics that you like. Elements of mountain meadows, lush grasslands, open oak woodlands and intimate riparian forests can often be translated into the domestic yard and garden. It takes careful observation of your area, followed by planning and attention to design to be successful in this. The rewards can be quite satisfying.

The Observe chapter introduced Sierra Nevada zones and plant communities. This chapter, Design, introduces sample yard and garden site plans that feature Sierra Nevada plant communities. Designing and maintaining habitat for plant species native and adapted to your area not only keeps your yard and garden work to a minimum, it also cultivates native soils, protects water quality and helps maintain the overall integrity of the Sierra Nevada landscape.

"Design your Sierra Nevada yard and garden keeping in mind the natural assets of your space and environment."

While options for integrating natural Sierra Nevada elements into the domestic landscape are extensive, there are limits that are important to pay attention to. Trying to force incompatible elements of the wildland landscape into your yard and garden will likely not produce success. This is why the guided observation of the previous chapter is an important preparation for the design steps introduced here. Site evaluation is an essential first step in good planning. Design your Sierra Nevada yard and garden keeping in mind the natural assets of your space and environment. Then, consider balance, contrast, focal points and repetition. The aesthetic you cultivate will combine those landscape elements you find visually pleasing with the functions you want your yard to serve.

The zone and island approach to design is introduced in this chapter. This approach has its foundations in the principles of preventing wildfire damage to your yard. The zone and island approach applies plant selection and maintenance practices by zone. Zones are defined by distance from the house. This approach also intersperses barriers to fire throughout your yard and garden by using non-flammable hardscape features in strategic locations.

Designing your yard or garden is a highly engaging and rewarding step. Make good use of the design step. It will pay off over the lifetime of your garden.

Design

Stephen Ingram

Contents

Design your outdoor space 63

Clarify what you want from your outdoor space 64
- How you currently use your yard 64
- What you want from your yard 65
- Existing and desired yard and garden features 66

Reality check 67
- Prioritize 67
- Practical project sequence 67
- Timeline 67

The zone and island approach to design 67
- The Lean Clean and Green zone 69
- The My Sierra Nevada zone 70
- The Transition zone 70

Design considerations 72
- Water 72
- Soil 73
- Vegetation 74
- Wildlife 76
- Wildfire 77
- Play areas, privacy & small spaces 77

The design notebook 78

Sample site plans 79
- The southern Sierra Nevada grassland 80
- The foothill oak woodland 82
- The lower montane riparian forest 84
- The upper montane meadow 86
- The eastern Sierra Nevada riparian slope 88

Create your site plan 90
- Mapping your existing yard 90
- Mapping your ideas—new layers of the site plan 92

Draft a timeline and budget for your project 94
- Budget considerations 94

Stephen Ingram

Design your outdoor space

Designing your outdoor space helps you:

- Create the space that works for you
- Draw a site plan that maps where you want things placed
- Strategically select the landscape features—both hardscape and vegetation—that make the right look and feel
- Sequence work using a logical and prioritized approach
- Create a timeline that reflects when you, or hired help, will be able to work on projects
- Calculate the budget you will need to realize your projects (minimizing surprise expenses)
- Assess how much time, energy and money it will take to maintain the outdoor features that you desire (preventing unexpected maintenance)
- Create the outdoor space that reflects your unique and personal interaction with the Sierra Nevada environment.

Designing your Sierra Nevada outdoor space is a personal endeavor. No two yards will be exactly alike. This section gives you tips and tools to spark your creativity and inform your approach to design. Use the ideas here to get started. Then have fun designing to express Sierra Nevada elements you like that are appropriate to cultivate in your area.

Clarify what you want from your outdoor space

It is fun to dream about all the things you can do with your outdoor space. Magazines and books blossom with colorful ideas and you probably have several of your own. Taking some time to think about how you currently use your outdoor space can help you gauge the scale of the landscape or garden project you want to undertake. With careful consideration, you may find that you really enjoy your yard just the way it is. In this case, ensuring that the features of your space are defensible in the event of wildfire and that your soil is protected are all you may want to do. On the other end of the spectrum, you may find that you want to re-design your yard from top to bottom. If this is your goal, this book can help to achieve this in a way that maintains the integrity of the Sierra Nevada environment in your yard.

If your yard does not already meet all of your needs this section can help stimulate your thinking about these questions:

- How do you currently use your yard?
- What do you want from your yard—are there additional ways you would like to use your space?

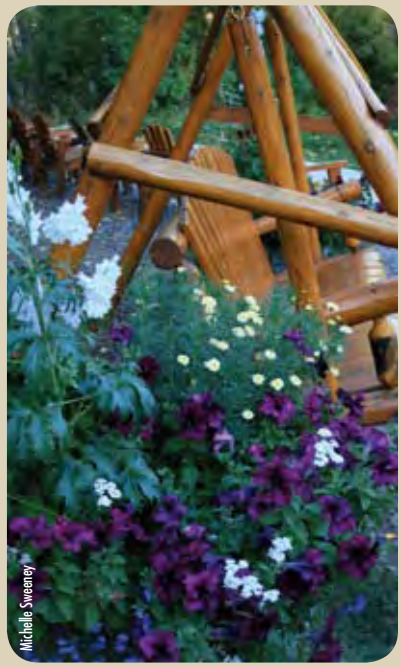
If your outdoor space already meets all of your needs, and you simply want some quick guidance on a specific garden undertaking, you may want to skip ahead to the Yard & Garden How-to chapter of this book.

How you currently use your yard

How do you currently use your yard? What do you (and others who use it) like about your outdoor space? Knowing what you like about your yard can help you:

- Preserve or enhance features that are really working for you
- Save money by working with what you already have
- Prioritize the sequence of garden projects.

A list of ways people use their yards is provided to help you get started thinking about it. Your final inventory will be unique to you. Jot down your responses in your Yard & Garden journal.


Michele Sweaney

How do you use your outdoor space?

- ☐ Relaxation
- ☐ Play
- ☐ Dining
- ☐ Parties/socializing
- ☐ Scenic observation
- ☐ Wildlife observation
- ☐ To produce food – vegetable garden
- ☐ Storage area
- ☐ Other…

What you want from your yard

What do you want from your yard? Are there ways you would like to use your site that you currently do not? It is worth taking some time to think about it and to ask others who use the space for their ideas. This step can help you:

- Make the most out of your space
- Come up with creative ideas
- Minimize misunderstanding with others who use the space
- Plan for multiple uses of the same areas.

Magazines and books filled with outdoor space ideas are abundant. Thinking about your desires over time, i.e. during different seasons, may lead to a wider array of conclusions than if you try to answer this all at once. What you come up with (and how you get those conclusions) is unique to you. Some ideas are provided to help you get started, but the fun in this question goes far beyond this page:

Michelle Sweeney

What do you want from your yard?

- ☐ Shade
- ☐ Sun
- ☐ Quiet
- ☐ Privacy
- ☐ Wildlife habitat
- ☐ Color
- ☐ Play space
- ☐ Viewing—in close proximity
- ☐ Viewing—a wide vista
- ☐ Relaxation space
- ☐ Social/hosting space
- ☐ Outdoor movie viewing or music listening space
- ☐ Star gazing space
- ☐ Nap area
- ☐ Other…

Are there additional ways you would like to use your space?

Michelle Sweeney

Cherry blossoms

Existing and desired yard and garden features

What existing landscape features make it possible to currently use your outdoor space the way you like? For example, would the space be as useable in the summer without shade? If there are trees or vegetation that create the shady area you rely upon, those trees and their placement are the features that make it possible to use your outdoor space accordingly. Similarly, your yard might not be as useful to you without sunny areas, flowers, or infrastructure for play, relaxation or dining. Use your *Yard and Garden journal* to note your thoughts and observations about the features that enable your current uses.

Would you like to enhance any of the existing features of your outdoor space? Would you be happier with your outdoor space if some of the features it already has were enhanced or improved to make them more useful? For example, perhaps you have an outdoor dining area you enjoy, but you only use it a few weeks out of the year because it is too hot much of the time. Would adding features that give shade to that space make it more useful to you? The *Yard & Garden journal* is a good place to jot down your thoughts on the enhancements you have in mind.

Reality check

The reality check involves prioritizing and sequencing your ideas. Now that you have put your thoughts and ideas on paper, doing a reality check takes you a step closer to being able to make design decisions. Perhaps in thinking about your desired yard and garden features you came up with quite a substantial list. Now, when you think about your budget, are the two compatible? There is a practical approach to addressing this.

Prioritize

First, prioritize the items in the desired yard and garden features notes, turning it into an actual list. Note the top priority items at the top of the list and then work downward in descending order of priority. The top several things on this list will be referred to as your *Top Priority Items*.

Practical project sequence

Next, sequence your top items according to the order in which it makes sense to do the work. For instance, if you need to remove a lot of dead brush and tree material, do so before planting a beautiful flower or vegetable bed in the vicinity of the tree work. Similarly, you will want to install retaining walls or erosion control structures on a slope before planting in the area.

Timeline

Finally, sketch a draft timeline showing the period when you would like to do the work. Extend your work timeframe to accommodate budget allowances and realistic estimates of the amount of time you have available to work on projects. For example, if you want a bountiful perennial garden but your budget limits your purchasing power, give yourself the option to build your perennial collection a little bit each month, or each year. Now place your sequenced *Top Priority* Items on this timeline.

Another important reality to check is how much time you have available to work on projects compared against the amount of time that those projects will require. One way to address a time shortfall is to pay other people to do your outdoor projects for you. On the other hand, if you know that you want to do the work yourself, but your time is limited, recognizing this at the outset can allow you to pace your projects so that you enjoy your outdoor project time instead of feeling overburdened by it.

You now have a *Yard and Garden journal* page featuring your *Top Priority Items* that approximates the sequence of them and generally connects them to a timeline. Now you are ready to begin to design your Sierra Nevada outdoor space.

The zone and island approach to design

With the zone approach to design, think of your yard in terms of three zones

- the Lean Clean and Green zone —within 30 feet of the house
- the My Sierra zone—within 30 to 100 feet of the house
- the Transition zone—100 feet from the house and beyond.

The zone approach can help you design for your personal priorities while establishing practices that reduce wildfire vulnerability and accommodate water, soil, vegetation and habitat needs.

"The zone and island approach can help you design for your personal priorities while establishing practices that reduce wildfire vulnerability and accommodate water, soil, vegetation and habitat needs."

The zone approach

The zone approach to design involves thinking about your yard in terms of three zones. The Lean Clean and Green zone, within 30 feet of the house, features low-to-the-ground, green vegetation and hardscape features of non-flammable materials. From 30 to 100 feet from the house the My Sierra zone features low and mid-height vegetation interspersed with hardscape features. The Transition zone, over 100 feet from the house, shifts into naturally-occurring vegetation, applying fire hazard reduction measures along the way.

With the island approach to design, think of your yard in terms of islands of vegetation interspersed among the three zones. A model outdoor space, integrating the zone and island approaches, has a bountiful selection of plant life starting with the lowest forms (ground cover) planted closest to the house. As you move away from the house, graduate to flowers, then taller plant forms as the distance from the house increases. Intersperse areas without vegetation—placing small patio or paving stone areas, sitting areas, grass, rock garden or water features—throughout the three zones. Interspersing these non-flammable areas amidst the vegetation creates islands of vegetation.

The integrated zone and island approach to design is not only visually pleasing, but is also an important tool for preventing the travel of wildfire across an outdoor space. Given that even green vegetation can be flammable in a wildfire situation, small areas lacking any vegetation materials can act as firebreak areas to slow down a fire. In the meantime, birds and other wildlife will find important habitat niches provided by the variety of vegetation types and arrangements this island approach provides. Whatever you do, do not turn your yard into a desert, removing vegetation unnecessarily or paving over the entire space. That would be a desertification approach to landscaping, resulting in the least Sierra Nevada-friendly yard possible. The integrated zone and island approach to design can accommodate diverse uses of a yard, is aesthetically-pleasing, wildlife and environment-friendly and reduces wildfire vulnerability all at the same time.

Plants and flammability

Given the right conditions, all plants will burn if exposed to enough heat. However, plants differ in their ignitability and how hot they burn. Flammability depends on plant size, arrangement of branches and leaves, and chemical properties of leaves, branches and bark. The horizontal and vertical arrangement of vegetation influences how fire burns.

The island approach

The island approach to design involves thinking about your yard in terms of islands of vegetation interspersed among the three zones. Interject a short stone wall, rock mulch walkway and other features that are of non-flammable materials. This creates islands of vegetation that are disconnected from one another and therefore less likely to spread fire.

The Lean Clean and Green zone

The Lean Clean and Green zone is the perimeter area surrounding your home to the distance of 30 feet. Lean refers to the minimization of flammable materials. Clean refers to the low height and density of vegetation and the absence of unnecessary items. Green is an indication that the least flammable types of vegetation are best suited to this zone. From the perspective of reducing wildfire risk, you want this area to be able to resist ignition from flying embers. You also want this zone to accommodate some of your most intensive uses as it is the transition from your house to the outdoor space.

"The Lean Clean and Green zone is the perimeter area surrounding your home to the distance of 30 feet. You want this area to be able to resist ignition from flying embers."

My Sierra zone example

What does the Lean, Clean and Green zone look like? This zone integrates short walls, small patio areas or grass or rock garden areas to create spaces to accommodate your uses and minimize the potential effects of wildfire. This zone is notably lacking in tall brush, woody debris (on the ground or still attached to trees) and flammable items or materials. It features vegetation that is green, non-flammable and low-to-the-ground. As this is the zone most-likely needing some level of irrigation, place plants with similar water needs near each other. This is likely the zone that experiences the most foot traffic. Make the most of your space and help your soil by taking partially-used walkways out of use and giving structure to those that are used. The personalized characteristics this zone features and the uses it serves are up to you.

The My Sierra zone

This zone will highlight the features of the Sierra Nevada that you want to cultivate just outside your doorstep. To best reduce the risk of wildfire, start this zone 30 feet from the house. This zone nicely accommodates outdoor dining and barbecue areas. Propane tanks are among the flammable and explosive items you want to avoid placing in proximity to the house.

What does the My Sierra zone look like? Consistent with the Lean Clean and Green zone, the My Sierra zone should still not have tall brush or woody debris. Different from the Lean Clean and Green zone, flammable items you cannot live without (a barbecue, wood pile or hammock for example) might appear on a limited basis in the My Sierra zone. Green vegetation can play a prominent role in this zone—you are not limited to short ground cover vegetation as you are in the Lean Clean and Green zone. Take care to eliminate ladder fuel scenarios (see below). For flowering gardens, an emphasis on Sierra Nevada species will help make your yard inviting for native birds and butterflies. The personalized characteristics this zone features and the uses it serves are up to you.

The Transition zone

The Transition zone is for properties that extend beyond 100 feet from the house. This zone should be managed to slow down an approaching wildfire while aesthetically blending with surrounding areas to the extent possible. Use the Transition zone to create a mosaic of low-lying vegetation, trim off branches at lower levels and break the continuity of fuels, while maintaining the naturally-occurring ecosystem features as much as possible. Trees should be at recommended distances, ladder fuels eliminated and woody debris and excess brush cleared at least annually.

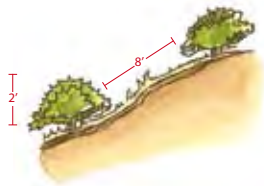
"This zone should be managed to slow down an approaching wildfire while aesthetically blending with surrounding areas to the extent possible."

Minimal horizontal clearance

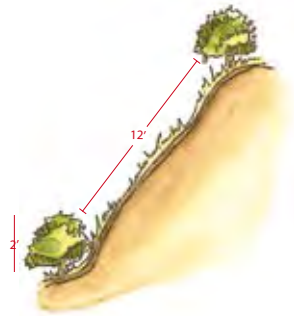
Shrubs

From edge of one shrub to the edge of the next

Flat to mild slope
(0% to 20% slope)
Two times (2x) the height of the shrub
(Two shrubs 2′ high should be spaced 4′ apart)



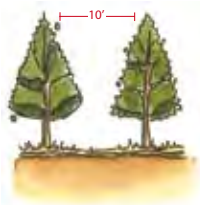
Mild to moderate slope
(20% to 40% slope)
Four times (4x) the height of the shrub
(Two shrubs 2′ high should be spaced 8′ apart)



Moderate to steep slope
(greater than 40% slope)
Six times (6x) the height of the shrub
(Two shrubs 2′ high should be spaced 12′ apart)

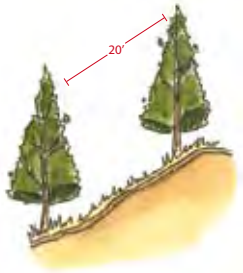
Trees

From edge of one tree canopy to the edge of the next



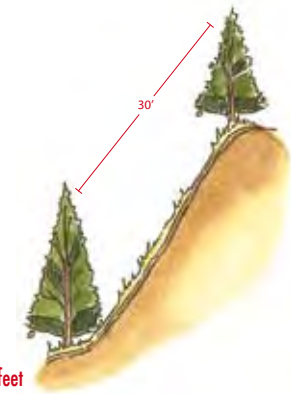
10 feet

Flat to mild slope
(0% to 20% slope)



20 feet

Mild to moderate slope
(20% to 40% slope)



30 feet

Moderate to steep slope
(greater than 40% slope)

Sandi Osterman

On multiple-acre properties the Transition zone may house domestic animals and associated shelters and materials. Once again, from a standpoint of reducing risk of wildfire damage, remove flammable materials as much as possible. Refrain from stacking or leaning flammable items (hay, woodpiles, ladders, debris piles) up against barns, sheds or trees.

What does the Transition zone look like? In general, the Transition zone is named as such because it is the area of a property that transitions into adjoining wilderness (or unmanaged) areas. This zone features good forest management practices, including thinning trees and caring for vegetation. This not only encourages robust, pest and drought-resistant growth, but is also aesthetically pleasing. Caring for native Sierra Nevada plant species is especially important in the Transition zone. Particularly if your site is adjacent to a wilderness area, seeds will be transported and native wildlife will transit through the Transition zone. To the extent possible, manage this zone to be Sierra Nevada-friendly, allowing wildlife transit and eliminating invasive weeds which compete with native plant species for resources.

Resource: Soil and water conservation tips for sites home to large domestic animals

Further Resources—*Small Ranch Manual: A Guide to Management for Green Pastures and Clean Water*

This is a very helpful document for anyone in ranching or with a small number of horses or cattle. It is produced by the University of Nevada Extension in Reno, 775.784.7070. The document can be downloaded for free at the following website: www.unce.unr.edu/publications/files/ag/other/eb9502.pdf.

The University of California Agriculture and Natural Resources department has more than 100 publications to address water quality on ranches and farms within California. 1.800.994.8849. Many of the publications are free, the website is: http://anrcatalog.ucdavis.edu/

Transition zone example

Design considerations

Make the zone and island approach the foundation of your yard or garden design. This integrated approach accommodates most uses and preferences in any yard. The following pages highlight some design features you may want to consider as you prepare to draw a site plan for your outdoor space. Should you choose to highlight any of these features in your yard, the zone and island approach can easily accommodate them.

Water

Why design for water efficiency? A water-efficient site is cost effective, precise, upgradeable, attractive, mulch friendly and long lasting. Maintaining a water-efficient site proves easier than maintaining a site where water is being wasted or applied incorrectly. In the long run, a water-efficient yard is less expensive than a site where water is not used for maximum effect.

Landscaping with natives and designing a water-wise irrigation system can be two of the most effective ways to conserve water. Native vegetation requires very little maintenance and significantly less water than introduced species do. A well-planned, automated irrigation system helps you get the most out of the water you use. It can also target use to be consistent with municipal regulations. Combining a water-efficient irrigation system with native plant species appropriate for your site microclimates results in a thriving landscape void of runoff containing soil or fertilizers and looks great. Targeting irrigation systems to avoid water waste and planting native and adapted vegetation in the soil and the sun/shade environment they need is key for a water efficient yard.

Xeriscaping

Xeriscaping focuses on using native, drought-tolerant plants and water saving strategies that create yard and garden areas that do not consume excessive amounts of irrigation water. Xeriscapes are divided into zones with different water requirements. Xeriscaping principles are at the foundation of the hydrozones approach to irrigation. In response to frequent drought and water shortage in the 1980s, minimal-irrigation landscape techniques became an art form called xeriscape. The name derives from the Greek word "xeros", meaning dry. However, xeriscaped sites are not dry, barren landscapes. Xeriscape emphasizes using native or well-adapted plants. A xeriscape can be as simple or complex as you wish.

Xeriscape garden

Resource: Online resources for water conservation

www.irrigation.org
www.nrcs.usda.gov/partners/for_homeowners.html

California's Model Water Efficient Landscape Ordinance

The California Department of Water Resources is currently working on an updated Model Water Efficient Landscape Ordinance, or AB 1881. This will pertain to home landscapes larger than 2,500 square feet starting in the year 2010. More information is available at http://www.owue.water.ca.gov/landscape/ord/ord.cfm.

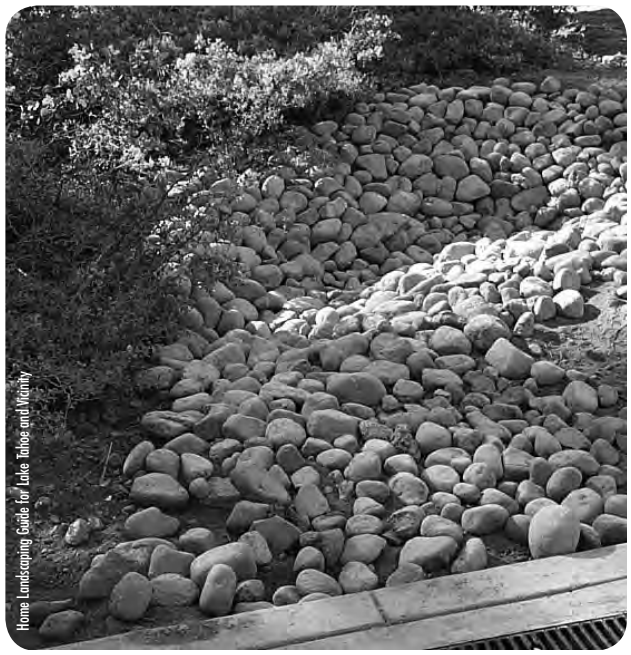
Soil

Though soil erosion is a natural process, accelerated erosion, caused by poor drainage, construction and other activity causes serious environmental problems. Soil loss from your property makes it less attractive and fertile. One of the most important things you can do for your soils is to pave unpaved driveways, especially those that are used year-round. Unpaved driveways compact from the weight of vehicles parked on them, preventing infiltration of water. Water flows over the compacted surface instead of soaking into the ground and erodes soil away. Unpaved driveways contribute to pollution and oftentimes become a real chore to maintain. A well-designed driveway is gently sloped and paved. It is also bordered by an infiltration trench or has a slotted drain installed across the width to collect and infiltrate runoff before it reaches the road or drainage ditch.

Another thing you can do for your soil is eliminate wind and water erosion with vegetation and/or structures that hold soil in place, stop and collect soil once it begins to move, collect and direct runoff water, and infiltrate runoff water into the soil (preferably before it picks up sediment and pollutants). Guidelines to the general erosion control approach relevant to your site can be found in the *Yard & Garden How-to* section of this book.

Sierra Note: Soil types and compositions vary greatly throughout the regions discussed in this guide. For example, in the southern Upper Merced River watershed area, clay soils are a dominant force in the garden. Meanwhile, in the Modoc Plateau area to the north, porous soils deriving from volcanic activity are dominant in many yards and gardens. The Natural Resource Conservation Service (NRCS) is in the process of updating online soil survey information. This is a great resource: http://soils.usda.gov/.

Unpaved driveways increase sediment flowing into rivers, lakes and streams.



Erosion control structures like this one keep sediment from reaching waterways.

Vegetation

Sierra Nevada native and adapted plants

Sierra Nevada native and adapted plants are wise additions to any yard or garden. They are diverse in color, texture and blooming season. Sierra Nevada natives and adapted species are likely to do well with little water as long as they are in a microclimate suited to their needs. Keep in mind that drought-tolerant native and adapted plants started in a nursery environment require dry season watering for a year or two until established.

Stephen Ingram

Indian paintbrush, a native of the Sierra Nevada.

Michelle Sweeney

Example of overly-dense trees

Trees

Keep trees to keep moisture. Soils planted with trees and plants accept and maintain moisture better than bare soils. On the other hand, tree density affects the overall health of a grove or collection of trees. If there are too many plants in a small area, then all grow to be small and weak. If there are too few plants or trees for your environment overexposure may occur. Observe your trees and consult with tree experts to determine the right tree density for the resources available in your yard.

Shrubs, hedges, screens, vines and ferns

Densely packed foliage proves useful to divide your garden or to block noise and unwanted passage. Grouped close together, large shrubs can block an unwanted view or direct attention to a focal point. Shrubs can form the framework of a landscape—serving as stable plantings that influence views and direct circulation. Paying special attention in the design phase of planning can prevent ladder fuel configurations.

Many shrubs offer seasonal focal points such as showy flowers, fruits and autumn foliage color. Vine stems are fairly limber and can be guided to grow in any direction—up a post or tree trunk, over an arbor, etc. Vines can also serve as ground covers. Some are evergreen and others deciduous.

Michelle Sweeney

Vine and ferns help create divisions in your yard

Ground covers

Grass is a well-known ground cover, suitable for walking or playing needs, but there are many other ground covers (some may be better suited to your needs) than grass. Where foot traffic is undesirable or infrequent, many other plants offer much of a lawn's neatness with far less maintenance. You can combine different ground covers to form a tapestry of colors and textures. Most ground covers meet the fire risk reduction criteria for the Lean Clean and Green zone as they are generally a few inches high or shorter. Ground covers spread by rooting stems or underground runners; others form clumps and require close spacing to achieve a solid cover. Since shrubby ground covers spread from individual root systems, plant them according to their expected width at maturity.

Michelle Sweeney

Ground covers can form a tapestry of colors and textures and offer less maintenance than a traditional lawn

Alternatives to turf

There are grass alternatives to turf that you can walk on, that are short and that do well in the Sierra Nevada. These require less water than turf and little to no fertilizer. Below are three top choice turf substitutes:

Red Fescue: Thrives in cooler temperatures. Good ground cover for shady areas during hot summer months. Can be mowed and walked upon. Of the non-turf grasses, red fescue tends not to clump.

Idaho Fescue: Thrives in cooler temperatures. Does well in diverse types of soil. Can be walked upon and does better with little mowing. A bunch grass (particularly as it ages). Attractive as it goes to seed. Idaho fescue is native to all of the western United States. Another popular cultivar of Idaho Fescue is Siskiyou Blue grass.

Blue gramma grass: Does well in warm and cool temperatures. Thrives in full sun and well-drained soils. Blue gramma grass is thin and has a little curl at the end of its blade (if you do not mow it) that adds character. Tolerant of diverse conditions. Turns brown in winter. Can be walked upon to a moderate extent.

Important tips:

1. These grasses require soil preparation. Seeding and weeding practices are the same for these grasses as for a turf grass. You can buy plugs or seeds, but seeds are recommended for large areas of coverage.
2. Try blending the blue gramma grass with either of the fescues. Since the fescues grow green in spring and fall and the blue gramma greens in the summer, a combination will give a green look and feel for three seasons.

About ornamental native grasses

Ornamental native grasses generally grow too tall and their blades too wide to be conducive to most people's idea of a play surface. They are, however, great landscaping elements for your yard. These native grasses used to cover many acres of the Sierra Nevada. Now they are rarely seen. Using them in your yard is a great way to re-invigorate their populations and have a very attractive native plant. They require little maintenance in the way of water or mowing. A few examples include: deer grass (the California state grass), purple needle grass and tufted hair grass (also called fairy grass).

Shade and sun

Why pay attention to shade and sun features? The shade and sun features of a site can have a profound effect on daily life. Shade and sun patterns on the landscape regulate temperature inside and outside structures. In addition, shade and sun landscape features can influence the way you use energy. For example, a laundry line placed in full sun in the summer can minimize the amount you need to use a clothes dryer. A shady patio can help keep adjacent indoor spaces cool in the heat of the summer and reduce the need for air conditioning. Facilitating exposure of the southern side of structures to winter sun can allow sunlight and warmth into a house, reducing the need to rely exclusively on technology-driven heat supplies. Are there design decisions you can make about your landscape that might influence your daily patterns? For example, would creating a shady, cool outdoor dining area allow you to find respite from summer heat during evening hours? Would creating a sunny, warm play area in spring allow your kids to comfortably enjoy some early days outdoors after a long, snowy winter?

Shade and sun features regulate temperature

Color and fragrance

Have you ever been walking down a sidewalk or trail when a fragrance hurried you along or stopped you in your tracks? Fragrance is a powerful though subtle presence in daily life. For some, fragrance contributes to a sense of place. The yard and its vegetative features define the fragrance around, and sometimes inside, a home. Pay attention to this as you consider the trees, shrubs and plants you encourage on your site. For example, if members of your household are allergic to certain pollens, you will want to do your best to minimize these. If you enjoy the scent of certain flowers, plan for them in an area that is upwind of the windows you open in the summer.

The colors present in a yard reveal a lot about where you are. The timing of the gold hue of the foothills reveals not only your approximate altitude and latitude in the Sierra Nevada, but also the time of year, how much precipitation there has been and what outdoor activities might be best. In the higher altitudes, and on the eastern slope, shimmering aspen are a sure sign of summer and their warm yellow and orange hues cue that the days are growing shorter with autumn's arrival. Selecting landscape and vegetation features that complement the natural color palette of your area can be very satisfying. Your selection can contribute to a sense of place and season and complement the naturally-occurring colors that make the Sierra Nevada home.

Michelle Sweeney

Color reveals a lot about the time of year.

Wildlife

In the Sierra Nevada, neighbors include wildlife. Close proximity to wildlife demands awareness, respect and often patience and ingenuity. Consider that designing to accommodate wildlife takes a high level of commitment as well as creativity, communication and adaptability. This is because the welfare of the wildlife you attract to your neighborhood depends on your awareness and good planning. It often occurs that people lure wildlife into domestic areas with good intentions but cause the demise of those animals in the process. Because wildlife relationships to the land are complex, unintended consequences of your actions can easily occur. For example, you may intend to host butterflies by planting certain vegetation, and inadvertently attract bears. Or, you may consider your old wood pile or piled brush to be good small critter habitat, but fire officials may cite you for creating a fire hazard. If you have an interest in designing to accommodate wildlife in your yard please read the Wildlife sections in the *Observe* and *Yard & Garden How-to* chapters.

Michelle Sweeney

Douglas squirrel

"You may intend to host butterflies by planting certain vegetation, and inadvertently attract bears."

Wildfire

The primary principles of design for reducing the risk of wildfire damage are illustrated by the integrated zone and island approach described earlier in this chapter. Creating and maintaining the Lean Clean and Green zone closest to the home or structures is the most important thing you can do in your outdoor space. Beyond taking a zone and island approach to designing your site plan and implementing fire risk reduction measures by zone, further fire risk reduction considerations are described in the *Yard and Garden How-To* section of this book.

Fire professionals agree that homes with both an effective defensible space and a nonflammable roof (composition shingles, tile, metal etc.) are many more times likely to survive a wildfire than those with a shake or shingle roof and without a defensible space.

Composition shingles

Wood shingles

Metal roof

Play areas, privacy & small spaces

Play areas

Do you currently, or do you want to be able to, use areas of your site for play and recreation? If so consider various users' needs. Do you need play space for children? If so, how will their needs be different in 3-5 years time? Would you get more out of your site if there were recreation space for adults? Are there a variety of activities that have the same space and environmental requirements? Before you invest in infrastructure such as swing sets or tennis courts, evaluate whether it will really be used, what seasons are amenable to those activities and the alternative activities that you might want to host in that space. Consider the microclimate conditions of an area throughout the year as well. A sandbox in the baking sun is not any more attractive than a swimming pool filled with pine needles in the shade.

Privacy

Privacy is an important service that landscape features can provide. Vegetation can provide not just a visual barrier, but also an audio barrier. Take caution not to remove trees or other vegetation without considering the privacy services these plants may currently be providing. In your landscape design planning, consider different privacy needs in the various seasons and in daytime versus nighttime. For example, deciduous trees that provide privacy in the summer may not be as helpful when they lose their leaves. Or, perhaps a neighbor has a service light that goes on and off during the night—take care not to remove the tree that keeps this disturbance from shining on you while you are sleeping. Vegetation absorbs sound, which helps keep neighborhoods quiet. Also consider the role that built structures play in your environment. Hard, flat surfaces such as concrete walls can help keep sound out, but they can also reflect sound, or cause it to travel in unforeseen ways. For example, there are instances in which sound barriers installed along highways have resulted in less noise directly adjacent to the highway but more noise at a distance from it. Installing a wall in your yard can have the same effect. As every yard differs with people's needs, there is no one-fits-all prescription for privacy. It is important that you include your privacy needs in your yard or garden design equation.

In instances where several neighbors coordinate their yard endeavors to create shared, common space for play, wildlife corridors and the aesthetic of open space, one factor cited as critical to the success of these communal areas is planning for functional private space.

Small spaces

It may be that you have only a small site to work with or that you wish to create small, unique islands to serve varying purposes on a larger site. The assets of small spaces are countless and their features unique. Functionally, small spaces encourage you to focus your creativity. They can also facilitate getting the most out of a limited budget. Trial and error is the surest way to perfect the features of your site. Trying things out on a small scale before investing in a feature over a larger site can be informative and save money.

Small spaces

Small spaces can be highly functional, but they also have design challenges. The gardeners' quandary may be to maximize use of minimal space. The key is to choose a framework of plants—trees, shrubs and ground covers—that will become permanent residents of the garden without overstepping their bounds. Overstepping bounds in small spaces can have serious repercussions such as damage to foundations, walls or other structural components. Also consider your neighbor's property to avoid causing damage with your vegetation (at the time of planting or many years later). Small spaces require that you think ahead. For example, before buying, inquire:

- How tall and wide will this tree / shrub grow in twenty or fifty years?
- What kind of space requirements does the root system require?
- How does the tree/shrub reproduce?
- Is the tree/shrub prone to catch on fire?

Once you have chosen the plants that will make up your framework, fill in empty spots and containers with colorful annuals and perennials.

"The key is to choose a framework of plants that will become permanent residents of the garden without overstepping their bounds."

The Design Notebook

Just as garden tools are essential to your project success, a few basic design tools can make your outdoor projects run smoothly. Think of the Design Notebook as the toolbox for the design step of your outdoor project. The Design Notebook is described in the Introduction section of this book.

Creating your Design Notebook will help you organize your thoughts in terms of 1) a site plan, 2) a budget, 3) a timeline, and 4) a journal. Keeping all of your yard and garden notes in this Design Notebook will help you stay organized.

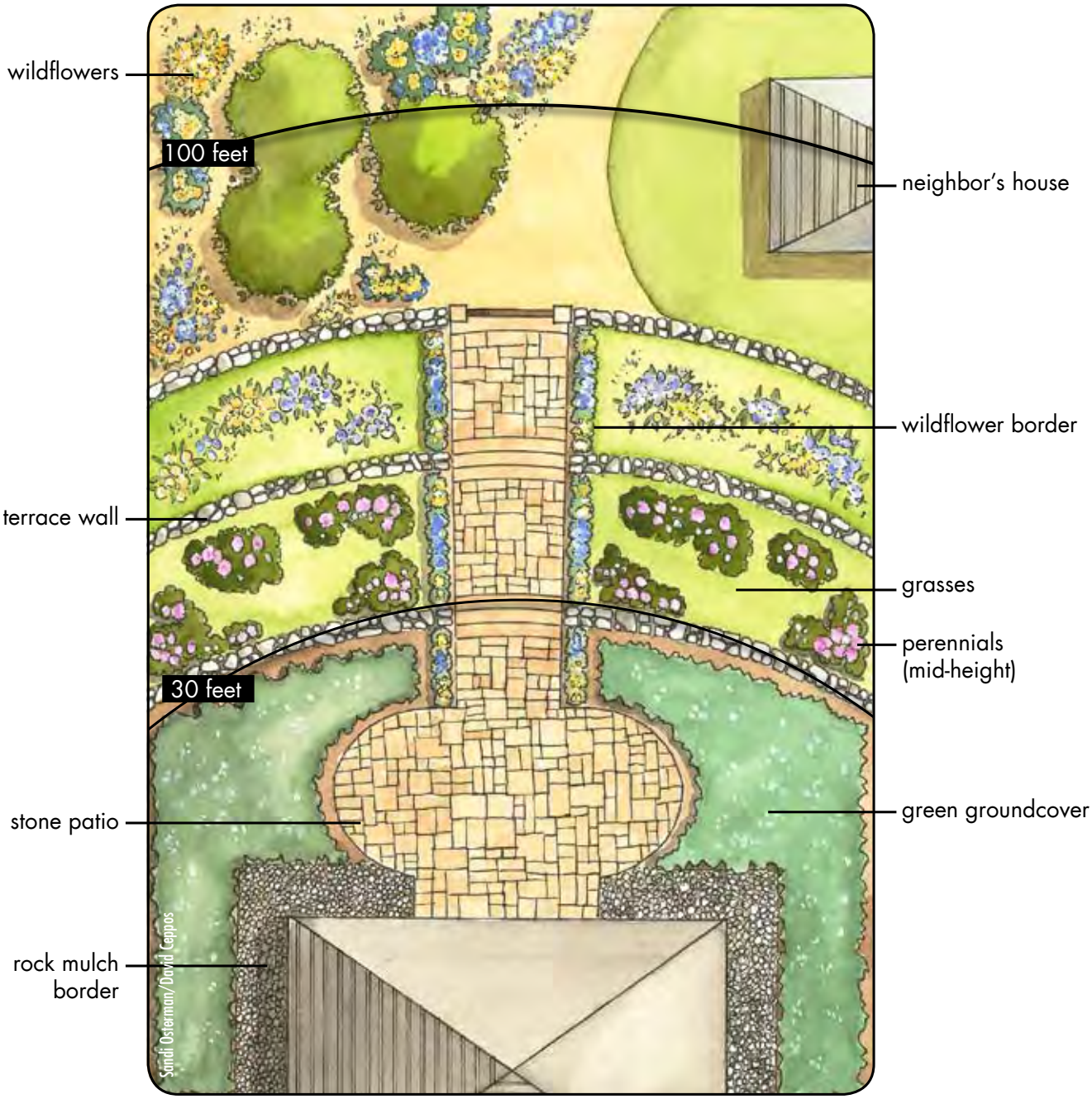
- The site plan is a map of your outdoor space, depicted in several layers.
- Your outdoor projects budget is an estimation of the costs of your outdoor space project.
- Your outdoor projects timeline approximates when to do the steps of your project.
- Your *Yard & Garden Journal* is your collection of notes.

Michelle Sweeney

Sample site plans

A site plan is a map of your outdoor space that illustrates its existing and desired features in several layers. A site plan is a tool used by professional landscape architects that can be helpful to non-professionals who want to organize ideas in an easy-to-use format. Step-by-step guidance for drawing your site plan is given in this chapter. Before you undertake your own site plan drawing, take a look at the following samples. These combine Sierra Nevada zones with plant communities to illustrate some local and native plant options for your design.

Sample site plan: Southern Sierra Nevada grassland



Beautiful southern Sierra Nevada wildflowers and grasses are susceptible to wildfire. Integrate fire prevention principles into a site plan. Featured in this sample site plan are: a rock mulch border, short, green groundcover and stonework. These are functional, aesthetically-pleasing, fire prevention hardscape features that complement native grasses, wildflowers and perennials.

Sample elements of a southern Sierra Nevada grassland

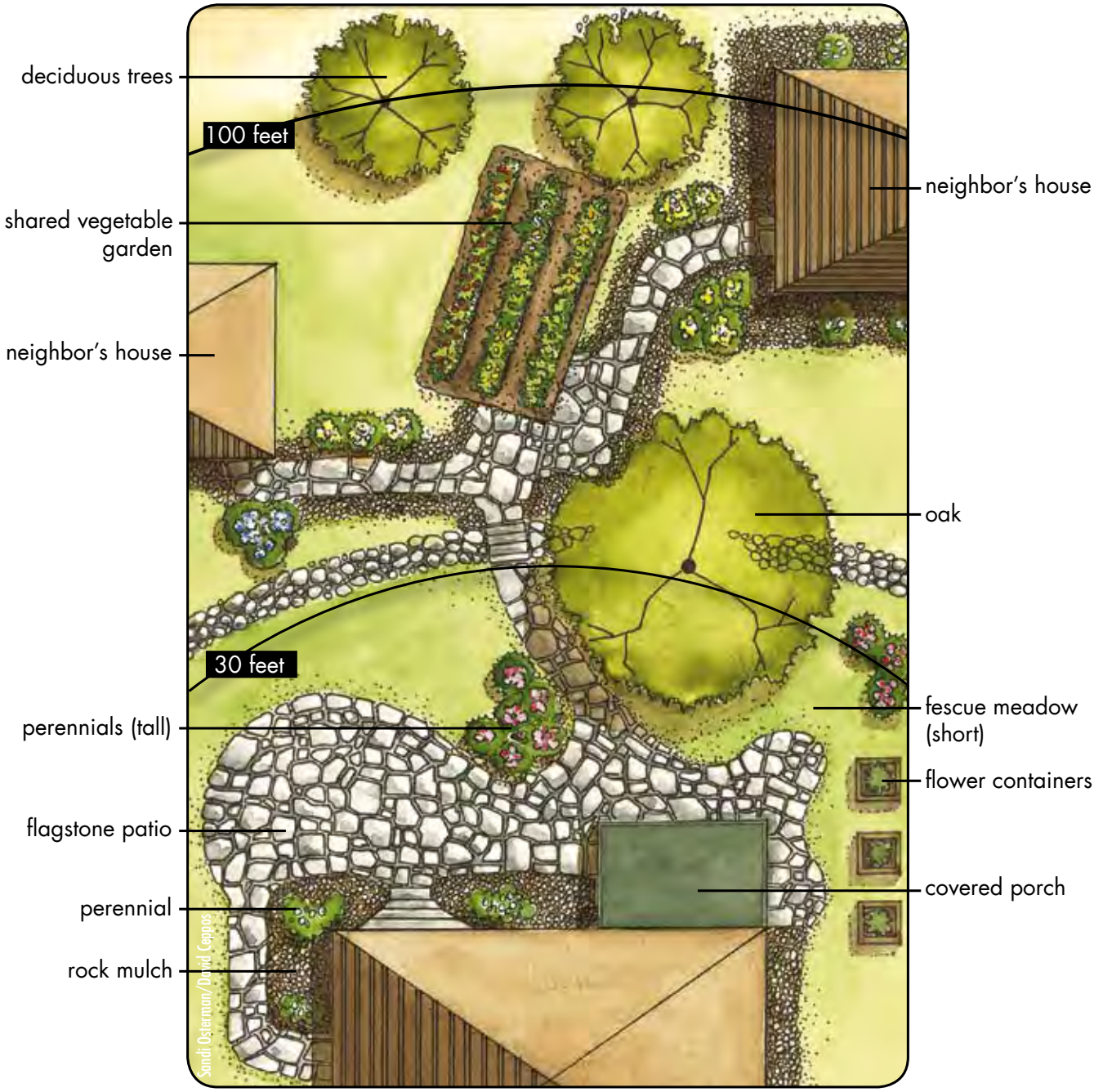
Stephen Ingram

Lindsey Johns

Michelle Sweeney

The poppy, the California state flower, flourishes in arid environments and soils in April through June in the southern Sierra and further north later in the summer months. Lupine are also naturally-occurring beauties in native landscapes that transition well into the garden.

Sample site plan: Foothill oak woodland



Rolling hills and stately oaks are icons of the California landscape. In this sample site plan a tall oak is the central feature of three adjacent yards. In this sample neighbors share not only the oak, but also a vegetable garden, a short rock wall and walkways. These are all creative, communal ways to utilize small outdoor spaces.

Sample elements of a foothill oak woodland landscape

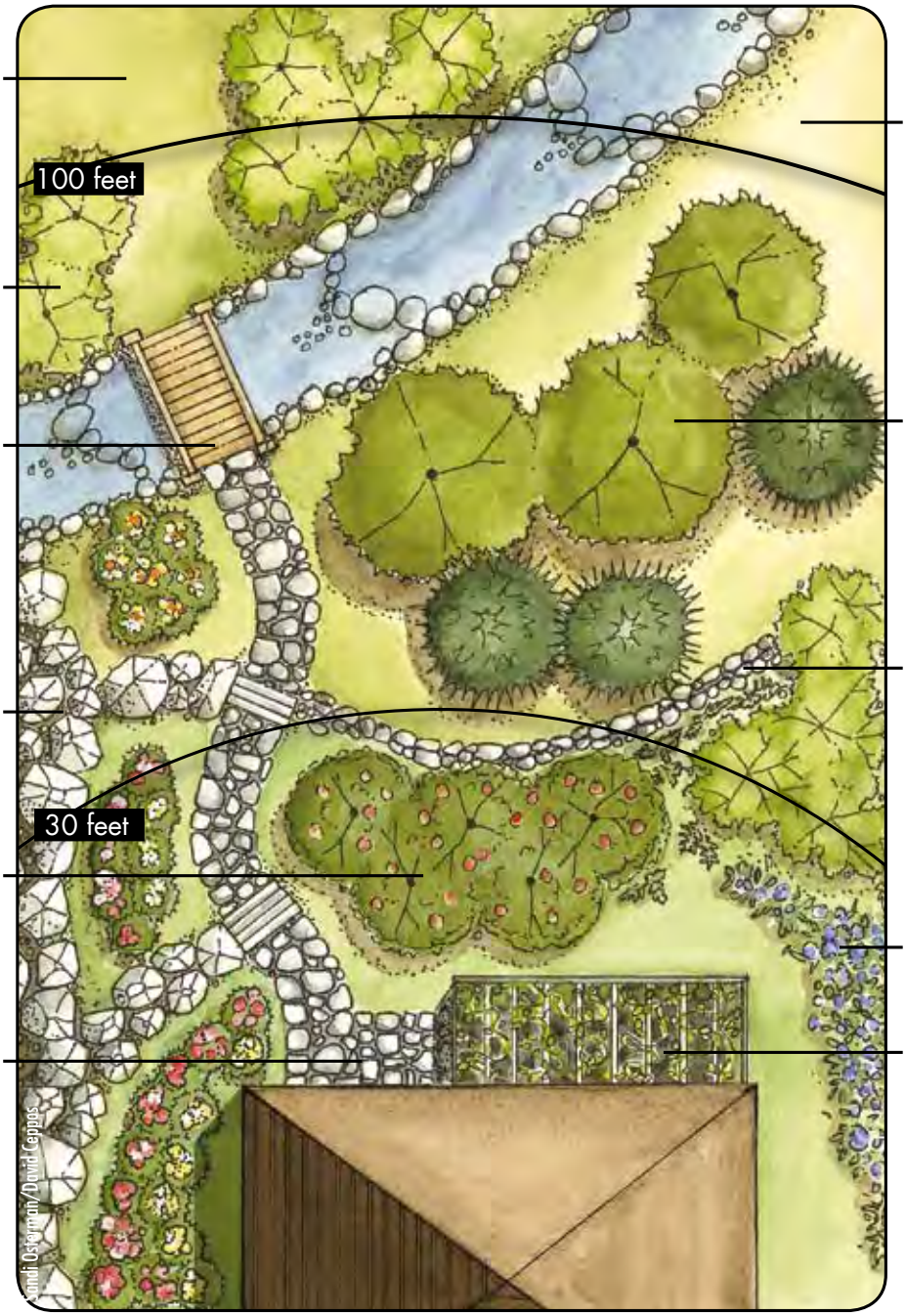
Michelle Sweeney

Michelle Sweeney

Michelle Sweeney

The oaks lend shade to foothill landscapes on hot summer days and they lend color in the autumn. Short stone walls add character, privacy and some defense against fire.

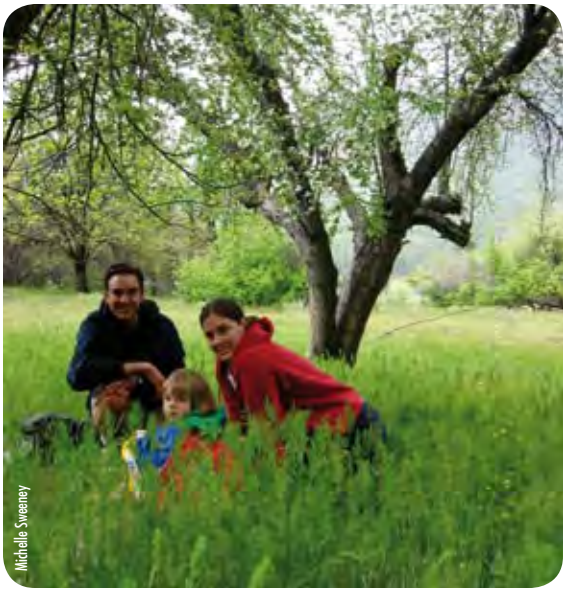
Sample site plan: Lower montane riparian area



Riparian areas often feature microclimates distinct from the surrounding environment. Cool, moist air and soil can support dense and diverse vegetation. Due to their proximity to water, riparian zones often require extra care to prevent erosion. This sample site plan illustrates use of stone for walkways and to reinforce creek beds as means to minimize erosion. The vine trellis is constructed of non-flammable metal to minimize fir hazard. Dense, naturally-occurring vegetation is complemented by perennial beds and fruit trees.

Sample elements of a lower montane riparian area landscape

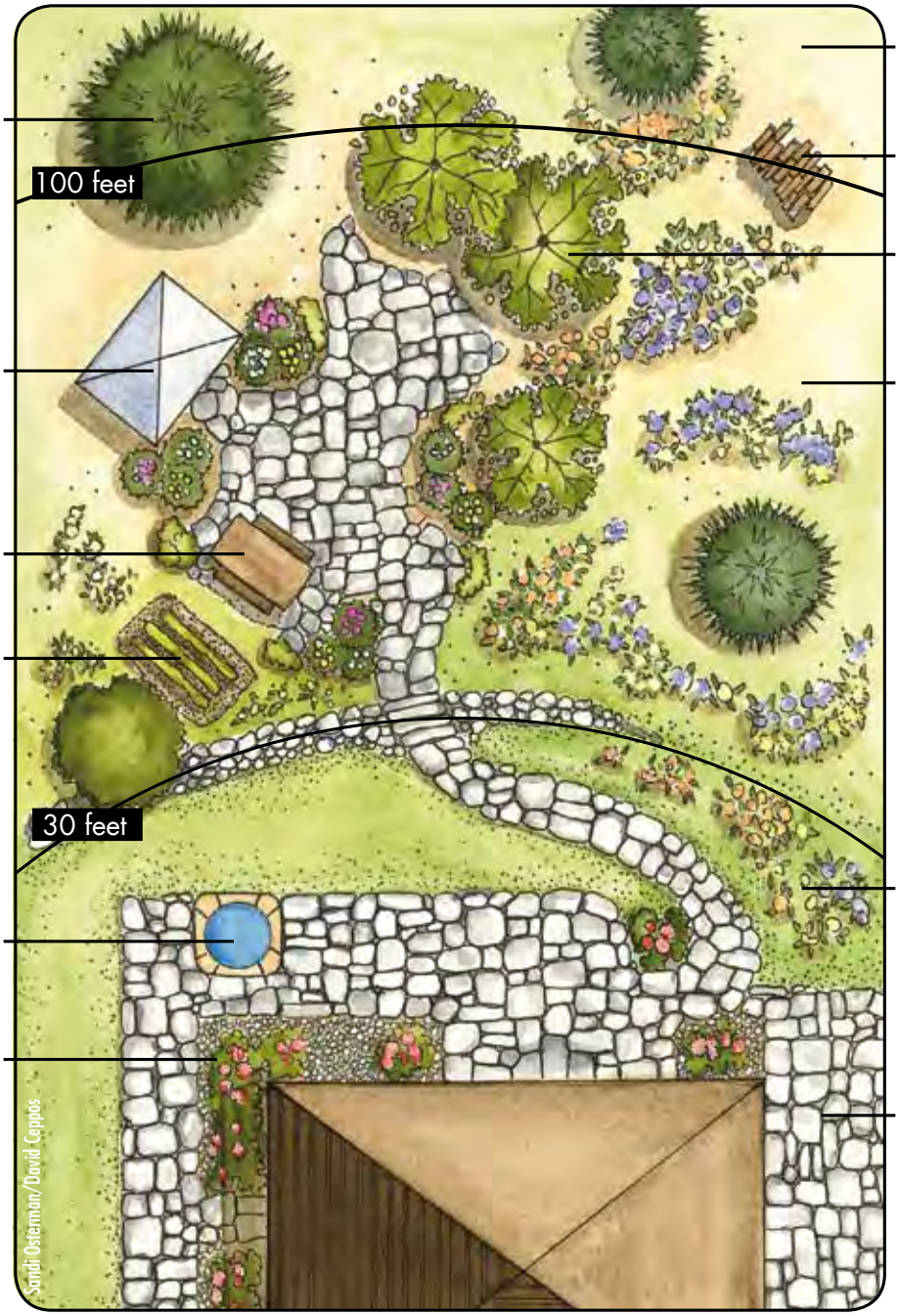
Michelle Sweeney


Michelle Sweeney

Michelle Sweeney

Nature provides tools and examples that the creative gardener can apply to the yard. Stones, driftwood, and vegetation with hearty root structure can all contribute to minimizing soil erosion and keeping waterways clean and free of sediment and debris.

Sample site plan: Upper montane mountain meadow



This sample site plan features a summer outdoor BBQ and dining area. This area is situated distant from the house in order to keep the propane tank away from the house. In the event of wildfire the tank would be a hazard. This dining area also reaps the aesthetic benefits of the naturally-occurring meadow grasses and flowers.

Sample elements of an upper montane meadow landscape

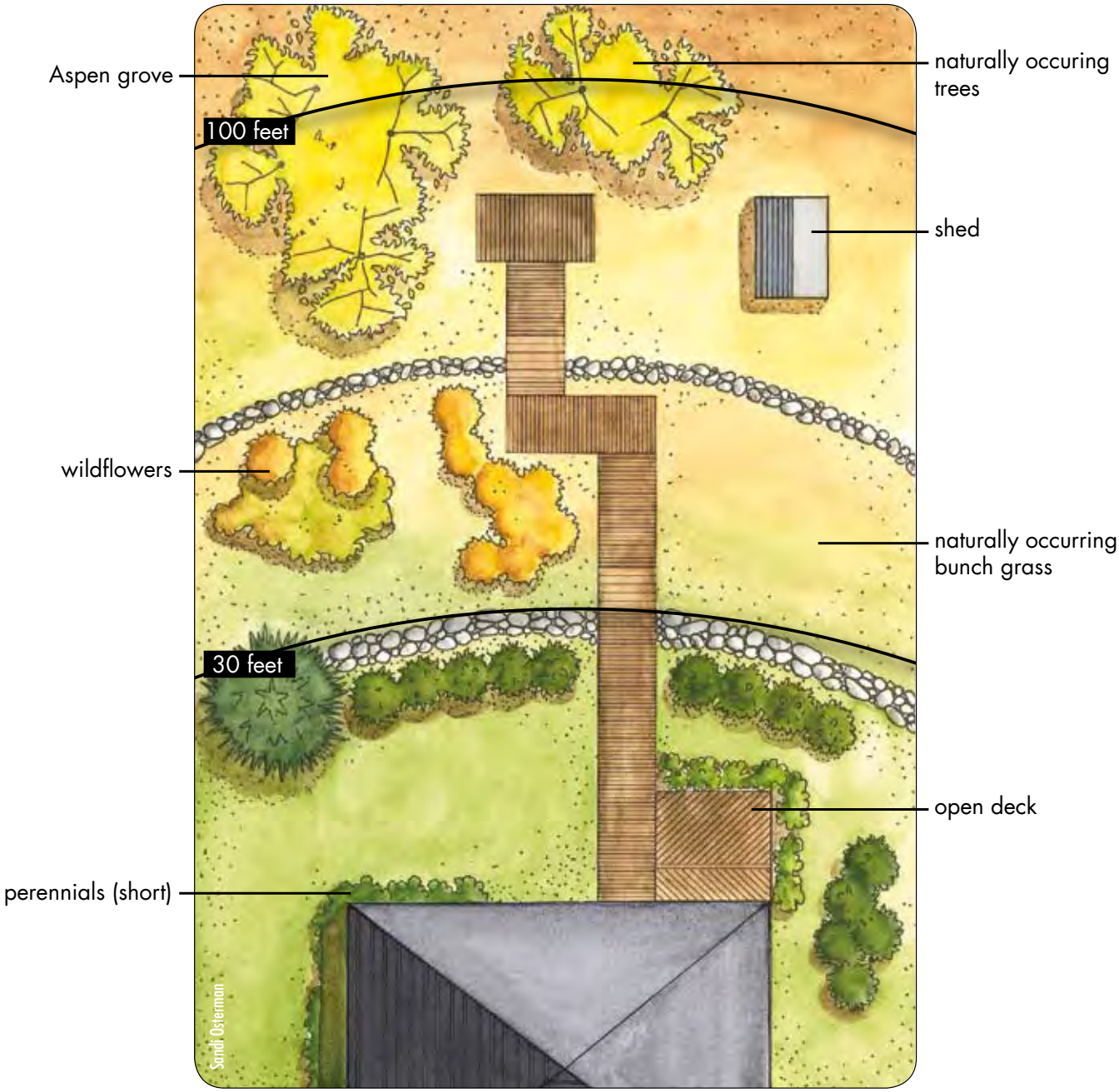
Michelle Sweeney

Michelle Sweeney

Michelle Sweeney

Meadows can provide exceptional habitat for native plants and animals. Eliminating the use of pesticides and being cautious not to introduce invasive species are particularly important practices in these sensitive, naturally-abundant areas.

Sample site plan: Eastern Sierra Nevada slope



While the geology of the Eastern Sierra Nevada is stunning, it is also the reason for the shallow soils and steep slopes that challenge the casual gardener. This sample site plan features a walkway to minimize soil compaction and erosion on steep slope. Also featured are well-maintained wildflowers and grasses which add rich hues to a yard in the autumn. Some irrigation is applied in proximity to the house in order to maintain a green zone that is less prone to fire.

Sample elements of an Eastern Sierra Nevada slope landscape

Michelle Sweeney

Michelle Sweeney

Michelle Sweeney

Aspen groves are like oases among the arid, steep slopes of the eastern Sierra Nevada. Beautiful, open aspen woodlands are on the decline in the Sierra due, in part, to fire suppression and drought. Maintaining landscapes that are clear of underbrush and dense vegetation can make room for aspen and reduce fire danger.

Create your site plan

Creating your site plan is fun. This is where you first see your ideas take shape. Your site map will include several layers of drawings, or site maps. The base map will depict the existing features of your outdoor space. On top of the base map, layers drawn on tracing paper will depict the future features of your site. Some helpful tools for creating the layers of your site plan are as follows:

- A 100-foot tape measure
- Ruler and yard or meter stick
- String and string level to help visualize boundaries and dimensions of garden elements
- Pencils
- Graph paper (2 feet wide by 3 feet long and imprinted with 8 squares per inch works well)
- Tracing paper or very thin paper (you can see through) 2 feet wide by 3 feet long (several sheets of these)
- T-square

You may want to take photos of your yard to supplement your site plan. Photos can help record details, like locations of sun and shade at different times of year, and also to record your landscaping progress.

The site plan maps can include:

- Existing features portrayed through your base map
- The integrated zone and island approach boundaries at 30 and 100 feet
- Structures layer
- Irrigation layer
- Vegetation layer
- Soil conservation layer
- Water or stream zone layer
- Wildlife habitat layer

Mapping your existing yard

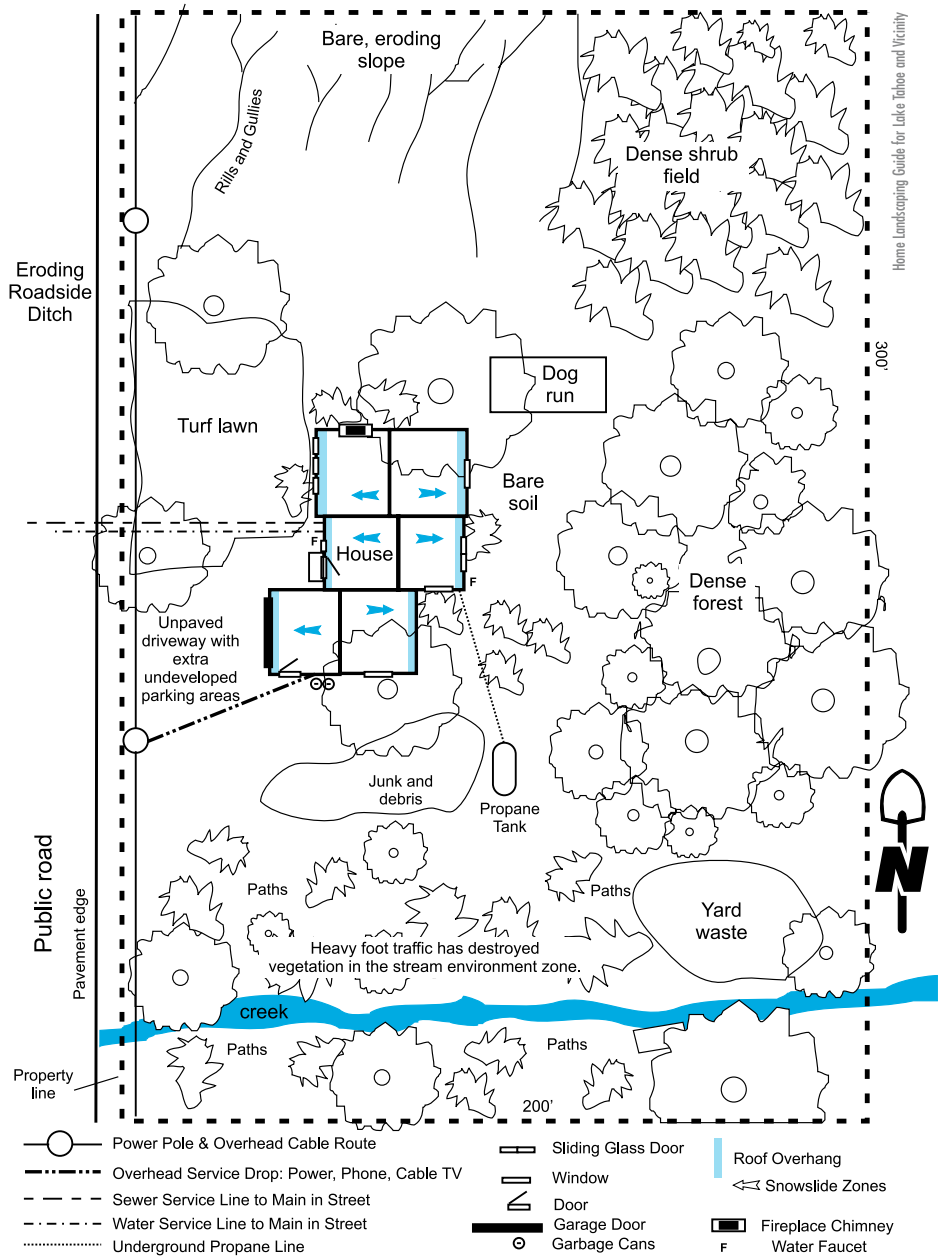
The base map is a scale drawing showing existing characteristics of your outdoor space. Any features that currently exist should be in the base map. Draw to scale so that you are able to fit items onto your map in correct proportion to the site. Indicate existing features that you plan to change or remove with a dashed line (or pencil instead of pen) so that these will fade in the background when you overlay your new plans for that space on top of this base map.

Your base map is a scale drawing of existing features.
Start by doing a scale drawing that shows all existing characteristics of your site. Do this drawing on the 2-by-3 foot graph paper. You will likely find it helpful to include dimensions. Do not include desired features on this base map, those will come later. Draw the following features on your base map as they pertain to your yard. In all cases where there is an existing feature that you intend to remove, outline that feature with a dashed or distinguishing line so you recognize that it will not be there later.

- ☐ Boundary of the yard
- ☐ Structures—Draw the outline of existing structures and their dimensions.
- ☐ Pavement and decks—Draw existing pavement and decks and their dimensions.
- ☐ Irrigation and drainage features—Draw existing irrigation features: sprinklers, hoses, drip lines etc. Draw existing drainage features: ditches, collection areas (intended and unintended), drip lines or areas where rain gutter water and debris is deposited.
- ☐ Microclimate features—Basic symbols (see illustration) are an easy way to depict existing water, soil, sun and slope features such as warm, sunny spots and cool, shady areas. Depict windy areas if these are a major feature of your site.

- Vegetation—Basic symbols are an easy way to depict characteristics of existing vegetation on your site.
- Other key factors—Utility lines coming into the house, crossing beneath the yard or overhead; Location of hose faucets; Overhang of the roof and areas that will be affected by snow or rain coming off the roof.
- Topography - Indicate the following on your base layer about the topographical features of your yard:
  - Streamside areas, wetlands or areas adjacent to a lake or beach
  - Yard elevation
  - Views you want to preserve
  - Elevation contour lines (in 2-foot intervals)
  - Downward direction of slopes with arrows indicating the steepness of the slope as a percent (measure the grade using a string level and yardstick. A 20 percent grade indicates the ground falls or rises 2 feet for every 10 feet of travel).

Sample base map

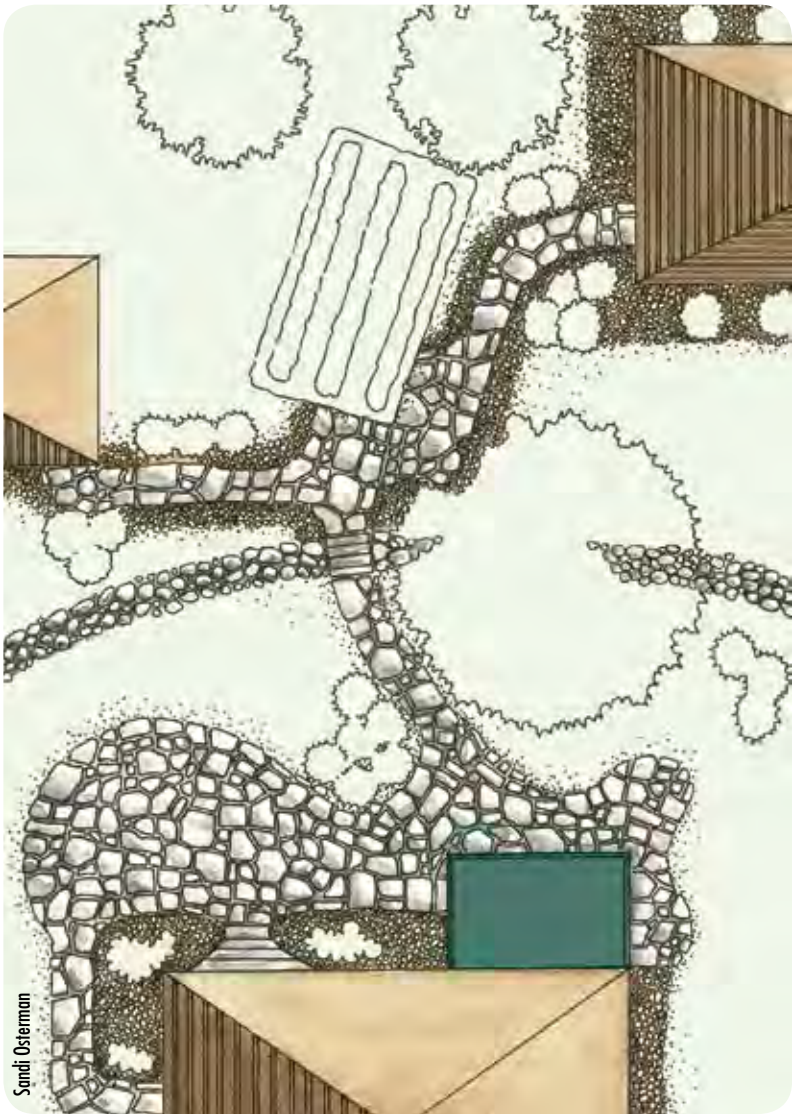


Mapping your ideas—new layers of the site plan

Your base map is the foundation layer of your site plan, which will include several layers. The next layers you draw will show what you want your outdoor space to look like in the future. It is recommended that you draw several different site plan layers to depict the features you plan to incorporate into your site; such as one for structures, one for vegetation and one for irrigation. Consider the themes of your outdoor space project and plan to draw map layers for the significant ones. For example, if you are emphasizing wildlife habitat, you will want to do a unique map layer for the features you will incorporate for wildlife. Using tracing paper (or some kind of thin paper you can see through) for each layer is suggested. These layers will show the features you want in your yard, overlaid over the ones that are already there. Any features that currently exist should be on your base map. Draw the new layers to scale so that you are able to fit items into your map in correct proportion to the site. It is likely that as you move into the implementation phase of your project, features will shift, change shape or be eliminated: try to remain loose and flexible. Check out useful references in the Yard and Garden How-To section of this book as you draw your site plan layers.

Drawing the site plan layers: future structures layer

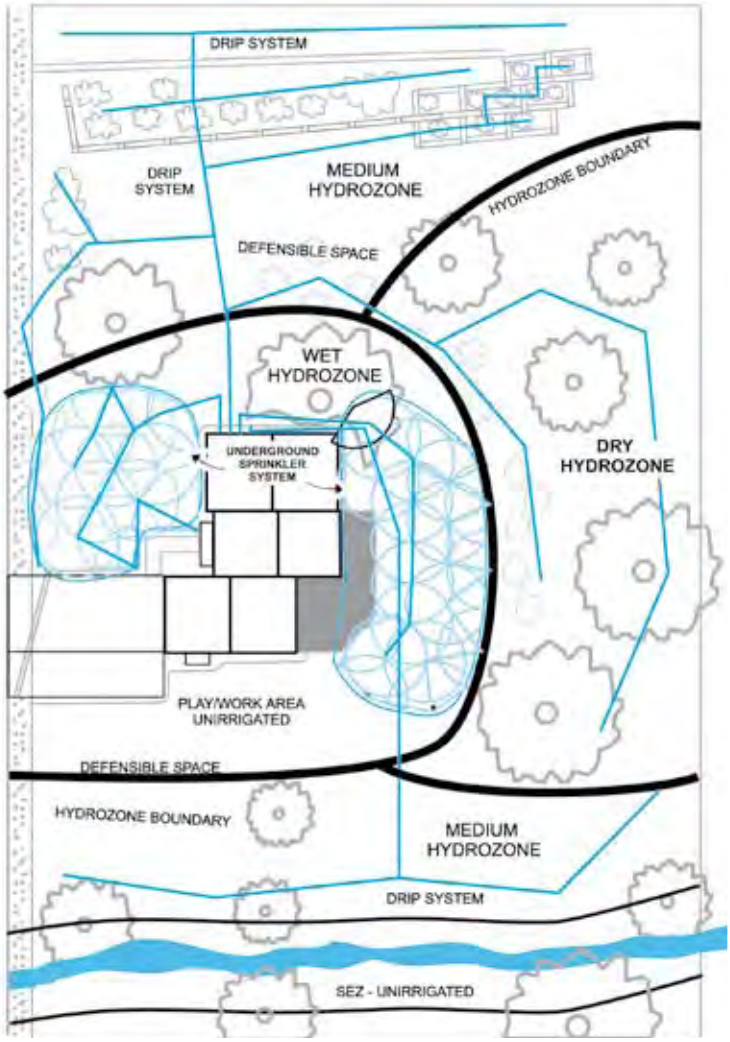
- Lay tracing paper over your base layer.
- Label this the Site plan structures layer.
- Indicate the 30 and 100-foot distances from the house or other existing structures.
- Draw the outline of structures you intend to install on the tracing paper.
- Plan to use non-flammable materials for your intended structures wherever possible; but keep in mind that fences, benches, chairs, sheds, decks or any other items that you intend to construct of flammable material (such as wood) should be outside of the Lean Clean and Green zone.
- Keep in mind propane barbecue tanks are explosive and highly flammable if wildfire approaches your house. If possible, plan for barbecue areas outside of the Lean Clean and Green zone, and create an erosion-minimizing footpath from the outdoor barbecue and dining area to the house.



Drawing the site plan layers

Drawing the site plan layers: irrigation layer

- Temporarily remove other tracing paper layers from the base layer except the vegetation layer, keep this below your new, blank paper.
- Lay tracing paper over your vegetation layer.
- Label the new layer the Site plan irrigation layer.
- Remember, existing vegetation areas (and trees) that you plan to keep should already be indicated on the base layer.
- Indicate the 30 and 100-foot distances from the house or other existing structures.
- Draw the outline of the areas where you intend to install irrigation on the tracing paper.
- Draw the outline of areas where you plan to plant on the tracing paper.
- Give generic labels to plant types for each area. (See the sample site plans for examples, such as: perennial area, groundcover area etc.)
- Keep in mind that only low-growing, green plants go in the Lean Clean and Green zone.
- The Lean Clean and Green zone is the most likely to require some kind of irrigation.
- See the discussion on irrigation in the Yard and Garden How-To section of this book to match the kind of irrigation infrastructure to the needs of the vegetation you will support in different areas of the yard. It is likely that different vegetation will require different irrigation infrastructure. Matching the irrigation type to the vegetation's requirements will help your garden flourish while conserving water.



Home Landscaping Guide for Lake Tahoe and Vicinity

Draft a timeline and budget for your project

You first see your ideas take shape and begin to come together in your site plan. Drawing out your project timeline and project budget is the next step toward making your ideas a reality. As with your site plan, your timeline and budget are unique to your project. Following are some step-by-step generic suggestions for creating the timeline and budget. Use these suggestions as a starting place for creating your own tools. For more information and insight into the factors to consider in design of your timeline and budget see the Yard and Garden How-To chapter of this book.

Creating your project timeline

- Look at your Top Priority Items page and the preliminary timeline you crafted with it.
- Now look at your site plan drawings (all layers).
- Using your Top Priority Items as headings, and your site plan drawings to inform the details, create a new list which details all of the steps required to realize each of your Top Priority items. (Using a computer for this step will make later updates and revisions easier than re-doing the list each time. Just print out your list and put it in your Design Notebook.)
- Create a parallel list titled Task List that itemizes the work to be done. For example, the hot tub project and the sprinkler project may both require water line infrastructure installation. In this instance, "Water line infrastructure installation" is an item in the Task List.
- Sequence the items on the Task List so that the ones that need to be done earliest (debris or tree removal) are first and the ones that are done last (plant new perennials) show up at the end of the list.
- Expand or contract your timeframe as makes sense given your Task List.
- Draw a new timeline.
- Write down the Task List items next to reasonable estimates of dates and timeframes for doing the projects.

Budget considerations

Consider the following in assembling your budget. This list is intended to trigger your thinking—not to be comprehensive!

- Over what period of time will you implement your projects?
- Will you hire help or do the work yourself?
- Do you have the tools you will need or do you need a tool budget?
- Is significant tree or vegetation removal involved? If so, it is wise to hire licensed professionals who are insured to do large tree removal. Call a tree removal specialist to help you estimate the cost of the work.
- Are permits required for any of the work you will be doing? If so, include the cost of these in your estimate. Your county or city offices will have this information in many cases.
- Will you be doing regular maintenance yourself or hiring yard maintenance help for things like grass mowing and basic plant maintenance?
- How much are you changing your site and how much will new vegetation cost?

Use your estimated project budget to inform your design decisions. For example, if you are way over budget and there is no way you can possibly do all the tasks, then adjust your site plan and task list accordingly. Or, if you can do all of the projects you have outlined but it will take a bit longer or a bit more money than you thought, adjust your timeline to reflect your expectations.

Creating your estimated project budget

- Look at your Task List Items from the timeline exercise.
- Create a table (a computer program such as Excel is an easy tool for doing this).
- Label the table Estimated Project Budget and the date.
- Make your Task List the left column in the table. Label it, Task List.
- Label, across the top, 3 more columns: Materials, Assistance, and Other.
- Make an initial estimate of the cost of materials, assistance and any other relevant costs you can think of for each Task List item. Put this estimate in the corresponding box in the table.
  Depending upon the scale of your project you may be interacting with a number of people providing services over the life of your outdoor space project—people with expertise in: trees, irrigation, garden design, stonework etc. Your project may involve work that requires permits from local government. In other words, for projects of any size, recognize that your timeline is only a draft and your budget an estimate.

Congratulations! Now you have a complete Design Notebook containing

- Your site plan including your base layer, structures, vegetation and irrigation layers (and whatever other layers are relevant to your project)
- Your outdoor projects budget
- Your outdoor projects timeline
- Your Yard and Garden journal

Make your Design Notebook a constant companion when working on your garden or yard project. Your site plan will be particularly useful for remembering and communicating with others what you have in mind.

Quick Design worksheet

Having read this chapter and considered its recommendations and questions you are now able to answer these basic garden questions. If you have not already done so, be sure to record your answers to the following in your Yard and Garden journal.

- ☐ Do you need landscaping to provide shade during the summer, but not in the winter months?
- ☐ Do you want to protect or enhance significant views?
- ☐ What types of plants already grow on your site? Which ones do you plan to keep or remove?
- ☐ Are there any unique, natural features on the site that should be part of a final plan?
- ☐ Where will you want public areas, semi-public areas and private areas?
- ☐ Should your design provide visual or physical connections to neighboring properties or not and how?
- ☐ Do you need to design around elements such as power lines or livestock pens?
- ☐ Where do you want play areas, parking, decks, future buildings, etc. located?
- ☐ Where do you want paths, or other elements not already mentioned?
- ☐ Where will entry points be into structures? Should one be the primary and one be the secondary entrance, or should they be the same?
- ☐ How much time to you want to spend maintaining the yard, and how much money do you want to invest?

North central Sierra spring blossoms

Feature: Mary Burnside • Springville, California

Landscaper: Quercus Landscape Design
Sierra Nevada zone: Foothill
Conservancy Sub-Region: Southern
Elevation: 900 feet
Watershed: Tule
Focus: Birds, blending landscape with surrounding wildlands
Yard Size: 4.5 acres
Favorite Resource: Peyton Ellas, her landscape designer

Mary Burnside with her cat Gypsy on their evening walk through the garden.

Every evening at dusk, Mary Burnside's cat, Gypsy, follows her as she circles the gardens of Many Birds Farm. They walk through the sage garden, the oak canyon, the manzanita meadow, the bird meadow. They walk along a line of olive trees and by a tumble-down rock wall, through Mary's beloved bird meadow usually flush with activity, and in among the different clusters of native and adapted plants. She pauses to rest at a seating area overlooking a native grass and wildflower meadow, alive with dragonflies, pollinators and birds.

Springville, a little town in the Sierra Foothills, is where Mary grew up. Her father was a logging contractor and worked along the Tule River. She moved first for college and then a successful career in software in the San Francisco Area. But when it came time to retire, Mary moved home again, buying a four-and-a-half acre parcel in Springville. She always had a small garden, but landscaping the two-and-a-half acres around the house was daunting.

That's where Peyton Ellas came in. Peyton heads Quercus Landscape Design, a native plant based landscape design business. Peyton specializes in using California native plants and creating eco-habitats. Mary didn't want the water dependent gardens she once had in Redwood City or Los Gatos—they didn't fit. She wanted something that worked with the local landscape, welcomed the wild birds she loves to watch, and had both groomed and untouched areas.

Peyton designed the yard, Mary edited. Mary said that the project wouldn't have been possible without Peyton, a great project manager and designer. But it was a back-and-forth process. Both Peyton and Mary designed the garden and the project plan. Mary's participation was essential to the process—to ensure that her vision and her methods were included in the final realization of the garden.

The separate gardens, the sage, manzanita, and so on, were planted with their water needs in mind, in what are called hydrozones. Drip irrigation and (what Peyton describes as) "loads of mulch" further maximize water efficiency on the property.

They planted three species of oaks. Along the property line, they planted olives, not native but adapted to Springville's hot Mediterranean-like climate. According to Mary, "One can only live with so much buckeye." Peyton suggested a jumble wall: rocks pasted together with mud instead of mortar. The wall swiftly crumbles in spots, a kind of speedy antiquing process, looking as if it was there for generations rather than just a year or so. Peyton planted native vines such as wild California grape and native blackberry, along with native grasses and wildflowers, in the mud between the rocks, allowing the plants to cover parts, rooting in the crags. The rocks and the clay used for the wall were collected from the property, which is in the historic alluvial plain of the Tule River. The Tule now runs about a half a mile from her property.

In the beginning of the project, they had a crew of twenty constructing and planting, plus Peyton directing. Now Peyton comes to check up on the yard as needed, and a maintenance man comes once a week. Mary calls herself an armchair gardener. Being an armchair gardener includes, in Mary's definition: knowing about the plants in her yard

Mary's house overlooking a fall, mostly hibernating, landscape.

and taking daily walks in among the garden, noting the wall or the birds in her bird meadow, having some quality time with Gypsy. It means having a general appreciation "for being among the growing."

The birds Mary hoped for in her plans came in abundance. There are plenty of shrubs for birds to hide in and take up residence. There are trees for perching in. There is nectar to drink and many bushes are flush with berries to eat. Water misters rise from the jumble wall, and Mary often sees birds, wings outstretched, hopping about on the mister for a bath. She sees a lot of what she calls, "the common birds": redwing blackbirds, morning doves, and sparrows. She also spots quail, western bluebirds, pheasant, goldfinches, house finches, several species of hawks who nest in the neighbor's pine trees, killdeer, acorn woodpeckers, and an owl who lives in her owl house. A bat house will go up this winter.

Peyton says that whenever she suggests a modification or new plant for the yard, Mary asks, "Will the birds like it?" If yes, then the idea is a go. "The birds pretty much like it all," Peyton adds, laughing. "So that makes it pretty easy for me."

Mary's garden is now almost complete. Just a few final touches are left. And it is an ongoing process of maintenance and modification. For example, a tree the crew had planted in front of her porch grew much taller than expected, blocking her view. Instead of cutting it down she hired a crew to move the porch, restoring her view and keeping the tree. It isn't just building the walls and planting the flowers, shrubs and trees. It is modifying, maintaining, and enjoying that space around her that she enjoys. The time is worth it to Mary—for the dip and soar of birds in her meadow and the evening walks in her garden.

Stephen Ingram

4 Plant Selection Guide

Michelle Sweeney

Select plants that thrive in your area for yard and garden success. Selecting the correct plant for your yard should be based on your understanding of your general climate, soil type and microclimate. As discussed in chapter 2, *Observe*, your yard has an almost unique set of conditions that include elevation, average and lowest temperature, number of frost free days, amount of shade and rain or snowfall amounts.

There are some very hardy plants that can be recommended for each region that are likely to do well. This chapter, Plant Selection Guide, gives a general profile of some plants to get you started in thinking about your personalized plant selection. In general, local plant nurseries are the best source of information about plants available for your area.

Plant Selection Guide

Michelle Sweeney

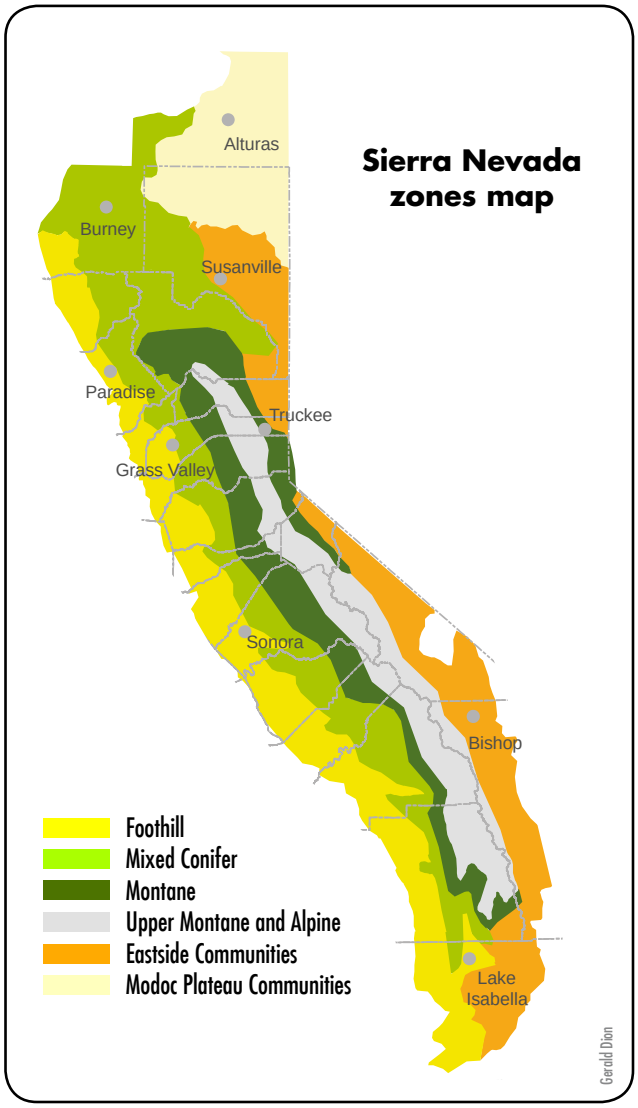
Contents

Regional plant recommendations 101

Foothill plants 101
Montane plants 101
Mixed conifer plants 101
Eastern Sierra plants 101
Modoc Plateau plants 101

Plant descriptions 102

Trees 102
Shrubs 104
Groundcovers 106



Regional plant recommendations

Foothill plants
Zones 7a - 9a (USDA cold hardiness map)
Zone 7 (Sunset)

Trees
Crape myrtle – *Lagerstroemia indica*
Trident maple – *Acer buergeranum*
Various crabapple species – *Malus spp.*
Various oak species – *Quercus spp.*
Various pine species – *Pinus spp.*

Shrubs
Bush anemone – *Carpenteria californica*
Western redbud – *Cercis occidentalis*
Sage species – *Salvia spp.*
Shrubby cinquefoil – *Potentialla fructiosa*
Toyon – *Heteromeles arbutifolia*

Groundcovers
Bearberry – *Arctostaphylos uva-ursi*
Creeping mahonia – *Mahonia repens*
Evergreen current - *Ribes viburnifolium*
Rockrose – *Cistus spp.*
Rosemary – *Rosemarinus officinalis*

Montane plants
Zones 7a - 8b (USDA cold hardiness map)
Zone 1 (Sunset)
Plants in this zone need to tolerate heavy snow loads which could break branches of trees and shrubs.

Trees
Blue spruce – *Picea pungens glauca*
Chokecherry – *Prunus virginiana*
Flowering crabapple – *Malus spp.*
Jeffrey pine – *Pinus jeffreyi*
Quaking aspen – *Populus tremuliodes*

Shrubs
French lilac – *Syringa vulgaris*
Mountain spirea – *Spirea densiflora*
Pink currant – *Ribes nevadense*
Redtwig dogwood – *Cornus sercia*
Shrubby cinquefoil – *Potentilla fructiosa*

Groundcovers
Bearberry – *Arctostaphylos uva-ursi*
Creeping mahonia – *Mahonia repens*
Evergreen Candytuft – *Iberis sempervirens*
Stonecrop – *Sedum spathulifolium*
Wild strawberry – *Fragaria virginiana*

Mixed conifer plants
Triplants from the Foothill and Montane Region

Eastern Sierra plants
Zones 4a - 8b (USDA cold hardiness map)
Zones 1, 2 and 11 (Sunset)
Plants in this zone need to tolerate very low temperatures.

Trees
Blue spruce – *Picea pungens glauca*
Flowering Cherry – *Prunus sargentii*
Flowering crabapple – *Malus spp.*
Quaking aspen – *Populus tremuliodes*
Western red birch – *Betula occidentalis*

Shrubs
French lilac – *Syringa vulgaris*
Mountain spirea – *Spirea densiflora*
Pink currant – *Ribes nevadense*
Redtwig dogwood – *Cornus sercia*
Shrubby cinquefoil – *Potentilla fructiosa*

Groundcovers
Bearberry – *Arctostaphylos uva-ursi*
Bearberry Cotoneaster – *Cotoneaster dammerii*
Creeping thyme – *Thymus praecox arcticus*
Evergreen Candytuft - *Iberis sempervirens*
Stonecrop – *Sedum spathulifolium*

Modoc Plateau plants
Zone 5b - 7b (USDA cold hardiness map)
Zone 1 (Sunset)
Plants in this zone need to tolerate very low temperatures.

Trees
Blue spruce – *Picea pungens glauca*
Chokecherry – *Prunus virginiana*
Flowering crabapple – *Malus spp.*
Jeffrey pine – *Pinus jeffreyi*
Western red birch – *Betula occidentalis*

Shrubs
French lilac – *Syringa vulgaris*
Mountain spirea – *Spirea densiflora*
Pink currant – *Ribes nevadense*
Redtwig dogwood – *Cornus sercia*
Shrubby cinquefoil – *Potentilla fructiosa*

Groundcovers
Bearberry – *Arctostaphylos uva-ursi*
Bearberry Cotoneaster – *Cotoneaster dammerii*
Creeping thyme – *Thymus praecox arcticus*
Idaho blue fescue – *Festuca idahoensis 'Siskiyou Blue'*
Stonecrop – *Sedum spathulifolium*

Plant descriptions

Each of the recommended plants is described with the following information:

- Common and Scientific Name
- Sun/Shade tolerance
- Moisture requirements
- Growth rate
- Deer resistance
- Fire hazard

Fire hazard and deer resistance notes

Given right conditions all plants will burn. Some plants are more prone than average to promote fire spread and intensity. These plants produce flammable oils or create a lot of flammable wood and leaves. The majority of plants recommended here create a lower-than-average fire hazard. Select plants that are below average fire hazard for your Lean Clean and Green zone.

Deer resistant plants are ones that deer would not walk across the street to eat, and in fact would likely avoid until more delectable plants are gone. However, deer may still eat the young shoots in the spring.

Trees

Black Oak
Quercus kelloggii
Zone: varies
Deciduous, moderate growth, sun to part shade, moderate to low water
Deer resistant: No
Fire hazard: high
Notes: Black oak (Quercus kelloggii) is most common in the Foothills, but you may also find other Western natives including Valley oak (Q. lobata), Blue oak (Q. douglasii) and Interior live oak (Q. wislizenii).

Blue spruce
Picea pungens glauca
Zone 2 (USDA) 1-10 (S)
Evergreen, moderate growth rate to 50 feet, full sun, moderate water
Deer resistant: Yes
Fire hazard: unknown
Notes: easy to establish, nice shape, green and blue varieties

Crape myrtle
Lagerstroemia indica
Zones 7-9 USDA and 7-10 (S)
Deciduous, full sun, infrequent water, moderate growth to 25′ – depending on variety
Deer resistant: Yes
Fire hazard: No
Notes: Very drought and heat tolerant, flowers all summer, great fall color.

Flowering Cherry
Prunus sargentii
Zone 5 USDA and 1-7 (S)
Deciduous, moderate growth, full sun, moderate water
Deer resistant: Yes
Fire Hazard: No
Notes: Primarily sold by named variety – many to choose from.

Flowering crabapple
Malus spp.
Zone 3 USDA and 1-21 (S)
Deciduous, moderate growth from 6-30 feet, full sun, moderate water
Deer resistant: Yes
Fire hazard: No
Notes: There are more than 200 named varieties, check your local nursery for the ones that perform best in your area.

Quaking aspen
Populus tremuliodes
Zone 1 USDA
Deciduous, fast growth 20-60 feet, sun to part shade, moderate to high water
Deer resistant: Yes
Fire hazard: No
Notes: Performs poorly at low elevations. Do not plant near pavement, sewer or septic lines. Their roots are invasive, and they form suckers.

Western chokecherry
Prunus virginiana demissa
Zones 5-10 USDA and 1-3, 10 (S)
Deciduous, moderate growth 20 feet, full sun, moderate water
Deer resistant: unknown
Fire hazard: No
Notes: Good fall color, tiny white flowers, astringent fruit

Jeffrey pine
Pinus jeffreyi
Zone7 USDA
Evergreen, moderate growth to 60 feet, full sun, moderate water
Deer resistant: Yes
Fire hazard: Yes
Notes: Use Jeffery pine at higher elevations and Ponderosa pine in the Foothills. Douglas fir (Psuedostuga menziesii) is also a nice alternate with similar habit and requirements.

Trident maple
Acer buergeranum
Zone 5-8 USDA and 4-9, 14-17 (S)
Deciduous, sun to part shade, moderate water
Deer resistant: Yes
Fire hazard: No
Notes: Use Vine maple (*Acer circinatum*) at higher elevations.
Various oak species
Quercus spp. (Show Q. Kelloggii)

Western red birch or Water birch
Betula occidentalis
Zone 2 USDA
Deciduous, fast growth to 15 feet, sun to part shade, high water
Deer resistant: Yes
Fire hazard: No
Notes: Shallow roots.

Shrubs

Bush anemone
Carpenteria californica
Zone 8 USDA and 5-9 Sunset
Evergreen, moderate growth to 5 feet, sun to part shade, low water
Deer resistant: Yes
Fire hazard: No

French lilac
Syringa vulgaris
Zone 3 USDA and 1-11 (S)
Deciduous, moderate growth to 20 feet, full sun, moderate to high water.
Deer resistant: Yes
Fire hazard: No
Notes: There are many varieties to choose from. All varieties take 2-3 years to fully establish

Western redbud
Cercis occidentalis
Zone 8 USDA and 2-24 Sunset
Deciduous, moderate growth to 20 feet, full sun, moderate to low water.
Deer resistant: Yes
Fire hazard: No
Notes: Native below 4,000 feet.

Mountain spirea
Spirea densiflora
Zone 5-9 USDA and 1-9 Sunset
Deciduous, moderate growth to 3 feet, sun to part shade, moderate water
Deer resistant: Yes
Fire hazard: No
Notes: There are many named varieties

Pink currant
Ribes nevadense
Zone 5b to 8b USDA and 4-9 Sunset
Deciduous, moderate growth to 6 feet, part shade, moderate water
Deer resistant: Yes
Fire hazard: No

Redtwig dogwood
Cornus sericea
Zone 2-7 USDA and 1-9 Sunset
Deciduous, moderate growth to 8 feet, sun to part shade, moderate to high water
Deer resistant: Yes
Fire hazard: No
Notes: Purple-red fall color.

Shrubby cinquefoil
Potentilla fruticosa
Zone 2-7 USDA and 1-11 Sunset
Deciduous, moderate growth to 4 feet, sun to part shade, moderate to low water
Deer resistant: Yes
Fire hazard: Yes

Sage species
Salvia spp.
Zone varies, some as low as Zone 4 USDA
Evergreen perennial, moderate growth, full sun, low water
Deer resistant: Yes
Fire hazard: Yes

Toyon
Heteromeles arbutifolia
Zone 7a to 11 USDA and 5-9 Sunset
Evergreen, moderate to slow growth to 10 feet, sun to part shade, low water
Deer resistant: Yes
Fire hazard: Yes

Resource: For more ideas on plants to select in the Sierra Nevada try: *Wildflowers of Placer and Nevada County* available from the Redbud Chapter of the California Native Plant Society. http://www.redbud-cnps.org/

Coyote

John Muir Laws ©2007, used with permission.

Groundcovers

Bearberry
Arctostaphylos uva-ursi
Zone 2 USDA and 1-9 Sunset
Evergreen, slow to moderate growth, sun to part shade, low water
Deer resistant: Yes
Fire hazard: Moderate
Notes: Good for erosion control.

Bearberry cotoneaster
Cotoneaster dammerii
Zone 5 USDA
Evergreen, fast prostrate growth 68 inches tall and 10 feet wide, sun to part shade, low water once established
Deer resistant: Yes
Fire hazard: No
Notes: Several varieties available. Good for erosion control.

Creeping mahonia
Mahonia repens
Zone 3 USDA and 2b-9 Sunset
Evergreen, slow to moderate growth, sun to part shade, low water
Deer resistant: Yes

Creeping thyme
Thymus praecox arcticus
Zone 5 USDA and 1-24 Sunset
Evergreen, moderate growth to 18 inches wide, full sun, moderate to low water
Deer resistance: Yes
Fire hazard: Yes
Notes: Many varieties to select from.

Evergreen candytuft
Iberis sempervirens
All USDA Zones
Evergreen perennial, moderate growth to 1 foot, full sun, regular water
Deer resistance: Yes
Fire hazard: No
Notes: Good for edging, rock gardens and small groundcover areas.

Evergreen current
Ribes viburnifolium
Zone 6 to 10 USDA and 7-9 14-24 Sunset
Evergreen, low-growing and trailing, partial shade, moderate water
Deer resistant: Yes
Fire hazard: No
Notes: Good under native oaks.

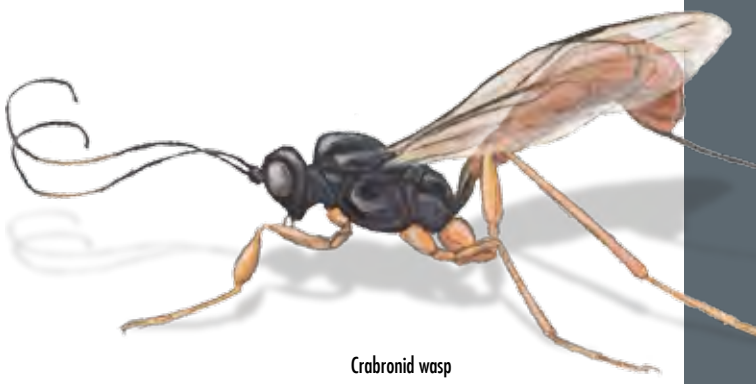
Idaho blue fescue
Festuca idahoensis 'Siskiyou Blue'
All USDA Zones
Evergreen, moderate growth, full sun to part shade, moderate to low water
Deer resistant: Yes
Fire hazard: No

Rockrose
Cistus spp.
Zone 7a USDA, 7-9, 12-24, borderline in 4-6 Sunset
Evergreen, full sun, little or no water once established
Deer resistant: Yes
Fire hazard: Yes
Notes: Many varieties available. Hardy to 15 degrees F.

Rosemary
Rosemarinus officinalis
Zone 7a USDA and 4-24 Sunset
Evergreen, moderate growth, full sun, moderate to low water
Deer resistance: Yes
Fire hazard: Yes
Notes: Look for varieties that are prostrate and cold hardy.

Stonecrop
Sedum spathulifolium
All USDA Zones
Evergreen, ground cover with short trailing stems, sun or part shade, no water in cool summer areas once established
Deer resistant: Yes
Fire hazard: No
Notes: Great native rock garden plant or for small ground-cover areas.

Wild strawberry
Fragaria virginiana
All USDA Zones
Evergreen, trailing habit, sun to part shade, moderate water
Deer resistant: May be eaten in some areas
Fire hazard: No



Crabronid wasp

John Muir Laws ©2007, used with permission.

Feature: Catherine & Scott Cecchi, South Lake Tahoe, California

Sierra Nevada zone: Upper montane (Jeffrey pine habitat)
Elevation: 6,237 feet
Watershed: Upper Truckee
Focus: Defensible space/fire prevention
Yard size: 1/4 acre
Favorite resource: Home Landscaping Guide for Lake Tahoe and Vicinity and Aspen Hollow Nursery, in Lake Tahoe (really helpful people)

Do Lee

Catherine Cecchi with her baby daughter, Sophia

Scott and Catherine Cecchi were on their way down from a hike at Echo Lake not ten miles from their home when they saw it. What had been a Saturday night smoldering campfire had grown hungry. Then the wind picked up, starting what would become the Angora Fire. Their 3 week old, Sophia, was snug to Catherine's chest in a carrier.

Once home, Scott got on the roof to sweep pine needles. While he was up there he threw some sprinklers on for extra measure. After that, a firefighter friend called to warn, "They're not going to get this one." Catherine said, "That totally blew my mind, I was like, what do you mean you're not going to get it? It's going to burn my house down?" Scott was down from the roof and packing up when the sheriff came to their door with an order to evacuate. They were lucky enough to have seen it coming; their neighbors only had the 30 minute evacuation to prepare. They went an hour and a half northeast to Reno to wait out the fire. By the time the fire was contained, 242 structures—many of them in Scott and Catherine's neighborhood—were lost.

The year before the fire Scott and Catherine had put in a great deal of work on their yard. A stone patio for lounging, several beds of native plants, drain rock and borders along the drip lines of their roof, a little seasonal channel routing the natural flow of spring water through their yard, a sprinkler system in the back and a soaker hose in the front, even a little rock lined dip in the driveway channeling water into a containment system adjacent to the asphalt. They had transplanted some unhappy alders, trying to find a more suitable spot. Their Irish moss was just starting to get established between the patio rocks. The natives attracted wildlife: butterflies balanced on the pireya and hummingbirds visited the columbines and scarlet gillias—the busy hummers had a time getting to the drooping gillias, sometimes even resting their bellies on the ground.

Scott and Catherine were prepared, at least in the backyard, for fire. The backyard was mostly low growing native plants, drain rock, and patio within 30 feet of the house. For the most part, they had a low growth, green, clean area in their backyard. There were a few exceptions, like the boat and tools they stored under their porch, or the few trees near the house. They emptied the porch storage area before they left. When the fire came burning hot in the crowns of the trees and swallowed their neighbor's house, the firefighters were able to use the Cecchi's back patio to easily fell three or four trees and hold the line. The clean, flagstone patio, and the low growing natives all helped the house stay safe.

Driving up the Cecchi's road there is one house on the right and there are three on the left. Then the road just keeps going into a forest of rust-colored pine trees and driveways leading to a crumpled chimney stack or a warped metal skeleton of car. When you look out from their patio today, it is enough to make you suck in your breath a little as you think of how close the fire came.

When the Cecchi's learned that their house had not burned, the first thing that came to Catherine's mind was the plants and trees, "You can't get them back, you know? You can get back stuff in your house, but it would take years to get all of these plants and trees to grow back."

The Angora Fire came within feet of the Cecchi's house. This rock patio gave firefighters space to hold the flames at bay.

Stephen Ingram

5 Yard & Garden How-To

You have your Design Notebook in hand. You have verified that your site plan works with your budget. You have outlined approximately how the plan will be implemented over a realistic timeframe. Congratulations! You are ready to pick up a tool or two and start to turn your yard and garden plan into reality. Build time into your calendar for trial and error. Try something, note the results, when you get the results that you want, continue pursuing that course. When you do not get the results you want, try something different. The content in this chapter is arranged into several categories. It is an index, not designed to be read through in one sitting. Go directly to the section you need, when you need it.

Yard & Garden How-To

Michelle Sweeney

Contents

Creating access and securing permits 114

From design to implementation 114

Protecting water, preventing erosion 115
- Best Management Practices (BMPs) 116
- The magic of mulch 119

Protecting stream areas and water bodies 120
- Maintain existing vegetation along stream banks and water bodies 120
- Keep plant nutrients out of ponds, creeks and wetlands 121
- Keep home, yard and garden chemicals out of water bodies 121
- Limit access activity in the stream or wetland area 122

Invasive weeds – be aggressive 122

Irrigating efficiently and effectively 122
- Hydrozones 122
- Types of irrigation systems 123
- Targeting the system for maximum efficiency and effectiveness 127

Preparing the soil, feeding the soil 128
- Organic amendments 128
- Fertilizer 128
- Composting 129

Planting and the first season 130
- Container gardening 130
- How to make a planting bed 131
- Planting tips 132
- Planting trees 132
- Planting shrubs 133
- Planting perennial and annual plants 134
- Sowing wildflowers by seed 134
- After planting and the first season 134
- Vegetable gardening tips 135

Long term maintenance 137
- Maintaining healthy plants 137
- Managing for disease prevention 137

Controlling pests without harming the environment: Integrated Pest Management 138
- Cultural controls 138
- Physical or mechanical controls 139
- Biological controls 139
- Chemical controls 140

Living with wildlife 141
Attracting birds 141
Attracting butterflies 142
Discouraging deer 142
Keeping bears out of trouble 143
Keeping mountain lions out of trouble 143
Dealing with gophers and moles 144

Clearing and wildfire Defensible Space 145
Prevailing wind 146
Plausible fire ignition locations 147
Diligently maintain your Lean Clean and Green zone 147
Slope and fire relationship 147

Swainsons hawk

John Muir Laws ©2007, used with permission.

Creating access and securing permits

Call before you dig. Before you remove any trees or do any substantial digging be sure to identify and map existing home infrastructure such as sewer or gas lines underground, as well as electric, phone or cable lines above ground. Consult with the county or with licensed professionals to identify potential risks of landscaping activities to the infrastructure already in place. Apply for permits well in advance as it can take time to get approval. You may need a permit to cut large diameter trees, do any type of grading of slopes, place retaining walls or do extensive soil removal. In some cases there are specific time frames in which work is allowed, so make sure you apply for and can receive the necessary permits prior to your anticipated construction time frame.

Site Evaluation Checklist

Following are a few items to verify before you start a project. (This list may not cover everything for your project.)

Locate:

- Property lines
- Rights-of-way (check property deed)
- Buried service lines (maps available from utility companies)
- Sewer and septic lines
- Telecom cables
- Water, gas, sewer and electric lines
- Zoning restrictions and permit requirements
- Setback requirements
- Permits
- Erosion control requirements

Evaluate:

- Access for equipment and deliveries
- Physical space to unload
- Adequate ground conditions to support loaded vehicles
- Travel paths for construction related activities
- Storage space for stone, base or bedding material; excavated soil and plants
- Off-site disposal of removed materials

Regarding insurance, consider:

- Homeowner's policy with existing coverage and options to obtain additional coverage as necessary
- Certificates of insurance from all contractors

From design to implementation

With site plan on paper and permits in hand it is the time to flag and mark out your plan on the site to see how it will look. Indicate boundaries for different uses on the site itself. If you are not doing all of the work yourself, having these boundaries marked will help hired assistants understand how you envision things laying out on the ground. Even if you are doing the work yourself, this step will help you get organized. Examples of site preparation include:

- Mark trees, shrubs or vegetation for removal with a ribbon or paint.
- Indicate the line location for installing irrigation, etc. with string between small stakes.
- Mark perimeters of areas where you want to minimize soil compaction, especially tree root zones, with string and small stakes.
- Indicate the exact route and dimensions you want paving to follow using string and stakes.
- Before digging the holes for planting vegetation, place the plants on the bed in the locations where you plan to put them. Evaluate whether distance is ample for future growth and whether the arrangement looks approximately correct.

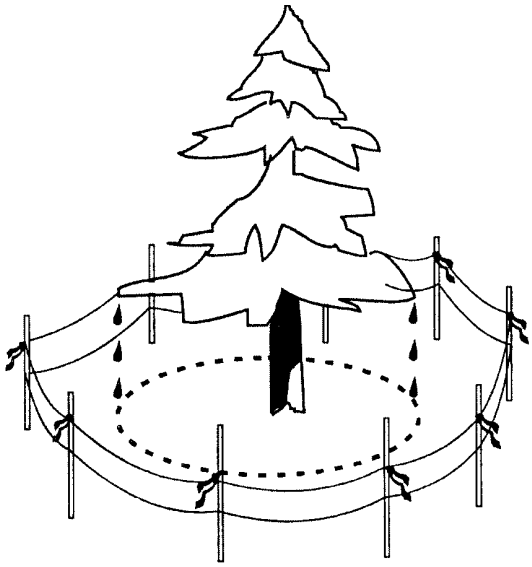
This step is intended to help you take a final, critical look at the way you want things laid out before you do the hard work to put things in place. While this step may take a little extra time, it minimizes the risk that you will have to undo work you have done. This step will also help you recognize how to best sequence and prioritize tasks.

In general, if you plan to upgrade your whole outdoor space, follow a sequence approximately like this:

- site cleanup work and fuel removal
- irrigation/electrical installation (if any)
- structure installation or maintenance
- paving/path installation or maintenance
- planting area preparation
- planting

811 Call before you dig

It is likely that you may have between three and seven underground utilities entering your house. It is critical that you know were they are before you hit one with your shovel. It is the law in California that you "Call before you Dig"— and it has never been easier. From any phone dial 811. This resource line provides information that helps you identify and locate your underground utilities. It is free, and services are provided within a few days.



Home Landscaping Guide for Lake Tahoe and Vicinity

Tree Protection Flagging. Mark the dripline of trees to protect the root zone.

Protecting water, preventing erosion

Throughout your project, keep in mind that soil is the foundation of your yard and garden success. Do everything you can to keep it in place and minimize compaction or other damage during the cleanup and landscaping process. Soil disturbed by grading, contouring, vehicle parking and materials storage is vulnerable to wind and water erosion.

During the planning design stage you may have identified areas in your yard that are currently eroding or areas of high runoff. Controlling erosion, limiting runoff and controlling impacts during installation of garden features are three important ways to protect waterways from sedimentation due to soil erosion.

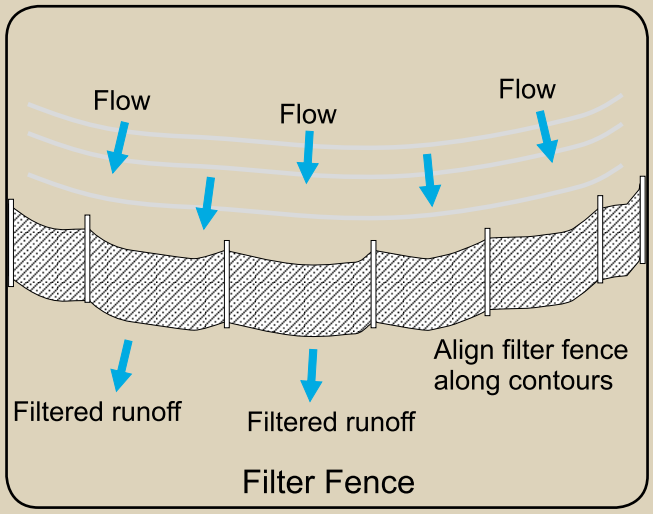
"Soil is the foundation of your landscape and garden."

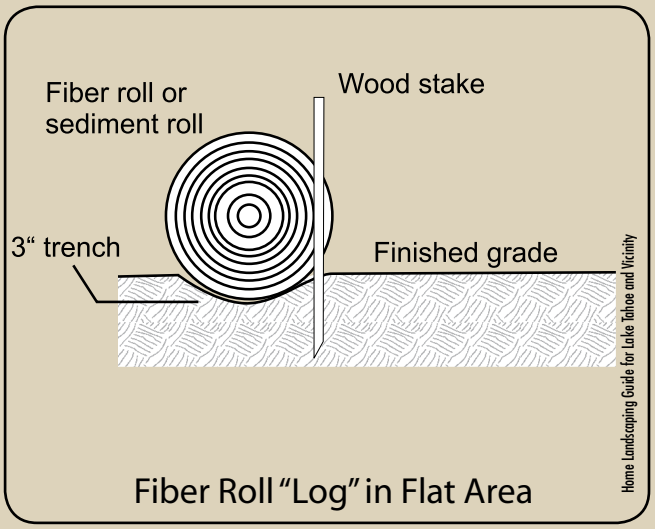
Before work begins, install temporary sediment control measures such as contoured ditches, fiber roll sediment barriers, filter fences, or sod and catch basins down slope of your project. These are to catch water, sediment and pollutants, and to keep them from leaving the site and polluting water downstream. After major work is done, redistribute sediment accumulated behind the barriers, cover the ground with mulch, and re-vegetate with native species to help soil stabilize over time.

Temporary best management

In order to guard against erosion during work, follow these steps:

- Disturb as little ground as possible. Use colored flagging or fencing to mark areas to be left undisturbed. The areas beneath and near the drip lines of trees should be fenced off.
- Meet with contractors before work begins to be sure workers understand why and where flagging is used.
- Control blowing dust from disturbed areas by spraying water on exposed soil surfaces whenever they dry out.
- Stockpile topsoil from disturbed areas for future use in re-vegetation efforts. Cover the pile with tarp to protect the topsoil from wind and rain.
- Mulch an area as soon as possible.





Home Landscaping Guide for Lake Tahoe and Vicinity

Temporary Erosion Control. Filter fences and fiber roll sediment barriers help guard against erosion during construction or soil moving activities.

Best Management Practices

A great deal of work has been done to develop methods for preventing sediment from entering waterways. Erosion control Best Management Practices (BMPs) are the methods professional resource managers generally agree upon for protecting soil resources. Soil erosion occurs when soil particles are detached and moved from their original location, usually by water, wind or gravity. BMPs enable protection of soil particles with a cover of plants or mulch to prevent movement. The plants or mulch allow stormwater to infiltrate into the ground rather than turn into runoff.

Protect bare soil

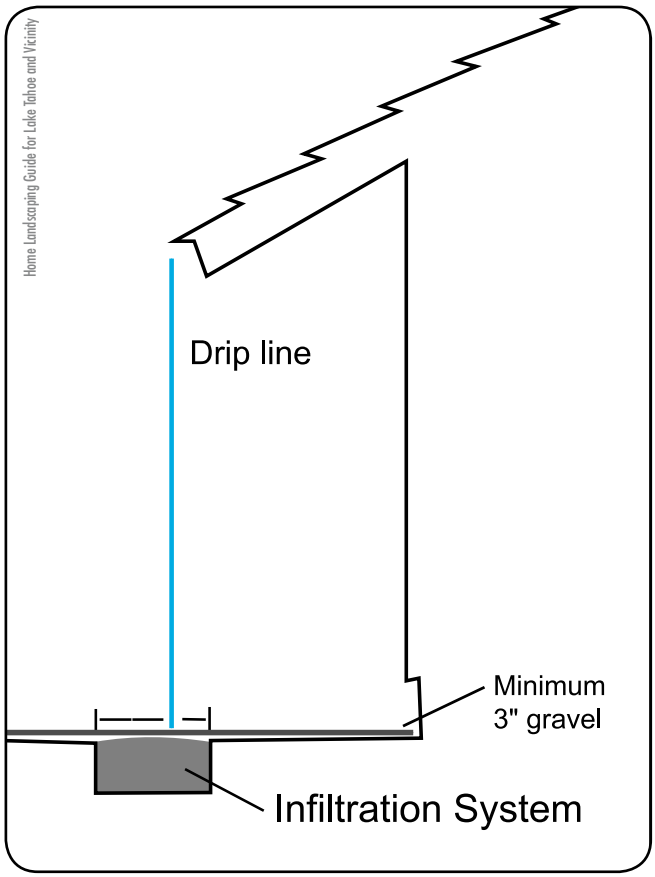
Bare soil, lacking the protective cover of vegetation or mulch, is vulnerable to raindrop impact and soil loss by wind and water. Cover bare ground with plants or mulch (see the following section on mulch).

Minimize impervious surfaces

Impervious surfaces cause excess water runoff. Roofs, driveways, compacted soils and streets are all examples of impervious surfaces, also known as *hardscape*—surfaces that water cannot permeate. The more hardscape there is on the land the higher the potential for erosion and degradation of the surroundings. Reduce the impact of hardscapes by removing any unnecessary hardscape and replacing it with vegetation. Pervious pavers, a type of pavement that allows infiltration of water into the soil, are a good means of reducing some driveway and walkway hardscapes.

Are there signs of erosion on the ground below the roof eaves? Stormwater coming directly from the roof onto bare soil can lead to erosion. Installing one of these BMPs under your eaves will help control erosion and infiltrate water into the ground. This not only will help keep water clean, but also help keep excess water from pooling in your yard after rain or snowmelt.

- Armor bare soil under eave with a 3" layer of drain rock. This will protect the soil by reducing the erosive impact of the roof runoff by allowing it to disperse and infiltrate into the soil. Use a border and filter fabric to preserve the life of the infiltration system. Border and filter fabric also make cleaning and maintaining the system easier. Economical borders can include lumber, logs, or cobble sized rock found on site. You can also use pressure treated wood, landscape edging and/or one of the many recycled composite products available. The use of filter fabric also increases the life of infiltration systems. Use filter fabric that is non-woven and needle punched geo-textile.
- Install a rock armored area for your gutter. By installing a rock area beneath your gutter downspout you will help dissipate the velocity of the water from hitting bare soil. If your structure has gutters it is not always necessary to armor the entire length of the drip line. Instead you can create a rock-lined area, trench or basin where the volume and energy of water can be slowed. When installing this type of system convey the water away from your structure.
- Plant or maintain vegetation/grass under eaves. Dense vegetation or grass under the drip line protects the soil from the impact of the concentrated roof runoff and promotes infiltration. For wildfire defensible space it is a good idea to use inorganic mulch or irrigated, low profile, non-woody vegetation within five feet of structure foundations.



Roof drip line infiltration systems can vary from a thin layer of gravel mulch to large dry wells filled with gravel or prefabricated infiltration units, depending on slope, soil type, and roof dimensions.

If you still have excess runoff, you can incorporate areas to infiltrate the water into your design plan. Infiltration systems collect runoff and store it until it is absorbed by the soil. Common infiltration systems include grassy swales/basins and trenches (dry wells) filled with ¾ to 1 ½ inch diameter gravel or prefabricated infiltration units. Infiltration trenches are useful as borders along paved areas (driveways and patios) and beneath the drip line of roof eaves. Proper design is essential. It is important to get runoff far enough from the structure foundation so as to not influence it with sitting water. Professional assistance to design and install infiltration systems is recommended. Infiltration systems require periodic maintenance to remove sediment and debris.

Where else have you observed erosion? If the eroding area is fairly flat and erosion is not too extreme, vegetative ground covers may stop erosion. Other options include physical covers such as organic or inorganic mulches. If there is substantial slope or erosion, stabilization methods such as retaining structures are likely necessary. A retaining structure is a wall or other structure placed at the bottom of a steep slope. Establishing vegetation along with a layer of rocks can also help stabilize slopes susceptible to erosion. Eroding slopes must be stabilized to prevent erosion. Depending on the steepness of the slope, soil type, and aesthetic preference, there are multiple options for stabilization. Guidance for measuring slope is provided in the soil section of chapter 2, *Observe*.

Rain gardens

A rain garden is a shallow depression, planted with native plants, designed to slow, capture and infiltrate rainwater from impervious (hardscape) area. Rain gardens are intended to soak storm water into the ground and cut down pollution flowing to creeks and streams.

Rain garden considerations:

- Soil must be permeable enough to facilitate drainage and filtration of water in order for a rain garden to function properly.
- Properly designed rain gardens drain water within a day and should not provide habitat for mosquito reproduction.
- At all times, avoid conveying water toward structural foundations.
- Do not create rain gardens under large trees as tree roots can be affected.

Sampling of online rain garden information sources:

www.rainkc.com
www.raingardennetwork.com
www.raingardens.org

Controlling erosion on slopes less than 33 percent (Moderate)

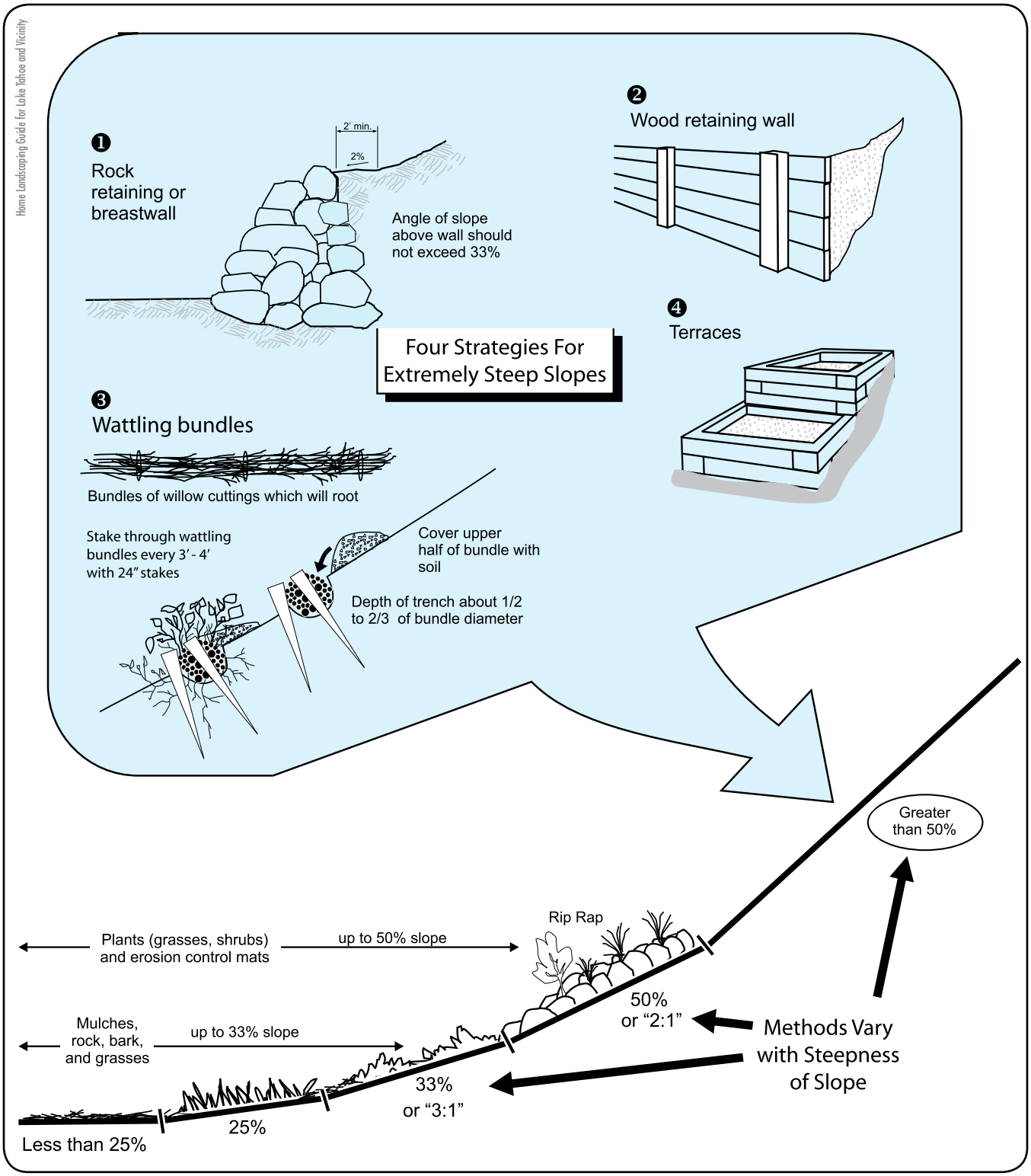
Gentle slopes can be stabilized with vegetation, mulch and/or erosion control blankets. Mulching is one of the simplest and most beneficial conservation practices you can use in your yard. Mulching protects soil from erosion, reduces compaction from the impact of heavy rain, conserves moisture, reduces the need for frequent watering, maintains a more even soil temperature, prevents weed growth and provides a finished look to your yard. Possible mulches include woodchips, bark chips, drain rock, pine needles and ornamental rock. These types of mulches provide a good protective cover and can be an attractive element of your landscape. These are also useful as temporary ground cover until supplemental vegetation becomes established. Erosion control blankets and mats of coconut fiber or jute netting can provide short-term protection and may be especially useful during times of construction. One easy mulching method is to let pine needles and leaves accumulate by not raking them up. However, fire risk increases after a depth of 1 inch.

Controlling erosion on slopes less than 50 percent

Erosion control blankets and mats can be used while getting plants established. Once established, plants provide excellent long-term erosion control. Roots knit together to hold the soil in place while leaves and twigs reduce the impact of rain and wind. Meanwhile, the organic matter they add to the soil improves water infiltration. A drip irrigation system can provide slow delivery of water to plants, so that water can infiltrate with little or no runoff.

Controlling erosion on slopes greater than 50 percent (Steep)

To infiltrate water on a steep slope the most effective methods are terracing or retaining walls. Terraces and retaining walls are used to reduce the gradient and provide level or gently sloping areas for establishing vegetation. Retaining walls are constructed with boulders, treated timber or bricks. For walls that are over four feet (measured from the bottom of the footing to the top of the wall) a building permit and/or engineering expertise may be required. It is also important to avoid having water collect behind structures, thus creating a dam. The added moisture and weight of the water could cause the retaining wall to fail. Place a sub surface drain surrounded by drain rock against the wall to drain the water.



Methods for erosion control on steep slopes

- **Terraces.** Materials for building terraces include, but are not limited to, interlocking concrete blocks, fieldstone, brick and treated wood. Interlocking concrete blocks are made specifically for walls and terraces and are among the easiest materials to use if you install the terrace yourself. Professional assistance is recommended for larger terraces, such as those requiring walls over two-feet high. Wall height is determined by slope steepness. Consult guides on terrace building to determine what is right for your yard. Terrace material must be strong, and anchored well, so it will stay in place through weather and temperature cycles.
- **Wood and rock retaining walls.** Rock retaining walls are free-standing walls built from rock 10 inches to 2 feet in diameter. A footing trench is dug along the toe of the slope, and the largest rocks are placed in the trench. Subsequent rocks are laid with at least three bearing points on the previously laid rocks. As the wall is built, fill material is placed around and behind the rocks and packed in. Wood retaining walls serve a similar purpose to rock walls. These employ lumber and posts set in concrete in the ground, with planks placed on the uphill side of the posts. It is important to leave gaps between lumber boards in order to give water a place to escape.
- **Contour ditches.** Contour ditches are shallow ditches running along the contour line (across) of the slope. These ditches collect water running down the slope, slow the flow and discharge it to a grass area, well-vegetated buffer strip or a natural vegetated area. The slope of a contour ditch should be 2 percent or less.
- **Roadside ditches.** Roadside ditches are often significant sources of erosion. These collect pollution from cars and the road, and when rain or snowmelt occurs, soil and pollution are carried to the nearest stream. Installing riprap, grass or shrubs, can help stabilize these areas, prevent compaction and erosion, and improve the appearance of the area.

Resource: soil erosion

For more information about how soil erodes from your yard check out the RUSLE—Revised Universal Soil Loss Equation. http://www.nrcs.usda.gov/programs/farmbill/1996/USLE.html. There are NRCS offices in most counties, check locally for a contact.

The magic of mulch

Mulching is one of the simplest and most beneficial practices you can use in the garden or landscape. Mulch is a protective layer of material that is spread on top of the soil. Use mulch wherever there is no turf or other ground cover. Bare soil promotes erosion that is detrimental to water quality. The water infiltration rate in mulched areas is often more than double that of unmulched areas because the mulch intercepts the impact of raindrops and prevents the soil from developing a less-permeable crust. Because organic mulch can move with water or wind, limit its use to flat areas and slopes up to 33 percent. Mulch also controls weeds, reducing the need for weed pulling or herbicides. It provides a great environment

Three types of mulches are shown above. From top: chipped bark, pine needle and river rock mulch.

for earthworms and insects which in turn increase water infiltration and build soil. Healthy soil is the first step to healthy plants, and helps prevent disease or pests from attacking your plants.

Types of mulch

A number of different materials fall under the category of mulch. Mulches can be organic or mineral and serve several purposes. Such purposes include stabilizing soil from wind and water movement, conserving water, controlling weeds, and contributing to soil health and defensible space. Mulch applied for one purpose often serves additional purposes as well.

Organic mulches include composts, broken and/or ground tree bark (in various sizes), pine needles, hay or straw and wood chips. These break down over time and provide a renewed supply of the organic component important for good soil structure. These materials can vary in their rate of decomposition and contribution to soil nutrients. Organic amendment mulches can contain weed seeds. To ensure that invasive plant seeds are not introduced into your environment, purchase a mulch that has been sterilized for seeds or use locally harvested materials if readily available. Inorganic mulches are materials such as gravel, coarse sand and river rock.

Mulch - inorganic vs. organic

Organic mulches reduce water evaporation from the soil, allow water to infiltrate, help control weeds, improve soil structure, provide soil organic matter, and provide a slow release of nutrients. Organic mulches include: bark chips, shredded bark, sawdust, pine needles, compost, leaves, grass clippings and other once-living materials.

Inorganic mulches reduce water evaporation from the soil, allow water to infiltrate, help control weeds, and reduce the threat of fire. Inorganic mulches include: rocks, gravel, and plastic.

When to apply mulch

The best time for application varies with results you seek. Mulches moderate the soil temperature by providing an insulating barrier between soil and the air. This means that mulched soil in the summer is cooler than adjacent unmulched soil. In the winter, the mulched soil does not freeze as deeply as unmulched soil. Since mulch acts as an insulating layer, mulched soils tend to warm up more slowly in the spring and cool down more slowly in the fall.

If you are using mulches in your vegetable or flower garden, apply them after the soil has warmed up in the spring. Cool, wet soils tend to slow seed germination and increase the decay of seeds and seedlings. If adding additional layers of mulch to existing perennial beds, wait until the soil has completely warmed. Apply mulches to help moderate winter temperatures late in the fall after the ground has frozen but before the coldest temperatures arrive. Applying mulches before the ground has frozen may attract rodents looking for a warm overwintering site. Delayed applications of mulch should prevent this problem.

To protect plants over winter, choose a mulch made of loose material, such as pine needles or pine boughs that help insulate the plants without compacting under the weight of snow and ice. One of the benefits of winter application of mulch is the minimization of the freezing and thawing of the soil that occurs in late winter and early spring. These repeated cycles of freezing at night and thawing in the warmth of the sun can cause small or shallow-rooted plants to be heaved out of heavy soils. This leaves root systems exposed, resulting in injury or death.

Protecting stream areas and water bodies

If your site has a stream, wetland or marsh on it or adjacent to it, consider the following in your site design plans.

- Maintain existing vegetation along stream banks and water bodies.
- Keep plant nutrients out of ponds, creeks and wetlands.
- Keep home, yard and garden chemicals out of the waterway.
- Limit access activity in the stream or wetland area.

These practices are vitally important to the long-term well-being of the Sierra Nevada environment.

Maintain existing vegetation along stream banks and water bodies

Trees, shrubs and plants along stream banks provide shade that is essential to keeping the stream cool. Warm water can be detrimental to fish and promotes rapid growth of pond weeds and algae. In addition the fish rely upon streamside trees and brush for shelter and food sources.

Streamside vegetation also protects stream banks from erosion and filters pollutants from stormwater. If natural vegetation is lacking, consider creating a buffer strip or filter strip of adapted vegetation next to the water body. A buffer or filter strip is a swath of undisturbed vegetation adjacent to a water body. Properly designed and vegetated buffer zones are very effective in intercepting and filtering pollution in runoff. A mixture of trees, shrubs and ground covers is more effective than a single species. Install mulch or erosion-control mats, or plant ground covers to hold the soil until trees and shrubs are established. If well-established vegetation is already there, the best thing to do is leave it intact.

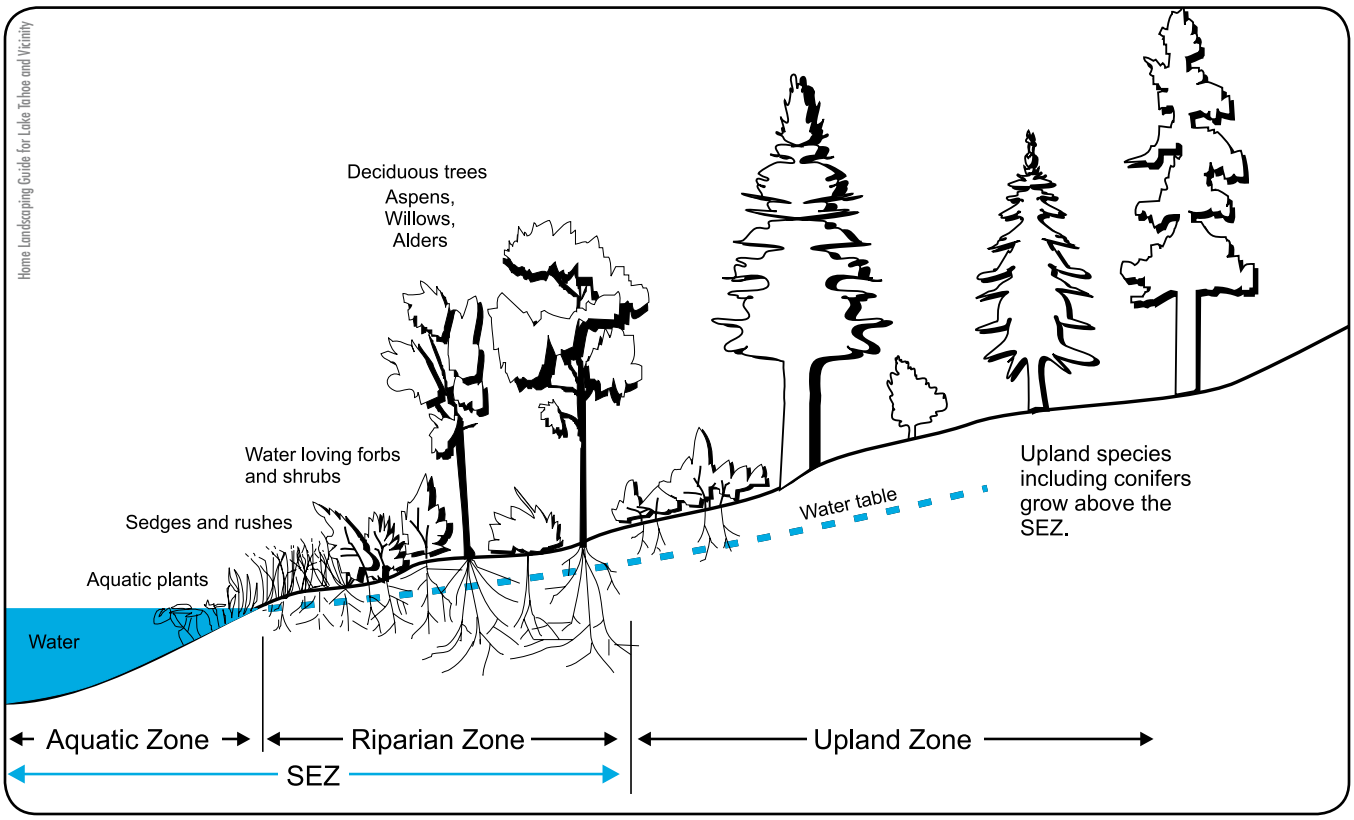
Sierra Note: Do not pave over or fill stream areas or edges of wetlands with dirt or rocks. It is illegal to fill a wetland unless you have a Clean Water Act Section 404 permit from the Army Corps of Engineers.

Keep plant nutrients out of ponds, creeks and wetlands

Plant nutrients such as nitrogen and phosphorous can be beneficial when you follow instructions and add proper, minimal amounts to gardens and grass. Nitrogen and phosphorous are found in most fertilizer products. In stream or wetland areas nitrogen and phosphorous are considered pollutants. As a rule of thumb, do not apply fertilizer within 25 feet of a water body. This will affect where you plant your grass and ornamental plants that want fertilizing. Wherever possible, consider amending soils with the application of organic compost to soils instead of fertilizer.

Keep home, yard and garden chemicals out of water bodies

Utilize and store pesticides and any hazardous chemicals with great care, far from streams and water bodies. These should only be disposed of through hazardous waste collection centers. You can get information on the location of these centers through the county environmental health department. These chemicals should never be dumped on the ground, in a hole, down a drain or anywhere except a collection center. The need to store these chemicals distant from water and people may influence where you decide to place a shed or garage addition.



Stream environment zones contain vegetation requiring large amounts of water.

Examples of Dangerous Household Hazardous Chemicals

- Automotive product soil, battery acid, brake fluid, antifreeze, gasoline
- Fertilizers and pesticides (weed killer, fungicides, insecticides): no-pest strips, flea collars, and some pet shampoos
- Household cleaners: spot removers, furniture polish, deodorizers, drain cleaners, oven cleaners, disinfectants, moth repellant, and ammonia
- Maintenance supplies: paint, varnish, lacquer, turpentine, wood stains, wood preservatives, asphalt, asbestos, roofing tar, swimming pool and hot tub chemicals

Limit access and activity in the stream or wetland area

Design your yard to have limited access to the stream or wetland to minimize damage to banks and sensitive areas. Where access is necessary, consider a walkway, platform or bridge structure. These means of access are the least intrusive and most protective of the environment.

Footbridge over riparian zone

Removing invasive weeds – be aggressive

Invasive weeds are non-native species whose introduction causes environmental harm. (See the Invasive weeds identification pages in chapter 2, *Observe*.) If you have identified invasive weeds on your property, now is the time to remove them. Treatments outlined in the *Integrated Pest Management* section of this chapter can be applied for this purpose. Be aggressive. If you have never tried to remove these weeds, know that they are very tough. Arm yourself with good information and know that control and eradication may take a few years. Some counties will assist you in removing specific weed species. Contact your county agricultural department to find out what programs your county offers.

Once your garden is established, focus on mechanical weed controls such as:

- Pulling the weed and all re-sprouts several times a year
- Removing flowers and seed heads immediately
- Refraining from composting any part of an invasive weed—place it in a double plastic bag and in the trash
- Working with neighbors to remove weeds throughout the neighborhood

Prevention is always the most cost-effective and successful approach to controlling and eliminating the spread of noxious and invasive weeds. Always know the exact source of soil, compost and organic mulches before you place them in your yard. Most commercial compost and mulches should be sterilized, but make sure they are. Ensure that any vegetation you plant in your yard is not an invasive—some nurseries still sell invasive plants.

Getting help with invasive weeds

The California Department of food and agriculture has a hotline for getting help with invasive weeds. The phone number is 1.800.491.1899.

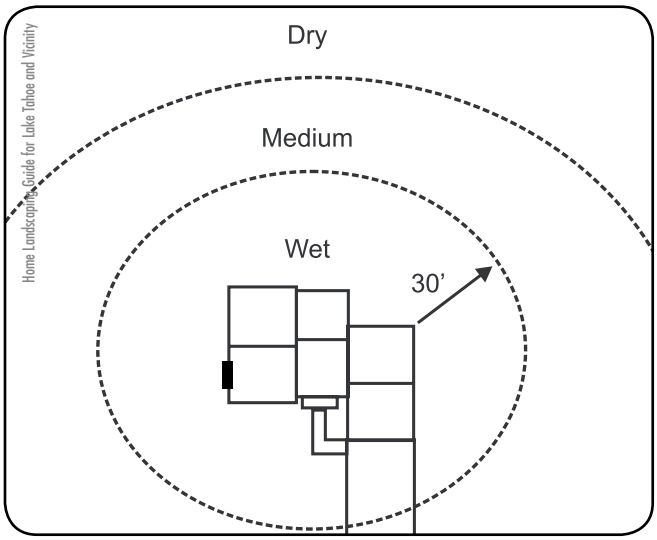
Irrigating efficiently and effectively

Hydrozones

When it comes to laying out an irrigation system, run separate lines to groups of plants with high, medium or low-water requirements. These separate areas of the landscape are called moisture zones, or hydrozones.

Plant low water-use plants apart from high water-use plants in order to avoid unhealthy situations where some plants dry up and others drown. If you have groups of native plants, that are well suited for your climate and soil type, you might have areas that do not require any extra water at all. This means that they will require the least maintenance and be the most water-efficient plants in a Sierra Nevada garden. Native trees rarely need water once they are established.

"The single most important thing that gardeners can do environmentally is to irrigate efficiently." Bruce Warden, Lahontan Water Quality Control Board.



For further illustration of hyrdozones, see chapter 3, Design.

Types of irrigation systems

There are four basic ways to irrigate: 1) sprinkler-based systems, 2) drip and micro-irrigation systems, 3) low-volume sprinkler systems and 4) garden hoses. This section is intended to be an introduction to irrigation systems, not a step-by-step instruction manual for installation. This is a basic overview of the application of each system. The choice between systems depends on the time you want to devote to watering, the type of areas to be watered, the costs involved, and the water requirements of your plants. Once you have surveyed the following information, contact a local irrigation supply company, hardware store or nursery before purchasing one of these systems. Ask about longevity of the system under local conditions, methods of proper care and availability of spare parts. This will help determine if the system is right for you.

Prevent irrigation systems from freezing

- Install a master shut-off value to turn off the whole system when the freeze season begins.
- Install an automatic drain valve at the end of each line to drain the water from the line after the water is turned off.
- Bury each valve a few feet into the ground to prevent freezing, or better yet, use disconnect couplings and remove the valve in the winter.
- Always have extra parts and fixtures on hand in case something breaks.

Sprinkler-based systems

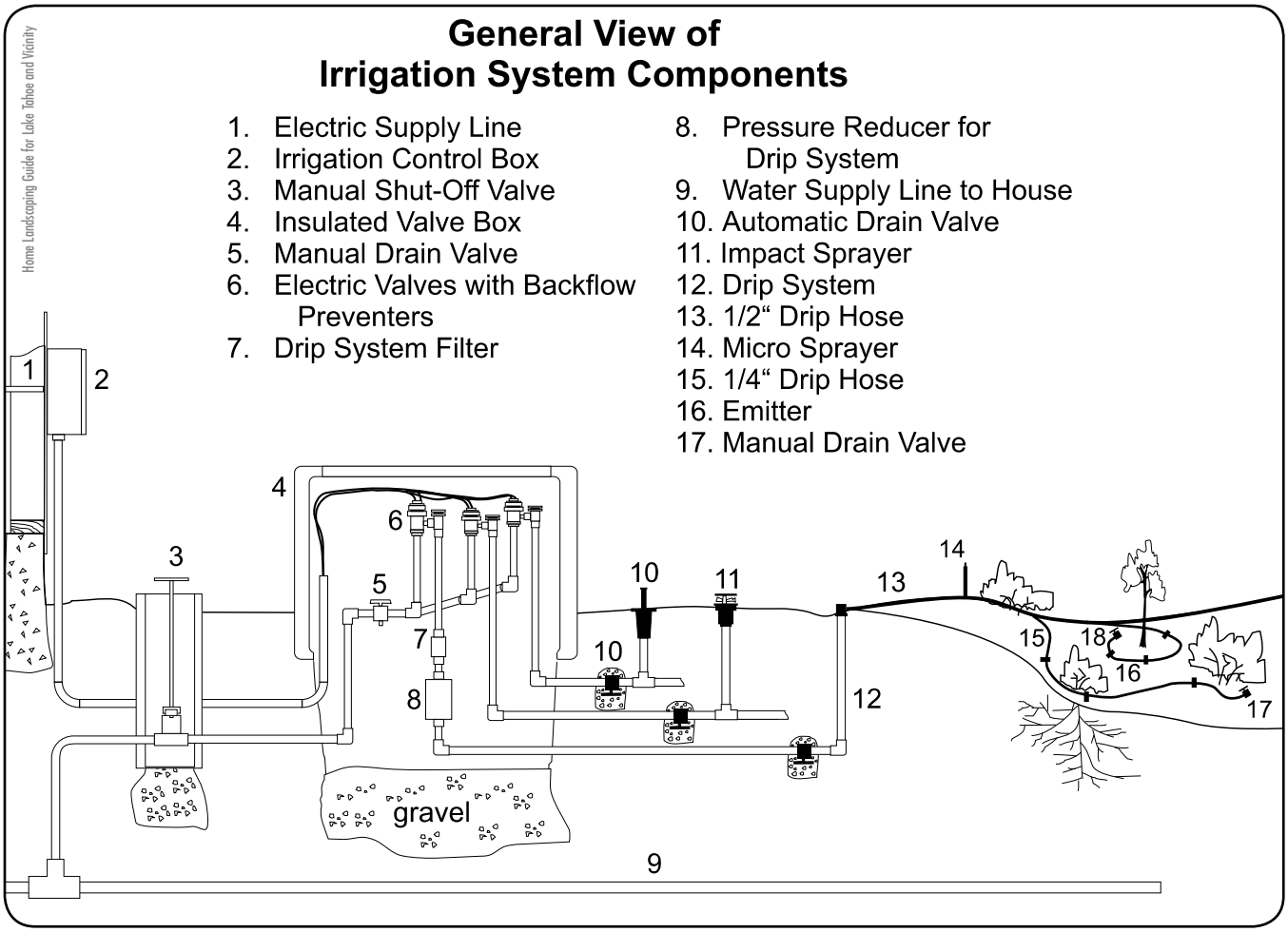
A sprinkler-based system is the most work to install and the least work to run on a daily basis. It delivers water through underground pipe to individual sprinklers. By varying individual sprinkler types (heads) you can vary the amount of water that is delivered to different areas of your yard and the period of time over which water is delivered.

A high-pressure irrigation system with underground pipe and sprinkler heads on risers is best used for grass and low-growing ground cover. A sprinkler-based system is very efficient when coupled with automatic timers set to water in the cool of the day, matching precipitation-rate sprinkler heads and rain-sensing shutoffs.

A sprinkler-based system is generally most efficient at high pressure: 30-80 pounds per square inch (PSI). However, few homes have enough water pressure to service the house and the landscape at the same time. Therefore, an irrigation system is divided into zones or circuits. Each part of the landscape is irrigated separately, operated by its own electric control valve, to avoid exceeding the maximum flow rate of the water supply. Do not mix high and low pressure fittings on a single irrigation line.

Sprinkler-based system considerations

Under the sprinkler-based, high-pressure irrigation system, backflow can occur when the incoming water pressure is lowered. This causes a reverse flow of water or suction (back pressure) to occur in the service line. Because the backflow of water can contain fertilizers, pesticides and sediments, control valves with backflow preventers must be installed. These control valves prevent contaminated water from flowing back into the main water line, which provides the drinking water supply to your neighborhood. If you have never installed such a system before, it might be useful to contact a professional to ensure the control valves are installed properly.



Installation and spacing of sprinklers

Sprinkler systems are often installed by professionals. However, if you will be undertaking installation yourself there are useful guides and resources with full instruction on how to do so. As you make your decision about whether to self-install, the following is useful to consider. Correct sprinkler-head spacing is essential for maximum efficiency. Designers commonly refer to this as 50 percent or head-to-head spacing. The 50 percent refers to one-half the diameter (the radius) of the sprinkler throw. A 30-foot diameter sprinkler has a 15-foot radius—thus the spacing for this sprinkler is 15 feet, or one “head” every 15 feet. This provides the proper overlap to prevent dry spots without over-watering. Also consider whether sprinkler heads should be spaced in a square or triangular (alternating) pattern to best meet your needs.

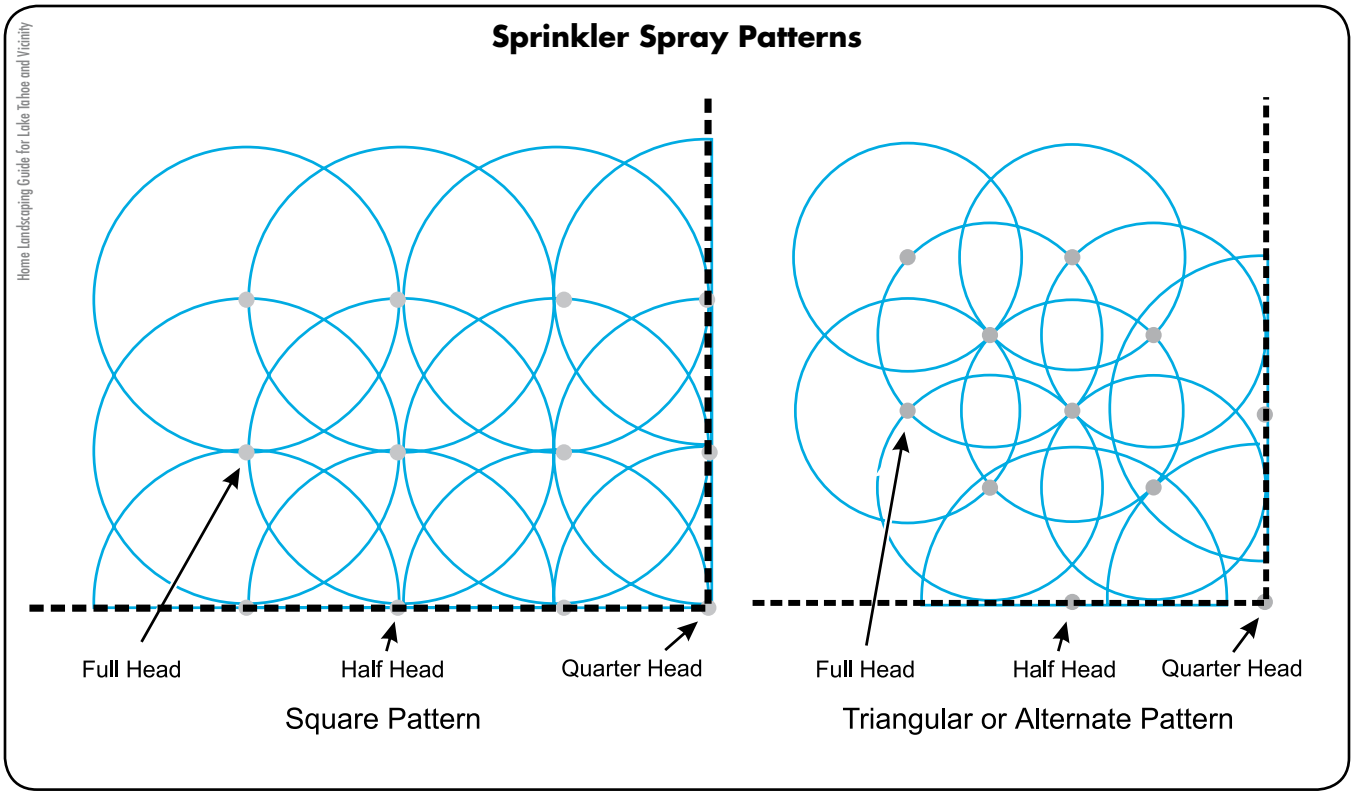
Resource: Irrigation manufacturer websites

Useful information about irrigation design and product specifications can be found on the manufacturers’ websites.

MP Rotator – http://www.mprotator.com
Toro –http://toro.com/watermgmt/index.html
Hunter –http://www.hunterindustries.com
Rainbird –http://www.rainbird.com

Drip and micro-irrigation systems

A drip and micro-irrigation system delivers small amounts of water to root zones. Drip and micro-irrigation uses much less water than other systems and is generally well-suited to smaller gardens and potted plants. This system works at low pressure (10-30 PSI) and delivers less water



Match the sprinkler spray pattern and spacing layout with the area to be watered. Your goal: an even distribution of water over the entire area.

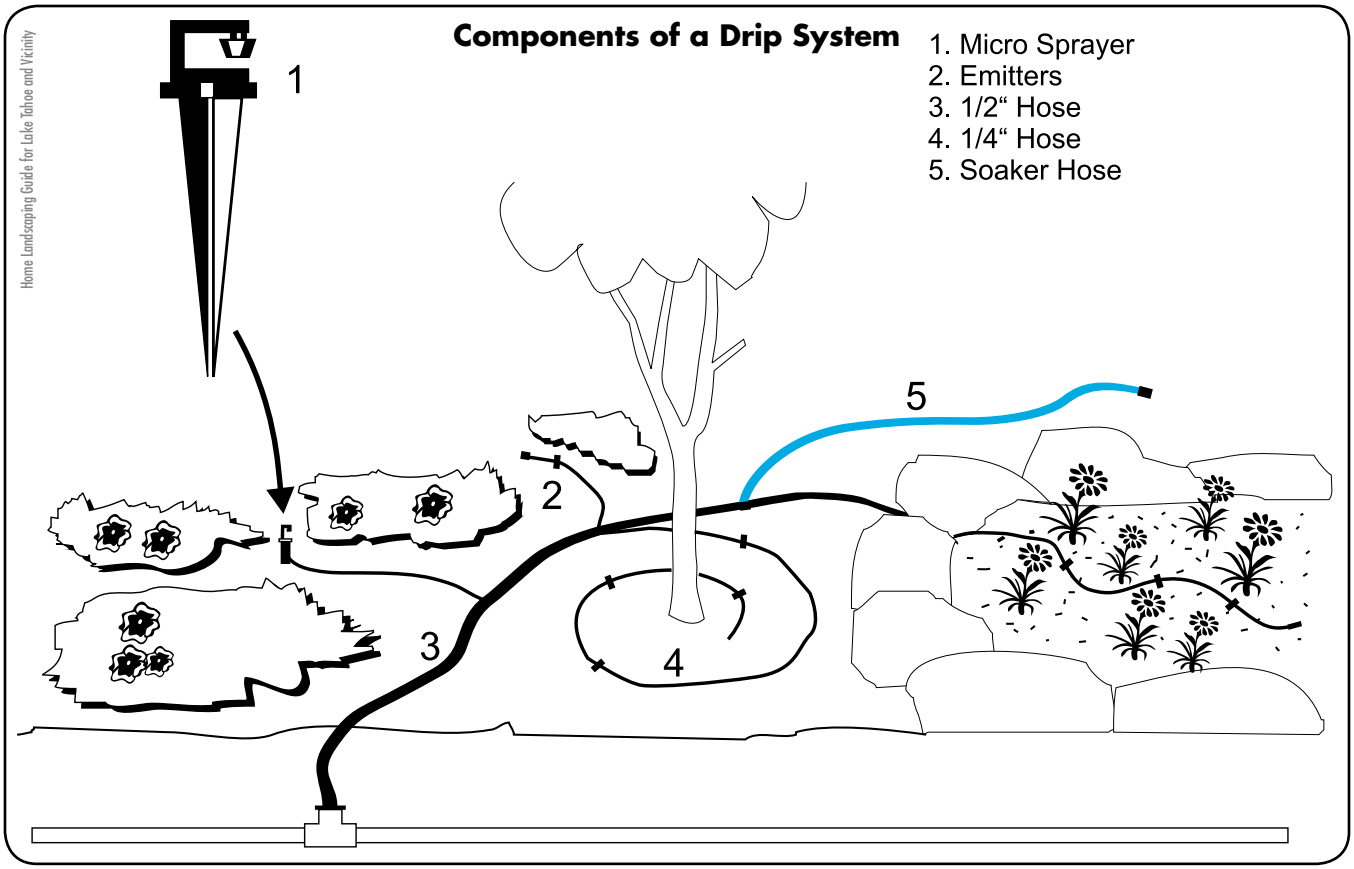
to specific locations, usually to the roots of individual plants. Water application to the soil is slow and seldom exceeds the infiltration rate. Thus, runoff does not occur. How deep the water penetrates into the soil depends on the duration of each watering. Emitters deliver gallons per hour, not gallons per minute. A drip system is an excellent choice for plants on hillsides, because there is rarely any runoff. This system applies water directly to the soil through a tube, with the volume of water determined by the size of an emitter. Emitters range in size from 1/2 gallon per hour to 5 gallons per hour of delivery. There are also spray-mist emitters and other specialty emitters.

Installation of drip and micro-irrigation systems

A drip system is easy to install, compared to a rigid pipe system. It is connected to one or two valves of the irrigation manifold, or to a hose bibb or hose end. The main tubing is usually a 3/8 to 1/2-inch diameter flexible pipe that delivers water to the emitter, which then delivers water to the individual plant. Emitters can also be connected to the main tubing through ¼ inch diameter hose or spaghetti tubing. The hoses are laid out to service each hydrozone. Ideally, separate drip systems, controlled by separate valves should be run to low and moderate water-use hydrozones. Emitters come in different sizes and shapes and are color-coded according to their gallon-per hour rating. The tubing lies on the ground and may be covered with mulch to hide it from view.

Tube systems are laid out so that emitters can be evenly spaced around and on top of the root ball of newly planted trees and shrubs. Sufficient emitters need to be placed in order to wet the entire root ball and surrounding soil. Wetting the surrounding area allows roots to grow into adjoining soil, providing an extensive root system and producing a healthy plant. It is also a good practice to leave extra tubing, so that as the plant grows, you can move the tubing farther from the plant.

Drip systems require monthly inspections of the emitters to determine if any are clogged and if the plant has the appropriate emitter to provide adequate moisture. It is a good idea to keep a supply of extra tubing and emitters on hand.



Components of a drip system

Low-volume sprinkler systems

A low-volume sprinkler system, or micro-sprayer system, is installed above ground and operates similarly to emitters operation. This system is often used to water low-growing ground covers, bedding plants and potted annuals, or to germinate seeds. Spray patterns range from a 45-degree angle to a full circle. The spray pattern (radius) is much smaller than a grass sprinkler's, but covers a greater distance than an emitter. Because a low-volume sprinkler covers a larger area than an emitter, it can produce a larger and healthier plant. A low-volume sprinkler system is easily adjustable, whereas in-line and tube emitters are not.

Low-volume spray emitter

Low-volume sprinkler system considerations

Low-volume sprinkler systems require more fittings than conventional drip systems. Also, more weeds germinate because larger areas receive water. The system is also easily broken and more costly than other systems.

Soaker hose

Garden hoses

A garden hose delivers water via a hose attached to an outdoor spigot. Garden hoses have increased in sophistication in recent times. There are even hose systems

available with timers, which enable water conservation. They are easy to install, but can be a tripping hazard. Hoses are the least expensive, the most time-consuming, and can waste water if not monitored carefully. The rate of application is difficult to control and contributes to runoff if the water is delivered faster than the soil can take it up. Directing the spray is also difficult. However, many homeowners find hoses useful to supplement an installed irrigation system.

Targeting the irrigation system for maximum efficiency and effectiveness

Irrigating new trees

Contractors or landscape designers sometimes run a line of drip tubing along a newly planted row of trees with punch-in emitters near the root ball of each plant. For any newly planted trees, loop ¼-inch or ½-inch drip tubing around the trunk, leaving enough slack to accommodate the growth of tree roots for up to five years on dry sites. Start with two or three emitters per tree, and add emitters around each tree every year until it is well established. Misters, or micro-sprayers, can also be used. Face them to spray out from the trunk and not on the trunk. Continuously-wetted bark is subject to disease.

Watering trees and shrubs

Water must reach the root zone of large plants. It is sometimes thought that you have to soak the soil for hours to do this, but the absorption roots of even very large trees are generally no deeper than two to three feet. Mature trees benefit most from water applied at or just beyond the drip line of the canopy, rather than close to the trunk. The drip line is the outside perimeter of the canopy formed by the leaves. The best watering techniques are those that keep the trunk dry.

Water the right amount and at the right time

Adjust watering routines seasonally to correspond with water demand. Watering early in the day results in less water lost through evaporation due to wind or higher temperatures, and hydrates the plant in preparation for the hottest part of the day. Watering deeply and thoroughly (but not excessively) allows a plant to develop a healthier, deeper root system that is less prone to drying out. Conversely, over-watering and over-frequent watering can cause a tree to build a shallow root system which is not good for tree stability.

Sierra Note: Some decomposed granite (DG) and sandy soils should be watered in shorter cycles to avoid washing nitrates through them and polluting the water table. Plants in these soils may require more frequent irrigation with less water applied each time.

The key to providing the right amount of water is understanding the relationship between rate or volume per time and the length of time watering. In general, the most efficient system waters at a low rate for a long time with long intervals between watering. This provides for a deep watering of plants and allows for strong root development. The correct rate and watering time can not be simply described. The more you understand your site and its soil types the better you will be able to optimize your watering. Again, planting by hydrozone will facilitate water conservation and meet the specific needs of your vegetation.

If your soil is prone to erosion, or it is slow to percolate water, you will have to reduce the rate of watering. If you have a system already installed, and you have erosion or standing water, consider a different watering pattern, such as repeated, short watering cycles (10–15 minutes on, 2–3 hours off). You may also need to look at installing some infiltration systems.

"Watch for erosion, it may be a sign your irrigation system is not working optimally. Erosion is bad for your plants and garden."

Tuning your irrigation system requires observation and adjustment. Your best tool for this is an automatic controller/timer. These systems are relatively cheap and very easy to set-up and fine tune. This will allow you to control how much water each hydrozone receives and when.

Water conservation recommendations

- Mulch plants—add up to 2 inches of mulch around plants to help conserve soil moisture.
- Install windbreaks—use an open fence or a hedgerow to slow the wind and reduce drying effects on your site.
- Use native plants—take advantage of plants naturally adapted to the local climate.
- Wait for wilt—hold back on watering just until trees and shrubs show they need it.
- Mow tall—cut grass less infrequently and use settings resulting in longer blades when you do cut the grass.

- Eliminate weeds—remove the weeds that compete for scarce water in the soil.
- Water accurately—avoid watering between plants.
- Water appropriately—provide trees with one thorough watering in spring and one in summer.
- Water grass sparingly.
- Take advantage of shade—move container plants to shaded areas.
- Maintain your system—check and repair sprinklers to be sure they are not wasting water.

Grey water recycling

Water that has been used in the home, except water from toilets, is called grey water. Dish, shower, sink and laundry water account for approximately fifty to eighty percent of waste water from the home. Grey water is named for its cloudy appearance and because it is neither fresh, potable water, nor heavily-polluted black water. Household water containing significant food residue or high concentrations of household cleaners or other toxins would not be considered grey water under general terms.

Application of grey water for irrigation purposes is a growing area of interest by municipalities and conservation interests seeking ways to conserve fresh water resources. This book neither advocates nor discourages grey water recycling in the domestic environment. If you are interested in grey water systems there is extensive information on the internet, including information about installation of these systems.

Grey water considerations:

- Be aware that grey water is legally considered waste water by many counties and municipalities. As such, application of grey water to the garden may be strictly regulated.
- Because it is considered waste water it is generally advised to apply grey water only through sub-surface application.
- The use of grey water requires a separate grey water waste line system in the house. Some experimentation is being done with this in new construction. In existing buildings installation of such systems can be quite a challenge.

Preparing the soil, feeding the soil

Organic amendments

Focus on the soil for the best results for your plants. Everything a plant needs comes from the soil. Healthy soil results in healthy plants. A sterile soil, without soil microbes, worms and insects will not grow plants. These living inhabitants of the soil generate nutrients for the plant.

Give the soil a balanced diet. Organic soil amendments such as compost, straw, manure, and woodchips feed and provide structure to the soil, help increase the water holding capacity of the soil, and provide nutrients to plants. Inorganic fertilizers provide a short term dose of a few nutrients.

During your inventory and design stages you may have determined that importing topsoil is necessary for optimal plant growth. Sources of manufactured topsoil can vary. If you are in doubt about the characteristics of an imported material, request to see an analysis of the product or have an analysis completed independently. If you are going to spend the time and money importing topsoil it could be wise to consult your local nursery professional about the quality of the topsoil.

Types of organic amendments

- Compost
- Sawdust
- Aged manures (fresh manure can kill plants)
- Bone/blood meals
- Straw
- Leaves and clippings
- Peat moss

Fertilizer

Once established, Sierra Nevada native and adapted plants often thrive without fertilizer. In the cases where fertilizer use is recommended for establishing plants be sure to look into the best fertilizer to meet your plant and soil needs. It is possible to kill plants by over fertilizing. Apply an appropriate amount of fertilizer for the size and type of plant you are planting. For the healthiest soil:

- Choose an organic, slow release fertilizer;
- Mulch after application;
- Experiment to find the lowest amount to use to get good results;
- Limit use of fertilizers in clay soils which generally require less fertilizer;
- Consider using compost and mulch to support plants instead of fertilizer.

The three numbers at the top of a package of fertilizer correspond to the percentages of nitrogen phosphorus and potassium. For instance an analysis of 3-5-3 means the nutrient content in the fertilizer is 3% Nitrogen, 5% Potassium and 3% Phosphorus by weight. Fertilizers also contain other nutrients and some inert ingredients.

Composting

Incorporating compost into soil can be an appropriate and ecologically-friendly alternative to using chemical fertilizers. Compost is decayed organic matter—leaves, grass, pine needles, sawdust, ground bark or wood, vegetable scraps, etc. It is possible to make your own compost. Ready-made compost comes in bags. The origin of ready-made compost varies. Contents range from redwood, to recycled wood, to treated sewage sludge (sounds disgusting but sludge is a great nutrient source and reuse of materials that would normally be discarded into landfills).

Making compost

Composting is a natural process that converts raw organic materials into a valuable soil conditioner. It is good for your garden and reduces waste in landfills. Compost materials are recycled garden and kitchen waste. Slow composting decomposes the materials introduced, such as leaves, branches or garden trimmings. If you create the optimum conditions for organisms that cause decay, the compost pile will heat up quickly and decompose in a few months. You can make compost in a freestanding pile or use an enclosure. The fundamentals of composting are the same regardless of method:

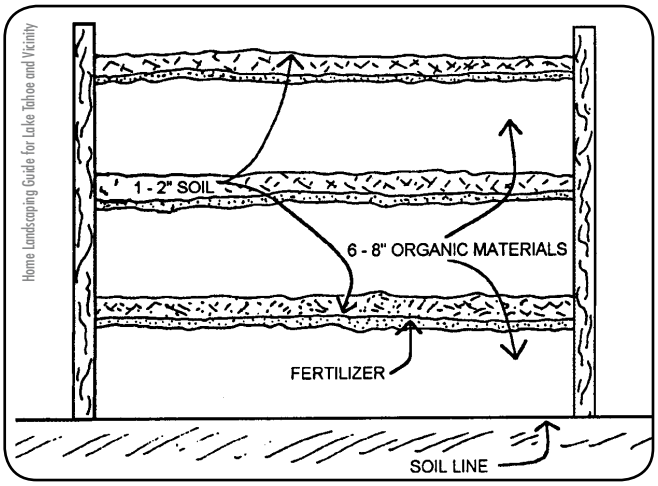
- Gather two times as much brown matter as green matter;
- The compost will heat up faster if you collect all the ingredients in advance and assemble the pile all at once;
- Do not use bones, dairy products, cat or dog waste, meat scraps, badly diseased or insect-infested plant or pernicious weeds (esp. bindweed, oxalis);
- Shred or chop large materials into pieces 1- 2 inches long.

Build the pile:

- Spread a 4-8 inch layer of brown material;
- Add a 2-4 inch layer of green material;
- Add another layer of brown material;
- Sprinkle the pile with water;
- Mix the first 3 layers with a spading fork;
- To speed up decomposition in a new pile add a few shovelfuls of old compost, which already contains bacteria and fungi.
- Continue adding layers, watering and mixing. Turn the pile weekly (In a few days the pile should have heated up dramatically.)
- Turning the contents expedites the decomposition by adding oxygen to the mix
- Redistribute materials on the outside toward the inside for better heat exposure
- Add water as needed so that the pile is moist but not soaked
- If the pile has a bad odor reduce the water and add more green matter. A good compost system should not have a bad odor.

Brown matter - dry leaves, hay, sawdust, straw, wood chips and woody prunings.

Green matter - grass clippings, fruit and vegetable scraps, coffee grounds, tea bags, crushed eggshells and manure from cows, horses, goats, poultry and rabbits.



In a layered compost pile, dried leaves and cuttings are sandwiched between layers of manure and kitchen waste (without meat products).

Compost functions differently in diverse soils. If your soil is loamy you may not need to apply compost. In landscape construction soil can lose some of its structure and compost gives it a boost back to optimal health. In sandy soils, where nutrient and water retention properties are lacking, compost aids in moisture retention and nutrient supply. Clay soils tend to repel water, not allow circulation of enough air and in some cases retain too much of some nutrients. Working compost into the soil helps to break up the clay, retain the air spaces, improve drainage and balance nutrient supplies.

Compost can help repair compacted soils. During construction or general use of a site, soils can become compacted from vehicle and foot traffic, materials staging and equipment cleaning. If these areas are to be utilized in your landscape plan as planted zones, the soil structure needs to be restored to a healthy environment for growing. In general these areas need to be tilled or scarified to a minimum depth of 12 – 18 inches and the soil amended to restore the balance of organic, mineral, water and air as well as nutrient components. Soil pH in these areas may vary from the rest of your property as these areas are often used for materials staging and cleaning which may leave behind elements that affect acidity levels. Most nurseries and home supply stores sell pH test kits with which you can test individual areas of your site if testing services are not available or are cost prohibitive.

Types of Composting Systems

- Free-standing compost pile (minimum of 3 feet by 3 feet)
- Wire cylinder or cage
- Three-bin systems
- Manufactured composters

Commercially available compost bins

Planting and the first season

Container gardening

Container gardening is a fun way to complement the permanent elements of a garden, or to create a garden in a small space that otherwise would not accommodate plants. Planter boxes and containers can transform window and patio areas, bringing seasonal color. Containers can accommodate experimentation with plants that would have a tough time in your native soil or environment. For example, plants that cannot take high-altitude winters can be moved inside during the cold season, and outside for warmer months.

Choose containers with at least one drainage hole. This is important for preventing water accumulation around plant roots. Submerge new or unused terracotta pots in water and let them soak thoroughly before planting anything in them. This prevents them from absorbing all of the moisture out of your planting mix.

A good potting soil is fast-draining, yet moisture-retaining, allowing roots to grow easily. Regular garden soil is too dense to use in containers. Packaged potting mixes are made for container use. Flush these mixes with water before planting anything in them. This gets rid of excess salts in the mix.

Container plants require more-frequent watering than those in the ground. In hot or windy weather they may even need watering a couple of times a day. If the soil is dry to the touch then the plant needs water. Apply water over the entire soil surface in the container, until the water flows from the drainage holes. You may occasionally want to submerge the entire container in water for about half an hour to ensure deep watering. For larger containers, occasionally let water from a hose trickle slowly into the container over time. Drip irrigation systems are very effective for watering container plants.

Container plants need fertilizer on a regular basis as frequent watering leaches nutrients from the potting mix. Apply a liquid fertilizer every two weeks during the growing season. Container plants need to be re-potted periodically. If roots are crowded, the plant has outgrown its container. When it is time for re-potting, select a new container that allows an inch or two of new mix on all sides. If roots are compacted, loosen the outside of the root mass gently with your fingers.

Container gardening

How to make a planting bed

Before sowing seeds or planting annuals, perennials or vegetables, prepare a planting bed. When soil or drainage is poor consider constructing a raised planting bed.

- Determine a planting bed location – delineate this with rope or stakes.
- Use a spade, remove unwanted vegetation and weeds completely.
- Loosen soil (with spading fork or tiller).
- Work with damp soil (If soil is too dry add water and continue work later).
- Dig down 10-12 inches breaking up clods and removing stones.
- Spread 3-4 inches of organic matter such as compost, ground bark, sawdust or peat moss to the entire bed.
- Mix soil and compost.
- Work fertilizer, as appropriate, into planting bed soil. Do not mix in fertilizer unless your soil test shows a need. In general, excessive amounts of fertilizer will do more harm than good.
- Add any amendments needed for your soil, incorporating evenly.
- Edge the planting bed (with bricks, rocks, material of choice).
- Level out planting bed with a rake.
- After your bed is prepared, water it thoroughly and wait a week. This allows weed seeds to germinate. Pull the weed seedlings.

Sample planting bed

Planting tips

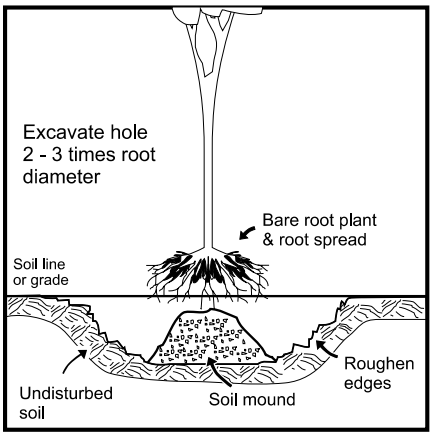
- Plant in early morning or late afternoon, when the weather is cool.
- Before digging, place the plants (still in the pots) on the bed, distributed as you plan to plant them.
- Check the label or inquire about the mature sizes of the plants and leave enough space for them to grow.
- Adjust location, distribution and spacing according to your site plan and make adjustments as needed before digging holes.
- When you are satisfied with placement, plant your garden from largest to smallest container, trees first, then shrubs, perennials and annuals.
- Incorporate some compost as you replace the soil.
- Mulch the area when done.

Planting trees

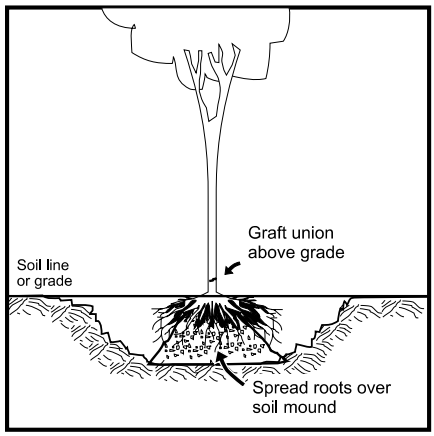
- Dig a hole twice as wide as the pot or root ball but no deeper.
- If the tree is potted, loosen the soil slightly around the roots.
- Place tree in hole.
- For balled and burlapped trees, loosen the burlap after the tree is in the hole.
- Cut away as much of the burlap as possible.
- Ensure tree is in place and straight.
- Fill hole one-third full with soil.
- Tap firmly to make good contact between roots and soil.
- Water immediately.
- Repeat watering three times, each time filling the hole with water.
- Loosely stake the tree if needed.
- Mulch to conserve moisture and suppress weeds. Organic mulches include shredded bark, pine straw, wood chips and grass clippings. Spread mulch to a depth of 2-3 inches.

How to plant a tree:

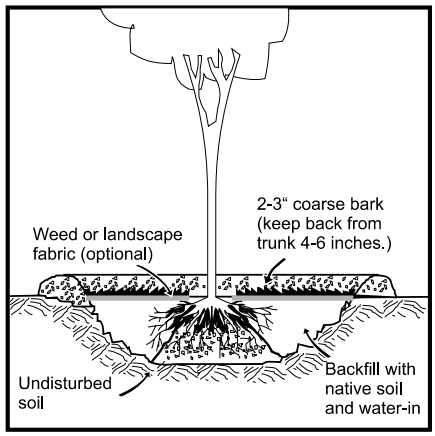
Home Landscaping Guide for Lake Tahoe and Vicinity



1. Make a cone of soil in the hole. Remove broken roots and untangle twisted roots. Trim 1/2 to 1 inch off the ends of the roots to stimulate new root growth.



2. Spread roots over soil cone and backfill with native soil. The soil line on the plant should be even with ground level or the grade of the slope. Do not allow the plant to settle below the surrounding soil.



3. Lightly tap or pack in the soil, and add water. Work soil around roots, keeping them spread out. During the growing season, add soil or mulch around the plant to make a watering basin or install two or three drip emitters.

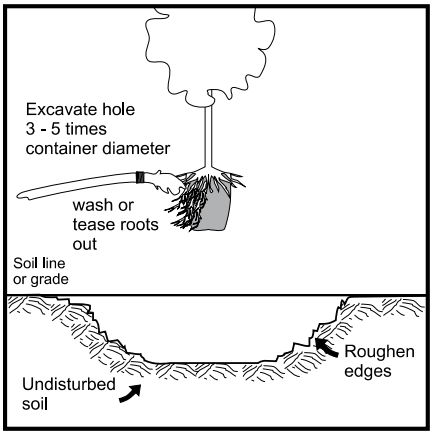
Planting shrubs

- Plant a shrub in a hole that is twice as wide as the root ball.
- The top of the root ball should be at the same level as the surrounding soil level.
- Backfill with soil and compost.
- Tap firmly to make good contact between roots and soil.
- Water immediately by running a hose at the shrub base for about 20 minutes.
- Mulch to conserve moisture and suppress weeds. Organic mulches include shredded bark, pine straw, wood chips and grass clippings. Spread mulch to a depth of 2-3 inches.

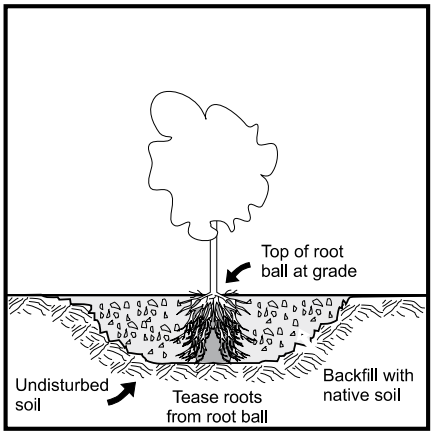
Planting a shrub

Planting a shrub:

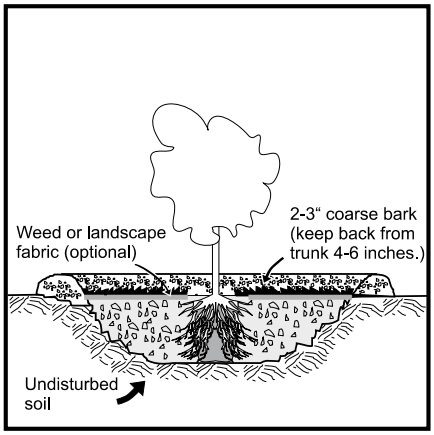
Home Landscaping Guide for Lake Tahoe and Vicinity



1. As you remove the plant from the container, spray the root ball with water. Cut or pull away any circled or matted roots so they radiate out from the root ball.



2. Place the plant in the hole so the soil line of the plant is level with the surrounding soil. Backfill the hole with unamended native soil. Do not allow the plant to settle below the soil.



3. Mound soil around the plant to form a watering basin. Water to keep the root ball and surrounding soil moist, but not wet, or instead install two or three drip emitters to water the tree.

Michelle Sweeney

Planting perennial and annual plants

- Dig a hole for each plant, the same depth as the container and an inch or two wider.
- Lightly separate matted roots with fingers.
- Place each plant in its hole so that the top of the root ball is even with the soil surface.
- Tap firmly to make good contact between roots and soil.
- Mulch to conserve moisture and suppress weeds. Organic mulches include shredded bark, pine straw, wood chips and grass clippings. Spread mulch to a depth of 2-3 inches.
- Water each plant gently and thoroughly. It is important to water so that the water reaches the root zone.

Sowing wildflowers by seed

Plant wildflowers from seed late in the fall season. Natives tend to germinate better after being in the ground through the winter. If you have missed the fall planting opportunity, plant as early as possible in the spring. Prepare wildflower beds as you would soil for a vegetable garden. Dig in a 3-inch layer of compost, then level the soil, and water. After about three weeks, pull the weeds that come up in that area. Now you are ready to plant. Mix the seed with dry sand, three parts sand to one part seed. Check the guidelines on the seed packet for distribution appropriate for your seed mix. In general, scatter the mixed sand and seed at the rate of one ounce per 300 square feet. Hand broadcast half of the seed and sand over the planting area. Then repeat the process in reverse with the other half. Rake lightly to about 1/16th of an inch in depth. Some seed will show on the surface. This is not a problem. Burying the seed too deep will prevent germination. Good seed-soil contact is necessary. Pack the surface down using a roller (can be rented cheaply) or other device for getting the seed bed firm.

Once germination occurs, keep the seed bed uniformly moist until roots have developed. During the growing season, water regularly and remove any weed seedlings. The drought resistant advantage of a native plant begins after the plants reach maturity. Once the wildflowers have finished blooming, leave the plants to set seed for the following year. After seeds have set, clean the wildflower area. Cut dry stems, remove weeds.

Sierra Note: Preparing for snow

If you get a significant amount of snowfall consider protecting your trees and shrubs from getting crushed. Conifers do not need any protection as they can deal with the snow. Wrap trees vulnerable to snow damage so that most of the branches reach upward. Wrap shrubs similarly and stake them as appropriate.

After planting and the first season

Mulch the garden after you plant. Organic mulches like shredded bark need to be topped off every couple of years. Mulch is an excellent tool to reduce water loss from the soil surface. It reduces runoff and improves soils. Mulch acts as an insulating blanket, preventing extremes in soil temperature and reducing moisture evaporation from soil. Mineral and inorganic mulches include gravels, cobble, geo-fabric or weed control cloth and plastic. These are especially effective at water conservation and weed control. However, while inorganic mulches are more permanent they do not improve your soil over time as organic mulches do.

Weeds are easiest to control when they first germinate. Pull or lightly hoe weed seedlings every month. If weeds are getting the upper hand in your garden focus on preventing them from going to seed, pulling weedy perennials and containing the spread of weeds.

Consider raking in an organic soil amendment in the early fall and mulch in the early winter. In spring start controlling weeds early and reapply mulch if needed.

Vegetable gardening tips

Soil is essential to successful gardening. For vegetables, soil needs to be rich and not compacted. To prepare the soil initially, add fresh topsoil and compost. Dig in a 3-inch layer of compost then level the soil and water. After about three weeks, pull the weeds that come up in that area. Then plant. Planting boxes are highly recommended at high elevations where granitic soils are particularly unfriendly toward vegetables. Crop rotation helps keep your soil healthy for vegetable growing. Plant a different family of vegetable in each area annually.

The flavor and crispness of homegrown vegetables depends greatly on watering them according to their stage of growth. Under-watered vegetables can be stunted, bitter and tough. Over-watered vegetables may rot before they make it to your table. Keep soil consistently moist but not soaked or too dry. Vegetables are very sensitive to irregular watering habits. It is best to do all watering before 9 a.m. or between 5 and 7 p.m. This conserves water by limiting evaporation and provides water to the plants at an opportune and consistent time. Plant vegetables in groups—according to their water needs. Beets, carrots, lettuce, spinach and radishes grow at about the same rate and use similar amounts of water. Corn, melons, and squash all grow rapidly and need more water.

As soon as the soil is relatively dry, workable, and has warmed to the recommended temperature, plant:

- Broccoli 45°
- Lettuces 50°
- Spinach 50°
- Peas 50°
- Radishes 40°
- Chard 60°
- Potatoes 45°
- Beets – moderate growth until temperatures stay around 60°
- Carrots – excellent frost tolerance
- Leeks – good frost tolerance
- Onions – good frost tolerance
- Other root crops

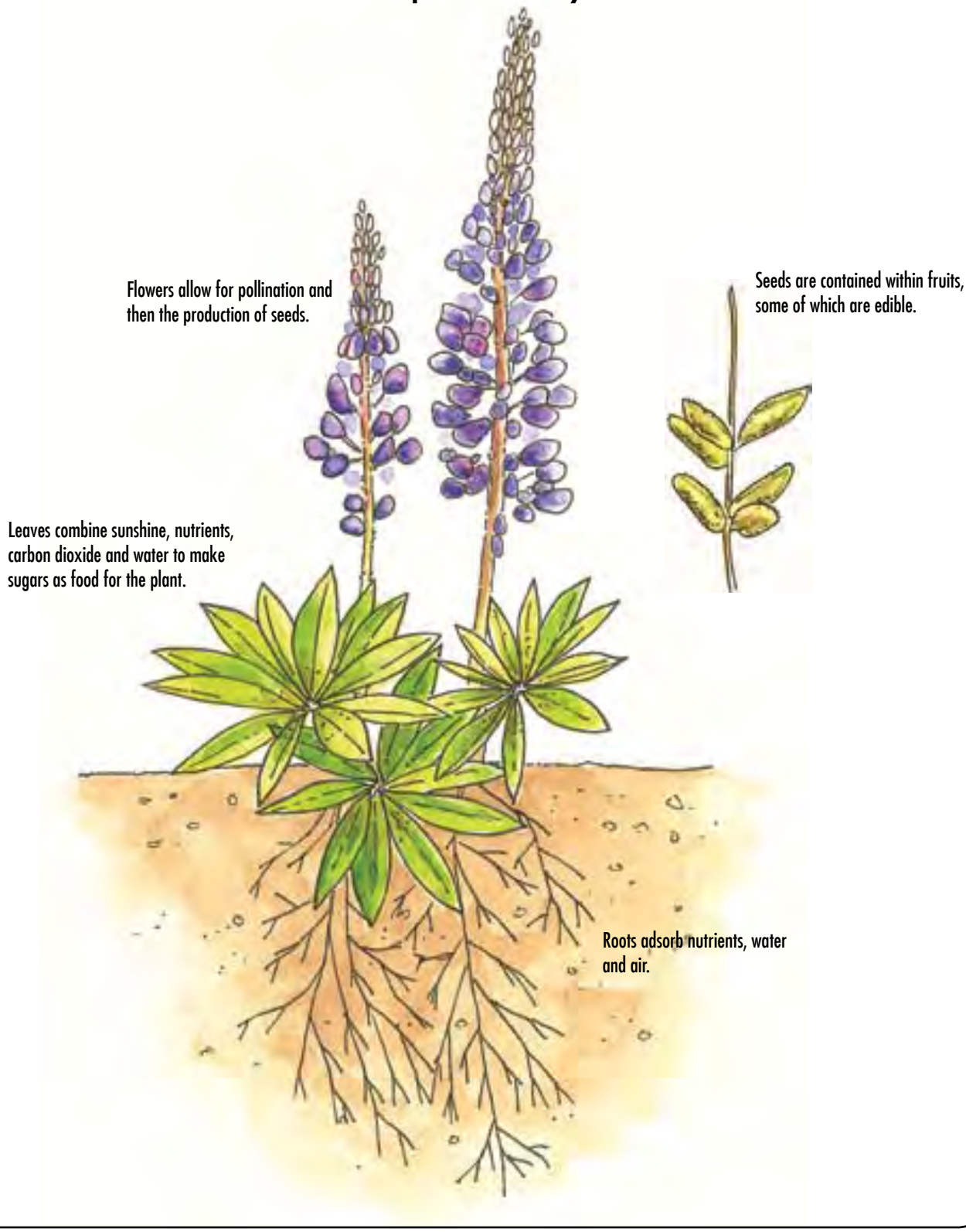
Garlic can be planted in spring or fall. Asparagus should be planted in the spring.

Sierra Note: Vegetables are a challenge to grow at elevation but it can be done! Gourmet lettuces, herbs, heirloom vegetables, carrots, spinach and potatoes are all harvested by dedicated gardeners at high elevation (over 6,000 feet).

Whenever frost threatens, cover your garden. Seedlings will not make it through frost, especially those of tomatoes, peppers, squash, cucumbers, pumpkins and corn. In frost-prone areas a good frost cover is a sound investment if you aspire to have a vegetable garden. If you are at high altitude and trying to grow from seed, the following vegetables should be started indoors no later than March 1. Plant the seedlings outdoors after the last frost date (between June 15 and July 5): Tomatoes, peppers, squash, cucumbers, corn, and pumpkins. Remember, whenever frost threatens cover your vegetables. These varieties will never be frost tolerant—not even as mature plants!

Growing vegetables at high elevation can be done.

Basic plant anatomy



Long term maintenance

Plants need sunlight, water, nutrients and space in order to grow. When all of these are available, the plant is usually healthy. Watch the appearance of your plants to gauge whether they are getting what they need. Compare the plants on your site with the same species on similar sites. Lighter, yellowish color often means a root problem, drought, soil compaction, poor nutrition or disease. Browning or reddening of plant foliage in patches is often a sign of insects, foliage disease or a broken branch. Widespread or complete color change of a tree is often a sign of damage to the growing layer under the bark—the result of insect, heat, drought or fungi.

Healthy plants have fuller foliage than stressed plants. A plant with thinning foliage is under stress. Unless the stress is identified and eliminated, the plant continues to decline or it succumbs to secondary problems like insects or disease.

Maintaining healthy plants

Avoid physical stresses to vegetation

Physical damage to vegetation is easy to avoid. Avoid vehicle travel or parking in proximity to vegetation and refrain from using trees as utility poles or posts. Roots are susceptible to damage indirectly from soil erosion, compaction or addition of new soil on top of the old. To maintain the health of native trees irrigate during the driest part of the summer. During mid and late summer months moisture reserves in the soil are low. At this time, trees are weakened by drought stress, increasing their susceptibility to attack by pests. To effectively irrigate a tree, snake a soaker hose around the tree, extending beyond the drip line. (Do not water at the base of the tree trunk.) Water trees once a month during the summer and early fall by soaking to a depth of 12 to 18 inches. Take care not to keep the soil saturated. It should dry thoroughly between waterings. Take care not to overwater as this can cause root damage and instability. In the late fall and winter months Sierra Nevada trees do not require watering.

Overcrowding

A tree suffers when its supply of light, water, nutrients and growing space is limited. This can happen if there are too many trees sharing the resources, or if the tree is in an environment that cannot support its needs. Overcrowding weakens trees and makes them susceptible to attacks from insects and diseases. Thinning, or removing trees that are growing too closely together, is advised where there is overcrowding. Select trees for removal that are deformed, have a thin crown or dead top, or show evidence of disease, insect damage or mechanical damage.

When thinning and maintaining trees, consider the following:

- Young, vigorous trees grow fastest and with best form if they have 10-15 feet of growing space around them.
- Trees are best located at least 10 feet from buildings and at least 5 feet from pavement.
- Trees growing beneath other trees often cannot develop well, and serve as ladder fuels to fire. Consider removal.
- Trees under power lines are likely to be topped or removed in the future.
- Trees that are leaning or splitting could become a hazard to structures or people. Consider removal.
- Prune trees in the winter before growth begins.

Managing for disease prevention

There are a variety of diseases that can damage your newly-planted or existing vegetation. When a problem arises, first learn what causes the problem. Then learn how to prevent or address the issue. Keeping a mix of tree and plant species with varying ages on your property lessens the chance of insect or disease.

Overwatering is the leading cause of disease for plants. Fungi, in particular, flourish in overwatered plants.

Sierra Note: Not only are fertilizers or chemical treatments for disease prevention not as effective as other options, but they also have serious long term implications for the environment and public safety.

Types of plant pathogens and disease

Fungi – microscopic organisms, some obtain their food parasitically from green plants, causing disease in the process. Most produce spores that spread very easily.

Bacteria – single-celled organisms that feed on organic matter, including plants. Require moisture and warmth for reproduction. Spread by insects, splashing water, garden equipment and handling.

Viruses – ultramicroscopic particles capable of invading plant tissue and reproducing in it, usually at the expense of the host plant. Beans, cucumbers, squash, tomatoes and peppers are especially prone. Aphids, leafhoppers and whiteflies are among the plant-eating insects that also spread viruses.

The following practices can help reduce risk to plant disease.

- Utilize plants varieties resistant to disease.
- Give each plant the climate, exposure and amount of moisture and fertilizer it prefers.
- Reduce stresses to the plant such as overcrowding and overwatering.
- Allow plenty of space between plants.
- Control weeds.
- Clean up the garden each fall.
- If disease does appear, immediately remove infected annuals and vegetables, leaves and branches.
- Discard all infected material in the trash, not the compost bin.

Controlling pests without harming the environment: Integrated Pest Management (IPM)

A healthy garden hosts an abundance of life, including insects and wildlife. Most of these share the yard and garden without causing any problems. Many are welcome visitors, performing vital functions such as pollinating plants, feeding on undesirable insects, and helping to break down plan matter, building soils and recycling nutrients. However, some garden visitors may injure plants and unacceptably damage the garden. These are pests.

Integrated Pest Management (IPM) is a philosophy whose primary aim is prevention. If insects, diseases, or other problems become serious, IPM offers a number of techniques to reduce their effects to tolerable levels while keeping unintended environmental damage to a minimum. IPM involves learning how to identify which pests are causing your problems and which control measures are likely to be effective.

The Integrated Pest Management Approach is to use a combination of control tactics—cultural, physical, mechanical, biological and chemical—in an overall pest management plan. Effective IPM requires you to look at your plants. Look for pests, leaf damage, disease, animal damage, stress or stunted growth, poor color or wilt. Know that there is a point of no return in some cases, in which the pest population unacceptably affects the ornamental or food value of the plant. IPM recommends that you tolerate some insects and other pests as long as they are not a serious threat to your landscape or the use of your plant or its products. Apply chemical controls only as a last resort as these controls in the long-term could have an adverse affect on your health and yard environment.

Cultural controls

Knowing a bit about the life cycle and habits of your yard pests can give you the upper hand in managing against them. Native and adapted plants tend not to be as susceptible to pests as non-natives. With natives, natural controls are often sufficient to keep pests under control. Regular maintenance keeps the landscape free of weeds, pest-ridden plants and debris. Ensuring that plant residue, diseased plants and weeds are removed as they occur and at the end of the growing season is a big step toward preventing pest problems in the next growing season. Cultivation, turning or loosening the soil, is critical in tended beds. Cultivation exposes soil insects to the element and to natural predators. Providing the right amount of water—neither too much nor too little—and adding appropriate soil amendments are great ways to defend your plants against the stresses that make them vulnerable to pests. A vigorously growing plant often can outgrow the injuries caused by garden pests.

Wash tools to prevent spread of disease

Physical or mechanical controls

Physical controls include actions that can directly kill or capture pests. These include handpicking, pruning, spraying plants with strong jets of water and hoeing or mowing weeds and using bands of material the pests cannot travel over.

- Handpick to remove snails, caterpillars, insect egg masses and other pests that can easily be found among the plants. Take care to leave the lady beetle larvae and other beneficial insects that are sometimes mistaken as pests.
- Prune and destroy branches, canes and other plant tissues that show evidence of actively developing pests such as borers, scales, fire blight and any plant diseases.
- Spray plants with a strong jet of water to dislodge small insects such as aphids, thrips and spider mites. Regular spraying with water may also help manage powdery mildew.
- Erect barriers to deter pests. These may range from a high, continuous fence around an entire garden (see wildlife section in this chapter) to row covers protecting a bed of plants and caps or protective collars around individual plants. Diatomaceous earth can deter some crawling insects. Wood ashes and copper strips can deter slugs and snails.
- Use traps to capture and monitor pests. Yellow sticky cards are used to capture flying insects such as whiteflies and aphids. Damp newspaper or other cover can concentrate slugs, millipedes and earwigs that seek daytime shelter.

Use a garden hose with a spray nozzle to wash insects off plants and trees for an effective mechanical control.

John Muir Laws ©2007, used with permission.

Beneficial insects, such as lady bugs, can help control pests like aphids.

Biological controls

Every garden has a built-in array of pest-control measures. Among the most obvious of these are biological controls—predators and parasites that feed on garden pests and help control diseases. Beneficial insects and mites can include ladybugs, lacewings, syrphid flies, wasps and preying mantis. Birds, toads and garter snakes all prey on insects. Plants that provide food and shelter for birds can increase their beneficial activities around a garden. (See the wildlife section of this chapter for more information.) Many insects prey on pest insects and mites. All spiders feed on insects and can provide tremendous benefits in plant protection. Many beneficial insects can be encouraged by planting flowers that they use as sources of nectar and pollen.

Trapping slugs, snails and earwigs

Overturned clay pots and damp newspapers set in the garden can attract slugs and earwigs. Fermenting liquids, such as beer or sugar, are attractive to slugs and snails and can be used to lure the pests. Earwigs are attracted to vegetable oils, wheat bran and wheat germ.

Chemical Controls

Insecticidal and herbicidal soaps, horticultural oils, botanical-derived insecticides and less-toxic pesticides are options when all other methods to control pests have been tried. Take great care when using chemicals. Use the appropriate chemical at the proper time to control the pest without damaging the plant or crop and to reduce risk to you, people around your garden and the environment. Always follow label instructions and measure accurately. Never exceed recommended rates of application. All chemical controls, whether man-made or plant-derived should be regarded as poisons and used cautiously.

Less-toxic pesticides

- Insecticidal soap: potassium, salt-based, effectively controls aphids, red spider mites and mealy bugs. Must hit the insect directly.
- Herbicidal soap: potassium, salt-based, effectively controls very young weed seedlings.
- Botanical-derived insecticides: These include pyrethrins, derived from the chrysanthemum plant, neem oil and seeds of the neem tree. While they are safer to the user and to the environment than conventional pesticides, they may kill beneficial insects and may not be as effective in control of pests.
- Sulfur sprays: Good all-purpose fungicides, which also help control mites.
- Bt: Bacillus thuringiensis, a bacterial biological control, is effective against leaf-eating caterpillars. (Be aware, caterpillars become butterflies so destroying the caterpillar population means the butterflies go too.)
- Horticultural oils: Most effective when applied as a dormant spray during fall and winter. Controls many types of insects and insect eggs, including aphids, scale and mealybugs.

Resource: For more information about biological pest and disease control: Peaceful Valley Farm Supply, Grass Valley, CA. 530.272.4769 www.groworganic.com.

The Bio-Integral Resource Center in Berkeley, CA publishes a directory of Least-Toxic Pest Control Products see www.birc.org or call 510.524.2567.

For more on IPM, visit the University of California's website www.ipm.ucdavis.edu

Integrated Pest Management

Anticipate the time of year that your known pests are likely to show up and take preventive measures. A seasonal checklist may help you get the edge on recurring pests and keep your work to a minimum. Some IPM basics include:

- Keep plants healthy and vigorous. Pests attack stressed plants.
- Plant beneficial species to ward off pests.
- Check your plants frequently to spot problems before they get out of hand.
- Be able to diagnose problems and recognize pests.
- Learn a bit about specific pests—this will allow you to judge the seriousness of the problem and what actions should be taken. To help with identification, read the descriptions in this section or contact your local Cooperative Extension office.
- Take care not to overfertilize with nitrogen fertilizer. Soft, rapid plant growth is particularly susceptible to insects.

R. S. Lynn

Living with wildlife

Intentionally creating accommodation for wildlife is a complex undertaking and has with it important responsibilities. See the wildlife sections in chapters 2 and 3 before applying the tips introduced in this section. Well-selected trees and shrubs nourish and protect wildlife. Native oaks are great wildlife habitat. They provide good nesting sites for birds and squirrels and tend to retain leaves well into the fall season providing cover for many species of birds and mammals. Acorns and seeds are great food sources for many species of birds and mammals. The insects that many wildlife species eat feed on flowers, twigs, leaves and bark. Native pines provide cover for birds and chipmunks, sap for sapsuckers, nesting cavities for woodpeckers and pine nuts for people and animals. Native fruit and nut trees are excellent choices for wildlife as well.

Mountain yellow leg frog

In many areas providing a water source can assist wildlife, especially in late summer or fall before rains arrive. Water will help attract frogs and salamanders as biological control for insects. However, be aware, providing a water source is a great responsibility. Shared water sources, if not cleaned as routinely as once a day, can spread disease.

Attracting birds

Birds require food, water and cover. Choose plants that provide fruits, seeds or nuts to attract birds. The ideal yard habitat for birds has a bountiful selection of plant life from ground cover (closest to house), to shrubs and trees (further from house). The island approach to design (See Design chapter) provides a variety of habitat niches, increasing the kinds of birds that will visit. Insects are also a draw for birds as well as bats.

California quail

Birds are attracted to sites with plants bearing berries, foliage, fruit and nectar. Plants that bloom at different times of the year will extend the season that birds visit the site. Leafy or twiggy shrubbery protects birds from predators and can be attractive nesting places provided they are in areas absent of a lot of people passing by. Be aware, in bear territory, bird feeders are somewhat of a liability. Bears are attracted to bird feeders. At first they may just visit your bird feeder, but subsequent visits can involve damage to your home such as the breaking of windows or doors in the search for food. For this reason bird feeders are discouraged in bear country.

Water will draw in birds. The simplest and least expensive way to provide water for birds is in a ceramic or metal birdbath mounted on a pedestal. As long as the water is clean, and changed frequently, birds will respond. If you attract birds, do so responsibly, maintaining the bath and area so it is clean is critical to the birds' well-being. One way to do this is to provide a birdbath with moving water that is pumped from one level to another. The moving water is attractive to the birds and is more sanitary than standing water. The presence of water will often attract migratory birds as well as local residents.

Cover can be provided in the form of nesting places in natural cover such as cavities in trees or rocks or in the form of bird houses. Bird houses and nest platforms should be firmly anchored to a post, tree or side of a structure some distance from your house and cleaned at

least once a year. Take care not to put birds in harms way by locating houses or nesting areas where household pets or wildlife such as coyotes can easily reach them. Also, keep in mind that nesting birds need space, personal territory that almost always extends beyond the immediate nest area. For this reason, provide nesting areas at a minimum. One or two will suffice for most yards. For advanced birders, pick your favorite types of local, native bird species then do some research to find out the size of nest structure the birds require and where these structures should be located.

Attracting butterflies

Butterflies are welcome visitors to most gardens. Butterfly larvae (caterpillars) need food plants; adult butterflies need nectar plants. Sunny areas that are sheltered from the wind and contain amenities such as leaf litter, rock crevices and damp places are the most welcoming places for butterflies. If you are trying to create butterfly habitat it is particularly important not to use pesticides on your site. Attracting certain insects can even help you minimize the use of fertilizers as they are natural repellents to bad insects.

Monarch butterfly

For a successful butterfly garden you need two types of plants: host plants, on which the butterflies lay their eggs and the caterpillars feed; and nectar plants, for feeding adult butterflies. Milkweed plants are the chief food for the caterpillars of the milkweed butterfly family (Danaidae), including the Monarch and the Queen. Milkweeds are also excellent nectar plants, attracting a myriad of colorful butterflies to their large flower clusters. Adult butterflies are less choosy about nectar plants than caterpillars are about the plants they eat.

Discouraging deer

Deer migrate from the low elevations in the winter, to higher summer pastures. On their travels they search for succulent growth. Browsing deer do not dine

Deer

indiscriminately. Some plants are particular favorites; others are left more or less alone. Fresh, fleshy growing vegetation is very attractive to deer. Vegetable gardens are a feast waiting to be devoured. In deer country, the best approach is to design your landscape or garden using less-favored plants. Though there really is not such a thing as a deer-proof plant, some choices will let you sleep easier at night than others.

Most deer feed in the late evening and very early morning. If you suspect deer are browsing in your yard but are not witnessing them directly, look for hoof prints. Deer hooves are split, pointed at the front and rounded at the rear, and are about 2 to 3 inches long.

If your garden contains choice deer vegetation and will continue to, physical exclusion such as fencing is a good option. Consider fencing just the areas with the most sought-after vegetation, as opposed to the entire site, in order to maintain open passage for migrating wildlife as well as to save money. Properly built and maintained fencing is the most-effective method for preventing deer damage. Deer are capable of clearing a 6-foot fence if chased or threatened. Due to this, a 7 to 8 foot fence is recommended when you are trying to exclude deer from an area. If an animal gets into your fenced area, it needs to be able to exit. Designing a removable section of the fence will allow a trapped deer to escape and thereby help prevent inadvertent deer trapping and associated potentially dangerous situations.

In deer territory it is advisable to individually fence young fruit or nut trees until primary branches grow above 7 feet. Plastic trunk protectors can be a good defense for young vines and trees against deer.

Plants that deer seem less fond of

Planting less-preferred plants in your garden is advised whenever feasible. Local nurseries and neighbor gardeners will likely be a good source of information on deer-resistance in your area. In general deer do not like:

- sticky plants
- rough plants
- spiny plants
- highly fragrant plants.

Keeping bears out of trouble

If you live in Sierra Nevada bear country the number one rule is: Never feed bears! Feeding them can lead not only to damage to your property as they return seeking food, but the practice of feeding them can lead to their demise. Once a bear finds food in your yard (including in your trash) it will return many times hoping for a repeat performance. Food sources can be in the form of pet food, a bird feeder, an unfinished picnic, garbage put out before pickup time, a compost pile, an apple tree full of ripe fruit, a bowl of peaches inside an open window, a candy bar laying in the front seat of the car, an open door to your house or an accessible garage with food or garbage inside.

People living in bear territory should take care to:

- Put out garbage for pick up on the day of pick up (as opposed to the night before) and as close to pick up time as possible.
- Use bear-proof garbage canisters.
- Secure garbage containers at all times (even inside your garage or canister to reduce odors).
- Keep ground level windows and doors closed to prevent bear entry.

John Muir Laws ©2007, used with permission.

Black bear

- If maintaining a vacation home or rental, take precautions to ensure that refrigerators and cupboards are left empty between visits.
- Collect fallen fruit rather than letting it rot and attract wildlife. (In some locations there are gleaning programs that will make use of the fruit.)

Sierra Note: Bear behavior and safety

If a bear does get into your house, it will leave by the same way it entered. Do not stand in its exit route. Also, crawl space under houses and decks are perfect places for bears to make day beds and hibernation dens. Make sure possible entry points are securely screwed shut.

Keeping mountain lions out of trouble

The Sierra Nevada is also mountain lion country. Take action to prevent mountain lions from being attracted to your property. Once a mountain lion decides your property is a food source, it will keep checking in. Mountain lions can follow their prey to your yard. The presence of deer and domestic pets may lure mountain lions. Tethering an animal in your yard, with no way to escape attack, attracts mountain lions. Protect livestock and pets in fully enclosed pens. Make sure the pen is not accessible via digging or jumping by predators.

Mountain lions tend to avoid contact with humans. Keeping your yard free of debris and places that large animals can shelter or hide discourages mountain lions.

Sierra Note: Mountain lion behavior and safety

If you do encounter a lion, do not run. Look as tall as possible—staying upright on two feet, holding up your arms, opening your coat or picking up large objects. Maintain eye contact, speak firmly and give the lion an exit.

If children are present, walk slowly to them and gather them around you, maintaining eye contact with the mountain lion. Instruct children not to run. Running can trigger a pounce response. Mountain lions roam up to thirty miles per day. If a mountain lion has been seen in your vicinity take precautions with children until you have confirmation the mountain lion has moved well out of your vicinity.

Dealing with gophers and moles

Pocket gophers are burrowing rodents. They range in length from 6 to 10 inches. Gophers are rarely seen outside of their burrowing systems. Mounds of fresh soil are a sign of them. Gopher mounds appear at the end of burrowing tunnels and are distinguished from vole mounds by their crescent shape. The presence of moles can be distinguished from gophers because moles commonly burrow just below the surface, leaving a raised ridge to mark their path. Gophers, in contrast, burrow fairly deeply and do not leave raised ridges.

Pocket gophers feed on a wide variety of vegetation, generally preferring herbaceous plants, shrubs and trees. They commonly feed on roots and fleshy portions of plants they find while digging. Gophers are also known to gnaw and damage plastic water lines and lawn sprinkler systems. This can cause soil erosion and water loss.

Moles are small, insect-eating mammals (not rodents). They can eat some roots, bulbs and other plant material, but their burrowing is the primary cause of nuisance in the garden setting.

The advice is similar for halting the invasion of your yard by both gophers and moles.

- Wire mesh baskets or bottoms of planter boxes can prevent moles from pulling planted bulbs.
- The sooner you detect mole or gopher presence, and take action to deter them, the more likely you are to succeed.
- Gophers and moles reproduce quickly and prolifically.
- Trapping is the recommended means of controlling populations. (Do not use poisons; pets and children are more likely to find the poisons than the rodents are. Also, if the rodent dies from the poison, another larger animal can eat and also die from the contaminated rodent.)
- Understanding mole or gopher behavior will inform the way you set traps.
- Fumigation with smoke or gas has proven largely ineffective against either animal.

Resource: Information about living with wildlife

- The Mountain Lion Foundation: Raising livestock, keeping pets and planning your yard in the habitat of predators such as raptors, bobcat, mountain lion, coyote and bear requires special care. Check out this website for tips on animal husbandry and living with wildlife: http://www.mountainlion.org.
- If you are interested in gardening with deer resistant plants, check out the Department of Fish and Game free *Gardener's Deer Guide to Preventing Damage*, found online at http://www.dfg.ca.gov/keepmewild/docs/gardenersguide.pdf.
- Defenders of Wildlife is a general, national resource: www.defenders.org.
- The USDA has an online resource for finding gleaning programs that will pick the unwanted fruit from your backyard trees and use it or compost it so that it does not attract wildlife: http://www.usda.gov/news/pubs/gleaning/appb.htm. More information on this topic can also be found at: http://www.villageharvest.org/.

Coyote

Clearing and wildfire defensible space

The first on-the-ground step toward a successful landscape or garden is to remove excess material and debris. This includes everything from old materials you have not used in years, to the dead branches of trees. In combination with using the integrated zone and island design approach that includes the Lean Clean and Green zone, the most crucial thing you can do to prevent wildfire threat to your site is to clear dead vegetation and reduce the space between potentially flammable vegetation. CAL FIRE, the agency tasked with preventing and putting out wildland fires, has the following recommendations for plants within 100 feet of a structure (please see chapter 3 for additional discussion):

- Remove dead and dying plants immediately;
- No trees or tree branches within six feet of structures;
- No shrubs within thirty feet;
- Shrubs should be widely spaced—at least three times the shrub height;
- Trees should be limbed between six and fifteen feet high;
- Trees should be spaced with ten or more feet between the canopies. Even greater spacing should be used on hillsides below a structure.

Professional advice is available to all homeowners about what to do to increase your defensible space. Please seek this advice if your home is on a steep hillside or in a fire prone plant community. The first place to look for help is a local fire safe council (www.firesafecouncil.org). The second place to ask for help is the CAL FIRE website (www.calfire.ca.gov). Another place to inquire is your local fire station. Make creating and maintaining defensible space a priority. Protecting life and property against the threat of wildfire is a vital part of life in the Sierra Nevada.

Fire risk reduction measures

Fire risk reduction literature suggests some standard items for removal or reduction.
Remove:

- Dry or dead vegetation;
- Dead branches of trees;
- Tree branches (alive or dead) within 6 feet of roof;
- Tree branches within 15 feet of a chimney or stovepipe;
- Vegetation in proximity to power lines;
- Woodpiles—to within a minimum of thirty feet of structures during fire season;
- Woodpiles that could roll downhill toward structures;
- Flammable decoration, outdoor furniture or hardware—to a minimum of thirty feet of structures from June through mid-September;
- Flammable materials from beneath deck or porch areas;
- Flammable shrubs such as juniper, arbor vitae and mugo pine.

Michelle Sweeney

California slender salamander

John Muir Laws ©2007, used with permission.

Clear and Remove Checklist

Use the following table to determine what work needs to be done in your yard to meet the minimum fire risk reduction recommendations.

	Minimum distance from structures			
Remove	6 feet	30 feet	100 feet	everywhere on property
dry or dead vegetation				x
dead branches of tress (ladder fuels) (up to at least 10 feet high)		x		
tree branches	x			
woodpiles			x	
woodpiles that could roll downhill toward structiures				x
wood mulches	x			
flammable decoration or outdoor furniture			x	
flammable debris				x
flammable materials from beneath deck or porch areas				x
flammable shrubs (such as juniper, mugo pine and arbor vitae)			x	
non-native species				x

Home design considerations for reducing risk of wildfire damage

- Keep barbecue propane tanks a minimum of thirty feet from the house.
- Maintain plants around the home and keep them free of debris.
- Clean gutters regularly or cover gutters with metal screening.
- If you have a chimney, be sure that it has an approved spark arrester.
- Consider metallic screens—these provide protection to windows from radiant energy from fires as well as some protection against wind-blown debris.
- Replace flammable roofing materials.
- Windows: Windows are a major point of fire's entry. High radiant energy from an approaching fire can fracture glass (untempered glass will expand much more than the frames and break). There are also reports of ignition of the materials inside of the house (such as drapes) from radiation through windows.
- Replace untempered glass windows with double pane tempered glass, which is less likely to fracture in the event of approaching wildfire. Single pane should be replaced with double glazed windows.
- Remove any combustibles (including large plants) from beneath first-floor windows. The safest approach is to have low-form plants under windows. Protect the windows by using shutters to act as a barrier or modify the windows by installing tempered glass.
- Be sure that there are no outdoor large plants directly below vents to the house.
- Vents: There are many types of vents that are located in soffits, roofs (eyebrow vents), tops of roofs (ridge vents), top ends of walls (gable vents), and crawl spaces. Of these, the soffit vents (including the frieze block vents, which are the round or notched vents for cathedral ceilings) are most vulnerable to fire.
- Siding: Since most sidings are combustible (except stucco), ensure that there are no combustibles at the base, that there are no openings in the siding where brands could enter, and that the siding is thick enough (3/4 inch) that it is unlikely to burn through into the wall cavity. Stucco walls are fine as long as the stucco is about 7/8 inch thick and has sheathing beneath it.

Prevailing wind

Know the pattern of the prevailing summer winds in your neighborhood. Winds are often the number one factor in determining the fate of a site in a wildfire situation. You can have textbook perfect defensible space on your site and still lose a home to wildfire. Summer is the season for wildfire. Conditions in which wildfires are most likely to start in the Sierra Nevada are hot, dry, windy summer days—generally between June and September. Wind is the primary driver of wildfire in its initial stages. Slope and vegetation are also drivers of wildfire, but if wind is present its direction will tell you which way the fire will initially travel.

Gregory Lockert

Plausible wildfire ignition locations

A diligently maintained Lean Clean and Green zone is a good barrier to ignition of your yard by flying embers. You can take prevention another step further by considering the most plausible places for wildfire to start in your neighborhood. Then calculate the approach wildfire would take to your site from those plausible fire start areas and plan your defensible space accordingly. Examples of plausible fire start areas are roads where cigarettes are discarded from passing cars and wildland areas where illegal campfires or activity with cigarettes or matches can occur. Particularly if your site is near a wildland, prioritize defensible space work in the locations on the site from which wildfire is most likely to approach, or where your site's vulnerabilities to fire are most evident.

Diligently maintain your Lean Clean and Green zone

Be diligent in maintaining your Lean Clean and Green zone. Sierra Nevada native landscapes can burn fairly readily. Managed native vegetation can help slow the progression of wildfire, but it is the Lean Clean and Green zone that best serves as defense. Perennial beds and islands of succulent ground cover near structures do a lot to protect your outdoor space and home.

Slope and wildfire relationship

If you have a down slope from your house with annual grasses/weeds, think about revegetating the area with a low-form, fire and drought-resistant plant. This may take a few years to fully develop (with watering in the first year or so), but it can serve as a significant barrier to the spread of fire. Because fire moves faster uphill than downhill, and creates its own wind, it is important to maintain 100 feet of defensible space on slopes leading to your home.

Resource: Defensible space resources

The following resources can help you reduce your risk to wildfire by developing defensible space around your home.

Living with Fire
This is a multi-agency umbrella group that provides defensible space information.
Website: http://www.livingwithfire.info/
775.784.4848

California Fire Safe Council
This is an umbrella group representing local fire safe councils. This is a good site to locate your nearest fire safe council. Website: www.firesafecouncil.org/

California Forest Stewardship Program (CFSP)
This website addresses common danger spots around your home and how to increase your defensible space.
Website: http://ceres.ca.gov/foresteward/html/danger.html

This website provides seven steps to creating a defensible space.
http://ceres.ca.gov/foresteward/html/defenspace.html

This website provides ten simple things you can do to increase your fire safety.
http://ceres.ca.gov/foresteward/html/tensimple.html

Jeffery pine cone

John Muir Laws ©2007, used with permission.

Feature: Susan Bragstad • Amador City, California

Sierra Nevada zone: Foothills
Conservancy sub-region: South Central
Elevation: 919 feet
Watershed: Mokelumne
Focus: All natural Sierra Nevada yard, water conservation
Yard size: 2 yard acres, 10 total acres
Favorite resource: Sunset Western Garden Book

Relying on her well for water has taught Susan Bragstad water wisdom. In Amador City, settled among the foothills of the Sierra Nevada, water resources can be very precious. When asked the meaning of water, Susan will say "expensive." She recognizes that plants will sometimes have to survive neglect when water is short. As Susan puts it, "The soil is just terrible, it has little nutrition, so you get really tough plants—survivors."

But she doesn't plant much. Susan owns 10 acres around her house, but has landscaped only two of these acres. And the landscaping is minimal, "I like it natural," she says. She relies on the arching blue oaks and live oaks to give beauty and shade to her yard, and leaves the rest to nature. Susan maintains drought-tolerant plants like wild grapes, blue and live oaks, and sycamore trees, to ensure survival. She also grows a small orchard of olive trees that produce fruit that is then pressed into olive oil and sold at the local farmer's market. She speaks highly of retiring, buying a farm and raising something from the land.

Susan's house

Around the buildings, Susan plants mostly shrubs with a few flowers. When she bought the house, Susan had ambitions to create a shared homestead for several friends. Currently, Susan and a friend live in their own small, studio-size bungalow and share a main "Cook House" where they make meals and eat. The Cook House porch is covered in ropes of grape vine that a friend brought from Syria. Outside the Cook House, a solar cooker boils a pot of lima beans.

With minimal landscaping and a creative living quarter, Susan's home won the Western Home Award from *Sunset Magazine* in 1991. When gazing out upon the bony elegance of the 200 year old oak trees, one appreciates not only their shade, but also their heartiness and beauty. Susan's love for her small space within the Sierra Nevada can be understood when you talk with her. Her passions lie in the way she constructed her house, walks in the fresh air to prepare each meal, cares for her olives, and takes part in the community. She knows her soil, recognizes the limits of her water, and does her best to help her space flourish. The yawn of Susan's front porch lures you to sit awhile, get away from the afternoon heat and share the gossip while the sun moves west in the sky, steadily shifting the patterns of oak shadows on the grass.

The porch provides shade from the hot summers, and a place for Susan's wild grape to grow.

Appendix A: Yard & Garden Resources **by Sub-Region of the Sierra:**

Northern Sierra (Lassen, Modoc & Shasta)

Master Gardeners:
Shasta College Master Gardeners (serving Shasta, Tehama & Trinity Counties)
http://www.mastergardeners.org/shasta_county.html
Redding, CA
530.225.4605

Cooperative Extension:
Shasta County University of California Cooperative Extension
http://ceshasta.ucdavis.edu/
1851 Hartnell Avenue
Redding, CA 96002-2217
530.224.4900

Lassen County University of California Cooperative Extension
http://celassen.ucdavis.edu/
707 Nevada Street
Susanville, CA 96130
530.251.2601

Modoc County Cooperative Extension
http://cemodoc.ucdavis.edu/
202 West 4th Street
Alturas, CA 96101
530.233.6400

Resource Conservation Districts:
Western Shasta County Resource Conservation District
http://westernshastarcd.org/
6270 Parallel Road
Anderson, CA 96007
530.365.7332
wsrcd@westernshastarcd.org

Central Modoc Resource Conservation District
http://cmrcd.carcd.org/index.html
804 W. 12th Street
Alturas, CA 96101
530.233.8872

Honey Lake Valley Resource Conservation District
170 Russell Avenue #C
Susanville, CA 96130
530.257.7271

Master Gardeners:
Mt. Lassen Chapter
Chico, CA
Contact Woody Elliot at 530.342.6053

Shasta Chapter (covers Shasta, Siskiyou, Modoc, and parts of Trinity and Tehama counties)
http://www.cnps.org/cnps/chapters/pages/shasta.php
Redding, California
530.474.1732
slibonati@shastacollege.edu

Native Plant Societies:
California Native Plant Society – Shasta Chapter
Redding, CA
http://www.cnps.org/cnps/chapters/pages/shasta.php
slibonati@shastacollege.edu

Fire Safe Councils:
Day/Lassen Bench Fire Safe Council
641-025 Old Country Rd.
McArthur, CA 96056
Ruth@rcrafts.com
530.336.6382

Janesville Fire Safe Council
Janeville Fire Department
Janesville, CA 96137
530.253.3737

Lassen County Fire Safe Council
Susanville, CA 96130
dorine.beckman@PlumasBank.com

Tionesta Basin Advisory Group
Susanville, CA 96130
530.257.7360

Modoc Fire Safe Council
Alturas, CA 96101
530.233.4141

Cottonwood Creek Watershed Fire Safe Council
3233 Brush Street, Cottonwood, CA 96022
530.347.6637
ccwg@shasta.com

Lakehead Fire Safe Council
P.O. Box 244
Lakehead, CA 96051
530.515.0627
slf@snowcrest.net

Shasta County Fire Safe Council
Western Shasta RCD
6270 Parallel Rd.
Anderson, CA 96007
barbara@westernshastarcd.org
www.westernshastarcd.org
530.365.7332 x210

North Central Sierra (Butte, Plumas, Sierra, Tehama):

Master Gardeners:
Shasta College Master Gardeners (serving Shasta, Tehama & Trinity Counties)
http://www.mastergardeners.org/shasta_county.html
Redding, CA
530.225.4605

Butte County Master Gardeners
http://cebutte.ucdavis.edu/Master_Gardener719/
Danielle Baker, Program Coordinator, drbaker@ucdavis.edu
New program, just started in January, 2008.

Cooperative Extension:
Butte County Cooperative Extension
http://cebutte.ucdavis.edu/
2279-B Del Oro Avenue
Oroville, CA 95965
530.538.7201

Shasta County Cooperative Extension
http://ceshasta.ucdavis.edu/
1851 Hartnell Avenue
Redding, CA 96002-2217
530.224.4900

Tehama County Cooperative Extension
http://cetehama.ucdavis.edu/
754 Walnut Street
Red Bluff, CA 96080
530.527.3101

Resource Conservation Districts:
Butte County Resource Conservation District
http://buttecountyrcd.org/
150 Chuck Yeager Way, Suite A
Oroville, CA 95965
530.534.0112 Extension 122
Fax 530.533.4936
bc-rcd@carcd.org

Tehama County Resource Conservation District
http://www.tehamacountyrcd.org/
2 Sutter Street, Suite D
Red Bluff, CA 96080
530.527.3013
tom@tehamacountyrcd.org

Fire Safe Councils:
Tehama-Glenn Fire Safe Council
Tehama County Resource Conservation District
2 Sutter St. Ste D
Red Bluff, CA 96080
530.527.3013 x120
tom@tehamacountyrcd.org

Butte County Fire Safe Council
http://www.buttefiresafe.org/
767 Birch Street
Paradise, CA 95969
530.887.0984

Yankee Hill Fire Safe Council
Yankee Hill, Ca 95965
brightmyer@juno.com

Sierra County Fire Safe Council
Sierra City, CA 96125
sierracountyfiresafe@yahoo.com

Almanor Basin Fire Safe Council
Chester, CA 96020
dngknut@frontiernet.net

Plumas County Fire Safe Council
www.plumasfiresafe.org
P.O. Box 673
Portola, CA 96122
jerry.hurley@sbcglobal.net
530.832.4705
530.259.2287
530.534.4179

Central Sierra (El Dorado, Nevada, Placer & Yuba):

Master Gardeners:

El Dorado County Master Gardeners
http://ceeldorado.ucdavis.edu/Master_Gardener/
311 Fair Lane
Placerville, CA
530.621.5512
530.621.5528
rkcleveland@ucdavis.edu

Placer and Nevada County Master Gardeners
http://ceplacer.ucdavis.edu/Custom_Program860/Projects.htm
11477 E Avenue
Auburn, CA 95603
530.273.4563
krmarini@ucdavis.edu

Sutter –Yuba Master Gardeners
http://cesutter.ucdavis.edu/Master%5FGardener/
530.822.7515
cesutteryuba@ucdavis.edu

Cooperative Extension:

El Dorado County Cooperative Extension
http://ceeldorado.ucdavis.edu/
311 Fair Lane
Placerville, CA 95667
530.621.5502
ceeldorado@ucdavis.edu

Placer-Nevada Counties Cooperative Extension
http://ceplacer.ucdavis.edu/index.cfm
DeWitt Center
11477 E Avenue
Auburn, CA 95603
530.889.7385

Sutter-Yuba Cooperative Extension
http://cesutter.ucdavis.edu/
Cooperative Extension Sutter-Yuba Counties, Sutter County Agricultural Building
142 Garden Highway, Suite A
Yuba City, CA 95991-5512
530.822.7515
cesutteryuba@ucdavis.edu

Resource Conservation Districts:

El Dorado County Resource Conservation District
http://www.carcd.org/wisp/eldorado/index.htm
100 Forni Road Suite A
Placerville, CA 95667
530.295.5630

Nevada County Resource Conservation District
http://www.ncrcd.org/home.html
113 Presley Way, Suite One
Grass Valley, CA 95945
530.272.3417

Placer County Resource Conservation District
http://www.carcd.org/wisp/placer/index.htm
251 Auburn Ravine, Suite 201
Auburn, CA 95603-3719
530.885.3046

Yuba County Resource Conservation District
http://www.co.yuba.ca.us/ycrcd/
1511 Butte House Road, Suite B
Yuba City, CA 95993
530.674.1461 ext.130
yubarcd_wc@yahoo.com

High Sierra Resource Conservation District (Sierra, Nevada, Placer, Yuba, El Dorado)
http://www.highsierra-rcandd.org/hsrc&d_area.htm

Native Plant Societies:

El Dorado Chapter
http://www.eldoradocnps.org/
Placerville, CA

Redbud Chapter (covers Nevada and Placer Counties)
www.redbud-cnps.org
Post Office Box 818
Cedar Ridge
CA 95924-0818
cnps@nccn.net or penstemon@nccn.net

Sacramento Valley Chapter (covers Sacramento, Yolo, Colusa, Sutter, Yuba and lower Placer County area)
http://www.sacvalleycnps.org/
Meeting location: Shepard Garden & Arts Center, McKinley Park
3330 McKinley Blvd (the eastern extension of E Street)
Sacramento, CA 95816
916.961.4057

South Central Sierra (Amador, Calaveras, Mariposa, Tuolumne):

Master Gardeners:

Amador County Master Gardeners
http://ceamador.ucdavis.edu/Master_Gardener/
209.223.6838
mgamador@ucdavis.edu

Calaveras County Master Gardeners
http://cecalaveras.ucdavis.edu/Master%5FGardeners/
209.754.2880

Mariposa County Master Gardeners
http://cemariposa.ucdavis.edu/Master_Gardener/
209.966.2417
mgmariposa@ucdavis.edu

Tuolumne Master Gardeners
http://cetuolumne.ucdavis.edu/Master_Gardener/
209.533.5696

Cooperative Extension:

Amador County Cooperative Extension
http://ceamador.ucdavis.edu/
12200-B Airport Road
Jackson, CA 95642-9527
209.223.6482
rmdwyer@ucdavis.edu

Calaveras County Cooperative Extension
891 Mountain Ranch Road
San Andreas, CA 95249
209.754.6477
rmdwyer@ucdavis.edu

Mariposa County Cooperative Extension
http://cemariposa.ucdavis.edu/
5009 Fairgrounds Road
Mariposa, CA 95338-9435
209.966.2417

Tuolumne County Cooperative Extension
2 South Green Street
Sonora, CA 95370
209.533.5695

Resource Conservation District:

Amador Resource Conservation District
http://www.amadorrcd.org/
42 Summit St. Ste. A
Jackson, CA 95642
209.223.1846
arcd@volcano.net

Mariposa County Resource Conservation District
http://www.sierratel.com/watershed/mariposa.htm
P.O. Box 746
Mariposa, CA 95338
Phone 209.966.3431
mcrcd@yosemite.net

Tuolumne Resource Conservation District
http://www.tcrcd.org/
PO Box 4394
Sonora, CA 95370
info@tcrcd.org

Native Plant Societies:

Sierra Foothills Chapter (covers Tuolumne, Calaveras, Amador, and Mariposa Counties) Contact stone@mlode.com or 209.984.0304

Sacramento Valley Chapter (covers parts of Amador County)
http://www.sacvalleycnps.org/
Meeting location: Shepard Garden & Arts Center, McKinley Park
3330 McKinley Blvd (the eastern extension of E Street)
Sacramento, CA 95816
916.961.4057

Fire Safe Councils:

Amador Fire Safe Council
http://www.amadorfiresafe.org/
P.O. Box 1055
13828 Gold Mine Road Unit 9
Pine Grove, CA 95665
amadorfiresafe@volcano.net
www.amadorfiresafe.org
209.296.6220

Calaveras Foothills Fire Safe Council
MURPHYS, CA 95247
Calaverasfiresafe@sbcglobal.net
209.795.5772

Highway 108 Fire Safe Council
jerry.tannhauser@us.army.mil
www.tuolumnefiresafe.org

Sierra Highway 4 Fire Safe Council
Carlsbad, CA 92008
valleafcon@yahoo.com
760.458.0914

Tuolumne Calaveras Ranger Unit
San Andreas, CA 95249
209.754.3831

Yosemite Foothills Fire Safe Council
Groveland, Ca 95321
209.962.4673
nlongmor@inreach.com

Mariposa Fire Safe Council
http://www.mariposafiresafe.org/
P.O. Box 1182
Mariposa, CA 95338
209.966.7700
kimberlyb@sti.net

East Sierra (Alpine, Inyo, Mono):

Master Gardeners:

Alpine Master Gardeners Association
http://www.otsego.org/amg/

Cooperative Extension:

Inyo-Mono Counties Cooperative Extension
http://ceinyo-mono.ucdavis.edu/index.cfm
207 West South Street
Bishop, CA 93514
760.873.7854

Resource Conservation District:

Alpine County Resource Conservation District/Carson Valley Conservation District
http://www.conservationdistricts.org/
1702 County Rd.
Suite 1A
Minden, NV 89423
775.782.3661
Kim.hansen@nv.usda.gov

Mono Resource Conservation District
http://www.conservationdistricts.org/monorcd/index.html
Mike Hayes, Resource Coordinator
mike.hayes@nv.usda.gov
1702 County Road Suite A-1
Minden, NV 89423
775.782.3661

Native Plant Societies:
Bristlecone Chapter (Mono and Inyo Counties and northeastern Kern County)
http://www.bristleconecnps.org/
PO Box 364
Bishop, CA 93515-0364
about@bristleconecnps.org

South Sierra (Fresno, Kern, Madera, Tulare):

Master Gardeners:

UC Master Gardeners of Fresno County
http://groups.ucanr.org/mgfresno/
UC Extension Office
1720 S. Maple Ave.
Fresno, CA
559.456.7563
mgfresno@ucdavis.edu

Kern County Master Gardeners
http://cekern.ucdavis.edu/Master%5FGardener/
1031 South Mount Vernon Avenue
Bakersfield, CA 93307
661.868.6220

Madera County Master Gardeners
http://cemadera.ucdavis.edu/Master_Gardener/

Cooperative Extension:

Kern County Cooperative Extension
http://cekern.ucdavis.edu/index.cfm
1031 South Mount Vernon Avenue
Bakersfield, CA 93307
661.868.6200

Madera County Cooperative Extension
http://cemadera.ucdavis.edu/index.cfm
328 Madera Avenue
Madera, CA 93637
559.675.7879

Resource Conservation District:

Navelencia Resource Conservation District (Fresno County)
23108 E. Jensen Ave.
Reedley, CA 93654
lindabtsa@att.net

Pond-Shafter-Wasco Resource Conservation District (Kern County)
5000 California Ave., Suite 100
Bakersfield, CA 93309
661.36.0967
brian.hockett@ca.usda.gov

Madera Resource Conservation District
PO Box 97, Madera, CA 93637
559.674.2108

Tulare County Resource Conservation District
3530 W. Orchard Court, Visalia, CA 93277
559.734.8732 Ext 3

Native Plant Societies:

Kern County Chapter
http://www.cnps.org/cnps/chapters/pages/kern.php
Based in Bakersfield, California.
lucyg391@gmail.com

North San Joaquin Valley (covers Merced, Stanislaus, and South San Joaquin Counties)
cnps_nsj@charter.net

Alta Peak Chapter (covered Three Rivers - Exeter area of Tulare County)
tori2@toliocsnet.net
559.539.2717

Fire Safe Councils:

Hwy 168 Fire Safe Council
P.O. Box 639
Prather, CA 93651
bfiresafe@netptc.net
559.855.3144

Kern River Valley Fire Safe Council
Kern County Fire Department
5642 Victor Street
Bakersfield, CA 93308-4056
rolson@co.kern.ca.us
661.391.7034

Eastern Madera Fire Safe Council
57839 Road 225
Suite D
North Fork, CA 93643
fsc@netptc.net
www.maderafsc.org/
559.877.3774

Tulare Fire Safe Council
Visalia, CA 92292-5650
Dave_Drum@fire.ca.gov
559.732.5954

Tahoe (the basin area):

Master Gardeners:

El Dorado County Master Gardeners
http://ceeldorado.ucdavis.edu/Master_Gardener/
311 Fair Lane
Placerville, CA
530.621.5512

Cooperative Extension:

El Dorado County Cooperative Extension
http://ceeldorado.ucdavis.edu/
311 Fair Lane
Placerville, CA 95667
530.621.5502
ceeldorado@ucdavis.edu

University of Nevada Cooperative Extension – Washoe County
http://www.unce.unr.edu/counties/washoe/incline/
Washoe County/Incline Village
P.O. Box 8208
Incline Village, NV 89452
775.832.4150

Resource Conservation District:

Tahoe Resource Conservation District
http://tahoercd.org/
870 Emerald Bay Road, Suite 108
South Lake Tahoe, CA 96150
530.543.1501 ext. 100
530.543.1501 ext. 113
tahoercd@yahoo.com

Nevada Tahoe Conservation District
http://www.ntcd.org/
297 Kingsbury Grade, Suite J
Stateline, NV 89449
info@ntcd.org

Native Plant Societies:

Tahoe Chapter (covers the Tahoe Basin)
Tahoe City, CA
revegetateearthlink.net
530.525.4366

El Dorado Chapter
http://www.eldoradocnps.org/
Placerville, CA

Redbud Chapter (covers Nevada and Placer Counties)
www.redbud-cnps.org
Post Office Box 818
Cedar Ridge, CA 95924-0818
cnps@nccn.net or penstemon@nccn.net

Sacramento Valley Chapter (covers Sacramento, Yolo, Colusa, Sutter, Yuba and lower Placer County area)
http://www.sacvalleycnps.org/
3330 McKinley Blvd
Sacramento, CA 95816
916.961.4057

Tahoe Basin Fire Safe Council
South Lake Tahoe, CA 96158
tahoebasinfiresafe@yahoo.com
530.573.2755

Nevada:

Cooperative Extension & Master Gardeners:

University of Nevada Cooperative Extension - Carson City/Storey County
http://www.unce.unr.edu/counties/carson-storey/
2621 Northgate Lane, Suite. 15
Carson City, NV 89706
775.887.2252

University of Nevada Cooperative Extension - Douglas County
http://www.unce.unr.edu/counties/douglas/
P.O. Box 338
Minden, NV 89423-0338
1329 Waterloo
Gardnerville, NV 89410
775.782.9960

Conservation Districts:

Nevada Tahoe Conservation District
http://www.ntcd.org/
297 Kingsbury Grade, Suite J
Stateline, NV 89449
info@ntcd.org

Carson Valley Conservancy District
http://www.conservationdistricts.org/
1702 County Road
Suite 1A
Minden, NV 89423
775.782.3661
Kim.hansen@nv.usda.gov

Carson River Subconservancy District
http://www.cwsd.org/
777 E. William Street, Suite 110A
Carson City, NV 89701
775-887-7450
genie@cwsd.org

Western Nevada Resource Conservation District
http://www.westernrcd.org/nevada.htm
P.O. Box 3543
Carson City, NV 89702-4061
775.883.2292
Daniel.Kaffer@nv.usda.gov

Native Plant Society:

Nevada Native Plant Society
http://heritage.nv.gov/nnps.htm
P.O. Box 8965
Reno, NV 89507-8965

Fire Safe Councils:

Nevada Fire Safe Council
http://www.nvfsc.org/index.html
Sierra Region Coordinator, Pat Muprhy
775.267.2123
papamurph@charter.net
P.O. Box 2724
Carson City, NV 89702

Sierra Lily

John Muir Laws ©2007, used with permission.

Appendix B: Bibliography

Agee, James K. *Fire Ecology of Pacific Northwest Forests*. Washington, D.C.: Island Press, 1993.

Anderson, Kat. *Tending the Wild*

Native American Knowledge and the Management of California's Natural Resources. Berkeley: University of California Press, 2005.

Arno, Stephen F., and Carl E. Fiedler. *Mimicking Nature's Fire : Restoring Fire-Prone Forests in the West*. Washington: Island Press, 2005.

Barbour, S., Pavlik, B. Drysdale, F., and Lindstrom, S. *California's Changing Landscapes, Diversity and Conservation of California Vegetation*. Ed. P. Faber. Sacramento, CA: California Native Plant Society, 1993.

Beesley, David. *Crow's Range : An Environmental History of the Sierra Nevada*. Reno: University of Nevada Press, 2004.

Blackwell, Laird R. *Wildflowers of the Tahoe Sierra : From Forest Deep to Mountain Peak*. Redmond, WA ; Edmonton: Lone Pine Pub., 1997.

Bornstein, Carol, David Fross, and Bart O'Brien. *California Native Plants for the Garden*. 1st ed. Los Olivos, Calif.: Cachuma Press, 2005.

Brenzel, Kathleen Norris. *Sunset Western Garden Book*. 8th ed. Menlo Park, CA: Sunset Pub. Corp., 2007.
---. *Sunset Western Landscaping Book*. 2nd ed. Menlo Park, Calif.: Sunset Books, 2006.

Cobourn, J., B. Carlos, J. Christopherson, W. Johnson, R. Post, J. Skelly, and E. Smith. *Home Landscaping Guide for Lake Tahoe and Vicinity*. Reno, NV: University of Nevada, Reno Cooperative Extension, 2002.

Defensible Space. Sacramento, CA: California Board of Forestry, 2005.

Donegan, F.J., Ramcke, J. Walks, Walls & Patios. Ed. *California Native Plant Society*. Upper Saddle River, NJ: Creative Homeowner, 2004.

Farquhar, Francis Peloubet. *History of the Sierra Nevada*. Berkeley: University of California Press, 1969.

General Guidelines for Creating Defensible Space. Sacramento, CA: California Board of Forestry, 2006.

Gruell, George E. *Fire in Sierra Nevada Forests : A Photographic Interpretation of Ecological Change since 1849*. Missoula, Mont.: Mountain Press Pub. Co., 2001.

Hinkle, George Henry, and Bliss McGlashan Hinkle. *Sierra-Nevada Lakes*. Reno: University of Nevada Press, 1987.

Horn, Elizabeth L. *Sierra Nevada Wildflowers*. Missoula, Mont.: Mountain Press Pub. Co., 1998.

Irwin, Sue, and Eastern Sierra Interpretive Association. *California's Eastern Sierra : A Visitor's Guide*. Los Olivos, CA: Cachuma Press, 1991.

James, Carolee. *Sharing the Knowledge, the Master Gardners of Tuolomne County*. University of California Cooperative Extension, 2003.

Keator, Glenn, and Alrie Middlebrook. *Designing California Native Gardens : The Plant Community Approach to Artful, Ecological Gardens*. Berkeley: University of California Press, 2007.

Kent, Douglas. *Firescaping : Creating Fire-Resistant Landscapes, Gardens, and Properties in California's Diverse Environments*. 1st ed. Berkeley, CA: Wilderness Press, 2005.

Lang, Susan, and Sunset Books. *Hillside Landscaping*. 1st ed. Menlo Park, CA: Sunset Books, 2002.

Laws, John Muir. *The Laws Field Guide to the Sierra Nevada*. Berkeley: Heyday Books, 2007.

McKinley, Michael & V. Larson Fowler. *Sprinklers & Watering Systems*. Des Moines, IA, 2005.

Lewis, Oscar. *High Sierra Country*. Vintage West Series. Reno: University of Nevada Press, 1988.

Morey, Kathy. *Hot Showers, Soft Beds, and Dayhikes in the Sierra : Walks and Strolls near Lodgings.* 1st ed. Berkeley, CA: Wilderness Press, 1996.

Munz, Philip A. *California Mountain Wildflowers.* Berkeley: University of California Press, 1963.

Pyne, Stephen J. *World Fire : The Culture of Fire on Earth.* 1st ed. New York: Holt, 1995.

Sagui, P. *Landscaping with Stone.* Upper Saddle River, NJ: Creative Homeower, 2005.

Schwab, James, et al. *Planning for Wildfires.* Chicago, IL: American Planning Association, 2005.

Sierra Nevada Ecosystem Project, SNEP Science Team, and University of California (System). Centers for Water and Wildland Resources. *Sierra Nevada Ecosystem Project Final Report to Congress : Status of the Sierra Nevada.* 3 vols. Davis: Centers for Water and Wildland Resources University of California, 1996.

Smith, Ed. *Living with Fire: A Guide for the Homeowner*. Reno, NV: University of Nevada, Reno Agricultural Experiment Staion and Cooperative Extension, 2006.

Teie, William C. *Firefighter's Handbook on Wildland Firefighting : Strategy, Tactics, and Safety*. Rescue, Calif.: Deer Valley Press, 1994.

Thomas, John Hunter, and Dennis R. Parnell. *Native Shrubs of the Sierra Nevada.* California Natural History Guides ; 34. Berkeley: University of California Press, 1974.

Vizgirdas, Ray S., and Edna Rey-Vizgirdas. *Wild Plants of the Sierra Nevada*. Reno: University of Nevada Press, 2006.

Weeden, Norman. *A Sierra Nevada Flora.* 4th ed. Berkeley, Calif.: Wilderness Press, 1996.

Quaking aspen leaf

John Muir Laws ©2007, used with permission.

Appendix C: Glossary

Bacteria - Single-celled organisms that feed on organic matter, including plants. Many types are beneficial to humans, and a few cause diseases to animals and plants. Spread by insects, splashing water, garden equipment and handling.

Best Management Practice (BMP) - Methods and techniques that are generally recommended ways to manage resources. Erosion Control BMPs are recommended ways of managing the land in order to collect, convey, and infiltrate water runoff in order to minimize erosion.

Biological Control - Predators and parasites that feed on garden pests and help control diseases. Beneficial insects and mites can include ladybugs, lacewings, syrphid flies, wasps and preying mantis. Birds, toads and garter snakes all prey on insects.

Compost - Leaves, grass, pine needles, sawdust, ground bark or wood, vegetable scraps that is decayed to a point where its original form is unrecognizable. An excellent source of organic matter for soil. Can be used as a Mulch.

Defensible Space - The area between a structure, such as a house, and an oncoming wildfire, where the vegetation condition can reduce the wildfire threat. This space can provide an opportunity for fire fighters to effectively defend the yard and structures on it.

Ecosystem - The plants and animals and non-living elements within an area that support life. The study of ecosystems focuses on the interactions and the flow of energy and materials between living and non-living elements.

Erosion - The process of soil particles being moved or displaced by water or wind. Generally this process removes the organic matter that a site needs to sustain vegetation, and causes water quality problems when the soil particle enter streams and lake.

Evaporation - The process of water loss to the atmosphere from lakes, the soil or other surfaces. Highly dependent on temperature and wind. An increase in temperature or wind will increase evaporation. See also Transportation below.

Fungus (plural Fungi) - A large class of organism ranging from the well know mushrooms to yeast. Most organisms obtain their nutrition from decomposing dead plants and animal matter. However, some organisms obtain their food parasitically from green plants, causing disease in the process. Most produce spores that spread very easily.

Groundcover - Dense, low-growing plants that blanket the ground and bind the soil together and help prevent erosion. Many perennials, shrubs and vines qualify as groundcovers. These plants can be used as low water alternatives to turf (lawn).

Habitat - Used in two ways: 1) the place plants or animals live; or 2) all of the necessary physical needs provided to an organism from the environment.
Infiltration The movement of water from the surface into the soil and then into the groundwater. Infiltration is the key goal to reducing erosion.

Integrated Pest Management (IPM) - A well support management philosophy whose primary aim is prevention of pest. If insects, diseases, or other problems become serious, IPM offers a number of techniques to reduce their effects to tolerable levels while keeping unintended environmental damage to a minimum.

Invasive Plant - Any plant not native to the Sierra, that is or can spread into the surrounding landscape. Frequently as this plant spreads it crowds out native plants and reduces the value of the habitat for animals.

Ladder Fuels - Medium and large trees are natural resistant to ground level fires. However shrubs, small trees and dead vegetation can burn so hot in a ground fire that the tops of the larger trees begins to burn and then a much larger and dangerous crown fire begins. These shrubs and small trees are considered ladders for the fire to go from a ground fire to a dangerous crown fire.

Microclimate - The term microclimate is used at many scales. In general it refers to a smaller area which has a different tempter, soil moisture or sunlight from the larger area. A backyard may have a small microclimate next to a house that is warmer with more sun. Likewise a canyon may be consistently colder than the rest of the county and this would also be considered a microclimate.

Mulch - Organic or mineral or a combination of both materials laid around a planting bed, and can serve to stabilize soil from wind and water movement, water conservation, weed control, soil structure health and defensible space components.

Native Plant - Any plant that has developed over large amounts of time within the Sierra Nevada.

Organic Matter - Part of the soil composed of any material that was once alive. This includes leaves, roots, wood, bark. Organic Matter is frequently required to make healthy soil. Adding the correct organic matter into a garden soil is the single most important action a gardener can take.

Phloem - Tissues and cells that transport organic food and materials within a plant. Specifically designed to bring sugars from the leaves where photosynthesis is occurring to rest of the plant including the roots.

Photosynthesis - The principle function within a plant, where sunlight is converted into sugar as an energy source for the plant. Plants use the energy of the sun to combine carbon dioxide and water to make sugar, and in the process releases oxygen.

Precipitation - Rain or snow.

Propagated Species - Most plants can be grown commercially through various propagation techniques. However, a small fraction of the total species are actually in commercial trade. These plants regardless if they are native or specially bred are considered propagated species.

Rain Gauge - A device for measuring the amount of rain fall, most likely a plastic cylinder with markings on the side.

Runoff - Excess water that leaves a site over the surface. Runoff is consider harmful, as it causes erosion and removes organic matter. Minimizing runoff is one of the keys to protecting water quality.

Sediment - The soil partials and organic mater resulting from erosion.

Site plan - A scale drawing of the property and all permanent features. Used as a base for further development of your landscape design. Slipping this plan under a sheet of tracing paper, you can easily experiment with designs.

Slope - The ratio of elevation rise over distance traveled. The equation is slope= Y/X; where y is the change in height and x is the change in distance.

Soil pH - The measure of soil acidity or alkalinity. The scale is from 0 to 14. Most plants do best in the middle of the range.

Topsoil - The upper part of the soil that is alive with root, insects, and microorganisms. Plants do not grow well in the soil layers below this upper layer.

Transpiration - The process by which a plant draws in water from the soil and releases remaining water into the atmosphere. Highly dependent on temperature and wind. An increase in temperature or wind will increase evaporation. However, plants can employ a number of tactics to reduce transpiration.

Turgor pressure - The internal water pressure in a plant that holds the plant upright. Insufficient pressure causes wilting and water stress.

Vegetation Zone - Large areas of the Sierra Range that has a similar mix of plant species. An example would be foothill oak woodlands.

Viruses - A cause of many plant and animal diseases.

Watershed - An area of land and water that captures precipitation and funnels it into a particular body of water, such as a stream, river, lake or ocean. Watersheds come in all sizes, with smaller watersheds combining to create larger ones.

Xeriscaping - A concept in landscape design that emphasizes flourishing landscapes with minimal water use. The practice encourages the use of native or well-adapted plants.

Xylem - Plant tissues that transport water and materials from the roots to the leaves and the rest of the plant.

Index

A

Alpine, 14, 15, 42, 100, 152
American River watershed, 15
Animals, see wildlife
Annual plants, 134

B

Bear safety, 52-54, 86, 141, 143-144
Bear River watershed, 15
Barbeque, propane, 146
Best management practices (BMPs), 116-119, 156
Budget, 8, 9, 63, 78, 94-95
Butterflies, 18, 21, 36, 52, 54, 70, 76, 108, 140, 142

C

Calaveras watershed, 15, 151
Caliente watershed, 15
Carson watershed, 15, 152-153
Cascades, Northern California 14, 15
Composting, compost, 120-122, 128-135, 144, 156
Constructing best management practices, see best management practice
Consumnes watershed, 15
Container gardening, 78, 82, 128, 130-131

D

Deer, 20, 52, 54, 102-107, 142-143, 144
Defensible space, see Wildfire, defensible space
Design Notebook, 8-9, 78, 94-95, 111
Ditches, 34, 90, 115, 119
Domestic animals, 54, 71, 72, 145
Drip irrigation, see irrigation
Drip line, see infiltration
Digging, call before you, 114

E

Eagle Lake watershed, 15
Eastern Sierra, 10, 19, 36, 42-44, 58, 88-89, 100, 101, 152
Eastern slope, 14, 15, 42-44, 51, 76, 88-89

F

Feather River watershed, 15, 28, 48
Ferns, 46, 53, 74, 84

F

Fertilizer, 16, 20, 33, 58, 72, 75, 121, 122, 123, 128-129, 130, 131, 137, 138, 140, 142
Fire: see Wildfire
Foothill, 14, 42-43, 44, 49, 82-83, 96-97, 100-103, 148-149, 152
Forests, 14, 17, 19, 35, 36, 43-44, 45, 46, 48, 55, 61, 71, 108, 147

G

Gophers, 144
Grade, grading, see slope
Grass, 45, 75, 119, 121, 123, 127, 128
Grasslands, 45-47, 80-81
Grass Valley, 14, 15, 20-21, 42, 100, 140
Grey water recycling, 128
Groundcover, 57, 74, 80, 101, 106-107, 123, 126, 156
Groundwater, 30, 156
Grouping plants, see hydrozone

H

Hardscape, 61, 63, 116, 117
Hazardous waste disposal, 121-122
Honey Lake watershed, 15, 150
Hydrozone, 72, 96, 122-123, 125

I

Impervious surface, 32, 116, 117
Island approach, 55, 57, 58, 61, 67-69, 72, 77, 90, 141, 145, 147
Infiltration system, 116-119, 127
Invasive weeds, 17, 18, 39-41, 71, 87, 120, 122, 156
Integrated pest management, 38, 54, 122, 138-140, 156
Irrigation, 29, 42, 58, 70, 72, 73, 88, 90, 114, 123-128
- drip & micro, 20, 26, 58, 72, 96, 117, 122, 124-26, 130
- map layer, 90, 93
- hose, 126-127, 91
- low volume sprinkler, 126
- sprinkler system, 29, 94, 123-24, 125, 130, 108, 144

J

John Muir Laws, see Laws, John Muir
Journal, yard and garden, see yard and garden journal

K

Kaweah watershed, 15
Kern watershed, 15, 152-153
Kings watershed, 15

L

Lake View watershed, 15
Lawn, see grass
Laws, John Muir, 2, 36, 53, 54, 105, 107, 113, 139, 143 145, 147, 153, 155
Lean clean and green zone, 19, 67, 68, 69-70, 74, 77, 92, 93, 102, 145
Limbing, see ladder fuels
Lower Montane, 20-21, 26-27, 43, 46, 48, 84

M

Madeline Plains watershed, 15
Maintenance, 10, 18, 26-27, 42, 58-59, 61, 63, 72, 74, 75, 94, 96-97, 114, 122, 123, 137-138
Meadow, 17, 35, 36, 43, 45, 46, 50, 82, 86-87, 96-97
Merced watershed, 15, 73, 152
Microclimate, 17, 25, 28, 36, 45, 72, 74, 84, 90, 99, 156
Modoc plateau, 13, 14, 42, 58-59, 73, 100, 101, 150
Mojave watershed, 15
Mokelumne watershed, 15
Moles, 52, 144
Mono Basin watershed, 14, 15, 152
Mountain lion safety, 52, 143, 144
Mulch, 20-21, 26-27, 96-97, 115, 116, 117, 119-120, 121, 122, 125, 127, 128, 132, 133, 134, 146, 156
My Sierra Zone, 67-68, 70

N

Native plants: see Vegetation, native
Natural Resource Conservation Service, 73
Nutrients, 16, 31, 32, 33, 35, 39, 120, 121, 129, 130, 136, 137, 138

O

Oak, 45, 49, 82, 96, 141, 148-149
Organic amendments, 16-17, 32, 33, 35, 49, 61, 96-97, 120, 121, 122, 129, 130, 131, 133, 134, 135, 138
Owens watershed, 10, 14, 15

P

Peaceful Valley Farm, 34, 140
Permits, 94, 114
Perennials, 26-27, 38, 45, 46, 51, 78, 80, 82, 86, 88, 93, 106, 120, 131, 132, 134, 147
Pervious pavement/pavers, 116
Pests, 38, 41, 52, 54, 71, 120, 122, 137, 138-140, 156
Pesticide, 16, 20-21, 121, 123, 140, 142
Planting, 17, 26-27, 28, 32, 58, 67, 74, 97, 114, 130-135
Play areas, 38, 64-65, 66, 74, 75, 77, 95
Privacy, 65, 77
Precipitation, 17, 28, 92, 30, 32, 38, 42, 43, 51, 76, 123, 157

R

Rain gauge, 29, 157
Retaining walls, see slope
Riparian area, 36, 43, 45, 46, 48, 51, 84, 85
Runoff, 16, 30, 35, 72, 73, 115, 116-117, 121, 125, 127, 134, 157

S

San Joaquin watershed, 15, 152
Sediment, 16, 30, 73, 85, 115, 116, 117, 123, 157
Seeds, 10-11, 20-21, 71, 75, 120, 122, 126, 131, 134, 135, 136, 140, 141
Septic tanks, 30, 103, 114
Shade, 26-27, 28, 29, 38, 44, 51, 58-60, 65, 66, 72, 75, 77, 83, 90, 95, 99, 102-107, 128
Shrubs, 20, 34, 36, 37, 38, 42, 43, 44, 45, 46, 48, 51, 54, 56, 58, 69, 71, 74, 76, 78, 84, 97, 101, 104-05, 114, 119, 120, 121, 125, 127, 132, 133, 134, 141, 144, 145, 146, 148
Sierra Nevada notes, 16, 31, 32, 34, 37, 59, 75, 125, 131, 138, 139, 141, 147
Sierra Zone, see My Sierra Zone
Site plan, 8, 61, 63, 72, 78, 79-89, 90-93, 94, 111, 114, 154
Slope, 14, 28, 30, 56, 67, 71, 73, 84, 88, 89, 90, 91, 114, 115, 116, 117-19, 132, 147, 157
Small spaces, 77, 78, 130
Snow, 16, 28, 29, 35, 43, 46, 91, 101, 120, 134
Soils, 7, 10, 13, 16-17, 20, 29, 31-35, 39, 42-48, 50, 70, 72, 73, 75, 81, 84, 85, 88, 90, 114, 115, 116-119, 120, 121, 122, 125, 127-130, 135, 137, 138, 144, 148
Soil loss equation, 119
Stanislaus watershed, 15, 16, 152
Sun, 26, 28, 32, 36, 38, 44, 47, 50, 58-59, 65, 66, 72, 75, 77, 90, 102-107, 120, 136, 142
Surprise Valley watershed, 15

T

Temporary best management practices, see best management practices
Terraces, 80, 117, 119
Timeline, 63, 67, 94-95
Top priority items, 67, 94
Topsoil, 32, 34, 115, 128, 135, 157
Transition zone, 67-68, 70-72
Trees, 29, 38, 40, 43, 45, 46, 48, 49, 56, 70, 71, 74, 77, 94, 101, 102-103, 108-109, 114, 115, 117, 127-128, 132, 134, 137, 143, 145, 148
Truckee watershed, 14, 15, 108-109
Tule watershed, 15, 96-97
Tuolumne watershed, 15, 151-152
Turf, see Grass

U

University of Nevada, Reno Cooperative Extension Service , 28, 30, 34, 73, 91, 93, 108, 115, 116, 118, 119, 121, 123, 124, 125, 126, 129, 130, 132, 133
Upper montane, 42, 43, 50, 86, 100, 108-109
Upper Sacramento watershed, 15

V

Vegetable gardening, 64, 82, 86, 120, 131, 135, 138, 139, 142
Vegetation, 9, 17-18, 29, 30, 32, 33, 34, 36-37, 38, 39, 42-51, 52, 54, 55, 56, 57, 66, 68-69, 70-71, 72, 73, 74-75, 76, 77, 90-93, 94, 114, 116, 120-121, 137, 142, 144, 145, 147
Vines, 45, 48, 74, 84, 96, 142

W

Walker watershed, 15
Water, 9, 15-16, 17, 29-30, 46, 48, 90
  conservation of, 10, 20-21, 26-27, 58-59, 72-73, 75, 93, 96-97, 119-120, 122-128, 148-149
  delivery, see irrigation system
  quality, 16, 42, 61, 115-119, 120-122
  vegetation and, 102-107, 130-136, 137
  wildlife and, 18, 54, 141-142
Watershed, 10, 15, 16, 34, 96, 157
Weeds, 26, 39-41, 71, 75, 117, 119-20, 122, 126, 128, 129, 131, 132, 133, 134, 138, 139-140
Whitmore, 15
Wildfire, 19, 55-57, 67-77
  building and, 77, 146
  defensible space, 20-21, 55-57, 64, 67-71, 92, 102-107, 108-109, 116, 120, 145-147
  fire breaks, 20-21, 57, 68
  in the Sierra, 17, 19, 55
Wildlife, 18, 20-21, 42, 43, 52-54, 64-65, 68, 71, 76-77, 92, 108-109, 139, 141-144
Windbreaks, 127
Woodlands, 45, 49, 82, 83
Woody debris, 70

X

Xeriscaping, 72, 157

Y

Yard and Garden Journal, 28, 29, 30, 31, 32, 33, 34, 38, 39, 53, 56, 64-65, 66, 67, 95
Yuba/Bear watershed, 15, 20-21, 151

Z

Zone and island approach to design, 55, 65, 67-71, 77, 90, 93, 145-147

Red-breasted nuthatch

John Muir Laws ©2007, used with permission.

The Sierra Nevada Alliance invites you

to join the Alliance and help protect the Sierra Nevada's amazing rivers, lakes, wildlife and magnificent vistas.

The Sierra is facing many challenges. Population in the region is projected to triple. Climate change scientists are predicting the Sierra snowpack will be reduced 25% to 40% in 20 to 40 years. Historic practices have impaired 23 out of 24 major river systems, put over 69 species at risk, and created traffic and sprawl around the region

The Sierra Nevada Alliance is committed to ensuring the beauty of this "Range of Light" will continue to inspire our children and our grandchildren. To accomplish this, we work through four main programs:

- The Sustainable Sierra Land Use Campaign
- The Sierra Water & Climate Change Campaign
- The Sustainable Watersheds Program
- And The Sustainable Community Group Program

We need the support of people like you who care about our environment and natural resources. **To join the Alliance, please fill out the form below or join on our website at: www.sierranevadaalliance.org.**

Supporters will receive our quarterly Sierra News with updates on Alliance campaigns, insider information on key environmental issues across the region and invitations to Alliance events.

Your support will truly make a difference in protecting the Sierra Nevada!

SIERRA NEVADA ALLIANCE

☐ **YES!** I want to join the Sierra Nevada Alliance and help protect the Sierra Nevada!

Donor Clubs

Mt. Whitney	$ 2,500
Yosemite	$ 1,000
Lake Tahoe	$ 500
Mono Lake	$ 250
Half Dome	$ 100
Family	$ 50
Sustaining	$ 35

Name _____

Address _____

City, State, Zip _____

Phone _____ Email _____

☐ Enclosed is my check payable to the Sierra Nevada Alliance

☐ Please bill my VISA/MasterCard

Amount _____

Card # _____ Exp _____

Signature _____

Clip and mail this form to: Sierra Nevada Alliance, PO Box 7989, South Lake Tahoe, CA 96158,
Phone: 530.542.4546 Fax: 530.542.4570, www.sierranevadaalliance.org

The Sierra Nevada Alliance is a not-for-profit 501©(3) organization. Donations are tax deductible to the extent by law.

Donors of art and work to Sierra Nevada Yard & Garden

This book is a project of the Sierra Nevada Alliance, a non-profit organization. There are no proceeds from the distribution of this work. Any cost associated is only to cover the cost of printing/distribution. Generous contributions of art work and of time helped make Sierra Nevada Yard & Garden informative and interesting. We would like to acknowledge those who donated significant resources to bring this book to you.

Allegro Communication Consulting offers organizational capacity building, meeting facilitation, communication strategy development, writing, photographic and editing services. Principal, Michelle Sweeney: msweeney@progresswithclarity.com.

John Muir Laws is a wildlife biologist and illustrator. He teaches classes on natural history, conservation biology, scientific illustration, and field sketching. He is the author and illustrator of *The Laws Guide to the Sierra Nevada and Sierra Birds: A Hiker's Guide*.

Stephen Ingram is a nature photographer and writer specializing in the botanical treasures and landscapes of California. His work has been published in numerous books, magazines, and calendars. To see more of his images, or to purchase prints or note cards, visit www.ingramphoto.com.

TALLAC
Applied Ecology & Design

Tallac Applied Ecology & Design is a consulting group that provides creative designs for complex ecological and landscape problems; from habitat restoration to interpretive planning to landscape architecture. Gerald Dion: gerald_dion@yahoo.com.

University of Nevada
Cooperative Extension

University of Nevada, Reno, Cooperative Extension
John Cobourn is a water resource specialist with the University of Nevada, Reno and the lead author of the *Home Landscaping Guide for Tahoe and Vicinity*. The Tahoe Guide contributed significantly to the information on Best Management Practices, Integrated Pest Management, irrigation and other topics that appear in this book, John Cobourn, cobournj@unce.unr.edu.

"The Sierra Nevada Yard and Garden is unique in its focus on plant communities, approaching landscape design as the establishment of natural ecosystems. In Emphasizing the natural landscapes specific to the Sierra Nevada it reviews landscaping principles and techniques, introduces native plants for grasslands, forests, edge areas & fire wise principles, illustrates how to evaluate a site and offers practical advice on reducing chemical use."—Tacy Currey, Executive Director, California Association of Resource Conservation Districts

RESOURCE

"... The real value of this guide is its ongoing use as a resource for residents in the Sierra. The techniques and methods described in these pages demonstrate simple, straightforward ways to implement good stewardship of California's watersheds."—Jim Branham, Executive Officer, Sierra Nevada Conservancy

SIERRA NEVADA CONSERVANCY

"This helpful guide is ideal for property owners throughout the Sierra Nevada. It gives people valuable information on how to manage their property to maximize its usefulness and beauty while preventing impacts to the environment and water quality."—John Cobourn, Water Resource Specialist and lead author on the *Home Landscaping Guide for Lake Tahoe and Vicinity*, University of Nevada Cooperative Extension.

University of Nevada Cooperative Extension

SIERRA NEVADA ALLIANCE