

Balancing Resources in the City of Spokane



A Quick Review

- ❖ Humble Beginning
- ❖ Surface Water Source
- ❖ Distributions System
- ❖ Developing a groundwater source

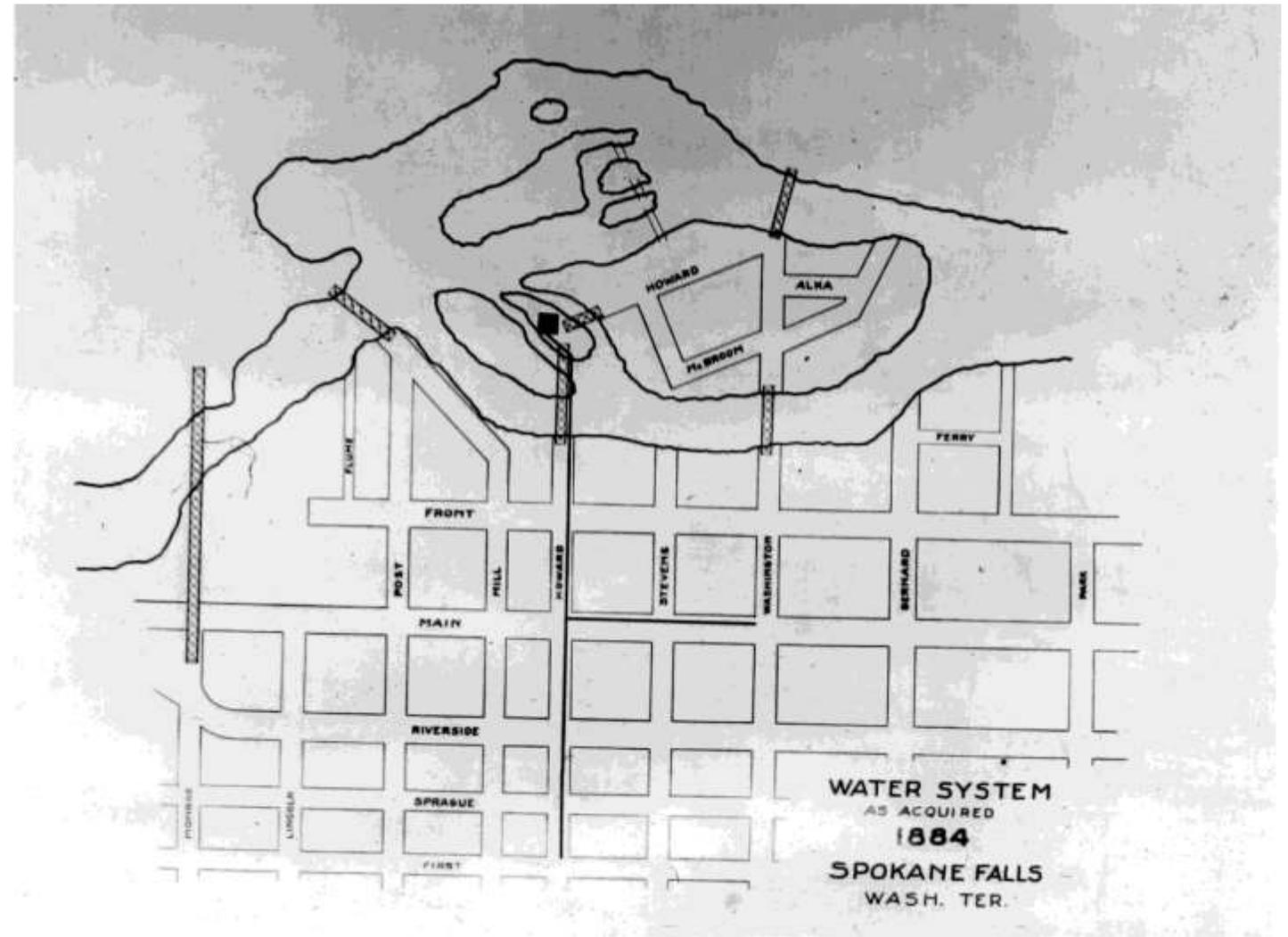
Wooden Water Main Delivery

(Circa 1883)



The water system as acquired in 1884

- Just over 1 mile of distribution main
- No storage facility
- Two water driven 40 hp pumps
- All the water was drawn from the Spokane River with no treatment.
- In 1888 Due to water quality issues a new point was established “upriver”



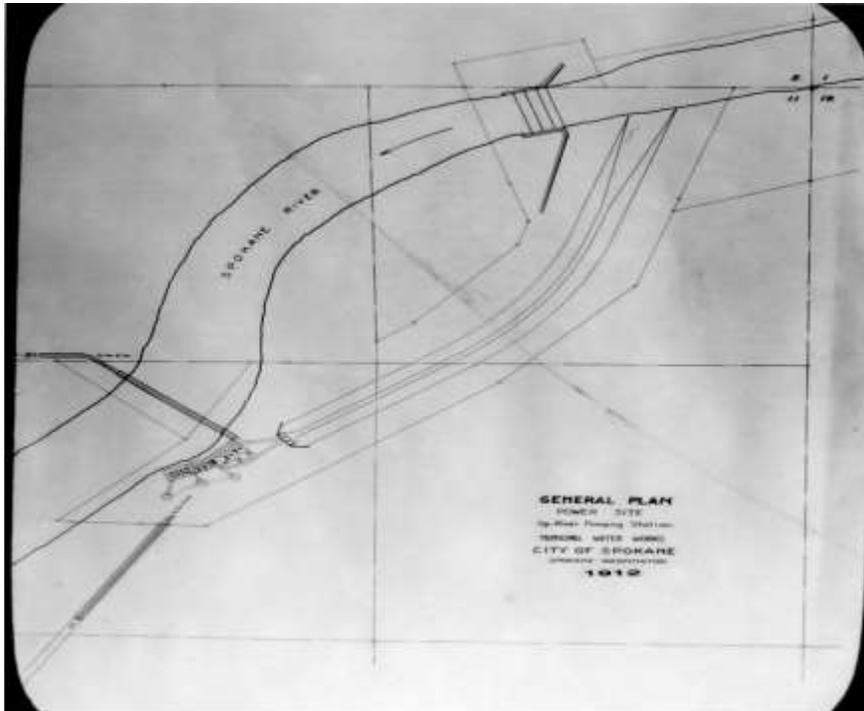
Timber Crib Dam

(Circa 1894)



Upriver Facility

Timber Crib Dam General Plan



Hydraulically Driven Pumps



Water Quality Changes the Plan

The move to ground water in 1907



ONE OF THE THREE SOURCES OF SPOKANE'S WATER SUPPLY.
Looking Down Into Well No. 2 Before Well House Was Erected, Showing Suction Pipes and Foot-Valves. Pebbles Shown are Seen Through 14 Feet of Water.

84 MGD



WELL NO. 1
CONSTRUCTED 1907
FLOOR ELEVATION 1919.08
TOTAL DEPTH OF WELL 40'
DIAMETER OF WELL 28'
DEPTH OF WATER 20'
CONSTANT TEMPERATURE 48°F
DRAWDOWN 44" 56 MGD
DIAMETER SUCTION PIPE 32"

1995 3 6



American Water Works Association
Pacific Northwest Section

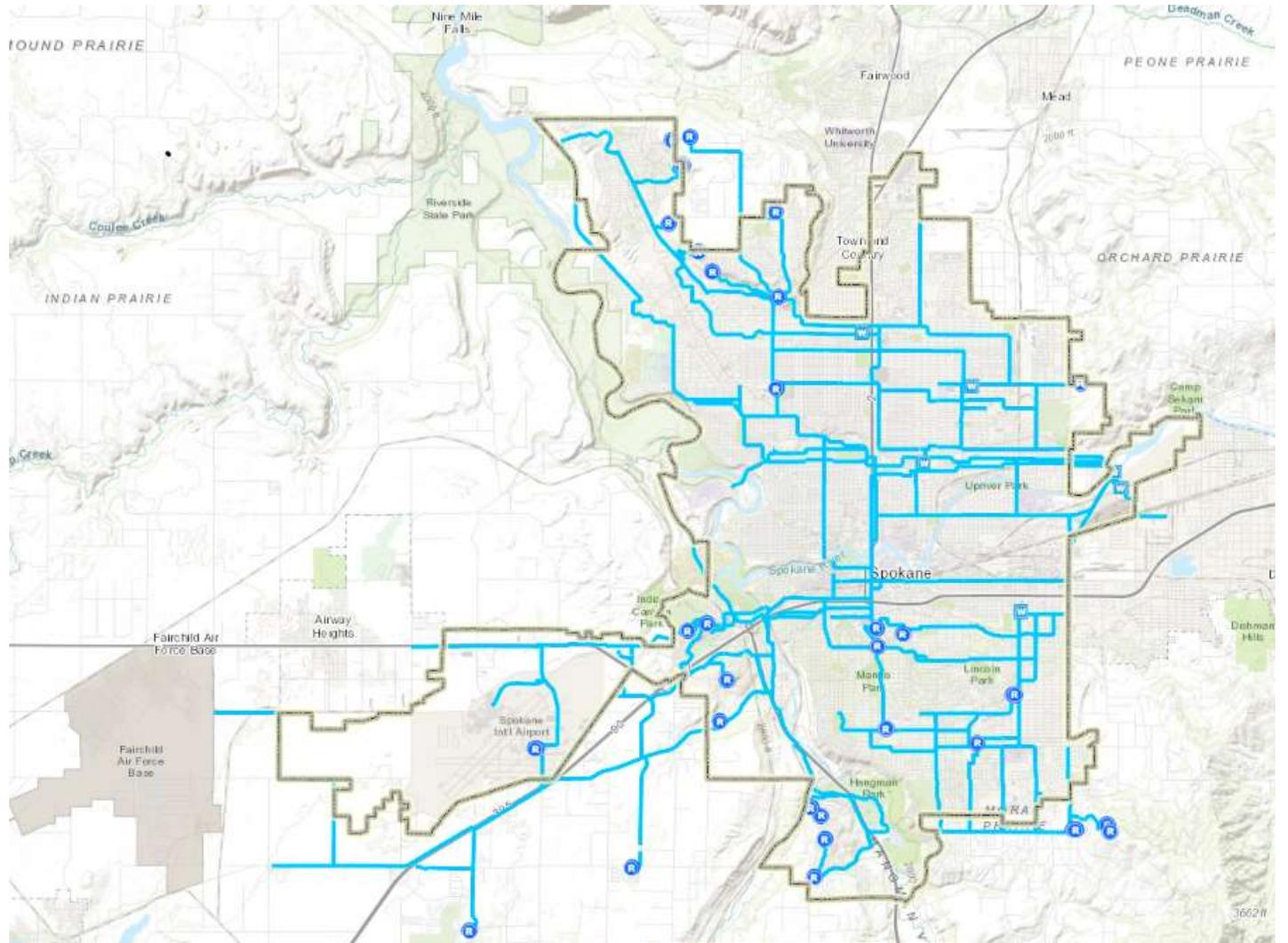
Upriver Today

280 MGD



The Water System Today

- ❖ *7 Well Sites*
- ❖ *27 Well Pumps*
- ❖ *26 Booster Stations*
- ❖ *24 Pressure Zones*
- ❖ *1,100 Miles of Pipe*
- ❖ *34 Storage Facilities/103 million in storage*
- ❖ *80,000 Service connections*
- ❖ *30 MGD Winter*
- ❖ *180 MGD Summer*
- ❖ *22 Billion Gallon Annually*



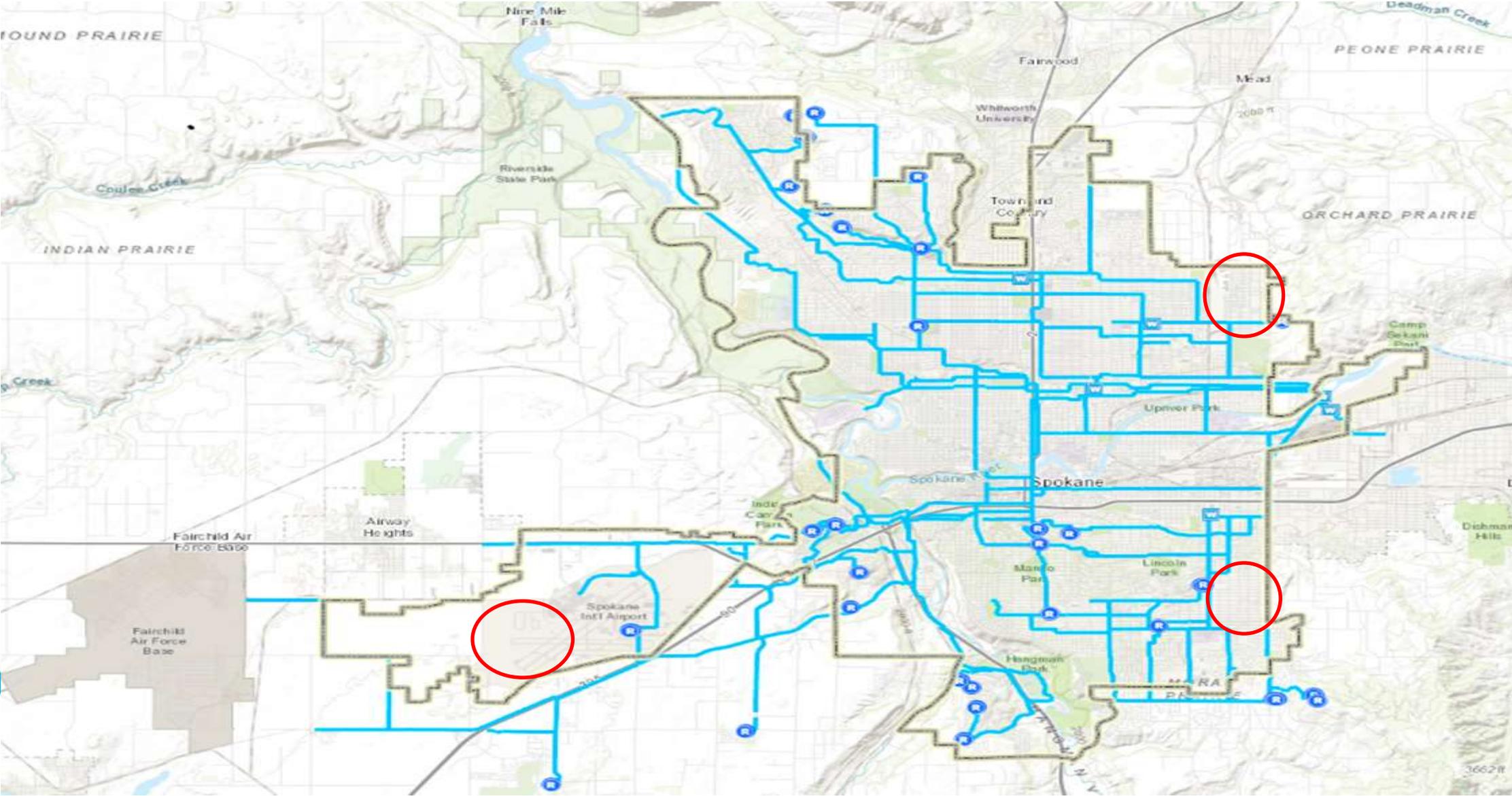
The Status Quo

- Planning and Vision
 - The work of those before us
 - Expanding the water system
 - Supporting economic growth

What Had Been Missing

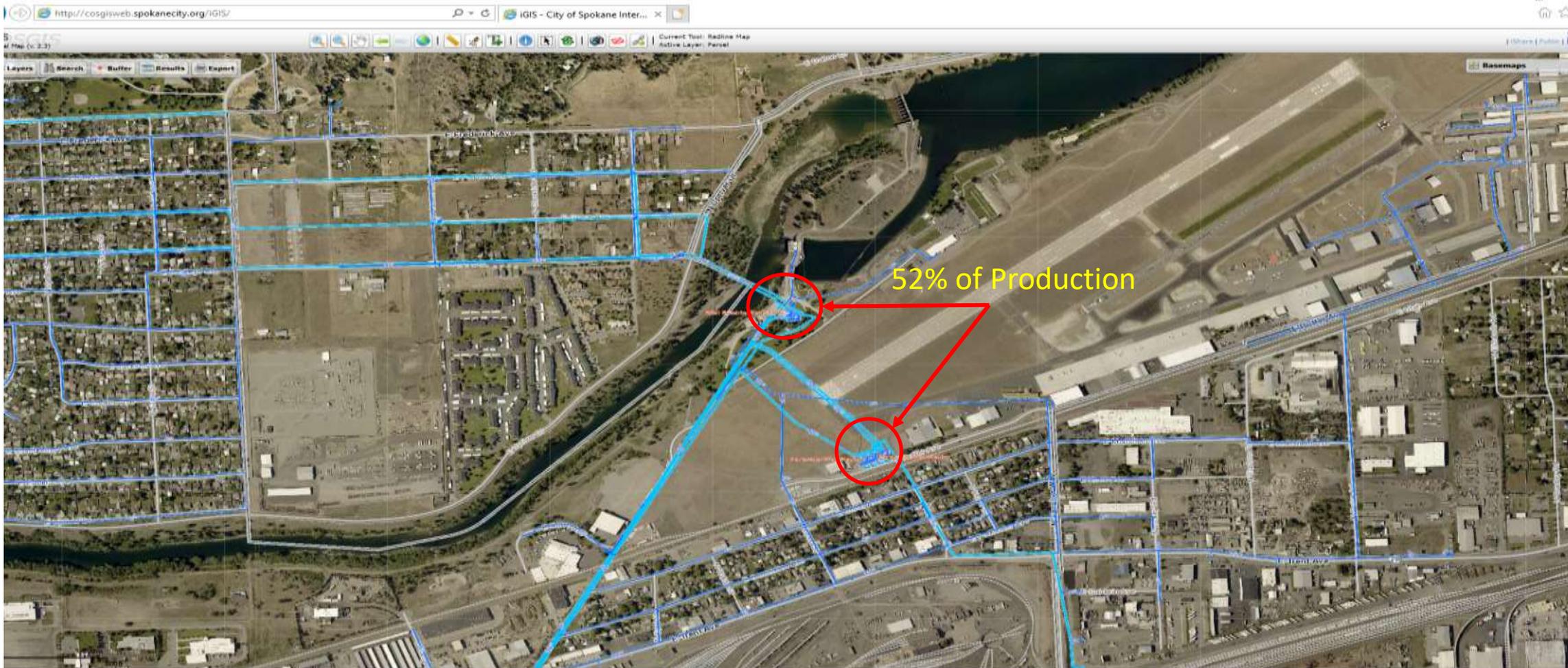
- Distribution Maintenance
- Critical Analysis
- Facility Maintenance
- Long Range Planning and Funding
- Targeted Growth Areas
- Managing Resources

Targeted Growth Areas

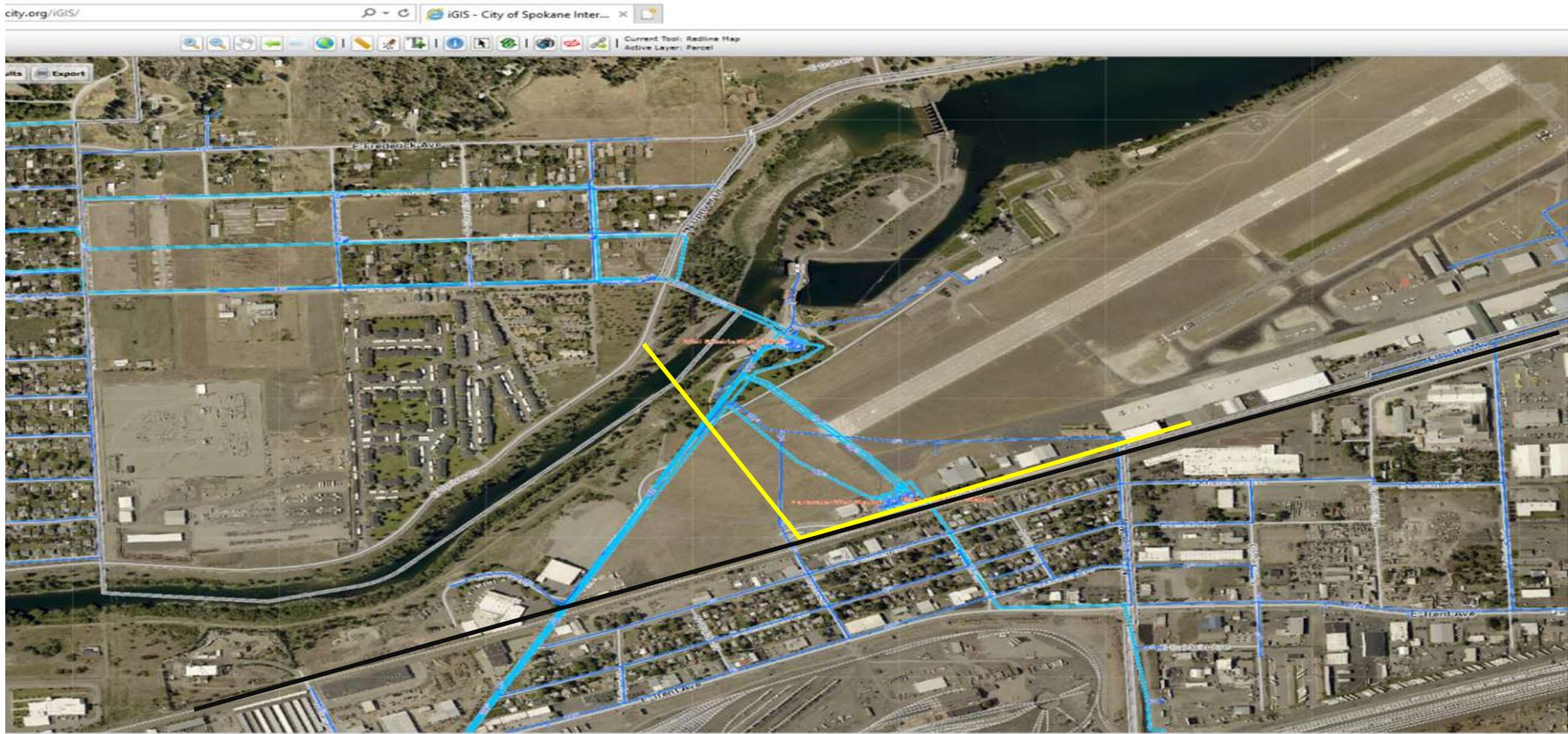


Change in Approach (Getting Your House in Order)

- Identify and own the problem
 - DSL near 20%
 - Run to failure mentality
 - Lack of capacity in some pressure systems
 - 50% turnover in staff (Grey Tsunami)
 - More efficient means of analysis
 - Climate variability
 - Balancing the resources - staff, capital and natural

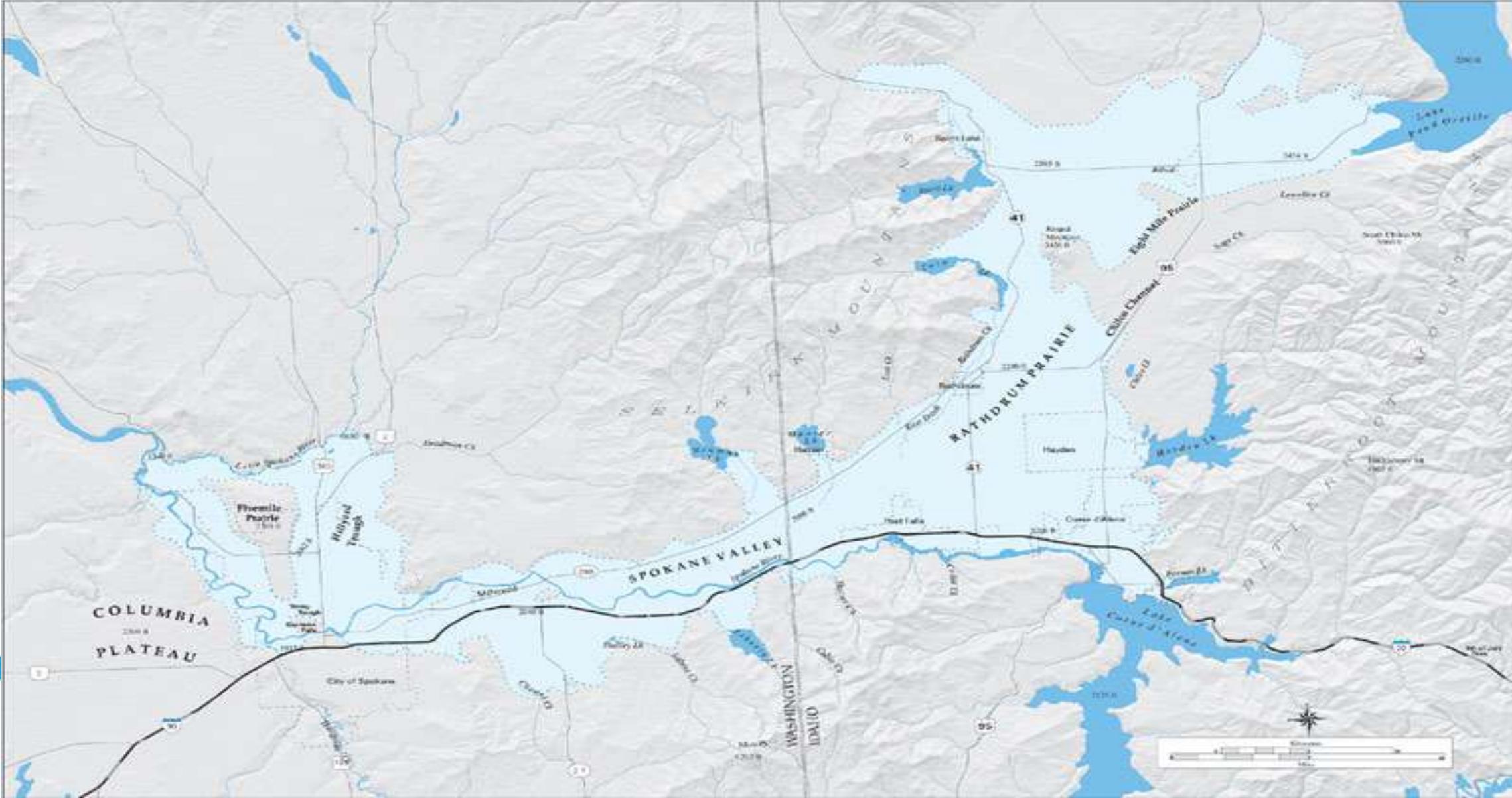


Proximity to the River & Felts Field



Proximity to Potential Problems

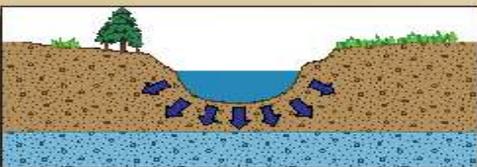
Spokane Valley Rathdrum Prairie Aquifer



Gaining and Losing Reaches



Low Flow Seepage Run: Spokane River Aquifer Interchange August 26-31, 2005



Losing Reach

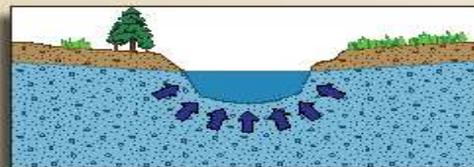
Where the water table is below the bed of the river, water percolates through the gravelly bed and downward into the Aquifer. In these locations the river is losing water, the typical condition for the Spokane River in Idaho and into Washington to Flora Road.

Aquifer Recharge and Discharge

River Streamflow Gain = Aquifer Discharge
 River Streamflow Loss = Aquifer Recharge

Aquifer Facts

For almost its entire length, the Spokane River interacts dynamically with the Aquifer. Measurements of the River-Aquifer interactions have only been performed during low streamflow conditions in late summer. When the streamflow in the River is greater than 10,000 cubic feet per second, gaining and losing reach trends are hard to determine.



Gaining Reach

Where the water table is higher than the river bed, the Aquifer loses water through springs and seeps and adds volume to the river. In these areas the reach of the river is gaining. The reach between Sullivan Road and the Centennial Trail Bridge is a gaining reach.

Aquifer-River Interchange

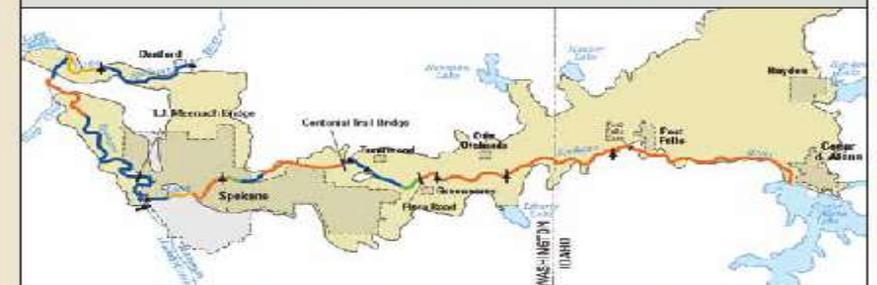
The two maps on this page provide similar views of Aquifer-River interactions. The map at left shows the information collected during a 5-day investigation of streamflow in August 2005. The map below provides an estimate of the annual reach interactions from 2004 data, and it compares well to the map at left. Study of Aquifer-River interactions has generally occurred during late summer low streamflow conditions, and these interactions during other periods of the year are less well known.



Losing reach of the Spokane River near Greenacres, August 1, 2003

River Reaches: Loss and Gain

A strong relationship between the Aquifer and the Spokane River is present throughout the river's length, from Lake Coeur d'Alene to the confluence with the Little Spokane River. Although the Aquifer-River interchange is complex, studies of the river have identified four types of interaction: gaining, losing, transitional and minimal. The average annual reach interactions based on 2004 data are shown below.



- Losing Reach:** the river loses water to the Aquifer
- Gaining Reach:** the river gains water from the Aquifer
- Transitional Reach:** changing condition between gain/lose
- Minimal Interaction:** the river neither gains nor loses

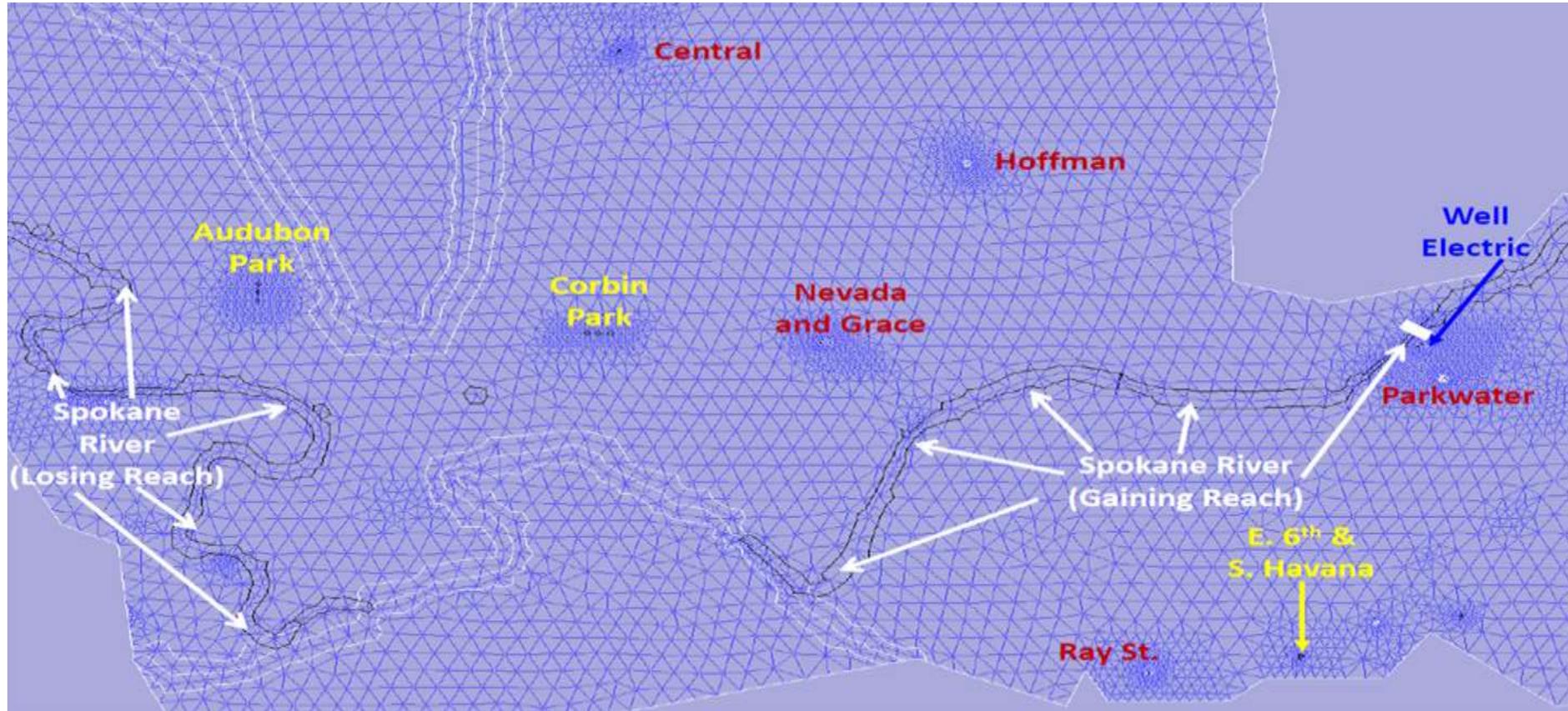
One Extreme to the Other



System, Aquifer and Community Needs



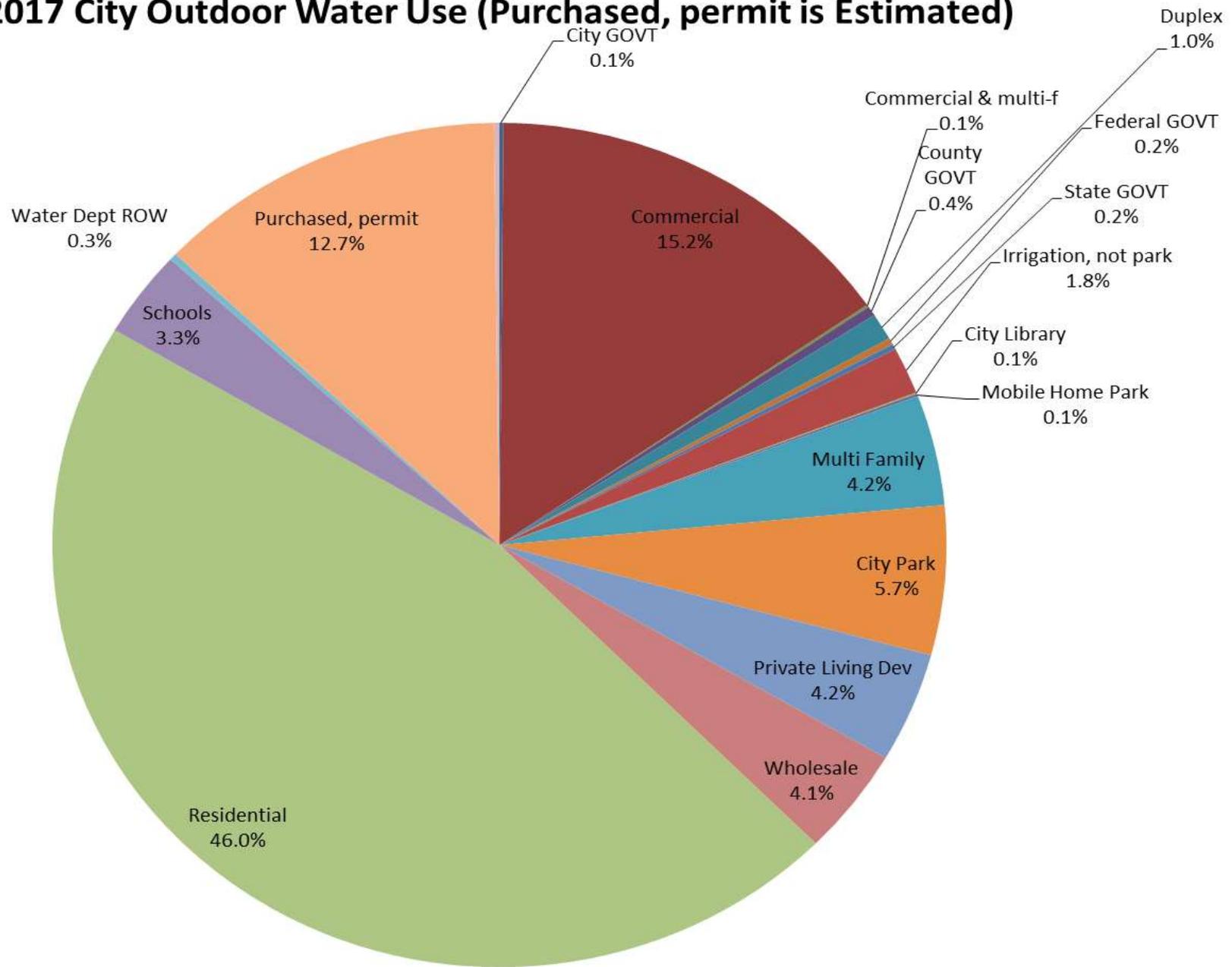
New Well Site Investigation

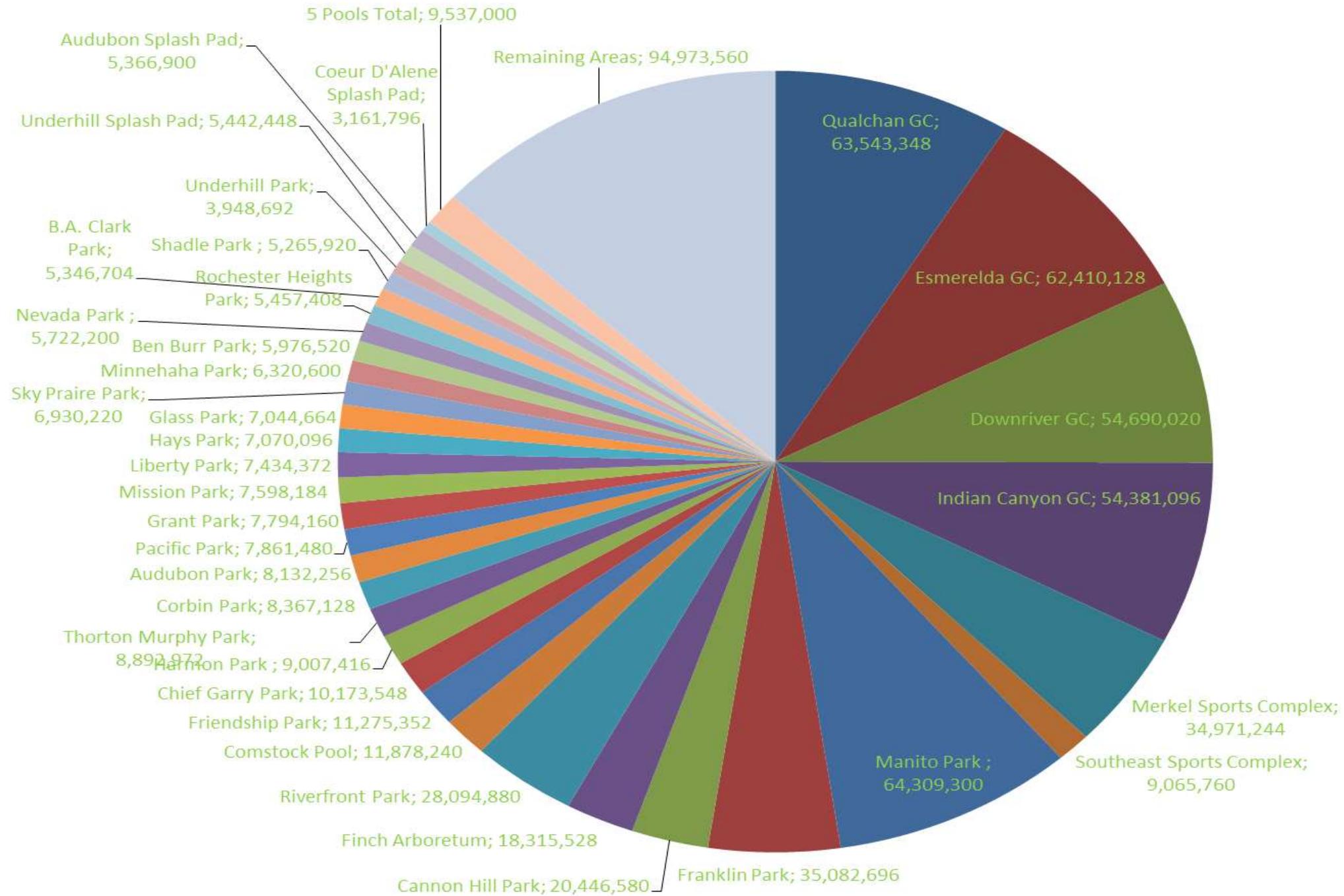


Reduce Production Through Conservation

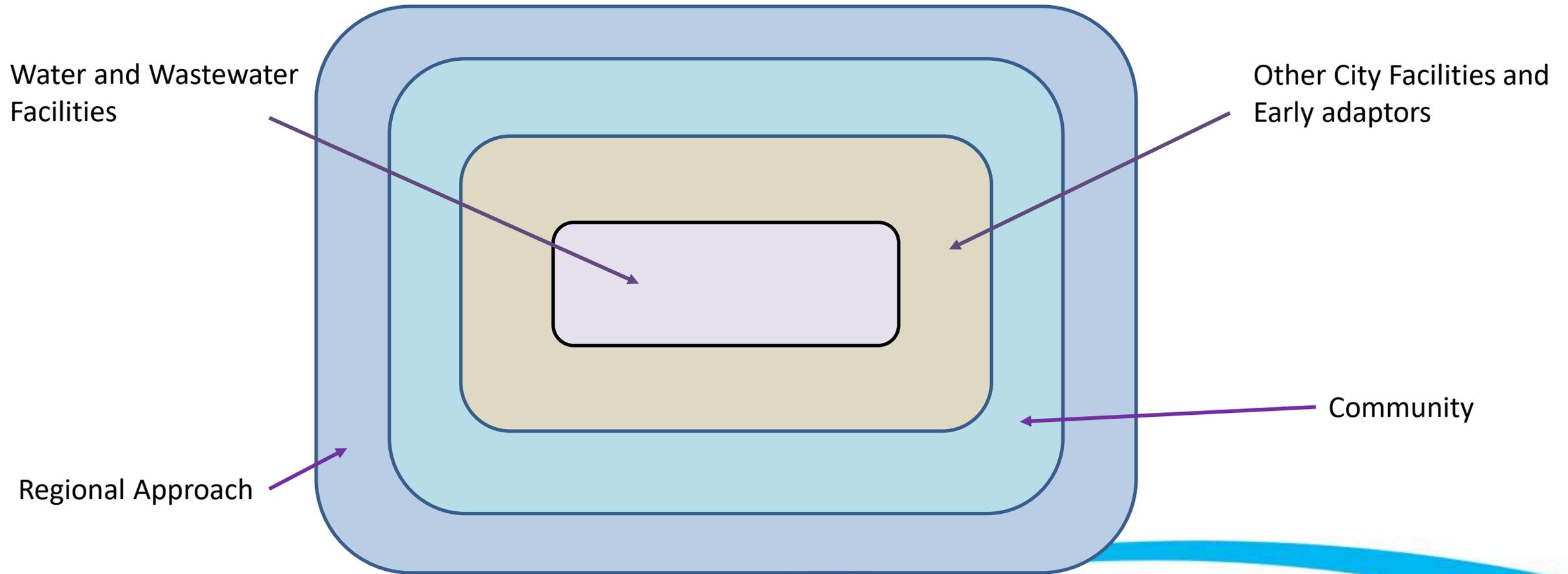


2017 City Outdoor Water Use (Purchased, permit is Estimated)





Expanding the Sphere of Influence



Thank You

GO DAWGS