Aquifer Recharge and Beneficial Reuse

WESTCAS Annual Conference
2016
Santa Fe, NM

Scott Reinert, P.E.
Water Resources Manager

EL PASO WATER UTILITIES PUBLIC SERVICE BOARD

Topics

- El Paso Water Supply
- ASR concepts
- Fred Hervey Water Reclamation Plant background
- Injection Wells or Basins?
- Uses of Fred Hervey Water Reclamation Plant effluent
- Future plans

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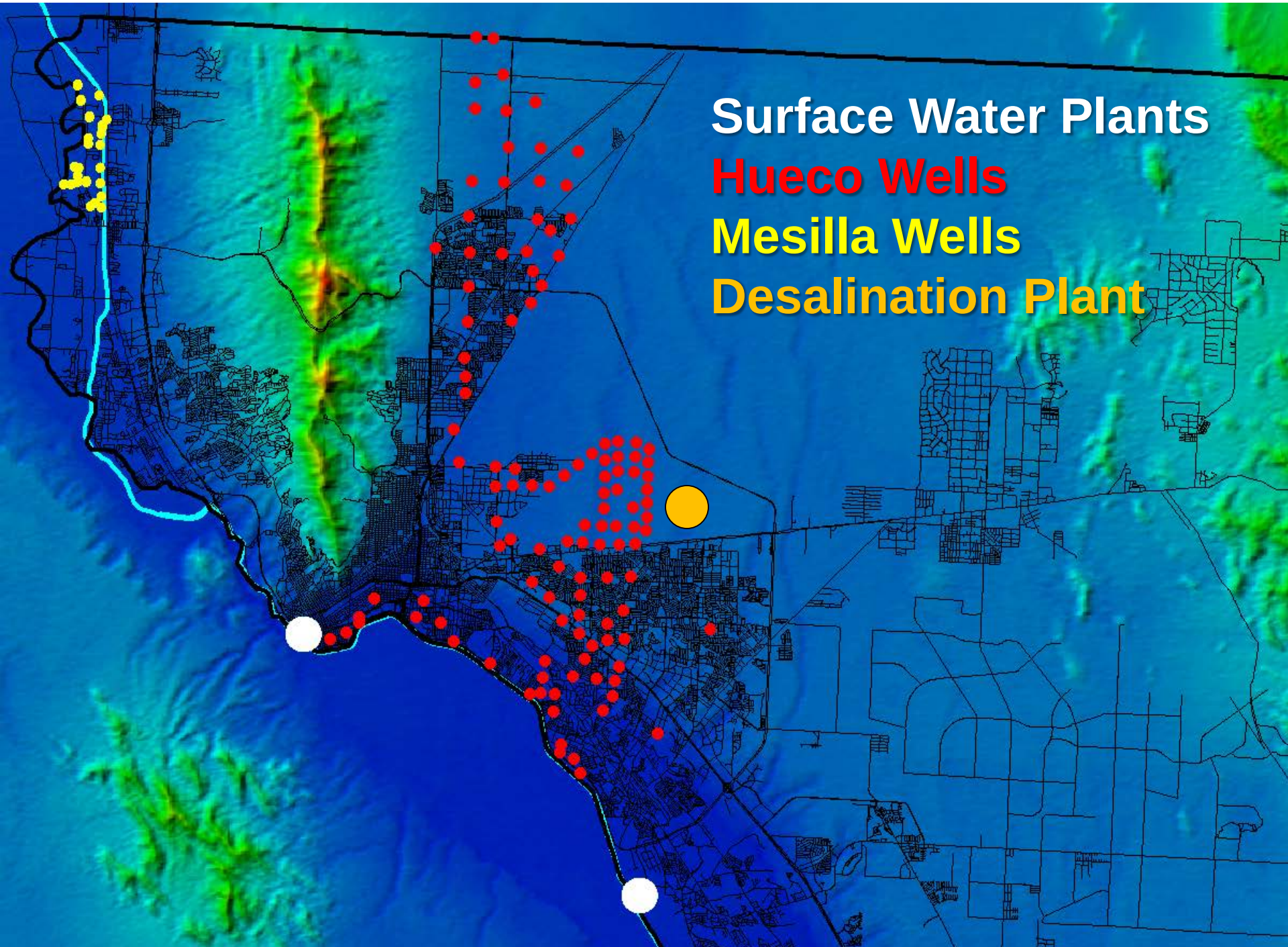
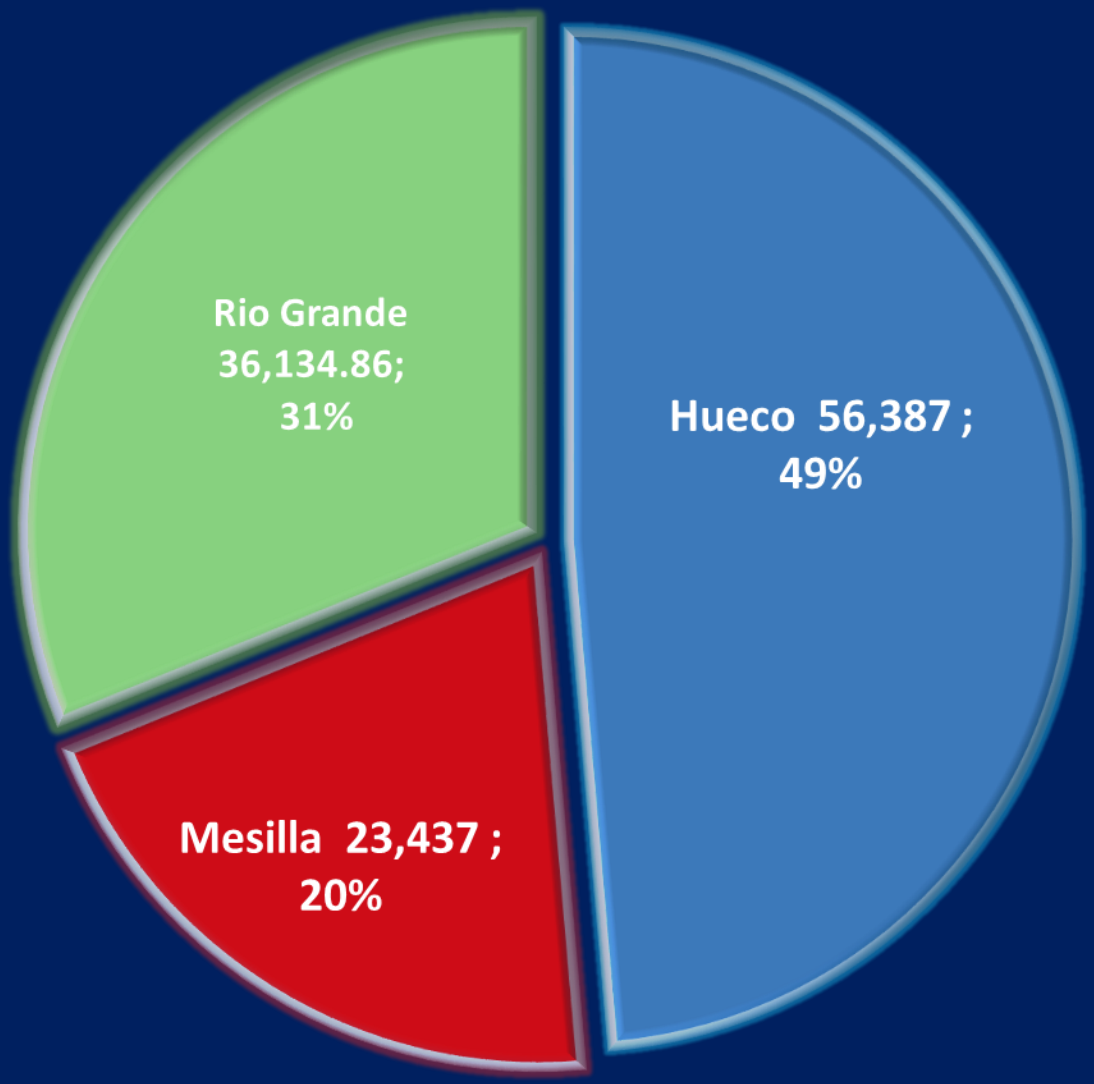
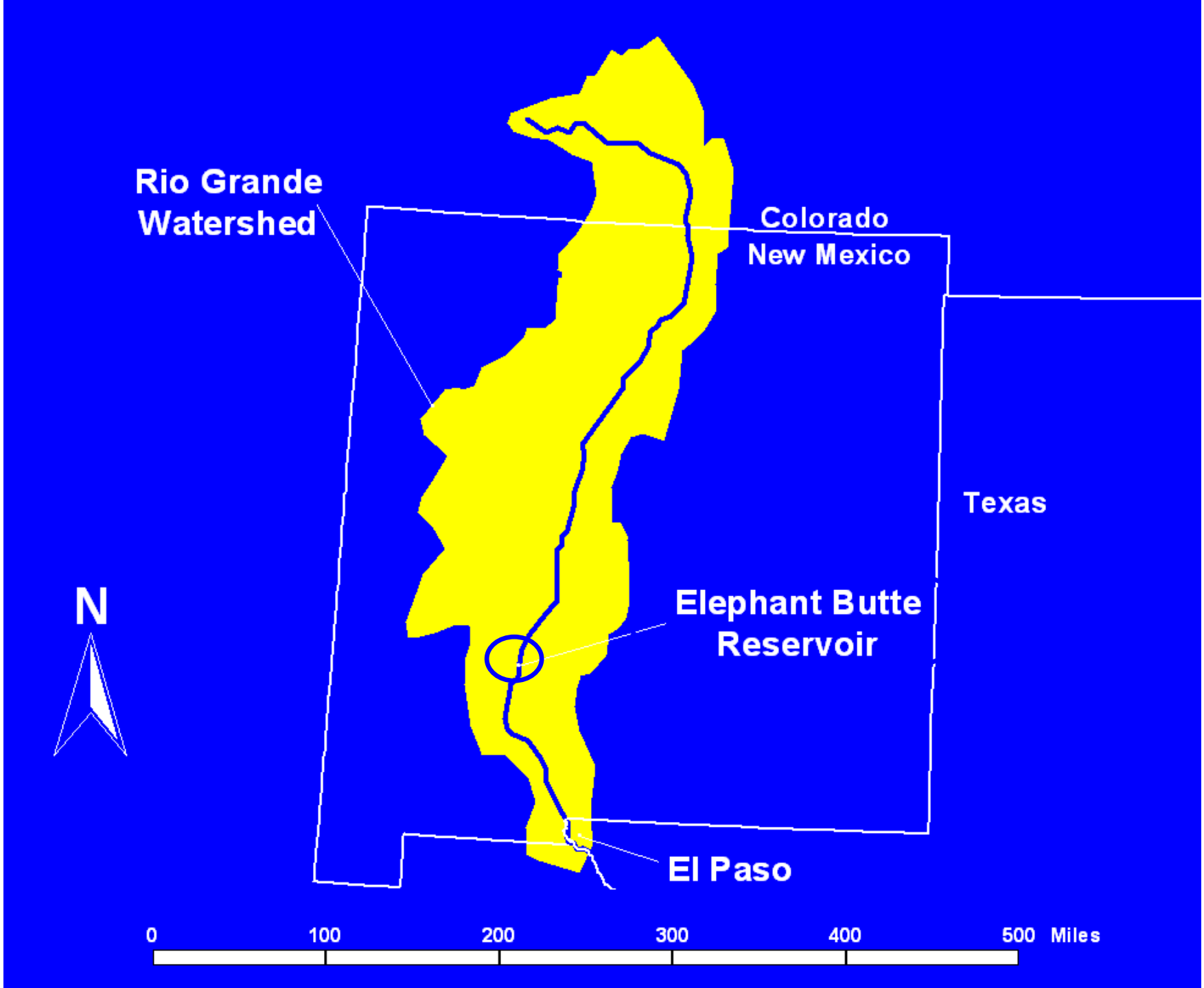
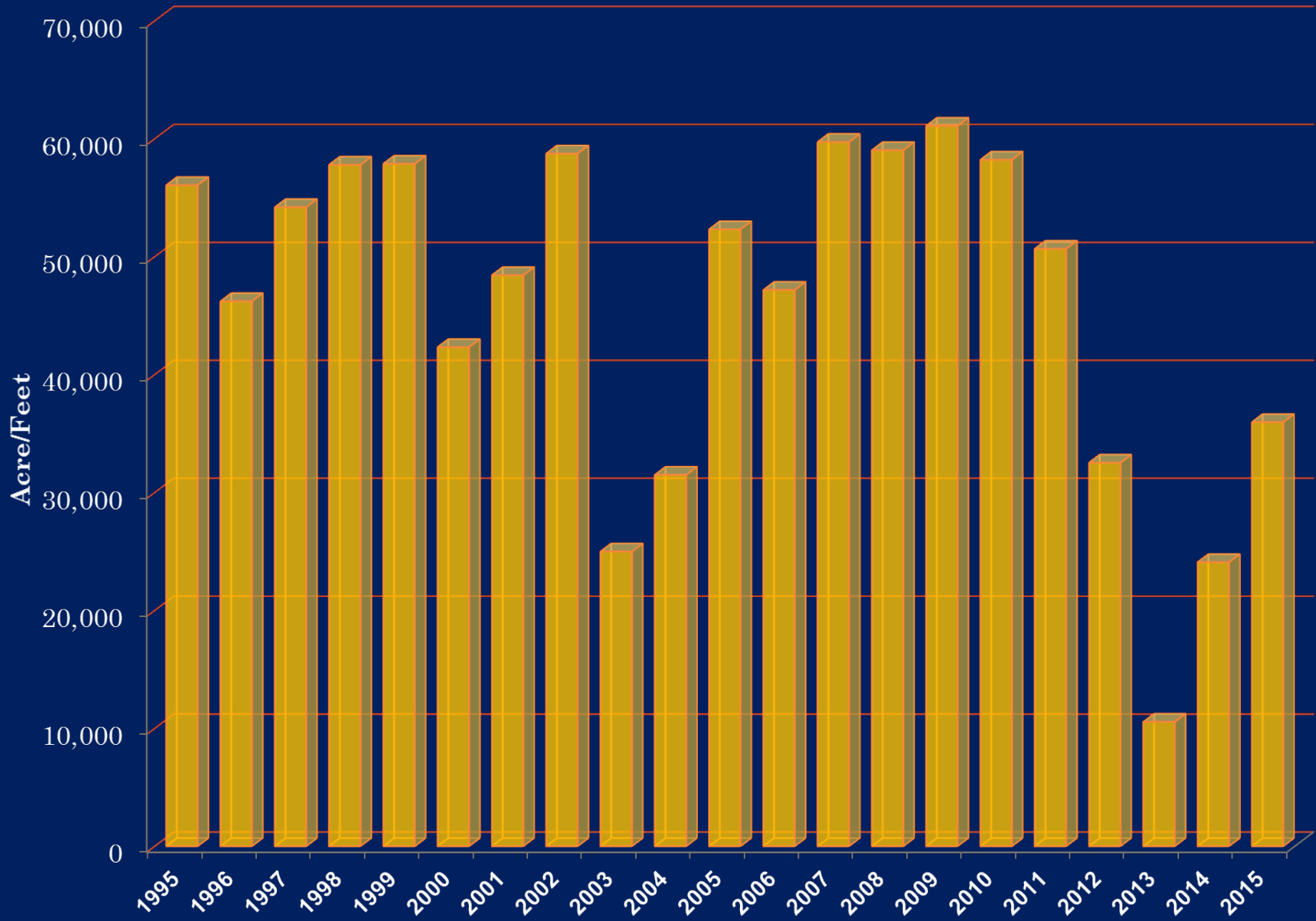

Surface Water Plants
Hueco Wells
Mesilla Wells
Desalination Plant

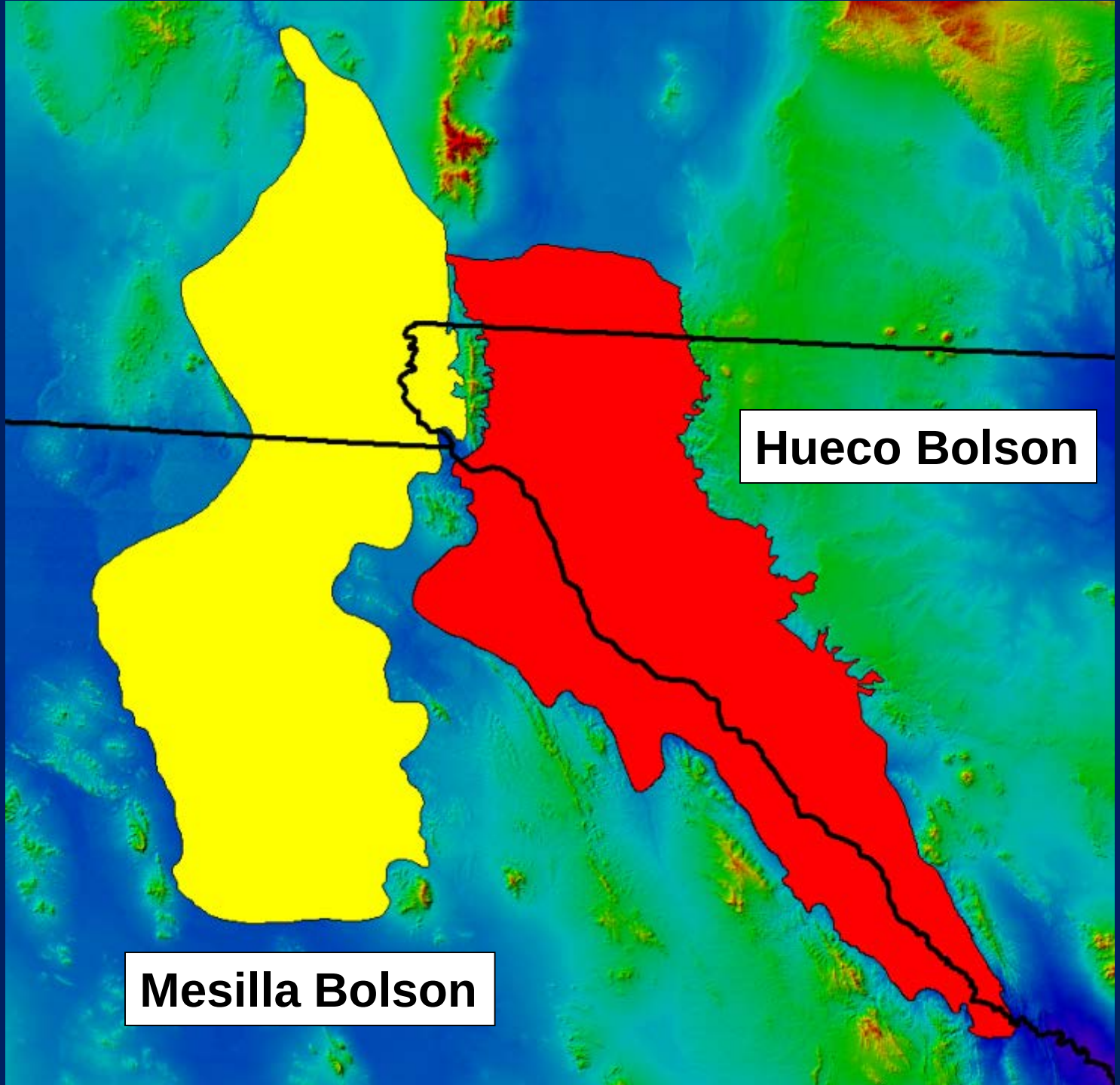
2015: TOTAL PRODUCTION
Acre-Feet



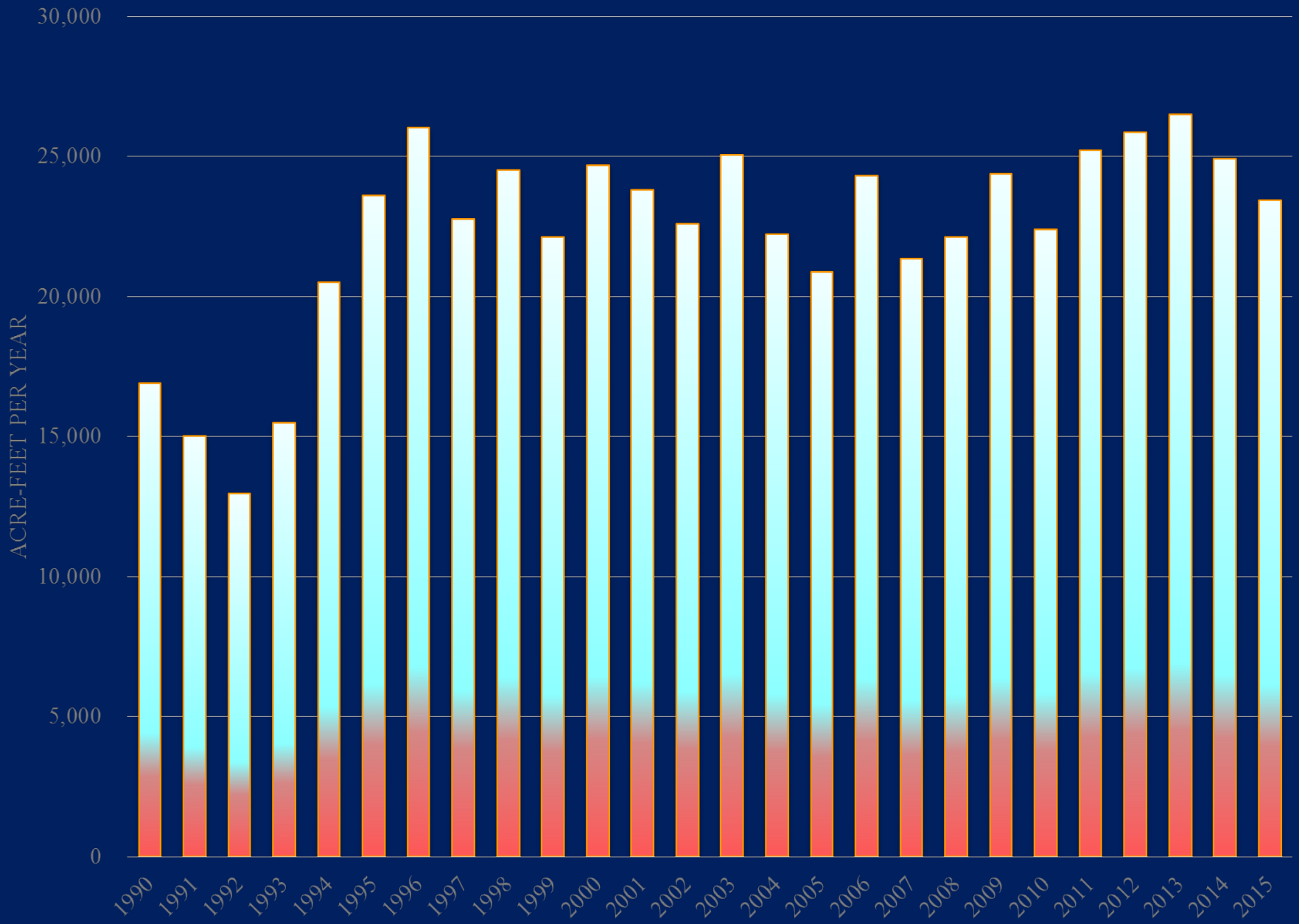

Rio Grande
Watershed
Colorado
New Mexico
Texas
N
Elephant Butte
Reservoir
El Paso
0
100
200
300
400
500 Miles

Rio Grande Diversions

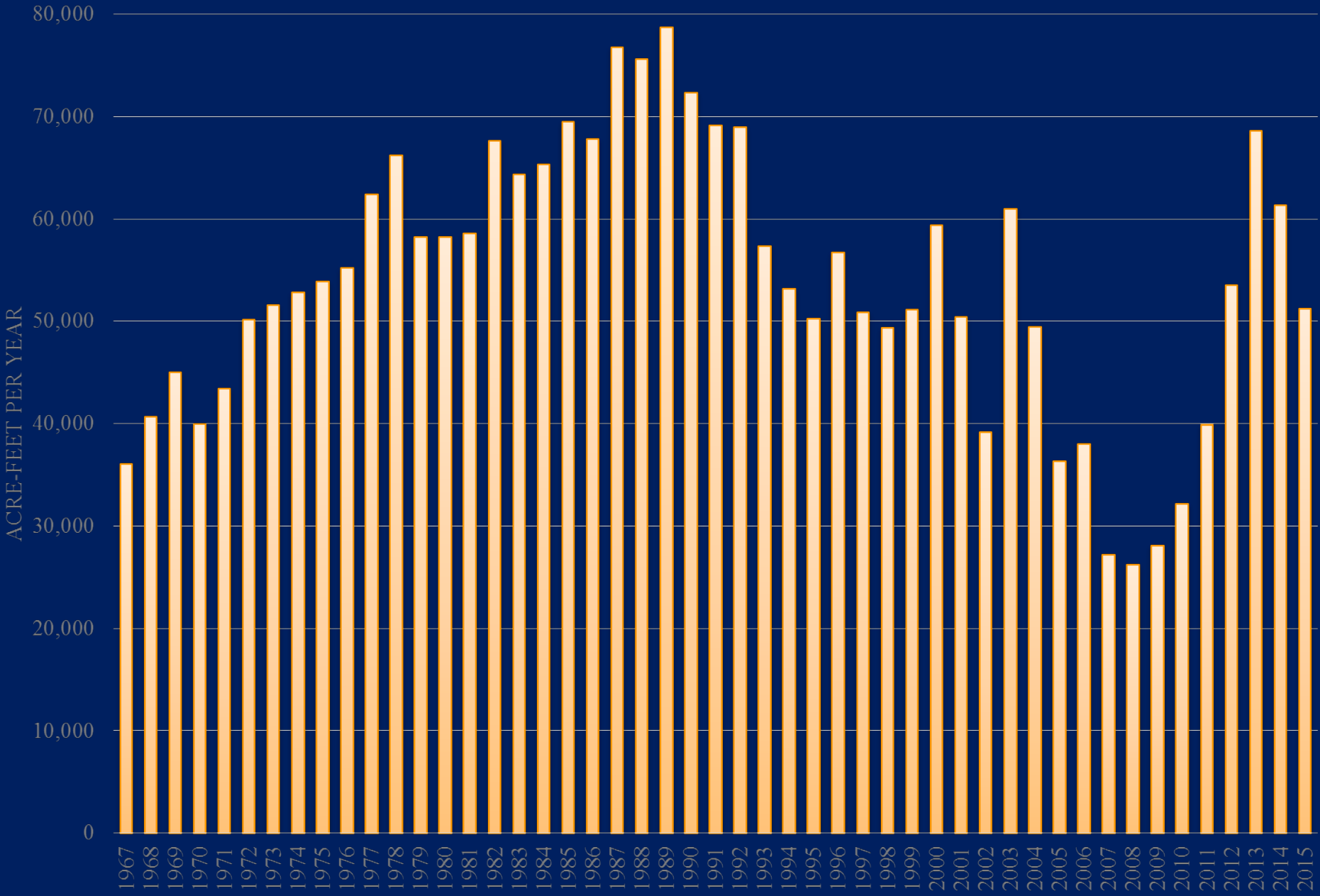


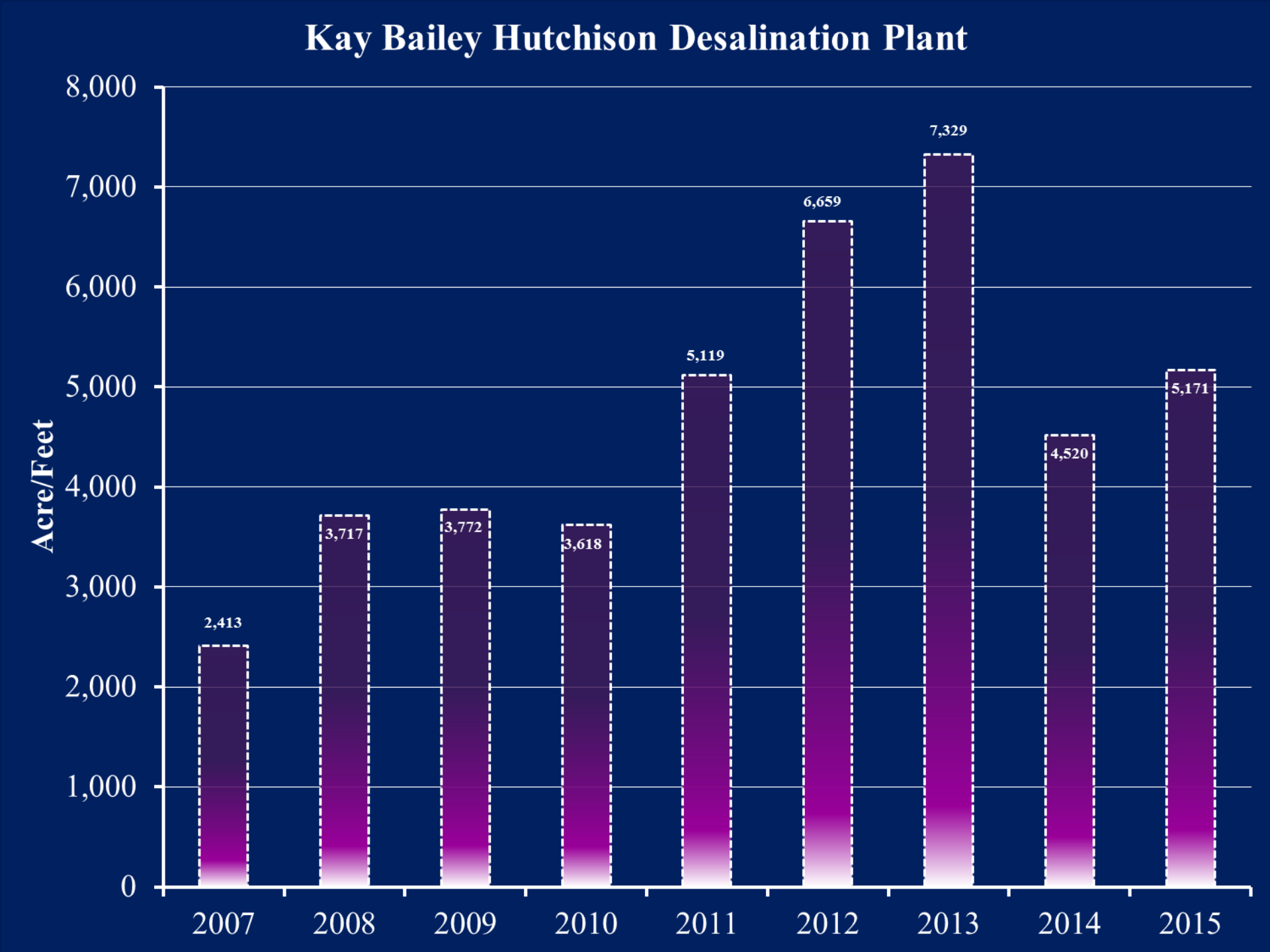

Hueco Bolson
Mesilla Bolson

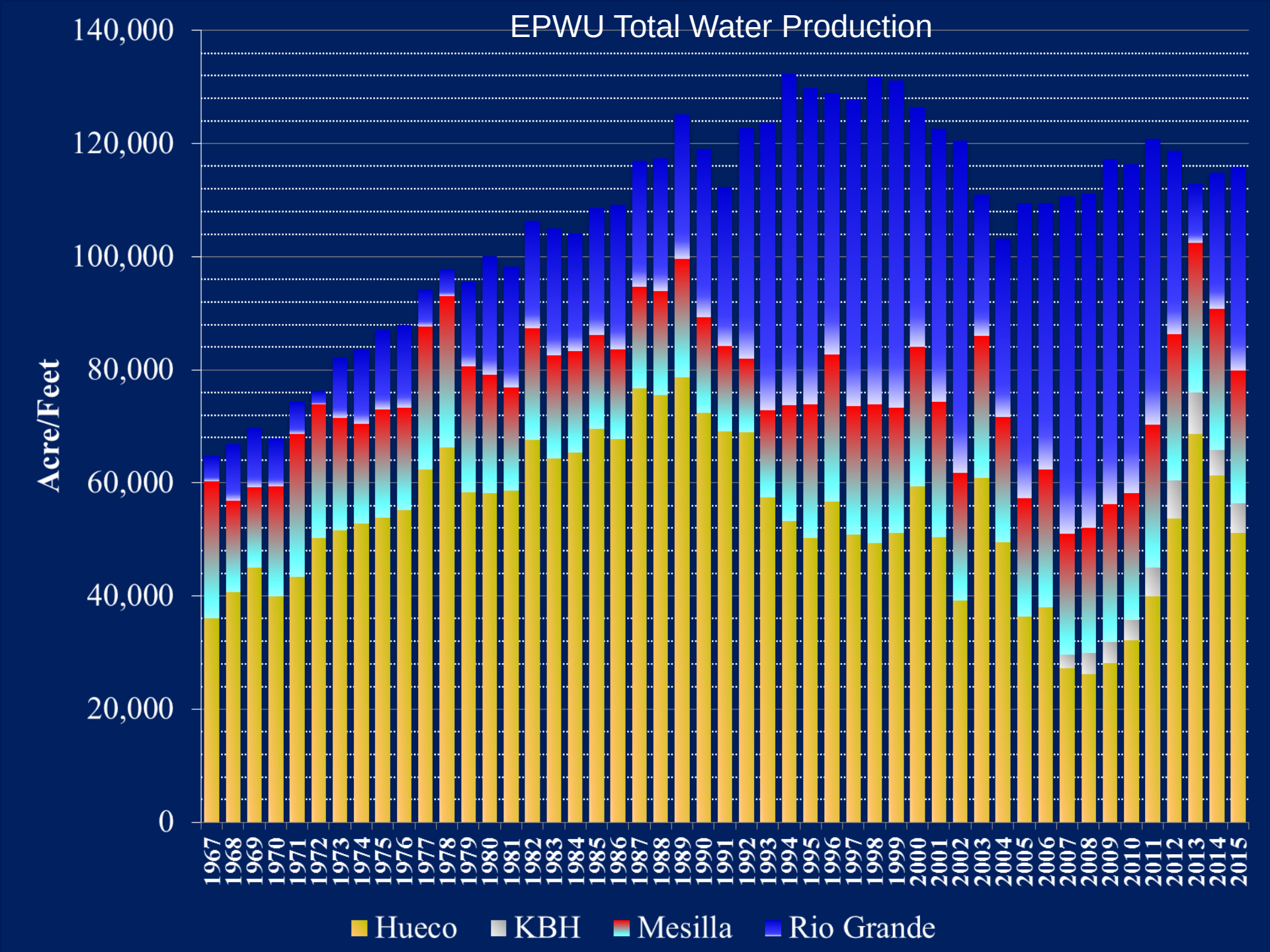
Mesilla Bolson Pumping



Hueco Bolson Pumping




Kay Bailey Hutchison Desalination Plant
Acre/Feet
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
2,413
3,717
3,772
3,618
5,119
6,659
7,329
4,520
5,171
2007
2008
2009
2010
2011
2012
2013
2014
2015


EPWU Total Water Production
Acre/Feet
140,000
120,000
100,000
80,000
60,000
40,000
20,000
0
1967
1968
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
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2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
Hueco
KBH
Mesilla
Rio Grande

Aquifer Recharge?

Aquifer Storage and Recovery

- El Paso Water Utilities uses highly-treated effluent for aquifer recharge
- Groundwater levels
- Improve water quality of the aquifer

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Aquifer Storage and Recovery

- Fred Hervey Water Reclamation Plant effluent is also used for turf irrigation and industrial cooling
- Since 1985, over 75,000 ac-ft of effluent has been recharged to the Hueco Bolson
- Only reclaimed water ASR program in Texas

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Fred Hervey Water Reclamation Plant

- First oxidation pond built in late 1950s
- Original plant built in 1985 (10 MGD)
- Plant located 20 miles from the Rio Grande, effluent discharge to the river not economical
- Expanded plant capacity (12 MGD)

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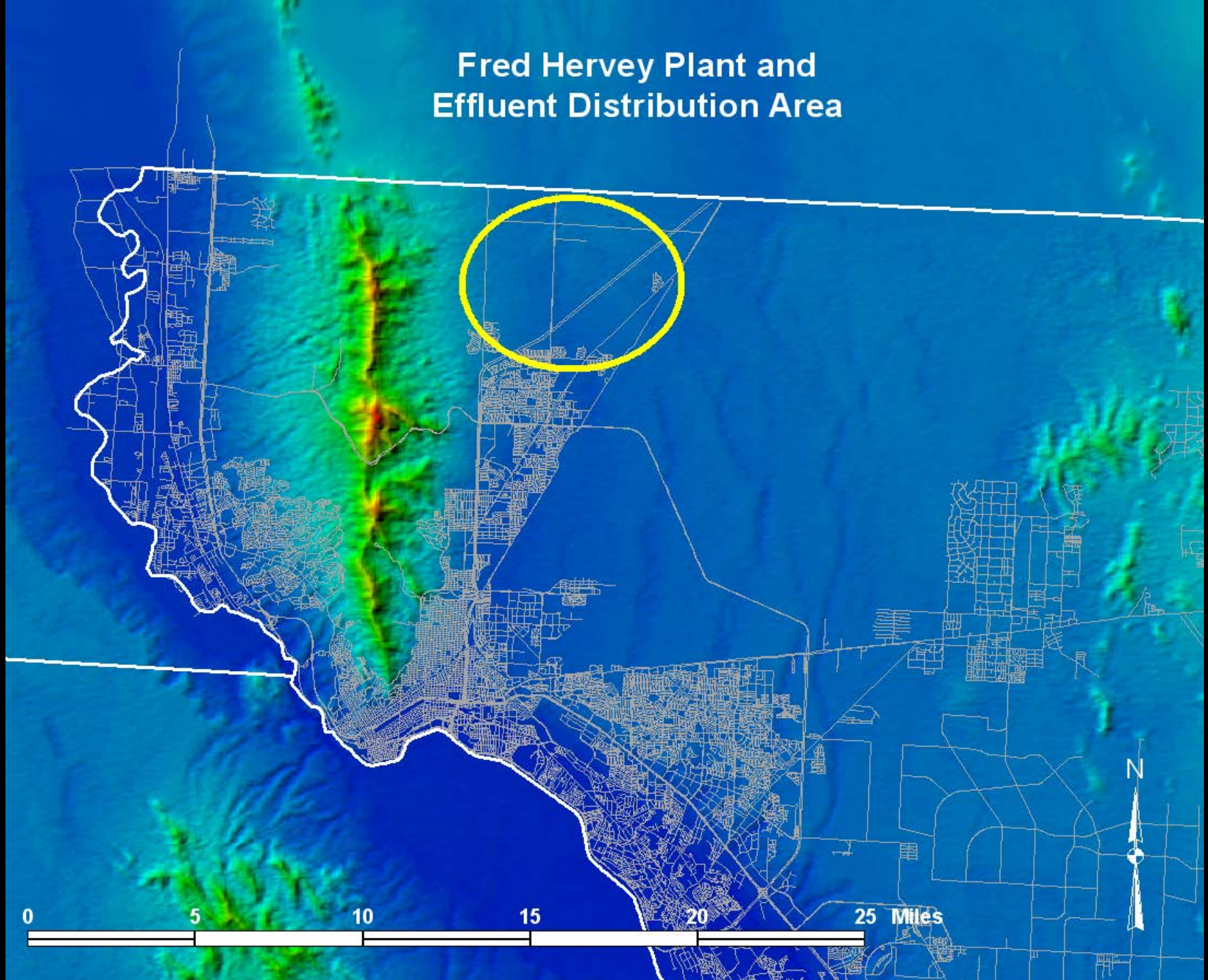
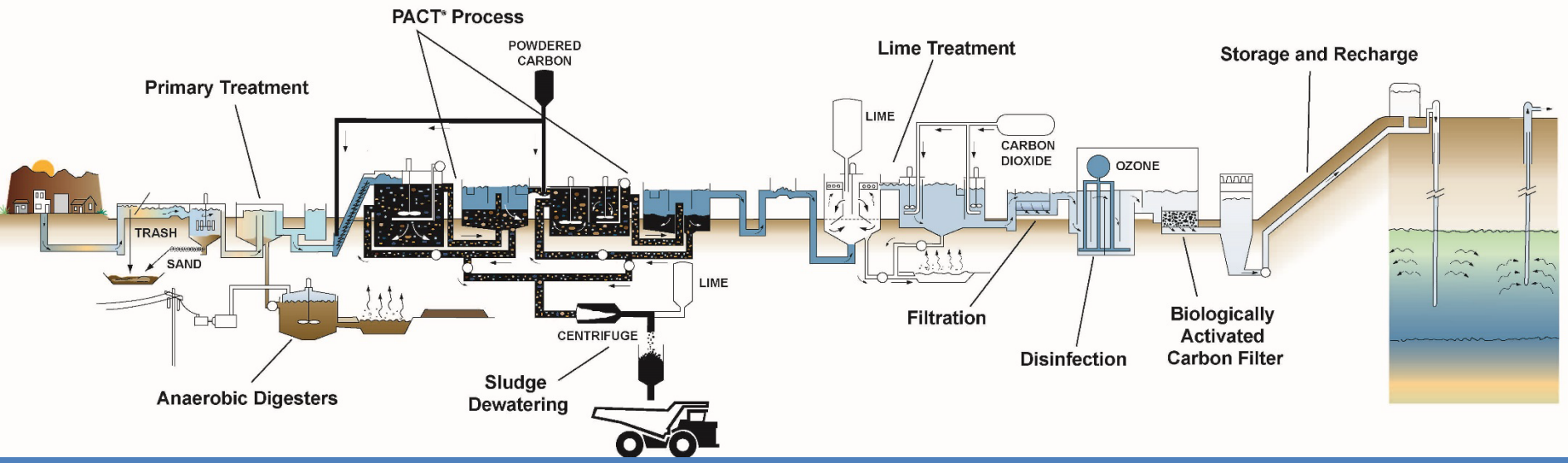

Fred Hervey Plant and
Effluent Distribution Area
N
0
5
10
15
20
25 Miles


ASR
Storage Basin
Chlorination
Lime Treatment
Filtration & Disinfection
(OZONE and GAC)
PACT Process
Center Control
Anaerobic Digesters
Carbon Regeneration
Primary Treatment

Fred Hervey Water Reclamation Plant Treatment Process



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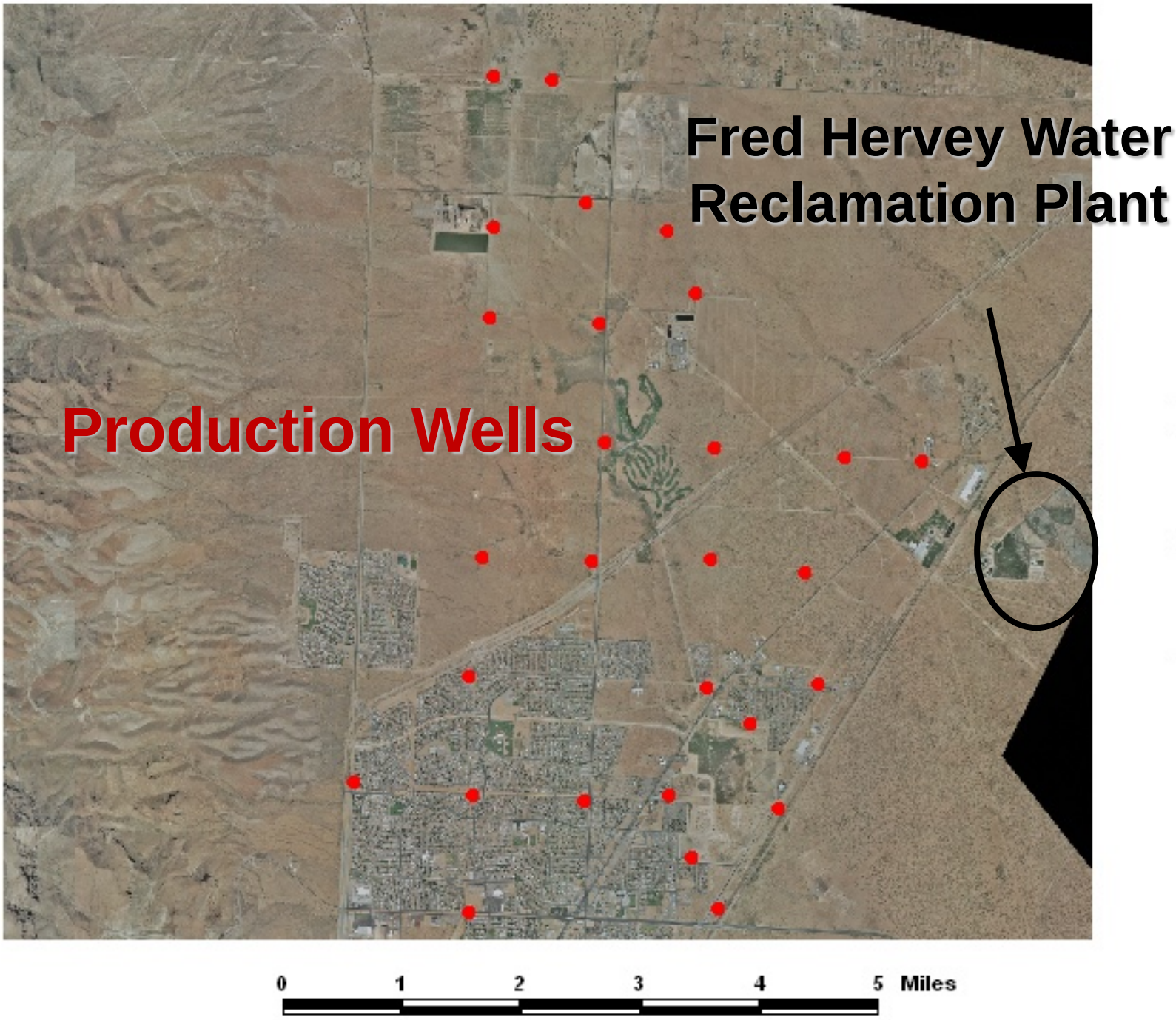
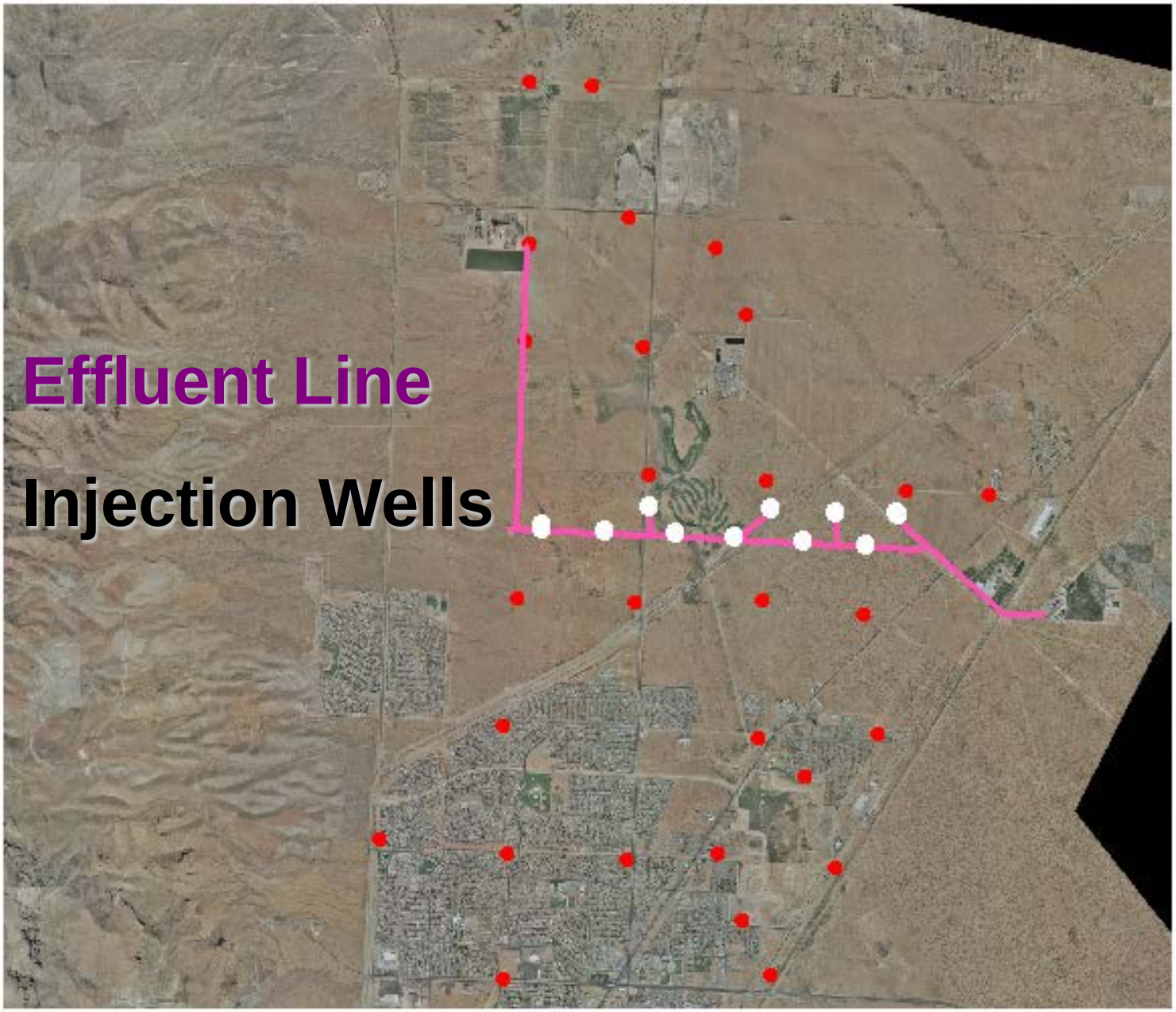
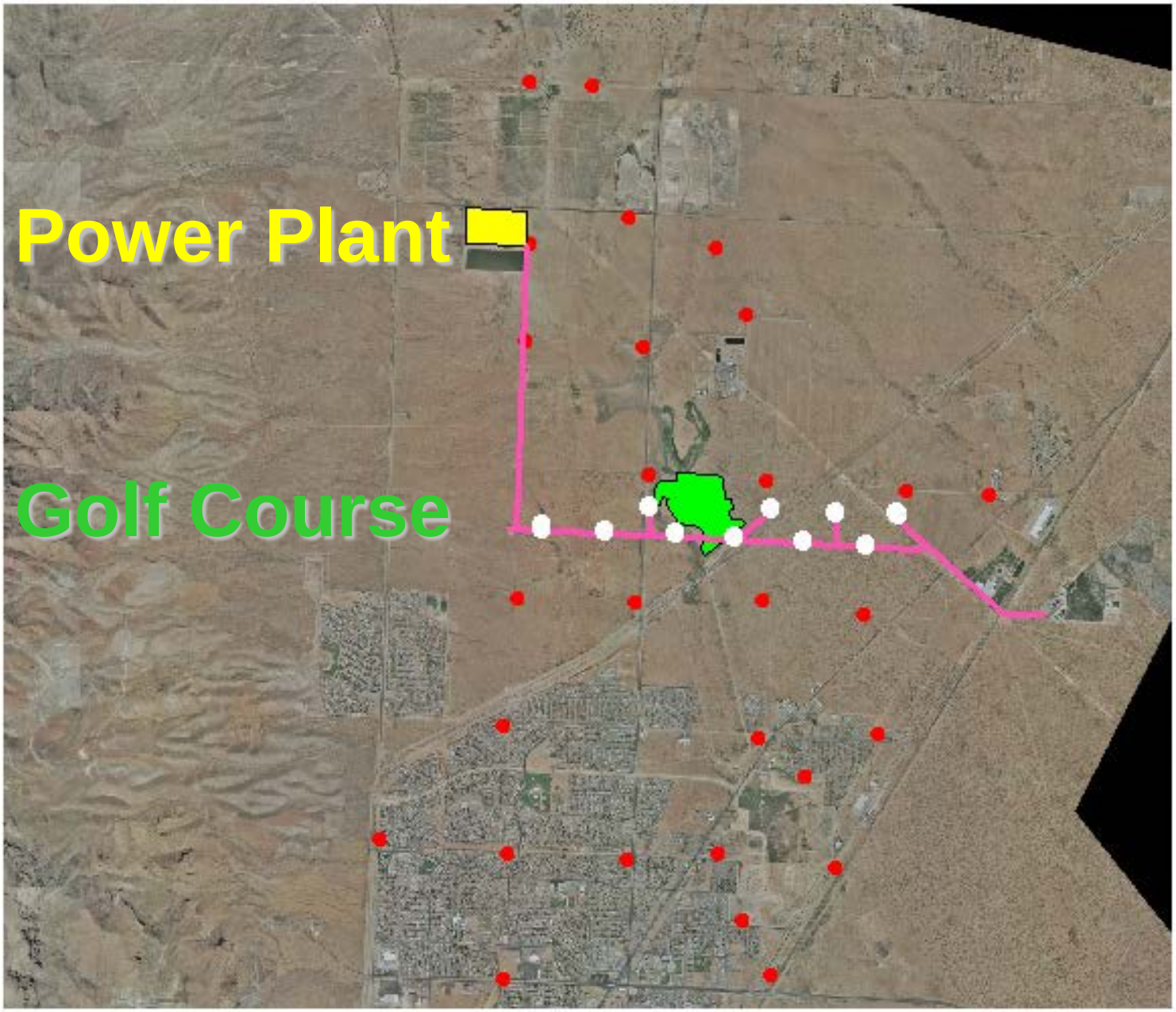
Fred Hervey Expansion


Fred Hervey Water Reclamation Plant
Production Wells
N
0
1
2
3
4
5 Miles


Effluent Line
Injection Wells
N
0
1
2
3
4
5 Miles


Power Plant
Golf Course
N
0
1
2
3
4
5 Miles

Injection Well Summary

- 10 injection wells completed with galvanized casing and well screen in 1984
- Due to concerns about corrosion in well casing material, PVC was used to complete injection wells
- 2 PVC wells are in service

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AWWARF Research Foundation Study (2003)

- Comparison of alternative methods for recharge of a deep aquifer
- Spreading Basin completed beneath the caliche at the surface
- Dry well completed in vadose zone below caliche and clays to speed transit to aquifer

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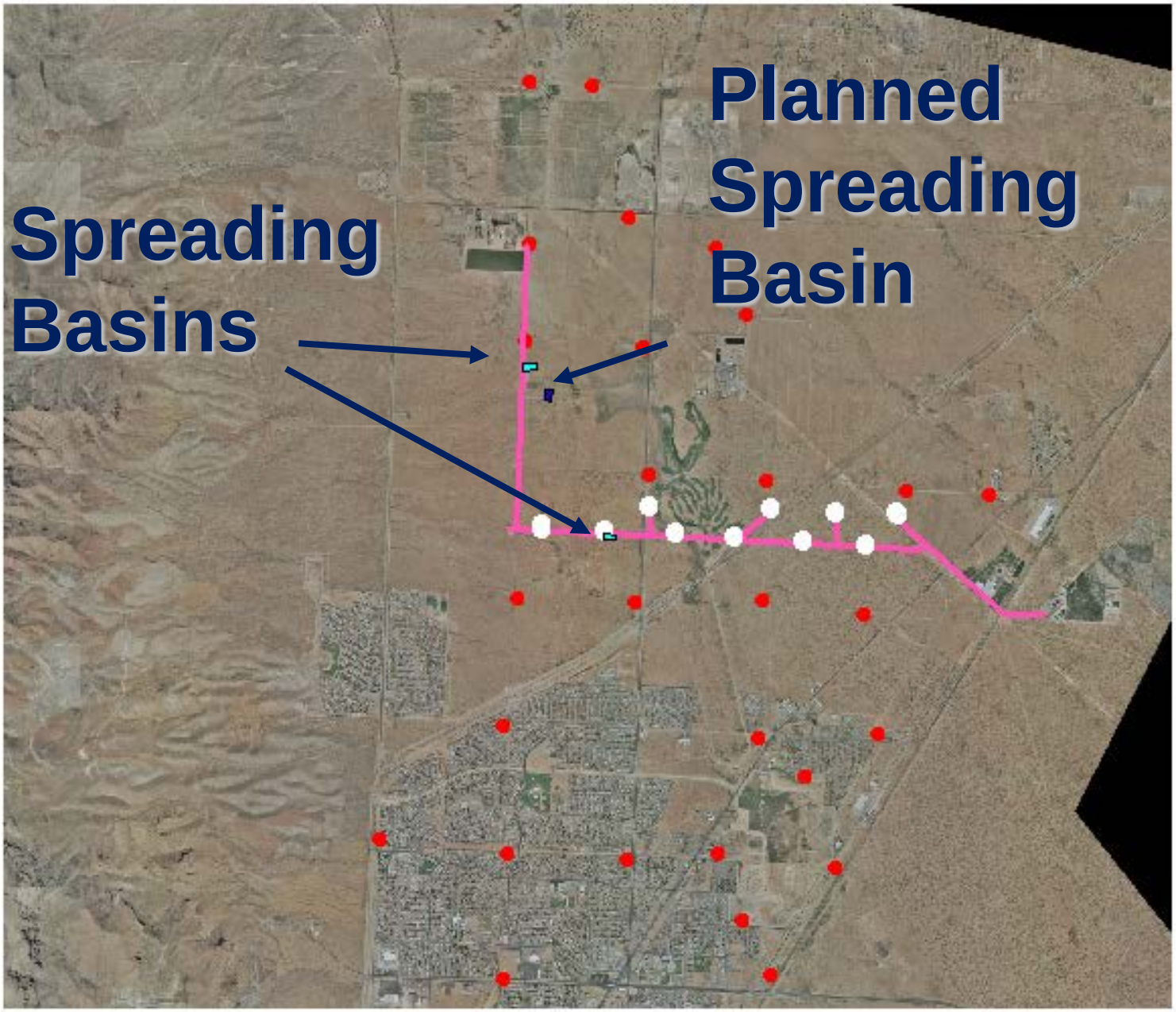
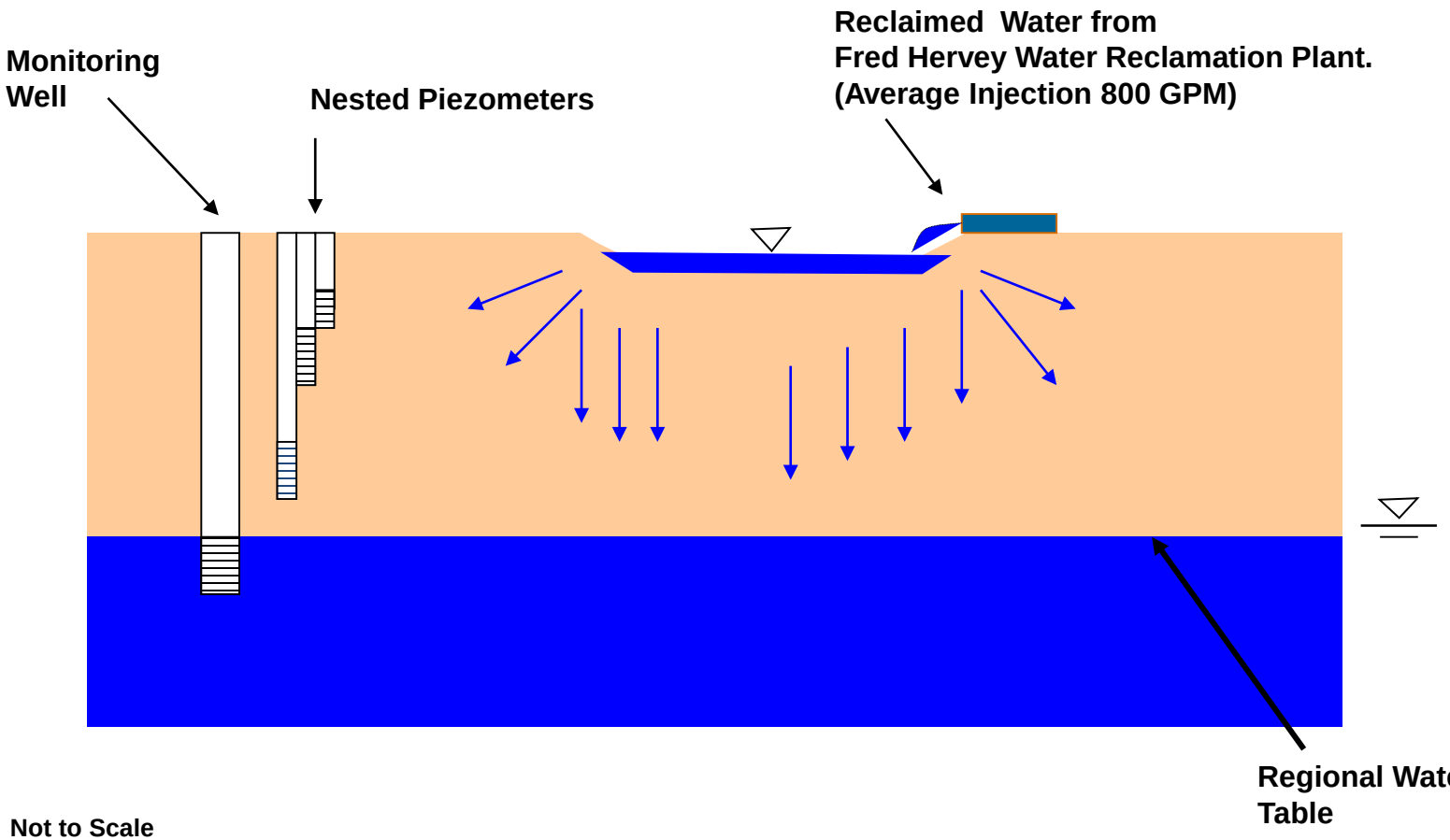

Spreading Basins
Planned Spreading Basin
N
0
1
2
3
4
5 Miles

AWWARF Study Infiltration Basin



Initial Start-Up of Recharge Basin

Recharge Basins

- Cost effective
- More land area required
- Must be completed below caliche horizon

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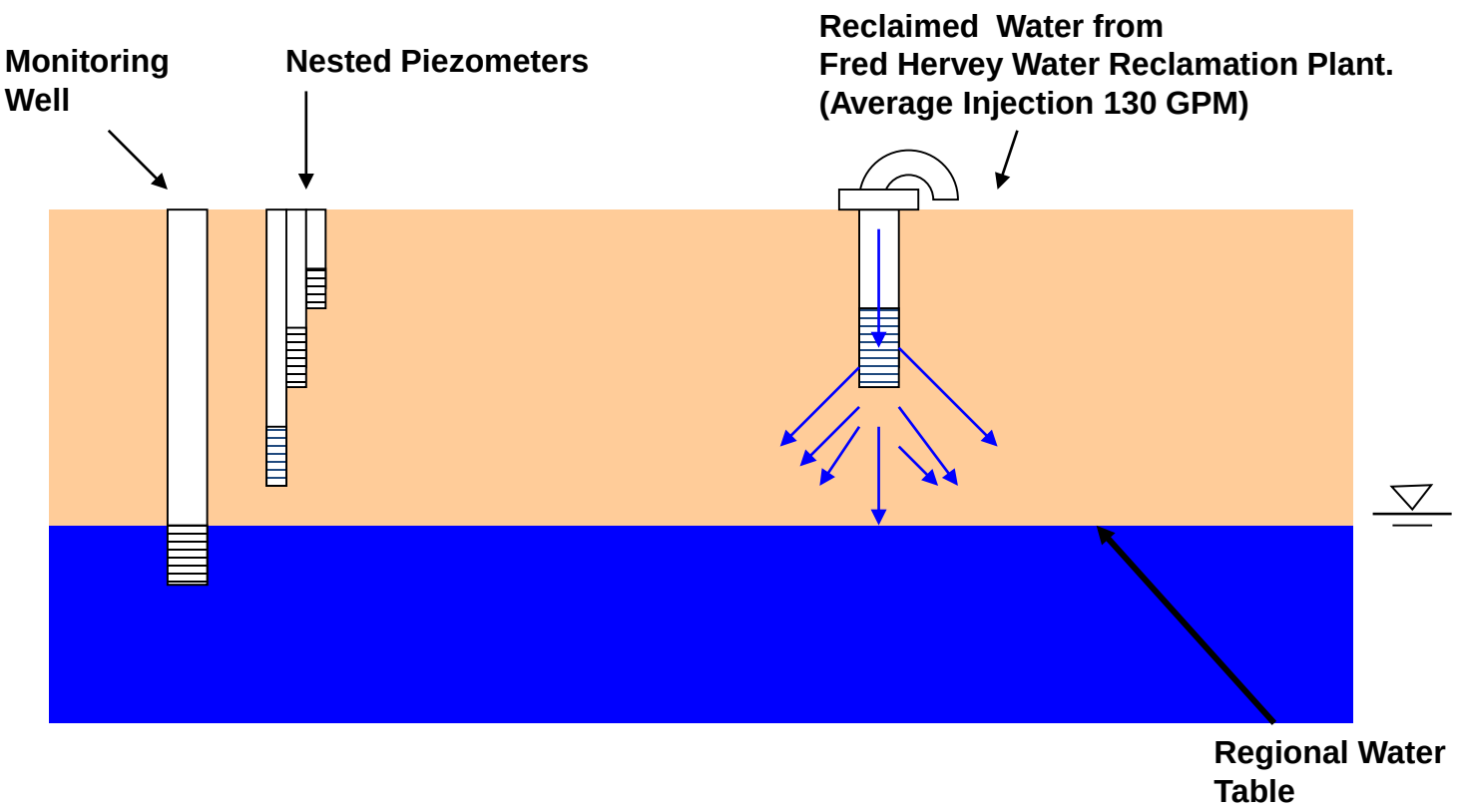
AWWARF Study
Shallow Injection Well (Dry Well)



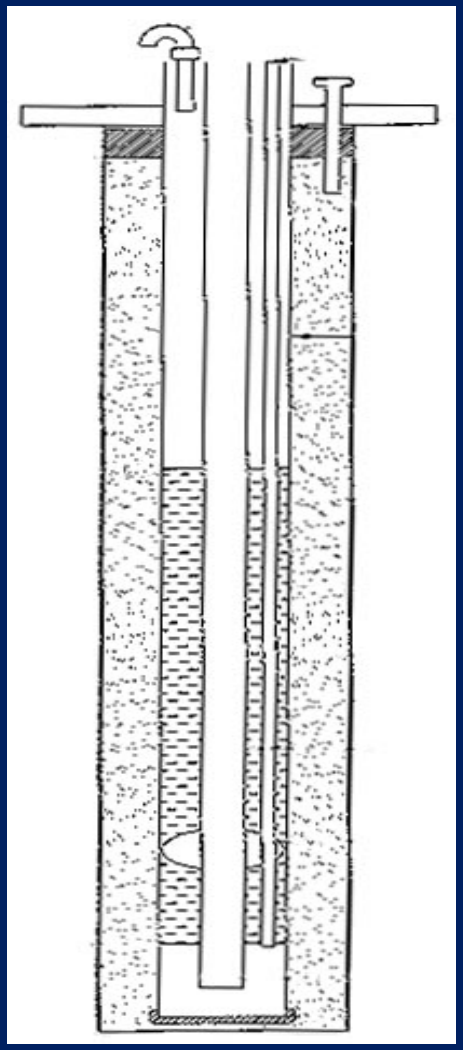
Not to Scale

Shallow Injection Well (Dry Well)

Casing Diameter 12”

Injection Tubing 4”

Total depth 170 ft



Shallow Injection Wells (Dry Wells)

- Well has modest land area requirements
- Well screen is installed beneath surficial caliche

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Surface Completion of Dry Well

Study Results

- Dry well was ineffective
- Spreading basin was capable of maintaining a high recharge rate
- Basins are a cost effective alternative to dry wells or injection wells

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Uses of Fred Hervey Effluent

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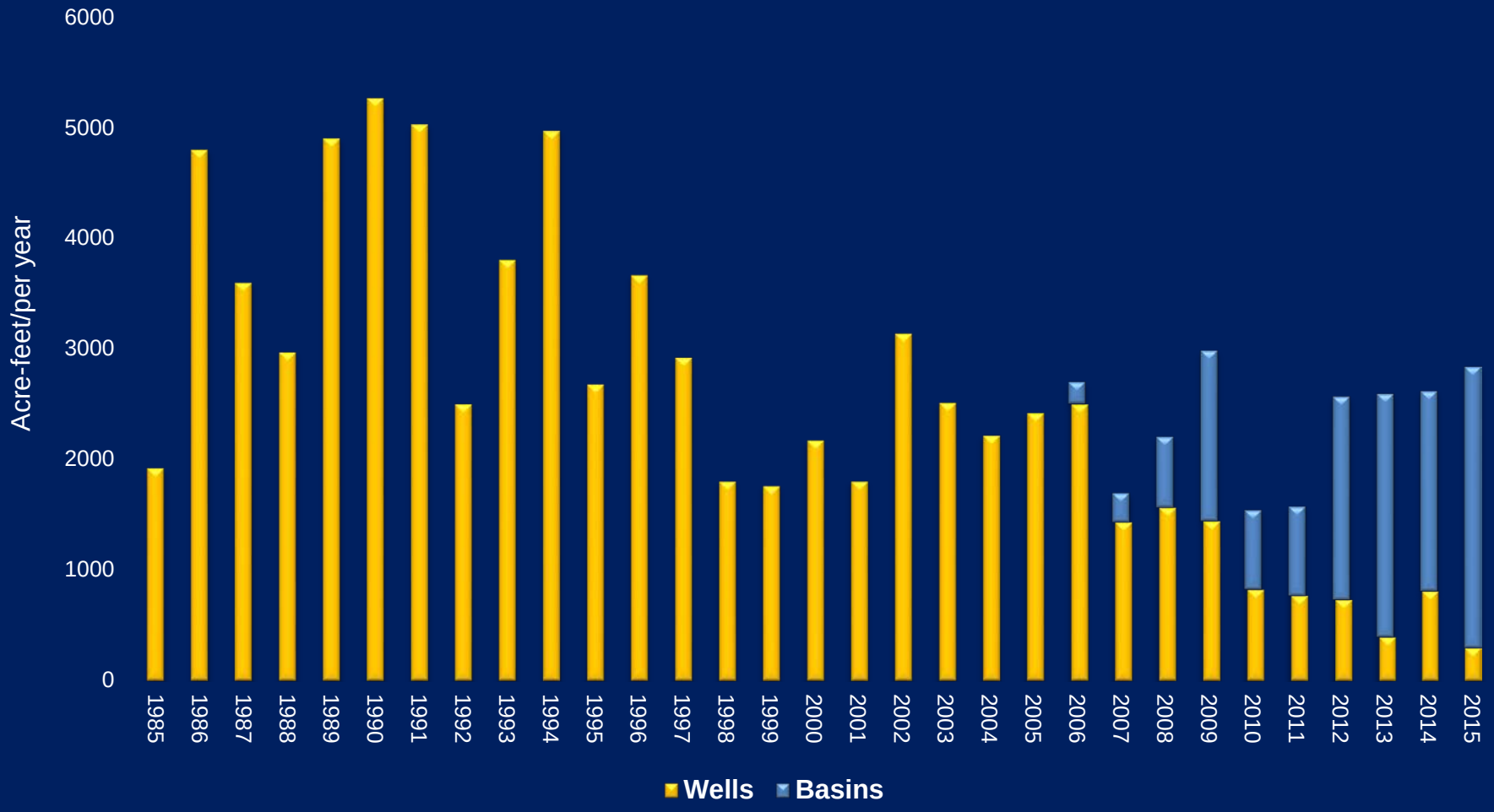
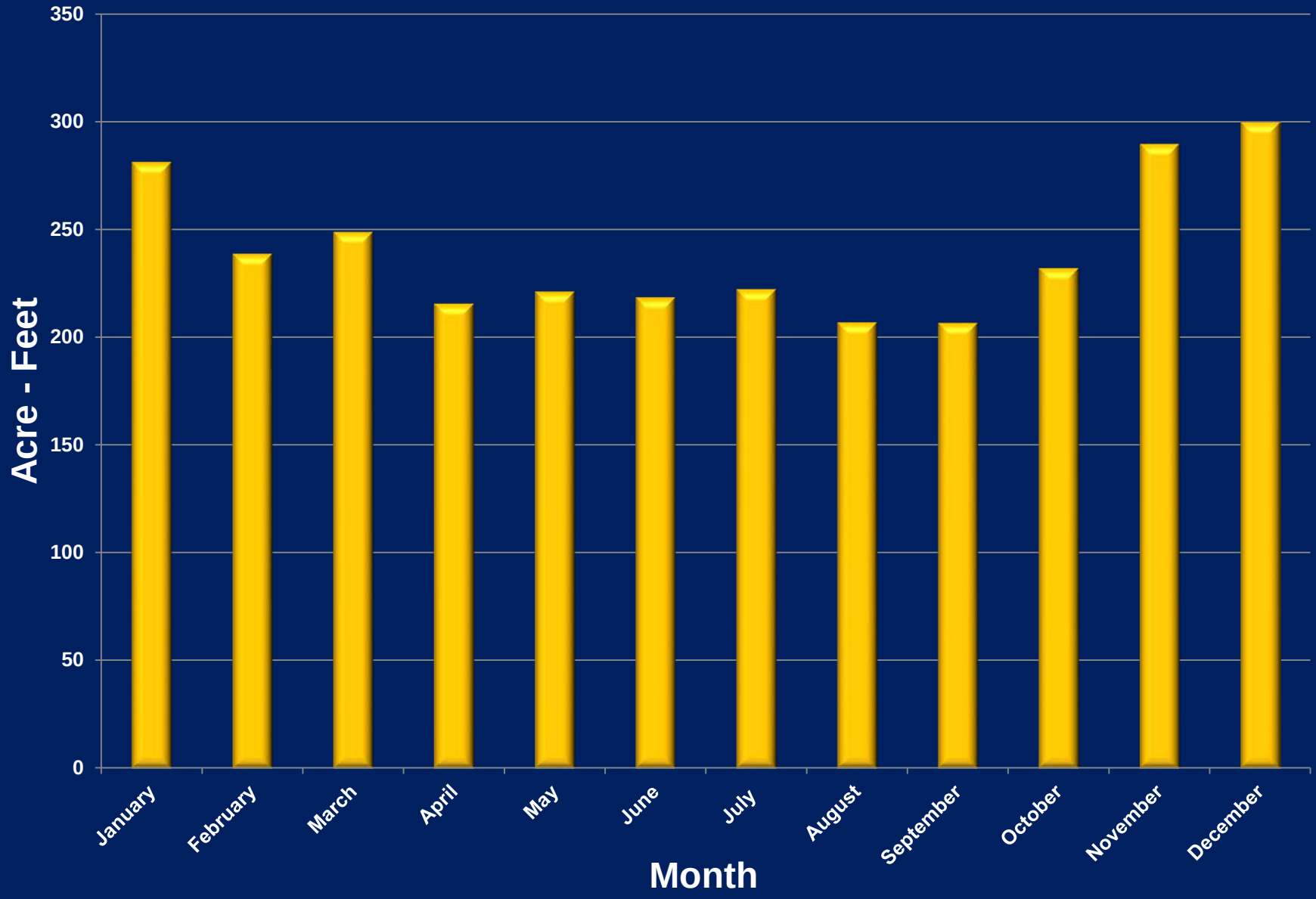
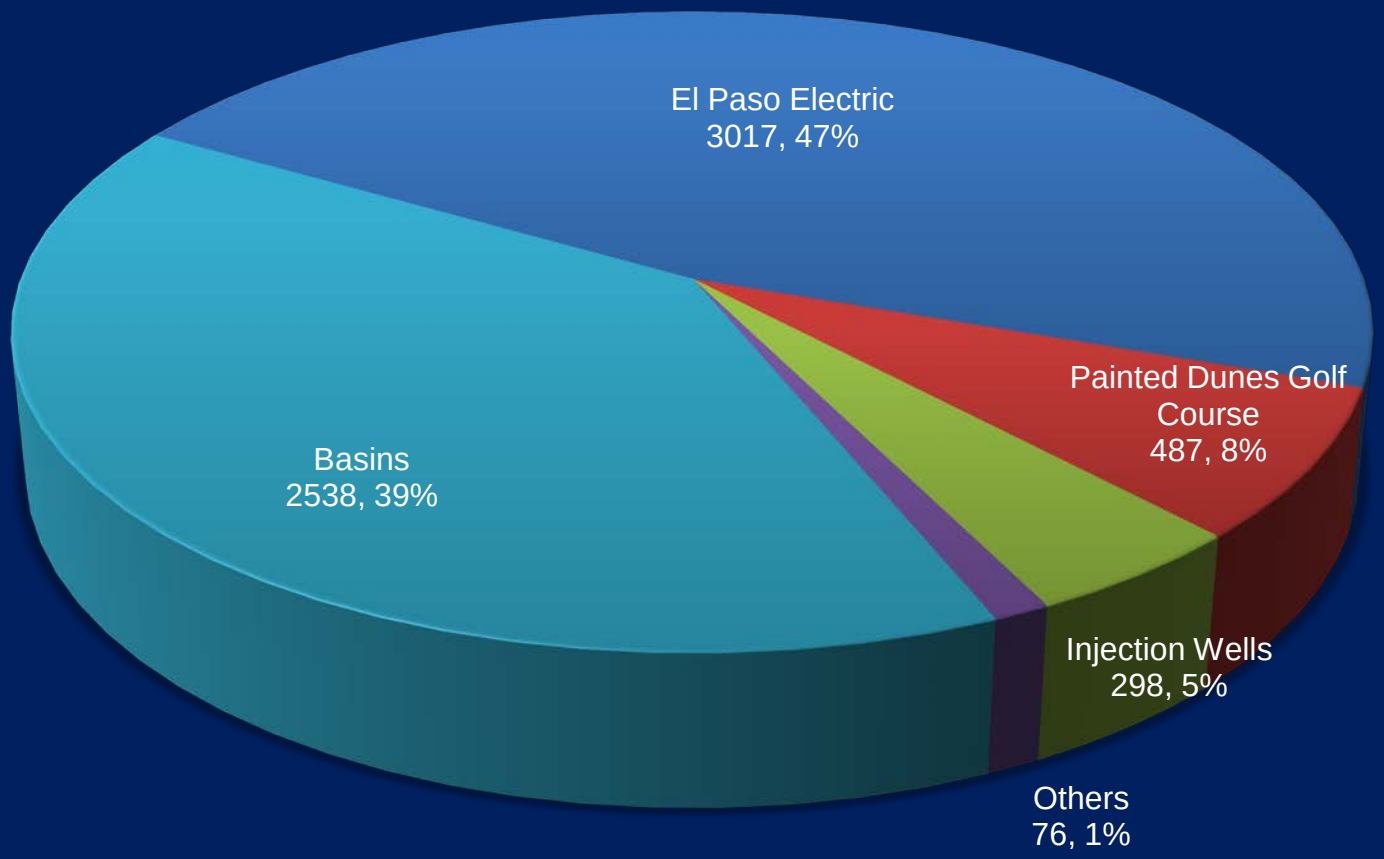
Fred Hervey Reclaimed Water Recharge (1985-2015)



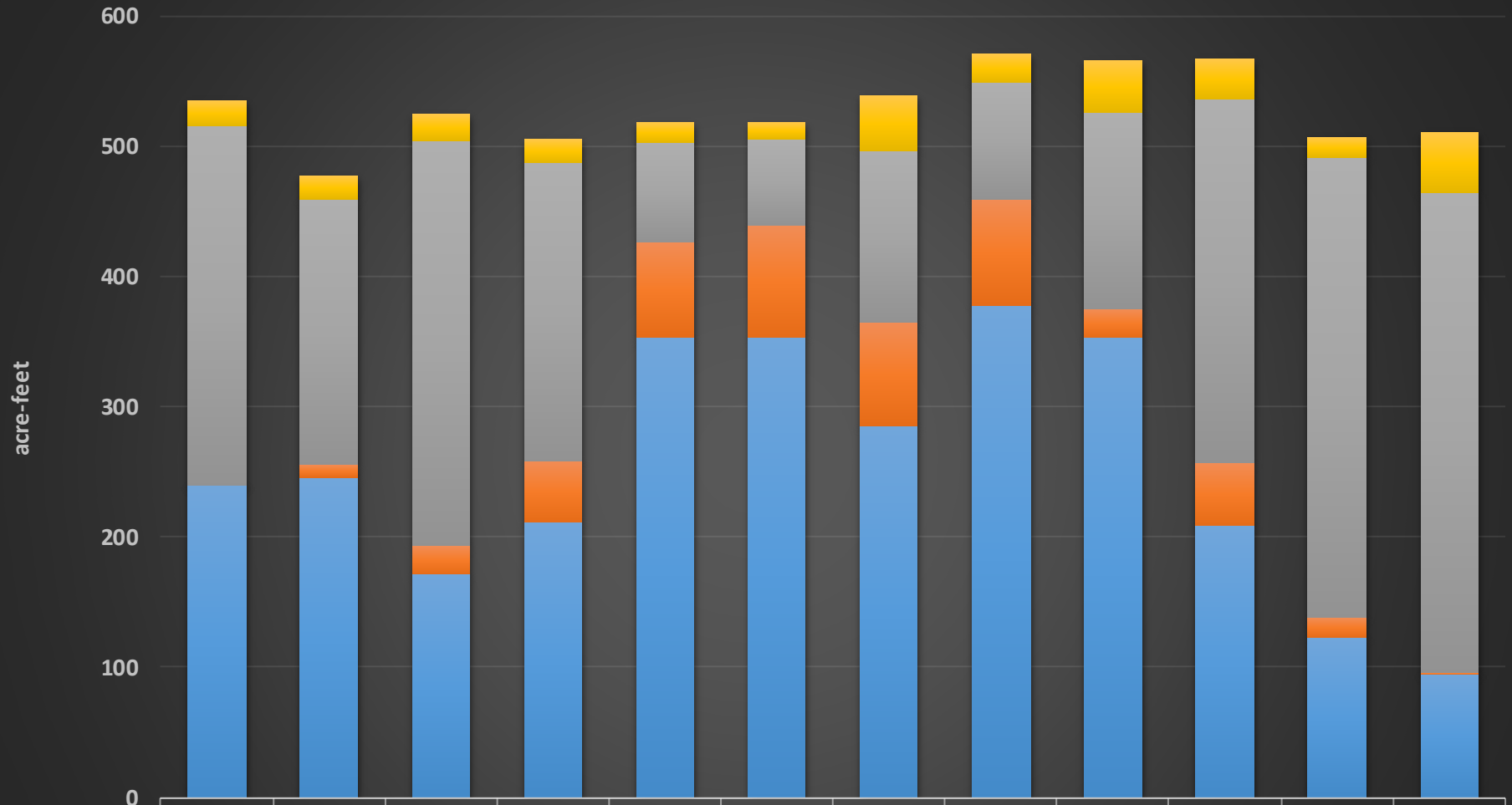
Monthly Injected Average (1985-2014)



2015 Fred Hervey Effluent Distribution by Use (acre-feet)



2015-Fred Hervey Effluent All Uses



	January	February	March	April	May	June	July	August	September	October	November	December
Injection wells	18	18	21	18	15	12	43	21	40	31	15	46
basins	277	204	310	229	77	67	131	90	151	279	354	369
PDGC	0	10	22	47	73	86	80	82	22	49	15	1
EPEC	239	246	172	212	353	353	285	377	353	209	123	95

Additional Aquifer Recharge Using Treated Surface Water

- Water rights for 70,000 AF/year
- Maximum annual diversion – 60,000 AF/year
- Early irrigation season supply vs. demand
- Aquifer Recharge Master Plan

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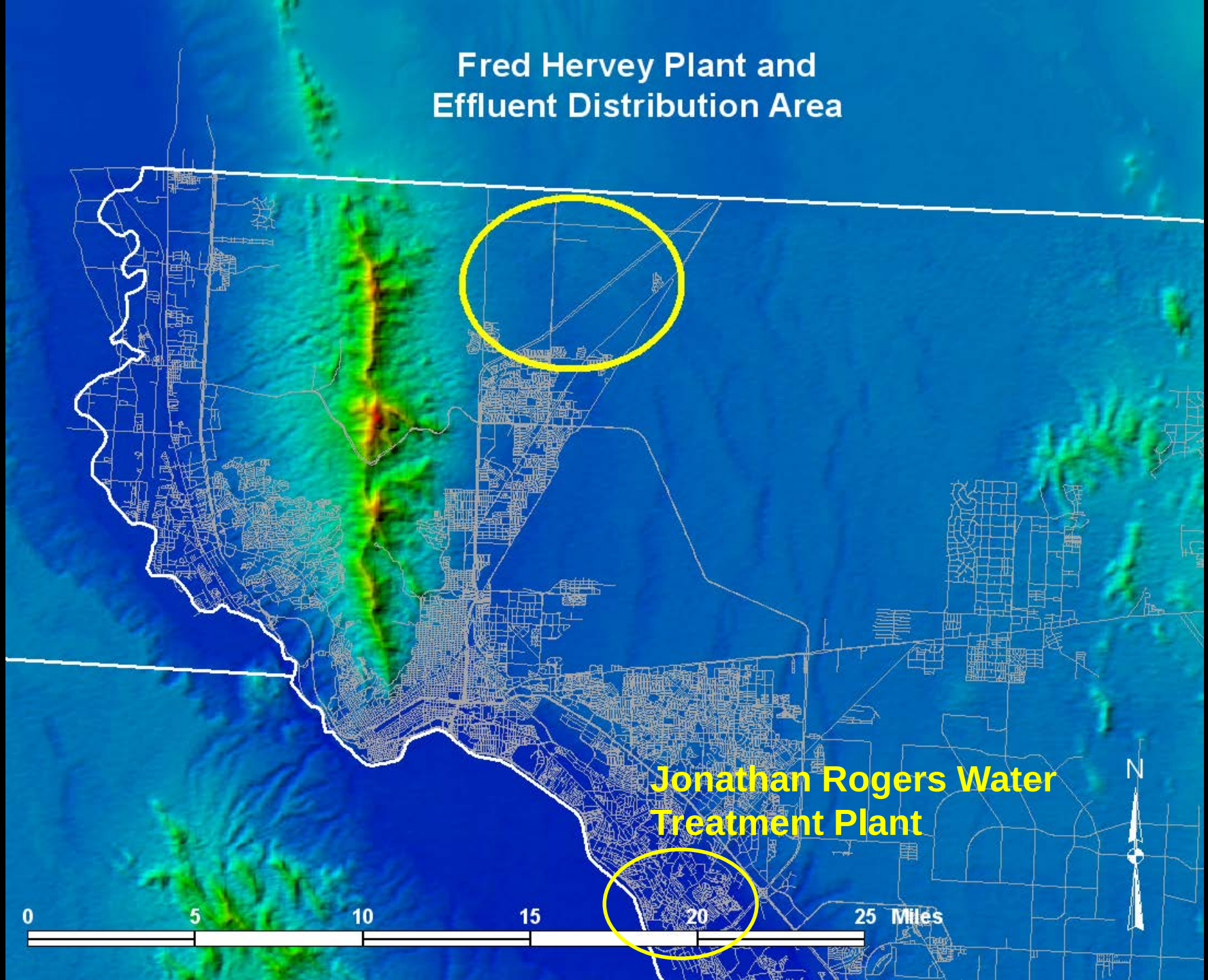
Fred Hervey Plant and
Effluent Distribution Area
Jonathan Rogers Water
Treatment Plant
N
0
5
10
15
20
25 Miles

Future Plans

- Additional spreading basins included into EPWU Northeast plan
- 5 “basin pairs” in current TCEQ permit
- Surface Water from Rio Grande (Jonathan Rogers Water Treatment Plant)

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Questions?

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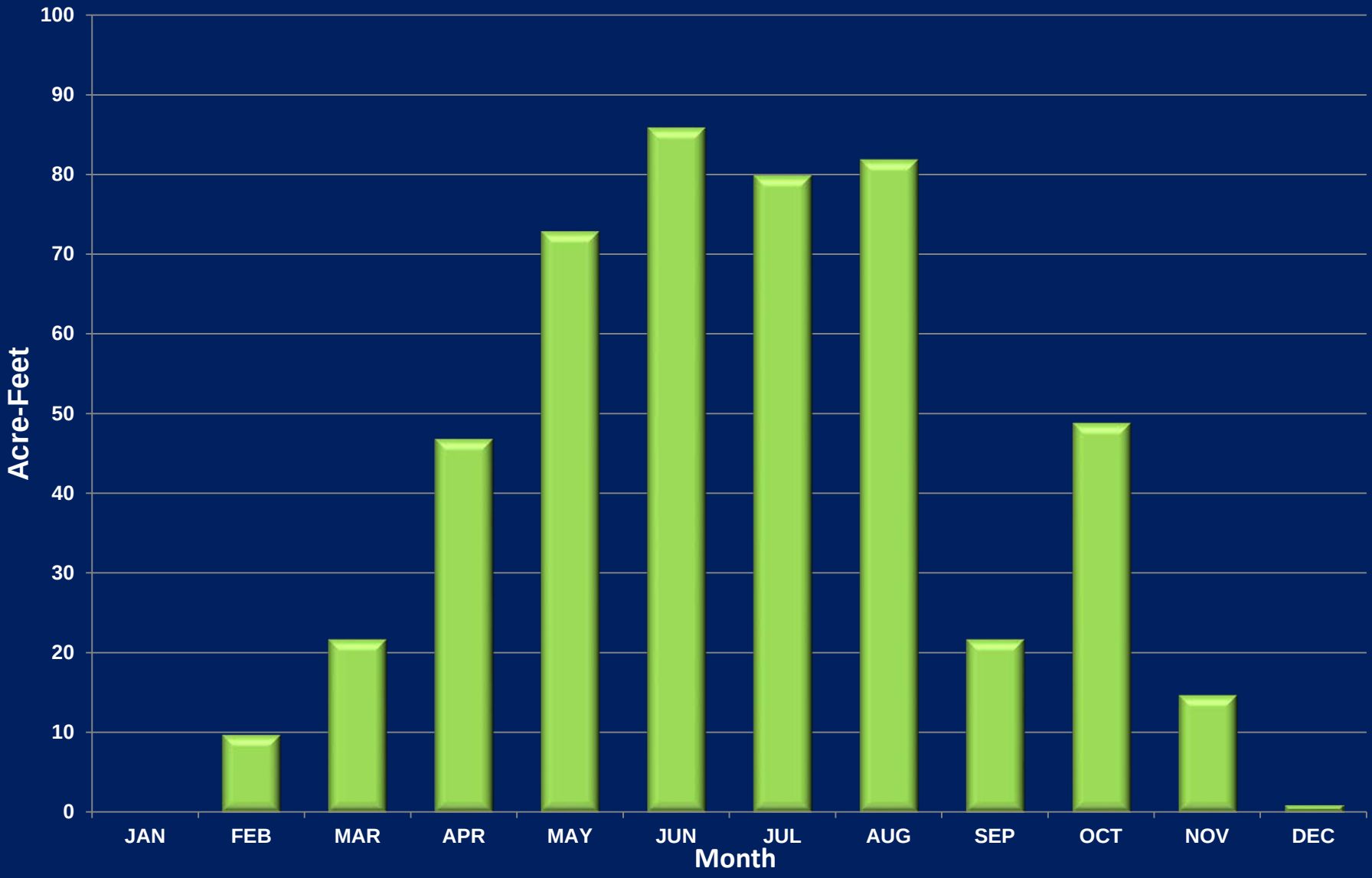
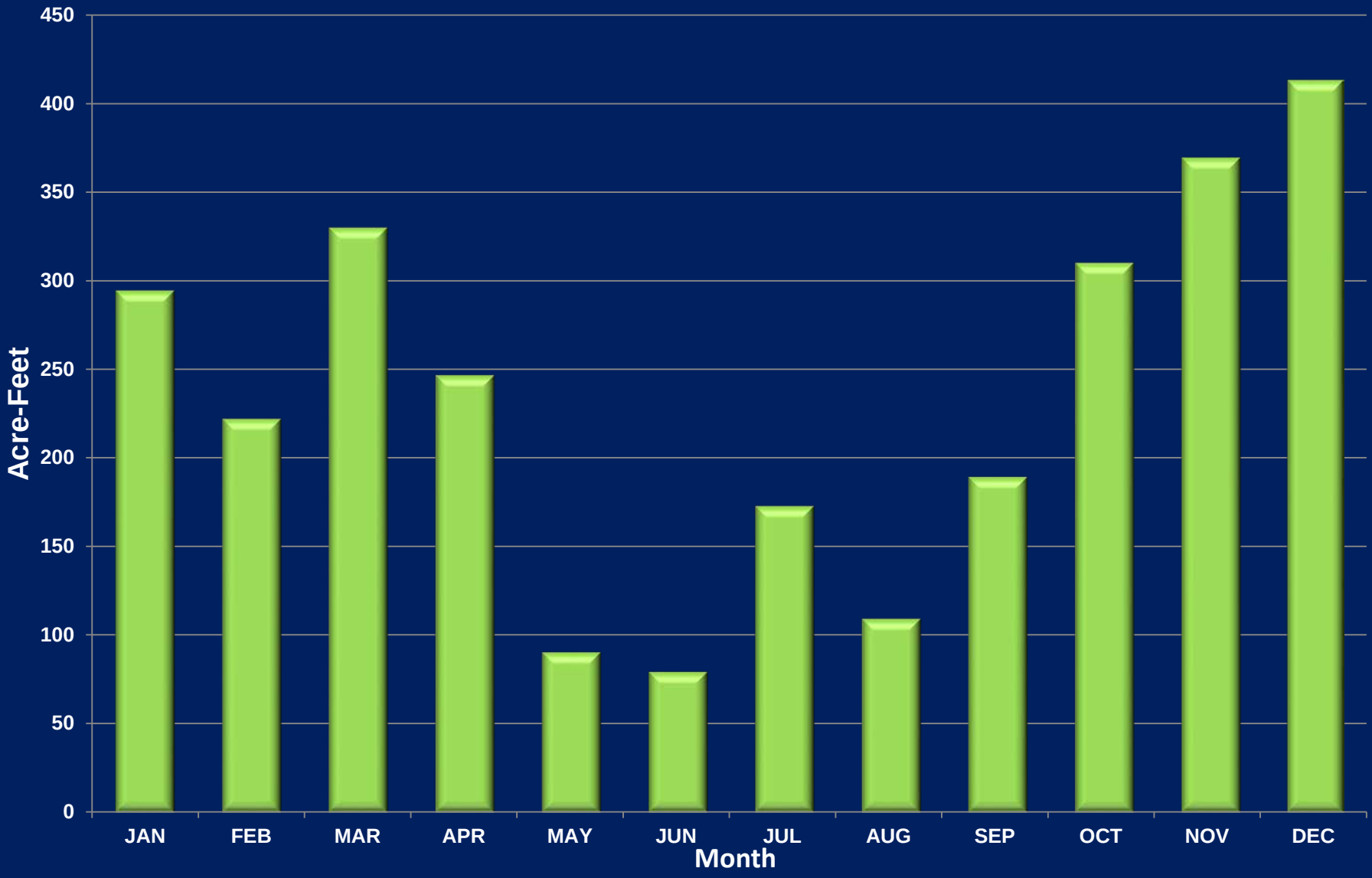
Fred Hervey Effluent Painted Dunes Golf Course - 2015



Fred Hervey Effluent Injected & Infiltration Basin - 2015



Fred Hervey Effluent E.P.E.C. - 2015