MARCH, 2014
COUNTY OF MARIN WATER CONSERVATION MEASURES

Department of Public Works
Water Conservation Measures

Existing Measures

Civic Center
- All restrooms (98) have low flow (<1 gpm) faucets. The automatic facets are on a timer set to deliver <1gpm.
- The restrooms have 53 waterless urinals, 10 ultra-low flush (<1 pint) urinals, and 74 low flow automatic flush toilets (1.6 gal per flush).

Jail
- Reclaimed water is used for jail toilets

Wellness Center, Kerner
- All restrooms have waterless urinals, low flow toilets (1.6 gal per flush) and low flow showers heads (2).
- All restrooms have low flow (<1 gpm) faucets.
- The main air condition unit is evaporative air cooled, not water cooled, so there is no water usage.

Garage
- In January, car washing was reduced, and the wash rack area is open Monday, Tuesday and Wednesday to reduce available to other wash rack users. Estimated water savings is 2000 gallons per week.

Marin Emergency Operations Facility (EOF under construction)
- All new restroom toilets and urinals (ultra-low flow, <1 pint) use reclaimed water
- All new faucets are low flow (<1gpm).
- Locker room showers heads are low flow.
- Cooling towers use reclaimed water.
- Landscaping is on reclaimed water.
- Remaining original toilets in other building restrooms use 1.6 gal/flush.

Airport
- Although minor use, landscape irrigation water was turned off in January 2014 and will remain off until the drought crisis is over.
- To reduce water consumption, the airplane wash rack available was changed; the wash rack is closed on Monday, Wednesday and Friday.
Potential Future Measures

Civic Center
- The single largest measure to reduce potable water use is to switch the Civic Center Hall of Justice and Administration buildings cooling towers to reclaimed water. It is estimate the switch to reclaimed water would save 727,000 gallons per year (972 ccf). However, because of reclaimed water quality (TDS and salts), system corrosion rates will increase, overall reclaimed water use will go up by 10% over existing, and water quality chemical costs will go up. It is recommended that corrosion protection coating be applied to chiller #1 to extend their life at a cost of approximately $20,000.

Signage
- Plans are underway to install water conservation signage at all restrooms to remind users to conserve water.

Fountains
- The Civic Center Dr. fountain can be turned off and result in an annual water savings of 10,000 gallons per year. The Cafeteria water feature can be turned off for a water savings of 70,000 gallons per year. However, we expect the protective fiberglass surface coating will crack and need to be replaced at a cost of $21,000.

Court Floor
- Judges’ chambers and jury room 3.6 gal./flush toilets (28) could be replaced with 1.2 gal./flush for an annual estimated water savings of 1,500 gallons. Cost of retrofitting is approximately $8,500 however the replacement may trigger other accessibility requirements which could greater increase the retrofit costs. The accessibility improvements will be proposed as part of the FY 2014-15 capital improvement plan.

Parks
Water Conservation Plan Summary

Marin County Parks is responsible for over 76 properties not including the open space preserves. Of this 76, 40 have developed landscapes that staff maintains. Parks staff has initiated water conservation measures over the past several months to maintain the health of the landscape during this dry winter. The following is a brief outline of some of the measures we are implementing, both short and long term until the drought ends.

Parks staff will meet, discuss, and coordinate water management with other departments and agencies who need to share in the decision making process related to water conservation measures. These include county facilities managed where the grounds are managed by Parks for other departments such as the libraries, Department of Public Works, Marin Center, County Service Areas, special districts, Health and Human Services, and the flood control district.
Current ongoing water conservation practices

Limit water use to water budgets, which are based on year round watering cycles, landscape needs, and water allotments.

- All irrigation systems were shut off in October in anticipation of winter rains for all Landscape Services sites. Additional irrigation was then applied during December and January as the drought persisted. Irrigation was confined to drought stressed turf and medians. Immediately after the first rains of the season all irrigation was again shut off. Park staff will monitor monthly water bills and compare usage with last year’s use. Staff will work with local water agencies to maximize water savings and adherence to the established water allotments.

Audit and monitor water use on a weekly basis during the summer.

- Landscape maintenance contractors (Gardener’s Guild, Heritage and Coast) monitor irrigation according to their current contract. They are required to report all water use monthly. Improved irrigation auditing will be carried out by the new park Water and Irrigation Technician when that position is filled. Auditing will provide information to reduce and eliminate water use in the MMWD third tier. It will also inform Marin Parks of areas where allotments and water budgets need to be adjusted. This will require close work with MMWD. Staff monitors incoming water bills and checks the meters weekly at all park facilities. Usage is currently compared to past billing cycles and meter use.

Where possible, replace most high water use plantings with low water use plants or eliminate plantings entirely.

- Currently Parks has a moratorium on planting new plant materials until voluntary water restrictions are lifted. All landscape plantings completed in the last 15 years have been reviewed by MMWD to assure plant materials are drought tolerant. Landscape Services will work with contractors and employees to meet the 25% voluntary reductions as requested by MMWD for this year by irrigating at 25% under the use last year. This will result in some plant materials that are stressed and growing at less than peak performance. Marin County has paid over $8,000 to have trees removed due to drought stress. Park staff will work with Park Landscape Architects to choose the most drought tolerant and deer resistant plants to be used in all future planting projects.

Prioritize landscape watering based on use by the public, cost of replacement, aesthetics, etc. High value assets that will receive priority include: sports fields, interior Civic Center gardens, trees, shrubs, and screening.

- Prioritization of water use has been carried out on a limited basis. Irrigation has been shut off until plantings became stressed and started to decline. Minimal irrigation was applied until the recent rains arrived. All irrigation systems are currently off.

- Eight mature pine trees have died due to drought so far this winter. Highest priorities in parks will be given to reservable areas and turf areas such as the McInnis athletic fields, Stafford Lake Area 1 & 2, McNears Beach large reservable areas, and Paradise Beach
main lawn area. These areas see the highest public use and also generate income for the Parks.

**Irrigate with reclaimed water where it is available.**
- Presently reclaimed water is only available at McInnis Park and the Civic Center for use on turf and landscape areas. MMWD has future plans to run reclaimed water lines to the Peacock Gap area, McNears Beach the Lucas Valley campus. Stafford Lake is irrigated with unprocessed lake water.

**Mulch all landscaped areas where possible.**
- Staff and volunteers work together wherever possible to mulch all landscaped areas that are bare. It is an important part of our IPM program and helps maintain moisture levels in soils around plants as well as preventing weed growth. In 2013 more sheet mulching was used for volunteer landscape projects than any year recorded in the past. These projects include Village Green Park in Stinson Beach, McNears Beach entrance, and McInnis Park and the civic center.

**Replace infrastructure, including worn out valves, sprinkler heads, corroded pipes, etc.**
- Given its age, it comes as no surprise that a large proportion of the department’s water infrastructure is approaching, or has already reached, the end of its useful life. Breaks and leaks are more common in aged systems. In 2012 the Paradise Beach Park main water line was replaced and all new valves installed. The McNears Beach Park main water line was also partially replaced in 2013.

**Install new technology irrigation systems with central computer control with watering schedules based on evapotranspiration rates and plant stress indicators.**
- Automatic irrigation is one of the largest causes of overwatering. The average automatic irrigation system applies 2 to 3 times the amount of water required by the Landscape. Parks is working to upgrade to these new controllers as renovations take place. Most of the landscape division irrigation systems and Paradise Beach Park currently use irrigation systems controlled by computers. (Central)

**Continue on-going training of employees in water management.**
- Training is ongoing and will be conducted by Central personnel this spring. More training will occur in the area of drought stress monitoring to help staff avoid plants reaching the permanent wilting point, which results in plant death. The training is planned for this spring and summer.

**Convert overhead irrigation to drip, where possible.**
- Projects to improve irrigation efficiency were completed at several sites including Sir Francis Drake Blvd. medians. Converting overhead to drip irrigation is planned for other sites as well. These include the interior of the civic center which is currently being automated and changed over to drip. Volunteer projects including new plantings in parks include switching to drip irrigation where currently there is overhead irrigation. Pop ups
installed at McNears Beach recently were low flow MP Rotator heads. These low flow heads will be installed in other areas where there is a need for overhead irrigation.

**Weed and mulch plantings to maintain soil moisture levels.**
- Mulching to maintain moisture and suppress weeds has been a priority at all sites. Mulching is an important part of our IPM program that is monitored monthly. The goal is to have all landscaped areas adequately mulched by summer.

**Convert urinals to waterless urinals.**
- Currently all of our regional parks use waterless urinals. The exception is Pt. Reyes Park where there are currently no urinals.

**Shut off leaking systems immediately and repair with 48 hours.**
- Staff is reminded on a weekly basis to check water meters and the facilities they manage daily to detect leaks in their irrigation systems. Any leaks discovered are repaired immediately.

**Use best cultural practices possible to maintain healthy plants since healthy plants use less water.**
- Staff is using the best cultural practices possible given its budget and age of its infrastructure. By regularly monitoring plant health and growing conditions, water and pests staff has kept plant materials as healthy as possible. This results in plants that are more able to cope with drought stress and ultimately reduces plant mortality rates.

**Water in the early morning to eliminate water loss from evaporation.**
- All parks and landscaped areas are watered at night or in the early hours of the day.

**Wash restrooms and dining areas only as required to maintain public safety.**
- Staff has reduced the length of time they spend washing paved surfaces and use shutoff spray nozzles on hoses to reduce water loss. Parks staff regularly sweeps out restroom facilities and uses a mop and bucket to disinfectant and clean the floors. Parks staff also recognizes the necessity to periodically hose down restroom floors and picnic tables to maintain a safe environment for visitors.

**Convert faucets and shower heads to low flow.**
- Park facilities utilize low flow fixtures where possible and have automatic shutoff valves on all of the sinks and drinking fountains. As an example Stafford Lake Park has Microphor toilets, which use less than a quart of water to flush. Automatic timed shutoffs are also used in showers at McNears Beach Park.

**Limit Lucas Valley field office shower use.**
- There is one shower at Lucas Valley, which is available to staff who have been exposed to substances which may be detrimental to their health. One example is exposure to poison oak.
Relay clear water conservation goals to staff.
- The Chief Ranger and the Chief of Landscape Services will be reviewing with staff the department’s water conservation goals at monthly tailgate training sessions. Periodically memos will be sent out to staff updating them on how well they are meeting the department’s water reduction goals.

Back wash the McNears pool only when necessary.
- Staff must regularly backwash the pool filters at McNears Beach Park in order to meet state public health requirements. Park and pool staff will limits the amount of waste water backwashed from the pool filters. Backwashing is a calculated process done by staff and is dependent on bather load on a weekly basis.

Hiring a water manager is currently underway.
- A new position has been created to help manage water use and the irrigation systems at facilities managed by our department. These include the libraries, county service areas, public health facilities, and numerous other sites. The new staff member will be a certified irrigation auditor and will evaluate each irrigated site for efficiency and adequate water allotment. They will install additional Evapotranspiration Technology (ET) irrigation clocks where absent and ensure all systems use current water conserving technology. The position is currently being advertised and the water manager position will be hired by mid-April.

Limit water features at playgrounds.
- The water features at Lagoon Park, Hal Brown Park and Castro Park are currently turned off until the drought is over.

Limit plant replacements.
- Planting may only be done in the fall after the first rain and is restricted to landscaped sites within a single irrigation zones and uses low water use plant material. Parks has recently ceased all new plantings. Examples of this are delaying the replanting at Village Green Park in Stinson and re-landscaping at CSA 16.

Additional short term measures until summer 2014

Develop water conservation plan for each facility.
- This will be fully implemented when the water manager position is filled. Each facility currently has a water budget and staff monitors water use in each park and landscape area.

Monitor soil nutrients.
- Maintain nutrient levels high enough in the soil to maintain the health of the plants but not high enough to stimulate excessive growth. This is a current practice on select turf areas. The testing will be expanded to other areas where opportunity and funding exists. There will be an increase in expense for additional soil testing at local labs.
Use reclaimed water on road and trail projects where feasible.

- Open Space District construction crews have estimated that the construction projects that are planned for this coming summer will require one acre foot of water to complete. Staff will closely look at each project and determine the availability of reclaimed water. Staff will cancel certain road or trail projects that require large amounts of water if staff is unable to get reclaimed water. One example of a project in need of large amounts of water is reconstruction of the Repack fire road in Cascade Canyon. The project may have to be postponed because of the expense and impact of hauling water a great distance.

Limit vehicle washing to as needed for safety purposes.

- Parks vehicles are seen by the public on a daily basis and need to maintain a certain level of professionalism. They will only be washed as deemed necessary by supervisory staff.

Additional long term measures beginning at the end of spring 2014 (if drought continues)

Close self-cleaning fish station at Black Point Boat Launch.

- The park currently has a fish cleaning station Black Point Boat launch for use by the public. Even though it has an automatic shutoff valve, visitors who keep the water on can waste water. If the drought continues the fish cleaning station will close until the drought is over.

Reduce vehicle and equipment washing.

- Vehicles will only be washed when it becomes a safety issue such as muddy windshields. If door emblems get covered with dirt, a light washing will be done. Equipment washing will only occur if the mechanics need to repair the machine and can’t repair it without cleaning it.

Eliminate power washing.

- Eliminate all power washing of concrete areas and park maintenance equipment except by the equipment mechanics for repair work. Parks continue to power wash the Paradise Beach kayak launch due to excessive algae growth which creates a slip/fall hazard.

Turn off water to areas deemed as low value.

- The priority and value of landscaped areas will be determined by the department’s landscape architects. All of these areas will be evaluated as to their esthetic and recreational importance and the expense to replace them. If the drought continues to worsen, and it is deemed necessary, staff will determine which areas should no longer receive water and be allowed to die.
Move water allotments as needed to stay within budgets.
- This is a duty of the new water manager position. Altering the water budgets needs to be done after the rainy season in order to see what adjustments are necessary. The use of leak detectors on water meters will be explored at as well.

Department of Cultural and Visitor Services
Water Conservation Measures

Saving Water - Indoors
- Thanks to rebates from the Marin Municipal Water District, 23 Sloan Waterfree Urinals were installed in the five men's restrooms of the Marin Veterans' Memorial Auditorium and Exhibit Hall buildings in 2008. By using the touch-free, completely hygienic Sloan Waterfree system, the fairgrounds conserve an average of 40,000 gallons of fresh water per urinal, annually. In total, Marin Center conserves approximately 920,000 gallons of fresh water per year.
- Thanks to the support of the Marin Municipal Water District, water efficient, 1.6 gallon toilet fixtures were installed in Exhibit Hall building restrooms in 2005.
- Low-flow faucets (.5 gallon per minute) were installed at 50 of 72 faucets throughout Marin Center in 2013, mostly restrooms.
- Low-flow sprayer was installed in the kitchen at the dish room sink in 2011 in the Exhibit Hall Building.
- Reclaimed water is in use at the 20 women's restrooms added to the Redwood Foyer of the Marin Veterans' Memorial Auditorium in 2000.

Water Efficient Landscaping – Outdoors
Parks practices these water efficient landscape practices:
- Staff saves fresh water by having the lawns, gardens and landscaping irrigated by reclaimed water provided by the Las Gallinas Sanitary District, starting in 1990's.
- Staff uses the landscaping techniques of sheet mulching.
- Staff adjusts irrigation schedules for each season, and inspects and maintains irrigation systems regularly.
- Three John Deere Eagle Irrigation Control Clocks predict temperature, wind, soil and planting conditions to conserve water and irrigate the lawns, trees, and landscaping only when needed. These California Irrigation Management Information System (CIMIS) controllers are linked to weather stations and satellites all over the state and the National Oceanic and Atmospheric Administration (NOAA) and were installed in 2008.

Water Conservation – Future Projects
Indoors
- Replace 24 of the toilets with units that use 1.28 gallons per flush units (gpf) or less water in the Marin Veteran's Memorial Auditorium; current models use 1.6. An estimate
for the labor and product costs for the project to replace these units would be $14,000. Funding for this is not in the FY 2013-14 budget.

- Replace 22 faucets with units that use .5 gallons per minute (gpm) or less; staff can complete this project in February, 2014 in the new women’s restrooms at the Marin Veterans’ Memorial Auditorium (16) and also at guest with disabilities sinks (6) at restrooms facility-wide.
- Replace 7 showerheads in the dressing rooms with units that use 2 gpm or less at the Marin Veterans’ Memorial Auditorium with shut-off; staff will complete in March, 2014.

**Fire Department**

**Water Conservation Measures**

- The California Department of Forestry and Fire Protection has been working with the Governor’s office to ensure the California Fire Service is ready and prepared for the current and predicted fire threat secondary to the drought. Marin County Fire has been engaged early assuring Marin County is provided resources necessary to protect our residents, infrastructure and environment. Marin County Fire Department has received funding to staff 2 wildland fire engines during the non-peak season and will be further exploring augmented staffing as we get closer to the traditional fire season (June-October).

- Due to the unprecedented dry winter and the significant risk of extended drought conditions, **effective immediately all personnel are to reduce water usage by 25%**.

- **Outside irrigation systems are to be turned off.** If foliage and ornamental vegetation begin to look like they are dying individual plants may be watered, preferably with recycled water if available.

- **Non-emergency use of water for training purposes shall be suspended.** If a training event requires the use of a hydrant or other static water supplies permission must be granted by the Fire Chief or Deputy Chief.

- The Fire Chiefs Association in partnership with MMWD is in the process of purchasing an engineering simulator that will allow for pump testing and training that only needs 500gal of water.

- Every attempt should be made to chamois equipment daily. The washing of engines will be at the direction of the Company Officer and should be very limited. The expectation for an interior and exterior clean and presentable piece of equipment should not be sacrificed.

- As hygiene permits, reduce flushing of toilets.
• Senior Captains have inspected their facility and inventoried any fixtures (toilets, showers, faucets) that are not contemporary water saving devices. Recommendations have been submitted to the Deputy Chief who will work with DPW to exchange them.

• Dishwashers should only be run if they are full.

• Any leaking faucets or toilets should be immediately reported and repaired.

• Attached is a document that further explains the increased fire risk.

University of California Cooperative Extension Farm Advisor

In addition to the collaboration with the Agricultural Department on a Drought Response Plan for Agriculture, our Academics, Staff, and volunteers are responding to demands for information about managing for drought conditions from farmers, ranchers, and homeowners. This includes online compilations and presentation of drought management resources:

• Ranch and Livestock information -
  http://cesonoma.ucanr.edu/Livestock_and_Range_Management/Drought_Management/,

• California drought information - http://ciwr.ucanr.edu/California_Drought_Expertise/ and
  http://ciwr.ucanr.edu/California_Drought_Expertise/Drought_information/

• Marin residential drought information - http://ucanr.edu/sites/MarinMG/Drought_Tips/

It also includes UC Marin Master Gardener educational presentations throughout Marin, preparation and distribution of a drought pamphlet in English and Spanish (attached), and delivery of home garden consultations in partnership with the Marin Municipal Water District through Marin Friendly Garden Walks -
California Winter Fuels and Fire Assessment
Issued: January 29, 2014

Summary

- Most of California is in a long term drought ranging from Severe to Extreme intensity.
  (Drought State of Emergency for CA declared 1/17/2014)
- Fuels are historically dry.
- Fire occurrence is well above normal.
- Concerns include Prescribed Burning, Resource Staffing and Increased Fire Occurrence:
  - Resource Staffing: Need for severity funding, fatigue management, preparations for earlier and long duration fire season, etc.
- Much of California will continue to have above normal large fire potential.
- North:
- South:

Weather

- It is unlikely that significant drought relief will occur despite the potential for moderate amounts of precipitation over the northern half of the state during the first few weeks of February.
- Percent of average precipitation expected:
  - February: 30% of average or less with most of the precipitation in the first 2 weeks of the month.
  - March: 20% of average.
- Average maximum temperatures are expected to be near normal to above normal through March.
- Winds in February are likely to be more seasonably westerly. The persisting East Pacific high pressure ridge is expected to return in March with a chance of occasional periods with moderate foehn (north to east) wind events of 1-3 days duration. Any foehn winds that develop will have greatest effects in the Sacramento Valley and surrounding foothills, Coast Range and Bay Area southward into southern California.

Fuels

- Energy Release Component (ERC) values are running far above average with many areas setting new maximum values for this time of year. ERC's are above the 90th percentile in over 50% of the Predictive Service Areas (PSA).
- Dormant live fuels will need a significant increase in soil moisture for normal green-up to occur this spring. The impact of long duration freezing temperatures in early December on vegetation has yet to be evaluated (amount and spatial extent of frost kill).
- 100 and 1,000 hour fuel moistures are at critically low levels due to lack of rainfall and snowpack.
- The amount of live/dead fuels available for combustion is unprecedented for this time of year.
Questions People are asking...

* Why are we talking about reducing household and landscape water usage? Water conservation for the entire household, inside and out, is always good practice; it saves money and one of the planet's most precious natural resources. The Environmental Protection Agency has determined that landscape irrigation accounts for more than 50% of all residential water use and that as much 50% of outdoor water is wasted due to inefficient watering methods. Significant savings in outdoor water usage could be achieved with proper garden design, plant selection/care, soil management and irrigation practices.

Water conservation is even more important in years with little rainfall. California and Marin County are facing the driest year on record. The current drought, which follows dry seasons in 2011 and 2012, may turn out to be the worst ever. Governor Brown has declared a statewide drought emergency and has asked residents to voluntarily reduce water consumption by 20%. Marin Municipal Water District has asked its customers for a voluntary reduction of 25%. In Spring 2014, depending upon reservoir reserves, Marin’s multiple water districts will determine if mandatory water restrictions are necessary.

* Should I even plant an edible garden this year? That depends upon a number of factors: how deep the restrictions might go, how many existing plants you want to maintain in your landscape and how much you reduce your indoor water use. After review of your water bills for the past few years, and a few calculations, you can determine how much water you have available for an edible garden this year. If you have an excess allocation after household use and after watering key plants in your existing landscape, you will be able to plant an appropriately sized edible garden.

Most vegetable crops require one inch or more of water each week during the growing season—which equals about 1/3 of a gallon of water per plant. In hot, dry conditions vegetables may demand more water. Even so, growing food at home is more water efficient than growing food commercially. So, if you grow a food garden, you may be using more water from your personal hose bib, but you are using less water than it would take to purchase the same food at the market.

Home edible gardens contribute to sustainability of the planet. The challenge for home gardeners is to learn to be as water efficient as possible, not just in the garden but, everywhere in the home. Reducing water consumption, harvesting water and or using greywater to irrigate ornamental landscapes are tested strategies we can employ in our homes so that we can save water and have an edible garden too.

UC Marin Master Gardeners
1682 Novato Blvd, Suite 150 B, Novato, CA 94947
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Reducing Water Use in Your Edible Garden

33 things you can do to save water this year.

CONSIDER DESIGN
1. Grow only what you need.
2. Locate gardens away from prevailing winds. Use fences or tall plants as windbreaks.
3. Group crops with similar water, soil, and sun needs into "hydrozones."
4. Group crops with similar root depth: deep-rooted crops such as asparagus and artichoke (roots 4’"); medium-rooted crops such as summer squash and cucumber (roots 3’"); and shallow rooted crops such as spinach, kale and lettuce.
5. Layout in blocks, not rows, to shade roots and reduce evaporation.
6. Plan a spring garden with edibles that use residual water in the soil: Asparagus, Broccoli, Pea, etc.
7. Plan to use edibles that mature quickly—30-60 days: Peppers, Runner Beans, Chard, Leek, Cucumber, Early Girl, Stippes and Sungold tomatoes, etc.
8. Grow high producing Chard, Salad Greens, Curled Kales, Strawberries, Zephyr Summer Squash, etc.
9. Choose water wise vegetables, fruit and herbs: Squash, Mulberries, Rosemary, etc.
10. Incorporate water wise native edible Blue Elderberry, Golden Current, etc.
11. Choose dwarf and mini cultivars that use less water: Lemos, Apples, Fig, etc.
12. Use advanced tactics: mulches and hula hoop for passive water collection, rainwater harvest, greywater, and hydropionics.

CONSIDER PLANT CARE
13. Care for your most valuable plantings first: usually mature fruit trees, shrubs and ornamentals.
14. Water when needed. Check soil moisture with finger or moisture meter. Irrigate when dry 2-4" deep.
15. Fertilize less.
16. Control weeds, as they compete with edibles for water.
17. Thin plants on time. Thin seedlings when they are 1-2" tall. Thin unwanted seedlings at soil level. Thin fruit trees when fruit is young.
18. Harvest crops on time. Take crops at peak of growth and flavor.
19. Know the signs of water and heat stress: wilting foliage, curled or yellow leaves and sunburned edges.
20. Water according to need: needs, young and shallow rooted plants need frequent, shallow water; flowering and fruiting plants need less frequent, but deeper water.

CONSIDER THE SOIL
21. Know the soil in your garden, its texture and water holding capacity.
22. Before planting, double dig the garden to loosen soil.
23. Incorporate aged compost to increase water-holding capacity of the soil.
24. Mulch on top of soil to reduce water needs up to 50%. Mulching reduces evaporation, moderates soil temperature, insulates roots, suppresses weeds, reduces soil compaction and prevents erosion.

CONSIDER IRRIGATION
25. Repair leaks and check regularly for new leaks.
26. Irrigate in the morning when temps are cool but rising.
27. Water deeply and less frequently.
28. Water according to plant needs and soil type.
29. Apply water slowly, to the base of plants, under mulch.
30. Avoid overspray and runoff.
31. Use low-volume drip irrigation.
32. Use emitter lines for closely spaced plants. Use individual emitters for widely spaced plants.
33. Install a WaterSense labeled smart irrigation timer. (And get a rebate from your water district.)
How can I grow edibles with less water?

Here are four basic concepts for growing a water efficient edible garden:

1. Grow a smaller garden.
2. Grow edibles that need less water including:
   - Plants that use residual moisture in spring soil
   - Plants that mature quickly
   - Drought tolerant plants
3. Compost and mulch
4. Irrigate more efficiently:
   - Fix leaks
   - Water early in the morning
   - Water deeply and less frequently
   - Avoid overspray
   - Use a smart irrigation controller

Pay attention to critical watering periods...

- Lettuce and other leaf vegetables need water most during heading and head development.
- For quality produce supply consistent moisture.
- Onion family crops require consistent moisture during bulbing and bulb expansion. Frequent irrigation is necessary due to small, inefficient root systems.
- Peas need water most during flowering.
- Potatoes need water most after flowering. Tubers will be knobby if they are overly dry during tuber development.
- Tomatoes, peppers and eggplant need water most during flowering and fruit expansion. Watch for overwatering.
- Cucumbers and summer squash need water most during flowering and fruiting and can be sustained with water 1-2 times per week. Moisture deficit can drastically reduce yield.

To calculate how much water is available to irrigate your seasonal edible garden: Review your water bills for the last two-three years. Chart water usage in average gallons per day for each month. (This number is shown on your bill). Notice how usage increases as the weather warms and as more water is used in your landscape. Notice water usage in the winter months when landscape water is turned off. That number is your baseline household use. Subtract your baseline household use from the total water usage during the months when you are irrigating (usually May – October). The difference is the amount of water used for landscape irrigation. Reduce this number by your Water District’s suggested/mandated water reduction. The result is the average gallons per day available for landscape and edible garden irrigation.

What are the most water efficient edible plants?

Favorite water efficient edibles from Master Gardner Steve Albert:

- Amaranth: green leaves used as vegetables
- Garbanzo Beans (chickpeas): beans
- Bean (Fava): dry beans, tender, nutritious
- Black-eyed Pea, e.g., cowpea: salad, soup
- Bean Yard-long Asparagus: long, crunchy
- Chard: grows in cool weather conditions
- Black Anne Corn: roast black kernels
- Eggplant: steamed, roasted, by oil or bake
- Mustard Greens: tangy, spicy salad green
- Purslane: use in a salad green
- New Zealand Spinach: grow in spring
- Pearson Tomato: used for canning
- Early Girl Tomato: medium size, tasty
- Super Roma Tomato: good for sauce
- Golden Nugget Tomato: great for salads

Rick Flores from UCSC Arboretum recommends water wise native edibles:

- Blue Elderberry
- California Hazel Nut
- Ceylan Pepper, e.g., California
- Thimbleberry
- Huckleberry
- Golden Current
- California Wild Grape
- Sierra Gooseberry
- Native Strawberries
- Yerba Buena

"The watering of a garden requires as much judgment as the seasoning of a soup." - Helene Ely (1856-1928)
Founder of the Gardening Club of America

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