# Landscape Irrigation Efficiency

Spokane River Forum November 15, 2017

# Background

- Approximately 60-75% of the water we use annually over the SVRP is applied to landscapes.
- Through education and planning, it is estimated that landscapes can be well maintained using 20-50% less water.

#### **Distribution Uniformity**

- Distribution Uniformity (DU)
  - A key indicator of the performance of an irrigation system.
  - DU measures how uniformly an irrigation system applies water to the landscape.
- The data from catch can trials are is used to calculate the distribution uniformity for an irrigation system.
- DU is calculated as the ratio of the average irrigation volume applied to the driest quarter of the landscape (or grid) and the average volume applied across the whole landscape (or grid).







#### Calculate DU

#### EXAMPLE

• Can Readings (mm):

25	15	20	10	15
20	25	28	22	18
17	10	14	7	18
19	14	12	9	18
16	15	23	13	22

- <u>Step 1</u>: Order the can results from the smallest number to the largest number: 7, 9, 10, 10, 12, 13, 14, 14, 15, 15, 15, 16, 17, 18, 18, 18, 19, 20, 20, 22, 22, 23, 25, 25 and 28.
- <u>Step 2</u>: Take the lowest quarter (in bold) and find their average. Then find the average of all the can readings. The average of these numbers is: (7+9+10+10+12+13)/6 = 10.2. The average of all the can readings is 17.0.
- <u>Step 3</u>: Calculate DU using the equation. DU = 10.2 / 17.0 = 0.6 or 60%.

### Importance of Distribution Uniformity

DU %	Water the plant needs	÷	DU Decimal	=	Amount of water you need to keep the dry areas green
30%	1 inch	÷	0.3	=	3.33 inches
50%	1 inch	÷	0.5	=	2.00 inches
70%	1 inch	÷	0.7	=	1.42 inches

Excellent	Good	Poor
(Achievable)	(Expected)	(Common)
75%	60%	50%

### Efficiency

- Efficiency of various irrigation methods:
  - Subsurface drip 90%
  - Surface drip (micro) irrigation 85%
  - Large rotors 70%
  - Small rotors 65%
  - Spray heads 50%
- Matched Precipitation Rate (MPR)
  - Example: MP Rotator 70%

#### Matched Head Precipitation

- Matched precipitation heads allow full circle, half circle and quarter circle sprinkler heads to be used together to provide a uniform coverage of an irrigated area (inproving DU).
- The flow rates of the nozzles are proportional to the degree of arc covered.

 For example, the flow rate of a quarter circle spray is equal to one-quarter that of a full circle spray. The flow rate of a half-circle spray is equal to one-half that of a full circle spray.

• Heads must spray head to head.

#### Matched Precipitation Rate



- Proportionate GPM A = 1 gpm B = 2 gpm C = 2 gpm
- D = 4 gpm

Therefore, each head is applying 1 gpm into the area within the spacing.



Matched precipitation ... any arc ... any radius.

The flow of the MP Rotator changes proportionally to the area being covered when the arc and/or the radius are changed. This maintains the original precipitation rate.







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Country Vista @ Lib Lk Rd
 Liberty Lake

Google earth



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Irrigation Inefficiencies Write a description for your map. Legend

Liberty Lake Sewer and Water District #1

100 ft

2011

Google earth

- Audited in June 2005. System efficiency (DU) was 44%
- Implemented landscape measures. Reduced water by 36% the following year.





## Proposal

- <u>Problem</u>: Irrigation systems are the only component of a developed property that have no standards, permits, or inspections.
- <u>Proposal</u>: Develop a regional Model Efficient Irrigation Design Standard.
- This regional model can be used by individual municipalities to implement irrigation design standards.
- Legislation?

### Model Examples

- California Department of Water Resources Model
   Water Efficient Landscape Ordinance
- Arizona Department of Water Resources Tucson Active Management Area
  - Adapted from the California State Model Water Efficient Landscape Ordinance to meet the needs of the Tucson Metropolitan Area
- Water-Efficient Landscape Design A model landscape ordinance for Colorado's communities utilizing a water conservation-oriented planning approach
- Standards for Landscape Irrigation in Florida



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