

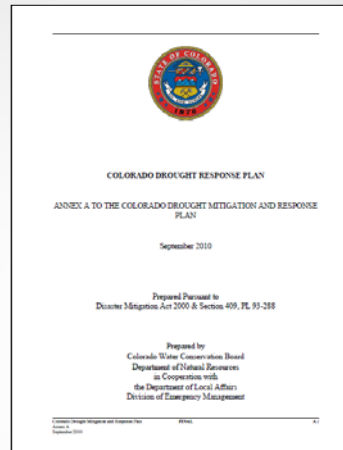
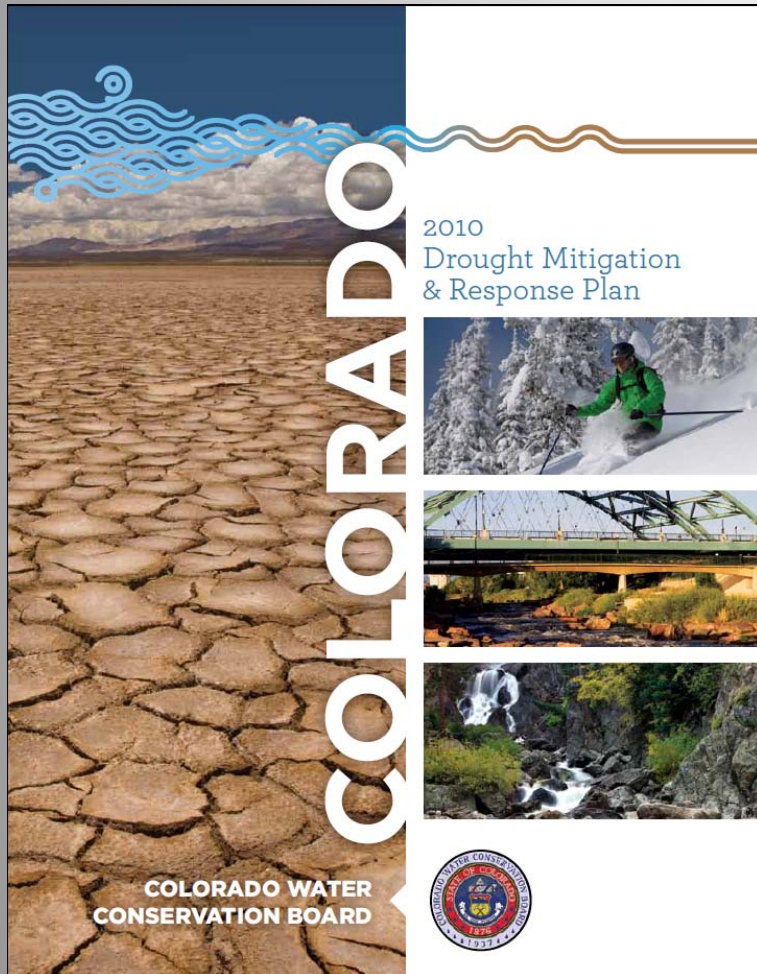


# 2010 Colorado Drought Mitigation and Response Plan

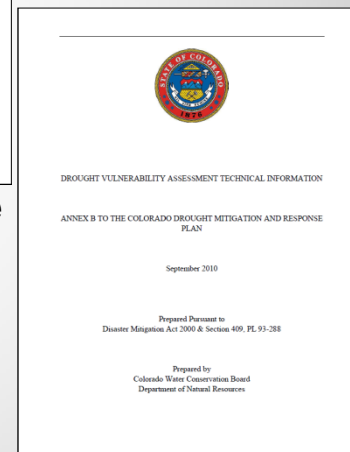
Yampa/ White Basin Round Table  
Craig, CO  
October 19, 2011



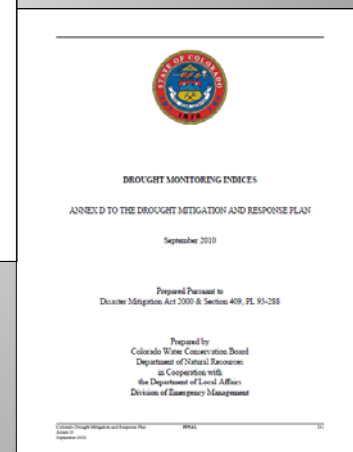
# Drought Mitigation and Response Plan



## Drought Response Plan



## Vulnerability Assessment



## Drought Monitoring Indices



# Key Changes in the 2010 Plan Revision

## Planning Process

- Extensive planning effort documented
- Multi-agency outreach and coordination
- More clearly defined and revised plan maintenance process

## Vulnerability Assessment

- Revised with latest climate science
- Developed drought vulnerability methodology
- Includes EMAP consequence analysis
- Updated drought indices





# Key Changes in the 2010 Plan Revision

## Coordination of Local Mitigation Planning

- Information revised with changes and assistance provided in past 3 years

## Mitigation Strategy

- Goals re-assessed and revised to reflect current priorities
- Mitigation Action table expanded and organized by goal
- Actions revised and prioritized
- New actions developed
- Comprehensive capability assessment review
- Funding sources revised







# Key Changes in the 2010 Plan Revision

## Drought Response Plan Annex

- Response elements from 2002 plan consolidated in Annex.
- NIMS compliant response and recovery plan format
- Streamlined response framework
- Consolidated Impact Task Force framework

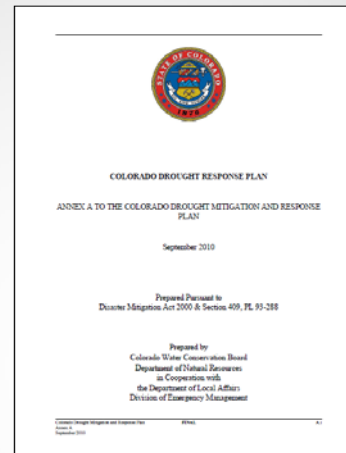
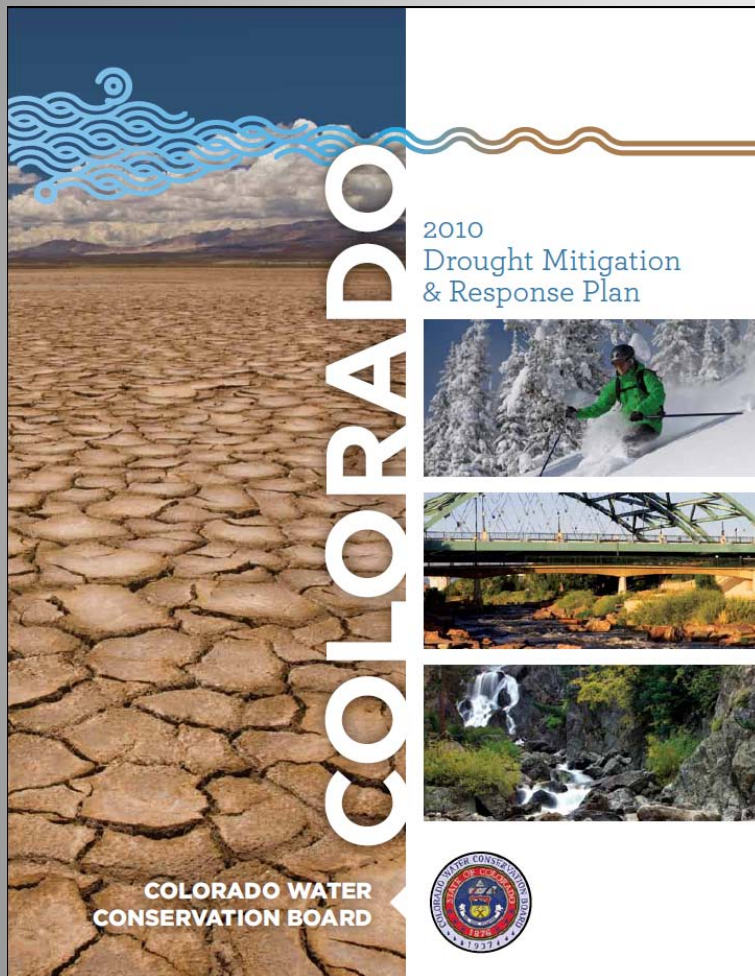


# Mitigation Action Strategy

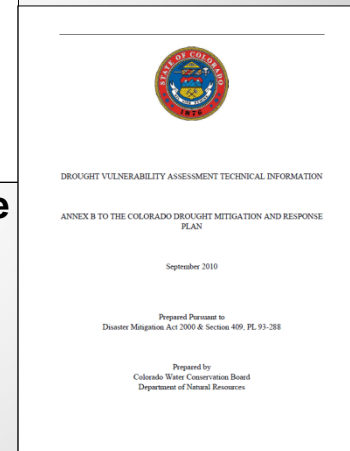


- Sample actions include:
  - Collect climatologic data at mid & lower elevations to fill existing gaps in the data collection network
  - Integrate and correlate the State Drought Mitigation Plan with other statewide planning efforts
  - Develop a state-wide drought messaging campaign
  - Construction of water storage facilities on State Trust Land
  - Integrate results, tools and methods from the 2010 vulnerability assessment to improve local hazard mitigation plans
  - Evaluate the relationship/interaction between both drought and water conservation on water quality of streams as well as health related consequences
  - Continue to pursue improved climate data to inform the planning process

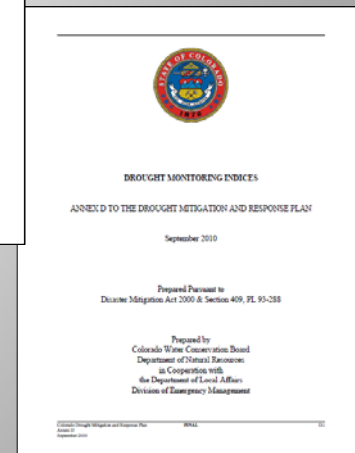
# Drought Mitigation and Response Plan



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# Response Element Key Updates

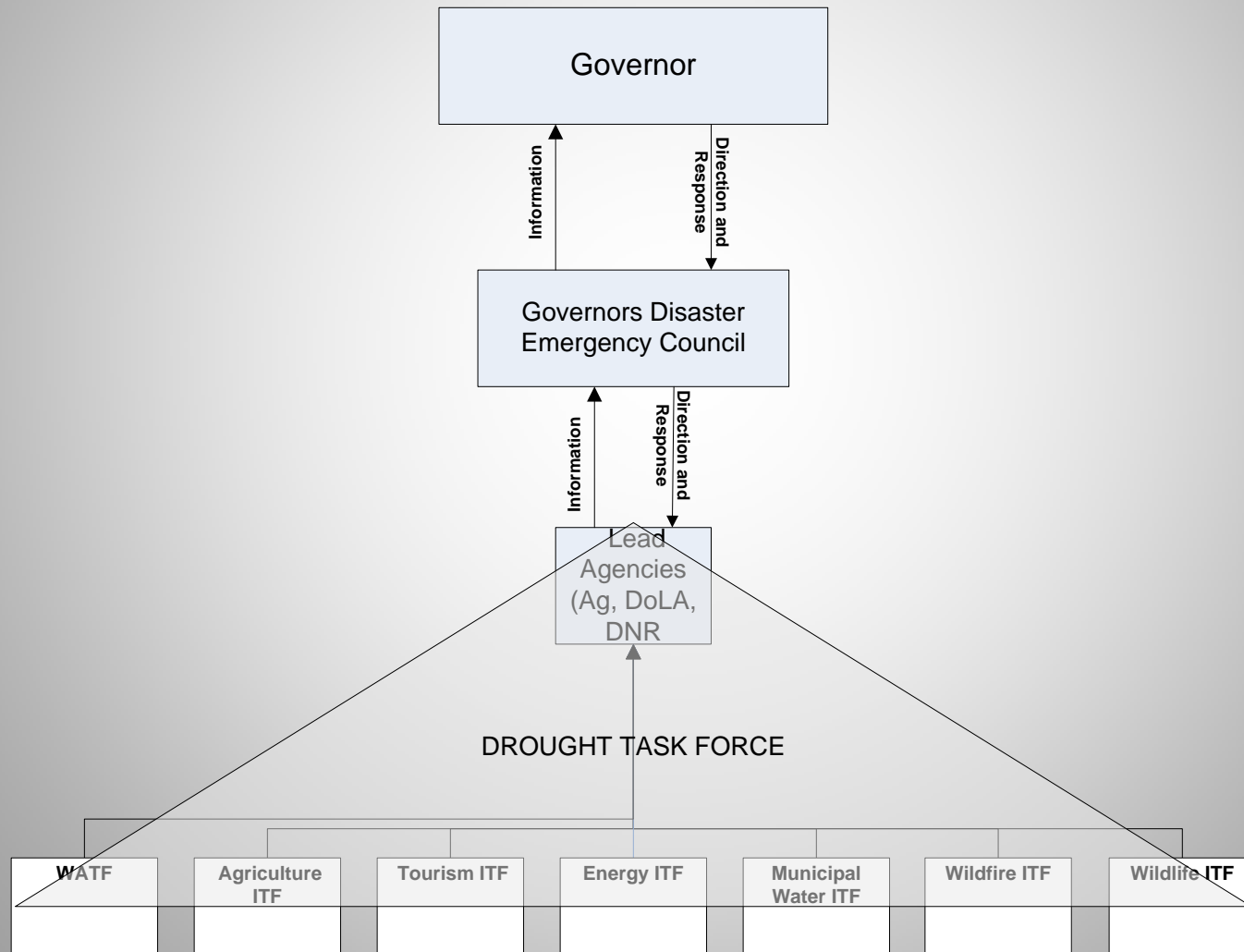


- Aligned with modern emergency planning guidelines
- Impact Task Force structure evaluated modified
- Response framework evaluated, modernized and streamlined
- Roles and responsibilities of state agencies updated
- Roles and responsibilities of Impact Task Forces updated and clarified





# Revised Response Framework



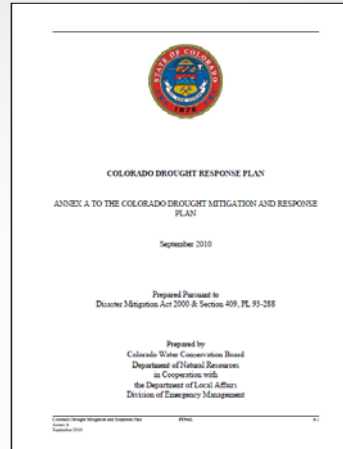
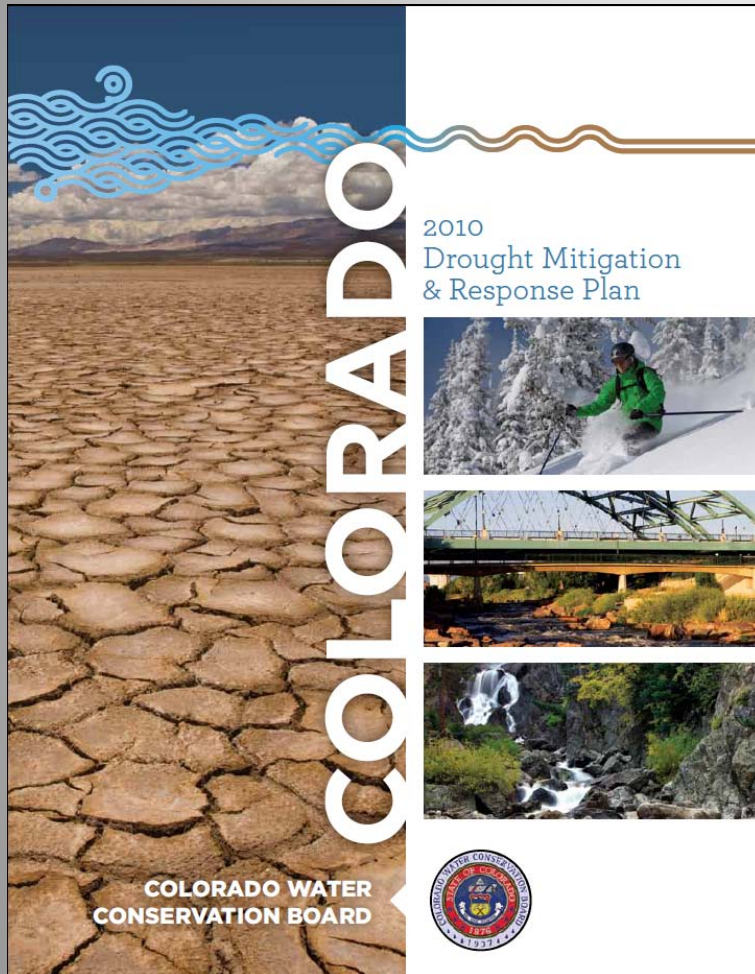
# Revised Drought Response Summary Action Table



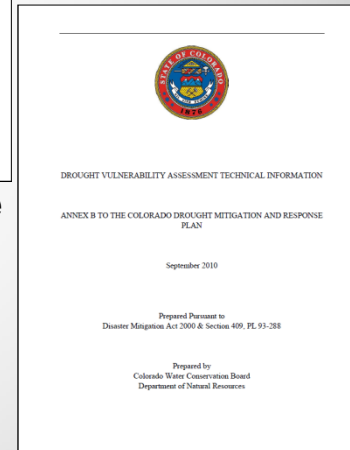
Severity Indicators and Impacts	Drought Phase and Response Summary	Actions to be Considered
<ul style="list-style-type: none"> <li>-0.5 to positive SPI (six month)</li> <li>D0 Abnormally Dry</li> <li>CMPDI or SWSI: -1.0 to -1.9</li> <li>SPI: -0.5 to -0.7</li> </ul>	Normal Conditions Regular Monitoring	<ul style="list-style-type: none"> <li>CWCB/WATF monitors situation on monthly basis.</li> <li>Data reviewed for drought emergence and summarized in Governor's Drought Situation Report.</li> <li>Implement long term mitigation actions</li> <li>ITF chairs meet twice yearly</li> </ul>
<ul style="list-style-type: none"> <li>-0.6 to -1.0 SPI (six month)</li> <li>D1 Moderate Drought</li> <li>CMPDI or SWSI: -2.0 to -2.9</li> <li>SPI: -0.8 to -1.2</li> </ul>	<b>Phase 1</b> More close monitoring of conditions for persisting or rapidly worsening drought; Official drought not yet declared	<ul style="list-style-type: none"> <li>ITF chairs alerted of potential for activation, monitoring of potential impacts</li> <li>Assess need for formal ITF and DTF activation</li> <li>DTF Lead Agencies (CDA/DoLA/DNR) notified of need for potential activation</li> </ul>
<ul style="list-style-type: none"> <li>Less than -1.0 SPI (six month)</li> <li>D2 Severe Drought</li> <li>CMPDI or SWSI: -3.0 to -3.9</li> <li>SPI: -1.3 to -1.5</li> </ul>	<b>Phase 2</b> Drought Task Force and Impact Task Forces are activated; Potential Drought Emergency declared	<ul style="list-style-type: none"> <li>Governor's Memorandum activates the Drought Task Force and necessary Impact Task Forces.</li> <li>Department of Agriculture initiates Secretarial Disaster Designation process if appropriate</li> <li>ITF's make an initial damage or impact assessment.</li> <li>ITF's recommend opportunities for mitigation to minimize or limit potential impacts</li> <li>Relevant state agencies undertake response and incident mitigation actions with their normal programs with available resources</li> </ul>

Current Status for SE Colorado

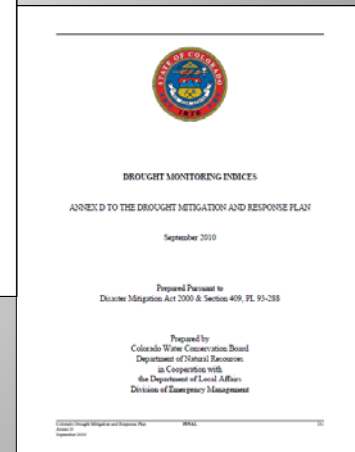
# Drought Mitigation and Response Plan



## Drought Response Plan

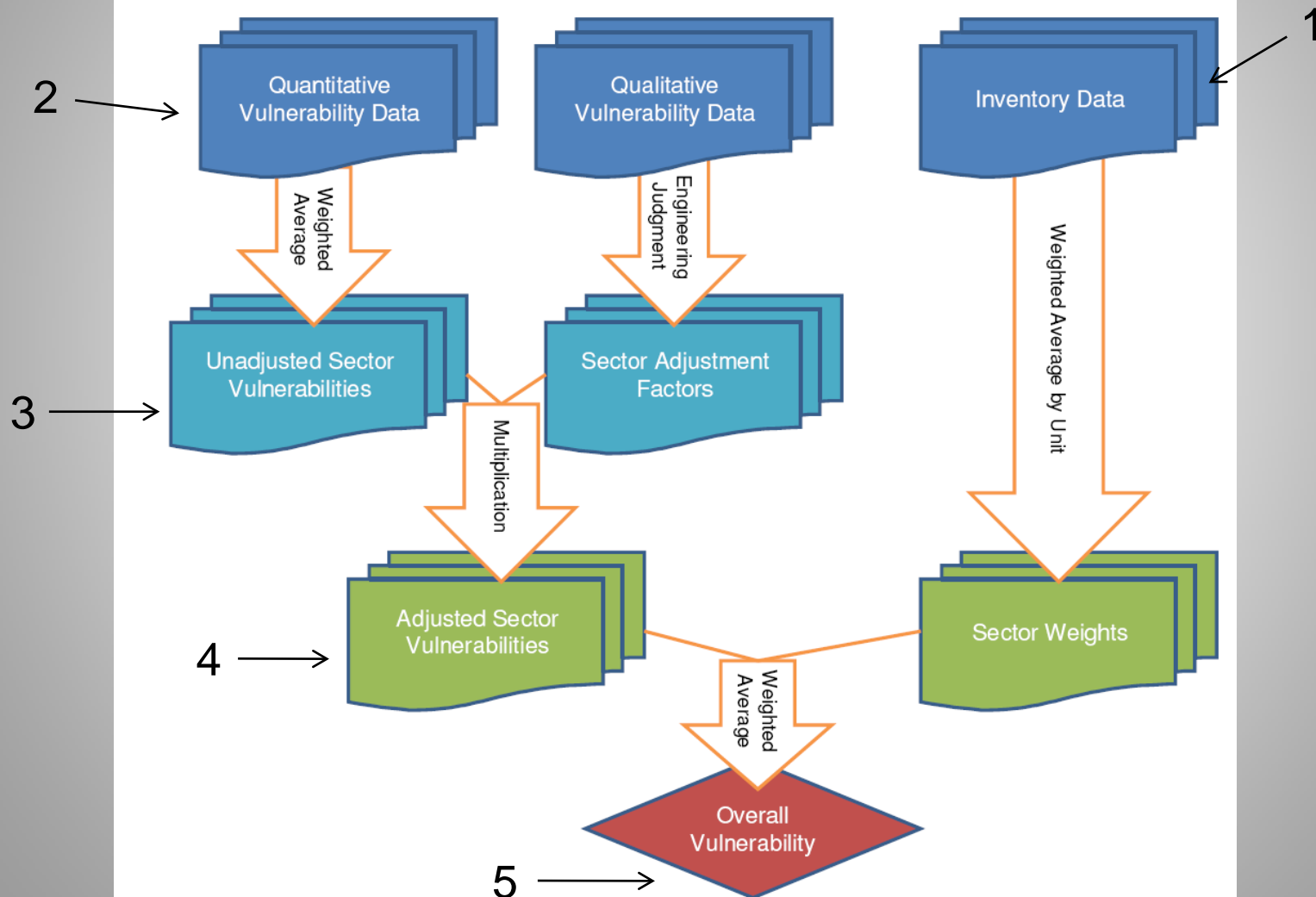


## Vulnerability Assessment



## Drought Monitoring Indices

# Methodological Framework



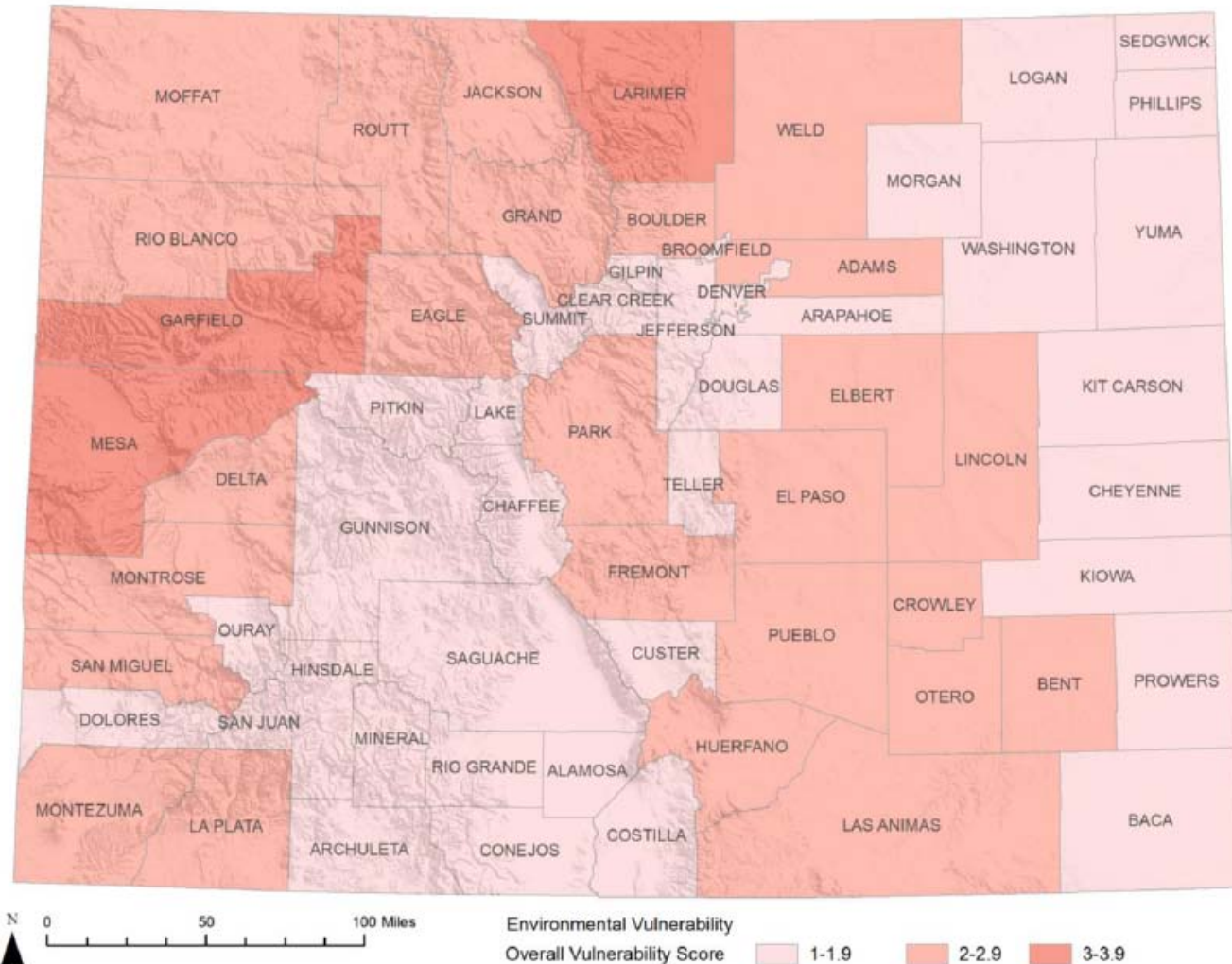


# Environment Impact Metrics



	GAP Stewardship Status	Impaired Reach Length (meters)	Impaired Lake Area (sq km)	Bark beetle aerial extent (acres per county)	Wildfire susceptibility index (ranking)	Sum length (km) of higher order streams	Instream flow rights (adaptive)	OVERALL Vulnerability Ranking
Routt		H		H	H		L	2
Moffat		H	L		H	H	H	3
Rio Blanco		H	L		H	H		3
Jackson	L		L	H				2

# Overall Environmental Vulnerability Scores

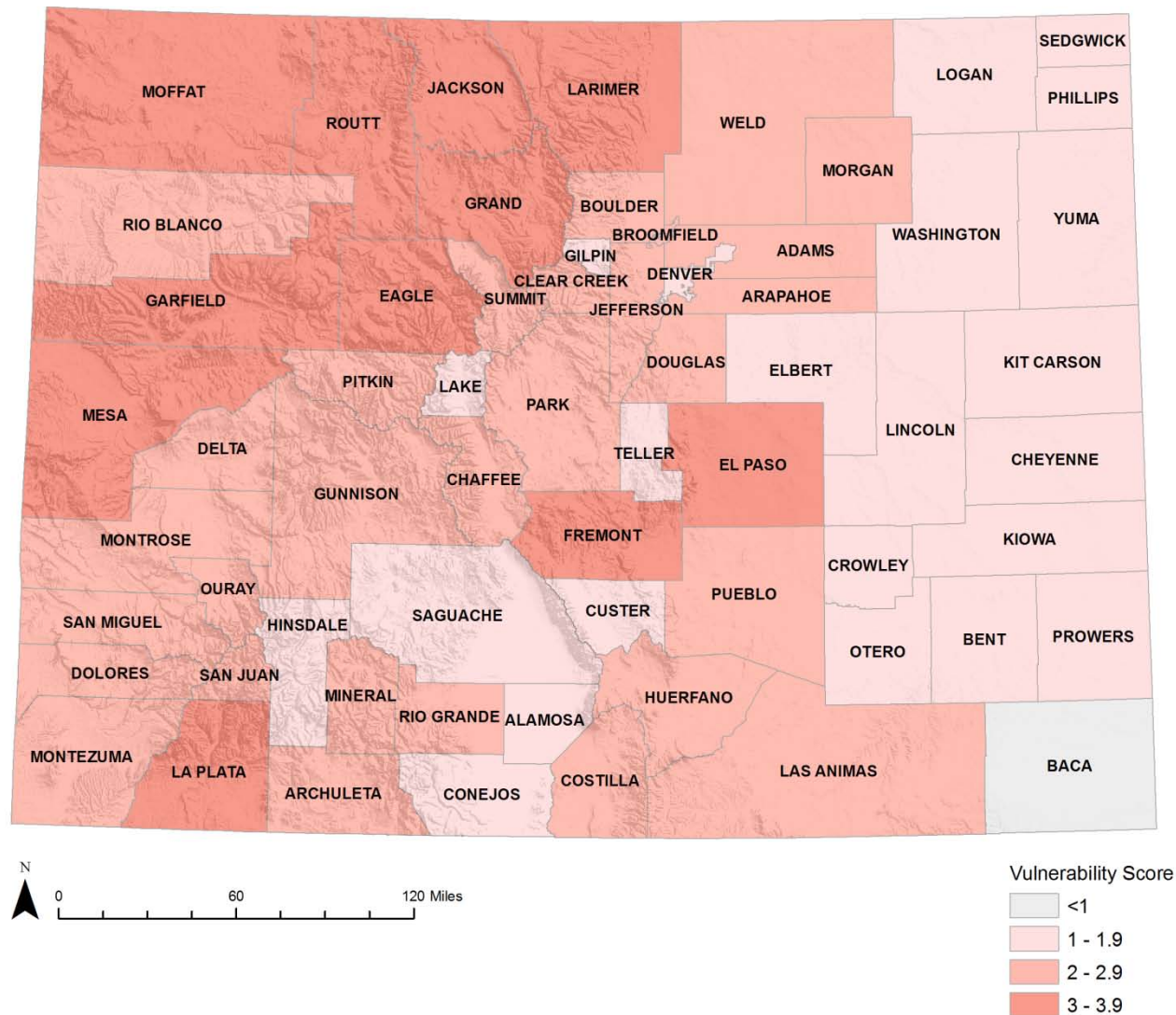


# Recreation Impact Metrics



	Skiing		Wildlife & Hunting, Fishing, Camping	Hunting, Fishing, Camping	Golf	Boating		Rafting		
	Acres	Snow Making	Wildfire Hazard Zone	Bark Beetle Infestation	Irrigated Golf Course Acres	Water Based State Parks	Relative Visitation 2002	User Days	Relative Visitation 2002	OVERALL Vulnerability Ranking
Routt		L	H	H		H			L	3
Moffat	L	H	H							3
Rio Blanco	L	H	H			L		L	L	3
Jackson	L	H		H	L		H	L	H	3

# Overall Recreation and Tourism Vulnerability Scores





# Climate Change Analysis



- What could drought look like in the future?
- Drought profile analysis using Colorado River Water Availability Study results for 2040
- Six scenarios from Colorado River Water Availability Study considered
- 100 paleo re-sequenced traces for each scenario
- Calculated maximum drought duration and intensity for each trace
- Drought calculations done relative to the mean of each scenario
- Exceedance probability is the chance that the maximum drought length will be greater than the observed median drought length given 100 traces



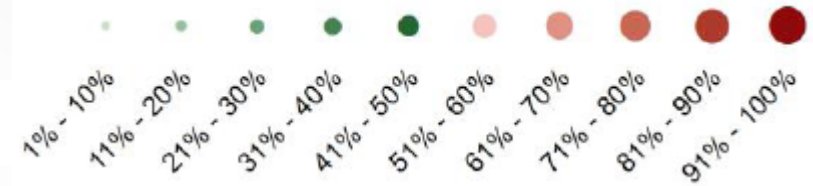
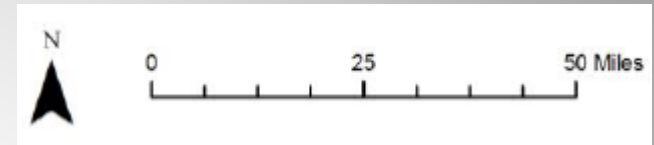
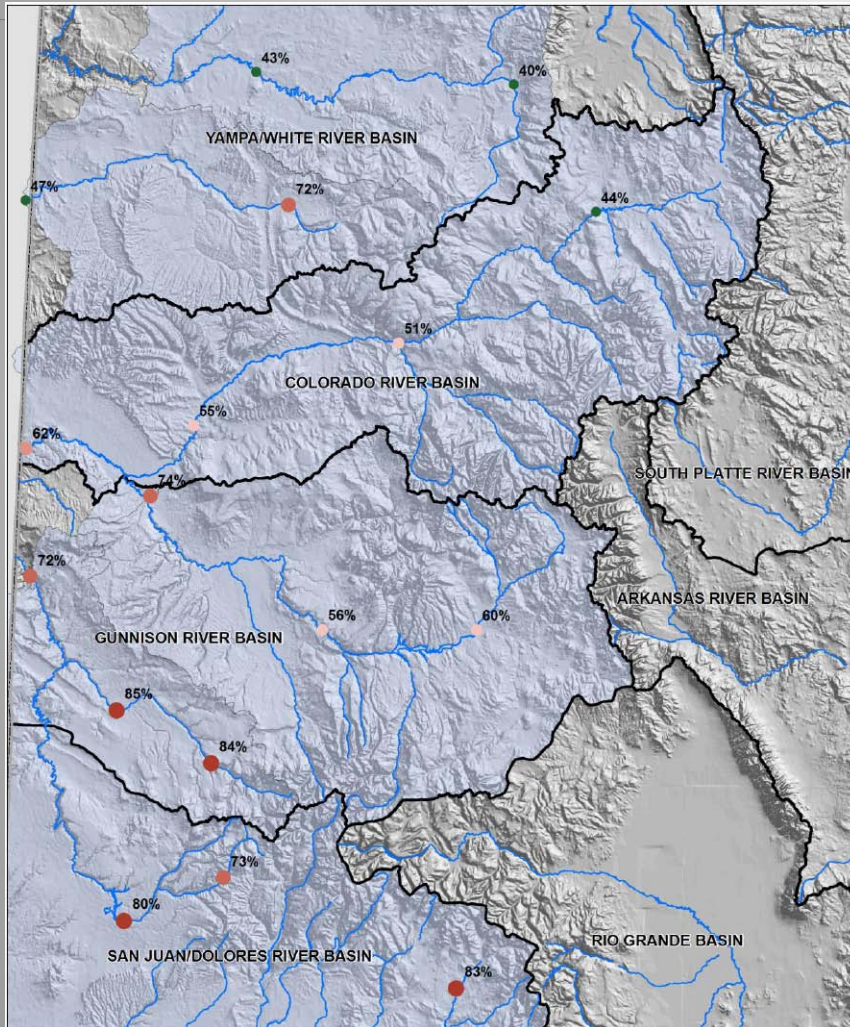


# Yampa River near Steamboat Springs

**Longest observed drought : 6 Years**

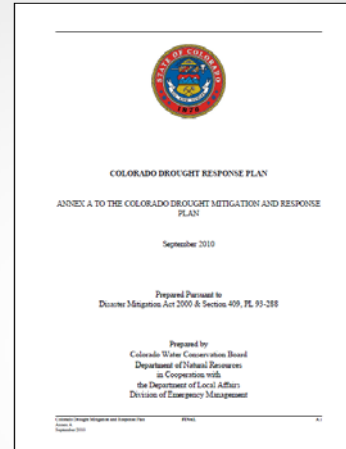
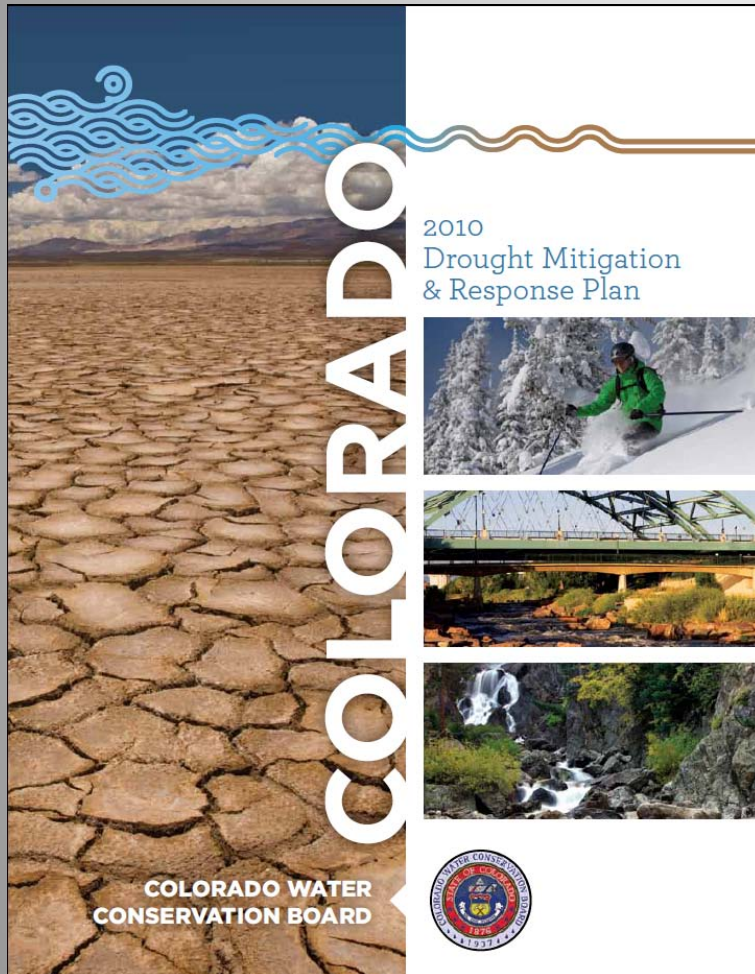
Average length of maximum drought (years)	Maximum drought length (years)	Chance of drought longer than observed
	<b>Alternate Historical Hydrology</b>	
5.8	12	42.5%
	<b>Projected Climate Scenarios</b>	
6.0	13	45.4%
5.6	11	37.5%
5.6	11	38.1%
5.6	11	36.3%
5.8	12	42.4%

# Average Maximum Drought Length Exceedance Probabilities

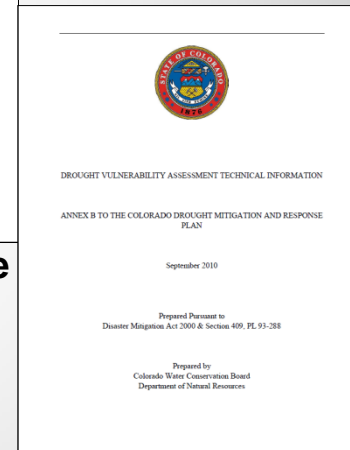




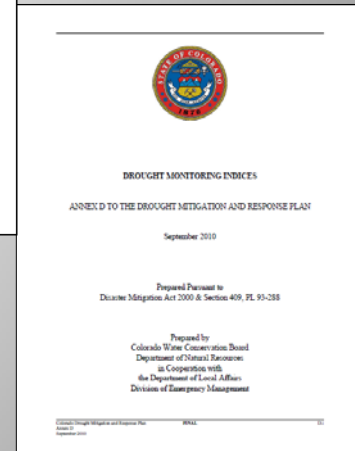
# Drought Mitigation and Response Plan



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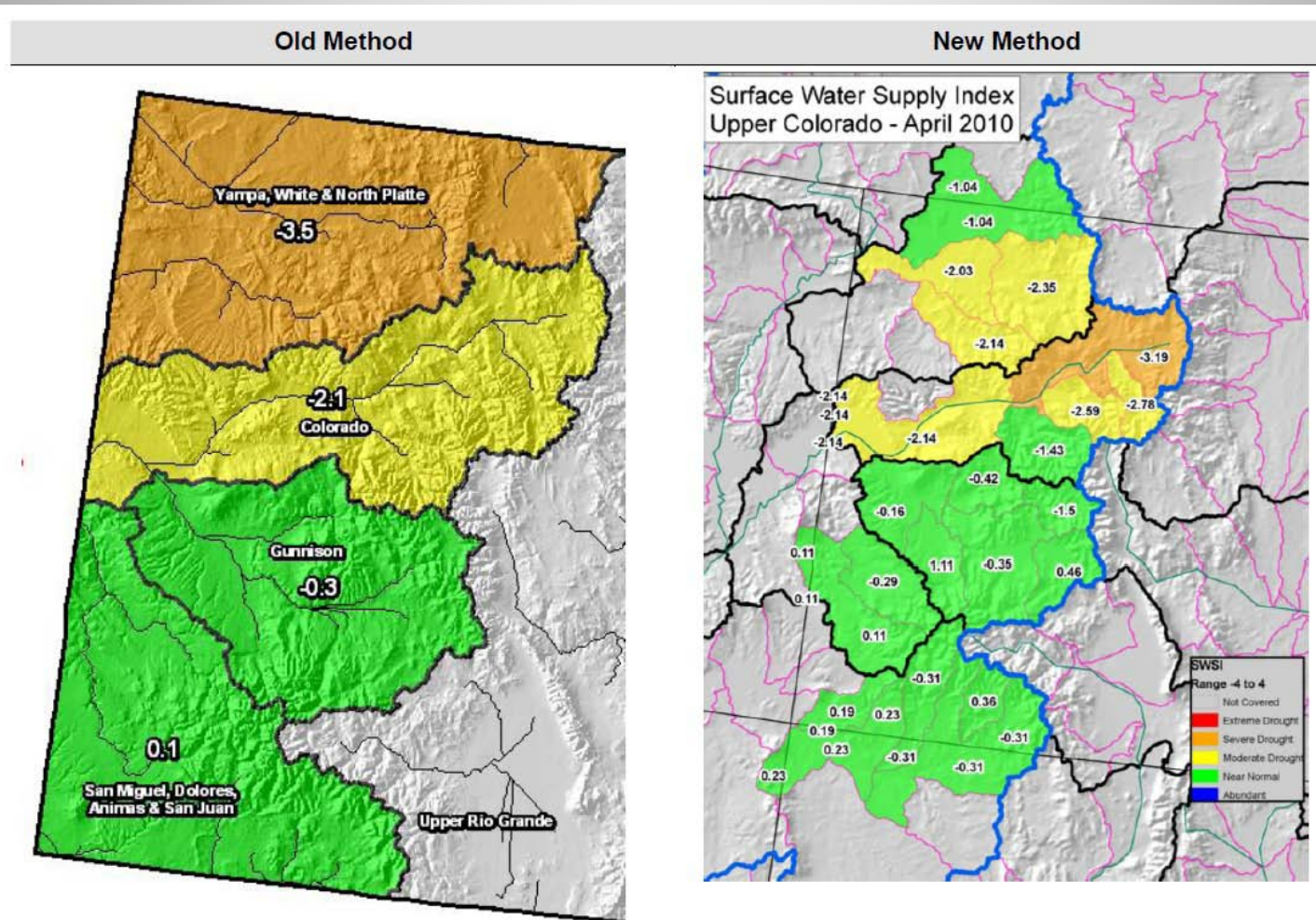


# Drought Monitoring Indices

- Drought Indicators historically used for activation and deactivation of the Colorado Drought Response Plan:
  - Surface Water Supply Index (SWSI)
  - Palmer Drought Severity Index (PDSI)
  - Standardized Precipitation Index (SPI)
- Goals of this work
  - Modernize the SWSI index for Colorado
  - Analyze the effectiveness of the Colorado Modified Palmer Drought Index (CMPDI)

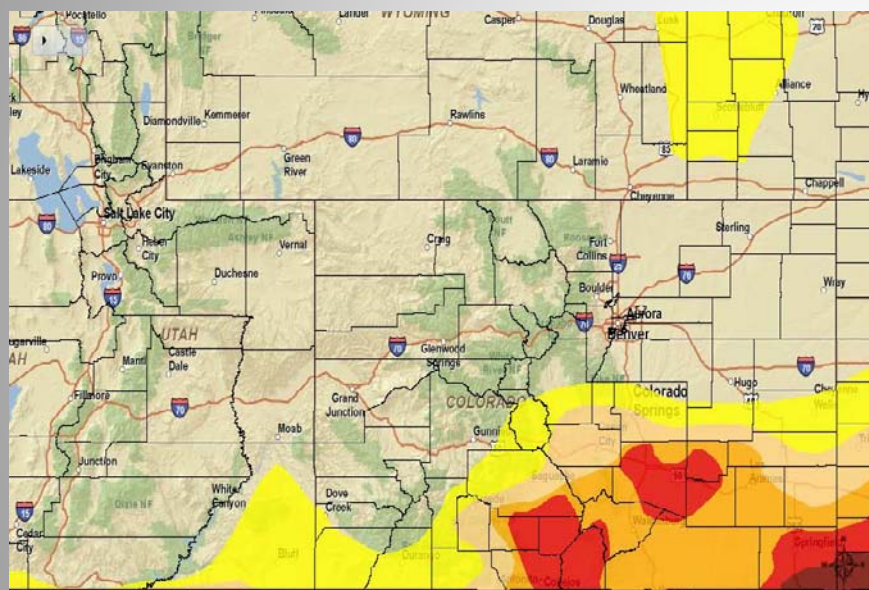


# Comparison of Old and New Surface Water Supply Index – April 2010



Source: USDA – Natural Resources Conservation Service

# Current Efforts



- ✓ Phase II Drought Response
- ✓ Economic Impacts of Drought
- ✓ DART Project
- ✓ Basin Roundtable Presentations
- ✓ Drought Spell Statistics
- ✓ Water Availability Task Force



# Questions?



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CWCB Office of Water Conservation and Drought  
Planning

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