Well Regulation in the South Platte River Basin

South Platte River Basin Task Force

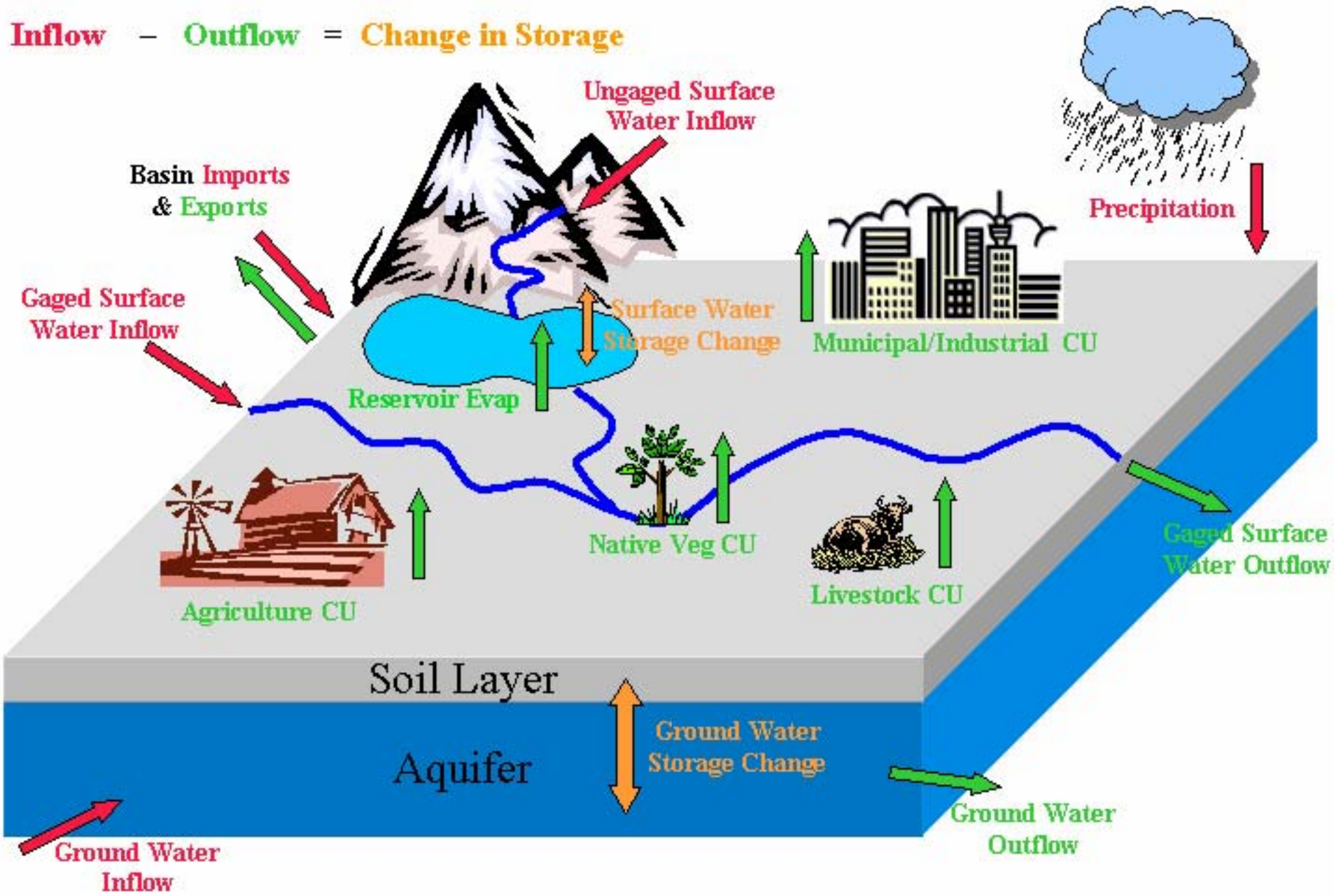
June 29, 2007
Union Colony Civic Center
Greeley, Colorado

Dick Wolfe, M.S., P.E.

COLORADO DIVISION OF WATER RESOURCES
DEPARTMENT OF NATURAL RESOURCES

What Defines the South Platte River System?

- This physical system is defined by the geographic boundaries of the South Platte River and its tributaries in Colorado extending from the surface to the base of the alluvial ground water aquifers.

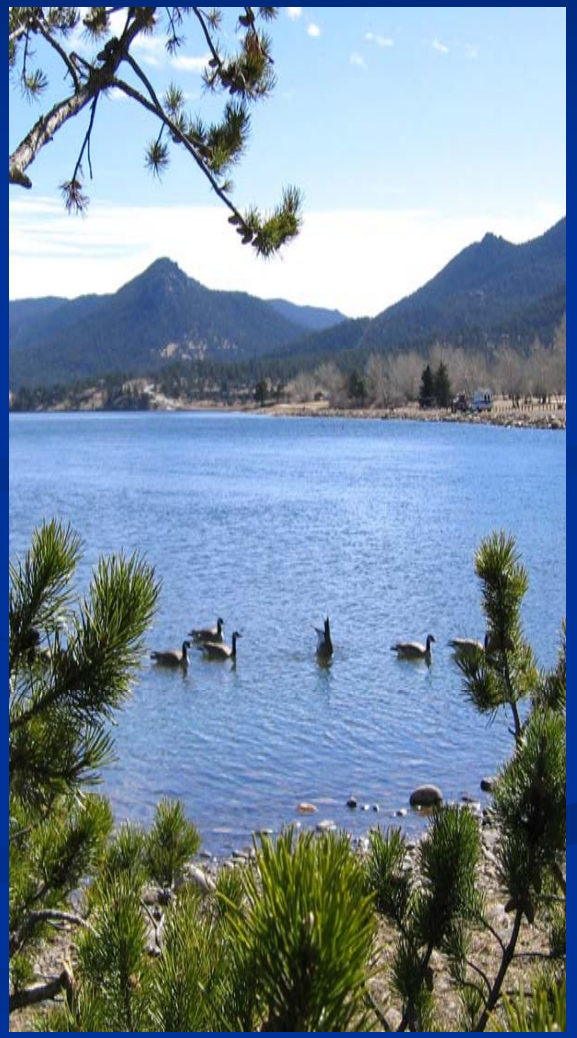

Inflow – Outflow = Change in Storage
Ungaged Surface Water Inflow
Basin Imports & Exports
Precipitation
Gaged Surface Water Inflow
Surface Water Storage Change
Municipal/Industrial CU
Reservoir Evap
Native Veg CU
Agriculture CU
Livestock CU
Gaged Surface Water Outflow
Soil Layer
Aquifer
Ground Water Storage Change
Ground Water Outflow
Ground Water Inflow

Inflow – Outflow = Change in Storage

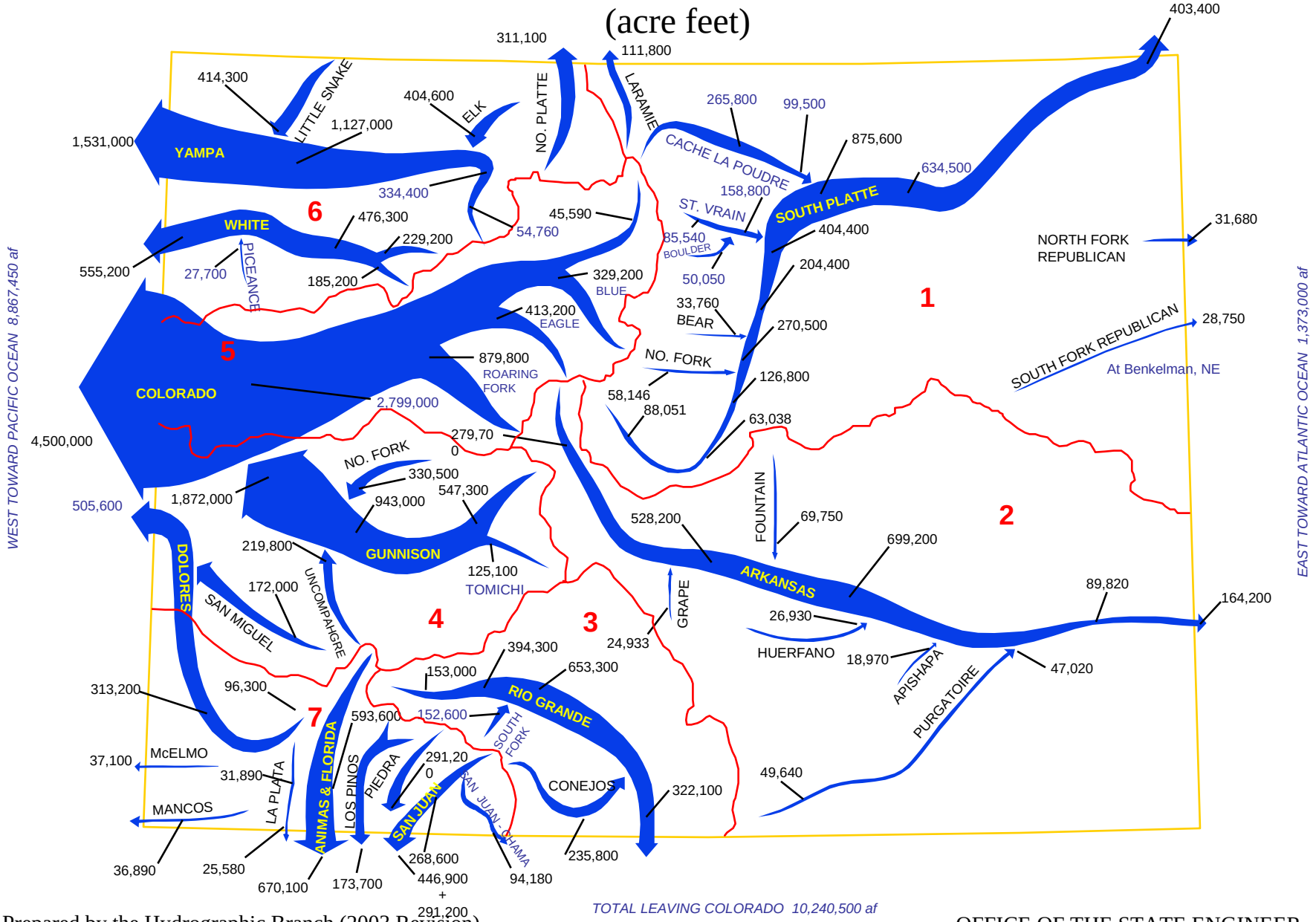
- Inflow
  - Precipitation (snow and rain)
  - Transmountain water imports
  - Return flows from bedrock ground water aquifers (NT, NNT)
  - Stream flow into the system
  - Ground water inflow
- Outflow
  - Evapotranspiration
  - Evaporation
  - Stream flow out of the system
  - Depletions associated with human activities
  - Recharge to bedrock aquifers
  - Ground water outflow

Change in Storage

- Alluvial storage capacity (3.4 MAF unsaturated and 13.6 MAF saturated)
- Reservoir storage capacity (1.77 MAF active and 3.46 MAF conditional)



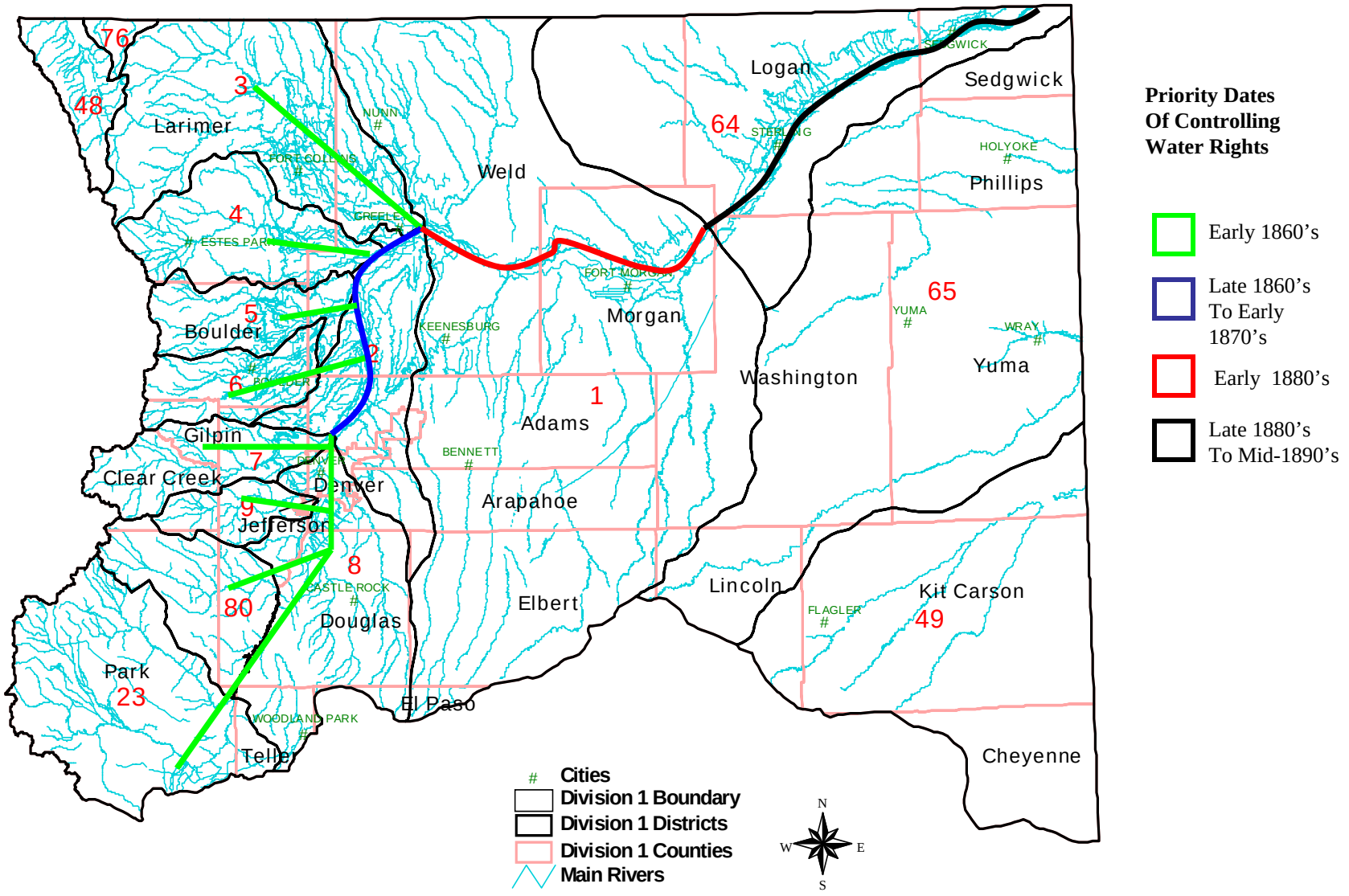
COLORADO
HISTORICAL AVERAGE ANNUAL STREAM FLOWS
(acre feet)



Prepared by the Hydrographic Branch (2003 Revision)
Historic averages obtained from USGS Water-Data Report CO-02

OFFICE OF THE STATE ENGINEER
COLORADO DIVISION OF WATER RESOURCES

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



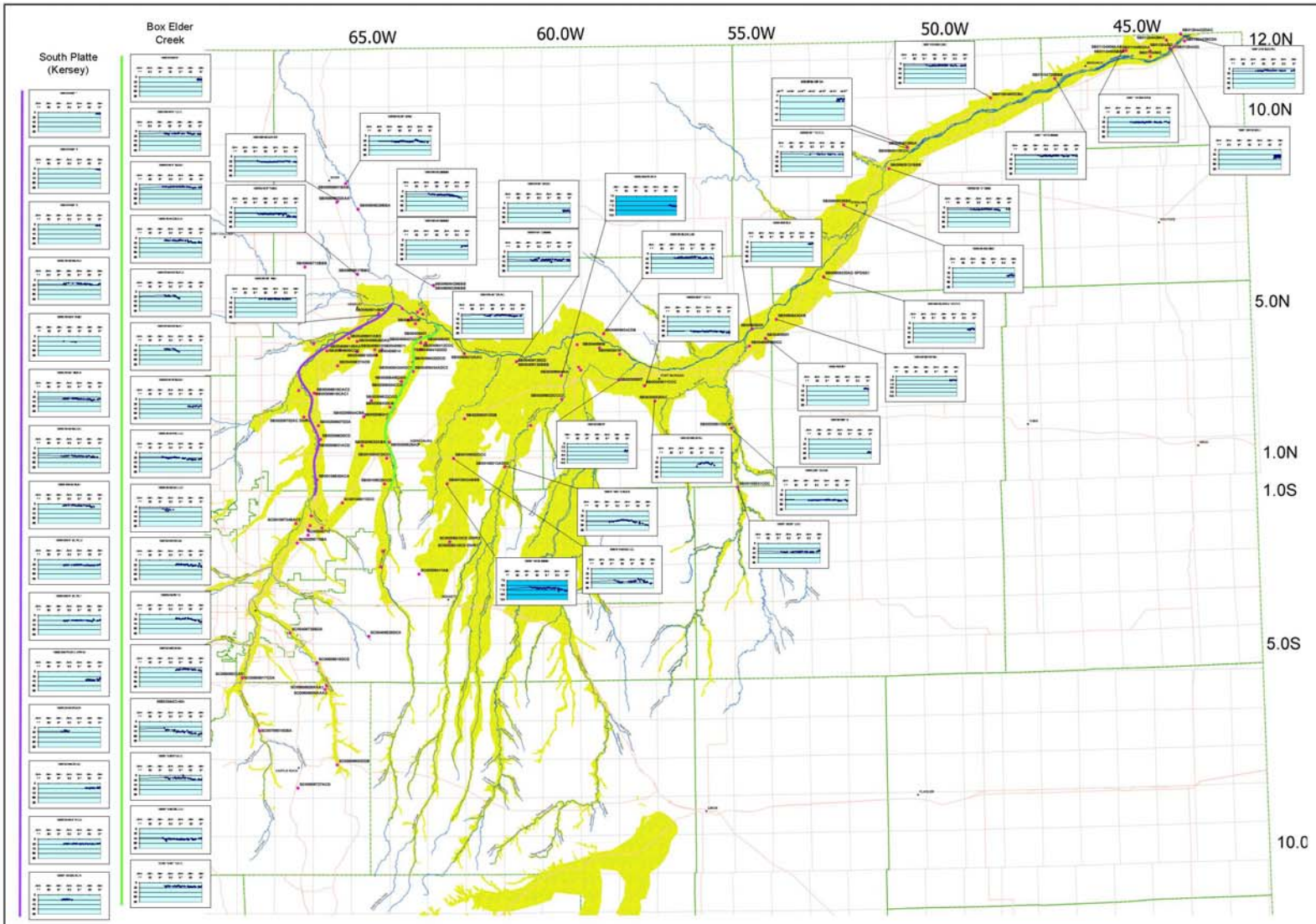
Priority Dates Of Controlling Water Rights

- Early 1860's
- Late 1860's To Early 1870's
- Early 1880's
- Late 1880's To Mid-1890's

South Platte River Compact
April 27, 1923

Key Provisions

- Divides South Platte River Basin into “Upper Section” and “Lower Section
- South Platte River Compact applies only in “Lower Section” (Washington County line to State Line, District 64)
- Flow of river is measured flow of Julesburg gage plus inflow below gage and above Western Canal diversion
- Between April 1 and October 15, Colorado shall not permit diversions with appropriation dates junior to June 14, 1897 when the flow of the river is less than 120 cfs unless the diversions are augmented
- Colorado has the right to the full and uninterrupted use of the waters of the South Platte River from October 16 to March 31



Lower South Platte Basin Observation Well Network

Source:
Observation Well, Colorado Division of Water Resources
Counties and Towns, Colorado Department of Local Affairs
Highways, Colorado Department of Transportation
Public Land Survey System, Tobin Data Graphics

1:275,000

0 5 10 20 30 40 50 Miles

- City
- River
- Highway
- County
- Township
- Mapped and Interpretted Alluvium
- WL_Sites2

COLORADO DIVISION OF WATER RESOURCES
DEPARTMENT OF NATURAL RESOURCES

d:\projects\geotech\sp_forum\obs_wells.mxd etp 6/25/2007

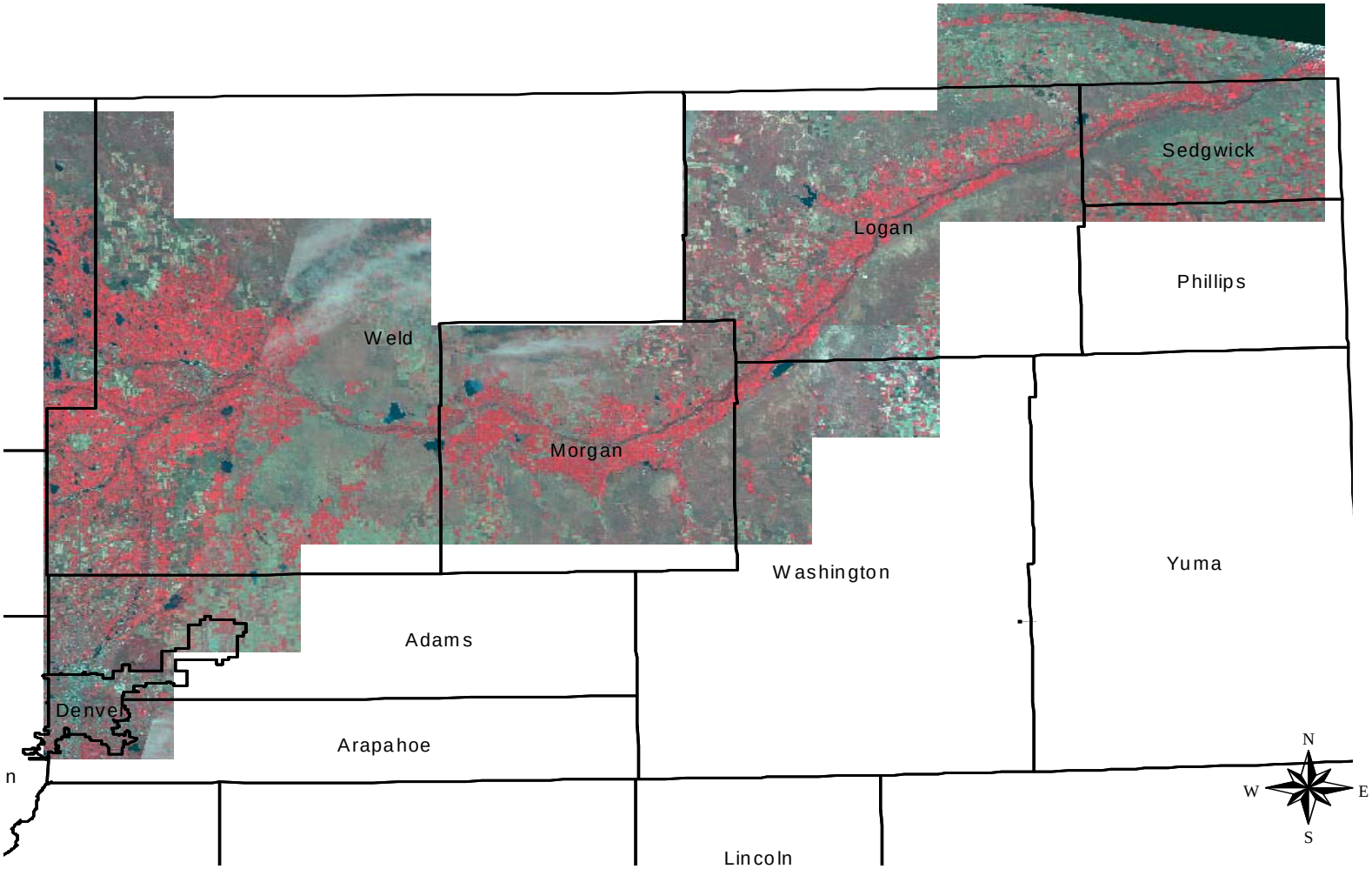
South Platte River Basin Hydrology

- Native flows for total basin estimated to be 1,400,000 acre-feet annually by the USGS
- Transmountain water provides approximately another 400,000 acre-feet per year
- Ground water pumping from high capacity alluvial wells located along the South Platte River are estimated to provide over 500,000 acre-feet annually
- Total annual surface water diversions equal approximately 4,000,000 acre-feet

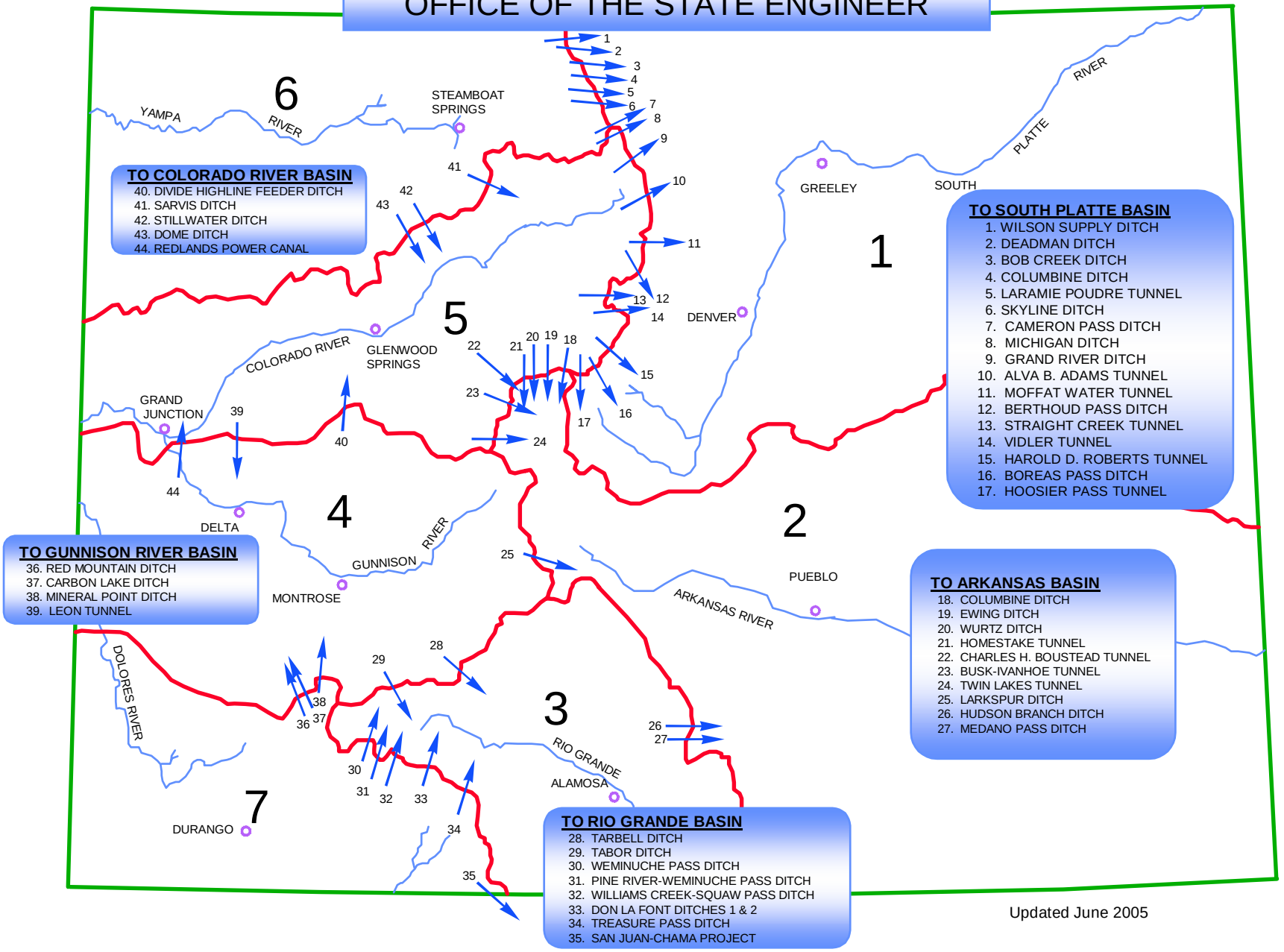
South Platte River Basin Irrigation

- Approximately 1 million irrigated acres
  - Approximately 18% is served by ground water only
  - Approximately 27% is served by a combination of surface and ground water
  - Approximately 55% is served by surface water only

Irrigated Area Along the South Platte River



TRANSMOUNTAIN DIVERSIONS
OFFICE OF THE STATE ENGINEER



TO COLORADO RIVER BASIN
40. DIVIDE HIGHLINE FEEDER DITCH
41. SARVIS DITCH
42. STILLWATER DITCH
43. DOME DITCH
44. REDLANDS POWER CANAL

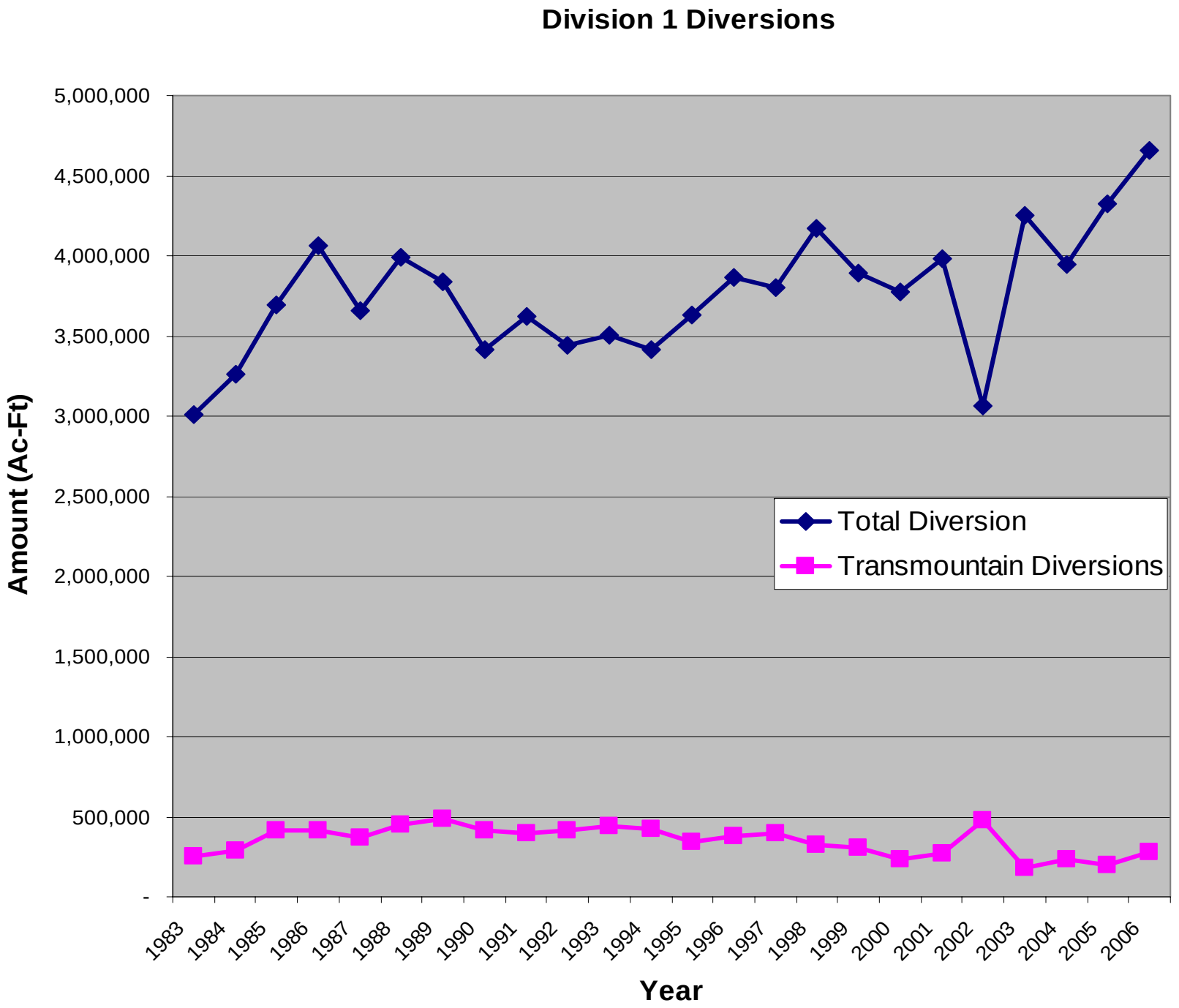
TO SOUTH PLATTE BASIN
1. WILSON SUPPLY DITCH
2. DEADMAN DITCH
3. BOB CREEK DITCH
4. COLUMBINE DITCH
5. LARAMIE POUDRE TUNNEL
6. SKYLINE DITCH
7. CAMERON PASS DITCH
8. MICHIGAN DITCH
9. GRAND RIVER DITCH
10. ALVA B. ADAMS TUNNEL
11. MOFFAT WATER TUNNEL
12. BERTHOUD PASS DITCH
13. STRAIGHT CREEK TUNNEL
14. VIDLER TUNNEL
15. HAROLD D. ROBERTS TUNNEL
16. BOREAS PASS DITCH
17. HOOSIER PASS TUNNEL

TO GUNNISON RIVER BASIN
36. RED MOUNTAIN DITCH
37. CARBON LAKE DITCH
38. MINERAL POINT DITCH
39. LEON TUNNEL

TO ARKANSAS BASIN
18. COLUMBINE DITCH
19. EWING DITCH
20. WURTZ DITCH
21. HOMESTAKE TUNNEL
22. CHARLES H. BOUSTEAD TUNNEL
23. BUSK-IVANHOE TUNNEL
24. TWIN LAKES TUNNEL
25. LARKSPUR DITCH
26. HUDSON BRANCH DITCH
27. MEDANO PASS DITCH

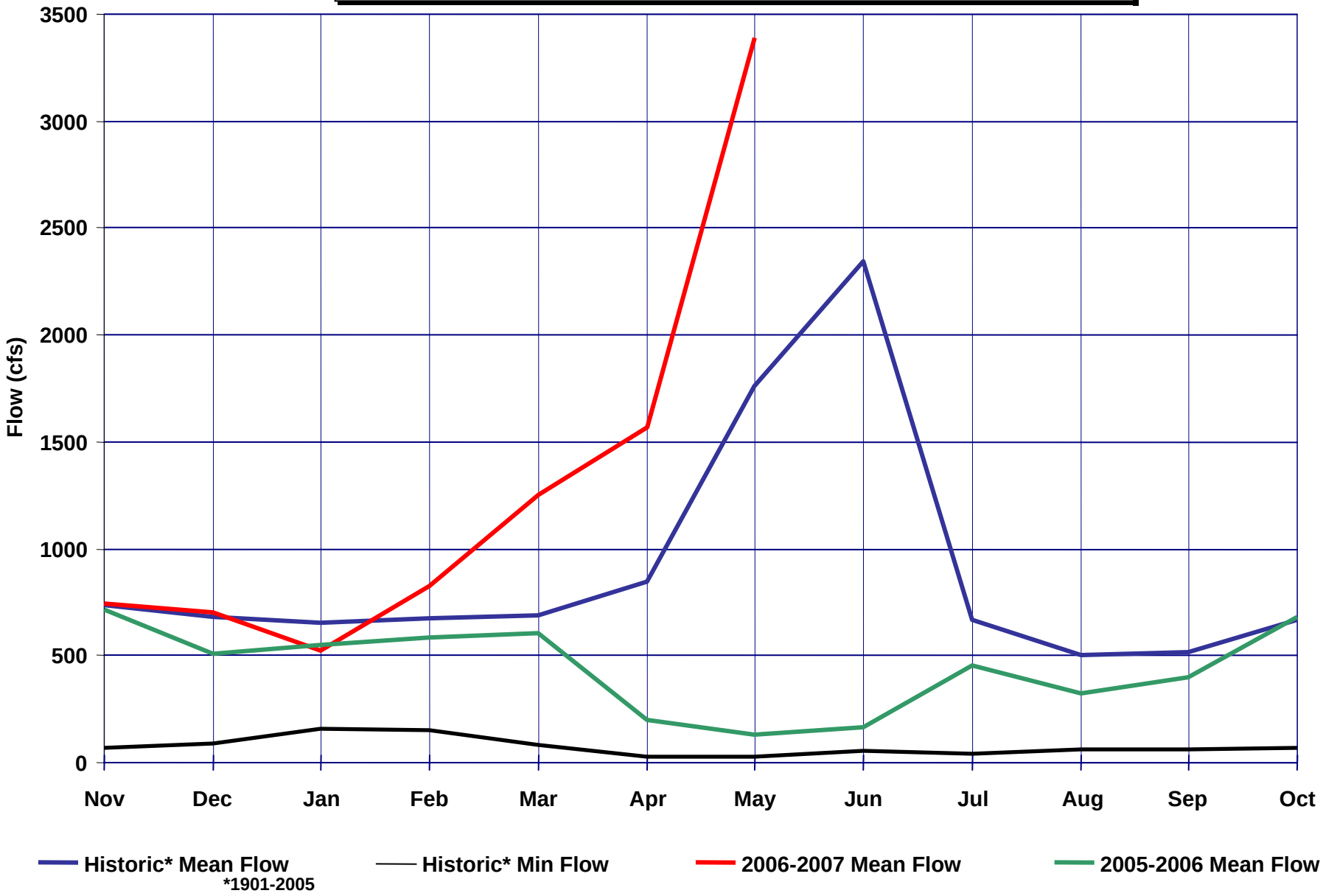
TO RIO GRANDE BASIN
28. TARBELL DITCH
29. TABOR DITCH
30. WEMINUCHE PASS DITCH
31. PINE RIVER-WEMINUCHE PASS DITCH
32. WILLIAMS CREEK-SQUAW PASS DITCH
33. DON LA FONT DITCHES 1 & 2
34. TREASURE PASS DITCH
35. SAN JUAN-CHAMA PROJECT

Updated June 2005


Division 1 Diversions
Amount (Ac-Ft)
5,000,000
4,500,000
4,000,000
3,500,000
3,000,000
2,500,000
2,000,000
1,500,000
1,000,000
500,000
-
Total Diversion
Transmountain Diversions
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
Year

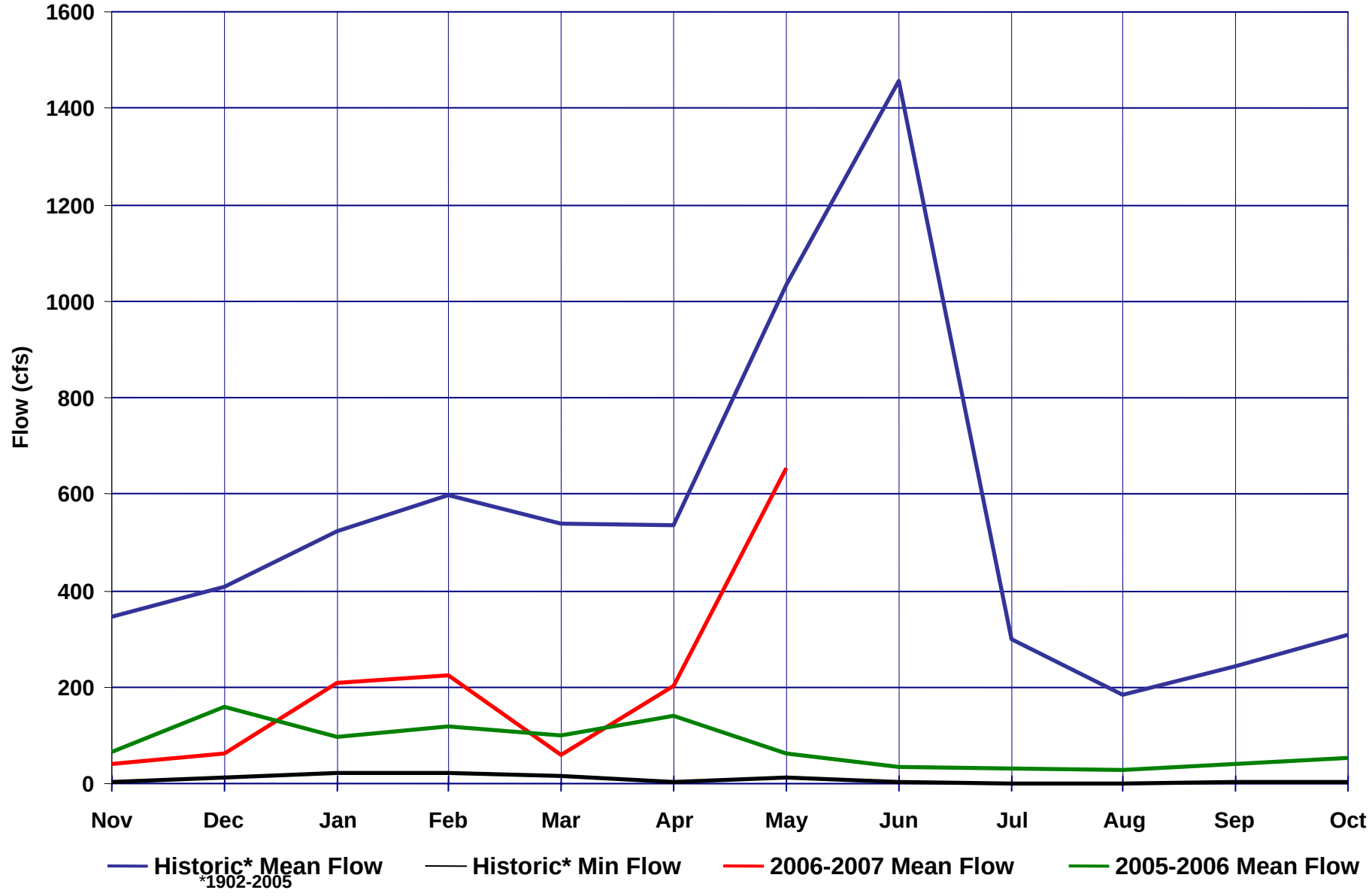
South Platte River at Kersey

Irrigation Water Year

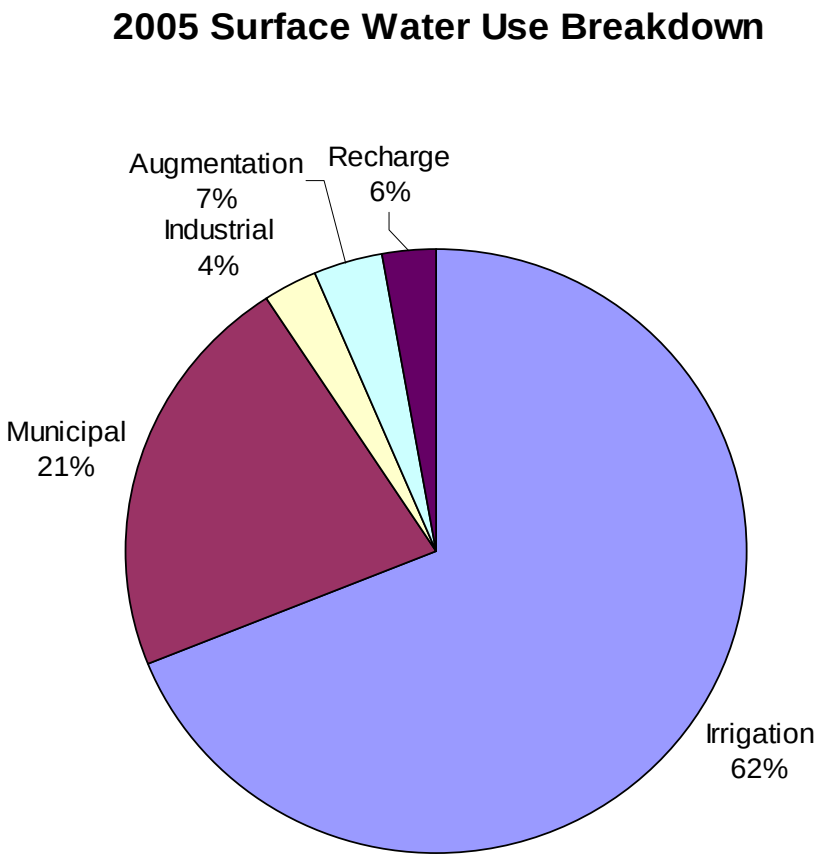


South Platte River at Julesburg

Irrigation Water Year



South Platte River Basin Water Use



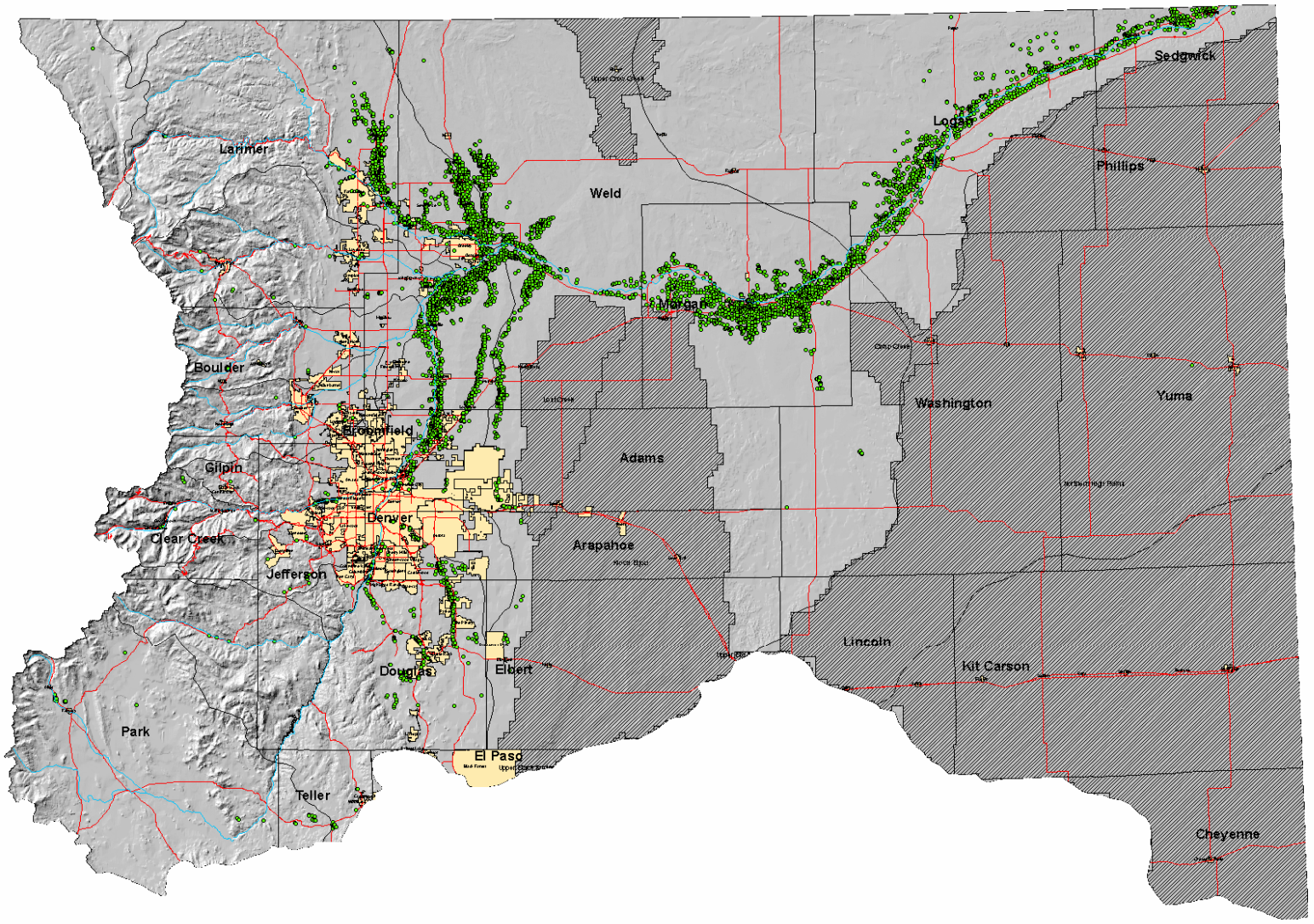
General Well Information

- Approximately 9,000 decreed high capacity wells in South Platte River basin and its tributaries on record. Less in actual existence.
- Have inventoried approximately 7,400 high capacity wells
- Still verifying use of remaining 1,600 wells (verification is starting near the river and moving away from traditional irrigated areas; it is estimated that 80% of these wells are in existence, but only 15% are being used)

General Well Information

- For 2007, the anticipated number of Division 1 Substitute Water Supply Plans ("SWSPs") with wells that will operate in 2007 is approximately 125. (This only includes SWSPs per 37-92-308, C.R.S., with wells.) Approximately 1,300 wells are included in these 125 plans.
- The number of wells operating in decreed augmentation plans in Division 1 is approximately 3,700.

Division 1 Wells in Plans



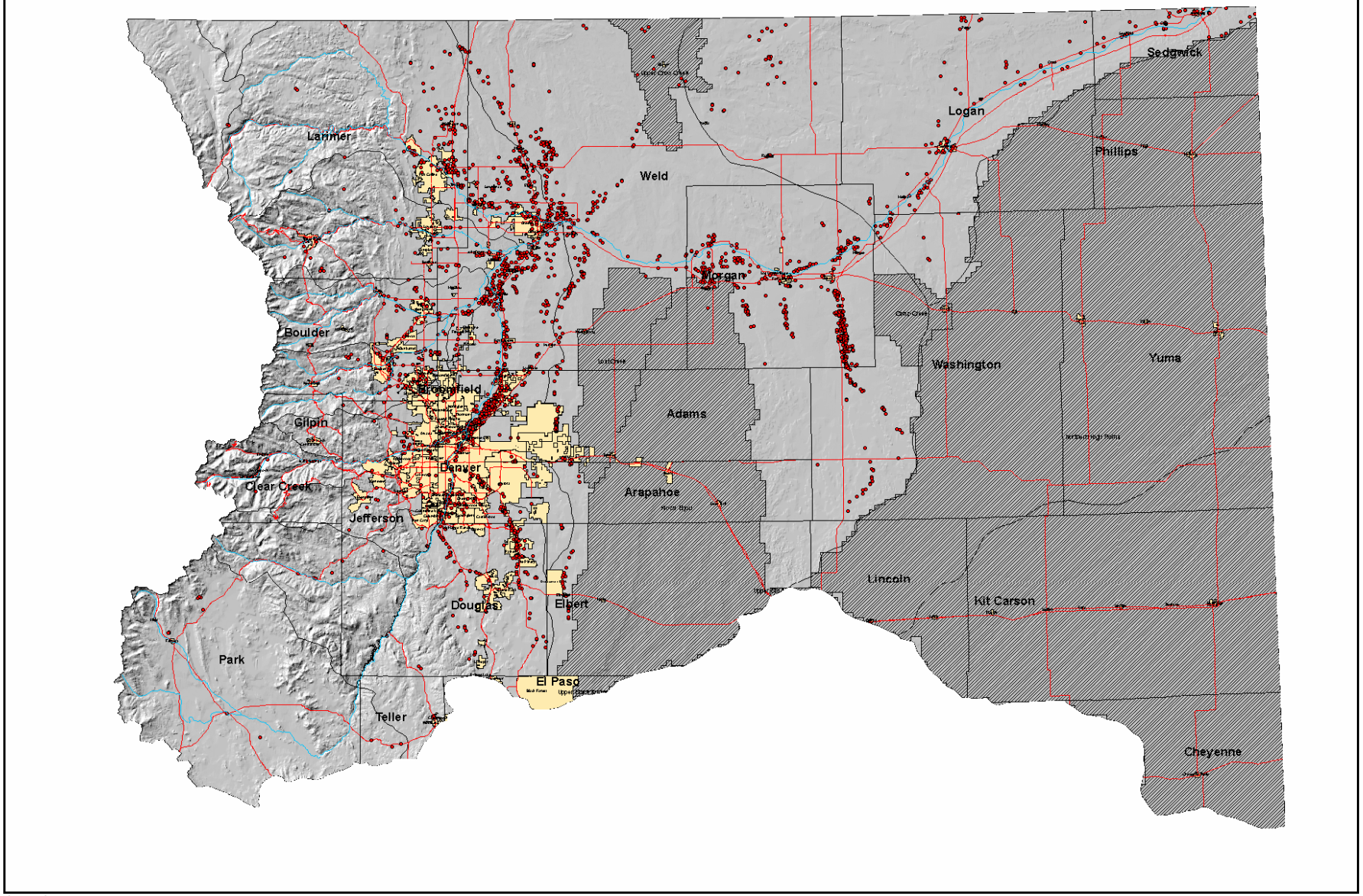
Legend

Designated Basins (not tributary to South Platte)

Division 1 wells in plans

0 10 20 40 60 80 Miles

Division 1 Wells Not in Plans



Legend

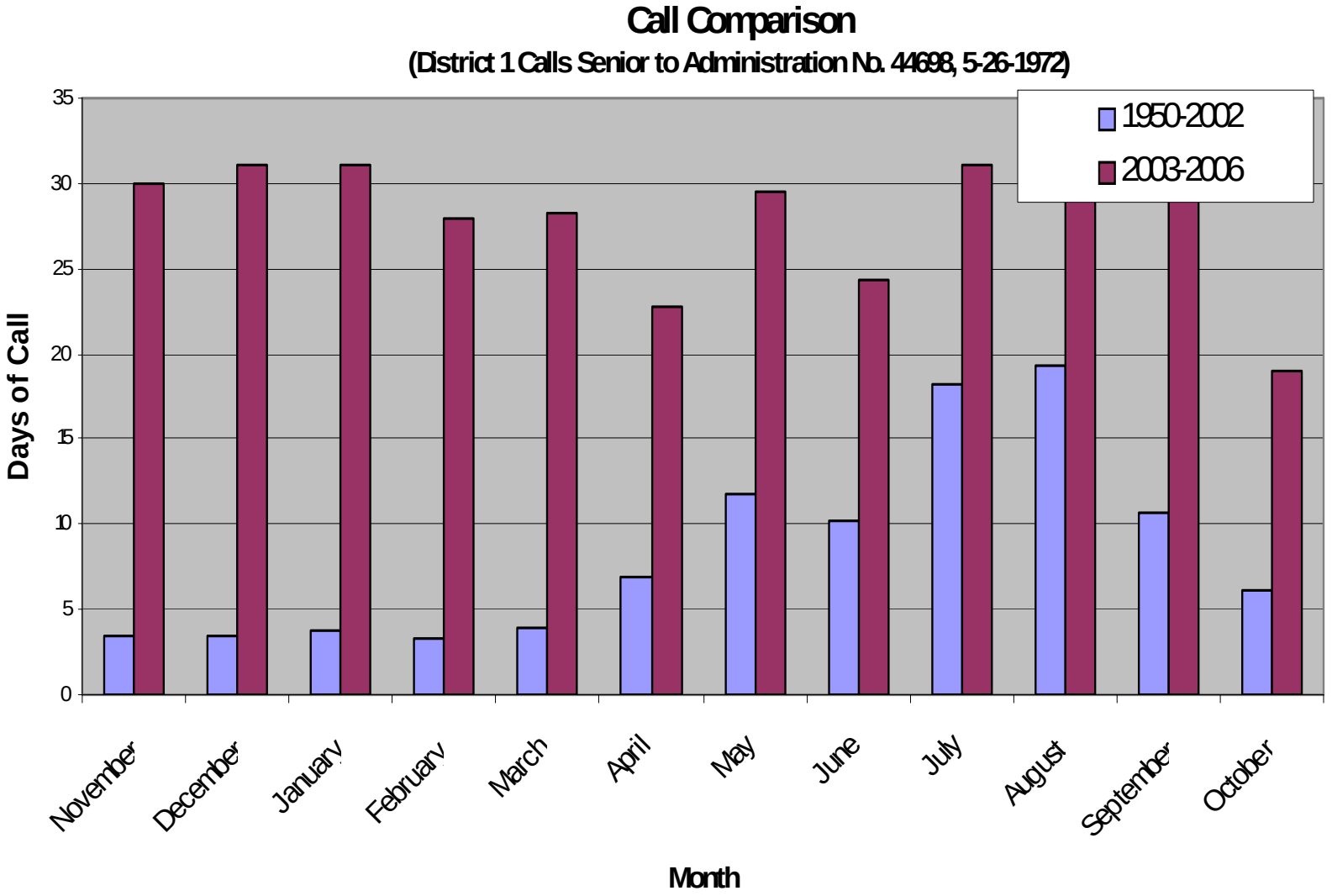
Designated Basins (not tributary to South Platte)

Division 1 wells not in plans

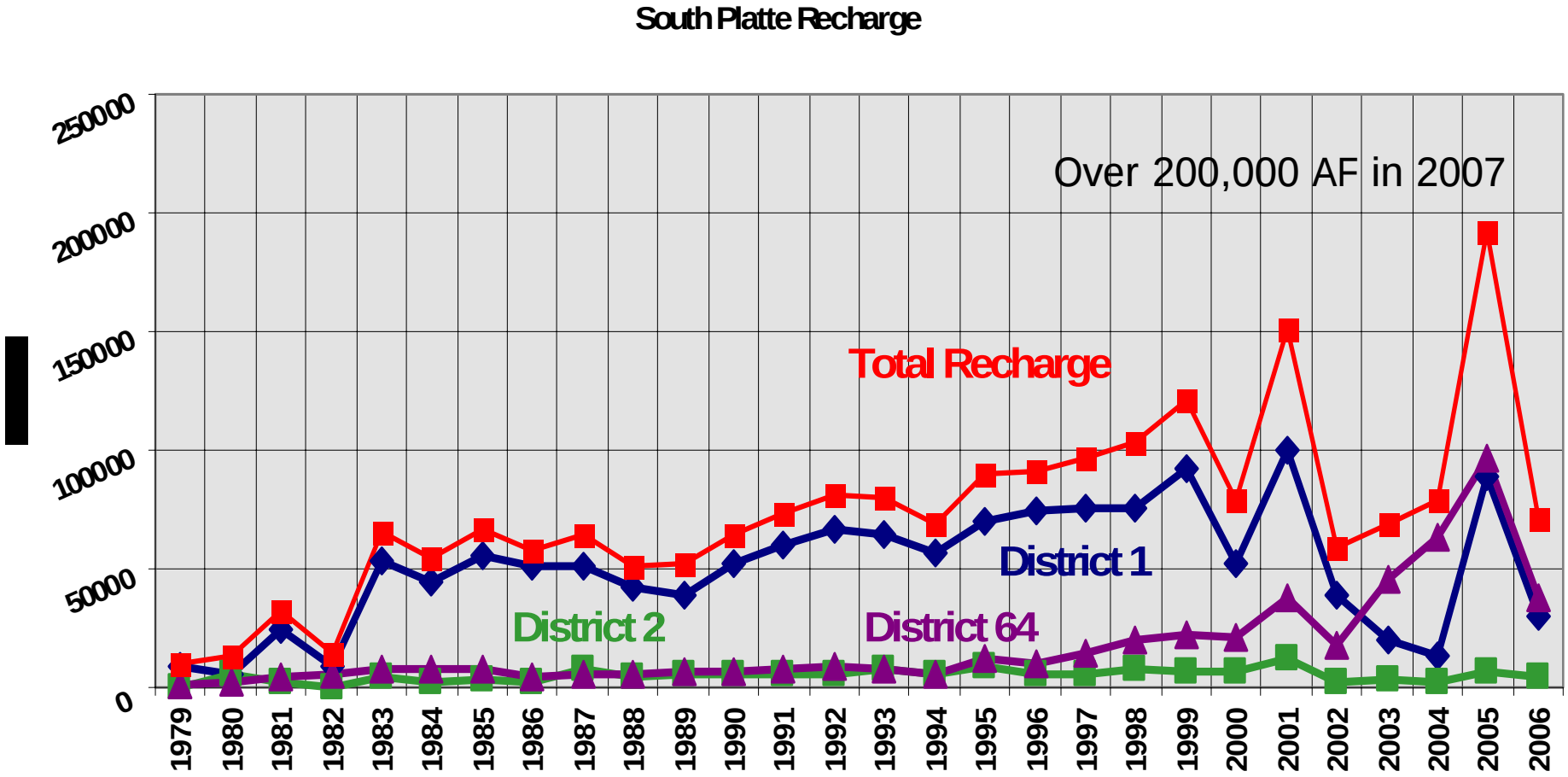
0 10 20 40 60 80 Miles

Changes in Water Supply, Availability, Use and Administration

- Drought/climate change
- Earlier calls because of well use limits
- Development of recharge projects
- Increased reuse of transmountain diversions
- Lining of gravel pits below Denver and on tributaries to recover reusable supplies (pumping or exchange to cities)
- Increased value of water and drought conditions have led to less cooperation and tighter administration, for example, no more "Gentleman's Agreement (historical agreement between reservoir operators to allow upstream, out-of-priority storage during winter fill season).



Note: Free River 4/25-6/12, 2007



Farmers Independent Ditch Recharge Site

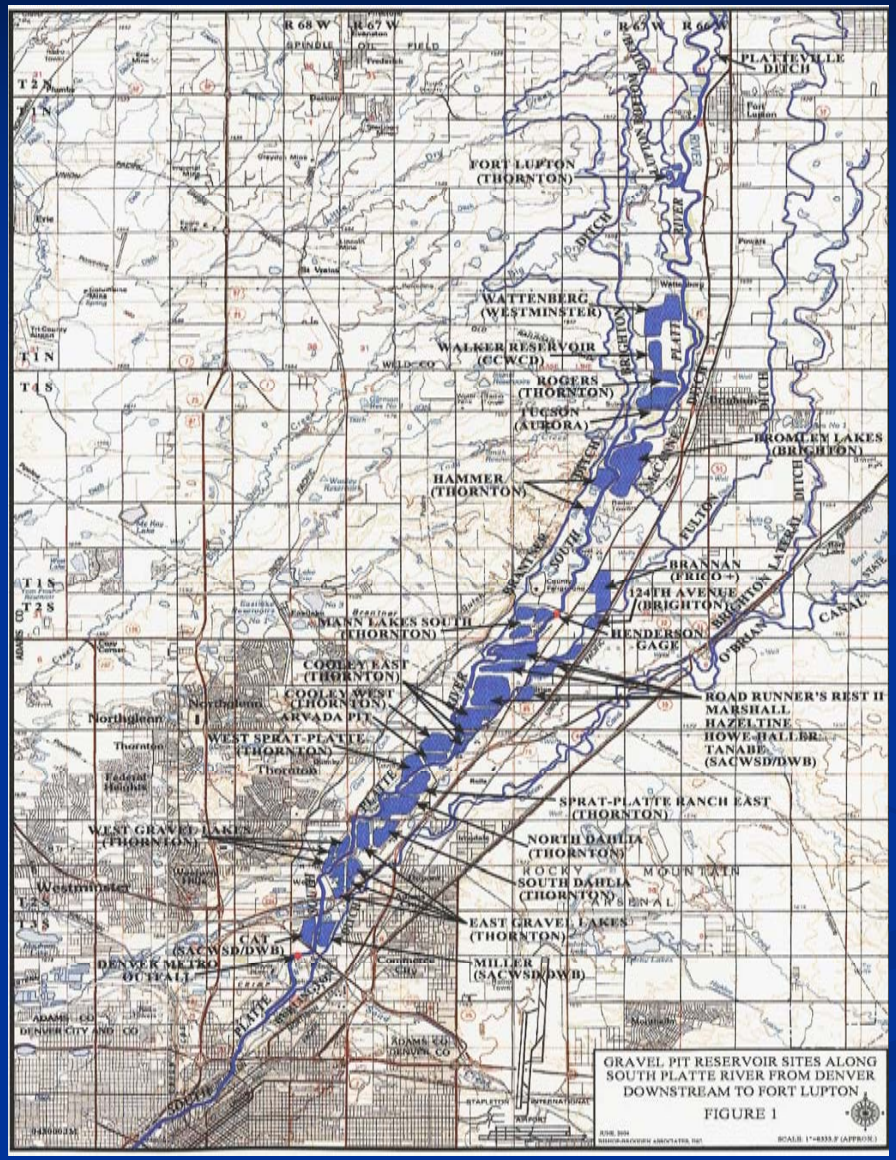
New Direct and Indirect Reuse of Fully Consumable Supplies

- Denver Water Reuse Plant (12 cfs presently, 68 cfs eventually)
- Other reuse projects by Broomfield, FRICO, ECCV and United Water
- Pump Installation in Chatfield Reservoir to Recover Environmental Releases from Strontia Springs Reservoir (30-60 cfs)

New Direct and Indirect Reuse of Fully Consumable Supplies

- Claims by Denver, Aurora, and others to exchange or use reusable lawn returns (>15 cfs)
- New lined gravel pit storage downstream of Denver to pick up reusable supplies to exchange or use directly (estimated over 100,000 acre-feet within next 10 years)
- Calpine (Rocky Mtn. Energy Center) 3,000 ac-ft/yr for treatment plant (average 4 cfs)

Gravel Pit Reservoir Sites Along South Platte River



Farmers Respond to Changes

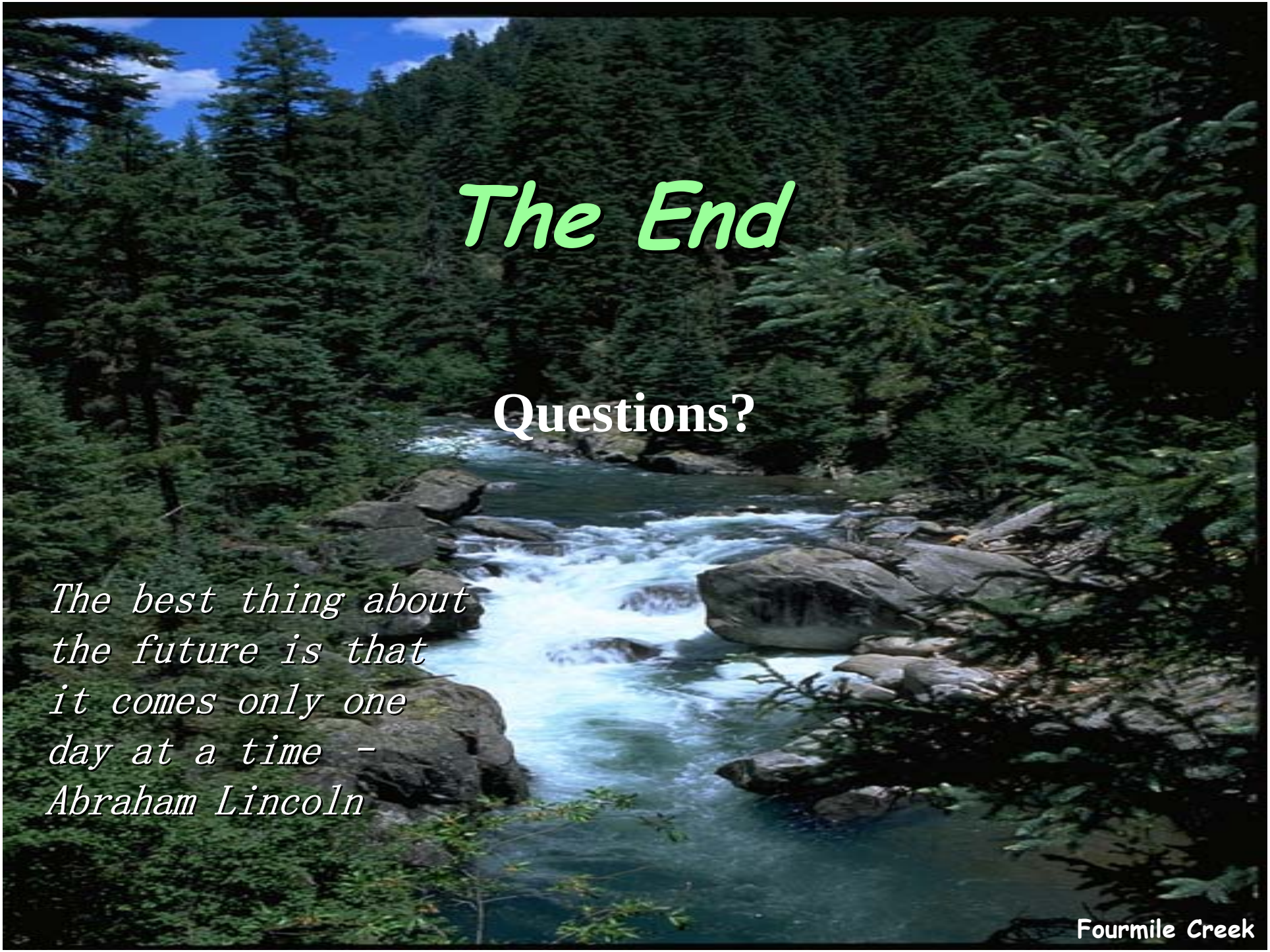
- Increased use of surface water supplies especially early in the year due to cost of running wells
- Increased use of reservoirs for irrigation
- Increased installation of sprinklers (reduces return flows)
- Change in cropping patterns (more winter wheat, alfalfa, etc.)

Farmers Respond to Changes

- Increased use of the South Platte River aquifer for retiming of depletions (recharge ponds, augmentation wells, recharge wells)
- Increased use of reusable effluent and reservoir releases for replacement
- Increased use of surface water rights in sprinkler irrigation systems
- Increased number of augmentation plans and SWSPs – subject to water court and State Engineer processes; more active in water court

Plan for Augmentation

A plan to replace out of priority depletions caused by a junior water right to senior water rights. The replacements are made with another source of water. Depletions must be replaced in time, place and amount in order protect senior water rights. The application for approval of a plan for augmentation in water court allows others the opportunity to express their concerns regarding its ability to protect their water rights.


The End
Questions?
The best thing about the future is that it comes only one day at a time - Abraham Lincoln
Fourmile Creek

Presented by:

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Possible Issues for Consideration by the Task Force

- More flexible wintertime administration of reservoir calls by the State and Division Engineers; aggregate replacement of winter depletions;
- Forgiveness of post-pumping depletion "debt" associated with some period of past well use;
- Grandfather wells prior to a certain date (e.g., "1969 Act");
- Revisit with Northern Colorado Water Conservancy District and other affected stakeholders the use of Colorado-Big Thompson Project water as a permanent augmentation source (currently prohibited by policy adopted by Northern Board of Directors);

Possible Issues for Consideration by the Task Force

- Encourage and help the lower reaches of the South Platte River to develop water districts and/or water authorities so that the water users can be competitive in attempting to purchase augmentation water supplies;
- Investigate growing alternative crops including dry-land farming;
- Investigate potential expansions of historical use by senior surface water rights;
- Evaluate economic options such as subsidies, buyouts, or programs such as CREP and EQIP; and
- Other legislative options.