NATURE IN THE CITY

LANDSCAPE DESIGN GUIDE

City of Fort Collins

ACKNOWLEDGEMENTS

Thank you to all who contributed to this incredible project!

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DESIGN GUIDE

An Introduction to Diversifying Urban Landscapes in Fort Collins

INTRODUCTION

Overview of the Guide

The purpose of this guide is to showcase a wide variety of diverse urban landscape options in Fort Collins. This guide will help you determine which landscape options are best for you, whether you are a homeowner, renter, business owner, school, developer, or part of a Homeowners Association. The overarching goal is to provide inspiration for your next dream landscape.

The examples in this guide apply to Northern Colorado Front Range ecosystems, however, the context may be appropriate for projects in other regions as well.

In this guide, you will find an introduction and the main considerations needed for installing each landscape option. Tips for design, installation, and maintenance are included in each chapter. In addition, each landscape option comes with its own curated plant list to help you select plants that will thrive in your landscape.

Thank you for creating diverse, beautiful, and resilient landscapes!

WHY DIVERSIFY LANDSCAPES?

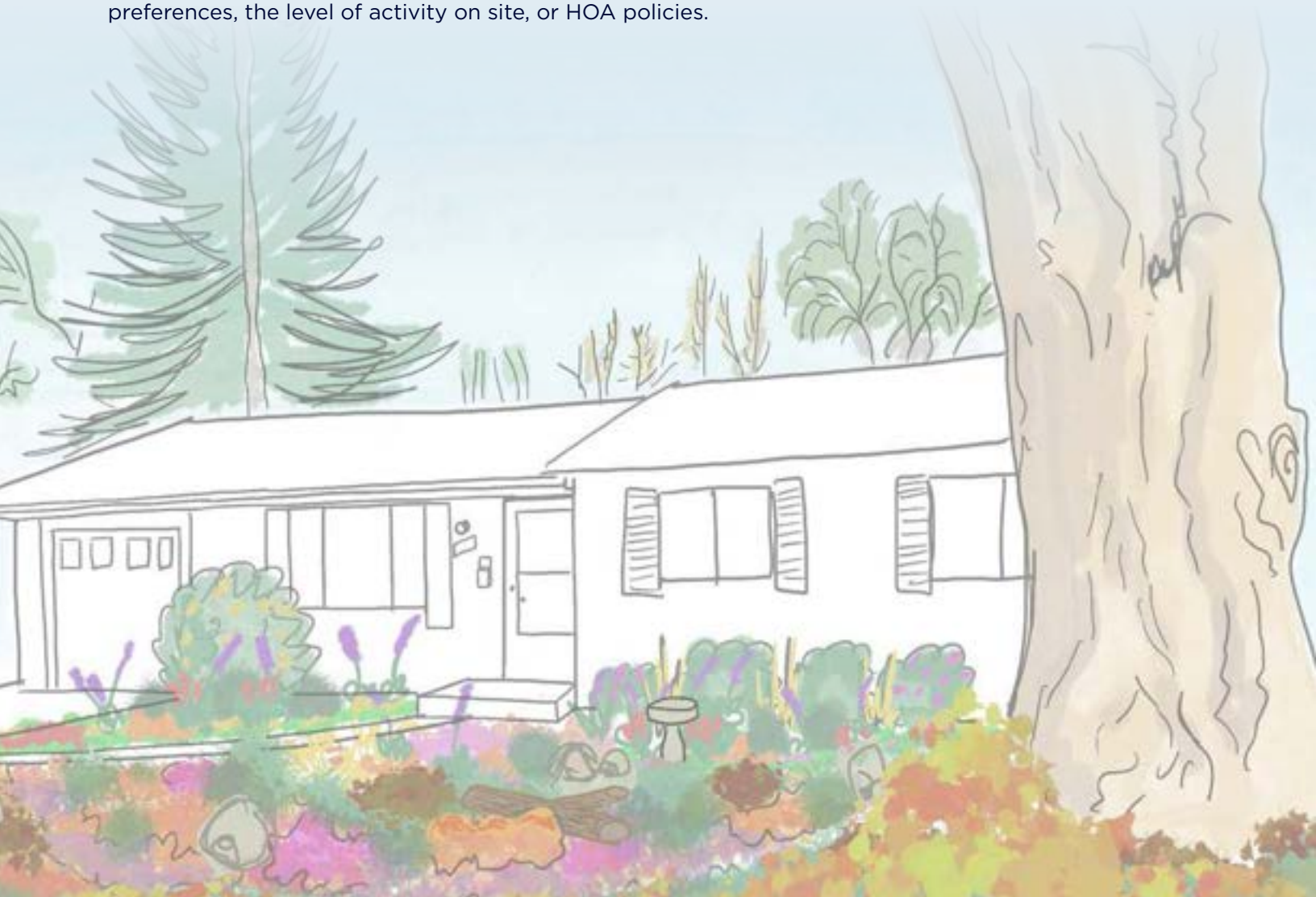
Diverse landscapes are beautiful and resilient. They contain a variety of native and adapted species that provide important habitat and resources for wildlife and pollinators. They are naturally adapted to the Front Range's semi-arid climate and native soils, which translates to lower water and chemical inputs, and a better ability to withstand short and long-term changes in climate. They invoke a Colorado landscape aesthetic and establish a sense of place. Spending time in them benefits our physical and mental health. In short, moving towards diverse landscapes is more sustainable and brings nature into the city, which provides considerable ecological, economic, and social benefits.






The use of plants that are native to Colorado is highly encouraged when you diversify your landscape. Native plants have evolved here and are adapted to our climate and soil types.

In addition, our local pollinators and wildlife co-evolved with these plants and many are dependent on specific native plant species for survival. As such, native plants form the base of local food webs. However, it is also important to recognize that native plants may not be appropriate in all situations, e.g., your aesthetic preferences, the level of activity on site, or HOA policies.

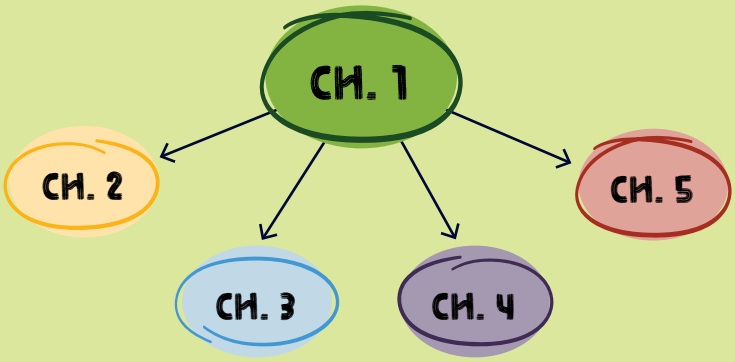


NAVIGATING THE GUIDE

This guide is broken into chapters (see Table of Contents), which primarily revolve around different landscape options (e.g., Pollinator Gardening, Low Water Lawn). The guide also includes chapters on other relevant landscaping topics (e.g., Soil Amendment, Weed Management). It is highly recommended to start with Chapter One – Site Characteristics and Planning.

IT IS HIGHLY RECOMMENDED TO

FIRST READ CHAPTER 1



THEN READ WHATEVER YOU WANT!

Within each chapter, you will find information on the following (when applicable):

- Overview of topic
- Physical requirements
- Design examples or case studies
- Irrigation
- Maintenance
- Plant list
- Additional resources
- Installation tips
- Fun fact!

FUN FACT!

Converting your yard from turf to a xeriscape and or native garden is **ON TREND!**

Since 2016, over 390 residential projects in Fort Collins have been granted Xeriscape Incentive Program (XIP) funding for a total of 462,100 square feet of converted landscape. That is 10 acres or approximately 7.5 football fields!

GLOSSARY

Adapted Species	Non-native species that grow well in a given habitat with adjusted changes to the environment such as water or nutrients.
Aggregate	A material or structure formed from a loosely compacted mass of larger soil clusters or rocks.
Aspect	The direction the land is facing, eg: north, south, northeast etc.
Cues to Care	(CTC) are landscape elements that are immediately recognizable as designed, and signal continuing human presence is needed to care for a landscape.
Complementary Colors	Colors opposite from each other on the color wheel. They have a strong contrast that increases how noticeable they are when placed close together.
Exotic Plants	Plants not native to the area where they are planted.
Forb	A herbaceous flowering plant that is not a grass.
Hydrozone	Areas where plants with similar water needs are grouped together - very low water, low water, medium water, and high water plants should be grouped by water needs.
Impervious Surface	A hard surface that does not let water soak into the ground, causing puddling or resulting in runoff.
Larval Host Plants	Plants required for the growth and development of insect larvae such as caterpillars. Butterflies are often particular about the species where they lay their eggs to support the larva.
Microclimate	Small areas that have a different climate than the overall climate of a site. They can be created by structures, topography, water, boulders, and impervious surfaces.
Native Plant	A plant species that grew in an area before colonization of that area.
Organic Matter	Any of the carbon-based compounds that exist in nature or material that comes from living things. This can include carbon-rich soils, manure, mulch, or compost.
Perennial	Any plant that persists for several years, usually with new herbaceous growth from a part that survives from growing season to growing season.
Permaculture	Permacultre stands for permanent agriculture. It uses whole systems thinking to create spaces for planting that encourages naturally flourishing ecosystems.
Pruning	Selective removal of certain parts of a plant such as branches, buds, or roots.
Resilient	Ability to bounce back after experiencing a setback.
Slope	A surface of which one end is at a higher level than the other; a rising for falling surface.
Xeriscape	Principles of sustainable landscape design including use of low water plants, and sustainable gardening techniques.

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LANDSCAPE DESIGN GUIDE

CHAPTER 1: SITE CHARACTERISTICS

An Introduction to Diversifying Urban Landscapes in Fort Collins

City of Fort Collins

CHAPTER 1

CHAPTER 1

Site Characteristics and Planning

Before starting any landscaping project, familiarize yourself with the project site by observing the site's characteristics. Create a map of your site (to scale) showing how the different site characteristics interact with each other. Once you understand your site, you can use this map to begin planning out your project. These characteristics apply to any size project area.

SITE CHARACTERISTICS

The characteristics of your site will determine which plants can thrive in your space. There are seven key characteristics for you to consider:

1. Soils
2. Drainage
3. Water
4. Sun and Shade
5. Microclimates
6. Aspect
7. Utilities

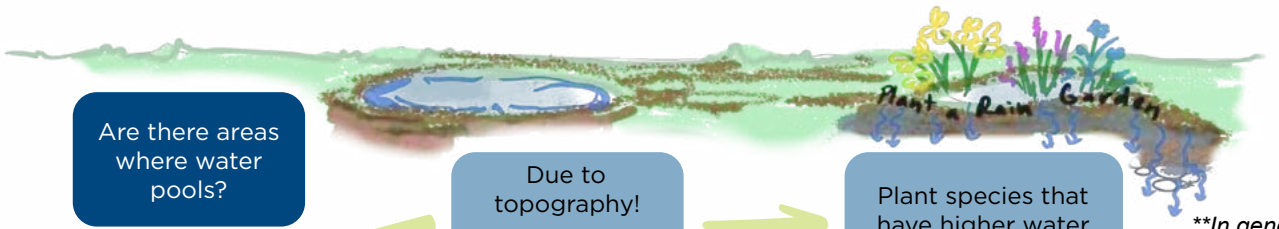
SOILS

Your soil is the most valuable asset you have in your landscape. Understanding what kind of soil you have is key to the success of your landscaping process. Start your project by learning about your soil – soil testing kits are available at most nurseries and CSU Extension offers comprehensive soil testing at a reasonable price (e.g., $35 for homeowner test as of 2021). Basic soil tests will reveal the texture and drainage qualities, and measure pH and nutrients like magnesium, calcium, phosphorus, and potassium. Most soil labs will help you interpret these results and what they mean for selecting and siting your native plants

Colorado soils are typically low in organic matter and high in pH (i.e., alkaline). Fortunately, native plants evolved with these soil conditions and usually can be successfully grown in unamended soils. However, some amendments may be needed depending on your soil test results and what kind of plants you want to grow.

DRAINAGE

It is important to understand how water moves on your site. It will give you clues about the topography of your site, the condition of your soils, and where to strategically place plants with different water requirements. Use the flow charts below to understand how you can alter or take advantage of your drainage.



Are there areas where water pools?

No

Yes

Due to topography!

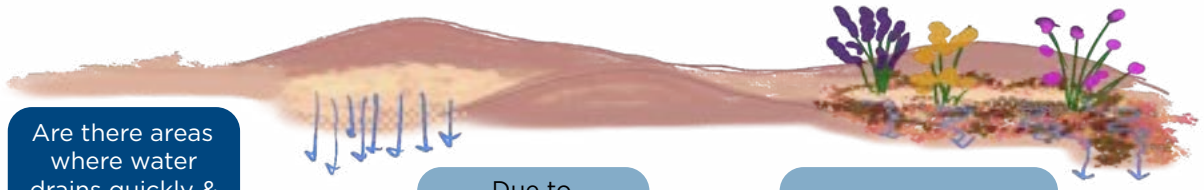
There's a dip or low spot

Due to poorly drained soils...

Plant species that have higher water requirements there

Amend soil with organic matter & small aggregate to increase porosity**

***In general, altering your plant palette is a simpler, less costly solution than changing your soil, unless you have exceptionally poor, or highly compacted soil.*



Are there areas where water drains quickly & becomes dry?

No

Yes

Due to topography!

There's a berm or a slope

Due to excessively well drained sandy or rocky soils...

Plant species that have lower water requirements there

Amend soil with organic matter to increase water retention**

***In general, altering your plant palette is a simpler, less costly solution than changing your soil, unless you have exceptionally poor, or highly compacted soil.*

If you are converting your space from a high-water use landscape (e.g., irrigated turf) to a low-water use landscape (e.g., native, xeric), observe the area after you have transitioned the irrigation You may no longer have pooling water once you are applying less water to the landscape.

WATER

All plants require some amount of water to live and this amount varies depending on the plant. Water requirements can be classified into four categories:

- **Very Low:** 3 gallons/square feet/season
- **Low:** 8 gallons/square feet/season
- **Moderate:** 14 gallons/square feet/season
- **High:** 18 gallons/square feet/season

You will want to check the water requirements for each species of plant. It is best practice to design your space so that plants with similar watering requirements are in the same area, this is called a **hydrozone** – this will make watering your landscape easier and more efficient. (For more information on irrigating, check out page 11.)

As you create your plant layout consider placing plants with higher water requirements near water sources such as downspouts, or in areas where water naturally pools such as a low spot beneath trees. These areas often have part shade that can keep areas wetter longer.

Please keep in mind that plants that with Very Low and Low watering requirements will still need to be watered regularly while they are getting established and their roots are developing. They can be slowly weaned off supplemental water over time. Recommended watering schedules are provided in following chapters.

High
Water Use

Moderate
Water Use

Low to Very Low
Water Use

Hydrozones *are areas where plants are grouped together based on their water needs to prevent over or under watering. If you have an irrigation system, each zone should correspond to a specific hydrozone.*

SUN & SHADE REQUIREMENTS

Almost all plants need sun to perform photosynthesis to live, however the amount of light different plant species require varies. Sun and shade requirements can be classified into three categories:

- **Full Sun:** 5+ hours of direct sun light per day
- **Part Sun:** 3 – 5 hours of direct sun light per day
- **Shade:** Less than 3 hours of direct sun light per day

Keep in mind that the amount of sun an area is exposed to will change during the year as the sun moves higher/lower in the sky and as trees leaf-out. You will want to focus on where the sun is during the growing season, roughly May – October.

PART SUN, WEST SIDE

3-5 hours of direct sun in the summer.

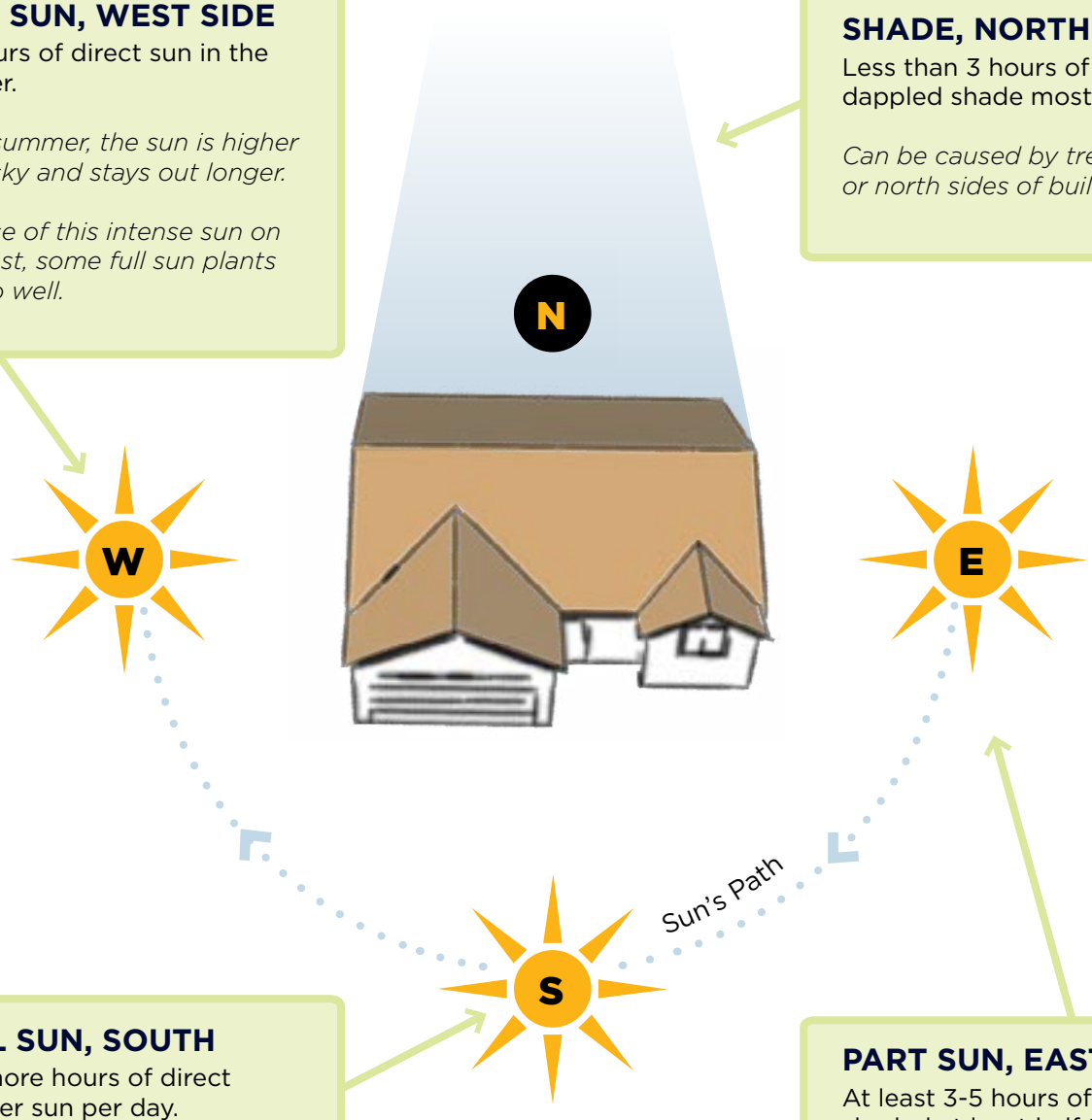
In the summer, the sun is higher in the sky and stays out longer.

Because of this intense sun on the West, some full sun plants may do well.

SHADE, NORTH

Less than 3 hours of sun or dappled shade most of the day.

Can be caused by trees, fences, or north sides of buildings.



FULL SUN, SOUTH

5 or more hours of direct summer sun per day.

Even though your yard may be south facing, trees, or fences can obstruct full sun on some plants and you should consider the microclimate.

PART SUN, EAST SIDE

At least 3-5 hours of direct sun, shaded at least half the day.

Morning sun is cooler than afternoon sun.

Plant part-shade plants here.

ASPECT

The aspect is the direction your site is facing - north, south, east, west. Buildings, trees, fences and other structures will affect the aspect of your site. Aspect is important since it will influence the amount of sun, wind, and the temperature of your site.

TYPICAL CHARACTERISTIC OF EACH ASPECT ARE AS FOLLOWS:

- **South:** Often receives sun all day and may be protected from cold north winds. Typically, the hottest and driest aspect. Plants native to the Colorado Plains, Southwest, and Mediterranean should thrive.
- **West:** Receives afternoon sun which is more intense and may be exposed to cold north winds. Typically, the second hottest aspect.
- **East:** Receives morning sun which is less intense and may be protected from cold north winds. Typically, the second coldest aspect.
- **North:** Often shaded and receives less sun which leaves the soil damp longer. Generally exposed to strong cold winds which reduces the humidity. Typically, the coldest and wettest aspect. Plants native to the Colorado foothills and mountains should do well.

Small changes in aspect can make a big difference to growing conditions.

MICROCLIMATES

Microclimates are small areas that have a different climate than the overall climate of a site. They can be created by structures, topography, water, boulders, and impervious surfaces, to name a few examples. It is important to note where you have microclimates in your space so you can select plants best adapted to the conditions of each microclimate. They can also be exploited to expand your plant palette. Typical microclimates include:

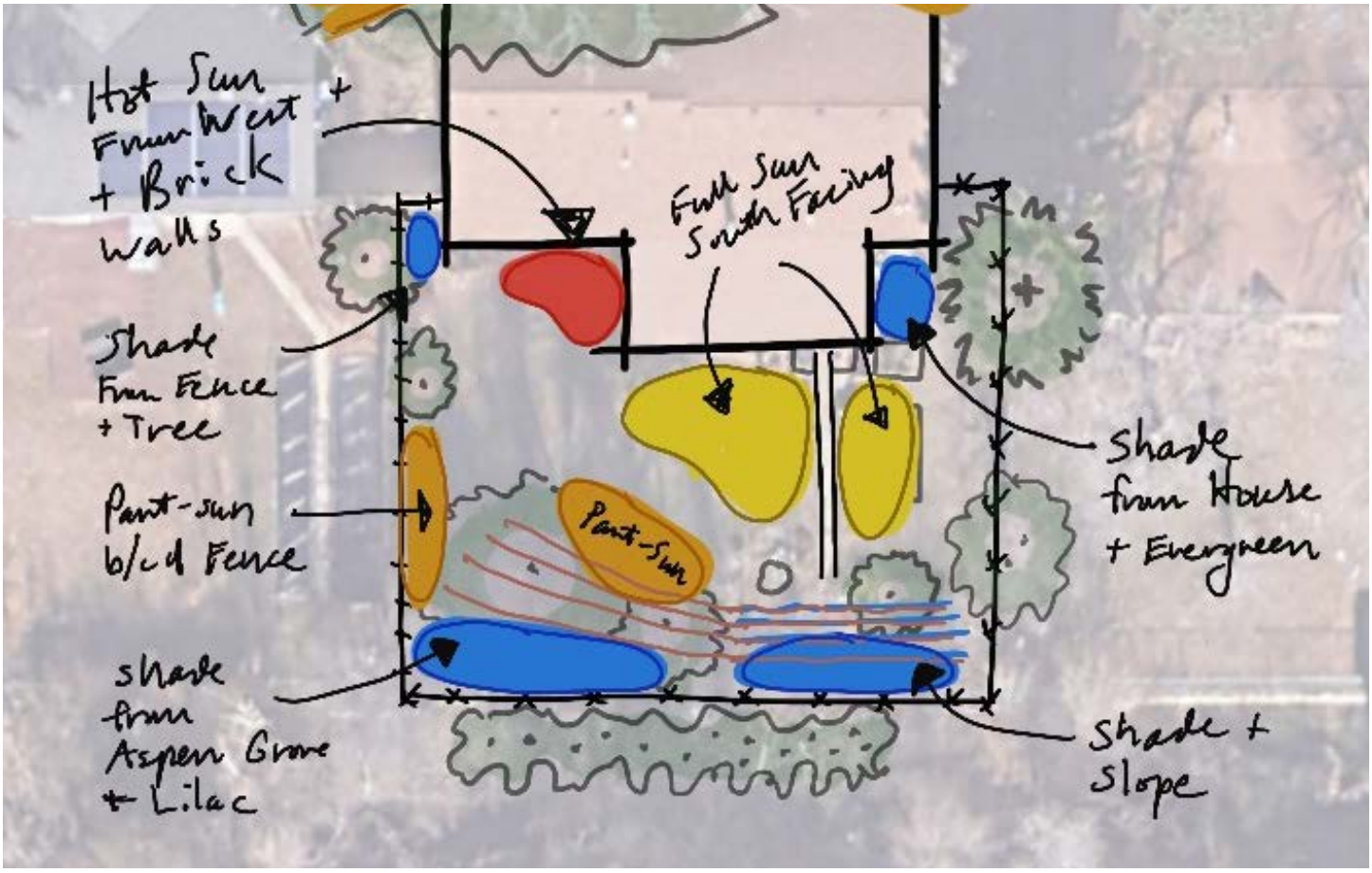
- Hot areas: These are often next to pavement, up against the south or west side of a building, or on south facing slopes. You will want to pick plants that enjoy heat and need less water for these spaces, such as plants in the beardtongues (*Penstemon*), buckwheat (*Eriogonum*) or cacti (*Opuntia*).
- Wet areas: These are often in topographic depressions where water might collect after rain, snow, or watering. They can also be at the bottom of a downspout or another spot where water runs off an impervious surface. Wet microclimates are great places to put plants that have higher water requirements such as Rocky Mountain iris (*Iris missouriensis*), marsh milkweed (*Asclepias incranata*), or many shrub species.
- Cold areas: These are often in spots with dense shade, like on the north side of a structure or under trees. Cold areas also have less temperature fluctuations which may benefit some types of plants. You will want to plant species that like cooler conditions or shade in these microclimates such as cut-leaved anemone (*Anemone multifida*), Oregon grape (*Berberis repens*), or geraniums (*Geranium*).

Hot Microclimate

Full Sun Microclimate

Part-Sun Microclimate

Shady/Cool Microclimate



Microclimates are small areas that have a different climate than the overall climate of a site. They can be created by structures, topography, water, boulders, and impervious surfaces, to name a few examples.

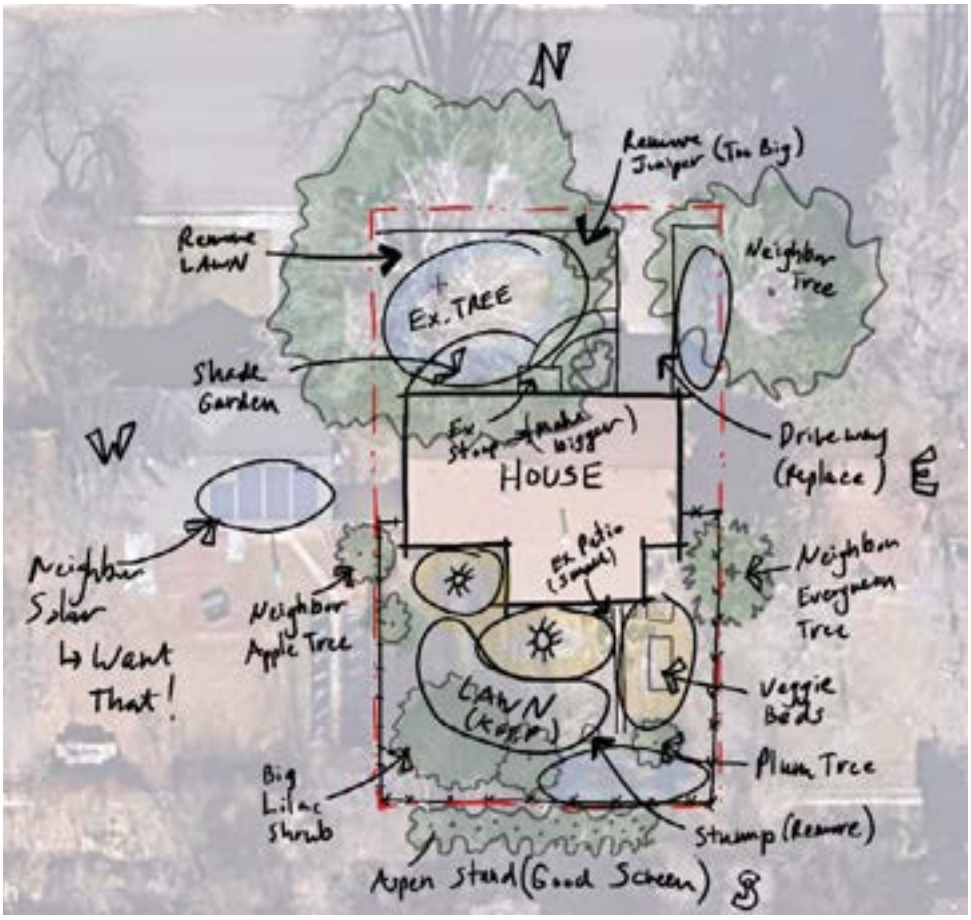
UTILITIES

It is vitally important to map where your utilities are located for the safety of you and your neighbors. Beyond immediate safety concerns, be sure to place large, deep-rooted trees sufficiently far from underground utilities for two reasons: 1) so that roots don't grow into pipes, and 2) so that your high value items are not dug up should maintenance need to be performed on the utilities. Be sure to locate your utilities ***before*** you start digging! The City recommends offsetting deep-rooted plants 10-feet from water, sanitary sewer, and gas lines, and 5-feet from electric, cable, and fiber lines. Also be sure to offset plants away from above ground utilities including fire hydrants, electrical boxes, and light poles. One free provider is Colorado 811 [1] - you can request for them to come locate and mark where your utilities are in your project space.

PLANNING

Now that you are familiar with your site characteristics, you can start planning. Planning your landscape out from the beginning will save you time in the long run and help you estimate costs, maintenance needs, and irrigation requirements. However, you do not need to have every detail figured out to start. Managing landscapes is a dynamic, iterative process – there will be surprises and mistakes, and that is okay! Here are a few topics to plan out beforehand that can help you get started and set your landscape up for success:

- Time and Money Investment
- Desired and Intended Uses
- Plant Selection
- Irrigation
- Maintenance



A site analysis map can help you understand your site according to the site characteristics. You might even consider creating a different map for each characteristic. Use lots of labels and let it be messy.

1. Fort Collins 811 website: *colorado811.org/colorado-811-fort-collins*

TIME AND MONEY INVESTMENT

One of the first things you need to decide is how much effort and financial input you are able to invest into your landscape. Virtually all landscapes require some amount of management in our altered urban ecosystem, especially during the initial establishment period. Consider how much you want to water, mow, prune, plant, weed, or mulch – in general, how much time do you want to put into your landscape? The answer to this question should influence how you plan out your landscape.

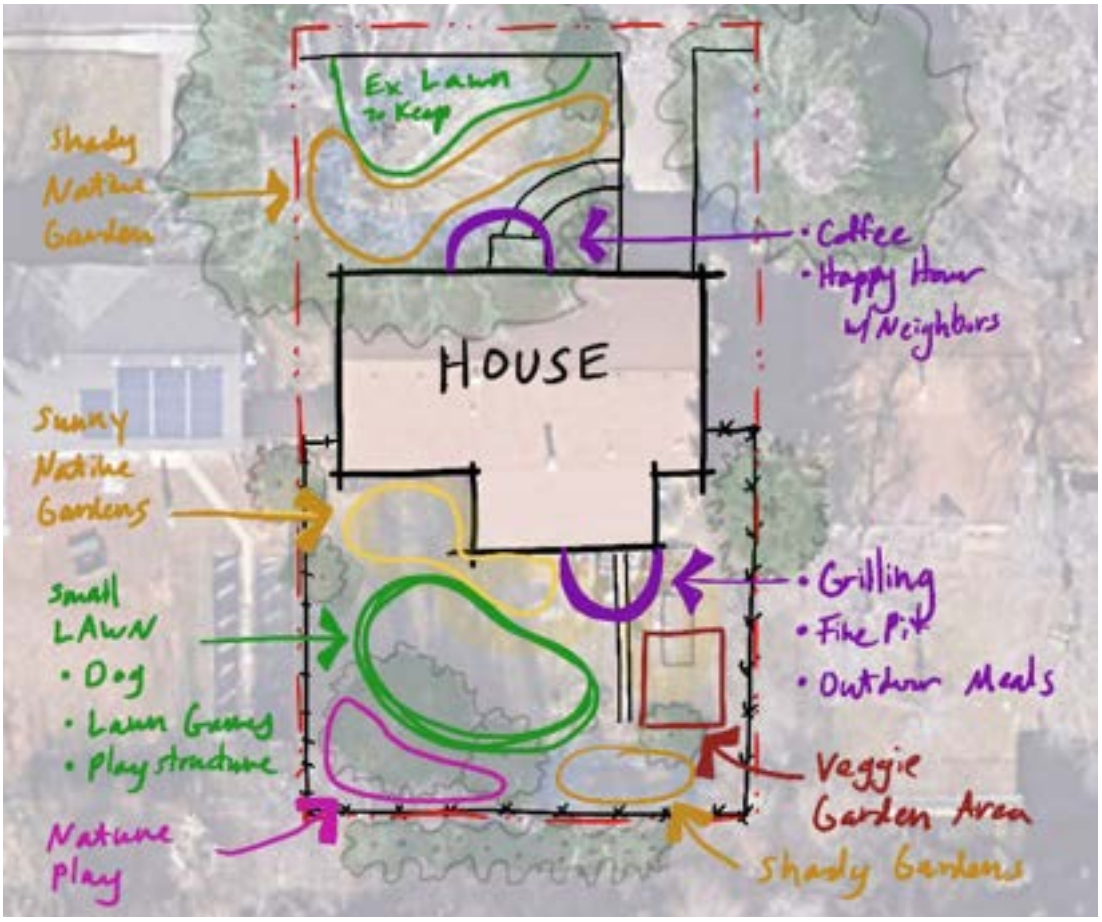
A native-dominant yard will take less maintenance over the long term, but the initial level of effort can be significant. Substantial preparation is necessary before planting anything, and watering and weed management require close attention in the first 2-3 years. But be diligent – that initial work rewards you with a beautiful, low maintenance, low water landscape you can enjoy for many years to come.

DESIRED AND INTENDED USES

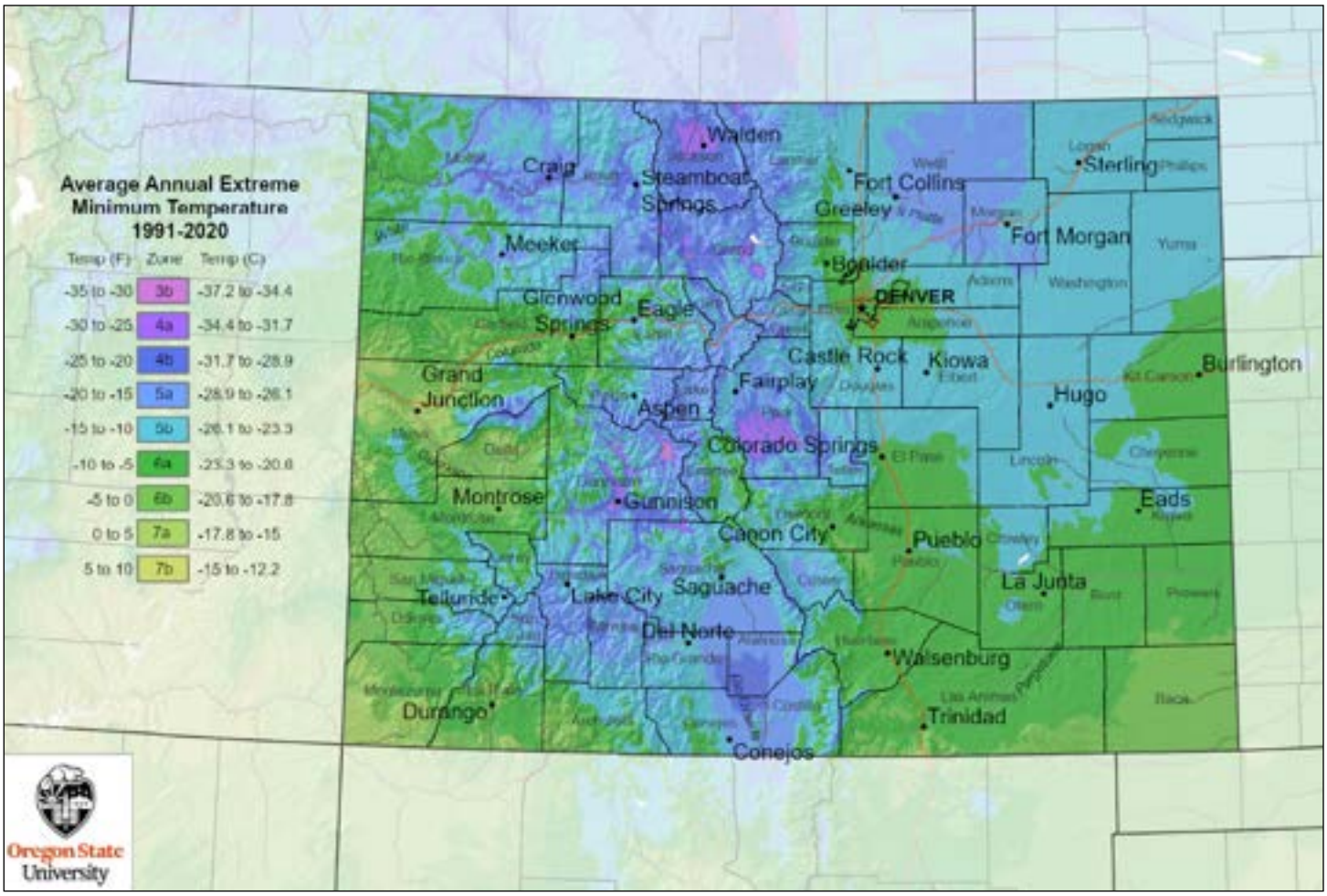
When planning your site, consider how you intend the site to be used. Will there be substantial foot traffic (e.g., kids playing)? Do you hope to do a lot of entertaining, or plan to store tools and equipment? Do you anticipate that most foot traffic will be concentrated along a certain path, or would you like to guide traffic along a particular path? During the planning stage is the time to consider these factors.

Hardscapes like walkways, patios, decks, and sheds provide wonderful atmosphere and amenities that allow you to make the most of your landscape. They can also prevent excessive wear on grasses that do not tolerate much traffic and be used in other ways to complement your plants. Plan out where you want your hardscapes first (if applicable), then design your vegetative landscaping around it.

A special use to consider are pets as they can be a real challenge to establishing and maintaining healthy plants. Will there be dogs using your site? Chickens? Consider dedicating part of your landscape as a 'run' and do not fret about the condition of the plants there.



How do you plan to use your outdoor space? Create loose bubbles and use lots of labels, or simply make a list.



Graphic from U.S. Department of Agriculture ***planthardiness.ars.usda.gov/system/files/CO150_HS.png***
You can also use this website to download a Plant Hardiness Zone Map that is tailored to your zip code.

PLANT SELECTION

When selecting plants to grow in your landscape, there are many different factors to consider. However, perhaps the most important is selecting species of plants that can handle the conditions of your site. The first thing to check is the USDA Plant Hardiness category of a species, which will tell you the cold hardiness of a plant. Fort Collins is in Zone 5b (map below), so be sure your plant falls into that range. Next, you will want to think about the specifics of your site. For example, don't pick a full-sun plant for a space that gets full-shade; or a plant that likes wet feet for a well-drained slope. Some of this you will find out with trial-and-error, but it is best to try and match plant requirements with the conditions of your site. Not sure about the requirements of your plants? Search for the plant in the City's ***Plant Database***.

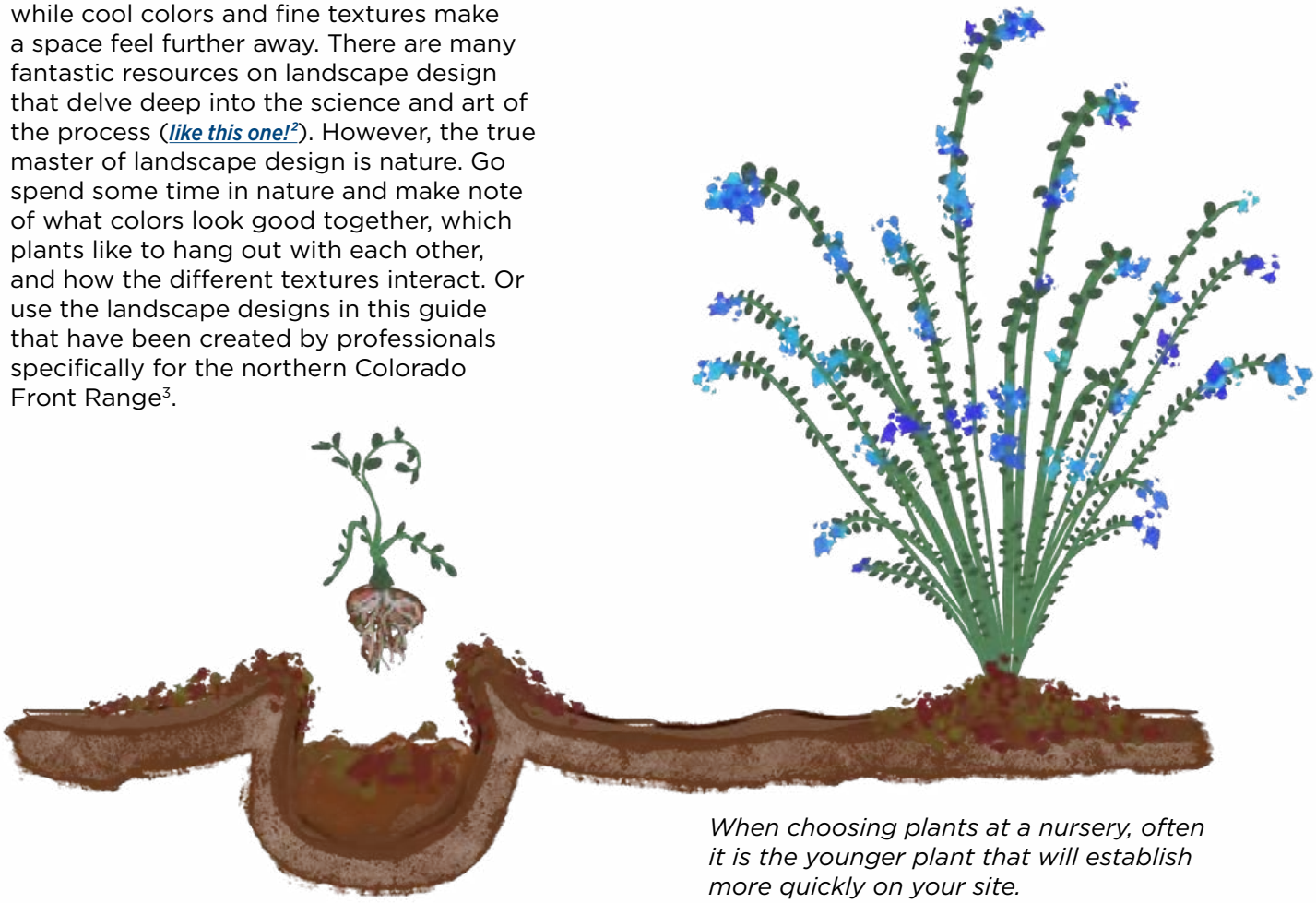
The old adage, 'the right plant in the right place', is a powerful idea to keep in mind. Some plants tolerate a wide array of conditions while others require very specific conditions. If you place a plant with specific conditions where it doesn't have those conditions, you'll end up pouring significant effort into that plant or you'll lose that plant. Similarly, every plant wants to express itself in a specific way – some plants are tall, some are wide, some spread more aggressively than others. It is important to keep in mind the end condition that the plant will continually strive for. If you fall in love with a certain species of tree that can grow quite tall, but you don't want it to grow too tall because of site constraints, you'll be pruning that tree forevermore, and the tree will not be able to thrive.

Once you have selected which species you want to grow, you will need to obtain them. There are many ways to get plants – you can look at your local nursery, grow them from seed, go to a specialty plant sale, or join a plant swap. One thing to consider when picking out plants is that the younger the plant, the quicker and more easily it will be able to adapt to your site.

Perhaps the most fun part of selecting plants is thinking about your landscape design. When selecting plants, you will want to think about the plant's:

- Color
- Texture
- Height

Keep in mind certain design principles, such as putting complementary colors next to each other. Or that warm colors and coarse textures make a space feel closer while cool colors and fine textures make a space feel further away. There are many fantastic resources on landscape design that delve deep into the science and art of the process (*like this one!*[2]). However, the true master of landscape design is nature. Go spend some time in nature and make note of what colors look good together, which plants like to hang out with each other, and how the different textures interact. Or use the landscape designs in this guide that have been created by professionals specifically for the northern Colorado Front Range[3].



When choosing plants at a nursery, often it is the younger plant that will establish more quickly on your site.

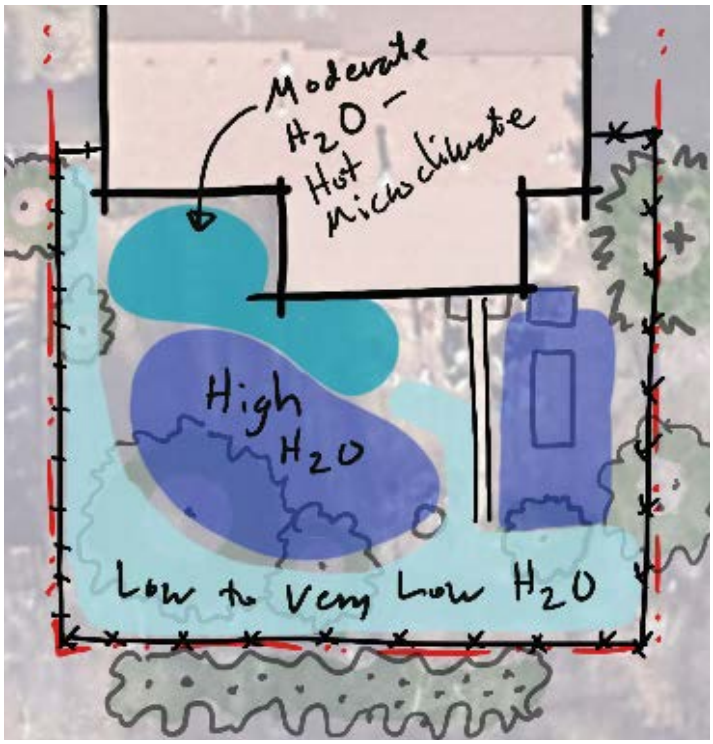
2 Basics of Landscape Design by CSU: *youtu.be/Me4NlKmkwDc?si=Qaw1b__VXzdXE6sC*
3. List of places to find Colorado Native Plants *fcgov.com/vegetation/*

IRRIGATION

While the goal is to minimize irrigation to conserve water, some irrigation will be required for the establishment phase at a minimum. Designing your landscape to be planted in hydrozones simplifies and increases the efficiency of your irrigation system. Hydrozones are areas where plants with similar water needs are grouped together - low water need together with low water, medium with medium, high with high. Planting by hydrozone allows the efficiency of irrigation systems to be maximized and prevents low water need plants from being overwatered and higher water need plants from getting too little water. The City has defined hydrozones (see table below) that can also help you plan your total annual water use.

Scale, cost, and effort are important considerations when planning how you'll water your landscape. Existing irrigation systems can be retrofitted to more efficient systems like drip or high-efficiency spray heads, and it is easiest to make those changes during the installation process. Irrigating by hand is also an option, and passive watering devices (e.g., watering bags, pots) are feasible options for trees and shrubs. Proper planning can also allow you to take advantage of moist microclimates from downspouts, snowmelts, minor elevation changes, and the toes of slopes.

Hand watering is ideal for smaller projects and is the cheapest option but requires the most time and effort in the long run.[2] Drip and spray systems are appropriate for large projects but can also be useful on small projects, however they are generally more expensive and require more effort initially and maintenance long term.



Hydrozone	Water Need (gallons per square feet)
High	18
Medium	14
Low	8
Very Low	3

MAINTENANCE

"MAINTENANCE IS LIKE LAUNDRY – IT'S ALWAYS THERE, AND IT WILL PILE UP IF IT ISN'T TENDED TO REGULARLY"

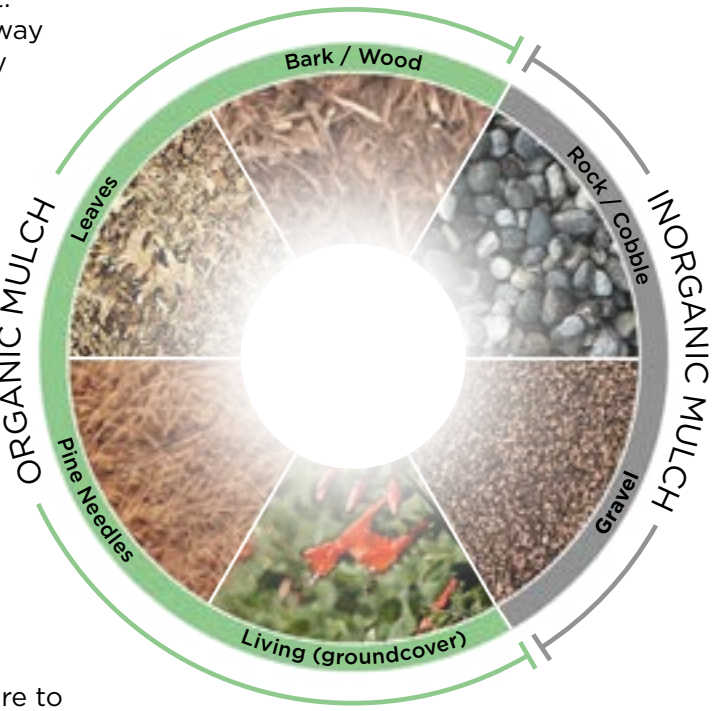
– Ellefson and Winger 2013

While different landscapes have different maintenance needs, all landscapes require some level of maintenance. Have an idea of how much maintenance you are willing to do before deciding on your landscape. For example, a shrub and turf grass dominant landscape is going to have a relatively lower maintenance requirement than a perennial pollinator garden landscape. However, there are a few ways to plan any landscape that may reduce your maintenance overall.

2. Irrigating by hand helpful guidance: https://youtu.be/5lD_bHJjCE4?si=3XpDHM0RC7ziVsJ2

MULCHING

Weed management is key when establishing a new landscape as weeds can out compete new plants and choke them out. Managing existing weeds prior to installation is a great way to reduce weed pressure post-installation. The best way to preventively suppress weeds is by using a mulch. Lay down 4 inches of mulch on your landscape. However, keep wood mulch away from the base of your shrubs and trees as this can cause disease. Mulch also helps conserve soil moisture. New mulch may be needed every few years. As your landscape matures and your plants grow to their full size, they may shade the soil enough that mulch is no longer needed.



There are two types of mulch you can use – organic and inorganic:

Organic mulches include shredded bark, wood chips, pine needles, shredded leaves, and living mulch. As organic mulch breaks down it will also help enrich the soil with organic matter and increase its ability to hold moisture. You can also use creeping perennial groundcovers to create a living mulch that fill in open spaces in your garden. This practice suppresses weeds, retains moisture, and can add new color or texture to your garden.

Inorganic mulches are rock or gravel. Rock and gravel mulch help eliminate run-off, by allowing fast falling rain to percolate quickly through to the soil. Inorganic mulches can increase the temperature of your site and create a hotter microclimate.

Weed Barrier is highly discouraged! Weed barriers disconnect your soil from the natural processes that keep it, and your plants, healthy. In addition, the rich organic material that inevitably ends up decomposing on top of the weed barrier makes a perfect bed for all those weeds you are trying to get rid of. Weed barrier creates more work in the long run. Rubber or plastic based mulches are also discouraged. They can lead to soil contamination, create a serious fire hazard, and increase the temperature of a site.

WEEDS & INTEGRATED PEST MANAGEMENT

When the weeds appear, use the principles of Integrated Pest Management (IPM). IPM is a holistic approach to managing pests which can include insects, weeds, and diseases. IPM uses a variety of tools to prevent and control pest infestations using the least toxic methods possible. Reducing our use of chemicals helps prevent pesticide resistance and protects the health of humans and ecosystems.

When utilizing IPM, you will learn about the pests in your garden and what environmental conditions they need to thrive. Using this information you can create conditions that are unfavorable for the pest. These are the steps in the IPM process:

- **Step 1:** Identify the pest and its lifecycle.
- **Step 2:** Monitor pest population.
- **Step 3:** Determine action threshold.
- **Step 4:** Choose the least toxic or least invasive management method(s): See graphic and list of control methods on the following page.
- **Step 5:** Continue to monitor and take action if necessary.

PRUNING

Woody plants like shrubs and trees will eventually require some pruning. However, this should be limited if you carefully selected the right plant for the right place, as discussed previously. Proper pruning can promote a more open plant, abundant flowering, maintain vigor, increase sunlight to plants underneath, and keep wayward branches from interfering with walkways. The timing of pruning can vary depending on the desired results and type of plant (i.e., spring blooming vs. summer blooming shrubs). PlantTalk Colorado, a part of CSU Extension, has useful guides, resources, and videos to guide your pruning efforts.[3]

LAYOUT

The layout of your landscape also influences the amount maintenance needed. Keep common sense landscaping principles in mind:

- Plant in hydrozones.
- Plant high water need plants near the water source.
- Do not design the space in very narrow or small triangular spaces that will be hard to maintain or mow around (if needed).
- Minimize erosion opportunities with dry stream beds, rain gardens, and/or mulching.

MAINTENANCE LEVEL

The best way to reduce the amount of maintenance your landscape needs is to do less maintenance. That might sound like a silly statement, but it is true. Decide that you are comfortable with a 'messy' yard – let those leaves stay in your yard and decompose into fertilizer. Don't trim back tall ornamental grass and stems that provide critical overwintering habitat for insects. Ornamental grasses can also add winter interest that provides beautiful color through the cold months. Let your turf grass go dormant earlier in the year and save on your water bill. A 'messy' yard is often, actually, a 'healthy' yard. The graphic below demonstrates how elements such as dead logs, old stems, and bunch grasses are homes for insects over the winter. These insects provide pollination and act as a critical food source for many species.

A 'messy' yard is often, actually, a 'healthy' yard.

*3. PlantTalk Colorado: **planttalk.colostate.edu/topics/trees-shrubs-vines/1713-pruning-shrubs***

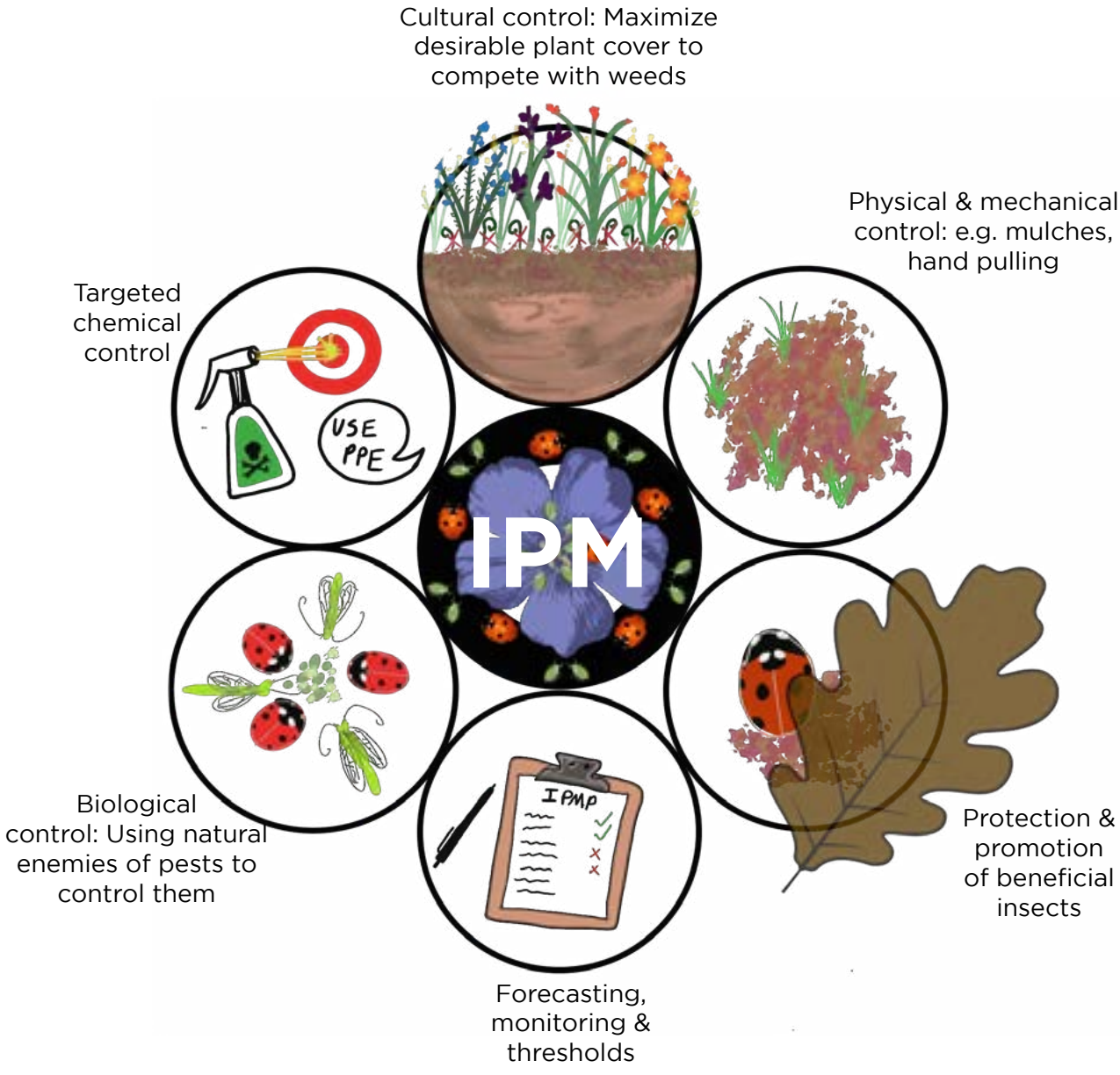
MANAGEMENT METHODS

Cultural controls are practices that reduce pest reproduction and survival. For example, decreasing irrigation or changing fertilization regimes can reduce the amount or type of weeds that are able to establish in your garden.

Biological controls are the practice of using the natural enemies of pests to control them. This includes using beneficial predator insects, parasites, pathogens, and competitors to control pests.

Mechanical and physical controls kill a pest directly, block pests out, or make the environment unsuitable for it. Traps for slugs and hand weeding are examples of mechanical controls. Physical controls include mulches for weed management and solarization of soil for disease management.

Chemical control is the use of pesticides. Pesticides include insecticides, herbicides, and fungicides. In Integrated Pest Management (IPM), pesticides are used only when needed and in combination with other approaches for long-term control. Pesticides are selected and applied in a way that minimizes their possible harm to people, non-target organisms, and the environment. Using IPM you will choose the least toxic pesticide available and apply the smallest amount needed. For example: spot spray weeds instead of broadcast spraying an entire area. It is important to read the safety labels on each pesticide container and follow all directions- the label is the law!



GARDEN PLANNING EXERCISE

SPRING

GROUND COVER
1. _____
2. _____

2-3 FT
1. _____
2. _____
3. _____

3-6’
1. _____
2. _____

SPRING-SUMMER

GROUND COVER
1. _____
2. _____

2-3 FT
1. _____
2. _____
3. _____

3-6’
1. _____
2. _____

SITE/ HYDROZONE

Aspect, Drainage, Sun/ Shade, Microclimates, Soils, Water/Hydrozone, Utility Location

SUMMER

GROUND COVER
1. _____
2. _____

2-3 FT
1. _____
2. _____
3. _____

3-6’
1. _____
2. _____

FALL

GROUND COVER
1. _____
2. _____

2-3 FT
1. _____
2. _____
3. _____

3-6’
1. _____
2. _____

Take an 8.5 x 11 sized piece of paper and fold it into quarters. Draw the above quadrant and central circle. In the central circle, write down the characteristics of your site/garden and then fill in the plants on the sheet for each of the seasons. Organizing your plant choices into seasons helps to make sure your site has plants blooming all seasons long which is not only good for you but for birds and pollinators too. There are many resources out there for choosing plants including the City’s Plant Database.[4] The Database will allow you to filter plants based on colors, height, seasons, irrigation needs and more to show you a wide variety of plants.

4. Fort Collins Plant Database: www.fcgov.com/vegetation/

NATURE IN THE CITY

LANDSCAPE DESIGN GUIDE

CHAPTER 2: POLLINATOR GARDENING

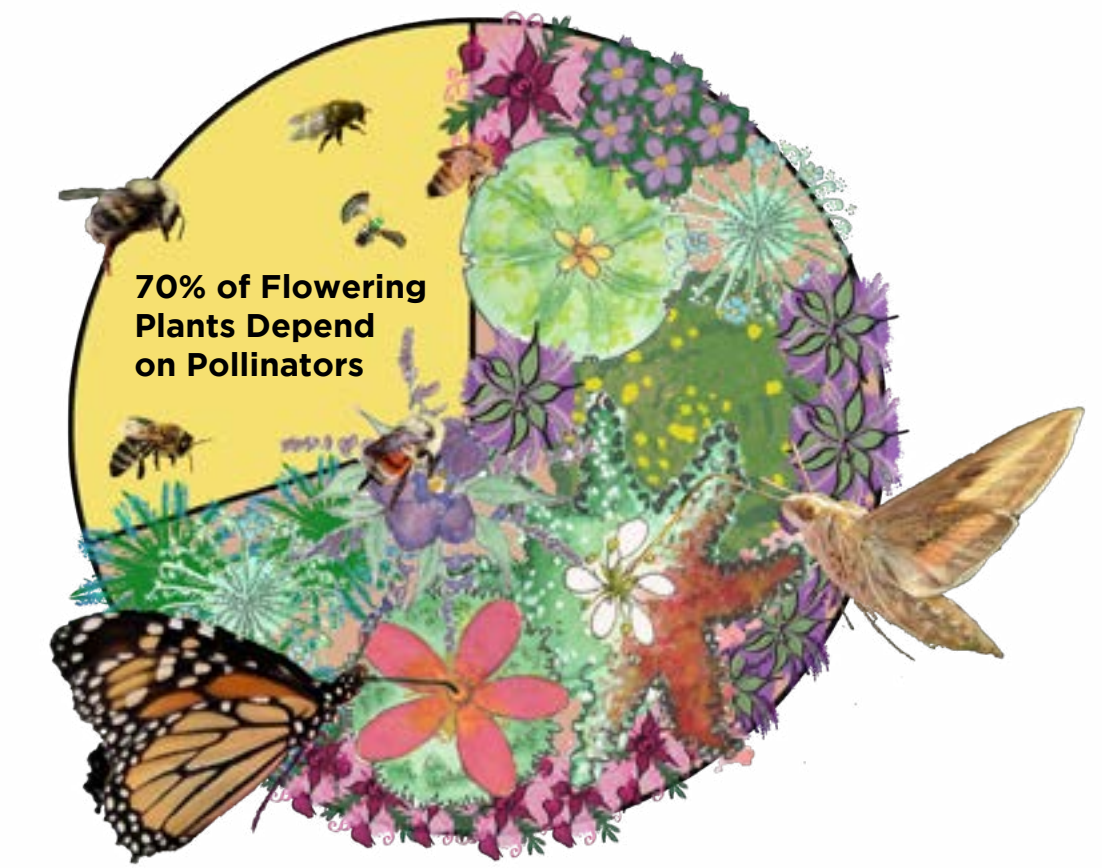
City of Fort Collins

CHAPTER 2

Pollinator Gardening

ABOUT POLLINATOR GARDENING

Pollinators make the world go around! Over 70 percent of the world's flowering plants require a pollinator to produce fruit or seeds. This amazing service allows plants that we depend on, for food and the economy, to thrive and makes our world a more vibrant place. You can help pollinators flourish by creating a pollinator garden.



Most outdoor spaces can be transformed into a pollinator garden. Here are key elements that should be considered when designing and installing your pollinator garden:

- Use as many native plants as possible. Many local pollinators need specific native plants that they evolved with to survive. However, some adapted plants can also provide resources to pollinators.
- Use a variety of plants so there is always something in bloom from early spring through fall.
- Choose plants with a variety of flower colors and shapes that will attract different pollinators. (*Learn more*[2.1])
- Make sure to include larval host plants in your landscape or bunchgrass for overwintering sites. *Here is a list*[2.2] of critical host plant species for Larimer County pollinators.

2.1. *fws.gov/pollinators/pdfs/PollinatorBookletFinalrevWeb.pdf*

2.2. *fcgov.com/natureinthecity/files/nativeplant-handout-final-outline4.24.pdf?1619107014*

- Plant the same species of plants in clumps or swaths. This allows pollinators to work more efficiently.
- Be wary of cultivars or hybrid plants. They are often bred for showy flowers or leaf colors that pollinators can't access or don't like.
- Do not use weed barrier fabric! This fabric is detrimental to the health of your soil and prevents ground nesting bees from being able to find a home.
- Leave bare soil spots, free from mulch, for ground nesting bees.
- Keep dead trees or limbs in your garden for bees that nest in wood.
- Insects need to drink water too! Leave out a shallow bowl of water or bird bath, and place rocks in it so they have a safe place to land.
- Don't use pesticides, insecticides or herbicides. These can directly or indirectly kill pollinators.

FACTORS TO CONSIDER WHEN SELECTING PLANT SPECIES

Pollinator gardens can be installed in a wide range of conditions since many plants can be used to support pollinators. In general, the following physical factors should be considered:

SUN REQUIREMENTS: Full sun or part sun (Have full shade? (Check out Chapter 3 – Dry Shade)

SOILS: Variable – can be rocky, loam, clay, etc. it just needs to be able to support plants.

DRAINAGE: Variable – however, many native and low water plants appreciate well-drained sites.

ASPECT: Variable - east, south, west are ideal since they get more sun.

WATER: Very low to moderate.

MICROCLIMATES: Take advantage of warm microclimates around your home (e.g., south side of a building, next to pavementyor on a south facing slope) to expand the palette of successful pollinator plants in your garden. Warm microclimates can be excellent sites for plants in the genera *Penstemon, Opuntia, Echinocereus*, and *Eriogonum*, for starters.

NOT SURE WHAT THESE DIFFERENT PHYSICAL REQUIREMENTS ARE?

CHECK OUT CHAPTER 1 – SITE CHARACTERISTICS.

DESIGN EXAMPLES

Small Project Design

This pollinator garden will fit snuggly into a corner. It measures 15’ x 15’ and 22’ diagonally. The tall purple (when in bloom) leadplant shrub anchors the garden. The design has repeating colors and varying textures through a wide selection of native perennial forbs.

Designed by
Deryn Davidson, CSU Extension

Numbers on design correspond to plants listed on next page

Native plants in a newly planted garden with pea gravel & cobble mulch.
Photo provided by Deryn Davidson.

Shrub

1

Dwarf Wild Indigo
Amorpha nana

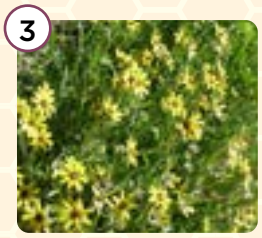
Grass

2

Sideoats Gramma Grass
Bouteloua curtipendula

Perrenials

3



Chocolate Flower
Berlandiera lyrata

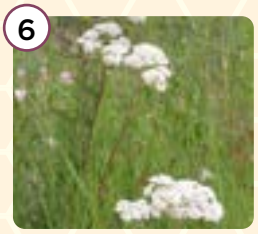
4

Prairie Sage
Artemisia ludoviciana

5

Purple Prairie Clover
Dalea purpurea

6



Common Yarrow
Achillea millefolium

7

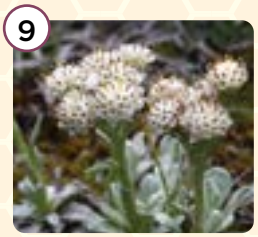
Blue Mist Penstemon
Penstemon virens

8

Blue Flax
Linum lewisii

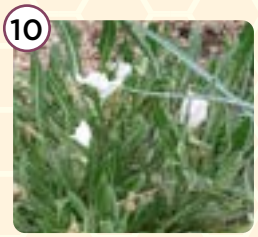
Groundcovers

9



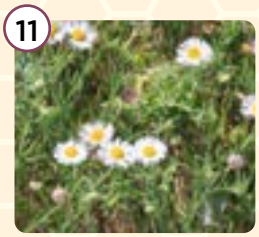
Pussytoes
Antennaria spp.

10



Evening Primrose
Oenothera caespitosa

11



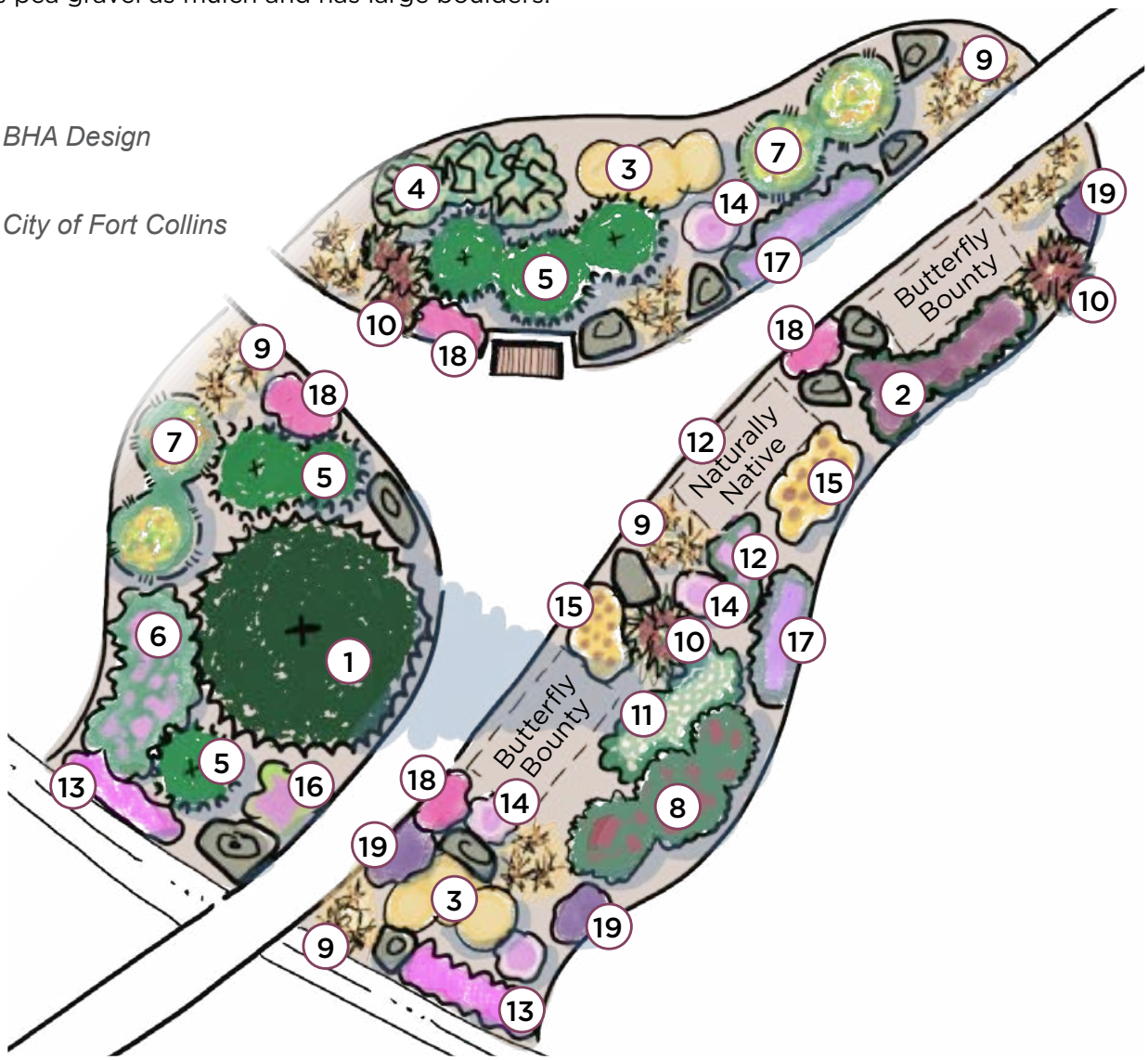
Spreading Daisy
Erigeron divergens

Medium Project Design – Oakridge Village

Oakridge Village VII HOA added a pollinator garden to their green space in 2020. The space is along a main walking path and encourages its residents to sit and admire a Colorado landscape. The garden has a large diversity of perennials, grasses and shrubs. It also highlights several *Garden in a Box designs*.[2.3]
The garden uses pea gravel as mulch and has large boulders.

Design by:
Angie Milewski, BHA Design

Adapted by:
Jennifer Torrey, City of Fort Collins



Oakridge Village Garden image provided by Kate Rentschlar

2.3. *resourcecentral.org/gardens/*

Tree

1

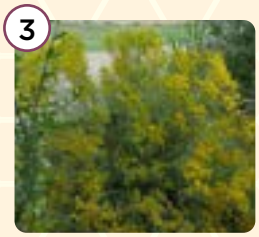
Rocky Mountain Juniper
Juniperus scopularum

Shrubs

2

Lead Plant
Amorpha canescens

3



Rubber Rabbit Brush
Chysothamnus nauseosus var. nauseosus

4

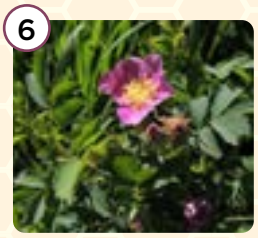
Green Ephedra
Ephedra viridis

5

Slowmound Mugo Pine
Pinus mugo 'Slowmound'

Grasses

6



Woods Rose
Rosa woodsii

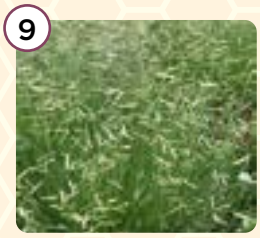
7

Shrubby Cinquefoil
Potentilla fruticosa

8

Boulder Raspberry
Rubus deliciosus

9



Blonde Ambition Blue Grama
Bouteloua gracilis 'Blonde Ambition'

10

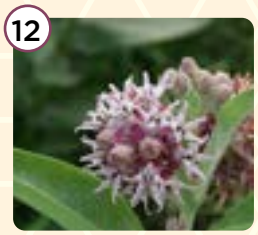
Undaunted® Ruby Muhly
Muhlenbergia reverchonii

Perennials

11

Western Yarrow
Achillea millefolium

12



Showy Milkweed
Asclepias speciosa

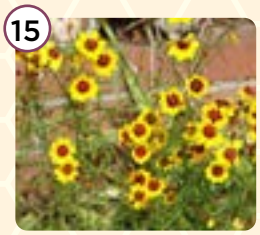
13

Purple Poppymallow, Winecups
Callirhoe involucrata

14

Rocky Mountain Bee Plant
Cleome serrulata

15



Plains Coreopsis
Coreopsis tinctoria

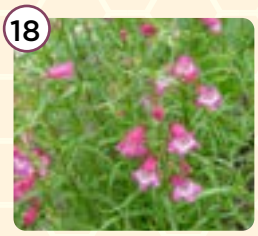
16

Beebalm
Monarda fistulosa

17

Little Trudy Catmint
Nepeta x Little Trudy

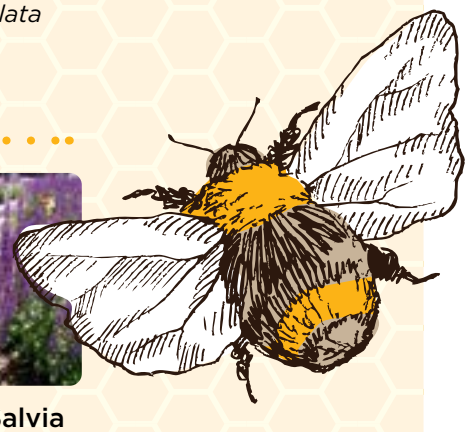
18



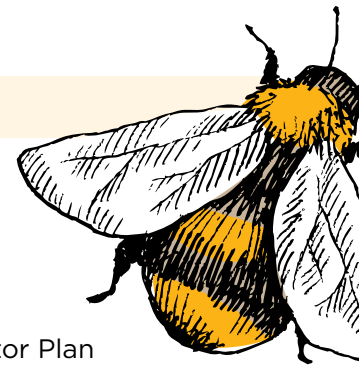
Red Rocks Penstemon
Penstemon x mexicalli 'Red Rocks'

19

May Night Salvia
Salvia nemorosa 'May Night'



Large Landscape-Level Project Design – Bloom



Designed by Norris Design

The Bloom Pollinator Plan is an innovative community planning and site design tool meant to establish pollinator habitat at Hartford Homes' 229-acre mixed-use neighborhood in Fort Collins. It supports the City's broader goals of creating pollinator habitat, integrating natural systems, improving aesthetics, implementing sustainable landscapes and stewarding natural resources.

Norris Design collaborated with City staff to develop pollinator habitat guidelines, from planning and design through maintenance best practices. The Bloom Development Plan recommends plant species that provide both year-round and seasonal habitat for pollinator species. The Plan also identifies locations for linear pollinator corridors and site-specific design nodes for pollinators of varied species and flight distances.

All landscape throughout the development is irrigated via non-potable water stored in irrigation ponds. Pond edges create additional opportunities for riparian pollinator species within the interior of the community.

KEY

	Primary Pollinator Corridor Nodes to be 100 sqft provided at 100' intervals
	Primary Pollinator Node
	Secondary Pollinator Corridor Nodes to be 50 sqft provided at 400' intervals
	Secondary Pollinator Node

Spring Blooming Plants for Pollinators

Blue Mist Bluebeard
Caryopteris x clandonensis 'Blue Mist'

Dwarf Pinon Pine
Pinus edulis

Prairie Smoke
Geum triforum

Sonoran Sunset Hyssop
Agastache cana 'Sinning?

Blue Oat Grass
Helictorichon sempervirens

Carol Mackie Daphne
Daphne x burkwoodii

Butterfly Weed
Asclepias tuberosa

Purple Poppymallow, Winecups
Callirhoe involucrata

Sulphur-flower
Erigonum umbellatum

Standing Ovation Bluestem Grass
Schizachyrium scoparium 'Standing Ovation'

Summer Blooming Plants for Pollinators

Showy Milkweed
Asclepias speciosa

Creeping Oregon Grape Holly
Berberis repens

Blanket Flower
Gaillardia aristata

Blue Flax
Linum lewisii

Indian Grass
Sorghastrum nutans

Fall Blooming Plants for Pollinators

Engelmann's Daisy
Engelmannia peristenia

Giant Goldenrod
Solidago gigantea

Stonecrop
Sedum spectabile

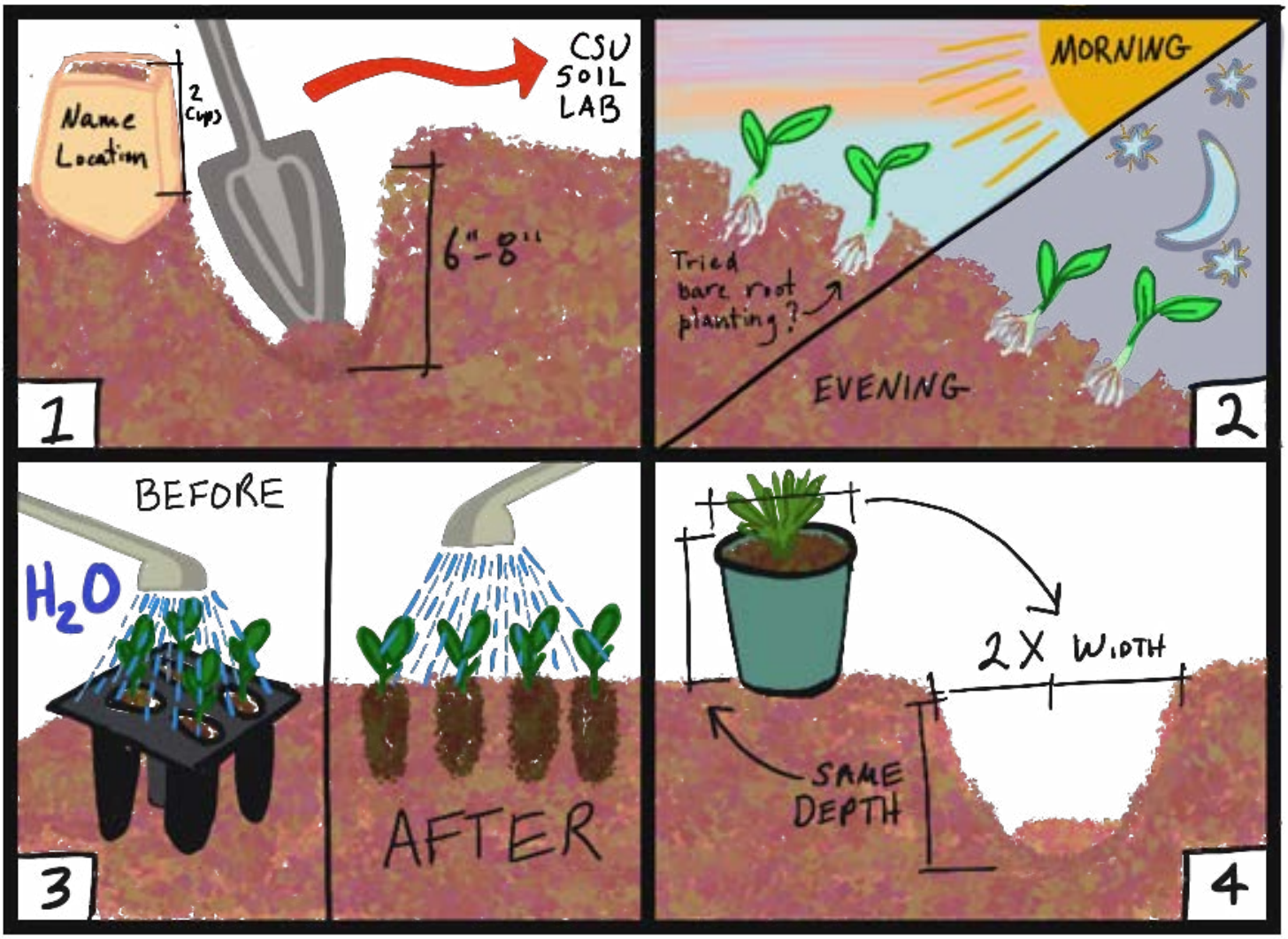
Purple Poppymallow, Winecups
Callirhoe involucrata

Showy Milkweed
Asclepias speciosa

INSTALLATION TIPS

Getting your plants in the ground is not quite as simple as digging a hole and dropping them in. Here are a few tips that will help your plants have a smooth transition into your landscape.

- Before planting, make sure you get a soil test done. You may need to amend your soil before planting so that it can support your plants (see chapter 1 page 2).
- Plant in the morning or evening; avoid planting during the hottest part of the day as this will stress your plants. Similarly, try to avoid planting during peak heat months, such as July and August.
- Water your plants before you put them in the ground and again after you put them in. Transplanting is stressful and they will do better if they are well hydrated.
- The width and depth of the hole you're planting will vary depending on what you are planting. In general, you should dig a hole twice the width and the same depth of the pot your plant is in. The exception to this is trees, which should be 2-3x the width of the root ball and 1-3 inches shorter than the root ball.



IRRIGATION

Pollinator gardens are typically dominated by plants adapted to Colorado's semi-arid climate and require less water than conventional landscaping. ***However, all plants need water to get established for the first growing season.***

To avoid over-watering your garden, it is best to create and stick to an irrigation plan. Overwatering can kill low water plants by rotting their roots. A good irrigation plan outlines how much to water and provides a timeline to help you cut back on watering by listing the appropriate time of day to reduce evaporation. Once plants are established, watering should be infrequent and deep. The simplest way to water is using a hose, but you can also install drip irrigation to save time and reduce the amount of evaporation.

Even the best laid plans cannot address all contingencies, like excessive drought or heavy/ prolonged rains. Therefore, the focus should be on results – if your plants are healthy above and below ground then your watering is likely appropriate. Frequent monitoring is key. Soil moisture monitoring devices are available to provide feedback but getting your fingers in the soil is an effective and easy way to monitor moisture levels. It is important to check the ,ksoil moisture between watering and each time you water, to ensure you are not over or underwatering.

IS THE GROUND MOIST 6 INCHES BELOW THE SURFACE OR ONLY AT THE SURFACE?

It is best to water infrequently and deeply, soaking the soil 6 inches down. Deep, less frequent watering will encourage plants to root deeply and become more drought tolerant.

Example Irrigation Plan for Establishment of a Perennial Bed for Pollinators*		
	FREQUENCY	**DURATION**
Spring & Fall Planting	Once a day	First week
	Once every 2-3 days	2 weeks (or end of growing season)
	Once every 7-14 days	As needed through growing season
Summer Planting	Once a day	First Week
	Once every 2-3 days	Until the fall
	Once every week	Until the end of growing season
Plants should receive roughly the same volume of water as the size of the pot the plant came in, per watering event.		
*Adjust as necessary given precipitation and condition of plants		

MAINTENANCE

Native-dominant pollinator gardens typically require less maintenance once established but some kind of maintenance is inevitable. Proper planning and installation can minimize required maintenance and increase the chances of long-term success. Refer to Chapter 1 for more on garden planning fundamentals.

Weed Management

The use of pesticides in a pollinator garden is strongly discouraged since the chemicals can be taken up by the plant and then transferred to non-target pollinators via pollen and nectar. If pesticides are used be sure to follow all application instructions closely – the label is the law! The Larimer County Weed District[2.4] can provide advice on weed identification, management, and pesticides.

Other

Don't clean up all of your garden in the Fall or Spring. The dead plant material is used by many pollinators to overwinter or nest in. Removing this plant material may expose the pollinators to harsh spring conditions that they will not be able to survive. Wait until May to start cleaning out your garden.

Mulching

Mulching is a critical practice for gardening to decrease soil temperature, suppress weeds, and conserve soil moisture. When adding mulch to new or existing plants, leave a buffer between the base of plants and mulch. This practice keeps the stems of plants dry and prevents rot. Learn more about the different types of mulch in Site Characteristics and Planning.

Weed barrier is not recommended, as it has a negative effect on soil quality and wildlife habitat. Weed barrier will also begin to degrade over time allowing weeds to root through it and it becomes difficult to remove and unsightly.

Keep in mind that many native pollinators are ground-nesting species and require some patches of bare and/or minimally covered soil. You can help them out by not mulching (or only mulching to a depth of 1 inch) in a 6-12 inch circle around the trunk or stems of some plants.

DEAD WOOD MAKES GREAT NESTS
for cavity nesting pollinators!

DON'T USE PESTICIDES...
they can kill pollinators.

DON'T CUT BACK IN THE FALL
do less work and leave stems and grasses!

2.4 larimer.org/naturalresources/weeds

APPROPRIATE PLANT LIST

When selecting plants, make sure they meet your physical requirements and are appropriate for your space. CSU Extension recommends the following plant list, with plants separated into times of the season they bloom. The plant list on the following pages in chapter 2 is to help you get started – some of these plants may not be appropriate for your space and there are many more plants that are great for pollinators.

For more plant options (or information on the plants in the list), use the Fort Collins Plant Database and select filters appropriate for your project.

ADDITIONAL RESOURCES

Bringing Nature Home -
Tallamy (2014), Timber Press

CSU Extension – Creating Pollinator Habitat:
extension.colostate.edu/topic-areas/insects/creating-pollinator-habitat-5-616/

CSU Extension – Attracting Native Bees to Your Landscape:
extension.colostate.edu/topic-areas/insects/attracting-native-bees-landscape-5-615/

Get Involved - Join the Native Bee Watch:
arapahoe.extension.colostate.edu/nbw/

The Bumble Bees of Colorado:
colorado.edu/cumuseum/sites/default/files/attached-files/thebumblebeesofcolorado-2017.pdf

Selecting Plants for Pollinators: A Regional Guide for Farmers, Land Managers, and Gardeners in the Southern Rocky Mountain Steppe – Pollinator Partnership: pdf

US Forest Service – Pollinators:
fs.fed.us/wildflowers/pollinators

US Forest Service:
Pollinator-Friendly Best Management Practices for Federal Lands

Xerces Society for Invertebrate Conservation:
xerces.org

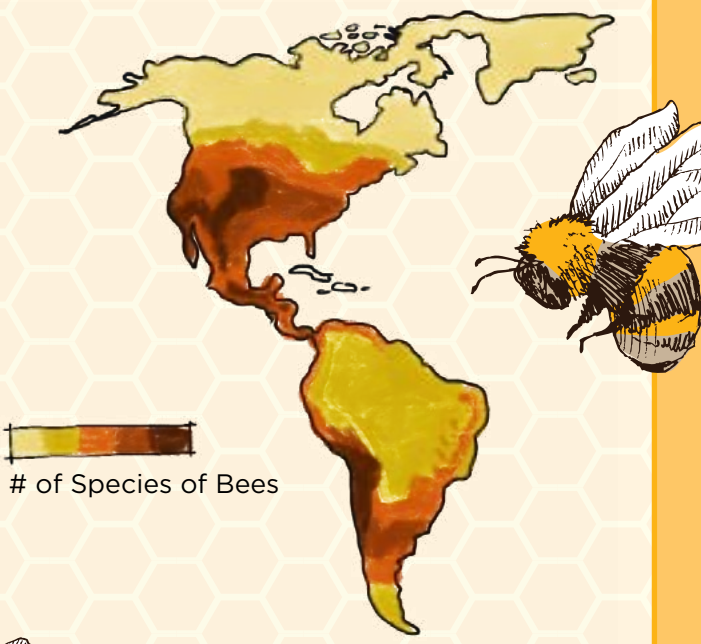
DID YOU KNOW

COLORADO IS A BEE HOT SPOT?

That's right, we have more than 946 species of bees that call Colorado home!

And almost half (437 species) are found in Larimer County.

Most people are familiar with the European honeybee (a non-native species) and bumble bees (Colorado has 24 species!). However, there are many more to explore. You can learn more about Colorado's bees through the Native Bee Watch or Xerces Society.



Orr et al. 2020. Global Patterns and Drivers of Bee Distribution, Current Biology, https://doi.org/10.1016/ j.cub.2020.10.053

HOW TO USE THE PLANT LISTS

TREE/ SHRUB			

The plant lists are divided by plant types headings labeled in the grey bar. They include Trees, Shrubs, Forbs, Perennials, Groundcovers, and Grasses.

Scientific Name	Common Name
Amelanchier alnifolia var. alnifolia	Saskatoon Serviceberry

Scientific names include the genus, species, and sometimes sub-species or variety of the plant. These are listed to help identify exact species. Some common names can be used for multiple species with different characteristics such as bloom clolor, size, or habitat value. If you would like to learn more about a plant listed in a chapter, find the common or scientific name in the plant list and look across the row to learn more about how it grows. For more information on plants that grow in Norther Colorado check out the digital plant database here: ***fcgov.com/vegetation***

Bloom Time	Scientific Name	Common Name	Nativity
TREE/SHRUB			
	Amelanchier alnifolia var. alnifolia	Saskatoon Serviceberry	FC
	Arctostaphylos x coloradoensis 'Panchito'	Panchito Manzanita	CO

Bloom Time			
A	B	C	D

The Bloom Time information is split into 4 columns, each **showing the main color of the plant as it blooms throughout the year**.

Column A is early spring, exact timing depends on temperatures and precipitation of that year, but usually around April and May.

Column B is the main plant color in early summer, late May and June.

Column C represents the plant color in the heat of summer, July and August.

Column D indicates the color in fall, typically September and October.

Nativity
FC

Nativity describes the closest location to Fort Collins where the plant grows natively.

FC= Fort Collins (these plants grow native in Fort Collins).

CO= Colorado (these plants grow native somewhere in Colorado, but not Fort Collins).

US= United States (these plants grow native somewhere in the United States, but not Colorado).

Not Native= These plants are not native in the United States.

Height X Width
20'x12'

Height is the vertical measurement of a plant at maturity; width is the measurement of the spread (how wide) you can expect a plant to grow. (Measurements are listed in iches or feet).

Exposure
FS/PS

Exposure tells you how much sun the plant likes. If more than one exposure is listed, the plant will do well in multiple types.

FS= Full Sun

PS= Part Sun

S=Shade

Notes
Water during drought

Any additional helpful information about the plant that is not already listed in another category.

Height X Width	Water Needs	Exposure	Habitat Value	Notes	Programs
20'x12'	Low, Moderate	FS/PS	np/bee, bf; hp/bf; birds; wl	Water during drought	NIC
10"x3'	Very low-Moderate	FS/PS	np/bee, bf; birds; wl	Needs good drainage; red twigs	NIC

Water Needs
Low, Moderate

Very Low- indicates a plant that requires 3 gallons of water per square foot per season in addition to precipitation.

Low- indicates a plant that requires 8 gallons of water per square foot per season in addition to precipitation.

Moderate- indicates a plant that requires 14 gallons of water per square foot per season in addition to precipitation.

High- indicates a plant that requires 18 gallons per square foot per season in addition to precipitation.

Habitat Value
np/bee, bf; hp/bf; birds; wl

Habitat value comes in many forms. Below is a key to describe what habitat values the plant provides. Sometimes a specific animal or insect type is described in the list such as “bee”or “bird”.

np = nectar/pollen

bf = butterfly

hb = hummingbird

s = seeds

frt = fruit

hp = host plant

wl= wildlife

Programs
NIC

Programs hosted by the City of Fort Collins include Nature in the City (NIC) and the Xeriscape Incentive Program (XIP). Nature in the City focuses on plants native to Colorado and Fort Collins where XIP focuses on water savings. Plants listed with both XIP and NIC are supported by both programs.

CHAPTER 2 POLLINATOR PLANT LIST

EARLY BLOOMERS PLANT LIST

Bloom Time	Scientific Name	Common Name	Nativity	Height X Width	Water Needs	Exposure	Habitat Value	Notes	Programs
TREE									
	Amelanchier alnifolia var. alnifolia	Saskatoon Serviceberry	FC	20′x12′	Low, Moderate	FS/PS	np/bee, bf; hp/bf; birds; wl	Water during drought	NIC
	Prunus americana	American Plum	FC	10′x15′	Very low-Moderate	FS/PS	np/bee, bf; hp; frt/birds; wl	Thorns, tolerates clay soil	NIC, XIP
	Prunus virginiana	Chokecherry	US	30′x15′	Very low-Moderate	FS/PS	np/bee, bf; hp; frt/birds; wl	Tolerates dry, rocky soil	NIC, XIP
	Flowering fruit trees including apples, cherries, peaches, and plums				Moderate to High	FS/PS/S	np/bee, bf; frt/birds; wl	Fruit for all	NIC
SHRUBS									
	Ribes aureum	Golden Currant	FC	4′x4′	Very low, Low	FS/PS/S	np/bee, bf; frt/birds; wl	Bluish berries, fall color	XIP
	Rhus trilobata var. trilobata	Three Leaf Sumac	US	6′x6′	Very low, Low	FS/PS	nests for bees, ss/birds	Likes sandy soil, good fall color	NIC, XIP
	Salix spp.	Willow	US	Varies	Moderate to High	FS/PS/S	np/bee, bf, hp/bf; frt/birds; wl	Grows in wet, damp soils	NIC
FORBS									
	Allium cernuum	Nodding Onion	FC	1′x6″	Low-Med	FS/PS	np/bee, bf	Dry soils, deer tolerant	NIC
	Callirhoe involucrata	Winecups	FC	6″x2′	Low-Med	S	np/bee, bf	Prefers compost, loam soil	NIC
	Eriogonum umbellatum	Sulphur Flower	CO	6″x1′	Low	S	ss/birds	Fall color	NIC, XIP
	Erysimum spp.	Wallflower	US	10″x4″	Low-Med	S/PS	np/bee, bf	Long blooming	XIP
	Geum triflorum	Prairie Smoke	CO	6″x1.5′	Low	FS	np/bee, bf, o	Whispy blooms	NIC, XIP
	Linum lewisii	Blue Flax	CO	2′x2′	Low	S/PS	np/bee, bf, o	Readily seeds	NIC
	Penstemon virens	Blue Mist Penstemon	CO	2′x1.5′	Low	S	np/bee, bf, o	Long blooming, native bee	NIC, XIP
	Penstemon eatonii	Firecracker Penstemon	CO	1′x1′	Very Low	FS/PS	np/bee, bf; n/hb	Handles rocky,sandy soil	NIC, XIP
	Pulsatilla nuttalliana	Pasque Flower	FC	6″x1′	Low	S/PS	np/bee	Earliest of blooms	XIP
	Penstemons (many native and cultivar options, check with local nursery)				Very low-Low	FS/PS	np/bee, bf; n/hb	Versatile plants	NIC, XIP

MID-SUMMER BLOOMERS PLANT LIST

Bloom Time	Scientific Name	Common Name	Nativity	Height X Width	Water Needs	Exposure	Habitat Value	Notes	Programs
TREE									
	Robinia neomexicana	New Mexico Locust	US	10′x12′	Very low-Low	PS	np/bee, hb; frt/birds; wl	Seeds poisonous to humans	NIC
	Tilia americana	American Linden	US	50′x30′	Med	S/PS	np/bee, bf; frt/birds; wl	Tolerates clay soil	NIC
	Gleditsia triacanthos	Honey Locust	US	60′x80′	Med	S	np/bee, bf; hp; frt/birds; wl	Tolerates drought, wind	NIC
SHRUBS									
	Amorpha canescens	Leadplant	US	4′x4′	Low	S/PS	np/bee, bf	Bluish berries, fall color	XIP
	Sambucus racemosa	Red Elderberry	Non-native	8′x8′	Med-High	S/PS	np/bee, bf; frt/birds; wl	Tolerates wet soils	NIC, XIP
FORBS									
	Asters (many native and cultivar options, check with local nursery)			1′x6″	Very low-Low	S/PS	np/bee, bf; n/hb	Versatile plants	NIC, XIP
	Anaphalis margaritacea	Pearly Everlasting	US	3′x1′	Low	S/PS	np/bee, bf; hp	Sandy or gravelly soils	NIC
	Asclepias speciosa	Showy Milkweed	US	3′x1′	Low-Med	S	np/bee, bf; hp; frt/birds; wl	Can tolerate moist soils	NIC
	Campanula rotundifolia	Bluebell Bellflower	US	6″-1′x1′	Low-Med	S/PS	np/bee, bf	Long blooming	XIP
	Gaillardia aristata	Blanket Flower	US	1′x1′	Low	S	np/bee, bf	Long blooming	NIC, XIP
	Salvias (many native options, check with local nursery)				Very low-Low	S/PS	np/bee, bf; n/hb	Versatile plants	NIC, XIP

LEAVE BARE EARTH FOR GROUNDNESTING POLLINATORS!

TRY A COBBLE RING!

CHAPTER 2 POLLINATOR PLANT LIST

LATE BLOOMERS PLANT LIST

Bloom Time	Scientific Name	Common Name	Nativity	Height X Width	Water Needs	Exposure	Habitat Value	Notes	Programs
TREE									
	Robinia neomexicana	New Mexico Locust	US	10′x12′	Very low-Low	PS	np/bee, hb; frt/birds; wl	Seeds poisonous to humans	NIC
	Tilia americana	American Linden	US	50′x30′	Med	S/PS	np/bee, bf; frt/birds; wl	Tolerates clay soil	NIC
	Gleditsia triacanthos	Honey Locust	US	60′x80′	Med	S	np/bee, bf; hp; frt/birds; wl	Tolerates drought, wind	NIC
SHRUBS									
	Amorpha canescens	Leadplant	US	4′x4′	Low	S/PS	np/bee, bf	Bluish berries, fall color	XIP
	Sambucus racemosa	Red Elderberry	Non-native	8′x8′	Med-High	S/PS	np/bee, bf; frt/birds; wl	Tolerates wet soils	NIC, XIP
FORBS									
	Asters (many native and cultivar options, check with local nursery)			1′x6″	Very low-Low	S/PS	np/bee, bf; n/hb	Versatile plants	NIC, XIP
	Anaphalis margaritacea	Pearly Everlasting	US	3′x1′	Low	S/PS	np/bee, bf; hp	Sandy or gravelly soils	NIC
	Asclepias speciosa	Showy Milkweed	US	3′x1′	Low-Med	S	np/bee, bf; hp; frt/birds; wl	Can tolerate moist soils	NIC
	Campanula rotundifolia	Bluebell Bellflower	US	6″-1′x1′	Low-Med	S/PS	np/bee, bf	Long blooming	XIP
	Gaillardia aristata	Blanket Flower	US	1′x1′	Low	S	np/bee, bf	Long blooming	NIC, XIP
	Salvias (many native options, check with local nursery)				Very low-Low	S/PS	np/bee, bf; n/hb	Versatile plants	NIC, XIP

"THE HUM OF BEES IS THE VOICE OF THE GARDEN"

Elizabeth Lawrence

NATURE IN THE CITY

LANDSCAPE DESIGN GUIDE

CHAPTER 3: DRY SHADE GARDENING

An Introduction to Diversifying Urban Landscapes in Fort Collins

City of Fort Collins

CHAPTER 3

Dry Shade Gardening

Dry shade can be one of the trickier spots to garden in, but with careful attention to your site's characteristics and by selecting well-adapted plant species you can create a beautiful and functional landscape. When planning a dry shade garden, consider how many hours of sun and what type of shade your site gets. Some other factors to consider are soil type, the site's aspect, drainage, soil moisture, existing trees and any microclimates within the space. Identifying these factors will help you choose plants that are well adapted to the conditions in your garden.

HOT TIPS FOR DRY SHADE

- Use mostly native plants that are adapted to low water. If you want to increase biodiversity in your yard, check out this list of key plant genera to include by the ***National Wildlife Foundation***.[3.1]
- Figure out what type of shade you have: full shade or part-sun. Find which plants work best in these conditions using the dry shade plant list at the end of chapter 3 or by searching the City of Fort Collins Vegetation Database.[3.2]
- Topdressing your garden with mulch and plant-based compost can help conserve water and improve soil moisture in very dry sites.
- Non-native species can sometimes be aggressive and have the potential to be invasive. We have recommended some non-aggressive, non-native plants on our plant list at the end of this chapter. The City of Fort Collins Vegetation Database[2] also has additional recommendations.

3.1 *nwf.org/-/media/Documents/PDFs/Garden-for-Wildlife/Keystone-Plants/NWF-GFW-keystone-plant-list-ecoregion-9-great-plains.ashx?la=en&hash=D93EC537B17AF4BEA41B4CC0149413C15A46CC29)*

3.2 *fcgov.com/vegetation*

FACTORS TO CONSIDER WHEN SELECTING PLANT SPECIES

When choosing plants for your garden, you will want to consider the following: how much sunlight the site gets, the soil type, the site's aspect, drainage, and any microclimates within the space. Identifying the conditions of your site will help you choose plants that are well adapted to those conditions and so they can thrive in your prospective garden.
See Chapter 1 for more information on Site Characteristics.

SUN REQUIREMENTS: Full Shade, Part Sun

- **Full Sun:** 5+ hours of direct sunlight per day
- **Part Sun:** 3 – 5 hours of direct sunlight per day
- **Shade:** Less than 3 hours of direct sunlight per day

ASPECT: Any aspect can have shade. North aspects may have cooler shade, while other aspects may receive more light which Part Sun plants may be able to tolerate.

WATER: Very Low to Moderate

MICROCLIMATES: Dry Shade is typically going to have a cooler microclimate due to the amount of shade or aspect of the site. Plant species that like cooler conditions or shade in these microclimates, such as kinnikinnick (Arctostaphylos uva-ursi), cut-leaved anemone (Anemone multifida), or Oregon grape (Berberis repens).

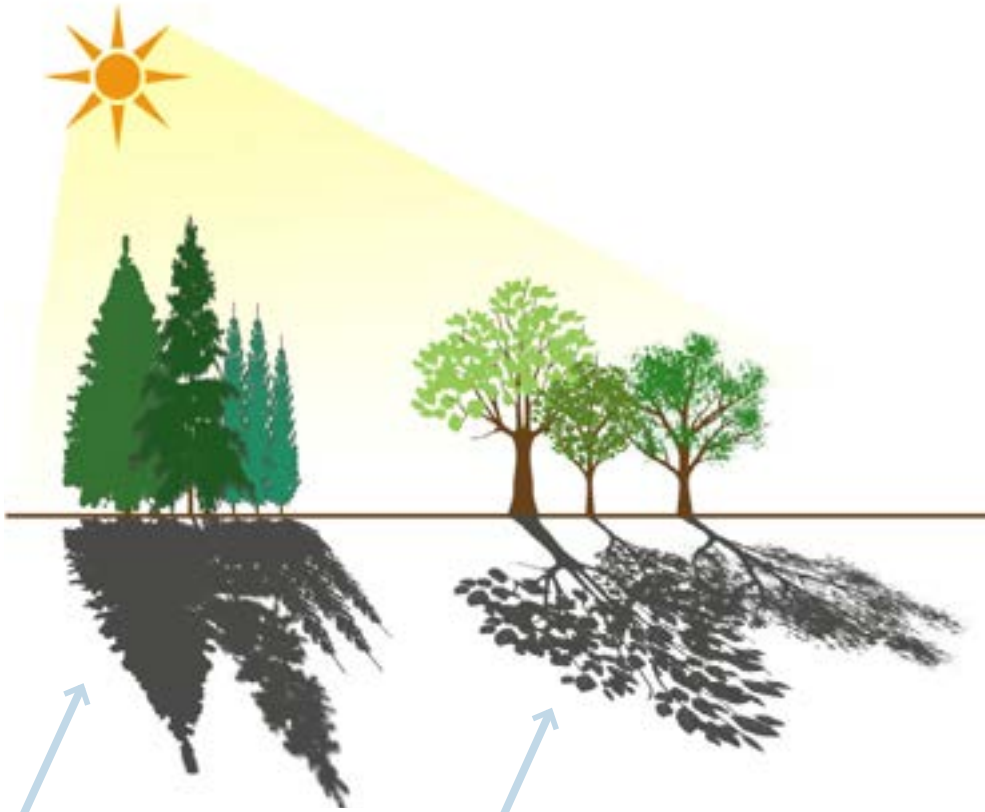
SOILS: The soil under trees is variable and likely influenced by how you manage the leaves or needles that fall from the tree. Leaving these materials to decompose will build up more organic material in your soil.

DRAINAGE: Trees will change how precipitation falls on your site – likely creating drier spots underneath them and potential wet areas at the edge of the crown. Buildings may cause snow drifts depending on their aspect. Observe how water moves on your site. Areas where building drain spouts drain into landscape beds will create wetter areas during times of precipitation.

WHAT TYPE OF SHADE DO YOU HAVE?

There are two types of shade- full shade and part sun. Within these groupings you can also have nuances depending on what is casting the shade. Solid structures and dense tree canopies can create deep shade with no direct light, while trees with more open canopies let light filter through and create dappled shade. To understand what type of shade you will be working with: observe the site over the course of a sunny summer day and throughout other seasons, if possible, to determine how much sunlight it receives throughout the day during different times of the year. Understanding what type of shade is in your yard will help you choose plants that can thrive in these spaces.

- **Part Sun:** 3 – t hours of direct sun light per day
- **Shade:** Less than 3 hours of direct sun light per day



DEEP SHADE

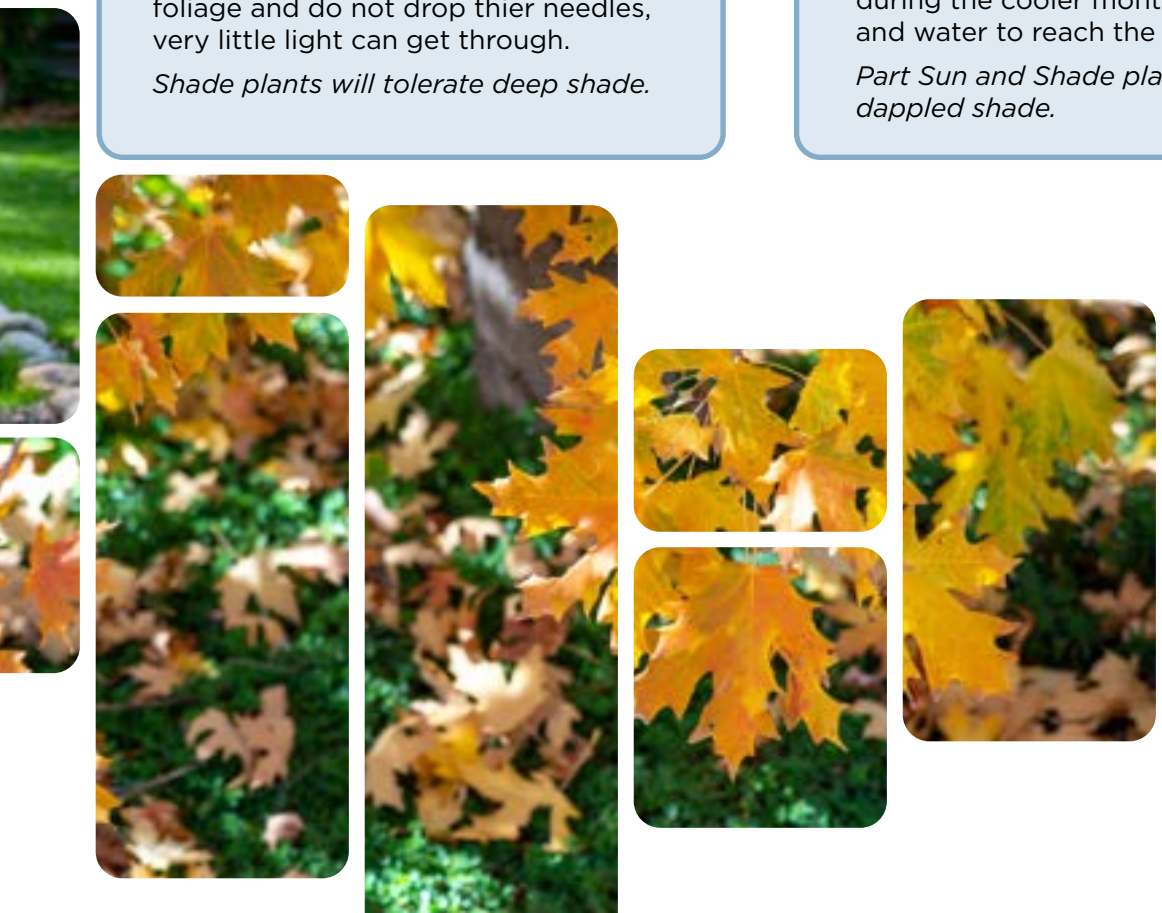
Evergreen trees tend to have year round shade because they have dense foliage and do not drop thier needles, very little light can get through.

Shade plants will tolerate deep shade.

DAPPLED SHADE

Deciduous trees have thinner canopies and have seasonal shade because they lose leaves during the cooler months allowing more light and water to reach the earth below.

Part Sun and Shade plants will do well in dappled shade.

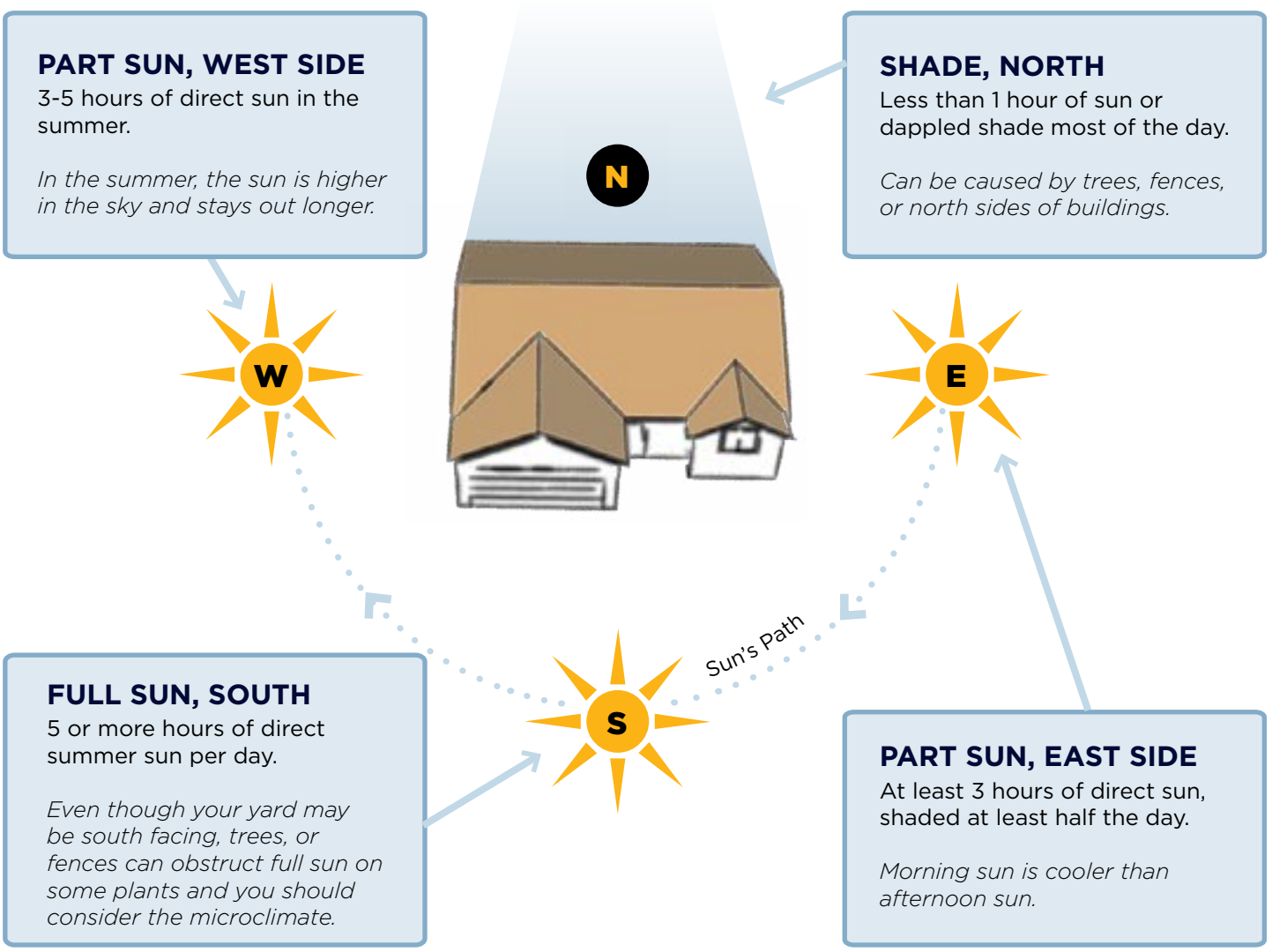


SHADE TYPE AND ASPECT

Shade can be created by trees or human-made structures like buildings, walls, or fences.

- **East facing** sites will get more gentle morning sun and depending on the length of exposure part sun plants do best here.
- **West and south facing** gardens will get the intense afternoon sun and frequently do best with full sun plants, even if they are shaded in the morning hours.
- **North facing** structures or dense evergreen trees can create areas that receive little to no sun throughout the day and frequently have a cooler microclimate. These sites will do best with full shade and part sun plants that don't need as much light.

Shade cast by trees can differ depending on the type of tree, the density of its canopy, how much water it uses, when the species leaf-out in the spring, and whether it has a deep or shallow root system. Evergreen trees provide year-round shade while deciduous trees provide seasonal shade because their leaves drop in winter. Deciduous trees that have thinner canopies, that leaf-out later or that have deeper root systems tend to be easier to grow under because they create dappled shade and allow for more light and water to reach understory plants. Deep rooted trees like Kentucky coffee tree (Gymnocladus dioicus), oak (Quercus spp.), hackberry (Celtis sp.) and the golden rain tree (Koelreuteria paniculata) are some species in our region that are easier to grow plants under for these reasons. Trees that have shallow root systems, that need large amounts of water or that have dense canopies are more difficult to grow under. Trees with these characteristics include spruce (Picea spp.), willows (Salix spp.), cottonwood (Populus spp.), and crabapple (Malus spp.).



REDUCING SHADE & INCREASING MOISTURE

If you have trees that are difficult to grow under due to dense canopies, high water consumption, or dense root systems, it is possible to improve growing conditions by increasing soil moisture and reducing the amount of shade.

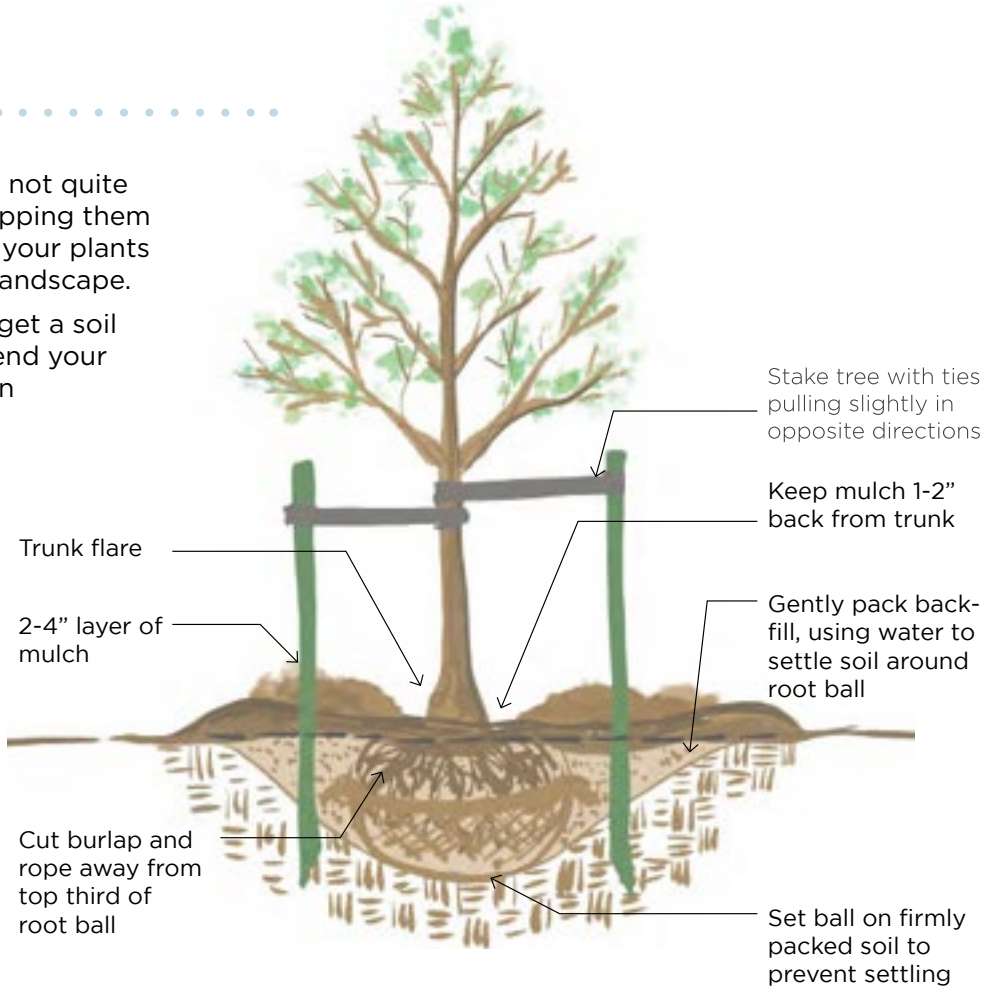
You can increase soil moisture in the area with irrigation, passive rainwater harvesting, mulching, or amending the soil. Many shade or woodland plants are adapted to soils with organic matter so adding plant-based compost and/or fall leaves can have beneficial effects.

If your deciduous shade trees have dense canopies, you can reduce the amount of shade by thinning the canopy with selective pruning or raising the canopy to let more light in. If you don't have experience pruning trees, a professional arborist can help.[3.3]

INSTALLATION TIPS

Getting your plants in the ground is not quite as simple as digging a hole and dropping them in. Here are a few tips that will help your plants have a smooth transition into your landscape.

- Before planting, make sure you get a soil test done. You may need to amend your soil before planting so that it can support your plants.
- Plant in the morning or evening; avoid planting during the hottest part of the day as this will stress your plants. Similarly, try to avoid planting during peak heat months, such as July and August. It is best to plant in the spring around late May or in the early fall before the ground freezes.
- Water your plants before you put them in the ground and again after you put them in. Transplanting is stressful and they will do better if they are well hydrated.

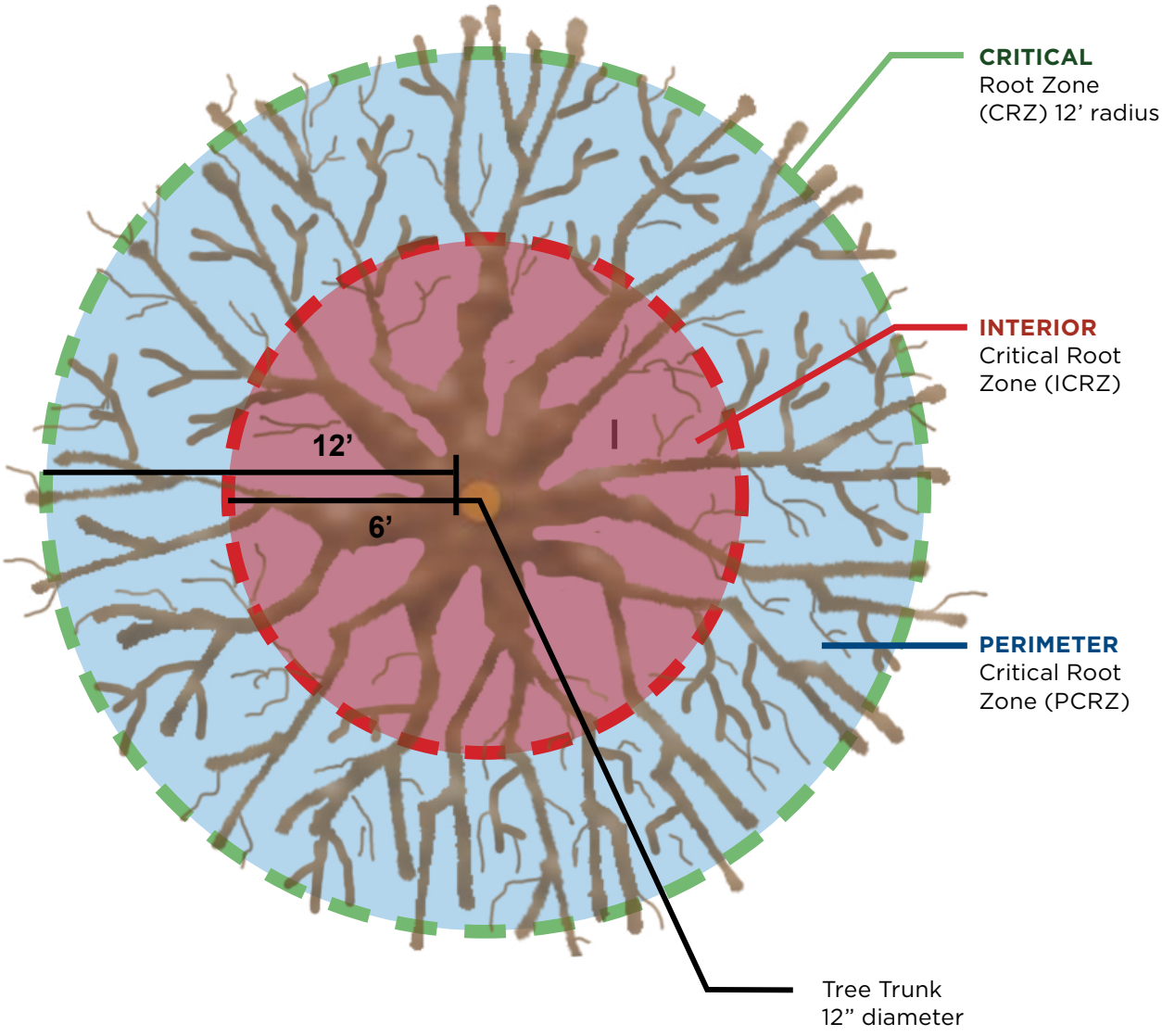


- The width and depth of the hole you're planting will vary depending on what you are planting. In general, you should dig a hole twice the width and the same depth of the pot your plant is in. The exception to this is trees, which should be 2-3x the width of the root ball and 1-3 inches shorter than the root ball. Learn more about tree planting at the City of Fort Collins Forestry webpage.[3.4]

3.3 *fcgov.com/forestry/arborists.php*
3.4 *fcgov.com/forestry/planting-trees*

SPECIAL CONSIDERATIONS FOR PLANTING NEAR TREES

- Don't install raised beds under the canopy of an existing tree. Tree roots need oxygen and adding a significant amount of soil on top could reduce the tree's ability to breathe. You can add 2" of plant-based compost on top of your soil to amend it.
- When you install your garden, avoid disturbing the soil directly under tree canopies as much as possible.
- Do not use a sod cutter in the critical root zone of the tree. *Diagram of critical root zone below.
- Never cut tree roots that are more than 2" diameter and don't cut more than 25% of a tree's root system.
- Remove existing turf by hand digging, spraying it with tree safe herbicides, or sheet mulching.
- Hand dig plant holes and choose the smallest plants available to minimize disturbance to the tree root system.
- If you do need to cut a tree root, cuts should be made using a sharp saw or appropriate hand tool so that extra root tissue is not damaged. Cuts should be smooth, and be completed very quickly after the root exposure occurs. Once the root cutting is complete, immediately cover the exposed root issue with good soil and then water the area to avoid root dehydration.



MYTH BUSTER!

You may have heard that the needles from pine trees and evergreens can change the acidity of your soil and make it difficult to grow plants underneath these trees.

The truth is that pine needles won't change your soil acidity significantly.

"IF YOU ARE HAVING DIFFICULTY GROWING OTHER PLANTS UNDER YOUR PINE TREES...

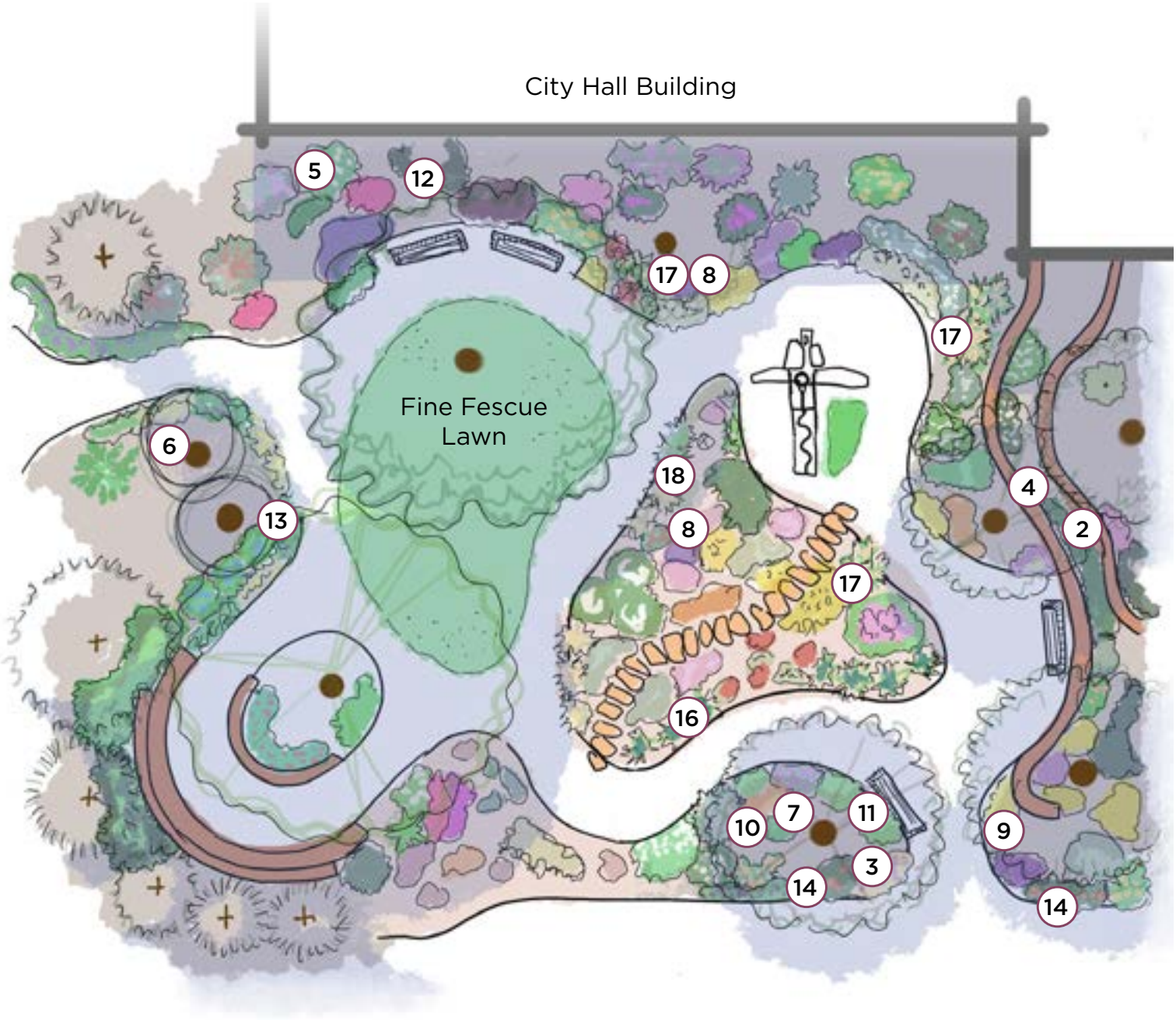
it is likely due to the fact that evergreen roots are numerous and shallow and compete for water and nutrients. The shady conditions under a tree can also make growing other plants a challenge."

– Amy Jo Detweiler,
Oregon State University Extension horticulturist

DESIGN EXAMPLES

Xeriscape Demo Garden Design

This is the Xeriscape Demonstration Garden, located at Fort Collins City Hall on Laporte Ave. installed 1986. Though the aspect is south facing, due to the many trees, this garden has mostly full shade and part shade planting beds. Not all plants have been labeled. You can visit the garden at 300 Laporte Ave, and access the downloadable brochure to see a full list of plants at the Fort Collins Utilities Xeriscape Garden Plant List.[3.5]



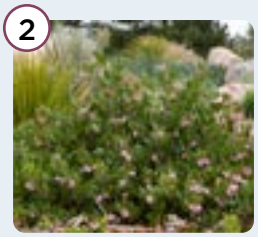
3.5 fcgov.com/utilities/img/site_specifi c/uploads/Xeriscape_Garden_Plant_List_Brochure_KS3).pdf

Shrubs

1

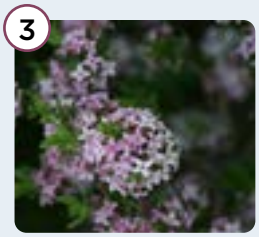
Saskatoon Serviceberry
Amelanchier alnifolia var. alnifolia

2



Panchito Manzanita
Arctostaphylos x coloradoensis 'Panchito'

3

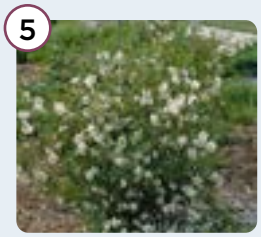


Carol Mackie Daphne
Daphne x burkwoodii

4

Dwarf Wild Indigo
Amorpha nana

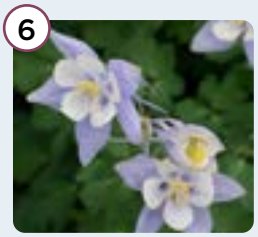
5



Cheyenne Mockorange
Philadelphus lewisii 'PWY01S'

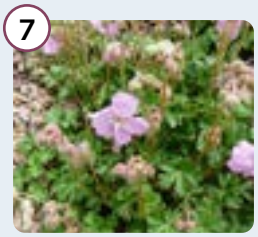
Perennials

6



Colorado Blue Columbine
Aquilegia caerulea

7

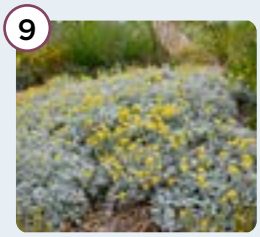


Dalmation Pink Cranesbill
Geranium dalmaticum

8

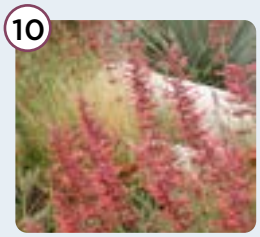
Aspen Fleabane
Erigeron speciosus

9



Patridge Feather
Tanacetum densum ssp. amani

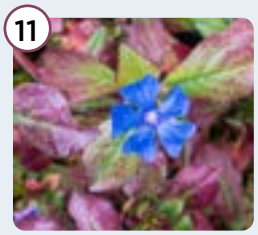
10



Sunset Hyssop
Agastache rupestris

Ground Covers

11

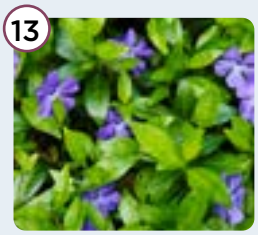


Plumbago, Leadwort
Ceratostigma plumbaginoides

12

Creeping Oregon Grape Holly
Berberis repens

13

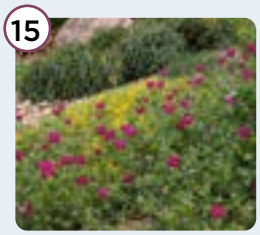


Periwinkle
Vinca minor

14

Orange Carpet Hummingbird Trumpet
Epilobium canum ssp. garettii 'PWWG01S'

15



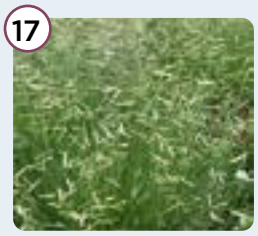
Purple Poppymallow, Winecups
Callirhoe involucrata

Grasses

16

Blue Fescue
Festuca glauca

17



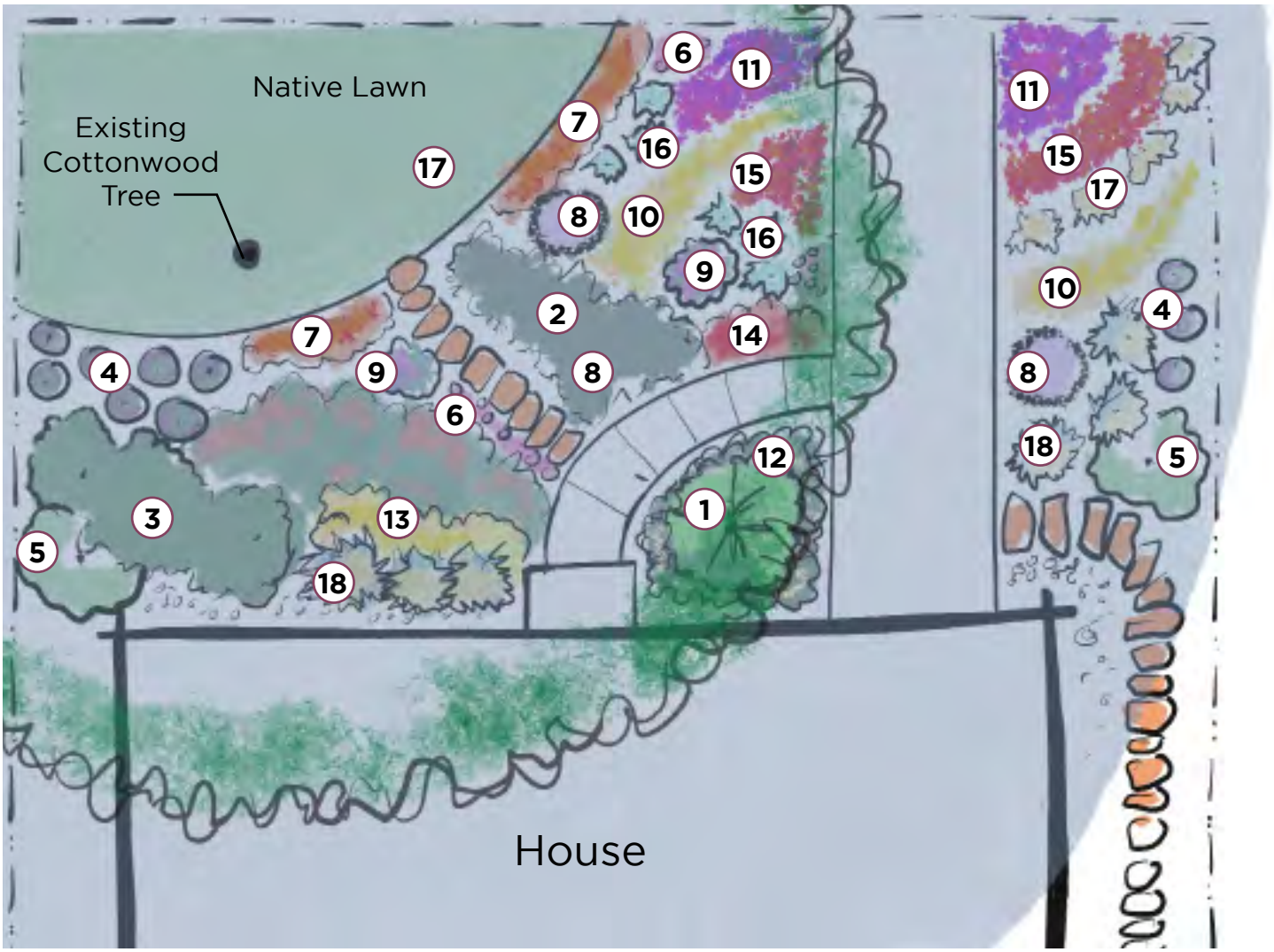
Blonde Ambition Blue Grama
Bouteloua gracilis 'Blonde Ambition'

18

Little Bluestem
Schizachyrium scoparium

Shade Garden Design

This north facing residential yard is shaded by a large existing cottonwood tree and has both full shade and part sun areas. Shade loving shrubs are paired with shade tolerant forbs. The part sun areas allow the plant palette to be expanded and the option of a native turf area.

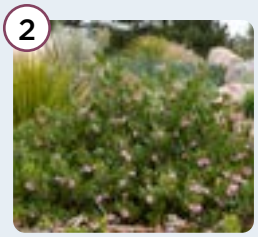


Scale 1” = 10’

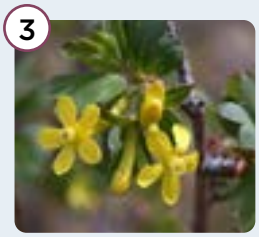
Shrubs

1


Saskatoon Serviceberry
Amelanchier alnifolia var. alnifolia

2


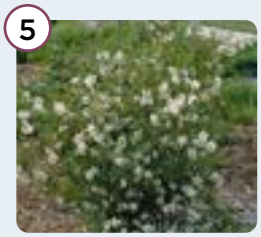
Panchito Manzanita
Arctostaphylos x coloradoensis 'Panchito'

3


Golden Currant
Ribes aureum

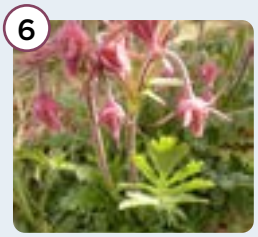
4


Dwarf Wild Indigo
Amorpha nana

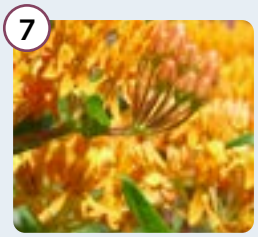
5


Cheyenne Mockorange
Philadelphus lewisii 'PWY01S'

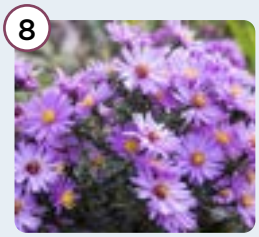
Perennials

6


Prairie Smoke
Geum triforum

7


Butterfly Weed
Asclepias tuberosa

8


New England Aster
Symphyotrichum novae-angliae

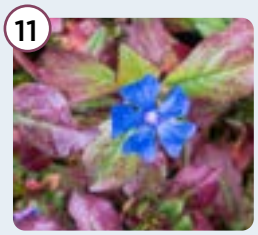
9


Sonoran Sunset Hyssop
Agastache cana 'Sinning'

10


Blackeyed Susan
Rudbeckia hirta

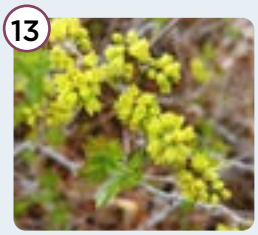
Ground Covers

11


Plumbago, Leadwort
Ceratostigma plumbaginoides

12

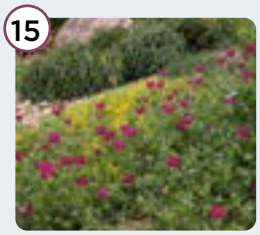

Creeping Oregon Grape Holly
Berberis repens

13


Gro-Low Fragrant Sumac
Rhus aromatica 'Gro-Low'

14


Orange Carpet Hummingbird Trumpet
Epilobium canum ssp. garettii 'PWWG01S'

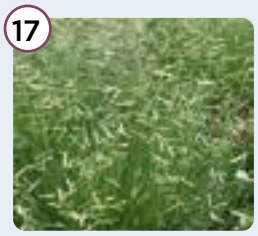
15


Purple Poppymallow, Winecups
Callirhoe involucrata

Grasses

16


Blue Fescue
Festuca glauca

17


Blonde Ambition Blue Grama
Bouteloua gracilis 'Blonde Ambition'

18


Little Bluestem
Schizachyrium scoparium

IRRIGATION AND WATER CONSERVATION

Dry shade gardens are typically dominated by plants adapted to a semi-arid climate and require less water than conventional landscaping. However, all plants need water to get established for the first growing season or during unusually hot weather or unusually dry conditions. Keep in mind because shade plants are not exposed to constant sunlight, they may retain moisture for longer, however, being located under other plants, trees or structures, means natural rain events may not reach them as easily. To avoid over-watering your garden, it is best to create and stick to an irrigation plan. Overwatering can kill low water plants by rotting their roots. A good irrigation plan outlines how much to water and provides a timeline to help you cut back on watering at the appropriate time. Once plants are established, watering should be infrequent and deep. The simplest way to water is using a hose, but you can also install drip irrigation to save time and reduce the amount of evaporation.

Even the best laid plans cannot address all contingencies, like excessive drought or heavy/prolonged rains. Therefore, the focus should be on results – if your plants are healthy above and below ground then your watering is likely appropriate. Frequent monitoring is key. Soil moisture monitoring devices are available to provide feedback but getting your fingers in the soil is an effective and easy way to monitor moisture levels. It is important to check the soil moisture between watering and each time you water, to ensure you are not over or underwatering.

IS THE GROUND MOIST 6 INCHES BELOW THE SURFACE OR ONLY AT THE SURFACE?

It is best to water infrequently and deeply, soaking the soil 6 inches down. Deep, less frequent watering will encourage plants to root deeply and become more drought tolerant.

Example Irrigation Plan for Establishment of a Dry Shade Perennial Bed*		
	FREQUENCY	**DURATION**
SPRING & FALL PLANTING	Once every 2-3 days	First 2 months
	Once every 7-14 days	As needed through growing season
SUMMER PLANTING	Once a day	Through peak heat
	Once every 2-3 days	Until the fall
	Once every week	Until the end of growing season
Plants should receive roughly the same volume of water as the size of the pot the plant came in, per watering event.		
*Adjust as necessary given precipitation and condition of plants		

MAINTENANCE

Native-dominant dry shade gardens typically require less maintenance once established but some maintenance is inevitable. Proper planning and installation can minimize required maintenance and increase the chances of long-term success. Please refer to Chapter 1 for garden planning fundamentals.

One mistake many new gardeners make is cleaning up their garden in the fall. Leaving your garden with leaves and dead plant material will help build your soil which is important for dry shade plants under trees and creates habitat essential to wildlife. Dead plant materials like plant stems and leaf litter are used by beneficial insects to overwinter or nest in. Wildlife like songbirds need insects in order to feed their young in the spring. Removing plant material in the fall or too early in the spring may expose overwintering insects to harsh spring conditions they will not be able to survive in. Wait until late May to start cleaning out your garden. Leaf litter will break down and help build organic matter in your soil. If you have gravel mulch in your gardens, it is recommended to remove leaves and compost them separately to prevent them from decomposing on top of the rock mulch.

Weed and Integrated Pest Management

Weeds and other garden pests can be managed in any landscape using Integrated Pest Management (IPM). IPM is a holistic approach to managing pests which can include insects, weeds, and diseases. IPM uses a variety of tools to prevent and control pest infestations using the least toxic methods possible. Reducing our use of chemicals helps prevent pesticide resistance and protects the health of humans and ecosystems. Refer to Chapter 7 for more information in IPM.

In small to medium sized gardens, the use of pesticides is discouraged since chemicals can be harmful to human health, as well as pets and non-target wildlife, especially pollinators. Hand weeding, mulching and mowing weeds are some sustainable options to suppress weeds in smaller gardens. To keep weeds from multiplying in future years it is important to remove weeds before they go to seed. If weeds go to seed, they should not be composted at home as home compost systems typically are not hot enough to kill weed seeds.

When working with larger pieces of land that have established or aggressive weed populations it may be necessary to use herbicide if you are not able to control weeds via mowing, biocontrol, or mechanical removal. When treating weeds with herbicide, it is important to properly identify each plant, so you know when you should spray and what herbicide you should use. The Larimer County Weed District (larimer.org/naturalresources/weeds) can provide advice on weed identification, management, and herbicides.

ADDITIONAL RESOURCES

Planting the Dry Shade Garden by Graham Rice

Undaunted Garden by Lauren Springer

National Wildlife: *nwf.org/Garden-for-Wildlife/About/Native-Plants/keystone-plants-by-ecoregion*

Best Management Practices: Tree Pruning: *fcgov.com/forestry/pdf/tree-standards-3-31-10.pdf*

Fort Collins Arborist Companies: *cgov.com/forestry/arborists.php*

Tree root pruning guidelines: *hort.ifas.ufl.edu/woody/root-prune-guidelines.shtml*

LEAVE BARE EARTH FOR GROUNDNESTING POLLINATORS!

TRY A COBBLE RING!

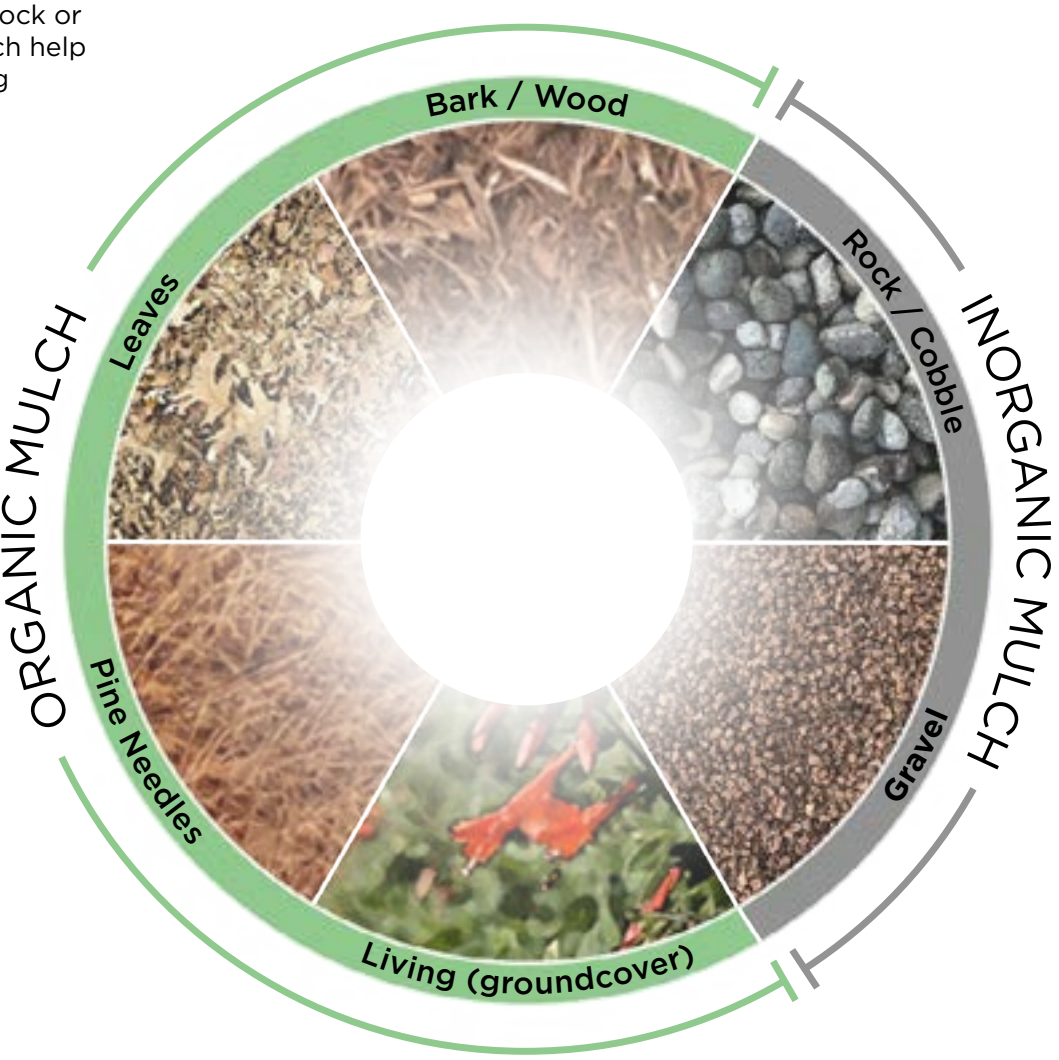
Mulching

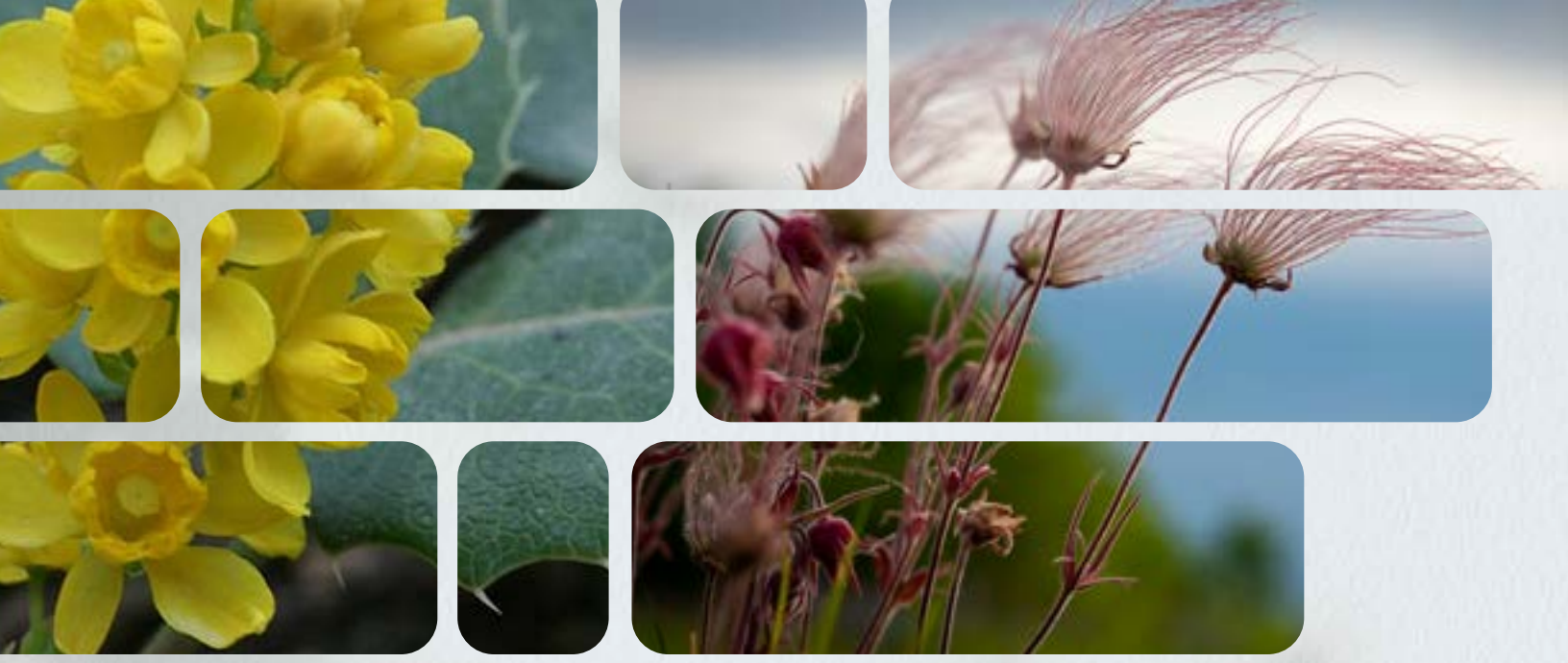
Mulching is a critical practice for gardening to decrease soil temperature, suppress weeds, and conserve soil moisture. When adding mulch to new or existing plants, leave a buffer between the base/trunk of plants and mulch. This practice keeps the stems of plants dry and prevents rot. Weed barrier is not recommended, as it has a negative effect on soil quality and wildlife habitat. Weed barrier will also begin to degrade over time allowing weeds to root through it and will be difficult to remove.

There are two types of mulch you can use – organic and inorganic:

ORGANIC MULCHES include shredded bark, wood chips, pine needles, shredded leaves, and living mulch. As organic mulch breaks down it will also help enrich the soil with organic matter and increase its ability to hold moisture. Living mulch is using spreading, perennial groundcovers to fill in open spaces in your garden. This practice suppresses weeds, retains moisture, and increases the plant biomass in your garden. We have recommended some non-native, non-aggressive groundcover plants on the plant list at the end of this chapter.

INORGANIC MULCHES are rock or gravel. Rock and gravel mulch help eliminate run-off, by allowing fast falling rain to percolate quickly through to the soil. While mulching helps with water conservation and weed management, many native bees are ground-nesting species and require some patches of bare and/or minimally covered soil. You can help them out by not mulching (or only mulching to a depth of 1 inch) in a 6-12 inch circle around the trunk or stems of some plants. Or instead of mulching, consider ringing these bare earth patches with cobble if you'd like to draw attention to these areas and educate your neighbors as well as create some artistic interest.





FUN FACT!

The Bad News:

Just over 3% of the plants in the Fort Collins Plant Database work well in dry shade.

The Good News:

That is over 43 different species to choose from.

Plants that grow in full shade in Northern Colorado are typically located in wet areas. However, with 43 full-shade, low water species listed in the database, you are sure to find a set of plants that works well for your dry shade project.

HOW TO USE THE PLANT LISTS

TREE/ SHRUB

The plant lists are divided by plant types headings labeled in the grey bar. They include Trees, Shrubs, Forbs, Perennials, Groundcovers, and Grasses.

Scientific Name	Common Name
Amelanchier alnifolia var. alnifolia	Saskatoon Serviceberry

Scientific names include the genus, species, and sometimes sub-species or variety of the plant. These are listed to help identify exact species. Some common names can be used for multiple species with different characteristics such as bloom clolor, size, or habitat value. If you would like to learn more about a plant listed in a chapter, find the common or scientific name in the plant list and look across the row to learn more about how it grows. For more information on plants that grow in Norther Colorado check out the digital plant database here: ***fcgov.com/vegetation***

Bloom Time	Scientific Name	Common Name	Nativity
TREE/SHRUB			
	Amelanchier alnifolia var. alnifolia	Saskatoon Serviceberry	FC
	Arctostaphylos x coloradoensis 'Panchito'	Panchito Manzanita	CO

Bloom Time			
A	B	C	D

The Bloom Time information is split into 4 columns, each **showing the main color of the plant as it blooms throughout the year**.

Column A is early spring, exact timing depends on temperatures and precipitation of that year, but usually around April and May.

Column B is the main plant color in early summer, late May and June.

Column C represents the plant color in the heat of summer, July and August.

Column D indicates the color in fall, typically September and October.

Nativity
FC

Nativity describes the closest location to Fort Collins where the plant grows natively.

FC= Fort Collins (these plants grow native in Fort Collins).

CO= Colorado (these plants grow native somewhere in Colorado, but not Fort Collins).

US= United States (these plants grow native somewhere in the United States, but not Colorado).

Not Native= These plants are not native in the United States.

Height X Width
20'x12'

Height is the vertical measurement of a plant at maturity; width is the measurement of the spread (how wide) you can expect a plant to grow. (Measurements are listed in iches or feet).

Exposure
FS/PS

Exposure tells you how much sun the plant likes. If more than one exposure is listed, the plant will do well in multiple types.

FS= Full Sun

PS= Part Sun

S=Shade

Notes
Water during drought

Any additional helpful information about the plant that is not already listed in another category.

Height X Width	Water Needs	Exposure	Habitat Value	Notes	Programs
20'x12'	Low, Moderate	FS/PS	np/bee, bf; hp/bf; birds; wl	Water during drought	NIC
10"x3'	Very low-Moderate	FS/PS	np/bee, bf; birds; wl	Needs good drainage; red twigs	NIC

Water Needs
Low, Moderate

Very Low- indicates a plant that requires 3 gallons of water per square foot per season in addition to precipitation.

Low- indicates a plant that requires 8 gallons of water per square foot per season in addition to precipitation.

Moderate- indicates a plant that requires 14 gallons of water per square foot per season in addition to precipitation.

High- indicates a plant that requires 18 gallons per square foot per season in addition to precipitation.

Habitat Value
np/bee, bf; hp/bf; birds; wl

Habitat value comes in many forms. Below is a key to describe what habitat values the plant provides. Sometimes a specific animal or insect type is described in the list such as “bee”or “bird”.

np = nectar/pollen

bf = butterfly

hb = hummingbird

s = seeds

frt = fruit

hp = host plant

wl= wildlife

Programs
NIC

Programs hosted by the City of Fort Collins include Nature in the City (NIC) and the Xeriscape Incentive Program (XIP). Nature in the City focuses on plants native to Colorado and Fort Collins where XIP focuses on water savings. Plants listed with both XIP and NIC are supported by both programs.

CHAPTER 3 DRY SHADE PLANT LIST

Bloom Time	Scientific Name	Common Name	Nativity	Height X Width	Water Needs	Exposure	Habitat Value	Notes	Programs
TREE / SHRUB									
	Amelanchier alnifolia var. alnifolia	Saskatoon Serviceberry	FC	20'x12'	Low, Moderate	FS/PS	np/bee, bf; hp/bf; birds; wl	Water during drought	NIC
	Arctostaphylos x coloradoensis 'Panchito'	Panchito Manzanita	CO	10"x3'	Very low-Moderate	FS/PS	np/bee, bf; birds; wl	Needs good drainage; red twigs	NIC
	Jamesia americana var. americana	Cliffbush	FC	5'x3'	Low	PS/S	np/bee, bf	Prefers shaded roots; red twigs	NIC, XIP
	Ribes aureum	Golden Currant	US	4'x4'	Very low, Low	FS/PS/S	np/bee, bf; frt/birds; wl	Bluish berries, fall color	XIP
	Amorpha nana	Dwarf Wild Indigo, Leadplant	CO	2'x2'	Very low, Low	FS/PS	np/bee, bf	Nitrogen fixer, deer tolerant	NIC
	Philadelphus lewisii	Cheyenne® Mockorange	US	5'x4'	Low	FS/PS	np/bee, bf	Plant Select; tolerates clay soil	XIP
	Prunus americana	American Plum	FC	10'x15'	Very low-Moderate	FS/PS	np/bee, bf; hp; frt/birds; wl	Thorns, tolerates clay soil	NIC, XIP
	Ptelea trifoliata	Common Hoptree, Wafer Ash	CO	15' x15'	Very low, Low	FS/PS/S	np/bf; frt/birds; hp	Understory tree; Swallowtail host	NIC

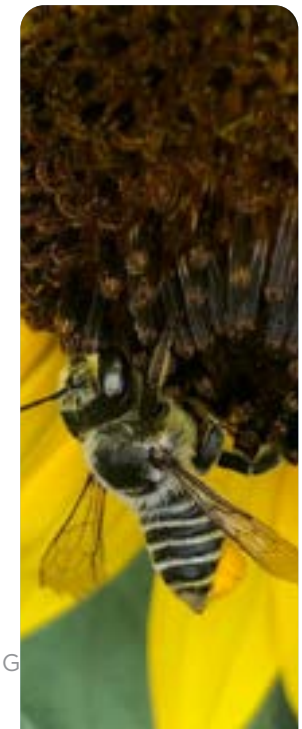
WHEN SELECTING PLANTS,

make sure that they meet your physical requirements and are appropriate for your space. The following is a list of plants, separated into what time of year they bloom. Pay attention to the exposure column where you'll find plants that can handle shade (S) and part sun (PS) as well as full sun (FS). This list is to help you get started – some of these plants may not be appropriate for your space and there are many more plants than these that are great for dry shade. You can find more information about plants suitable to our area on the City of Fort Collins Vegetation Database.

Bloom Time	Scientific Name	Common Name	Nativity	Height X Width	Water Needs	Exposure	Habitat Value	Notes	Programs
PERENNIALS									
	Anchusa capensis	Summer-Forget-Me-Not	Not Native	8″x8″	Moderate	FS/PS	np/bee, bf	Long blooming, deer tolerant	XIP
	Aquilegia coerulea	Colorado Blue Columbine	CO	6″x1′	Very low-Moderate	FS/PS/S	np/hp	Prefers compost loam soil	NIC
	Geum triflorum	Prairie Smoke	CO	4″x4″	Very Low, Low	FS/PS/S	np/bee, bf; wl	Readily seeds	NIC, XIP
	Heuchera pulchella	Sandia Coral Bells	US	8″x4″	Low*	FS/PS/S	np/bee, bf; n/hb	*when in shade; evergreen	XIP
	Lamium galeobdolon 'Herman's'	Herman's Pride Archangel	Not Native	1′x1.5′	Moderate	PS/S	np/bee, bf	Silver green foliage, wildlife tolerant	XIP
	Anemone multifida	Cut-leaved Anemone	FC	1′x1′	Very low-Moderate	PS/S	np/bee, bf	Readily seeds	NIC
	Asclepias tuberosa	Butterfly Weed	US	1″x1′	Low	FS/PS	np/bee, bf; n/hb; hp/bf	Long blooming, deer tolerant	XIP
	Geranium viscosissimum	Sticky Purple Geranium	US	1′x1.5′	Very Low	FS/PS	np/bee, bf	Long blooming, fall color	XIP
	Penstemon eatonii	Firecracker Penstemon	CO	1′x1′	Very Low	FS/PS	np/bee, bf; n/hb	Handles rocky,sandy soil	NIC, XIP
	Penstemon procerus	Littleflower Penstemon	FC	6″x6″	Very low-Moderate	PS/S	np/bee, bf; n/hb	Good for rock gardens	XIP
	Agastache foeniculum	Blue Giant Hyssop	FC	1″x1.5′	Very low-Moderate	FS/PS	np/bee, bf; n/hb; wl	Rare plant, Long blooming, wildlife tolerant	XIP
	Campanula rotundifolia	Bluebell, Harebell	FC	4″x8″	Very low, Low	FS/PS	np/bee, bf; n/hb	Rock garden, deer tolerant	NIC, XIP
	Rudbeckia hirta	Blackeyed Susan	US	1′x1′	Low	FS/PS	np/bee, bf; s/birds; wl	biennial, long blooming, deer tolerant	XIP
	Symphyotrichum novae-angliae	New England Aster	CO	1′x6″	Very low-Moderate	FS/PS	np/bee, bf; hp/bee, bf	Likes acidic/low PH soil	XIP
	Erigeron speciosus	Aspen Fleabane	FC	6″x1.5′	Very low, Low	FS/PS/S	np/bee, bf; hp/bee, bf	Can handle variable soil	NIC, XIP
	Tanacetum densum ssp. amani	Partridge Feather	Not Native	4″x1.5′	Very low-Moderate	FS/PS	No data	Silver foliage, evergreen, wildlife tolerant	XIP
	Agastache cana 'Sinning'	Sonoran Sunset® Hyssop	Not Native	1.5′x1.5′	Very low-Moderate	FS/PS	np/bee, bf; n/hb	Long blooming, deer/rabbit tolerant	XIP
	Salvia darcyi 'Pscarl'	Vermillion Bluffs® Mexican Sage	Not Native	3′x1.5′	Very low-Moderate	FS/PS	np/bee, bf; n/hb	Long blooming, deer tolerant	XIP

CHAPTER 3 DRY SHADE PLANT LIST

Bloom Time	Scientific Name	Common Name	Nativity	Height X Width	Water Needs	Exposure	Habitat Value	Notes	Programs
GROUNDCOVERS									
	Arenaria 'Wallowa Mountain'	Wallowa Mountain Desert Moss	US	1″x8″	Very low-Moderate	FS/PS	No data	Evergreen, winter interest, deer tolerant	XIP
	Berberis repens	Creeping Oregon Grape Holly	CO	4″x1′	Low	FS/PS/S	np/bee; frt/birds	Evergreen w/ blue berries, red in fall	NIC, XIP
	Lamium maculatum 'White Nancy'	White Nancy's Spotted Deadnettle	Not Native	6″x1′	Moderate	PS/S	np/bee, bf; birds	Deer/rabbit tolerant, neat foliage	XIP
	Veronica 'Reavis'	Crystal River® Veronica	Non Native	2″x1.5′	Low, Moderate	FS/PS	No data	Winter interest, deer tolerant	XIP
	Epilobium canum ssp. garrettii	Orange Carpet® Hummingbird Trumpet	US	4″x1.5′	Very low-Moderate	FS/PS	np/bf, hb	Hummingbirds love, good for rock gardens	XIP
	Callirhoe involucrata	Purple Poppymallow,	FC	8″x4′	Very low-Moderate	FS/PS	np/bee, bf; n/hb	Readily seeds	NIC, XIP
	Rhus aromatica 'Gro-Low'	Gro-Low Fragrant Sumac	Not Native	1.5′x6′	Very Low, Low	FS/PS	np/bee, bf; birds	Fall color, Wildlife tolerant	XIP
	Ceratostigma plumbaginoides	Leadwort	Not Native	8″x1.5″	Low	FS/PS/S	np/bee, bf	Long blooming, fall color, tolerates clay	XIP



Bloom Time	Scientific Name	Common Name	Nativity	Height X Width	Water Needs	Exposure	Habitat Value	Notes	Programs
GRASSES									
	Festuca glauca	Flue Fescue	Not Native	10″x6″	Low, Moderate	FS/PS	No data	Bluish color, needs well drained soil	XIP
	Bouteloua gracilis 'Blonde Ambition'	Blonde Ambition Blue Grama	Native	2.5′x2.5′	Very low-Moderate	FS/PS	s/birds; hp/bf, moths	Host plant for skippers, deer tolerant	XIP
	Schizachyrium scoparium	Little Bluestem	US	2′x1′	Very low, Low	FS/PS	bee, bf; birds; wl	Host plant for skippers, deer tolerant	XIP
	Chasmanthium latifolium	Northern Sea Oats	US	2′x1.5′	Moderate	FS/PS/S	bee, bf; birds; wl	Attractive seed heads	XIP







NATURE IN THE CITY

LANDSCAPE DESIGN GUIDE

CHAPTER 4: LOW WATER LAWNS

An Introduction to Diversifying Urban Landscapes in Fort Collins

City of Fort Collins

CHAPTER 4

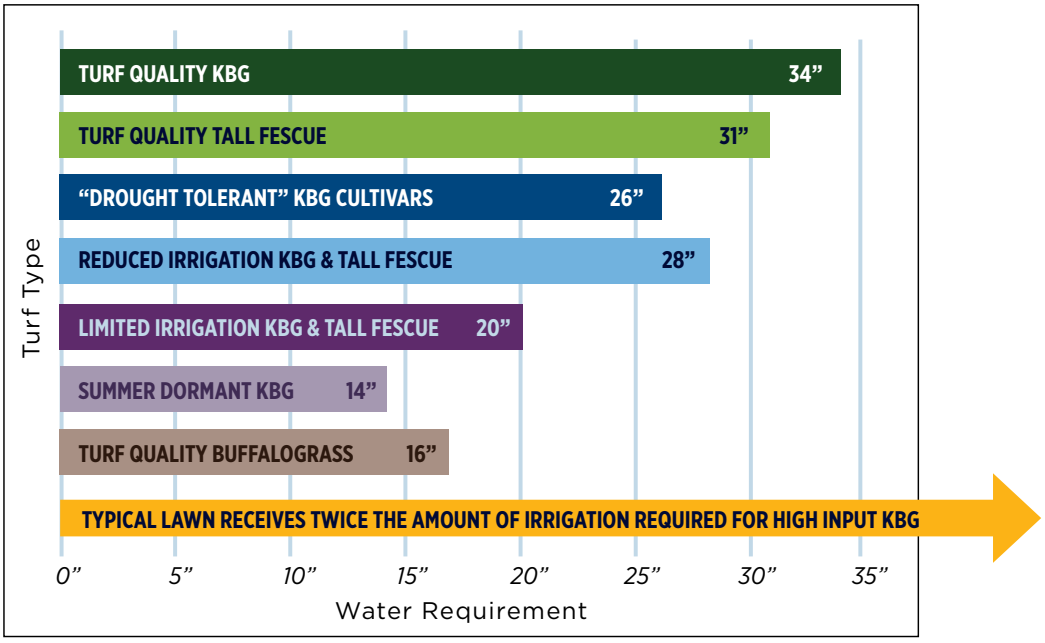
Low Water Lawns

Northern Colorado has a semi-arid climate and receives, on average, only 16 inches of rain each year. With a rapidly growing population and the increasing impacts of climate change, there is concern about the future of water security on the Front Range. Urban lawn watering is the single largest demand on most municipal water supplies! This is because traditional Kentucky bluegrass (KBG), the most common grass species used for turf, requires a lot of water to keep it from going dormant and turning brown during the summer.

If you want to conserve water and reduce your water bill, you don't have to eliminate turf altogether but instead consider how you can reduce the amount of turf in your yard. In addition to reducing turf size, you can also convert high water turf to low water turf. Converting a traditional Kentucky bluegrass lawn to a low water turf variety, can reduce your water usage by up to 75%.[4.1] A 5,000 sf plot of Kentucky bluegrass needs on average 18,500 gallons of water a month, while the same area of buffalograss would need only 3,000 gallons once established.[4.2]

If you want to make the switch to a low water landscape, don't forget to check with your utility company to see if they provide incentives. Many utility companies in Northern Colorado offer incentive programs that will pay you to convert to low water landscaping. The City of Fort Collins has several programs such as the Xeriscape Incentive Program.[4.3]

The graph below shows that most KBG lawns receive much more water than they actually need.



This graphic from CSU Extension compares the seasonal water requirements (including rainfall and irrigation) of different lawn options.

4.1. extension.colostate.edu/topic-areas/yard-garden/buffalograss-lawns-7-224/#:~:text=Buffalograss%2C%20a%20%E2%80%9Cwarm%2Dseason,hard%20frost%20in%20the%20fall.

4.2. extension.colostate.edu/topic-areas/family-home-consumer/water-conservation-in-and-around-the-home-9-952/

4.3.fcgov.com/utilities/residential/conserve/water-efficiency/xeriscape/incentive-program

KEY CONSIDERATIONS WHEN CONVERTING TO LOW WATER TURF

USAGE: Will this area have high usage? Consider whether the species you select are durable for high activity areas. The City of Fort Collins requires irrigated turf grass in high usage areas.

SOIL: Have you done soil testing? Will the species you are selecting do well in your soil type?

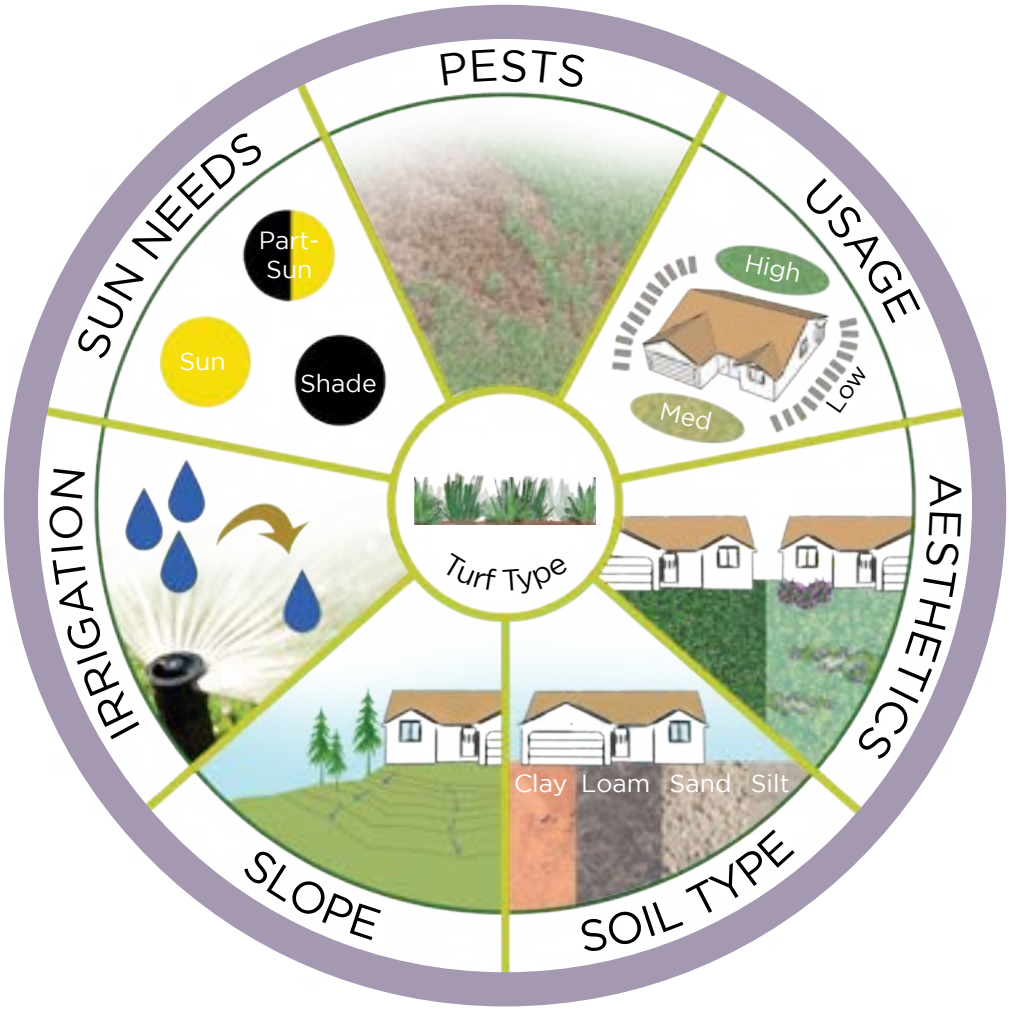
SLOPES: Will your turf be on a slope? Slopes, particularly south or west facing, tend to be drier. Grass species selection is important for these types of sites.

AESTHETICS: Do you want a more traditional looking lawn? Or are you okay with the more natural look of native turf?

IRRIGATION: Irrigation systems often need to be retrofitted for low-water turf. Low water turf will need to be in a separate zone from traditional turf and pop-up heads may need to be converted from 4" to 6" heads.

PESTS: Is there a history of disease or insect issues in current turf? Native turf is more resistant to these issues.

SUN: How much sun does the area being converted receive throughout the day? Kentucky bluegrass and tall fescue fares okay in partially shade conditions while native turf species require full sun.

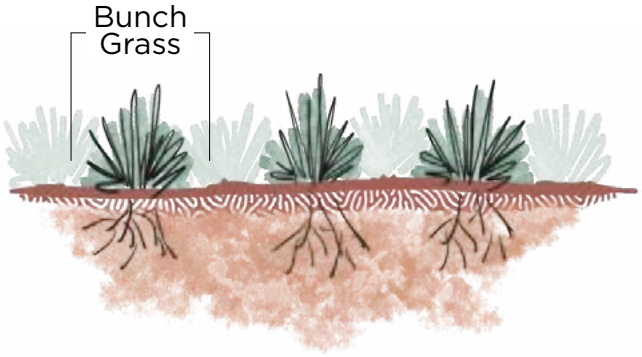


WHAT IS TURF GRASS?

Traditionally, turf is composed of non-native grass species. In Colorado, the most common species used for turf are non-native Kentucky bluegrass (Poa), fescues (Festuca), and rye grass (Lolium) species that have high water, maintenance, and fertilization needs. Conventional non-native turf can be replaced with more drought tolerant non-native grass species, native turf species, or low water perennial beds. Turf grass encompasses a variety of grass species adapted to frequent mowing and foot traffic. Turf grass species are selected for traits such as tolerance to shade, drought, foot traffic, and disease resistance.

Types of Grass and Definitions

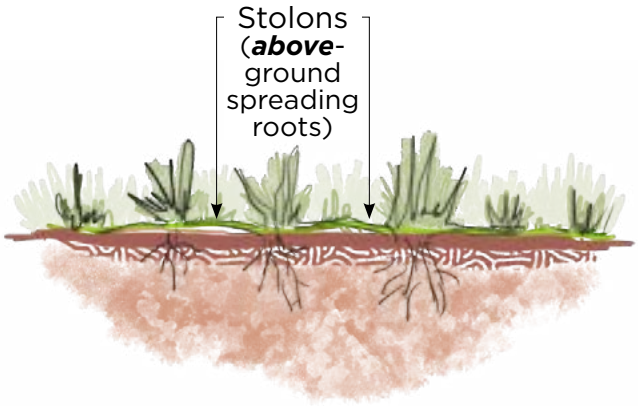
BUNCH GRASS: A grass that grows in clumps and reproduces through seed dispersal. Low water turf is sometimes comprised of bunch grasses. Example: Blue Grama



Example: Blue Grama
Photo courtesy of Lady Bird Johnson Wildflower Center

Blue Grama Lawn
Photo courtesy of Colorado Springs Utilities Xeriscaping

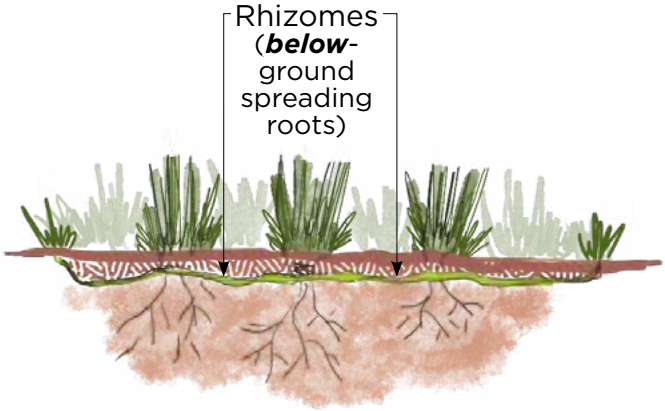
RUNNER GRASS: A grass that grows using stolons to reproduce, sending out runners, and creeping outward along the ground. Example: Buffalograss



Example: Buffalograss
Photo courtesy of City of Fort Collins Recommended Plant List Database

Buffalograss Lawn
Photo courtesy of Dyck Arboretum

RHIZOMATIC GRASS: A grass that has continuously growing, horizontal or underground stem, which puts out lateral shoots and adventitious roots at intervals. Example: Bermuda Grass

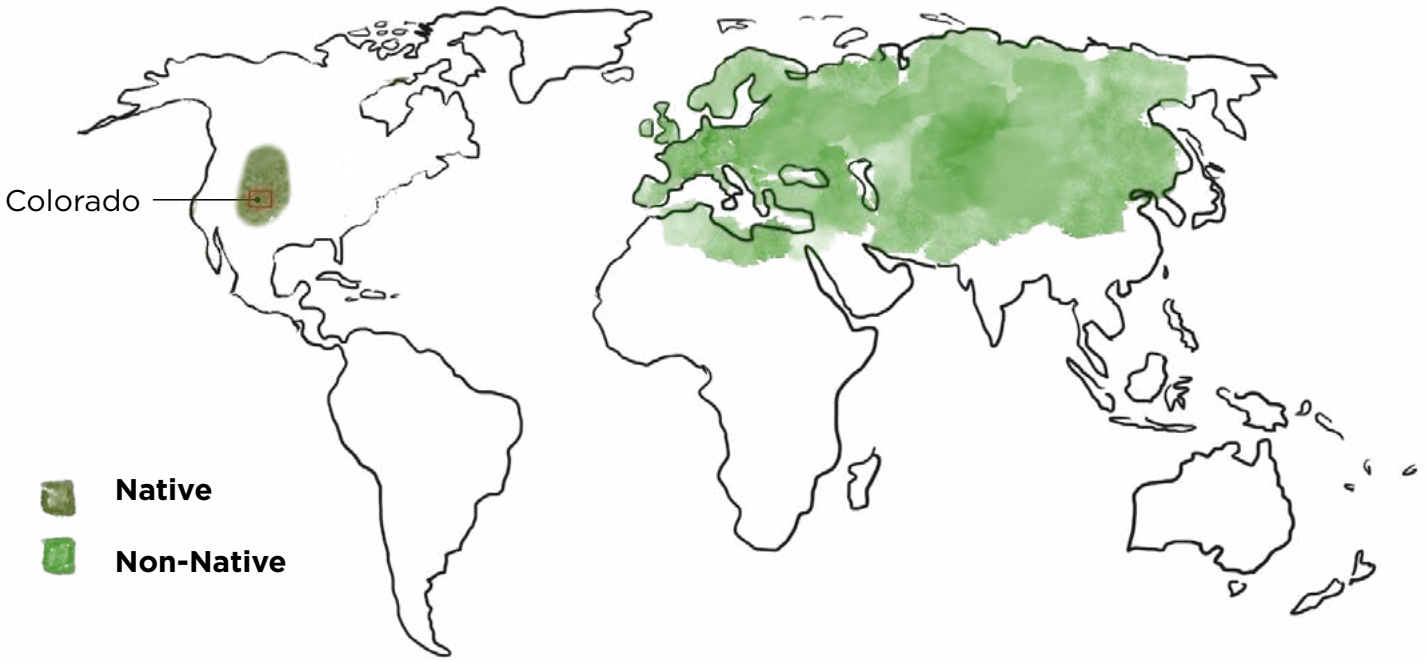


Example: Western Wheatgrass
Photo courtesy of City of Fort Collins Recommended Plant List Database

Western Wheatgrass Lawn
Photo courtesy of Western Native Seed

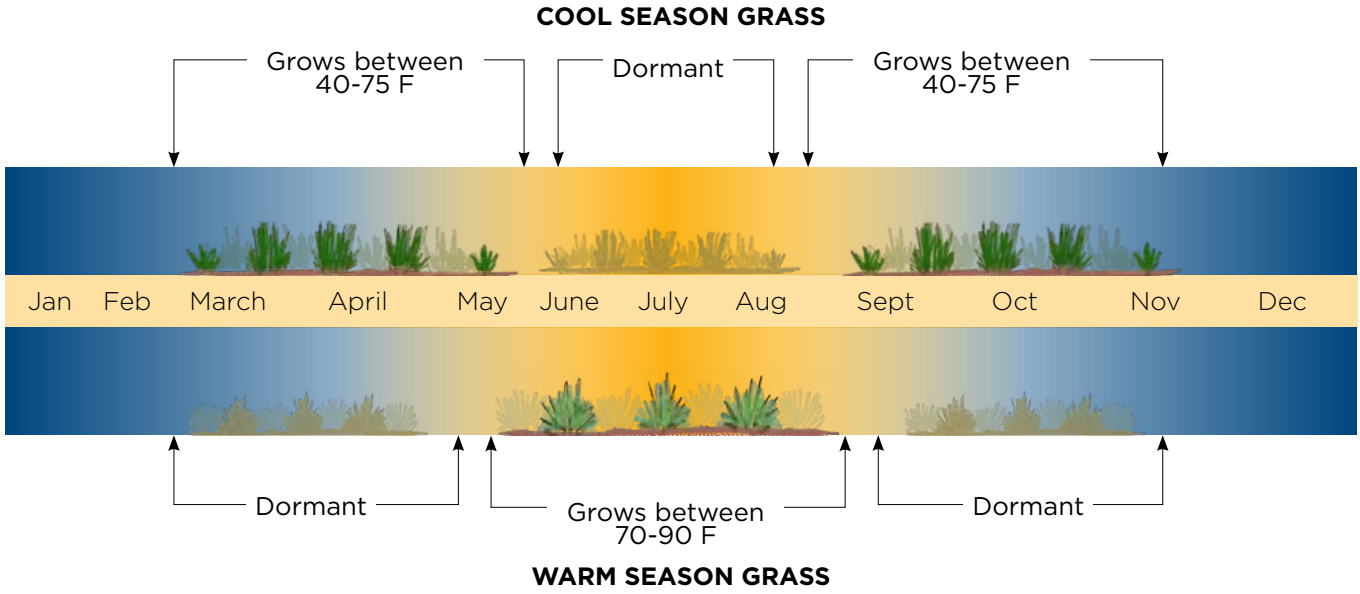
NATIVE PLANT: A plant species that evolved and occurs naturally in a particular region, ecosystem, and/or habitat.

NON-NATIVE PLANT: A plant introduced to a new place or new type of habitat where it did not evolve and was not previously found. Note: Not all non-native plants are invasive.



WARM SEASON GRASS: Warm season grasses actively grow when temperatures are between 70-90 F, approximately May-September, and are dormant the rest of the year. Example: Blue Grama

COOL SEASON GRASS: Cool season grasses actively grow when temperatures are between 40-75 F, approximately March through October. These species are dormant during the hottest parts of summer and during the winter. Example: Kentucky Bluegrass



LOW WATER TURF OPTIONS FOR NORTHERN COLORADO

TURF SPECIES	ADVANTAGES	DISADVANTAGES	GROWTH SEASON	WATER NEEDS	PLANTING TIMING
Buffalograss *Buchloë dactyloides* **Blue Grama** *Bouteloua gracilis* **Turf Type:** Native	• Requires minimal water once established • Good for sunny areas • Very heat & drought tolerant • Goes dormant when stressed & can stay dormant for long periods • Requires less inputs and improves soil • Minimal labor and inexpensive to maintain	• Not very traffic tolerant during dormancy (Oct-May) • Weed control can be a problem • Doesn't perform well as a lawn above 6,500ft elevation • Doesn't perform well in shady areas	Warm	Low	Seed: April-July Plug/Sod: June-mid Aug
Sheep Fescue *Festuca ovina* **Turf Type:** Non-native	• Good option for dry shade • Undulating texture when left un-mowed, can be kept mowed & manicured as well • No disease or pest issues	• Requires some supplemental irrigation • Does not come in sod form, can be slow to fill in when seeded • Does not perform well in hot, full sun areas	Cool	Low	Seed: Spring or Fall Plug/Sod: Currently not sold in plug or sod form
Tall Fescue *Lolium arundinaceum* **Turf Type:** Non-native	• Shade tolerant • Tolerates heavy foot traffic • Has few disease or insect issues • Bunch grass that won't spread • Doesn't require a lot of fertilizer	• Requires supplemental irrigation • Can develop bare spots that will need to be reseeded	Cool	Med	Seed: March-early June; mid-Aug-Sept Plug/Sod: Spring or Fall
Plant Select, Dog Tuff* *Cynodon sp. 'PWIN04S'* **Turf Type:** Non-native	• Drought tolerant and resistant to dog urine. • Grows well on dry slopes. • Does well with moderate foot traffic and recovers quickly from heavy usage.	• Has the potential to be weedy and spread aggressively through stolons. Should only be planted in areas surrounded by hardscape.	Warm	Low	Plugs: late May- mid July

** The City of Fort Collins does not allow this species to be planted adjacent to Natural Areas, Natural Habitat Buffer Zones, Certified Natural Areas, and other ecologically sensitive areas.*

PREPARING TO PLANT LOW WATER TURF

Before converting to low water turf you will have to kill or physically remove the existing vegetation including pre-existing turf. The timing of this process depends on which method you choose to physically remove or kill turf. Your removal method will also depend on how you plan to establish your new low water turf. If you are seeding or using plugs, any method will work. If you plan to install new sod, you will need to use a sod cutter to remove your current sod. For more information on the different methods and to find out what will work best for your space, check out the Turf Removal Chapter 6.

Tilling your soil or scalping your lawn is not recommended. These methods are not effective for killing turf. Tilling will disturb the soil and encourage weed growth. Grass will grow back after being scalped. Kentucky bluegrass is persistent and will not be killed by tilling or scalping.

If your irrigation system needs to be retrofitted to accommodate your new low water turf, check with an irrigation specialist, or contact your water utility company for more resources.

If you have bare soil and are not ready to replant right away, you can protect and improve the soil by planting a cover crop of annual grass until you are ready to replant your turf. The chart has several types of annual seeds that can be used as a cover crop. Cover crops should be mowed before they go to seed to prevent them from popping up in your new turf.

COVER CROP OPTIONS			
SPECIES (COMMON NAME)	**GROWTH SEASON**	**POUNDS OF PURE LIVE SEED (PLS) / ACRE**	**PLANTING DEPTH (INCHES)**
Oats	Cool	35-50	1-2
Spring Wheat	Cool	25-35	1-2
Millet	Warm	3-15	1/2-3/4
Winter Wheat	Cool	20-35	1-2
Winter Barley	Cool	20-35	1-2

Research and information from Mile High Food District.

IF YOU PLANT DOG TUFF... BE SURE TO CONTAIN IT WITH HARDSCAPE!

NATIVE LOW WATER TURF SELECTION

Native turf in Northern Colorado is most commonly a mix of buffalograss *(Buchloë dactyloides)* and blue grama *(Bouteloua gracilis)*. Buffalograss is a runner grass and blue grama is a low growing bunch grass. Blue grama and buffalograss are commonly available as seed and plugs. Buffalograss sod is available, but can be difficult to source and is more expensive than establishing turf using seed or plugs. Plugs typically produce quicker results than seeding.

Native turf can be more time intensive to establish, but once established will require less maintenance, fertilizer, and water than traditional Kentucky bluegrass (KBG) turf. Native turf is also resistant to many of the diseases and pests that cause issues with non-native turf.

RECOMMENDED NATIVE TURF VARIETIES:

- Buffalograss:
  - Seed: Bison, Bowie, Cody, Plains, and Topgun.
  - Plugs: Legacy, Prestige
  - Sod: Legacy, Prestige, and Turffalo
- Blue Grama:
  - Seed or Plugs: Hachita
- City of Fort Collins Warm and Cool season Grass Seed Mix (see table below)

SITUATIONS WHERE NATIVE TURF IS NOT IDEAL:

- Shady areas
- Areas with high foot traffic, pets, high use.
- Where a traditional KBG type lawn is desired: watering and fertilizing a native lawn in an effort to make it look like bluegrass turf can result in weed problems.
- Elevations above 6500 feet. The growing season is too short but there are other native grasses like western wheatgrass (Pascopyrum smithii) and junegrass (Koeleria macrantha) that can grow at elevation.

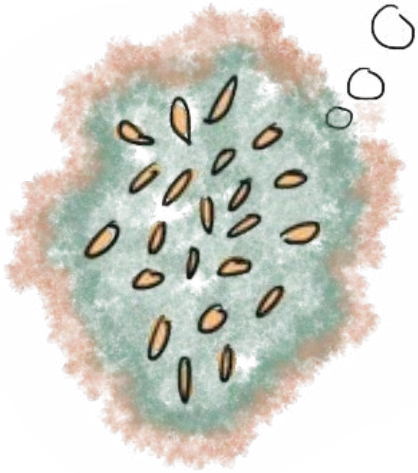
CITY OF FORT COLLINS WARM AND COOL SEASON GRASS SEED MIX

COMMON NAME	SCIENTIFIC NAME	% OF TOTAL	POUNDS OF PURE LIVE SEED (PLS) / ACRE
Sideoats Grama	*Bouteloua curtipendula*	10%	3.28
Buffalograss	*Buchloë dactyloides*	10%	9.33
Blue Grama	*Bouteloua gracilis*	10%	0.72
Inland Saltgrass	*Distichlis stricta*	5%	0.50
Bottlebrush squirreltail	*Elymus elymoides*	10%	2.75
Idaho fescue	*Festuca idahoensis*	15%	1.74
Rocky Mountain fescue	*Festuca saximontana*	15%	0.00
Prairie Junegrass	*Koeleria macrantha*	5%	0.11
Alkali muhly	*Muhlenbergia asperifolia*	10%	0.22
Galetta	*Hilaria jamesii*	10%	3.29
GRASSES TOTAL* **		**100%**	**21.93**

*****Please note: This is a custom mix and you can ask a local seed provider to create it for you or you can use local native seed mixes created by your local seed provider.*

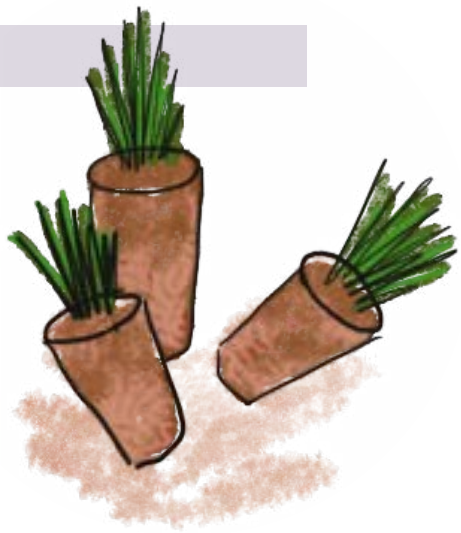
INSTALLING NATIVE LOW WATER TURF

Installation steps for seed:



1. Determine how much seed you will need and where you can purchase it. Buffalograss and blue grama should be seeded at a rate of 3-4 pounds per 1000 square feet[4.4]. Seeding should take place between April to July, so that grasses have time to establish before the first hard freeze.
2. Locate existing irrigation. Flag all irrigation heads and boxes to avoid damaging the irrigation system.
3. Remove existing lawn. If you have solarized or used chemical application, mow the area as low as possible or to 2-3 inches. If you sheet mulched or used a sod cutter, you can plant directly into the soil.
4. Consider what to do with removed existing lawn. If a sod cutter is used and turf is not composted in place, you will also want to add about 2-3" of topsoil to replace the sod that was removed.
5. Aerate project site. Use a hollow, tine core aerator that pulls a 2-to-3-inch plug. Aerate aggressively to make lots of holes for seed. Make at least three passes going different directions.
6. Hand broadcast seed. Cover seed with only ¼ - ½ inch of soil using a drag harrow or rake. Do not plant deeper, native seeds need sunlight to germinate.
7. Apply fertilizer. Use a low fertility, slow release, organic fertilizer the day you plant.
8. Irrigate your seed beds. Soil should stay consistently moist when attempting to germinate grass seed. Irrigate every 4-5 hours during the day to maintain even moisture, avoiding the hottest parts of the day.

Installation steps for plugs:



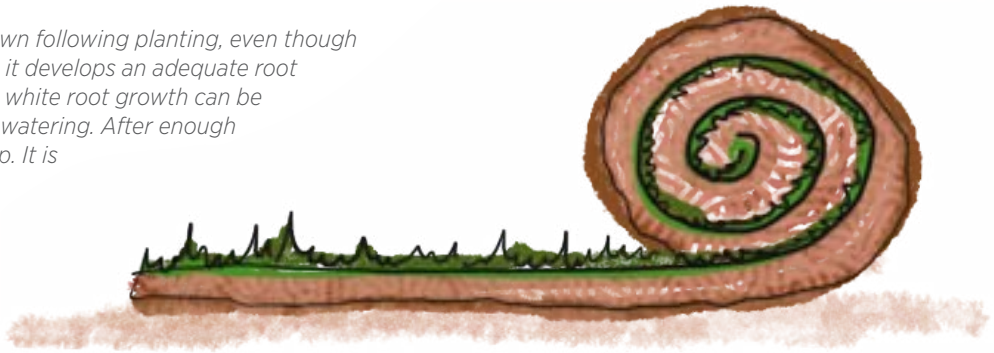
1. Choose when to plant. Buffalograss and blue grama plugs should be planted between June to mid-August.
2. Remove existing lawn. If you have solarized or used chemical application, mow the area as low as possible or to 2-3 inches. If you sheet mulched or used a sod cutter, you can plant directly into the soil. Leaving dead turf in place, will help prevent weeds and you can plant directly into it shortly after treating it.
3. Consider what to do with removed existing lawn. If a sod cutter is used and turf is not composted in place, you will need to haul your pre-existing sod away. In this case you will also want to add about 2-3" of topsoil to replace the sod that was removed.
4. Irrigate project site ahead of planting plugs. Irrigate the ground thoroughly several days ahead of planting the plugs so that soil is moist when plugs are installed.
5. Plant plugs 12-18 inches apart. You can use a hori-hori, metal bar, or an auger to create a 1" deep hole. An auger will make this easier if you must plant several trays of plugs.
6. Apply a low fertility, slow release, organic fertilizer the day you plant.

4.4 extension.colostate.edu/topic-areas/yard-garden/buffalograss-lawns-7-224/#:~:text=Buffalograss%2C%20a%20%E2%80%9Cwarm%2Dseason,hard%20frost%20in%20the%20fall.

Installation steps for Sod:

1. Remove existing lawn. If you are converting high water turf to low water turf, you will need to use a sod cutter to remove your pre-existing sod. The sod you cut can be flipped and composted in place, if you plan several months ahead.
2. Consider what to do with removed existing lawn. If you don't compost in place, you will need to haul your pre-existing sod away. In this case you will also want to add about 2-3" of topsoil to replace the sod that was removed.
3. Determine how much sod you will need and where you can purchase it. Buffalograss is not readily available as sod, but you may be able to find it regionally with the suppliers listed above. Sod is more expensive than the previous methods but is the quickest way to get a weed free native lawn. Blue grama does not come in sod but can be interplanted.
4. Lay sod and begin irrigating. Buffalograss sod should be given enough water to maintain a moist, but not saturated, root zone under the sod.

Please note: Buffalograss sod can quickly turn brown following planting, even though it is being irrigated. The grass goes dormant while it develops an adequate root system over the following one to two weeks. New, white root growth can be seen on the bottom of the sod after a few days of watering. After enough rooting has occurred, buffalograss should green up. It is important that you keep watering the sod, even if it turns brown and appears to be dead.



NON-NATIVE LOW WATER TURF SELECTION

There are several options for non-native, drought tolerant turf species. Non-native Kentucky bluegrass cultivars and tall fescue have been bred for drought resistance for those wanting a more traditional looking lawn that will also cut water costs. Research is ongoing but current data suggests that Texas and Kentucky bluegrass hybrids such as ***Reveille, Longhorn, Thermal Blue, Solar Green, Dura Blue and Bandera have better than average drought resistance and heat tolerance.***[4.5] These Kentucky bluegrass cultivars are widely available in sod, plugs, and seed. Tall fescue can develop deep roots and drought tolerance in amended clay soil or more porous soil. In unamended clay soil, tall fescue may not be able to develop a deep root system and may need more supplemental water than KBG. Tall fescue is widely available in seed, but sod can be difficult to source and expensive

4.4 planttalk.colostate.edu/topics/lawns/1544-modern-bluegrass-varieties-better-heat-tolerance-drought-resistance/

MAINTAINING NATIVE LOW WATER TURF

Irrigation

When establishing seed, sod, or plugs, irrigate every 4-5 hours during the day to maintain even moisture, but not constant saturation. Reduce irrigation to once or twice a week once seedlings germinate and rooting occurs. Water during the winter the first year, if there is not regular precipitation.

After the first year, native lawns can generally be irrigated quite minimally. During very dry summers, all native lawns will become dormant without supplemental irrigation. Un-mowed native grasses will have better drought tolerance. To maintain green growth, buffalograss and blue grama turf need 1-2 inches of water every 4-5 weeks during a dry summer. In a dry spring, irrigation can begin in late May when these warm season grasses begin growing. Irrigating earlier in the spring will encourage weed growth.

Fertilization

During the establishment period you will fertilize at planting, then again four weeks later.

After the first year, fertilize buffalograss/ blue grama once yearly in July or August with a low fertility, slow-release fertilizer.

Excessive fertilization will promote weed growth.

Weed Control

As you are establishing native turf it is important to control weeds, especially early in the season when warm season grasses are still dormant and not actively growing. Weeds can be controlled using hand pulling or selective herbicides.

Integrated Pest Management can help you manage your weeds with the least toxic methods. For more information, check out Chapter 7: Weed Management.

Mulching

If you start your lawn using plugs or seed, mulching with erosion control matting or straw mulch can help retain moisture and prevent erosion in steep areas. Make sure that mulch is applied lightly and that it does not cover the plugs.

Interplanting Wildflowers

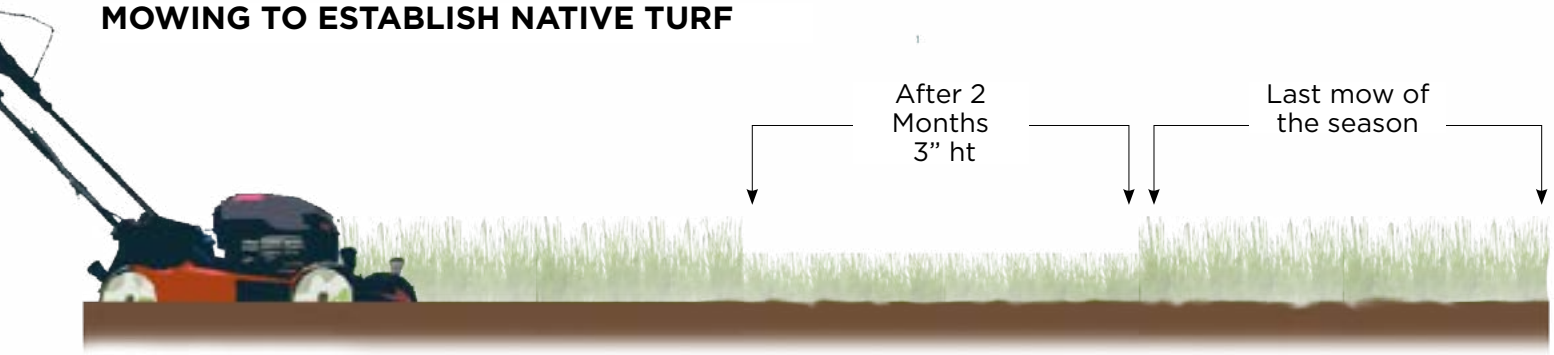
It is easiest to establish wildflower patches once your turf is healthy and weeds are under control. Turf will need to be thinned in the wildflower areas so that seed can be planted. Alternatively, you can also plant mature flower plants or bulbs instead of seeds.

Mowing

Two months after planting, cut the grass to a height of 3 inches to help stimulate growth.

In the long term, mowing is not necessary unless city codes require it. Leaving native turf un-mowed will help with drought tolerance and will help prevent weeds. An established native lawn can be cut 1 or 2 times to a height of 3 to 4 inches over the course of the summer if you want a more manicured look. Keep the last mow of the season high, to help prevent weed germination in spring.

MOWING TO ESTABLISH NATIVE TURF



INSTALLING NON-NATIVE LOW WATER TURF

If you want a more manicured lawn that can hold up to high traffic, two good options are drought tolerant Kentucky bluegrass cultivars or tall fescue cultivar. See the chart on pg. 6 for more info on the difference between these turf types.

Irrigation

Watering deeply and less frequently will increase your turf's drought tolerance.

Drought tolerant KBG and tall fescue will need supplemental water to survive. Water requirements vary depending on microclimates and location, but a high-quality lawn may need up to 2.25 inches of water per a week during hot, dry summer conditions. Turf should be irrigated so that the entire root zone is moistened. In clay soils, it can help to water for shorter periods, multiple times in a day to allow water to soak in before applying additional water.

Fertilization

Kentucky bluegrass should be fertilized in the spring, summer, and fall. In March/April apply 0.5 lbs of nitrogen/1000 sq ft of turf. Apply the same amount of nitrogen fertilizer sometime between May and mid-June. In August/September apply 1-1.5 lbs. of nitrogen fertilizer per 1000 square feet.

Tall fescue should be fertilized only in the spring and fertilization should be avoided during the hottest parts of the summer. In mid-March and in May, apply 0.5 lbs. of fertilizer per 1000 square feet.

Mulching

If you start your lawn using plugs or seed, mulching with erosion control matting or straw mulch can help retain moisture and prevent erosion in steep areas. Make sure that mulch is applied lightly and that it does not cover the plugs.

Weed Control

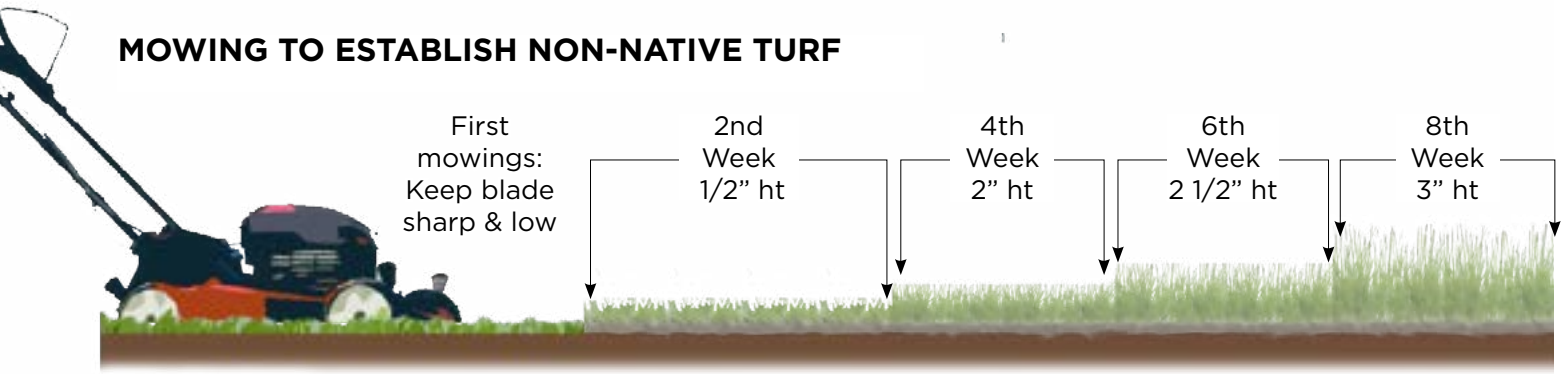
As you are establishing turf it is important to control weeds while your turf fills in. Weeds can be controlled using hand pulling or selective herbicides.

Integrated Pest Management can help you manage your weeds with the least toxic methods. For more information, check out Chapter 7: Weed Management for Alternative Landscapes.

Mowing:

While turf is establishing, keep your first mowings at a lower setting with a sharpened blade. Raise your mower height every one to two weeks until it hits about two-and-a-half to three inches. This added height will protect the root system from heat and will help retain moisture in Colorado's arid climate.

Do not cut turf short before winter. It is best to leave turf long in fall to help prevent weeds in spring.



GRASS WATERING AFTER ESTABLISHMENT

		MAY	JUNE	JULY	AUG.	SEPT.
COOL SEASON GRASS *(fescue, bluegrass)*	Spray	**1-2 days/ week** • 2 cycles, 6 mins each	**2-3 days/ week** • 2 cycles, 8 mins each	**2-3 days/ week** • 2 cycles, 9 mins each	**1-2 days/ week** • 2 cycles, 8 mins each	**1-2 days/ week** • 2 cycles, 7 mins each
	Rotar / Rotary	**1-2 days/ week** • 2 cycles, 16 mins each	**2-3 days/ week** • 2 cycles, 18 mins each	**2-3 days/ week** • 2 cycles, 20 mins each	**1-2 days/ week** • 2 cycles, 18 mins each	**1-2 days/ week** • 2 cycles, 16 mins each

		MAY	JUNE	JULY	AUG.	SEPT.
WARM SEASON GRASS *(buffalograss, blue grama, Dog Tuff)*	Spray	**1 day/mid-late month** • 2 cycles, 5 mins each	**1 day/every other week** • 2 cycles, 5 mins each			**1 day/month** • 2 cycles, 5 mins each
	Rotor / Rotary	**1 day/mid-late month** • 2 cycles, 10 mins each	**1 day/every other week** • 2 cycles, 10 mins each			**1 day/month** • 2 cycles, 10 mins each

A TALE OF THREE LAWNS

NATIVE LAWN CONVERSION CASE STUDIES

Converting to low water turf can be an undertaking but hopefully this chapter has helped outline and lay out the steps required to make the switch. Converting to low water lawns can help save water and money. Below are several examples of native lawn conversions in Fort Collins. These case studies showcase the aesthetic of native lawns and provide information on what the conversion process was like for two small scale residential home projects and a larger scale project in the Rigden Farms HOA.

Small Scale Residential Projects

RESIDENTIAL EXAMPLE 1: SCOTT'S LAWN ESTABLISHED IN 2020

What method did you use to remove your original turf?

I sprayed glyphosate twice then used a sod cutter to cut and flip sections upside down (root side up). Finally, I let the roots sit in the sun for a week or two. Excess sod was used for mounding, also stacked upside down.

What did you do for install i.e. amended soil and then installed via seed or plug or sod?

I kept amendment to a minimum, just a little compost mixed in. I used leftover dirt, compost, and pea gravel to level low spots, but the those areas have actually had less robust growth compared to the less-amended areas. For seeding, I first broadcasted blue grama at roughly 3-4 lbs/ft^2 and hand raked, then I planted buffalograss plugs at less than the recommended density (plugs are a lot more expensive than seed). I did this in mid-May. We also spread a straw mulch with tackifier to help retain soil moisture. In the fall we planted early blooming bulbs, crocuses and irises, so that they would bloom in early spring while the grass was still brown.

How much water did you use to establish and now maintain your native lawn?

This was variable over the 2021 growing season. We hand-watered to just wet the surface several times a day to get good germination. Once the seed germinated, I switched to watering more deeply and less often by hand, then to a sprinkler. Right after germination, that looked like watering 2-5 minutes two or three times a day, then to 1-2x/day for 5-7 minutes, then worked down to 1x/week or 1x/2 weeks but for 20-25 minutes. I also ignored the 'don't water in October' advice since October was hot and dry and the grass was still active. This year we have only been watering once a week or two for 10-20 minutes, depending on the weather.

Maintenance practices?

We have a bad bindweed problem and we knew that was going to be an issue. The year we seeded/plugged we just hand-weeded while the grass was young and sensitive and still establishing, and to protect the bulbs. I think the straw mulch had some annual grass weed seeds, so I also targeted those before they went to seed. But that is not really sustainable long-term (it took a lot of time). I spot-sprayed an herbicide with quinclorac this year in late spring/early summer, and will probably do that one more time in fall 2022/spring 2023 and then hand weed after that.

Would you do it again?

Absolutely. The only hesitation I have is with foot traffic – I think blue grama/buffalo can take more foot traffic than people think but I haven't really found the right amount yet.

SITE VISIT PHOTOS:

Visit a low water native lawn and see and feel for yourself, check out the Xeriscape Incentive Program Self-Guided Tour.

Residential Buffalograss/Blue Grama Lawn

Wildflower lawn border-pictured here: Rocky Mt. Penstemon & Buckwheat

Lawn comparison

Close up of Residential Buffalograss/Blue Grama Lawn

RESIDENTIAL EXAMPLE 2:
ARLO'S LAWN ESTABLISHED IN 2008

SITE VISIT PHOTOS:

Residential Buffalograss/Blue Grama Lawn

Side yard grass comparison

Lawn challenges

Close up of Buffalograss/ Blue Grama Lawn

What method did you use to remove your original turf?

I sprayed glyphosate to kill off the existing bluegrass lawn.

What did you do for install i.e. amended soil and then installed via seed or plug or sod?

Rototilled the dead grass and amended with cow manure compost. Installed plugs on approx. 12" spacing.

How much water did you use to establish and now maintain your native lawn?

Followed (mostly) recommended instructions for establishment that came with the plugs. Currently watering about ½" once a week.

Maintenance practices?

Mow about once every 2 weeks. Mostly to keep weeds down.

Would you do it again?

Yes. I've learned some lessons that would change my approach. Here are some other thoughts:

- I have had some volunteer Kentucky bluegrass. If I did it again, I'd do two rounds of spraying.
- I feel like the cow manure compost I used introduced a lot of weeds. I'd probably do something different next time.
- I'm looking to switch to a single 1" deep watering every two weeks. I've gone to hunter MP rotators for low and slow watering.
- Have also planted some early-blooming bulbs on the west edge of the yard.
- Bindweed has become a major issue in the yard. Been fighting it and will probably have to spray quinclorac as well.

My goal was not to have a picture-perfect lawn but lower my water usage and mowing frequency, which I did!

RIGDEN FARMS

Buffalograss/Blue Grama Lawn at Rigden Farms

Buffalograss/Blue Grama Lawn - light green color

Areas beginning to go dormant during Summer heat

Close up of Residential Buffalograss/Blue Grama Lawn

Mild spot fix needed due to rabbit damage

ADDITIONAL RESOURCES

Denver Water:
denverwater.org/business/efficiency-tip/right-grass-right-place

Watering Established Lawns:
extension.colostate.edu/topic-areas/yard-garden/watering-established-lawns-7-199/

CSU Extension – Attracting Native Bees to Your Landscape:
extension.colostate.edu/topic-areas/insects/attracting-native-bees-landscape-5-615/

Buffalograss Turf
extension.colostate.edu/topic-areas/yard-garden/buffalograss-lawns-7-224/#:~:text=Buffalograss%2C%20a%20%E2%80%9Cwarm%2Dseason,hard%20frost%20

Native Lawn Fact Sheet:
fcgov.com/natureinthecity/files/native-lawn-fact-sheet-2020.pdf

The Bumble Bees of Colorado:
colorado.edu/cumuseum/sites/default/files/attached-files/thebumblebeesofcolorado-2017.pdf

General Lawn Care Information from CSU- good information on irrigating turf:
extension.colostate.edu/topic-areas/yard-garden/lawn-care-7-202/

US Forest Service – Pollinator-Friendly Best Management Practices for Federal Lands

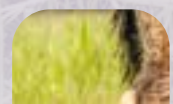
Tony Kioski's Turf Resources:
agsci.colostate.edu/csuturf/resources/lawn-care/

Tall Fescue:
planttalk.colostate.edu/topics/lawns/1519-tall-fescue-lawns/in%20the%20fall.

FUN FACT!

BUFFALOGRASS REQUIRES 50-75% LESS WATER THAN MOST WARM SEASON LAWN GRASSES.

This means you could save big on your water bill! Buffalo grass originates from the area along the rocky mountains and is adapted to dry weather and clay soils. Fossil evidence indicates Buffalo grass has been growing in the west for at least 7 million years and is a favorite food for bison.



NATURE IN THE CITY

LANDSCAPE DESIGN GUIDE

CHAPTER 5: PARKWAY STRIP GARDENING

An Introduction to Diversifying Urban Landscapes in Fort Collins

City of Fort Collins

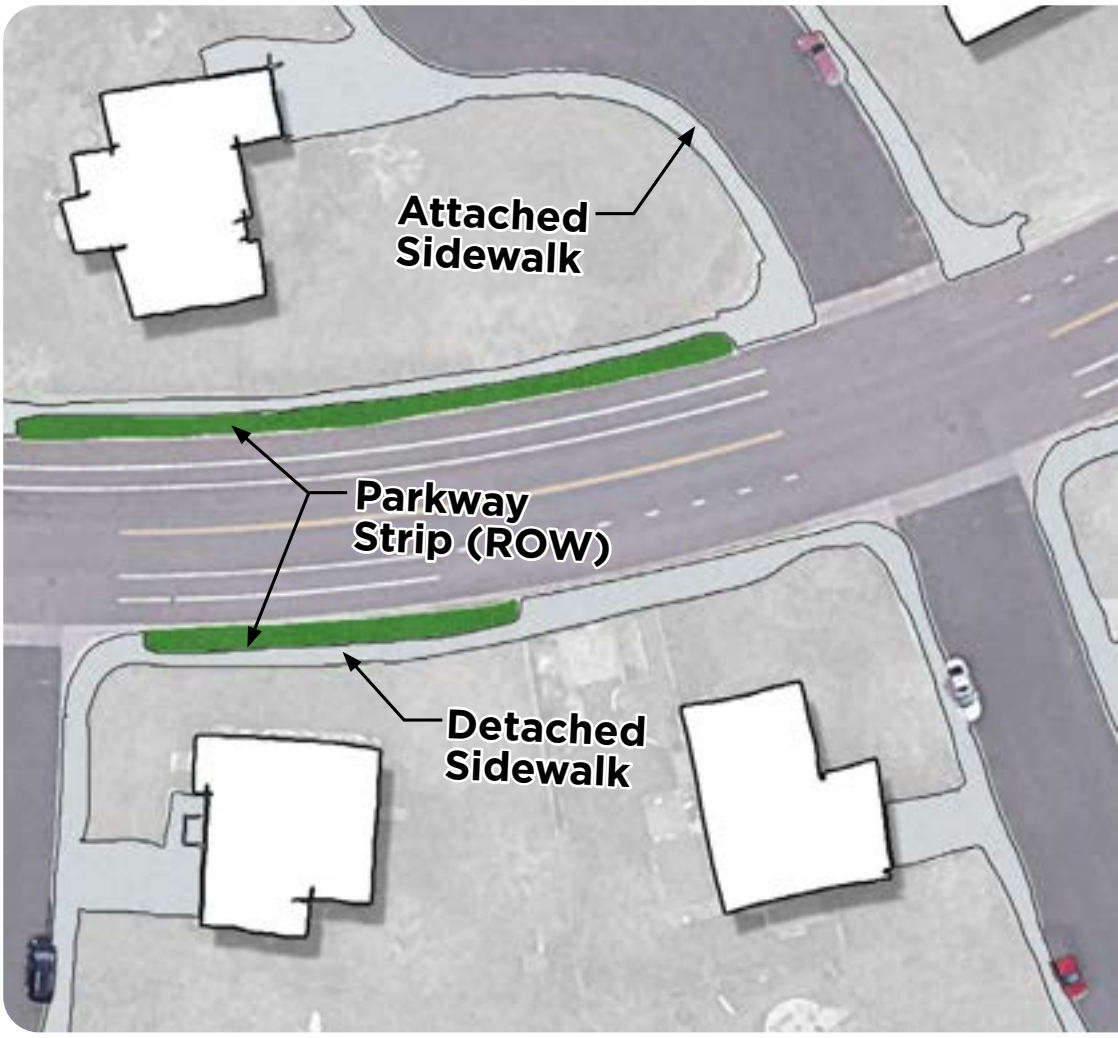
CHAPTER 5

CHAPTER 5

Parkway Strip Gardening

What are Parkway Strips?

Parkway strips, also known as hellstrips or tree lawns, are the narrow planting areas found between the street and sidewalk. Parkway strips are City-owned right-of-ways, however the adjacent property owner or homeowner association (HOA) is responsible for maintaining these areas. The City of Fort Collins traditionally encouraged the use of turfgrass and trees in these spaces because they are easy to maintain, but parkways can also be great spaces for low-water pocket gardens composed of perennials and shrubs. Parkway gardens can create curb appeal for your home, reduce your water costs and increase wildlife habitat in your neighborhood. If you are thinking about landscaping your parkway strip, you will first need to read the City regulations associated with parkway strips, listed next, to learn more about the process. Once you have come up with a plan for the parkway strip, you can fill out the parkway amendment application and other necessary permits to get approval for your project before beginning installation.



Parkway Landscape Amendment

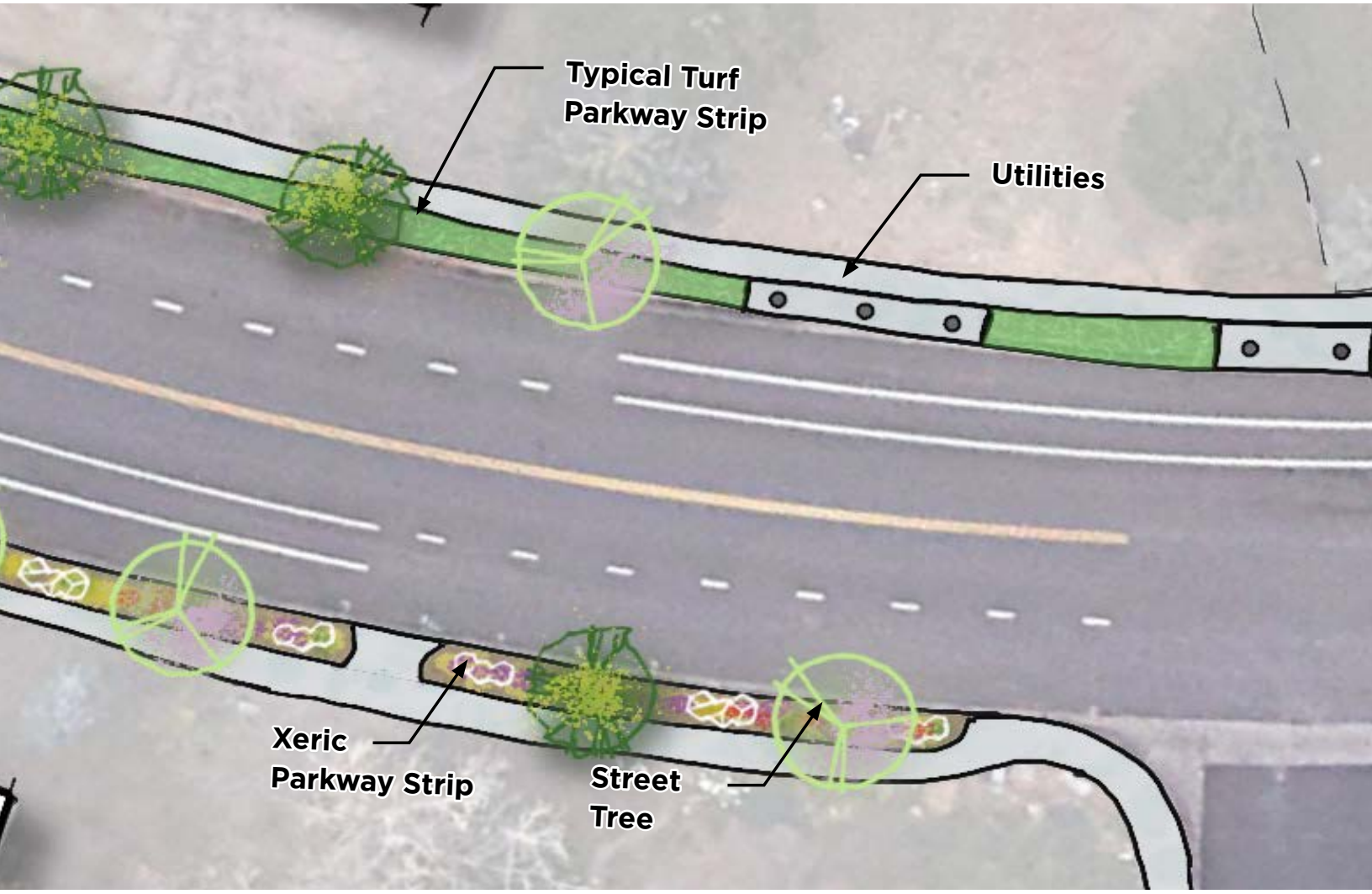
If you plan to landscape your parkway strip, you must first apply for a free Parkway Landscape Amendment. Copies of your landscape plan along with the amendment application are required. Share your plans with your HOA, if applicable, and give them a chance to comment. For information, contact Zoning at 970-416-2745 or *fcgov.com/zoning.*

Turf Regulations

City Code requires all turf grasses be kept to a maximum height of 6 inches, except for blue grama and buffalograss. These are drought-tolerant, native grasses that may be grown up to 12 inches. Blue grama and buffalograss are not suitable for areas with high traffic or shade and can be difficult to establish and keep free of weeds. Perennial bunchgrasses do not need to be kept under 12 inches but should be kept under 2-3 feet for visibility.

Tree Regulations

Before any trees are planted, pruned, or removed in the public right-of-way, a permit must be obtained from the City Forester. This includes zones between the sidewalk and curb, medians and other city property. A permit is also needed to approve the species and location of new trees to be planted. Failure to obtain a permit could result in a citation. Contact Forestry at: 970-221-6660 or *forestry@fcgov.com* for more information.



Plant, Mulch and Rock Regulations

At least 50 percent of the area must be covered with live plant material at maturity (tree canopy does not count). No bare dirt or artificial plants. Plant materials must not obscure the line of sight for traffic or obstruct the sidewalk. Keep plants under 2 feet tall within 5 feet of a driveway and under 3 feet tall in other areas. When selecting plants, choose varieties that will be close to these heights at maturity in order to reduce the need for pruning.

Mulch and plant material must be kept off the street and sidewalk. Keep the soil surface 2-3 inches below the curb and sidewalk to keep mulch contained.

Boulders, if used, should not be taller than 1 foot in height and should be placed at least 5 feet away from tree trunks.

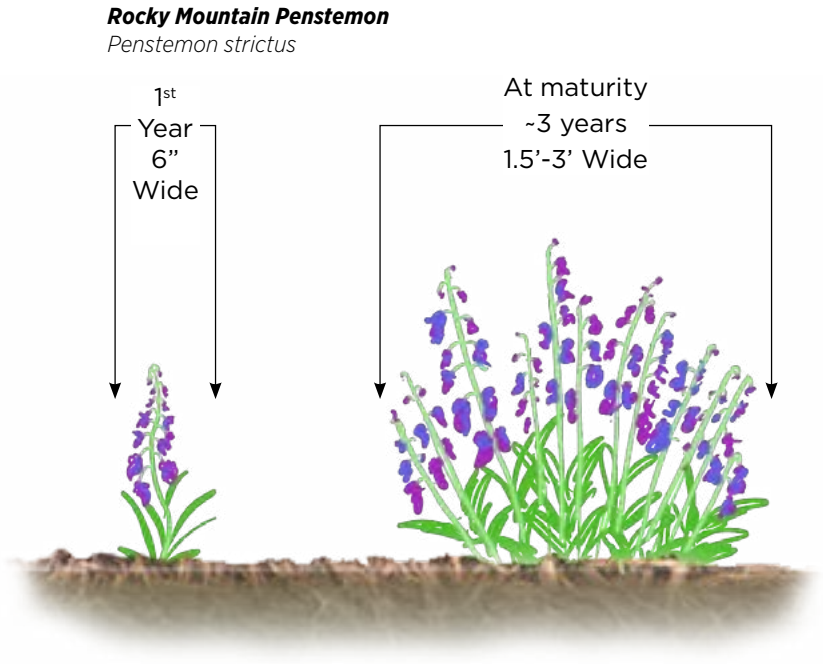


Figure 1

Figure 2

50% Coverage of live plant material is required. Figure 1 shows 50% of the parkway strip planted. In reality, you're not going to plant only half of the parkway strip, but take those plants and spread them out as in Figure 2. It can take up to three years for plants to reach full maturity so if your newly planting parkway strip seems a bit sparse, spreading native groundcover seed to help fill in the bigger gaps until your new plants reach maturity can help. Some native wildflower mixes can have plants blooming the same season you spread the seed. You can also always plant more plants than the 50% coverage minimum.

Sight Triangles

Sight triangles are shown in yellow in both Figures 1 and 2, is the distance needed for a driver to detect what's happening in a roadway at an intersection, or driveway, to determine how to proceed into the roadway.

Figure 2 demonstrates how plant material must not obscure the line of sight for traffic or obstruct the sidewalk. Plants must be kept under 2 feet tall within 5 feet of a driveway and under 3 feet tall in other areas. When selecting plants, choose varieties that will be close to these heights at maturity in order to reduce the need for pruning.

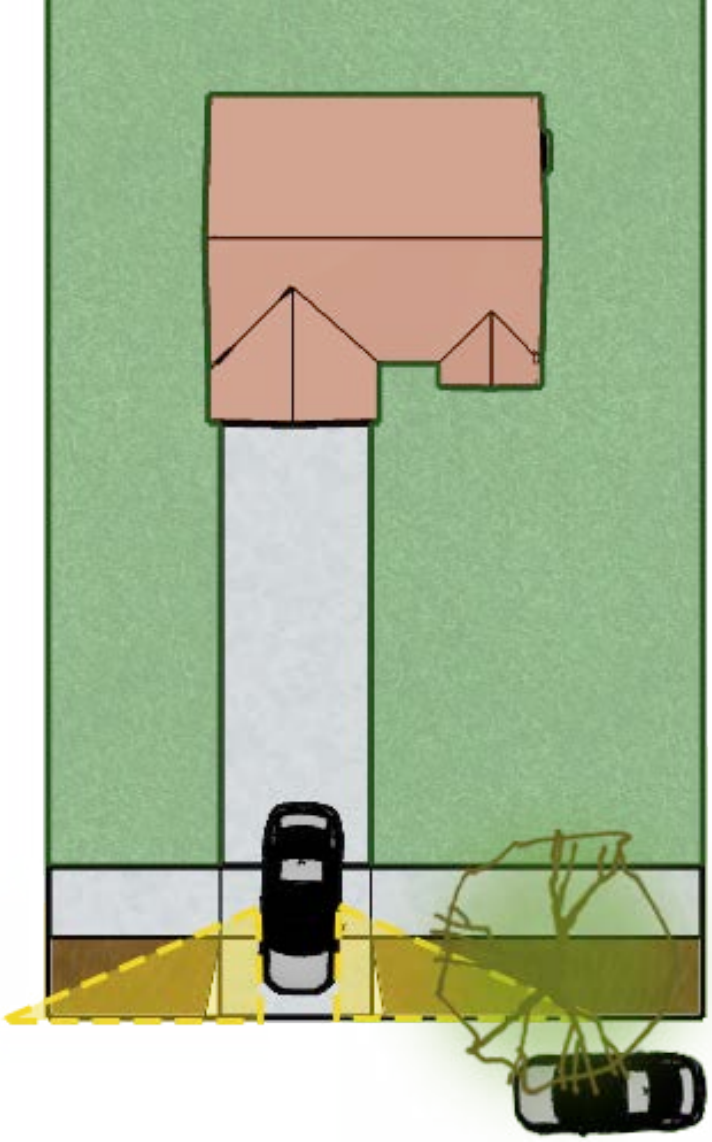


Figure 1
Sight Triangle
Plan View

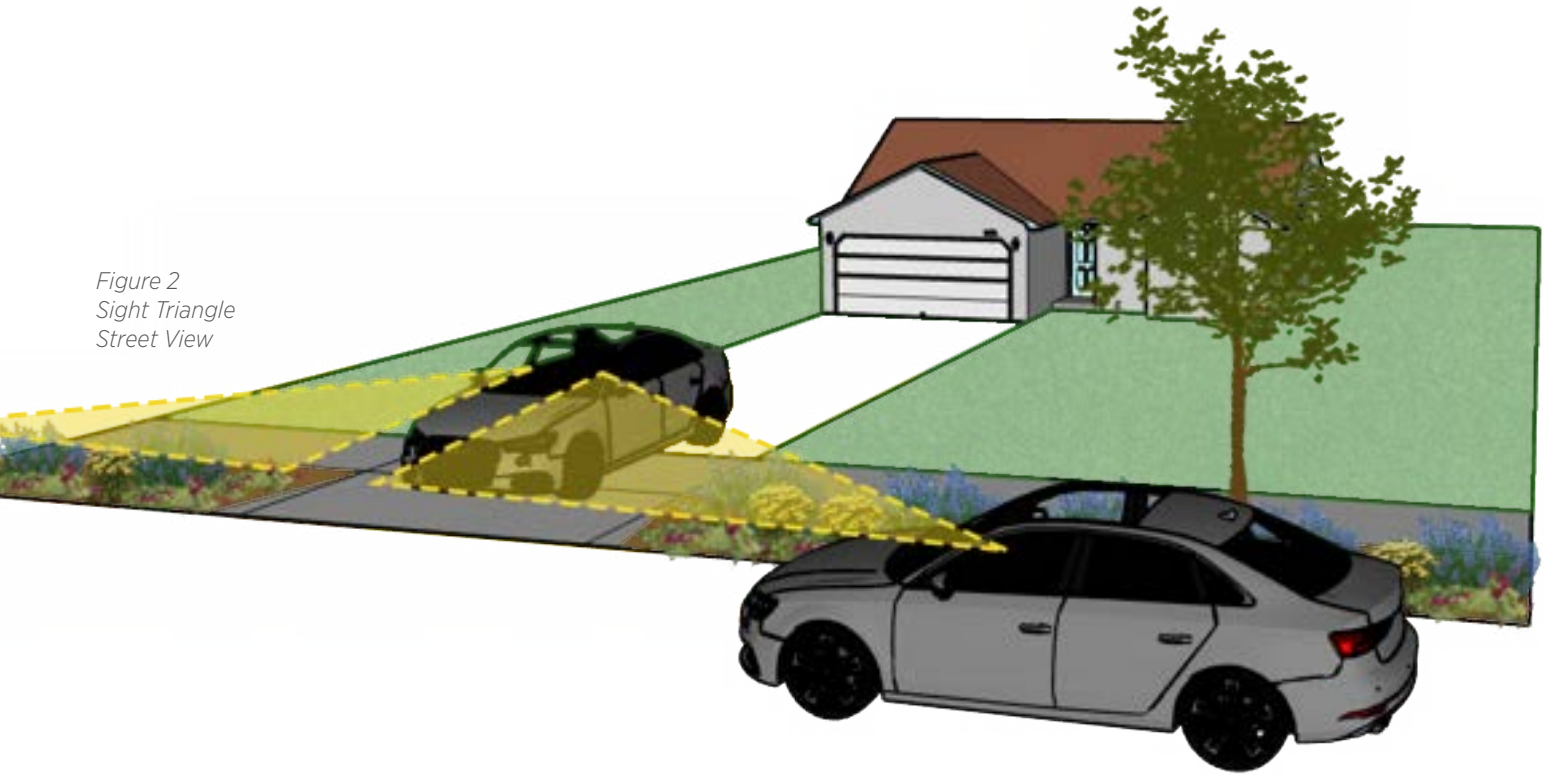


Figure 2
Sight Triangle
Street View

FACTORS TO CONSIDER WHEN SELECTING PLANT SPECIES

When choosing plants for your garden, you will want to consider the following: how much sunlight the site gets, the soil type, the site's aspect, drainage, and any microclimates within the space. Identifying the conditions of your site will help you choose plants that are well adapted to those conditions and so they can thrive in your prospective garden. See Chapter 1 for more information on Site Characteristics.

SUN REQUIREMENTS: Parkway strips often have street trees present which can reduce the amount of sunlight your garden receives. If you live in a new neighborhood and your street trees are young, you should consider choosing part sun and full sun plants. If you live in an older neighborhood with mature street trees, you might choose part sun and full shade plants.

- **Full Sun:** 6+ hours of direct sunlight per day
- **Part Sun:** 3 – 6 hours of direct sunlight per day
- **Shade:** Less than 3 hours of direct sunlight per day

ASPECT: The direction your parkway strip faces can affect the intensity of sunlight it receives and the temperature of the site. Parkway strips can have any aspect.

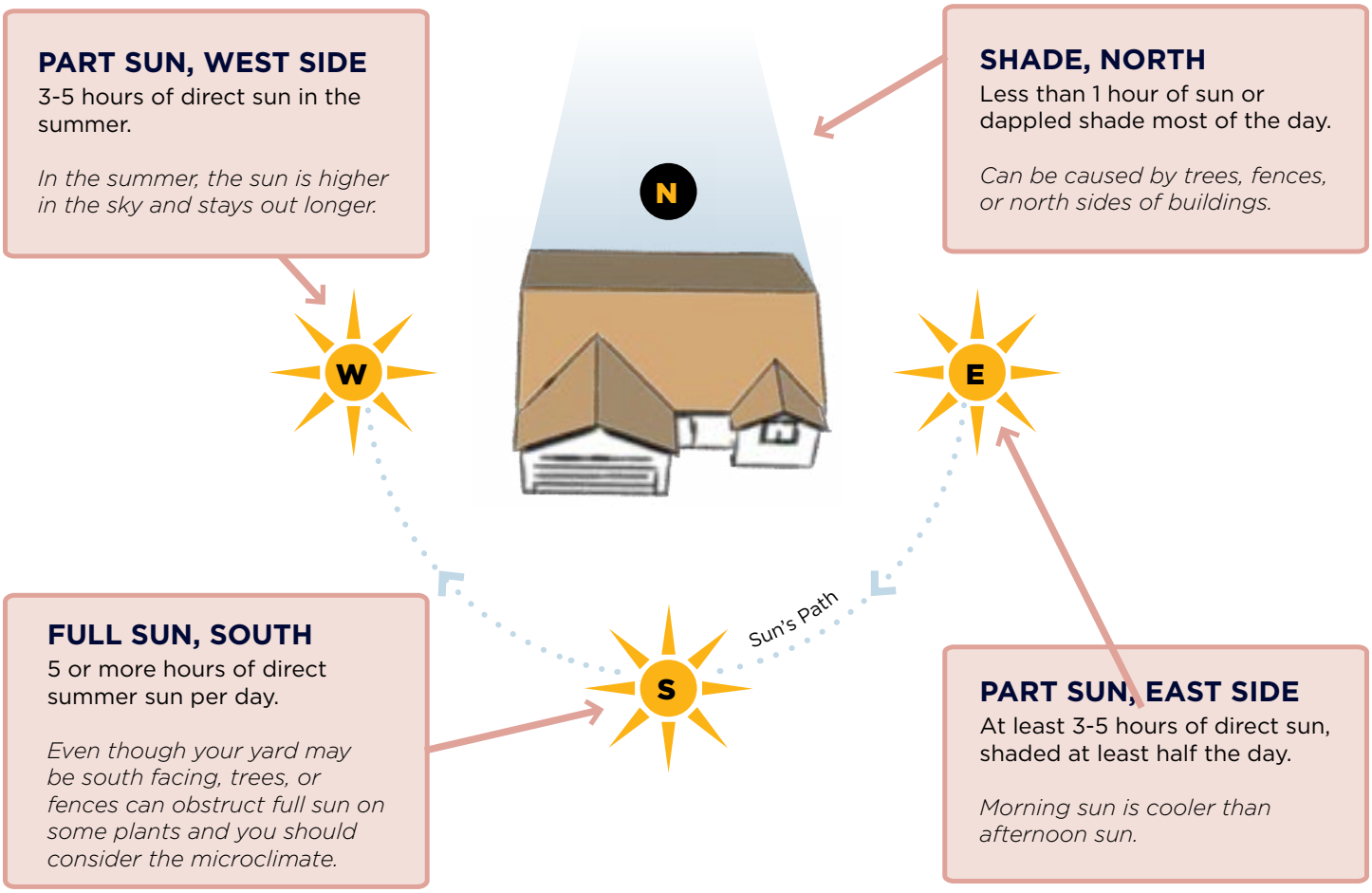
WATER: Very Low to Low

MICROCLIMATES: Parkway strips can have hot or cold microclimates.

- **Cold:** Parkway strips often have large street trees that may create dense shade causing a colder microclimate. In these areas, you will want to plant species that prefer cooler conditions or shade.
- **Hot:** Parkway strips also often tend to be hot and dry because of their sun exposure and proximity to surfaces that absorb heat, like asphalt and concrete. In areas with hotter microclimates, plants that have low water needs will be most successful.

SOIL TYPE: Parkway strips frequently have their soil disturbed during construction and may have particularly poor or compacted soil from foot traffic.

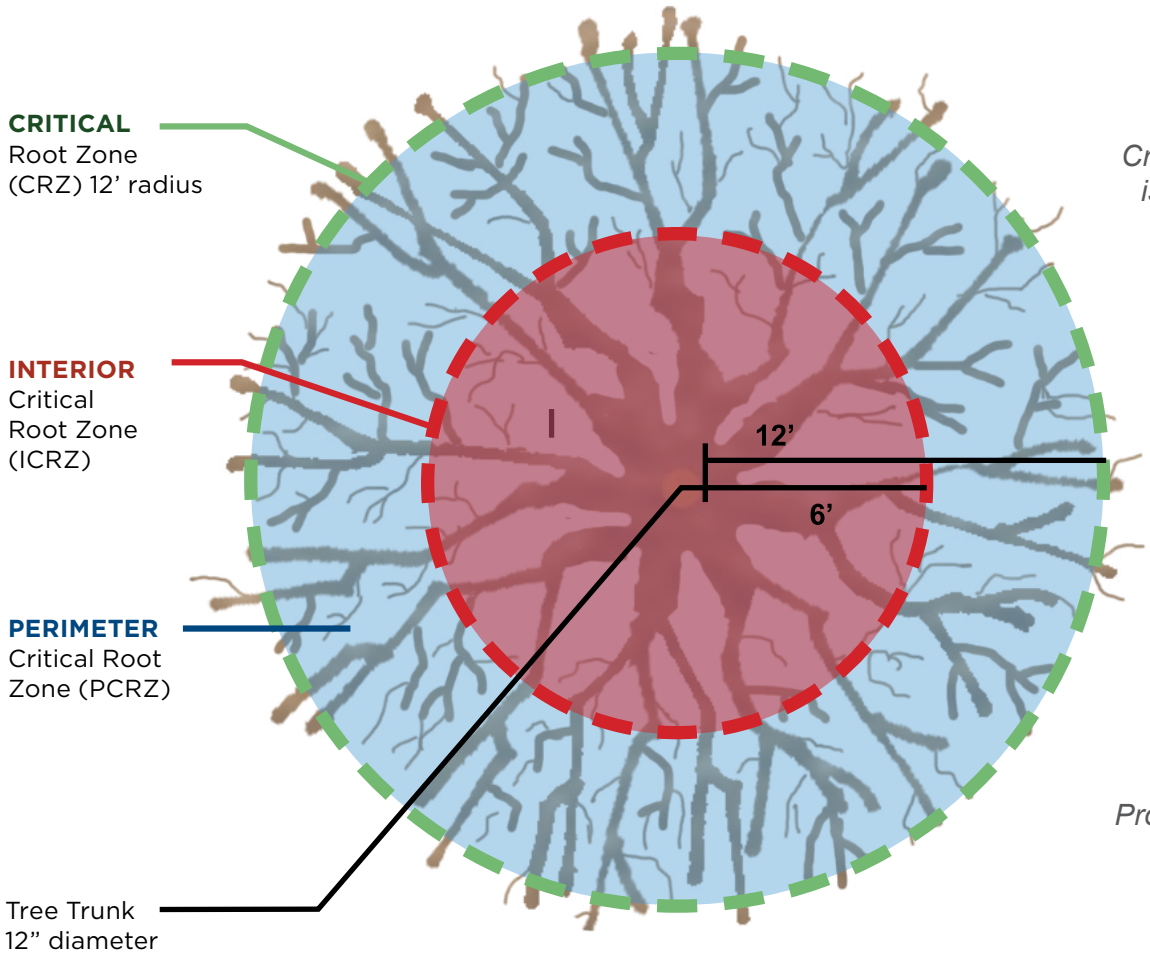
DRAINAGE: Parkway strips may have poor drainage due to compacted soils or because they are boxed in by impervious surfaces. They can get additional water from snow piled up in the winter and water runoff from surrounding impervious surfaces. These areas can also be high in salt or other chemicals used to melt snow.



DESIGNING YOUR PARKWAY POCKET GARDEN

Planning Your Garden and Getting Started

- Call 811 and have them mark any utilities that may be buried. It's better to have this done early in the process, so you can design around any obstacles. This step is extremely important and a great place to start your design.
- Talk to your neighbors about your plans to make sure they are on board. They may even want to design their parkway strip too. Review all city regulations around parkway strips.
- Plan pathways or stepping stones for pedestrians to get from the sidewalk to street.
- Incorporate plants or structural elements from your house or garden so that the parkway feels like a continuation of your yard. You can use some of the same plants, color schemas or stones that are visible in your front yard.
- Think about incorporating low growing, spreading perennial groundcovers that can act as a mulch, fill in small spaces and add color.
- Consider how you will irrigate this space until plants are established. Drought tolerant plants can be hand watered until they are established, or your existing irrigation can run under the sidewalk with the help of a professional.
- Parkway strips can be hot, dry, difficult to irrigate and are a small space to work within. Selecting low water species that will fit within the space requirements is important for long term success. Find which plants work best in parkway strips by using the plant list on page 18 or by searching the City of ***Fort Collins Vegetation Database.***[5.1]
- No fences or thorny/spiny plant material.
- To avoid clutter, do not add edging, timbers, concrete blocks, etc. If edging is needed to separate turf and mulch, it should span the parkway and not divide it into thinner strips. Edging should be installed so it can't be seen.



Critical Root Zone (CRZ) is the distance from the trunk that equals one foot for every inch of the tree's diameter at chest height. For example, if the tree has a 12 inch diameter, the CRZ would be a 12 foot radius around the tree. If digging in this area, hand digging is optimal. This graphic modified from City of Fort Collins municipal code regarding Tree Protection Specifications.

5.1 fcgov.com/vegetation/

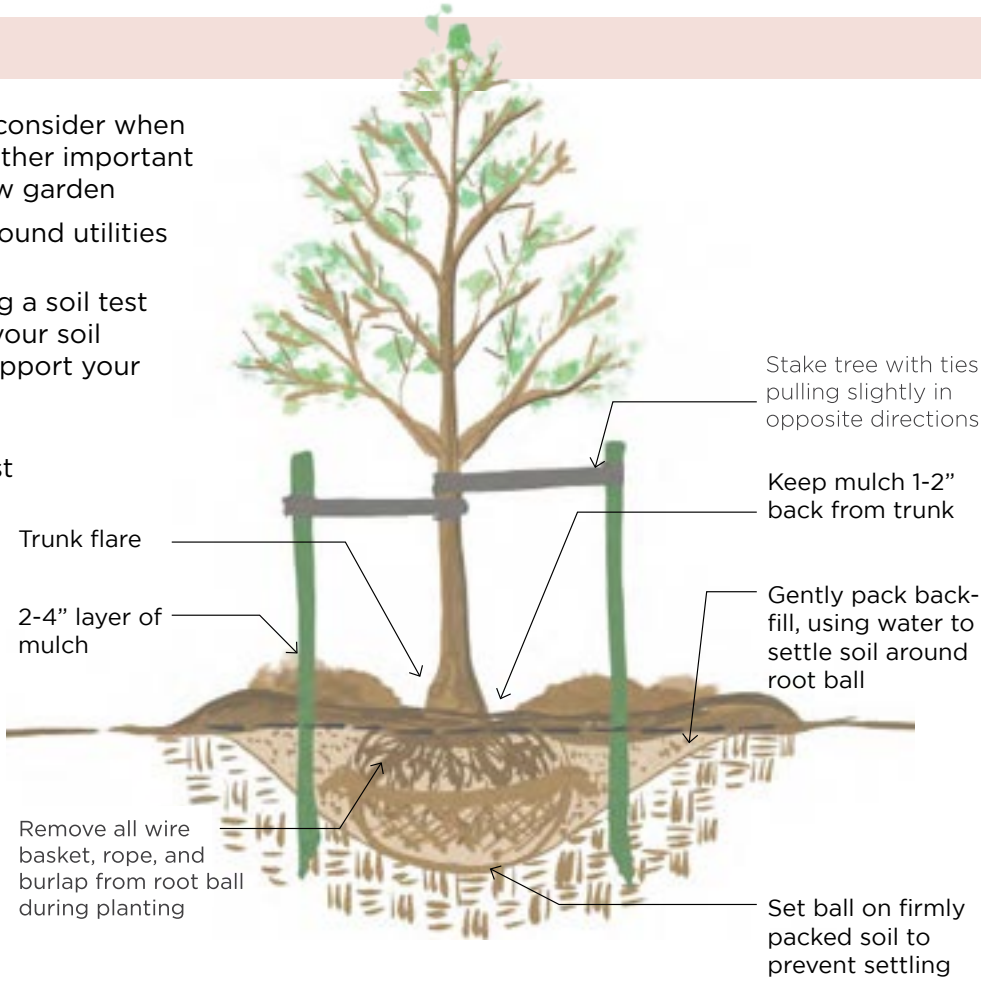
Special Considerations for Designing Around Trees

- If you plan to install a new tree in your parkway, modify irrigation for an existing tree, or make any changes to a tree in the right-of-way, you will need to first contact Forestry at: 970-221-6660 or ***forestry@fcgov.com*** for more information on permitting.
- A permit is needed to plant new trees. For a list of tree species approved for right-of-way plantings, see the parkway tree list at the end of chapter 5.
- Mulch each tree with an organic mulch ring a minimum of 3-4 feet wide and around 4 inches deep.
- Tree roots need oxygen and adding a significant amount of soil on top could reduce the tree's ability to breathe. You can add 2" of plant-based compost on top of your soil to amend it.
- When you install your garden, avoid disturbing the soil directly under tree canopies as much as possible.
- Do not use a sod cutter in the critical root zone of the tree.
- Never cut tree roots that are more than 2" wide. Damage to more than 25% of the roots can cause irreparable damage..
- Remove existing turf by hand digging, spraying it with tree safe herbicides, or sheet mulching.
- Hand dig plant holes and choose the smallest plants available to minimize disturbance to the tree root system.

Installation

Timing and water are important to consider when planning your garden installation. Other important considerations for planting your new garden

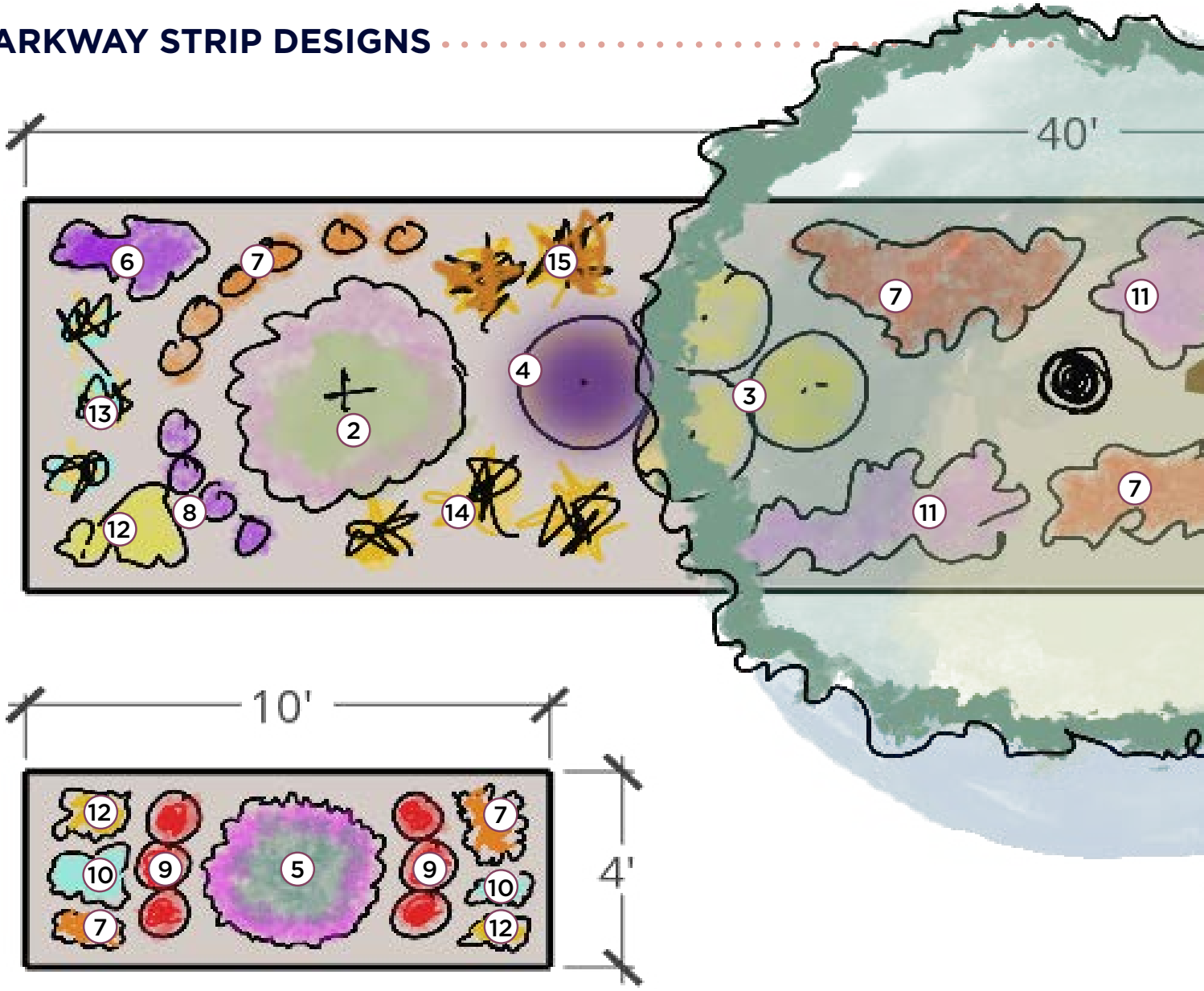
- Call 811 to locate where underground utilities are before digging.
- Before planting, consider getting a soil test done. You may need to amend your soil before planting so that it can support your plants.
- Plant in the morning or evening; avoid planting during the hottest part of the day as this will stress your plants. Similarly, try to avoid planting during peak heat months, such as July and August.
- It is best to plant in the spring around late May or in the early fall before the ground freezes.
- Water your plants before you put them in the ground and again after you put them in. Transplanting is stressful and they will do better if they are well hydrated.



- The width and depth of the hole you are planting will vary depending on what you are planting. In general, you should dig a hole twice the width and the same depth of the pot your plant is in. The exception to this is trees, which should be 2-3 times the width of the root ball and 1-3 inches shorter than the root ball. Learn more about tree planting on the ***Forestry website.*** [5.2]

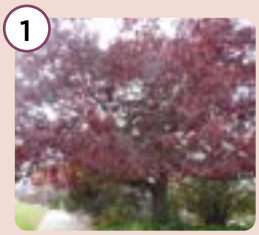
5.2 fcgov.com/forestry/

PARKWAY STRIP DESIGNS



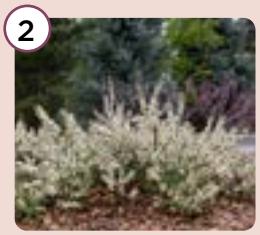
Tree

Shrubs



1

Shumard Oak
Quercus shumardii



2

Pawnee Buttes ® sandcherry
Prunus pumila var. besseyi '

3

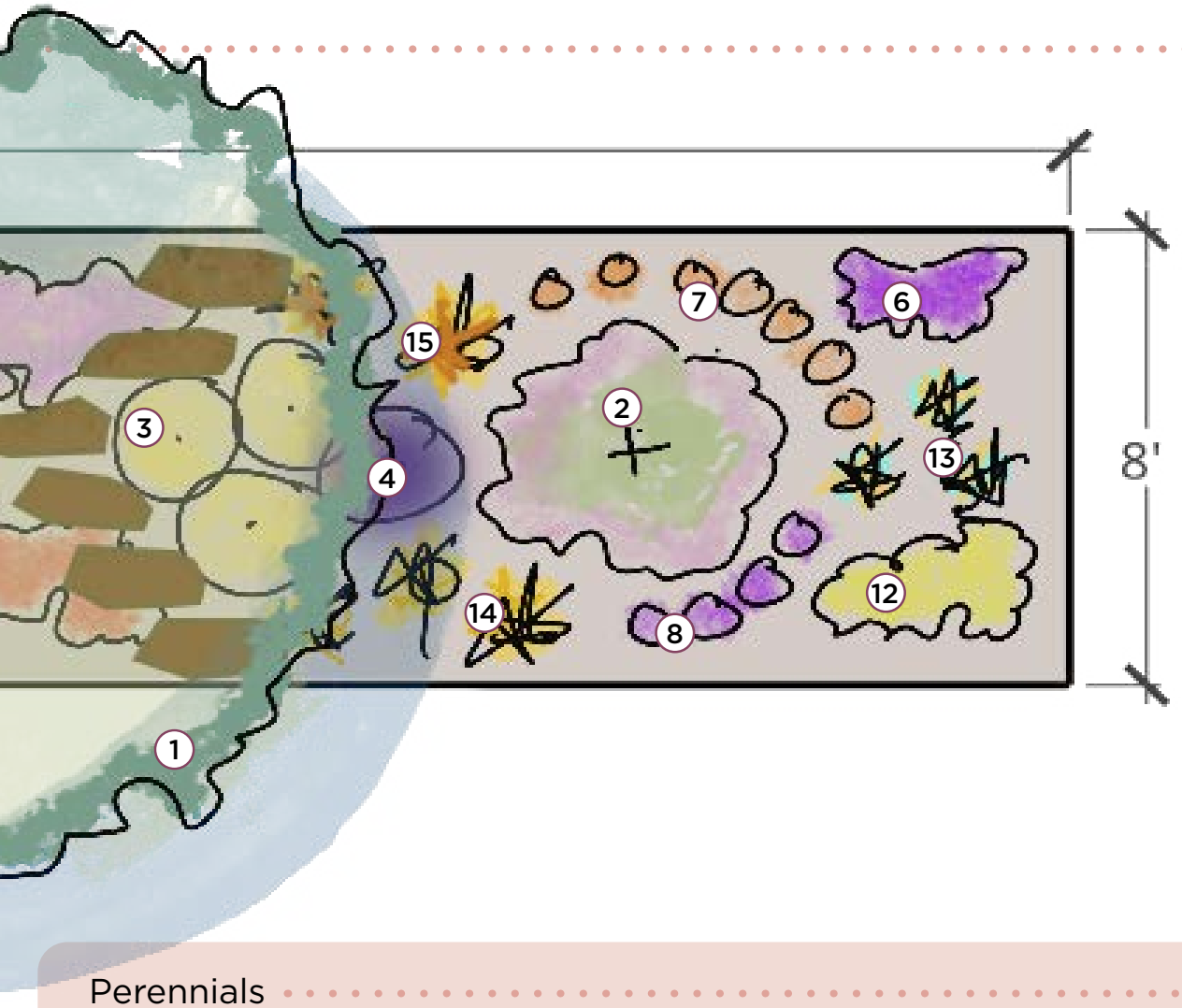
Baby Blue Rabbitbrush
Chrysothamnus nauseosus 'Baby Blue'

4

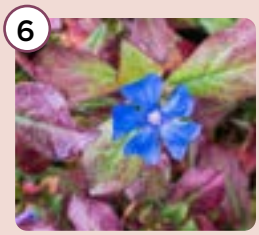
Dwarf Wild Indigo
Amorpha nana

5

Mojave Sage
Salvia pachyphylla

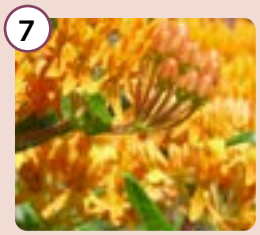


Perennials



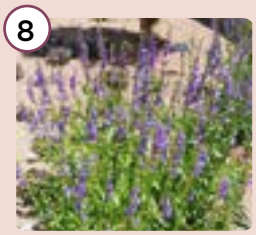
6

Leadwort
Ceratostigma plumbaginoides



7

Butterfly Weed
Asclepias tuberosa



8

Rocky Mountain Penstemon
Penstemon strictus

9

Firecracker Penstemon
Penstemon eatonii

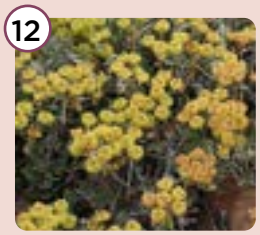
10

Wallowa Mountain
Arenaria 'Wallowa Mountain'

Ground Covers

11

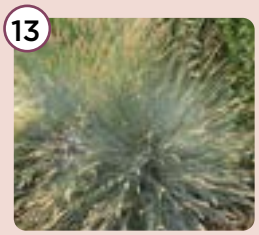
Purple Poppymallow, Winecups
Callirhoe involucrata



12

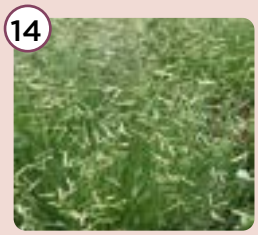
Sulphur Flower
Eriogonum umbellatum

Grasses



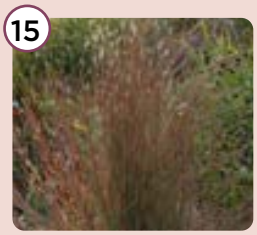
13

Blue Fescue
Festuca glauca



14

Blonde Ambition Blue Grama
Bouteloua gracilis 'Blonde Ambition'



15

Little Bluestem
Schizachyrium scoparium

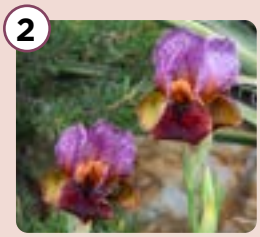
GARDENS ON SPRING CREEK PARKWAY

Pictured Plants

1

May Night Salvia
Salvia nemorosa 'May Night'

2

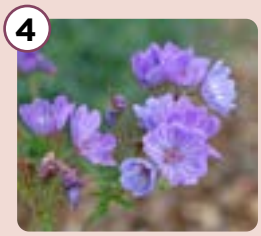


Variegated Iris
Iris pallida sp.

3

Paprika Yarrow Achillea
Millefolium 'Paprika'

4



Sticky Purple Geranium
Geranium viscosissimum

5

Pinelead Penstemon
Penstemon pinilolius

6

Dwarf Wild Indigo
Amorpha nana

IRRIGATION AND WATER CONSERVATION

Dry shade gardens are typically dominated by plants adapted to a semi-arid climate and require less water than conventional landscaping. However, all plants need water to get established for the first growing season or during unusually hot weather or unusually dry conditions. Keep in mind because shade plants are not exposed to constant sunlight, they may retain moisture for longer, however, being located under other plants, trees or structures, means natural rain events may not reach them as easily. To avoid over-watering your garden, it is best to create and stick to an irrigation plan. Overwatering can kill low water plants by rotting their roots. A good irrigation plan outlines how much to water and provides a timeline to help you cut back on watering at the appropriate time. Once plants are established, watering should be infrequent and deep. The simplest way to water is using a hose, but you can also install drip irrigation to save time and reduce the amount of evaporation.

Even the best laid plans cannot address all contingencies, like excessive drought or heavy/ prolonged rains. Therefore, the focus should be on results – if your plants are healthy above and below ground then your watering is likely appropriate. Frequent monitoring is key. Soil moisture monitoring devices are available to provide feedback but getting your fingers in the soil is an effective and easy way to monitor moisture levels. It is important to check the soil moisture between watering and each time you water, to ensure you are not over or underwatering.

IS THE GROUND MOIST 6 INCHES BELOW THE SURFACE OR ONLY AT THE SURFACE?

It is best to water infrequently and deeply, soaking the soil 6 inches down. Deep, less frequent watering will encourage plants to root deeply and become more drought tolerant.

Example Irrigation Plan for Establishment of a Dry Shade Perennial Bed*		
	FREQUENCY	**DURATION**
SPRING & FALL PLANTING	Once every 2-3 days	First 2 months
	Once every 7-14 days	As needed through growing season
SUMMER PLANTING	Once a day	First week
	Once every 2-3 days	Until the fall
	Once every week	Until the end of growing season
Plants should receive roughly the same volume of water as the size of the pot the plant came in, per watering event.		
*Adjust as necessary given precipitation and condition of plants		

MAINTENANCE

Parkway gardens tend to be constrained to a small space, also in a very public place, so regular maintenance is important. Choosing species that are low water and will stay within the bounds of your garden space at their mature size can help minimize the amount of pruning, watering, and plant replacement required.

- Regularly prune plants to keep them under 2-3 feet. Make sure plants don't block road visibility or sidewalk access.
- Weed frequently to prevent weeds from going to seed.
- In the spring, remove debris that has collected and cut out old, dead growth as new growth begins to sprout from the base.

Weed & Integrated Pest Management

Weeds and other garden pests can be managed in the landscape using Integrated Pest Management (IPM). IPM is a holistic approach to managing pests which can include insects, weeds, and diseases. IPM uses a variety of tools to prevent and control pest infestations using the least toxic methods possible. Reducing our use of chemicals helps prevent pesticide resistance and protects the health of humans and ecosystems. Refer to chapter 7 for more information on how to implement IPM.

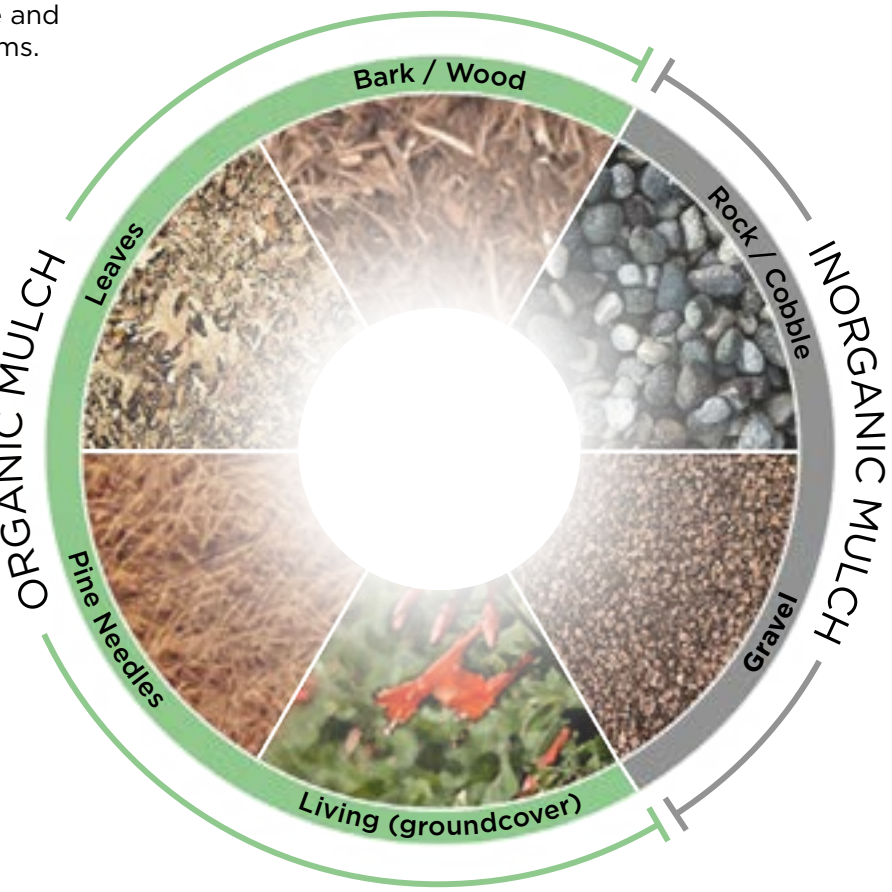
In small gardens, the use of pesticides is discouraged. Hand weeding, mulching, and mowing weeds are more sustainable options for managing weeds in small gardens. To keep weeds from multiplying in future years it is important to remove weeds before they go to seed. If weeds go to seed, they should not be composted at home as home compost systems typically are not hot enough to kill weed seeds. When treating weeds with herbicide, it is important to properly identify each plant, so you know when you should spray and what herbicide you should use. The ***Larimer County Weed District*** can provide advice on weed identification, management, and pesticides.

Mulching

Mulching is a critical practice for gardening to decrease soil temperature, suppress weeds, and conserve soil moisture. Mulch in parkway gardens should be under 2 inches in diameter to prevent tripping hazards and contained within the garden so that it does not spill or blow out onto the sidewalk. When adding mulch to new or existing plants, leave a buffer between the base of plants and mulch. This practice keeps the stems of plants dry and prevents rot. Learn more about the different types of mulch in the Site Characteristics and Planning Chapter.

Weed barrier is not recommended, as it has a negative effect on soil quality and wildlife habitat. Weed barrier will also begin to degrade over time allowing weeds to root through it and become difficult to remove and is unsightly.

Keep in mind that many native pollinators are ground-nesting species and require some patches of bare and/or minimally covered soil. You can help them out by not mulching (or only mulching to a depth of 1 inch) in a 6-12 inch circle around the trunk or stems of some plants.



ADDITIONAL RESOURCES

City of Fort Collins Parkway Landscaping Brochure

Fort Collins Native Plants

Low Water Front Range Natives

Plant Selection and Grouping: XIP video

Fort Collins Streetscape Standards

Denver Gardener: Design Example by CSU Denver Extension

Hellstrip Gardening by Evelyn Hadden: book with local examples

FUN FACT

The parkway strip is sometimes referred to as a **"Hell-Strip"** because it is notoriously difficult to plant due to heat from the surrounding pavement, foot traffic, lack of soil and water retention.

The term is most often attributed to garden writer Lauren Springer, who popularized the practice of planting tough, drought-tolerant plants (including cactus) on hell strips.

HOW TO USE THE PLANT LISTS

TREE/ SHRUB

The plant lists are divided by plant types headings labeled in the grey bar. They include Trees, Shrubs, Forbs, Perennials, Groundcovers, and Grasses.

Scientific Name	Common Name
Amelanchier alnifolia var. alnifolia	Saskatoon Serviceberry

Scientific names include the genus, species, and sometimes sub-species or variety of the plant. These are listed to help identify exact species. Some common names can be used for multiple species with different characteristics such as bloom clolor, size, or habitat value. If you would like to learn more about a plant listed in a chapter, find the common or scientific name in the plant list and look across the row to learn more about how it grows. For more information on plants that grow in Norther Colorado check out the digital plant database here: ***fcgov.com/vegetation***

Bloom Time	Scientific Name	Common Name	Nativity
TREE/SHRUB			
	Amelanchier alnifolia var. alnifolia	Saskatoon Serviceberry	FC
	Arctostaphylos x coloradoensis 'Panchito'	Panchito Manzanita	CO

Bloom Time			
A	B	C	D

The Bloom Time information is split into 4 columns, each **showing the main color of the plant as it blooms throughout the year**.

Column A is early spring, exact timing depends on temperatures and precipitation of that year, but usually around April and May.

Column B is the main plant color in early summer, late May and June.

Column C represents the plant color in the heat of summer, July and August.

Column D indicates the color in fall, typically September and October.

Nativity
FC

Nativity describes the closest location to Fort Collins where the plant grows natively.

FC= Fort Collins (these plants grow native in Fort Collins).

CO= Colorado (these plants grow native somewhere in Colorado, but not Fort Collins).

US= United States (these plants grow native somewhere in the United States, but not Colorado).

Not Native= These plants are not native in the United States.

Height X Width
20'x12'

Height is the vertical measurement of a plant at maturity; width is the measurement of the spread (how wide) you can expect a plant to grow. (Measurements are listed in iches or feet).

Exposure
FS/PS

Exposure tells you how much sun the plant likes. If more than one exposure is listed, the plant will do well in multiple types.

FS= Full Sun

PS= Part Sun

S=Shade

Notes
Water during drought

Any additional helpful information about the plant that is not already listed in another category.

Height X Width	Water Needs	Exposure	Habitat Value	Notes	Programs
20'x12'	Low, Moderate	FS/PS	np/bee, bf; hp/bf; birds; wl	Water during drought	NIC
10"x3'	Very low-Moderate	FS/PS	np/bee, bf; birds; wl	Needs good drainage; red twigs	NIC

Water Needs
Low, Moderate

Very Low- indicates a plant that requires 3 gallons of water per square foot per season in addition to precipitation.

Low- indicates a plant that requires 8 gallons of water per square foot per season in addition to precipitation.

Moderate- indicates a plant that requires 14 gallons of water per square foot per season in addition to precipitation.

High- indicates a plant that requires 18 gallons per square foot per season in addition to precipitation.

Habitat Value
np/bee, bf; hp/bf; birds; wl

Habitat value comes in many forms. Below is a key to describe what habitat values the plant provides. Sometimes a specific animal or insect type is described in the list such as “bee”or “bird”.

np = nectar/pollen

bf = butterfly

hb = hummingbird

s = seeds

frt = fruit

hp = host plant

wl= wildlife

Programs
NIC

Programs hosted by the City of Fort Collins include Nature in the City (NIC) and the Xeriscape Incentive Program (XIP). Nature in the City focuses on plants native to Colorado and Fort Collins where XIP focuses on water savings. Plants listed with both XIP and NIC are supported by both programs.

CHAPTER 5 PARKWAY STRIP PLANT LIST

Bloom Time	Scientific Name	Common Name	Nativity	Height X Width	Water Needs	Exposure	Habitat Value	Notes
CITY OF FORT COLLINS APPROVED PARKWAY TREES								
	Catalpa speciosa	Northern Catalpa	US	60′x40′	Moderate-High	FS, PS	p/bees	Showy flowers
	Celtis occidentalis	Northern Hackberry	US	40′x40′	Moderate-High	FS, PS	frt/birds; p/bees;	
	Gleditsia triancanthos f. inermis	Honeylocust	Not Native	40′x30′	Moderate	FS	wl; seed/birds	
	Gymnocladus dioicus	Kentucky Coffeetree	US	40′x60′	Moderate	FS	n/hb; p/bees	
	Quercus buckleyi	Texas Red Oak	US	30′x30′	Moderate	FS	wl; seed/birds	
	Quercus macrocarpa	Bur Oak	US	60′x60′	Low-Moderate	FS	wl; seed/birds	
	Quercus muehlenbergii	Chinkapin Oak	US	40′x60′	Low-Moderate	FS	seeds/birds, wl; p/bees	
	Quercus robur	English Oak	Not Native	40′x40′	Low-Moderate	FS	seeds/birds, wl; p/bees	
	Quercus shumardi	Shumard Oak	US	40′x30′	Low-Moderate	FS	Seeds/birds, wl; p/bees	
	Tilia americana	American Linden	US	60′x30′	Moderate	FS/PS	np/bees	
	Tilia cordata	Littleleaf Linden	Not Native	50′x20′	Moderate	FS/PS	np/bees	
	Tilia x euchlora	Redmond Linden	Not Native	40′x20′	Moderate	FS/PS	np/bees	
	Tilia x flavescens	Glenleven Linden	Not Native	30′x30′	Moderate	FS/PS	np/bees	
	Ulmus sp	Accolade Elm	Not Native	30′x20′	Low-Moderate	FS		

Bloom Time	Scientific Name	Common Name	Nativity	Height X Width	Water Needs	Exposure	Habitat Value	Notes	Programs
DECIDUOUS SHRUBS									
	Amorpha nana	Dwarf Wild Indigo, Leadplant	CO	2′x2′	Very low, Low	FS/PS	np/bee, bf	Nitrogen fixer, deer tolerant	NIC
	Caryopteris × clandonensis	Blue Mist Spirea	Not Native	3′x2′	Low	FS	np/bee		XIP
	Chrysothamnus nauseosus 'Baby Blue"	Baby Blue Rabbitbrush	CO	2′x3′	Very Low	FS	np/bee, bf; seeds/wl, birds	Important larval food	NIC, XIP
	Cotoneaster apiculatus	Cranberry Cotoneaster	Not Native	2′x5′	Low	FS/PS		Showy red fruit	XIP
	Daphne cneorum	Rose Daphne	Not Native	6″x1′	Moderate	PS/S			XIP
	Potentilla fruticosa	Shrub Potentilla	CO	2′x3′	Low, Moderate	FS/PS	p/bee; wl; seeds/birds		NIC
	Prunus pumila var. besseyi 'Pawnee Buttes' ® Sandcherry	Pawnee Buttes ® SandCherry	FC	2′x4′	Low	FS		np/bees; frt/ birds, wl	NIC, XIP
	Rhus aromatica 'Gro-Low'	Gro-Low Sumac	FC	1.5′x6′	Very Low, Low	FS/PS	np/bee, bf; birds	Fall color, wildlife tolerant	XIP
	Rhus trilobata 'Autumn Amber'	Autumn Amber Sumac	FC	10″x6′	Very Low, Low	FS	p/bee; frt/birds, wl	Fall color	NIC, XIP
	Ribes cereum	Wax Currant	CO	2′x4′	Very Low	FS/PS/S	n/hb; np/bees; frt/birds, wl		NIC, XIP
	Salvia pachyphylla	Mojave Sage	US	2′x2′	Low	FS	np/bees, bf		XIP

WHEN SELECTING PLANTS,

make sure that they are appropriate for your space and conditions. The following is a list of plants, sorted by plant type (i.e., shrub, grass, tree, perennial). Pay attention to the exposure column where you'll find plants that can handle full shade (S), part sun (PS) and full sun (FS). The colors on the lefthand side signify what color bloom or foliage this plant offers through the seasons. This list is to help you get started – some of these plants may not be appropriate for your space and there are many more plants than these that are great for parkway strips. You can find more information about plants suitable to our area on the City of Fort Collins Vegetation Database.

CHAPTER 5 PARKWAY STRIP PLANT LIST

Bloom Time	Scientific Name	Common Name	Nativity	Height X Width	Water Needs	Exposure	Habitat Value	Notes	Programs
EVERGREEN SHRUBS									
	Arctostaphylos x coloradoensis 'Panchito'	Panchito Manzanita	CO	2' x 5'	Moderate	FS/PS		Requires excellent drainage	NIC
	Arctostaphylos uva-ursi	Kinnikinnick	FC	6"x6'	Moderate	FS/PS	seeds/birds, wl; np/bees		NIC
	Euonymus fortunei	Purpleleaf Wintercreeper	Not Native	3'x4'	Moderate	FS/PS/S			XIP
	Juniperus horizontalis	Creeping Juniper	US	1'x8'	Low	FS			XIP
PERENNIALS & BIENNIALS (ANNUALS)									
	Agastache rupestris	Sunset Hyssop	US	1.5'x1.5'	Low	FS/PS	np/bee, bf; n/hb		XIP
	Achillea 'Moonshine'	Moonshine Yarrow	Not Native	2'x1'	Low	FS	np/bee		XIP
	Pulsatilla nuttalliana	Pasque flower	CO	6"x8"	Very Low	FS/PS	np/bee, bf		NIC
	Artemisia frigida	Fringed Sage	FC	1'x1.5'	Very low	FS	p/bee; s/birds		NIC
	Artemisia ludoviciana	Prairie Sage	FC	8"x1.5'	Very low	FS	p/bee; s/birds; wl		NIC
	Asclepias tuberosa	Butterfly Weed	US	1"x1'	Low	FS/PS	np/bee, bf; n/hb; hp/bf	Long blooming, deer tolerant	XIP
	Berlandiera lyrata	Chocolate Flower	CO	1'x1'	Low	FS	np/bee		NIC, XIP
	Callirhoe involucrata	Purple Poppymallow,	FC	8"x4'	Low	FS/PS	np/bee, bf; n/hb	Readily seeds	NIC, XIP
	Coreopsis tinctoria	Golden tickseed	CO	1'x4"	Low	FS	np/bee		NIC
	Campanula rotundifolia	Bluebell, Harebell	FC	4"x8"	Low	FS/PS	np/bee, bf; n/hb	Rock garden, deer tolerant	NIC, XIP
	Dalea purpurea	Purple Prairie Clover	FC	1' x 1'	Very low	FS	np/bee; seeds/birds; wl		NIC, XIP
	Engelmannia peristenia	Engelmans's Daisy	CO	2'x1'	Very low	FS/PS	np/bee, bf	Readily seeds	NIC, XIP
	Erigeron speciosus	Aspen Fleabane	FC	6"x1.5'	Very low, Low	FS/PS/S	np/bee, bf; hp/bee, bf	Can handle variable soil	NIC, XIP
	Erigeron vetensis	Early Bluetop Fleabane	FC	4"x4"	Low	FS	np/bee, bf; hp/bf	Important host plant	NIC, XIP

Bloom Time	Scientific Name	Common Name	Nativity	Height X Width	Water Needs	Exposure	Habitat Value	Notes	Programs
PERENNIALS & BIENNIALS (ANNUALS) CONTINUED									
	Gaillardia aristata	Blanketflower	FC	1′x1.5′	Very Low	FS	np/bee, bf	Long blooming, fall color	NIC, XIP
	Gazania linearis	Colorado Gold Gazania	Not Native	6″x6″	Low	FS/PS			
	Geranium viscosissimum	Sticky Purple Geranium	US	1′x1.5′	Very low	FS/PS	np/bee, bf	Long blooming, fall color	XIP
	Geum triflorum	Prairie Smoke	CO	4″x4″	Very low, Low	FS/PS	np/bee, bf; wl	Readily seeds	NIC, XIP
	Heterotheca villosa	Hairy goldenaster	FC	4″x2′	Very low	FS	np/bee; s/birds; wl	Long blooming	NIC, XIP
	Ipomopsis aggregata	Scarlet Gilia**	CO	3′ x 1.5′	Very low	FS	n/hb	Readily reseeds; long blooming	XIP
	Liatris punctata	Gayfeather	FC	1.5′X6″	Very low	FS	n/hb; s/birds; wl		NIC, XIP
	Mentzelia decapetala	Ten petal mentzelia**	FC	1′x1.5′	Very low	FS	np/moth	Showy flowers	NIC, XIP
	Penstemon eatonii	Firecracker Penstemon	CO	1′x1′	Very low	FS/PS	np/bee, bf; n/hb	Handles rocky,sandy soil	NIC, XIP
	Penstemon grandiflorus	Large penstemon	CO	1.5′x1′	Very low	FS	np/bees, n/hb	Short lived, but reseeds	NIC, XIP
	Penstemon pinifolius	Pineleaf Penstemon	US	6″x1′	Low	FS	n/hb		XIP
	Penstemon secundiflorus	Sidebells Penstemon	FC	1′x6″	Very low	FS	np/bees; hp/bf; n/hb; seeds/birds	Important larval host plant	NIC
	Penstemon strictus	Rocky Mountain Penstemon	FC	1′x3′	Very low	FS/PS	np/bees; n/hb	Important larval host plant	NIC
	Penstemon virens	Blue Mist Penstemon	FC	1′x1.5′	Very low	FS/PS	np/bees; n/hb; seeds/birds	Important larval host plant	NIC
	Ratibida columnifera	Prairie Coneflower	FC	2′x2′	Very low	FS	p/bees; seeds/birds		NIC
	*Rudbeckia hirta****	Blackeyed Susan	US	1′x1′	Low	FS/PS	np/bee, bf; s/birds; wl	Biennial, long blooming, deer tolerant	XIP
	Santolina chamaecyparissus	Lavender Cotton	Not Native	1′x3′	Very low	FS	p/bees	Not reliably winter hardy	XIP
	Sphaeralcea coccinea	Scarlet Globemallow	FC	1′x1′	Very low	FS	np/bees, wl		NIC, XIP
	Symphyotrichum ericoides	White Aster	FC	1′x1′	Very low	FS	np/bees; seeds/birds, wl		NIC, XIP

CHAPTER 5 PARKWAY STRIP PLANT LIST

Bloom Time	Scientific Name	Common Name	Nativity	Height X Width	Water Needs	Exposure	Habitat Value	Notes	Programs
GOUNDCOVERS									
	Arenaria 'Wallowa Mountain'	Wallowa Mountain Desert Moss	US	1″x8″	Moderate	FS/PS	No data	Evergreen, winter interest, deer tolerant	XIP
	Artemisia versicolor 'Sea Foam'	Sea Foam Sage	Not Native	1′x3′	Moderate	FS/PS			XIP
	Ceratostigma plumbaginoides	Leadwort	Not Native	8″x1.5″	Low	FS/PS/S	np/bee, bf	Long blooming, fall color, tolerates clay	XIP
	Delosperma spp.	Hardy Iceplant	Not Native	2″x1.5′	Low	FS/PS	np/bee	Nneeds well drained soil	XIP
	Eriogonum umbellatum	Sulphur flower	US	1′x2′	Very Low	FS/PS	np/bees, bf; s/ birds, wl	Larval food source for 14 butterflies	XIP
	Oenothera caespitosa	Tufted Evening Primrose	US	1′x2′	Very Low	FS	np/bees,bf; s/ birds, wl		XIP
	Nepeta 'Psfike'	Catmint	Not Native	1′x1′	Very Low	FS/PS	np/bees		XIP
	Penstemon caespitosus	Mat Penstemon	CO	4″x1′	Very Low	FS/PS	np/bees; n/hb		XIP, NIC
	Thymus pseudolanuginosus	Wooly Thyme	Not Native	4″x1″	Moderate	FS		Does not like wet soils.	XIP
	Veronica spp. "Reavis'	Veronica	Not Native	2″x1.5′	Low, Moderate	FS/PS	No data	Winter interest, deer tolerant	XIP
GRASSES									
	Festuca glauca	Blue Fescue	Not Native	10″x6″	Low, Moderate	FS/PS	No data	Bluish color, needs well drained soil	XIP
	Bouteloua curtipendula	Sideoats Grama	FC	3′x2′	Very Low	FS	s/birds, wl; p/ bees	Important larval food source for native invertebrates.	XIP, NIC
	Bouteloua gracilis 'Blonde Ambition'	Blonde Ambition Blue Grama	Native	2.5′x2.5′	Very low	FS	s/birds; hp/bf, moths	Host plant for skippers, deer tolerant	XIP
	Muhlenbergia reverchonii	Undaunted ® Ruby Muhly	Not Native	1.5′x2′	Low	FS	s/wl		XIP
	Pennisetum alopecuroides 'Hameln'	Fountain grass	Not Native	2′x1.5′	Low	FS	s/birds		XIP
	Schizachyrium scoparium	Little Bluestem	CO	2′x1′	Low	FS	bee, bf; birds; wl	Host plant for skippers, deer tolerant	XIP

> "GARDENING IS THE ART THAT USES FLOWERS AND PLANTS AS PAINT, AND THE SOIL AND SKY AS CANVAS"
>
> Elizabeth Murray

NATURE IN THE CITY

LANDSCAPE DESIGN GUIDE

CHAPTER 6: TURF REMOVAL

Converting to Low Water Landscaping

City of Fort Collins

CHAPTER 6

CHAPTER 6

Turf Removal

WHAT IS TURF GRASS?

Turf grass encompasses a variety of grass species adapted to frequent mowing and foot traffic. Turf grass species are selected for traits such as tolerance to shade, drought, foot traffic, and disease resistance. Conventional turf grass is relatively easy to maintain and performs well in a broad range of conditions. It is a great option for areas that see high activity such as a play space, walkway, or many pets.

Traditionally, turf is composed of non-native grass species. In Colorado, the most common turf used is non-native Kentucky bluegrass (*Poa pratensis*), fine and tall fescues (*Festuca* spp.), and perennial ryegrass (*Lolium perenne*). These species tend to have high water and fertilization needs. In addition, high quality lawns often require regular aeration and frequent mowing. Under the right conditions, conventional non-native turf can be replaced with more drought tolerant non-native grasses, native turf, or low water perennial beds.

WHY REMOVE CONVENTIONAL NON-NATIVE TURF GRASS?

Water Conservation

Northern Colorado has a semi-arid climate and receives, on average, only 16 inches of rain each year. There has been growing concern in recent years about the future of water security on the Front Range with the impacts of climate change and a growing population. According to CSU, outdoor water usage in Colorado accounts for 55 percent of residential water usage in urban areas along the Front Range, most of which is used for turf. In 2022, Fort Collins Water Utility customers used approximately 43% of treater water (2.1 billion gallons) on outdoor irrigation. Fort Collins Utilities does not serve all areas within the City limits, so 2.1 billion gallons only represents a portion of the water that was used on outdoor irrigation.

Urban lawn watering is the single largest water demand on most municipal supplies. Conservation and ecosystem stewardship are not just for preserves and parks, individuals can make a difference in their own yards or spaces. Converting your lawn to a low water landscape can save you money, reduce the strain on our water supply, and help your landscape thrive in Colorado's harsh climate. For example, a 5,000 sq. foot plot of Kentucky bluegrass needs on average 18,500 gallons of water a month, while the same area of native buffalograss (*Buchloë dactyloides*) would need only 3,000 gallons a month once established.

Wildlife Habitat and Sustainability

A study at the University of Delaware found that landscapes composed of at least 70% native plants were needed to support certain wildlife populations. In the US, turf is planted at an astounding rate. Americans add 500 square miles of lawn each year to the 40 million acres that already exist (Tallamy, 2019). All this turf is often replacing the native plant communities and ecosystems that are necessary to support the complex ecological functions that support humans: crop and plant pollination, water filtration, oxygen production, pest control, carbon sequestration, and erosion control. Converting turf to a more diverse landscape can help support the biodiversity that is lost with the development of buildings and turf.

extension.colostate.edu/topic-areas/family-home-consumer/water-conservation-in-and-around-the-home-9-952






BEFORE

LAWN CONVERSION PROJECT

AFTER

PLANNING YOUR CONVERSION

When planning to convert your turf to a low water landscape there are several things you will want to consider: project scale, turf removal method, City approval processes and permits, incentive programs, erosion control, and irrigation.

City Approval and Permits

Before you start your conversion, check with the City to see if you need to apply for any permits or plan amendments. Landscaping projects like turf removals may require a City permit called a 'Minor Amendment'[6.1] depending on the size and location of the project (not applicable for individual homeowner yards). An erosion control permit may be needed if the project area is over 10,000 square feet. You can find more information on city processes, permits, and amendments on the City's development review website[6.2] and on the application forms[6.3].

Incentive Programs

Check with your water utility provider to see if they offer any incentives for converting turf to low water landscaping. There are many programs out there. Several programs currently offering rebates are the Northern Water grant program[6.4], Nature in the City[6.5] and the City of Fort Collins Xeriscape Program[6.6] for residential and commercial properties.

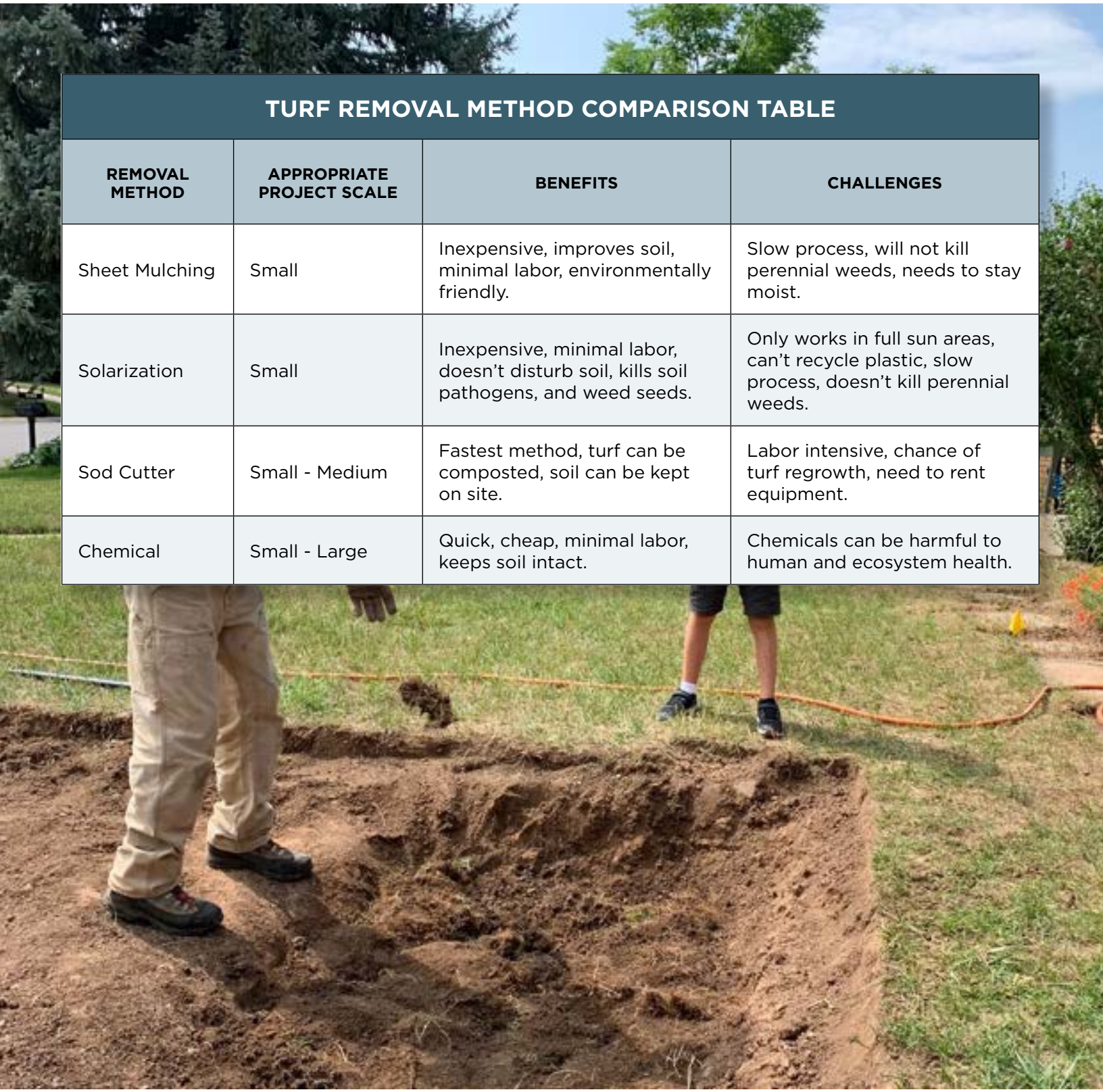
Irrigation

Existing irrigation and sprinkler systems can be retrofitted and converted for low water landscapes. You will also need to prep your existing sprinkler system before starting turf removal if you plan to use a sod cutter or sheet mulch. If you are using a sod cutter you should flag the sprinklers and work around them to avoid damaging the irrigation system. If you plan to sheet mulch, you will want to flag sprinkler heads to find later in case they get buried.

6.1 fcgov.com/developmentreview/pdf/minor-amendment-application.pdf
6.2 fcgov.com/developmentreview/process
6.3 fcgov.com/zoning/what.php
6.4 northernwater.org/grants
6.5 fcgov.com/natureinthecity/
6.6 fcgov.com/xip

METHODS FOR REMOVING TURF

There are several methods for turf removal. When considering which to use for your space, consider the size of space to be converted, the time it will take to complete each method, the cost, the sustainability of each option and amount of labor required. You will also want to consider what you will be planting in the space afterwards – native grasses, forbs, shrubs, or a mixture. If you are converting a large space and replanting with native grasses, chemical treatment is the best way to go, while a smaller lawn or area that is being converted to forbs and shrubs can be converted using sheet mulching, solarization, or a sod cutter.



TURF REMOVAL METHOD COMPARISON TABLE

REMOVAL METHOD	APPROPRIATE PROJECT SCALE	BENEFITS	CHALLENGES
Sheet Mulching	Small	Inexpensive, improves soil, minimal labor, environmentally friendly.	Slow process, will not kill perennial weeds, needs to stay moist.
Solarization	Small	Inexpensive, minimal labor, doesn't disturb soil, kills soil pathogens, and weed seeds.	Only works in full sun areas, can't recycle plastic, slow process, doesn't kill perennial weeds.
Sod Cutter	Small - Medium	Fastest method, turf can be composted, soil can be kept on site.	Labor intensive, chance of turf regrowth, need to rent equipment.
Chemical	Small - Large	Quick, cheap, minimal labor, keeps soil intact.	Chemicals can be harmful to human and ecosystem health.

Sheet Mulching or Lasagna Gardening

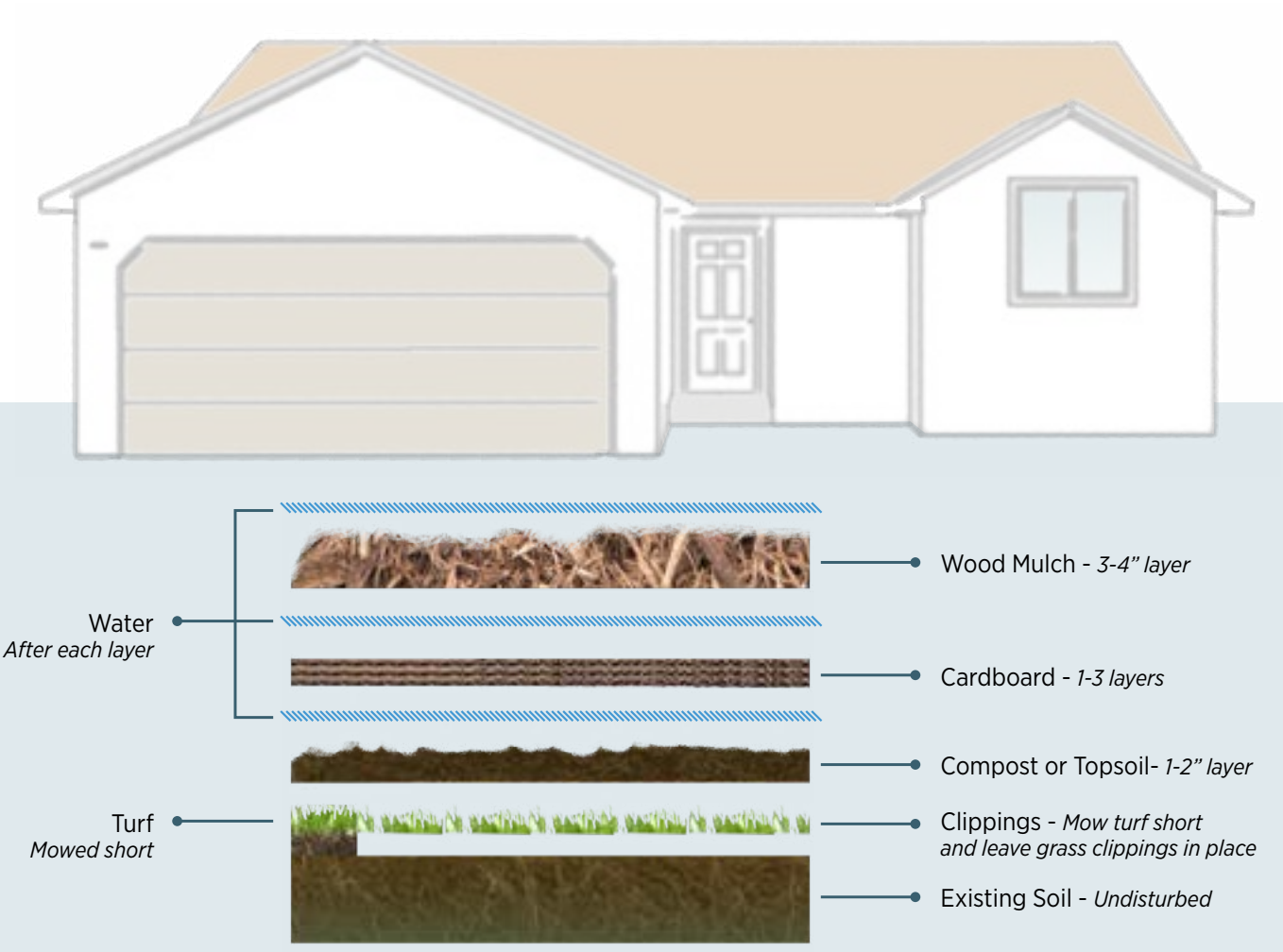
Sheet mulching, also known as lasagna gardening, is the process of smothering existing turf by covering it in cardboard and organic matter and letting those materials compost in place for several months. This method works best for smaller scale projects, such as a residential landscape.

BENEFITS: Inexpensive, improves soil, requires minimal labor, and environmentally friendly. This is one of the easiest methods for killing turf for smaller spaces and can be started any time of the year.

CHALLENGES: It is a slower process that can take 3-6 months to kill the turf. It is best to start this process in the fall and let it sit over the winter when snowmelt will provide moisture. Otherwise it needs regular watering to keep moist and break down the cardboard. Certain perennial weeds, like bindweed, may persist through the sheet mulching and will need to be hand pulled or sprayed.

MATERIALS NEEDED:

- Large pieces of cardboard: Enough to cover your space in 1-2 layers
- Mulch: Sources of free organic mulch include arborist companies, free mulch days with the City, free mulch bins at the Timberline Recycling Center and the Gardens on Spring Creek, and Chip Drop
- Plant based compost or topsoil



STEPS

1. To prep the site, cut the grass as short as possible and leave the clippings in place. Dig a trench about 3” wide by 5” deep along any hardscapes and remove grass manually from these edges. Lay down 2-3” of plant-based compost on top of the turf. Water thoroughly.

2. Lay cardboard down over the compost and grass. Overlap the cardboard so the ground is covered completely and cannot be seen.

3. Soak your cardboard layer in water and then add 2” of plant-based compost or topsoil on top.

4. Cover your site with 3-4” of organic mulch or 1-2” of inorganic mulch. Place rocks or weights throughout the site to weigh down cardboard so it doesn’t blow away if it gets dried out. Water mulch thoroughly.

5. If you sheet mulch over the winter, the snow should keep it moist enough to break down. If you do sheet mulching during the warmer months, you will need to water it occasionally.

6. Let the sheet mulching sit for about 3-6 months to allow time for your turf to break down. You can check on your progress by pulling up a corner of the cardboard. If your grass has fully died back, you are now ready to plant.

7. To plant into sheet mulching, pull mulch away from your planting spot, cut a hole in the cardboard and plant into the soil below.

Photo of sheet mulching from Everybody Grows project illustrating the lasagna method of adding wood mulch over cardboard.

Solarization

Solarization is the process of killing turf by covering it with a clear plastic sheet. The plastic traps heat from the sun and bakes the vegetation underneath it. This method is best used in smaller landscapes with full sun. Solarization is best for small scale projects.

BENEFITS: Inexpensive, minimal labor, doesn't disturb soil, kills soil pathogens, and weed seeds.

CHALLENGES: This method only works in hot, sunny areas during the summer months. It can take up to two months to kill turf and several years to kill persistent perennial weeds with deep taproots or rhizomes. Finally, plastic can rip, is unsightly, and cannot be recycled.

MATERIALS NEEDED:

- Clear plastic:*
  - Thin plastic (1 mm) is more effective at trapping heat, but is also likely to tear from wind, debris, or animals.
  - Medium thickness plastic (1.5 to 2 mm) is ideal for windy areas.
  - Thick plastic (4+ mm) can be used if the treated area is small.

**Black plastic can be used; however, clear plastic is more effective at capturing heat and thus ideal for solarization.*

STEPS

1. Solarization should be done only on sites with full sun during the hottest summer months: June-August. To successfully kill your turf, you will need to keep temperatures under the plastic between 110 -130 degrees Fahrenheit for 4-8 weeks.

2. Prep your site: Solarization will work best when the plastic has good contact with the soil, so you want the area to be as smooth and debris free as possible. Cut your lawn as short as possible. Rake up and remove all lawn clippings, other vegetation and any rocks or sticks that may rip plastic. Rake out soil to as smooth a surface as possible.

3. Dig a trench along the edges of your site deep enough to bury the edge of the plastic sheeting to weigh it down.

4. Thoroughly water the site, until the soil is soaked 12" deep. You want your soil to be moist, but not swampy or puddling.

5. After watering, immediately cover the site in a layer of clear plastic. Bury the edges of the plastic in the trenches and backfill with soil.

6. Let your site "cook" for 8 weeks. If tears or holes develop in the plastic sheeting, repair with duct tape.

7. If the site has pernicious perennial weeds such as Canada thistle (Cirsium arvense), field bindweed (Convolvulus arvensis), or crown vetch (Coronilla varia), it will often require two or even three years of smothering to deplete their extensive root reserves and kill the plants. Targeted herbicide applications can be used post-solarization if you have species such as these.

Use of clear plastic to solarize sod in a field as part of a University of Minnesota Extension project.

Sod Cutter

Using a machine to cut the sod and roots out of the ground. The result is a shallow cut in the ground exposing bare dirt. Strips of sod can be rolled up and used in other areas.

BENEFITS: This is the fastest way to remove turf. Removed sod makes great compost or can be used to build berms, and it leaves most of the soil intact. This method is great for small to medium sized projects when removing Kentucky bluegrass/fescue turf with limited weed pressure.

CHALLENGES: This method is the most labor intensive, and has a higher chance of turf regrowth. A sod cutter does not remove deep roots and you will need to rent and transport equipment. Using a sod cutter disturbs the top soil structure. Finally, if cut sod isn't composted on site then topsoil is removed and lots of material will need to be hauled away.

MATERIALS NEEDED:

- Sod Cutter: rent from hardware store for around $125/day *2022 price
- Flags: to mark sprinkler heads

STEPS

1. Hand dig a 6” by 6” trench along any hard surfaces, like sidewalks, and remove grass manually to avoid damaging walkways or rock edging. Flag all irrigation heads so that you can avoid hitting and damaging them with the sod cutter.

2. Rent a sod cutter from an equipment or hardware store. Follow the directions in the manual to remove the sod.

3. You can either compost the sod on site or pay to have it hauled away. If you choose to haul away the sod, you will need a dump trailer, or a dumpster delivered to your house- sod is very heavy. Keeping your sod on site costs nothing, will be less labor and it keeps native soil on site.

4. If you choose to compost the sod on site, you can flip it in place and then do sheet mulching on top of it, following the sheet mulching instructions above. You can also use extra sod pieces to build berms to catch precipitation.

5. Add 2-3” of topsoil on top of your new site to amend the soil and level the site to match existing topography and maintain positive drainage away from structures.

6. You may have some resprouting of grass after removing turf via a sod cutter. Water the area where you have removed grass and wait to see if it resprouts. If this happens, you can solarize the area, follow up with a treatment of herbicide, sheet mulch on top, or hand weed the remaining grass.

Sod cutters create strips of sod including the roots that can be rolled up and moved.

Chemical Application

When working with very large lawn conversions or lawns that will be replanted with native turf, herbicide is the most effective option. Avoid using chemicals that have long residual activity, as replanting will be difficult.

Glyphosate is the most effective chemical for killing turf and takes about two weeks to kill grass. If removing Kentucky bluegrass or fescue turf, chemical application is most effective when they are actively growing in the spring or fall when temperatures are in within the range stated on the product label and when grass is not stressed in the summer heat. Glyphosate is absorbed through the leaves of the plant and pulled down into the plant, so DO NOT cut your grass before applying it.

BENEFITS: This method is quick, cheap, not labor intensive, the grass doesn't need to be removed (which is important if the area being converted is over 10,000 square feet), and it can be directly planted into as dead grass acts as a weed barrier. It is the best option for large spaces.

CHALLENGES: Chemicals can be toxic and have unwanted health and environmental effects if they are not applied correctly. Proper Personal Protective Equipment (PPE) such as rubber boots and chemical gloves can help mitigate risks or consider hiring a qualified individual to apply. Follow all herbicide label instructions – the label is the law!

MATERIALS NEEDED:

- Hand, backpack, or boom sprayer
- Personal Protective Equipment (PPE): rubber boots, pants, long sleeve shirt, chemical resistant gloves, eye protection, optional: face mask. Some chemicals require additional PPE, follow the product label.
- Glyphosate formulation

STEPS

1. Cover any desirable plants that you don't want chemicals on with plastic sheeting or use cardboard as a shield to protect nearby plants.
2. Carefully read the directions and follow all safety information on the chemical label. Over applying or not applying according to the label instructions is illegal. Glyphosate formulations typically do not need additional ingredients like surfactant.
3. Glyphosate kills plants by entering through the leaves, so do not cut grass before applying. For best results, make sure that grass has been adequately watered before applying. DO NOT apply when rain is expected in the next 24 hours or if it is windy (more than 10 mph).
4. Get suited up in your personal protective equipment. Mix the chemical according to the label. There are glyphosate formulations that come ready to use and do not require additional mixing, minimizing user exposure. Do not exceed the recommended rate on the label - this is illegal!
5. Spray grass in the early morning hours in the spring or fall when temperatures are within the range stated on the product label, there is no wind, and grass is still green. Spray the leaves until they are wet and shiny. Walk backwards as you spray to avoid walking through areas that have already been treated with the chemical.
6. DO NOT water your lawn for the next 24 hours. After 24 hours, water the lawn like normal. Gradually decrease watering over the next two weeks. Allow about two weeks for the chemical to kill the grass, then check to see if there is any grass remaining alive. If there is still living turf, reapply glyphosate and repeat the process.
7. Some broadleaf weeds are glyphosate resistant and may require hand removal or an alternative chemical application.
8. After the turf has been thoroughly killed, scalp the dead grass using the lowest setting of your lawn mower and rent a power rake to de-thatch. Leaving the dead turf roots, instead of tilling it in, can help control weeds as you convert the landscape. You can now plant directly into the old sod.
9. If reseeding the area, you can rake seed in, use a seed drill, or aerate heavily. If you are planting with plugs or transplants, they can be planted directly into the old sod.

METHODS NOT RECOMMENDED

Simply tilling your soil or scalping your lawn is not recommended. These methods are not effective. Tilling will encourage more weed growth with soil disturbance and scalping the lawn without the use of chemicals allows the grass to grow back. Kentucky bluegrass is persistent and will not be killed by tilling or scalping.

SOIL AMENDING

Improving Soil Texture & Structure

Topdressing your soil with organic matter such as plant-based compost, wood mulch, or leaves can help improve soil structure and improve water infiltration, drainage, air infiltration, and allow for deeper rooting of plants.

If you need to amend your soil, CSU Extension recommends adding 2-3 inches of plant based compost or 1 inch of manure based compost to your landscape. Compost should be incorporated to a depth of 6 to 8 inches. You can learn more from their fact sheet on Choosing a Soil Amendment.[7.7]

Soil Amendment Types

There are inorganic and organic amendments. Organic amendments are materials that were once alive such as wood mulch, manure, plant-based compost, and straw. Inorganic amendments (made from non-living material) include perlite, vermiculite, and pea gravel. Some slow release fertilizers such as Osmocote continue to fertilize small amounts for four to five months.

Manure based amendments are typically not recommended in Colorado because of their high salt content. If converting your turf to native turf and plants, plant-based composts are best because they can help improve soil structure by adding organic content, without adding excessive nutrients. Native plants do not like over-amended soils high in nutrients. Most natives do best in soil that is un-amended with an inorganic mulch.

Over Amending

It is important to test your soil, as it is possible to over amend your soil. Over amending soil can lead to high salts, nutrient imbalance, holding excess water, high ammonia, groundwater contamination, and micronutrient imbalances. You can get a soil test done at the CSU Soil Lab.[7.8]

7.7 extension.colostate.edu/topic-areas/yard-garden/choosing-a-soil-amendment/
7.8 agsci.colostate.edu/soiltestinglab
7.9 fcgov.com/vegetation

TURF REMOVED, TIME TO REPLANT

There are many options for how to replant your new landscape and perhaps you already know exactly what you want to do. Some options to consider if you have not already done so include adding a pollinator garden, low water turf or putting in a parkway strip with plants that survive in very hot and dry conditions. For more information on plants for these types of gardens, check out Chapter 2 on Pollinator Gardens, Chapter 4 on Low Water Lawns and Chapter 5 on Parkway Strips. Each of these chapters provides a list of appropriate plants for you to start out with, but you can also find more information on plant species for our area in the City of Fort Collins Vegetation Database.[7,9]

New landscapes will require some maintenance with weed control being especially important in the first few years. Remember, converting your lawn is a worthwhile endeavor, but it is also a process. Mistakes will be made, lessons learned, and ultimately you will end up with a new low water landscape that will be more sustainable and will save you money. There is a community of folks in Northern Colorado who have been through this process and that you can connect with by reaching out to the City of Fort Collins Xeriscape and the Nature in the City programs, or other local organizations like Wild One's: Front Range Chapter, or the Northern Colorado Chapter of The Native Plant Society.

DID YOU KNOW

THAT TURF GRASS IS THE MOST COMMON CROP IN AMERICA?

If we replaced half of the acres of lawn with native plants, that would be more land than all of the national parks combined!

HomegrownNationalPark.org

NATURE IN THE CITY

LANDSCAPE DESIGN GUIDE

CHAPTER 7: WEED MANAGEMENT

For Alternative Landscapes

City of Fort Collins

CHAPTER 7

Weed Management for Alternative Landscapes

The low-water and lower-maintenance landscapes described in this guide still require keeping a close eye on weeds. Total control of weeds is not a realistic goal, but there are some important principles to consider that can help set our gardens up to be healthy habitats for a larger ecological system beyond our backyards.

Weed management can be as much of an art as a science and as such demands a lot of attention and flexibility from the landowner/manager. Weed management is highly site and situationally specific, especially with the more diverse alternative landscapes promoted in this Design Guide. Frequent observation and monitoring are critical so that you can understand how the plants, both the ones you want and the weeds, are reacting to that year's precipitation, heat, etc. This chapter will help you understand weeds, describe different control methods, and outline basic principles to assist you in formulating a plan of how to manage weeds.

WHAT IS A WEED?

Generally speaking, a weed is a plant out of place. What is a plant out of place? That depends on your desired aesthetics, the plant and insect community you want to achieve, and your management goals for your garden. It also depends on the type of "plant out of place" you are dealing with. There are two types of weeds to be knowledgeable on and manage: invasive weeds and noxious weeds.

Invasive Weeds vs. Noxious Weeds

INVASIVE WEEDS are any plant out of place that can reproduce aggressively and is located out of its natural range. Sometimes these plants can out-compete our desirable plant species for resources and they need to be controlled. While some native plants can be aggressive spreaders, they are not considered an invasive weed since they are in their natural range where the surrounding plant community evolved with this behavior.

NOXIOUS WEEDS are any non-native plant that threatens the environment, economy, and human health as defined by the Colorado Noxious Weed Act. The Colorado Department of Agriculture defines noxious weeds as "non-native aggressive invaders that replace native vegetation, reduce agricultural productivity, cause wind and water erosions and pose increased threat to communities from wildfire." In fact, PlantTalk Colorado reports noxious weeds cost Colorado residents more than $10 million annually in lost productivity. Noxious weeds are important to remove and either suppress, contain, or eliminate and eventually eradicate, if possible.

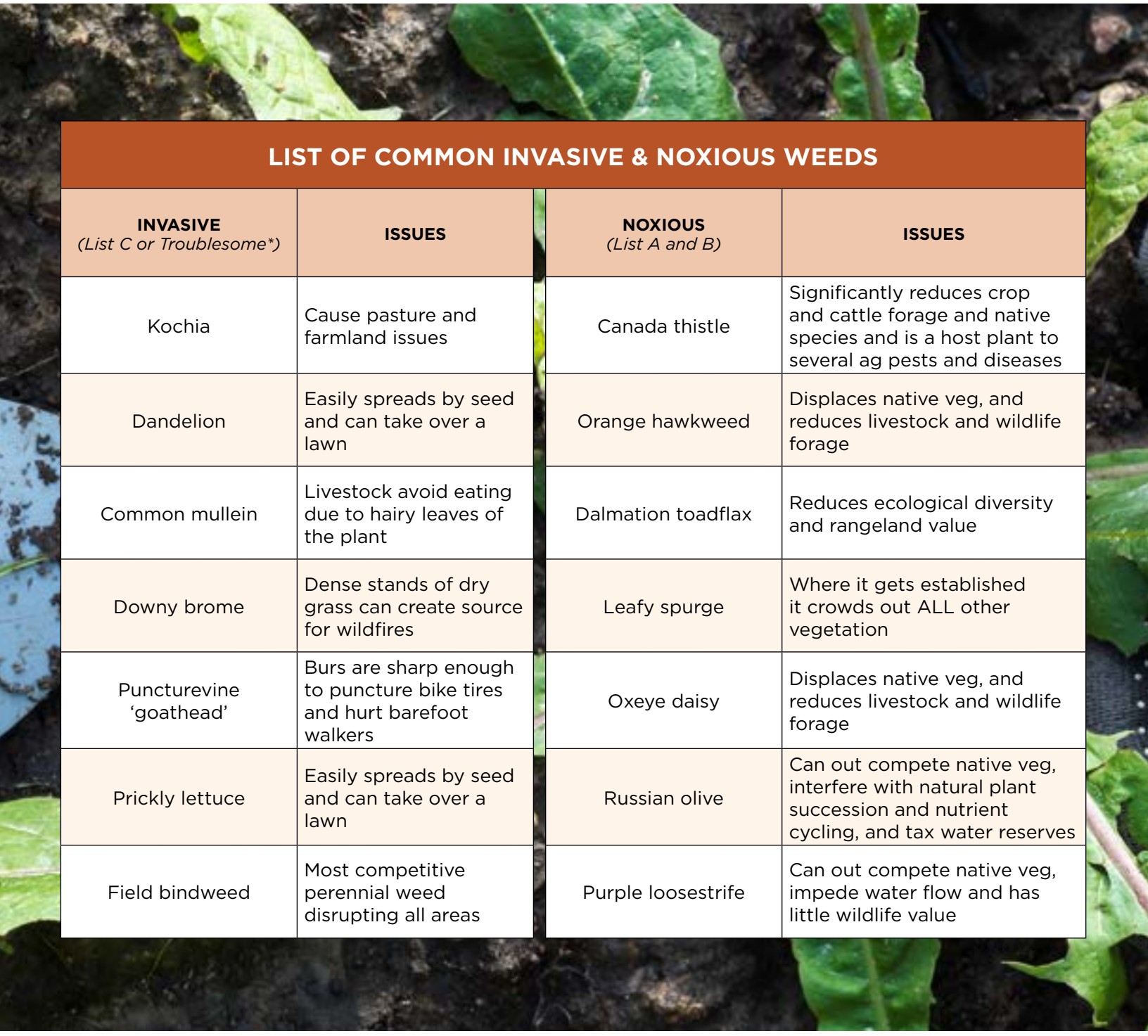
Invasive Weeds vs. Noxious Weeds Continued

Noxious weeds in Colorado have been divided into three categories:

- List A – Elimination mandatory throughout Colorado
- List B – Plants whose continued spread should be halted
- List C – Selected for recommended control methods

Many noxious weeds were brought into the US for use in gardens and then escaped into ecosystems. Be careful what you plant.

Go to the Colorado Department of Agriculture website to see the weeds associated with each list mentioned above.



LIST OF COMMON INVASIVE & NOXIOUS WEEDS

INVASIVE *(List C or Troublesome*)*	**ISSUES**	**NOXIOUS** *(List A and B)*	**ISSUES**
Kochia	Cause pasture and farmland issues	Canada thistle	Significantly reduces crop and cattle forage and native species and is a host plant to several ag pests and diseases
Dandelion	Easily spreads by seed and can take over a lawn	Orange hawkweed	Displaces native veg, and reduces livestock and wildlife forage
Common mullein	Livestock avoid eating due to hairy leaves of the plant	Dalmation toadflax	Reduces ecological diversity and rangeland value
Downy brome	Dense stands of dry grass can create source for wildfires	Leafy spurge	Where it gets established it crowds out ALL other vegetation
Puncturevine 'goathead'	Burs are sharp enough to puncture bike tires and hurt barefoot walkers	Oxeye daisy	Displaces native veg, and reduces livestock and wildlife forage
Prickly lettuce	Easily spreads by seed and can take over a lawn	Russian olive	Can out compete native veg, interfere with natural plant succession and nutrient cycling, and tax water reserves
Field bindweed	Most competitive perennial weed disrupting all areas	Purple loosestrife	Can out compete native veg, impede water flow and has little wildlife value

**Plant list developed from research done on the Larimer County Weed District and Colorado Department of Agriculture websites as well as City of Fort Collins' municiple code.*

Annual, Biennial, Perennial Weeds and Seed Banks

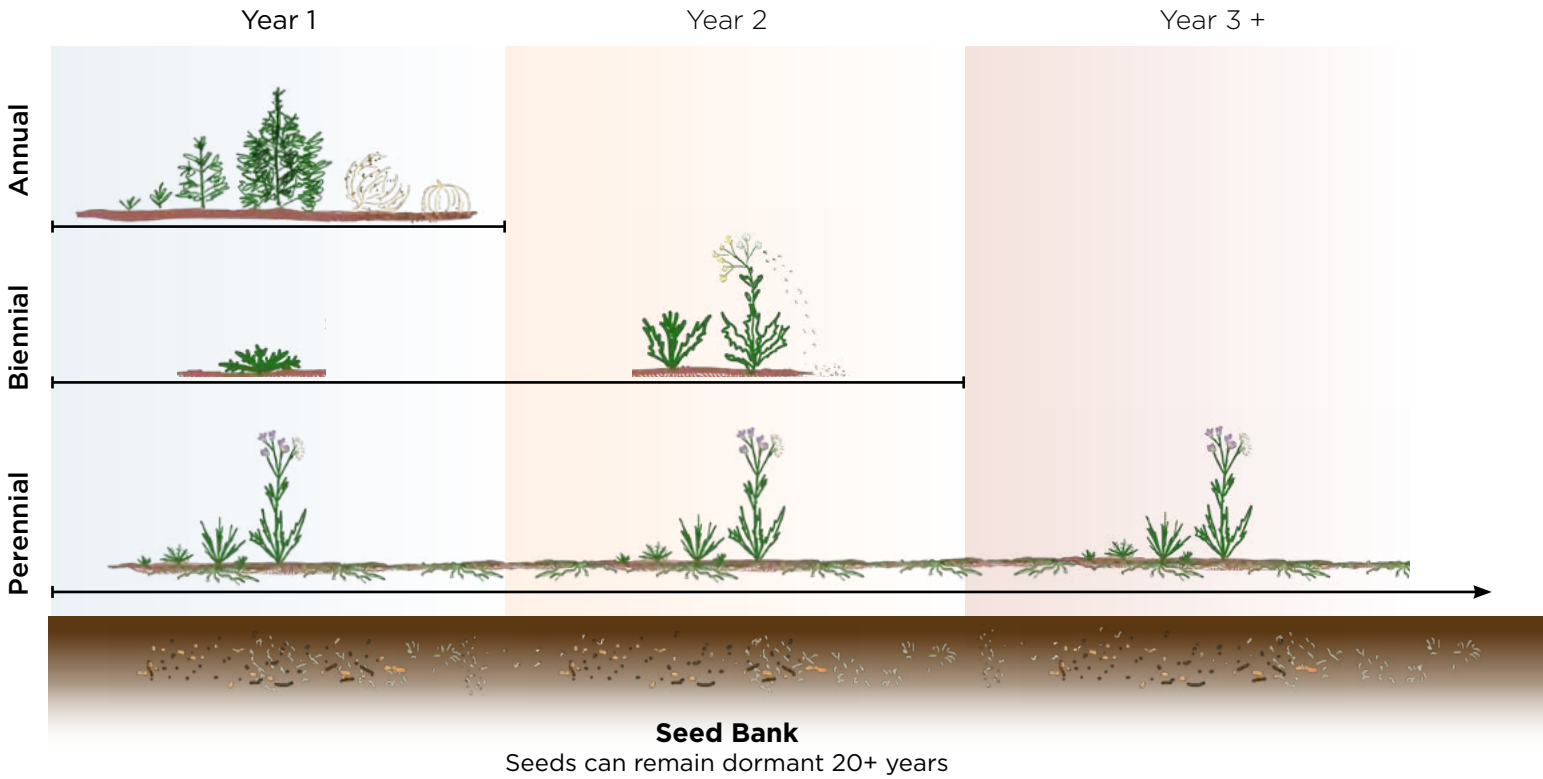
Understanding the life history of a weed as an annual, biennial, or perennial will help guide which control methods to be used.

ANNUAL: A plant that completes its life cycle (from germination to producing seeds) in one growing season and then dies off each year. Control of annual weeds focuses on preventing seed production and providing ample competition for resources from desirable plant species.

BIENNIAL: A plant that requires two seasons to complete their growth cycle. In the first year, seeds germinate without flowering, forming a circular array of leaves, called a rosette. In the second year they send up a stalk, flower, and go to seed. They can be eliminated in both their first and second year but should be prevented from producing seeds in their second year.

PERENNIAL: A plant that can live for three or more growing seasons. Some perennial species rely on seed to reproduce, some on vegetative reproduction (e.g., spreading roots), and some use both strategies. However, all use their roots for energy storage between growing seasons and therefore it's important to deplete those energy stores as much as possible. It is best to research the most effective way to control each perennial species, as the timing and method can vary widely.

SEED BANK: A reserve of seeds that exist in your soil (from previous homeowners, neighbor's yards, seeds floating in, etc.) and the ones being added by the plants in your yard that go to seed. Any weed that is allowed to go to seed can contribute thousands of seeds to a gardens seed bank with some seeds able to persist and still be viable in the soil for years to come. Field Bindweed seeds, for example, can remain viable in the soil for up to 40 years! It is impossible to know your initial seed bank, but if you can keep new weeds from going to seed, you can help deplete the seed bank over time.



WEED MANAGEMENT AND WEED MANAGEMENT PLANS

Whether you are installing a new garden or trying to maintain an existing one, weed management is important and prevention is a key first step. Below are a few preventative techniques you can use to tackle weeds. But keep in mind that every situation is different – for example, if you are removing existing well-managed sod that has low weed pressure and replacing with a perennial bed, the level of weed management post-disturbance will be very different than if you are installing that same perennial bed where a long-neglected patch of weeds had been.

A Weed Management Plan is simply a guide to help you effectively manage undesired weeds. It is the who, what, where, when, and how of any kind of plan. They can be as detailed as a plan for a large-scale restoration effort or as simple as saying you'll pull weeds in your yard once a week. You can check out the free 'Weed Management Guidance Document' from the City of Fort Collins Environmental Planning's website. A link to the document can be found in resources at the end of this chapter.

PRE-INSTALLATION WEEDING: If you know you have existing weeds, intensively managing them before you start any installation can put you ahead. Weeds thrive on the flush of released nutrients and decreased competition for resources that comes with any disturbance (like installing a new planting bed), so removing or stressing them as much as possible is a strategy to save you time, effort, and money over the long term.

POST-DISTURBANCE WEEDING: Installing a new garden bed or landscaping element entails some level of disturbance, like sod removal, tilling of amendments, etc. Once that happens the weeds think, 'Now is my time to shine!' and will start growing in a hurry. This is called a 'flush'. We can use this flush to our advantage by practicing patience, waiting two weeks or so, and then intensively removing the young, vulnerable weeds that pop up. You can even promote the weeds' germination with some light watering. The young weeds will be much easier to remove with mechanical means than their mature forms and can help avoid excessive herbicide use.

PRE-EMERGENT HERBICIDES: If you go the route of herbicide application, then a pre-emergent herbicide can be an option and needs to be applied before any weeds germinate. Keep in mind a pre-emergent will not kill existing weeds, only help control those annual and perennial weeds in your seed bank before they germinate. Using a pre-emergent that will persist in the soil beyond two weeks could also kill any seeds you plan to plant so choose your type of pre-emergent carefully. Some pre-emergents target specific types of weeds (e.g., broadleaf), while others are non-selective and will kill all plants. So, remember to read labels and directions carefully!

FLUSHING TECHNIQUE

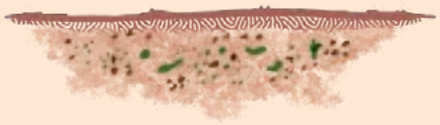


Fig 1: Seed Bank - weed seeds wait in the soil

Fig 2: Tilling - disturbance event wakes the seeds

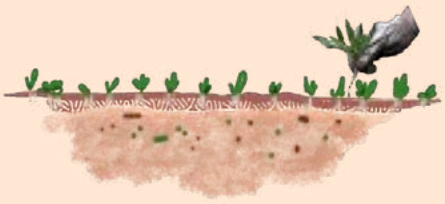


Fig 3: Flush of weed growth - these seedlings are easier to weed than a mature plant

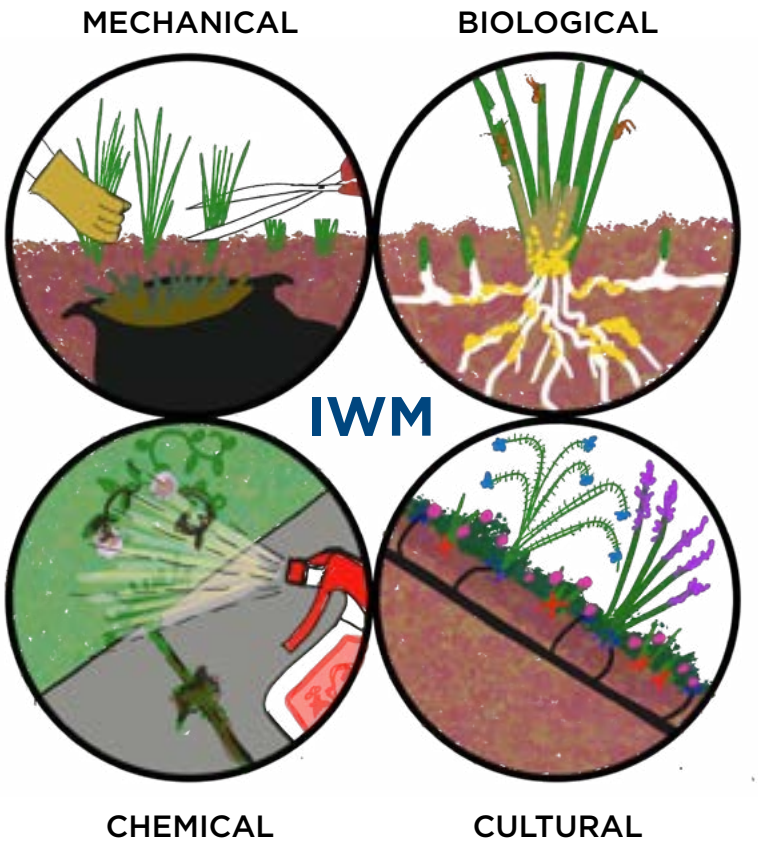
Sneaky Weed Seeds

Some weed seeds can be brought onto your site from the materials you import, like soil, straw, mulch, seed mixes, and even the soil your plants are potted in. When you bring in outside materials select certified weed free products. These products are part of a program the North American Invasive Species Management Association (NAISMA) is spearheading that hopes to limit the spread of noxious weeds with weed free standards for forage, mulch, and gravel. If you can not get weed free products, expect to get weeds from the materials you import and use methods like flushing or pre-emergent to stay on top of them before they get too established.

Also, keep in mind that using compost or richer soil to amend your existing soil may increase the success of weeds. Fortunately, native plants are adapted to the Front Range's generally nutrient-poor soils and don't generally like enriching soil amendments. So, if you're planting a native plant garden, you can likely skip the enriching amendments and that too can help suppress weeds. A soil test can help you determine if amendments are needed for what you plan on planting.

Integrative Weed Management and Early Detection Rapid Response

Maintaining a garden old or new requires various weed management techniques. Integrative Weed Management (IWM) is an approach that utilizes multiple control methods during a growing season to manage troublesome weeds. For example, simply resorting to herbicides can create herbicide resistant weeds, but used in combination with other methods, herbicides can continue to be effective. IWM is composed of the following methods:



MECHANICAL OR PHYSICAL: This method uses physical actions to disrupt germination and kill weeds such as – hand-pulling, tillage, burning, and mowing.

BIOLOGICAL: This tactic uses living organisms, like bacteria, fungi, or insects to target and control weeds. These organisms target only one species, typically a noxious weed, and have been thoroughly tested to ensure that they do not spread to unintended plants. The Colorado Department of Agriculture has information and resources through their "Request-A-Bug" program (additional information on page 11).

CHEMICAL: This method includes the use of herbicides, which can be synthetic or organic (like concentrated vinegar). It is important to correctly identify the target weeds and know how to use the herbicide correctly - at the right rate and frequency, the right time, with the right conditions, and in a safe manner for both people and the environment. Read the label - the label is the law!

CULTURAL: Cultural practices are those practices that help your desired plants compete against weeds. They are often cost-effective and the most ecological of all the control methods. Practices include selecting plants adapted to the local environment (right plant in the right place), cultivating as much desirable plant cover to outcompete weeds for resources, using appropriate irrigation practices (e.g., only where it's needed and not too much), using effective mulches, and can even include grazing in the right circumstances.

Early Detection and Rapid Response

The central idea of the IWM approach is to stress weeds in as many different ways as possible for effective management. It is the 'how' of weed management, whereas Early Detection and Rapid Response (EDRR) is to help guide your 'when' and 'how often'. Weeds are far easier, cheaper, and less-time intensive to manage when you can spot them early, before they establish and spread. Ultimately, regular monitoring and observation are important to detect a weed problem early. Make sure you check your garden at least once a week if not more. Enjoy monitoring with your favorite morning or afterwork beverage. Make it a routine but do not let it take over the enjoyment of being in your garden. In your Weed Management Plan, create a schedule for monitoring and only monitor during the times you have set aside to do so.

Additional Considerations

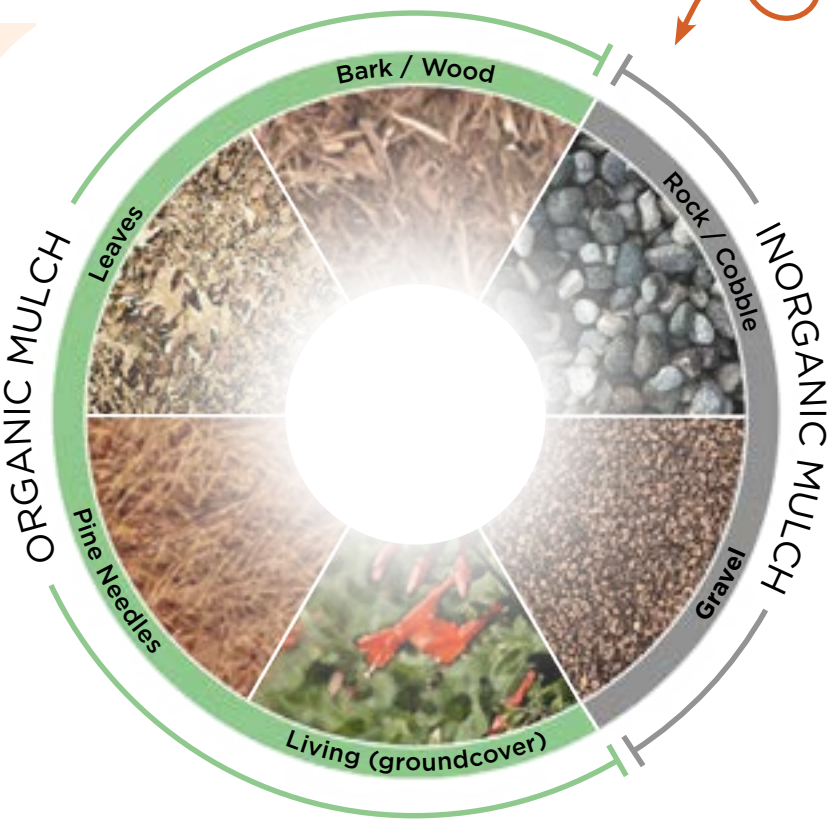
AESTHETICS: Your aesthetic preference can drastically change how you manage weeds. If you are trying to cultivate a very neat, botanic garden look then your weed management will be more intense than if you are cultivating a more naturalistic look and trying to attract pollinators and wildlife to your home.

EFFORT AND COST: An important question to consider is what level of effort, whether physical, time, or financial, you are willing and able to put into your garden and managing weeds? If you do not have the time, perhaps your budget allows you to hire a landscaper. Or, if you do have some time to spare and can monitor weeds on a regular basis with your daily morning or afternoon routine but then only tackle them every two weeks or once a month, put that schedule in your Weed Management Plan.

CITY REQUIREMENTS: The City of Fort Collins has some requirements for weed management in the Municipal Code. Chapter 20 states that weeds must remain below 6" height and lawns need to be mowed. Noxious weeds must be removed and not permitted to grow. This can be challenging depending on the size of the property and quality of the vegetation, so it is important to think about how to incorporate these requirements into your Weed Management Plan.

Homeowner and Renter

Finally, whose job is it to manage weeds on a property? For most, being a homeowner also means taking care of the surrounding outside property, but for others who rent, the conversation with your landlord about weed management can be challenging. Weed management, especially if it has been neglected, can be costly and take a lot of time to address. Ultimately the landlord is responsible for handling the weed management on a property and will often require the renter to at least mow the lawn. Those who rent can engage their landlords to address certain weed issues and ask about a Weed Management Plan. Perhaps offering to help maintain weeds for a break in the rent can help everyone involved.



Rock screen with 1.5" holes to filter for smaller rocks
Image from University of Alaska

PROS AND CONS OF WEED BARRIERS, MULCH & HERBICIDES

Now that you are well on your way to developing a Weed Management Plan, here are some more details and some pros and cons of different Cultural and Chemical methods to think about before diving in:

Weed Barrier Fabric:

The main benefit is helping suppress weeds for 1 - 3 years while your new plants get established and save you time weeding. However, weed barrier can start to look messy after a few years and is very difficult to replace. After a year or two, weed seeds can usually grow on top of the weed barrier since most weeds need very little organic material to germinate. Often the amount of weeds it prevents in the long run is negligible. In addition, plastic weed barrier does not allow air or water to go through it, effectively killing the soil underneath it. It can also make it difficult for our ground nesting native bees to access nesting spots.

Mulch:

When applied at a 3-4" depth, mulch can suppress annual weeds by limiting the light needed for weed growth.

Mulch can also help retain soil moisture. Mulch should typically be reapplied every few years and can also impede ground nesting pollinators. Many weed seeds can easily grow in mulch after a few years once enough organic material ends up in the mulch.

If you do choose to use mulch, choosing between organic mulches (i.e., chipped wood) and inorganic mulches (i.e., rock or gravel) depends on your aesthetic, the level of work you want to put in, and budget. Also, remember to get certified weed free products if you can.

WOOD MULCH is the best bang for your buck, is organic, and can break down and add nutrients to the soil. Wood mulch is best used under trees or shrubs, where you might find wood 'mulch' in nature and with plants that are used to those conditions.

DECORATIVE RIVER ROCK looks nice but can be more expensive than wood, make soil more alkaline, and can sometimes get too hot and burn desirable plants. Larger river rock (~1.5" screen size see image) is less effective than sharp-edged fractured rock (like crushed gravel) of a smaller screen size. Rock mulch is good in limited quantities and best used to create an aesthetic accent in your garden.

SMALLER ROCK GRAVEL or mulch is a good choice if you want to create a garden that resembles more mountainous or prairie terrain. Crushed rock with ½-inch screen or less, with or without fines, spread at a depth of 3 inches is recommended as the sharper edges lock together and hold moisture and prevent weeds more effectively than rounded pea gravel. The cons to crushed rock and gravel are similar to using River Rock but with a less expensive price tag.

YARD LITTER MULCH comes from your own yard and includes leaves, grass clippings, and other yard trimmings. Some benefits of this mulch are that it is free, it is typically easier for pollinators to navigate if they nest in the ground, and you can do less clean up maintenance in your yard. So don't be hasty to clean up your gardens if you are trying to provide lifecycle habitat for bees, butterflies, and other beneficial insects. One downside of this method is if the litter mulch gets too deep and wet for an extended period of time, it can become anaerobic (no oxygen) and kill the plants around it.

Vinegars & Herbicides:

Before choosing an herbicide, whether a synthetic chemical or vinegar, it is extremely important to identify the weeds you want to kill. Herbicides come in many different types and do different things to different kinds of weeds. You must read the labels to know what the particular herbicide targets. Is it a pre-emergent or post-emergent? Does it kill only broad-leaf weeds or all weeds? Is it systemic, killing the entire plant and spreading into the roots, or a contact herbicide only killing the part of the plant it touches? Contact herbicides can be effective for annual weeds but will only chemically mow perennials as the roots are left unscathed. Many organic herbicides like vinegar are considered contact herbicides and need frequent reapplication through the growing season. Again, if you choose to use herbicides, remember to also use another method of weed control – IWM works best when you utilize all the techniques in conjunction with each other.

COMMON WEEDS OF FORT COLLINS

The following are a few of the most common invasive and noxious weeds found in your garden. Remember the importance of correctly identifying your weeds before you attempt to remove them.

Kochia *(Kochia scoparia)* -
Not State-Listed but Invasive

An invasive non-native summer annual broad-leaf species brought over from Europe as an ornamental. This plant emerges in early spring, grows rapidly, and tolerates heat, drought, and salty soil. Its seeds do not last more than a year or two in the soil. Seed dispersal occurs via a "tumbleweed" process after the plant reaches the end of its lifecycle and its base can be broken off by strong winds. This plant is easily hand-pulled and best to do so before it flowers. You'll also want to bag this weed for added seed dispersal prevention. If you choose to mow kochia, be aware that timing is very important because kochia is able to produce seeds after being mowed, just at a lower height. So, if you mow too early, the plant will produce seeds at height that most mowers aren't able to drop to. Hand-pulling and bagging this plant is the most effective technique for its control.

Image credit Eric Westra, Colorado State University.
adams.extension.colostate.edu/ag-acreage/kochia

Button stage

Maturity

Prickly Lettuce *(Latuca serriola)* -
Not State-Listed but Invasive

An invasive non-native summer biennial, resembling lettuce or arugula but with stiff prickly bristles on the leaves. Flowers are small yellow florets arranged in a ray, similar to lettuce. It reproduces by seed and germinates in the spring. Seeds do not live past 1-2 years, but germination can be immediate. This plant is easily hand-pulled and best to do so before it flowers.

Seedling → *Maturity*



Image credit Division of Plant Sciences, University of Missour ***adams.extension.colostate.edu/ag-acreage/prickly-lettuce***

Canada Thistle *(Cirsium arvense)* -
List B Noxious Weed

A noxious non-native, deep-rooted perennial weed. It aggressively spreads by wind dispersed seeds and creeping horizontal roots called rhizomes. Its seeds can persist in the soil for up to 20 years. They have flower clusters with 1-5 purple flowers and spiny bright green oblong leaves. The trick to controlling it is to use a combination of methods to eliminate seed production and to weaken the root system. The roots are the biggest problem because they can reproduce from a fragment of root so simply pulling it creates another plant. Timing is critical when cutting back these plants. You want to let them put effort into the stalk and almost flowering, then cut them down at the base of the stalk in order to weaken the plant. There are several effective herbicide options for Canada thistle that vary depending on the life stage and location of the plant; refer to CO Department of Agriculture's factsheet to learn more.

Rosette → *Maturity*



Image credit Colorado State University. ***adams.extension.colostate.edu/ag-acreage/canada-thistle***

Field Bindweed *(Convolvulus arvensis)* - List C Noxious Weed

An invasive troublesome non-native, creeping perennial weed of the Morning glory family. It reproduces by seed and rhizomes and has a tap root that can extend 20 feet below ground. Its seeds can persist in the soil for up to 40 years. Stems are twining, hence the common name bindweed, and can reach up to 6 feet long. Flowers range in color from pink to white and resemble morning glory flowers. The plant is poisonous to horses causing intestinal issues. Using a combination of methods helps to control this weed as it is one of the trickiest weeds to control and it doesn't respond to Round-Up. Look for herbicides that target Field Bindweed and have the chemical quinclorac (active ingredient) in it. Cultural methods such as cutting back the plant or crowding it with desirable plants can be effective. Biological methods like releasing bindweed mites can be helpful too.

Image credit Division of Plant Sciences, University of Missouri and Phil Westra, Colorado State University (pink bindweed flower).
poisonousplants.cvmbs.colostate.edu/Plants/Details/52

Seedling

Maturity

ADDITIONAL RESOURCES

Larimer County Weed District: *larimer.gov/naturalresources/weeds*

Colorado Department of Agriculture: *ag.colorado.gov/conservation/noxious-weeds*

CSU Planttalk Colorado: *planttalk.colostate.edu/topics/weeds-cultural-problems/*

Certified Weed Free Products: *naisma.org/programs/weed-free-products/*

IWM: *growiwm.org/what-is-integrated-weed-management/*

Request-A-Bug: *ag.colorado.gov/conservation/biocontrol-at-palisade-insectary/request-a-bug*

EDRR: *ag.colorado.gov/conservation/noxious-weeds/edrr*

Guidance for Weed Management Plans in the City of Fort Collins: *fcgov.com/developmentreview/files/weed-management-plan-guidance-10-21-2020.pdf?1689267488*

Mulches: *leaflimb.com/too-many-choices-which-mulch/#:~:text=At%20Leaf%20%26%20Limb%2C%20we%20recommend,erosion%2C%20and%20it%20regulates%20temperature*.

Flushing Technique: *gallandt.files.wordpress.com/2017/10/seedbankmanagement.pdf*

Weed Seed Bank: *planttalk.colostate.edu/topics/weeds-cultural-problems/2113-many-weeds-weed-seed-bank/*

Greer, Tasha. Weed Free Gardening; A Comprehensive and Organic Approach to Weed Management. Beverly, MA: Quarto Publishing Group Inc., 2022

(NOT SO) FUN FACT

Bindweed can grow as much as 3 feet in one season!

Bindweed roots can sink as deep as 20 feet into the soil, though most of the roots work to spread horizontally to sprout in other locations, and one plant can return annually for 20 years! Not only that, plants spread rhizomatously (through the roots) and by seed.

If you are having a hard time battling bindweed take heart- you are up against one powerful weed.


City of
Fort Collins