



WATERING NATIVE PLANTS



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Your Practical Guide for Healthy Natural Gardens

WHY WATER

You are watering the **soil** in order to provide for the **plants'** needs.

Soil is the bank where water is deposited and stored, and where all withdrawals originate. Water exits the soil by evaporation into the atmosphere and through transpiration, which is the term describing it's use by plants. Taken together, the total water loss/use is called evapotranspiration.

WHAT TO WATER

Plants use water to cool themselves and to grow. Plants draw water in through their roots and transport it through their entire system and those roots grow in soil. Different plants have different water needs. Plants can absorb some water through their leaves as well, though most natives are adapted to not need this source of water in the summer months.



Flowering native plants watered once a month in summer

WHEN TO WATER

Rain is the best water. It comes at the best time, it is free and it is pure. Native plants love rain and they grow during the rainy season. You should build swales, check dams, micro-topography and soil surface profiles in your garden in order to direct and retain rainfall so that it will soak in rather than run off. Take advantage of all the natural waterings we might get. You can also capture rainwater in rain barrels or reservoirs, for use later during the dry season.

In the dry season, you need to water **before** the plant needs it. Put water in the soil (like savings in the bank) so plants can make withdrawals as needed. In California it rains in winter, usually





Key Point

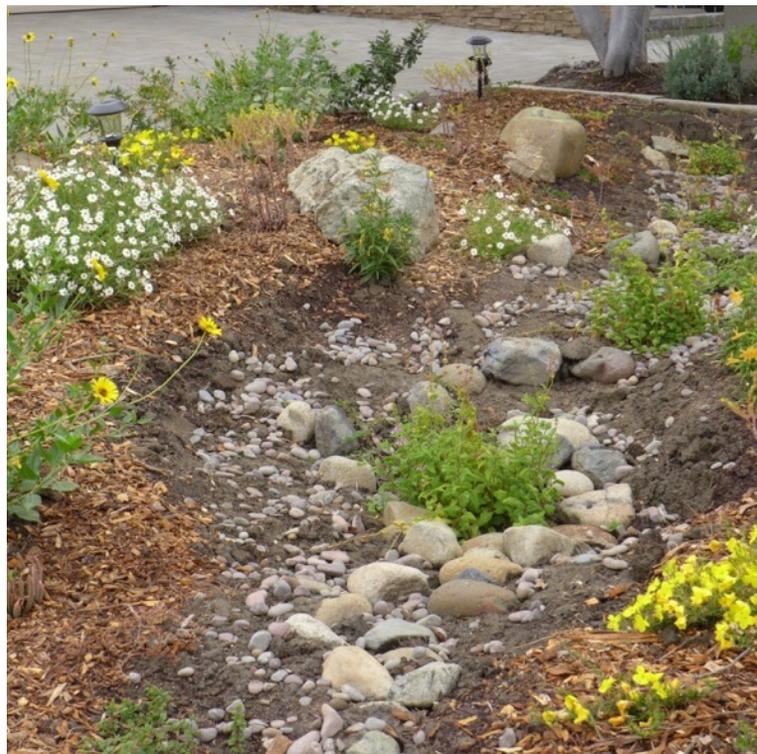
Most native plantings will thrive with a deep-soak irrigation once every 3-4 weeks during the dry season. New plantings or landscape with herbaceous, shallow rooted plants can receive light waterings in between, but for all plantings, be prepared to irrigate thoroughly about once a month, May through October. A thorough irrigation is considered applying enough water to equal a rain event totaling approximately 1 -1.5 inches. See HOW MUCH TO WATER on page 11.

enough to carry natives through summer. In our gardens, our plants might need a little extra water in summer to keep them looking better than their cousins out in the dry hills.

But be careful with summer watering. The goal is to promote root systems that reach extensively into deep soils. You achieve this goal with **deep infrequent irrigations**. Shallow waterings alone will not promote healthy, sustainable landscapes.

Waterlogged soils will cause root rots on plants that need oxygen in their root zones, especially in summer when soil temperatures are warm. Root rots and other disease organisms are most likely to infect plants in summer, in instances where there is too much water and not enough oxygen.

As a general rule, it is time for a deep soak when the soil has become dry at a depth of 3 - 4 inches. On newly planted gardens, you need to keep the soil a bit more consistently moist, but don't water every day or too frequently as you will create waterlogged situations.



Rain swale to capture water and allow for deep soak.

FACTORS DETERMINING WATERING FREQUENCY:

Season

During the cool season, most native plant landscapes will do fine on rainfall alone with no supplemental watering. Of course new plantings will need watering, and in a dry winter, you may want to provide water during an unseasonal dry spell. Rain is best, so watch the forecasts and hold back on watering when rain is anticipated.

Location

Sites near the coast are cooler in summer and the nighttime humidity helps the vegetation during the summer months. Inland sites are much hotter and drier. Of course you need to choose the right plants, and understand that plants in inland sites will usually require more water than plants in coastal gardens.

Exposure

Plants in full sun grow in soil that will become hotter and drier than soil that is shaded. Plants have figured this out, so their strategy to shade their own root zone is actually pretty clever. Low branches and fallen leaves provide shade and mulch to keep the root zone cool and moist. Soil in the shade of trees, fences, buildings, etc. will stay moist longer than soils in the sun.

Weather

This factor might seem too obvious. The point is you should be watering “ahead.” Farmers (the good ones) do not play catch-up in watering their crops. They water for the plants’ future needs. In summer, watch the weather forecasts and soak your garden several days **before** the heatwave, otherwise the plants will be making withdrawals from an NFS account, (non sufficient funds).

Soil type

Different soils store water differently. Clay soils retain moisture a long time. Sandy soils dry out quicker. Loam soils are ideal, providing a perfect blend of moisture retention and pore space where roots can find the water and the oxygen they need to be healthy. Clay soils hold moisture but can become waterlogged to a point where there is no oxygen for the roots. Sandy soils can easily dry out to the point where roots cannot find water.

Plant types

Plants from dry climate regions (like California) are adapted to require less water than plants from temperate or tropical regions. California natives are accustomed to getting their water during the cool rainy season, and then toughing it out through the dry summer. In the garden, they will benefit from a little summer water, but it has to be applied correctly.

WHERE TO WATER

Water where the roots are, and where you want them to be, or where you know they should be as the plant matures. As a general rule, a plant's root system is most active in the zone equivalent to its outermost branches. Do not over-water right next to the crown of the plant, which is the spot where the stem comes out of the soil. Many plants suffer from fungal rot if the soil at the crown is continually saturated during warm weather.

On **new plantings** you need to make sure the nursery root ball does not dry out, and you need to promote rooting into the surrounding soil by applying water well outside the dimensions of the planting hole.

On **established plantings**, you simply need to **get all the ground uniformly wet**, just the way a rain event does. And you need to get the water to **soak down deep**.



The plants in these photos are being hand watered 10 months after planting. Note the watering basins and the secondary watering rings, well outside the dimensions of the original planting holes. This deep soak is only necessary once or twice during the first summer to get the plants established. The goal is to promote healthy root systems in deep, cool, moist soil.



HOW TO WATER

Cycle/soak or Pulse Irrigation

Water three days in a row to achieve a cumulative total of 1 - 1.5 inches. In each of the methods described below, you may find it beneficial to water using a technique called “**cycle/soak**” or “**pulse irrigation.**” This is especially important in heavy (clay) soils where penetration is difficult and absorption is slow. The premise is simple and based on natural rainfall. By example, our most effective rains come as showers falling over an extended period. If we get 2 inches of rain in showers scattered over a three-day period, it is much better than a huge single 2-inch downpour. The same with summer waterings. If you apply 1 - 1.5 inches of precipitation over three consecutive days, you will get better penetration, better oxygenation, and better root uptake. **Your three days of watering will be considered one irrigation “event.”**

Hand water

For home landscapes and all small accessible spaces, don't underestimate the simple act of standing with a garden hose and soft rain nozzle and watering your plants by slowly and methodically soaking the soil. It takes a little while but it is time well spent and you will see details in your garden you may miss otherwise. Do this in the early morning or late afternoon, and not in the heat of the day. If you have watering basins and micro-topography built into your planting, this will be an easy way to get a good deep soak. You can water thoroughly about once a month, and include a few light waterings in between if you like, always avoiding the mid-day heat.



Hose-end mini sprinkler with 9 - foot radius supplies approximately 1/4" precipitation per hour, ideal for cycle/soak or pulse irrigation deep soak

Sprinkler (hose-end)

Since native plants only need water about once a month, it is very easy to set up an old fashioned sprinkler on the garden hose, turn the water on at a gentle flow, and leave the sprinkler run for several hours, effectively soaking the ground where the sprinkler covers. You can move these “sets” around until your entire garden is watered. Believe me, grandpa use to water his lawn this way. For natives, find a sprinkler that supplies water with low volume (provides deep soak), small droplets (prevents soil compaction) and low trajectory (keeps most of the leaves dry). Tree of Life Nursery makes and sells micro-sprinklers as singles or with multiple sprinklers in-line for simple cost effective watering. With micro-sprinklers, pulse irrigation described above is best, because you need 8-12 hours of run time to get a good deep soak, better applied over a three day period, three sets of 3-4 hours each.

Sprinklers (systems)

You can **estimate** your **precipitation rate** by placing several empty coffee cans in your garden, running the sprinklers for 30 minutes, measuring each can and taking an average, then multiplying by two (since you watered for half an hour) to get the average “inches per hour” factor for your sprinkler system. This will help you know how many minutes you need to apply the recommended 1 - 1.5 inches of water per irrigation event. You can also **calculate** your **precipitation rate** if you know the gallons per minute (GPM) flowing through the sprinkler valve as follows: $(\text{GPM} \times 96.3) / \text{square footage} = \text{precipitation rate in inches}$.



Spray head nozzles apply water at a high rate.



Stream rotor nozzles apply water at a low rate.

Sprinklers (spray heads)

If you have spray heads from a previous lawn or garden, or have installed them for native plants, you can use them to water. Since they apply water rather rapidly (high flow rates), be careful to avoid runoff or overspray. “Misting” (too much pressure) and wind drift can be problematic as well. Cycle soak or pulse irrigation will help make spray head irrigation more effective. Know your precipitation rate and water accordingly, measured in inches per hour.

Sprinklers (stream rotors)

Many older spray head sprinkler systems have been converted or adapted to stream rotors. These newer heads apply water more slowly, making them more efficient with less overspray, runoff, and wind drift. If you know the precipitation (estimated, calculated or as stated by manufacturer) you can easily apply 1 - 1.5 inches per irrigation event. Stream rotors allow for better penetration into the soil, but they will need to run a longer time to deliver the desired amount of water. Know your precipitation rate and water accordingly, measured in inches per hour.

Sprinklers (practical tip)

Run the sprinklers approximately once a month to achieve 1 - 1.5 inches precipitation, May through October. On new plantings and young gardens you can sprinkle lightly, (i.e.; 5 minutes once or twice a week) in between and in addition to the deep soak irrigations. The light sprinkles will freshen the plants, wash the leaves, and keep the soil surface a little cooler and somewhat moist. However, **the light sprinkles will not effectively water** the root zone nor promote long term sustainability. All sprinkler watering, whether deep soak or light sprinkles, should be done in the cool of the early morning.

Drip irrigation (systems)

Drip was developed in dry Mediterranean zones over 40 years ago in commercial agricultural applications. A single species (monoculture), planted in straight lines, (i.e.; vineyard, orchard, row crop) can be effectively watered by drip because the root systems, crop age, growth rate, desired yield, soil type, and evapotranspiration rate are uniform throughout the entire planting. Transferring this technology to ornamental gardens is not as easy as it might sound.

In many cases it can be quite difficult to make drip work well in horticultural settings. In a native landscape, where many different plants are involved, the goal remains the same: **Get all the soil wet with a deep soak approximately once a month**, and supplement with a few refreshing, shallow overhead waterings in between.

Drip irrigation (point-source emitters or in-line drip)

You need to know your precipitation rate and how long it takes for capillary action to wet all the soil laterally. Given these factors, you can run the system to apply 1 - 1.5 inches of water per irrigation event, once a month for deep soak.

Drip irrigation (practical tip)

All the principles of irrigation apply equally to all the various drip configurations. “Point-source drip” irrigation applies a slow steady flow of water at one spot, the installed emitter. “In-line drip” functions a bit more like a soaker hose in that the emitters are spaced regularly along the entire length of pre-fab



tubing. The tubing is usually hidden under the soil surface or under a layer of mulch. In both examples, water is measured in gallons per hour rather than gallons per minute, because of the low flow rates. Drip is operated under low water pressure as well.

The technique of drip irrigation has its challenges in all stages; design, installation, application, and maintenance. The list below outlines a few of the factors to consider when using drip irrigation in a native garden. It is a common misconception that a drip system will allow you to simply water your garden on auto-pilot.

Quite the contrary. Drip requires careful planning, proper installation, good management, and a lot of maintenance.

Drip Do's and Don'ts

- At all costs, avoid placing the emitter too close to the crown. This will cause crown rot. With in-line systems, avoid planting a plant right next to an emitter. This is the most challenging aspect of natives on drip.
- Install sufficient number of emitters or set the grid at the proper spacing to wet all the soil where the roots will grow. See WHERE TO WATER, above.
- Avoid dry spots and/or over-saturated spots. Here's how it works: Water moves vertically (down) through soil by gravity and capillary action. Water moves laterally (sideways) through soil only by capillary action. Capillary action is the way each soil particle holds water on its surface, and then passes any free water on to its neighboring soil particles. Drip irrigation relies on capillary action to get moisture uniformly distributed throughout the root zone. In sandy soils, water does not move laterally. In clay soils, capillary action is strong, but absorption rates are slow. Drip systems are not recommended for sandy soils. In every other soil type, they must be engineered correctly.
- The key to drip design is to have the emitters properly spaced and their flow rates properly calculated so that the entire root zone will be saturated uniformly at the proper depth on every irrigation event. The sad fact is that on many systems you see polka dot wet and dry spots, shallow moisture levels, uneven plant growth, and a harmful accumulation of salts resulting from short, frequent waterings with water that has high pH and elevated levels of total dissolved salts.
- The factors to be considered in designing a drip system are the evapotranspiration rates of the plants (their water needs), and the soil type (affecting capillary movement and penetration of

water). Without this information you cannot properly determine the flow rate, proper spacing of the emitters, and the frequency and the run-time for your irrigations.

- Since drip systems water from the surface or from slightly below the surface, you have to test the soil with a soil probe or by digging a small hole to observe the moisture level 4 inches down. Estimating watering needs with drip, by only observing the soil surface can be very misleading. It might be bone dry or sopping wet down there, and you have to see it to know.
- Since drip systems irrigate with no spray or sprinkle, leaves and branches can become very dry, dusty and unsightly. Just like with sprinkler irrigation, the plants will benefit from an occasional light sprinkle or hosing off during the cooler hours of a summer day, in between the deep-soak events. These light sprinkles are not considered effective irrigations, but they do promote good plant health and water conservation, as the planting area is occasionally cooled and moistened.
- If you depend on drip to consistently and uniformly apply water to your plants, you have to frequently inspect the system while it running. Breaks in the line, coyote chews, gopher damage, or clogged emitters will ruin the system and your plants will suffer.
- With point-source drip, you will have to relocate the emitters (move them farther from the crown) and add new ones as your plants grow and their root systems become more extensive. Consider doing this every 6 months for the first 2 years.
- If you plan on digging or cultivating, hoeing weeds or planting new plants, you have to be careful to not cut the drip hose with your garden tools. Always have repair kits and spare parts handy.

Drip Do's and Don'ts (illustrated)

Salvia 'Skylark' (*right*). Accumulated summer water concentrated too close to the plant creates conditions for crown rot or fungal root rot. Better to make sure water runs away from the crown and that the deep soak takes place at the drip line, outside the perimeter of the branches.



Organic bush beans at Tree of Life Nursery (*left*). Drip irrigation's highest and best use is in agriculture; single species, straight rows, and uniformity in both root depth and the crop's water needs. As a general rule, it is difficult to use drip correctly in ornamental plantings.

Manzanita (*right*). If the plant is planted too deep, root rot with summer irrigation is almost inevitable, as the roots are deprived of oxygen. Regardless of the irrigation method, if water collects in the basin at the plant's crown, it is susceptible to root rot.



White sage (*left*). The single drip emitter for watering this plant is placed directly at the crown. This is wrong. To promote healthy roots and prevent root rot, multiple emitters should be placed away from the stem and periodically relocated further. Also, as the plant grows you need to add new emitters. After a couple years, a mature white sage would likely have 5 - 6+ emitters in a circle 3 - 4 feet in diameter, for deep watering at the drip line.

Drip Do's and Don'ts (illustrated)

Turf replacement project (below). This in-line drip system is not installed correctly. The emitters are too close to the plants. In-line drip should be engineered to wet all the soil through gravitational and capillary action. You need to match the soil type and the plant's root depth/ water needs to the emitter flow rate and hose spacing. The goal is to provide 1 - 1.5 inches of precipitation with each irrigation to all the soil, with no soggy spots or dry spots.



In-line drip installation (right). If engineered correctly, all the soil be be uniformly irrigated because the designer chose the emitter flow rate and the hose spacing based on the soil type and the water needs of the planting.



All wrong for all the reasons (above). If you read this paper, you can identify all the problems.

- Wrong plants
- Grade too high
- Wrong drip design
- Emitters too close to plants
- Dry spots to be expected
- Hoses on surface
- Hoses may be covered with more mulch, which may smother the plants
- Salt accumulation from inconsistent shallow watering
- No swales or microtopography to catch and absorb rainfall





Key Point

Native plants need a fraction of the water required to maintain traditional gardens. Native landscapes use about 10% the amount of water to keep turf alive and green (90% savings), and use approximately 30% of what is needed for most ornamental shrubs, (on average, a 70% savings).

HOW MUCH TO WATER

Remember, soil stores water where plant roots can find it. Clay soils retain moisture longer, but absorb water more slowly. Sandy soils dry out quicker, and while water readily sinks in, the water which actually adheres to the outside of each sand particle (capillary water) is easily lost.

Plants differ in their water needs. These and many factors have to be considered in determining how much to water. Water exits the soil through evaporation into the atmosphere and through transpiration, which is the use by the plant in cooling itself and growing. The rate at which water is lost and used in the landscape is called the evapotranspiration rate. In areas of high evaporation (hot, dry, windy) you will need to apply more water more frequently. In sandy soils, you will also need to water more often and with more water than in clay soils.



In-line drip irrigation. Avoid the polka dot wet/dry syndrome by matching soil type and plant needs to drip tubing flow rates and spacing.



Tree of Life Nursery during a series of winter rain showers.

Key Point

Our rains come during the cool season when evapotranspiration rates are low. In summer, the plants limit their use of precious soil moisture through ecological adaptations to reduce transpiration, i.e; making leaves that are grey, fuzzy, small, thick, waxy, oriented vertically on the stem, or which reduce in number, or various combinations of the above. We can manage summer water for the benefit of the plants, keeping them attractive and verdant through the season, but too much water, especially in soggy soils can harm them. Most are simply not adapted to grow in warm wet soils. With deep infrequent irrigations, we provide a place for healthy roots in cool moist soil, and plenty of valuable oxygen in the root zone.

CRADLE TO MATURITY

New planting, the first 3 - 6 months

Deep soak - Hand water the plants, apply water in the basins, the swales, and the secondary watering rings, for deep soak approximately every 3 - 4 weeks.

Light sprinkles - Hand water or use sprinklers once or twice a week to lightly water the leaves and wet the soil surface. With sprinklers, a 3-5-minute run time should be plenty.

Do not water in heat of day and preferably not during heat waves. Water ahead.

Young planting, becoming established, 6 - 18 months

Deep soak - Hand water or run sprinklers (hose end or system) or drip (point-source or in-line), approximately once a month to apply the recommended 1 - 1.5 inches precipitation. Cycle/soak or pulse irrigation method is best.

Light sprinkles - Approximately once a week run sprinklers for 5 minutes or so.

Do not water in heat of day and preferably not during heat waves. Water ahead.

Mature planting, fully established, 18 months onward

Deep soak - Set hose-end sprinkler, run sprinkler system or drip system (irrigate by your normal method) to apply approximately once a month to apply the recommended 1 - 2 inches precipitation. Cycle/soak or pulse irrigation method is best.

Light sprinkles - Not necessary, but you can wash the leaves and freshen up the garden occasionally in summer by sprinkling or hosing down the foliage in early morning or late afternoon/evening.

Do not water in heat of day and preferably not during heat waves. Water ahead.

A note on established mature plantings

Depending on the type plants, established mature native plantings may need little or no summertime irrigation, or slightly **increased quantities** (not increased frequency) over when they were first planted. If the plants are native in the immediate vicinity where they are planted, they will naturalize and get by mostly on rainfall. If the plants are native to a wetter part of California (i.e.; north coast), as mature specimens they will need continued irrigation and the garden may actually need a little more water than when it was initially becoming established, because with more leaves, higher levels of transpiration will occur. This is somewhat mitigated of course by low branches and leaf drop which shade the ground around the plants, conserving moisture.

Practical example

If you are watering a garden with **established shrubs** in let's say, Mission Viejo or Escondido and the two example plants were in the same planter bed, you would water to meet the needs of the plant that requires summer water.

Lemonade berry, (*Rhus integrifolia*) - Native to site and will naturalize. No summer water needed, but added water will be fine.

Manzanita cultivar, (*Arctostaphylos densiflora* 'Howard McMinn') - Native to Sonoma County. Summer water recommended, 1 - 1.5 (2 further inland) inches precipitation per irrigation, deep soak once a month, May through October.

In summary, as regional natives become mature, they need less water (or none, because they become naturalized), and as horticultural natives from wetter climes become mature, they still need to be irrigated, and maybe with more water to satisfy the needs of the larger plant.

Native plant gardens reflect the beauty and diversity of California's natural ecosystems. They function as much needed refuge for beneficial pollinators and lovely hummingbirds. As the garden matures, watering becomes a simple activity... just provide a deep soak once a month. In winter, rainfall will suffice. Enjoy!



Key Point

In a native plant garden in southern California, when you water your plants, you are only applying a total of 6 - 10 inches of supplemental water per year, far less than 50 - 60 inches required by turf grass or the 20 - 24 inches utilized by many landscapes considered "drought tolerant" or "water efficient." When it comes to "California Friendly" natives cannot be beat.

BENEFITS -

HIDDEN AND APPARENT

Aside from the simple fact that naturalistic gardens use less water (70 - 90% savings) as compared to a typical turf/flower/shrub bed garden, they also become, in their own right, functional "ecosystems." Sustainable native landscapes are wonderful places to visit and spend time, interacting with song birds, butterflies, hummingbirds, beneficial pollinators, lizards, and other of our (to borrow a term from John Muir) "fellow mortals." With good horticulture, we create healthy soils, clean air and water, and experiential spaces where we can realize renewal and healing.

Our engagement in tending these intimate gardens proves to be in itself a healing activity. We invite the best of nature to come close, where we can be part of it (and it a part of us) every day.

Matilija poppy. This simple planting is watered approximately once a month with a hose-end micro sprinkler. In winter, the sprinkler goes into storage and the rains take over. Watering native plants is simple. Most native plantings will thrive without complicated systems and automated controls, if the people in charge simply know when, where, how, and why to water. And now you know.



Tree of Life Nursery is the largest grower of California Native Plants in the state. Specializing in a line of plants from the Southern California region, Tree of Life is dedicated to providing the finest quality of commercially available plants to the landscaping trade and to the public. Tree of Life believes in creating spaces that look and feel authentically Californian.

