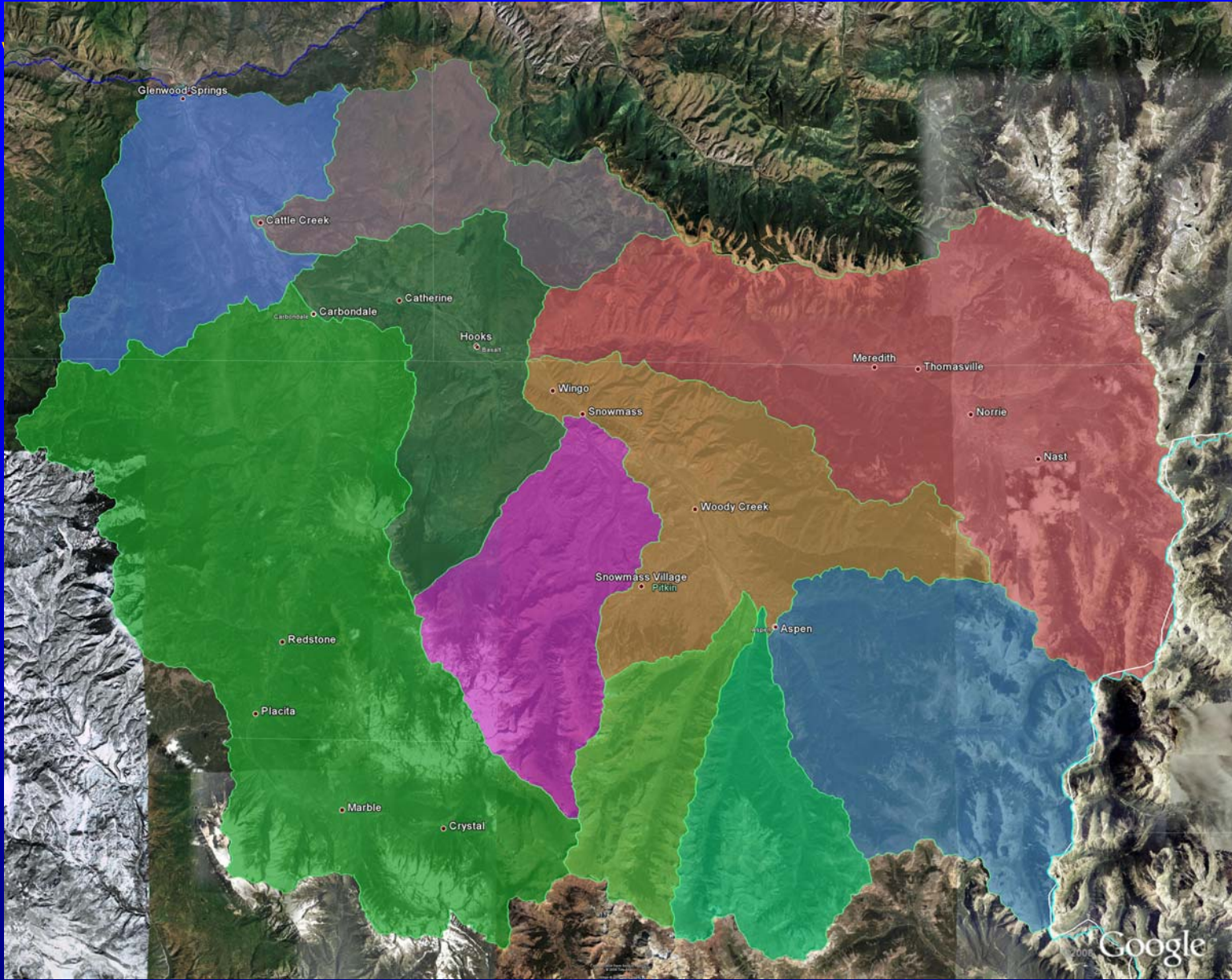


Visualizing a Secure Watershed

Water: Our Greatest Liquid Asset
2009 State of the Roaring Fork Basin

Dave Kanzer, P.E.
Senior Water Resources Engineer



Colorado River District

Protecting Western Colorado Water Since 1937

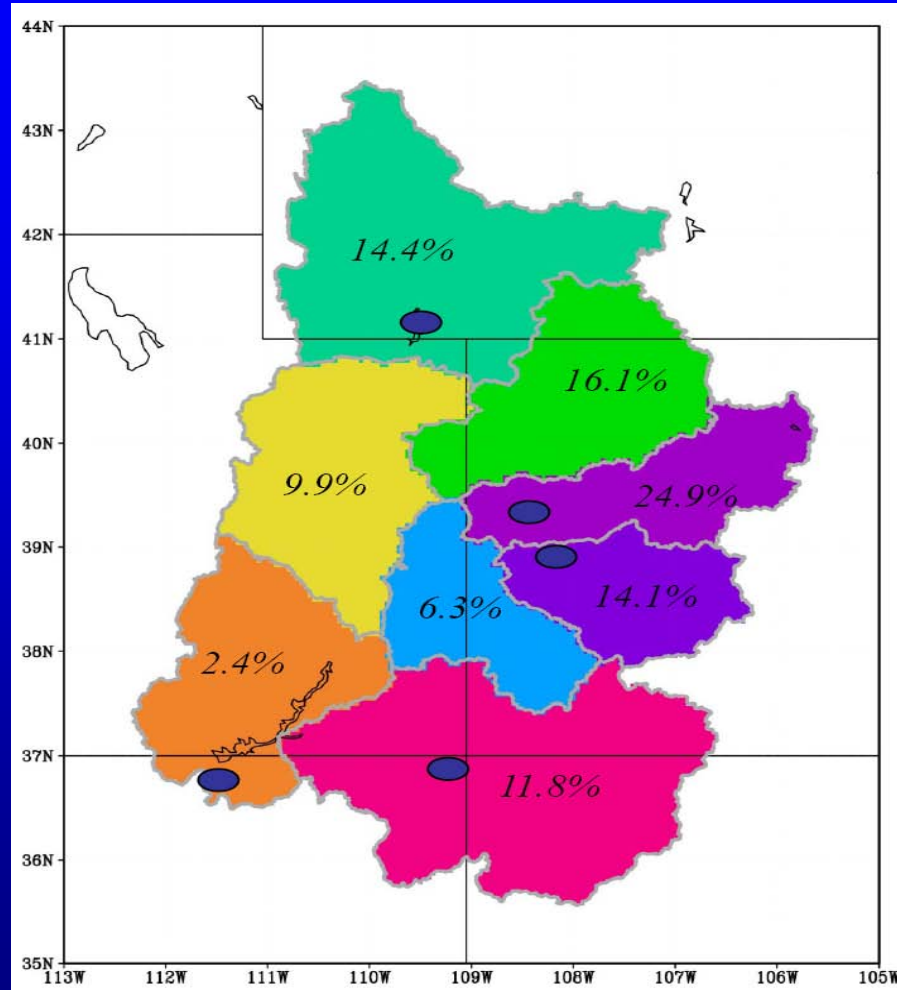
Visualizing Our Watershed



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Contributions from Sub basins of the Upper Colorado



Roaring Fork Transbasin Diversions

- *Frying Pan – Arkansas*

Ruedi Reservoir (compensatory storage) collection system and Busk-Ivanhoe tunnel conveyance

- *Twin Lakes System (Pueblo/Colo Spgs)*

Lost Man & Grizzly Reservoirs, collection system and Independence Pass tunnel conveyance

Fryingpan-Arkansas Project

- Multi-purpose project includes flood protection, recreation, Division of Wildlife, power, irrigation, and municipal & industrial components
- Southeastern Colorado Water Conservancy District formed in 1958 as the official agency to repay the Irrigation and Municipal & Industrial portions of the Fryingpan-Arkansas Project
- Fryingpan-Arkansas Project legislation passed in 1962

Ruedi Reservoir

- Compensation for the Fryingpan-Arkansas diversions that are limited to 2,352,800 acre-feet in any 34 consecutive years, (ave. 69,200) maximum of 120,000 acre-feet in any one year
- Completed in 1965; 102,369 acre-feet
- Cost \$24,854,420

Fry-Ark Diversions to the East Slope

- Designed to divert 69,200 acre-feet per year through Boustead Tunnel.
- Must meet minimum stream flow conditions that have been set at various locations before diverting any water.
- At times cannot take full diversions limited by storage capacity (Turquoise, Twin Lakes and Pueblo reservoirs) or limited by minimum stream flows

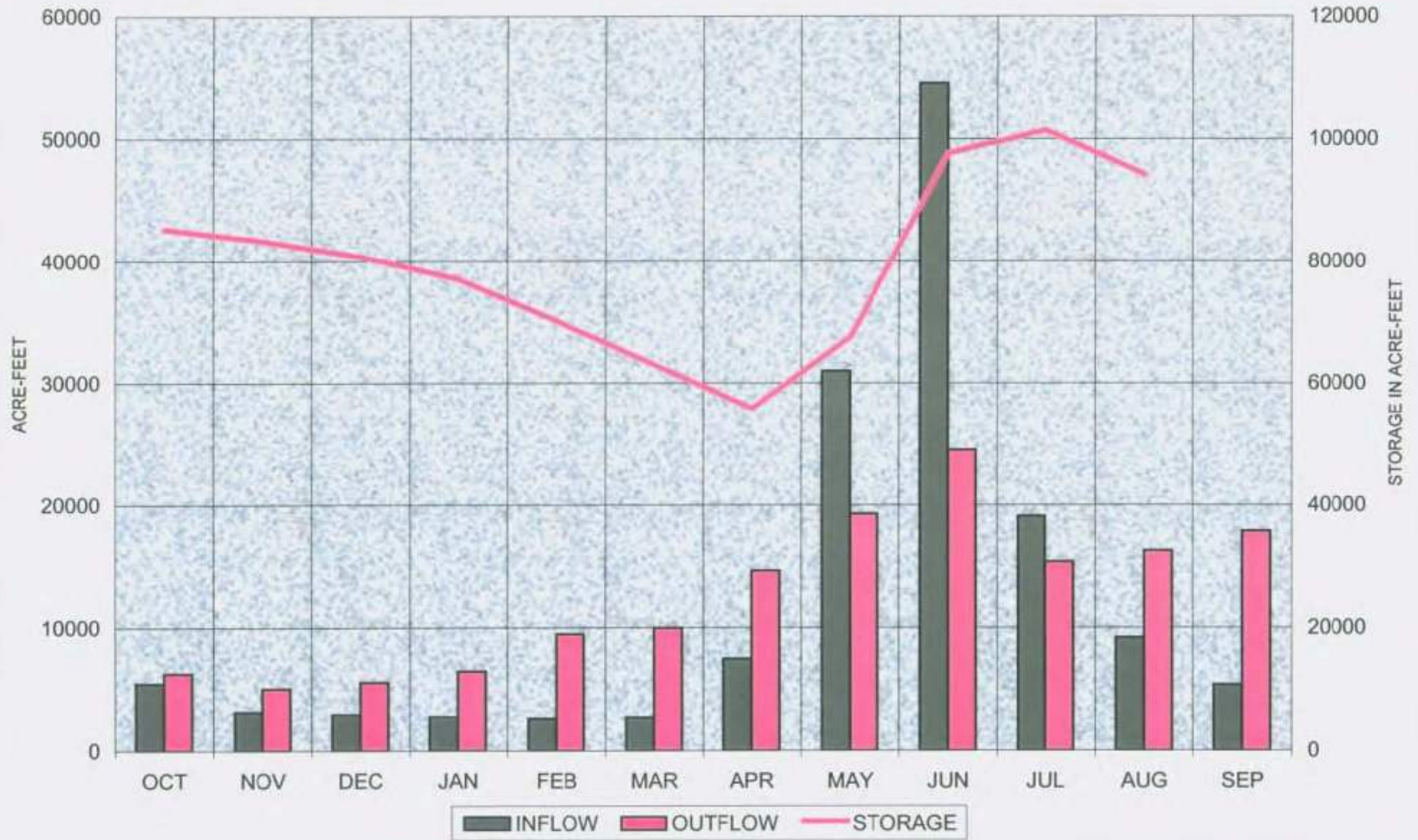
River Basin Operations

- Enough to go around?
- Balancing human, environmental needs
- Look back at 2008
- Look forward to 2009

2008 Basin Operations

- The year that was
- *What was unique?*
 - Dry fall, wet winter, cool spring, (El Nino) above average snowpack, late runoff
- *What was common?*
 - Reservoirs filled, coordinated releases for peak enhancement; late season augmentation for baseflows, transbasin diversions, in basin uses

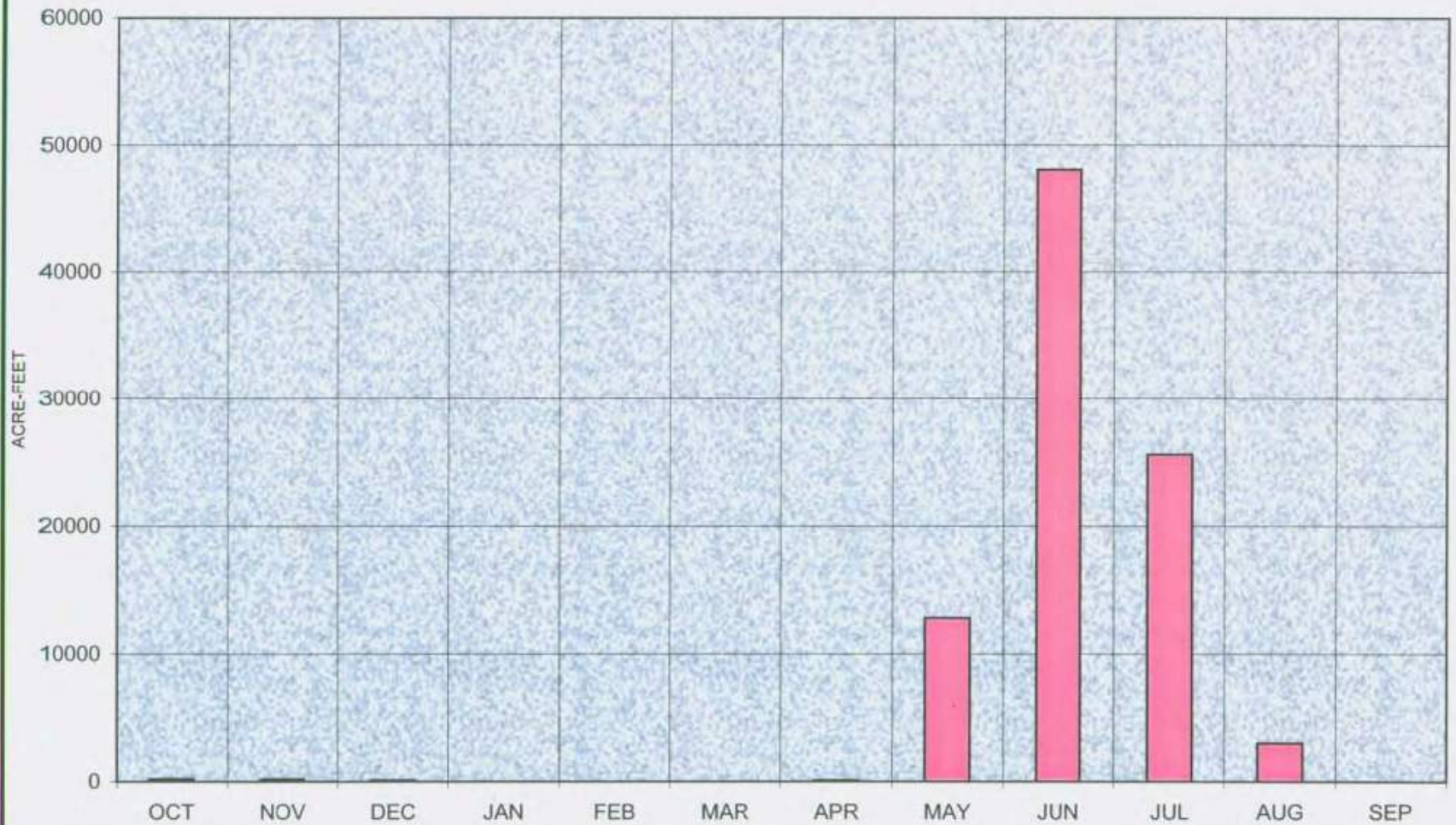
RUEDI RESERVOIR WATER YEAR 2008 ACTUAL OPERATIONS



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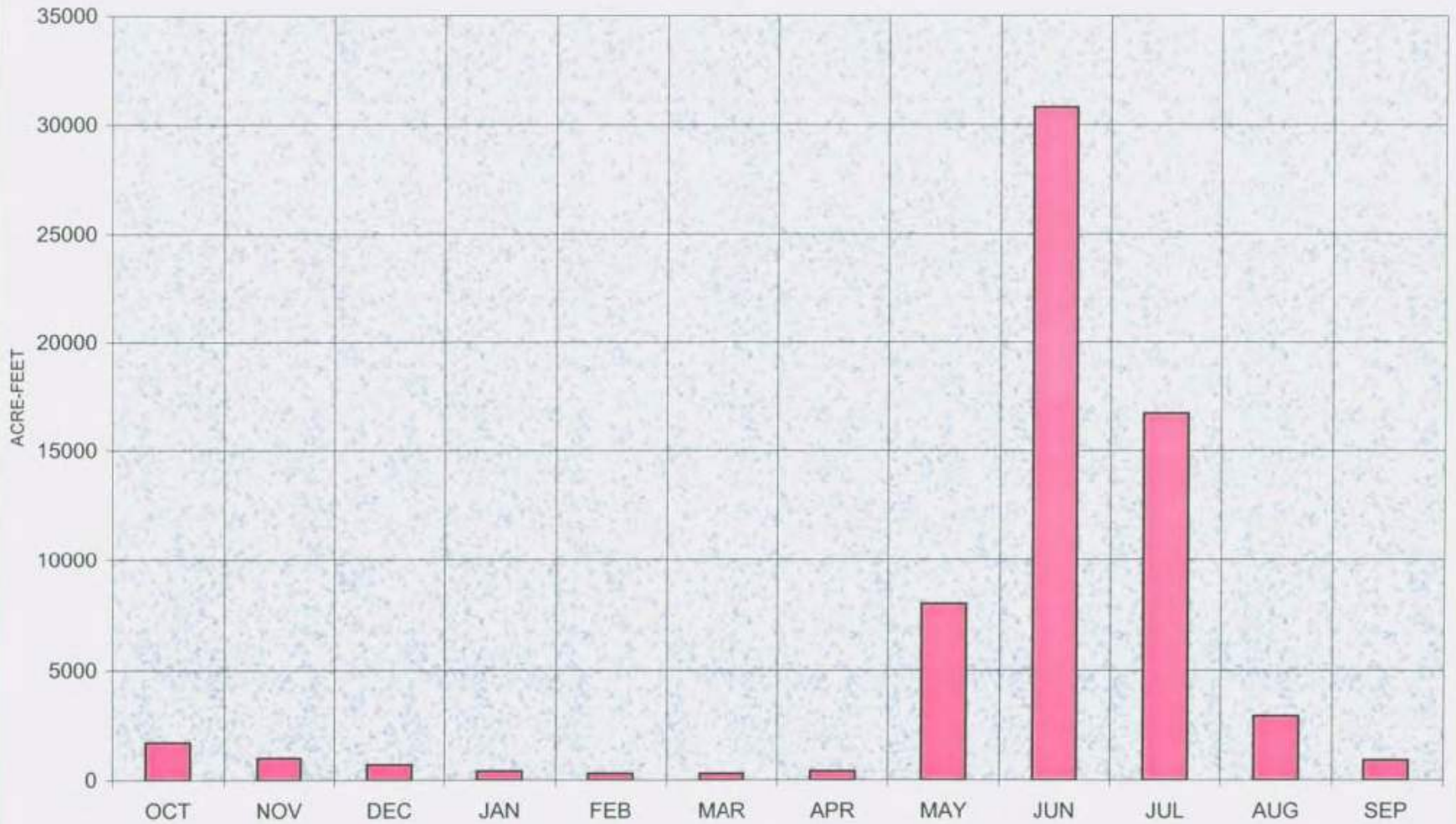
BOUSTEAD TUNNEL IMPORTS WATER YEAR 2008



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TWIN LAKES TUNNEL IMPORTS WATER YEAR 2008



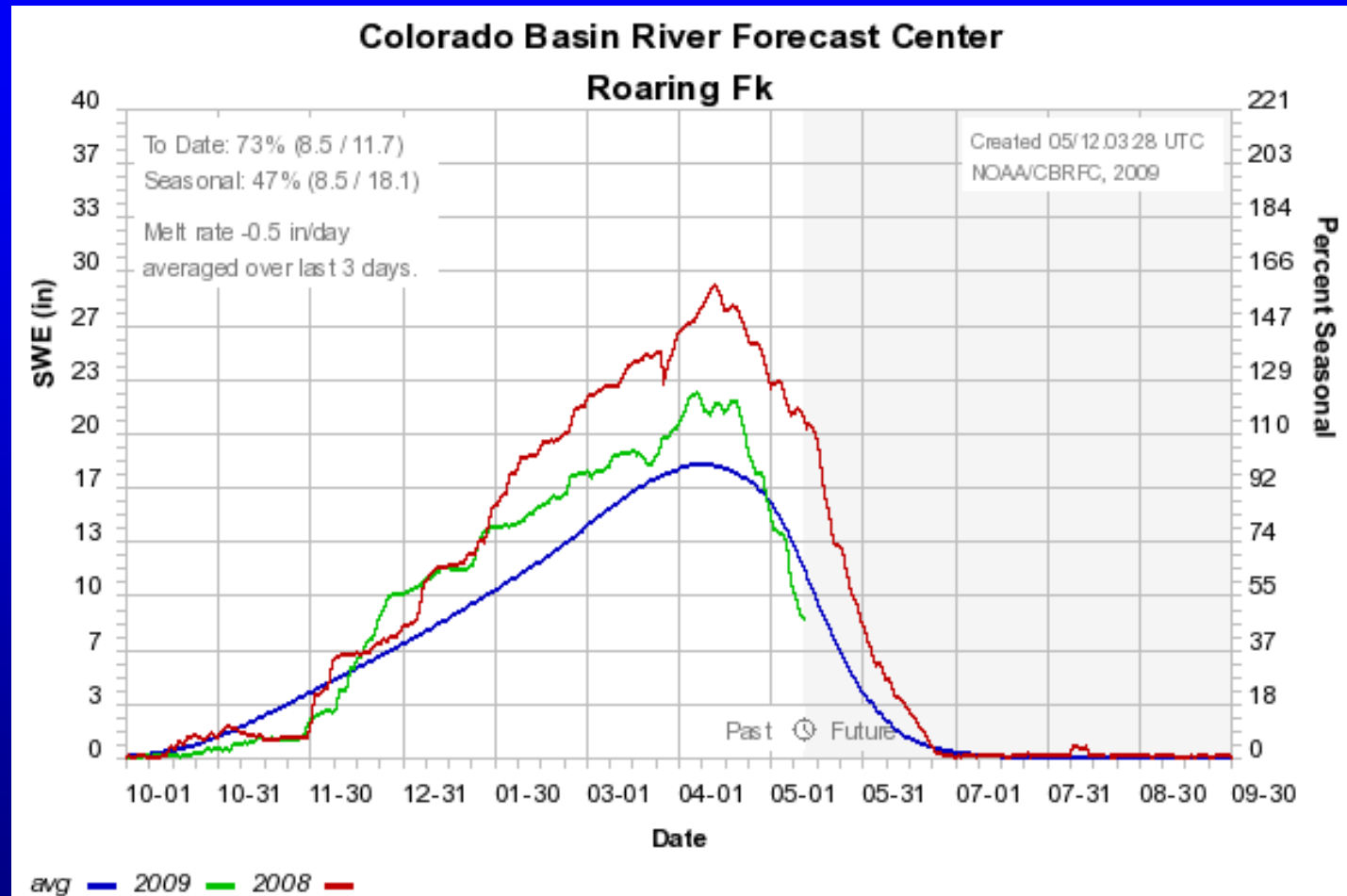
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2009 Basin Operations

- The year that will be
- *What's unique?*
 - Dry fall, wet winter, warm spring (La Nina), 12 distinct “dust on snow” events, early runoff
- *What might be common?*
 - Average snowpack, reservoirs should fill, coordinated releases for peak enhancement; late season augmentation for baseflows, transbasin diversions, in basin uses

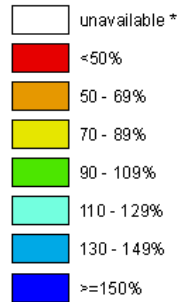
2009 Snow Year



Colorado
SNOTEL Current Snow Water Equivalent (SWE) % of Normal
 Laramie and North Platte

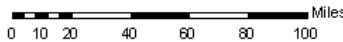
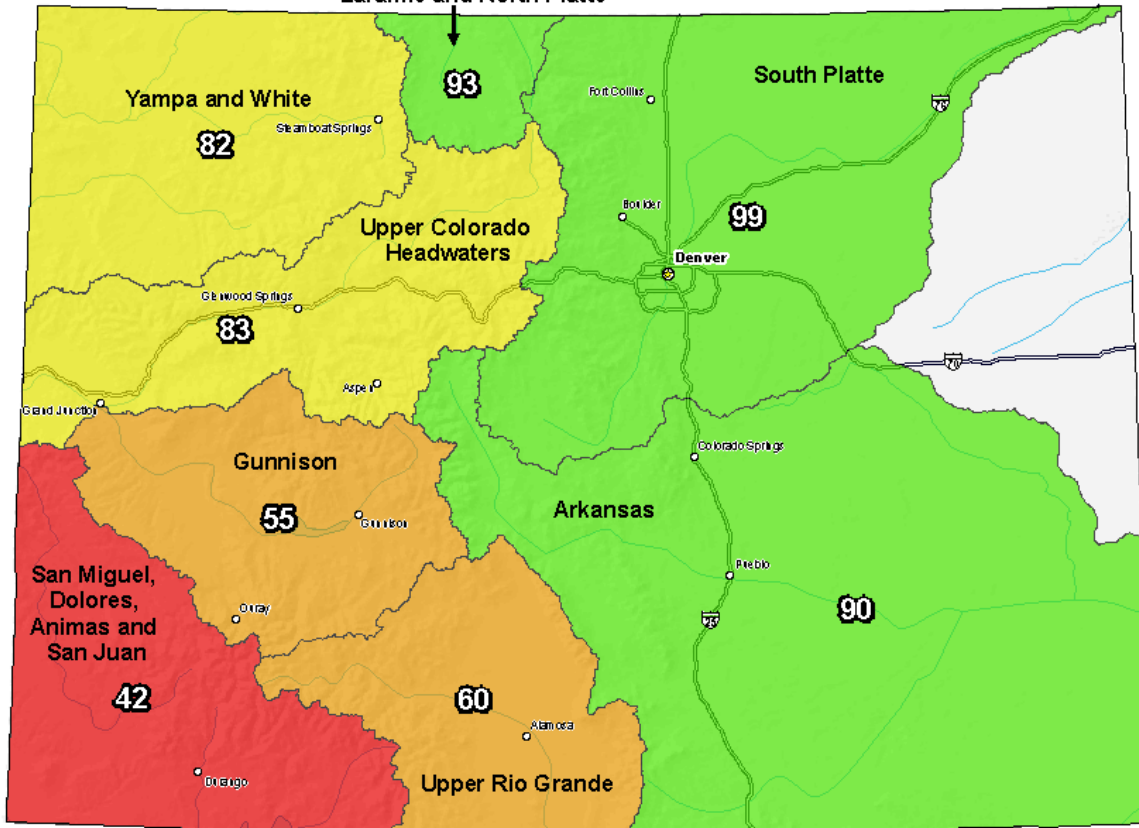
May 11, 2009

Current Snow Water Equivalent (SWE) Basin-wide Percent of 1971-2000 Normal



* Data unavailable at time of posting or measurement is not representative at this time of year

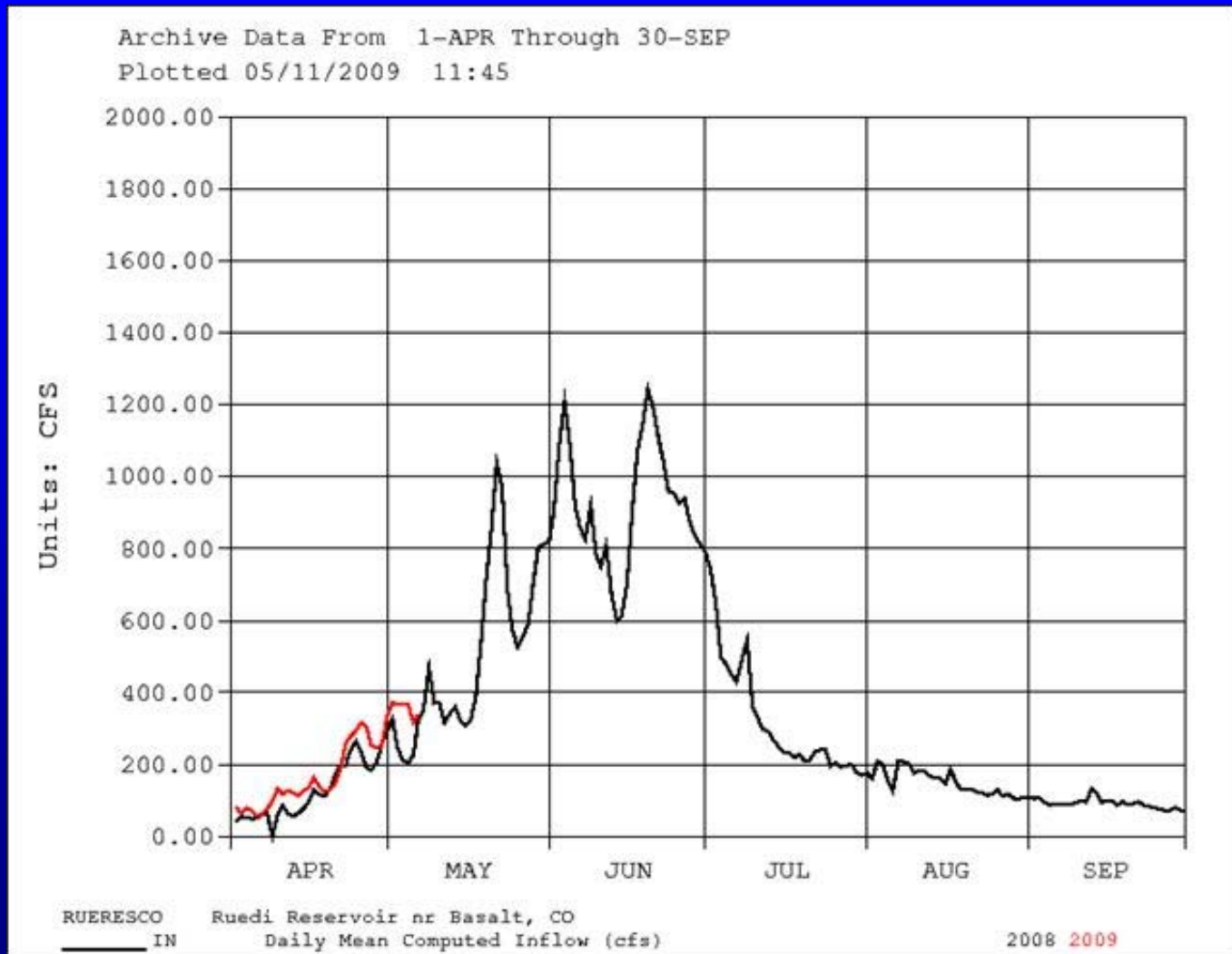
*Provisional Data
 Subject to Revision*



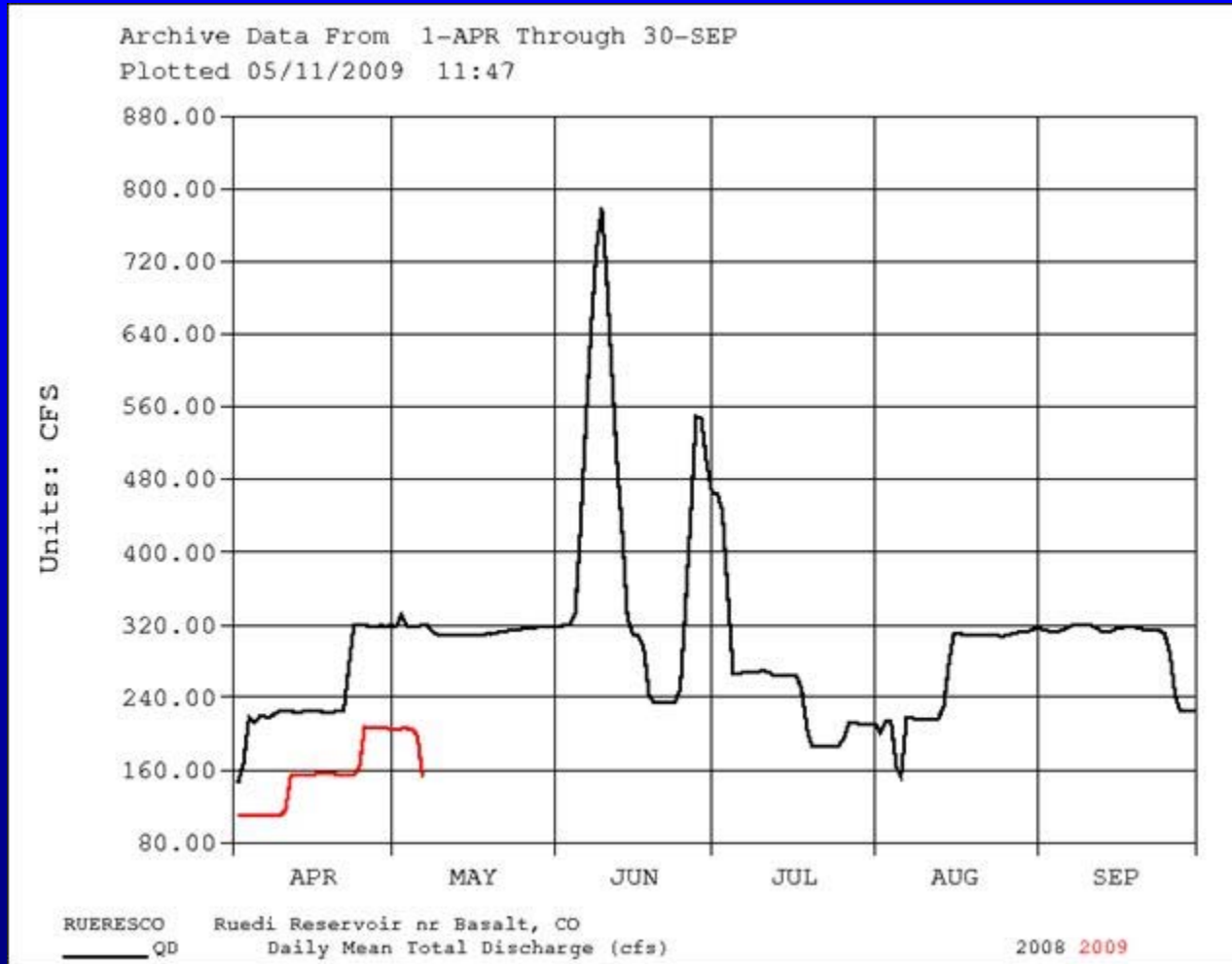
The snow water equivalent percent of normal represents the current snowwater equivalent found at selected SNOTEL sites in or near the basin compared to the average value for those sites on this day. Data based on the first reading of the day (typically 00:00).

Prepared by the USDA NRCS National Water and Climate Center
 Portland, Oregon <http://www.wcc.nrcs.usda.gov/gis/>
 Based on data from <http://www.wcc.nrcs.usda.gov/reports/>
 Science contact: Tom.Pagano@por.usda.gov 503 414 3010

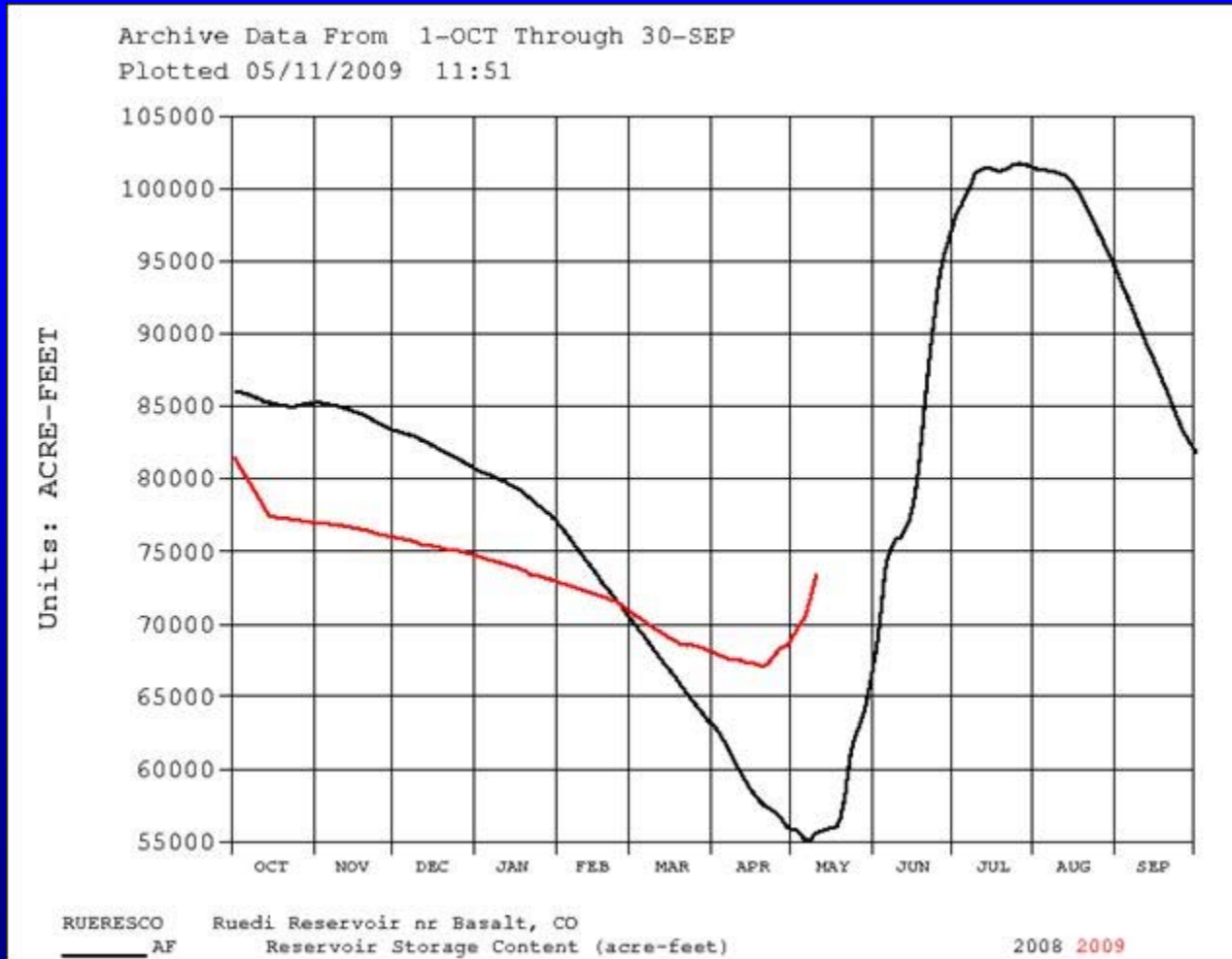
2009 Inflows to Ruedi Reservoir



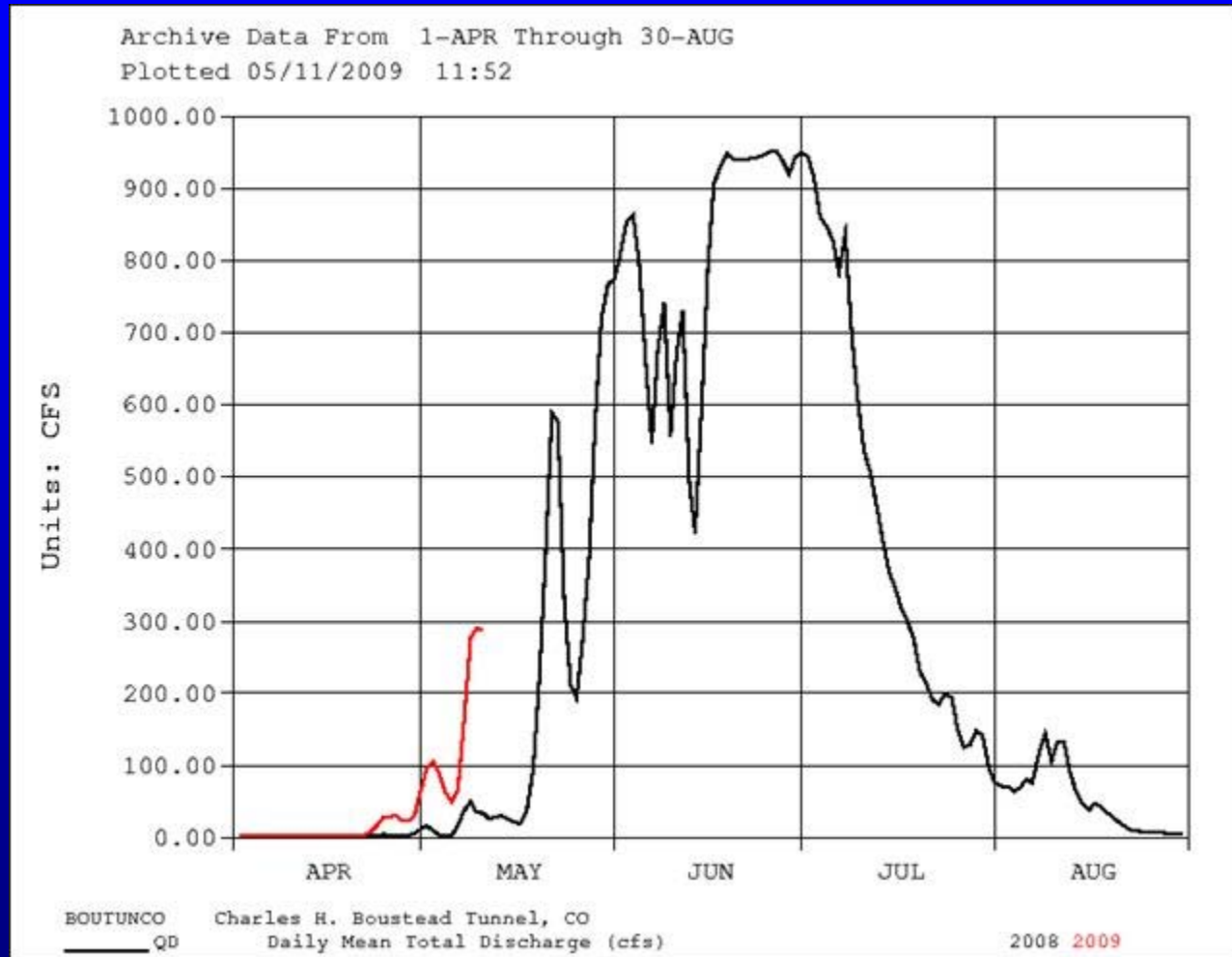
Outflows from Ruedi Reservoir



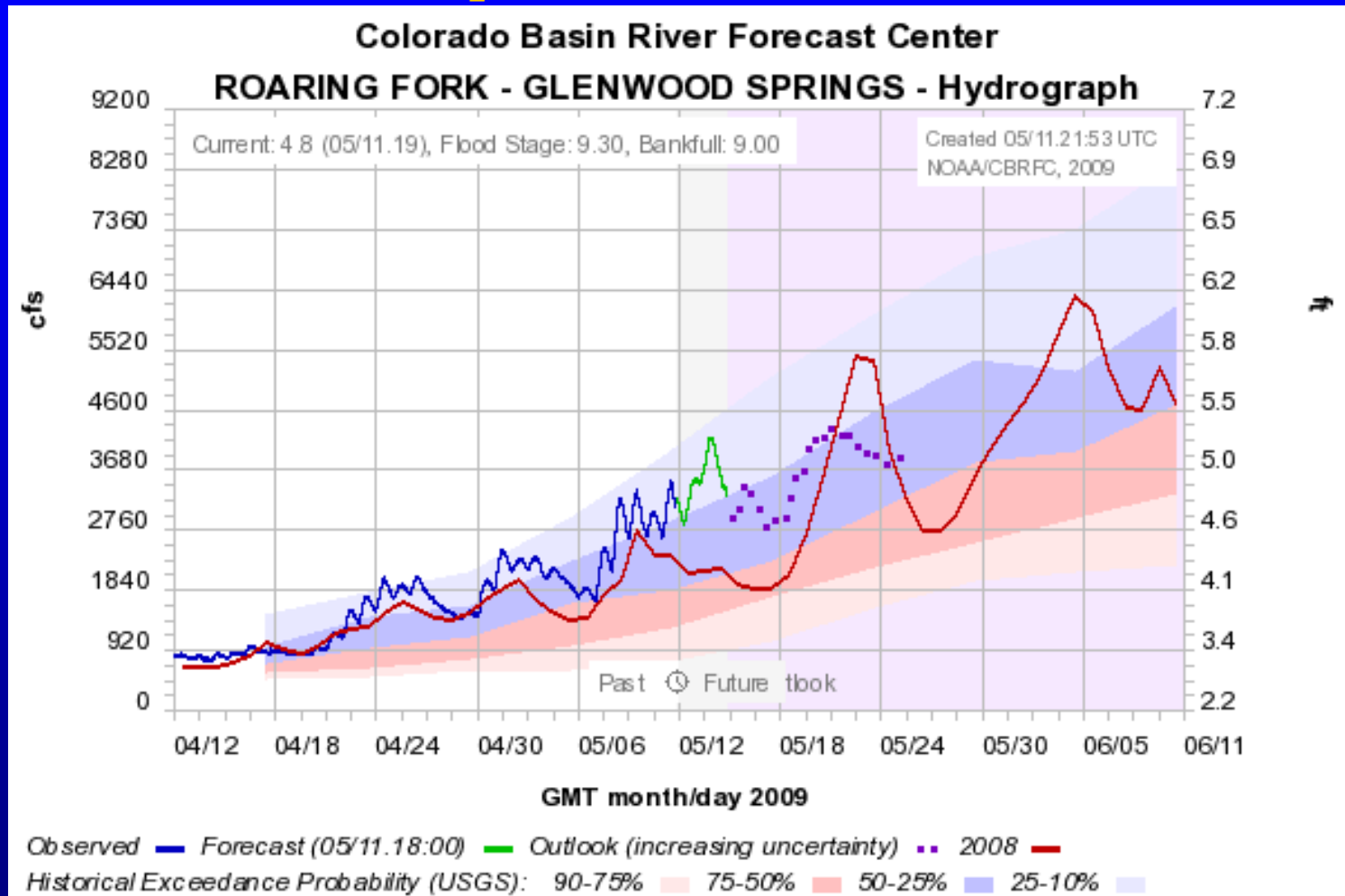
Ruedi Reservoir Storage



Bousted Tunnel Diversions



Anticipated Runoff



Lakes Powell / Mead Forecast

- **Powell: how much will it increase?**
approximately +11 feet, +1.1 Million Acre-feet (net gain)
- **Mead: how much will it fall?**
approximately -13 feet, -1.3 Million Acre-feet (net loss)

Issues Affecting Watershed Security

- **Present Shock:**
 - Water quantity (TMDs, in basin uses)
 - Water quality (less dilution, more loading, increased temperature)
 - Stream health (encroachment)
- **Future Shock:**
 - Climate change (more ET, less flow?)
 - Dust on snow (faster runoff?)