Strategies for Efficient Irrigation

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Basic goal:

Find ways to reduce amount of water used for irrigation

Water conservation campaigns

- Water scarcity
- Water costs
- Environmental morality

Irrigation habits after water conservation campaign in Corvallis, OR

Magnolia

Socio economic factors affect water habits

The Highlands


Beacon Hill Seattle
Corvallis, OR

Reduce irrigation by design

- Eliminate odd shaped areas
- Don't leave unplanned areas
- Utilize Alternative plant materials
- Change placement of lawns

Don’t plant lawns where they don’t belong

Lawns: a poor choice for difficult to irrigate sites

Eliminate the lawn and extend the sidewalk

What is the plan?

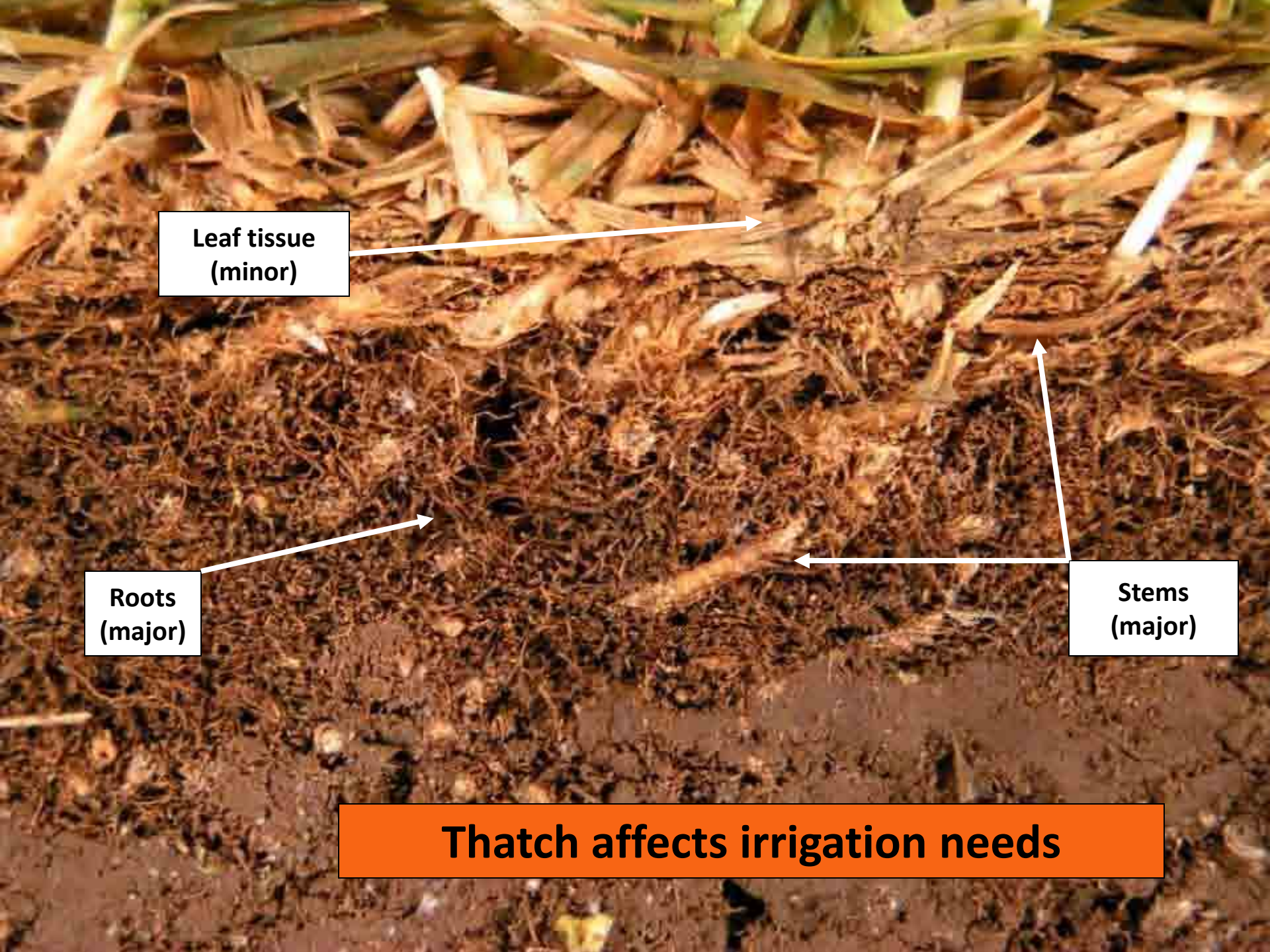
Redesign to eliminate an impossible irrigation problem


Houston we have a problem!

Enclose lawns inside beds to keep water on lawns and beds and out of streets

Irrigation needs change
as
landscapes evolve

Tree vs. lawn competition


Leaf tissue
(minor)
Roots
(major)
Stems
(major)
Thatch affects irrigation needs

Rootzone issues affect irrigation strategies

Irrigation system issues

- Poor design and layout
- Growth of plant materials
- Poor irrigation uniformity
- Poor system maintenance
- Poor system management

Conceptual design flaws


Bad head placement

Design was ok until trees grew up.

Now one side is a swamp and the other side is dead from drought.

Hydraulic problems


Malfunctioning heads

Plant growth

Developing irrigation strategies

- prioritized irrigation
- alternative plant materials
- shrinking the irrigation season
- tuning irrigation systems
- improving soil conditions


High priority, irrigate as needed


Low priority, little or no irrigation

Strategic irrigation

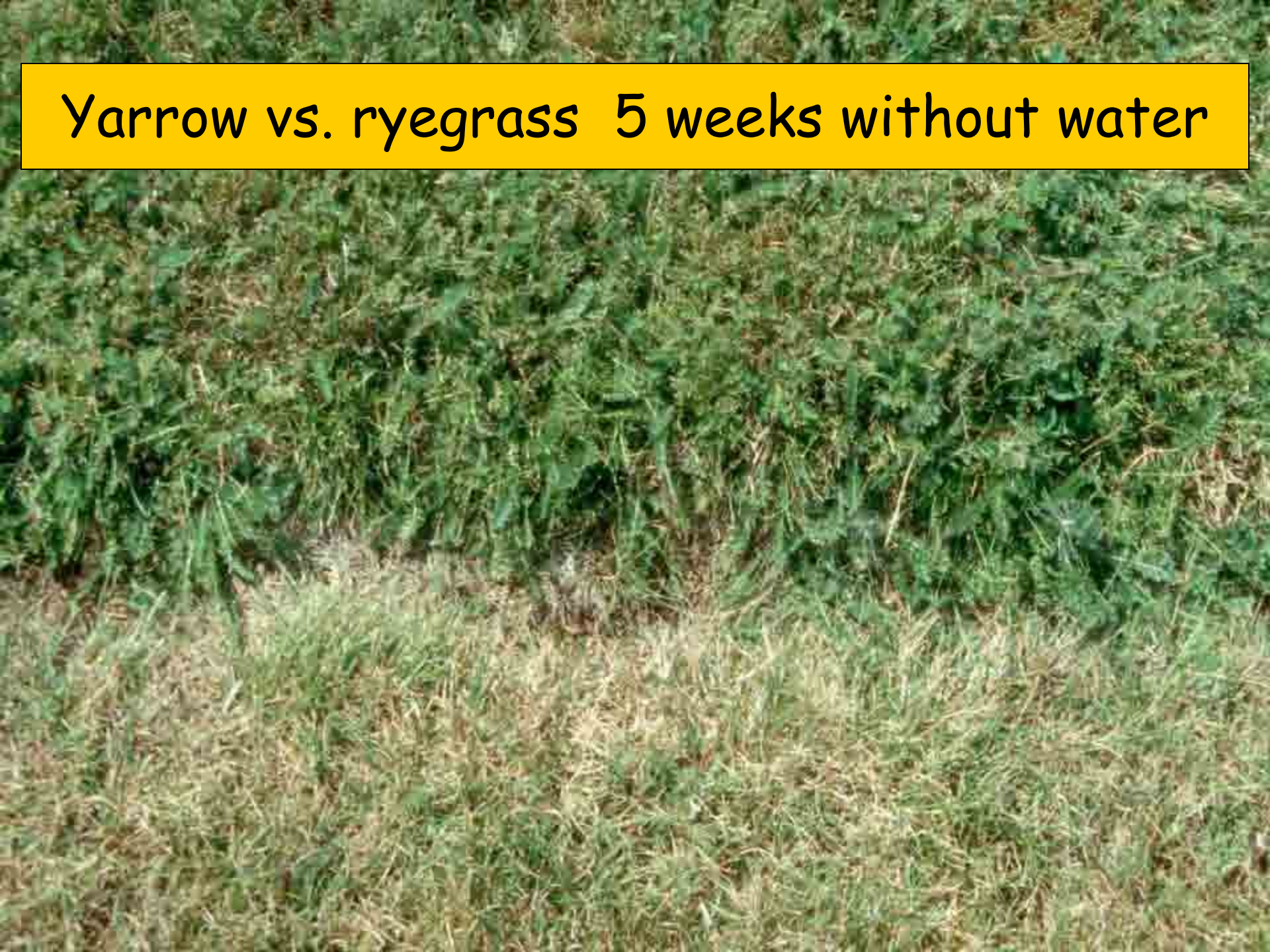
Looking for alternative materials

Mowable groundcovers

- *Cotoneaster dammeri*
- *Euonymous fortunei*
- *Juniperus conferta*
- *Juniperus horizontalis*
- *Vinca minor*

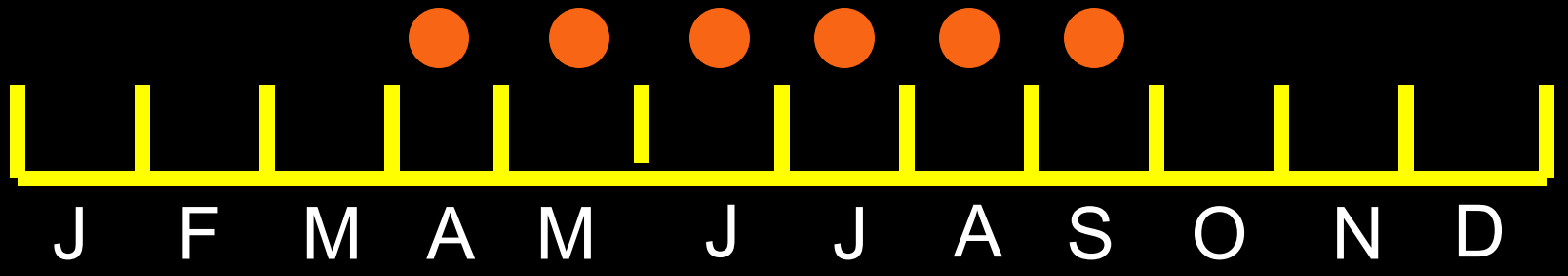
Mowed *Euonymous fortunei*

Grass + dicot mixtures can reduce irrigation needs


Yarrow vs. ryegrass 5 weeks without water

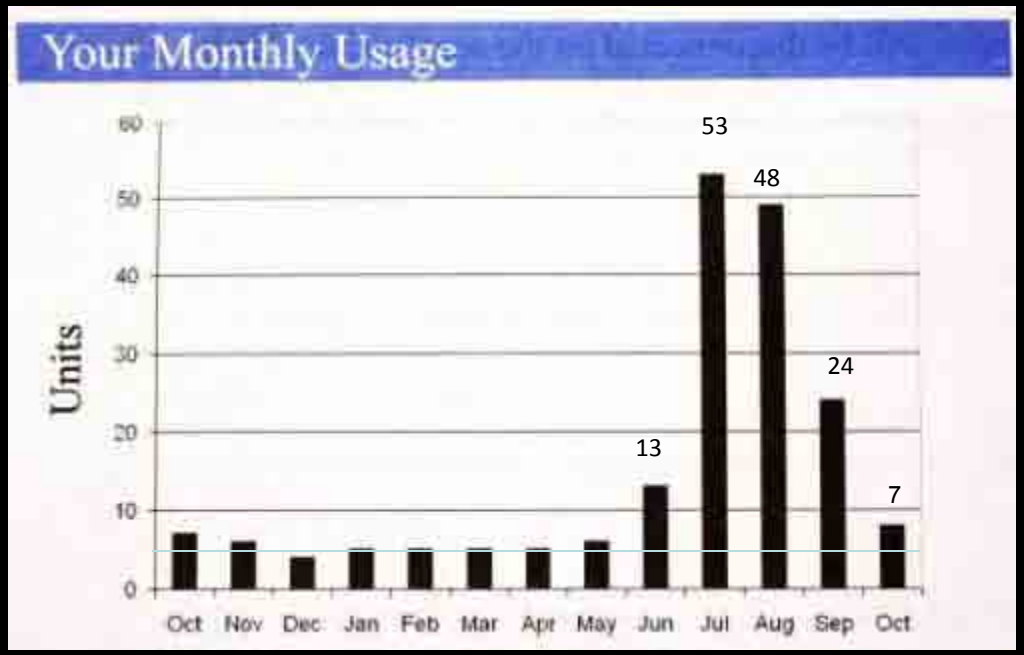
Shrinking the season

The Irrigation Water Management Society



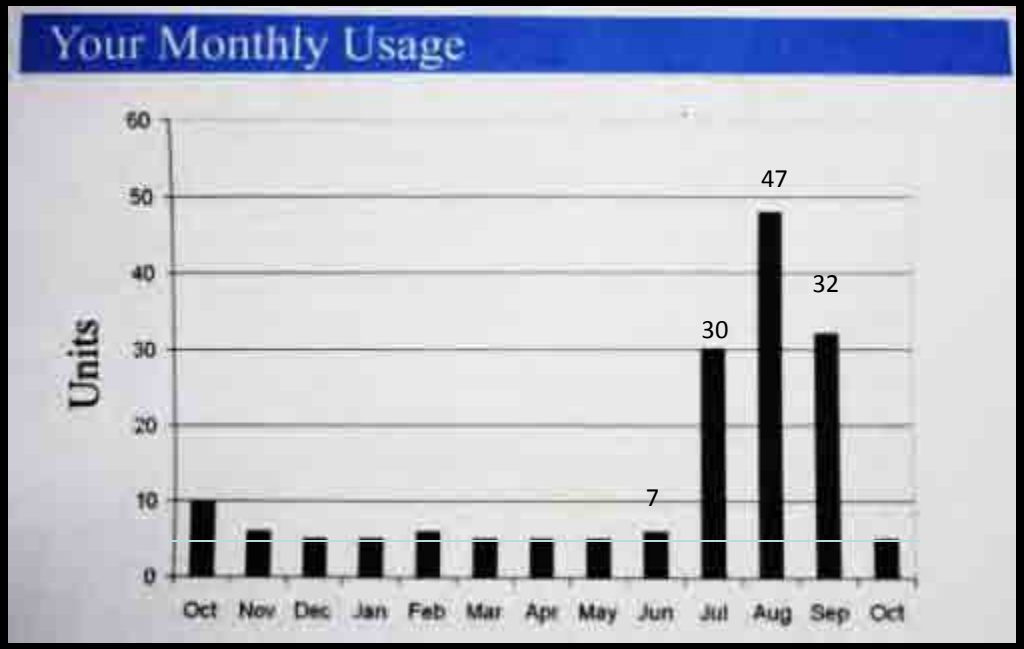
Typical irrigation season for Seattle

Corvallis, OR



2008: A dry year

Peak in July & August
Total irr. units = 140

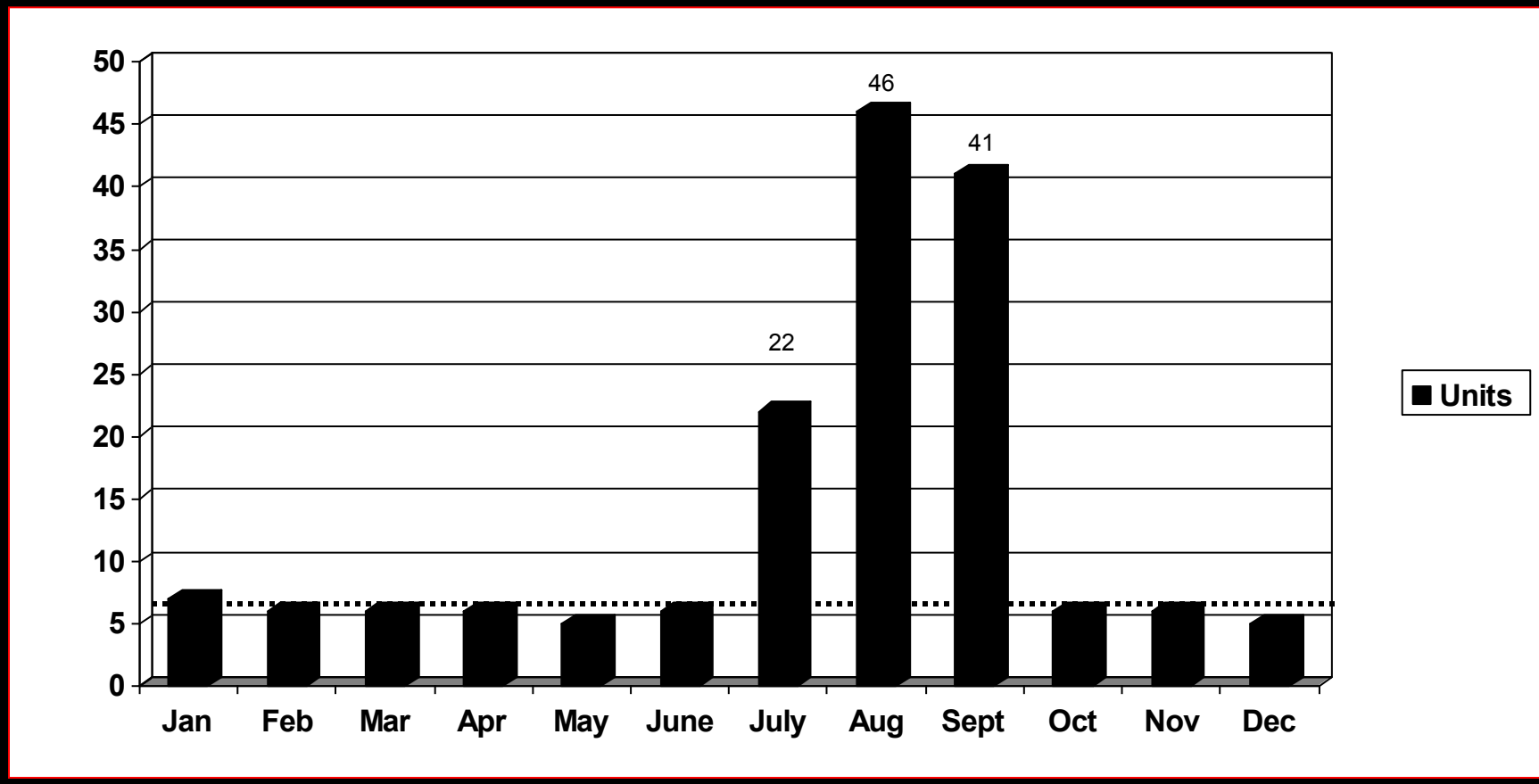


2010: A normal year

Peak in August
Total irr. units = 116

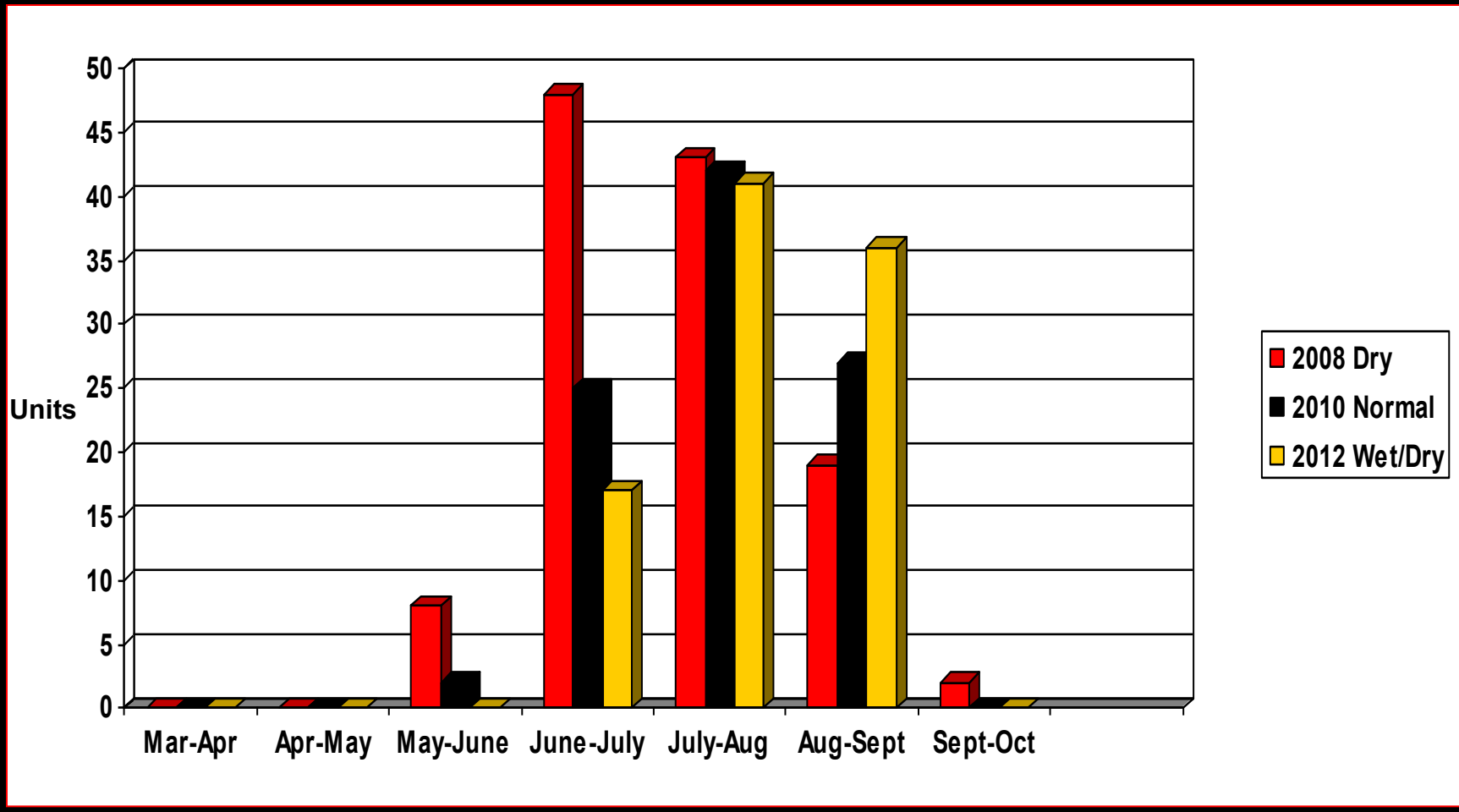
Half Acre Garden in Corvallis

2012: Wet spring and very dry late summer
Total irrigation units = 97



Half Acre Garden in Corvallis

Irrigation months for three different years



Shrinking the irrigation season

1. Wait as long as possible before starting irrigation in spring

2. Irrigate consistently in summer

3. Stop irrigation ASAP in fall (around labor day most years)

Optimize system performance


Adjust spacing as needed
Head to head is still the best standard


Heads need to be vertical
Adjust annually

Check and adjust arc


Don't mix head types


System designed for
Stream Rotors


Poorly adjusted
gear rotor substituted for
stream rotor

Broken head

No nozzle

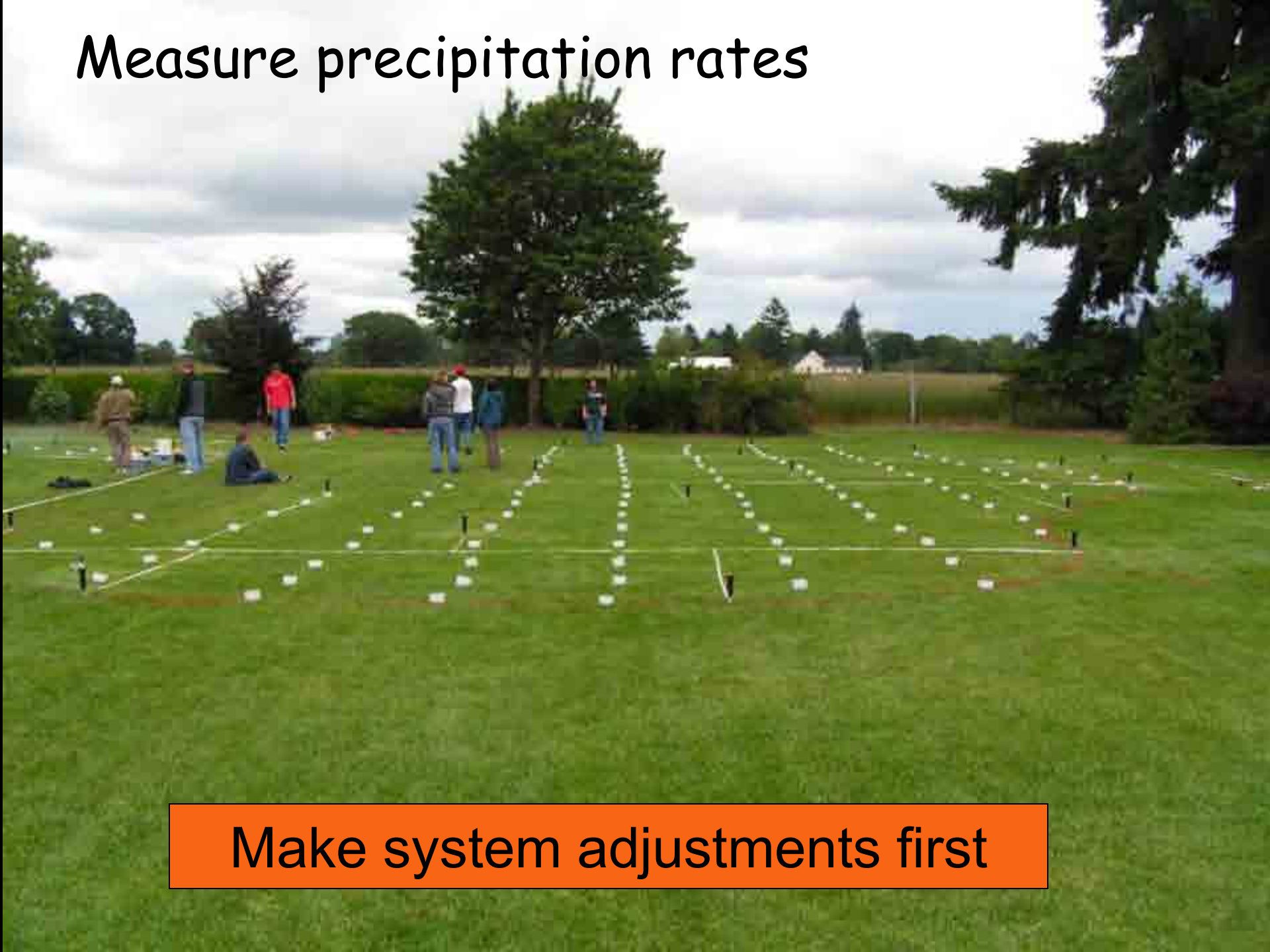

Replace lost heads

Zones should account for microclimate differences


Excess pressure is a problem with spray heads

Spray zones should have pressure regulators

Measure precipitation rates



Make system adjustments first

What about soil?


How can this be irrigated efficiently?

Coring
improves profile
consistency

Mowing height vs. irrigation needs?

Standard dogma:

Mow high to get deeper roots.
Deep roots require less water.

Perennial Ryegrass

Functional mowing heights

Erect growing grasses

Fine fescues	1.5" – 2.5"
Per. ryegrass	1.5" – 2.5"
Ky. bluegrass	1.5" – 2.5"
Tall fescue	2.0" – 3.0"

Lawns evolve from planted grasses to climax species

Colonial bentgrass false crowns at high heights

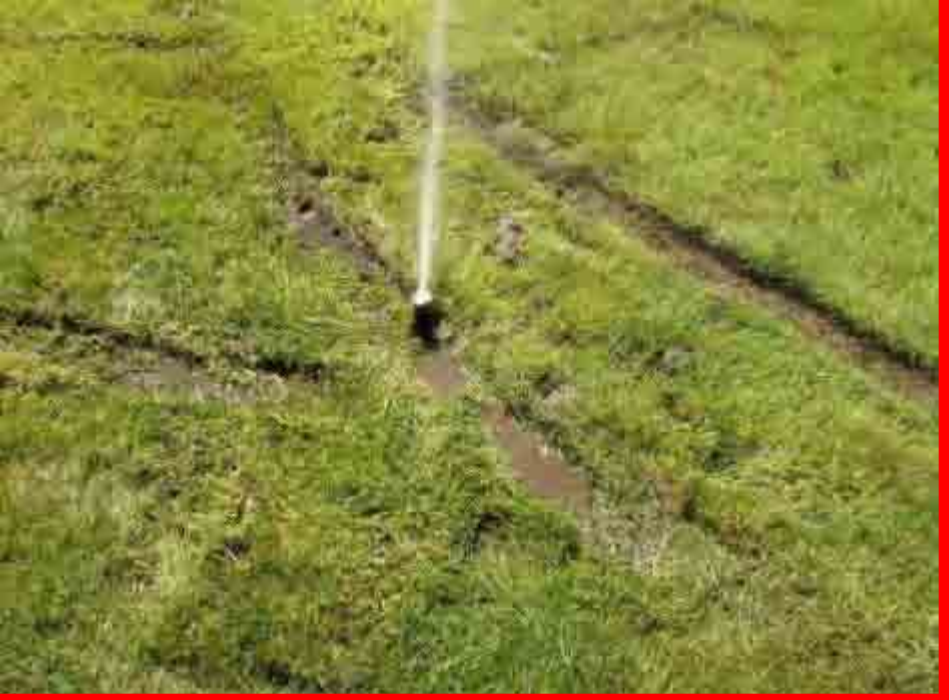
Bentgrass appearance mowed at 2.5”

Functional mowing heights

Prostrate growing grasses

Colonial bentgrass	1.0" – 2.0"
Rough bluegrass	1.0" – 2.0"
Annual bluegrass	1.0" – 2.0"
Climax lawns	**1.0" – 2.0"**

Irrigating



Poor irrigation management is everywhere

Recent irrigation research

North Carolina:

In ground systems used twice as much water as hose and sprinkler irrigation.

Homeowners all thought they used less water with in ground systems.

How do we measure water needs?

Lysimeters

- Measures maximum ET
- Primary reference for other measures

Lysimeter in use

Lysimeter ET rates of turfgrasses

Measured ET in inches/day

Grass	West. WA*	Colorado	Southwest CA
Tall Fescue	0.15”	----	0.42”
Annual Bluegrass	0.14”	----	------
Per. Ryegrass	0.14”	----	0.26”
Kentucky Bluegrass	0.12”	0.20”	------
Colonial Bentgrass	0.12”	----	------
Cr. Red Fescue	0.11”	----	------
Chewing's Fescue	0.09”	----	------
Hard Fescue	0.08”	----	------

* Represent mid-summer ET rates

Weekly ET for Perennial Ryegrass:

.14" per day X 7 days per week =

0.98" or about 1" per week

This represents
the mid-summer weekly ET
in Puyallup, WA.

Current technology for estimating water use

Basic Irrigation Questions

1. How much water is needed?

2. How often should it be applied?
   - > Deep and infrequent
   - > Light and frequent

Colorado State University research

The most efficient frequency*

Every 2 days @ 75% MWU
or
Every 4 days @ 85% MWU
or
Every 7 days @ 106% MWU

* Based on maintaining quality rating of 7

How often to irrigate?

In ground systems

Goal:

2-3 times per week

Reality:

- More than once per week
- Less than 7 times per week

Summary

- Reduce irrigation by design
- Prioritize areas
- Use alternative plant materials
- Tune and upgrade systems
- Shrink irrigation season
- Upgrade control systems