# BOISE PARKS & RECREATION WATER CONSERVATION GUIDELINES

# TABLE OF CONTENTS

## ACKNOWLEDGEMENTS

Boise Parks & Recreation acknowledges, and thanks the following agencies for providing information included in this document.

- Denver Water Office of Water Conservation
- Denver Parks and Recreation
- Denver Landscape and Indoor Design and Maintenance Guidelines for Water Conservation
- The Irrigation Association
- Colorado “GreenCo”
- City of Salt Lake

## EXECUTIVE SUMMARY

Boise Parks & Recreation administers the use of water resources for multiple purposes including; irrigation of parks and ROW landscapes, park restrooms and drinking fountains, recreation facilities such as community centers and pools, to display features and ponds. As a major water user in the Treasure Valley, Boise Parks & Recreation has a responsibility to use these resources wisely and efficiently.

Boise Parks & Recreation consumes water from three sources. The majority of water used by Boise Parks & Recreation is by our irrigation systems, making them our biggest target for conservation. When determining the irrigation water source for a site, surface irrigation and wells are considered prior to municipal water.

The Boise Valley annually receives approximately 10-12 inches of precipitation, with the majority received during the months of January and February. During the hottest, driest months of the year, typically July and August, our landscapes can require 1.5 to 2 inches of water per week to replace water transpired by the plant, and lost through evaporation. Proper design, installation, maintenance, and management of irrigation systems will result in lower water usage in the landscape.

Along with providing an efficient irrigation system, we must make wise decisions on what, when and where to plant. By placing the proper plants in the proper location, efficient and water conserving landscapes can be achieved.

We must also consider our water usage inside our facilities to assure that we are making use of new technology, and guidelines directed at conserving water.

By adopting the Management recommendations described in this document, Boise Parks & Recreation can be a leader in “Water Conservation”, by using our resources wisely and efficiently.

# RECOMMENDATION SUMMARY FOR "WATER CONSERVATION" DESIGN AND MAINTENANCE GUIDELINES

The following is a summary of recommendations, taken from the BMPs included within this document, which will assist Boise Parks & Recreation in making water wise and efficient decisions when planning and maintaining parks and facilities:

**Irrigation System Design:**

1. All irrigation system designs for park maintained properties must be approved by Boise Parks & Recreation Design, or Horticulture staff.
2. Irrigation designs for park maintained properties shall be made with direct knowledge of site conditions, obtained through visits to the site.
3. Irrigation designs shall adhere to all Boise Parks & Recreation design standards.
4. Where possible, water sources that are capable of meeting peak irrigation demands within a 10 hour water window will be sought.
5. Where possible, alternative water sources such as surface irrigation or recycled water will be considered.
6. Irrigation designers shall identify soil infiltration rates and select components with precipitation rates below them.
7. Designs shall include separate zones for plant materials with differing water requirements.
8. Irrigation head placement shall be designed to avoid watering of non-vegetative areas, and to avoid conflicts between plant materials and spray patterns.
9. When irrigation heads are located adjacent to roads, parking lots, or any hardscapes, equipment with "anti" or reduced back splash shall be used.
10. Where possible, new designs, or system renovations should include connections to Boise Parks & Recreations "Maxicom" system. The "Maxicom" system allows for daily system monitoring, and station runtime adjustment via a central computer and weather station.

**Irrigation System Maintenance:**

1. Boise Parks & Recreation maintenance personnel will activate systems beginning approximately March 1(pending weather conditions). At the time of activation, all necessary repairs will be made to bring the system to optimal operating condition. Operation of the system on a regular basis will be determined by weather conditions and plant water needs.
2. During the irrigation season (March - October) park maintenance staff will conduct weekly inspections and repairs to ensure proper operation of the irrigation system, and monitor plant health. Site inspections shall include:

a. Operation of controllers and all related equipment to ensure proper operation.
b. Visual inspection of all pump control valves (pressure relief, pressure sustaining, pressure reducing) for proper operation and settings.
c. Turning on of all irrigation zone valves to ensure proper operation.
d. Visual inspection of irrigation heads for proper coverage and adjustment, as well as repair of any broken parts. Repairs to irrigation heads will use replacement parts identical to those damaged or malfunctioning.
e. Inspect the site for inefficient irrigation system performance, or wasteful irrigation practices. Examples of items to look for include:
    a. wet areas indicating over watering, or poor drainage
    b. watering of non-vegetative areas
    c. areas that are dry indicating poor coverage, or malfunctioning irrigation heads
f. When possible maintenance staff shall make repairs to correct these conditions while onsite. If repairs require additional attention, staff shall report them to their supervisor on a daily basis.
g. When vegetation is interfering with proper irrigation coverage, maintenance staff shall trim or remove as required (trimming of tree limbs requires approval of the Forestry unit, or may be done by staff that has received training through the Forestry unit). When necessary add irrigation heads to compensate for blocked spray patterns.

3. Maintenance staff shall create a site map for each irrigation system showing; water source, backflow device (if applicable), controller, station valves and area served by each valve. Maintenance staff shall be responsible to update maps as needed; one copy of the map shall be posted onsite, and one copy kept in a master file at the Horticulture Maintenance Shop.
4. At sites not controlled by Boise Parks & Recreation "Maxicom" system, maintenance staff shall base the irrigation run times and schedules on the following:
    a. plant water requirements based on local ET (evapotranspiration) rates provided by the Maxicom system (ET rates for turf and shrubs will be provided by the Maxicom system operator on a weekly basis)
    b. accumulated rainfall
    c. soil infiltration rates
    d. site topography(slope)
    e. available water window
    f. system precipitation rate

    (Appendix 3 provides sample precipitation rates, and runtimes for various ET rates for sprinkler heads typically used in our parks.)

**Landscape Design:**

1. All Landscape designs for park maintained properties must be approved by Boise Parks & Recreation Design, or Horticulture staff.
2. Landscape designs shall adhere to all Boise Parks & Recreation design standards.
3. When designing new, or renovating existing landscapes, implementation of the seven basic landscape design principals of "xeriscape" shall be considered:
    a. planning and design
    b. soil analysis and improvement
    c. appropriate plant selection
    d. practical turf areas
    e. efficient irrigation
    f. use of mulches
    g. appropriate maintenance
4. Design landscapes with the natural mature form of the plant material in mind, using low maintenance as a goal.
5. Group plant material with similar water requirements. Reference appendix 1 for suggested plant materials.
6. Incorporate the use of organic mulches in planter areas to reduce evaporation, and help cool the soil.

**Landscape Maintenance:**

1. Maintain a 3-4" mulch layer in planting beds where possible. Mulching beds will help suppress weed growth, cool the soil, and reduce water loss through evaporation.
2. Frequently remove dead or dying plants and all weeds that compete with healthy plants for available water.

**Turf Maintenance:**

1. Maintain mowing height of turf grass at 2.5-3" to help increase drought and heat tolerance.
2. Mow turf grass on a 7 day cycle during the growing season, or as required removing no more than 1/3 of the grass blade with one cutting.
3. Leave clippings on the lawn when possible allowing nutrients to be recycled back into the soil.
4. Sharpen mower blades on a weekly basis. Dull blades will tear the blade rather than cut, leaving shredded or white tips.
5. Aerate turf following recreation seasons (soccer, softball, baseball and football), and major community events to reduce compaction and increase infiltration rates.

**Plumbing Design and Maintenance:**

1. All facility designs for park maintained properties must be approved by Boise Parks & Recreation Design, or Infrastructure staff.
2. Facility designs shall adhere to all Boise Parks & Recreation design standards, and applicable State and Local plumbing codes.
3. Maintenance staff installing new, or replacing existing fixtures shall use fixtures adhering to the following flow requirements:
    a. Toilets 1.6 gpf (gallons per flush)
    b. Urinals, 1 gpf
    c. Faucets, 2.2 gpm (gallons per minute)
    d. Showerheads, 2.5 gpm
4. New designs or replacement of faucets in park restrooms shall incorporate the use of self closing features.
5. Custodial staff shall inspect fixtures for leaks or problems at each visit, and report them to Infrastructure staff to make repairs in a timely manner.

**Water Source Selection:**

When determining the irrigation water source for a site, surface irrigation and wells are considered prior to municipal water for irrigation, and ponds/waterways.

The following depicts water sources available to Boise Parks& Recreation, and the priority where the water shall be directed:

**Surface Irrigation (canals):**

1. Irrigation
2. Ponds/waterways

**Wells:**

1. Irrigation
2. Ponds/waterways

**Municipal Water Companies (United Water):**

1. Facilities (park restrooms, Community Centers)
2. Drinking fountains
3. Display fountains
4. Irrigation

# INTRODUCTION

## Purpose

The purpose of this document is to present Best Management Practices (BMPs) for irrigation and maintenance of turf and landscapes, along with facility plumbing. These BMPs support the design, installation, maintenance and management of irrigation systems, turf, landscapes, and facilities in ways that save water and protect water quality. This document also presents Practice Guidelines that facilitate implementation of the BMPs. The BMPs and Practice Guidelines compliment existing turf and landscape cultivation practices, and routine facility maintenance.

The goal is to provide maintenance staff with tools to understand, implement, and efficiently manage turf, landscapes, irrigation systems, and facilities.

## Definitions

### Best Management Practice

*Best Management Practices* (BMP's) are a voluntary practice that reduces water consumption and protects water quality. A BMP is economical, practical and sustainable, and maintains a healthy, functional landscape without exceeding the water requirements of the landscape, or efficient use of water within a facility.

### Practice Guideline

A *Practice Guideline* (PG) is a recommended set of practices that contributes to the related BMP.

## WATER CONSERVING BMPS

**Identification of BMPs**

The following table lists the BMPs for the design, installation, maintenance, and management of irrigation systems, landscapes, and facilities that result in the efficient use of water resources.

### Best Management Practices

| BMP No. | Best Management Practice |
|---|---|
| 1 | *Assure Overall Quality* of the Irrigation System |
| 2 | *Design* the Irrigation System for the Efficient and Uniform Distribution of Water |
| 3 | *Install* the Irrigation System to Meet the Design Criteria |
| 4 | *Maintain* the Irrigation System for Optimum Performance |
| 5 | *Manage* the Irrigation System to Respond to the Changing Requirement for Water in the Landscape |
| 6 | *Design* the landscape based on the seven elements of Xeriscape as set forth by Xeriscape Colorado! |
| 7 | *Plant Selection* and placement choosing the proper plant for the location |
| 8 | *Mowing* practices to increase drought tolerance |
| 9 | *Mulching* planter beds to retain moisture and reduce soil temperatures |
| 10 | *Drought management* of the landscape during extended drought conditions |
| 11 | *Plumbing Design and Maintenance* |
| 12 | *Water Sources* selecting the proper source |

Each BMP, and the Practice Guidelines that support them, were developed to meet the criteria of the following tenets of Best Management Practices. To be effective a BMP must be:

- Water conserving through protection of water quality and quantity
- Sustainable by allowing for improvement through adoption of new technology and knowledge.
- Economically feasible in installation and use.

**BMP 1 - Assure Overall Quality of the Irrigation System**
The purpose of an irrigation system is to provide supplemental water when rainfall is not sufficient to maintain the turf and landscape for its intended purpose. A quality irrigation system and its proper management are required to distribute supplemental water in a way that adequately maintains plant health while conserving and protecting water resources and the environment. Assuring the overall quality of the system requires attention to system design, installation, maintenance and management in the following sense:

• The irrigation system shall be designed to be efficient and to uniformly distribute the water.
• The irrigation system shall be installed according to the irrigation design specifications.
• The irrigation system shall be regularly maintained to preserve the integrity of the design and to sustain efficient operation.
• The irrigation schedule shall be managed to maintain a healthy and functional landscape with the minimum required amount of water.

**PG 1 - Practice Guideline for Assuring Quality of the Irrigation System**
To assure that a high quality irrigation system is designed, installed, maintained, and managed:

1. All irrigation designs must be reviewed and approved by Boise Parks & Recreation Design or Horticulture staff.
2. Boise Parks & Recreation or an irrigation contractor shall install the irrigation system. The BPR approved irrigation system shall be thoroughly tested to verify that the system operates according to the design criteria.
3. Boise Parks & Recreation Design or Horticulture staff shall perform site observations during system installation to check for adherence to the design. The observations shall inspect the installation of the backflow prevention assembly, main line, laterals, valves, sprinkler heads, control wire, controller, and water conserving devices and should assure that the intent of the irrigation design has been preserved.
4. The irrigation system shall be maintained to sustain efficient performance based on the requirements of PG 4.
5. The controller programming (scheduling) shall be properly managed to respond to the changing need for water in the landscape as based on PG 5.
6. Following installation of a new system, a field performance audit shall be conducted.

**BMP 2 - Design the Irrigation System for the Efficient and Uniform Distribution of Water**

The irrigation system shall be designed to be efficient and to uniformly distribute the water. Specific criteria that shall be considered in the design include soil type, slope, root depth, plant materials, microclimates, weather conditions, water source (i.e., quantity, quality and pressure), peak demand and watering windows.

**PG 2 - Practice Guideline for Designing an Irrigation System**

To ensure that the irrigation system is designed to efficiently and uniformly distribute the water, and to conserve and protect water resources, the irrigation designer shall:

1. Adhere to all Boise Parks & Recreation design standards.
2. Obtain direct knowledge of site conditions and not rely solely on plot plans to generate a design.
3. Specify manufacturer, model, type, and size of all components to eliminate ambiguity at construction and to facilitate management of the system. The selection of pipe, electrical wire and other materials shall be based on environmental conditions and code requirements.
4. Design the irrigation system to minimize installation and maintenance difficulties. The selection and placement of sprinkler components should be guided by the expected size of larger specimen plants through a three-year establishment period for shrubs and ten years for trees.
5. Specify a water source that meets peak demands for landscape water with irrigation duration of no more than 10 hours per day.
6. Specify pressure regulation where variable or excessive static pressure exists.
7. When selecting system components, place a high priority on avoiding surface runoff. Ideally, select components to keep the sprinkler precipitation rate below the infiltration rate of the soil.
8. Locate sprinkler heads based on a thorough evaluation of physical, environmental, and hydraulic site conditions, including typical wind conditions during the normal irrigation period.
9. Use the following water-conserving concepts and equipment where appropriate and economically justified:

    A. Use an alternative water source where practical. Special management practices and components may be required when using alternative water sources.
    B. Use low-volume irrigation for narrow and small irregularly shaped areas to reduce evaporation losses and to avoid applying water on hardscapes.
    C. To mitigate the effects of wind, use low-trajectory sprinkler nozzles along with the appropriate modified head spacing. Select components that do not mist when manufacturer's pressure specifications are met.
    D. Water-conserving devices such as:
        - Check valves to minimize low-head drainage.
        - Pressure regulators or pressure compensating screens, stems or nozzles to control high pressure.

    - Climate sensors such as rain, and wind sensors to suspend irrigation during weather conditions that are unfavorable for irrigation.
    - Environmental sensors that can actively measure weather conditions to determine actual plant water need on a day-to-day basis.

E. To simplify manual reading of the total landscape irrigation water use, a water meter with an electronic output signal that supports a remote display mounted at the controller, or provide for installation of a temporary meter and monitor.
F. For automated management of the landscape irrigation water use, a landscape irrigation meter with an electronic flow rate output signal that is compatible with the controller. This allows the controller to measure and control the amount of water use, as well as to indicate leaks (i.e., broken pipes or sprinklers).
G. A controller that has at a minimum multi-program capability with at least four start times and run time adjustments in one-minute increments.

**BMP 3 - Install the Irrigation System to Meet the Design Criteria**
The irrigation system shall be installed according to the irrigation design specifications. The installed components shall meet the irrigation design specifications, manufacturer's specifications, and State and Local code requirements. The installation shall result in an efficient and uniform distribution of the water.

**PG 3 - Practice Guideline for Installing an Irrigation System**
To ensure that the irrigation system is installed to efficiently and uniformly distribute the water, and to conserve and protect water resources, the irrigation installer shall:

1. Prior to beginning installation, staff shall contact all appropriate utility companies to locate underground utilities including gas lines, electrical, telephone, cable, and so forth. State laws (and some Federal laws) require anyone who digs to notify utility companies before starting. Staff shall not begin until all such utilities are located and marked.
2. Prior to beginning installation, staff shall locate, identify, and mark all privately-owned underground utilities. Staff shall not begin installation until all such utilities are located and marked.
3. Prior to beginning installation, verify that the point of connection, flow rate, and static and dynamic pressures meet design criteria.
4. Install the irrigation system according to the design specifications and manufacturer's published performance standards.
5. Review planting plans prior to installation to minimize conflicts between larger plants and irrigation heads.
6. Where deviations from the design are required (for example, running pipe around a tree or other structure), redline the plan drawing to note the deviation.
7. Complete an "as-built" record set of drawings of the system. Within the record set of drawings describe the system layout and components including all changes from the original design.
8. Test the irrigation system to verify that it meets the design criteria.

**BMP 4 - Maintain the Irrigation System for Optimum Performance**
The irrigation system shall be regularly serviced to maintain the performance of the system as designed. To conserve and protect water resources and the environment, the serviced components shall meet the irrigation design specifications, manufacturer's specifications, and State and Local code requirements. The maintenance shall result in sustaining an efficient and uniform distribution of the water.

**PG 4 - Practice Guideline for Maintaining the Irrigation System**
To ensure that the irrigation system continues to efficiently and uniformly distribute the water, and continues to conserve and protect water resources, maintenance personnel shall:

1. Establish a weekly maintenance schedule for inspection and repairs of the irrigation system during the irrigation season. Weekly inspection shall include the following:
    - Create a station zone map for ease of system inspection and controller programming.
    - Verify that pressure regulators are adjusted for desired operating pressure.
    - Examine filters and clean filtration elements as required.
    - Verify proper operation of the controller. Confirm correct date/time input and functional back-up battery.
    - Adjust valves for proper flow and operation. Adjust valve flow regulators for desired closing speed.
    - Verify that heads are properly adjusted – nozzle size, arc, radius, level and attitude with respect to slope.
    - Repair or replace broken hardware and pipe; restore the system to its design specifications.
    - Complete repairs in a timely manner to support the integrity of the irrigation design and to minimize the waste of water.
2. Ensure that the replacement hardware used for system repairs matches the existing hardware, and is in accordance with the design. Aftermarket replacement nozzles may not match original parts well enough to preserve irrigation system efficiency or distribution uniformity.
3. As plant material matures, trim or remove vegetation as required to preserve system performance. Add additional sprinklers or other hardware as required to compensate for blocked spray patterns or changes in the irrigation needs of the landscape. Ensure that system modifications do not cause landscape water demand to exceed the hydraulic capacity of the system.
4. Establish a "winterization" protocol and a corresponding process for system activation in the spring.

**BMP 5 - Manage the Irrigation System to Respond to the Changing Requirement for Water in the Landscape**

The irrigation schedule shall be changed as required to provide supplemental water to maintain a functional and healthy turf and landscape with the minimum required amount of water.

**PG 5 - Practice Guideline for Managing Irrigation**

The irrigation schedule shall be changed as required to provide supplemental water to maintain a functional and healthy turf and landscape with the minimum required amount of water.

This Practice Guideline:

- Helps landscape irrigation manager's plan and adjust the irrigation schedule so that the minimum amount of water is applied to the landscape while keeping it functional and healthy.

The irrigation manager or, maintenance personnel shall:

1. Create a site map showing, at a minimum, the location of each point of connection (POC) water meter, backflow prevention device, controller, station zone valves and landscape area served by each valve.
2. Understand the capacities and capabilities of the irrigation system.
3. Identify the soil texture and soil infiltration rate for the purpose of estimating the water holding capacity of the soil.
4. Prepare the system for effective water management. Install a dedicated irrigation water meter for measuring both the irrigation water flow rate and the volume applied to the landscape, or provide for installation of a temporary meter and monitor. The water meter should have an electronic flow rate output signal for interfacing with a remote display or to controllers that can perform leak detection and water management.
5. Base the run time on the expected plant water requirement, effective rainfall, precipitation rate, distribution uniformity, estimated water management efficiency and area of the sprinkler zones.
6. Base the schedule on the plant type, root zone depth, soil type and infiltration rate. Also account for site topography such as slope. Where there is a potential for surface runoff, use multiple repeat cycle start times to allow the water to infiltrate into the soil.
7. On a monthly basis verify that sensors in the irrigation system are working properly.
8. During weekly site visits perform visual verification that the plant material is healthy and that soil moisture is adequate. Use a soil probe to evaluate root depth, soil structure and moisture.

9. When water supplies are limited, manage the irrigation based on a site-specific Drought Response Plan (see Appendix 2). The plan should have two primary

components, one dealing with landscape cultural practices and the other with deficit irrigation practices:

A. Landscape Cultural Practices

There are many cultural practices that can help a landscape irrigation system operator cope with a water shortage, including adjusting mowing height, fertilization practices, use of mulch in planter beds, and amending the soil. The owner should determine the overall priorities of the site and evaluate those areas that deserve the greatest attention.

B. Deficit Irrigation Practice

Deficit irrigation is a practice that may be used at the discretion of the irrigation manager. It is most commonly used in response to a drought (or other water shortage). The goal of deficit irrigation management is to apply the absolute least amount of water while keeping the plant material alive, and potentially placing them in a water-stressed condition. It is important to understand that managing plants in a deficit irrigation mode puts them at risk to other environmental and/or biological factors. Careful and frequent observation of the landscape is essential to such an irrigation strategy.

**BMP 6 - Xeriscape**

***Description***

Implement the seven basic landscape principles of xeriscape: planning and design, soil improvement, hydrozoning of plants, creating practical turf areas, efficient irrigation, mulching and appropriate maintenance.

*General Note: The term .Xeriscape. was coined by Denver Water in 1981. The seven Xeriscape principles are included as individual GreenCO BMPs. Integration of these seven BMPs provides a comprehensive approach that can be very effective for conserving water.*

**PG 6 - Basic Practice Guidelines**

1. Plan and design landscaping comprehensively. Start with a site inventory and analysis, where existing conditions such as drainage, exposures, soil types, views, existing plants, etc., are noted. Next, develop a list of activities and their support facilities that need to be included in the design. Continue by diagramming possible locations for the activities from the program, while also allowing for planned traffic patterns and access or screening. Finally, use this information to develop a plan that integrates plants into the overall scheme.
2. Evaluate soil and improve, if necessary. Improve soil before planting and installing the irrigation system. Soil improvement promotes better absorption of water, improved water-holding capacity and drainage of the soils. It also allows for better oxygen transfer within the root zone.
3. Create practical turf areas. Include turf areas where they provide defined functions (i.e., recreation, traffic areas, etc.). Grass is best separated from plantings of trees, shrubs, ground covers and flowers so it can be watered separately. Often, portions of turf areas can be replaced with more water-efficient ground covers and mulches. Alternative plants for certain bluegrass areas may include tall fescue, buffalograss, blue grama and wheat grass.
4. Use appropriate plants and group according to their water needs (i.e., "hydrozoning"). Plants with lower water requirements such as native species adapted to Idaho's climate should be considered. However, other plants can have a place in xeriscape designs, even if they require larger amounts of water. The key is to use those plants in appropriate locations and not to interplant them with others that have very different, lower water requirements. In effect, the groupings of plants are separated into zones based on their water requirements, which allows them to be irrigated efficiently.
5. Water efficiently with a properly designed irrigation system. Irrigate according to the condition of the plants, not on a fixed schedule. Well-planned sprinkler systems can save water when properly installed and operated. Turf areas should be watered separately from beds, shrubs and trees. Apply only as much water as the soil can absorb to avoid runoff. Trees, shrubs, flowers and ground covers can be watered more efficiently with low volume drip emitters. To promote deep rooting, water infrequently, but deeply.

6. Use organic mulches to reduce surface evaporation of water and weeds. Mulched planting beds are an ideal replacement for expansive turf areas. Mulches cover and reduce temperature extremes in the soil, minimize evaporation, reduce weed growth and slow erosion. Mulches also provide landscape interest. Organic mulches are typically bark chips, wood grindings or pole peelings. Inorganic mulches include rock and various gravel products. Place mulch directly on the soil or on breathable fabric. Do not use impermeable sheet plastic beneath mulched areas.
7. Practice appropriate landscape maintenance. Proper pruning, weeding, mowing and fertilization, plus attention to the irrigation system, are needed to maximize water savings. Regular maintenance preserves the intended beauty of the landscape and saves water and maintenance costs. Always water according to plant needs and current soil moisture conditions and not on a rigid schedule.

**A well-designed and maintained Xeriscape not only conserves water, but is also aesthetically pleasing, incorporating a variety of landscaping.**
Source: Denver Water.

## BMP 7 - Plant Selection and Placement

***Description***

Select appropriate plants for the site, place plants in appropriate locations and group plants according to similar water needs (i.e., "hydrozoning").

## PG 7 - Basic Practice Guidelines

1. Select plants that are well adapted to the climate, topographic and geologic conditions of the site. Native plants and plants with documented lower water requirements should be given priority in landscape design. (see Appendix 1)
2. Choose plants with lower water requirements for areas with southern and western exposures.
3. Group plants together that have the same water requirements. Plants located within the drip line for large trees and shrubs should have water requirements similar to the trees and shrubs.
4. Preserve existing healthy trees. Established plants have often developed a root system that is adapted to lower water conditions. Preserving healthy trees means following industry standards to protect canopies, trunk and critical root zones during construction and when modifying the landscape.
5. Remove species that are designated state noxious weeds, especially ornamental species such as purple loosestrife, oxeye daisy, tamarisk, myrtle spurge and yellow toadflax.
6. Determine water requirements for all existing landscape plants and water accordingly.
7. When selecting plants, consider factors such as the size of the area to be covered, soil type, exposure conditions, steepness of slope, pedestrian traffic, area usage, drainage conditions and maintenance requirements along with the aesthetic desires.
8. A good rule of thumb is to place plants with higher water use in lower-lying drainage areas, near downspouts or in the shade of other plants.
9. On steep slopes, select plant species that produce dense, fibrous roots to help prevent soil erosion. Maintenance safety issues should also be considered in selecting plants for these areas. For example, mowing may not be safe on steep slopes; therefore, alternatives to manicured turf should be explored.
10. A temporary nurse crop of grasses and legumes may be required to provide immediate soil stabilization on steep slopes.

**Thoughtful plant selection, placement and maintenance contribute to a water efficient, aesthetically pleasing landscape.**
Source: Denver Water.

## BMP 8 - Mowing

***Description***

Mow lawns to the proper height and at the proper frequency to maintain turfgrass health, thereby minimizing the need for pesticide and fertilizer application and reducing water usage.

## PG 8 - Basic Practice Guidelines

1. Mow the lawn frequently enough so that no more than one-third of the grass blade is removed during a single mowing. For example, if maintaining the grass at a height of 2½ inches, cut the grass by the time it reaches 3¾ inches tall. This requires changing the mowing schedule to reflect how quickly the grass grows. This can range from four to ten days between mowing.
2. Grass undergoes less stress when the amount of blade left on the plant can still function efficiently. The preferred height of turfgrass species such as Kentucky bluegrass and long fescue is 2½ to 3 inches. The minimum height is two inches. Mowing grass to a height of less than two inches can reduce drought and heat tolerance, and cause a higher incidence of insect, disease and weed pest problems. Scalping is never recommended.
3. Leaving clippings on the lawn can be beneficial to the plants and save mowing time. Clippings break down quickly, which allows nitrogen and other nutrients to be recycled. Clippings can also encourage the growth of beneficial soil microorganisms. Studies show that it takes less time to mow more often and leave clippings on the lawn than to mow less often and catch and bag clippings for disposal.
4. Keep grass clippings and leaves off of streets and out of gutters. Using a mulching lawn mower to keep lawn clippings on the lawn is especially useful. Do not use a power blower to blow clippings into the gutter.
5. Keep grass extra-long during the hot summer months to reduce water needs. Remember to decrease irrigation when implementing this practice.
6. Mowing equipment should be well maintained. Sharpen blades several times per season. Shredded or white tips of grass blades are an indication of a dull or damaged mower blade that needs sharpening. Use the operating and service instruction manual provided with the mower, and consistently perform the suggested maintenance. A competent service person should thoroughly inspect the mower at least once a year.

**Proper mowing, irrigation and maintenance of turfgrass results in deeper, more drought resistant root systems.**

Source: International Turf Producers Foundation

## BMP 9 - Mulching

***Description***

Use organic mulches to reduce water loss through evaporation, to reduce soil loss due to exposure to wind and runoff, to suppress weeds and to provide a more uniform soil temperature.

## PG 9 - Basic Practice Guidelines

1. Heavily mulch planting beds with partially composted organic material in a layer three-to-four inches deep to reduce weeds, keep roots cool, keep soil moist and reduce the frequency of required watering. Also mulch tree and shrub bases as appropriate for each species.
2. Apply mulch to the soil surface, not against the plant stem or high against the base of tree trunks to minimize disease.
3. Organic mulch material includes bark, wood chips, chopped leaves and pine needles. Potentially appropriate inorganic mulch material includes gravel, pebbles and woven ground cloth. Fabric material can be placed underneath the mulch to reduce weeds. Some plants are better suited to inorganic mulches due to propensity to root rot, so check with nursery professionals regarding suitable mulches for specific plants.
4. Apply mulch to areas of disturbed soil to prevent erosion and sediment transport to drainageways. In areas prone to significant runoff, inorganic mulches that are less easily washed away than bark should be used.
5. Check mulched areas on a routine basis, at least monthly, and replace mulch as needed.

**Mulch planted areas to help conserve water.**
Source: Denver Water.

**BMP 10 - Drought: Landscape Management**

***Description***

Manage landscapes using the most water-efficient techniques during drought conditions. *This BMP has been adapted from Coping with Drought: Water Restrictions and the Landscape. by Patrick McCarty, Colorado State University Cooperative Extension Agent, Garfield County, and Dr. Curtis E. Swift, Area Extension Horticulture Agent, Grand Junction, as posted on www.colostate.edu/Depts/CoopExt/TRA/PLANTS/drought.html.*

**PG 10 - Basic Practice Guidelines**

**Irrigation Practices**

1. Delay watering in the spring; base the first watering on soil moisture content. Spring is the time of maximum nutrient uptake. Watering too early in the spring cools the soil and reduces nutrient uptake. This stresses the grass and makes it more susceptible to insect and disease problems. Early spring watering can also saturate the soil, reducing the oxygen available to deeper roots, which results in the death of these deep roots. The loss of deep roots increases the grass's susceptibility to drought stress, and increases the need for more frequent waterings.
2. Check the moisture content of the soil with a trowel, shovel or soil probe to a depth of 3 to 4 inches. If the soil is dry, water. If the soil is moist, delay watering.
3. Irrigate according to the requirements of the plants, not on a fixed schedule. Apply only enough irrigation to replace water loss by evapotranspiration (ET). Match irrigation application rate to the soil type and root depth. Avoid applying more water than can be contained in the root zone. Daily observation is necessary to determine the appropriate changes to make to the irrigation system.
4. When turfgrass requires water, it will:
    - Turn darker than normal (it appears as if a shadow is cast on the lawn).
    - Turn blue-gray.
    - Not spring back when walked on (depressions left by footprints do not bounce back).
    - Prevent the blade of a screwdriver or other such implement from penetrating into the soil any deeper than 2 inches.
5. Drought symptoms can appear in patches or over the complete turf area. When only small areas exhibit drought stress, water only those areas that need to be irrigated. Watering the complete lawn when only a small area requires water, or watering too frequently, results in shallow roots, increased susceptibility to drought (especially during the hot and dry days of July and August), and increased susceptibility to Melting-out Disease (Leaf-spot Disease).
6. Water deeply but only as needed; avoid shallow frequent watering. Watering a lawn on a frequent, shallow basis results in death of deep roots, increasing the need to water
7. In some instances, it may be necessary to water daily or every other day. This is especially true if the soil is very sandy as this soil texture dries out quickly. Turf on a shallow soil will likewise require more frequent irrigation. Soils should always be amended with a good quality organic matter such as compost, composted horse

manure, or composted chopped straw or hay. This will help hold the soil moisture and reduce the need for frequent irrigation.

8. Water at night to reduce water loss from evaporation. Watering during the heat of the day can result in excessive levels of evaporation. Watering during the night reduces problems with turf diseases and reduces the amount of water lost from evaporation, making the irrigation more efficient.
9. The most efficient and ideal time to irrigate turfgrass is between midnight and 6 A.M. Such timing, however, is difficult for all but those gardeners with an automatic sprinkler system.
10. Do not water during windy times to reduce water loss from evaporation. Wind will also divert the water, resulting in some areas getting much more water than others, and leaving dry spots. Areas of the turf that do not receive adequate moisture will require more water to stay alive.

**Extended Drought Conditions**

If extended drought conditions require discontinuing irrigation due to water shortages, Boise Parks & Recreation will follow our plan for short water years. (See Appendix 2)

## BMP 11- PLUMBING DESIGN AND MAINTENANCE

***Description***

Tremendous amounts of water and energy are wasted using non-efficient toilets, urinals, faucets, and showerheads. Federal guidelines for manufacturing of lavatory fixtures set in 1994 and 1997 require that commercial toilets use no more than 1.6 gpf (gallons per flush), urinals no more than 1 gpf, showerheads 2.5 gpm (gallons per minute), and faucets 2.2 gpm. Facilities still using older fixtures have a significant opportunity to save water by upgrading to the newer standards.

### PG 11 - Basic Practice Guidelines

1. Designs for new construction and renovations of existing facilities must follow all Boise Park and Recreation design standards, and State and Local plumbing codes. Plans must be reviewed and approved by Boise Parks & Recreation Design or Infrastructure staff.
2. New, or replacement toilets, urinals, faucets, and showerheads must meet the Federal guidelines for low flow fixtures.
3. The use of self closing faucets can reduce the amount of water wasted by leaving faucets running when not in use.
4. Having Custodial staff inspect fixtures for leaks or problems at each visit, and reporting them can reduce water consumption by allowing repairs to be made in a timely manner.
5. When performing maintenance repair worn parts and adjust mechanisms to ensure that water usage meets manufactures guidelines.

## BMP 12- WATER SOURCE SELECTION

The majority of water used by Boise Parks & Recreation is by our irrigation systems, making them our biggest target for conservation. When determining the irrigation water source for a site, surface irrigation and wells are considered prior to municipal water for irrigation, and ponds/waterways.

### PG 12 - Basic Practice Guidelines

The following depicts water sources available to Boise Parks & Recreation, and the priority where the water shall be directed:

**Surface Irrigation (canals):**

3. Irrigation
4. Ponds/waterways

**Wells:**

3. Irrigation
4. Ponds/waterways

**Municipal Water Companies (United Water):**

5. Facilities (park restrooms, Community Centers)
6. Drinking fountains
7. Display fountains
8. Irrigation

# Appendix 1

## LANDSCAPE PLANTS FOR WATER CONSERVATION

**Use of Low Water Demand Plants.** Many beautiful and functional plants are available that thrive with natural precipitation or only small amounts of supplemental water. The range of plant with low water requirements is now wide enough to permit selecting for function, beauty, and seasonal interest. However, as with all plant selections and planting, care must be taken to match specific needs of plants to the environmental conditions and the intensity of human activity at the planting site.

### The Plant Lists

The following lists of trees, shrubs, herbaceous perennials, ornamental grasses, vines, and groundcovers have been compiled to serve as a guide for selection of landscape plants which have low water requirements.
These lists **should not be considered definitive**. As additional information becomes available over time it is likely that plants may be added, or removed, from this list.

### Explanation of Column Headings

**Water Zones** identify the minimum amount of water a plant needs in order to survive after it is established in the landscape. It should be understood that, while plants will survive with the amounts of water indicated, some plants may not maintain their best appearance without some additional water. Depending on the planting location and weather factors more or less water may be required. It is assumed that the establishment period will be a minimum of two years during which more frequent supplemental water may be needed. Water zones, as used in this list, are defined as follows:

**0** Minimal or no supplemental water is required after plants are established.
**1** At least 1 inch of supplemental water per month may be required after plants are established.
**2** At least 1 inch of supplemental water every two weeks may be required after plants are established.

**Botanical name** is the scientific name which identifies plants by separating them into families, genus, species, and varieties. Each plant has only one botanical name, making it unique from any other plant. In this list the botanical name has been abbreviated to include only the genus, species, and, if necessary, the variety. The genus followed by "sp.", indicates that there are several different species or varieties of a plant which all have similar characteristics.

While a plant has only one botanical name it may have several **common names**. In compiling this list an attempt has been made to determine the most widely used common names.

**Mature size** is considered to be the average size a plant could be expected to grow with proper care and the amount of water indicated. Actual size of a given plant at a given location may vary.

**Maximum spacing** is the spacing necessary to create a "massing" effect, to create a hedge or screen, or, in the case of trees, to eventually create a continuous tree canopy.

The **comments** column contains qualifying statements and/or unique cultural requirements that affected the determination of water zones. This column has also been used in some cases to provide additional general information about a plant.

## LIST OF WATER-CONSERVING PLANTS

### Vines & Ground Covers

| Water Zone | Botanical Name | Common Name | Mature Size H X W | Maximum spacing | Comments |
|---|---|---|---|---|---|
| 0 | Mahonia repens | Creeping Oregon Grape | 18" | 3' o.c. | |
| 0 - 1 | Juniperus sp. | Juniper (many species and varieties) | 4"-24" x 8'-20' | 4' o.c. | |
| 0 - 1 | Parthenocisisis sp. | Virginia Creeper, Boston Ivy | climbing vine | N/A | |
| 1 | Campsis radicans | Trumpet Vine | climbs to 40' | N/A | |
| 1 | Cerastium tomentosum | Snow In Summer | 8" x 36" | 12" o.c. | |
| 1 | Fragaria sp. | Wild Strawberry | forms 8" mat | 12" o.c. | |
| 1 | Helianthemum nummularium | Sunrose, Rockrose | 8" x 36" | 24" | |
| 1 | Lonicera japonica | Japanese Honeysuckle | 12" x 15' | 18" o.c. | |
| 1 | Rhus aromatica | Grow Low Sumac | 24" x 4' | 3' o.c. | |
| 1 | Rosa sp | Spreading Rose | 12" x 10' | 3' o.c | Has thorns. |
| 1 | Sedum sp | Utah Green Sedum, Goldmoss Sedum, Green Stonecrop, Dragon's Blood Sedum | forms 2" to 12" mat | 12" o.c. | |
| 1 | Sempervivum tectorum | Hens And Chicks | forms 4" mat | 12" o.c. | |
| 1 | Vinca major | Periwinkle | forms 12" mat | 12" o.c. | |
| 1 - 2 | Clematis 'Hybrids' | Clematis | climbs to 10' | N/A | Water zone varies with variety. Some may be invasive |
| 2 | Aegopodium podagraria | Bishop's Weed | forms 18" mat | 18" o.c. | Shade. |
| 2 | Arabis caucasica | Rock Cress | forms 6" mat | 12" o.c. | |
| 2 | Arctostaphylos uva-ursi | Kinnikinnick | 12" x 15' | 24" o.c | |
| 2 | Delosperma cooperi | Delosperma, Ice Plant | 5" x 24" | 18" o.c. | |
| 2 | Delosperma nubigenum | Yellow Ice Plant | 1" x 36" | 18" o.c. | |

| | | | | | |
|---|---|---|---|---|---|
| 2 | Euonymus fortunei | Winter Creeper | forms 8” mat | 18” o.c. | |
| 2 | Galium odoratum | Sweet Woodruff | forms 8” mat | 12” o.c. | Shade. |
| 2 | Hedera helix | English Ivy | 12” x spreads, climbing | 12” o.c. | Shade. |
| 2 | Hypericum calcinum | Aaron's Beard, St. Johnswort | forms 18" mat | 18” o.c. | |
| 2 | Thymus sp. | Woolly Thyme, Pink Creeping Thyme | forms 3” to 6” mat | 12” o.c. | |
| 2 | Vinca minor | Dwarf Periwinkle | forms 6” mat | 12” o.c. | Shade. |
| 2 | Wisteria | Wisteria | vine | N/A | |

## ORNAMENTAL GRASSES

| Water Zone | Botanical Name | Common Name | Mature Size H X W | Maximum spacing | Comments |
|---|---|---|---|---|---|
| 0 | Elymus glaucus | Blue Oat Grass | 24” x 24” | 24” o.c. | |
| 0 | Oryzopsis hymenoides | Indian Rice Grass | 12” - 18” H | 18” o.c | |
| 0 | Pennisetum ruppelii | Fountain Grass | H - 4' | 36” o.c | |
| 1 | Calamagrostis x acutiflora ‘Stricta’ | Feather Reed Grass | 4’ x 4’ | 36” o.c. | |
| 1 | Festuca ovina glauca | Blue Sheep Fescue | H - 14" | N/A | |
| 1 | Miscanthus sinensis ‘gracillimus’ | Maidenhair Grass | H - 5’-6’ | 36” o.c | |
| 1 | Stipa comata, Stipa speciosa | Needlegrass, Needle and Thread Grass | H - 12" | N/A | |

## HERBACEOUS PERENNIALS

| Water Zone | Botanical Name | Common Name | Mature Size H X W | Maximum spacing | Comments |
|---|---|---|---|---|---|
| 0 | Achillea millefollium. | Yarrow (many varieties) | 36” x 24” | 24” o.c. | |
| 0 - 1 | Gaillardia sp. | Blanket Flower, Firewheel | varies | 24” o.c. | |
| 0 - 1 | Linum kingii, Linum lewisii | Golden Flax, Perennial Flax, Native Blue Flax | 18” x 12” | 12” o.c. | |
| 0 - 1 | Oenothera sp. | Evening Primrose | 8" x 18” | 18” o.c. | |
| 0 - 1 | Penstemon sp. | Firecracker Penstemon, Palmer Penstemon, Shrublet Penstemon, Wasatch Penstemon | 18” x 18” | 18” o.c | |
| 0 - 2 | Artemisia sp. | Wormwood, Sagebrush | up to 36” x equal spread | 36” o.c. | Water zone varies with variety |
| 0 - 2 | Aster sp. | Alpine Aster, Hardy Aster, Michaelmas Daisy, Pacific Aster | up to 48" x equal spread | 18” o.c. | Water zone varies with variety. |
| 0 - 2 | Geranium sp. | Cranesbill, Wild Geranium | 18” x 18” | 12’ o.c. | Water zone varies with variety |
| 0 - 2 | Lupinus sp. | Lupine | to 5’ x 36” | 24” o.c. | Water zone varies |

| | | | | | |
|---|---|---|---|---|---|
| | | | | | with variety. |
| 0 - 2 | Rudbeckia sp. | Black Eyed Susan, Gloriosa Daisy, Dwarf Rustic Coneflower | 36” x 24” | 24” o.c. | Water zone varies with variety.. |
| 0 - 2 | Viola sp. | Violet, Pansy | 6” x 6” | 12” o.c. | Shade, Water zone varies with variety |
| 1 | Bulbs | Spring Flowering Bulbs | varies | varies | |
| 1 | Centaurea sp. | Bachelor Button | up to 24” x equal spread | 24” o.c. | |
| 1 | Echinacea purpurea | Purple Coneflower | 36" x 24” | 24” o.c. | |
| 1 | Iris missouriensis | Missouri Iris | 24" x 24” | 18” o.c. | |
| 1 | Iris x germanica | German Bearded Iris | 36” x varies | 18” o.c. | |
| 1 | Lavandula angustifolia | English Lavender | 15" x 15” | 12” o.c. | |
| 1 | Monarda didyma | Bee Balm | 36” x 36” | 24” o.c. | |
| 1 | Papaver sp. | Poppy, Oriental Poppy | to 4’ x equal spread | 24” o.c. | |
| 1 | Perovskia atriplicifolia | Russian Sage | 36” x 36” | 24” o.c. | |
| 1 | Sedum sp. | Sedum (many species & varieties) | 2” – 18” high, spreads | 12” o.c. | |
| 2 | Alcea rosea | Hollyhock | 6’ x 3’ | 24” o.c. | |
| 2 | Anacyclus depressus | Mount Atlas Daisy | forms 6” mat | 12” o.c. | |
| 2 | Aquilegia sp | Columbine | 24” x 18” | 12” o.c. | Shade. |
| 2 | Baptisia australis | Blue False Indigo | up to 6’ tall | 36” o.c | |
| 2 | Campanula sp. | Carpathian Harebell, Serbian Bellflower, Bluebells Of Scotland, and others | 6” to 18” x 12” to 24” | 12” o.c. | Shade. |
| 2 | Chrysanthemum maximum | Shasta Daisy | 12”-36” x 24” | 18” o.c. | |
| 2 | Coreopsis grandiflora | Coreopsis, Pot Of Gold | 24” x 24” | 12” o.c. | |
| 2 | Dianthus sp. | Hardy Carnation, Sweet William, Maiden Pinks | up to 20” high | 12” o.c | |
| 2 | Euphorbia epithymoides | Cushion Flower, Spurge | 18” x 18” | 12” o.c | |
| 2 | Gypsophila paniculata | Baby's Breath | 36” x 36” | 24” o.c. | |
| 2 | Hemerocallis hybrid | Daylily | 15" x 12” | 18” o.c. | |
| 2 | Heuchera sanguinea | Coral Bells | 12” x 12” | 12” o.c. | |
| 2 | Hosta sp. | Plantain Lily | 24" x 24” | 24” o.c. | Shade. |
| 2 | Iris sibirica | Siberian Iris | 36” x varies | 18” o.c. | |
| 2 | Paeonia hybrida | Peony | 36” x 24” | 18” o.c. | |
| 2 | Phlox subulata | Creeping Phlox | 6" high, spreads | 12” o.c. | |
| 2 | Salvia sp. | Salvia | 30” x 24” | 18” o.c. | |
| 2 | Stachys byzantina | Lambs Ears | 18” x 18” | 18” o.c. | |
| 2 | Thymus sp. | Thyme (many | 1” to 10” x | 12” o.c. | |

| | | | | | |
|---|---|---|---|---|---|
| | | varieties) | equal spread | | |
| 2 | Verbena sp. | Verbena | 12” to 36” x equal spread | 12” o.c. | |
| 2 | Veronica sp. | Speedwell | 18” x 12” | 12” o.c. | |

**SHRUBS**

| Water Zone | Botanical Name | Common Name | Mature Size H X W | Maximum spacing | Comments |
|---|---|---|---|---|---|
| 0 | Atriplex canescens | Fourwing Salt Bush | 3’ x 4’ | | Evergreen |
| 0 | Atriplex gardneri | Gardner Salt Bush | 12” x 4’ | | Evergreen |
| 0 | Caragana arborescens | Siberian Pea Shrub | 10’ x 6’ | 5’ o.c. | |
| 0 | Chrysothamnus nauseosus | Rubber Rabbitbrush | 4' x 4’ | 4’ o.c. | |
| 0 | Holodiscus dumosus | Rock Spray Spiraea | 4’ x 3’ | | |
| 0 | Juniperus chinensis | Phitzer Juniper, Blue Point Juniper, & other upright varieties | 8’ x 10’ | 5’ o.c | Evergreen |
| 0 | Juniperus sabina | Tam Juniper (Many varieties) | 3’ x 4’ | | Evergreen |
| 0 | Juniperus communis | Common Juniper | 2’ x 5’ | | Evergreen. |
| 0 | Mahonia fremonti | Fremont Barberry | 6’ x 8’ | | Limited availibility, evergreen. |
| 0 | Purshia tridentata | Antelope Bitterbrush | 6’ x 6' | 5’ o.c. | . |
| 0 | Rhus glabra | Smooth Sumac | 10’ x 8’ | 6’ o.c. | |
| 0 | Rhus trilobata | Oakbrush Sumac, Skunkbrush | 6' x 5’ | 5’ o.c. | . |
| 0 | Rosa rugosa | Rugosa Rose | 6' x 6’ | 4’ o.c. | Has thorns |
| 0 | Yucca sp. | Yucca | 4’ x 4’ | | Evergreen. |
| 0 - 1 | Amelanchier alnifolia | Saskatoon Serviceberry | 4’-8’ x 6’ | 5’ o.c. | May be other suitable species |
| 0 - 1 | Amelanchier utahensis | Utah Serviceberry | 4’-8’ x 6’ | 5’ o.c. | May be other suitable species |
| 0 - 1 | Rosa foetida | Copper Rose | 1 5’ x 5’’ | 4’ o.c. | Has thorns |
| 1 | Caryopteris clandonensis | Blue Mist Spiraea | 2’ x 2’ | | |
| 1 | Chaenomeles japonica | Flowering Quince | 5’ x 6' | 4’ o.c. | |
| 1 | Cotoneaster acutifolia | Peking Cotoneaster | 8’ x 6’ | 4’ o.c. | |
| 1 | Cotoneaster divaricata | Spreading Cotoneaster | 6’ x 8’ | 5’ o.c. | |
| 1 | Cotoneaster apiculatus | Cranberry Cotoneaster | 3’ x 4’ | | |
| 1 | Cotoneaster horizontalis | Rock Cotoneaster | 3’ x 4’ | | |
| 1 | Forsythia sp. | Forsythia | 6’ x 4’ | 4’ o.c. | |
| 1 | Hibiscus syriacus | Confederate Rose, Rose Of Sharon | 8’ x 8’ | 5’ o.c. | |
| 1 | Kolkwitzia amabilis | Beauty Bush | 8’ x 6’ | 5’ o.c. | |
| 1 | Lonicera sp. | Zabelli Honeysuckle, Tatarian Honeysuckle | 10’ x 8’ | 4’ o.c. | |
| 1 | Mahonia aquifolium | Oregon Grape | 5’ x 6’ | 4’ o.c. | Evergreen. Can be |

| | | | | | |
|---|---|---|---|---|---|
| | | | | | invasive. |
| 1 | Philadelphus sp. | Mockorange, Sweet Mockorange (dwarf varieties also available) | 8’ x 10’ | 5’ o.c. | |
| 1 | Physocarpus sp. | Ninebark | 4’ x 4’ | 4’ o.c | |
| 1 | Pinus mugo pumilo | Dwarf Mugo Pine | 4’ x 4’ | 4’ o.c. | |
| 1 | Potentilla fruticosa | Shrubby Cinquefoil | 3' x 3’ | | |
| 1 | Rhamnus cathartica | Tallhedge Buckthorn | 8’ x 8’ | 4’ o.c. | May have thorns |
| 1 | Rhus typhina | Staghorn Sumac | 12’ x 10’ | 8’ o.c. | |
| 1 | Ribes sp. | Alpine Currant, Golden Currant | 4’ x 4' | 4’ o.c. | |
| 1 | Rosa woodsii | Woods Rose | 4’ x 4' | 4’ o.c. | Has thorns |
| 1 | Symphoricarpos albus | Common Snowberry | 4’ x 5' | | |
| 1 | Syringa vulgaris | Common Lilac (many varieties) | 12’ x 10’ | 5’ o.c. | |
| 1 | Syringa patula | ‘Miss Kim” Dwarf Korean Lilac | 3’ x 4’ | | |
| 1 - 2 | Berberis sp. (screening varieties) | Mentor Barberry, Red Leaf Barberry, Rose Glow Barberry | 5’-6’ x 4’-6’ | 4’ o.c. | Has thorns, evergreen |
| 1 - 2 | Berberis sp. | William Penn Barberry, Crimson Pygmy Barberry | 2’ x 2’-4’ | | Has thorns, evergreen |
| 2 | Buddleia sp. | Butterfly Bush | varies | | |
| 2 | Buxus sempervirens | Common Boxwood | 10’ x 8’ | 4’ o.c. | Shade, evergreen |
| 2 | Buxus microphylla ‘Winter Gem’ | Winter Gem Boxwood | 3’ x 3’ | | Shade, evergreen |
| 2 | Cornus sp. | Red Twig Dogwood, Yellow Twig Dogwood, Tartarian Dogwood | 8’ x 6’ | 5’ o.c. | |
| 2 | Cornus sericea ‘Kelseyi’ | Dwarf Kelsey Dogwood | 3’ x 3’ | | |
| 2 | Cotinus coggygria | Smoke Tree | 15’ x 12’ | | |
| 2 | Euonymus japonica | Evergreen Euonymous | 6’ x 6’ | 4’ o.c. | evergreen |
| 2 | Euonymus japonica ‘Microphylla” | Box Leaf Euonymous | 2’ x 3’ | 4’ o.c. | evergreen |
| 2 | Euonymous kiatschovica ‘Manhatten’ | Manhatten Euonymous | 6’ x 6’ | 4’ o.c. | evergreen |
| 2 | Euonymous alata | Winged Euonymous | 8’ x 10’ | 5’ o.c. | deciduous |
| 2 | Euonymous alata ‘Compacta | Dwarf Winged Euonymous | 4’ x 4’ | 5’ o.c. | deciduous |
| 2 | Ligustrum vulgare | Common Privet (several varieties for screening) | 8’ x 6’ | 5’ o.c. | |
| 2 | Pyracantha angustifolia | Dwarf Pyracantha | 4' x 4’ | 4’ o.c. | Has thorns, evergreen |
| 2 | Pyracantha coccinea | Pyracantha, Firethorn | 10’ x 8’ | 5’ o.c. | Has thorns, evergreen |
| 2 | Rosa meideland | Meideland Rose And Others | 3’ x 6’ | | Has thorns. |
| 2 | Salix purpurea | Dwarf Blue Arctic Willow | 6’ x 4' | 4’ o.c. | |

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|---|---|---|---|---|---|
| 2 | Spiraea x bumalda | Spiraea | 3’ x 3' | | |
| 2 | Spiraea x vanhouttei | Bridal Wreath Spiraea | 6’ x 5' | 4’ o.c | |
| 2 | Taxus sp. (screening) | Hick’s Yew, Japanese Yew, Upright Yew, Brown’s Yew, & others | 6’-10’ x 5’-8’ | 4’ o.c. | Shade, evergreen |
| 2 | Taxus sp. (low, spreading) | Spreading English Yew, Dwarf Japanese Yew, & others | 3’ x up to 8’ | | Shade, evergreen |
| 2 | Thuja sp. (screening) | Emerald Arborvitae, Blue Cone Arborvitae, & others | 8’-15’ x 3’-8’ | 4’ o.c. | Evergreen |
| 2 | Thuja sp. (low, spreading) | Woodward Globe Arborvitae, Little Giant Arborvitae, & others | 3’-4’ x 3’-4’ | | Evergreen |
| 2 | Viburnum sp. | Arrowwood Viburnum, Burkwood Viburnum, Cranberry Bush | 8’ x 8’ | 5’ o.c. | |
| 2 | Viburnum rhytidophyllum | Leatherleaf Viburnum | 10’ x 8’ | 5’ o.c | Shade, evergreen |
| 2 | Weigela florida | Weigela | 5’ x 4’ | 4’ o.c. | |

## DECIDUOUS TREES

| Water Zone | Botanical Name | Common Name | Mature Size H X W | Maximum spacing | Comments |
|---|---|---|---|---|---|
| 0 | Prunus virginiana | Chokecherry | 15’ x 10’ | 10’ o.c | |
| 1 | Eleagnus angustifolia | Russian Olive | 20' x 20’ | 15’ o.c | Not recommended for general use. Use on harsh sites only. Use seedless varieties. Has thorns. |
| 1 | Acer campestre | Hedge Maple | 30’ x 20’ | 15’ o.c. | |
| 1 | Acer ginnala | Amur Maple | 20’ x 15’ | 10’ o.c | May be subject to chlorosis. |
| 1 | Catalpa speciosa | Western Catalpa | 60’ x 40’ | 30’ o.c. | Large seed pods. May be subject to chlorosis |
| 1 | Gleditsia triacanthos inermis | Thornless Honey Locust (several varieties) | 35’ x 25’ | 25’ o.c. | |
| 1 | Gymnocladus dioica | Kentucky Coffee Tree | 50’ x 25’ | 25’ o.c. | |
| 1 | Koelreuteria paniculata | Goldenrain Tree | 25’ x 25’ | 20’ o.c. | |
| 1 | Quercus macrocarpa | Bur Oak | 50’ x 30’ | 30’ o.c. | |
| 1 | Ulmus parvifolia | Lacebark Elm | 40’ x 25’ | 25’ o.c. | |
| 1-2 | Celtis occidentalis | Common Hackberry | 50’ x 40’ | 30’ o.c. | |
| | | | | | |
| 1 - 2 | Crataegus sp. | Hawthorn | 20’ x 15’ | 15’ o.c | Has thorns |
| 2 | Platanus acerifolia | London Plane Tree, Sycamore | 60’ x 40’ | 30’ o.c | |
| 1 | Populus sp. | Cottonwood, improved “cottonless” varieties | 60’ x 40’ | 30’ o.c. | Use seedless varieties |
| 2 | Quercus robur | English Oak | 80’ x 40’ | 35’ o.c. | |
| 2 | Quercus rubra | Red Oak | 80’ x 50’ | 40’ o.c | May be subject to chlorosis |
| 2 | Sophora japonica | Japanese Pagoda Tree | 40’ x 30’ | 25’ o.c | |

## EVERGREEN TREES

| Water Zone | Botanical Name | Common Name | Mature Size H X W | Maximum spacing | Comments |
|---|---|---|---|---|---|
| 0 | Juniperus sp. | Juniper | 20’ x 15 | 20’ | |
| 0 | Pinus edulis | Pinyon Pine | 20’ x 15’ | 15’ | |
| 1 | Cedrus sp. | Cedar | 40’ x 30’ | 30’ | |
| 1 | Pinus aristata | Bristlecone Pine | 15’ x 12’ | 10’ | |
| 1 | Pinus flexilis | Limber Pine | 40’ x 30’ | 25’ | |
| 1 | Pinus mugo | Mugo Pine | 20’ x 15’ | 15’ | |
| 1 | Pinus nigra | Austrian Pine | 50’ x 25’ | 20’ | |
| 1 | Pinus ponderosa | Ponderosa Pine | 80’ x 30’ | 30’ | |
| 1 | Pinus sylvestris | Scotch Pine | 60’ x 25’ | 25’ | |
| 1 | Pinus thunbergiana | Japanese Black Pine | 20’ x 15’ | 15’ | |

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• “Ornamental and Shade Trees for Utah”, E. Gregory McPherson and Gregory H. Graves, Utah State University Cooperative Extension
Service, Logan, Utah.
• “Sunset Western Garden Book”, Sunset Publishing Corporation.
• “American Standard for Nursery Stock”, American Association of Nurserymen.

Appendix 2

**EXTENDED DROUGHT WATERING**

Water is supplied to our irrigation systems from three main sources; United Water Corp., surface irrigation (canal), and deepwater wells. In some cases a site may be served by a combination of these sources, with the intent to use the most cost efficient source as the main supply and any others as a back up.

With the three different water sources used, a three-tiered approach is needed when determining how to deal with water shortages and increased costs.

**Tier 1** Loss of surface water
**Tier 2** Discontinued use of United Water due to rising costs or mandated cutbacks
**Tier 3** Discontinued use of wells in extended drought situations

Tier 1
As water rights are different for each provider of surface water, some will likely run out of water earlier than others. (Example: The Zinger Lateral Ditch (Hobble Creek and McDevitt) has indicated that water may be discontinued sometime in August, while the Boise Valley Ditch (Optimist) has one of the older rights on the Boise River and may have water the entire season.)

As surface water is turned off at those sites where it is used as the main water source, a decision will be made as to whether the backup system will be activated. Those sites using wells as backup would be turned over to operating on the well. Those sites using United Water as a backup would be considered on an individual basis for water shut off due to the cost of purchasing water. The following Priority will be used as a guide for water shut off (1 being the first to be shut off):

1. Right-of-ways
2. Neighborhood parks
3. Greenbelt
4. Community parks
5. Regional parks
6. Special Use parks

When sites are switched to United Water, then the guidelines for Tier 2 will be followed.

Tier 2
Following the loss of surface water, a greater demand will be placed on our use of United Water. As budget constraints dictate or cutbacks are mandated, sites irrigated with United Water will be considered for discontinued irrigation using the following order as a guide (1 being the first to be cut back):

1. Right-of-ways
2. Mini parks
3. Administration buildings
4. Neighborhood parks
5. Greenbelt
6. Community parks
7. Regional parks
8. Special Use parks
9. Public facilities (Fort Boise Community Center, Zoo, etc.)

Tier 3

During an extended drought in which groundwater levels are affected, or when rising power costs dictate budget constraints, discontinued watering will be considered using the following order as a guide:

1. Right-of-ways
2. Neighborhood parks
3. Greenbelt
4. Community parks
5. Regional parks
6. Special Use parks
7. Public facilities

When and if we reach the point where we discontinue watering of sites, the following impacts will likely occur:

- The turf will be the first to show signs of stress due to the lack of irrigation. The weather and length of time without irrigation will determine the long term effects. Most turf will go dormant and may come back when irrigation is resumed.
- Over seeding most likely will be required once irrigation is resumed to help re-establish a healthy stand of turf.
- Weeds will invade when the water is cut off and will require additional control to keep them at acceptable levels once the irrigation is restored.
- Turf areas will be hard and compacted if irrigation is off for a lengthy period. The loss of resiliency will increase the likelihood of injury to park users.
- The impacts to well established trees and shrubs may not be evident right away. Depending upon the length of time without irrigation and weather conditions loss of plant material may be high.

Supplemental watering for trees:

The Forestry unit has developed a per-tree cost for watering if the irrigation system is shut down. Supplemental watering of the trees and the associated cost may determine whether the irrigation system is shut down. The Forestry unit estimates the per-watering cost of each tree to be $40.00.

Appendix 3

**NON MAXICOM IRRIGATION SCHEDULE**

**E.T.** – (Evaportranspiration) Amount of water a plant loses (turf or shrubs) in a given week that needs to be replenished.

**PRECIPITATION RATE** – The amount of water in (inches per hour) that an irrigation head applies to the plant.

**RUN TIMES PER WEEK** – The amount of time a station needs to run for proper irrigation to occur based on the E.T. for that week.

**How many days a week to water** to meet the needs of the plants depends on many factors such as mow day(s), events or games scheduled for that site, time windows for a particular site (11:00pm – 6:00am) and how much water can be applied before runoff occurs.

Generally, trees and shrubs need about half the amount of water that turf does because of their deeper roots and shrub beds can be watered less often and more deeply to meet the weekly requirements.

Below are two examples:

## Turf

| E.T. | Type | Run Time per Wk. | # of Days | Minutes per Day |
|---|---|---|---|---|
| 1.0 | Maxipaw | 120 minutes | 3 | 40 minutes |

| E.T. | Type | Run Time per Wk. | # of Days | Minutes per Day |
|---|---|---|---|---|
| 1.0 | 1800 popup | 30 minutes | 2 | 15 minutes |

## Shrubs

| E.T. | Type | Run Time per Wk. | # of Days | Minutes per Day |
|---|---|---|---|---|
| 1.0 | 1800 popup | 15 minutes | 1 | 15 minutes |

### ***Average Weekly E.T.***

| ***March*** | ***April*** | ***May*** | ***June*** | ***July*** | ***August*** | ***Sept.*** | ***Oct.*** |
|---|---|---|---|---|---|---|---|
| .42 | .94 | 1.27 | 1.44 | 1.55 | 1.02 | .97 | .10 |

| E.T. Rate Per Week | Type | Nozzle # | Precipitation Rate | Run Times Per WEEK |
|---|---|---|---|---|
| 0.5 | Drip .6GPH | 18-24 ROW SPACING | .42 IPH | 72 MIN. A WEEK |
| | 1800 POP-UP | 12' | 2 | 15 MIN |
| | 3500 ROTOR | #3 | .69 IPH | 44 MIN |
| | 5000 ROTOR | #6 | 0.63 | 48 MIN |
| | 6504 ROTOR | #10 | 0.72 | 42 MIN |
| | MAXIPAW IMPACT | #8 | 0.51 | 60 MIN |
| | BUCKNER P144 | #14 | 0.32 | 96 MIN |
| | BUCKNER IP101 | #18 | 0.42 | 72 MIN |
| .05 - 1.0 | Drip .6GPH | 18-24 ROW SPACING | .42 IPH | 144 MIN |
| | 1800 POP-UP | 12' | 2 | 30 MIN |
| | 3500 ROTOR | #3 | .69 IPH | 88 MIN |
| | 5000 ROTOR | #6 | 0.63 | 96 MIN |
| | 6504 ROTOR | #10 | 0.72 | 84 MIN |
| | MAXIPAW IMPACT | #8 | 0.51 | 120 MIN |
| | BUCKNER P144 | #14 | 0.32 | 188 MIN |
| | BUCKNER IP101 | #18 | 0.42 | 144 MIN |

| E.T. Rate Per Week | Type | Nozzle # | Precipitation Rate | Run Times Per WEEK |
|---|---|---|---|---|
| 1. - 1.5 | Drip .6GPH | 18-24 ROW SPACING | .42 IPH | 216 MIN |
| | 1800 POP-UP | 12' | 2 | 45 MIN |
| | 3500 ROTOR | #3 | .69 IPH | 132 MIN |
| | 5000 ROTOR | #6 | 0.63 | 144 MIN |
| | 6504 ROTOR | #10 | 0.72 | 128 MIN |
| | MAXIPAW IMPACT | #8 | 0.51 | 180 MIN |
| | BUCKNER P144 | #14 | 0.32 | 282 MIN |
| | BUCKNER IP101 | #18 | 0.42 | 216 MIN |
| 1.5 - 1.75 | Drip .6GPH | 18-24 ROW SPACING | .42 IPH | 252 MIN |
| | 1800 POP-UP | 12' | 2 | 51 MIN |
| | 3500 ROTOR | #3 | .69 IPH | 150 MIN |
| | 5000 ROTOR | #6 | 0.63 | 165 MIN |
| | 6504 ROTOR | #10 | 0.72 | 144 MIN |
| | MAXIPAW IMPACT | #8 | 0.51 | 210 MIN |
| | BUCKNER P144 | #14 | 0.32 | 330 MIN |
| | BUCKNER IP101 | #18 | 0.42 | 252 MIN |