Turfgrass, Drought, and Watering Restrictions
Mary Hattendorf
Northern Water Boundaries
Northern Water

- Northern Colorado Water Conservancy District
  - Established 1937: Colorado–Big Thompson project
    - Built between 1938 and 1957
  - Transfer water from west slope to Front Range
  - Largest trans-mountain water diversion project in Colorado
  - About 60% municipal/40% agriculture water use
  - Supplies 30 cities
  - Irrigates 632000 acres farmland (2007)
Water Conservancy Act of 1937

- Gave conservancy districts the ability to “provide for the conservation of water resources of the state and for the greatest beneficial use of water within this state”
Conservation Gardens at Northern Water

- Water Conservation in Urban Landscapes
  - Xeriscape plants
  - Principles of Xeriscaping (Water-efficient landscaping)
  - Irrigation systems and techniques
  - Turf response to irrigation deficit
  - Best practices
Colorado Drought

U.S. Drought Monitor
Colorado

May 14, 2013
Valid 7 a.m. EST

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

http://droughtmonitor.unl.edu

Rich Tinker, Climate Prediction Center/NCEP/NWS/NOAA

Drought Conditions (Percent Area)

<table>
<thead>
<tr>
<th></th>
<th>None</th>
<th>D0</th>
<th>D1</th>
<th>D2</th>
<th>D3</th>
<th>D4</th>
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<tbody>
<tr>
<td>Current</td>
<td>0.00</td>
<td>100</td>
<td>93.18</td>
<td>71.71</td>
<td>24.53</td>
<td>15.84</td>
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<tr>
<td>Last Week (05/07/2013 map)</td>
<td>0.00</td>
<td>100</td>
<td>95.49</td>
<td>75.99</td>
<td>20.97</td>
<td>17.93</td>
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<tr>
<td>3 Months Ago (02/12/2013 map)</td>
<td>0.00</td>
<td>100</td>
<td>100</td>
<td>91.30</td>
<td>60.99</td>
<td>24.92</td>
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<tr>
<td>Start of Calendar Year (01/01/2013 map)</td>
<td>0.00</td>
<td>100</td>
<td>100</td>
<td>95.06</td>
<td>53.47</td>
<td>13.48</td>
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<td>Start of Water Year (09/25/2012 map)</td>
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<td>100</td>
<td>100</td>
<td>100.00</td>
<td>61.75</td>
<td>16.89</td>
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<td>One Year Ago (05/09/2012 map)</td>
<td>51.13</td>
<td>94.87</td>
<td>91.81</td>
<td>29.40</td>
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</table>

Intensity:
- D0 Abnormally Dry
- D1 Drought - Moderate
- D2 Drought - Severe
- D3 Drought - Extreme
- D4 Drought - Exceptional

Released Thursday, May 16, 2013
3-Month Outlook

Jun-Jul-Aug_2013

Jun-Jul-Aug_2013
U.S. Seasonal Drought Outlook
Drought Tendency During the Valid Period
Valid for May 16 - August 31, 2013
Released May 16, 2013

KEY:
- Drought to persist or intensify
- Drought ongoing, some improvement
- Drought likely to improve, impacts ease
- Drought development likely

Depicts large-scale trends based on subjectively derived probabilities guided by short- and long-range statistical and dynamical forecasts. Short-term events -- such as individual storms -- cannot be accurately forecast more than a few days in advance. Use caution for applications -- such as crops -- that can be affected by such events. “Ongoing” drought areas are approximated from the Drought Monitor (D1 to D4 intensity).

For weekly drought updates, see the latest U.S. Drought Monitor. NOTE: the green improvement areas imply at least a 1-category improvement in the Drought Monitor intensity levels, but do not necessarily imply drought elimination.
Current C–BT Water Status

- Quota still set at 60%
  - Objective is to increase stored water
- Late snowstorms have helped bring the South Platte Basin snowpack up to 114% of average (May 17, 2013)
- Some communities have landscape watering restrictions
Community Watering Restrictions

- Fort Collins
  - Response Level 1 as of April 1
    - Lawn watering allowed 2 days per week
    - Even residential addresses water on Thursday & Sunday
    - Odd residential addresses water on Wednesday & Saturday
    - Commercial/business, multi-family & HOAs water on Tuesday & Friday
    - No watering between 10 am & 6 pm or on Mondays
    - Hose-shut-off nozzle recommended to water flowers, trees, & vegetable gardens
Community Watering Restrictions

- **Loveland**
  - No current watering restrictions
  - Working on drought response plans
  - Water sources in good shape & adequate supplies

- **Little Thompson Water District**
  - No current restrictions
  - Follow conservation measures to help protect supplies
Community Watering Restrictions

- **Louisville**
  - Lowered drought designation from Stage 2 to Stage 1
  - Voluntary 2 day/week watering schedule
  - No outdoor watering from 10 am to 6 pm
  - No water waste

- **Boulder–Erie**
  - No current restrictions
  - Follow conservation measures to help protect supplies
Community Watering Restrictions

- Lafayette
  - No outdoor irrigation between 10 am and 6 pm.
  - No water overrun onto non-vegetated areas
  - No paved area can be washed

- Greeley
  - 3-day per week watering schedule (usual schedule; no additional restrictions in 2013)
Strategies

- Turf is tough, especially Kentucky bluegrass
- Preserve trees, shrubs, other perennials
  - Helpful if irrigation is zoned separately from turf
  - If not, cutting water to turf hurts the other perennials
- Water trees and shrubs manually if turf watering restrictions are in place
- Effects of irrigation deficit on trees and shrubs show up in subsequent seasons
Strategies

- Landscaping is valuable—can be worth 15% of property values on average
- Many community and environmental benefits as well
Drought

- **Short-term**
  - Periods of a few weeks only

- **Long-term**
  - Weeks to months of chronic precipitation and irrigation deficits
Drought-hardening your Lawn

- Prepare the soil well
  - Deep tilling can expand the volume of un-constricted soil in clays
  - Added organic material can loosen clay soils, provide more air for roots, and increase soil water infiltration rates
  - Added organic material in sandy soils aids soil water retention
Amending Your Soil – Add Compost

Clay Soils
- Better infiltration
- Reduced runoff
- Better aeration
- Better drainage

Sandy Soils
- Greater water holding capacity
- Reduced deep percolation
- Reduced leaching of nutrients
Amending Your Soil – Add Compost

How Much?
- 3 to 6 cubic yards per 1,000 ft²
- 1 to 2 inches deep
- Incorporate or till into the top 4 to 6 inches – mixing well

Required for new construction?
- Most Front Range communities require tillage and soil amendment
- Renovating? Core aerate, top dress with high quality compost
Drought-hardening your Lawn

- The depth of irrigation defines the root zone
  - Shallow, frequent irrigations lead to shallow roots
  - Deeper, less frequent irrigations encourage deeper root growth—greater volume of soil moisture to draw from
Watering Your Lawn

**Water Deeply & Infrequently**

- Encourage *deeper rooting*
- More soil volume for water extraction
- *First line of defense against drought*

**Apply Water Only when Needed**

- Grass is blue-grey, retains footprints, soil probe difficult to push in
- Operate your sprinkler system as if you were a hose-drapper
- *Adjust for seasonal water requirements*
Drought-hardening your Lawn

- How deep is the root zone?
  - Bluegrass root zones are typically 8–12”.
  - Tall fescue root zones are up to 24” deep.
  - Fine fescues and perennial ryegrass root zones are more similar to bluegrass root zones.

- Irrigate at least ¾” per irrigation. Wait until the turf shows that it needs water.
  - Color change to blueish
  - Footsteps remain for 20–30 minutes
Average Weekly Cool Season Lawn Water Requirements
Rainfall + Irrigation*

These are average values—every year is different. Water your lawn 1 to 1.5" each irrigation only when the lawn indicates need.

*Adapted from Rocky Mountain Sod Growers
How Much to Apply

Apply Until Root Zone is Moist
- Check with soil probe or shovel

Check Sprinkler Application Rate
- 4–6 flat bottom/sided cans
- Time the output
- Measure the water depth

Adjust Controller
- Minutes per inch
- Reset runtime minutes to apply 0.75”–1.0”
- Soak cycles–prevent runoff
Watering—Time of Day

Water can be wasted via evaporation loss if applied during the hottest part of the day. Windy conditions can also increase evaporative loss and distort sprinkler patterns, leading to dry spots. Excess leaf wetness can lead to disease.

- **Water between 10 PM and 6 AM.**
  - Cooler—less evaporative loss
  - Winds are lower

- **Irrigation and lawn diseases**
  - Water during nighttime dew periods
  - Minimize length of time leaves are wet
Turf Choices

- Cool season turf
  - Growing (green) season: April–October
  - Grows better in spring and fall (cooler)
  - Many turf-quality choices

- Warm season turf
  - Growing season: late May–late September
  - Grows best in warmer temperatures
  - Fewer turf-quality choices in Colorado
    - Buffalograss and blue grama
Cool Season Turfgrass Characteristics

- Bluegrasses
  - Sod-forming
    - Kentucky bluegrass
    - Texas Hybrid bluegrass
- Fescues
  - Bunch-forming
    - Tall fescue
    - Fine fescue
- Perennial Ryegrass
- High water requirements for high quality turf
Early Tall fescue greening

April 2012 Tall fescue

April 2012 Kentucky bluegrass

Pre–1st irrigation photos: Tall fescue has a deeper root system than Kentucky bluegrass and is accessing soil moisture deeper in the soil profile.
May 2012 CGNW Turf

May 2012 Kentucky Bluegrass

May 2012 Tall fescue
Cool Season Turfgrass Characteristics

- Turf quality with reduced maintenance requirements
  - Bluegrasses (Kentucky; Texas Hybrid)
  - Can tolerate a wider range of reduced irrigation over time than other cool season turfgrasses
- Very drought tolerant
  - Goes dormant; may have some stand thinning; growth habit aids recovery
Cool Season Turfgrass Characteristics

- Turf quality with reduced maintenance requirements
  - Tall Fescue
  - A drought avoider
  - Deep root zone means a bigger soil moisture reservoir
  - No dormancy mechanism
  - Stand will die off if chronic water deficits occur
    - Example: Line Source area at north end of CG
Turf Coefficients and Tall Fescue

$K_T$

- 0.53 15' from curb
- 0.62 13' from curb
- 0.69 11' from curb
- 0.75  9' from curb
- 0.80  7' from curb
- 0.84  5' from curb
- 0.86  3' from curb
- 0.87  1.2' from curb
Cool Season Turfgrass Characteristics

- Turf quality with reduced maintenance requirements
  - Fine Fescue
  - Not particularly drought resistant
  - No dormancy mechanism
  - Stand will die off if chronic water deficits occur
    - Example: Line Source area at north end of CG
  - Bunchy appearance as stand thins
Cool Season Turfgrass Characteristics

- Turf quality with reduced maintenance requirements
  - Perennial ryegrass
  - High maintenance turf species
  - Not very drought resistant
  - No dormancy mechanism
  - Stand will die off if chronic water deficits occur
  - Bunchy appearance as stand thins
<table>
<thead>
<tr>
<th>% Ratio (Def/Opt Irrigation) Plot</th>
<th>Kentucky Bluegrass Variety</th>
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<tbody>
<tr>
<td>99 Rampart</td>
<td>Greenness Persistence</td>
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<tr>
<td>97 Showcase</td>
<td>Ranking after Short-term</td>
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<tr>
<td>95 Moonbeam</td>
<td>Irrigation Deficit 2011</td>
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<tr>
<td>95 Total Eclipse</td>
<td>(Preliminary)</td>
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<td>95 Midnight2</td>
<td>(agrees substantially with Dr. Tony Koski’s list of Kentucky Bluegrass cultivars that MAY exhibit drought tolerance, CSU, 2003)</td>
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<tr>
<td>94 America</td>
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<td></td>
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<td>92 Award</td>
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</table>
Warm Season Turfgrass Characteristics

- Buffalograss & Blue grama—native to Colorado
  - Green season is late May to end of September
  - Buffalograss spreads by above-ground stems (stolons)
  - Blue grama spreads by underground stems (rhizomes)
- Not shade tolerant
- Adapted to a wide range of soil moisture conditions without loss of stand
- Highly drought resistant
Turf Coefficients and Warm Season Mix

\[ k_T \]

- 0.53 15' from curb
- 0.62 13' from curb
- 0.69 11' from curb
- 0.75 9' from curb
- 0.80 7' from curb
- 0.84 5' from curb
- 0.86 3' from curb
- 0.87 1.2' from curb

Seasonal precip + irrigation 28”
(5/1–10/31)

Seasonal precip + irrigation 14”
@9th rain gauge
Line Source Irrigation Turf Persistence Study 2011

% of Maximum Greenness vs. Ratio of (Applied Irrigation + Precip)/Eto K_T

- Kentucky Bluegrass Compacted No Amendment
- Kentucky Bluegrass 12" tillage 6 cy compost
- Warm Season Mix
- Aggressive Kentucky Bluegrass Blend
- Canada Bluegrass
- Fine Fescue Mix
- Kentucky Bluegrass 6" tillage no Amendment
- Kentucky Bluegrass 6" tillage 3 cy amendment
- Natures Choice
- Texas Hybrid Bluegrass
- Perennial Ryegrass
- Tall Fescue
Questions?