



Metro Roundtable

Denver, Colorado



March 13, 2013



Purpose of this Discussion

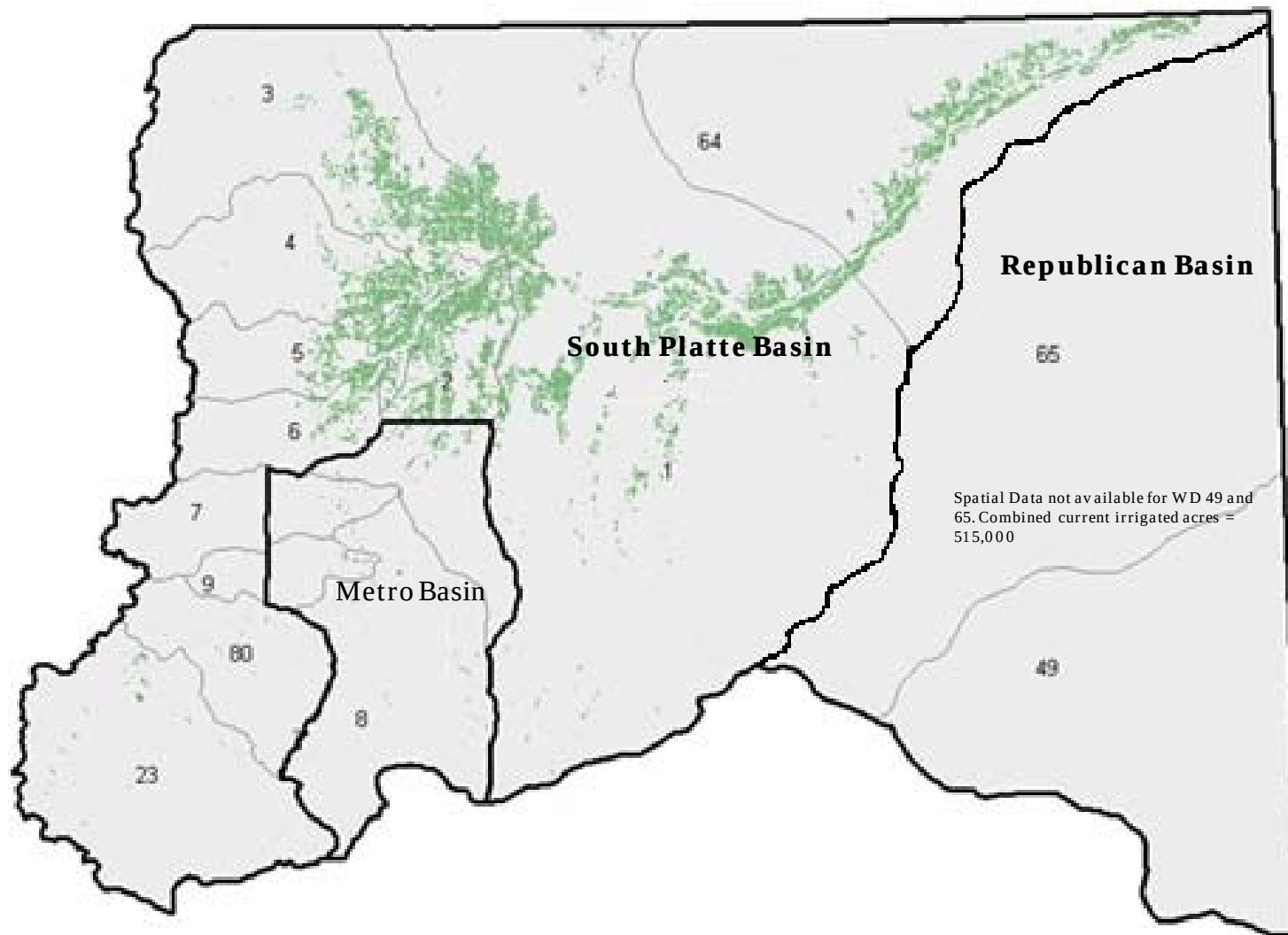
- Inform and refresh basin roundtable members on the South Platte, Metro and Republican Basin on the following:
 - Demands
 - Agricultural water use and production
 - Nonconsumptive needs
 - Hydrology of the basin
 - Water availability
 - Basin infrastructure
 - Compacts and constraints
- Initiate basin planning discussions



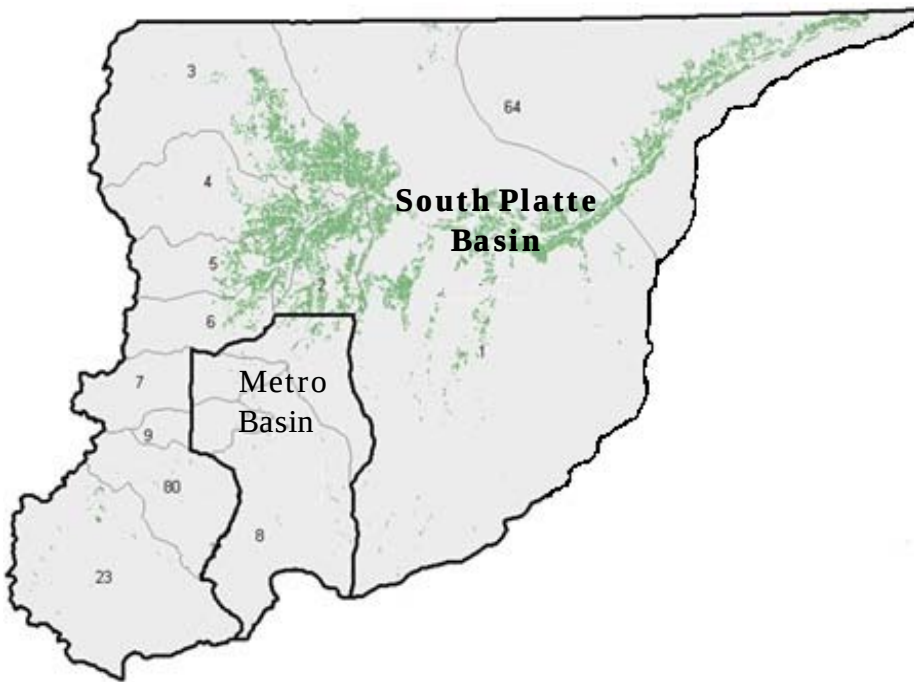
Future Opportunities/Basin Planning

- Update to SWSI (2016)
 - Infrastructure Sharing
 - New Water Supply (in-basin and transbasin options)
 - ATM Implementation Opportunities
 - Optimization of Basin Resources w/o injury to others

South Platte, Metro and Republican Basins



South Platte and Metro Basin Water Use

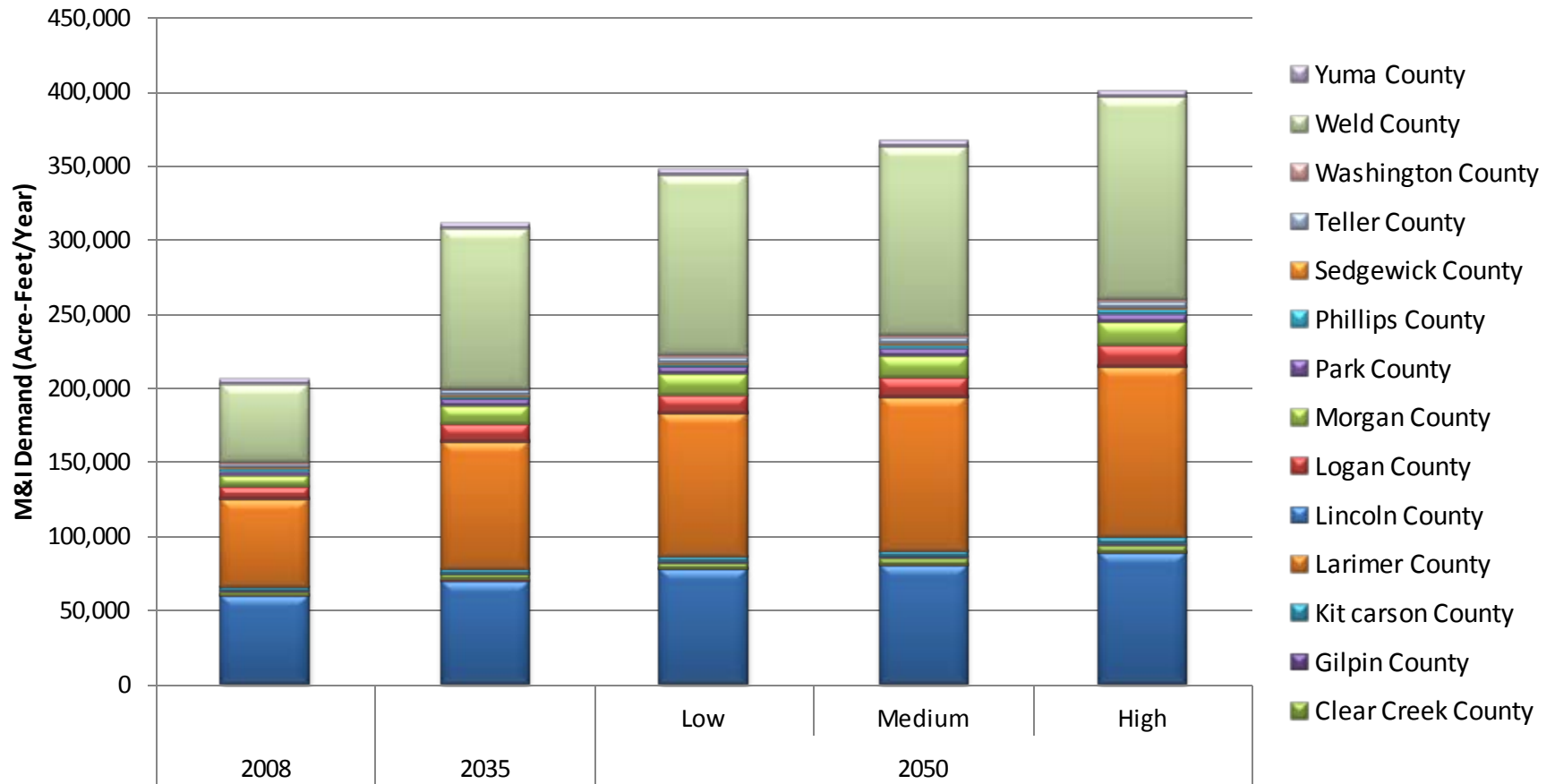


- Supplies
 - 1.4 million AF annual native flow for total basin
 - 400,000 AF generated from transbasin projects
- Use
 - 600,000 AF tributary groundwater used
 - Total annual surface water diversions: 4 million AF



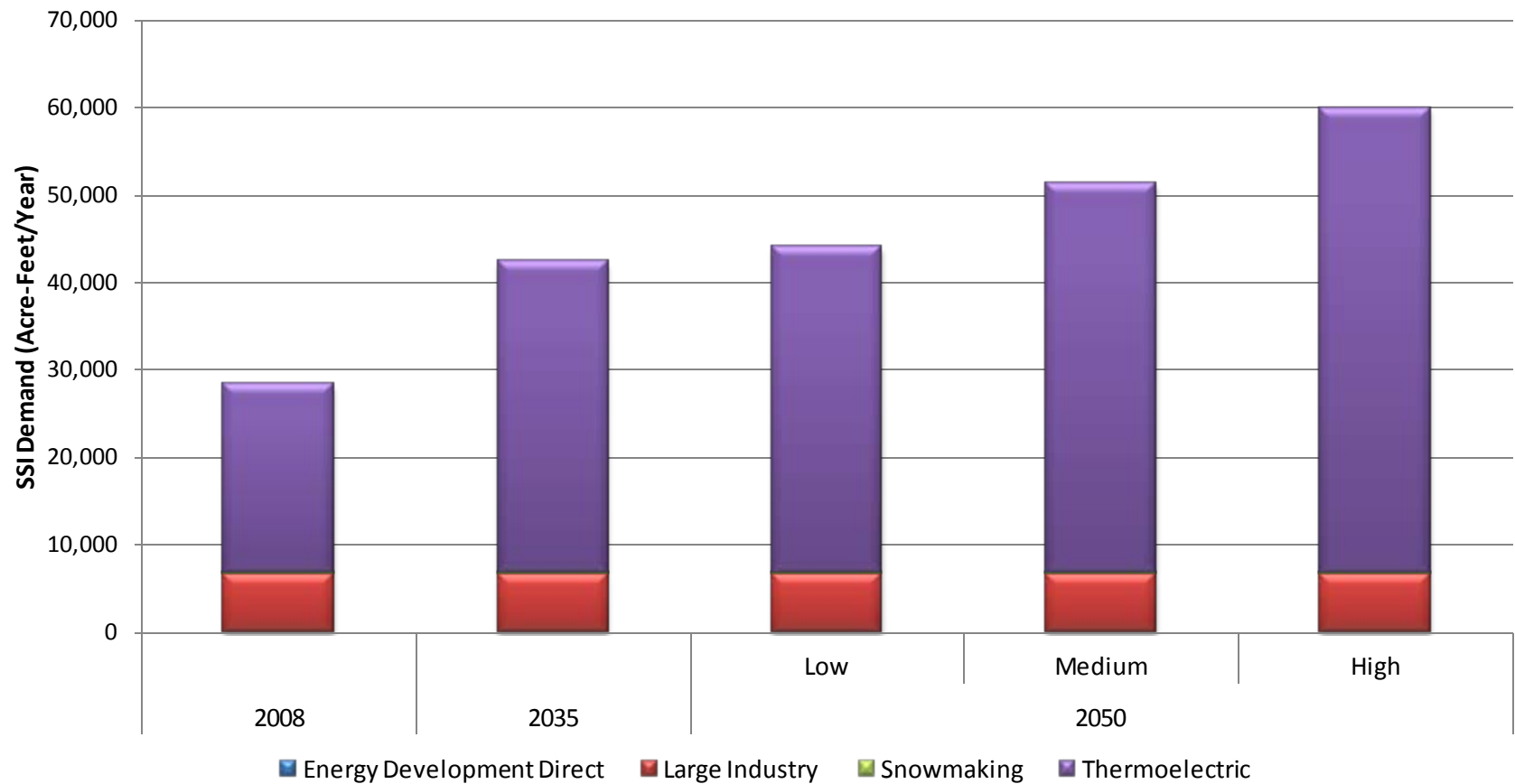
Demands

South Platte Roundtable Basin M&I Water Demands



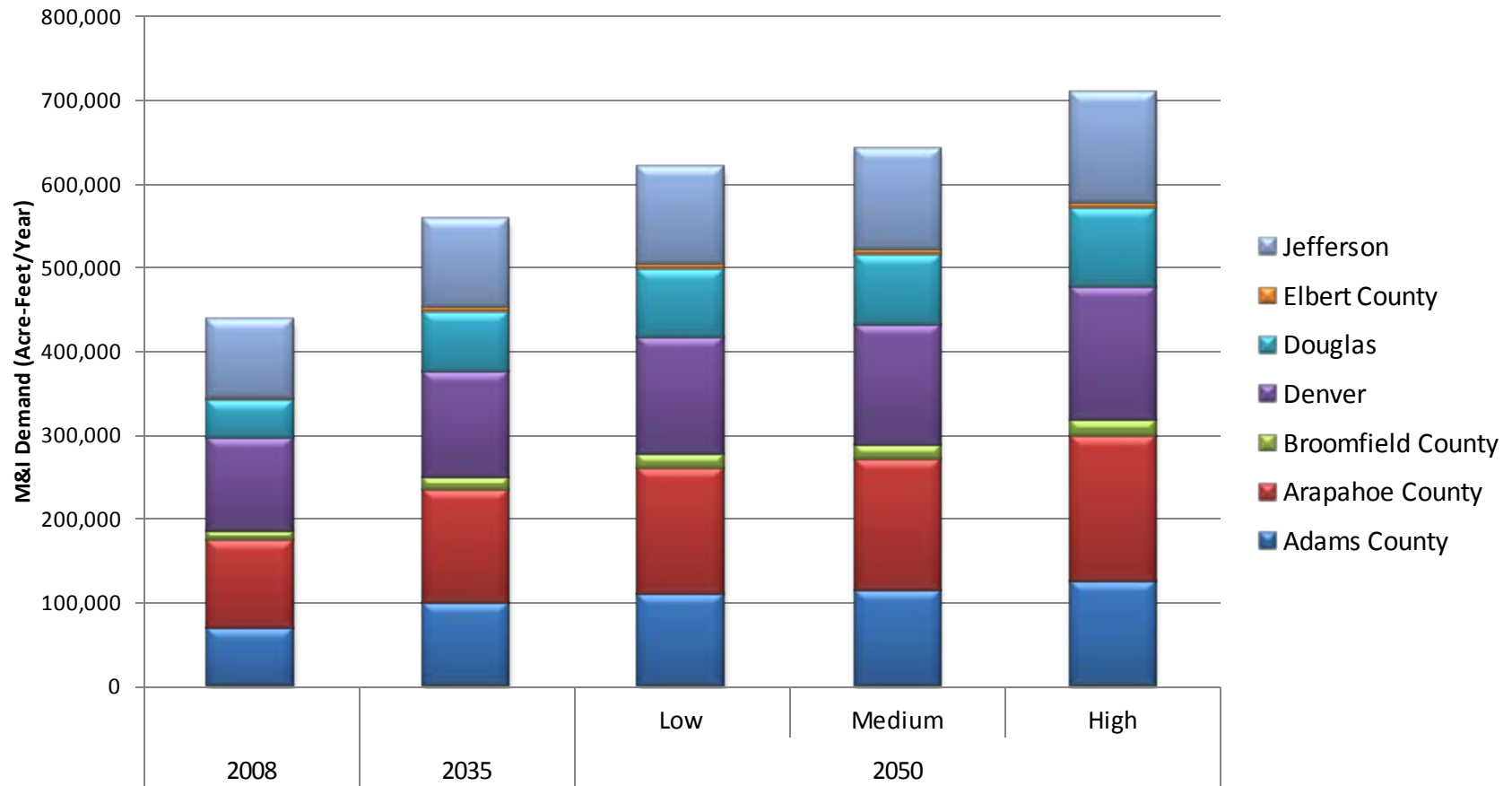
Source: SWSI 2010 South Platte Basin Report Basinwide Consumptive and Nonconsumptive Water Supply Needs Assessments, Figure 4.2

South Platte Roundtable Basin SSI Water Demands

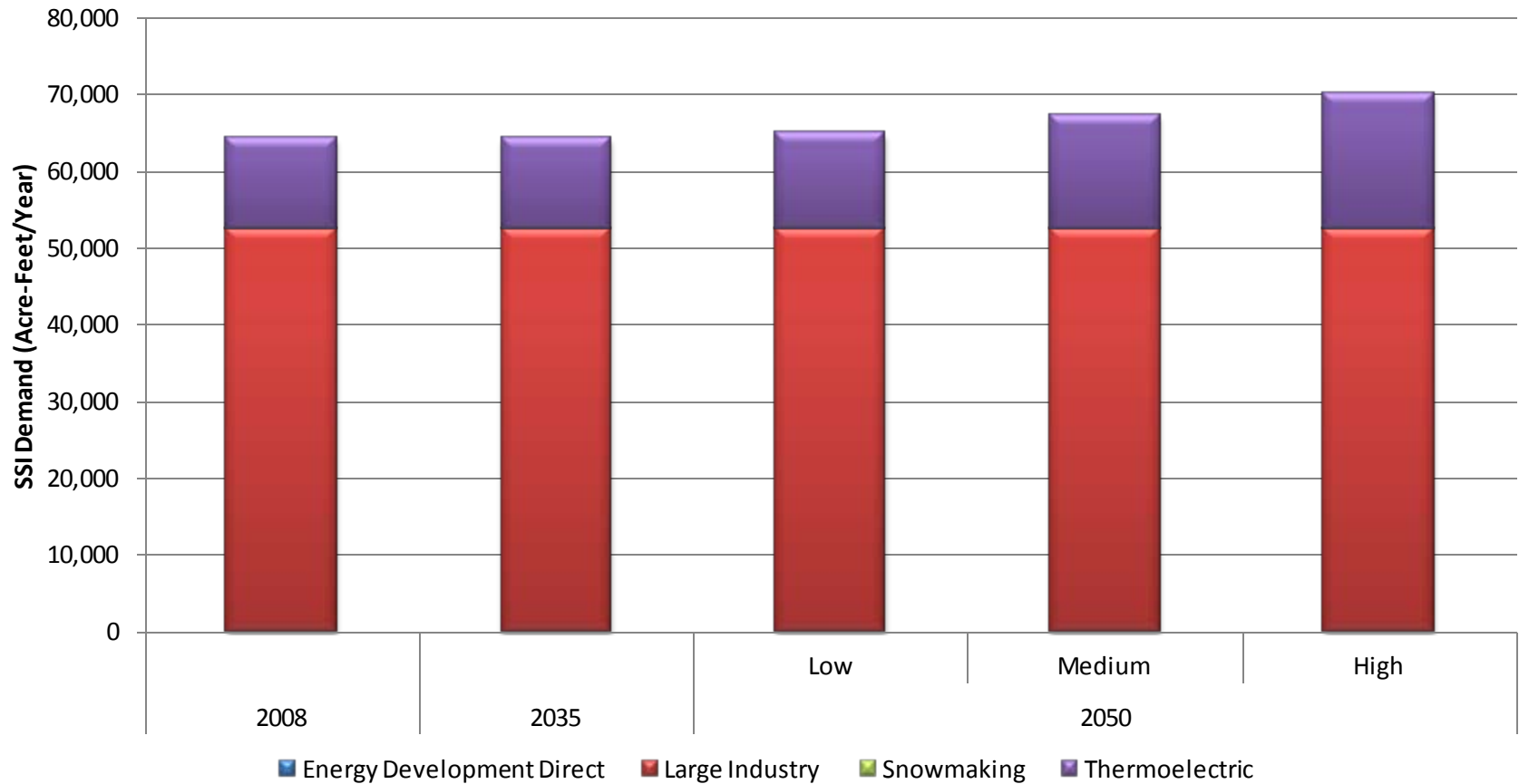


Source: SWSI 2010 South Platte Basin Report Basinwide Consumptive and Nonconsumptive Water Supply Needs Assessments, Figure 4.3

Metro Roundtable Basin M&I Water Demands

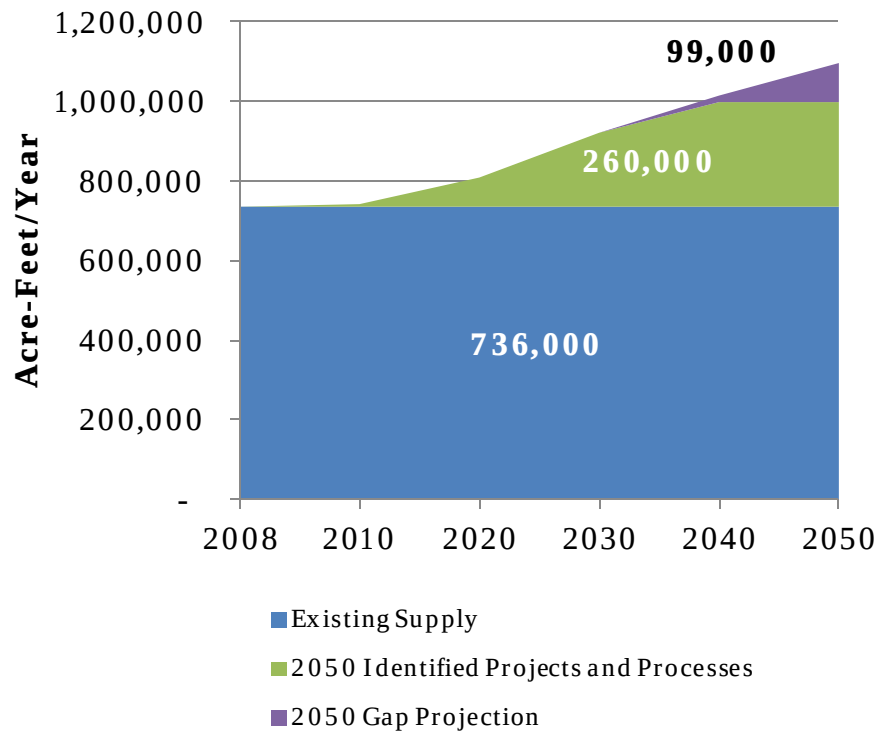


Metro Roundtable Basin SSI Water Demands

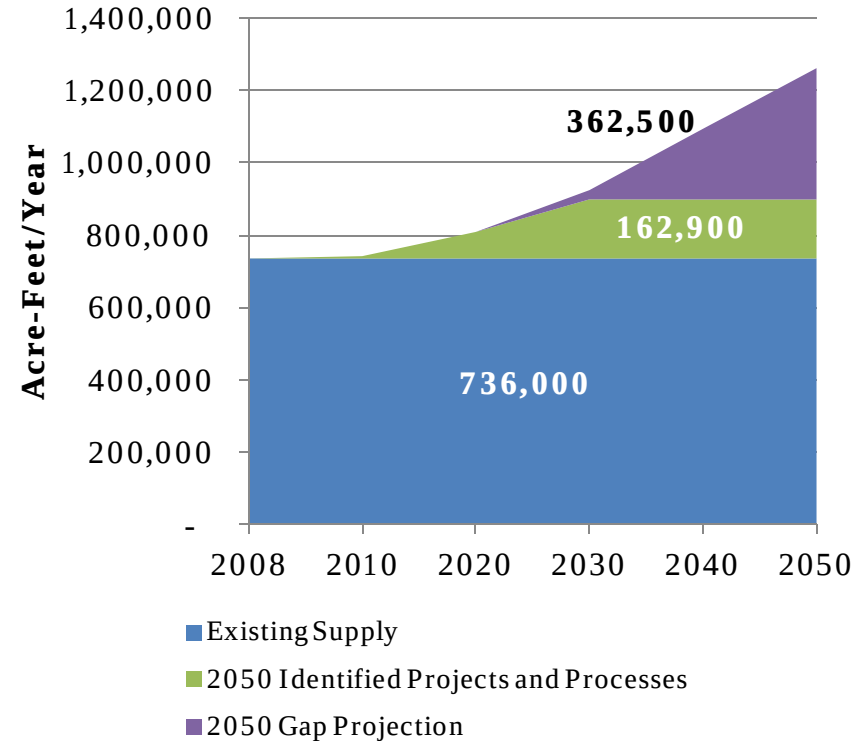


South Platte and Metro Basin M&I and SSI Gap Summary

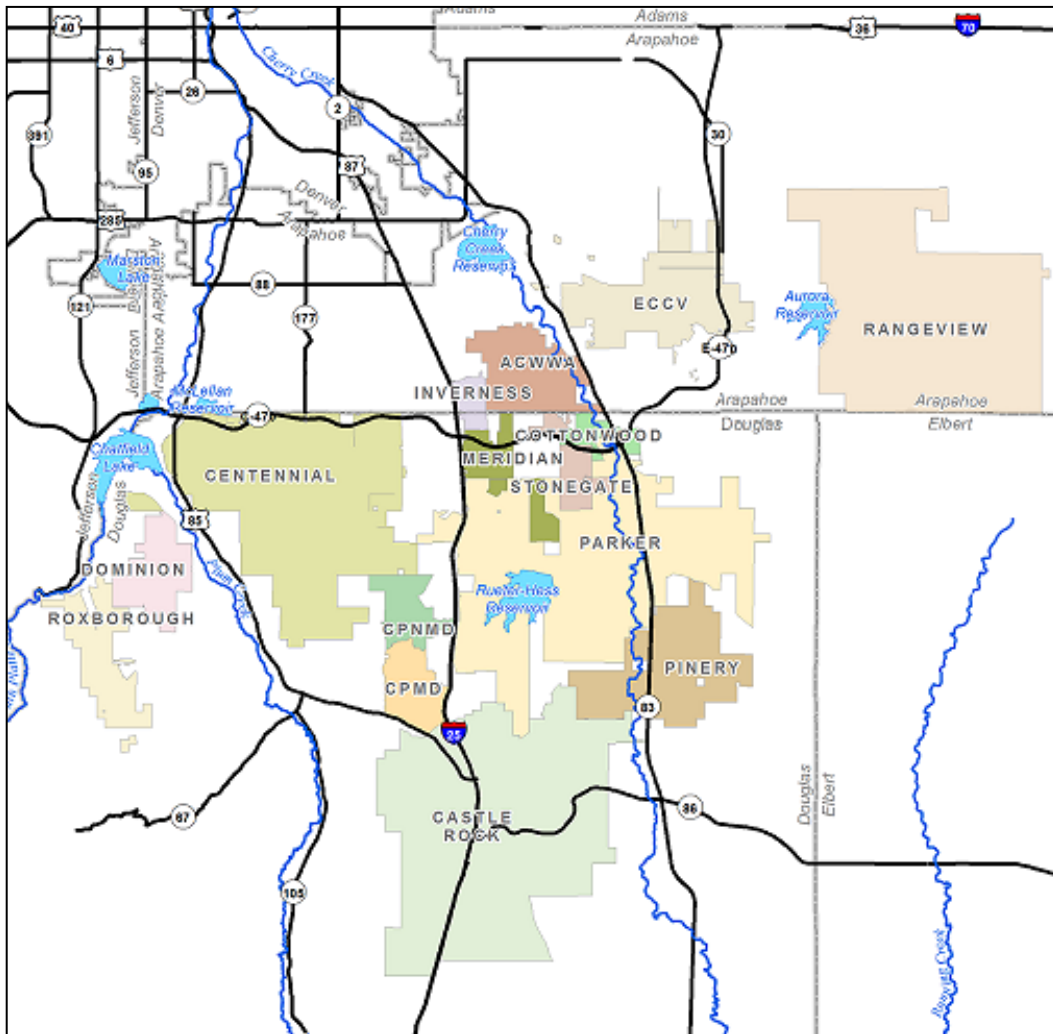
IPPs at 100% Success Rate



IPP at Status Quo



Major Gap Area is South Metro

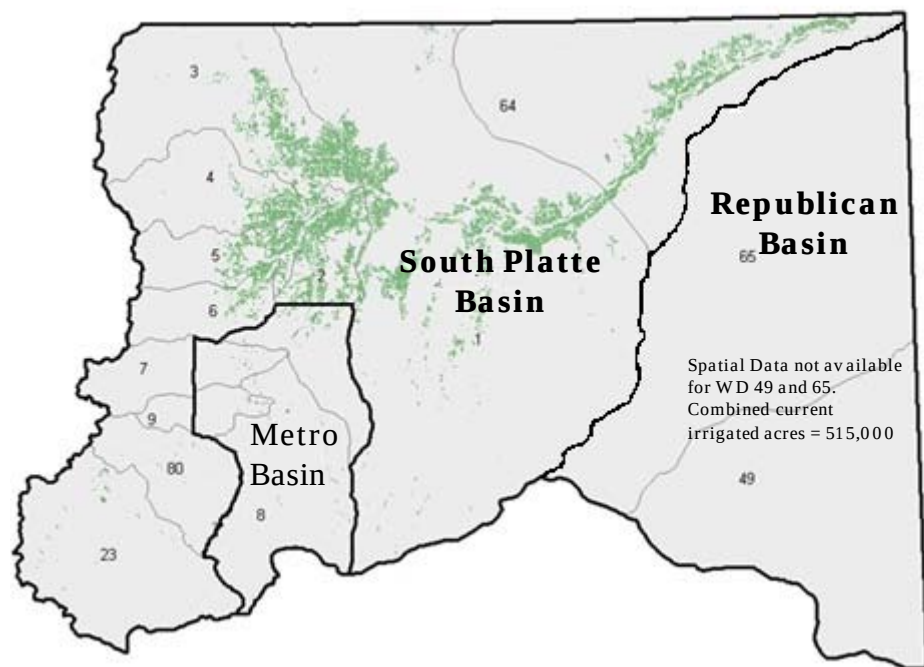


- Reliance on Denver Basin groundwater wells for supplies
- Transitioning to renewable supplies
- Demands in 2010 are ~68,000 AFY and growing
- Potential to impact gap



Agricultural Water Use and Production

South Platte, Metro and Republican Basin Agriculture Water Use



- South Platte & Metro Basin:
 - 831,000 irrigated acres
 - 500,000 AF alluvial groundwater used
 - 3.2 million AF diverted annually for agriculture
- Republican Basin:
 - 516,000 irrigated acres
 - 515,000 acres irrigated with groundwater
 - 1,000 acres irrigated with surface water/diversions

Agriculture Production

Colorado Agriculture Value of Agricultural Products Sold by County

Data from 2007 Census of Agriculture, USDA

Data for * Counties
 #57-Broomfield \$358,000
 #60-Denver \$561,000
 #62-Clear Creek \$127,000
 #64-San Juan No Data Available

Colorado Ag Facts

▲ Value of all agricultural products sold in 2007 totaled \$6 billion.

▲ Agribusiness contributes \$16 billion to the state economy each year and employs more than 100,000 people.

▲ There are 37,054 farms in the state encompassing nearly 32 million acres.

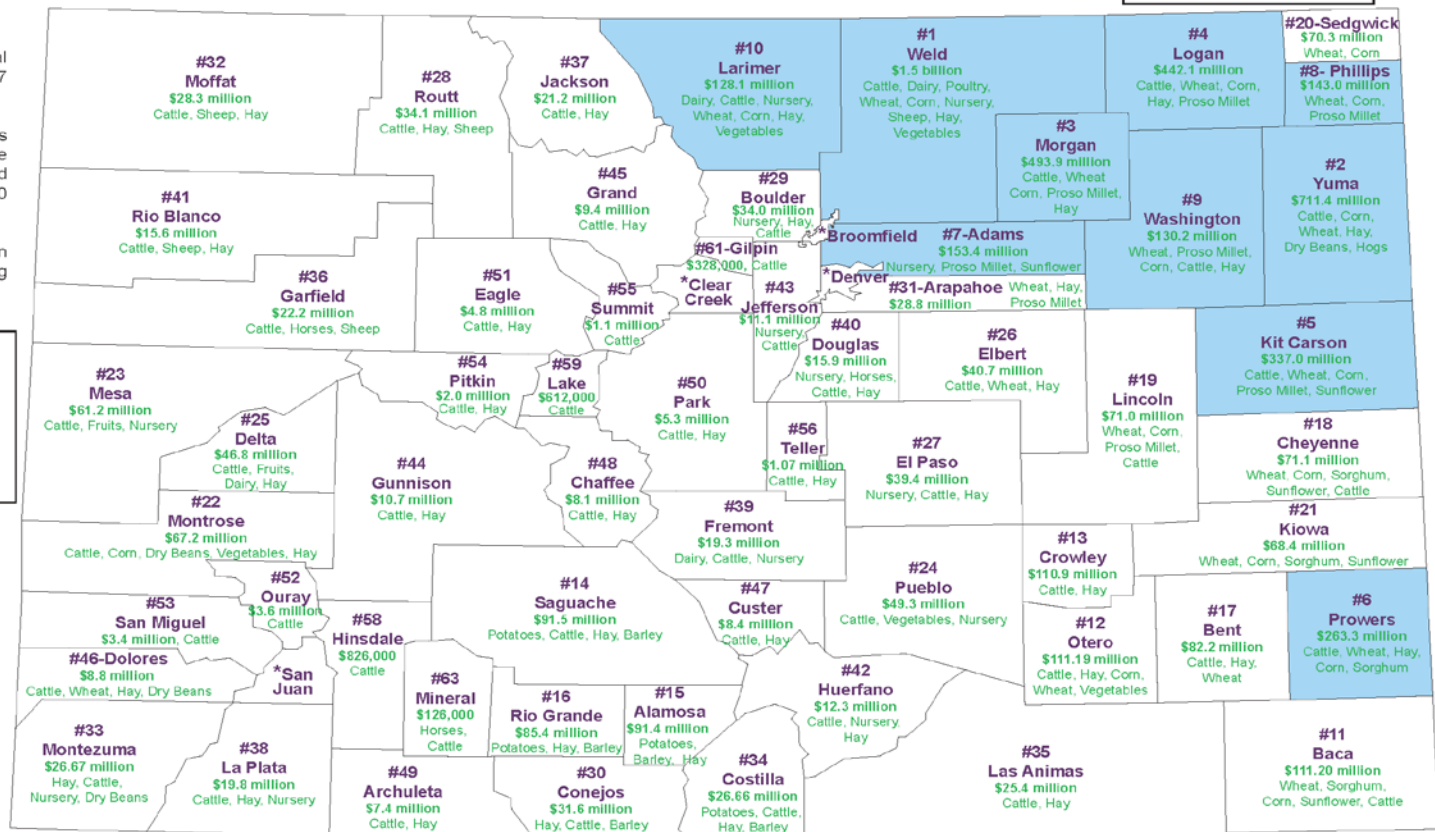
LEGEND

County Rank and Name
 Total Value of Agricultural Products Sold
 Top agricultural products

Shaded areas are top ten agricultural counties in Colorado.

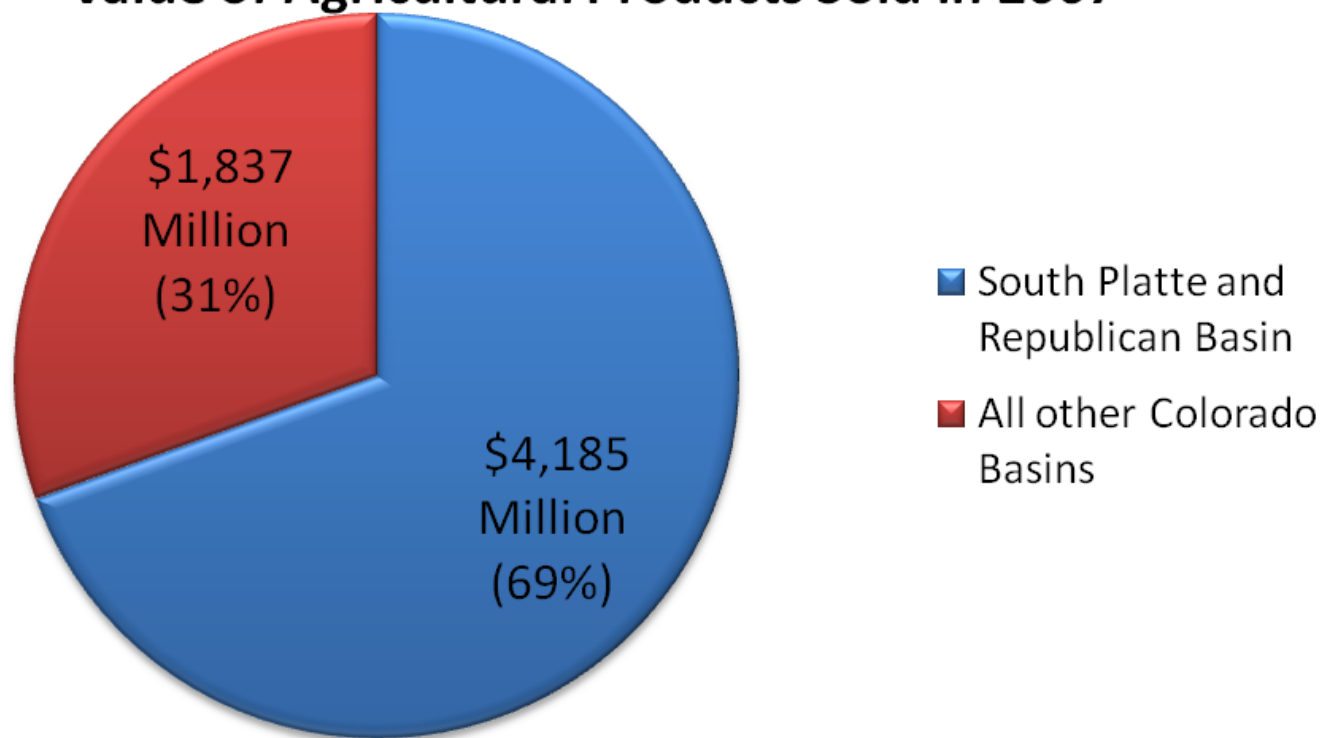


700 Kipling Street, Suite 4000
 Lakewood, CO 80215
 Phone (303) 239-4114
 Fax (303) 239-4125
 E-mail: markets@ag.state.co.us
 www.coloradoagriculture.com



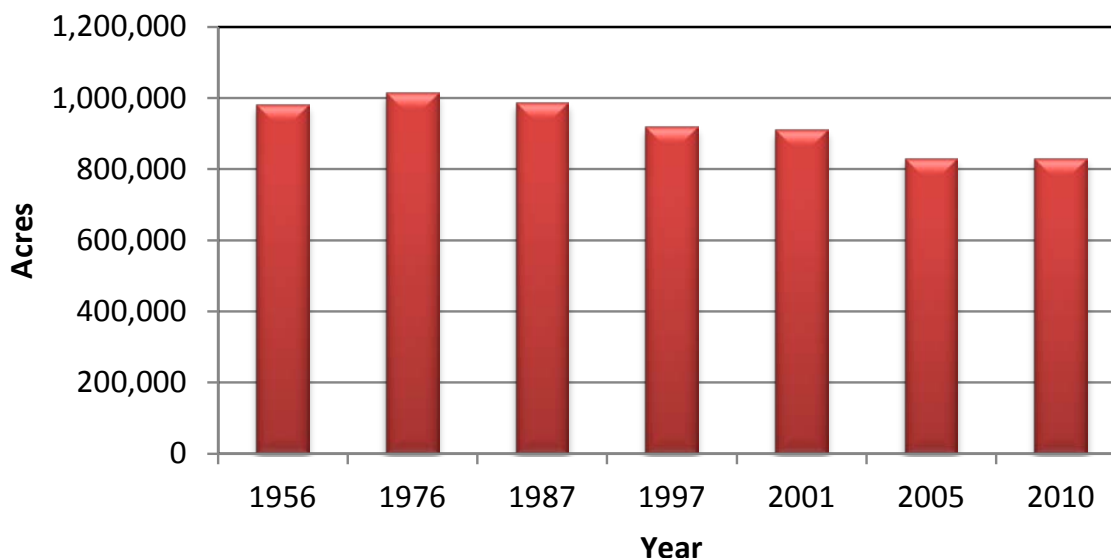
South Platte Basin Agricultural Production

Value of Agricultural Products Sold in 2007



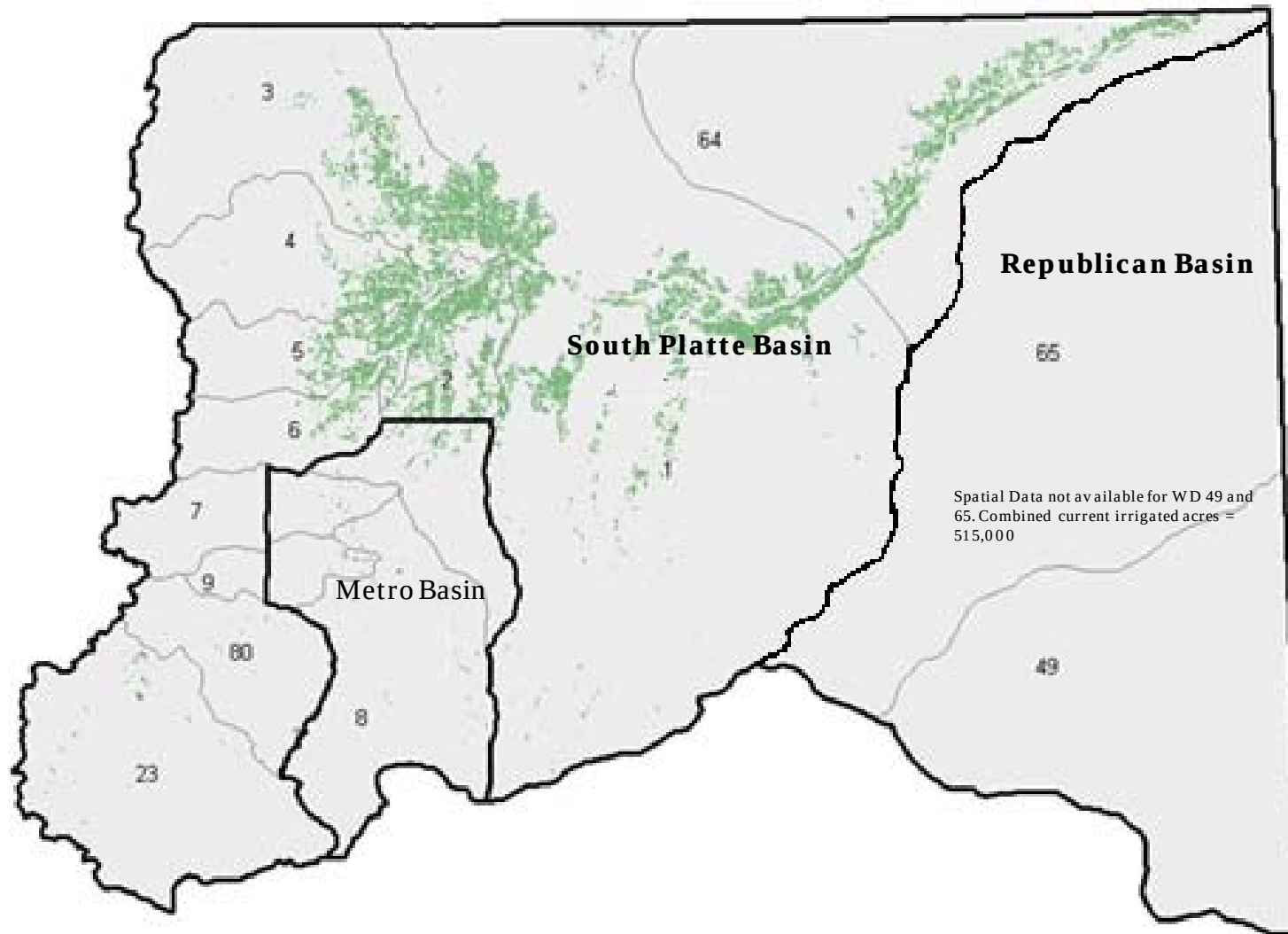
Irrigation in the South Platte Basin (excluding Republican)

Irrigated Acreage for Selected Years



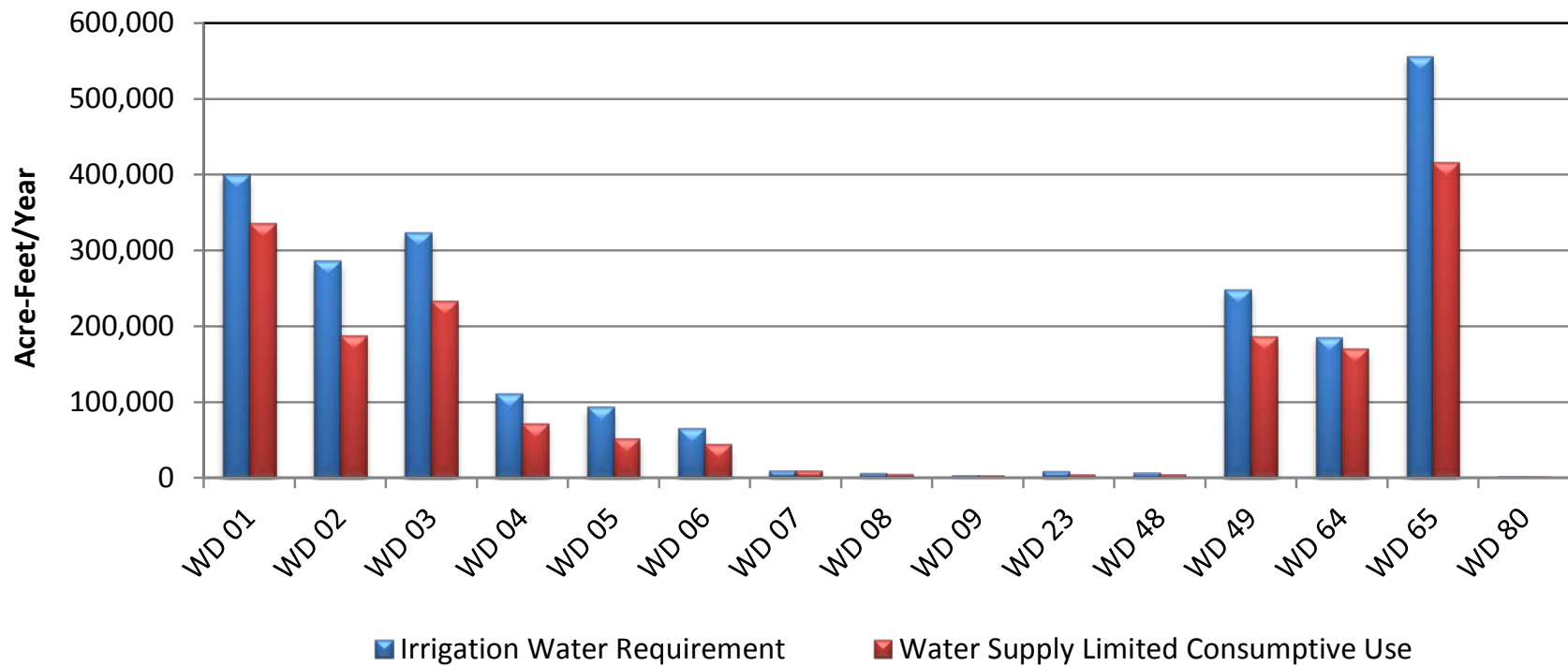
Irrigation Method	1956	2010
Flood Irrigation (Acres)	982,000	481,500
Sprinklers (Acres)	0	349,500
Total Irrigation	982,000	831,000

South Platte River Basin Water Districts



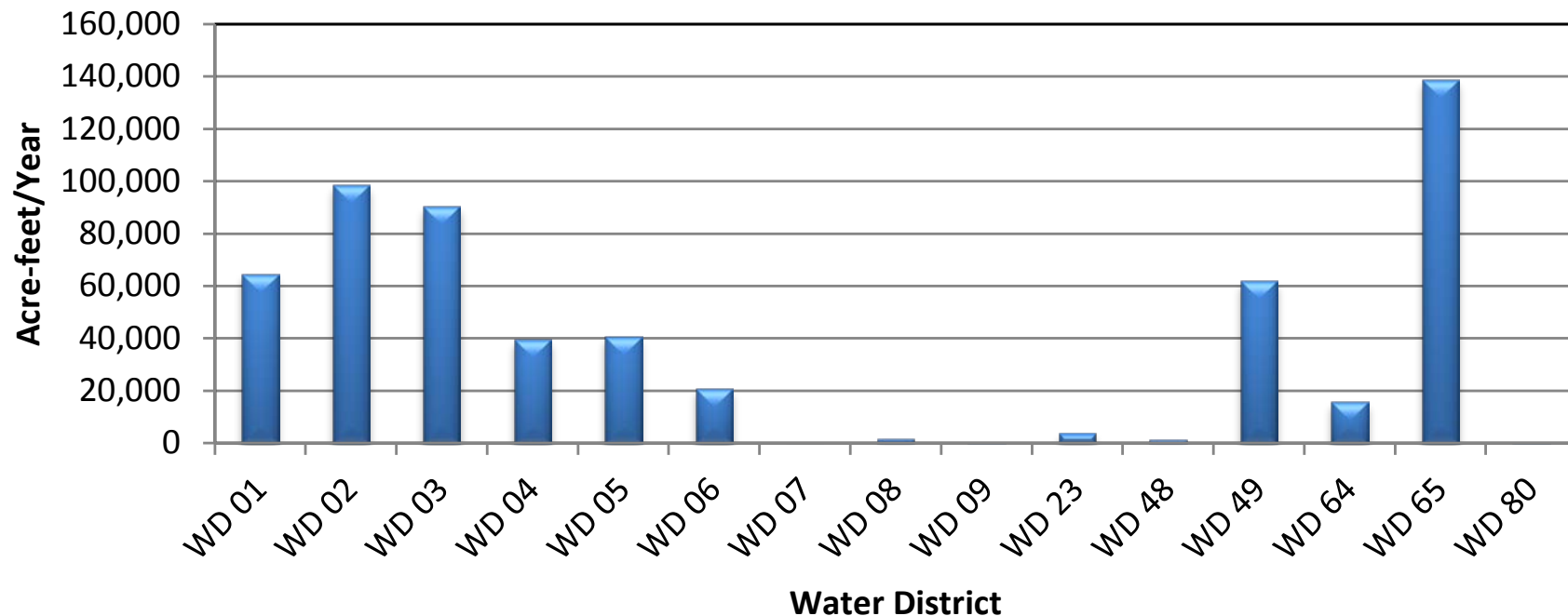
Irrigation Supply by Water District

Water Use by Water District (1997-2006)



Irrigation Shortages by Water District

Shortages by Water District (1997 - 2006)



South Platte and Metro Basins Shortages: 378,400 AF
Republican Basin Shortages: 200,600 AF



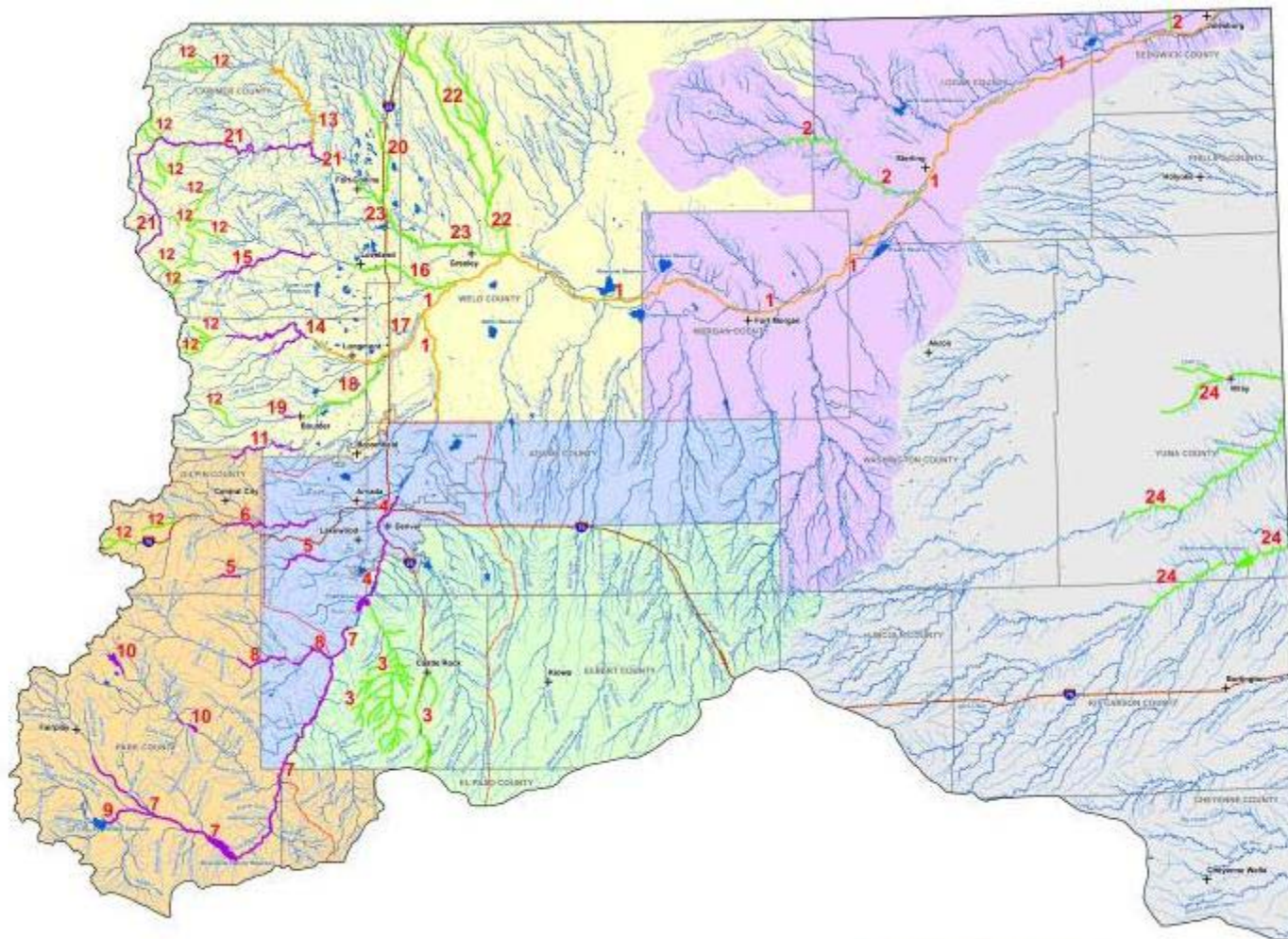
Nonconsumptive Needs



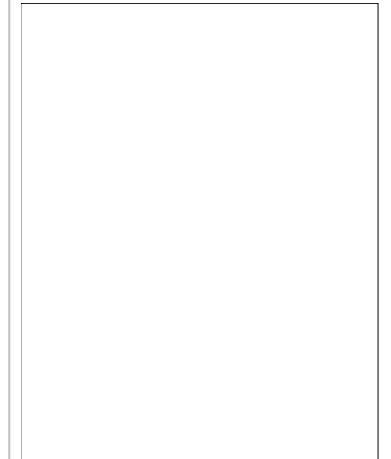
Nonconsumptive Needs

- Protect and enhance rivers for environmental and recreational uses
- Sample categories of nonconsumptive needs
 - Fishing
 - Wetland areas
 - Endangered, threatened, and species of special concern
 - Recreation
 - Waterfowl hunting and viewing

Environmental and Recreational Focus Areas



Candidate Environmental and Recreational
Focus Areas
Legend

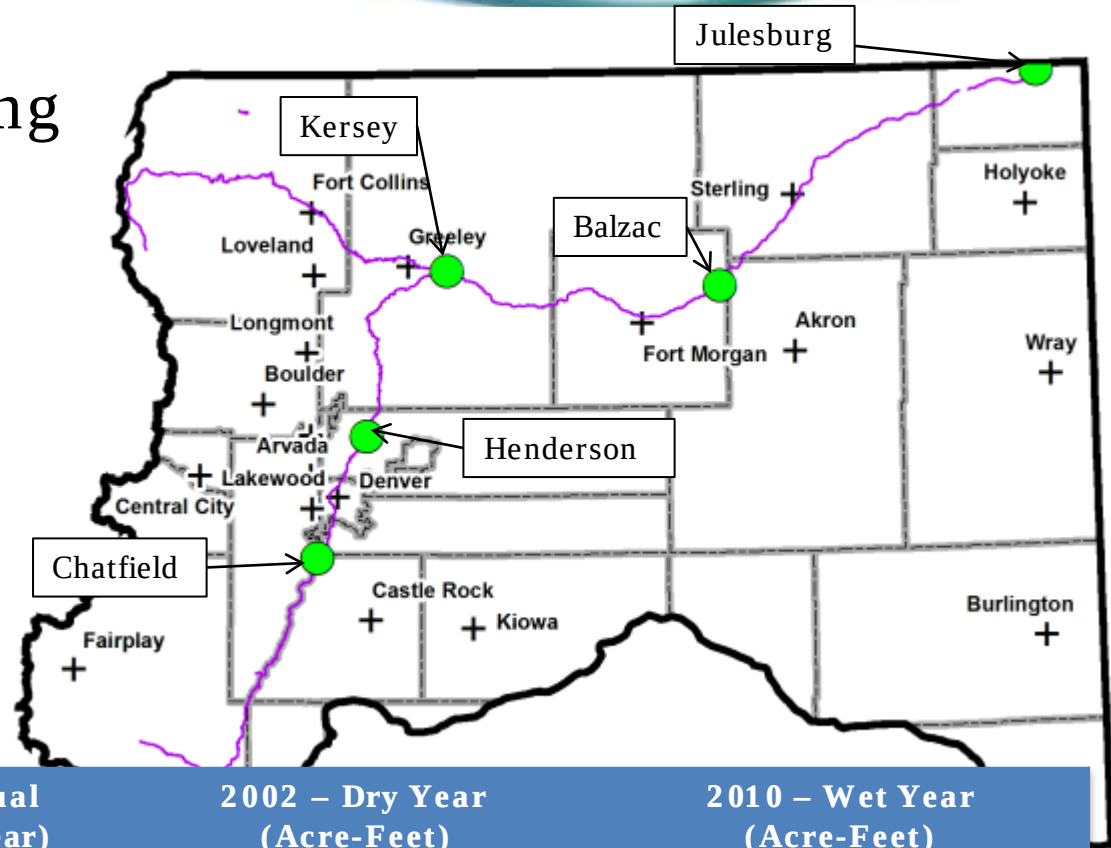


*Note: Red numerical labels correspond
to segment # on NCNA focus area matrix.



Hydrology of the Basin

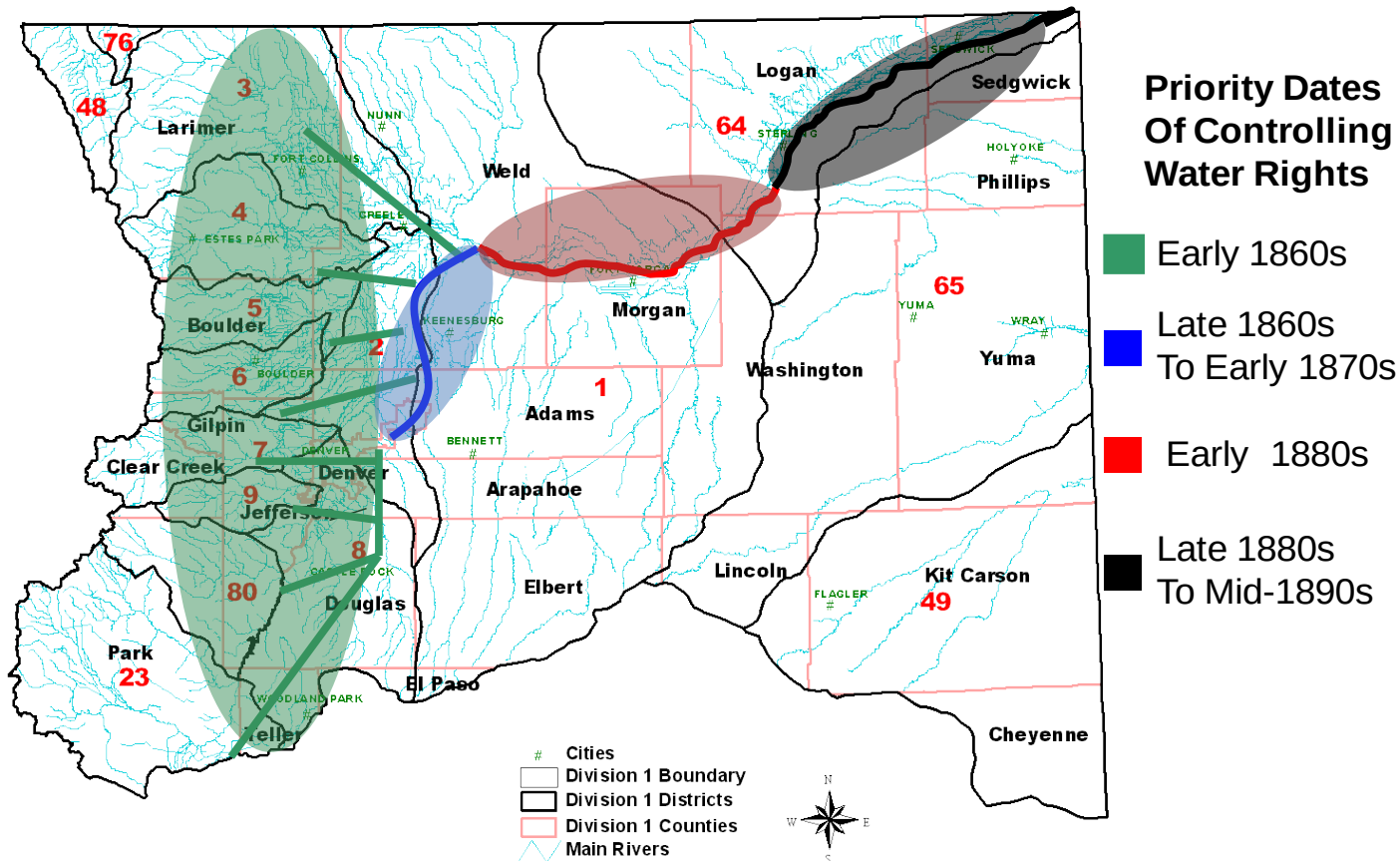
Hydrology at Key Gaging Stations in the South Platte Basin



Gauge (Period of Record)	Average Annual (Acre-Feet/Year)	2002 – Dry Year (Acre-Feet)	2010 – Wet Year (Acre-Feet)
Chatfield (1987 – 2011)	102,180	9,421	103,056
Henderson (1927 – 2011)	318,676	175,105	382,466
Kersey (1914 – 2011)	662,595	247,160	907,493
Balzac (1918 – 2011)	359,600	102,481	516,436
Julesburg (1902 -2011)	366,607	66,853	591,027

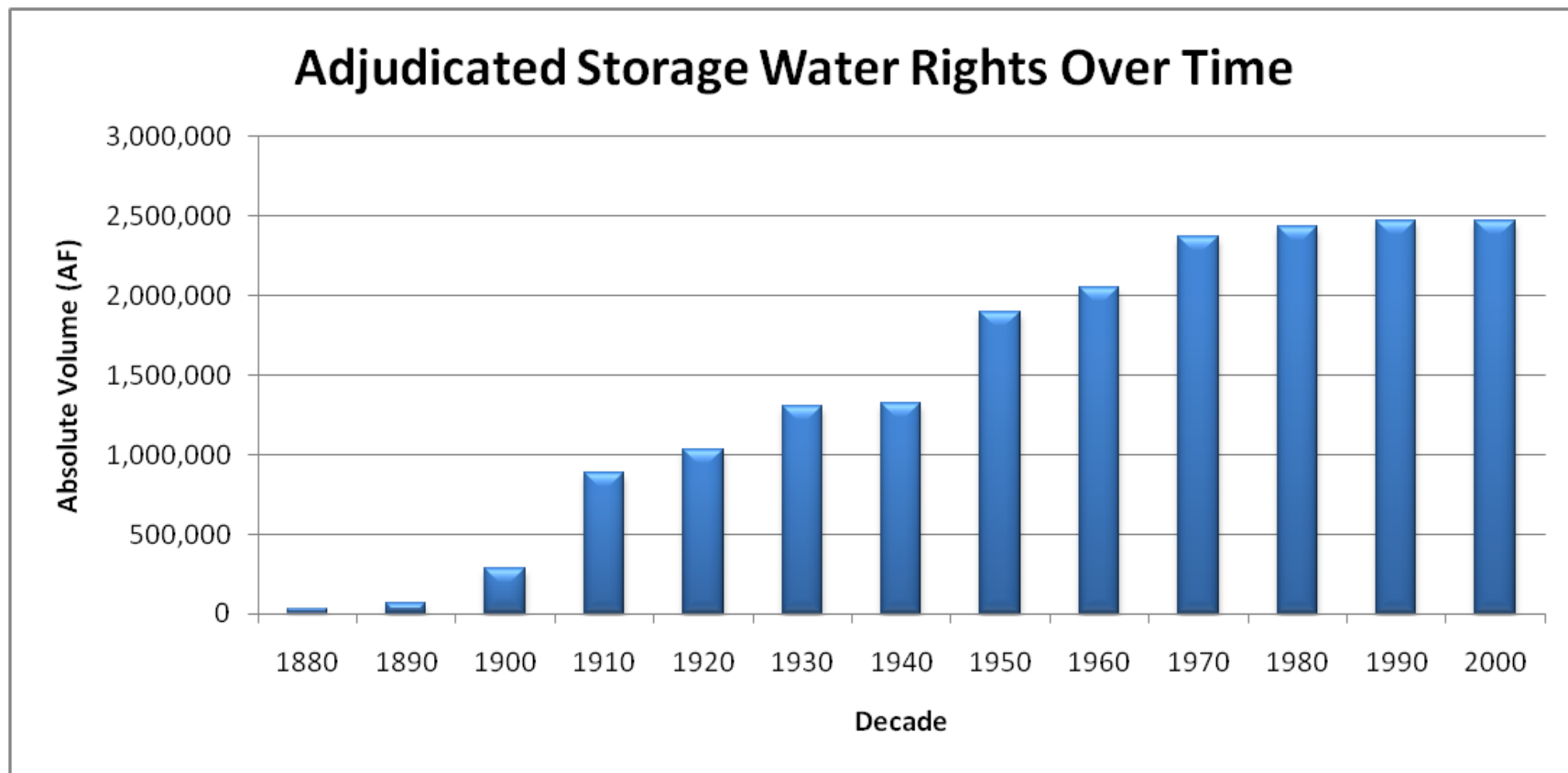
Water Rights Development in South Platte Basin was Influenced by Return Flows

State of Colorado, Division of Water Resources, Division 1, South Platte River Drainage.



Source: SWSI 2010 South Platte Basin Report Basinwide Consumptive and Nonconsumptive Water Supply Needs Assessments, Figure 6.12

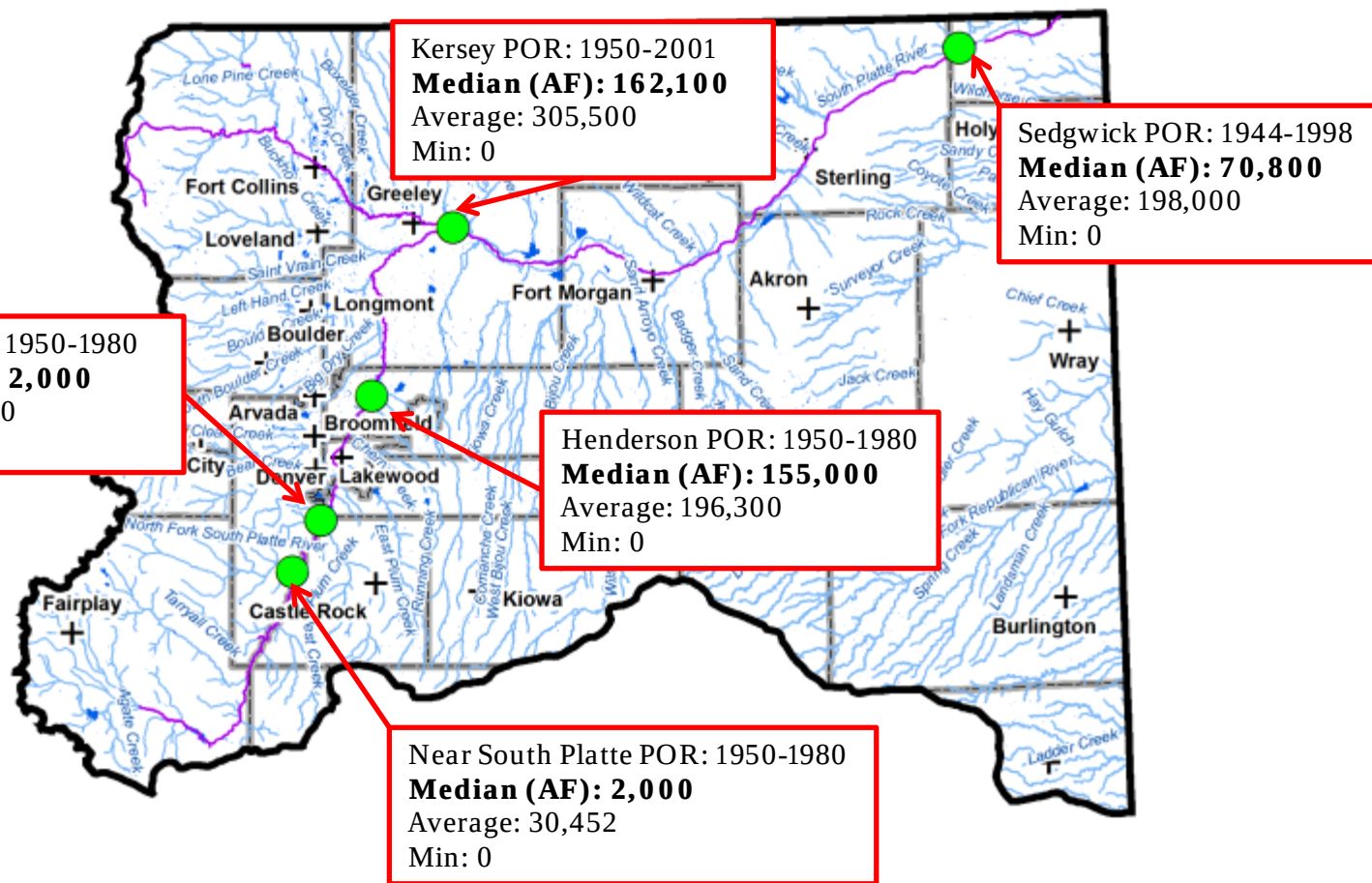
Reservoir Storage Constructed to Provide Dependable Supplies in South Platte and Republican Basin



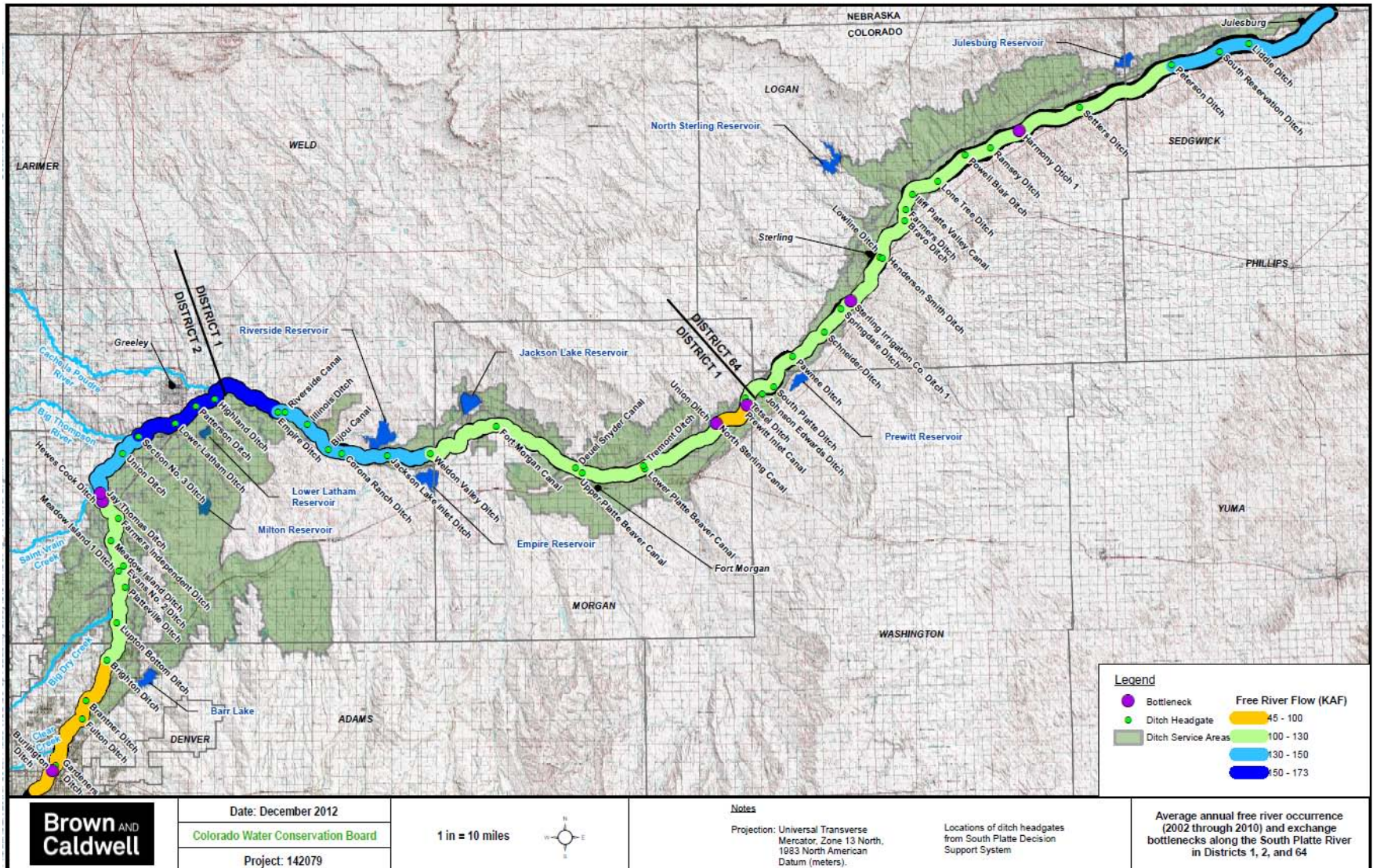


Water Availability

Summary of Modeled Water Availability in the South Platte Basin

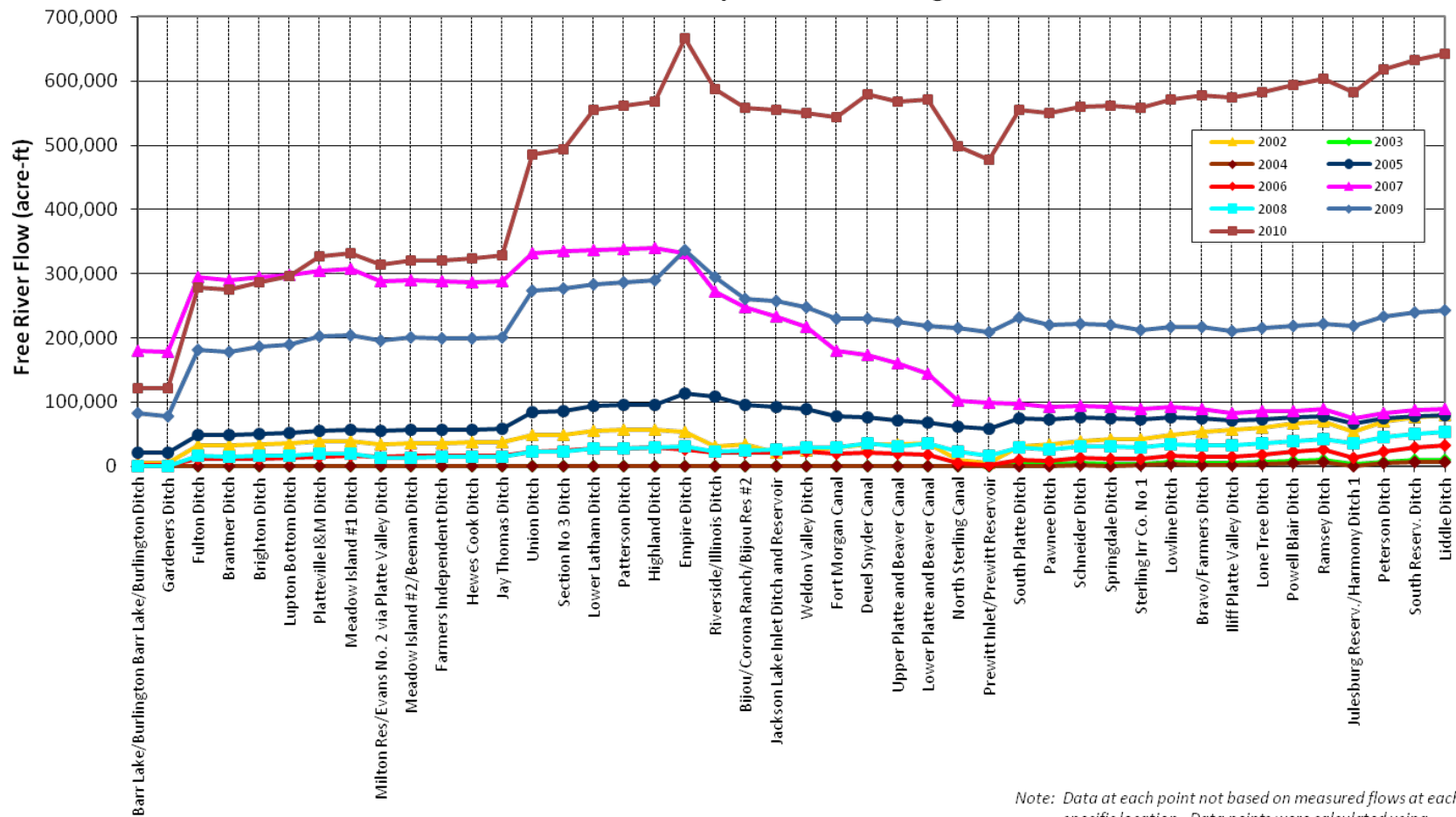


Free River Analysis on South Platte River



Free River Analysis on South Platte River

Variation in the annual volume of free river flow passing various points along the South Platte River for water years 2002 through 2010

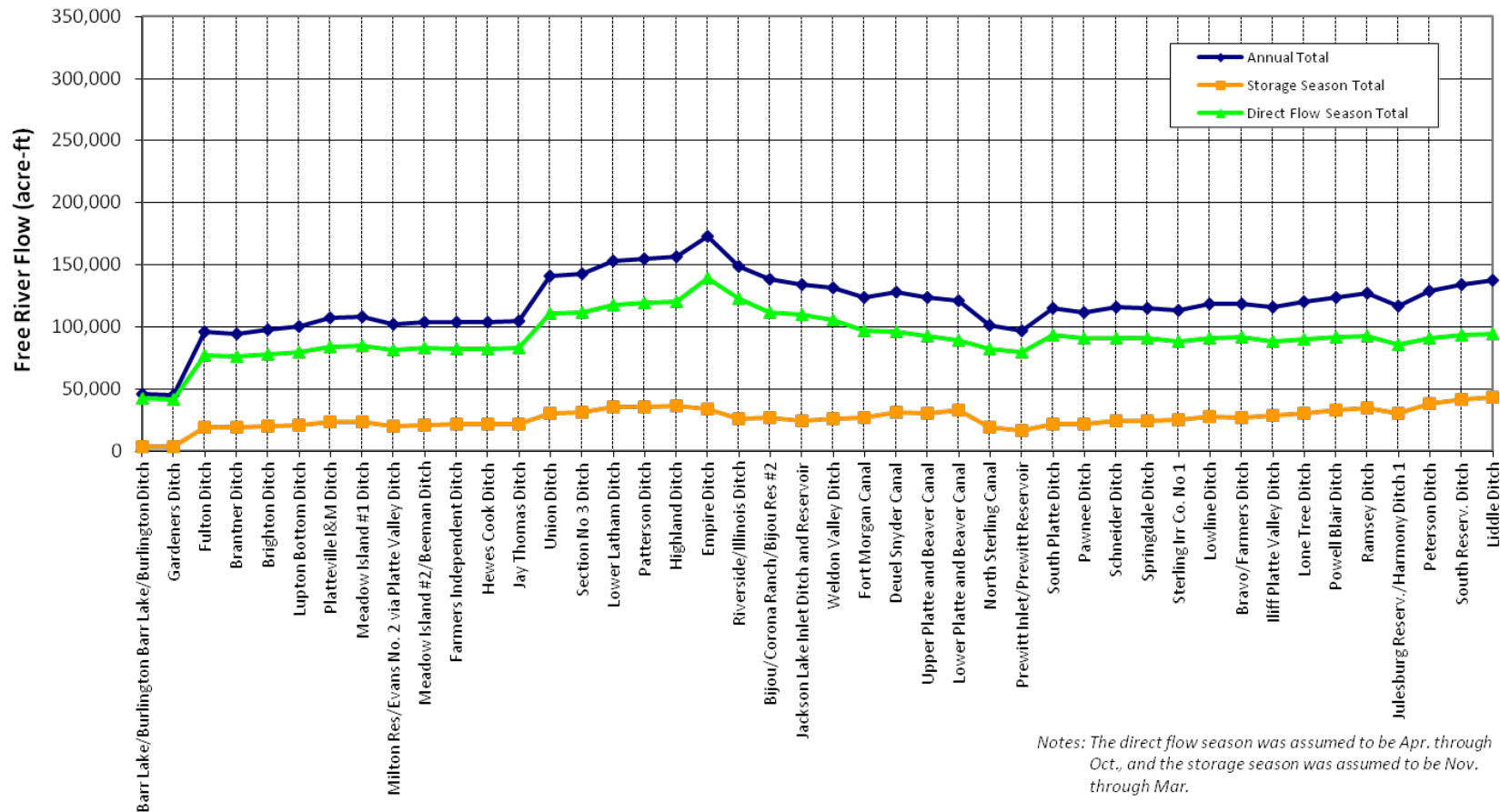


Note: Data at each point not based on measured flows at each specific location. Data points were calculated using measured river flows at various locations, measured diversions, and river losses/gains.

Structure (upstream to downstream)

Free River Analysis on South Platte River

Variation in the average annual volume of free river flow passing various points along the South Platte River for water years 2002 - 2010

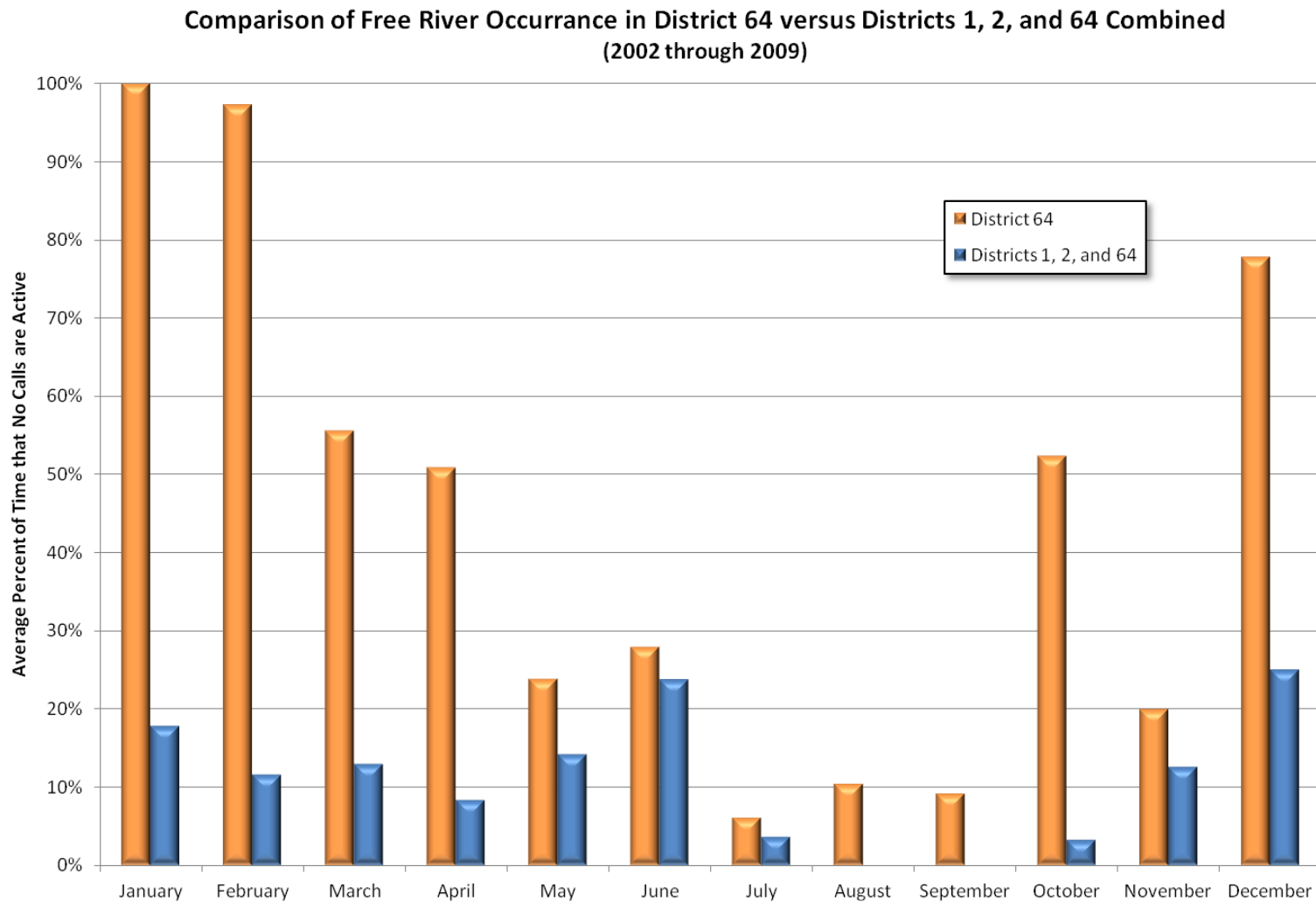


Notes: The direct flow season was assumed to be Apr. through Oct., and the storage season was assumed to be Nov. through Mar.

Data at each point not based on measured flows at each specific location. Data points were calculated using measured river flows at various locations, measured diversions, and river losses/gains.

Structure (upstream to downstream)

Free River Analysis





Factors Affecting Water Availability

- Change in precipitation and runoff patterns
 - Above average conditions reported 1970s – 1990s
- Rapid population growth coincident with three of the wettest decades
- Projected increase in reuse and recapture of consumable M&I return flows
- Development of projects that capture surplus flows for agricultural well augmentation programs



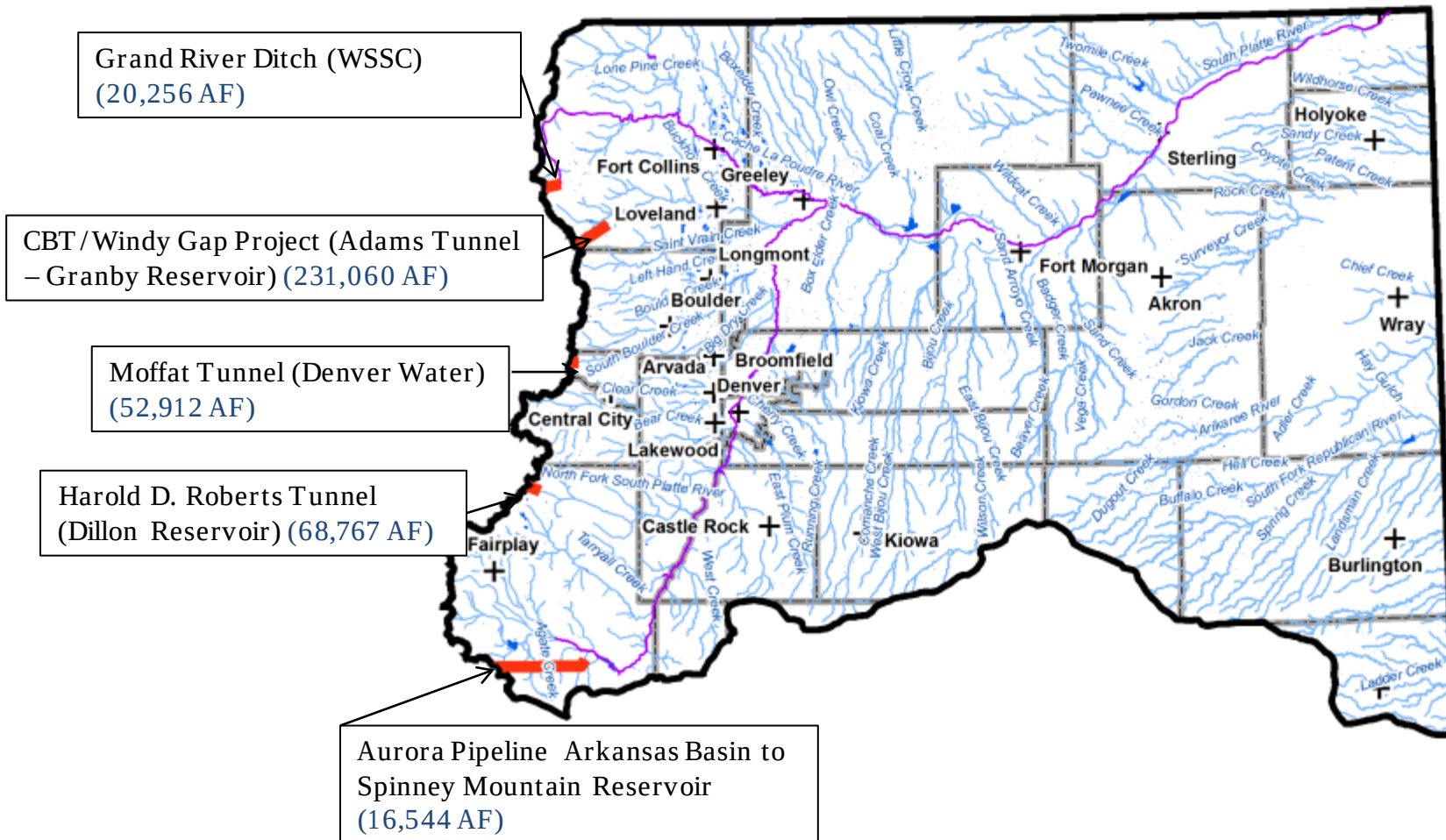
Future Factors that could Impact Supply Availability

- Platte River Recovery Implementation Program (PRRIP)
- Recreational in-channel diversions (RICDs)
- Instream Flows
- Development of conditional storage water rights
- Development of new and conditional recharge projects
- Climate variability
- Changes in Return Flow Patterns
- Regulatory permitting



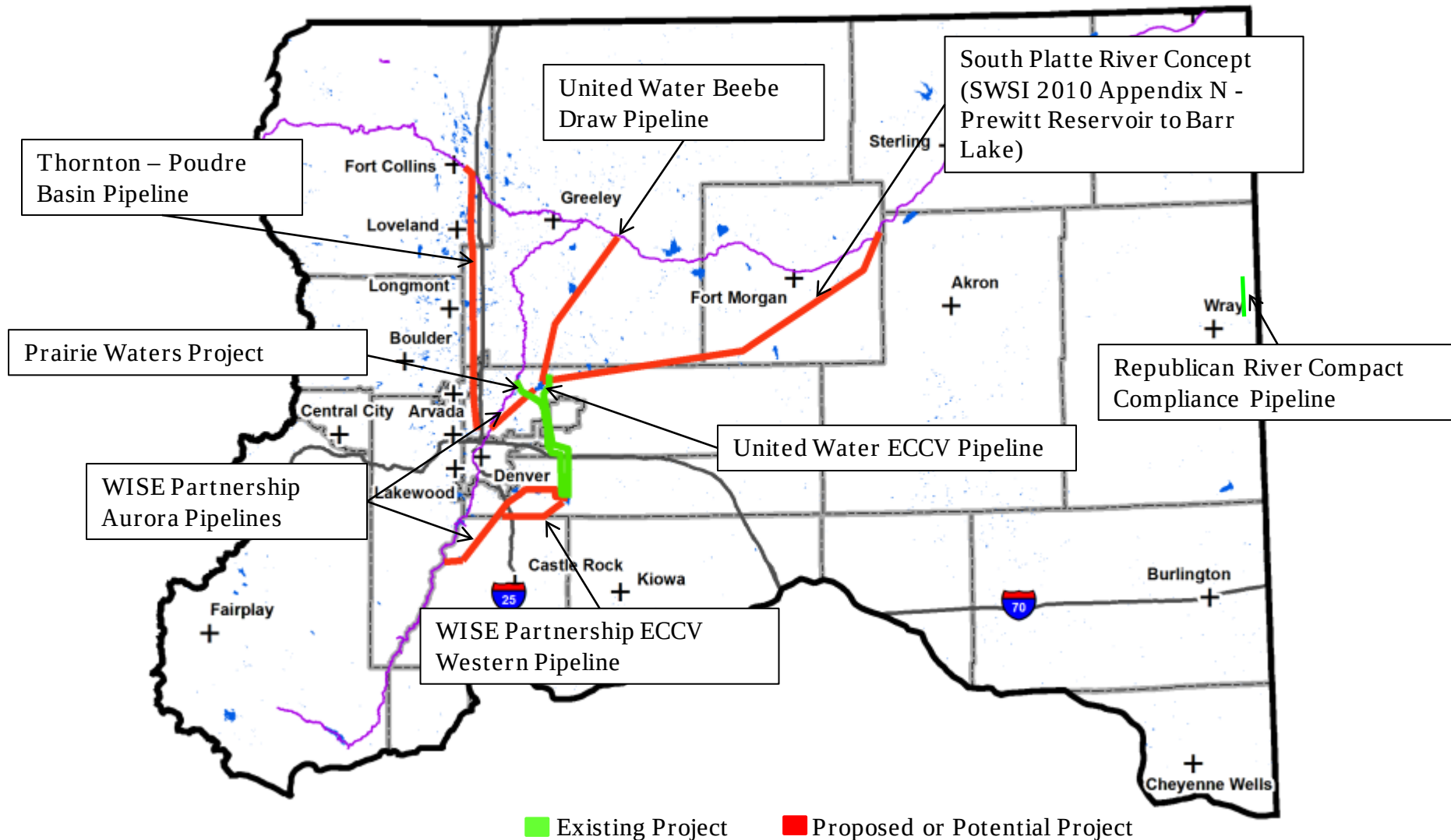
Basin Infrastructure

Major Transbasin Water Supply Projects

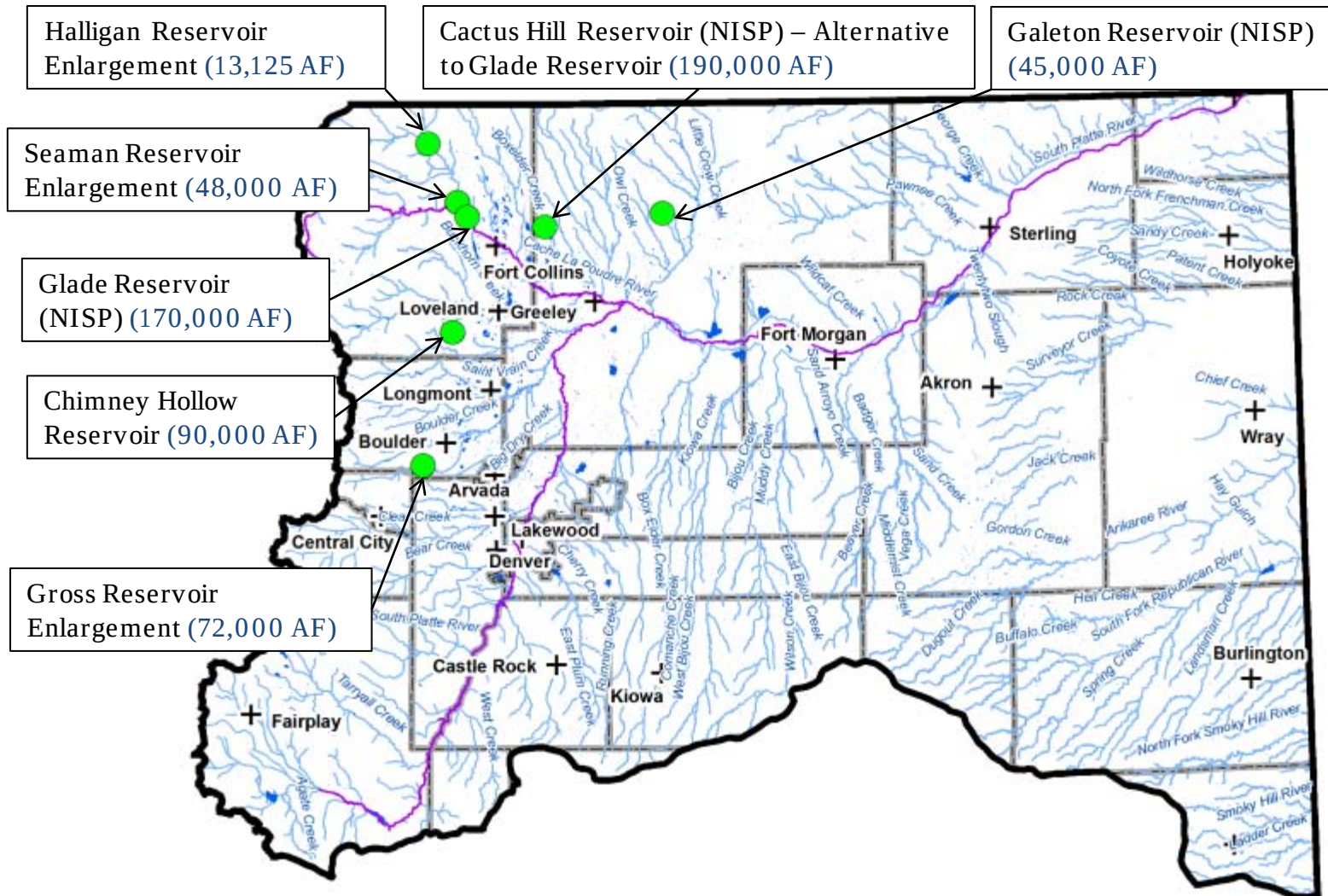


Approximately 400,000 AF generated from transbasin projects

New and Proposed Major Pipelines



Major Proposed Storage Projects







Lined Gravel Pit Reservoirs

- Uses:
 - Store unappropriated flows
 - Store reusable return flows
 - Facilitate exchanges
- Gravel Pit Storage Volumes upstream of Kersey:
 - Total Existing Gravel Storage 71,950 AF
 - Total Planned Gravel Lake Storage 83,500 AF



Compacts and Constraints



Institutional Constraints on Water Use on South Platte River Basin

- South Platte River Compact
- Platte River Recovery Implementation Program (PRRIP)
- Republican River Compact



Future Opportunities/Basin Planning

- Update to SWSI (2016)
 - Infrastructure Sharing
 - New Water Supply (in-basin and transbasin options)
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Questions/Comments



Additional Information



South Platte River Compact

- Effective April 27, 1923
- Impacts the lower river only-District 64
- From 4/1 to 10/15-water rights junior to 6/14/1897 are curtailed if flow at Western Canal in Nebraska is less than 120 cfs
- From 10/16 to 3/31 Colorado can divert the flow of the river



Platte River Recovery Implementation Program (PRRIP)

Three main elements to provide for Endangered Species Act (ESA) compliance for existing and certain water related activities:

1. Enhancing and protecting habitat lands for the target bird species in Central Nebraska
2. Increasing stream flows in Central Platte River during relevant time periods
3. Accommodating existing and certain new water related activities



Platte River RIP Goals

- Phase 1 (2007 to 2019) enhance and protect 10,000 acres of habitat
- Phase 1 reduce target flow shortages by 130,000 to 150,000 acre-feet per year
- Adaptive management for successful implementation



Platte River RIP Details

- Management by the Governance Committee
- Three phases of approximately 15 years each
- Program area is Platte River basin above confluence with Loup River
- Program costs in 2005 dollars is \$320 million
- Monetary costs are \$187 million with Colorado's share \$24 million
- Colorado water contributions Phase 1: 10,000 AF Tamarack I (existing use)
- Colorado plan for future depletions Tamarack II



Republican River Basin

- Major tributaries include:
 - North Fork of Republican River
 - South Fork of Republican River
 - Arikaree River
 - Beaver Creek
- Water use is primarily irrigation with:
 - 515,000 acres ground water supply from Ogallala aquifer
 - 1,000 acres surface water supply



Republican River Basin Compact

- Approved on December 31, 1942
- Compact states are Colorado, Kansas, and Nebraska
- Allocates undepleted water supply of 478,900 AF
 - Colorado is allocated 54,100 AF of depletion
 - Kansas is allocated 190,300 AF of depletion
 - Nebraska is allocated 234,500 AF of depletion
- Compact allows for adjustment of allocations based on computed undepleted annual water supply



Republican River Compact Litigation and Final Settlement Agreement

- Suit initiated by Kansas in May, 1998 against Nebraska for depletions to streamflow by wells
- Colorado drawn into litigation in July, 2000
- Settlement negotiations began in October, 2001
- Final Settlement Agreement signed December 15, 2002



Final Settlement Agreement Details

- Groundwater pumping depletions computed with a jointly developed groundwater model
- New accounting procedures agreed upon
- Five year moving average for compact compliance accounting
- Unused allocation in a sub-basin could be used in another basin
- Establishes a dispute resolution process



Republican Compact Compliance Actions

- Created Republican River Basin Water Conservation District
- District actions toward compact compliance:
 - Established a water use fee that for 2010 was \$14.50 per irrigated acre
 - Permanently retired 30,000 acres from groundwater irrigation by a conservation reserve program
 - Constructed an augmentation pipeline to pump 15,000 AF of historical consumptive use water to the North Fork and removed an additional 10,000 acres from irrigation by wells
 - Pipeline completed in July, 2012
 - Bonny Reservoir