



WATER RESOURCES
& CONSERVATION

Citizens Water Advisory Group
September 12, 2020

Flagstaff's Water Management Program: Moving Towards a Sustainable Future

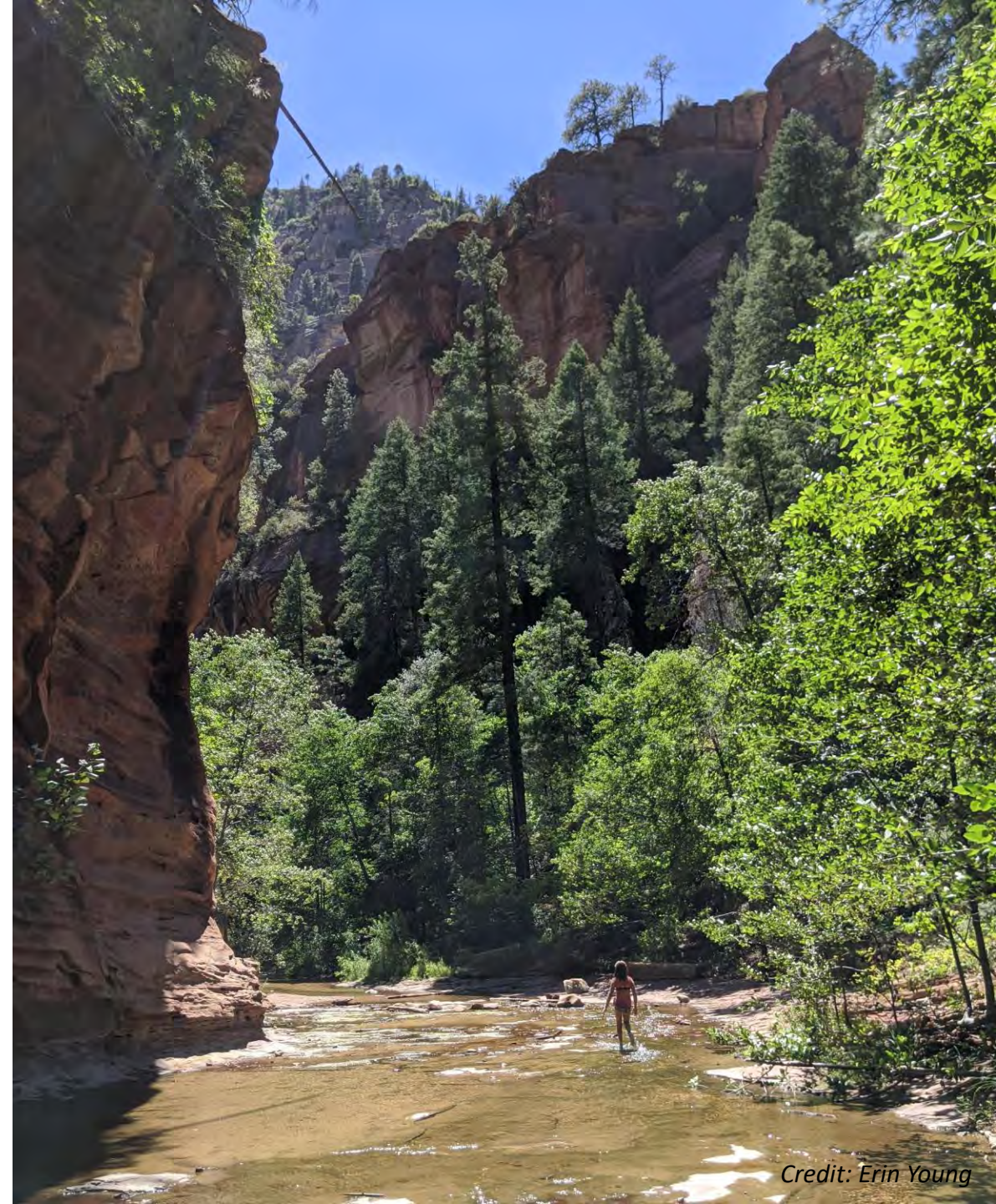
About me

- Minnesota to Arizona in 1994
- ASU, B.S. Geology 2000
- NAU, M.S. Geology 2006
- Groundwater consulting 2000-2013
- Water Resource Manager, COF, 2013-current

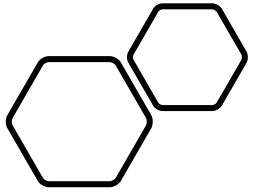


Battle Lake, MN

Credit: Orion Magazine, Renee Gallant, June 2013



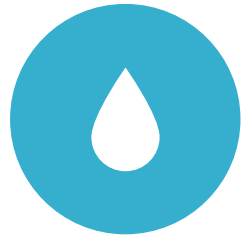
Credit: Erin Young



Talk Outline



WHERE DOES
FLAGSTAFF'S WATER
COME FROM?



WATER SUPPLY
MANAGEMENT
HISTORY



ACCOMPLISHMENTS
IN CONSERVATION



ADWR DESIGNATION
OF ADEQUATE WATER
SUPPLY



NEXT STEPS

Water Supply History – Surface Water

- Old Town Spring, O’Neill Spring (Kachina Village) 1850’s
- Inner Basin Springs ~1890
- Lower Lake Mary Reservoir ~1905
- Upper Lake Mary Reservoir 1941



Credit: Jon Mason, USGS



CONSTRUCTION
workers mobilize
horse and install in
trenches, in order
to construct the 13-mile
to a 3 million gallon
An 8-inch cast iron
then continued into
providing the railroad
00 service connections
water. Arizona
Historical Society, Flagstaff
S. 0338 00005]

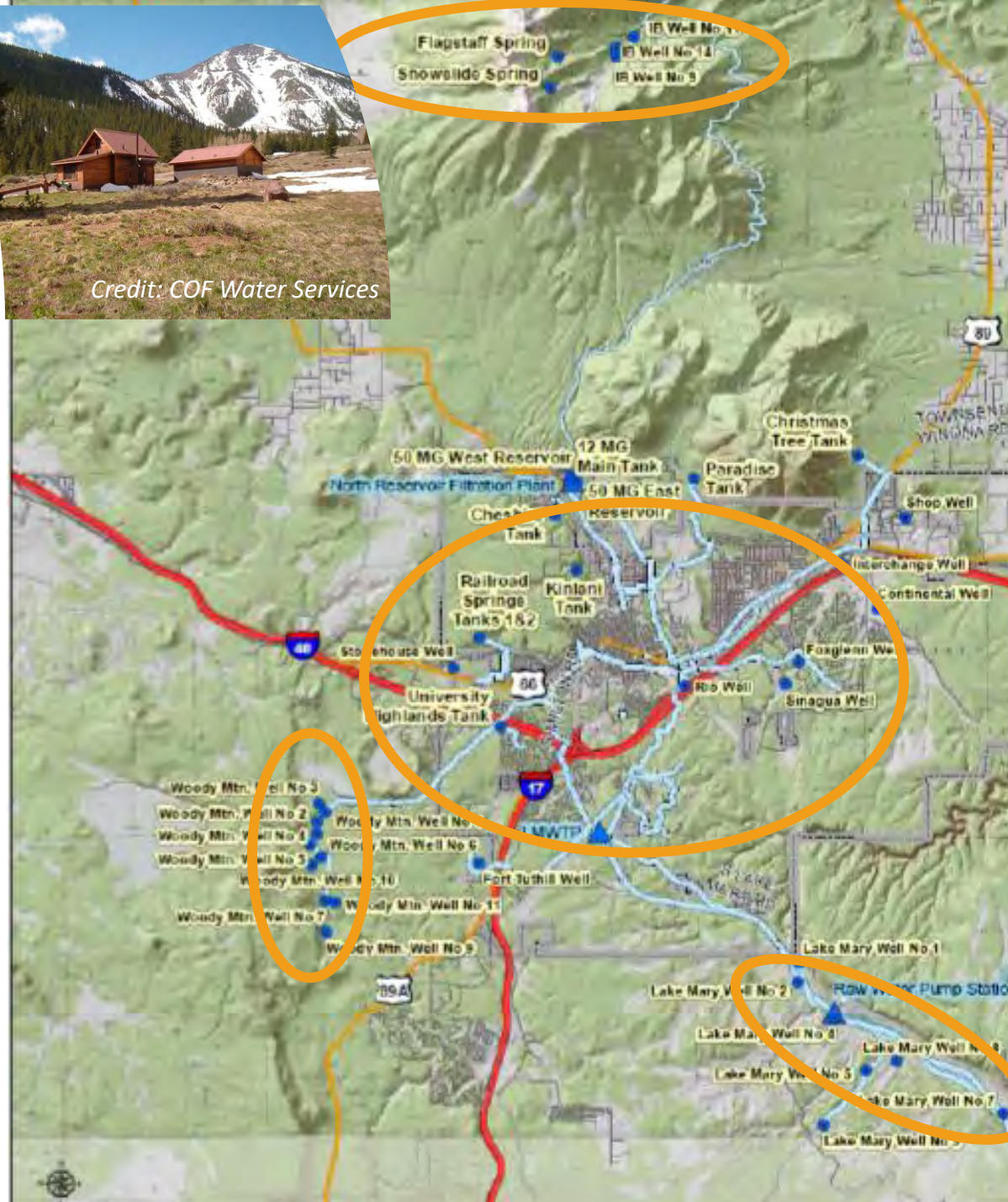
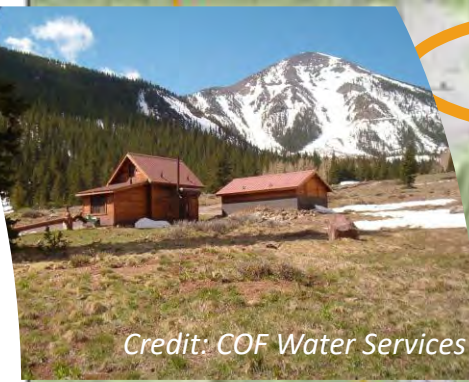
**BOOMING
BUSINESS**

Credit: COF Water Services

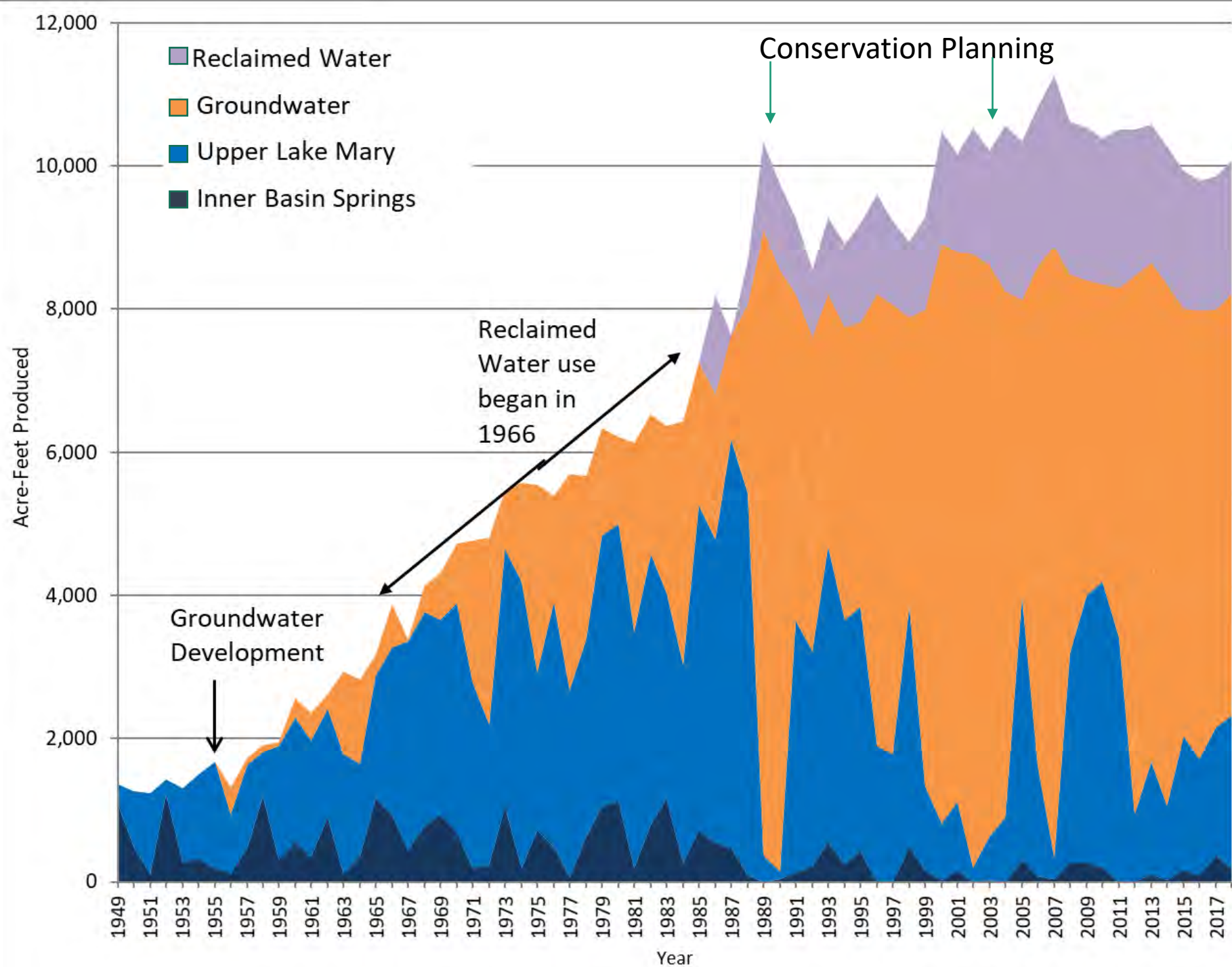


Water Supply History – Groundwater & Reclaimed Water

- Woody Mountain Wellfield 1954
- Lake Mary Wellfield 1962
- Reclaimed Water to Continental Country Club 1966
- Inner Basin Wellfield 1968
- Reclaimed Water System 1993
- Inner City Well 1997

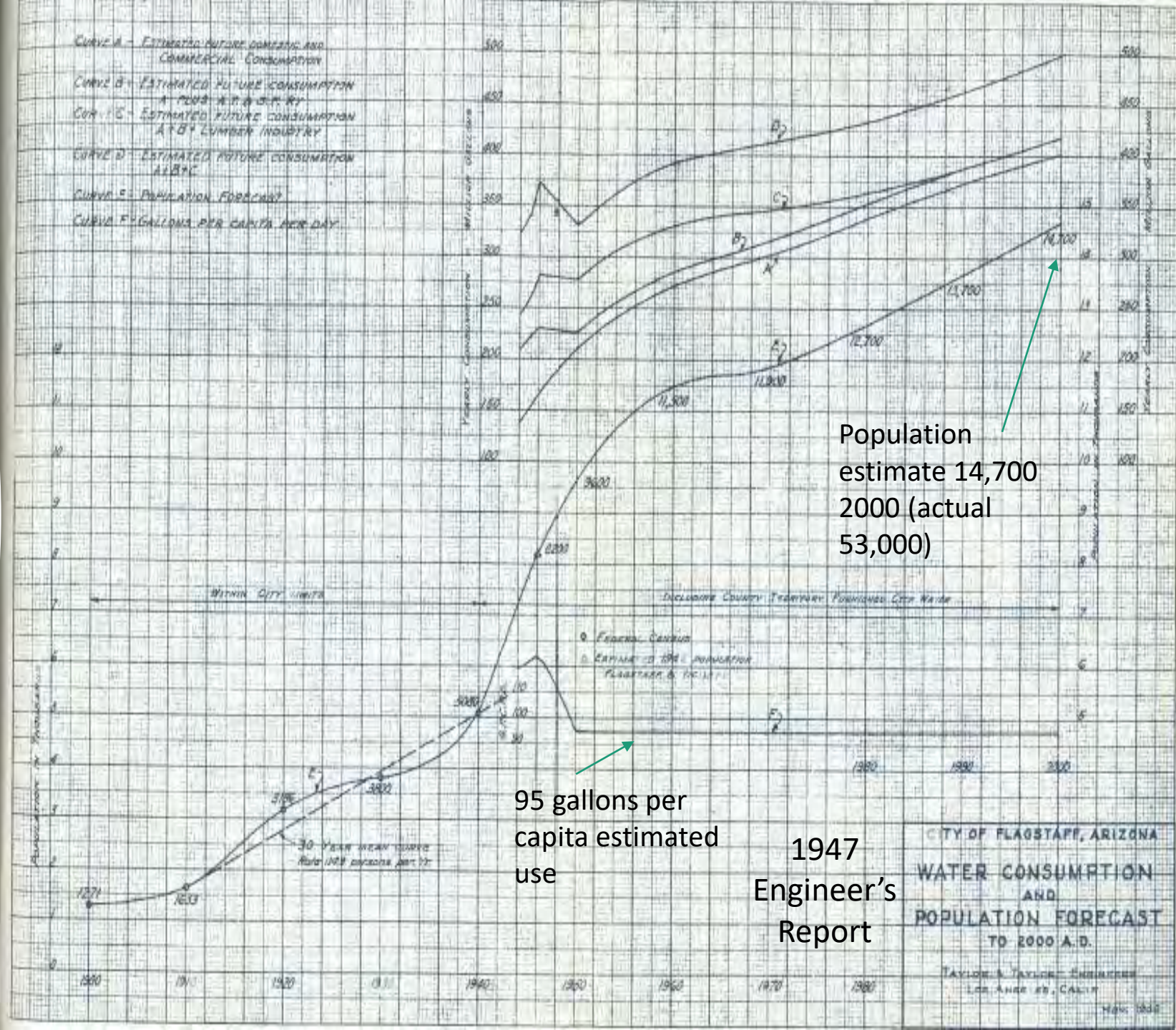


NAME	DATE OF COMPLETION
Woody Mtn Well #1	Dec-54
Woody Mtn Well #2	Jul-56
Woody Mtn Well #3	Oct-57
Woody Mtn Well #4	Nov-57
Lake Mary Well #1	Oct-62
Woody Mtn Well #5	Jun-63
Lake Mary Well #2	Dec-64
Lake Mary Well #3	Sep-65
Woody Mtn Well #6	Mar-68
Inner Basin Well #9	Aug-68
Inner Basin Well #14	Aug-70
Inner Basin Well #11	Aug-71
Lake Mary Well #4	Jan-72
Lake Mary Well #5	Dec-75
Woody Mtn Well #7	Apr-78
Lake Mary Well #7	Dec-78
Lake Mary WTP #8	Mar-82
Woody Mtn Well #9	Nov-85
Lake Mary Well #9	Sep-91
Woody Mtn Well #10	Mar-96
Foxglenn Well (EPDS 4)	Jan-97
Continental Well-2 (EPDS 5)	Feb-97
Woody Mtn Well #11	Jun-98
Interchange Well (EPDS 6)	Nov-02
Shop Well (EPDS 7)	Dec-02
Rio Well (EPDS 8)	Nov-03
Ft. Tuthill Well (EPDS 9)	Jan-08
Sinagua Well (EPDS 4)	May-08
Stonehouse Well	Apr-09

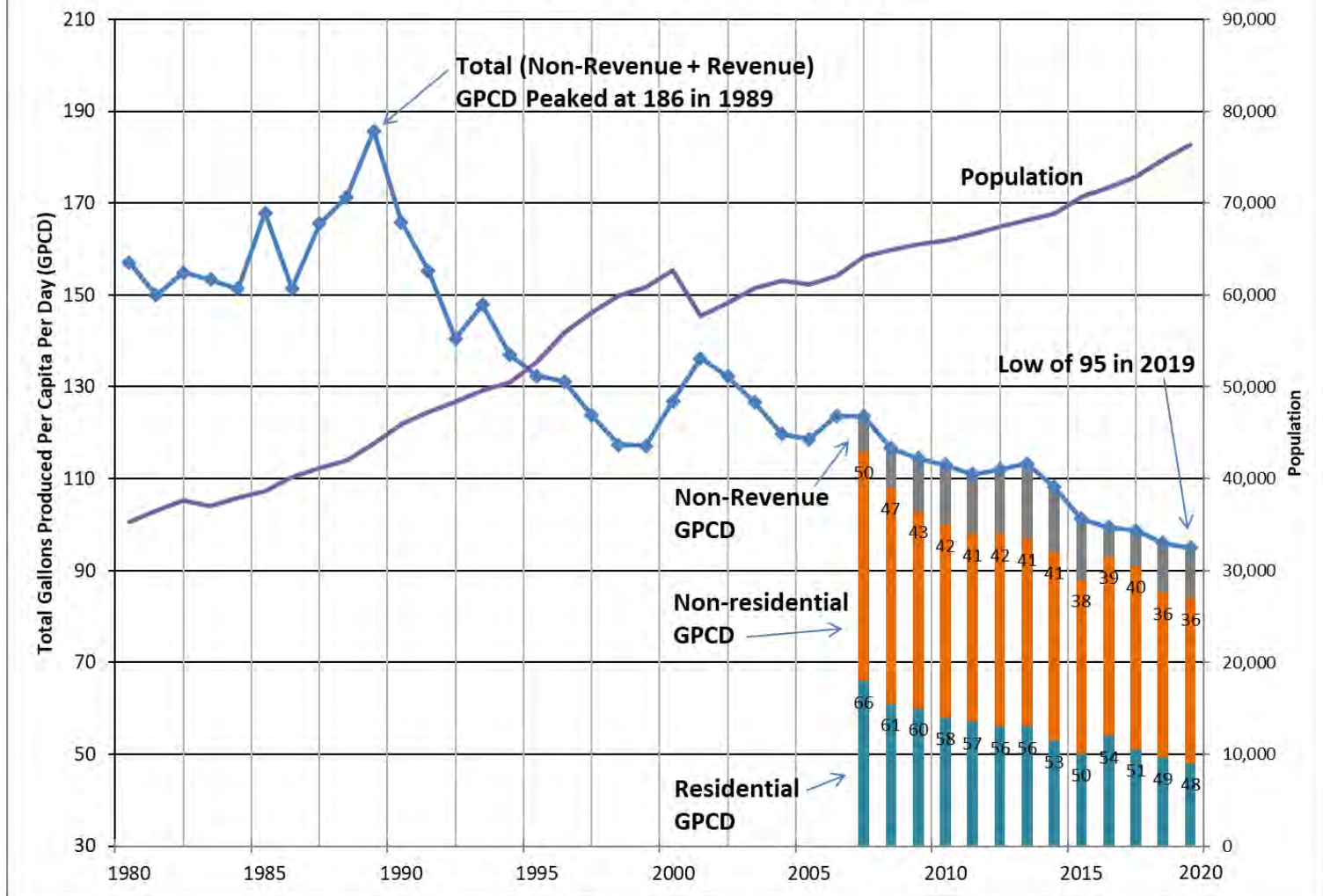


Water Supply Management History

- Population-based water demand forecasting
- Reactionary to supply issues
- Conservation scenarios common in records
 - Conservation first in city code 1989
- Arizona Water Commission "Adequate Water Supply" in 1973
 - Never required to prove Physical Availability



Water use trends through 2019



1988: Conservation Ordinance
"resource status"

1990: Rate Structure & Tiers for Residential

1991: Low Flow Toilet Rebate Program (6,000 to date)

1993: Rate Increase

2003: Expand Residential Rate Tiers; Establish Water Conservation Program

2005: New Rebate Programs

2009 & 2010 Conservation Program Cut

2011 Adopted 1.28 gallon per flush toilets in City Code

1988 Resource Status Ordinance



Violations = misdemeanor



Odd-even law takes effect today

Mandatory watering restrictions might last until September, or until summer rains have replenished Lake Mary.

By ANNE MINAHD
Sun Staff Reporter

Today marks the first day of mandatory water use restrictions throughout Flagstaff, based on high water use in the area.

Level II restrictions

A8

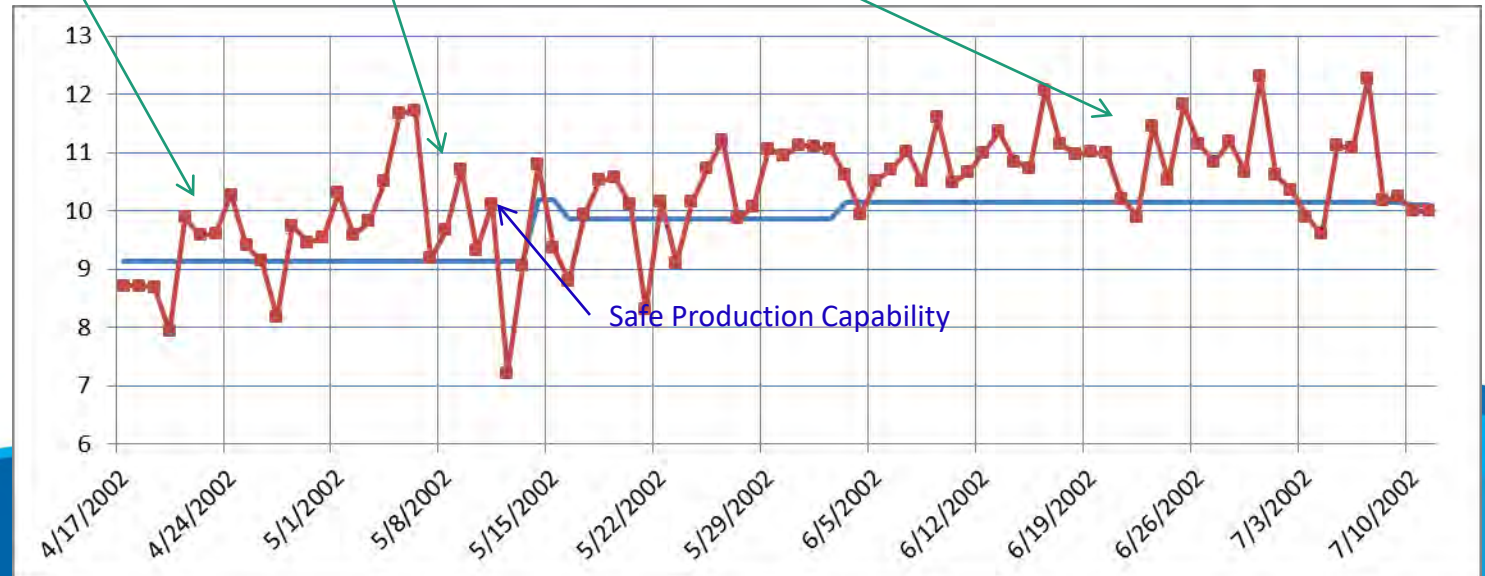
That capacity dropped by about 6 million gallons a day on Tuesday when Lake Mary reached a minimum pool that is no longer available to the city without water use restrictions.

Despite repeated requests from the city for residents to limit water use, the city was forced to take action.

place by court order in December to increase the probability that spillover from Lake Mary will make it into the riparian area in Walnut Canyon, thereby protecting the ecological resources in the national monument.

According to that agreement, the city is not allowed to draw surface water after the lake reaches a low of 740 million gallons, or 18 feet, unless the city goes into mandatory conservation. Going to Level II restrictions will now free up that water for use by the city.

2002 Timeline



1988 Resource Status Ordinance Revised Strategies May 2003

- MANDATORY**
- LEVEL 1** Water Awareness
 - “Encouraged to conserve”
 - LEVEL 2** Water Restrictions
 - Odd/even irrigation days
 - Water golf courses before noon and after 7pm
 - LEVEL 3** Water Emergency
 - Irrigation time restrictions
 - No watering golf courses
 - LEVEL 4** Water Crisis
 - No water for irrigation

- MANDATORY**
- LEVEL 1** Water Awareness
 - Odd/even watering days & times (before 9am & after 5pm)
 - Golf courses may not irrigate w/ potable water
 - Prohibits wasting water
 - \$25 fine, compounded per violation
 - LEVEL 2** Water Emergency
 - Water Demand > Safe Capacity 5 days
 - Drought Rate Structure
 - \$50 fine, compounded per violation
 - LEVEL 3** Water Crisis
 - Water demand exceeds *total production capability &/or* threat to fire protection
 - No outdoor watering
 - \$100 fine; compounded per violation

Violations = misdemeanor



Lessons Learned & Action

- Council listened to staff & community
 - Formal Work Sessions to discuss revisions to water conservation strategies
 - Incentivized connecting to reclaimed water for residential irrigation
 - Funded Water Conservation Program
- Bonds passed in 2004 – supply redundancy and future growth
 - \$8 million for wells
 - \$15 million for water rights
 - Purchased Red Gap Ranch



Ryan & Bob 2015 Enforcement Staff



1988 Resource Status Ordinance Revised Strategies May 2003

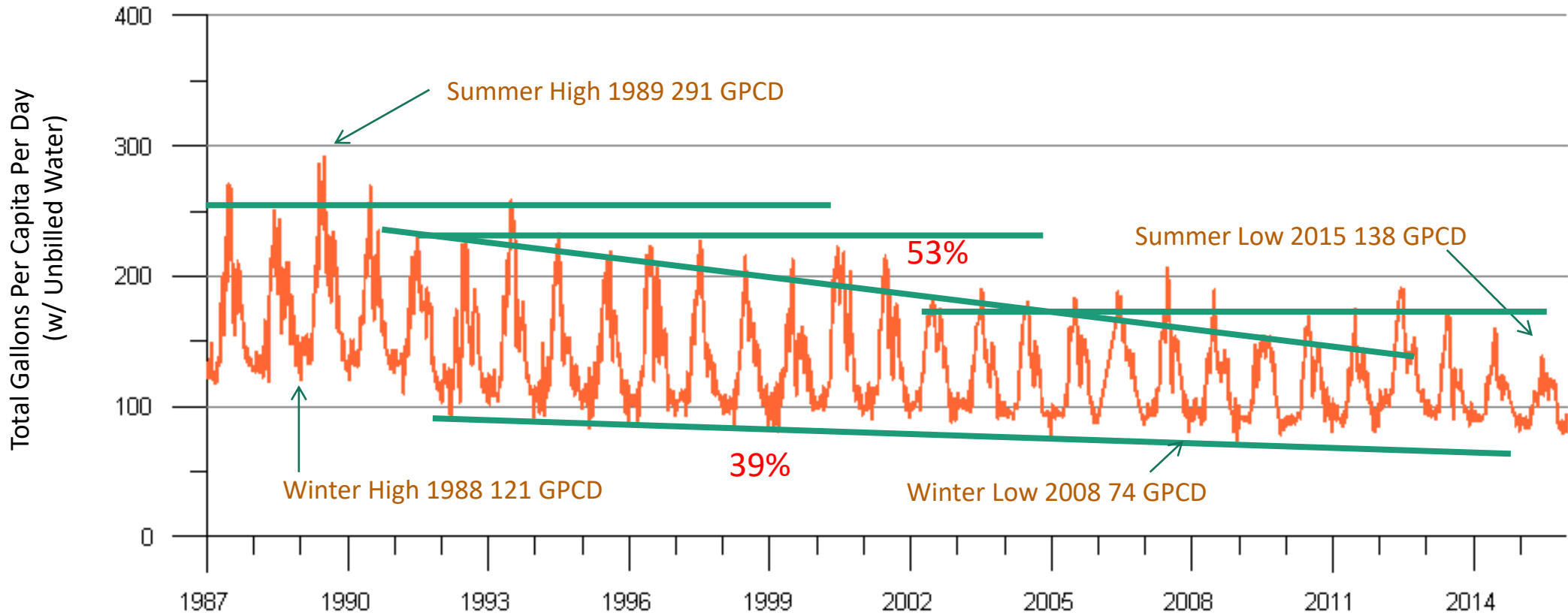
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Impact to Peak Day Demand



Conservation Program Today

- 2 full-time and 3 part-time staff
- Toilet rebates for <1.28 (0.8) gpf
- Turf replacement rebates
- Education & Outreach
- Mayor's Challenge for Water Conservation
- Arizona's Water Awareness Month
- Water Conservation Strategic Plan (2021)



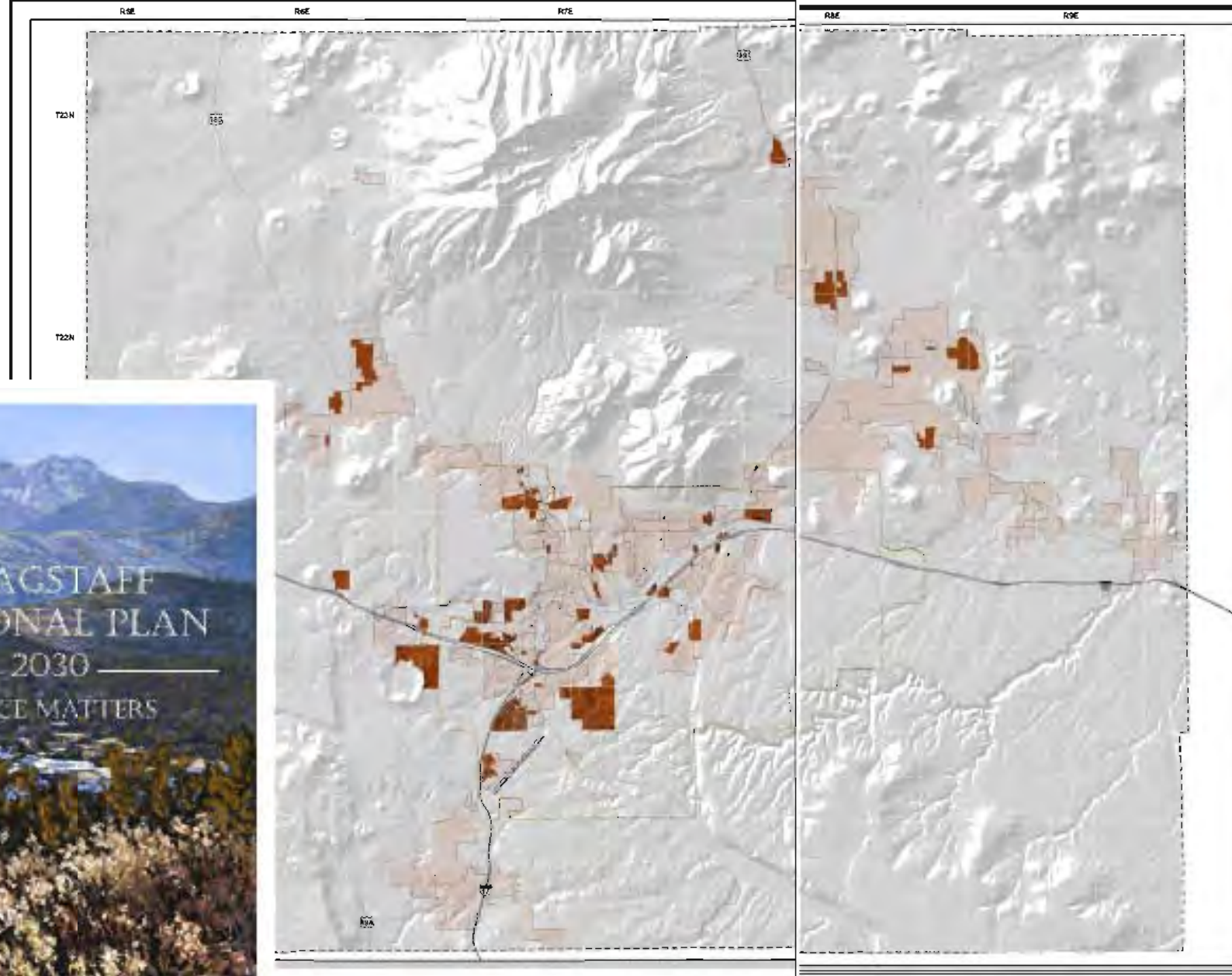
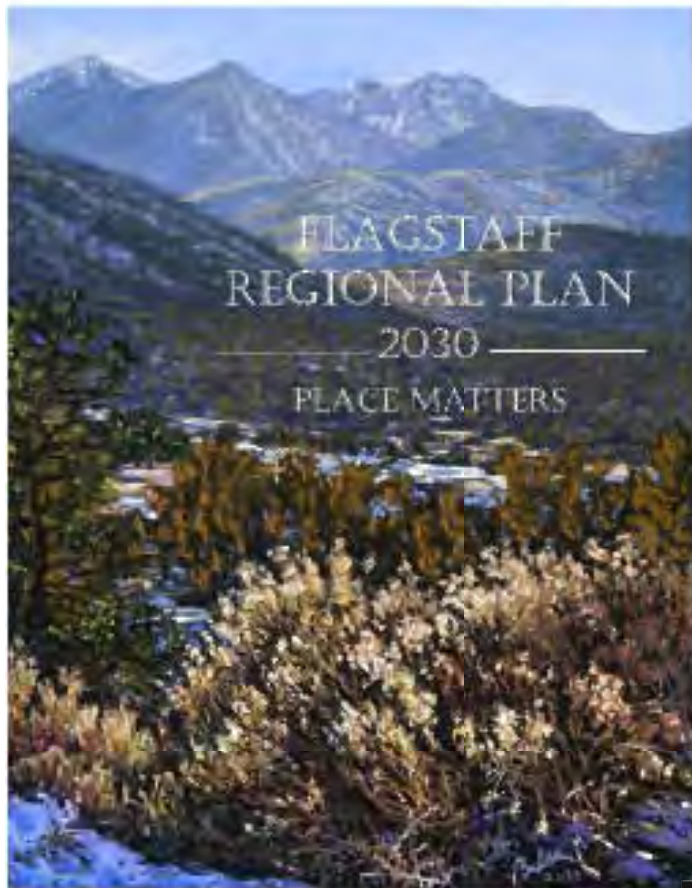
Water Resources Planning Then & Now

Then...

- Population-based water demand forecasting
- Reactionary to supply issues
- Conservation scenarios common in records
 - Conservation first in city code 1989
- Arizona Water Commission “Adequate Water Supply” in 1973
 - Never required to prove Physical Availability
- Value of Water in the Community

Now...Water Resources Manager Hired in 2007

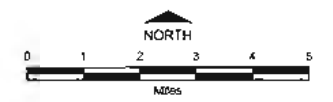
- Purchased Red Gap Ranch
- Land-use based forecasting
- Council Direction to pursue Designation of Adequate Water Supply for the City (2013)
 - Proved Physical Availability of Supplies
- Towards Safe Yield & Sustainability
 - Self-regulate pumping of groundwater based on projected impacts of pumping
 - Defining Conservation for Flagstaff (how low can/should we go with water use?)
 - Best Use of Uncommitted Reclaimed Water
 - Value of water – Return on Investment



Map 15:
GROWTH FROM 2000 - 2012

-  Buildings within new Growth Areas
-  Growth Areas 2000-2012
-  Neighborhoods
-  City of Flagstaff

Total Acres added from 2000-2012		
	# Parcels	Acres
Residential	6633	2,929
Commercial	137	424
Industrial	207	223
Institutional	6	8
General	201	293

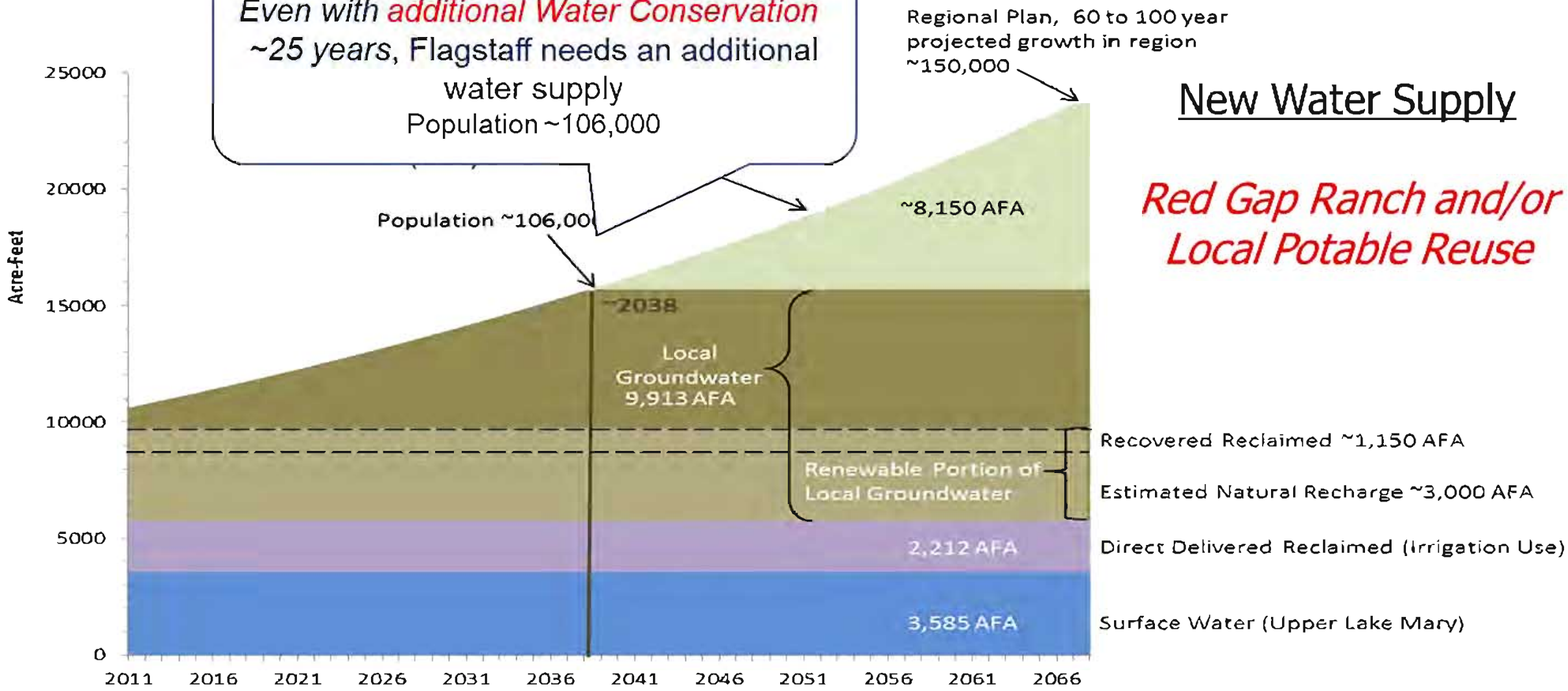


FLAGSTAFF REGIONAL PLAN
VISION 2030: PLACE MATTERS

City of Flagstaff 100-Year Designation of Adequate Water Supply

(as accepted by Arizona Department of Water Resources, supplies are in acre-feet annually [AFA])

Even with *additional Water Conservation* ~25 years, Flagstaff needs an additional water supply
Population ~106,000

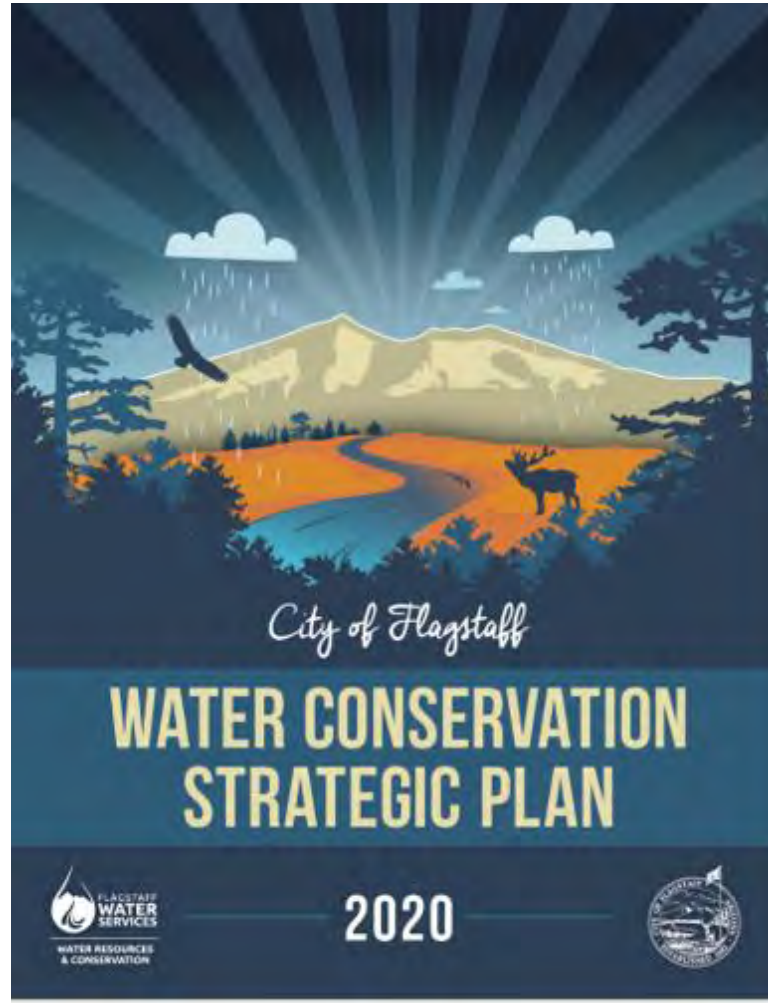


Flagstaff's Future Water Needs & Next Steps

- Flagstaff's Future Demand
 - Still about 20 years from needing the next water supply
- Designation of Adequate Water Supply (2013)
- Future Alternatives & Best Practices:
 - Red Gap Ranch purchased as a water ranch in 2005 (71% voter approval)
 - Additional Water Conservation measures (2021)
 - Reclaimed Water Master Plan (2020-2021)
 - Water Loss Control Program (Non-Revenue Water) (2021)
 - Define Return on Investment Per Gallon
- Water Resources Master Plan (2021-2022)



Towards Safe Yield & Sustainability



HELP GUIDE FUTURE MANAGEMENT OF RECLAIMED WATER IN FLAGSTAFF

ARE YOU INTERESTED IN MAKING A DIFFERENCE? APPLY FOR THE COMMUNITY STAKEHOLDER COMMITTEE ON RECLAIMED WATER!
WE NEED YOUR HELP IN DEFINING THE FUTURE OF THIS IMPORTANT WATER RESOURCE

Flagstaff Water Services is looking for **10 individuals** to represent Flagstaff's diverse community

THE COMMITTEE WILL BE EXPECTED TO

- Become informed on topics including water management and supply considerations, reclaimed water quality, and regulations
- Learn about water balance data, benefit-cost comparisons, economic data and strategies, infrastructure considerations, water quality data
- Participate in short surveys related to reclaimed water use
- Attend three virtual workshops and watch short videos that address specific topics
- Rank management options for reclaimed water
- Commit to a 6-month time period

STAFF OBJECTIVE: OBTAIN COMMUNITY-SPECIFIC GUIDANCE ON WATER MANAGEMENT STRATEGIES FOR RECLAIMED WATER

Wastewater generated from homes and businesses is collected through pipelines for treatment at either the Rio de Flag Water Reclamation Plant (Rio WRP) or the Wildcat Hill Water Reclamation Plant (Wildcat WRP). Both WRP's are delivering the highest quality of reclaimed water regulated under Arizona Department of Environmental Quality (ADEQ), Class A-. One-third of all reclaimed water supply generated each year is committed for our current customers. We would like your help in determining the most appropriate water management options for the remaining, uncommitted water supply.

APPLY BY SEPTEMBER 7, 2020

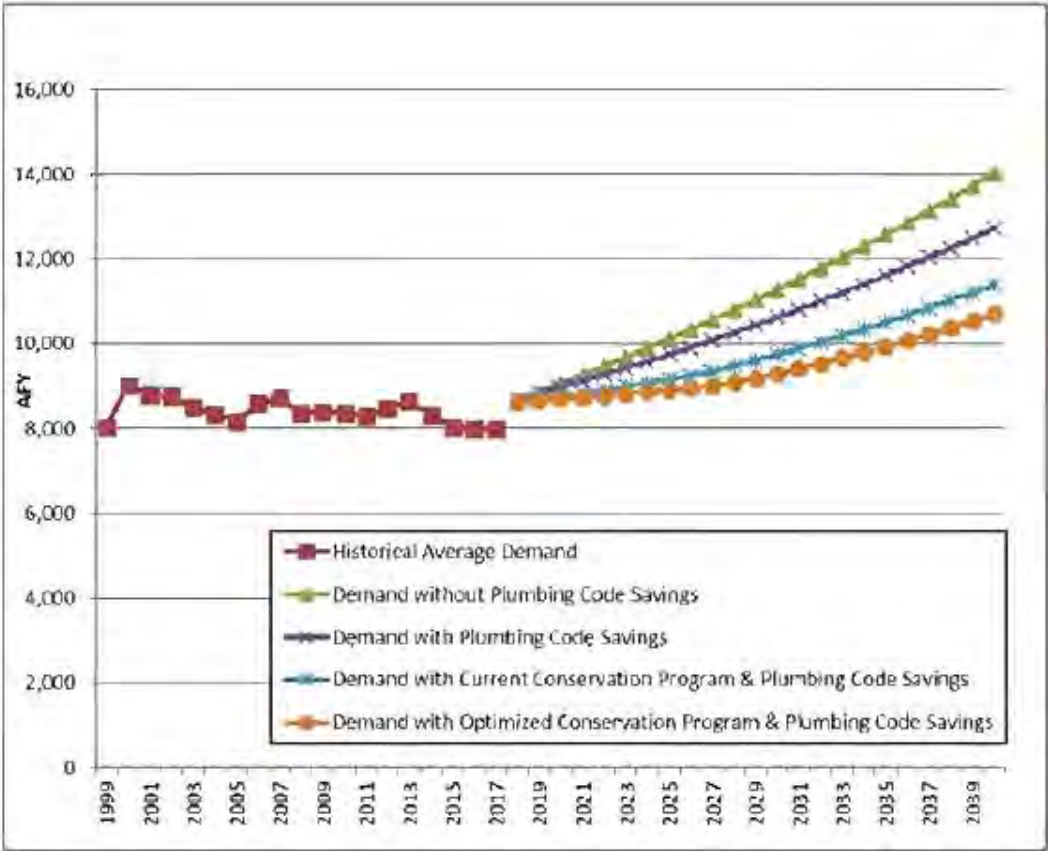
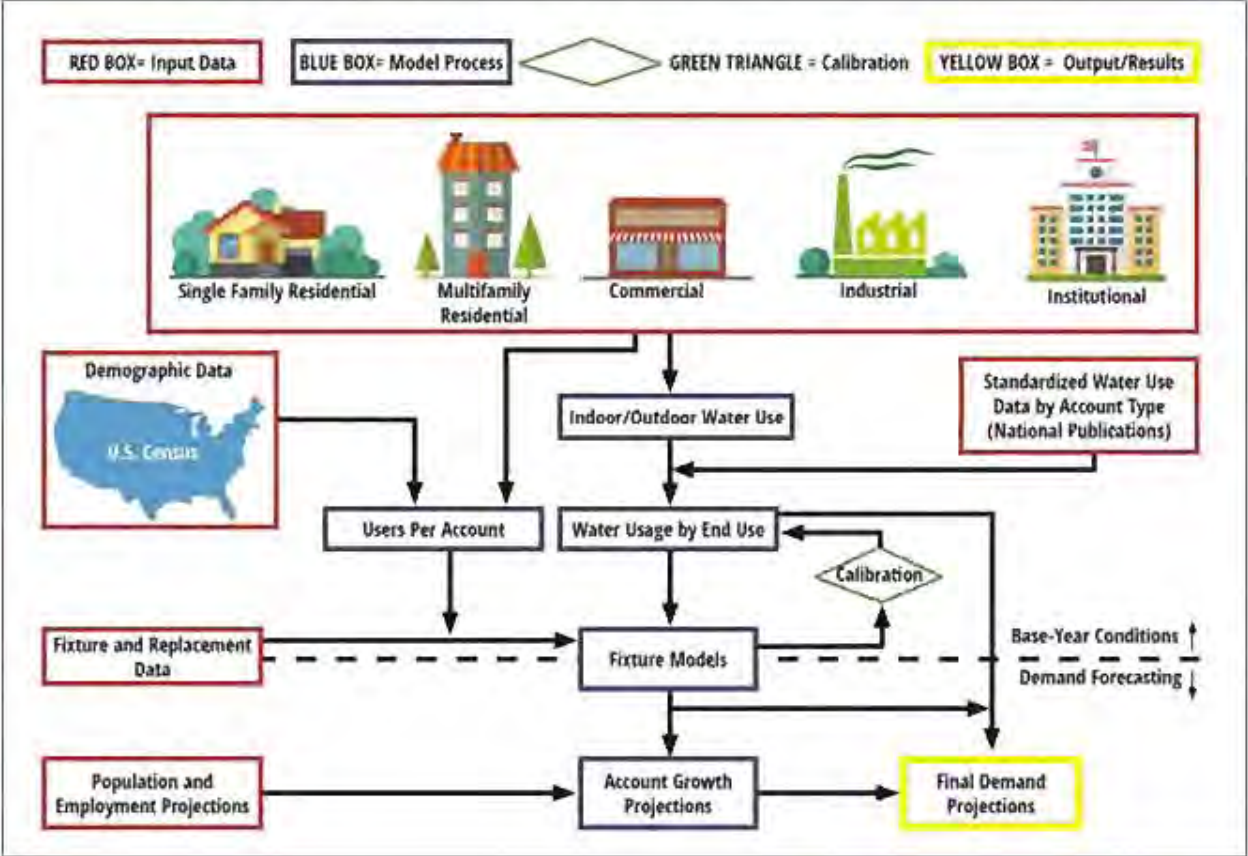
Applications can be submitted by mail or email to eyoung@flagstaffaz.gov
All applicants call (928) 213 - 2405 to confirm application

Erin Young, City of Flagstaff Water Services
Re: Stakeholder Committee
2323 N Walgreens Street, Suite 1
Flagstaff, AZ 86004

Applications will be reviewed by city staff and our consulting team. A recommendation will be made at the September 17 Water Commission meeting.

FLAGSTAFF WATER SERVICES
WATER RESOURCES & CONSERVATION

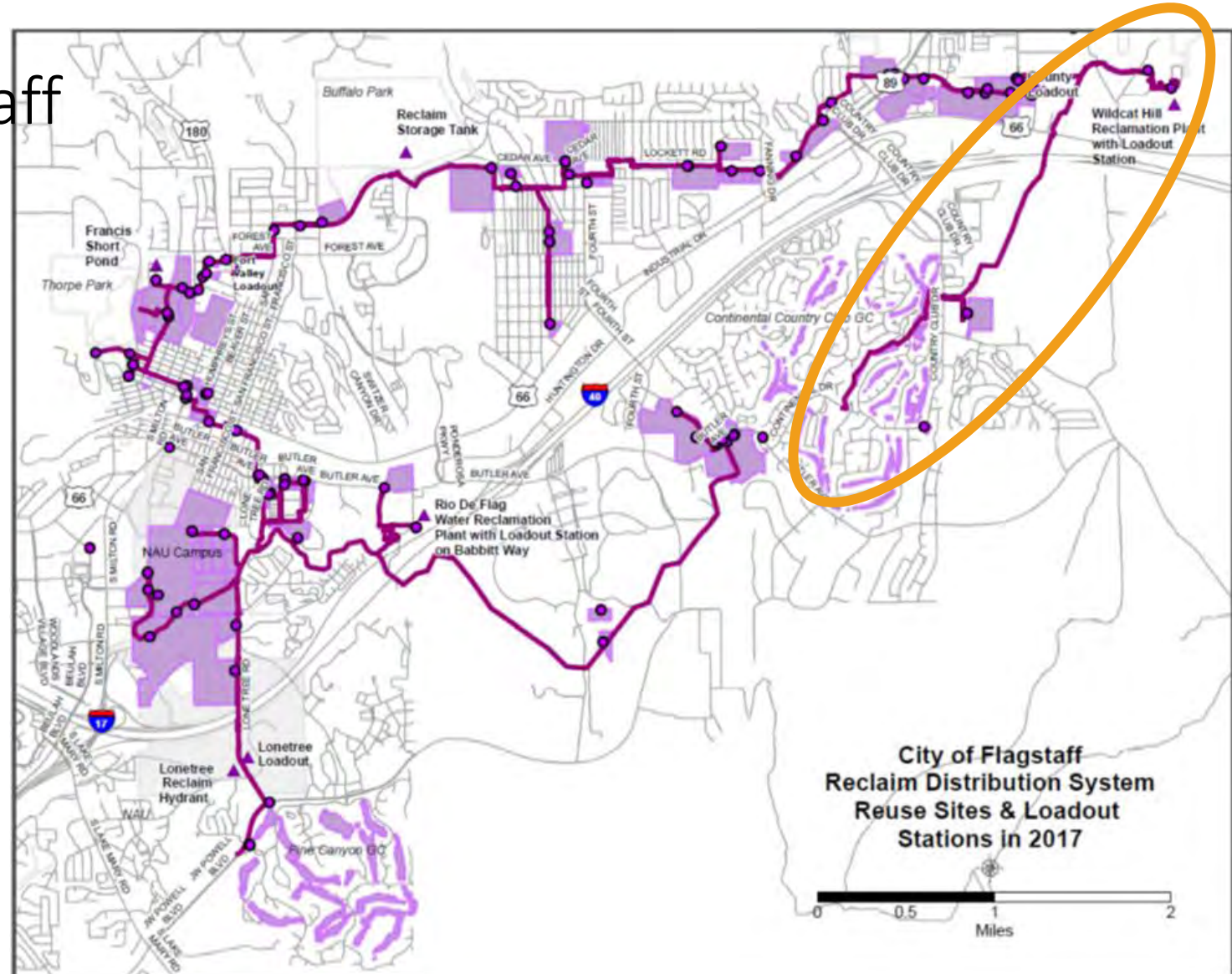
Figure A-5. DSS Model Overview Used to Make Potable Water Demand Projections



Reclaimed Water Master Plan

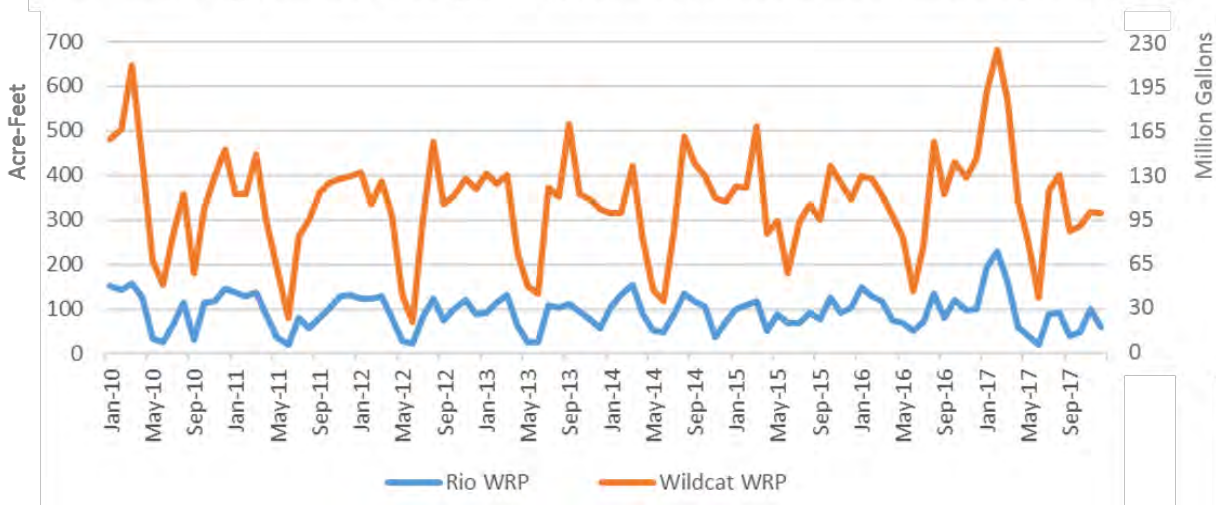
Water Reuse in Flagstaff

- 1966 Reuse at Fairfield County Club
- 1993 New Class A+ Water Reclamation Plant & System Expansion
- 26 Miles of Reclaimed Water Main
- ~70 customers



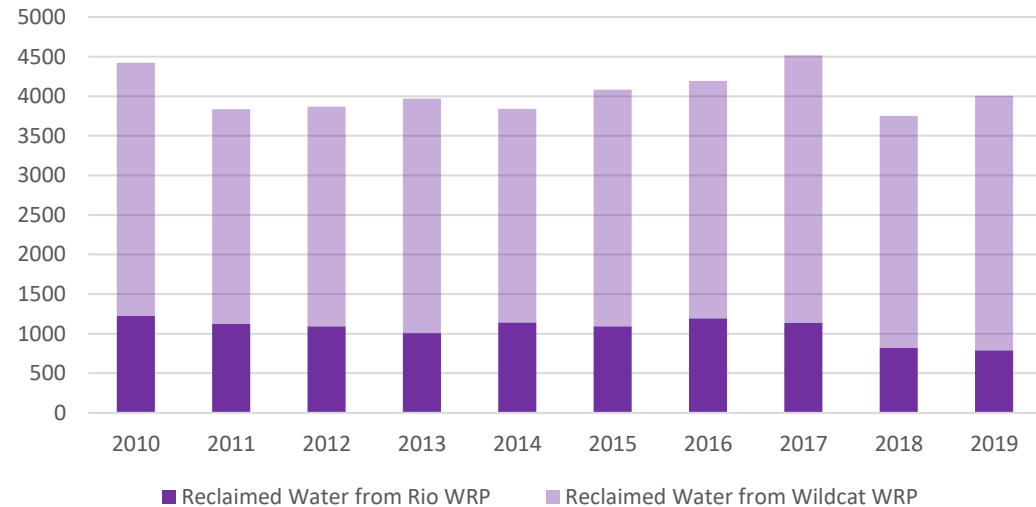
Present: Working Towards 100% Utilization of Uncommitted Reclaimed Water

Total Discharge to Rio de Flag Wash, Acre-Feet and Million Gallons per Month



Seasonal variation: **very little water available in May and June** to an excess of 150 million gallons a month in the cooler months

Discharge to Rio de Flag Wash, Acre-feet per Year



Annually, from 3,500 to 4,500 acre-feet of water is available each year for recycling back into the community

Pipeline & conveyance needs in CIP = \$3 million

Is Potable Reuse a viable alternative for Flagstaff?

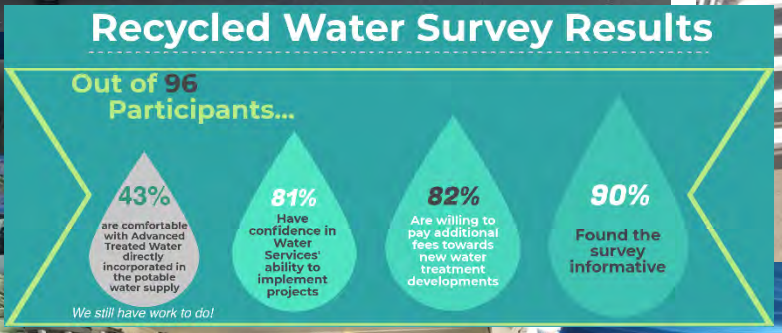
- The pieces are starting to fall into place
- City Council & some community members have asked staff for “cheaper” alternatives to Red Gap Ranch
- Expressed desire to remove unregulated Compounds of Emerging Concern from reclaimed water
- Water Services has requested funding from City Council to conduct several critical studies regarding viability of potable reuse (\$445,000 to date)

Path to Potable Reuse

- 2017 Carollo Potable Reuse Alternatives Study (*outside the fence*)
- 2018 Brown and Caldwell Potable Reuse Feasibility Study
(*inside the fence*)
- 2019 Preliminary Aquifer Recharge testing – *intentional DPR*
- 20/21 Reclaimed Water Master Plan & Community Stakeholder Committee
on Reclaimed Water
- 2022 Water Resources Master Plan

Expand wastewater treatment process to align with Potable Reuse

Reuse Outreach



Reclaimed Water Master Plan & Community Stakeholder Committee on Reclaimed Water

Build an educated and informed group that understand the issues and carry the message

- Commitment from Stakeholders ~4 hours a month for 6 months
- Stakeholder Committee Selection – looking for applications to narrow to ~10 individuals
 - Engineering Consultants
 - Field Experts
 - Large Customers
 - Public
 - Sustainability Commission
 - Water Commission



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STAKEHOLDER COMMITTEE ON RECLAIMED WATER!**
WE NEED YOUR HELP IN DEFINING THE FUTURE OF THIS IMPORTANT WATER RESOURCE

Conclusions

- Population-Based Planning may be Short sighted: ADWR Offers a Planning Framework Useful to Rural Cities
 - Incorporates some, but not all, options for reclaimed water
 - Does not look to conservation as a supply
 - It is up to a Rural Community to self-regulate!
- Water Supplies are Expensive and Impactful
 - Conservation is often cheapest supply
 - Community engagement is critical
 - Water Loss Control Program demonstrates Utility's commitment

