Slattery & Hendrix Engineering LLC
Water Resources, Water Rights and Computer Modeling

Republican River Water Conservation District

Meeting with County Commissioners and Groundwater Management Districts

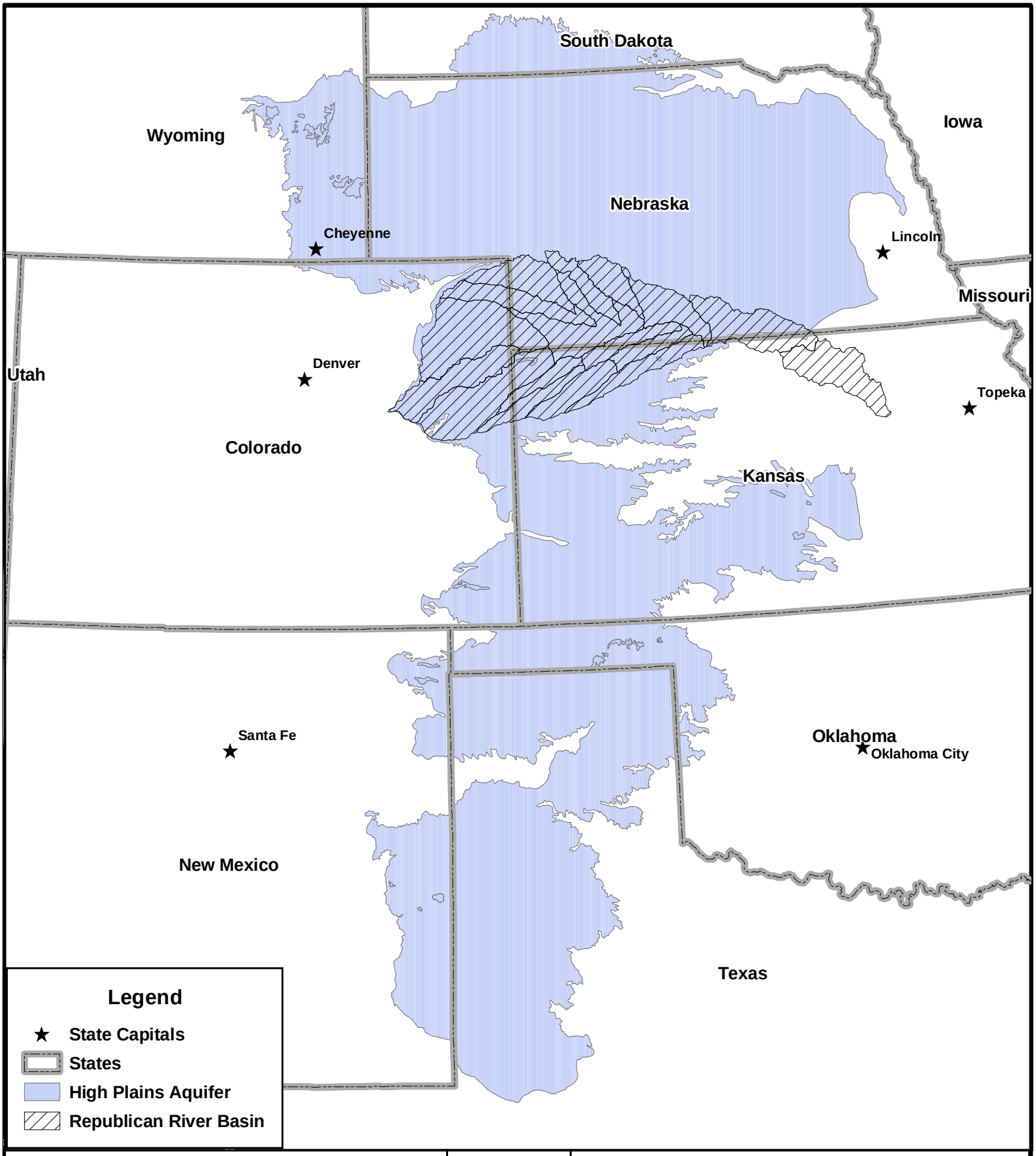
December 14, 2009

Yuma, Colorado

Presented by Jim Slattery and

Prepared in cooperation with Randy Hendrix

8357 Windhaven Drive
Parker, CO 80134
(303) 309-0061



High Plains Aquifer

N

Helton & Williamsen, P.C.

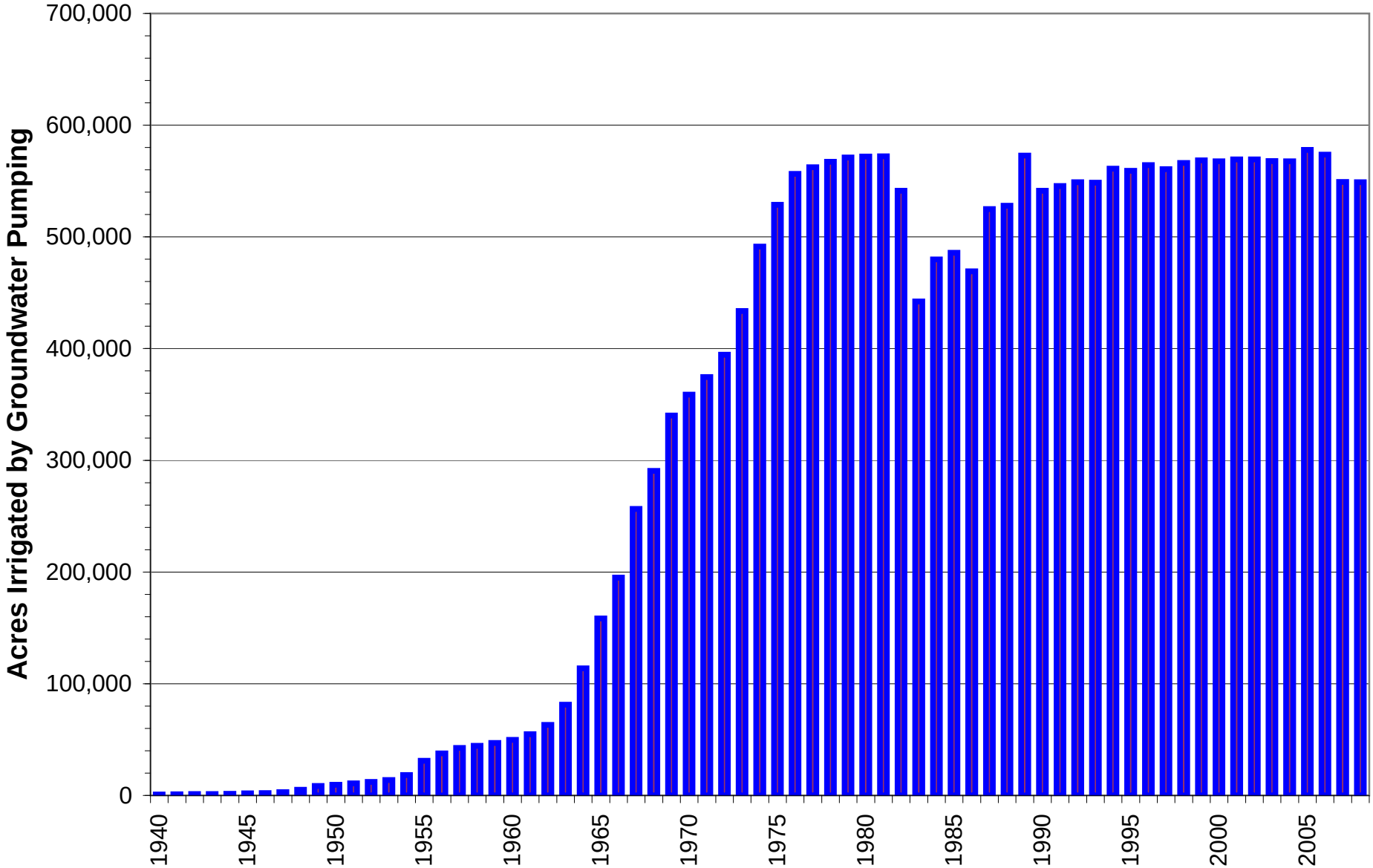
	DRAWN BY: Randy Hendrix	Checked by:
Job No. R1601	FILE: High Plains.mxd	Rev. Date:
DATE: 04/04/2007	0 50 100 200 300 Miles	

REPUBLICAN RIVER COMPACT

1. Compact Signed in 1942
2. Colorado Allocation of 54,100 ac-ft/yr
3. 1998 Kansas filed complaint in the United States Supreme Court
4. December 15, 2002 Final Settlement Stipulation
5. Colorado is not in compliance
6. Draft Compact Rules by State of Colorado

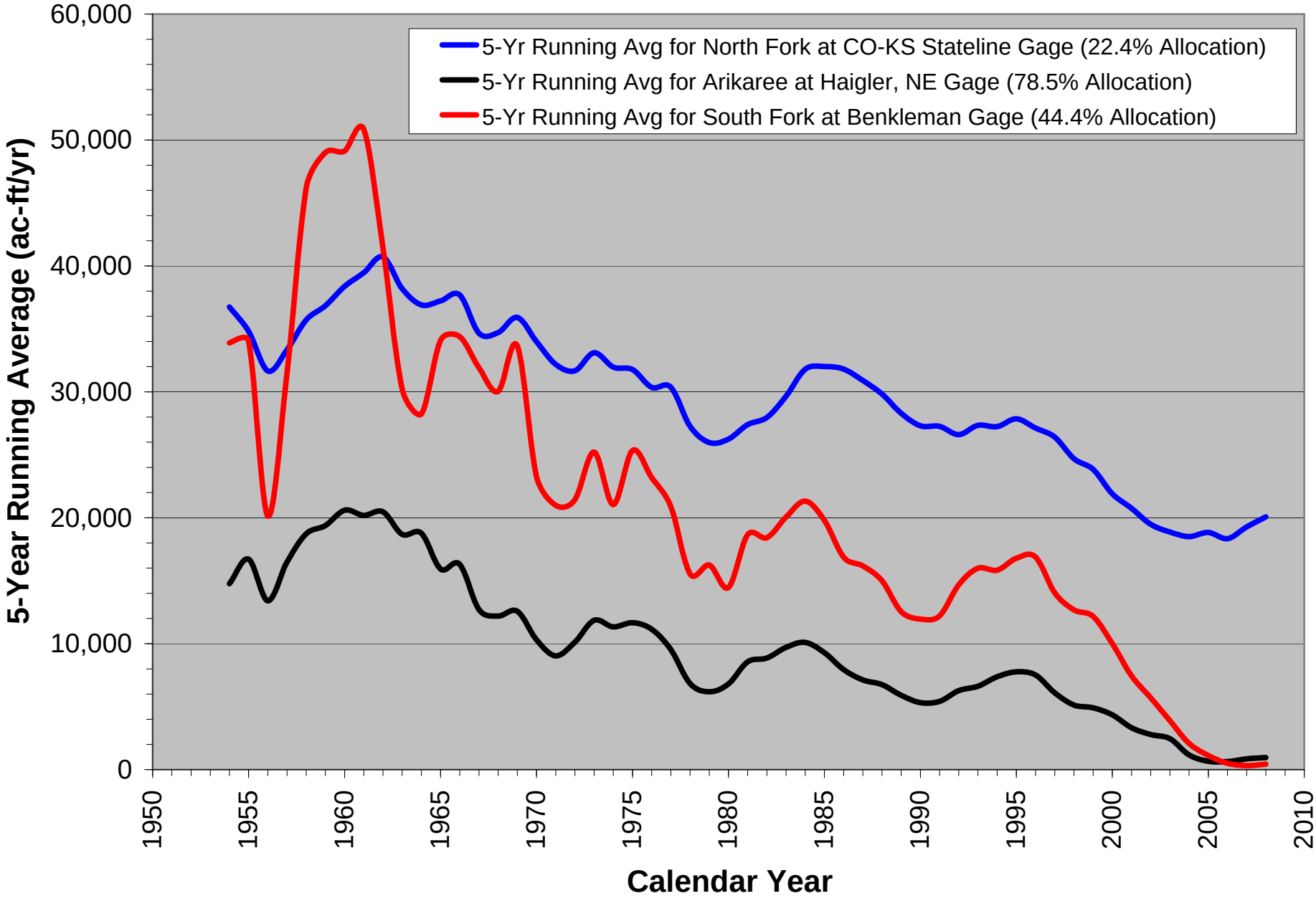
Figure 1

Acres Irrigated by Groundwater Pumping in Colorado



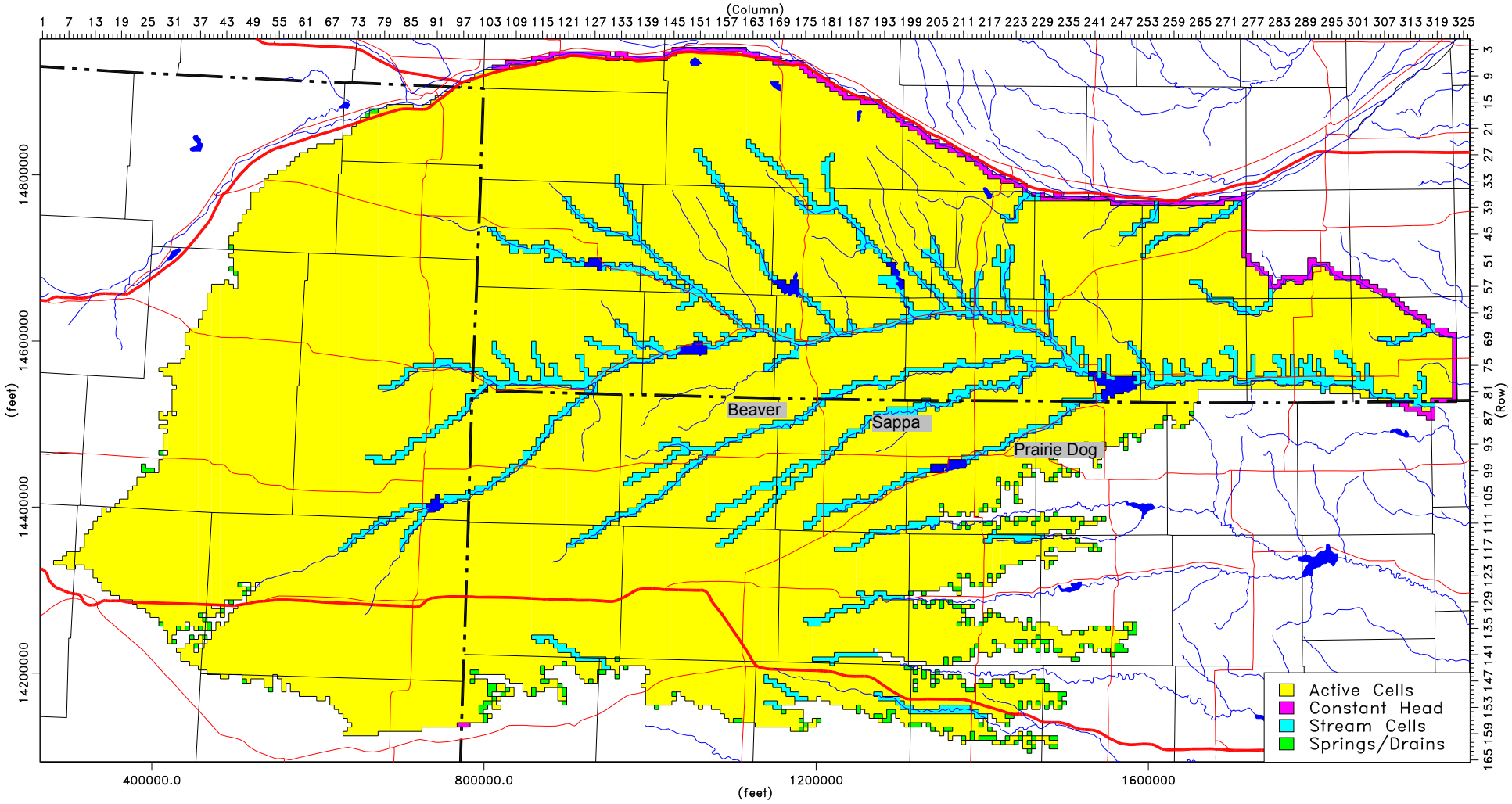
CO Pump Summary 1940-2008.xls, Fig 1-Acres, 12/11/2009

Historical Streamflow Gages Used in Compact Accounting



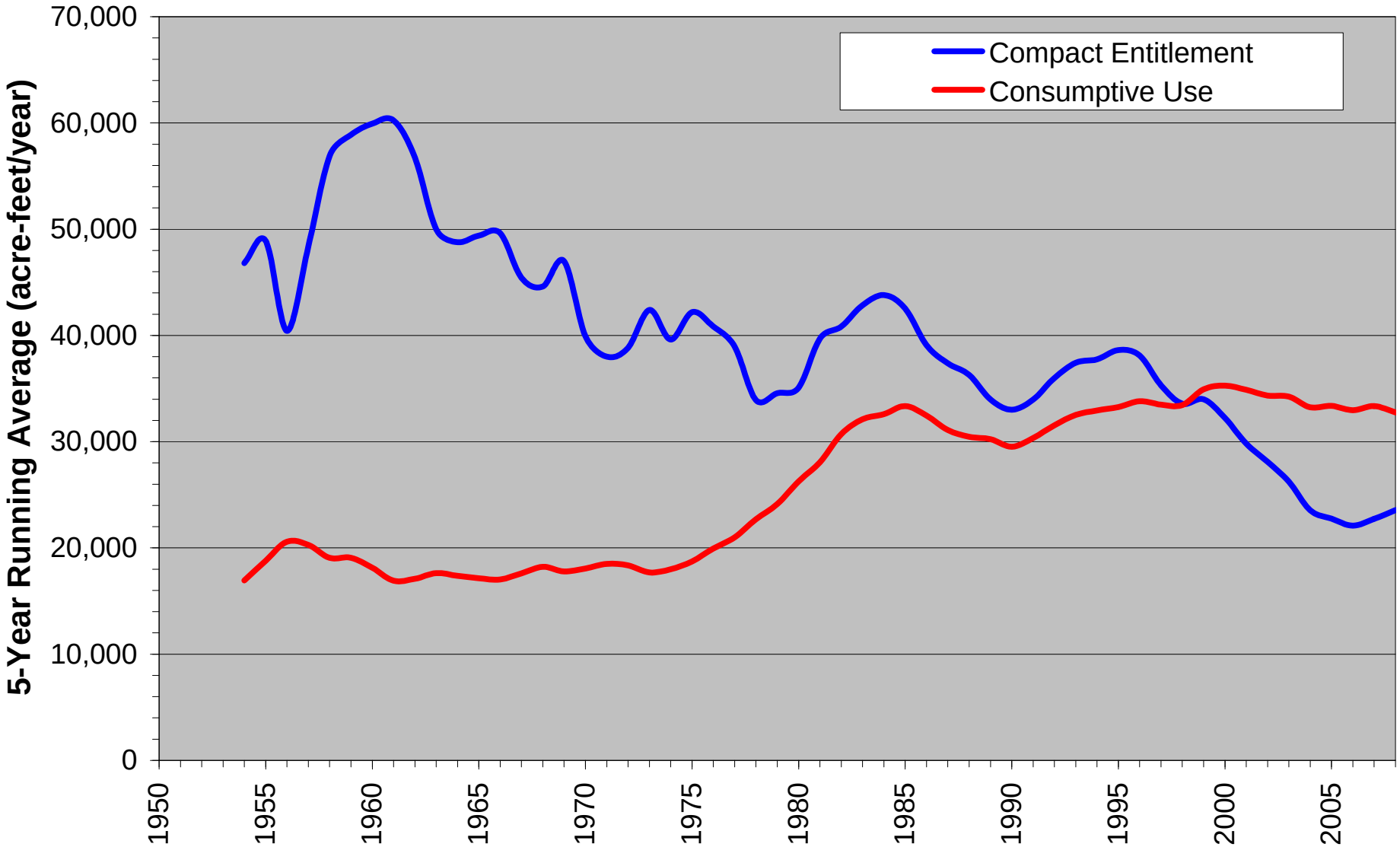
Colo Impact 1950 to 2008.xls, Fig5, 12/11/2009

RRCA Ground Water Model Domain



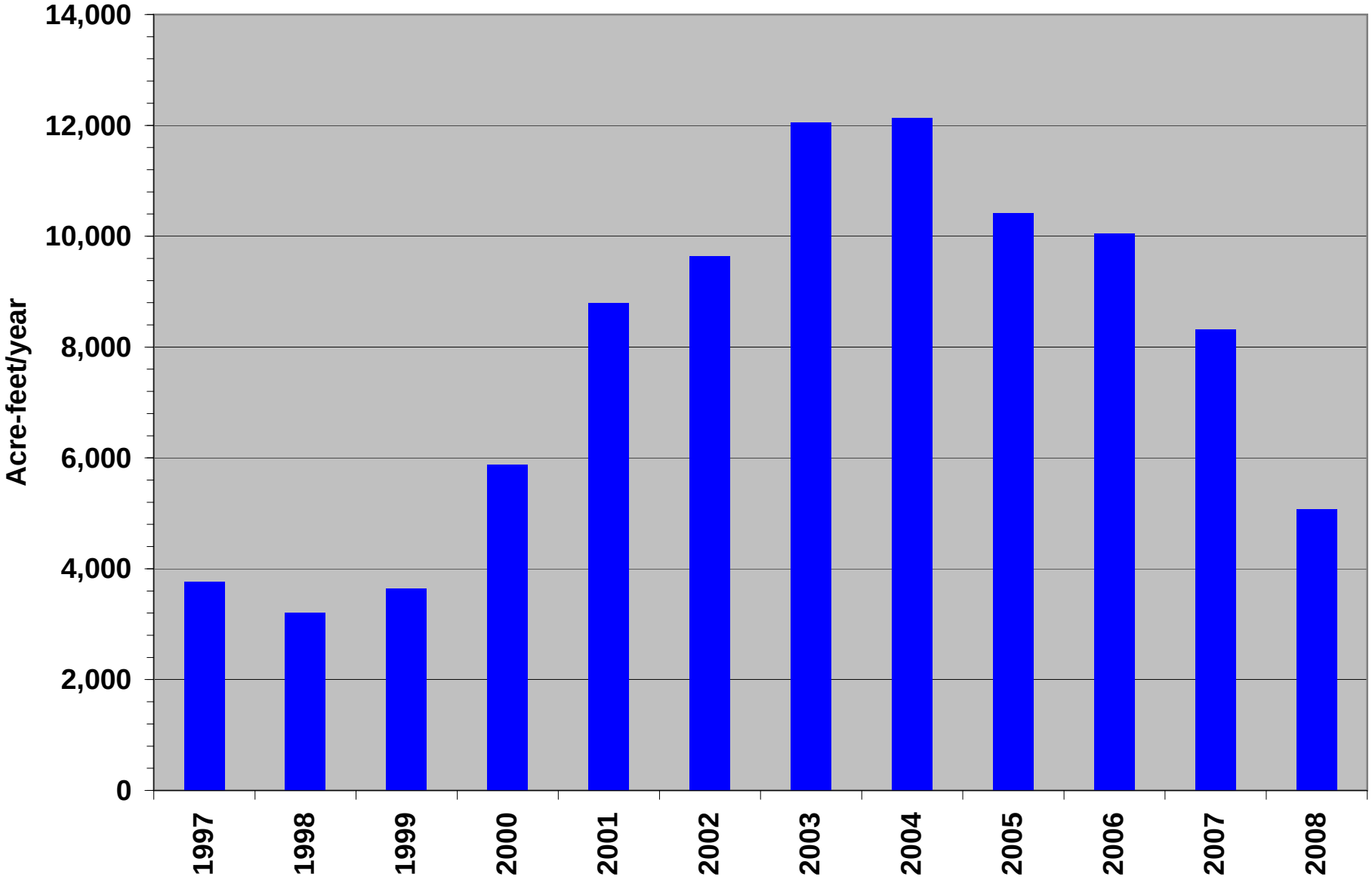
Colorado Consumptive Use and Compact Entitlement

(5-Year Running Average)



Colo Impact 1950 to 2008.xls, Fig 2, 12/12/2009

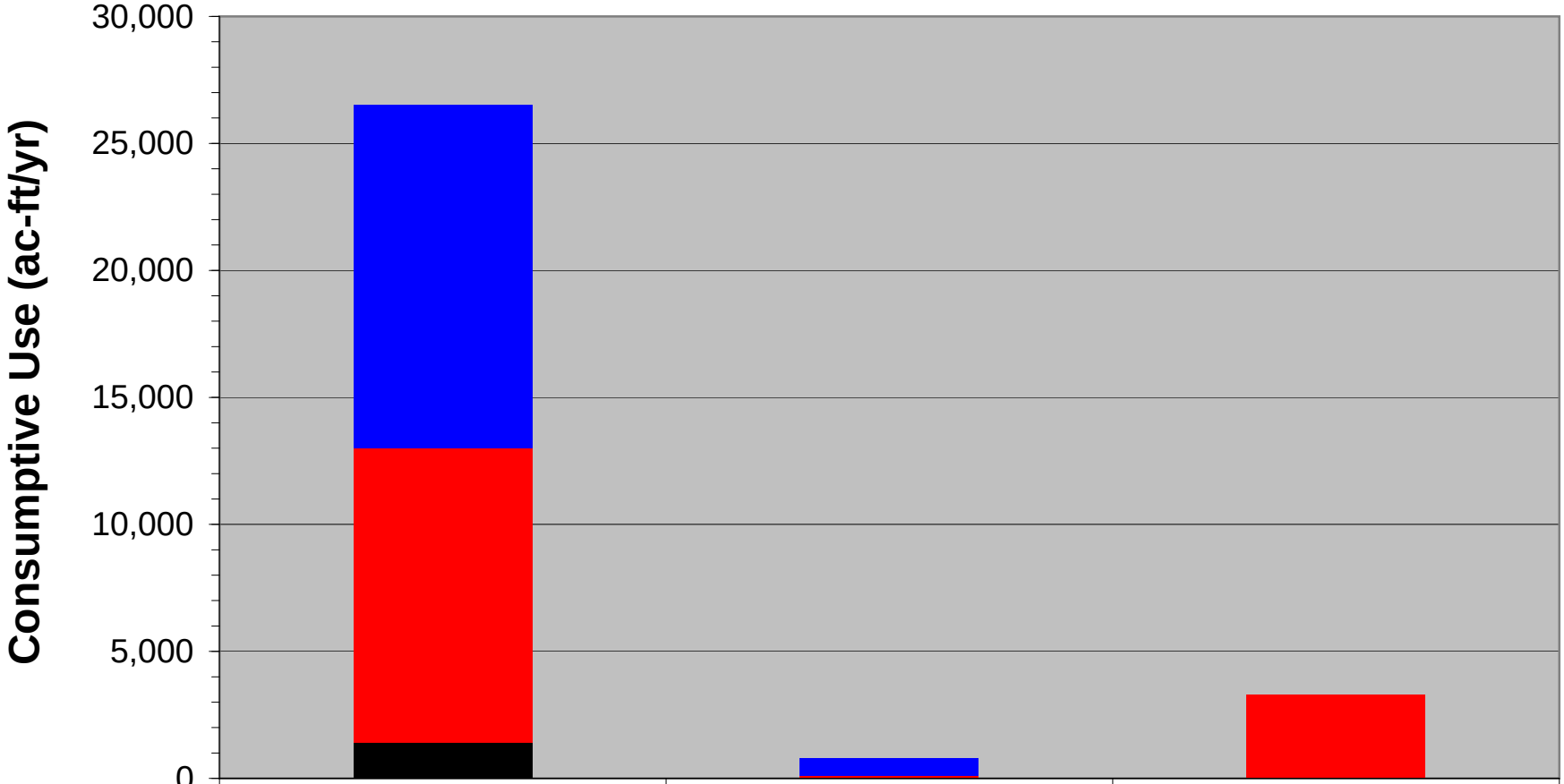
Amount Colorado Exceeded Compact Entitlement



Colo Impact 1950 to 2008.xls, Fig7, 12/12/2009

Colorado Consumptive Use Components In 2008

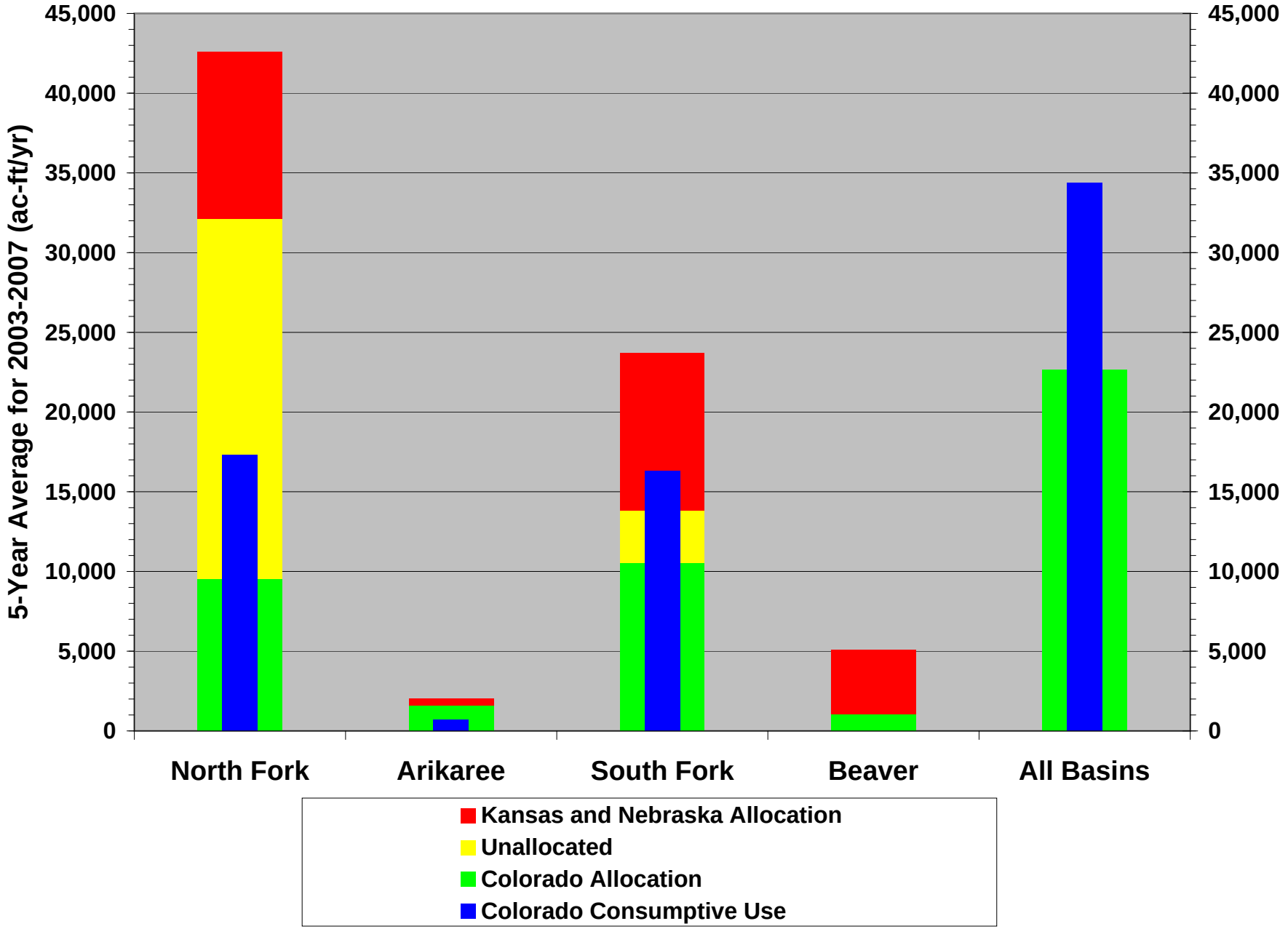
(total of 30,600 ac-ft/yr)



	Stream Depletions from Groundwater Pumping	Surface Water Diversions Consumptive Use	Bonny Reservoir Evaporation and Seepage
North Fork & Misc	13,500	700	
South Fork	11,600	100	3,300
Arikaree	1,400	0	

Colo Impact 1950 to 2008.xls, Fig6, 12/11/2009

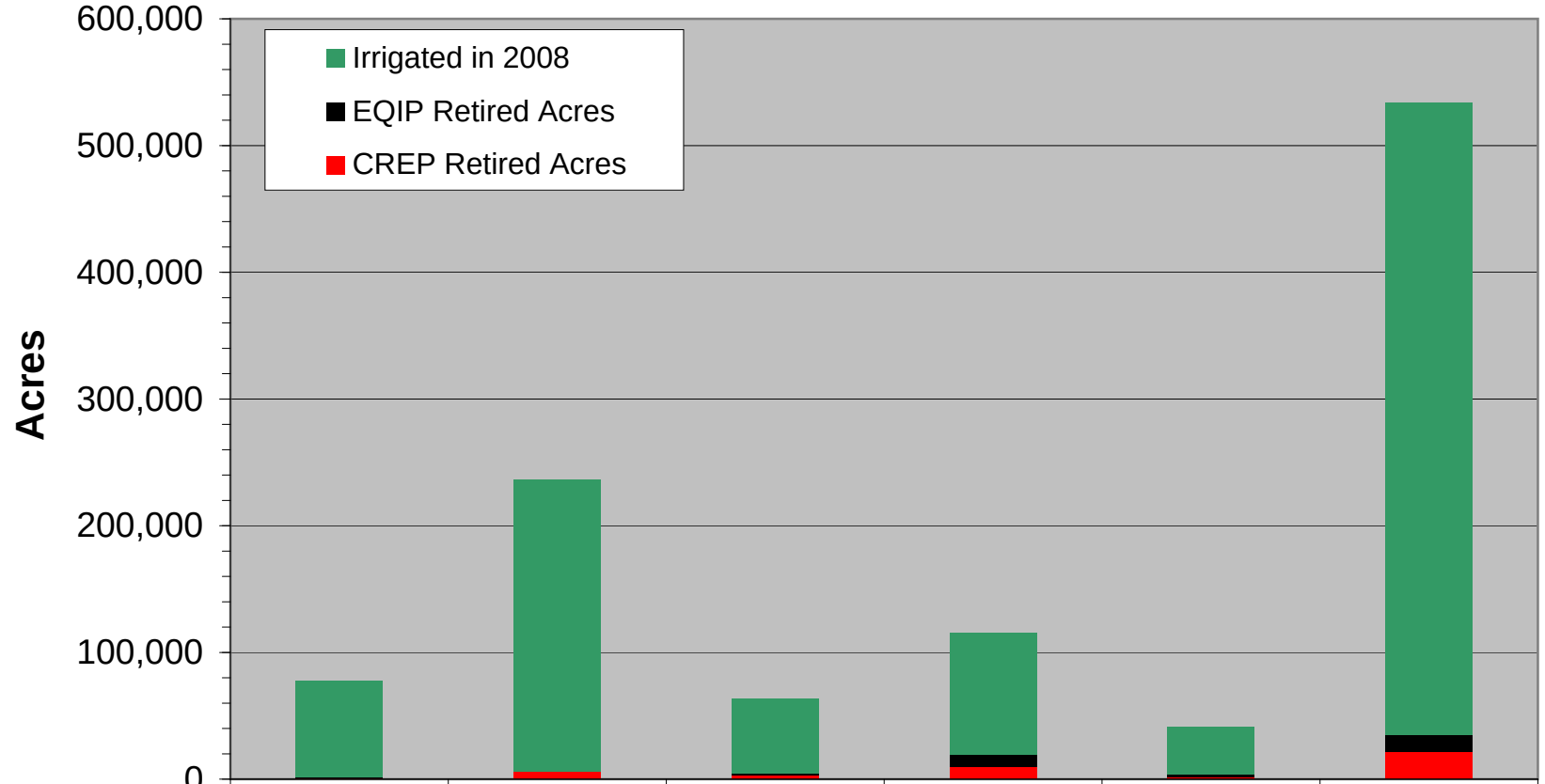
Sub-Basin Accounting



SAE Analysis for July 10, 2008 Meeting.xls, Chart2, 7/9/2008

Republican River Water Conservation District

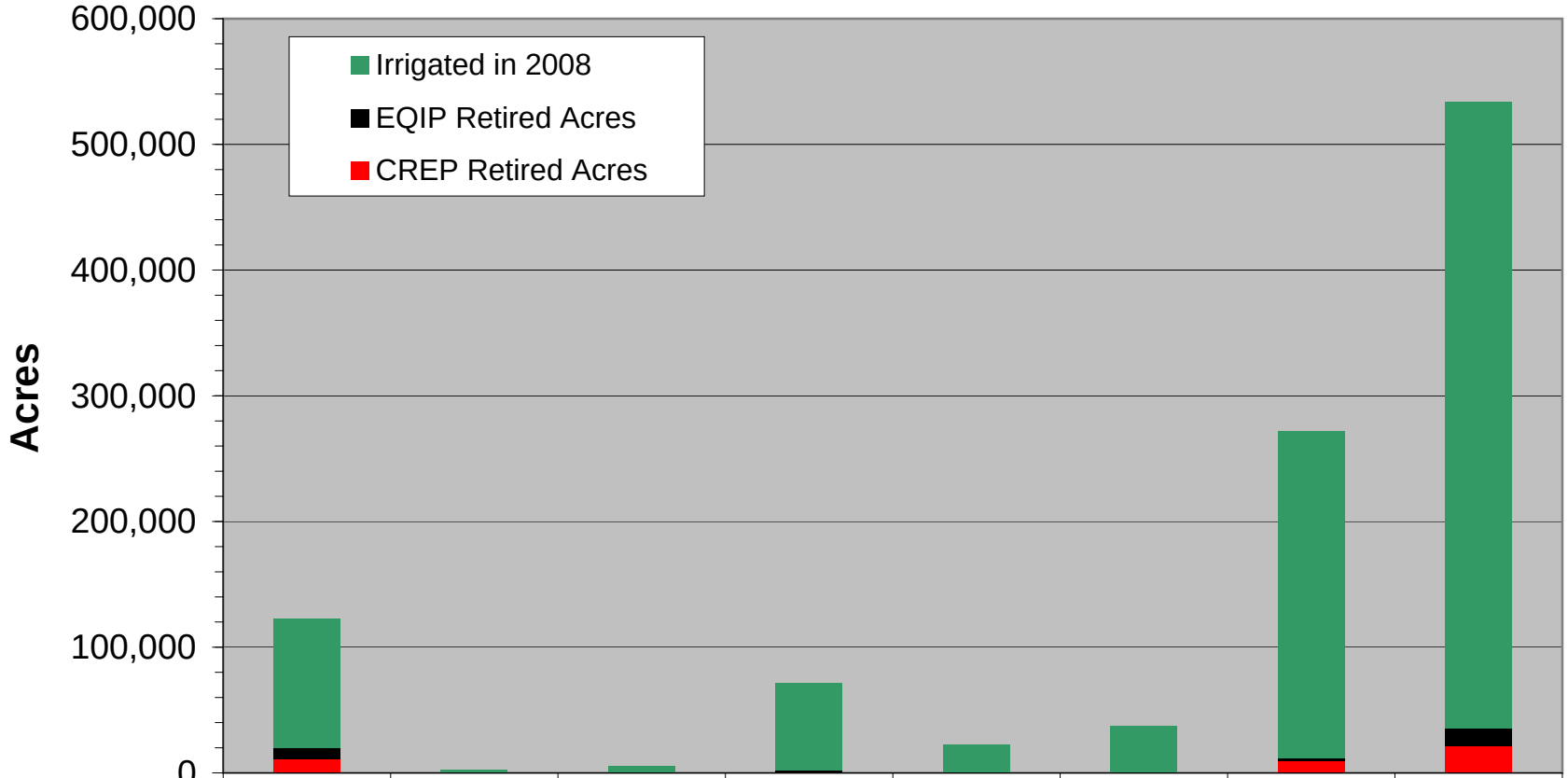
Irrigated Acreage and Conservation Programs Summarized by Sub-Basin



	Frenchman	North Fork Republican	Arikaree	South Fork Republican	Beaver Creek	Total
Irrigated in 2008	75,749	230,131	58,867	96,254	37,645	498,646
EQIP Retired Acres	897	751	1,428	9,005	1,704	13,783
CREP Retired Acres	607	5,548	3,159	10,220	1,981	21,514

Republican River Water Conservation District

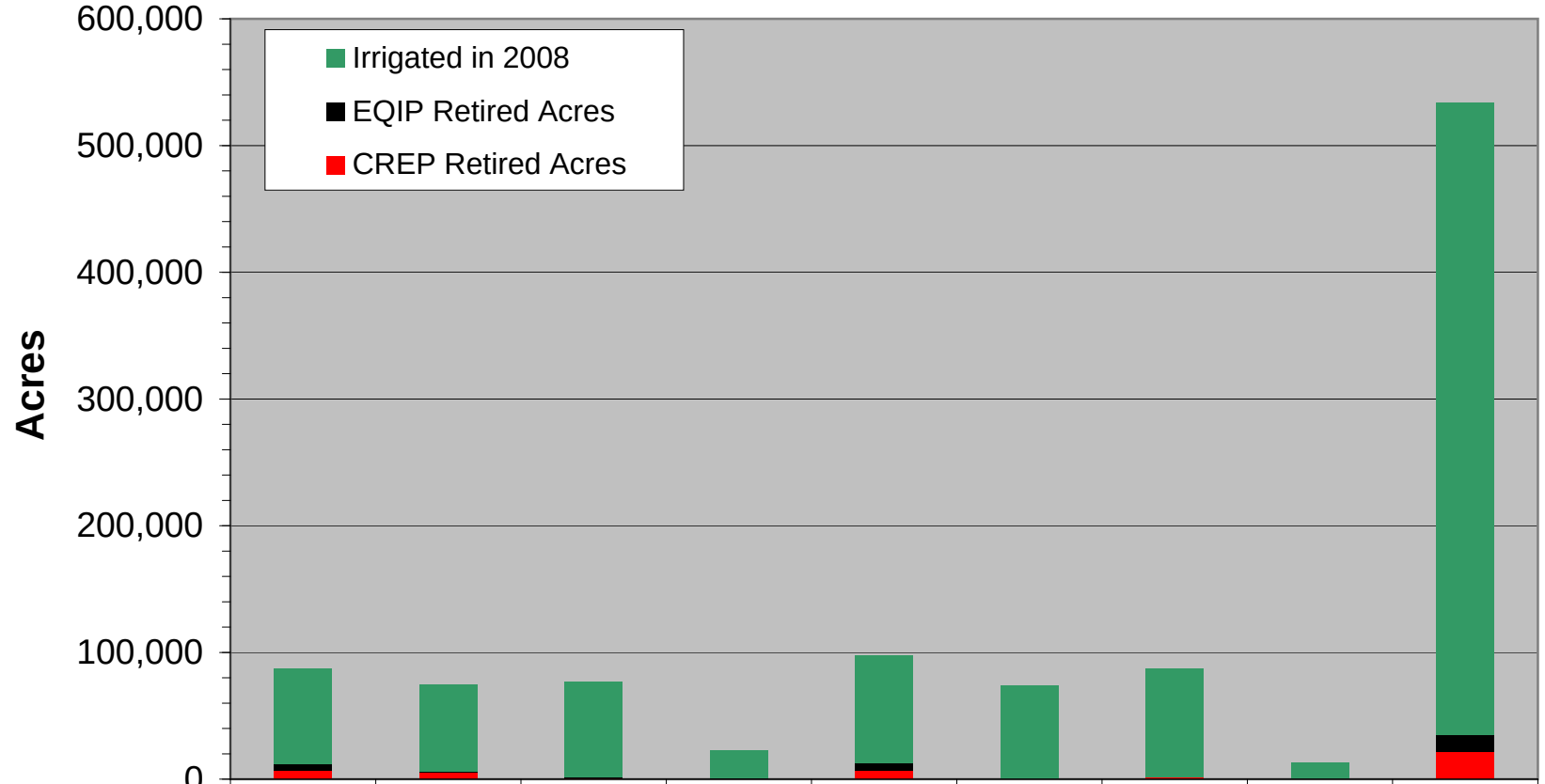
Irrigated Acreage and Conservation Programs Summarized by County



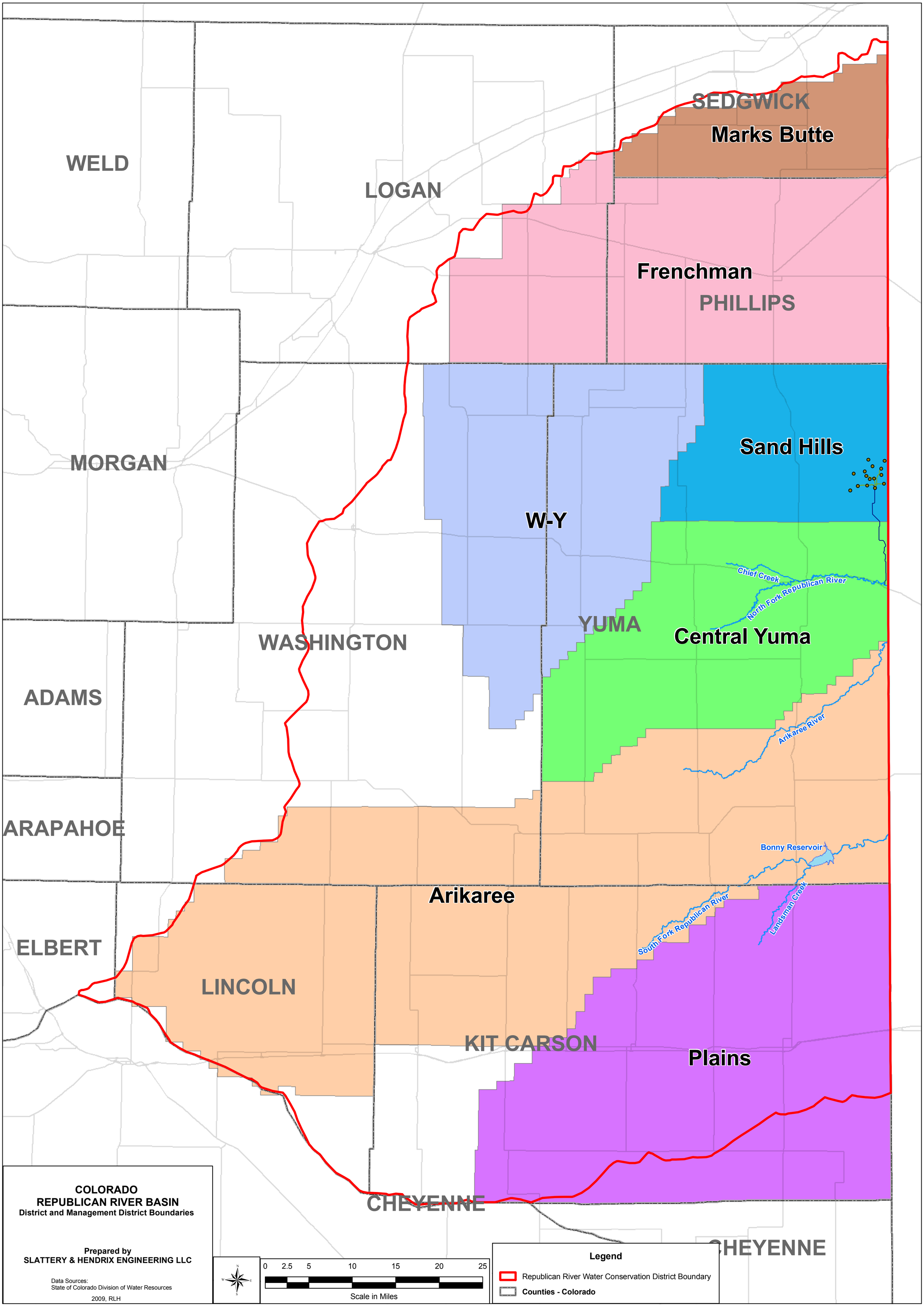
	Kit Carson	Lincoln	Logan	Phillips	Sedgwick	Washington	Yuma	Total
Irrigated in 2008	102,709	2,367	5,841	69,208	22,239	36,414	259,868	498,646
EQIP Retired Acres	9,033	0	0	782	242	956	2,770	13,783
CREP Retired Acres	11,062	0	0	1,064	126	0	9,263	21,514

Republican River Water Conservation District

Irrigated Acreage and Conservation Programs Summarized by Groundwater Management District



	Arikaree	Central Yuma	French man	Marks Butte	Plains	Sand Hills	W-Y	No District	Total
Irrigated in 2008	75,397	68,659	75,050	22,118	85,008	73,569	85,973	12,873	498,647
EQIP Retired Acres	5,262	377	782	242	6,215	0	531	374	13,783
CREP Retired Acres	6,963	5,454	1,064	126	6,730	0	1,178	0	21,514


WELD
LOGAN
SEDGWICK
Marks Butte
PHILLIPS
Frenchman
MORGAN
W-Y
Sand Hills
Chief Creek
North Fork Republican River
YUMA
Central Yuma
WASHINGTON
ADAMS
Arikaree River
ARAPAHOE
Bonny Reservoir
Arikaree
South Fork Republican River
Landsman Creek
ELBERT
LINCOLN
KIT CARSON
Plains
CHEYENNE
CHEYENNE
COLORADO
REPUBLICAN RIVER BASIN
District and Management District Boundaries
Prepared by
SLATTERY & HENDRIX ENGINEERING LLC
Data Sources:
State of Colorado Division of Water Resources
2009, RLH
N
W
E
S
0 2.5 5 10 15 20 25
Scale in Miles
Legend
Republican River Water Conservation District Boundary
Counties - Colorado

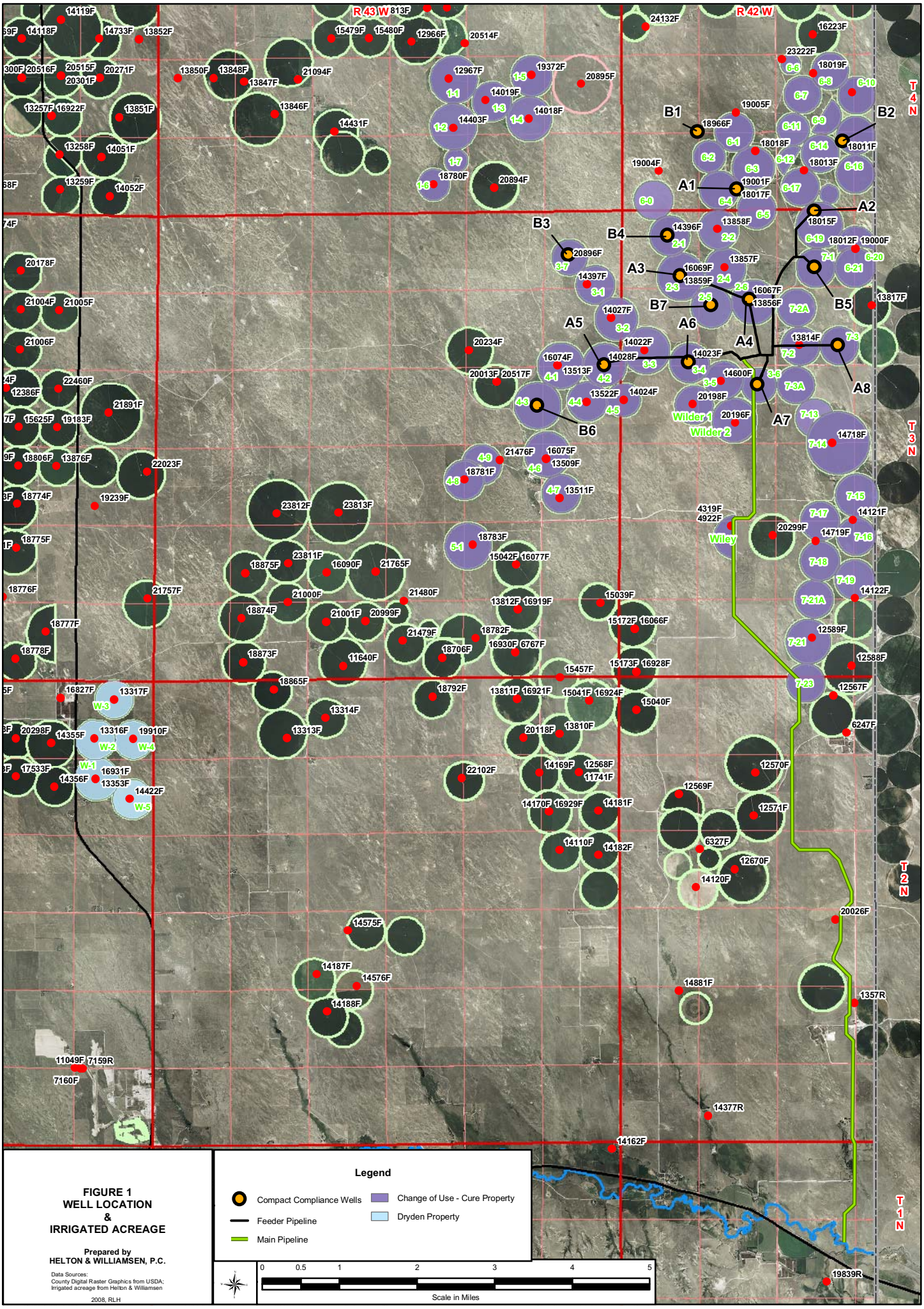


FIGURE 1
WELL LOCATION
&
IRRIGATED ACREAGE

Prepared by
HELTON & WILLIAMSEN, P.C.

Data Sources:
County Digital Raster Graphics from USDA;
Irrigated acreage from Helton & Williamsen

2008, RLH

Compact Compliance Pipeline

1. Purchased approximately 15,000 ac-ft/yr of consumptive use water
2. Approximately 10,000 acres
3. Consolidated water from 62 permits to 15 wells
4. Hired GEI to design and supervise construction
5. Formed Technical Advisory Committee

6. Pump from 8 wells with average capacity of approximately 1,700 gpm
7. Ability to pump from 7 additional wells in future
8. 9 miles of collector pipe ranging in size from 12” to 24”
9. Existing collector pipe sized so additional 7 wells can be connected
10. Storage tank of about 200,000 gallons (about 15 minutes of re-regulation)

11. Pipeline flows by gravity through 12.5 miles of large diameter pipe to the river (4.5 miles of 42”, 5 miles of 36” pipe, and 3 miles of 30” pipe)
12. Flows through energy dissipator value at end of pipeline and flow meter
13. About 325 feet of head difference between tank and river. About half is lost by friction losses in pipe

14. Enter North Fork about ½ mile upstream of North fork

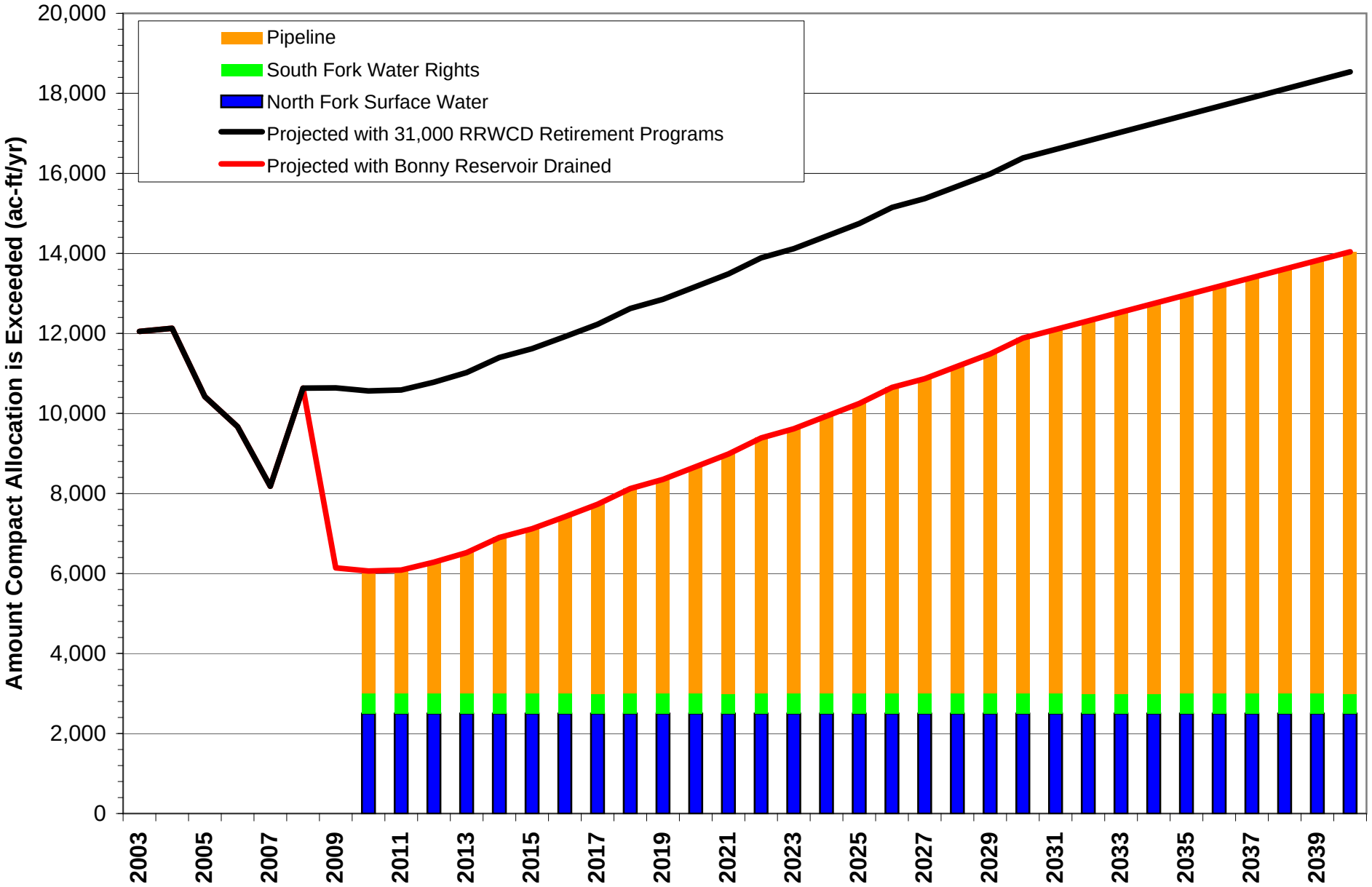
15. Main Pipeline has capacity of 25,000 ac-ft/yr

Operation of Compact Compliance Pipeline

1. Operation Cycle Starts January 1 of each year
2. Run Pipeline from January 1 to March 31 (4,500 ac-ft)
3. First of September gather provisional hydrologic data for Jan-Aug
4. Project hydrologic conditions for Sept-Dec
5. Estimate amount of pipeline deliveries needed for compact compliance

6. **Run Pipeline Oct-Dec for water needed after accounting for the 4,500 ac-ft ran in the spring.**
7. **Generally run pipeline at about 25 (25 cfs is 11,200 gpm or 7 wells running at 1,600 gpm)**
8. **Expand operations into Apr-Sept as compact obligation increases**

Projected Amount Colorado Exceeds Compact Allocation



SAE Analysis for Mar 4, 2009 Meeting.xls, Chart1, 3/3/2009

Republican River Compact Compliance Pipeline

Theoretical Schedule Assuming RRCA Approved Pipeline (which it has not)