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MAINTENANCE
MANUAL

WATER SMART GARDENS MAINTENANCE MANUAL

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Acknowledgement and gratitude to peer reviewers: Marie Goulet, Carol Olson, Liz Platte-Bermeo, Dallas Jarvis Rick Taylor, April Owens, Peter Anderson, Alan Good Charlotte Torgovitsky, Maura Baldwin, Jessica Neafsey, Mimi Enright

A special thank you to Cesar Camacho for demonstrating gardening techniques, and to Larkmead Winery for garden photo shoots.

Acknowledgement and gratitude to the project team of the Sonoma-Marin Saving Water Partnership: Deb Lane, Claire Nordlie, Greg Plumb, Keith Bancroft, Carrie Pollard, Kris Loomis, Chad Singleton, Brian Lee, Paul Piazza

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First Edition

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WATER SMART GARDENS - LOCAL STYLE, CLIMATE ADAPTIVE, AND RESOURCE SENSITIVE:

This manual is a guide to garden care in the North Bay Area. It's a companion piece to the Water Smart Landscape Templates, focused on establishing young gardens so they require less maintenance, water and other resources. Our gardens can adapt and thrive in a changing climate that is expected to bring more extreme heat and drought, greater wildfire risk, and more frequent, high-intensity rainfall events.

We can do this by creating gardens and using design and management practices that:

- 1. Restore soil so that it supports healthy long-lived trees and plants and becomes a sponge to store water
- 2. Use climate adapted plants that are tolerant of heat and drought including native plants
- 3. Grow long-lived medium and large trees for shade in the right places
- 4. Integrate habitat elements into our gardens
- 5. Infiltrate rains on site with permeable paving, rain gardens, swales, and healthy soil
- 6. Keep plants "clean and green" during fire season

In short, gardens have a lot of work to do! And a nature based approach to gardening integrates all these priorities and aligns the gardener with natural cycles and processes.

A nature-based approach to gardening integrates all these priorities and aligns the gardener with natural cycles and processes.



The Native Adaptive garden design of the Saving Water Landscape Templates by ABLA



Gates Associates, ABLA, and the City of Santa Rosa

A 3D illustration of the Native Adaptive Garden Design with the following key features:

- 1. A place to observe and enjoy the garden
- 2. Permeable paving
- 3. Drought adapted plants provide year round color and habitat for birds, pollinators and beneficial insects
- 4. Rain gardens and swales to improve soil moisture and quality
- 5. Long lived trees
- 6. Water for wildlife

SIX KEYS TO THRIVING GARDENS



The First Key to a thriving garden is restoring the soil through soil preparation. Encouraging healthy soils by creating a nutrient cycle within the garden means less work for the gardener, less supplemental nutrients, and less irrigation over time.

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The Second Key is

to select plantings that are native or well adapted to the local soil and climate of the North Bay and to group plants together that need similar garden conditions. This creates mutually supporting "companion" plantings.

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The Third Key is efficient and simple irrigation that you can easily operate and maintain.

The Fourth Key is

maintenance that encourages well-rooted, well-structured plantings through timely weeding, mulching, pruning, and soil amending. Add amendments to the soil surface without tilling to avoid disturbing the soil microbial and fungal food web that cycles nutrients to the plants.



A thriving garden well adapted to the site



Larkmead Winery Garden, ABLA

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The Fifth Key is inviting beneficial insects, including bees and other pollinators, as well as native birds and small wildlife into the garden. The diversity of life is one of the best indicators of a healthy garden, contributing to pollination, disease and pest control, and the cycling of nutrients.

The Sixth Key is growing

your knowledge of your garden and learning to time maintenance activities to reduce work and maximize results. This increases your enjoyment of your garden and creates a healthy space to relax and feel life humming all around you. Well timed maintenance enhances habitat for birds and pollinators. For example, prune trees before or after nesting bird season (April to July).





RESTORING AND ENHANCING SOIL – A RECIPE

At any time, but especially during planting and plant establishment, attending to healthy and fertile soil is the most effective action to support a thriving garden. Soil is inhabited by millions of living organisms that help form soil structure, digest and make nutrients available to plants, and reduce disease pressure. Nurturing your soil cultivates a biological process between these organisms that creates a vibrant and rich new elixir! Commonly called humus, this elixir is the magical ingredient in loam soils that increases their biological capacity. What follows is a recipe for rejuvenating or enhancing your soil by caring for soil structure and biology.



- Use a digging fork to open the soil to see the soil layers and depth of topsoil.
- Compare your soil to the soils pictured—The soil on the left in photo has a complex structure with organic matter (humus) to act as a sponge and is open to air and water flow. The soil on the right is more compacted, has less organic matter, and is more closed to air and water.
- To understand soil texture, place a sample of your soil with water in a jar, close the lid and shake, then let settle for an hour or two. The soil particles will separate into gravels, sand, silt, clay, and organic matter, allowing you to see what portion of each makes up your soil.



Step Two: Decrease compaction, Increase air and water

- Use a digging fork to gently open soil and allow air and nutrients to penetrate the soil crust and compost to fall into the openings. Be sure not to work wet soils as you can create a hard soil layer.
- Avoid tilling as it kills soil organisms, depletes organic matter in the soil, and releases carbon into the atmosphere.

Rich organic soil (left) Compacted soil (right)

Step Three: Use Compost to increase organic matter and healthy biology in soil.

- For new gardens or to rejuvenate established gardens and edible landscapes, add a 1" layer of compost to reactivate soil biology and restore depleted soils. Repeat periodically as needed.
- Compost should smell sweet and earthy. Reject sour, acidic or bad smelling compost as this indicates poor quality.
- Resist using chemical fertilizers or herbicides that weaken or destroy soil microbial life and limit natural nutrient uptake by plants.
- Native planting areas need no or minimal soil amendments if soil is not damaged.

Nurturing your soil cultivates a biological process between soil organisms that creates a vibrant and rich new elixir!



Step Four: Mulch or seed bare soil areas, and cycle soil nutrients into your garden.

- Provide 2-3" of well-aged mulch around trees, shrubs, and perennials to retain moisture and nutrients. Replenish in Spring and Fall as needed. This mulch will slowly age in place and become incorporated into the topsoil. Pull mulch 3-6" away from each plant to reduce the risk of fungal attack at the plant crown. Mulch ornamental grass areas lightly, 1" or less.
- For a fire-wise landscape, mulch with round or crushed gravel or compost within the first 5 feet of the home's foundation—the non-combustible zone. Don't use shredded redwood bark or "gorilla hair" in areas of fire risk.
- Seed bare soil areas between plantings with native wildflowers* or nitrogen fixing legumes like fava beans to add diversity and reduce colonization by weeds.
- Recycle fallen leaves, cuttings, and prunings directly into the garden itself either by scattering them or by creating small piles that myccorhizal fungi and beneficial bacteria can utilize and break down. Your garden will need less soil amending and fewer mulch applications, saving time and expense.
- Sheetmulch to remove a lawn or weedy area by covering the area with a layer of cardboard (or ~5 sheets of newspaper) with 3" of mulch on top. Worms will multiply under the cardboard and further improve your soil.
- * See Resources for local native wildflowers and cover crop selections



Use a digging fork to gently open soil



Allow compost to fall into openings



Use the digging fork to disperse compost

PLANT SELECTION AND PLACEMENT

California has a remarkable climate with the longest dry season of all "Mediterranean" or summer dry climate regions around the globe. The North Bay also has an amazing number of microclimates due to our hills, valleys, coastal influence and fog cycles. All of this contributes to making the North Bay a global "hot spot" of biodiversity. To adapt to these conditions, Water Smart Gardens should have a balance of 75% low water use plants, and no more than 25% medium water use plants, and feature many locally native and non-invasive* climate adapted plants.

Successful Plantings Will:

Fit the micro-climate(s) on your site–or create new ones:

- Locate shade adapted plants along the north side of the house or in filtered light beneath trees.
- Locate plants adapted to full sun and drying winds in the south and west facing garden areas. Use trees and shrubs here to shade windows and foundations but place away from building in firewise landscapes and avoid shading solar panels.
- Choose plants adapted to the site soil conditions like wet soils, high ground water table, or heavy clay soils.
- A large long lived tree or grove of trees will create a new shady micro climate once mature.

Be compatible with the plants around it:

- Group plants that have the same water needs in the same irrigation zone. Typical zones are: temporary irrigation to establish adapted plants, very low, low, or moderate water use. See this site https://ucanr.edu/ sites/WUCOLS/Plant_Search/ to determine the water needs of plants.
- Place plants with similar soil needs or tolerances like wet soils, or acidic soils together.

Be the right size for the space:

- Pick plants based on their size at maturity and let them grow naturally to fit the space with minimal guidance and pruning.
- * Invasive plants are non native plants that spread exponentially causing harm to crops and habitat. See https://www.cal-ipc.org/plants/



Photo by The Theodore Payne Foundation for Wild Flowers & Native Plants



Photo by The Theodore Payne Foundation for Wild Flowers & Native Plants

PLANTING











Shrub planting demonstration

How:

- Plant in healthy soil (amend as necessary), with a properly dug hole. Roughen the sides of the hole and make a firm mound on bottom to set the plant upon as shown.
- Before planting gently loosen roots that are circling or stuck together from being in the container too long.
- Plant with the root crown slightly above the surrounding soil level for positive drainage away from the plant stem. This is referred to as planting 'proud.' Backfill around the roots with soil.
- Construct a watering berm for shrubs and trees, and immediately hand water deeply after planting. Water well outside the rootball especially if the surrounding soil is very dry.
- Place mulch around new plantings, leaving the plant crown 3-6" clear of mulch.
- Place drip emitter(s) toward the edge of the root ball not near the plant crown. Be sure to move emitters outward as the plants grow. The roots can be 1-2x wider than the above ground plant.
- When replanting, pull the mulch away before digging to avoid damaging the drip irrigation lines under the mulch!

- Native plants typically don't need amendments as they are adapted to native soils. However, they won't thrive in damaged or compacted soils.
- In areas of high gopher activity plant at least 50% of plants in appropriately sized gopher baskets. Encourage owls with owl boxes and other natural controls.

When:

- Planting in our area is best done in fall or spring, when the soil is warm and not too wet, but the air temperature is cool. In a shaded location planting can be done most of the year.
- Plant and transplant in the morning and not during heat spells or hot afternoons.
- Protect young plants from frost.
- Don't plant when soils are very wet, especially clay soils.

TLC FOR NEW PLANTINGS

In the first day or two new plantings can get transplanting shock, especially if planted during hot weather into either dry or very wet, poorly draining soils.

If plant leaves start to brown out:

- Check to make sure irrigation drip lines are above plant roots but not right at the plant crown.
- Provide water in early mornings and don't over water, especially drought adapted native plants.
- Water deeply to moisten the top 18" of soil, don't "splash and dash".
- Constantly wet soils stress native and drought adapted plants. Allow soils to dry out between waterings-causing roots to spread and improving air flow in soils.
- Provide temporary shade if leaves are burning.
- If compost is too rich or too thickly placed, it can cause dieback. Compost made only from greenwaste materials without manures or amendments is best for native plants. Similarly, ensure mulch is pulled 3-6" from plant crown.

In the first two years focus on soil health, the right amount and timing of irrigation and early weeding. Plants should start to show new growth within several weeks. If there are signs of plant decline, adjust the following:

- Ensure the plant crown is not below the adjacent soil level. If it is, choose a cool early morning or evening to replant higher. Gently dig a trench all around the plant outside of the root zone so as not to break the roots or root ball. Lift the root ball out carefully and re-plant per the direction on the prior page.
- Several months after planting if plants show signs of low vigor or nutrition like discolored leaves, add compost tea, worm castings, or a kelp based natural fertilizer in the fall or spring season. Native plants typically won't need fertilizer.
- Continue to improve soils with mulch and amendments seasonally.

Weeding Recommendations: Early

and often! As plants grow in, the weeding will become easier if you prevent weeds from getting established.

- Hand weed when weeds are small. Finish prior to late April when seed starts to ripen and set. Don't let weeds set and spread new seed.
- Digging weeds opens the soil for new weed seeds to germinate. Prevent this by disturbing as little ground as possible. You can also cover the area with sheetmulch, or a thick layer of mulch, or sow wildflower seed under a light mulch.



Drip irrigation lines placed over plant roots away from crown



Pull mulch away from plant crown



Weeding with digging fork

TLC FOR YOUNG TREES



Tree staking for wind protection

Tree Care Recommendations:

Young trees need attentive care and protection to become healthy and vigorous.

- Make sure they are planted "proud" in the soil and water drains away from the trunk area.
- Avoid having the later afternoon sun scorch the bark by wrapping burlap loosely around the trunk or leaving low branches to shade the trunk.
- When pruning young trees, don't remove too many low lateral branches as branches secrete a hormone that causes the trunk to thicken. Slowly prune lower branches over time.
- In windy areas, staking is needed for up to two years to prevent the tree from being blown over in high winds. Gently shaking the tree for a few moments routinely will stimulate root growth to brace the tree. Be sure to remove ties and stake(s) after two years as they may tighten on the trunk as it grows.

- If new trees aren't thriving try a kelp-based natural fertilizer and/ or worm castings to stimulate soil biology and nourish the tree roots.
- Unless you are working under established trees, use a digging fork to open compacted soil around the young tree planting hole.
- Continued soil care will create a fertile soil horizon in the top 12-24" but this is not necessary for native locally adapted trees.

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For drought tolerant trees, particularly our native Coast Live Oaks, plant understory plantings outside the existing oak canopy edge or "drip line" and allow plants to spread naturally closer to the trunk without supplemental irrigation. Irrigating under mature Live Oaks can cause gradual dieback and slowly kill the tree over time.

Young trees need attentive care and protection to become healthy and vigorous.

IRRIGATION DESIGN BASICS

A simple, easy to operate, and efficient irrigation system ensures plants get the right amount of water without waste.

The most important principle of any irrigation system is to plant in hydrozones. **Hydrozones** are groups of plantings with similar water needs, sun exposure, rooting depth, and soil conditions. Each hydrozone has a separate valve station with a unique watering schedule. Trees are placed on their own hydrozone so they can be watered more deeply and less frequently independent of the plants around them. **Inline drip systems** are user friendly, low cost, and efficient. The lines of inline drip irrigation systems are spaced to provide full coverage akin to a spray system. Each inline drip line has built-in drip emitters spaced 12" or 18" apart and the lines can be laid to create a grid of evenly spaced drip emitters as in the diagram below. Mulch is then placed on top of the lines to protect the lines and further reduce water loss from evaporation.



This irrigation layout plan of the native adaptive garden design indicates three valves, each of which water a hydrozone as indicated by the dashed areas and dashed lines of the tree spirals in the diagram above. Main Elements of Inline Drip System:

- 1. Hard pipe connection to valve
- Supply header

End cap for manual flush out
Inline drip lines 12 to 18" on center

KEY IRRIGATION STRATEGIES

- 1. Healthy soils with ample organic matter and diverse microbial and fungal communities have good water holding capacity reducing the need for irrigation.
- Clay, Loam and Sandy soils infiltrate water differently. The spacing of emitters should be closer together for sandy soils, further for clay soils. See the lower diagram to the right.
- 3. Many native plants prefer hand watering. If you have mostly native and adaptive plants hand watering will be more cost and water efficient than irrigation systems as you can give each plant only the water it needs.
- 4. Avoid concentrating water at the plant crown. Inline drip emitters should be set at the edge of the root ball not at the plant crown.
- 5. Avoid constantly wet soils for drought tolerant natives especially in hot weather as they are not well adapted to summer irrigation.
- 6. As plants mature, irrigate less frequently but longer duration for deeper and wider root growth. This will increase drought resilience.
- 7. Groundcovers need the most frequent irrigation, shrubs intermediate frequency, and trees the least frequent. Ideally, they are placed on different irrigation zones.
- 8. Adjust irrigation seasonally and as plants mature. During late summer heat from July to September plants will need more water. In anticipation of extreme heat events, make sure young plants are well watered 1-2 days in advance.



Image by Hunter Irrigation



Clay soils absorb water slowly and distribute it more widely. Sandy soils drain water more quickly and straight down. Loam is a balance of sand, silt and clay with organic matter enhancing water absorption and retention.

CONTROLLER PROGRAMMING

Create a Water Budget:

Plants that are not fully adapted to your site will need supplemental irrigation. The graph below describes when your plants will typically need irrigation throughout the year, mainly from April to October. Irrigation schedules are programmed for the month of July which establishes your maximum monthly water budget (100%). Water needs for each month are expressed as a percentage of the July "inches of rain equivalent needed."

Selecting a Controller:

Efficient irrigation systems require a smart controller with either an onsite weather sensor or the ability to connect via Wi-Fi to a local weather station. Make sure to select a controller that is easy to program and operate. Most controller manufacturers have online videos with detailed instructions.

Inches of rain equivalent needed	1.17	1.77	3.09	4.305	5.475	6.39	6.49	5.715	4.505	3.14	1.565	1.06	44.675
Month	January	February	March	April	May	June	July	August	Sept	October	Nov	Dec	Total
Controller water budget setting	18%	27%	48%	66%	84%	98%	100%	88%	69%	48%	24%	16%	
Average inches of rainfall for Santa Rosa	6.35	6.06	3.91	2.13	1.22	0.35	0	0	0.12	1.46	3.31	6.35	31.26
Controller status	Off	Off	Off	Monitor	On	On	On	On	On	Monitor	Off	Off	Total

Santa Rosa Water Budgeting Information

Programming the Controller:

In the **initial post planting** schedule, plants need to be watered more frequently due to small root area and shallow root depth.

The initial programming schedule at right shows a sample schedule for new low and medium water use plants growing in the three main soil types. Clay soils infiltrate slowly and water will run off if irrigated too long. They are watered in two different start times on the same day (dawn and dusk) to allow the first amount of water to infiltrate before adding the second. Loam soils infiltrate water well so they have one start time. Sandy soils are free draining so they have to be irrigated for a short duration.

Initial programming schedule for July by soil type/plant water use

Soil/ Plant water use type	Number of days per week to water	Total minutes per week	Number of start times or cycles	Minutes per cycle	Program
Clay / Low	4	106	2	13	В
Clay / Medium	4	213	2	27	В
Loam / Low	4	106	1	27	А
Loam / Medium	4	213	1	53	A
Sandy / Low	4	49	1	12	А
Sandy / Medium	4	98	1	25	A

Additional sample controller programs can be found at: www.savingwaterpartnership.org/watering-times

CONTROLLER ADJUSTMENT & VALVE MAINTENANCE

Irrigation systems need a pre-season inspection and monthly check ups and adjustments to make sure all elements are working properly.

Inspect Irrigation Controller/Sensors:

- Open box, check for, and remove critters (spiders, ants) that can damage the wiring.
- Using the controller, turn each valve station on to ensure each valve turns on and off and is not leaking.
- If valves don't open or close properly, check the valve, controller, and ground wire. Check for sand or other particles in the valve.
- Test and replace the battery in the controller.
- If a weather or rain sensor is installed, clean the dome and check the vents to ensure they are opened to the proper setting. For clay soil, the vent window should be closed all the way. Coarse soil should have the window all the way open.

Adjust Your Controller Seasonally

A smart controller will adjust the irrigation amount seasonally based on historical data and/or an on-site sensor, or via real time weather data using Wi-Fi. If your controller is not a smart controller, but it has a water budgeting feature like the "Seasonal Adjust" tab on the controller pictured at right, you can use this feature to increase or decrease irrigation without changing the programming schedule. You can do this by setting a percentage of your July (100%) irrigation budget as shown in the lower table on page 17. Typically your city or county will provide resources that will tell you what percentage to budget (also called a "watering index") on a weekly or bi-weekly basis. Here is a link to the City of Santa Rosa Water Smart site: https://srcity.org/3446/Watering-Recommendations

Local Forecasts:

- Review your local water purveyor website to set your watering adjustments for the week, for example Santa Rosa Watering Recommendations: https://srcity.org/3446/Watering-Recommendations
- Using the soil probe weekly will inform you whether your soils are drying out or retaining moisture and prevent overwatering.
- Remember, a controller can't anticipate extreme heat events when it is best to apply extra irrigation a day or two **before** the heat.



Create New Irrigation Schedules as the Garden Matures

Water need should decline over time as plants become established and well rooted. The first full year would be the **initial phase** watering schedule. Years 2 and 3 are the establishment phase with a reduced irrigation schedule. After the 3rd summer, native plants should be able to survive with minimal supplemental water, and adaptive plants should be on a stable very low, low or moderate water use schedule.

Plant Establishment: Years 2-3

Adjust schedule for less frequent but deeper watering to encourage deeper, more extensive root growth.

Plant Maturity: Plants typically mature after 3 years. The establishment period for trees will be longer.

IRRIGATING TREES

Trees are their own hydrozone: Trees are placed on their own valve so they can be watered less frequently and more deeply to encourage extensive rooting. In periods of extreme drought, this allows you to only water your trees which are your garden's most essential long-term investment.

Irrigate your trees using Inline Drip Spirals: Lay the inline drip in a spiral pattern around the young tree so that the entire growing root zone is well watered. At planting, the drip spiral should be no closer to the trunk than just inside the edge of the rootball. See adjacent photo. The spirals are easily held in place with wire irrigation staples.

Irrigation Recommendations for Trees:

- For younger trees, irrigate to the full rooting depth (typically 18" to 24") 2 - 4 times per week.
- As the tree grows, expand the spiral out to the dripline, which is the edge of the tree canopy.
- Letting the soil dry out between waterings will allow air to flow into the root zone. Use a soil probe to observe soil moisture and adjust your irrigation schedule to provide the minimum water necessary for your trees to thrive.
- Water more deeply and less frequently as the trees mature.
- Even mature trees, during a prolonged drought, will benefit from occasional deep waterings. Native trees like Redwoods or Big Leaf Maples that are adapted to cooler or wetter sites than many home gardens will need modest supplemental water during prolonged drought.



Tree irrigation spiral

IRRIGATION MAINTENANCE

Observe and Adjust:

- Walk through and observe your garden. Look for dried plant stems, leaves or buds, areas with heavy weeds, or very wet or dry soil as indicators that the irrigation schedule needs adjustment. Use a soil probe to test soil moisture in the root zone.
- Walk through each hydrozone while the irrigation is on several times during the dry season and check all emitter lines to make sure they are working.
- Run the valve stations manually, check valve operation, identify and fix leaks, replace clogged emitters, and replace kinked sections of hose.
- Adjust drip lines to locate emitters at the expanding root perimeter of growing plants.
- Avoid adding button emitters to inline drip tubing as it negatively affects pressure, even-distribution, and can create leaks. If plants need more water, re-evaluate the irrigation schedule or hand water small patches of plants as needed.
- If necessary, pull mulch away from drip lines for inspection. Always inspect before adding more mulch.
- Native plants aren't adapted to wet soils in hot summer weather. A sign of overwatering is sudden full stem or branch dieback.
- Use a soil probe to check moisture and observe how long it takes for soils to dry out.

Flush-out irrigation system annually

- Turn system off.
- Clean filter screens.
- Remove end caps/closures of water lines.
- Turn the system on and run water until a clear stream of water flows from the lines.
- Put all components of the system back together.
- Turn system on and check for proper operation.





Irrigation line repair



Replace unused emitters with plugs



Clean filters regularly to maintain flow in valves and emitters

PRUNING BASICS

Pruning is as much an art as it is a science and takes a little time and practice to learn well. Go slowly in the beginning. Step back often and look at your work to observe balance, project the year's growth, and think through pruning options. Start with small cuts; you can always cut more later if needed. Observe how your tree or shrub responds to pruning from year to year.

Why:

- Prune to maintain a "Lean, Clean and Green" zone for fire safety around your buildings. This means removing dead plants, stems, branches, and overly dense growth. Trim plants regularly to create separation between trees and shrubs and from combustible garden items like swings and decks.
- Prune branches 10' away from chimneys.
- Prune tree branches up from the ground to create separation between the tree and understory plants and shrubs and to eliminate fuel ladders (or connected fuels) into the tree canopy.
- Prune to create a strong, attractive branching structure and to allow light into the center of a tree or shrub.
- Prune to remove dead or non-vigorous growth and to renew a plant that crown sprouts.
- Prune to improve fruit set and flower display.
- Prune branches away from the roof and walls of buildings so rodents cannot use them as access points.



Prune at the branch "collar" where branching occurs and prune parallel to the remaining stem

When:

- Prune when trees or shrubs are dormant, or when finished blooming. Don't prune when plants are showing signs of stress. Larger pruning cuts (over 1.5") should always be made in the dormant season. Avoid pruning during bird-nesting season (April to July).
- Deciduous* trees and shrubs are dormant in winter. Prune them before buds begin actively growing in the spring. Pruning deciduous trees and shrubs in summer reduces vigor. Evergreen** trees can be pruned in winter as well as in late summer dormancy (August to September).

How:

- Prune for structure by eliminating weakly attached branches (narrow crotch angles), low vigor branches, dead branches, or crossing branches.
- Prune at the place where the shrub branches, and prune within the thickened branch collar parallel to the larger branch remaining. Don't leave stubs as they invite rot into the remaining stem.
- Use an undercut to make sure the bark doesn't tear when removing a branch over 1". Avoid cuts over 3" in diameter whenever possible as they are harder for the tree to heal over with new growth.
- Don't "lion tail" = removing all side stems on a branch and leaving a cluster at the branch end. (Side stems release a hormone causing the branch to thicken)
- Don't use heading cuts in general, except for young fruit tree structuring and trees you plan to maintain by pollarding. Heading cuts are cuts in the middle of a stem or branch not at a branch collar. They cause multiple branches to sprout that are weakly attached and prone to failure and/or leave unsightly dead branch ends that invite rot.
- Always use clean tools when pruning to avoid spreading disease.

Deciduous Trees

- For young deciduous trees, prune to maintain a central leader (the central leader is the tallest upward growing stem of the trunk). Shape and direct tree growth by removing problematic branches when the tree is young to avoid large cuts later and save expense. Select strong lateral branches that create a balanced tree in three dimensions. Remove weakly connected and crossing branches before they are bigger than 1.5".
- Deciduous trees will have a pyramidal, oval, umbrella, or rounded canopy. You will want to prune to allow the tree's natural form to develop. Keep shoots on the southwest trunk of young trees to prevent the low angle afternoon sun from burning the tree bark and creating a burn scar and entry point for insects and disease.

Evergreen Trees

- For young evergreen trees, prune to develop a balanced canopy, good structure, and some light to the lower branches. Ensure balance 360 degrees around canopy. Many broad-leaf evergreens develop a multi-trunked habit above 6-12' and grow out into a rounded canopy.
- * "Deciduous" Trees that lose their leaves in winter (Maple, Ash, Sycamore). There are also "drought deciduous" trees like California Buckeye who lose their leaves in late summer as a dry season adaptation.
- ** Evergreen trees include Conifers (Fir, Pine, Redwood), and Broad Leaf Evergreens (Bay, Olive, Eucalyptus, Coast Live Oak, and Madrone)

Pruning is as much an art as a science and takes a little time and practice to master.

PRUNING & CARING FOR PLANTS

Pruning & Caring for Shrubs

- Deciduous shrubs respond vigorously to a winter pruning.
- Shrubs like Redbud, Hazels, and Blueberries, grow new shoots from the base ("crown sprouting"). As these shrubs mature, they can be coppiced (all shoots cut back to the plant crown) or older shoots can be cut back to the plant crown during the winter to promote new shoots to sprout.
- For cane growing shrubs (like many berries), thin out and prune shoots to favor the stronger, thicker, and new canes to allow in adequate light and air circulation.
- The pruned material from deciduous shrubs and younger tree branches are generally rich in nutrients. Cut up or chip to use as mulch and cycle nutrients back into your soil.
- Prune evergreen shrubs like small trees. A hard pruning back of up to 1/3 of branch length in early fall every three to five years can re-invigorate the shrub, especially ones adapted to disturbance by fire.

Pruning Herbs and Flowering Perennials

- Deadhead (pinch off old flowers) deciduous herbs and flowering perennials during the blooming season. This will cause many plant species to re-bloom. Alternatively, delay deadheading to allow insects and birds to use seeds and flower parts. Prune back hard when dormant to main stems or to the plant crown in early-late fall.
- Cut back evergreen herbs and flowering perennials hard every 1-3 years in early spring to re-invigorate growth. Prune lightly in summer for shape.
- Semi woody perennials (or "sub-shrubs") like Lavender (Lavandula) and Sage (Salvia) get woody as they grow older and will benefit from harder pruning. Remove 1/3 of the growth annually in fall.





Cutting back perennials after flowering (two photos above)



Deadhead (pinch off old flowers)

PRUNING PERENNIAL GRASSES

The Water Smart Landscape Template designs and many modern gardens feature perennial bunch grasses which live many years and stay green at the base even during the dry season. Absent mowing or pruning every year or few years, perennial grasses can slowly die out in the center or decline in vigor. Grasses are co-evolved with grazing animals (and most with fire as well) and need you to "graze" them once a year to remove dead material. This renews them from the base, and keeps dead stems from over thatching and shading out new growth.

The Template designs also feature alternatives to conventional lawn that use less water and require infrequent to no mowing. *Festuca rubra* ("No Mow Fescue"), *Agrostis pallens, Danthonia california, Carex praegracilis,* and some bioswale mixes can all be mowed between 3-6" consistently to form a turf that tolerates low foot traffic.

How:

- Shear or cut back bunch grass blades and seed stems to 4"-18" depending on the overall size of the grass. Don't cut lower than 4" as this will kill the grass over time.
- Use pruning shears for smaller grasses and a hedge trimmer, weed-eater, or scythe for larger grasses and bigger area.
- For turf alternatives, mow consistently to the same height or slowly reduce mow height from a tall winter height to a 4" minimum summer height. Never mow non turf type perennial grasses lower than 4" during hot summer weather.

When:

- Most perennial grasses in our area are cool season grasses, meaning their growth period is from November-April. Cool season grasses are pruned in October or November right before they begin new growth when cool rainy weather arrives.
- Warm season grasses, like Deer Grass (*Muhlenbergia rigens*) grow from March to September. These are pruned in March.
- Bunching perennial grasses can be pruned or high-mowed after seed set in July in a fire prone area to leave the fire resistant green basal leaves at the base. Leave the seeds for the birds as long as fire conditions allow.







Shearing of bunch grasses, removes last year's growth, improves new growth

FIRE SAFER PRINCIPLES

Fire Smart landscapes are developed from the building out. Hardening your building envelope (roofs, gutters, vents, eaves, siding, windows, and decks) is the first essential step. Equally important, the first five feet of landscaping against the building should contain mostly inorganic material and be an ember resistant non-combustible zone. This non-combustible zone should be free of flammable material and vegetation. There are several approaches to doing this creatively; this area could be a pathway, or a planting bed with a gravel mulch featuring non-combustible low-growing perennials and succulents, or well-maintained vegetable gardens, or recycling water features. A well-watered, well-maintained planting bed with non woody plants like coral bells and iris that have very high water content is a big fire safe improvement over a bed with large foundation shrubs. Equally important is to maintain this area free of weeds, leaf litter, or any other combustible material like coarse mulches or wood chips. Fencing and gates in this five-foot zone should be metal or other non-combustible material. Refer to your fire safety organizations and local ordinances for additional information.

FIRE SAFER MAINTENANCE

Moving beyond the five-foot zone, you will want to maintain 30' of "Clean, Lean and Green" zone. In this zone, minimize fuel connectivity and reduce the amount of fuel to lower fire intensity and rate of spread. Optimally, this garden area is characterized by islands of plantings separated by hardscape, non-flammable plantings like a lawn alternative, or areas of succulent plantings. Shrub clusters should be horizontally distant from trees to avoid creating a fuel ladder for fire to reach the tree canopy. As your landscape matures, you will probably find yourself "editing" the landscape to reduce fuel and maintain separation between the trees and shrubs. Twiggy, dense, fire prone growth in older shrubs or as a result of hedging should be avoided around the house. Branches of fire resistant tree species can overhang the roof if they are well maintained and pruned 6' from the roof. A light monthly hand-held or sprinkler irrigation helps plants thrive and keeps them firewise.



Native Adaptive Garden Design Concepts, rendering by Gates Associates, ABLA, and the City of Santa Rosa

A "Clean, Lean, and Green" area within the first 30 feet of your house consists of:

- 1. Clean gutters—gutter guards recommended
- 2. Ember Resistant Non-Combustible 0-5' Zone including non combustible fencing and gates
- 3. Trees pruned 10' away from chimney and 6' from roof and clean of dead wood
- 4. Strategic use of medium water-use plants near home that are less combustible.
- 5. Defensible spaces, good pathways, and clear sight lines for emergency crews
- Overall, eliminate fuel ladders, larger combustible plants and shrubs that might bring fire up into the crown of a tree. Reduce horizontal fuel connectivity by separating combustible plantings along the ground with hardscape or non-combustible plantings like succulents to stop flame spread and reduce flame intensity.

See resources for additional information.

NATIVE PLANTS & HABITAT DESIGN

To invite native birds, pollinators and small wildlife into your garden, create natural garden areas with native plants and non-invasive adapted plants that are clustered for habitat value. Some essential habitat gardening elements are:

- Make clustered plantings of flowering perennials over six square feet in size to provide accessible nectar resources for pollinators.
- Create shrub clusters that provide safety for birds.
- Use seed of well sourced locally adapted wildflowers to provide additional pollinator and bird habitat. (See References/Resources)
- Provide a shallow basin as a year-round accessible water source.
- Areas of bare wet soil attract butterflies and other pollinators
- Dry stacked stone and stone walls provide habitat niches
- Create a "Wild Corner"—that is less manicured; let seed mature on grasses, leave open ground for ground nesting bees, and provide perches for birds.
- Create or preserve areas that use no irrigation which favors native plants, and soil invertebrates and microbes.
- Create a mosaic of planting types for habitat diversity—a patch of perennial grasses bordering a swale, nestled against a cluster of tall shrubs—providing year-round food resources for a broad range of native bird and pollinator species as shown in the illustration on page 28.



Blanket flower (Gaillardia aristata), Cleveland Sage (Salvia clevelandii)

Seeing various species of birds, butterflies and pollinators in your garden means you're doing a good job!



Honey Bee on Woolly Blue Curls (Tricholostemma), Hummingbird on Sage, elder Monarch Butterfly, Western Blue Bird, Western Fence Lizard, California Quail



TREES

Native trees provide an abundance of food (nectar, seed, nuts, fruits and insects) as well as cover and prime nesting habitat for birds. Providing bird boxes for cavity nesters such as barn owls, bluebirds and oak titmouse is helpful. Some native trees such as oaks and willows are larval host plants for feeding and pupating caterpillars. The tree canopy is an oasis for many forms of life. Even just one well-tended oak tree can help expand the diversity of a thriving habitat garden.

SHRUBS + VINES

Native shrubs and vines provide very important cover for birds, as well as food (nectar, seed, nuts, fruits and insects). Some native shrubs such as ceanothus, coffeeberry, and currant are host plants for feeding and pupating caterpillars. Having shrub cover near a water source creates a sense of safety, offering safe haven to retreat to quickly if necessary. Having a diversity of native shrubs (separated from trees to prevent fuel ladders) will create excellent habitat.

GRASSES + PERENNIALS

Grasses provide nesting materials and habitat for birds, as well as seed for juncos, finches, towhees, etc. Some grasses are larval host plants for feeding skipper butterflies. Plant your favorite flowering perennials in masses (six square feet for each species) to benefit nectar-loving hummingbirds and butterflies. Caterpillar host plants such as milkweeds and buckwheats should consist of at least three of each. Hummingbirds love tubular flowers including salvias and epilobium.

WATER, SOIL, DUFF + ANNUALS

Having a source of clean water that is close to shrub or tree cover, and away from the threat of predators is beneficial to birds. Butterflies like to sip from wet ground or gravel. Leaving natural leaf litter in moderation (not so much that it's a fire hazard) benefits soil health and insect diversity. A little patch of bare ground allows native bees a place to nest, and insect-loving birds to forage freely. Annual wildflowers are also important sources of nectar for butterflies.

Lupine Sidalcea Tansy-leaf phacelia Poppy Allium **Tidy Tips** Clarkia

Fiddleneck Sunflowers

***For more information on bird and pollinator habitat plants:

Xerces Society Audubon Society California Native Plant Society Calscape.org

Manzanita Coffee berry Tovon Silk Tassel Ceanothus Elderberry Wax Myrtle Grape Clematis

Coast Live Oak

Valley Oak

Ironwood

Willow

Arbutus

Redbud

Buckeye

Sycamore

Monterev

Currant Holly-leaf Cherry Cream bush **Bush Anemone** Matilija Poppy Rhus Vine Maple Dutchman's Pipe Vine

Cypress

Monterev Pine

Incense Cedar

Big Leaf Maple

Coast Redwood

Muhlenbergia Stipa Aristida Carex Festuca Melica Deschampsia Deerweed Milkweed

Buckwheat Verbena Salvia Penstemon Epilobium Cirsium Aster Viola ssp.

BIOSWALES & RAIN GARDENS

Bioswales and rain gardens slow, clean, and infiltrate rain, and provide a new habitat type in your garden for moisture loving plants and a drinking place for birds and butterflies. By diverting water from downspouts or paved areas into swales and rain gardens, we reduce run off into storm drains that can cause pollution, flooding, and erosion in creeks. Both rain gardens and swales increase soil moisture and ground water recharge in your garden. Storing the water in our soils for plants to use reduces the need for irrigation in the spring and fall months.

- Bioswales are gently sloping shallow drainage ways that move water across the landscape and allow it to infiltrate into the soil. Bioswales should be planted with rushes, sedges, and water tolerant grasses to clean and infiltrate run off. Cobble filled trenches or swales function for drainage and infiltration but do not clean water or provide habitat as well as planted swales. Swales can transition to cascades that step down steeper areas with rocks placed to manage water velocity and limit erosion.
- Rain gardens are low areas in the garden that create wet soil areas and introduce plantings adapted to streams and wet meadows. The rain stored in the soil becomes available to plants over the long transition from spring to full summer. Frogs and amphibians like newts may find a home in your swales and rain gardens. Rain gardens are typically quite shallow, less than 8" deep and designed to prohibit mosquito breeding.



Photo by The Theodore Payne Foundation for Wild Flowers & Native Plants



Photo by The Theodore Payne Foundation for Wild Flowers & Native Plants



Photo by The Theodore Payne Foundation for Wild Flowers & Native Plants

Design Considerations:

- Check soil infiltration rates before installing.
- Amend soils to improve infiltration rate prior to planting.
- Consider connecting rain gardens and swales and always have an overflow spillway to an appropriate area.
- Must be sited a minimum of 10' from structures. Consult with a geotechnical engineer if on a slope or unstable soils.

Rain garden and swale maintenance:

- Keep wood chips, mulches, compost, and excess nutrients from amendments or fertilizer out of these systems.
- Ensure water does not pond in these features for over 72 hours or mosquitoes can breed. A pea gravel mulch makes puddled water unavailable to mosquitos, and preserves moisture for plants.
- In order to keep the stormwater holding capacity of your bioswales, remove any organic matter or silt that builds up over time.
- Inspect the bioswales for signs of erosion. If found, plant these areas and/or use a larger gravel mulch such as 1-1/2" drain rock or river cobble.
- When pruning grasses and sedges, remove cuttings and add them to your compost pile, use as a straw mulch elsewhere in garden, or place in the green bin.
- Seed or plant bare soil areas in early fall before the rains.

TIMING IS EVERYTHING

This calendar illustrates the timing for and relationship between seasonal garden maintenance activities, wildlife use, intervals of heightened fire risk/fire safety, and periods of potential frost. Gardening activities, such as weeding, can take place all year but the calendar illustrates the critical period from March to May which is the time to finish weeding and to remove annuals before they start to sow seed.

Note that the calendar starts with September at the top. This is the end of one gardening year as many plants are dormant or approaching dormancy at the end of the dry season. It is also the beginning of a new gardening year as we start preparing for new planting and seeding. Early fall is the time to put in motion next year's harvest and garden abundance.

The calendar illustrates when bird nesting season takes place from March to July. Because of nesting times, the best time to do heavy pruning is from August to February. Migratory birds are federally protected. If you must do heavy pruning during the nesting season conduct a nesting survey by observing birds during early morning and evening for several days before doing the pruning. Avoid working near nesting birds until fledging has occurred. Similarly, nectar feeding periods are noted to encourage gardeners to provide nectar resources during that period including deadheading perennials for repeated blooms. The calendar also shows the period when caterpillars are feeding and pupating to highlight their life cycle needs and to preserve this habitat in the garden.

This calendar can be printed out and placed on the fridge and marked up with your garden observations and experiences. Prioritize your activities based on the "best window" for activities to take place. If you keep track of your maintenance schedule, you'll quickly observe the effect of properly timing your maintenance activities will have on your garden each year.

In contrast, the graphic maintenance schedule on the following pages provides a more detailed breakdown of seasonal gardening tasks. Task periods are shown over a longer period with greater color intensity during the most optimal period of action and less color intensity when the activity is still worthwhile but less effective than during the optimal period. Make notes on the calendar to adjust the optimal windows to your own site and its unique microclimates.



MAR

MAINTENANCE SCHEDULE

CLIMATE	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	
Rain							
Frost							
Fog						-	
Prepare for Fire Season							
Wildfire							
PLANT CARE + MAINTENANCE							
Weed/Mow							
Amend/Mulch						_	
Prune Warm Season Grasses							
Dead Head/Pinch							
Irrigation							
Prune Evergreen Trees + Shrubs							
Soil Preparation							
Seed				**			
Plant							
Prune Perennial + Cool Season Grass							
Prune Deciduous Tree/Shrub							
BIRDS AND INSECTS							
Nesting Birds							
Pollen and Nectar Feeding							
Caterpillar Feeding							
Chrysalis							

* Maintenance timing can vary depending on year and site microclimate

** Seeding vegetables or garden flowers with supplemental irrigation can occur over a longer time period than depicted

	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	CLIMATE
							Rain
							Frost
							Fog
							Prepare for Fire Season
							Wildfire
							PLANT CARE + MAINTENANCE
							Weed/Mow
							Amend/Mulch
							Prune Warm Season Grasses
_							Dead Head/Pinch
_							Irrigation
							Prune Evergreen Trees + Shrubs
							Soil Preparation
			**	**			Seed
							Plant
							Prune Perennial + Cool Season Grass
	*	***					Prune Deciduous Tree/Shrub
							BIRDS AND INSECTS
							Nesting Birds
							Pollen and Nectar Feeding
							Caterpillar Feeding
							Chrysalis

*** Seed native grasses and wildflowers

**** Prune lightly in summer as it reduces plant vigor

GRAYWATER SYSTEMS MAINTENANCE

Graywater is legally permitted recycled water from your bathroom sinks, showers, tubs, and washing machines for use in the garden. It is not black water from kitchen sinks or toilets. Graywater systems can be simple gravity flow systems or more complex with tanks, pumps and filters. All permitted systems have a diverter valve to the sewer system. The resources page has links for further information on design and permitting of graywater systems. The following are some guidelines for use and maintenance of graywater systems:

- Graywater must stay below the soil surface and away from human contact per health regulations. Typically, this is done by discharging graywater into mulch basins as illustrated in the lower right diagram.
- Ensure soap, shampoos and detergents are biodegradable, nontoxic, low sodium, graywater safe and compatible with plants. Avoid high sodium, boron, borax and water softener products that are toxic to plants.
- Distribute graywater evenly in the garden to avoid concentrating soaps/ detergents, for example from the first rinse of the laundry. This allows later graywater discharges to dilute any soaps/detergents.
- Avoid graywater discharge coming in contact with food. Do not use graywater with root vegetables. Graywater can be used for edible trees and shrubs if it does not come in contact with the fruit.

Annual Maintenance Checklist

- Inspect PVC and HDPE hoses to ensure there are no leaks or breaks.
- Inspect the graywater system to insure good flow to all the outlet areas and adjust as necessary. Clear clogged outlets or pipes.
- Check for leaks at the washing machine discharge hose.
- Check for leaks from the auto vent.
- Replace mulch when decomposed with fresh arbor mulch. Maintain mulch so graywater remains below the surface. Decomposed mulch can be covered in a pile for 6 months for further aerial decomposition then later spread in the non edible garden, or it can be disposed of in the green waste bin.



Adjust flow into each of the basins while washer is discharging so water is distributed equally from front to back

Gopher baskets can be added if needed



RAINWATER SYSTEM MAINTENANCE



Rainwater systems capture winter rains to be used as irrigation during the summer months. They can be smaller 55 gallon drum systems or large plastic or metal cisterns of several thousand gallons.

Non permitted Rainwater catchment systems meet the following conditions:

- Water is used for outdoor non-spray irrigation.
- Maximum storage tank capacity is 5000 gallons. Tank is directly supported on the ground. Tank ratio of height to diameter does not exceed 2 to 1.
- There is no electrical power or makeup water supply connection.
- An overflow swale or rain garden area is provided.

Permitted Rainwater catchment systems meet additional conditions and must comply with California Plumbing Code 1601.3:

- A pump to pressurize the attached irrigation system.
- A make up float valve inside the tank refills the tank with domestic water.
- An air gap is required to the domestic water supply to avoid cross contamination.
- Always comply with installer instructions and the manufacturer's manual.

Annual Maintenance Checklist:

- 1. Check tank overflow, outlet, swales, and drainage. Maintain flow at a minimum of 10' away from buildings and direct overflow to intended areas.
- 2. Use gutter guards and maintain them to insure they remain intact. Clean leaves and silt from the roof and gutters prior to early rains.
- 3. Using a hose, clean out the first flush system and tank filter. This should be done during the rainy season to ensure no build up clogs your system.
- 4. Drain the tank in summer and clean the inside with a hose, then allow the tank to dry out.
- 5. Check system for leaks.

Additional Requirements:

• Keep the tank cooler in the summer with trees, vines or a shade structure.

REFERENCES/RESOURCES

WATER SMART GARDENS

Sonoma-Marin Saving Water Partnership Programs: https://www.savingwaterpartnership.org/programs-rebates/

Sonoma-Marin Saving Water Partnership Landscape Design Templates: https://www.savingwaterpartnership.org/programs_list/ landscape-design-templates/

Sonoma-Marin Saving Water Partnership Water Smart Plant Picker: https://www.savingwaterpartnership.org/programs-rebates/ plant-picker/

Russian River Friendly Landscaping Guidelines: http://www.rrwatershed.org/project/rrflg/

UC Master Gardener Programs and Publications of Sonoma and Marin: https://sonomamg.ucanr.edu/ and https://marinmg.ucanr.edu/

PLANT & SOIL CARE

Hemenway, Toby. <u>Gaia's Gardens: a Guide to Home Scale</u> <u>Permaculture</u>, Chelsea Green Publishing, 2001

Kourik, Robert, <u>Sustainable Food Gardens</u>, Metamorphic Press, 2021

Phillips, Michael, <u>The Holistic Orchard, Tree Fruits and Berries the</u> <u>Biological Way</u>, Chelsea Green Publishing, 2012

IRRIGATION SCHEDULING

Santa Rosa Water: WaterSmart Yard: www.srcity.org/WaterSmartYard

Sonoma-Marin: Irrigation Scheduling Tool: https://www.savingwaterpartnership.org/watering-times/

Marin Water: Weekly Watering Schedule: https://marinwater.org/weekly-watering-schedule

NATIVE PLANT & WILDLIFE GARDENING

California Native Plant Society (CNPS) Calscape Program: https://calscape.org/

California Native Plant Society Milo Baker (Sonoma) Chapter: https://milobaker.cnps.org/

Home Ground Habitats: https://www.homegroundhabitats.org/ Popper, Helen. <u>California Native Gardening, A Month by Month Guide</u>, UC California Press, 2012 Bauer, Nancy, <u>The California Wildlife Habitat Garden</u>, UC Press, 2012 Theodore Payne Foundation for Wild Flowers & Native Plants theodorepayne.org | (818) 768-1802 ext. 22 Daily Acts Wildlife Gardening: https://dailyacts.org/savewater/ Hedgerow Farms: https://www.hedgerowfarms.com/ Cal Flora Nursery: https://www.calfloranursery.com/ The Watershed Nursery: https://www.watershednursery.com Larner Seeds: https://larnerseeds.com

FIREWISE OR FIRE SAFER LANDSCAPING

Fire Safe Sonoma: https://www.firesafesonoma.org/ FireSafe Marin: http://firesafemarin.org/create-a-fire-smart-yard/ CNPS Fire Recovery Guide: https://www.cnps.org/give/priority-initiatives/fire-recovery Resilient Landscape Coalition: https://www.sonomaresilientlandscapes.com/

GREYWATER & RAINWATER

Daily Acts Greywater 101: https://dailyacts.org/faq-items/graywater-101/ Daily Acts Drought Conservation and Rainwater Harvesting: https://dailyacts.org/savewater/

Greywater Action: https://greywateraction.org/about/ Lancaster, Brad, <u>Rainwater Harvesting for Drylands and Beyond, vol 1&2</u>, Rainsource Press, 2008, 2010, 2013

NOTES



SONOMA-MARIN SAVING WATER PARTNERSHIP

> ANN BAKER LANDSCAPE ARCHITECTURE