DO YOU KNOW...

Where we get our water?

Where we store our water?
How much water our city uses per year?
What programs we offer?
How much water we have saved over the years?
Colorado is a headwaters state, with the majority of the state’s rivers beginning high in the Rocky Mountains as snowmelt. One of the benefits of living in a state that relies primarily on surface water is that unlike groundwater, surface water is a renewable water source.

One of the drawbacks is that precipitation levels vary greatly from year-to-year making the majority of the state’s water supply relatively unpredictable – and highly prone to drought.

Do you know...
Aurora’s water system starts nearly 180 miles away and includes the use of reservoirs, the natural river system, pipes, tunnels and pumps, all of which help us pull the water we own from our three river basins and deliver it to Aurora.

Aurora receives 25% of its water supply from the Colorado, 25% from the Arkansas and 50% from the South Platte river basins.

Homestake, Turquoise, Twin, Spinney Mountain, Jefferson, Strontia Springs, Rampart Quincy, Pueblo, Aurora, Meredith, Henry

Do you know how much water the city uses?
The average annual distribution for the past three years is 16.6 billion gallons annually. About half of that water is used outdoors. Aurora has a semi-arid climate, and our snow and rain levels are about half of the average annual precipitation for the United States, so it’s important that we all do our part to help conserve water.

Do you know that we offer programs to help conserve water?
Do you know how much water the conservation division has saved?

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...we offer programs to help you save water and money?

**INDOOR**
- Free indoor water assessment
- Ultra-high-efficiency toilet rebate
- Low-income water efficiency program

**OUTDOOR**
- Free landscape designs and rebates
- Free automatic sprinkler system assessments and rebates
- Customize your watering schedule
- Water conservation classes
- Gardening and volunteering
...how much water the conservation division has saved?

448 million gallons or 7.2 billion cups of water

Combined water savings for 2016, 2017, 2018

Be sure to check out our fliers at the end of class to see how Aurora Water can help you save water and money.
Turf Grass Alternatives
This class will teach you how to save water and money by removing Kentucky bluegrass and installing an alternative turf-like grass or groundcover.

Alternatives will provide yard solutions that offer similar functionality but save water. All recommended alternatives still provide:
- A walkable surface (can tolerate some foot traffic)
- Defined open space in the yard
- Green at least part of the year
- Aesthetically pleasing

Our agenda:
1. The traditional Kentucky bluegrass lawn
2. Dormancy
3. Considering an alternative lawn
4. Your alternatives
   - Groundcovers
   - Native grasses
5. City code requirements
Kentucky bluegrass varieties are the most common type of turf used for lawns in Colorado. They provide a living green carpet throughout the year.

Pros:
They are useful for children, pets and for play. The turf is comfortable to walk on and is sturdy and resilient with regard to foot traffic. Kentucky bluegrass is readily available in sod or seed form. It has great heat and cold tolerance.

Cons:
In order to maintain the lush green look, Kentucky bluegrass must be watered well, mowed often, fertilized and weeded, often treated with chemicals. It has poor shade tolerance. It is more susceptible to diseases like leaf rot, necrotic ring spot, and ascochyta leaf blight. Like most turf-forming grass, it requires aeration periodically in order to avoid thatch.
In Colorado, bluegrass must receive about 40” of water a year to maintain a lush look. However, proper watering practices reduce this amount to 34”, as shown in this graph (figures from Colorado State University). In Aurora, on average, we receive only 15” of precipitation a year in the form of rain and snow. This means we must irrigate with a supplemental 19-28” or more.

Utilizing plant material that thrives on the amount of water we receive naturally would conserve our water supply and save you money.

In the table above, notice that of all turf varieties normally used in Colorado, Kentucky Bluegrass needs the most amount of water. We’ll touch on the benefits and drawbacks of other types of grasses in the following slides.
Bluegrass is a cool season grass, meaning it thrives in spring and fall and wants to stop growing in summer heat when water is less prevalent. We encourage growth in summer with regular watering. Actively growing Kentucky Bluegrass lawns require up to 1.5 inches of water per week, while a dormant bluegrass lawn requires only 0.5 inches of water every two weeks. A light watering or rainfall of 0.5 inch every two weeks supplies enough moisture to keep crowns, rhizomes and roots hydrated and alive. While this low volume of water will not re-green a dormant lawn, it will help to insure good recovery once rainfall occurs in fall.

Allowing bluegrass lawns to fully enter dormancy is an alternative to continued watering during hot, dry conditions and can result in a significant water savings. There will be some loss of root mass when a lawn goes into dormancy, but the 0.5 inches of water every other week will help it recover.

The above photo shows grass going dormant. Ensure that it enters dormancy without dying by gradually decreasing watering over the course of a few weeks until you are supplying only .5 inches every two weeks. How do you know it’s not dead? As temperatures start to cool, check for green shoots in the brown patches. If you see green, the grass is breaking its dormancy and should start to repair itself as the root structures begin to grow again.
Reasons to replace Bluegrass and other high-water turf:

• Desire for savings on your water bill
• Difficulty maintaining current grass; obvious over or under watering
• Turf grass area size and location may be impractical. For example, mowing and watering a steep slope can be challenging. Or, due to the layout of your beds, they're difficult to mow, maintain, and water.
• Current grassy area isn’t being fully utilized because of lack of demand; no children, pets or games.
• Desire for low-maintenance landscape; no mowing, aerating, fertilizer or herbicide to worry about.
• Belief in the importance of water conservation for environmental sustainability.
• Desire to change look of the lawn.
Perennial groundcovers are a great alternative to traditional turf. Be aware that they do not act the same as turf grass. Some cannot stand heavy foot traffic. But, many groundcovers have other benefits – summertime blooms like this purple-flowered creeping thyme, for example!

There are so many good things to say about groundcovers!

- Groundcover density can inhibit competition from weeds.
- Groundcovers enhance the attractiveness and interest of your yard. They can provide seasonal color from blooms.
- They can assist with erosion control.
- They act as living mulch.
- They save time and money with regard to labor and materials.

Only one con:
- Does not tolerate foot traffic well, more appropriate in between stepping stones or in areas that won’t receive much traffic.
Groundcovers we recommend as turf alternatives that provide similar functionality:

- **Turkish Speedwell** (*Veronica liwanensis*)
  - Small, glossy green foliage
  - Blue flowers, late spring to early summer

- **Sunny-Side Up Fleabane** (*Erigeron scopulinus*)
  - Deep green foliage
  - Tiny white daisy-looking flowers bloom late spring to early summer

- **Wooly Thyme** (*Thymus pseudolanuginosus*)
  - Has tight, wooly, gray-green foliage
  - Tiny pink flowers bloom for a short period of time, about 2-3 weeks, in spring
  - Foliage persists through winter

- **Petite Dianthus** (*Dianthus gratianopolitanus* ‘Petite’)
  - Gray-green foliage
  - Small pink flowers on short spikes cover plant in early summer

- **Creeping thyme** (*Thymus serpyllum*) - photo on previous slide
  - Dark green and narrow, oval foliage
  - Foliage persists through winter
  - Tiny pink flowers bloom for a short period of time, about 2-3 weeks in early summer
Groundcovers we recommend that can replace turf and provide similar functionality are:

- **Elfin Thyme** (*Thymus serpyllum* ‘Elfin’ or *Thymus praecox arcticus* ‘Elfin’)
  - Reaches 1-3” high
  - Has small, green-gray oval-shaped foliage
  - Foliage persists through winter
  - Tiny pink flowers bloom for a short period of time, about 2-3 weeks, in early summer

- **Periwinkle** (*Vinca minor*)
  - Reaches 2-5” high
  - A small-leaved vining groundcover
  - Prefers full shade but will also do okay in part sun
  - Small purple flowers will bloom in spring and in fall

- **Dragon’s Blood Sedum** (*Sedum spurium* ‘Dragon’s Blood’)
  - Reaches 4-6” high
  - Gorgeous red-purple-green foliage
  - Vibrant pink flowers in summer

- **Angelina sedum** (*Sedum rupestre* ‘Angelina’)
  - Reaches 4-6” high
  - Gorgeous yellow-green foliage
  - Yellow flowers in summer
Native and/or xeric grasses are a great alternative to traditional bluegrass, plus they look and act more like bluegrass. Most can stand at least some foot traffic. Some are not green all year round. Carefully research grass species to help you decide on the right variety for you, their availability and whether they come as seeds or plugs. Plugs are small clumps of sod (some have attached soil).

Aurora city code states that front yard lawn height cannot exceed 6” unless the grass is a turf alternative. These turf-type grasses may be grown to their natural height.

Turf-like grasses are either warm-season or cool-season grasses. These will be explained in the next slides.

Another distinction amongst grasses is whether they are bunchgrasses or sod grasses. Bunchgrasses grow in single clumps. Most ornamental grasses, like feather reed grass and little bluestem, are bunchgrasses. Sod grasses form a thick mat and spread in all directions, like Kentucky bluegrass.

If you’re interested in native grasses, here is a full list of natives for Colorado landscapes from CSU extension: [http://www.ext.colostate.edu/mg/Gardennotes/581.html](http://www.ext.colostate.edu/mg/Gardennotes/581.html)
Warm season grasses

- Are green and growing during the warm (not hot!) temperatures of spring and early summer
- Enter dormancy slowly and don’t reach maximum growth rate until midsummer
- Root mass can reach 3 feet below ground

**Buffalograss** is a sod-forming grass, a native to much of the Great Plains.
- Cultivars like ‘609’ and ‘Legacy’ have been popular for many years.
- New cultivars, ‘Roadcrest’ and ‘Cody’ were created to form thicker turf and increase the duration of the growing season (stay green longer). It can be left unmowed and will reach 6-8”, or if a mown look is preferred, we recommend 3-5”.

**Blue Grama** is native to Colorado. It is a bunchgrass in warmer climates, though can achieve an attractive sod form if mowed no more than once a month. In the front range, it will take some time to form turf. It can be left unmowed to form its curving eyelash-like seedheads at 12-18”. Several cultivars exist, ‘Bad River’ and ‘Hachita’ are a couple of the preferred.
Cool Season Grasses

- Are green and growing during the cooler temperatures of spring and fall, when sufficient water is present.
- Emerge from dormancy and grow rapidly in the spring
- Root mass is in the upper 12-18” of soil

**Hybrid Kentucky Bluegrass** is a sod-forming grass just like the original Kentucky Blue. This group is made up of cultivars such as ‘America’, ‘Compact’, ‘Livingston’, and ‘Reveille’, to name a few. Though this species is not considered low-water, it has a reduced water

**Wheatgrass** cultivars are bunch or sod-forming grasses.
- The ‘Fairway’ cultivar is a bunch grass and is very drought-tolerant. It has a dense root system near the surface but also has roots that will grow as deep as 3’. It thins out if watered too much.
- The ‘Ephraim’ cultivar is a non-native, sod-forming grass. It has a more wiry texture if left unmowed.

**Smooth bromegrass** is no longer recommended, as it is highly invasive.
Turf-type Tall Fescue is a bunch grass that seems to perform best in the predominant clay soils in Aurora. Although not very tolerant of high foot traffic, it is more tolerant of shade than Kentucky Bluegrass and buffalograss.

Fine Fescue species are bunch or sod-forming grasses. They are well adapted to shade, poor soils and dry soils. Mowing should be done with care, and avoided as much as possible in the hottest days of summer. Thatch is a problem and fine fescue lawns should be aerated every couple years.

- **Chewings** Fescue, a bunchgrass, is the best looking for a lawn
- **Red** Fescue, a sod-former, is highly shade tolerant and should not be overwatered.
- **Sheep** Fescue, a bunchgrass
- **Hard** Fescue, a bunchgrass
# Turfgrass Persistence Under Low Maintenance

(1=best persistence, 10=worst persistence)

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>Persistence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buffalograss</td>
<td>Buchloe dactyloides</td>
<td>1</td>
</tr>
<tr>
<td>Blue grama</td>
<td>Bouteloua gracilis</td>
<td>1</td>
</tr>
<tr>
<td>Wheatgrass</td>
<td>Agropyron sp.</td>
<td>1-2</td>
</tr>
<tr>
<td>Hard fescue (Fine fescue)</td>
<td>Festuca longifolia</td>
<td>2-3</td>
</tr>
<tr>
<td>Sheep fescue (fine fescue)</td>
<td>Festuca ovina</td>
<td>3-5</td>
</tr>
<tr>
<td>Creeping fescue (fine fescue)</td>
<td>Festuca rubra rubra / trichophylla</td>
<td>3-5</td>
</tr>
<tr>
<td>Chewings fescue (fine fescue)</td>
<td>Festuca rubra commutata</td>
<td>5-6</td>
</tr>
<tr>
<td>Tall fescue</td>
<td>Festuca arundinacea</td>
<td>6</td>
</tr>
<tr>
<td>Kentucky bluegrass</td>
<td>Poa pratensis</td>
<td>8</td>
</tr>
<tr>
<td>Hybrid Kentucky bluegrass</td>
<td>Poa pratensis sp.</td>
<td>9-10</td>
</tr>
<tr>
<td>Perennial ryegrass</td>
<td>Lolium perenne</td>
<td>10</td>
</tr>
</tbody>
</table>
To install a native grass lawn, you must apply for a **new lawn permit** from Aurora Water so that you can water daily over a 30-day establishment period. A soil inspection is included in the cost of the permit to ensure soil was properly prepared. For information and the application, visit [www.auroragov.org/CityHall/Permits/LawnandIrrigationPermits/index.htm](http://www.auroragov.org/CityHall/Permits/LawnandIrrigationPermits/index.htm)

**Soil Preparation:** When installing any sod, the preparation of the soil should be treated as if you were installing a traditional bluegrass lawn. Till in 1.5” of compost (4 cubic yards per 1000 sq. ft.). When seeding during warm weather, mulch with straw or other coarse material. A fertilizer is helpful at this initial point. If seeding in a small area, rake the bare soil.

If **seeding onto bare soil**, till about .75” of compost (2 cubic yards per 1,000 sq. ft.) into the top 4” of soil. Apply seed with broadcast spreader. Make sure seed is making good contact with the soil. You can lightly rake it in or roll with an empty “drum” roller. For small sites, seed may be broadcast by hand.

If **seeding into existing vegetation**, use herbicide and follow directions to eliminate any grass or weed cover which may compete with germination and establishment. Wait appropriate time before seeding.

**When?**: It is recommended to seed between October 1 and May 1 to take advantage of natural moisture for germination. Most sources say best results are obtained by planting in late spring while the ground is moist and it is not too hot yet.

**Watering**: Keep the newly seeded area evenly moist during and after germination for up to 30 days. This is the only time this lawn will require such extensive watering.
The following links are for local companies that specialize in selling native grass seed. They list single species and mixes for lawns, pastures, foothills, plains and prairie. Most of these are available as seed, with a few exceptions sold as small plants called plugs.

- Western Native Seed [www.westernnativeseed.com](http://www.westernnativeseed.com)
- Arkansas Valley Seed [www.avseeds.com](http://www.avseeds.com)
- Rocky Mountain Seed Co [www.rockymountainseedco.com](http://www.rockymountainseedco.com)
- Southwest Seed [www.southwestseed.com](http://www.southwestseed.com)
- Pawnee Buttes Seed [www.pawneebuttesseed.com](http://www.pawneebuttesseed.com)
Watering

Water
Soil must remain moist to insure germination. Water twice a day for a couple of weeks, until sprouts are up. Reduce watering frequency to once a day for a couple of weeks and then once every other day for a month. Finally, twice a week for the rest of the growing season.

Once the lawn is established (year 2), water only as needed. Research the water needs of your species. Do NOT use a watering scheduled based on Kentucky bluegrass.
What to expect
Most native grasses will germinate in two to three weeks and fully mature in two to three years. Be diligent with weeds during this time. In order to achieve good coverage during the first year, if you have planted a warm season grass, add a cool season grass such as fine fescue.

Maintenance
How much maintenance your new lawn needs depends on what kind of grass it is.

1. Cut regularly, before grasses form seedheads. Cutting before it goes to seed encourages more foliage. This could be as little as once per month, depending on the species. Choose low-growing species, and take off no more than 1/3 of the grass length with each cutting. Keep mower blade sharp.

2. Leave your clippings on the ground, the extra nitrogen keeps your lawn healthy.

3. Keep your lawn within bounds. Grasses will keep expanding their reach across soil and mulch, into nearby beds, etc. At borders, clip grasses and dig up escapees.

4. Let them grow a bit higher, up to 6”. Grasses that are left taller develop larger root masses which buffer them against more extreme climate conditions.

5. Aerate any kind of sod-forming grass. Aeration helps prevents soil compaction and breaks up thatch. Aeration removes plugs of thatch and soil two to three inches long (the longer, the better) and deposits them on the lawn. Enough passes should be made to achieve two-inch spacing between holes. It is a good practice to aerate in the spring and fall and apply fertilizer after aeration.
Nitrogen applications can often be reduced by 1/4 to 1/3 when grass clippings are returned to the lawn during mowing. Nitrogen and other nutrients contained in the clippings are recycled to the lawn as they decompose. Grass clippings do not contribute to thatch accumulations in lawns.

** On sandy soils, use slow-release nitrogen fertilizers (sulfur-coated ureas, IBDU, and natural organic-based fertilizers) throughout the year to reduce the potential for leaching loss. On very sandy soils, do not fertilize turf after late September. Nitrogen can leach into ground water during the winter months.

*** The March-April nitrogen application may not be needed if fertilized late fall (September to November) the previous years. If spring green-up and growth is satisfactory, delay fertilizing until May or June.

**** Make the final fall nitrogen application (October-November) while the grass is still green and at least two to three weeks before the ground begins to freeze. Optional N applications shown in ( ). Use extra nitrogen applications where a higher quality turf is desired or on a heavily used turf.

For the full fact sheet, visit CSU Extension at http://www.ext.colostate.edu/mg/Gardennotes/551.html
Weeds
Once grasses have been seeded, weeds can be controlled the establishment period (first year and a half) by selective mowing at a height above the native grass seedlings.

Initial mowing for weed control will be most effective during spring or early summer during the second growing season. Selective herbicides that target broadleaf weeds can be used when native grass plants have reached the four-leaf stage and the air temperature does not exceed 75 degrees. See the illustration above for grass leaf stages.

Promote diversity. Consider letting other plants (like clover) into your lawn. Left to nature's devices, a lawn would become more diverse, allowing broad-leaved plants to mingle with the grass.
Code for General Landscape Coverage
- Residential front/side yards must have 50% long-lived plant material coverage (long lived = trees, perennials, turf). Example: 2,000 square feet of landscape area will require 1,000 square feet of plant coverage. The city has developed plant coverage values based on height and spread.
- Rock mulch is limited to not more than 50% of total landscaped area (whereas organic mulch is unlimited).
- Use of natural stone or manmade pavers may not exceed 40% of landscaped area.

Code for Turf Coverage
- A permit is required to establish any kind of new lawn.
- Multifamily, commercial and large properties can have no more than 33% of the total landscape area in turf of any kind (this includes native grass) and it must be one continuous area.
- Residential backyards can have no more than 45% coverage of turf in the total landscape area.
- Residential front yard coverage requirement depends on lot size.
  - Small lots - 3,700-5,999 square feet, 40-50% turf coverage
  - Standard lots - 6,000-8,999 square feet, 30-40% turf coverage
  - Large lots - 9,000 square feet and greater, 25-40% turf coverage

Code for Turf Maintenance
In the front yard, non-native turf must be mowed to a height of six inches or less.
Thank You

Water Conservation Office
Hotline 303-739-7195
conservation@auroragov.org

Please visit our website for additional information at www.aurorawater.org. We offer conservation classes throughout the growing season. Register at www.auroragov.org/waterclasses.

Important Contacts:

Water Conservation
Hotline, conservation@auroragov.org or 303-739-7195

Water-wise Landscape Information
Zach Versluis, zverslui@auroragov.org or 720-859-4366