Colorado River Water Availability Study

Interbasin Compact Committee Meeting

December 2, 2009

Consulting Team

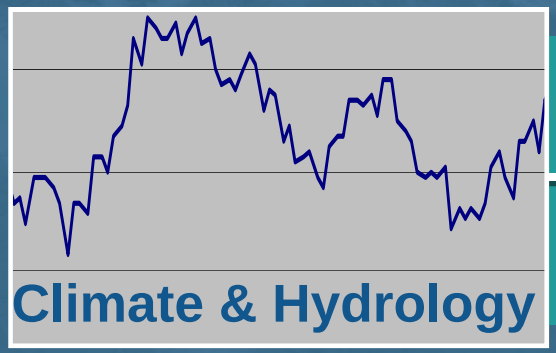
AECOM Water
AMEC Earth & Environmental
Canyon Water Resources
Leonard Rice Engineers
Stratus Consulting

BOYLE | AECOM

Agenda

- Status report on in-state modeling results
- Builds on previous PRELIMINARY results:
  - Drought frequencies and durations
  - Hydrologic impacts of projected climate change
  - Climate change impacts on consumptive use
- Today's results
  - Water availability using CDSS/ StateMod for each basin for one of the hydrologic traces

Colorado Decision Support System

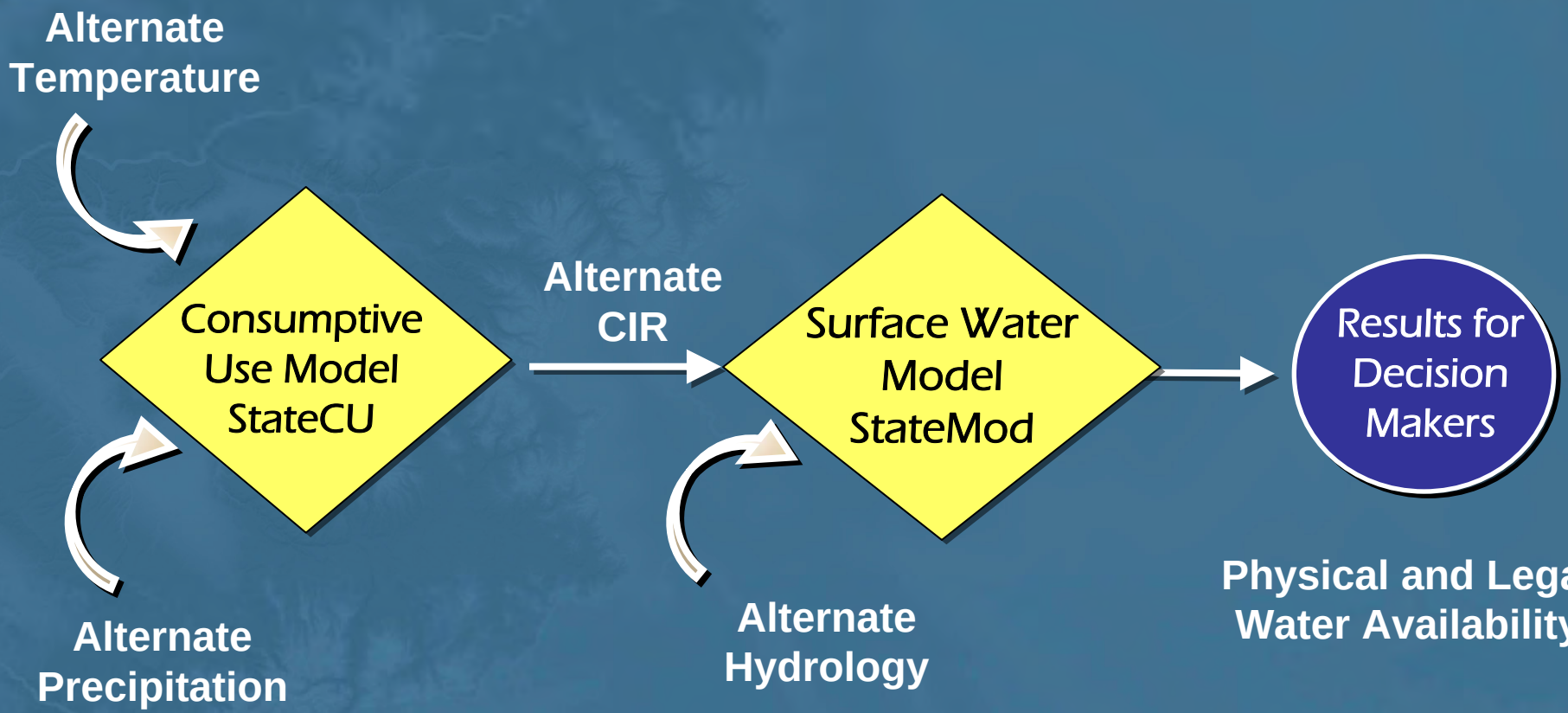


CDSS Models
StateCU
StateMOD

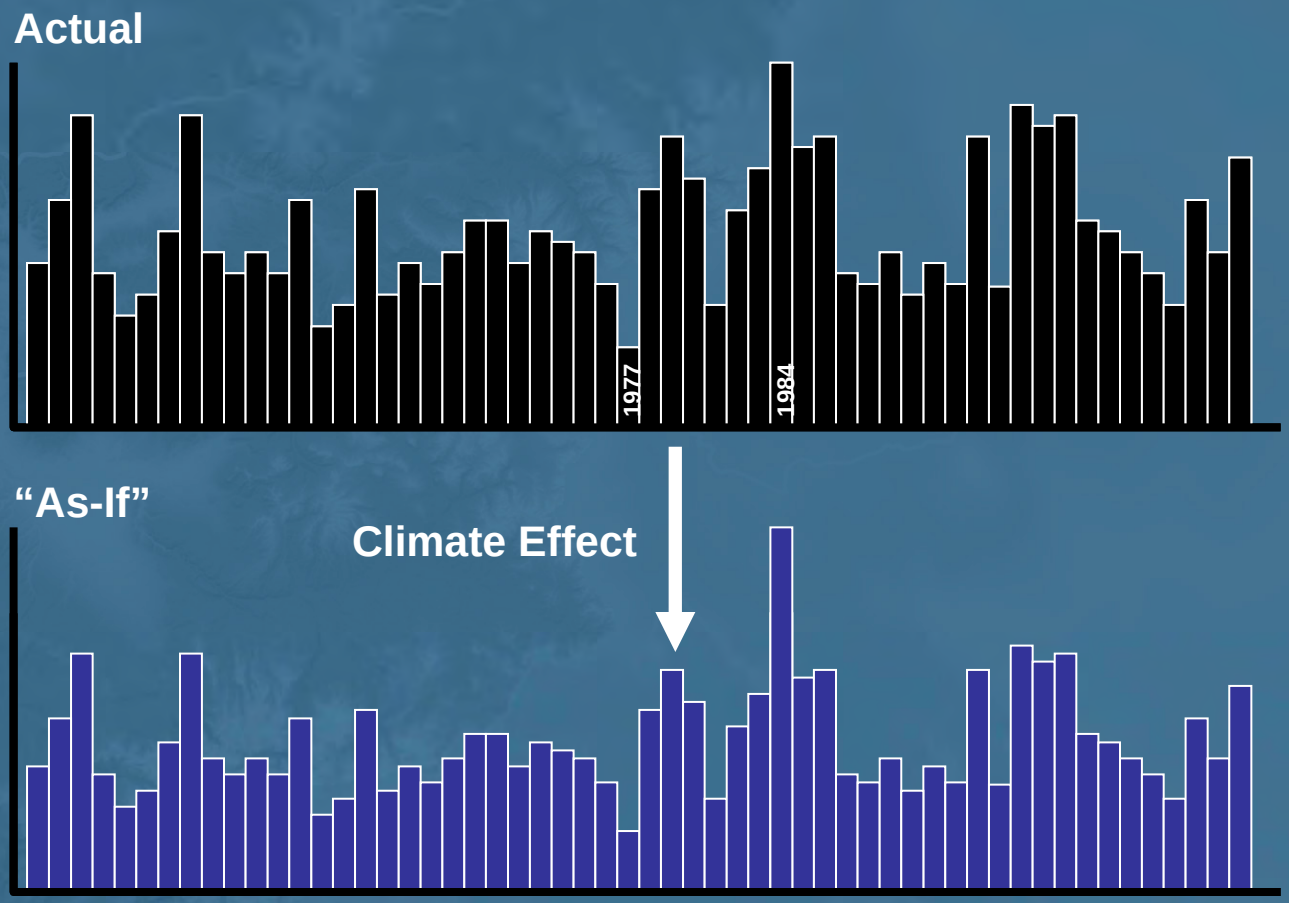
Results for Decision Makers

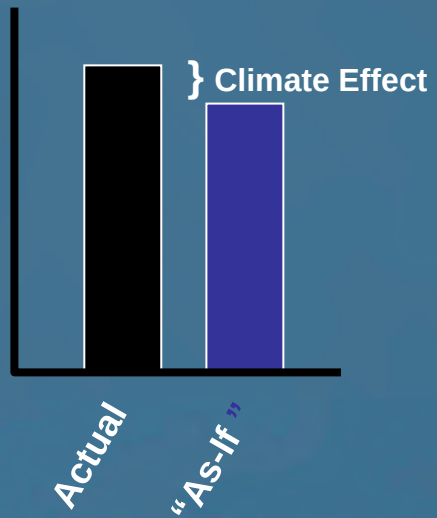
Water Availability
Reservoir Conditions

Last Step for Phase I - Water Availability



GCM's & Hydrology – Process





GCM's Effect On Temperature

Lower Elevations Show Largest Increase

Basin Wide 2040 Average Increase = 3.6 Deg F

Basin Wide 2070 Average Increase = 5.8 Deg F

Increase is Consistent Each Month

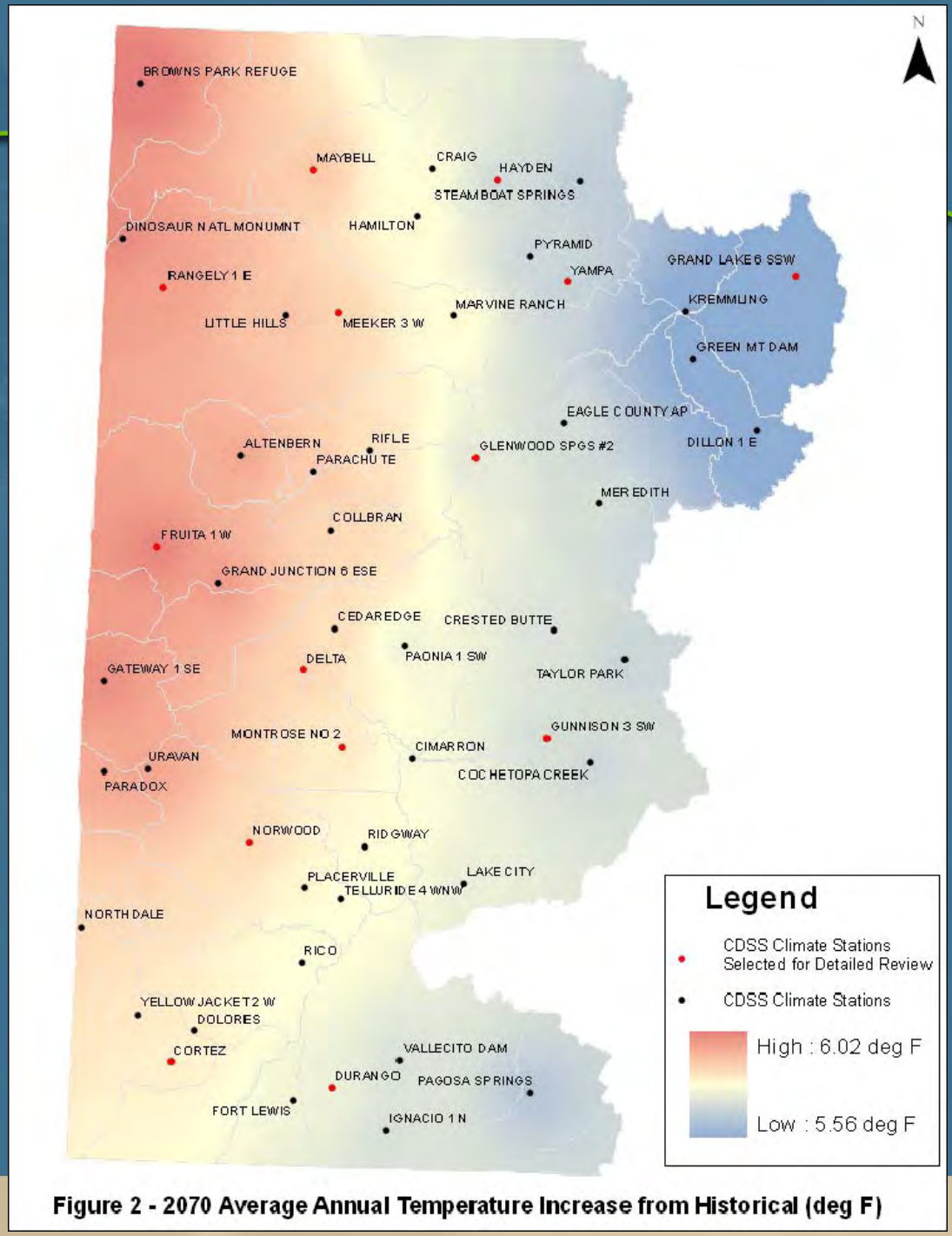


Figure 2 - 2070 Average Annual Temperature Increase from Historical (deg F)

GCM's Effect On Winter Precipitation

Winter Precipitation Increases Basin-Wide

Winter Precipitation Increases More in Northern CO

Winter Precipitation Increases More at Higher Elevations

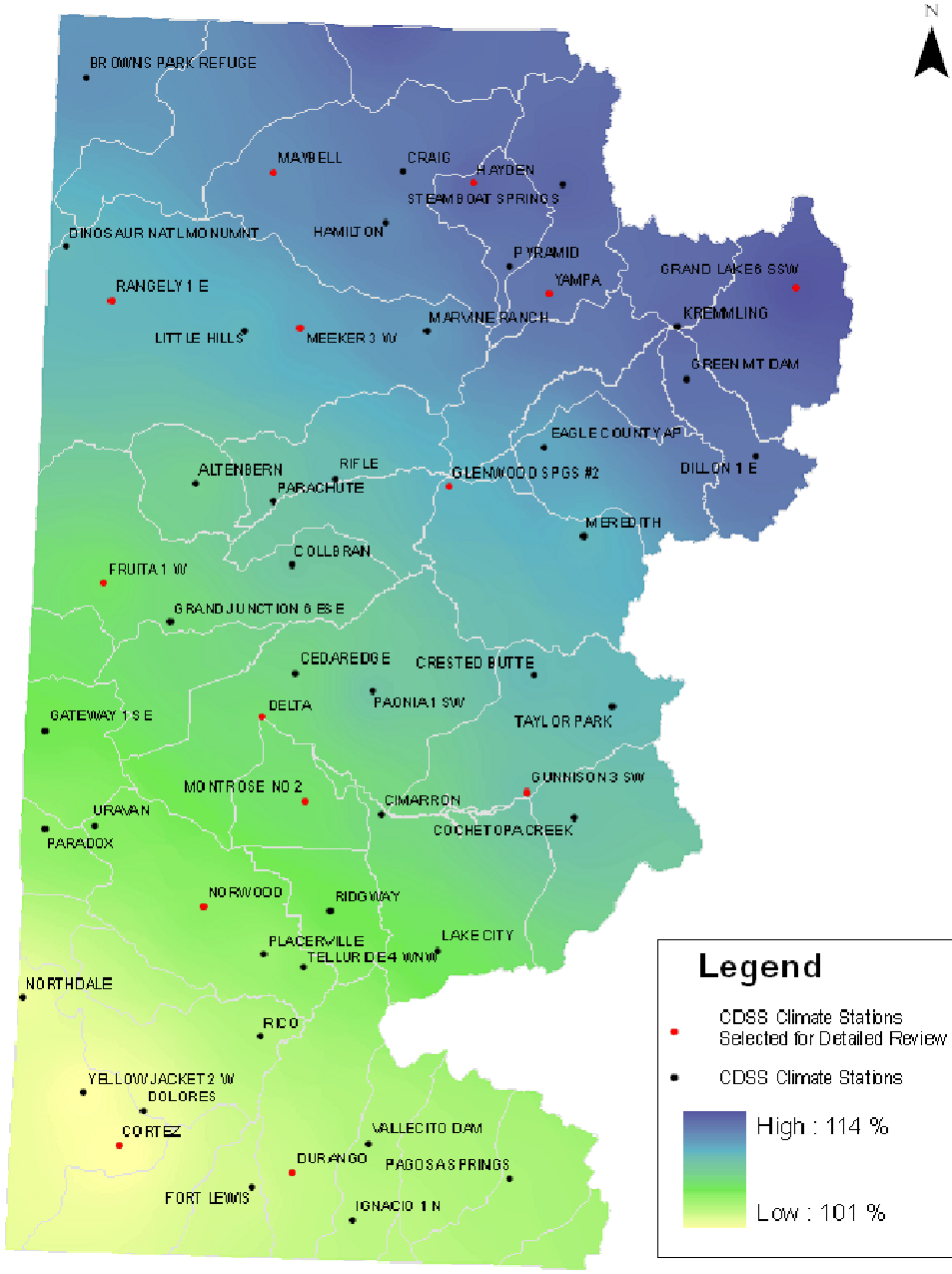


Figure 4 - 2070 Percent of Historical Winter (Nov - Mar) Precipitation

PRELIMINARY RESULTS – UNDER REVIEW

GCM's Effect On Irrigation Season Precipitation

Summer Precipitation Decreases Basin-wide

Precipitation Decreases More in Southern CO

Precipitation Decreases Less at Higher Elevations

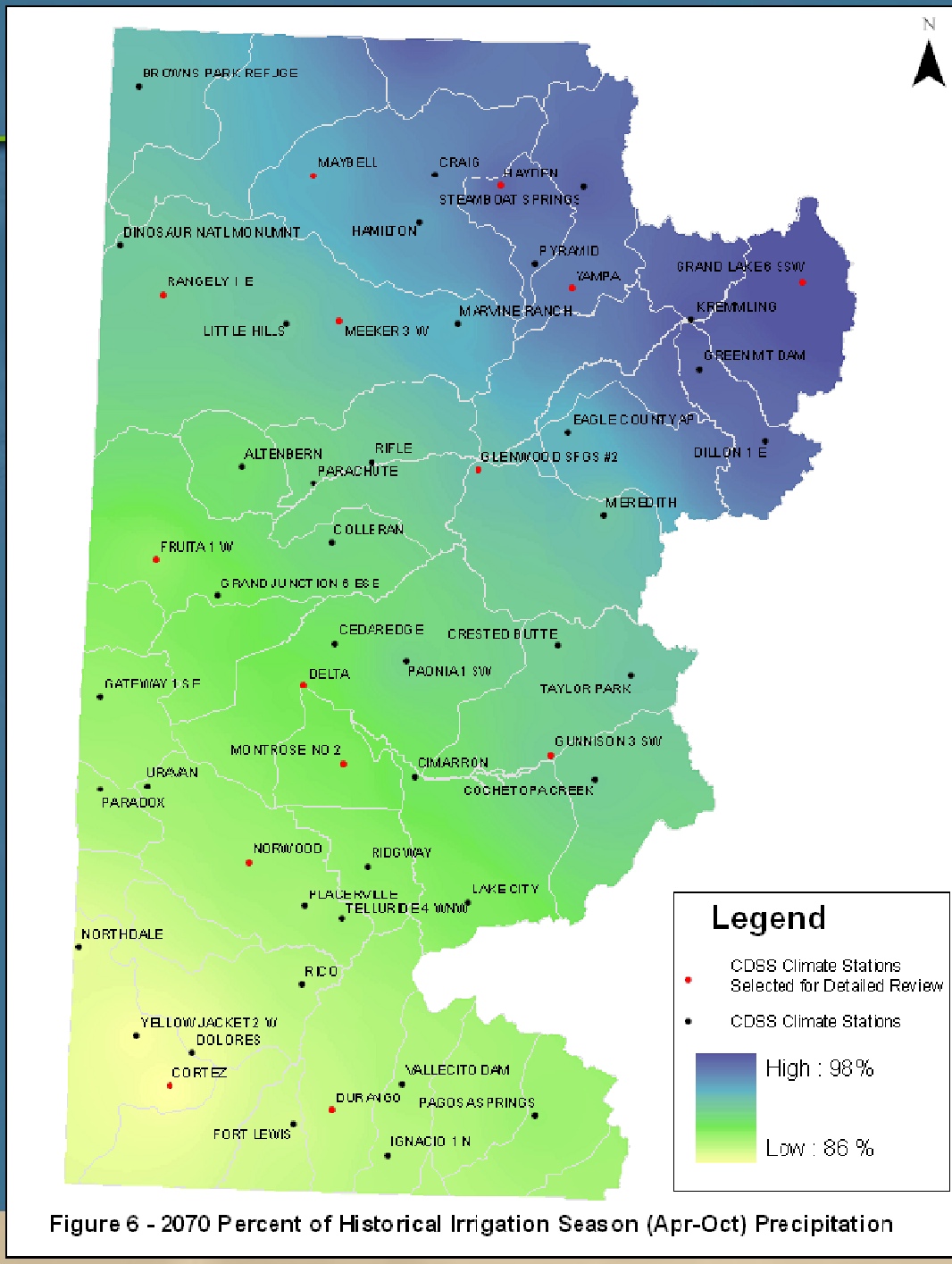


Figure 6 - 2070 Percent of Historical Irrigation Season (Apr-Oct) Precipitation

GCM's Effect On Crop Irrigation Requirement

2040 Average Increase
= 20% (0.4 AF/Acre)
= 8 more growing days

2070 Average Increase
= 31% (0.64 AF/Acre)
= 29 more growing days

Lower Elevations Show Largest Increase

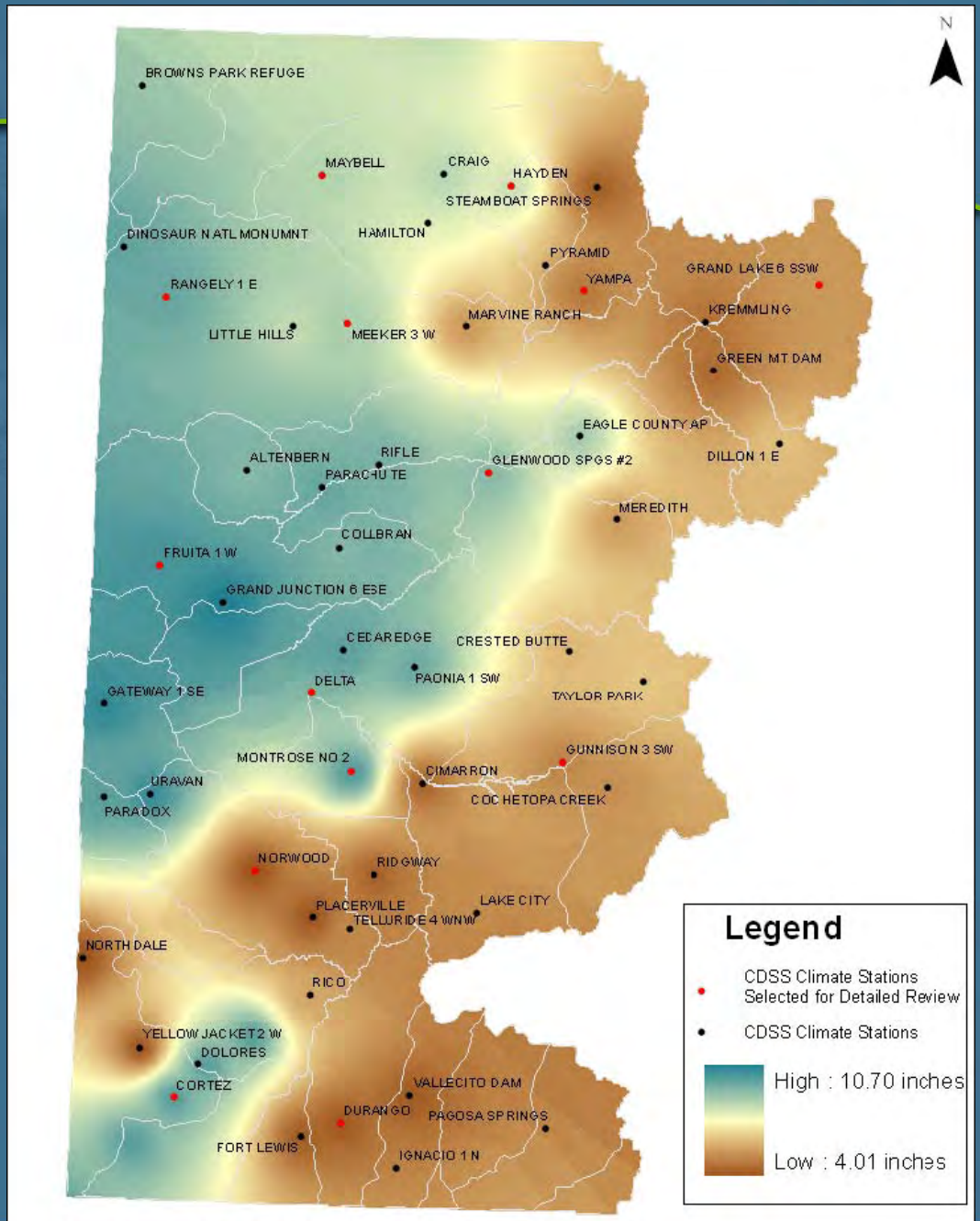
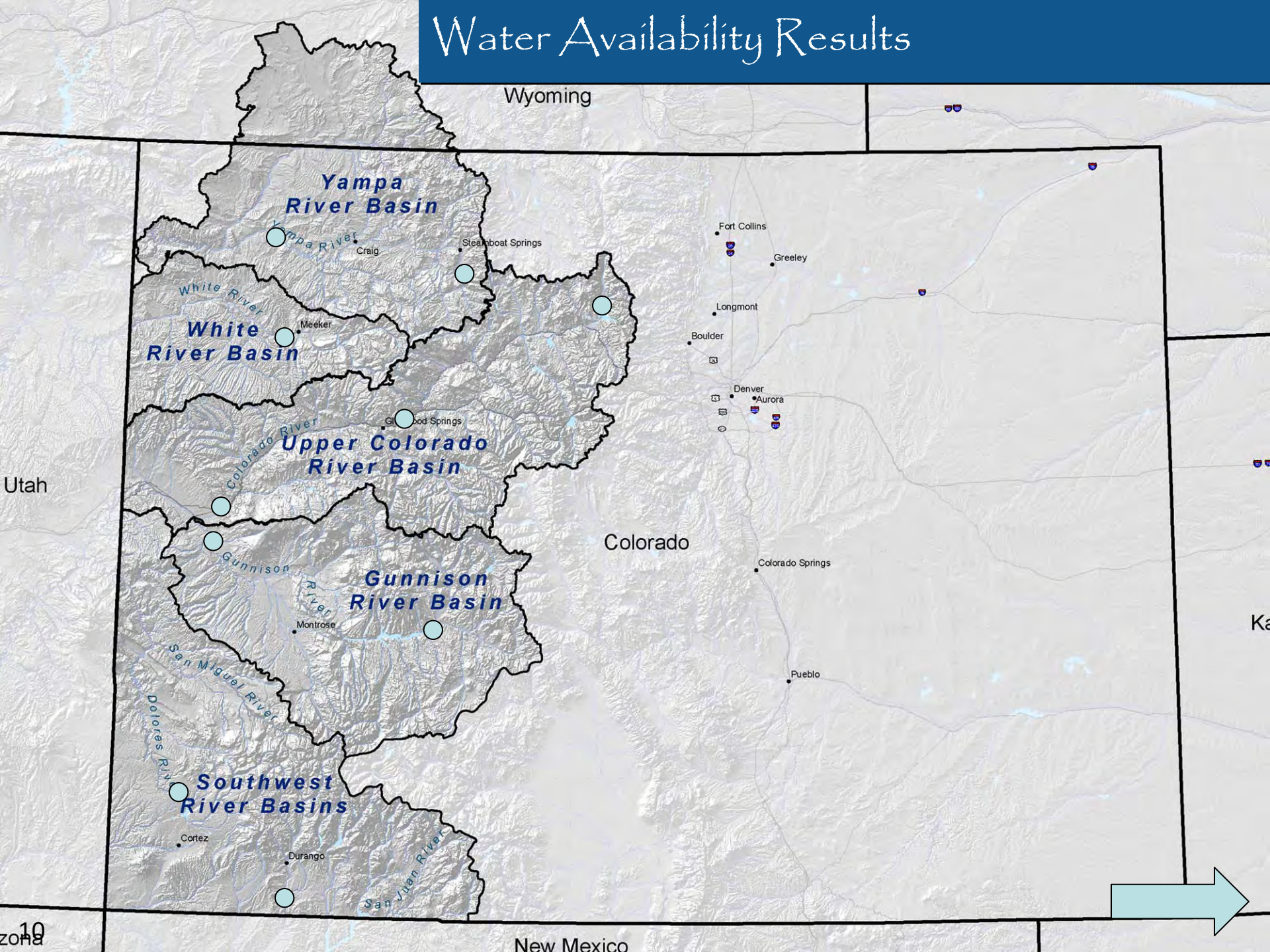
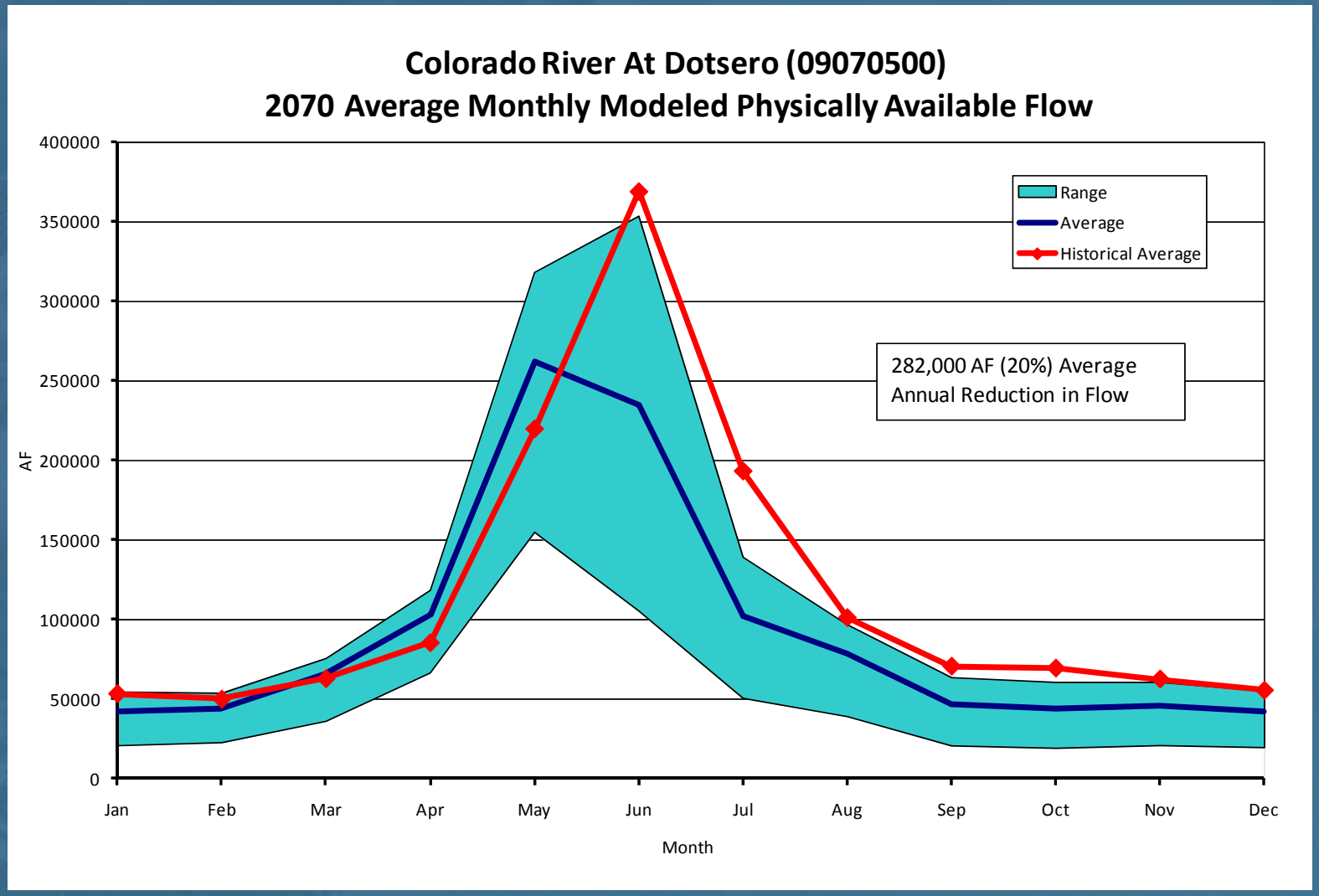


Figure 8 - 2070 Increase in CIR from Historical (inches)

Water Availability Results

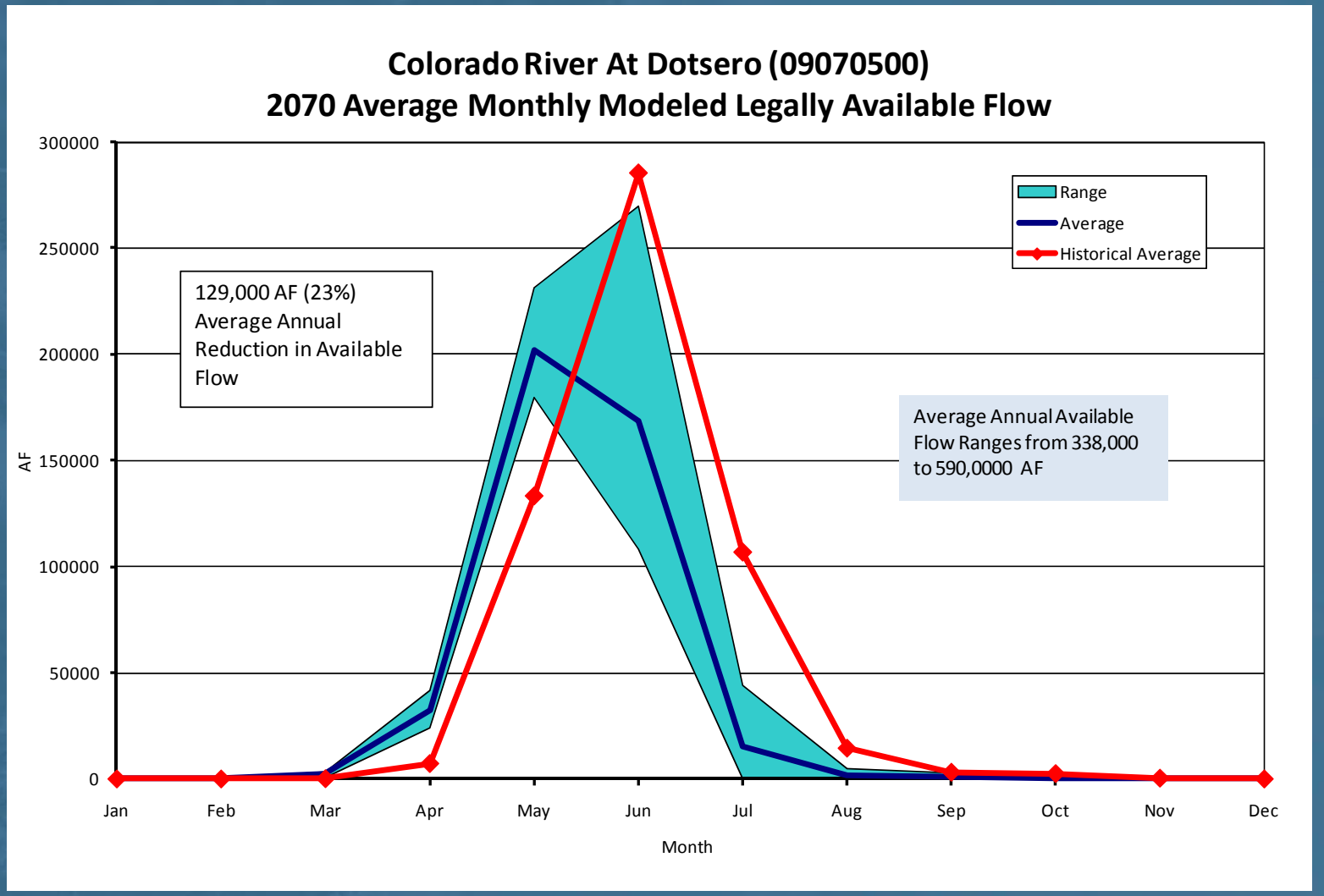


Water Availability Results



PRELIMINARY RESULTS – UNDER REVIEW

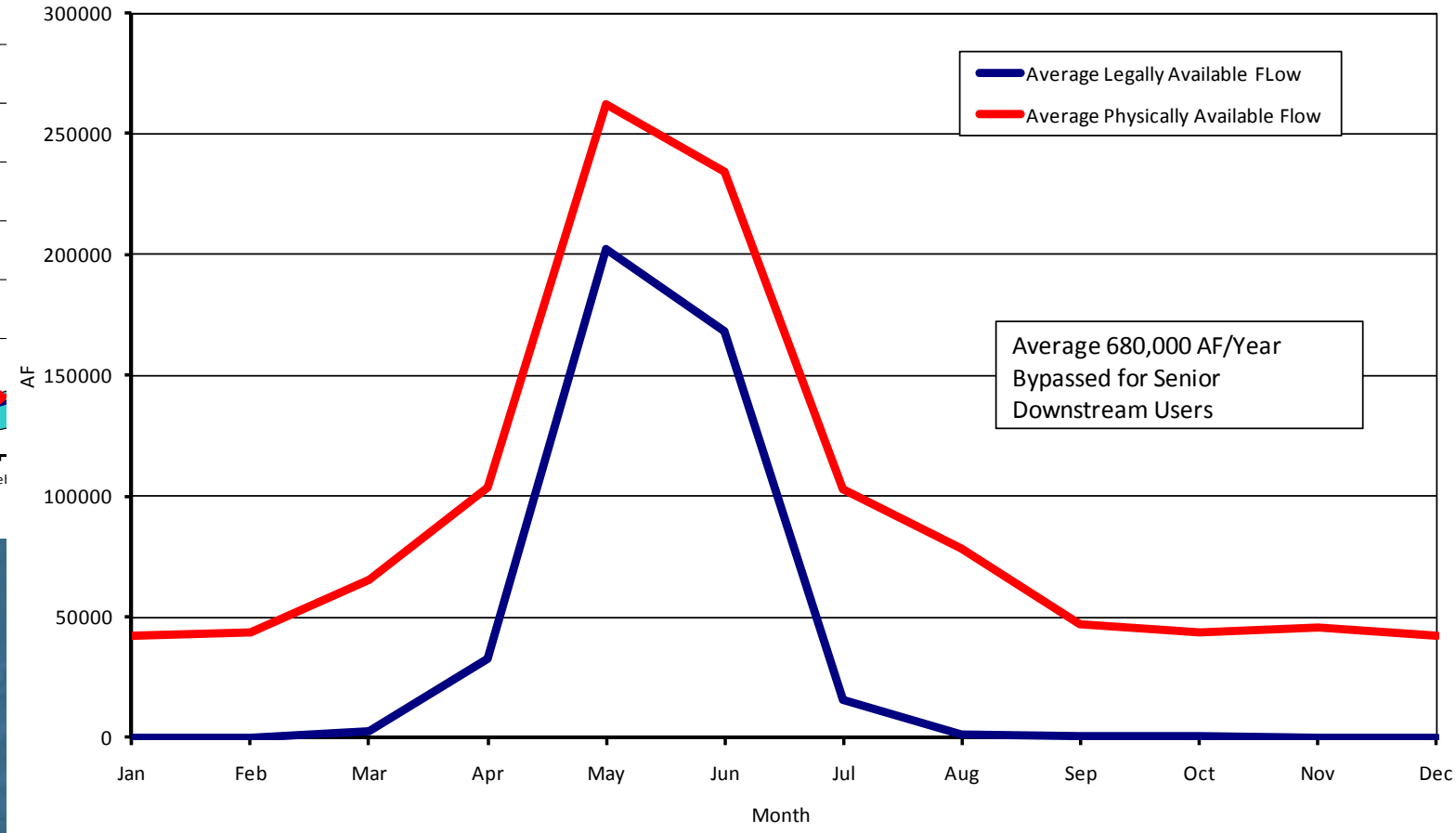
Water Availability Results



PRELIMINARY RESULTS – UNDER REVIEW

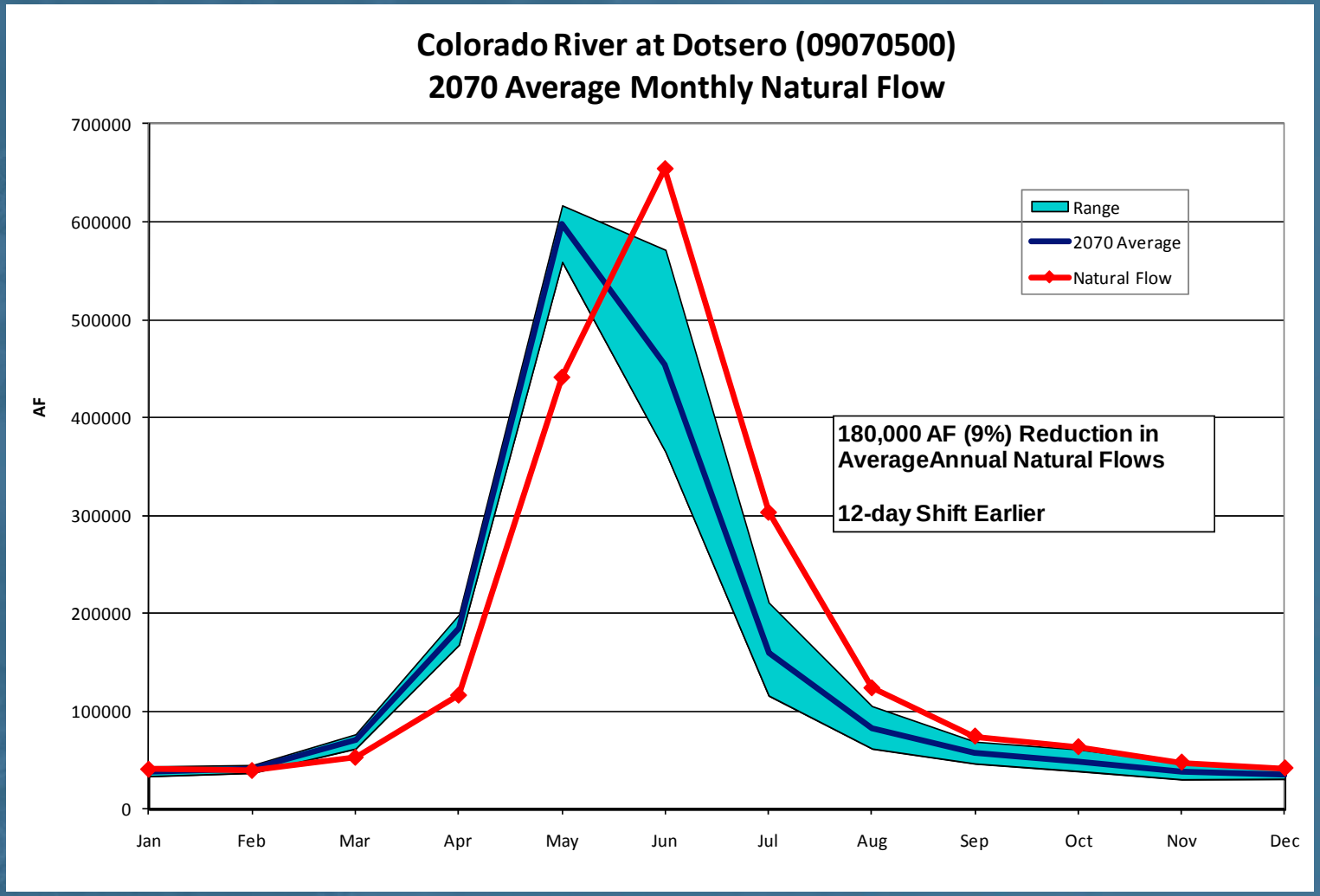
Water Availability Results

Colorado River At Dotsero (09070500)
2070 Average Monthly Modeled Legally and Physically Available Flow



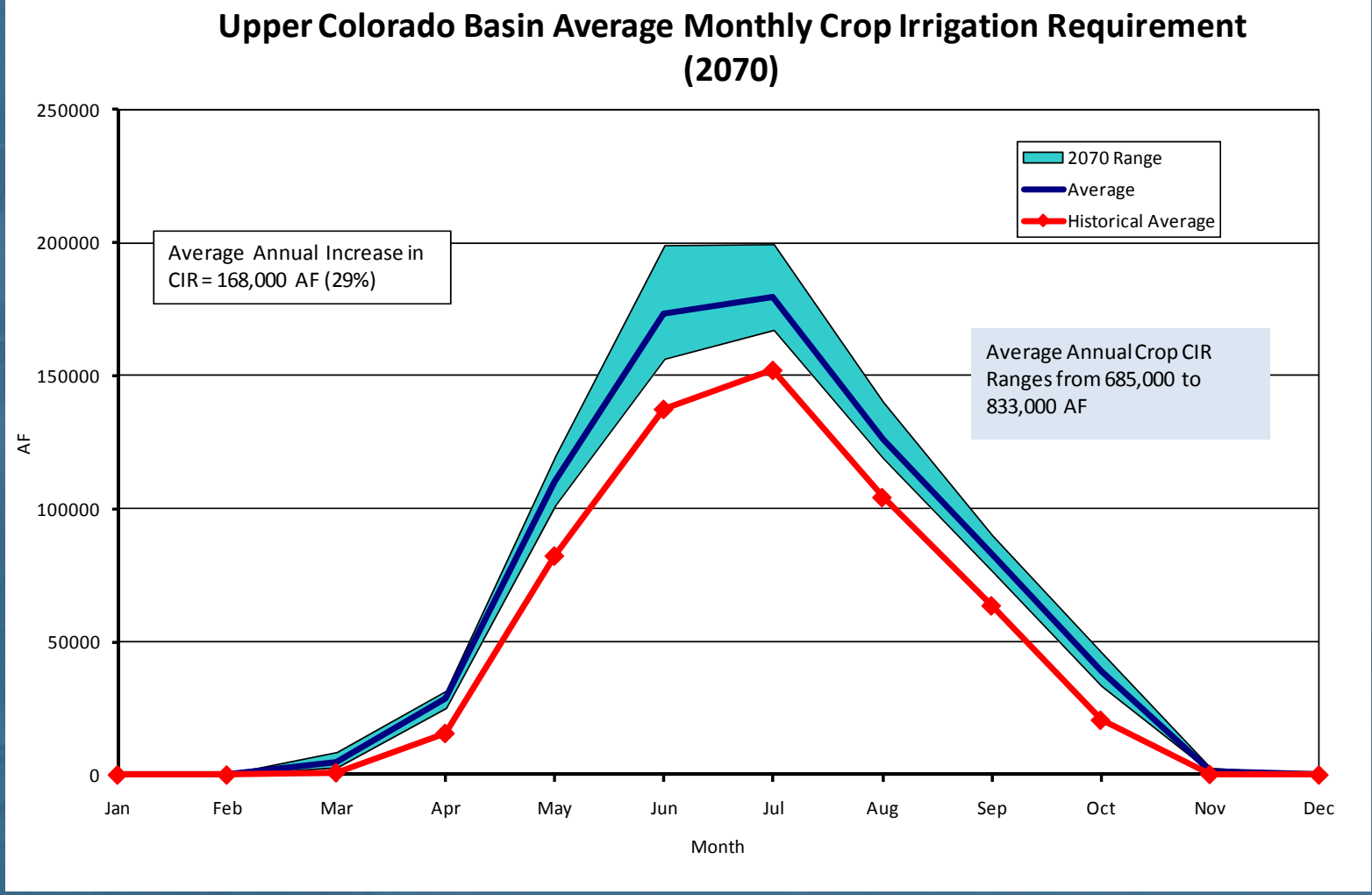
PRELIMINARY RESULTS – UNDER REVIEW

Water Availability Results



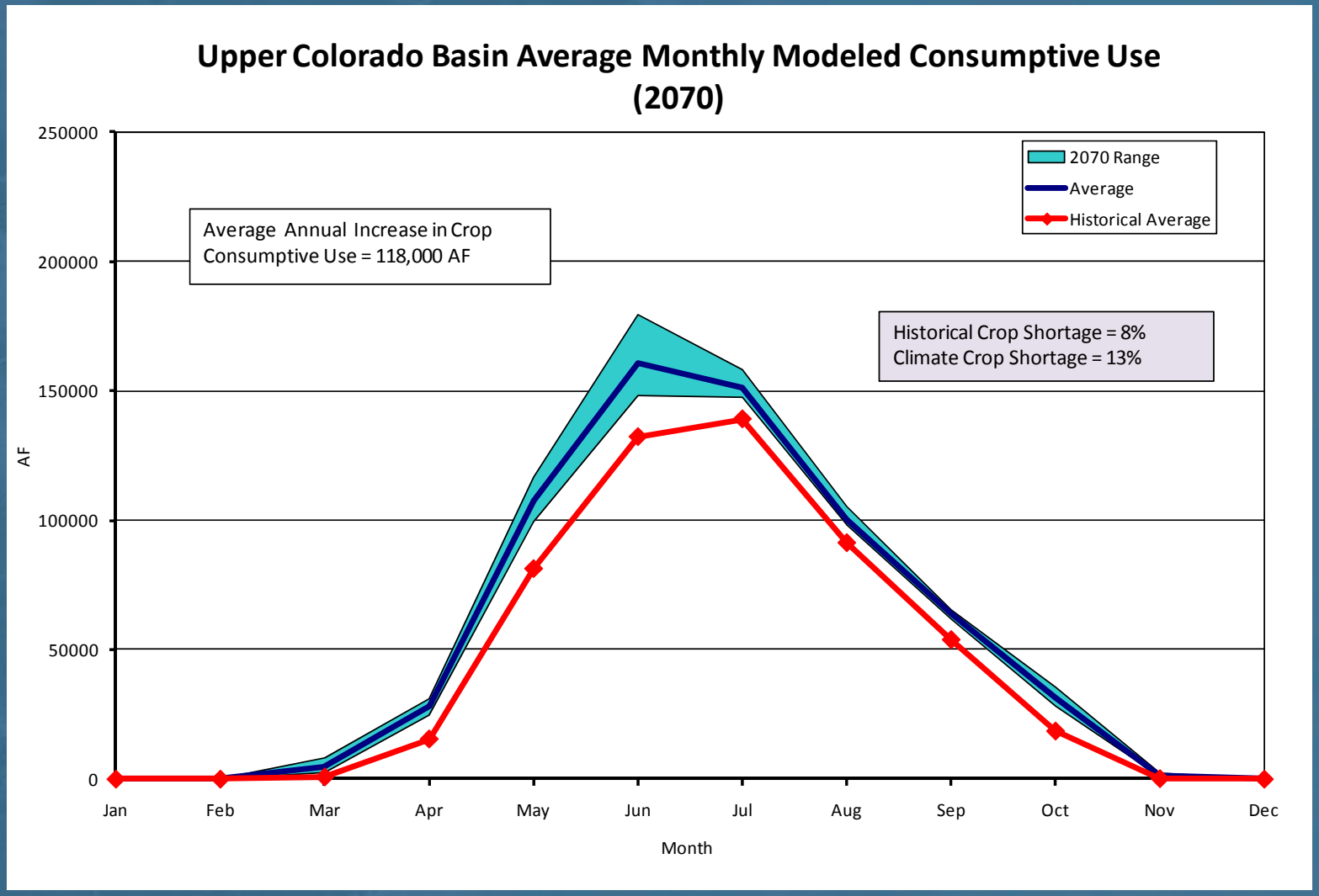
PRELIMINARY RESULTS – UNDER REVIEW

Water Availability Results



PRELIMINARY RESULTS – UNDER REVIEW

Water Availability Results



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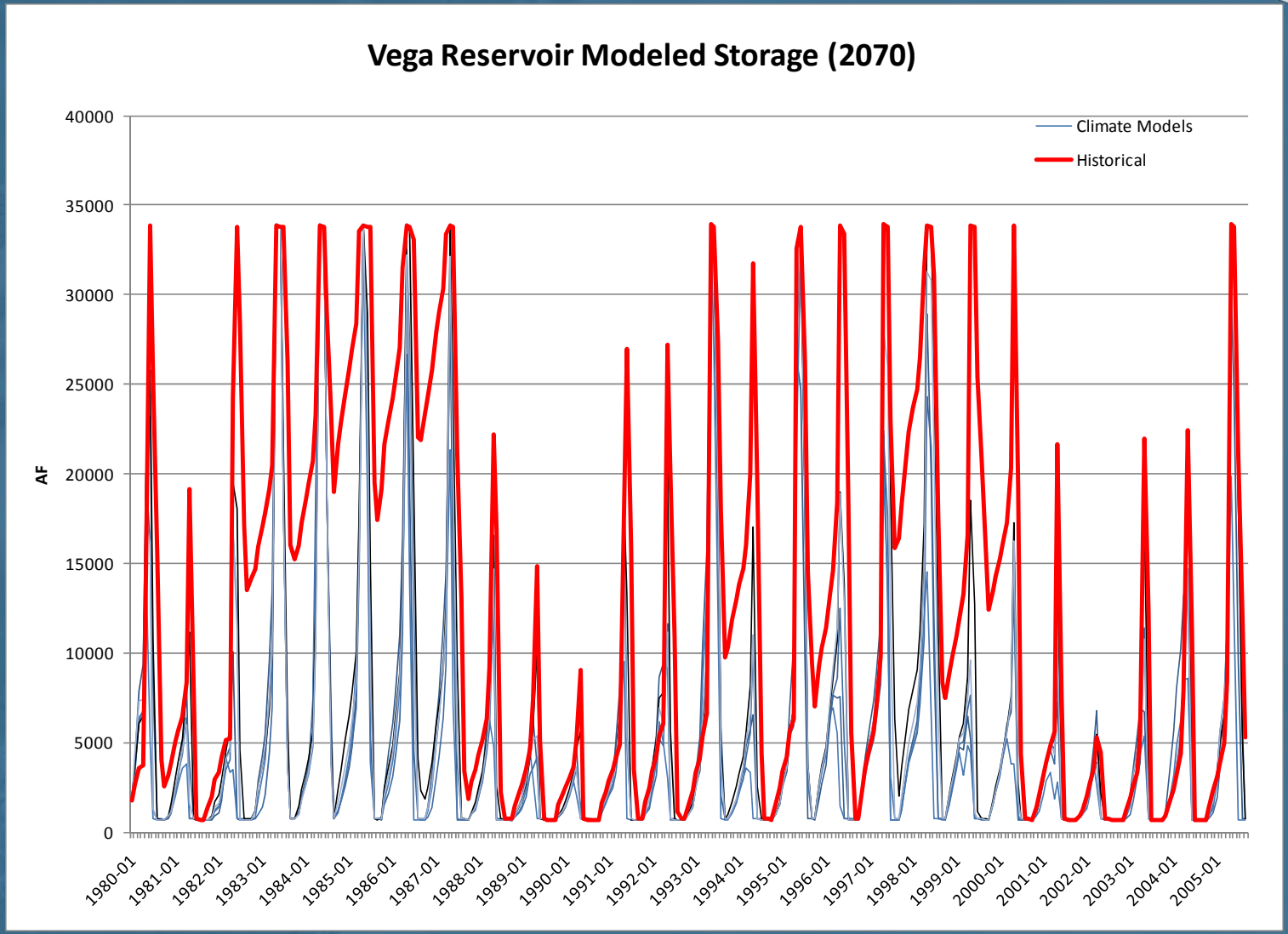
Water Availability Results



PRELIMINARY RESULTS – UNDER REVIEW

Colorado River at Dotsero - Breakdown

- Natural Flow Decrease

  = 180,000 AF/YR (9% of Historical)

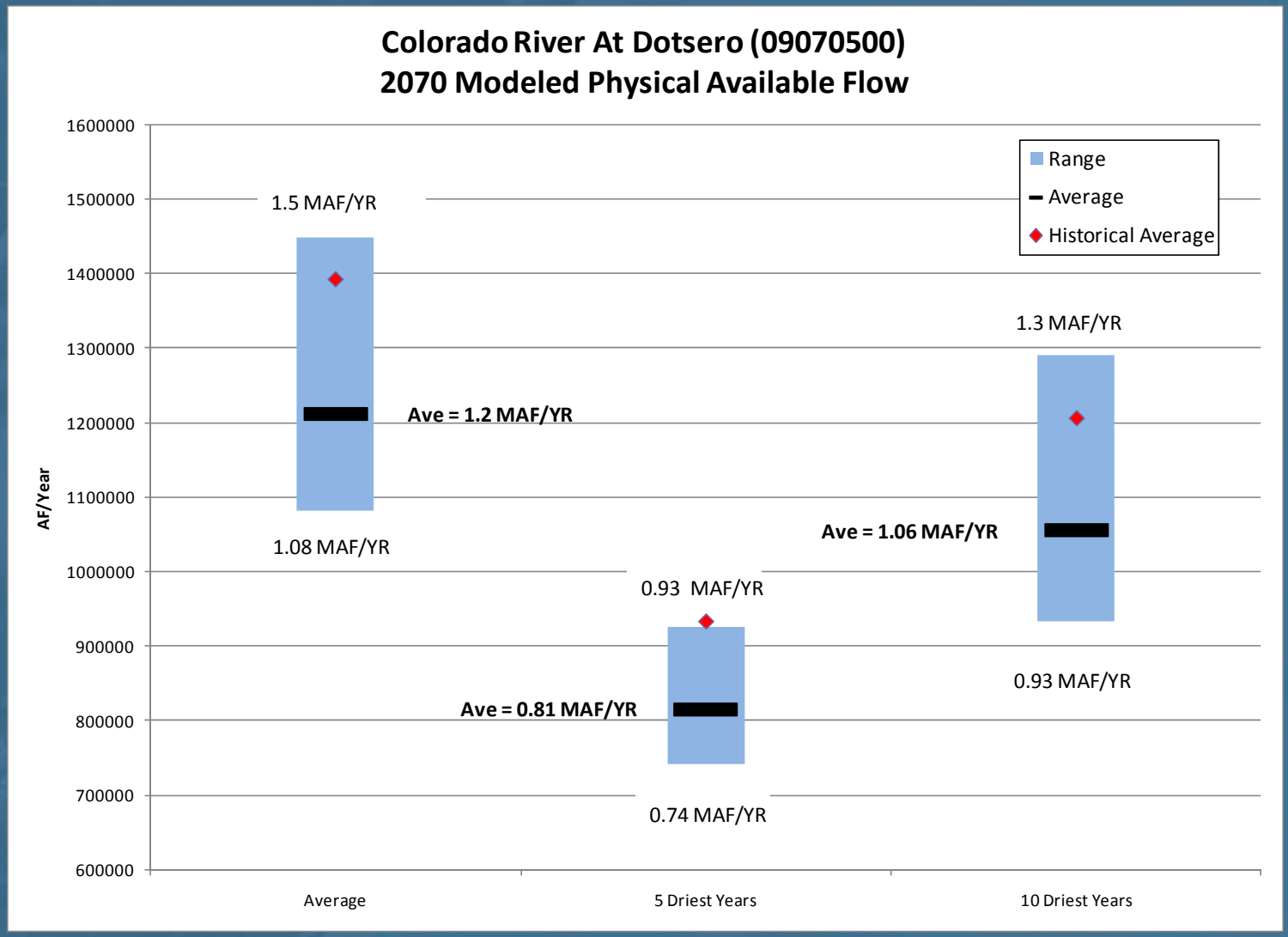
- Crop Consumptive Use (Supply-limited) Increase

  = 118,000 AF/YR (22% of Historical)

- Legally Available Flow Decrease

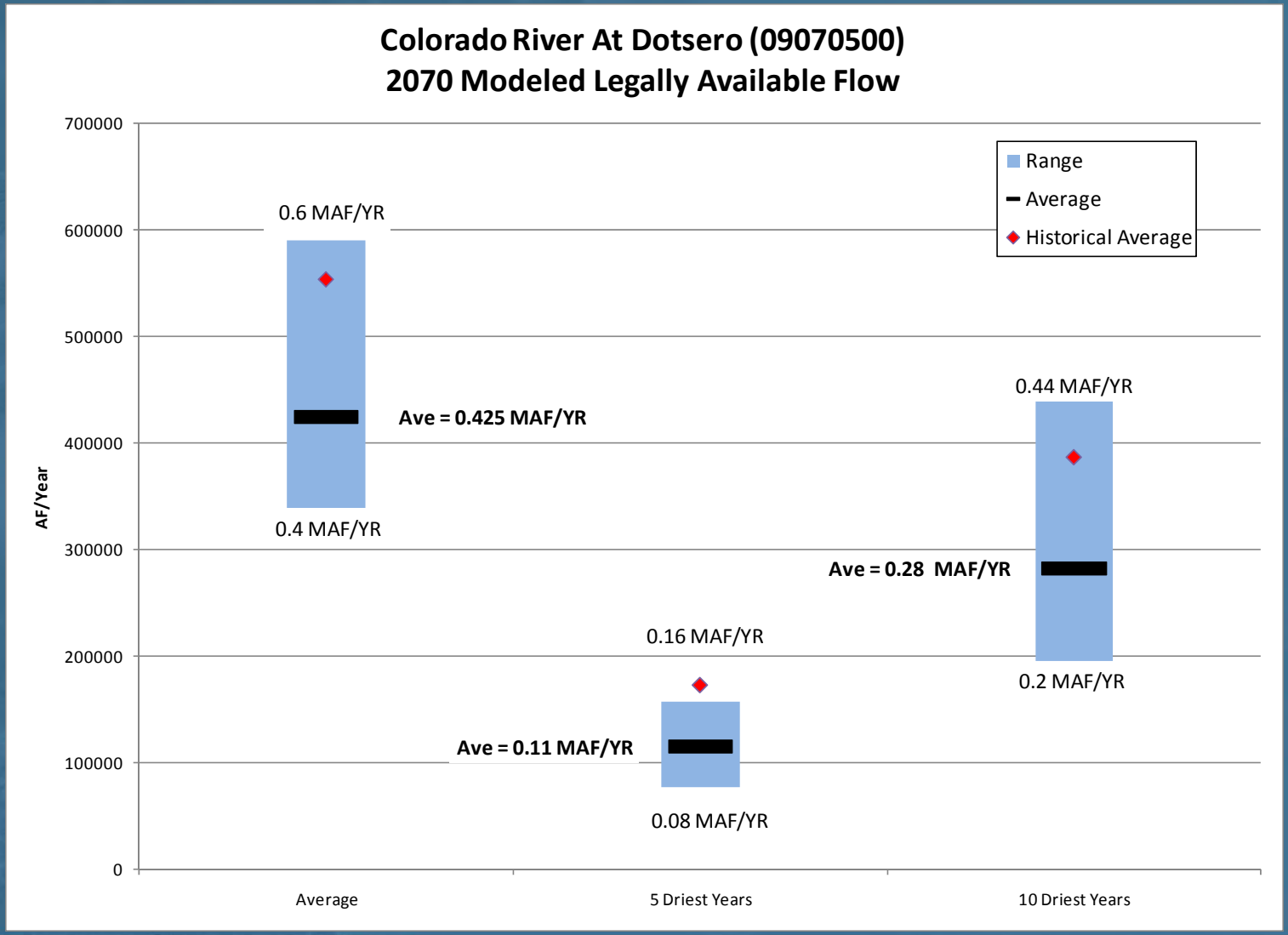
  = 129,000 AF/Year (23 % of Historical)

Water Availability Results



PRELIMINARY RESULTS – UNDER REVIEW

Water Availability Results



PRELIMINARY RESULTS – UNDER REVIEW

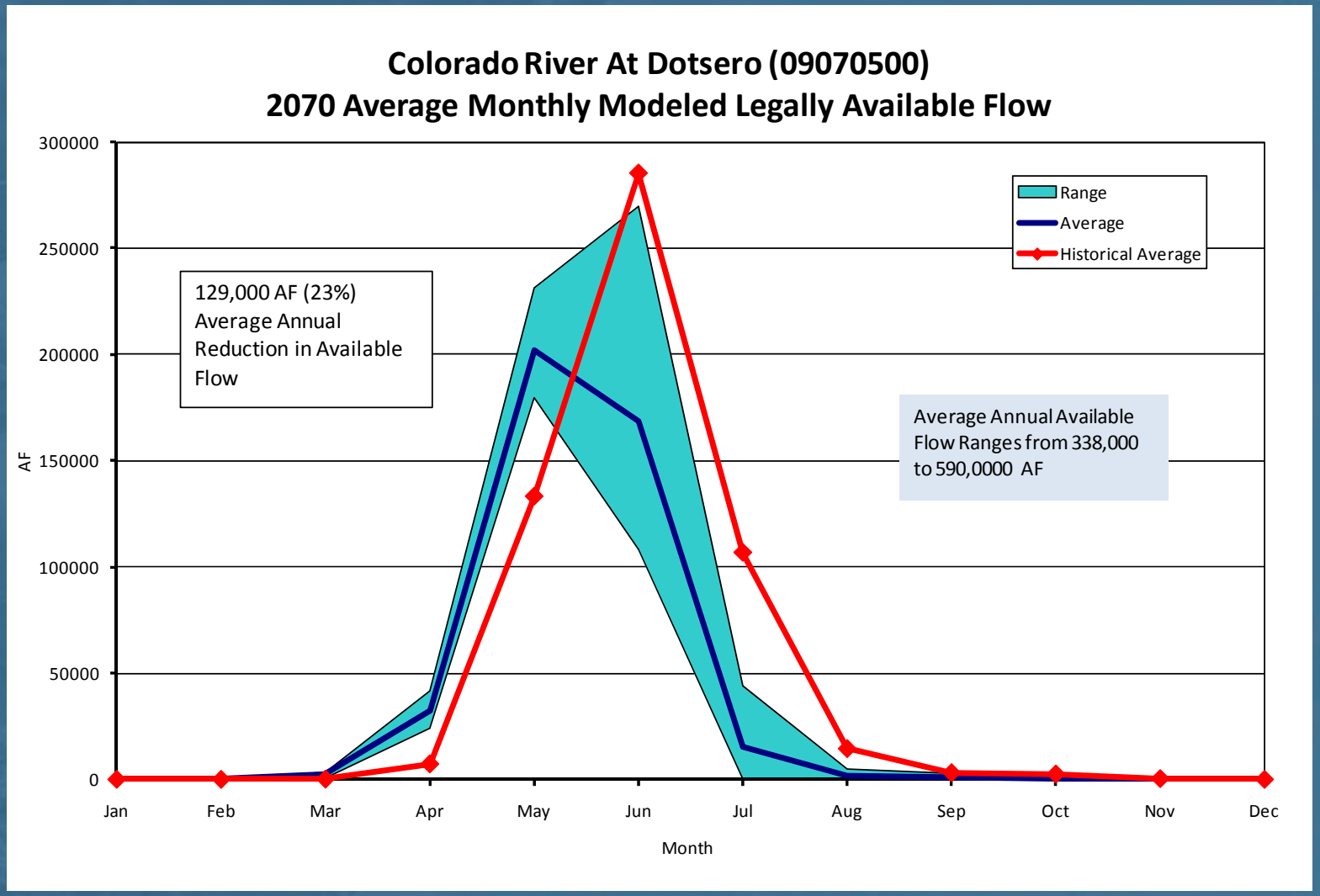
Colorado River at Dotsero - Breakdown

	2070 Legally Available Flow			
	Historical Average (AF/YR)	Climate Scenario Average (AF/YR)	Decrease (AF/YR)	% Decrease
5 Driest Consecutive Years	173,000	114,000	59,000	34%
10 Driest Consecutive Years	386,000	282,000	104,000	27%

	2070 Physically Available Flow			
	Historical Average (AF/YR)	Climate Scenario Average (AF/YR)	Decrease (AF/YR)	% Decrease
5 Driest Consecutive Years	933,000	815,000	118,000	13%
10 Driest Consecutive Years	1,206,000	1,055,000	151,000	13%

PRELIMINARY RESULTS – UNDER REVIEW

Water Availability Results



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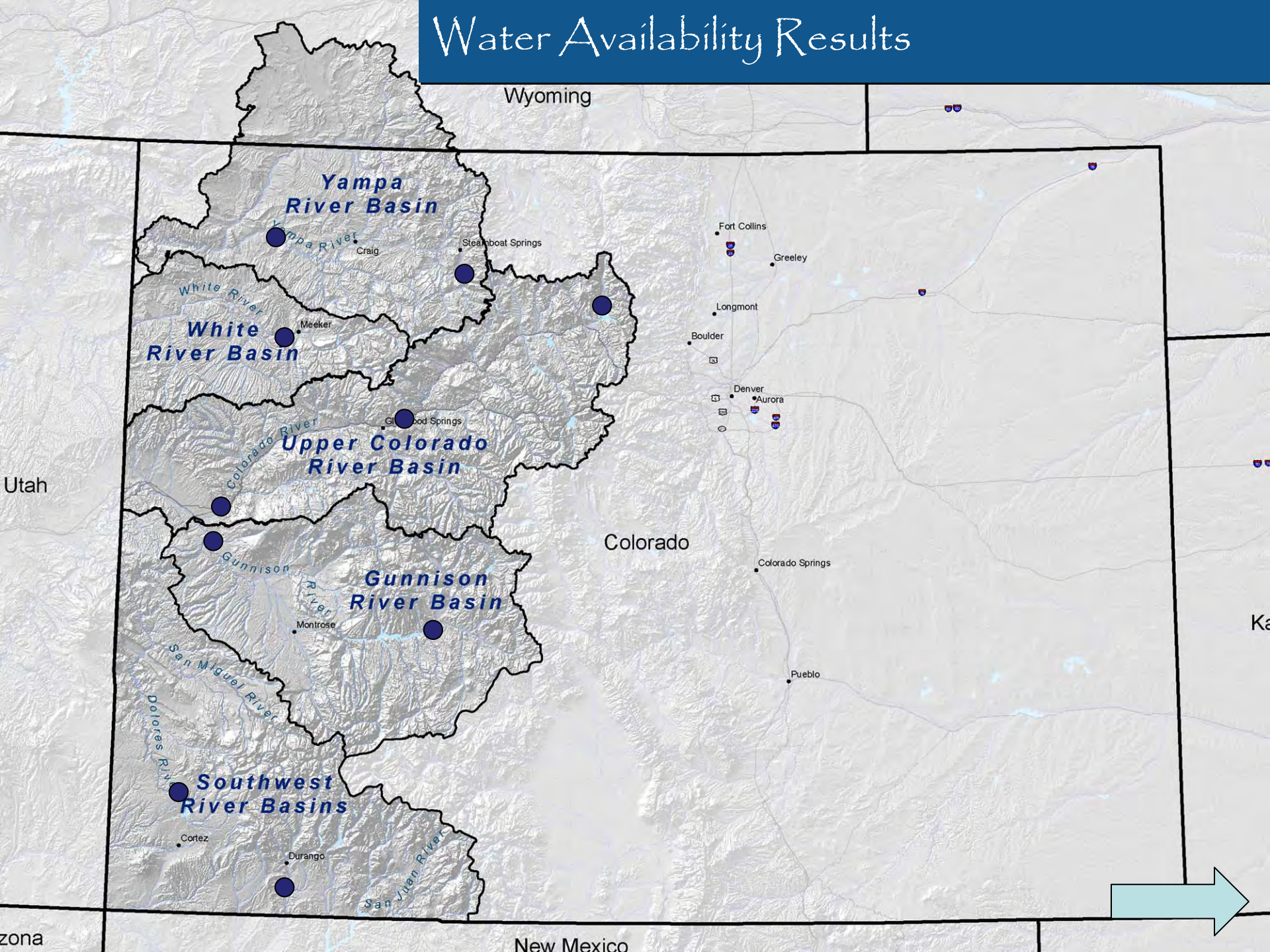
Water Availability Results



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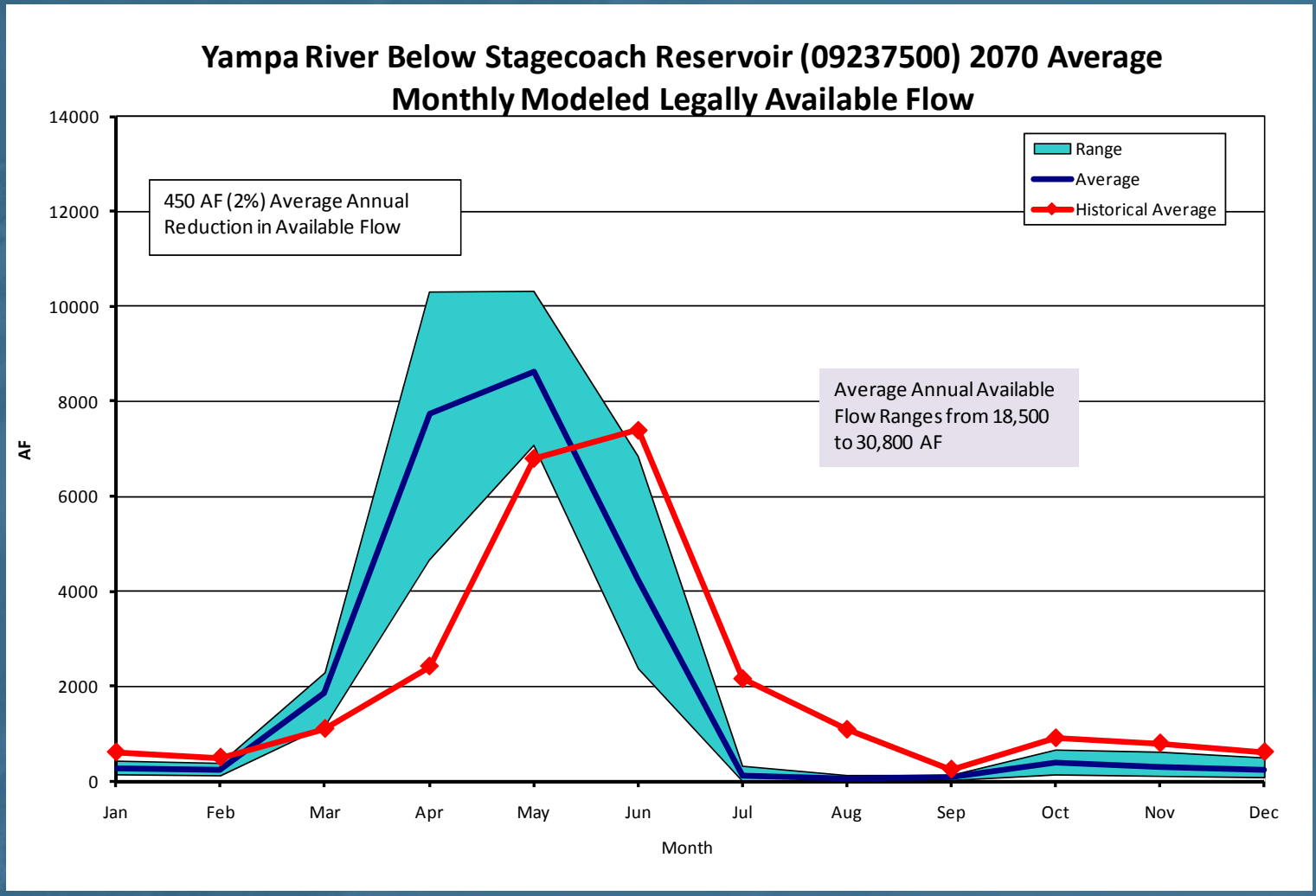

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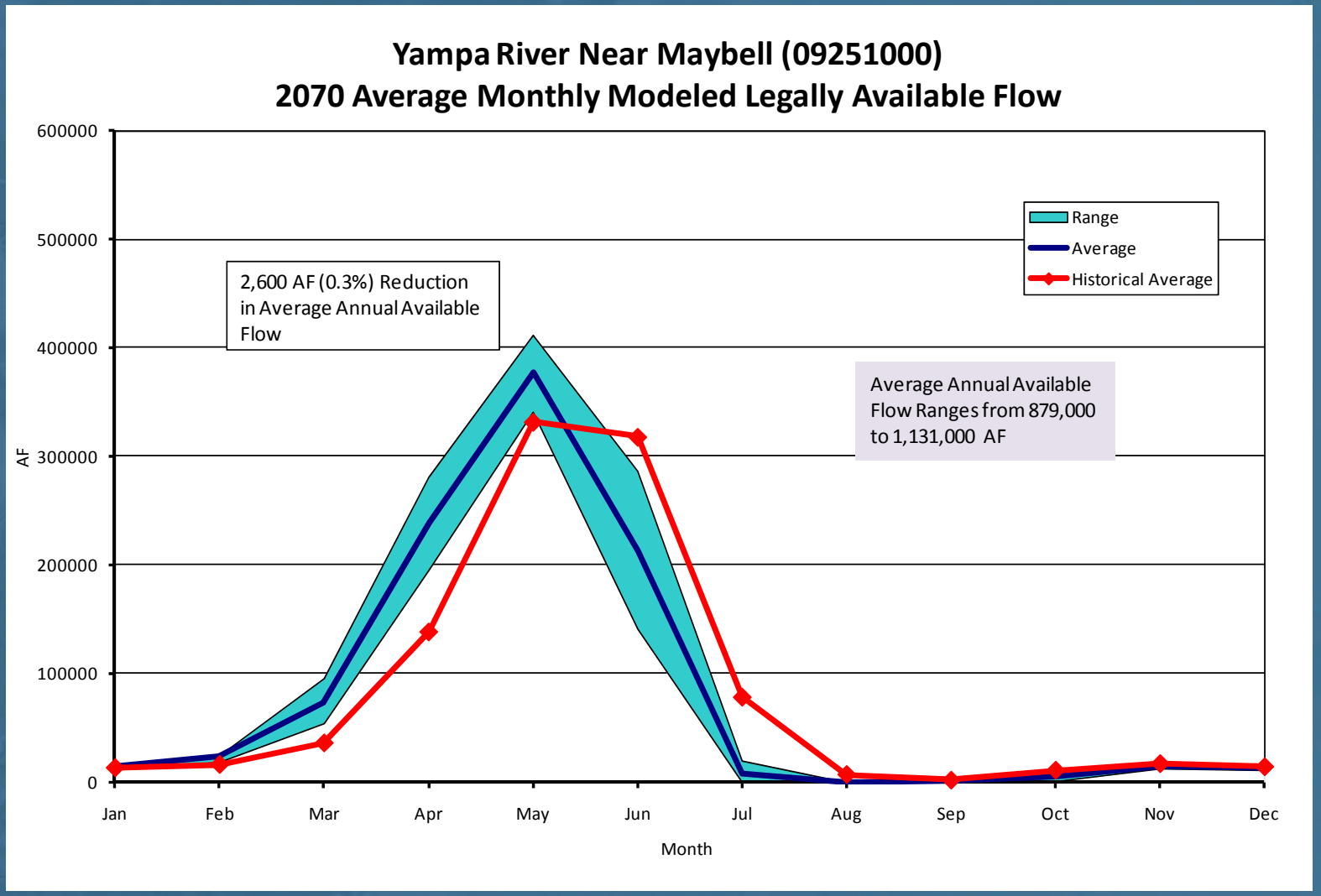

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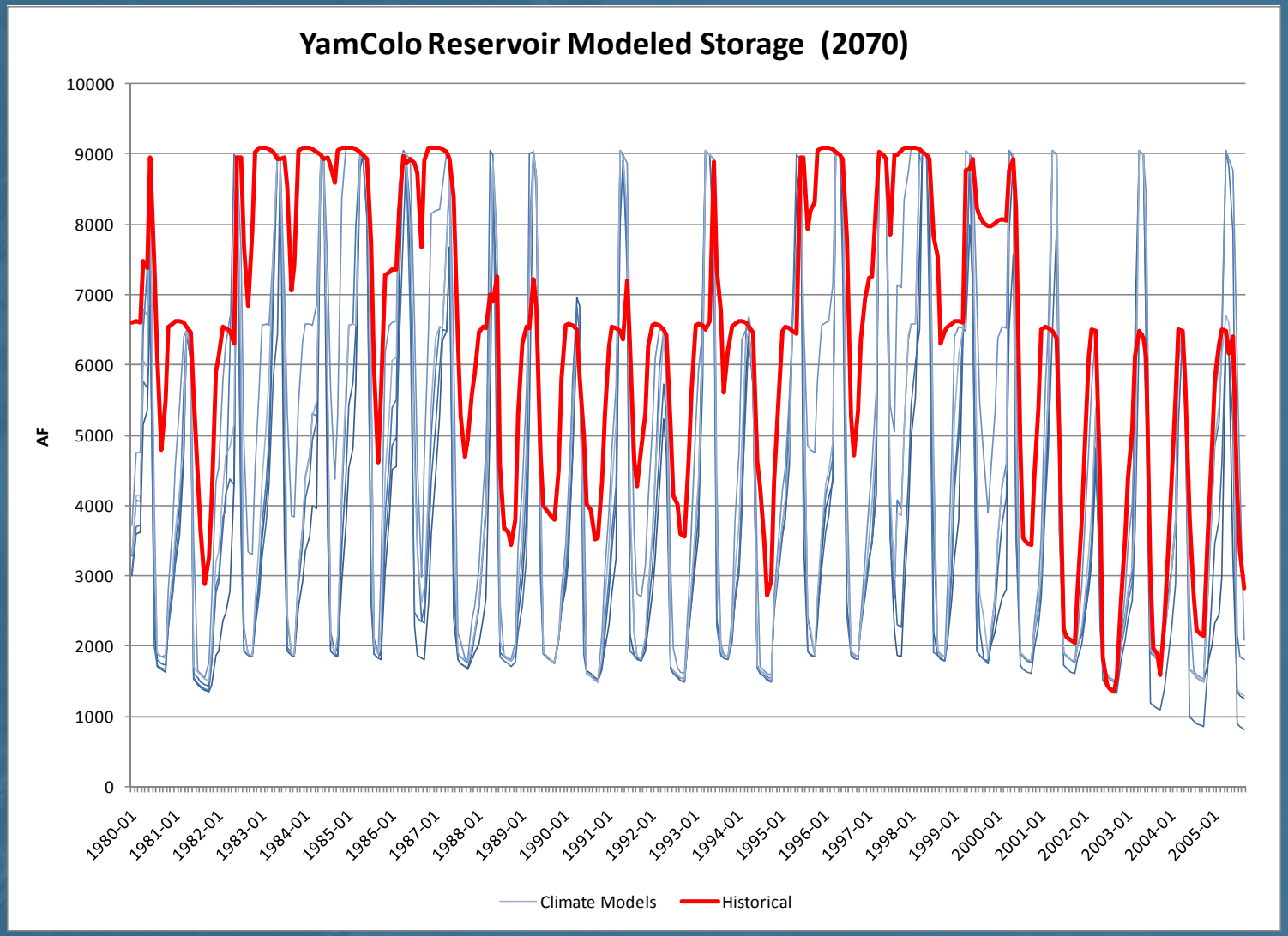

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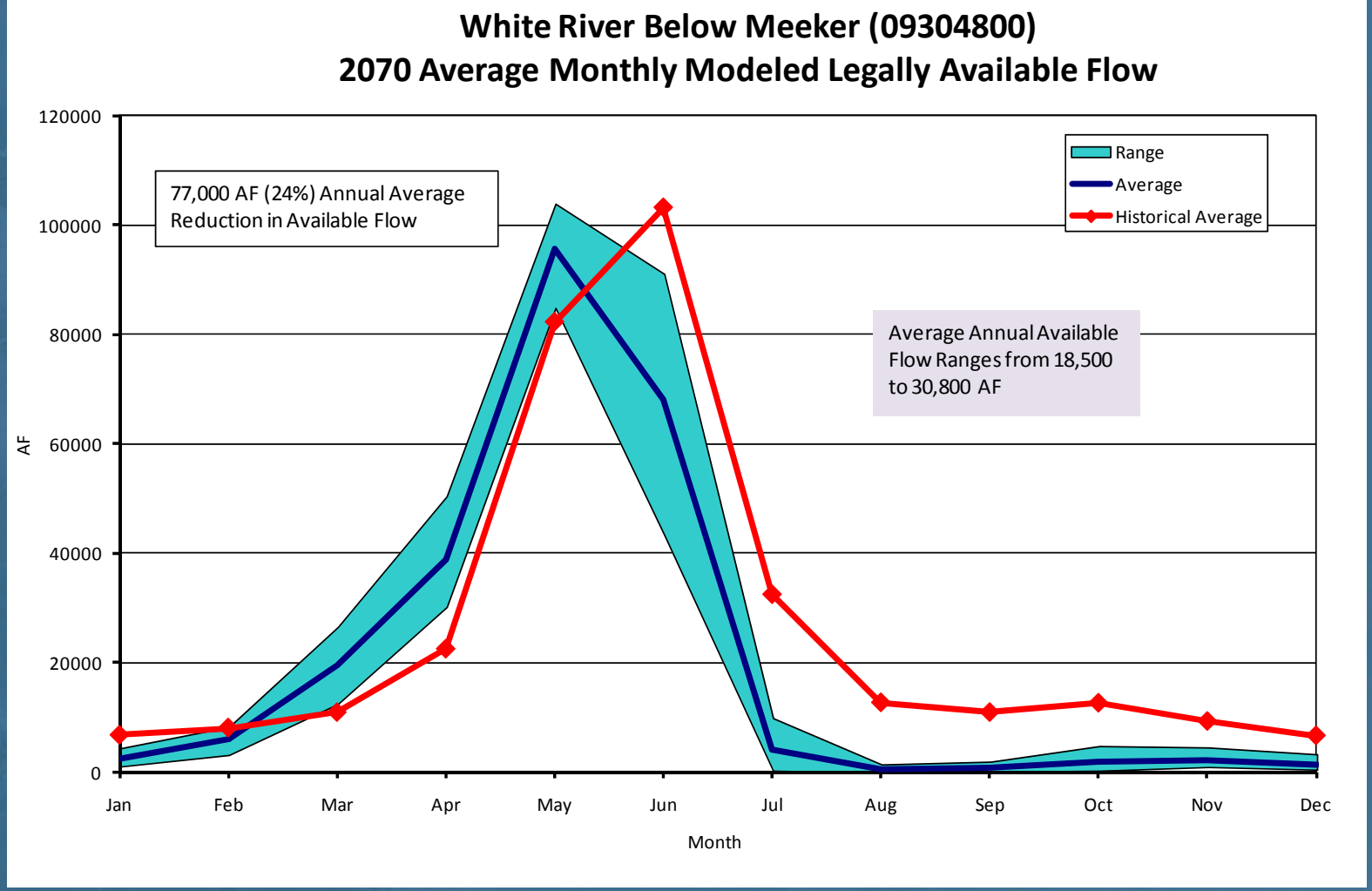

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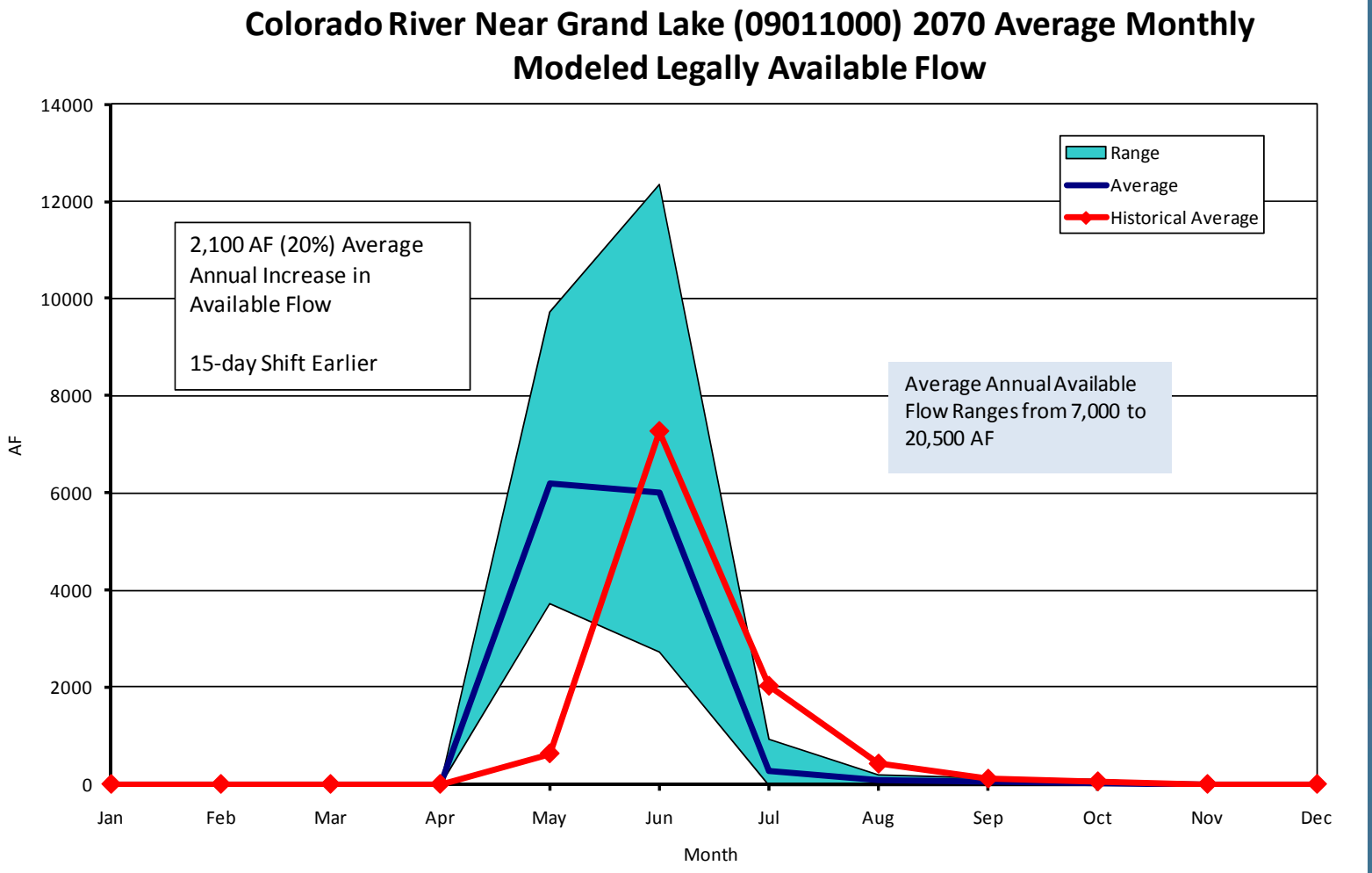

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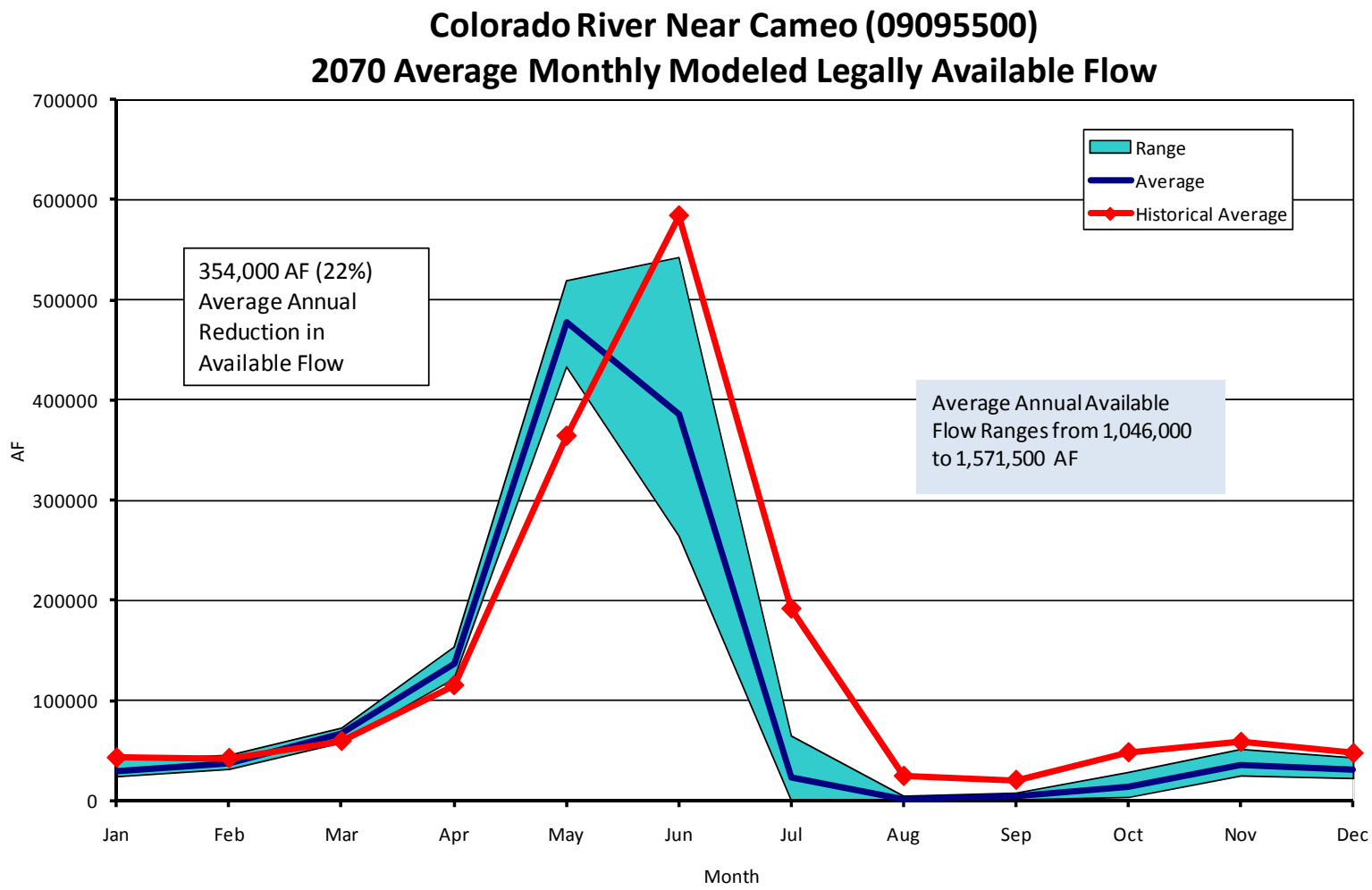
Water Availability Results



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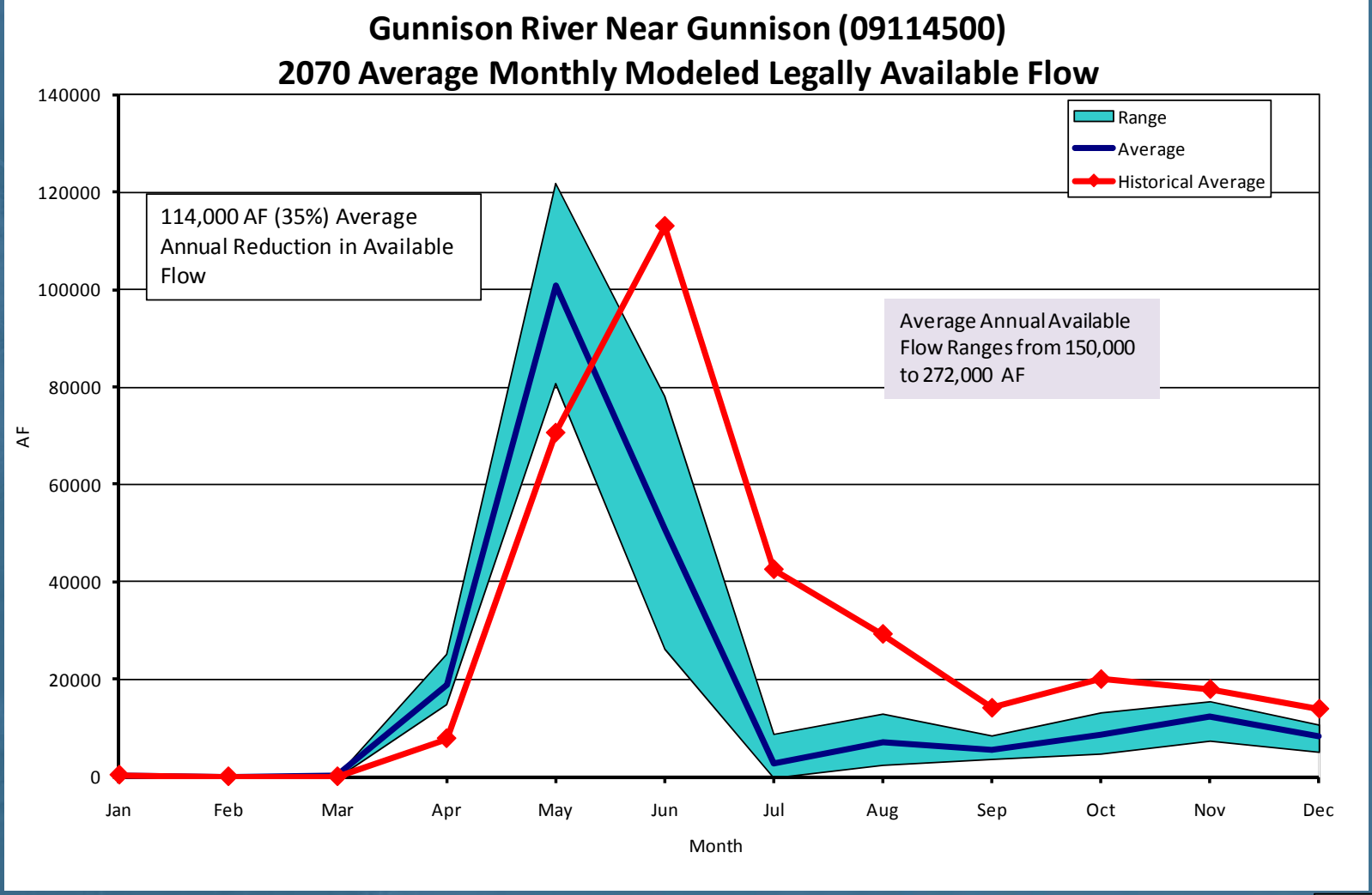
Water Availability Results



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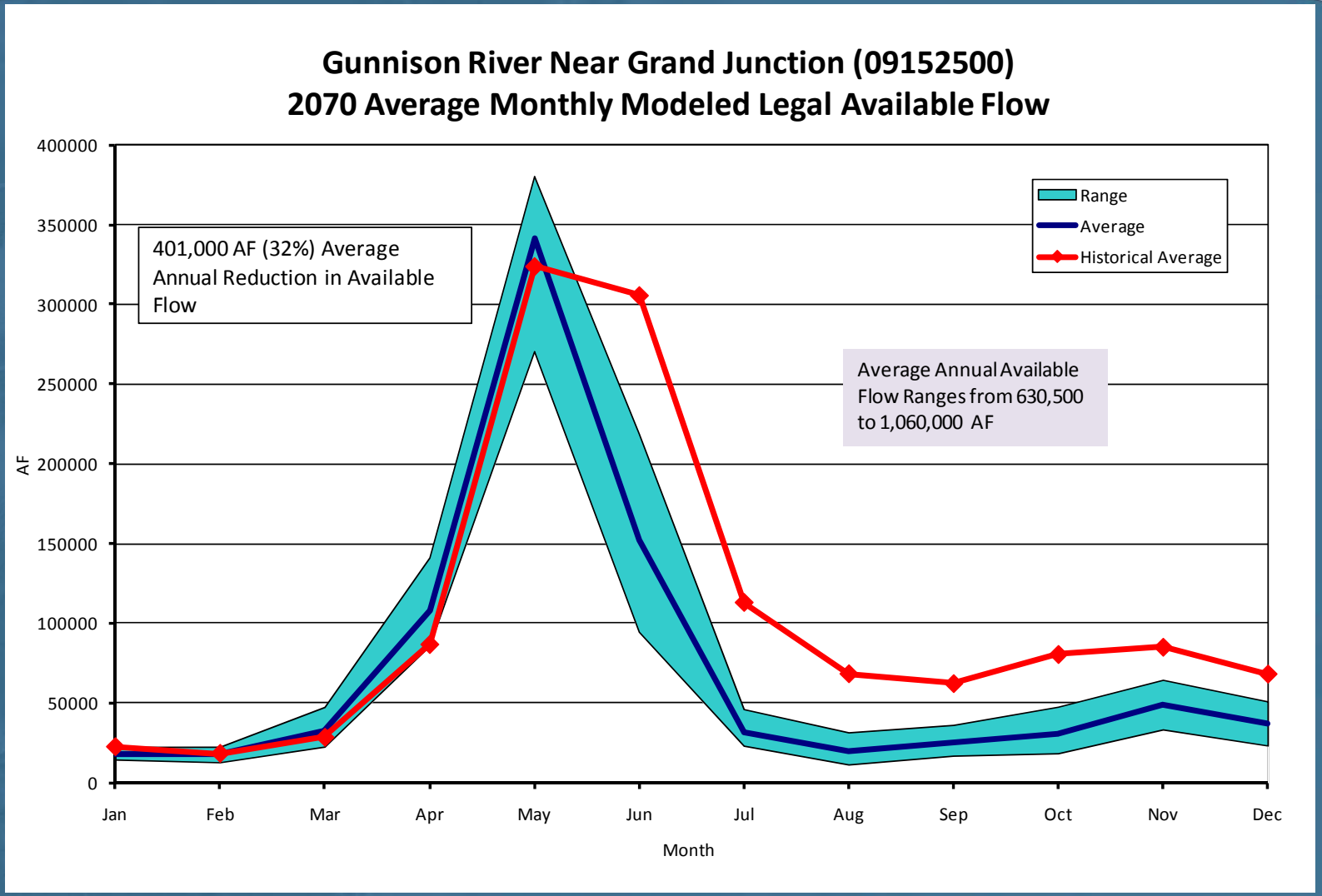
Water Availability Results



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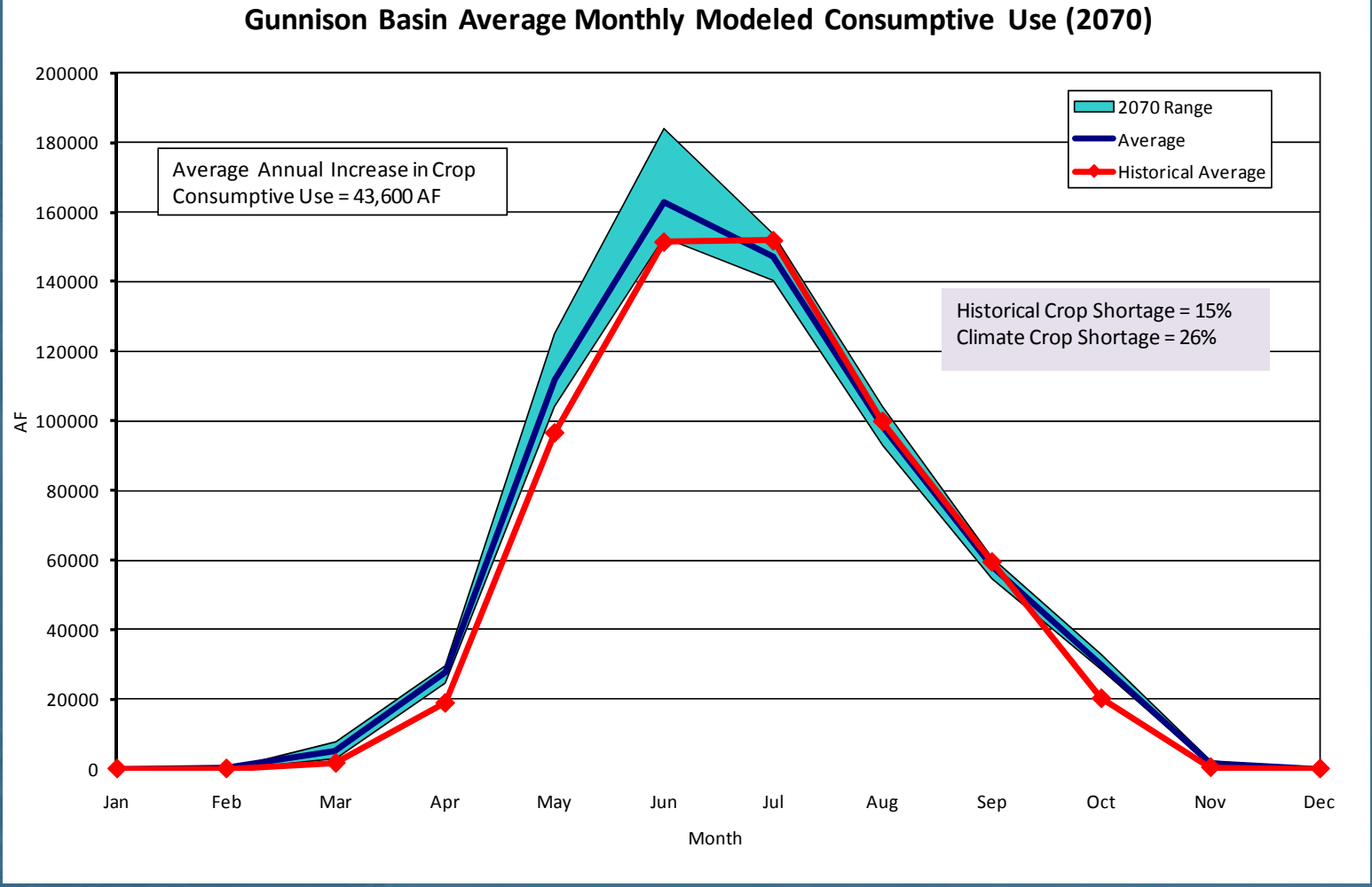
Water Availability Results



PRELIMINARY RESULTS – UNDER REVIEW

Gunnison River at Grand Junction- Breakdown

- Natural Flow Decrease

  = 326,000 (14% of Historical)

- Crop Consumptive Use (Supply-limited) Increase

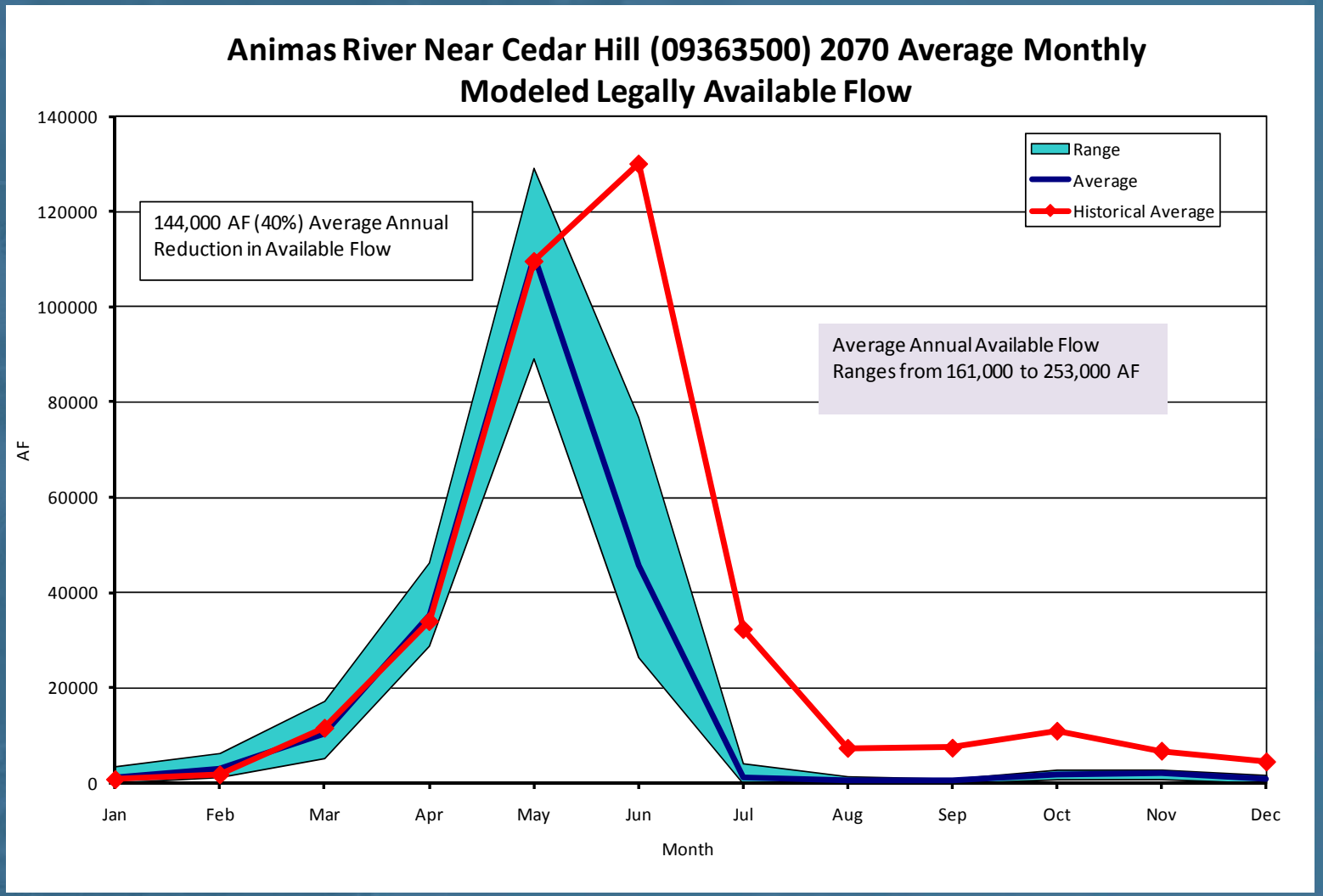
  = 43,600 AF/YR (7% of Historical)

- Legally Available Flow Decrease

  = 401,000 AF/YR (32% of Historical)

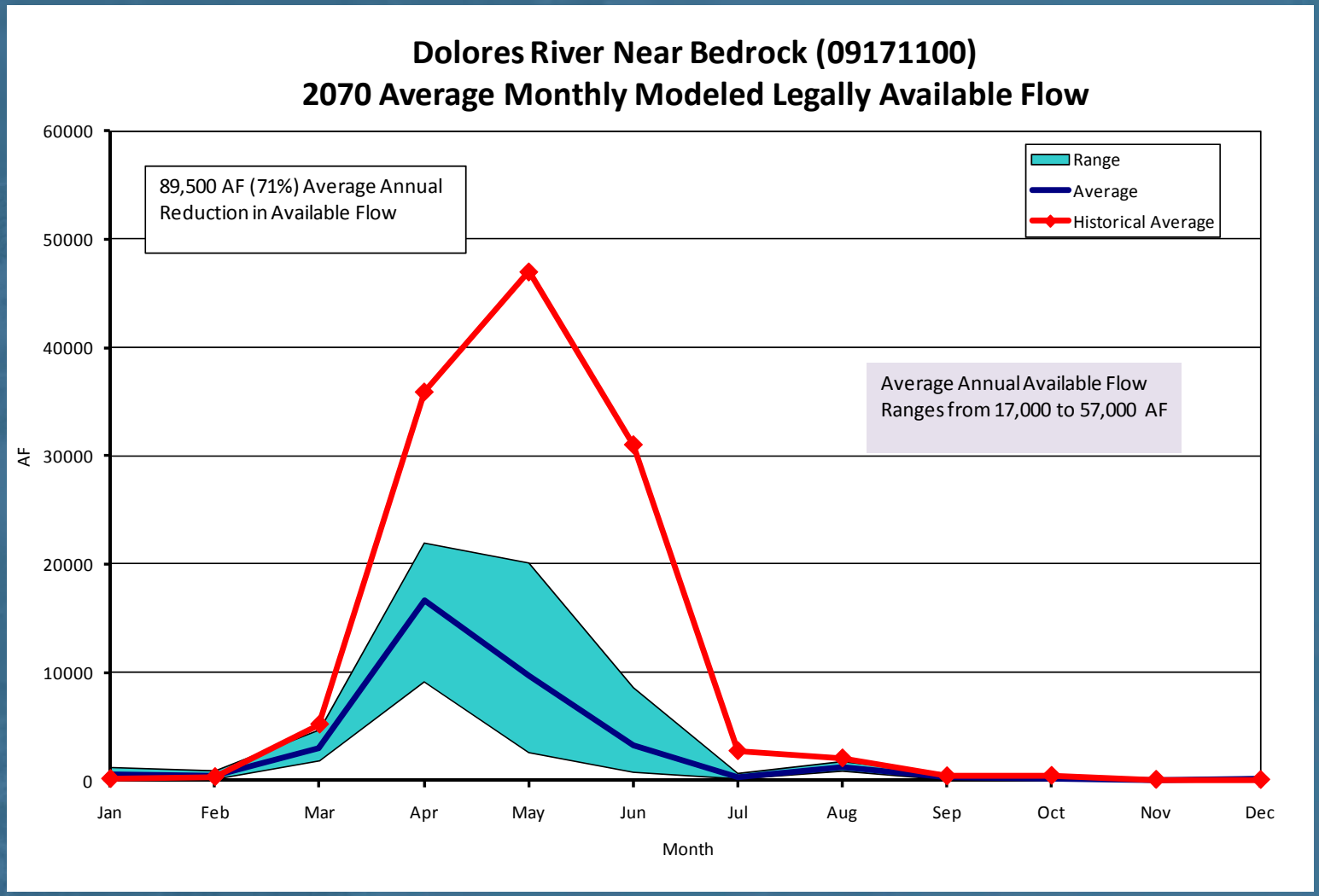
PRELIMINARY RESULTS – UNDER REVIEW

Water Availability Results



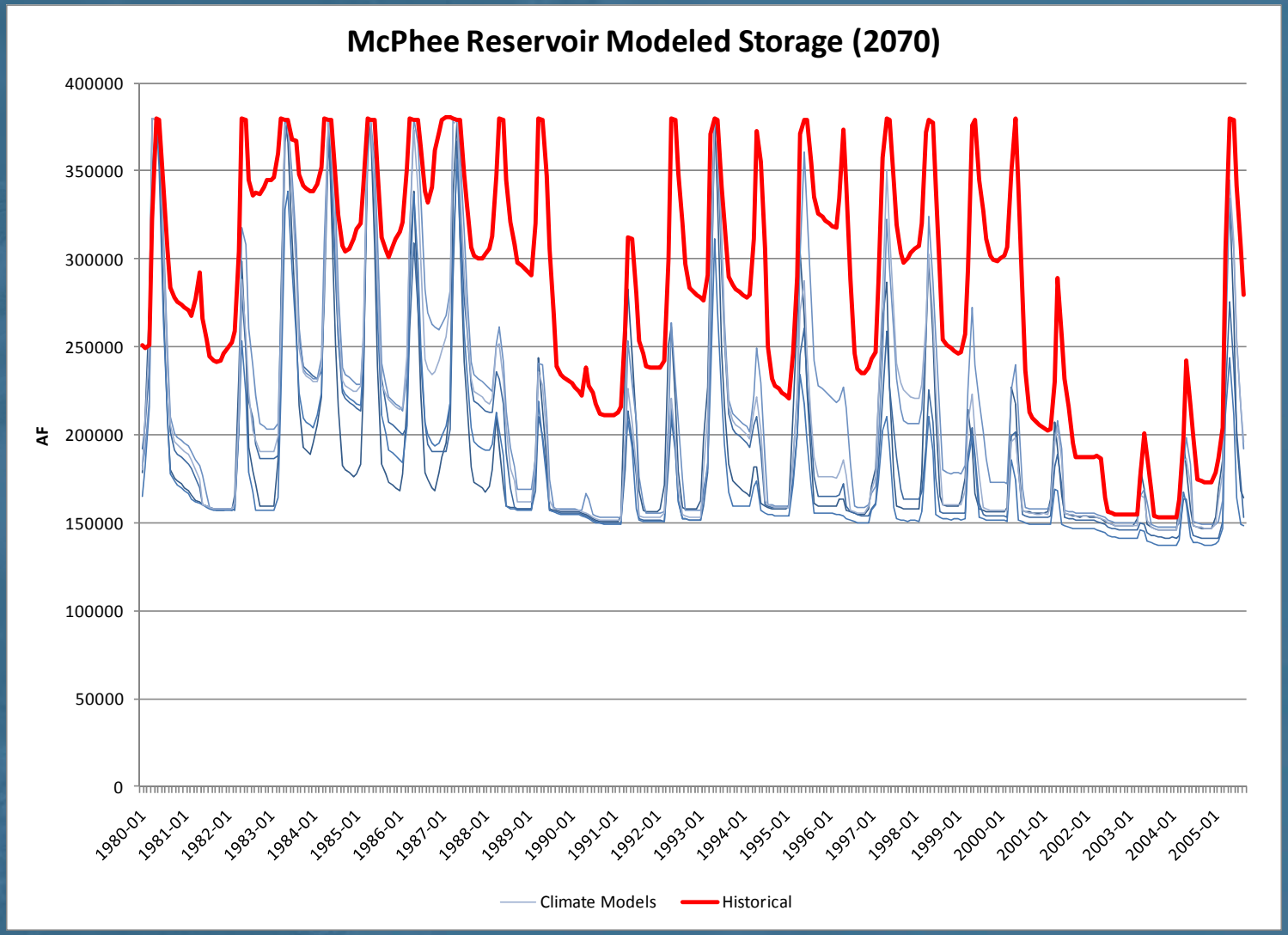
PRELIMINARY RESULTS – UNDER REVIEW

Water Availability Results



PRELIMINARY RESULTS – UNDER REVIEW

Water Availability Results



PRELIMINARY RESULTS – UNDER REVIEW

Dolores River at Bedrock- Breakdown

- Natural Flow Decrease

  = 129,000 AF/YR (32 % of Historical)

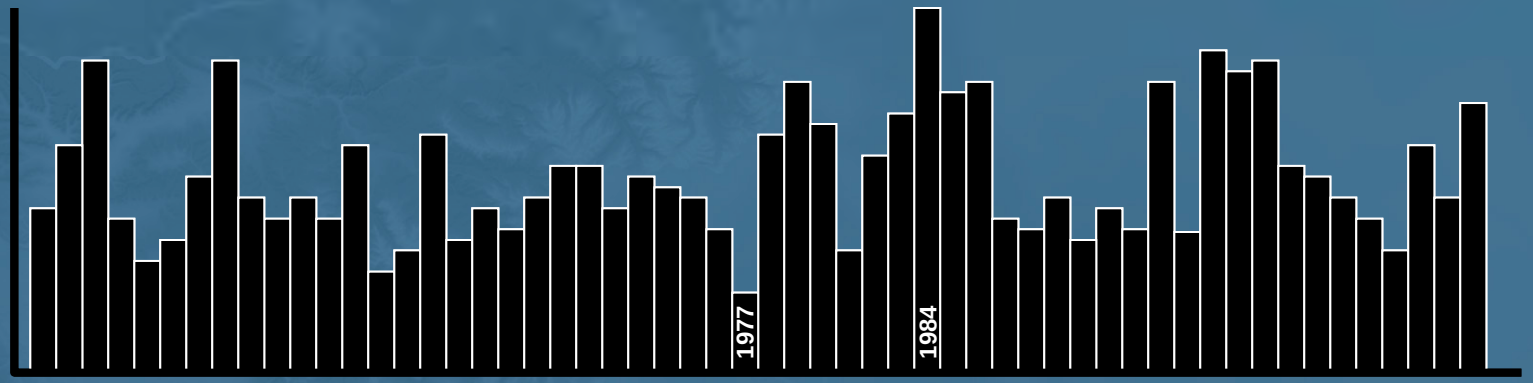
- Crop Consumptive Use (Supply-limited) *Decrease*

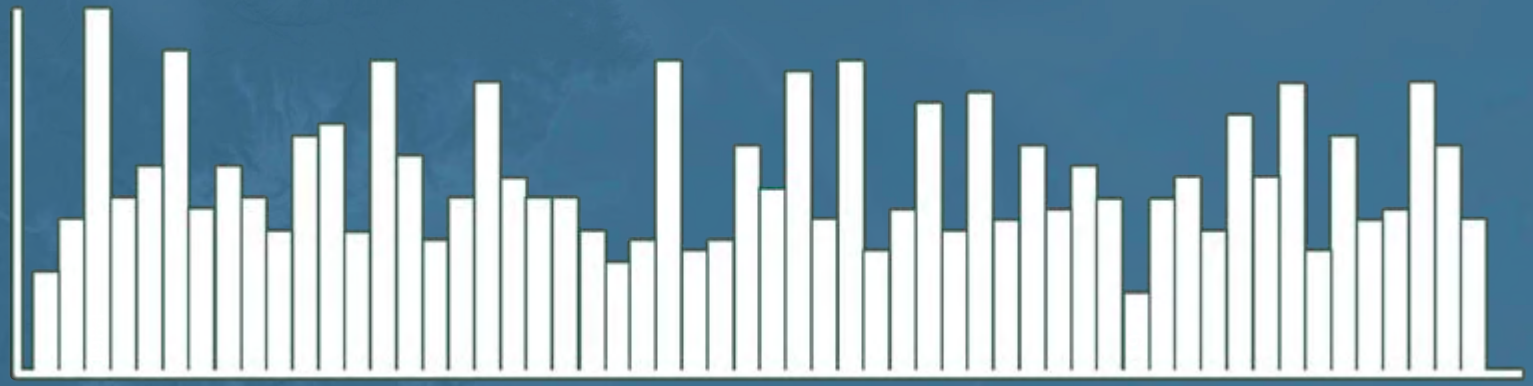
  = 45,000 AF/YR (14% of Historical -includes transbasin diversions)

- Legally Available Flow Decrease

  = 89,500 AF/Year (71% of Historical)

Resequencing – Alternate Historical Hydrology





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Phases

- Phase I
  Water Availability under current water supply infrastructure, currently perfected water rights, and current levels of consumptive and non-consumptive water demands
- Phase II
  Water Availability under projected demands from existing, conditional, and new water rights and for additional consumptive and non-consumptive water demands

Comments and Questions?

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http://cwcb.state.co.us/WaterInfo/CRWAS