Updated Impact Task Force Framework

amec

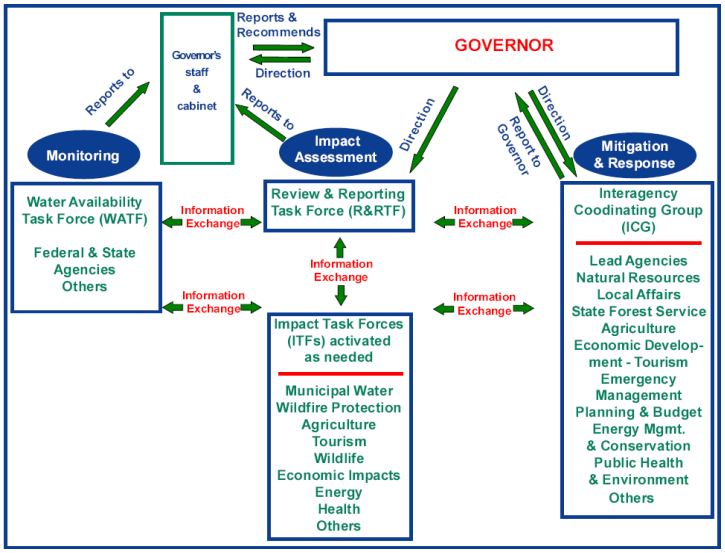
Existing

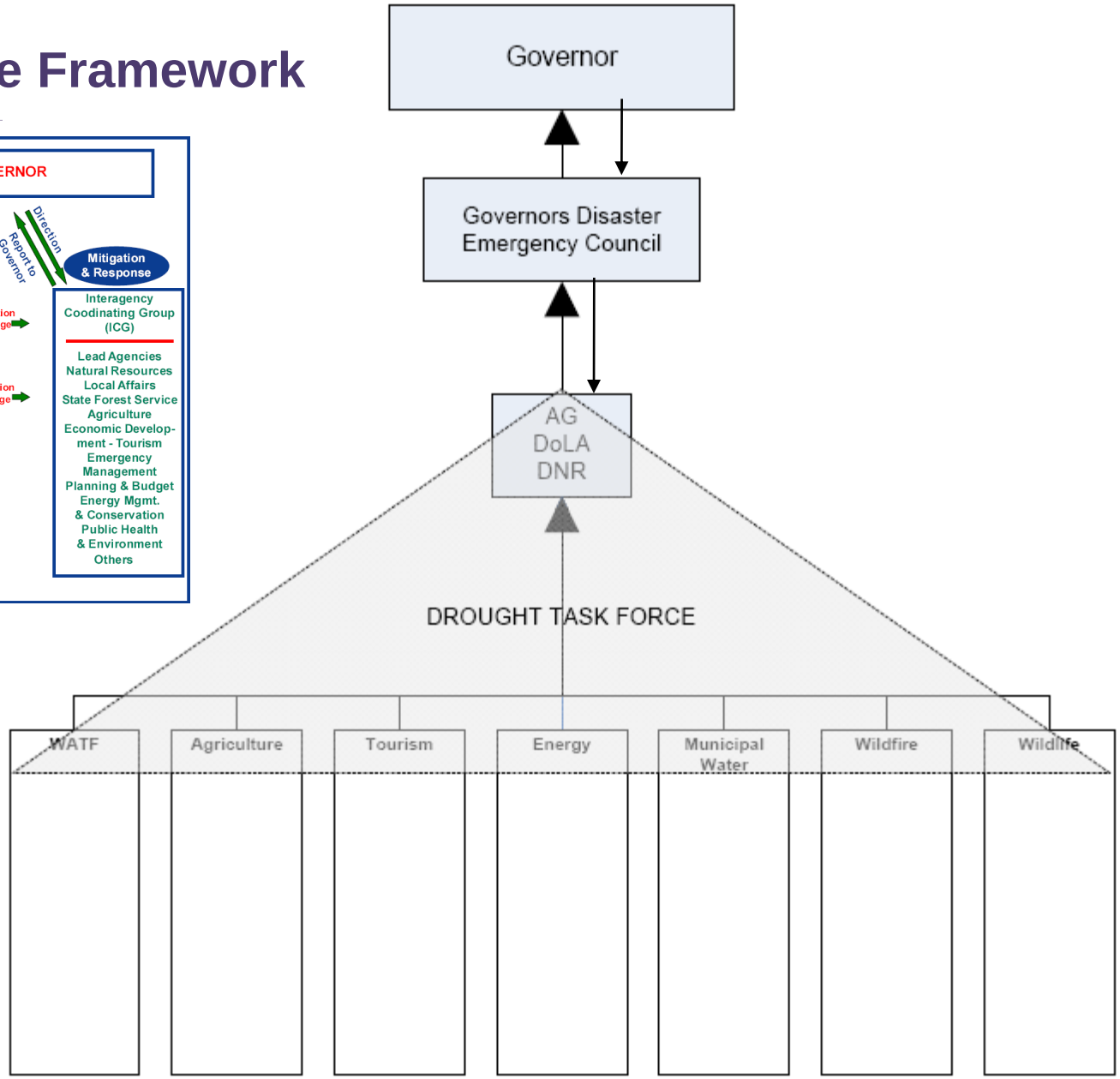
- WATF
- Agriculture ITF
- Tourism ITF
- Economic ITF
- Energy ITF
- Health ITF
- Municipal Water ITF
- Wildfire ITF
- Wildlife ITF
- Review and Reporting TF

Proposed

- WATF
- Agriculture ITF
- Tourism ITF
- Energy ITF
- Municipal Water ITF
- Wildfire ITF
- Wildlife ITF

Revised Response Framework





Drought Response Annex

Drought Mitigation and Response Plan Goals

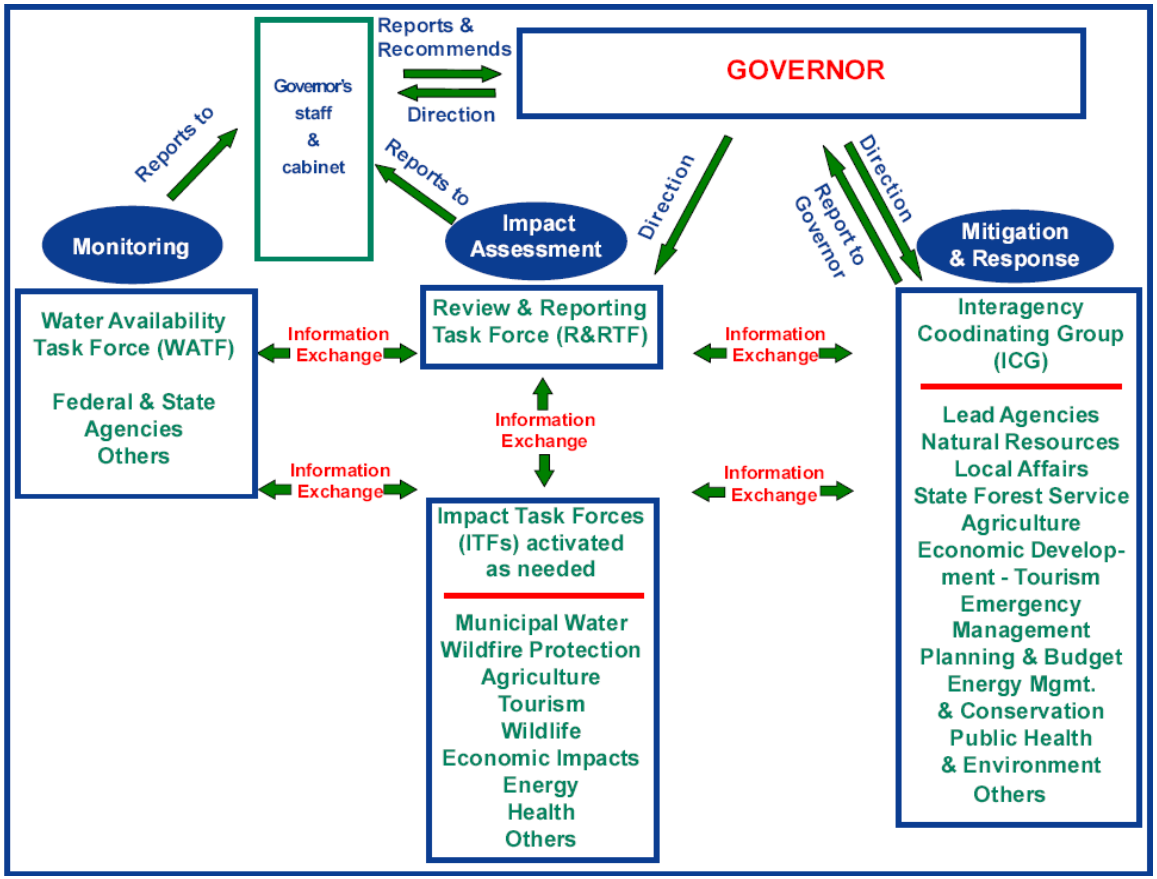
1. Improve Water Availability Monitoring and Drought Impact Assessment
2. Increase Public Awareness and Education
3. Support Substitute Water Supply Plans and Leasing Options to Augment Water Supply (alt: Implement mechanisms for moving water from areas of shortage to areas of surplus during a drought)
4. Coordinate and Provide Technical Assistance for State, Local, and Watershed Planning Efforts
5. Reduce Water Demand/Encourage Conservation
6. Reduce Drought Impacts to Colorado's Economy, People, State Assets, and Environment.
7. Develop Intergovernmental and Interagency Stakeholder Coordination
8. Evaluate Potential Impacts from Climate Change

CWCB Board Meeting

Drought Plan and Vulnerability Assessment Overview

Improving State Drought Response

- WATF
- Agriculture ITF
- Tourism ITF
- Economic ITF
- Energy ITF
- Health ITF
- Municipal Water ITF
- Wildfire ITF
- Wildlife ITF



Project Overview

- Plan Coordination\Plan Revision
  - Coordinated standard planning process
  - Mitigation and Response Strategy Enhancements
  - Tool development: Local Guidance Document and Web Toolbox
  - Assessment of progress made
- Vulnerability Assessment
  - Enhanced estimates of potential losses
- Triggers and Indices
  - Refinement of monitoring and triggering mechanisms

Plan Coordination\Plan Revision

Benefits of the Newly Revised Drought Plan

- Reduced Losses (economic, social, physical, etc..)
- Efficient, Coordinated Government
- Reduced Liability
- Reduced State and Local Expenditures
- Includes Continued Eligibility for Mitigation Funding
- Increased Collaboration

Technical Assistance: Resources & Tools Development

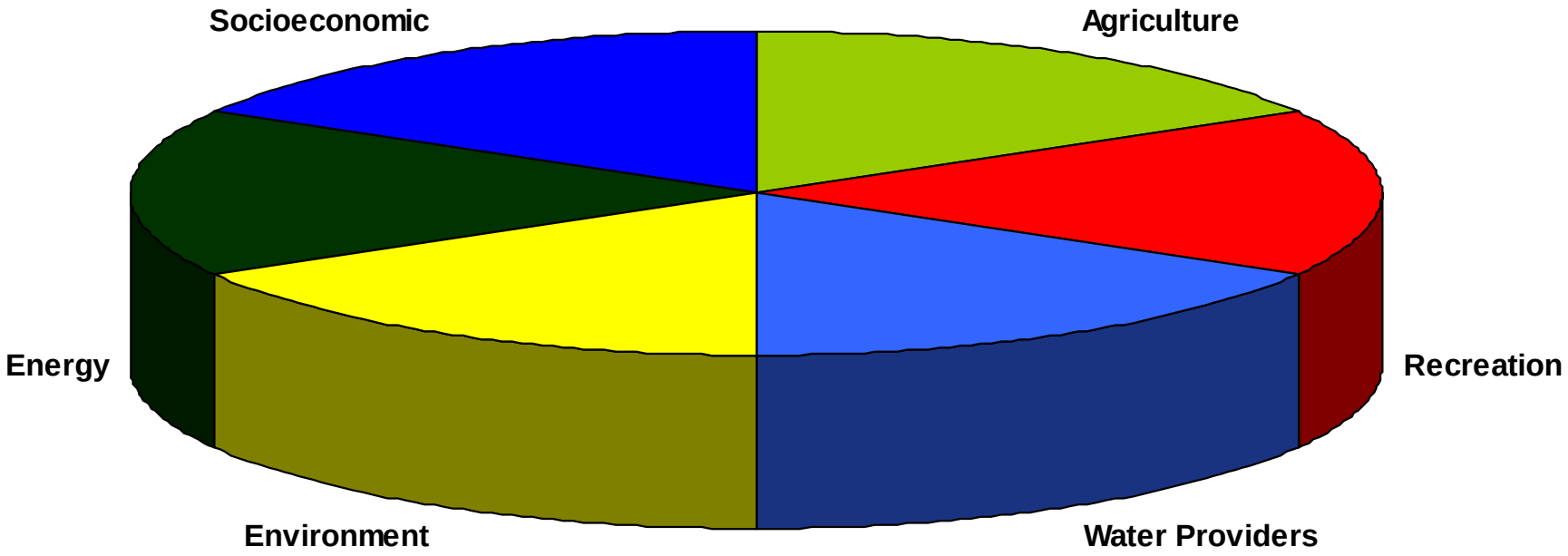
- Web based Drought Tool box under development
- Local Drought Management Plan Guidance Document
  - Developed with input from a steering committee comprised of local water providers from around the State

Vulnerability Assessment

Engineering Risk

1. When should the system fail?
2. How often is system failure expected?
3. What are the likely consequences of a system failure?

Integrated System



Risk

Risk = A combination of multi-sectoral hazard, vulnerability and exposure. The impacts a hazard would have on communities, services, facilities and the environment and the likelihood of a hazard event resulting in adverse conditions that produce negative impacts.

Definitions

Risk Assessment: The process of identifying the likelihood and consequences of an event to provide the basis for informed planning decisions on a course of action (FEMA 1992)

Drought Risk =

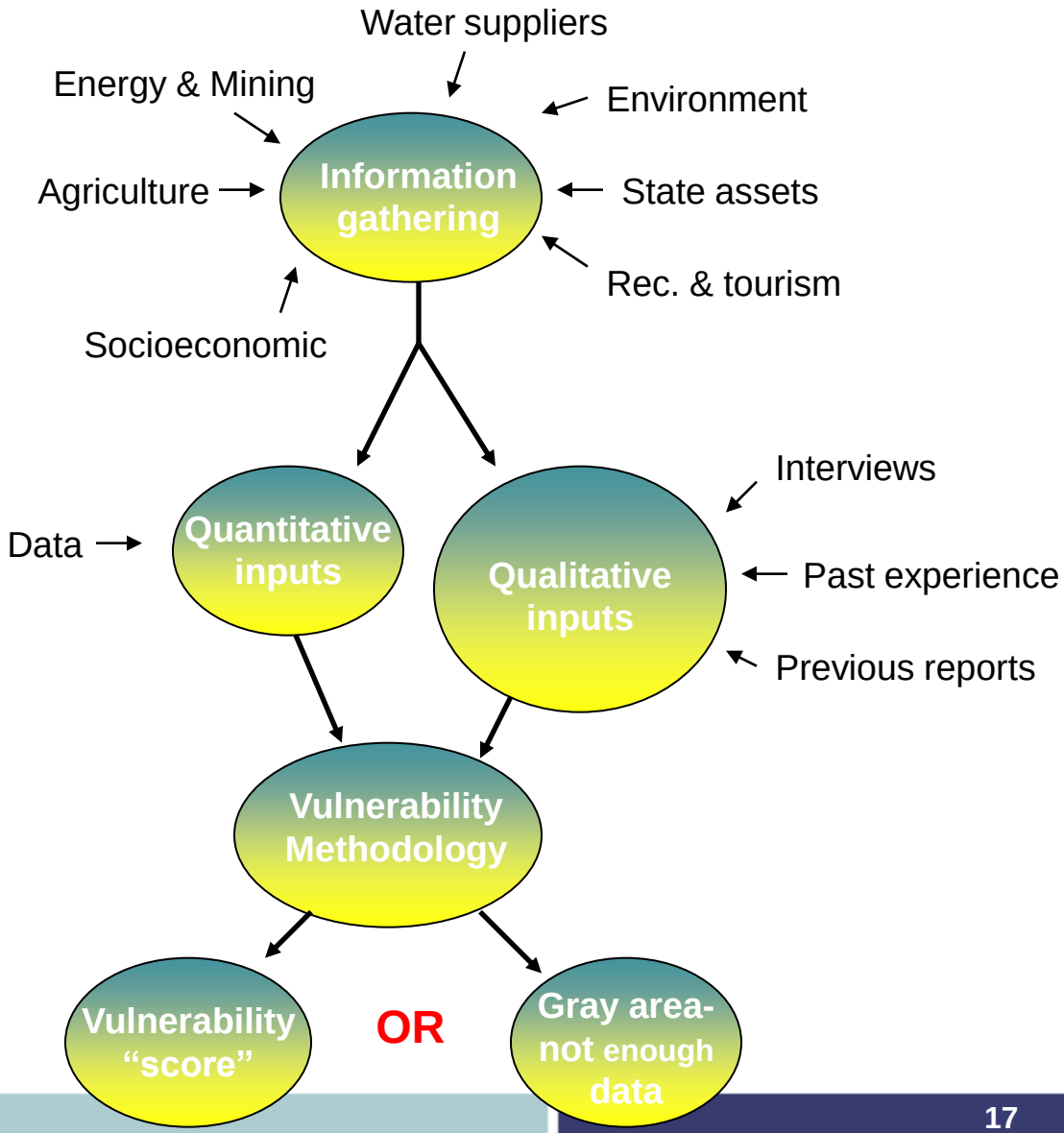
Hazard x **VULNERABILITY**

Drought Hazard: a period of abnormally dry weather sufficiently prolonged for the lack of water to cause serious hydrologic imbalance in the affected area."

Vulnerability: The susceptibility to injury or damage from hazards." (Godschalk 1991, 132)

Methodological Framework

- Research sectors, publications, previous drought studies
- Quantitative data
  - What we have
  - What we need
- Qualitative
  - Interviews
  - Past experiences
  - Specific knowledge of the area
- Methodology
- Vulnerability “score” OR framework for future data collection



Methodology Example

County	Quantitative Impact Rating							
	1	2	3	4	5	6	7	8
	Buildings	Critical Infrastructure	Instream Flows	Teresstrial Habitat	Protected Species	State Hatcheries	State Land Trust Revenue	Outdoor Recreation Revenue
ADAMS	2.5	2	2	1.5	1	1	4	2.1
ALAMOSA	4	2	4	3.5	1	3.4	3	1.3
ARAPAHOE	1.5	2	4	1.5	1	2	4	2
ARCHULETA	4	2	2	2.5	1	3.6	4	2.8
BACA	3	1.5	2	2.5	1	2.2	4	1.9
BENT	1.5	1	2	3	1	2.8	4	2.5

County	Impact Ratings with Qualitative Adjustments							
	1	2	3	4	5	6	7	8
	Buildings	Critical Infrastructure	Instream Flows	Teresstrial Habitat	Protected Species	State Hatcheries	State Land Trust Revenue	Outdoor Recreation Revenue
ADAMS	1.25	1.1	2	2	1	3.4	4	3.7
ALAMOSA	2	2	4	1.5	1	1.8	3	1.7
ARAPAHOE	1.25	2.5	4	2	1	1	4	2.5
ARCHULETA	0.5	1	2	4	1	2.6	4	2.3
BACA	1.5	1.5	2	1.5	1	2.2	4	1.3
BENT	1.5	2	2	2	1	1.4	4	2.2

County	Overall Vulnerability Ranking
ADAMS	2.23
ALAMOSA	2.83
ARAPAHOE	2.56
ARCHULETA	2.55
BACA	2.42
BENT	2.09

Example Results

County	Overall Vulnerability Ranking
ADAMS	
ALAMOSA	
ARAPAHOE	
ARCHULETA	
BACA	
BENT	

Drought Impact Key		
Symbol	Category	Description
	Not relevant	Sub sector not relevant for this location
	Not very vulnerable to drought	Impacts are small and not a major planning concern relative to other hazards
	Somewhat vulnerable to drought	There are impacts but they are mostly offset by strong adaptive capacities
	Vulnerable to drought	There are impacts - adaptive capacities are limited
	Extremely vulerable	Irreperable damage likely, federal aid likely

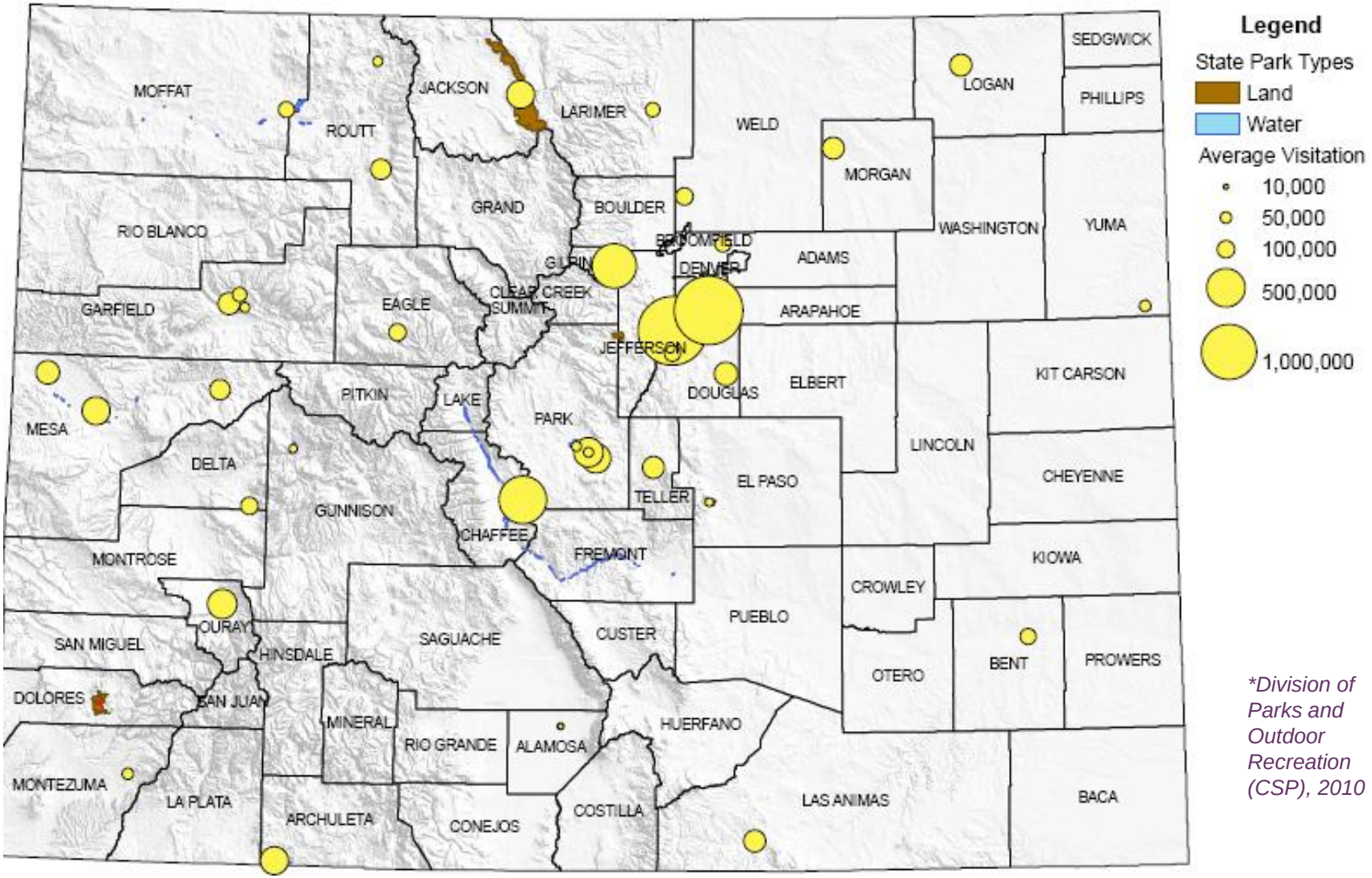
Colorado State Parks

- Two phases of drought impacts
  - Low river and reservoir water levels immediately impact visitation
  - Visitation further impacted by wildfires later, as the drought progresses
- Public perception
  - Confusion over national parks and forests closures
  - Are state parks still open?
  - Negative perception of drought, wildfires

Key Impacts to State Parks	Key Adaptive Capacities or Mitigation Strategies
Lower reservoir and stream levels	PR campaign to educate the public about alternative activities to boating/fishing
Impacts from wildfires, including park closures and campfire restrictions	Communicate with media to emphasize which state parks are still open, which counties don't have campfire restrictions
Negative media portrayal	Maintain communication with other state agencies, the media, and the public

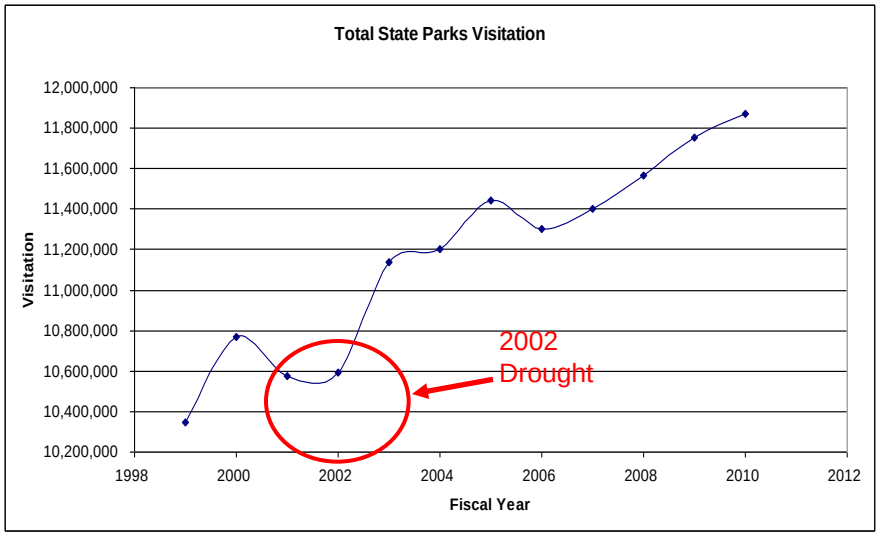
State Parks Visitation

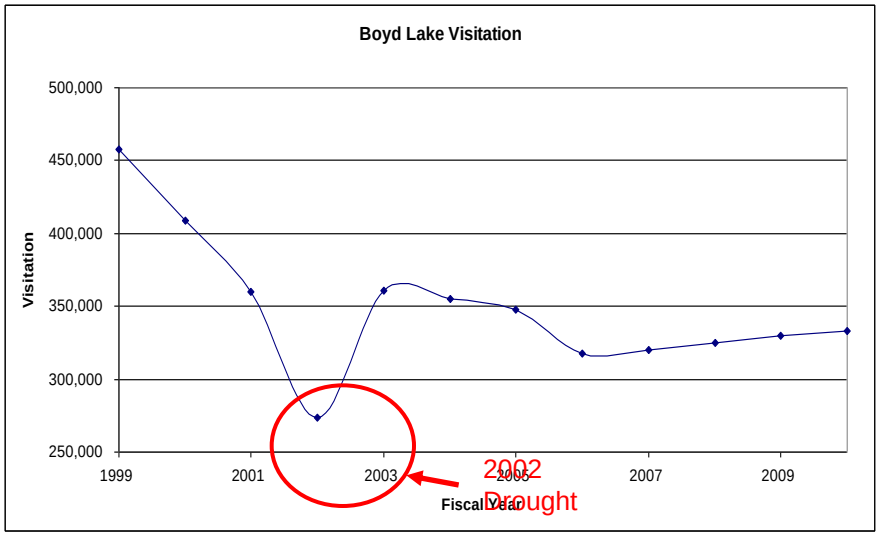
2002-2009 CY Average Visitors per Park*



**Division of Parks and Outdoor Recreation (CSP), 2010*

General State Parks 2002 Impacts





- Visitation down by 5%
- Early in the spring visitations were expected to rise so the actual impact may be more
- Parks division estimates loss vs. expected visitors ~ 1 million visitors

Source: Division of Parks and Outdoor Recreation (Colorado State Parks), 2010

Drought and Climate Change

Climate Change Analysis

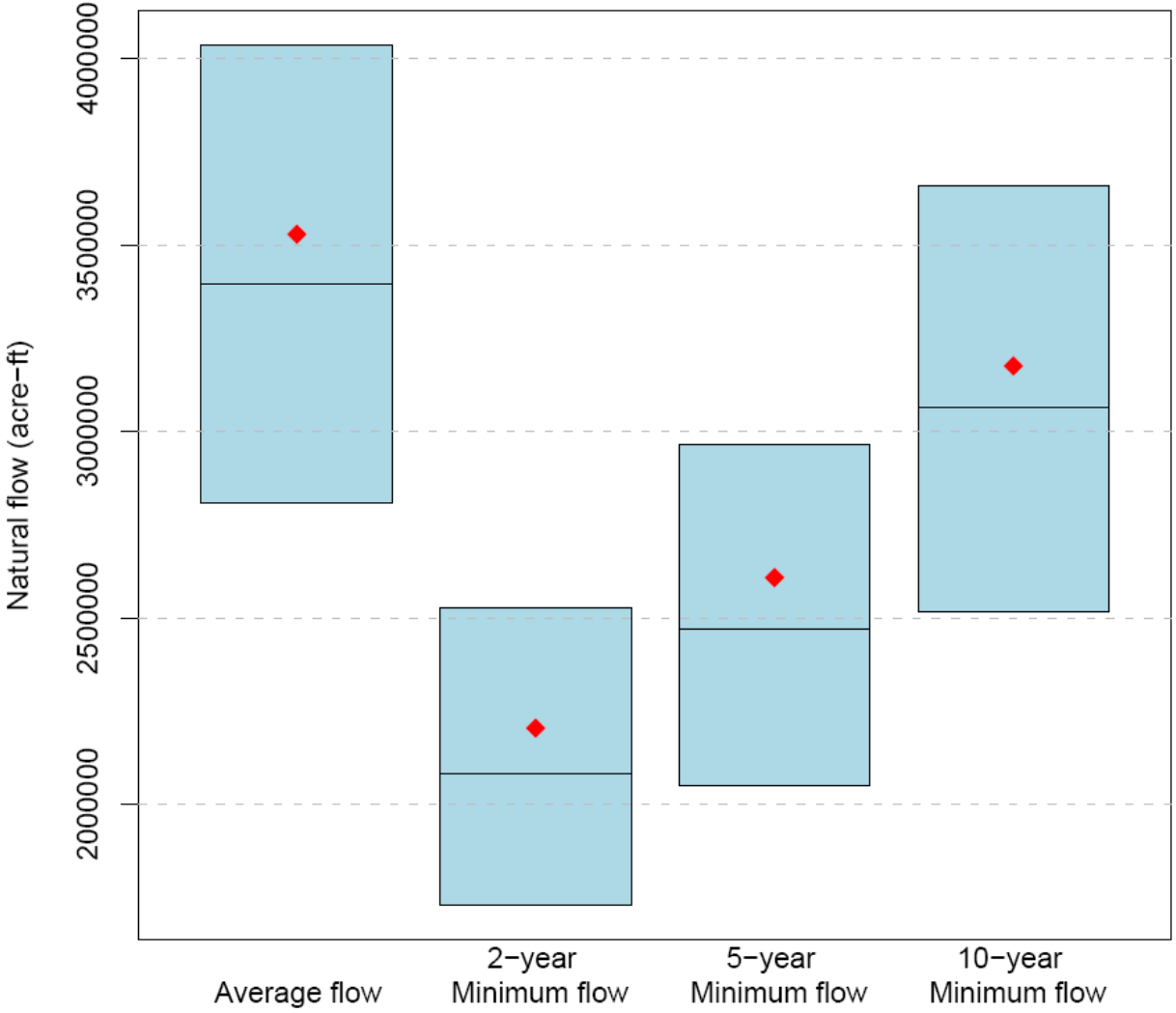
- What could drought look like in the future?
- Drought profile analysis using Colorado River Water Availability Study results for 2040
- Six scenarios from Colorado River Water Availability Study considered
- 100 paleo re-sequenced traces for each scenario
- Calculated maximum drought duration and intensity 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

Colorado River near Cameo

Longest observed drought : 6 Years

	Average length of maximum drought (years)	Maximum drought length (years)	Chance of drought longer than observed
Alternate Historical Hydrology	5.8	15	58.3%
Climate Scenario 1	6.5	13	56.7%
Climate Scenario 2	6.1	15	54.0%
Climate Scenario 3	6.2	12	50.5%
Climate Scenario 4	6.5	12	55.4%
Climate Scenario 5	6.4	12	54.3%

Colorado River near Cameo

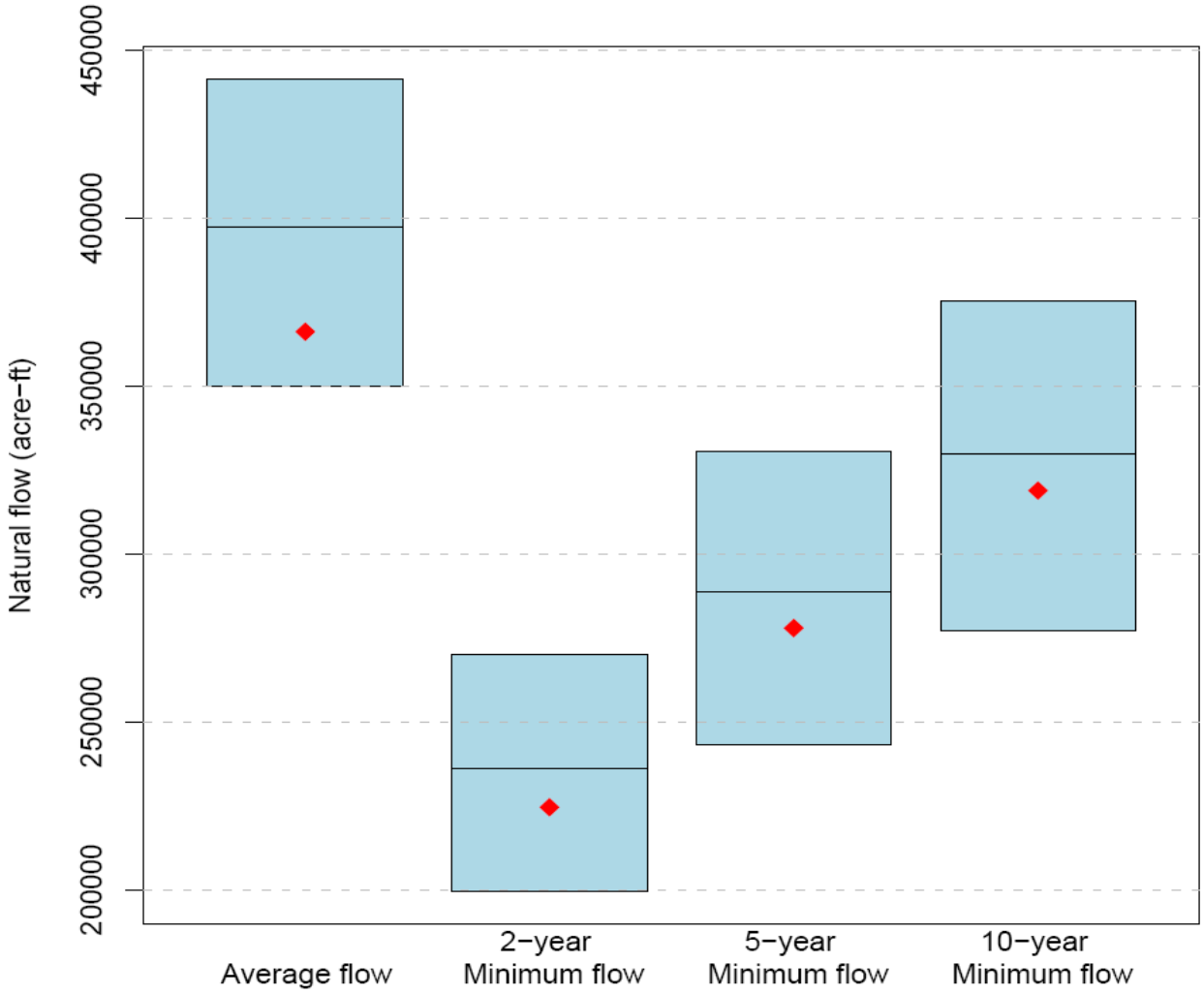


Yampa River at Steamboat Springs

Longest observed drought : 6 Years

	Average length of maximum drought (years)	Maximum drought length (years)	Chance of drought longer than observed
Alternate Historical Hydrology	5.8	12	42.5%
Climate Scenario 1	6.0	13	45.4%
Climate Scenario 2	5.6	11	37.5%
Climate Scenario 3	5.6	11	38.1%
Climate Scenario 4	5.6	11	36.3%
Climate Scenario 5	5.8	12	42.4%

Yampa River at Steamboat Springs

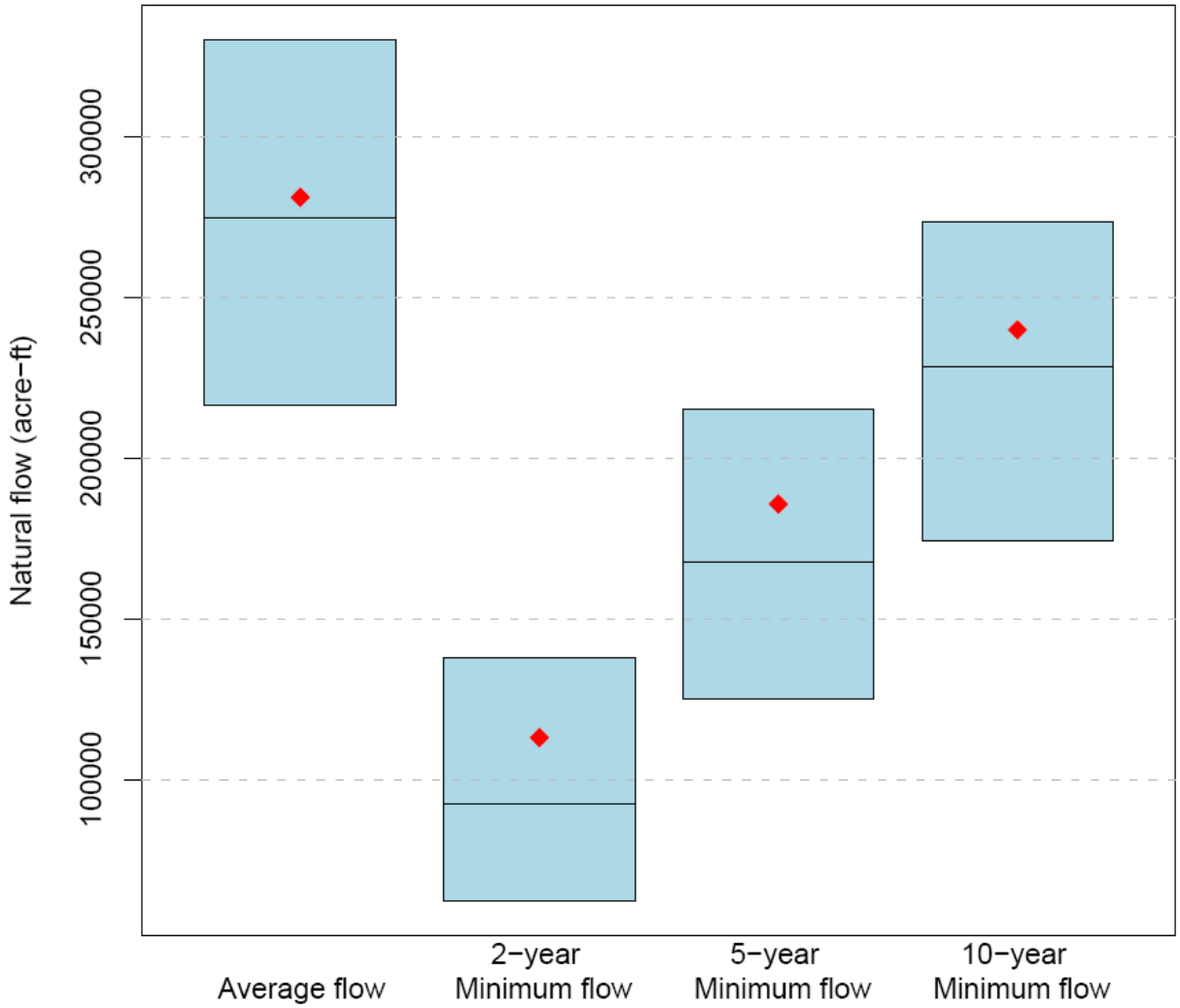


San Juan River at Pagosa Springs

Longest observed drought : 4 Years

	Average length of maximum drought (years)	Maximum drought length (years)	Chance of drought longer than observed
Alternate Historical Hydrology	5.1	11	75.7%
Climate Scenario 1	5.2	10	78.3%
Climate Scenario 2	5.6	11	83.3%
Climate Scenario 3	5.7	11	85.5%
Climate Scenario 4	5.8	11	89.0%
Climate Scenario 5	5.9	11	88.5%

San Juan River at Pagosa Springs



Next Steps

- Complete Draft targeted June 15th
- June 15th-June 30th Comment period from Drought Mitigation and Response Planning committee
- Public and stakeholder review draft targeted for July 12, comments due July 30th
- Initial Draft Toolbox July 12th
- Incorporate final comments and finalize plan Sept 15
- Board approval in September
- Submit to CDEM late September for inclusion in State Hazard Mitigation Plan
- Adoption by Governor and submittal to FEMA late 2010

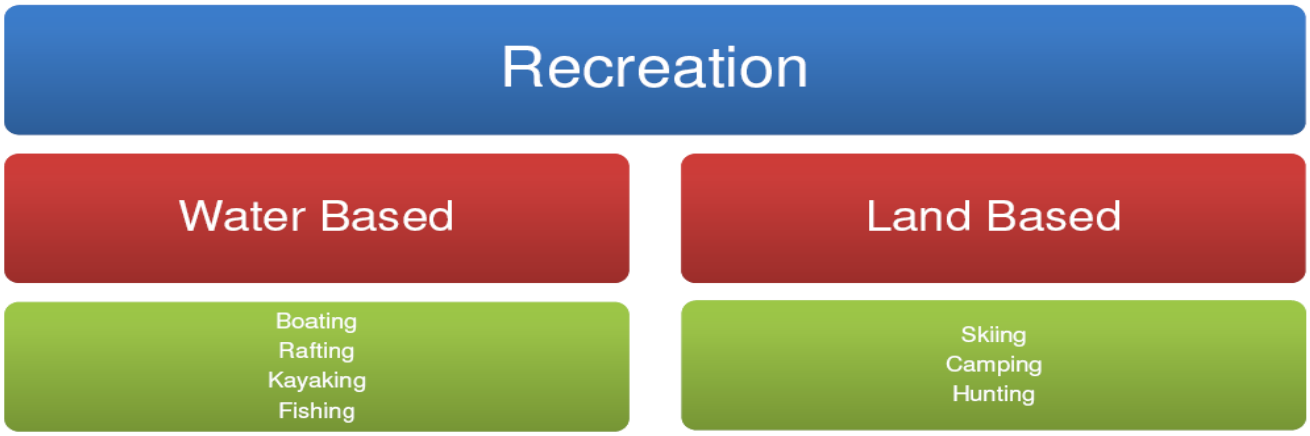
Questions?

Jeff Brislawn
Graeme Aggett
AMEC Earth and Environmental
Jeff.brislawn@amec.com
303-742-5313

Draft Priority Recommendations

- Develop Impact Assessment/Monitoring Improvements
- Continued Education and Outreach
- Climatalogic data collection at mid and lower elevations
- Construction of water storage facilities on State lands
- Mandate drought planning at the local level
- Encourage use of more efficient irrigation systems – Agricultural and Municipal
- Create a sustainable funding source for implementing recommendations in drought plan
- Continue assimilation of climate change data/science

Sector Analysis Example



Key Impacts	Key Adaptive Capacities and Mitigation Strategies
Public perception of drought decreases recreational tourism	Work with PR firms and media to control message, emphasize the positive
Low water levels: ■ Streamflow too low for rafting or kayaking ■ Reservoir levels too low for boating ■ Impaired fish populations	Rafting operations can diversify services and modify season length
Fire restrictions resulting in less interest in camping	
Land use restrictions to protect sensitive plant species	
Decline in skier visits due to lack of snow	■ Work with PR firms and media to control message, emphasize the positive ■ Ski resorts can market other ski town activities
Watering restrictions for golf courses	■ Increase irrigation efficiency by changing irrigation methods or timing (water at night, for example) ■ Increase use of xeriscaping and drought resistant grasses

Drought Mitigation and Response Planning Committee

STATE AGENCIES

- CWCB – Lead
- DWR- State Engineer's Office
- Governors Energy Office
- OSPB
- Dept of Agriculture
- Division of Wildlife
- DOLA
- State Parks
- Division of Emergency Mgmt
- CDPHE
- Economic Dev. – Tourism
- CSU – Climate Center
- CSU – Water Resources Institute
- CSU- State Forest Svc

OTHER AGENCIES

- NDMC
- NOAA- CIRES
- NRCS
- USGS – NIDIS
- Recreation Industry reps
- Local Government

Revised Response Framework

- Option 1: Alignment with updated Vulnerability Assessment Impact Sectors:
  - Water Availability TF
  - Agriculture ITF
  - Municipal Water ITF
  - Recreation and Tourism ITF
  - Environmental ITF (wildlife, wildfire, health)
  - Energy ITF

- Option 2: Alignment with National Drought Impact Reporter
  - Agriculture ITF
  - Water/Energy ITF
  - Environmental ITF
  - Social ITF (economic, Health, municipal water, recreation, tourism)

Economic impacts becomes an element and responsibility of each ITF to track