

Closing the Gap – Case Study City of Flagstaff



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Closing the Gap between Water Supply and Demand
WRRC Conference 2014

April 8, 2014

Goals

- History of how the City has been proactive
 - Council actions (conservation & reuse)
 - Community commitment
 - Mandatory Water Adequacy Designation
- Looking to the future
 - Water Conservation & Reuse
 - Water Policy development
 - Supply augmentation
 - Economic analysis of alternatives
 - Land use





Water Conservation & Reuse Program Recognition

Colorado River Basin Study M&I Conservation & Reuse Group

RECLAMATION Managing Water in the West

U.S. Department of the Interior
Bureau of Reclamation

Moving Forward to Address the Challenges Identified in the Colorado River Basin Water Supply and Demand Study

In 2012 the Bureau of Reclamation, in partnership with the seven Colorado River Basin States (Basin States), published the most comprehensive study of future supplies and demands on the Colorado River ever undertaken. The Colorado River Basin Water Supply and Demand Study (Study) confirmed what most experts knew: there are likely to be significant shortfalls between projected water supplies and demands in the Colorado River Basin (Basin) in coming decades.

Those that rely on the Colorado River and its tributaries are committed to approaching these future challenges with the same steadfastness that they have approached and overcome past challenges. Beginning today following the call to action of the Study and as a first step in that commitment, all that rely on the Colorado are taking initial steps — *working together* — to identify positive solutions that can be implemented to meet the challenges ahead.

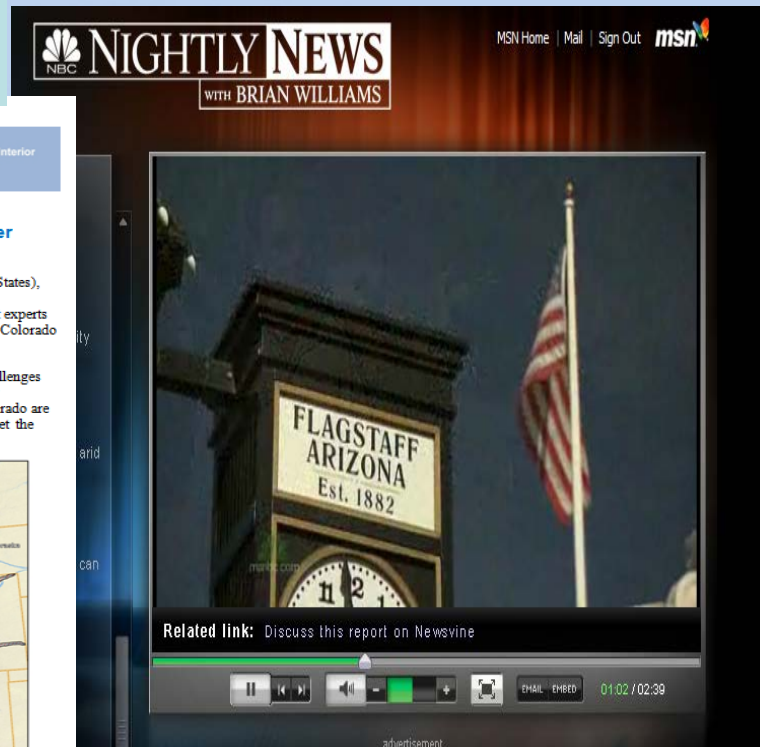
Phase 1: Stakeholder Teams Working Together — Verifying Potential Strategies for Water Conservation, Reuse, Transfers, and Healthy River Flows

Groups representing Federal, State, Tribal, agricultural, municipal, hydropower, environmental, and recreational interests are all engaged in a coordinated way to examine in more detail both the challenges we face together and the potential solutions that will work in the Basin. This effort will require innovative thinking, integration of many viewpoints, and a commitment to work in a positive and collaborative spirit. By working together, we will improve public understanding of the challenges faced in the Basin and identify the potential solutions that can help reduce future uncertainties and meet the significant challenges ahead.

This document sets out the framework for the first phase of action following publication of the Study and is intended to complement other State and Tribal efforts



June 13 2013



November 17, 2009



December 2003

City of Flagstaff – WRRC Closing the Gap



Conservation & Reuse Program History

1983 1st direct delivery reclaimed water - Continental C.C.

Prior to 1988 Volunteer Water Conservation Committee

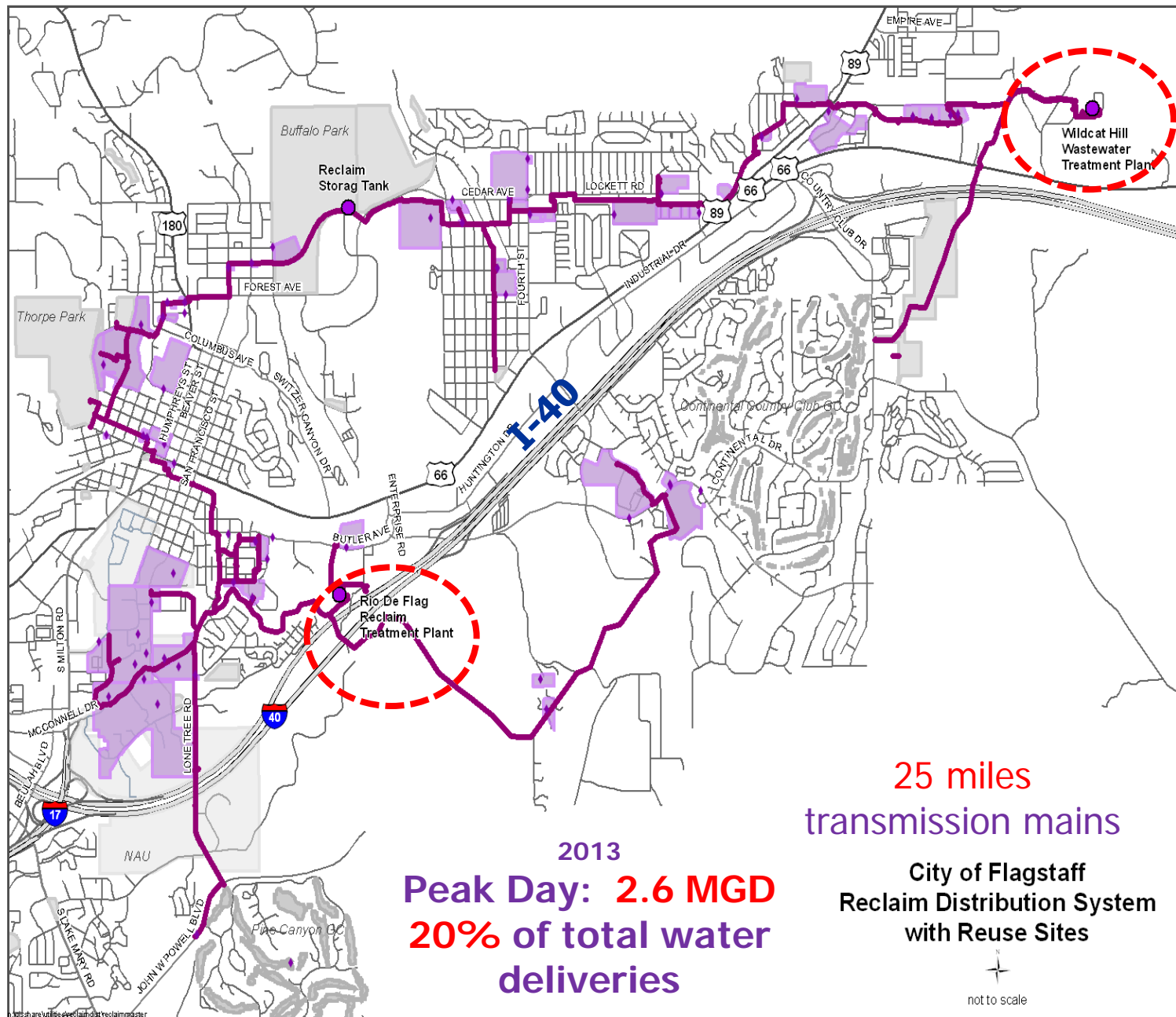
1988 *Water Conservation Ordinance adopted*

1991 *Inverted Water Rate Structure & Rebate Program*

1993 Expanded direct delivery of reclaimed water
construction of the *Rio WRF*

Since 1993 *incidental recharge of reclaimed water*







- Incidental recharge ~66% of reclaimed water
Exploring how to permit through ADWR
- Established *riparian areas* within Rio de Flag
20 Year Agreement with environmental community &
Az Game & Fish minimum *200 gpm* flow discharge



Conservation & Reuse

Program History

2003 **Amended Conservation Ordinance**

- *Drought mitigation strategies / Water Schedule restrictions / Water Cops*

2006 **Updated Building Plumbing Code** (voluntary)

- *Dual plumbing systems & Gray water systems*

2009 **Low Impact Development (LID) Ordinance**

2010 **Expanded direct delivery of reclaimed water -** *upgraded Wildcat Hill WWTP & tied into reclaimed system*

2012 **Rainwater Harvesting Ordinance**

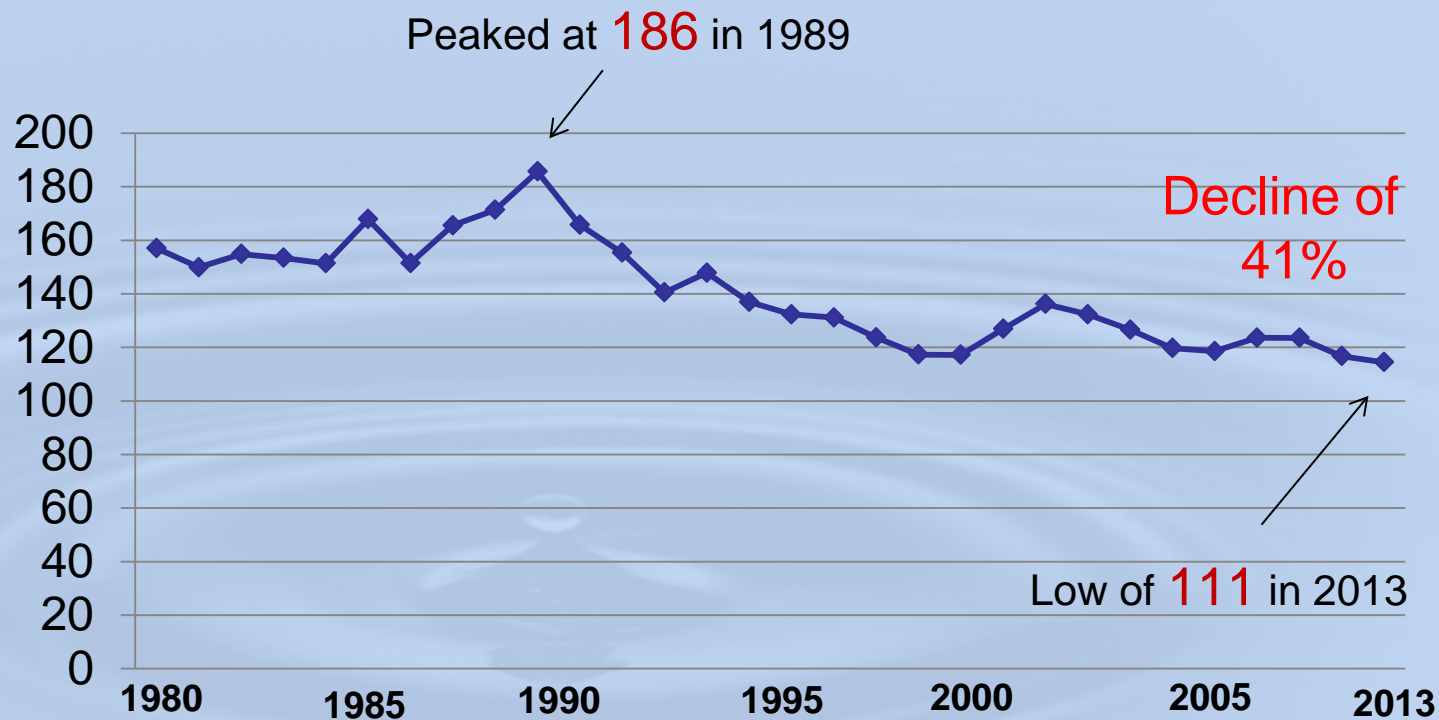
2013 **Designation of Water Adequacy**





Total GPCD

Community Commitment



Residential: 64
Non-Residential: 47



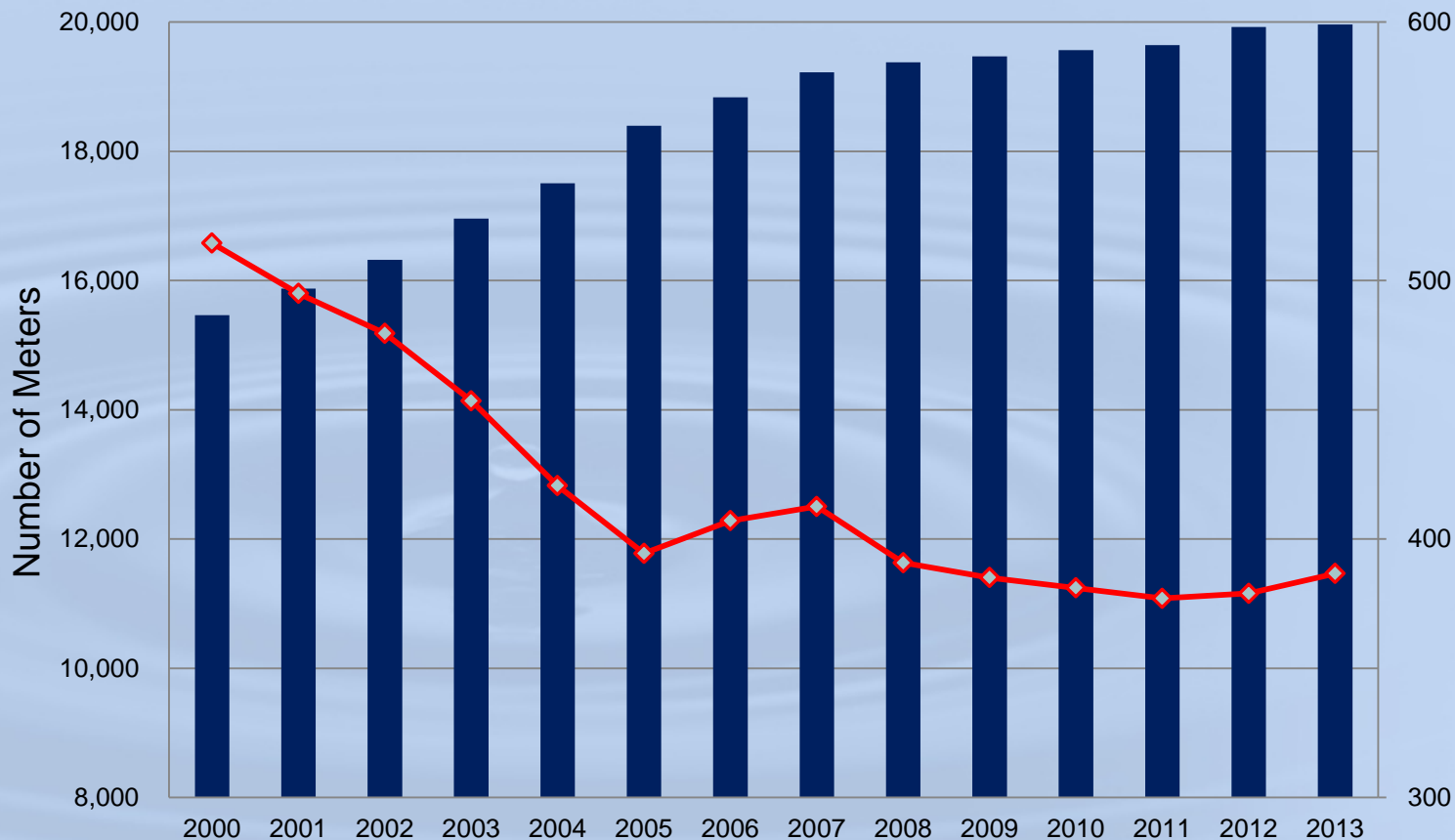
Average Water Use per Account

Community Commitment



Residential and Non-Residential

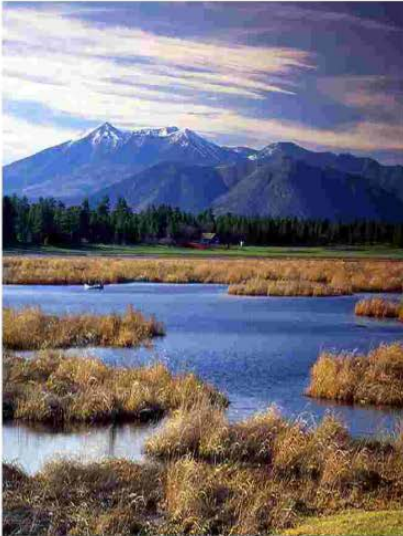
gallons per day



City of Flagstaff – WRRC Closing the Gap

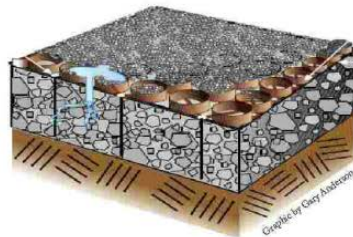
Low Impact Development

Guidance Manual for Site Design and Implementation



Principles of LID

- Conserve natural resources that provide valuable natural functions associated with controlling and filtering stormwater.
- Minimize and disconnect impervious functions.
- Use distributed small-scale controls or Integrated Management Practices (IMPs) to mimic the site's pre-project hydrology.
- Direct runoff to natural and landscaped areas conducive to infiltration.



City of Flagstaff • Stormwater Management Section • Jan, 2009



Adopted in 2009

- **Retain 0.5" to 1.0" on-site**
- **Mimic natural forest run-off after development**
- Developer required funding
- Site Planning Practices
- Engineered IMPs
- Design Fact sheets
- Maintenance Protocols

Stormwater and Water Conservation benefit



Bio-retention basin



Rock-lined swale



"green" streets



Check dams



Rain Water Harvesting

Ordinance adopted 2012

Active RWH

- Mandatory for Commercial only
capture first 1" off rooftops
- Exempt if development uses native plants

Passive RWH

- Not mandatory, Single Family guidance
- Driveways tilted to landscaping
- Roof downspouts to landscaping
(not into streets)

Mandatory Water Adequacy

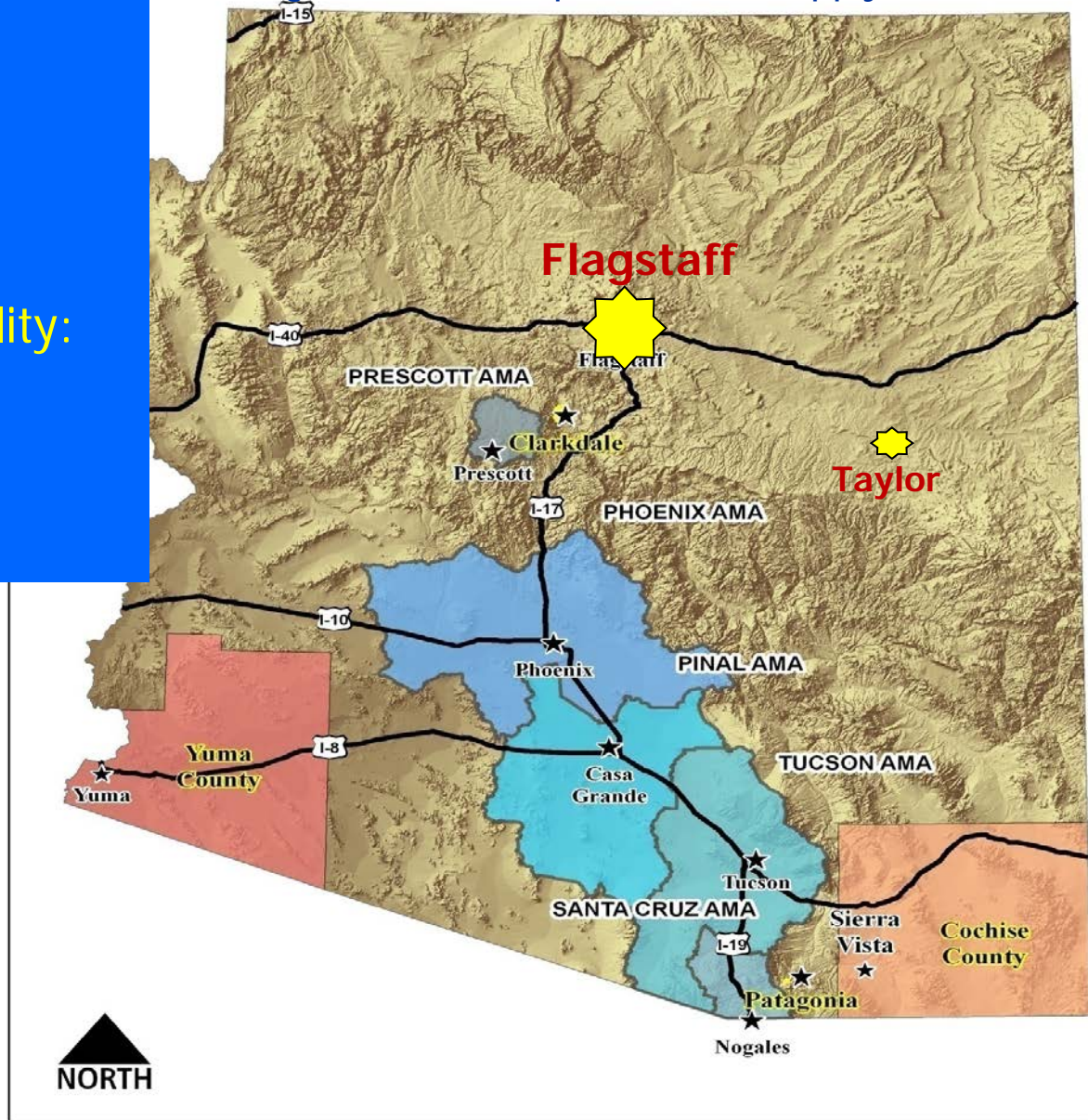
Ordinance: (2008)

Clarkdale
Patagonia
Cochise County
Yuma County

Hydrologic/Physical Availability:

Flagstaff (2013)
Taylor (2011)

In 2013 City of Flagstaff received a
Designation of Adequate Water Supply



City of Flagstaff – WRRC Closing the Gap



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Water Resources Master Plan

draft 2011

Future Water Supply Alternatives & Preliminary Economic Analysis
over a 10-year period ▲ **12,000 AF/year at build-out**

Water Conservation

Volume

Cost

Active RWH new residential

232 AF/yr

\$5,500/AF

Incinerating Toilets

588 AF/yr

\$1,290/AF

Replace with HET Toilets

311 AF/yr

\$25/AF

Turf removal

1,499 AF/yr

\$297/AF

Other Options

Red Gap Ranch

12,000 AF/yr

\$3,857/AF

Indirect Reclaimed Reuse*

4,480 AF/yr

\$1,307/AF

(includes Advanced Treatment)

new Direct Reclaimed Reuse

3,647 AF/yr

\$587/AF





Alternative Water Conservation, land use & Reuse?

Water Conservation alternatives

Increase water rates?

current Top Tier > 11,700 gal - - - \$11.64/1000 gal

current Mid Tier > 6,400 gal - - - \$6.27/1000 gal

Update to General Plan vote in 2014

Land use changes to increase density

Reuse

invest additional \$3.5M to access supply
from Wildcat Hill WWTP (pumps, piping, etc)



UTILITIES INTEGRATED MASTER PLAN

Principles of Sound Water Management Water Policies Chapter



April 1, 2014

City of Flagstaff - Utilities Division

New WATER POLICIES

- A. Finance
- B. Water Resource Management
- C. Reclaimed Water
- D. Water Conservation
- E. Stormwater
- F. Infrastructure
- G. Master Planning
- H. Regional Leadership
- I. Security

Started discussions in 2008 with
citizens Water Commission
and then with Council in 2012
adopted in April 1, 2014

Our Future is Now — Closing the Gap between Water Supply & Demand

Supply Augmentation

Red Gap Ranch

Purchased in 2005

40 miles east of Flagstaff

Drilled 12 wells on the ranch

Signed Stipulation with Navajo Nation for 8,000 AF/year

Negotiating with ADOT for I-40 Right-of-Way



Questions?



Water buffalo – northern Arizonicus