Colorado's Water Supply Future

IBCC Meeting

Longmont, Colorado

March 16, 2008

Agenda

- Welcome, Introduction, and Agenda Review
- Scenarios for Colorado's Water Supply Future
- Demand Management Strategy
- Agriculture Transfer Strategy
- New Supply Development Strategy
- Next Steps and Path Forward
- State Budget Update

Today – Examine the Engineering Evaluation Elements for Strategies

- Description of strategy or project elements – water source, conveyance and storage, water quality
- Capital costs – permitting, mitigation, land acquisition, pumps, pipe, treatment
- Annual O&M costs – energy, equipment maintenance and replacement

<u>Purpose</u>

Ability to begin to compare tradeoffs between strategies

After Today – Further Evaluation of Strategies will Include:

- Identification of:
  - Project benefits
  - Implementation issues
  - Potential attributes/additional options
  - Acceptability
- Other evaluation elements:
  - Additional cost elements (water rights or storage)
  - Discuss potential attributes/additional options for ag transfer and new supply development options with Basin Roundtables
  - Incorporate other conservation elements such as sharing of conserved water and the infrastructure and institutional arrangements required
- Qualitative description of how each strategy meets the Vision Statement and Vision Goals

Scenarios for Colorado's Water Supply Future

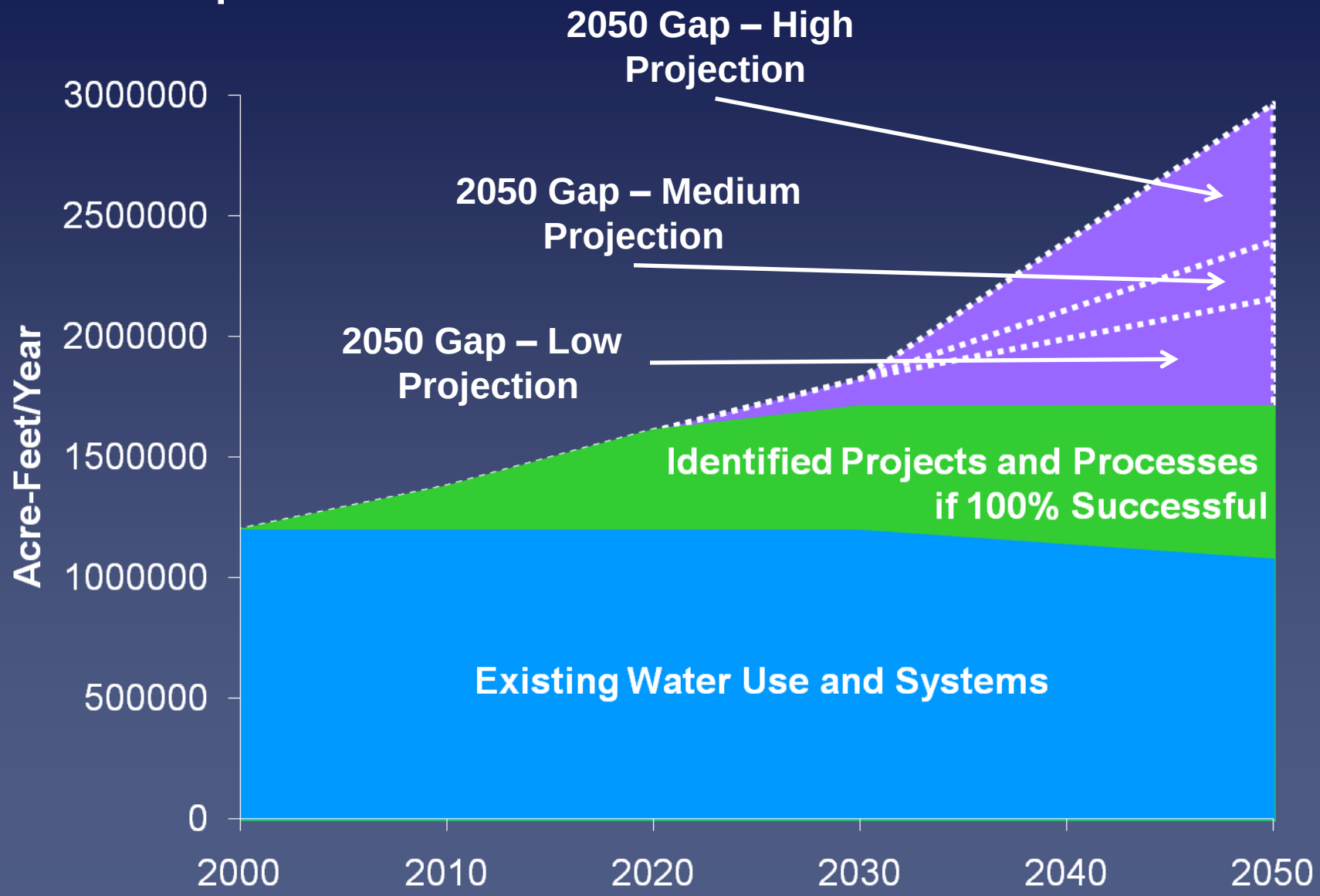
Scenarios will Address the Following Water Needs

- Municipal & Industrial
- Agricultural
- Environmental & Recreational

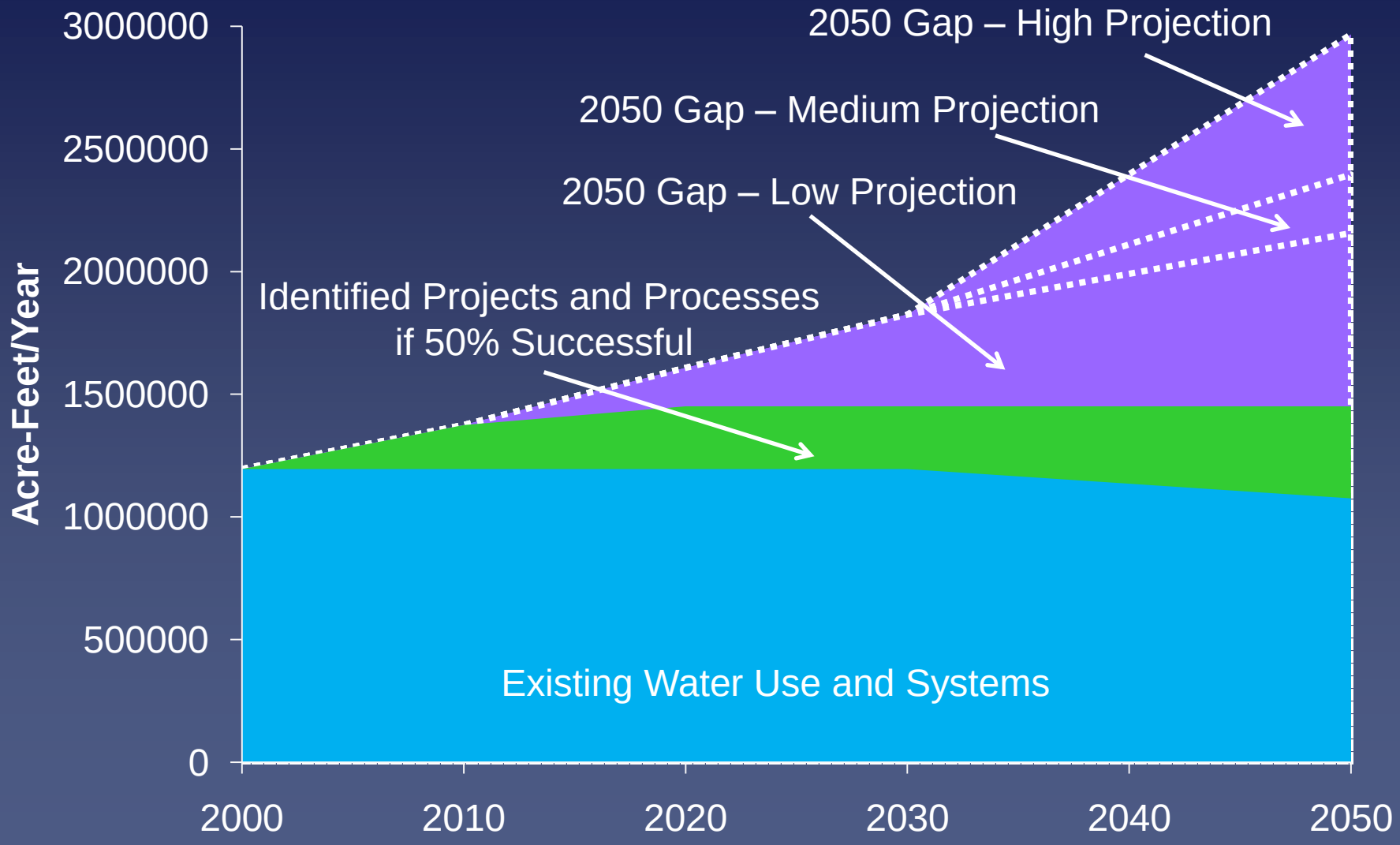
Development of Scenarios

- Overview of Water Needs
  - M&I (short-term and long-term)
  - Agricultural
  - Environmental Needs
- Scenario Development for M&I Needs
  - Low to High Demand
  - Low to High Supply
- Scenario Portfolios for M&I Needs

State of Colorado Projected M&I Water Use and Gaps



State of Colorado Projected M&I Water Use and Gaps



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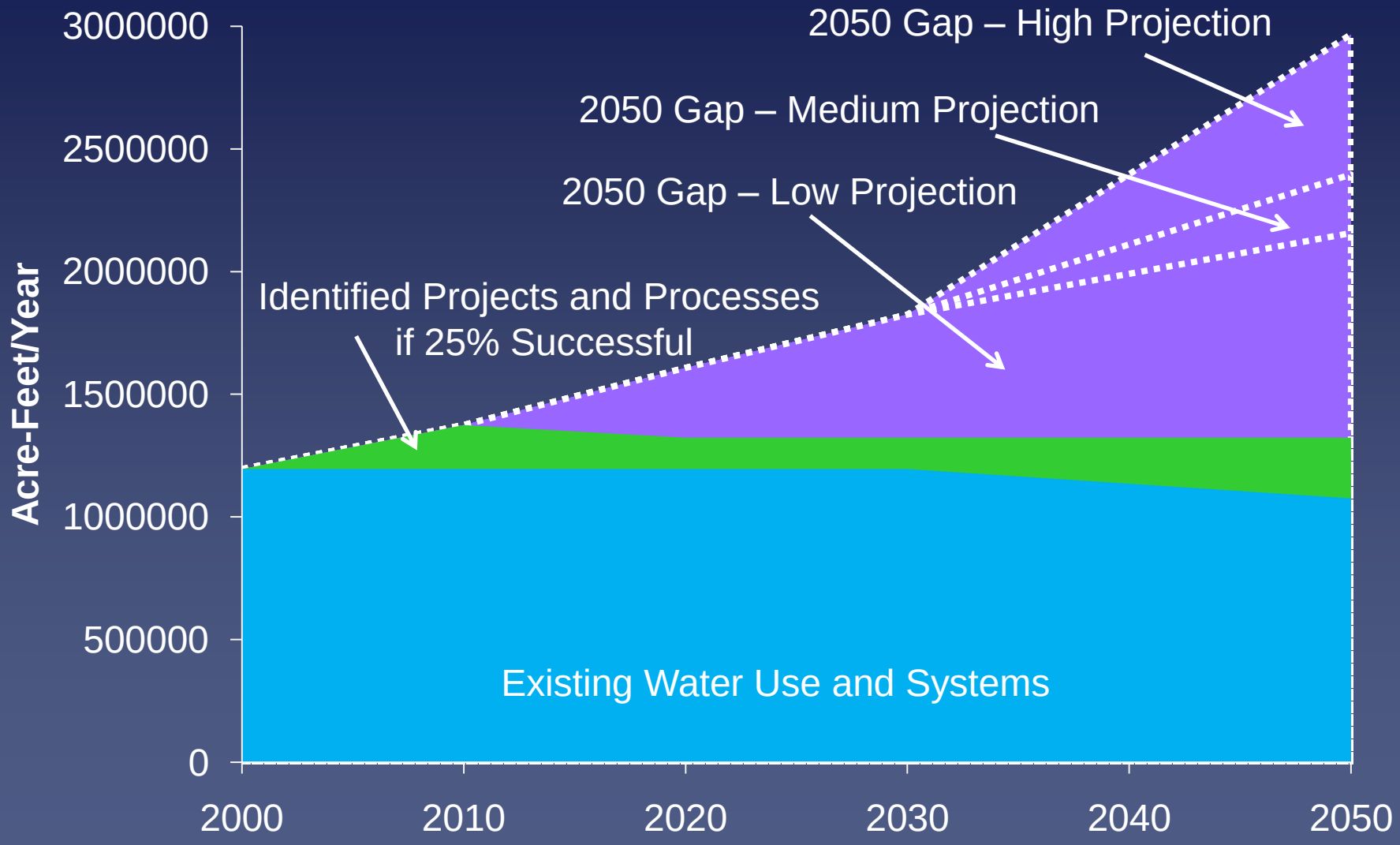
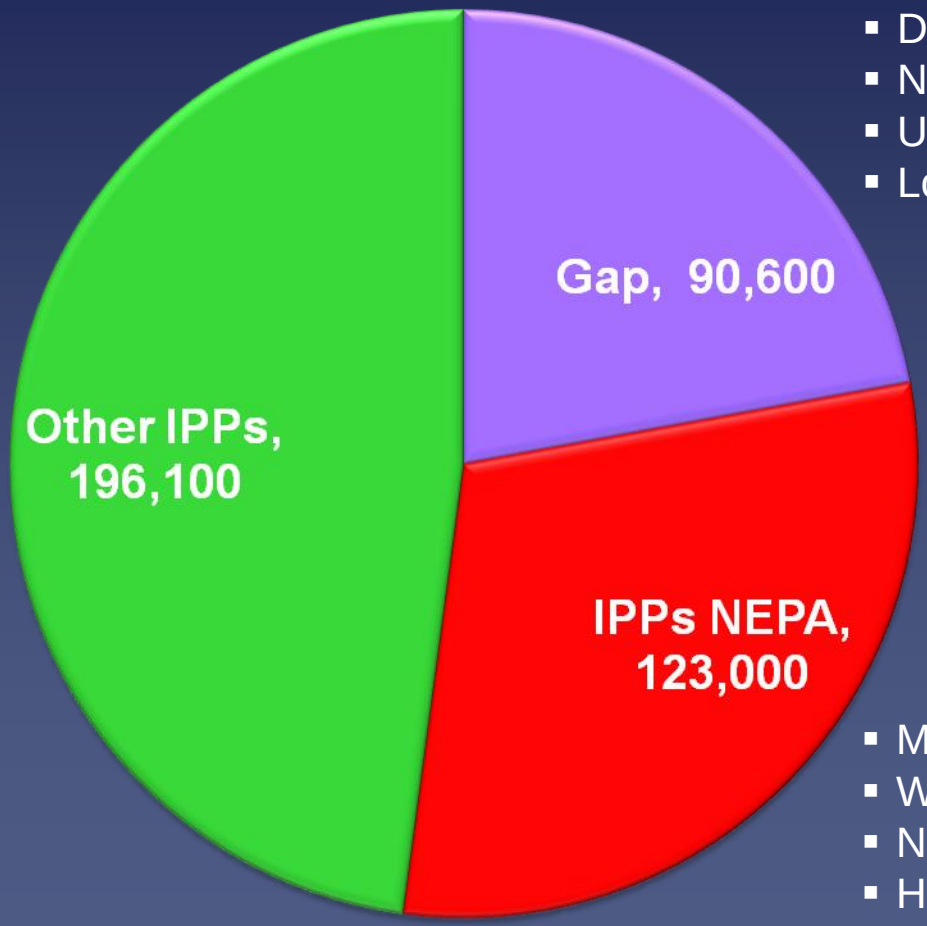


In 2030, the South Platte and Metro Basins will have 409,700 of New Demand

- South Metro Counties Rueter-Hess
- ECCV Northern
- Non-trib GW
- Denver Metro Counties
- Aurora Prairie Waters
- Thornton Poudre Pipeline
- Ag Transfers
- Gravel Lakes
- Northern Counties CBT acquisitions, ag transfers and local storage

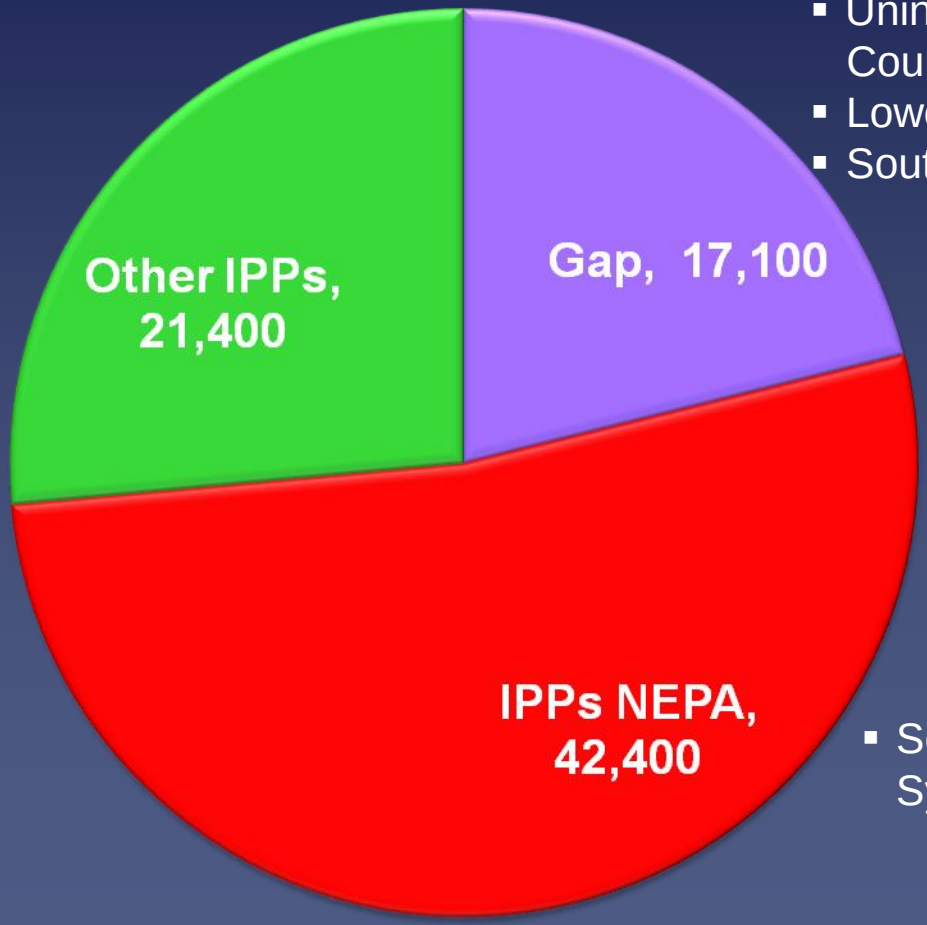


- South Metro
- Denver Metro
- Northern
- Upper Mountain
- Lower Platte

- Moffat Firming
- Windy Gap Firming
- NISP
- Halligan-Seaman

In 2030, the Arkansas Basin will have 80,900 of New Demand

- Arkansas Valley Conduit
- Well augmentation
- Non-trib GW
- PSOP
- Existing water rights
- Agricultural Transfers

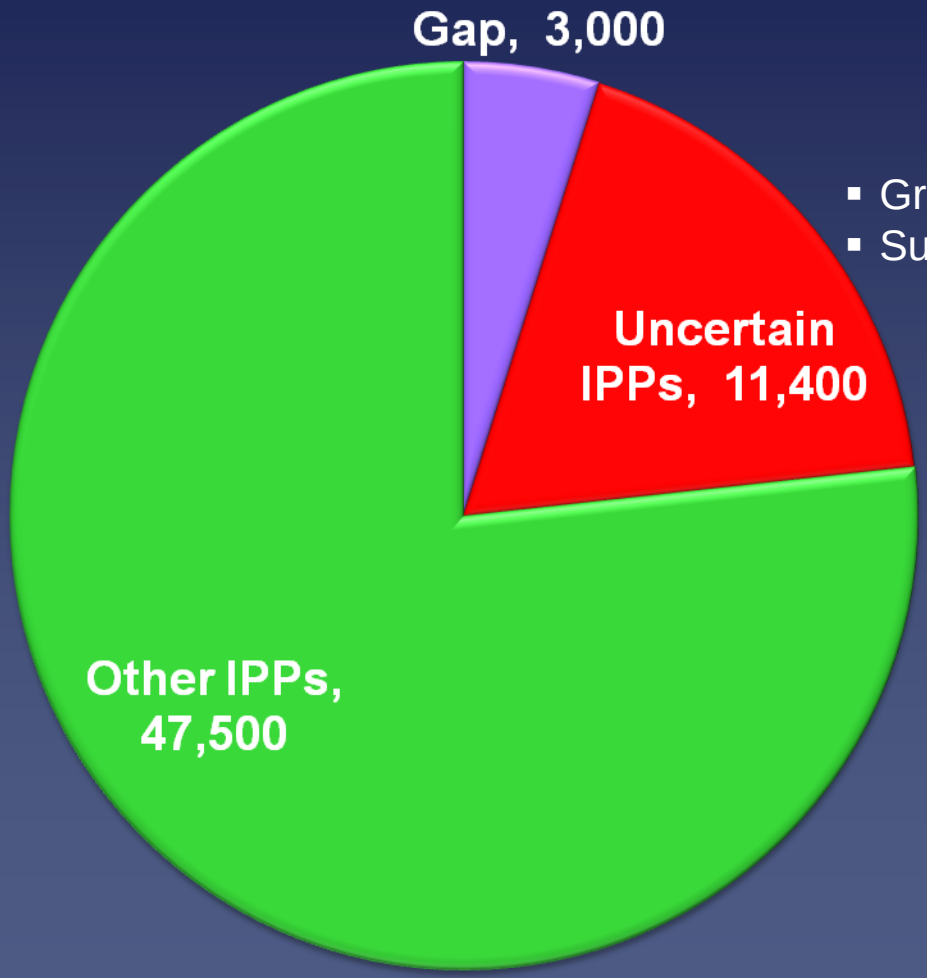


- Upper Arkansas
- Unincorporated El Paso County
- Lower Arkansas
- Southwestern Arkansas

- Southern Delivery System

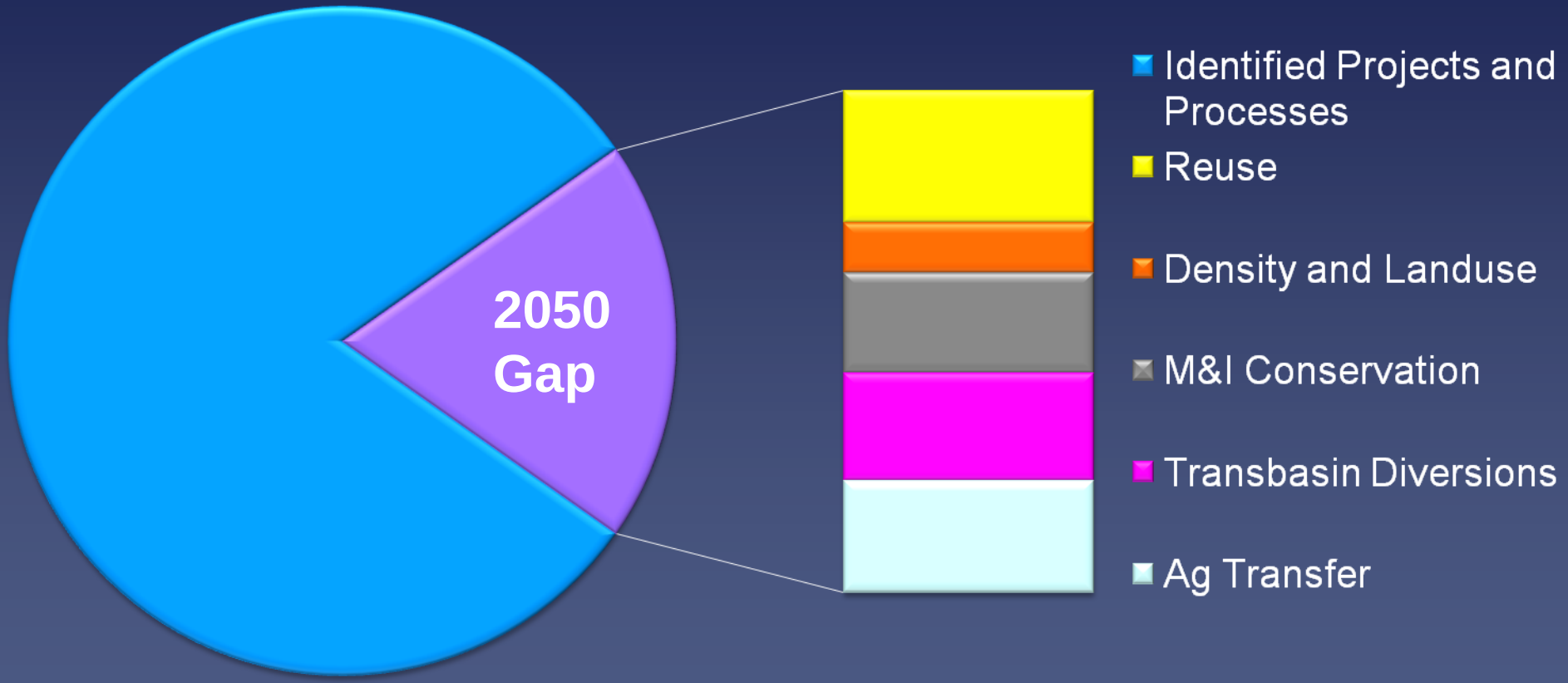
In 2030, the Colorado Basin will have 61,900 of New Demand

- Pitkin County IPPs Existing Supplies
- Ruedi Reservoir
- Mesa City IPPs Existing Supplies, Ag Transfers, Ruedi/Wolford
- Jerry Creek Reservoir
- Garfield City IPPs Existing Supplies
- Ag Transfers
- Eagle City IPPs Existing Supplies
- Ag Transfers
- Eagle River Process



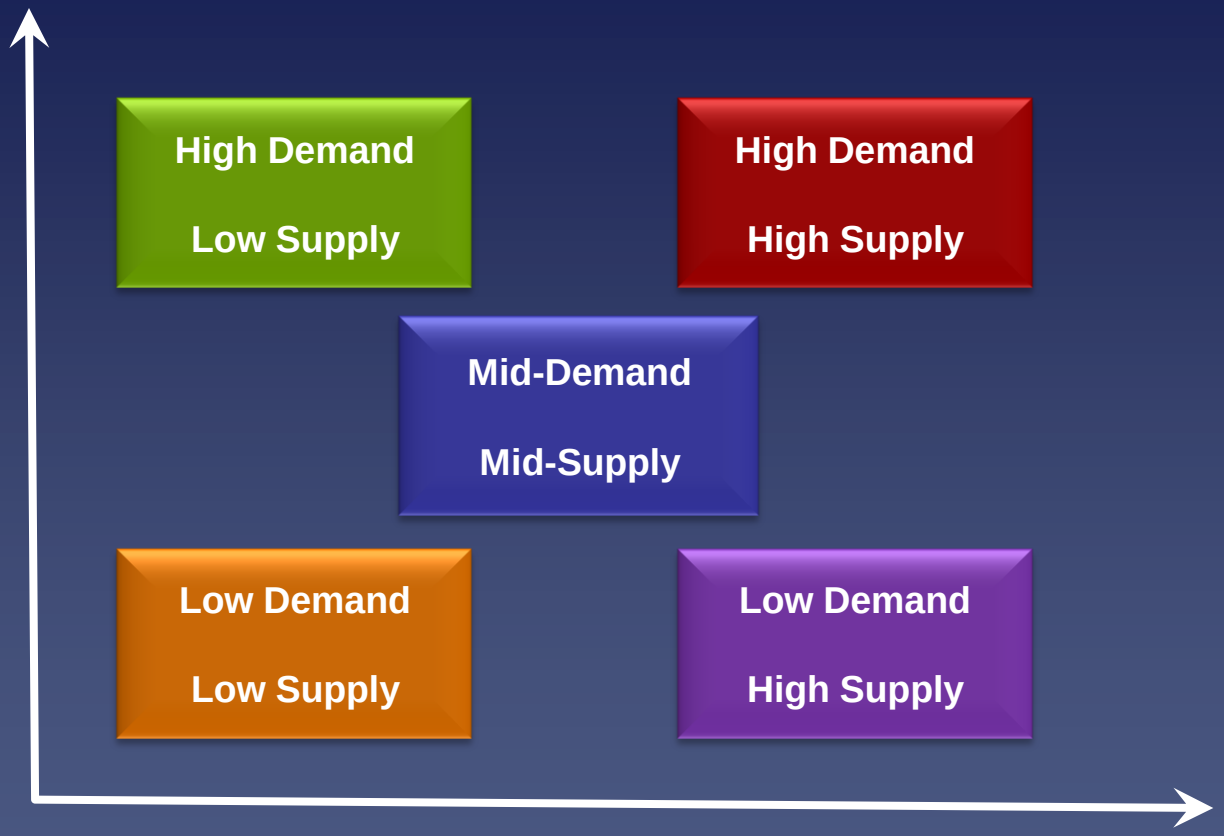
- Grand County
- Summit County

Example of Portfolio to Meet 2050 M&I Needs



2050 Planning Horizon for Colorado's Water Supply Future

Demand Factors:
- M&I Growth
- Energy Demands
- Identified Projects and Processes Uncertainty



Supply Factors:
- Colorado River Hydrologic Variability
- Climate Change
- Compact Considerations

Scenario for Colorado's Water Supply Future

- Not forecasts of the future
- Represent potential conditions in the future
- Influenced by issues outside of the control of a water manager

There does not need to be agreement on each scenario just an acknowledgement that these scenarios may happen in the future

Scenario for Colorado's Water Supply Future

- Strategies are water management responses to future conditions
- Strategies can be related to future conditions and assessed by performance measures related to the vision goals
- Utilize no regrets planning platform

Scenario Development Summary

- Many issues outside of control of water manager
- For this effort have focus on issues that impact water demand and supply
- Developed narratives for demands and supply
- Demand narratives are very detailed based on 2050 demands projections
- Supply narratives are more general detail will be provided by the Colorado River Water Supply Availability Study

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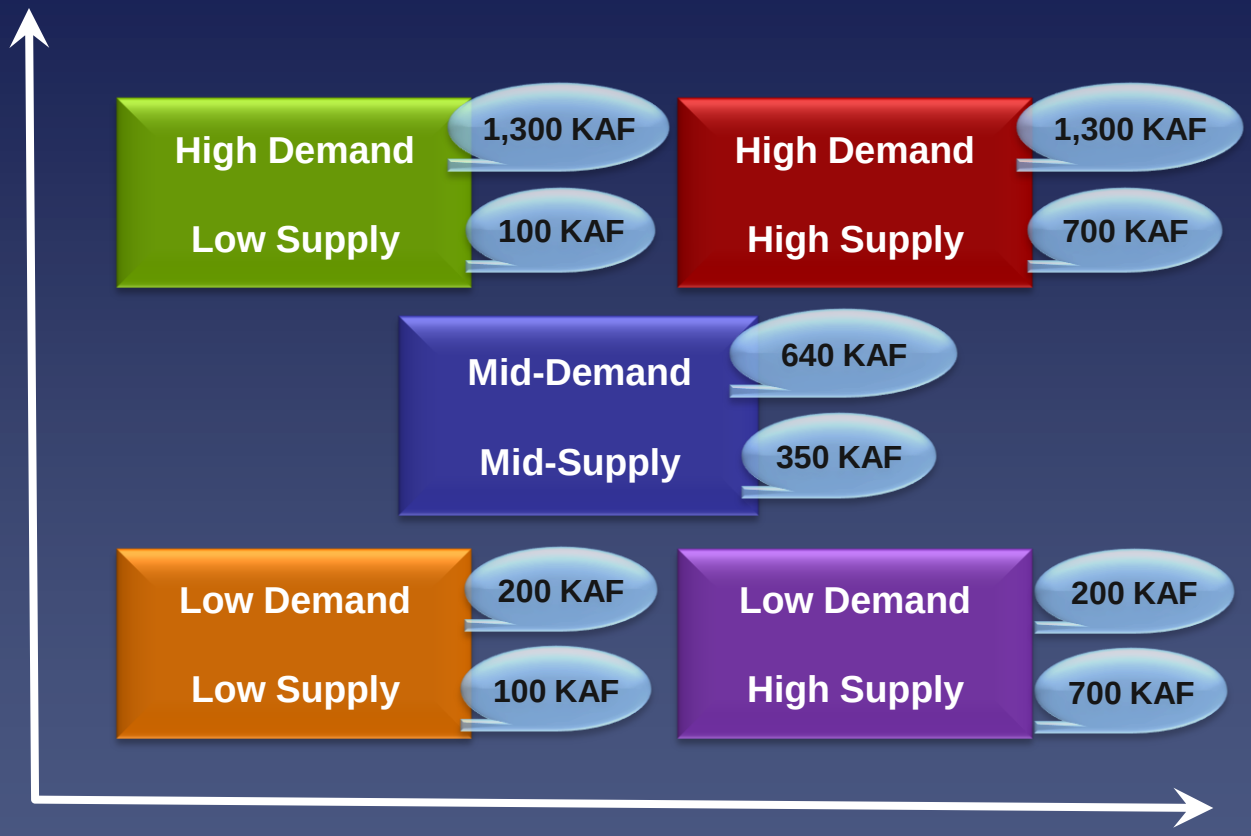

Supply Factors:
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Water Supply Strategies

- Water Conservation
- Agricultural Transfers
  - Conventional and alternative transfers
- Development of New Supplies
  - West Slope M&I and Energy
  - Transbasin

These strategies address M&I needs, but options to address agricultural and nonconsumptive needs will be added as strategies are evaluated

2050 Planning Horizon for Colorado's Water Supply Future

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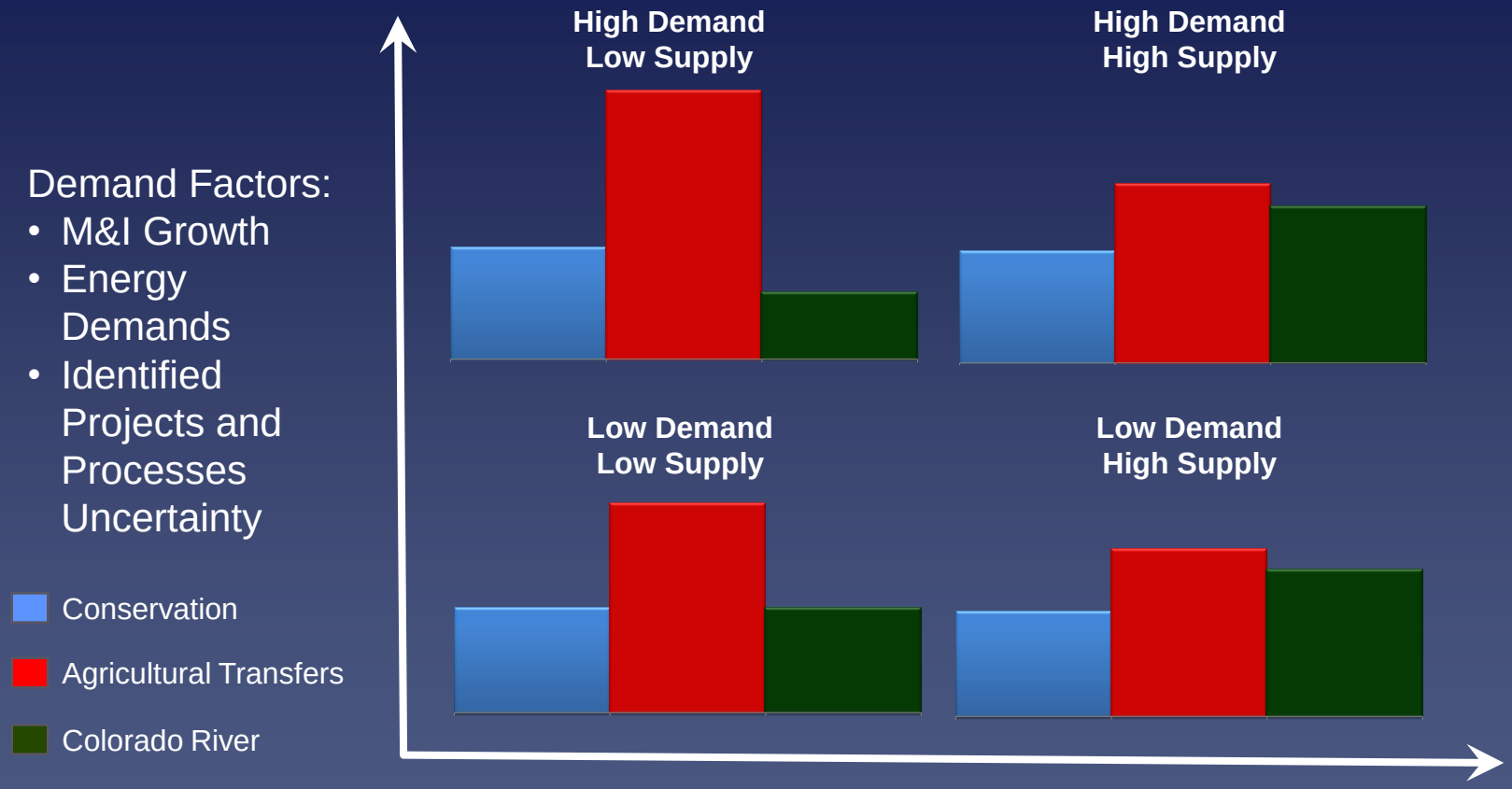


Supply Factors:
- Colorado River Hydrologic Variability
- Climate Change
- Compact Considerations

Conservation Strategy

Conservation Strategy

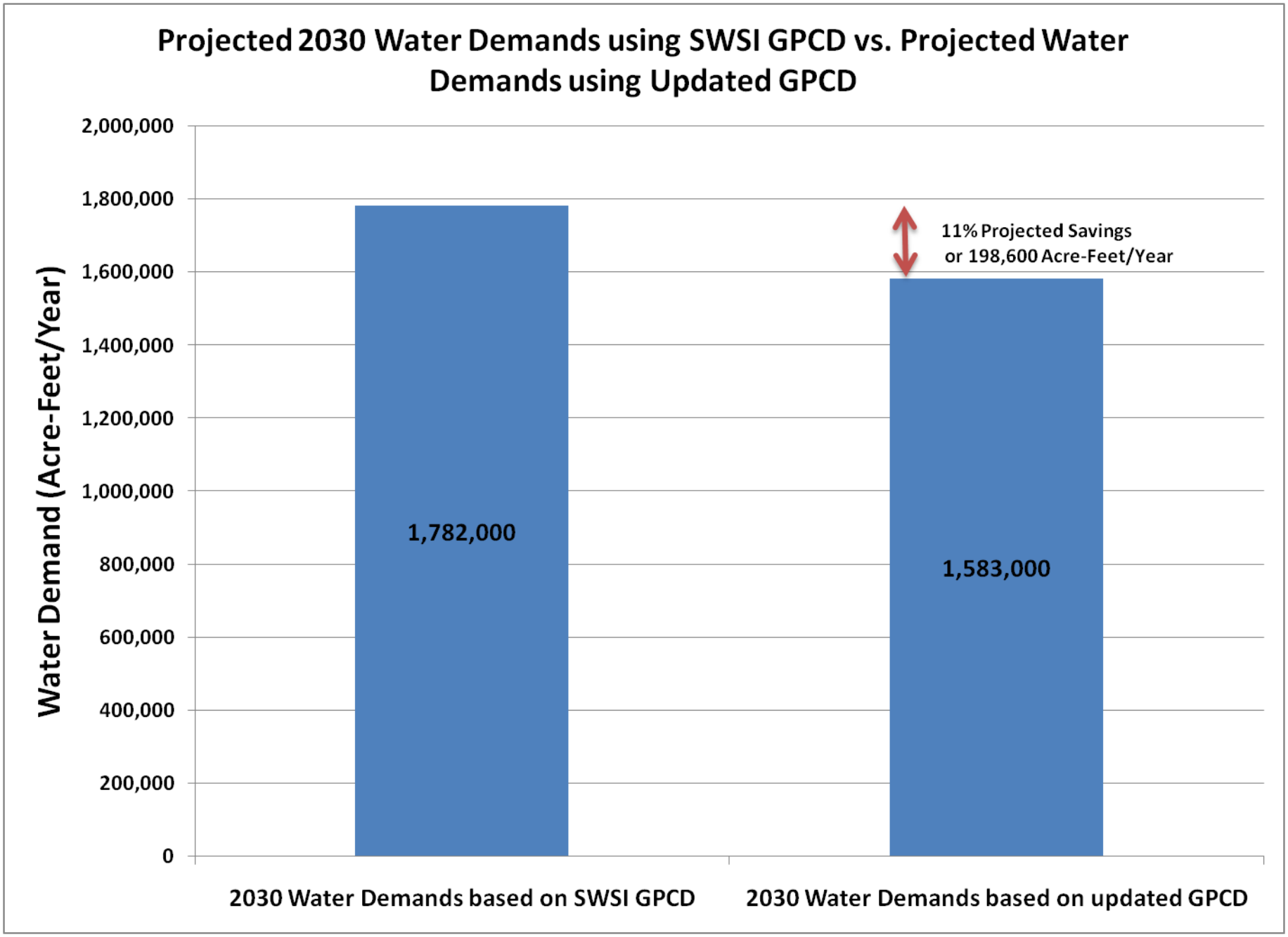
- 20 to 40 percent savings analyzed for each basin
- Management practices identified
- Overview of initial results
- Feedback on how much this strategy will reduce overall 2050 demands

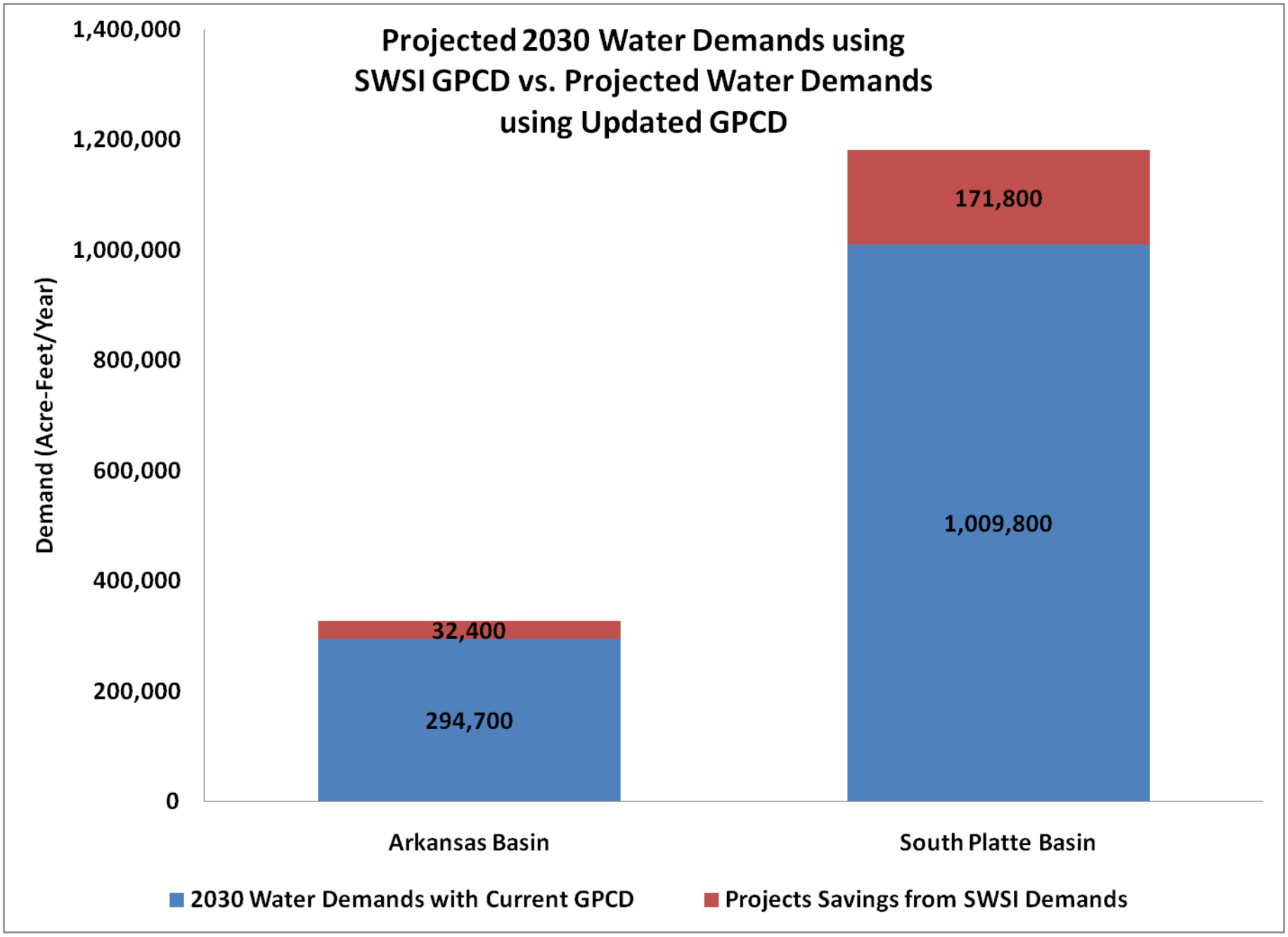
Overview of Conservation Strategy Approach

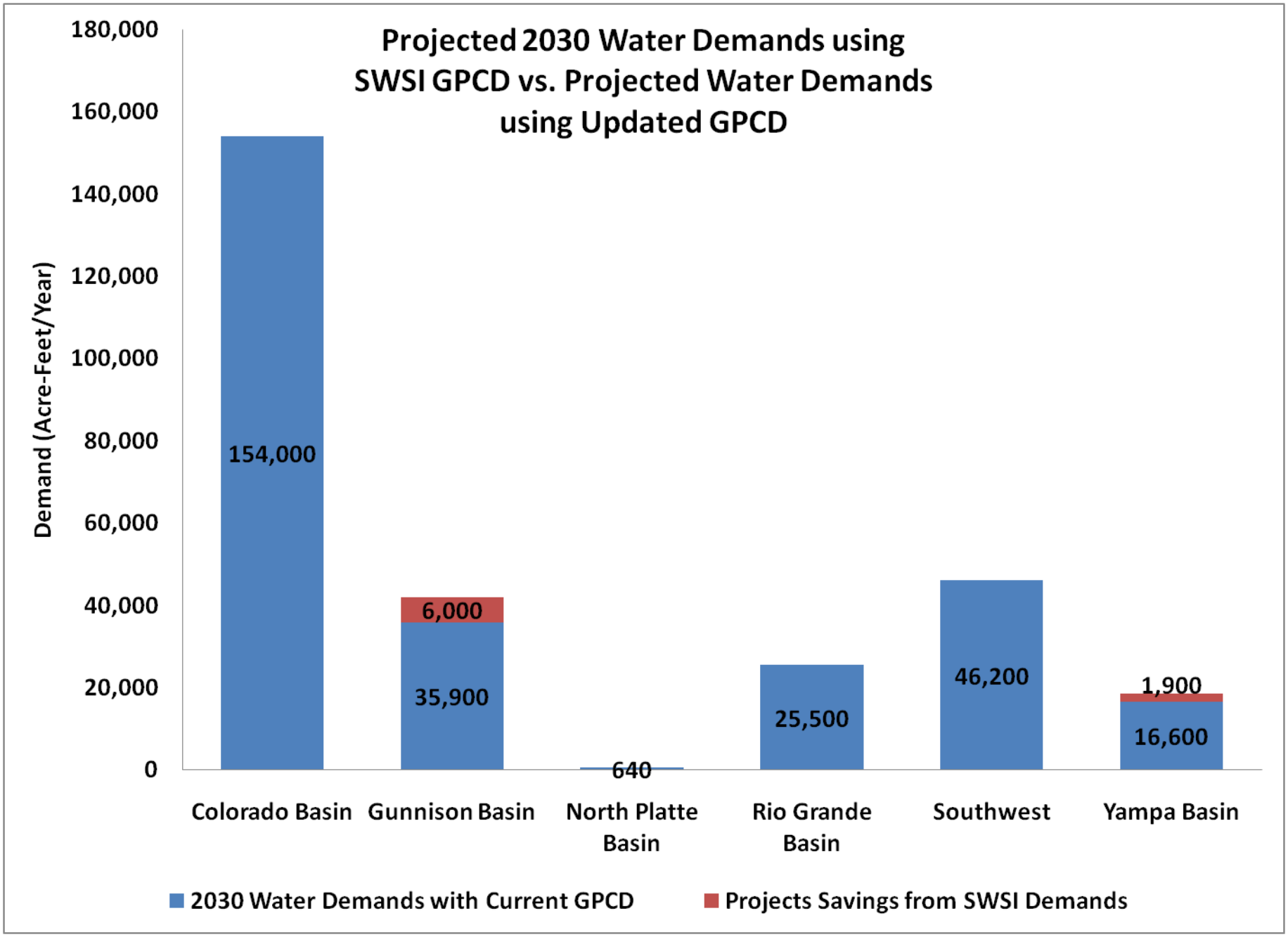
- Used SWSI 1 as baseline
- Estimated percent reduction in water usage at 2050 at 20 percent, 30 percent, and 40 percent reduction levels from SWSI 1
- Examine measures identified in SWSI 2 that could be utilized to achieve reduction levels
- Review results with major water providers and Basin Roundtables
- Summarize findings

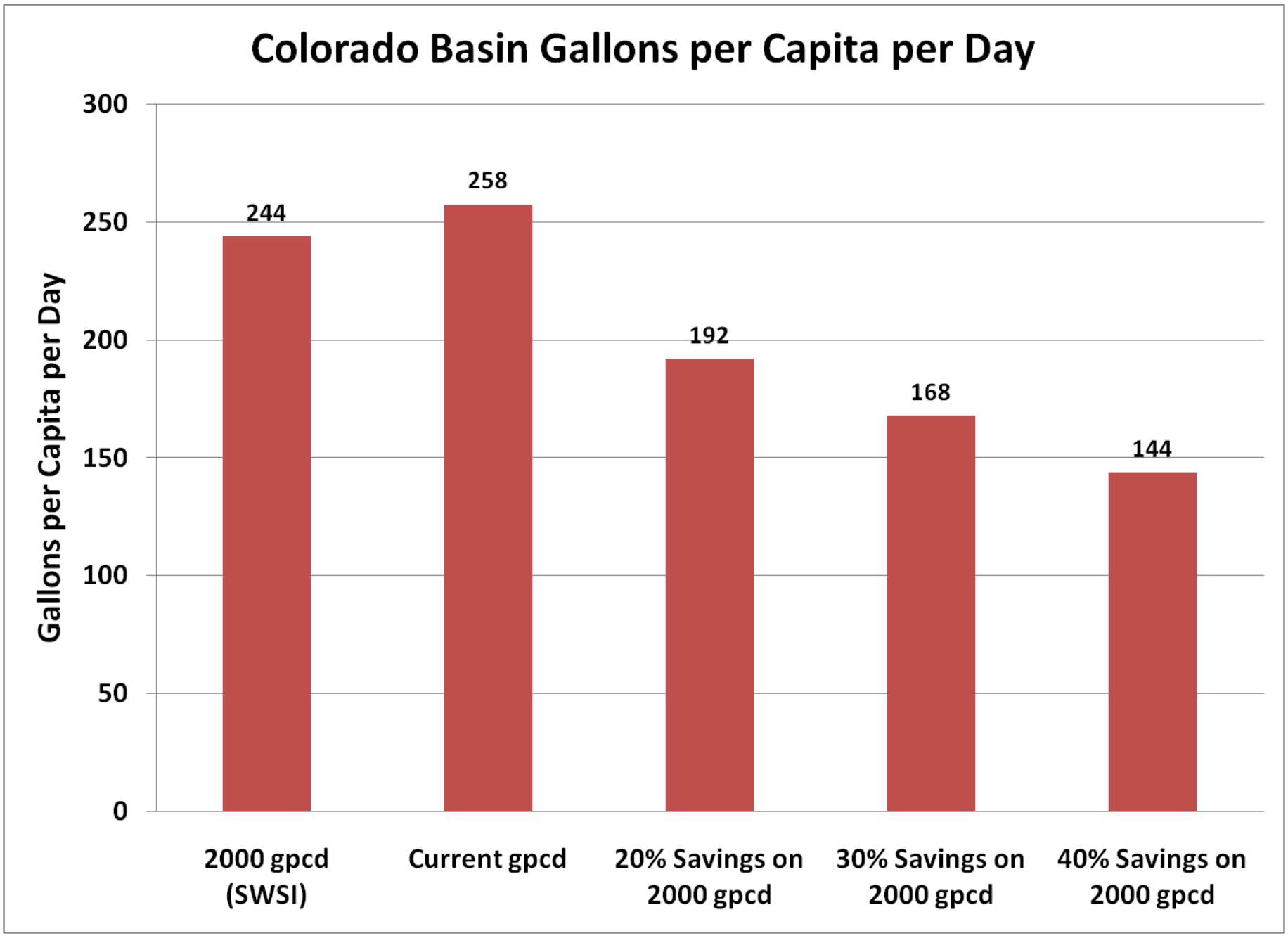
Initial Results

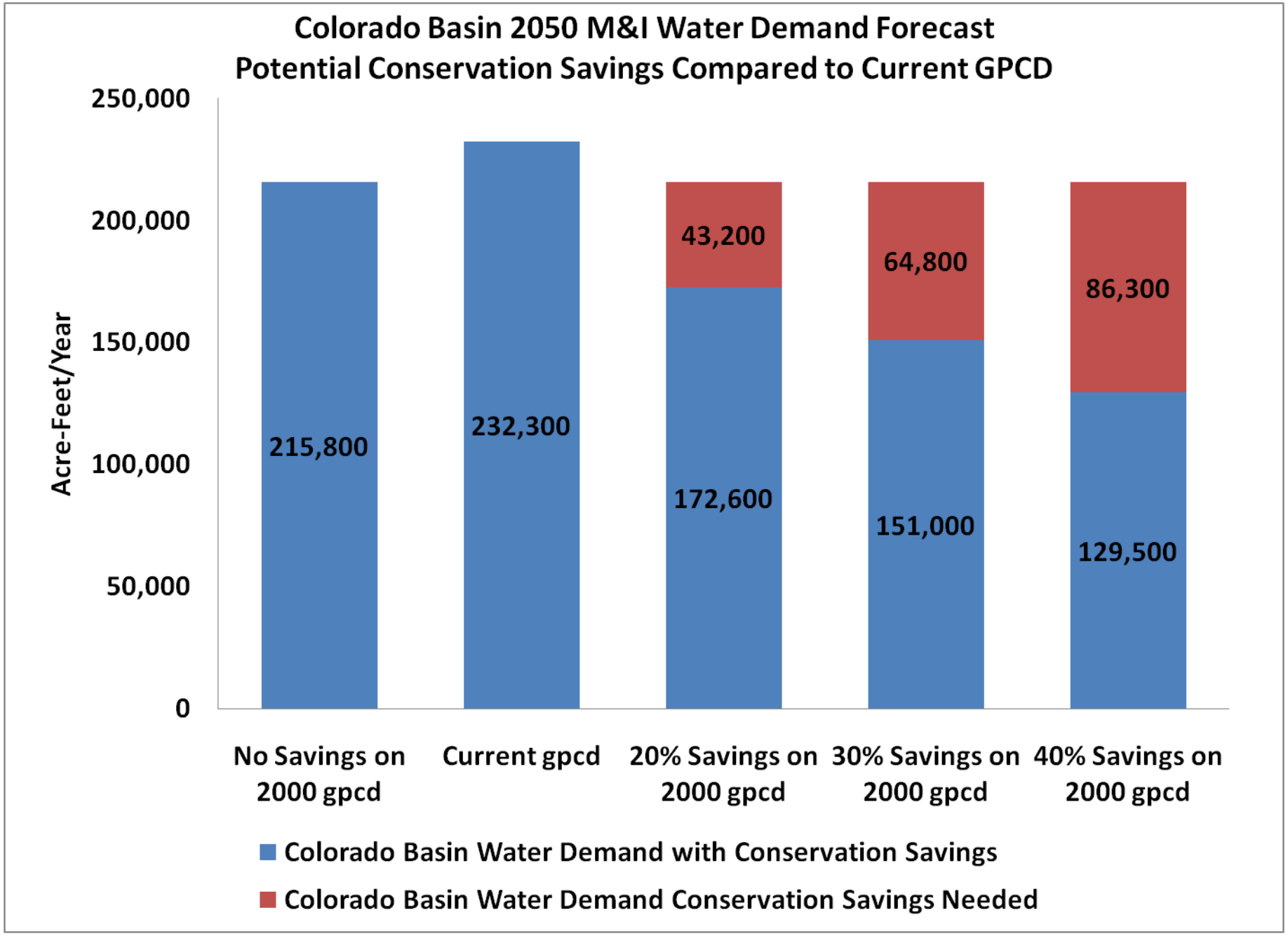
- What progress have we made in meeting 2030 demands with respect to demand reductions from conservation?
- What demand reductions should be implemented by 2050?
- What conservation best management practices could be used to implement these reductions?
- What do other states require regarding conservation or demand reporting?

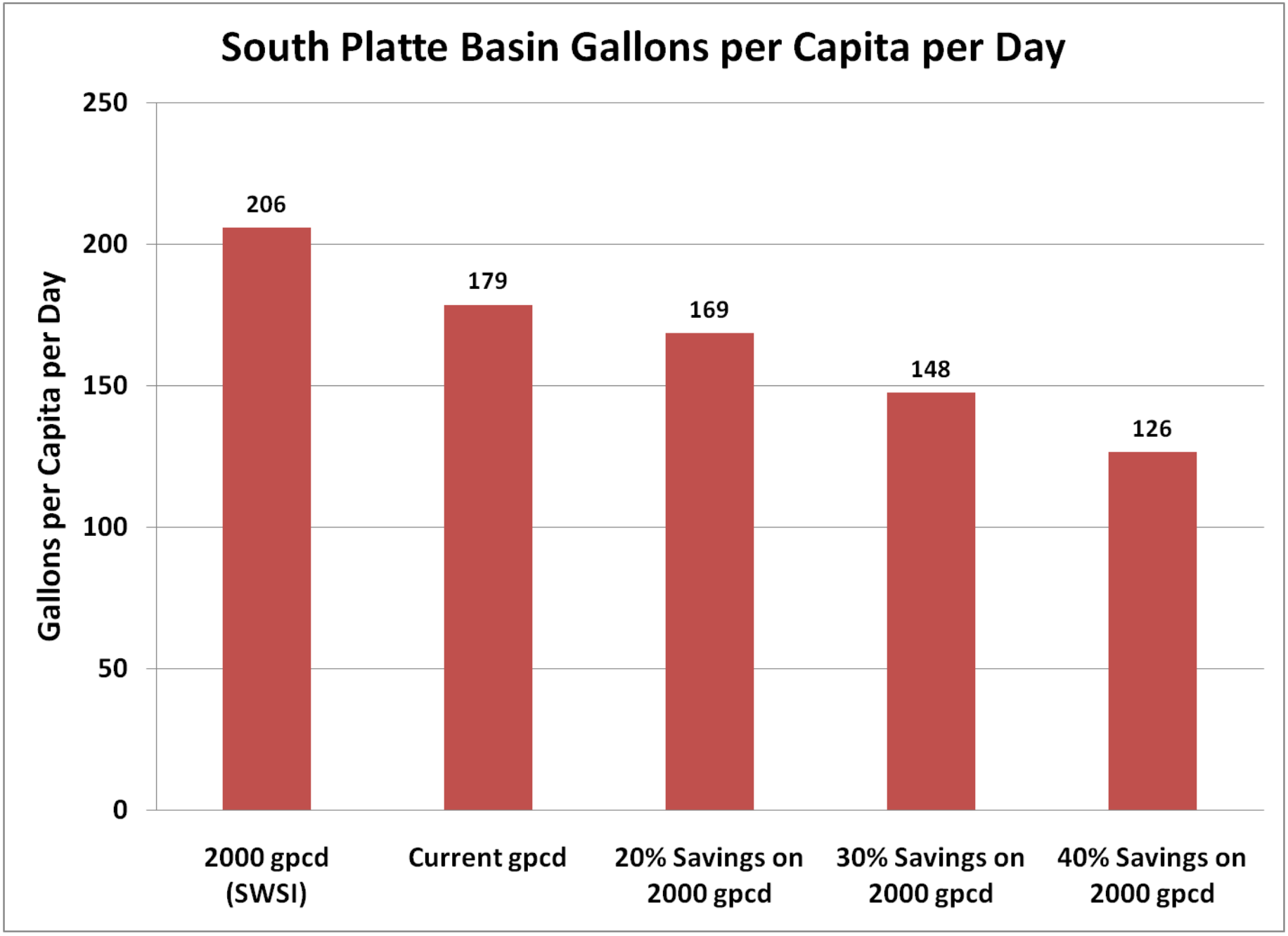

Projected 2030 Water Demands using SWSI GPCD vs. Projected Water Demands using Updated GPCD
Water Demand (Acre-Feet/Year)
2,000,000
1,800,000
1,600,000
1,400,000
1,200,000
1,000,000
800,000
600,000
400,000
200,000
0
1,782,000
1,583,000
11% Projected Savings
or 198,600 Acre-Feet/Year
2030 Water Demands based on SWSI GPCD
2030 Water Demands based on updated GPCD

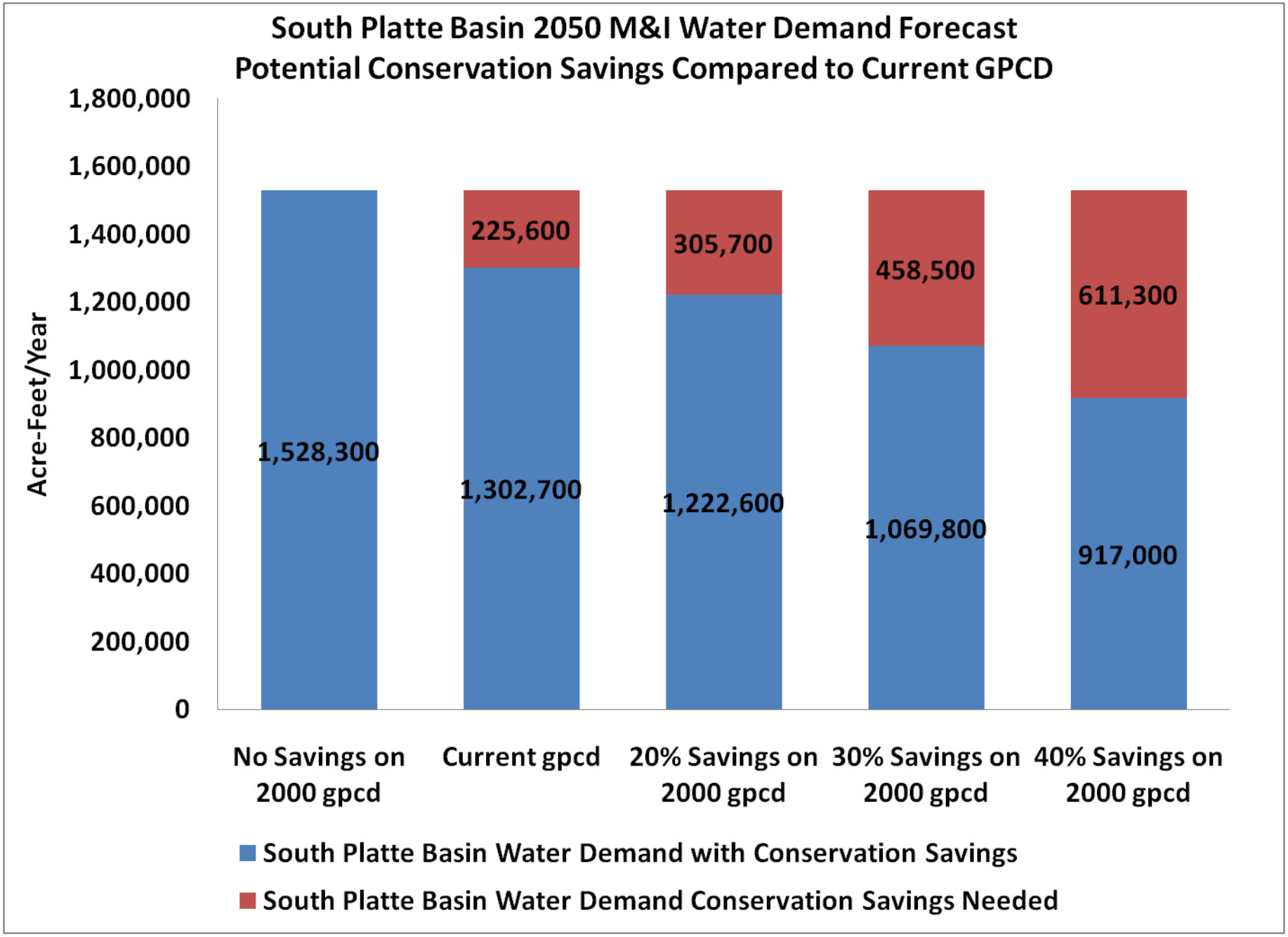

Projected 2030 Water Demands using SWSI GPCD vs. Projected Water Demands using Updated GPCD
Demand (Acre-Feet/Year)
1,400,000
1,200,000
1,000,000
800,000
600,000
400,000
200,000
0
32,400
294,700
171,800
1,009,800
Arkansas Basin
South Platte Basin
2030 Water Demands with Current GPCD
Projects Savings from SWSI Demands


Projected 2030 Water Demands using SWSI GPCD vs. Projected Water Demands using Updated GPCD
Demand (Acre-Feet/Year)
180,000
160,000
140,000
120,000
100,000
80,000
60,000
40,000
20,000
0
154,000
6,000
35,900
640
25,500
46,200
1,900
16,600
Colorado Basin
Gunnison Basin
North Platte Basin
Rio Grande Basin
Southwest
Yampa Basin
2030 Water Demands with Current GPCD
Projects Savings from SWSI Demands


Colorado Basin Gallons per Capita per Day
Gallons per Capita per Day
300
250
200
150
100
50
0
244
258
192
168
144
2000 gpcd (SWSI)
Current gpcd
20% Savings on 2000 gpcd
30% Savings on 2000 gpcd
40% Savings on 2000 gpcd


Colorado Basin 2050 M&I Water Demand Forecast
Potential Conservation Savings Compared to Current GPCD
Acre-Feet/Year
250,000
200,000
150,000
100,000
50,000
0
215,800
232,300
43,200
172,600
64,800
151,000
86,300
129,500
No Savings on 2000 gpcd
Current gpcd
20% Savings on 2000 gpcd
30% Savings on 2000 gpcd
40% Savings on 2000 gpcd
Colorado Basin Water Demand with Conservation Savings
Colorado Basin Water Demand Conservation Savings Needed


South Platte Basin Gallons per Capita per Day
Gallons per Capita per Day
250
200
150
100
50
0
206
179
169
148
126
2000 gpcd (SWSI)
Current gpcd
20% Savings on 2000 gpcd
30% Savings on 2000 gpcd
40% Savings on 2000 gpcd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Potential Conservation Savings Compared to Current GPCD
Acre-Feet/Year
1,800,000
1,600,000
1,400,000
1,200,000
1,000,000
800,000
600,000
400,000
200,000
0
1,528,300
225,600
1,302,700
305,700
1,222,600
458,500
1,069,800
611,300
917,000
No Savings on 2000 gpcd
Current gpcd
20% Savings on 2000 gpcd
30% Savings on 2000 gpcd
40% Savings on 2000 gpcd
South Platte Basin Water Demand with Conservation Savings
South Platte Basin Water Demand Conservation Savings Needed

SWSI 2 Conservation Measures

- Turf replacement
- Utility water loss reduction programs
- Toilet rebates
- Conservation oriented water rates
- Washer rebates
- Cooling towers increased cycle concentration
- Rebates for landscape retrofits other than turf replacement
- Residential landscape audits
- Residential indoor audits
- Sub-metering in multi-family housing
- Commercial landscape audits
- Commercial indoor audits
- Metering of all utility customers

South Platte Basin Example

Conservation Measure	Preliminary Projected Savings at 2050
Turf Replacement	104,300 AFY to 208,600 AFY
Leak Detection Programs	35,200 AFY to 58,600 AFY
Toilet Rebates	53,100 AFY
Conservation Orientated Water Rates	20,400 AFY
Washer Rebates	15,400 AFY to 36,400 AFY
Cooling Towers	1,540 AFY to 12,200 AFY
Rebates for Landscape Retrofits other than Turf Replacement	3,100 AFY to 10,000 AFY
Residential Landscape Audits	3,500 AFY to 10,400 AFY
Residential Indoor Audits	2,100 AFY to 6,300 AFY
Submetering in Multi-family Housing	2,800 AFY to 7,800 AFY
Commercial Landscape Audits	1,300 AFY to 5,000 AFY
Commercial Indoor Audits	700 AFY to 3,300 AFY
Total Project Savings	267,000 AFY to 432,000 AFY

Colorado Basin Example

Conservation Measure	Preliminary Projected Savings at 2050
Turf Replacement	12,900 AFY to 25,900 AFY
Leak Detection Programs	5,800 AFY to 9,700 AFY
Toilet Rebates	6,000 AFY
Conservation Orientated Water Rates	2,500 AFY
Washer Rebates	1,900 AFY to 4,500 AFY
Cooling Towers	190 AFY to 1,500 AFY
Rebates for Landscape Retrofits other than Turf Replacement	400 AFY to 1,200 AFY
Residential Landscape Audits	400 AFY to 1,300 AFY
Residential Indoor Audits	300 AFY to 800 AFY
Submetering in Multi-family Housing	300 AFY to 1,000 AFY
Commercial Landscape Audits	200 AFY to 700 AFY
Commercial Indoor Audits	100 AFY to 500 AFY
Total Project Savings	31,600 AFY to 56,200 AFY

Conservation Strategy Next Steps

- Complete basin by basin analysis
- Work with water providers and Basin Roundtables to confirm analysis
  - Confirm where 2000 to current savings is permanent or temporary
  - Confirm conservation measures utilized
- Summarize findings

Conservation Strategy Next Steps

- Identify benefits, implementation issues, potential attributes and acceptability
- Cost Estimates
- Utilize demand reductions as baseline conditions for meeting 2050 water needs
- Analyze other conservation elements such as sharing of conserved water and the infrastructure and institutional arrangements required

M&I Conservation Strategy
Example of Benefits, Impacts and Attributes

Benefits	Impacts	Potential Attributes
Cost effective water supply strategy	Potential reliability concerns	Environmental or recreational flows
Reduces need for future transbasin diversion	Consideration of utilities financial model	
Reduces need for future agricultural transfers	For higher levels of conservation, potentially severe landscape impacts	

Overview of Agricultural Transfer Strategy and New Supply Development Strategy

Today – Examine the Engineering Evaluation Elements for Strategies

- Description of strategy or project elements – water source, conveyance and storage, water quality
- Capital costs – permitting, mitigation, land acquisition, pumps, pipe, treatment
- Annual O&M costs – energy, equipment maintenance and replacement

<u>Purpose</u>

Ability to begin to compare tradeoffs between strategies

After Today – Further Evaluation of Strategies will Include:

- Identification of:
  - Project benefits
  - Implementation issues
  - Potential attributes/additional options
  - Acceptability
- Other evaluation elements:
  - Additional cost elements (water rights or storage)
  - Discuss potential attributes/additional options for ag transfer and new supply development options with Basin Roundtables
  - Incorporate other conservation elements such as sharing of conserved water and the infrastructure and institutional arrangements required
- Qualitative description of how each strategy meets the Vision Statement and Vision Goals

Assumptions for Today's Analysis for the Agricultural Transfer Strategy and New Supply Development Strategy

- Delivery of similar water quality
- With exception of Green Mountain concept, strategies will deliver water in the range of 100KAF to 250KAF
- Provide apples to apples comparison of key cost components
- Cost presented in terms of net present value and cost per acre-foot basis

Cost Estimate Approach

- High level or reconnaissance planning approach
- Preliminary estimates
- Reviewed existing studies
- Identified major cost components
  - Pipelines
  - Pump stations
  - Tunneling
  - Water treatment
  - Land Costs
- 2009 unit costs

Conveyance Cost Components

Capital

- Pipeline
- Pump stations
- Tunneling
- Land/Easements
- Engineering and Legal
- General contingencies

Annual O&M

- Power costs
- Pump and pipeline maintenance

Treatment Cost Components

Capital

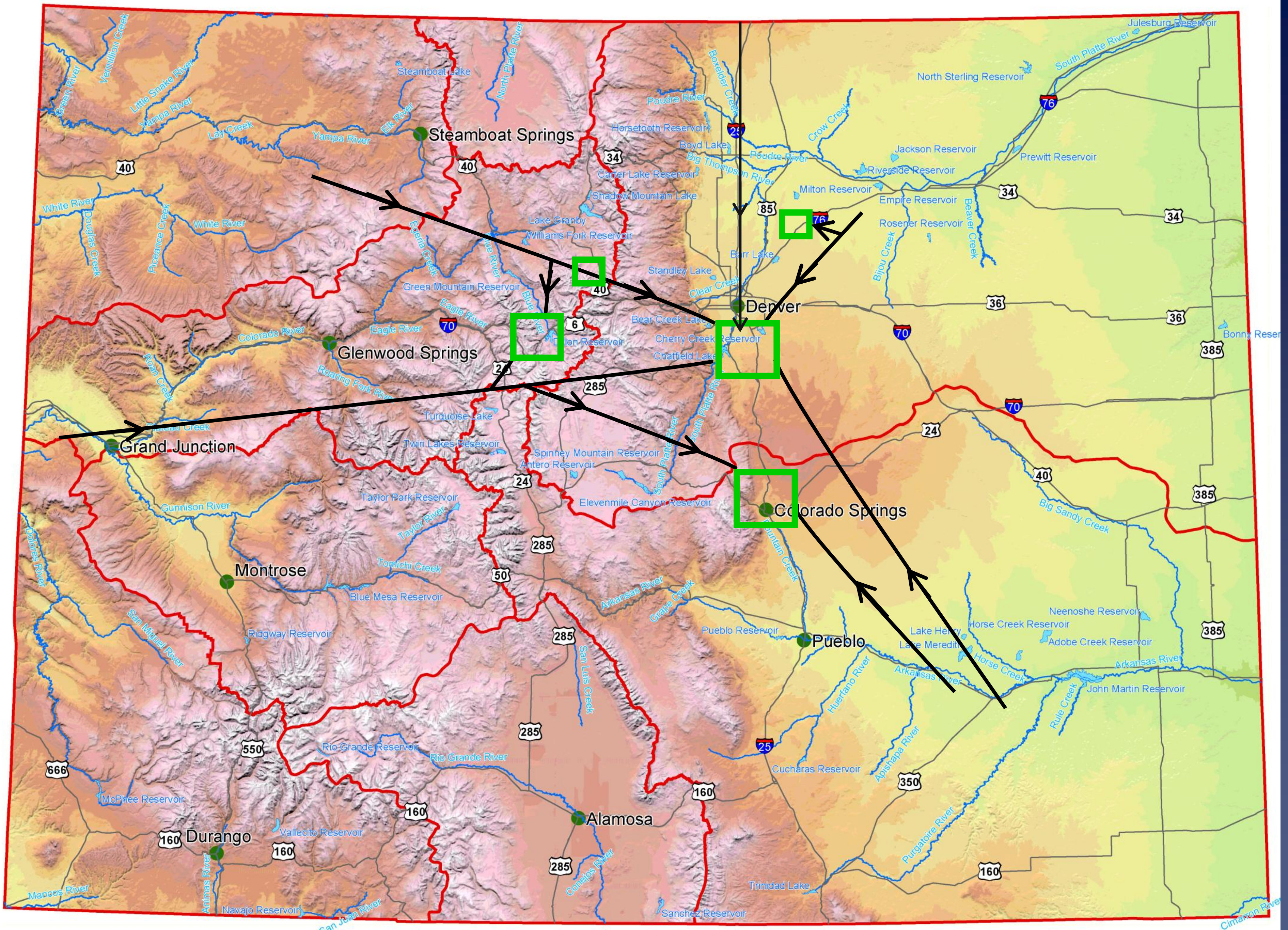
- Treatment type based on water quality
  - Reverse osmosis
  - UV for bypass water
  - Conventional treatment
- Includes costs for building treatment facilities
- Unit costs for treatment range from $1.90/gallon to $5.02/gallon

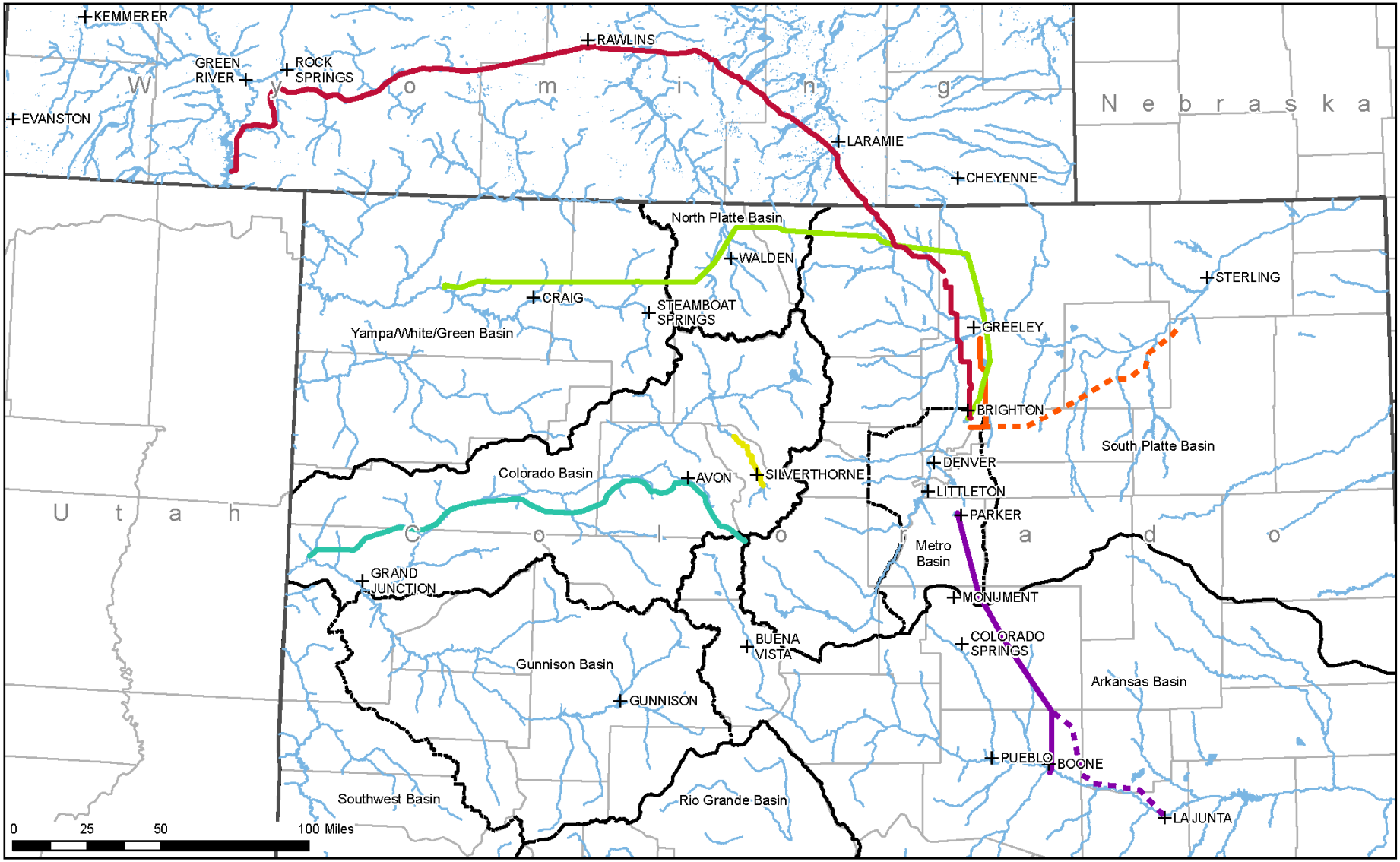
Annual O&M

- O&M costs based on treatment type
- O&M costs range from $0.30/Kgal to $1.03/Kgal

Concepts That will be Presented Today

- Lower South Platte concept
- Lower Arkansas concept
- Green Mountain concept
- Yampa concept
- Flaming Gorge concept
- Colorado River Return Reconnaissance concept


Steamboat Springs
Glenwood Springs
Grand Junction
Denver
Colorado Springs
Montrose
Pueblo
Alamosa
Durango
Steamboat Lake
Horsetooth Reservoir
Boyd Lake
Carter Lake Reservoir
Shadow Mountain Lake
Lake Granby
Williams Fork Reservoir
Green Mountain Reservoir
Standley Lake
Barr Lake
Bear Creek Lake
Cherry Creek Reservoir
Chatfield Lake
Dillon Reservoir
Turquoise Lake
Twin Lakes Reservoir
Spinney Mountain Reservoir
Antero Reservoir
Elevenmile Canyon Reservoir
Taylor Park Reservoir
Blue Mesa Reservoir
Ridgway Reservoir
Pueblo Reservoir
North Sterling Reservoir
Julesburg Reservoir
Jackson Reservoir
Prewitt Reservoir
Riverside Reservoir
Milton Reservoir
Empire Reservoir
Rosener Reservoir
Neenoshe Reservoir
Horse Creek Reservoir
Adobe Creek Reservoir
John Martin Reservoir
Lake Henry
Lake Meredith
Rio Grande Reservoir
Cucharas Reservoir
Trinidad Lake
Sanchez Reservoir
McPhee Reservoir
Vallecito Reservoir
Navajo Reservoir
South Platte River
Poudre River
Yampa River
White River
Colorado River
Gunnison River
Arkansas River
Rio Grande River
San Juan River
Animas River
Purgatoire River
47



Legend

- Colorado River Return Reconnaissance Study Concept
- Flaming Gorge Concept
- Yampa River Concept
- Middle South Platte Concept
- Lower South Platte Concept
- Lower Arkansas Concept 1
- Lower Arkansas Concept 2
- Green Mountain Concept
- Colorado Basins

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Agricultural Transfer Strategy

Agricultural Transfer Strategy Overview

- Overview of projects and methods to meet needs matrix for roundtables
- Engineering Evaluation Elements
  - Lower South Platte concept 100,000-250,000 acre-feet
  - Lower Arkansas concept 100,000-250,000 acre-feet
- Example benefits and issues with each project

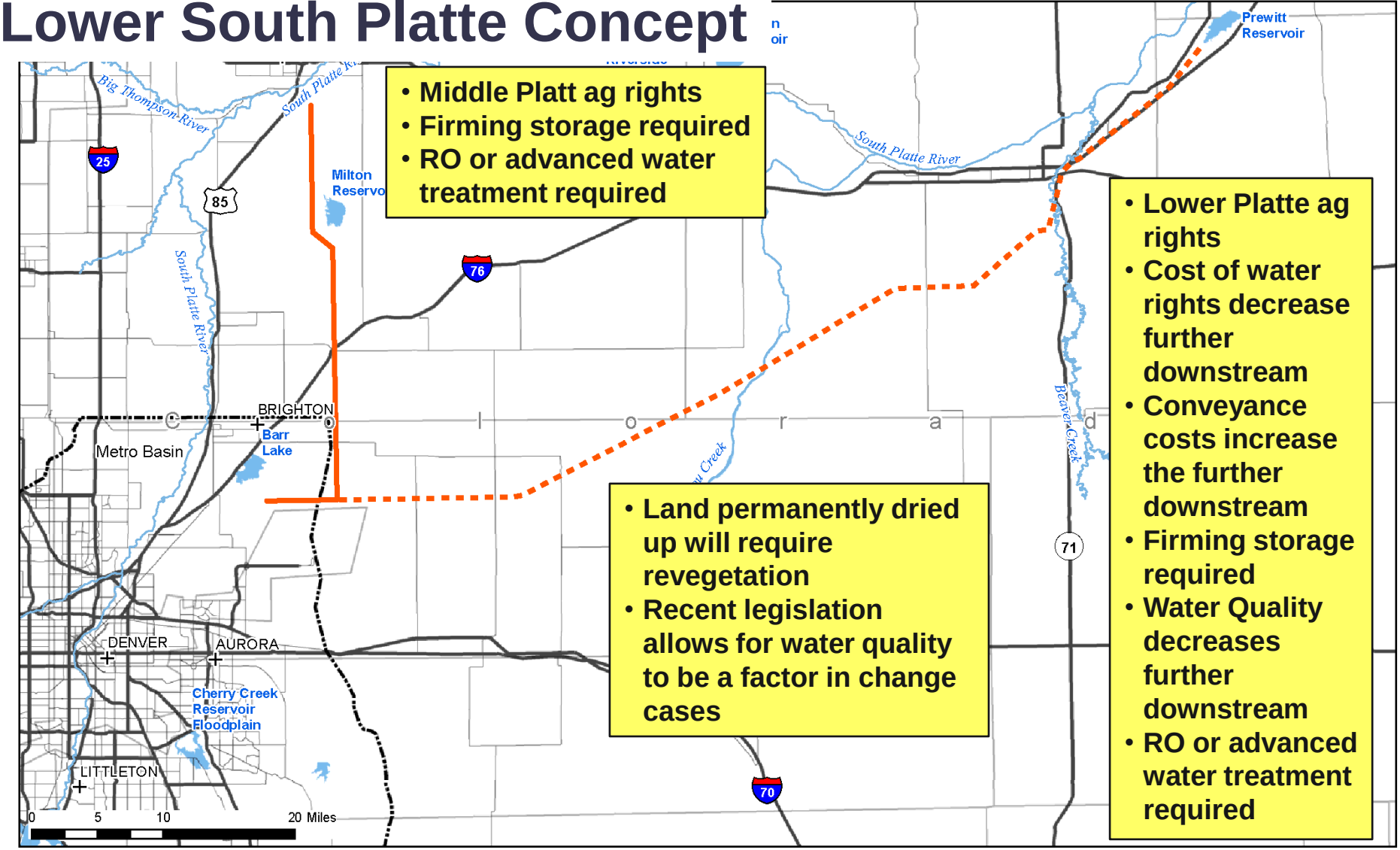
Alternative Agricultural Water Transfer Methods - Arkansas Basin (Grant Awards)

Name of Project	Name of Applicant
Lower Arkansas Valley Super Ditch Company	Lower Arkansas Valley Water Conservancy District
High Line Canal Water Leasing Project	High Line Canal Company
The Effect of Land Fallowing and Water Rights Leasing on Corn Yield, Nutrient Needs and Economics in the Lower Arkansas River Valley of Colorado	Colorado State University (Southern Regional Extension Office

Alternative Agricultural Water Transfer Methods – South Platte Basin (Grant Awards)

Name of Project	Name of Applicant
Alternative Water Transfers in the South Platte Basin Using the Farmers Reservoir and Irrigation Company System	Farmers Reservoir and Irrigation Company
Lower South Platte Irrigation Research and Demonstartion Project	Parker Water and Sanitation District
Development of Practical Alternative Agricultural Water Transfer Measures for Colorado Irrigated Agriculture	Colorado Corn Growers

Lower South Platte Concept



Legend

- Cities
- Highways
- Other Roads
- Rivers and Streams
- Lakes and Reservoirs
- Colorado Basins
- Middle South Platte Concept
- Lower South Platte Concept

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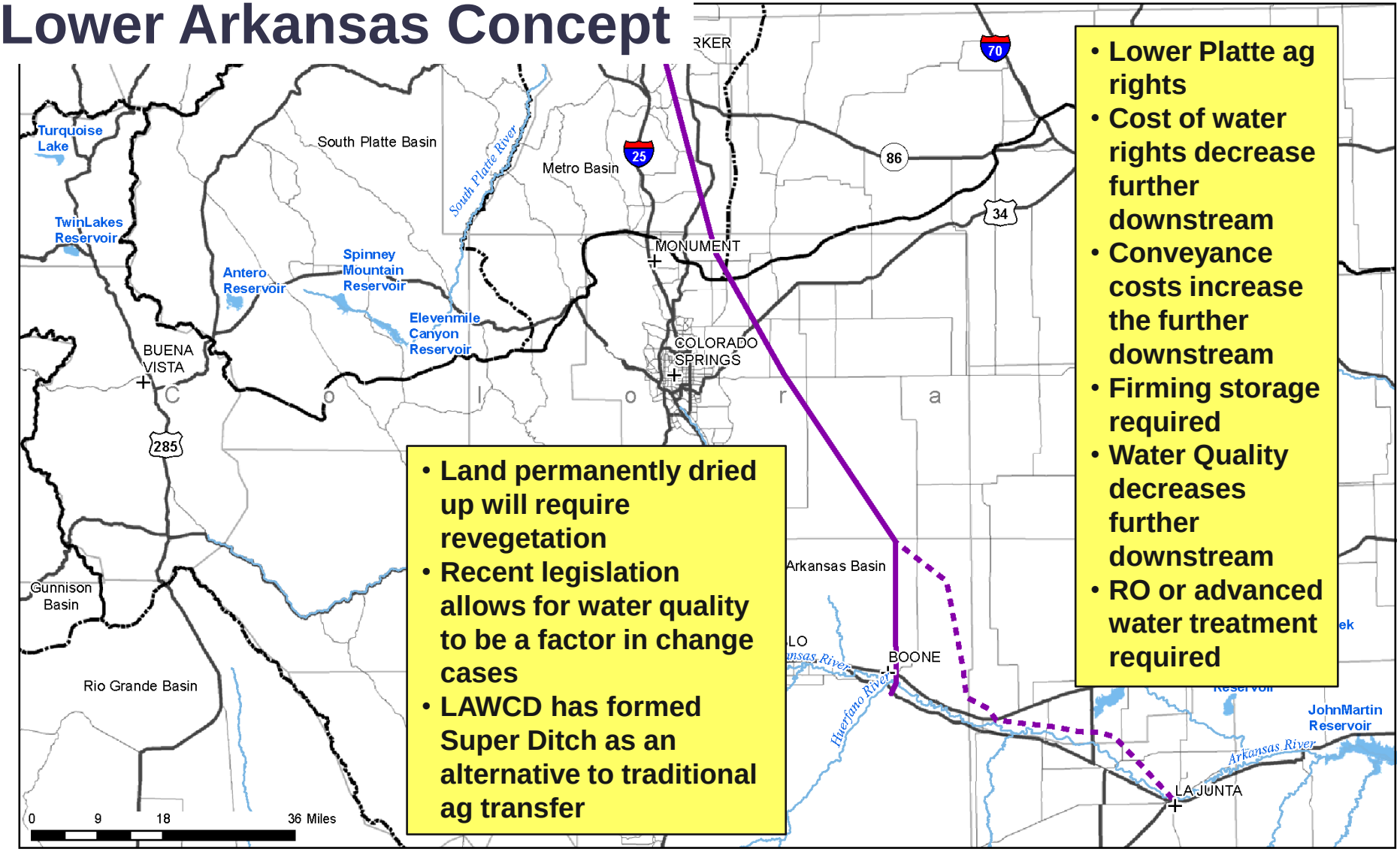
Lower South Platte Concept
Example of Benefits, Impacts, and Attributes

Benefits	Impacts	Potential Attributes
Less reliance on additional deliveries from headwaters areas, thus minimizing streamflow impacts in environmentally sensitive areas	Water quality is poor and treatment costs (capital and O&M) are high	Potential to collaborate with remaining agricultural users to construct lower basin storage or recharge facilities to improve agricultural yields or provide for well augmentation
Decreases the need for additional transbasin diversions	Disposal of treatment waste stream concentrate is a challenge and very costly	Shared infrastructure among water providers, resulting in economies of scale for capital and O&M
No net increase in depletions to the river system	Loss of irrigated acreage in production annually regardless of the type of agricultural transfer	Can provide for coordinated acquisition of agricultural rights for either a traditional or alternative transfer preserving higher quality/value agricultural production
	Significant energy requirements for pumping and water treatment	Conjunctive use with non-tributary groundwater can potentially improve the overall project operation

Lower Arkansas Concept



Legend

- Cities
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- Lakes and Reservoirs
- Colorado Basins
- Lower Arkansas Concept 1
- Lower Arkansas Concept 2

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Lower Arkansas Concept
Example of Benefits, Impacts, and Attributes

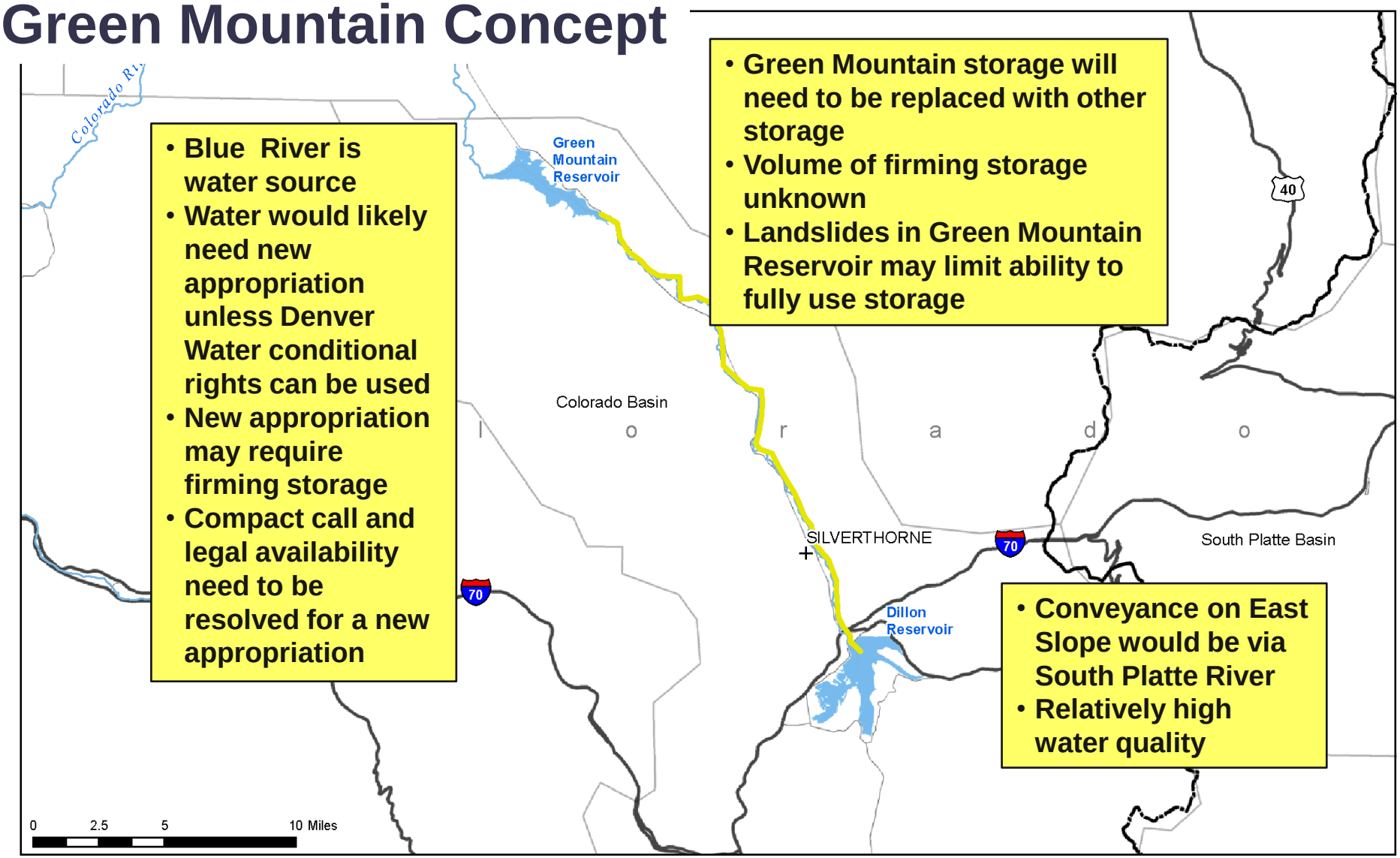
Benefits	Impacts	Potential Attributes
Less reliance on additional deliveries from headwaters areas, thus minimizing streamflow impacts in environmentally sensitive areas	Water quality is poor and treatment costs (capital and O&M) are high	Potential to collaborate with remaining agricultural users to construct lower basin storage or recharge facilities to improve agricultural yields or provide for well augmentation
Decreases the need for additional transbasin diversions	Transfer to South Metro Area may be of concern	Shared infrastructure among water providers, resulting in economies of scale for capital and O&M
No net increase in depletions to the river system	Disposal of treatment waste stream concentrate is a challenge and very costly	Can provide for coordinated acquisition of agricultural rights for either a traditional or alternative transfer preserving higher quality/value agricultural production
	Loss of irrigated acreage in production annually regardless of the type of agricultural transfer	Conjunctive use with non-tributary groundwater can potentially improve the overall project operation
	Significant energy requirements for pumping and water treatment	

New Supply Development

New Supply Development Strategy Overview

- Overview of projects and methods to meet needs matrix for roundtables
- Engineering Evaluation Elements
  - Green Mountain concept <100,000 acre-ft
  - Yampa concept 100,000 to 250,000 acre-ft
  - Flaming Gorge concept 100,000 to 250,000 acre-ft
  - Colorado River Return Reconnaissance concept 100,000 to 250,000 acre-ft
- Example benefits and issues with each project

Green Mountain Concept



- Blue River is water source
- Water would likely need new appropriation unless Denver Water conditional rights can be used
- New appropriation may require firming storage
- Compact call and legal availability need to be resolved for a new appropriation

- Green Mountain storage will need to be replaced with other storage
- Volume of firming storage unknown
- Landslides in Green Mountain Reservoir may limit ability to fully use storage

- Conveyance on East Slope would be via South Platte River
- Relatively high water quality

Legend

- Cities
- Highways
- Other Roads
- Rivers and Streams
- Lakes and Reservoirs
- Colorado Basins
- Green Mountain Concept

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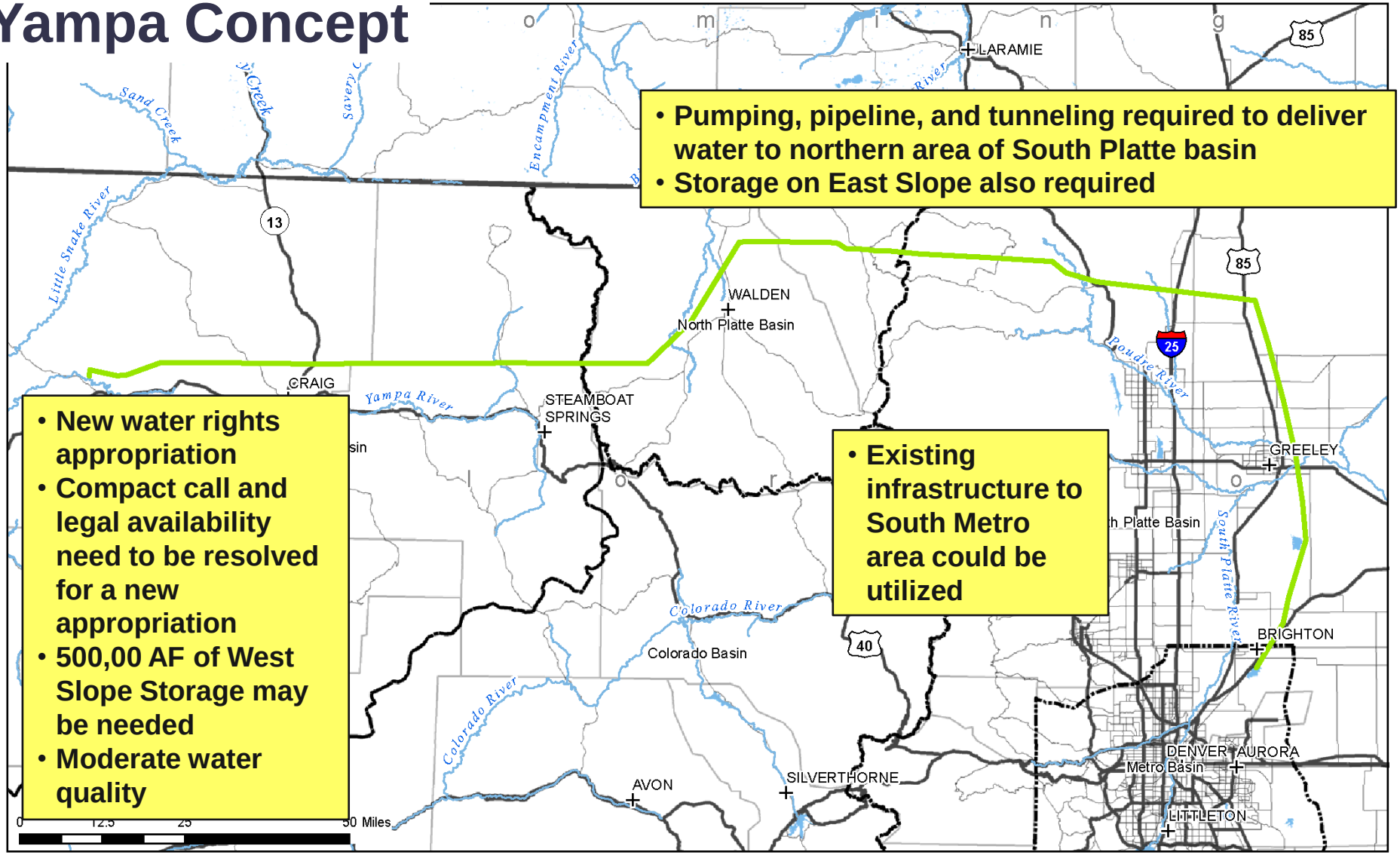
Green Mountain Concept
Example of Benefits, Impacts, and Attributes

Benefits	Impacts	Potential Attributes
Minimize loss of irrigated acres in South Platte and Arkansas Basins	Potential for increased compact call	Delivery to North Fork of South Platte upstream of Denver Metro area for gravity delivery to Denver Water customers and other water providers
Maximize Colorado's Colorado River compact entitlement	Additional in-basin storage	
Additional flows in Upper South Platte	Diminished flows in rivers below proposed diversions with potential increases in TDS and other water quality impacts	Protect or enhance Blue River flows
Grand County streamflow management	Phosphorus levels in Dillion Reservoir	Exchanges for additional flows in Colorado headwaters
Additional Grand Valley water supplies	Green Mountain Reservoir levels	Multi-purpose storage for endangered species and other Colorado Basin needs

Green Mountain Concept
Example of Benefits, Impacts, and Attributes (cont.)

Benefits	Impacts	Potential Attributes
Dillon Reservoir Levels	Green Mountain Reservoir/ Wolcott Reservoir Swap	Ability to exchange water for Summit County Municipal and Industrial purposes
Additional water supplies for the upper Blue River		
Additional yield for Clinton Reservoir		
Blue River flow enhancement		Recreation component for Wolcott Reservoir
Additional west slope supplies		
Abandonment of some Eagle River rights		

Yampa Concept



Legend

- Cities
- Highways
- Other Roads
- Rivers and Streams
- Lakes and Reservoirs
- Colorado Basins
- Yampa River Concept

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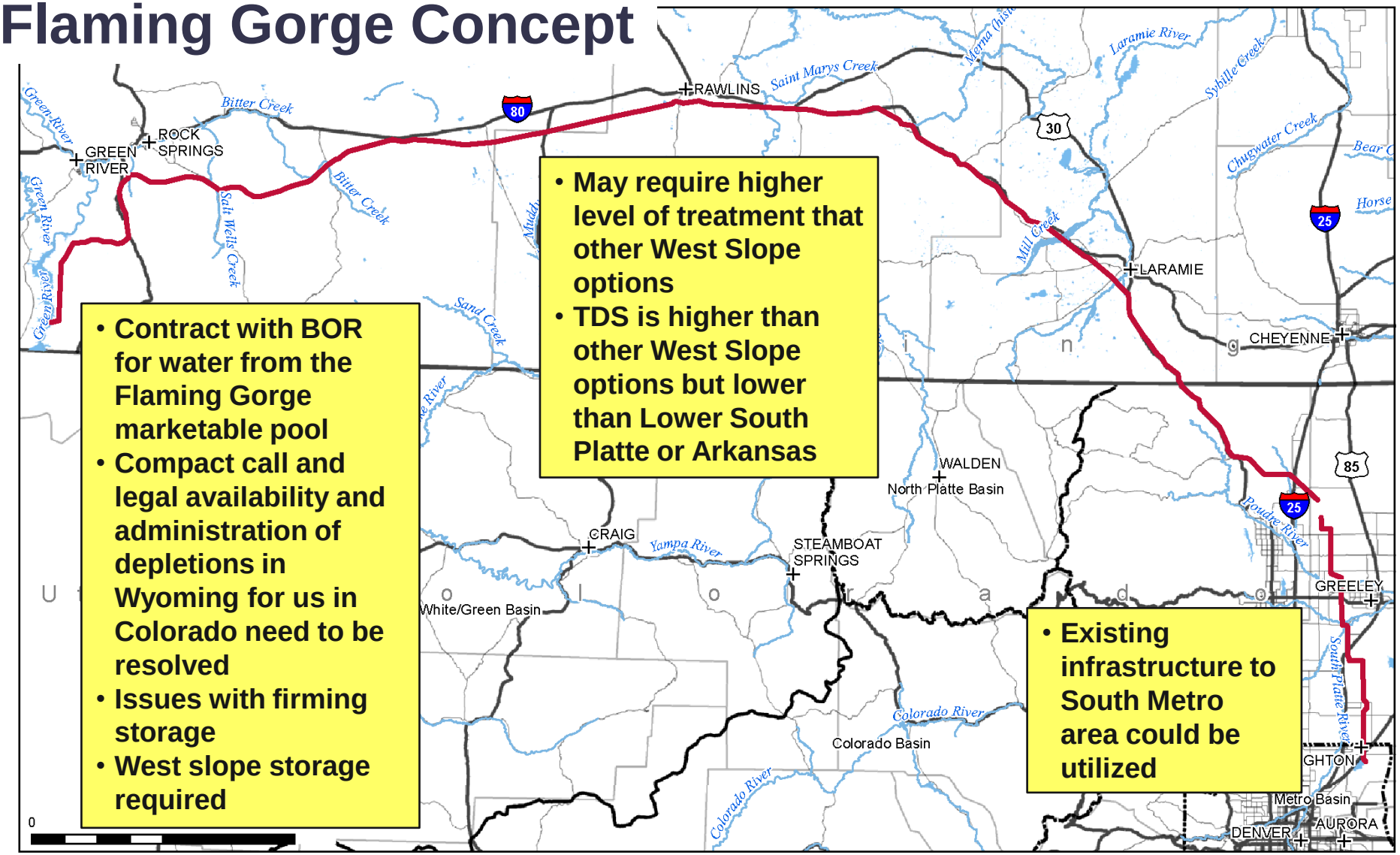
Yampa Concept
Example of Benefits, Impacts, and Attributes

Benefits	Impacts	Potential Attributes
Minimize loss of irrigated acres in South Platte and Arkansas Basins	Potential for increased compact call	Multiple Front Range delivery locations
Maximize Colorado's Colorado River Compact entitlement	Large energy requirements	West Slope and East Slope storage
	Endangered species on Yampa and Green Rivers	East Slope hydropower facilities
	Dinosaur National Monument located downstream of proposed diversion	

Flaming Gorge Concept



- Contract with BOR for water from the Flaming Gorge marketable pool
- Compact call and legal availability and administration of depletions in Wyoming for us in Colorado need to be resolved
- Issues with firming storage
- West slope storage required

- May require higher level of treatment that other West Slope options
- TDS is higher than other West Slope options but lower than Lower South Platte or Arkansas

- Existing infrastructure to South Metro area could be utilized

Legend

- Cities
- Highways
- Other Roads
- Rivers and Streams
- Lakes and Reservoirs
- Colorado Basins
- Flaming Gorge Concept

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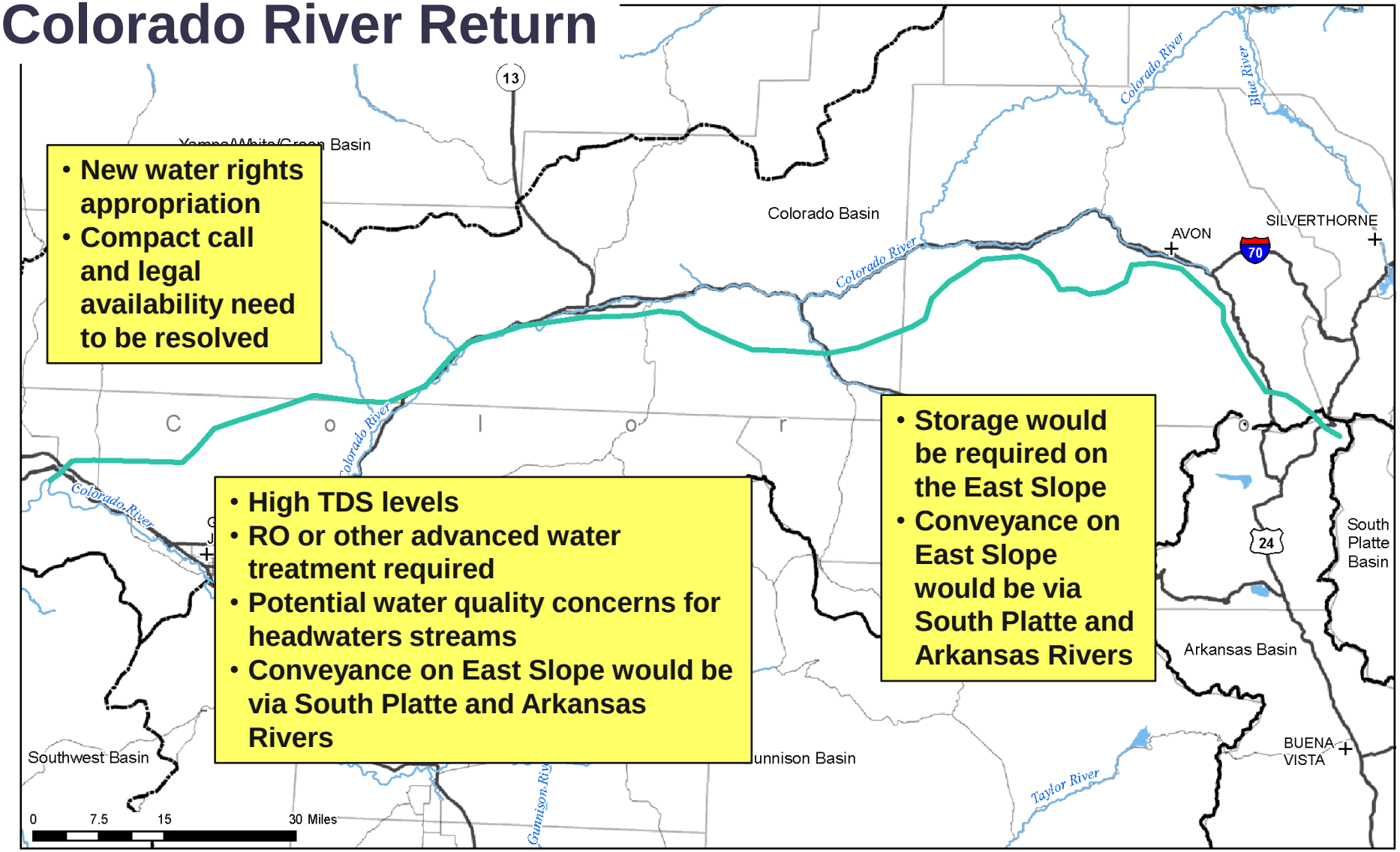
Flaming Gorge Concept
Example of Benefits, Impacts, and Attributes

Benefits	Impacts	Potential Attributes
Minimize loss of irrigated acres in South Platte and Arkansas Basins	Potential downstream endangered fishes and depletion issues	Delivery to in-basin users for agricultural domestic augmentation and instream flows
Acceptable quality water source that may not require advanced water treatment processes	Enlargement or construction of additional storage in South Platte or Arkansas	Exchanges for additional flows in Colorado headwaters
Maximizes State of Colorado's Colorado River Compact entitlement without impacting streamflows Colorado	Large energy requirements	Allows water development while protecting recreational and environmental flows in Colorado River Basin
	Potential for increased compact call	
	Coordinated administration of water rights in the event of a compact call	

Colorado River Return



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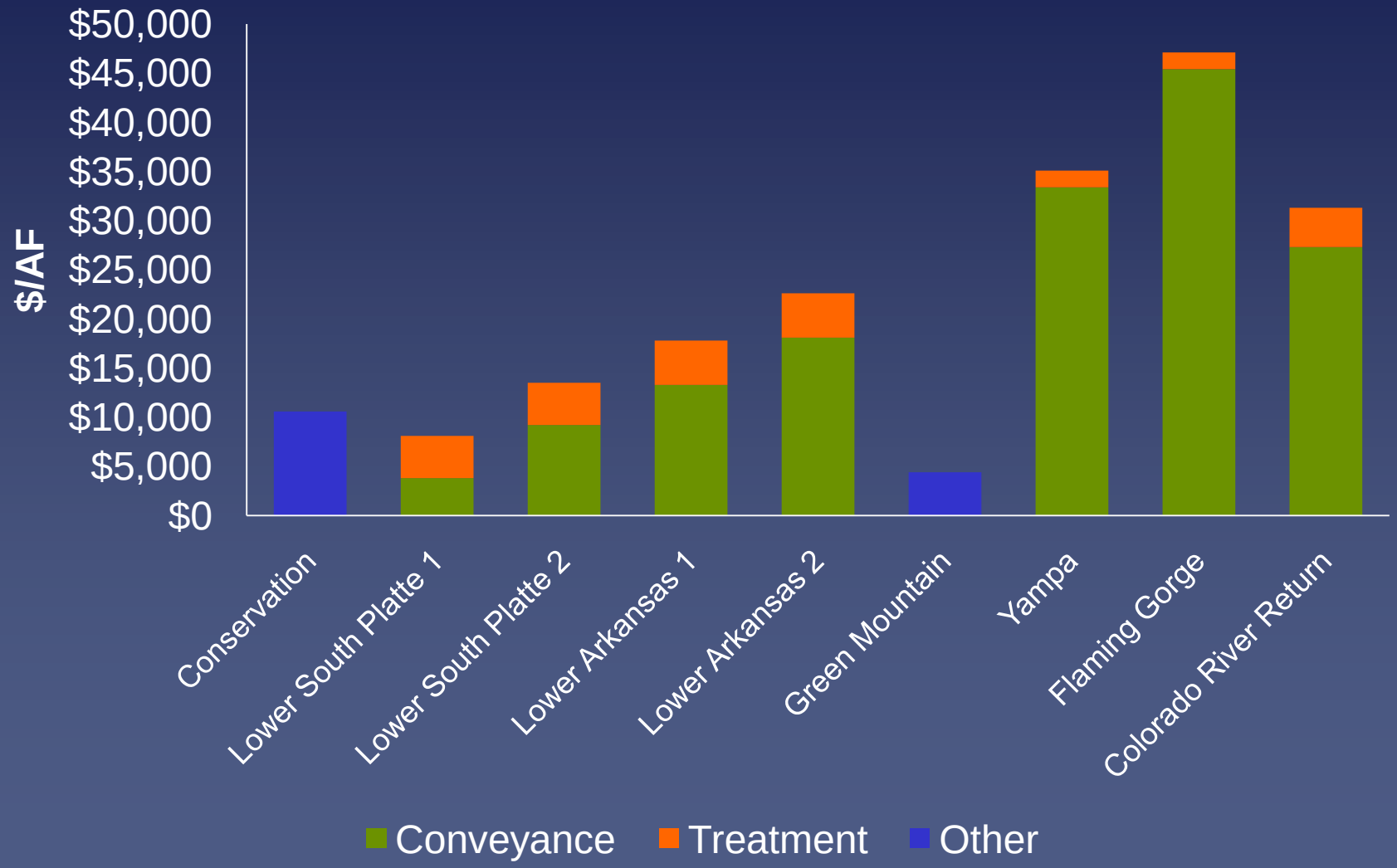
Colorado River Return Reconnaissance Example of Benefits, Impacts, and Attributes

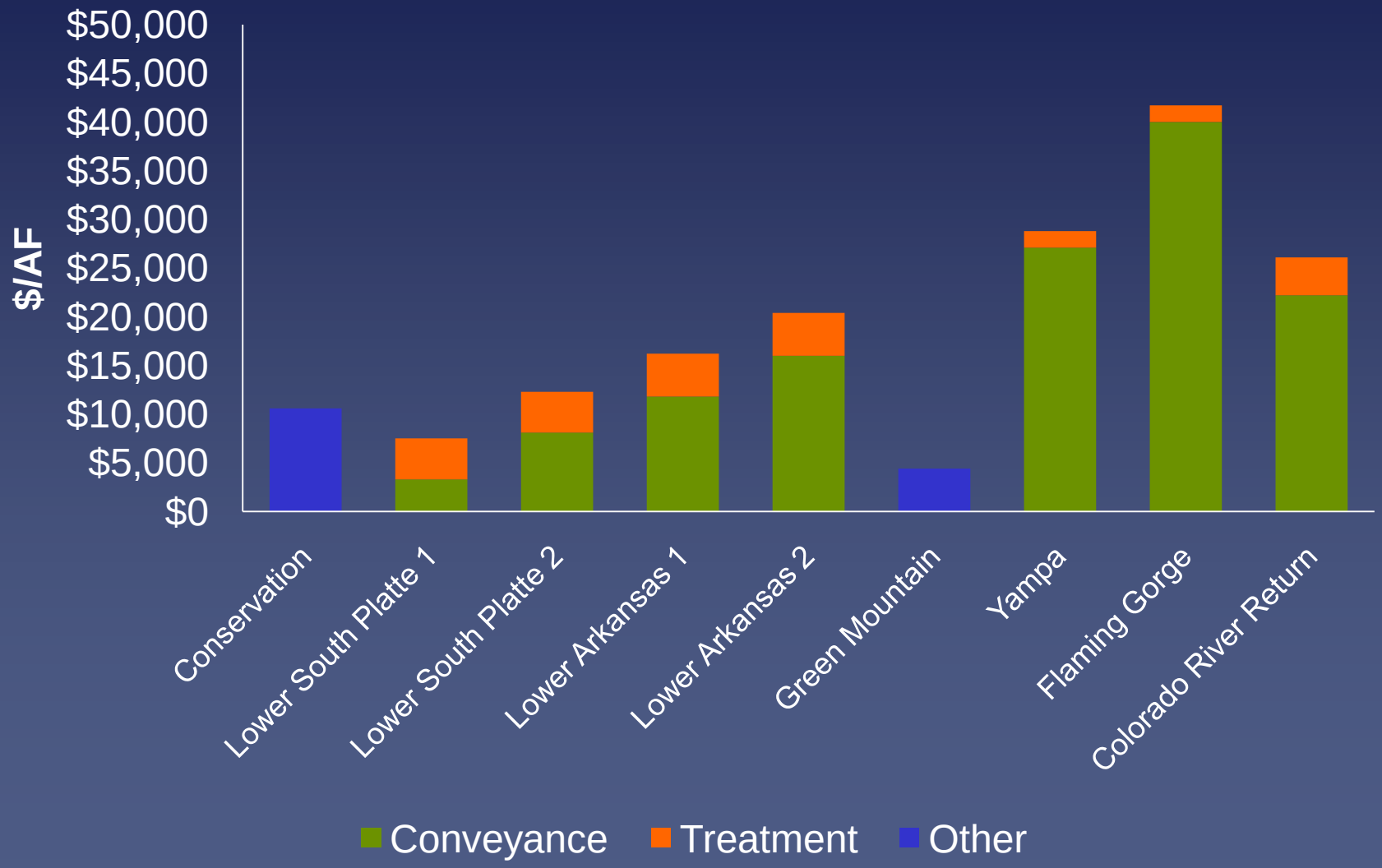
Benefits	Impacts	Potential Attributes
Minimize loss of irrigated acres in South Platte and Arkansas	**Water quality is poor and treatment costs (capital and O&M) are high**	**Delivery to in-basin users for ag, domestic augmentation, and instream flows**
Diverts below all major users in Colorado	**Disposal of treatment waste stream concentrate is a challenge and very costly**	**Exchanges for additional flows in Colorado headwaters**
Maximize Colorado's compact entitlement	**Potential for increased compact call**	**Allows water development while protecting recreational and environmental flows in Colorado basin**
Less reliance on additional deliveries from headwaters areas, thus minimizing streamflow impacts	**Stream temperature, nutrients, and TDS in water after treatment will be different than streams receiving discharge from project**	
Additional flows in upper South Platte, Arkansas, and Colorado Rivers, providing for additional environmental and recreational enhancement	**Reduction of flows in the main stem Colorado River and the presence of federally listed fish species below the diversion**	
Multiple basin delivery	**Significant energy requirements**	

Summary

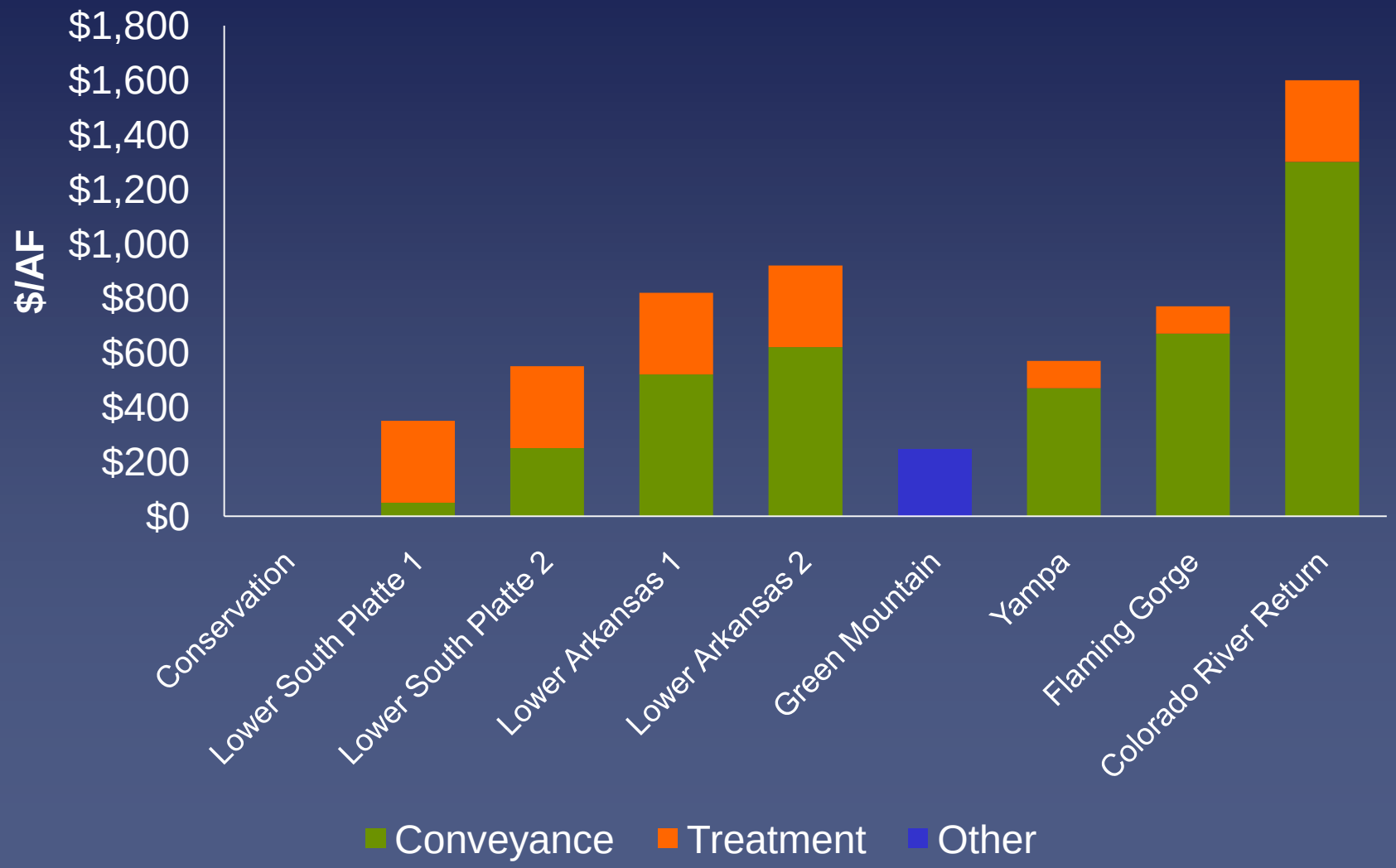
Summary of Capital Costs per Acre-Foot by Concept – 100,000 AF Increment (Preliminary Draft)



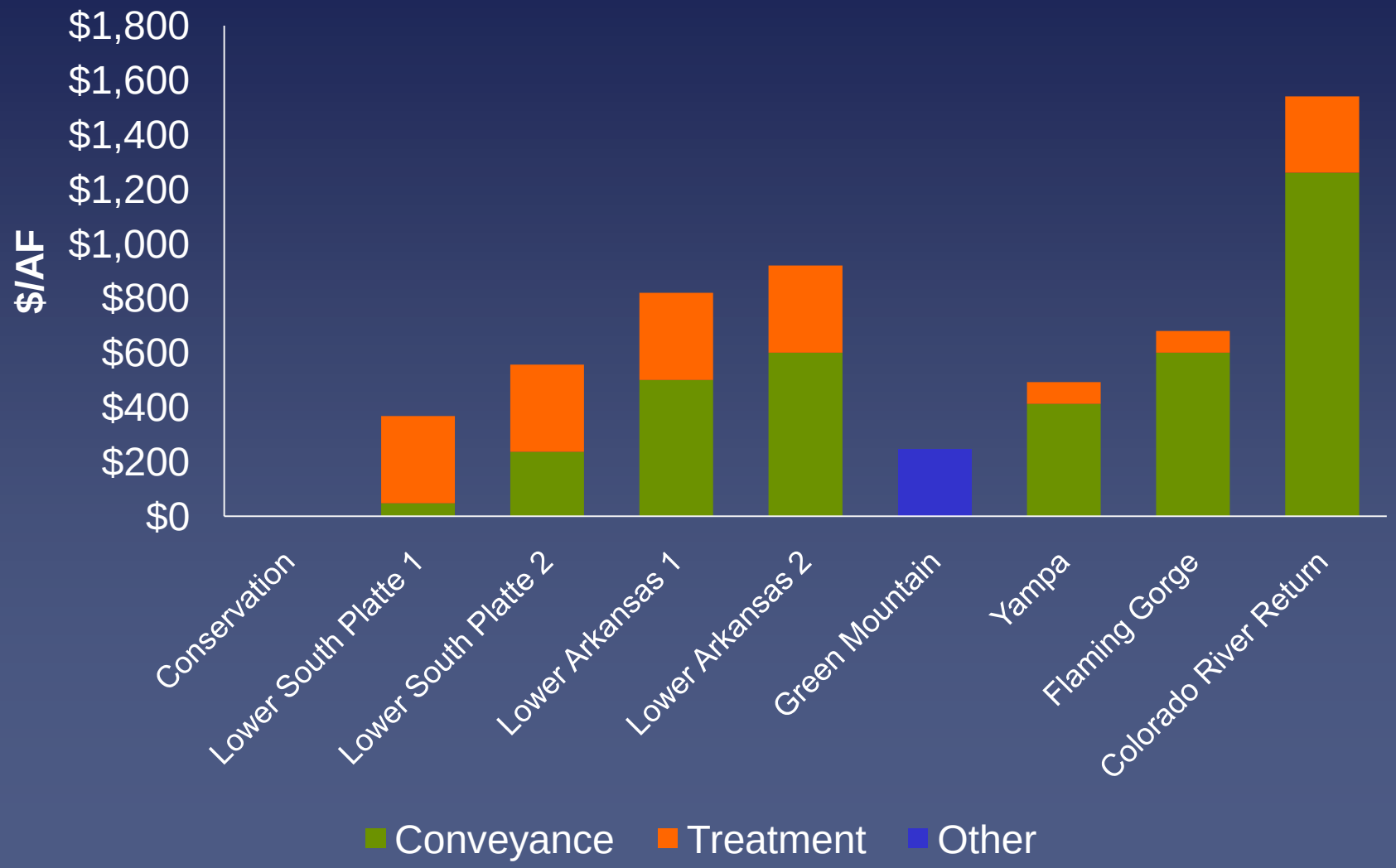
Summary of Capital Costs per Acre-Foot by Concept – 250,000 AF Increment



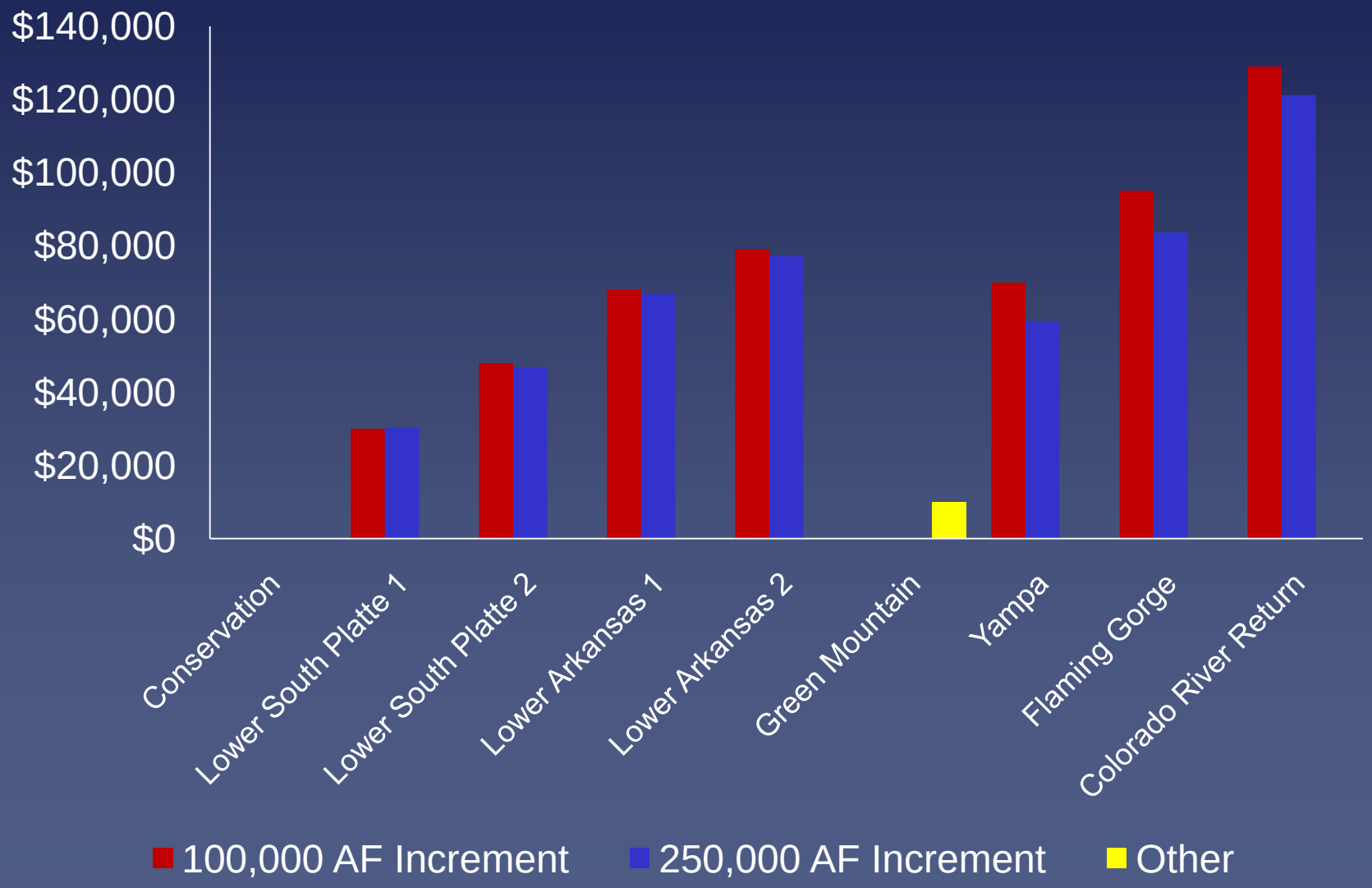
Summary of O&M Costs per Acre-Foot by Concept – 100,000 AF Increment



Summary of O&M Costs per Acre-Foot by Concept – 250,000 AF Increment



Summary of Net Present Value by Acre-Foot



Risk Management Strategies

Risk Management and Planning

- Timing and phased development
- Incremental development
- No regrets planning

Risk Management and Implementation

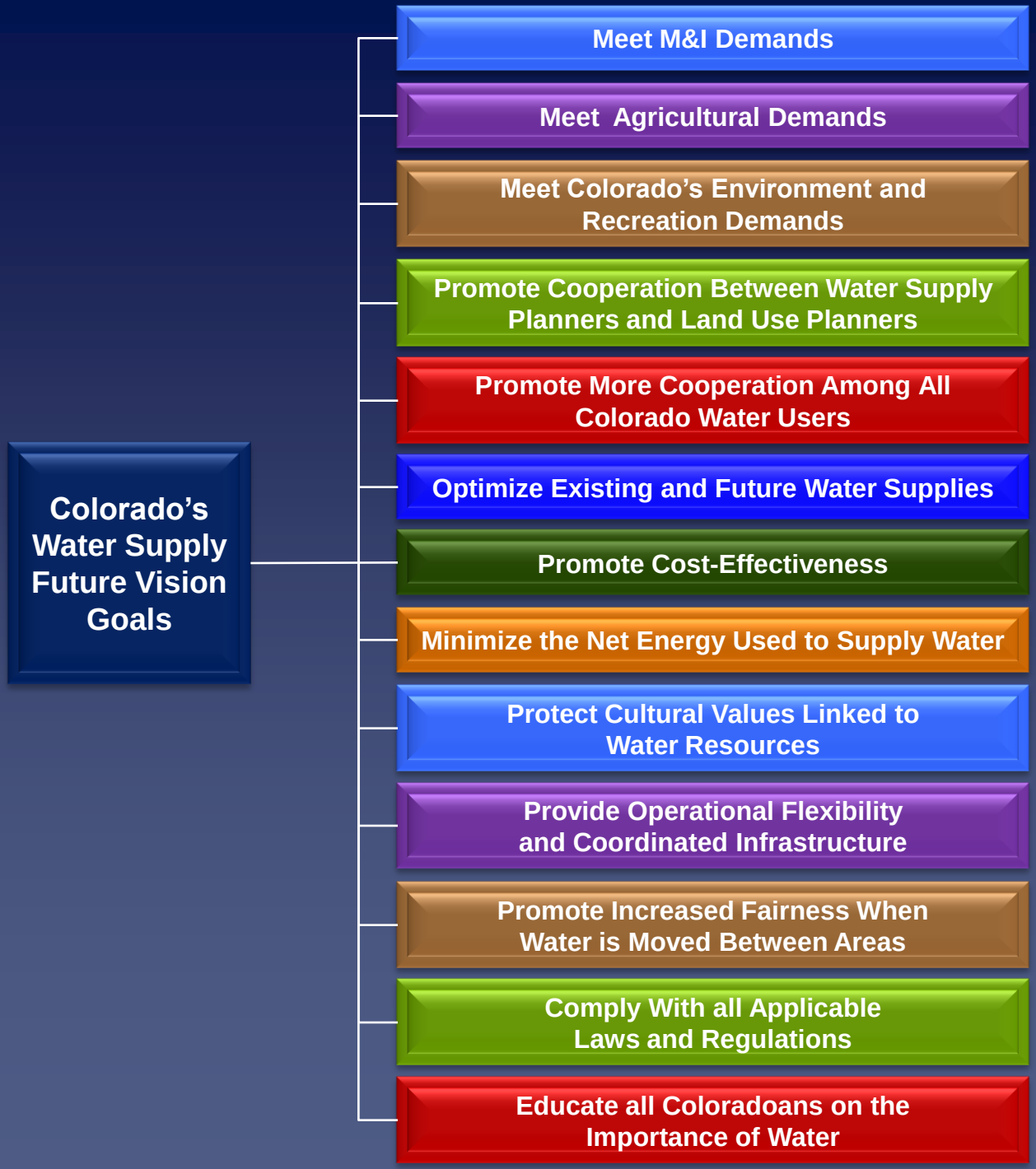
- West Slope Water Bank
- Compact Delivery via Blue Mesa
- Conjunctive Use of Denver Basin Aquifer
- System Wide Augmentation

Next Steps and Path Forward

Next Steps in Strategy Analysis

- Evaluation processes
- Tradeoffs
- Risk and uncertainity

Elements of the Visioning Process


Colorado's Water Supply Future Vision Goals
Meet M&I Demands
Meet Agricultural Demands
Meet Colorado's Environment and Recreation Demands
Promote Cooperation Between Water Supply Planners and Land Use Planners
Promote More Cooperation Among All Colorado Water Users
Optimize Existing and Future Water Supplies
Promote Cost-Effectiveness
Minimize the Net Energy Used to Supply Water
Protect Cultural Values Linked to Water Resources
Provide Operational Flexibility and Coordinated Infrastructure
Promote Increased Fairness When Water is Moved Between Areas
Comply With all Applicable Laws and Regulations
Educate all Coloradoans on the Importance of Water

How Will we Know What Future Scenario we Are On?

- Need to have triggers at certain timeframes in the future
  - IPP success or failure
  - Population growth
  - Supply availability analysis
  - Climate change
- What actions are taken given on certain outcomes

Additional Information

Recap of Path Forward for CWCB and IBCC

- May IBCC Meeting Direction
- July CWCB Meeting Direction
- Visioning exercise – August IBCC Meeting
- October IBCC Meeting – Visioning and Strategies
- December IBCC Meeting – Strategies
- January CWCB Meeting – Conceptual Conservation Alternative Presented

Continued Development of Water Supply Strategies

- Front Range Needs Assessment request to examine strategies in coordination with West Slope
- West Slope Responds
- Additional interests including existing transbasin diverters and River District have confirmed the need for strategy development

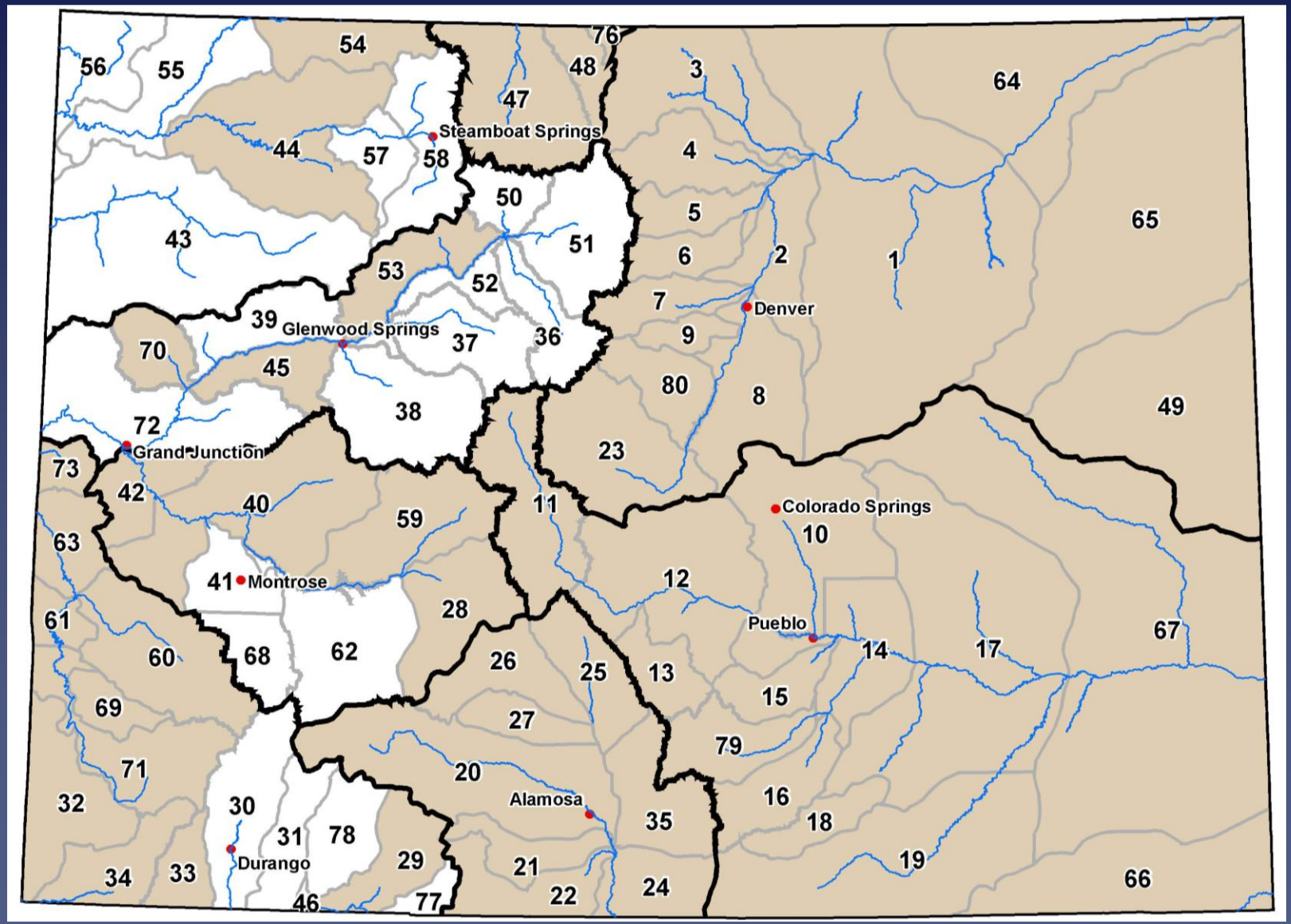
Since the December 2008 IBCC Meeting, We Have Presented the Strategies Overview at Roundtable Meetings

- January
  - Colorado
- February
  - Metro
  - South Platte
  - North Platte
  - Yampa
- March
  - Gunnison
  - Rio Grande
  - Southwest
  - Arkansas

Agricultural Needs

- Most areas in the state have shortages greater than 10 percent
- Based on Needs Assessment Updates, Yampa/White Basin and Gunnison Basin are executing WSRA grants to assess their current and future shortages and needs
- New Water Supply Development will look for opportunities for agricultural shortages

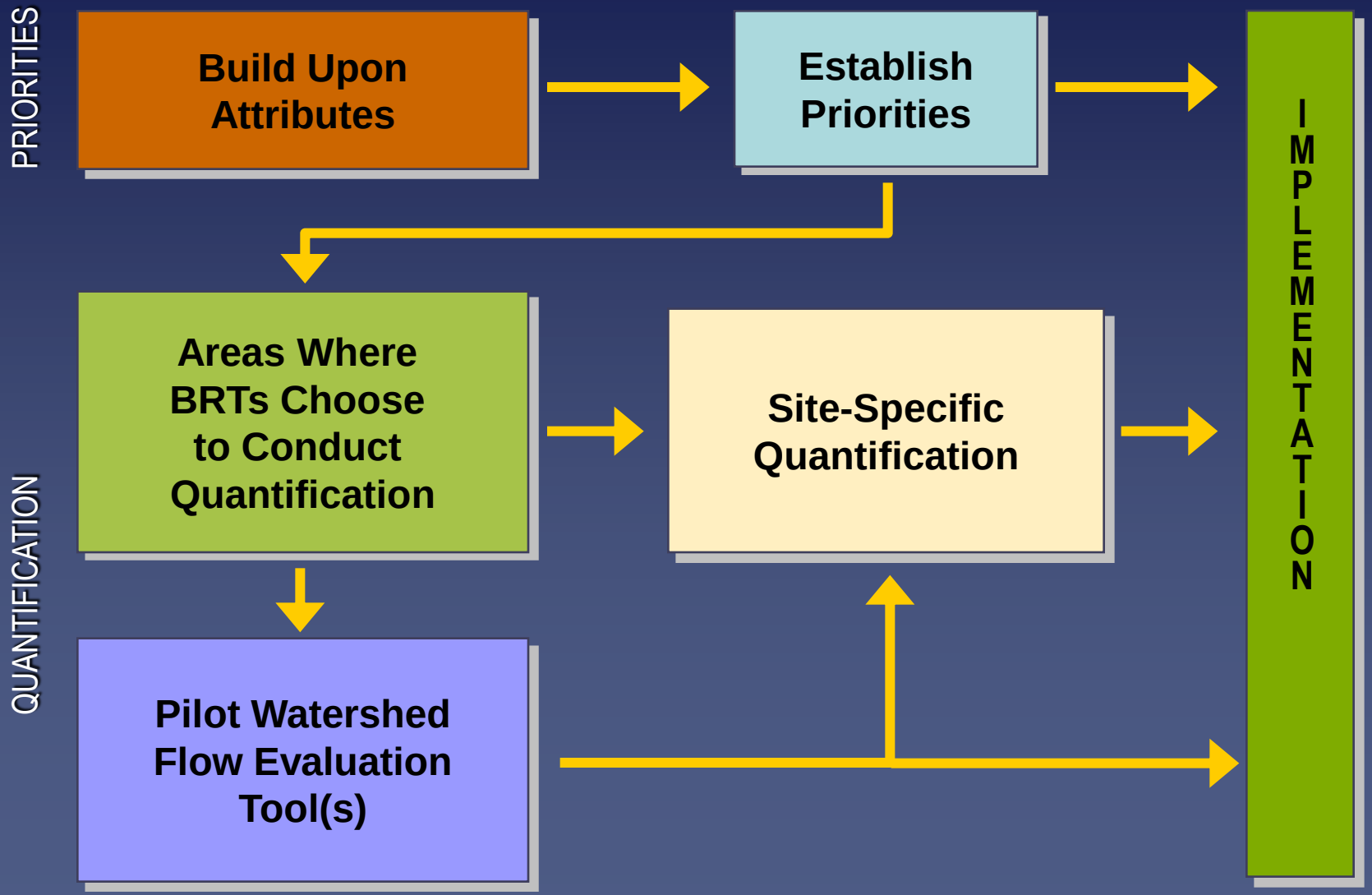
2030 Ag Water Shortages Greater than 10 percent (shaded) by Water District



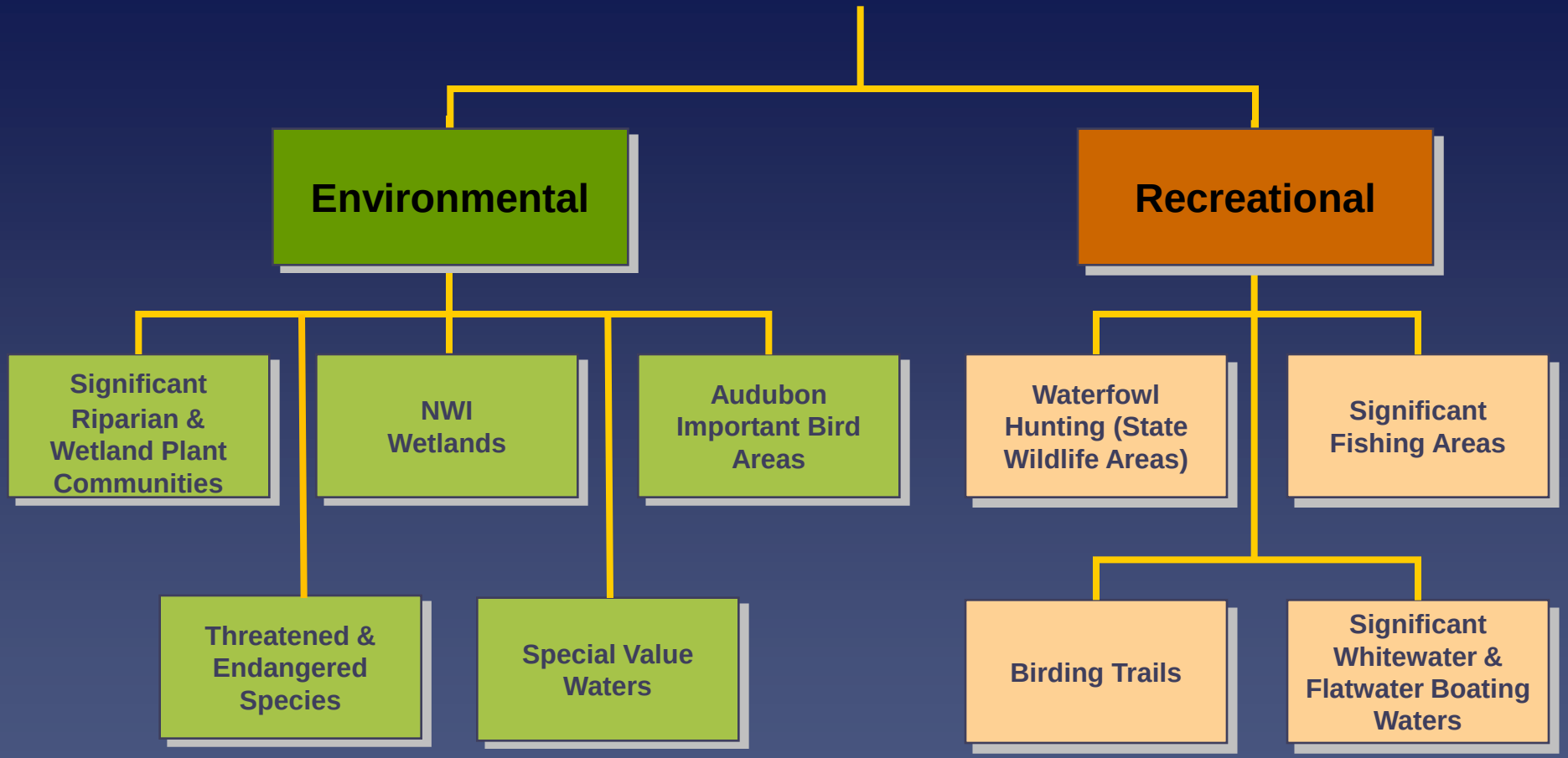
Environmental and Recreational Needs

- Roundtables are in the process of finalizing their environmental and recreational priority areas
- Statewide map will be developed of these priority areas
- Arkansas Basin and Colorado Basin have prepared WSRA applications for further quantification of their environmental and recreational needs

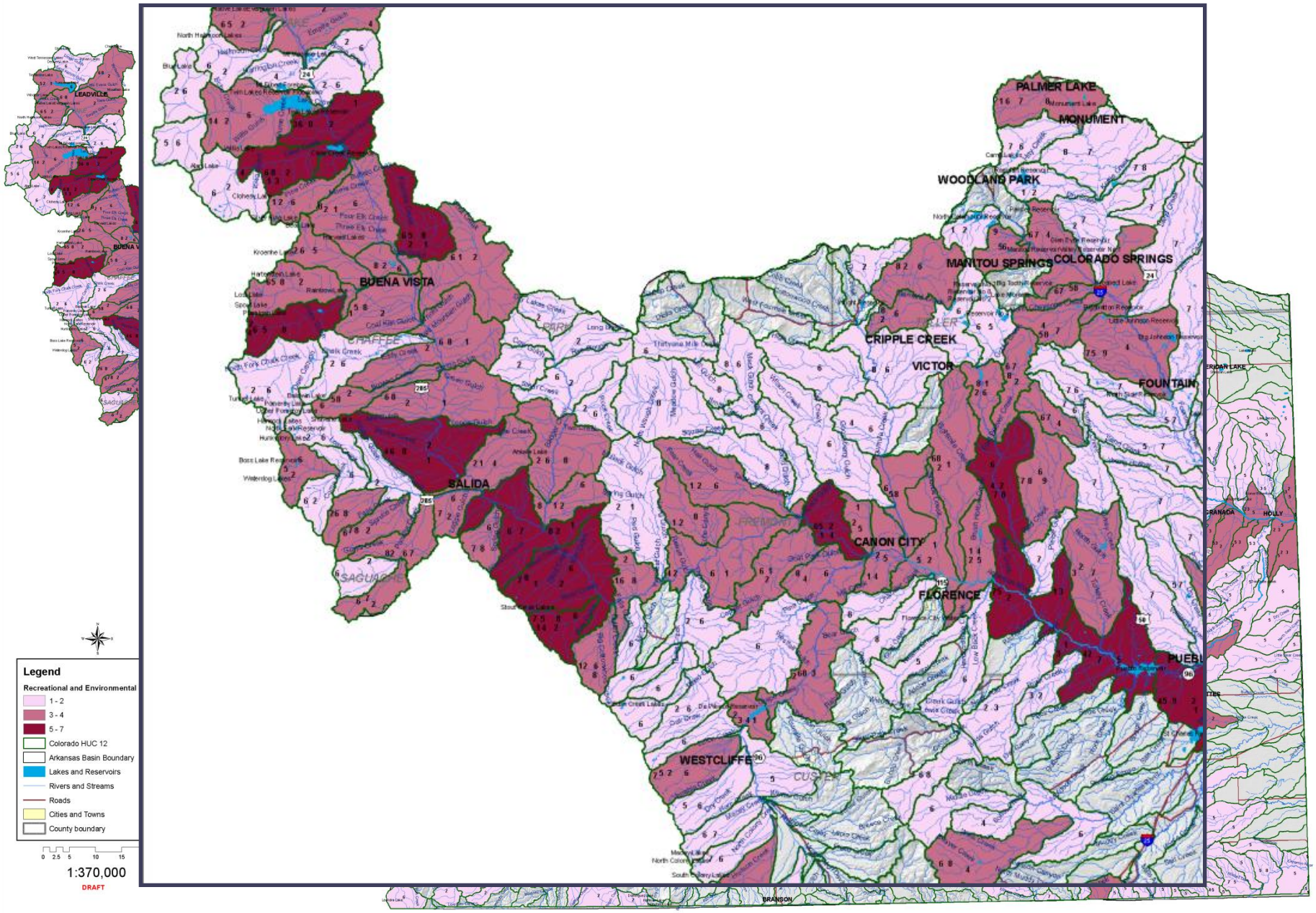
Nonconsumptive Needs Assessment Methodology



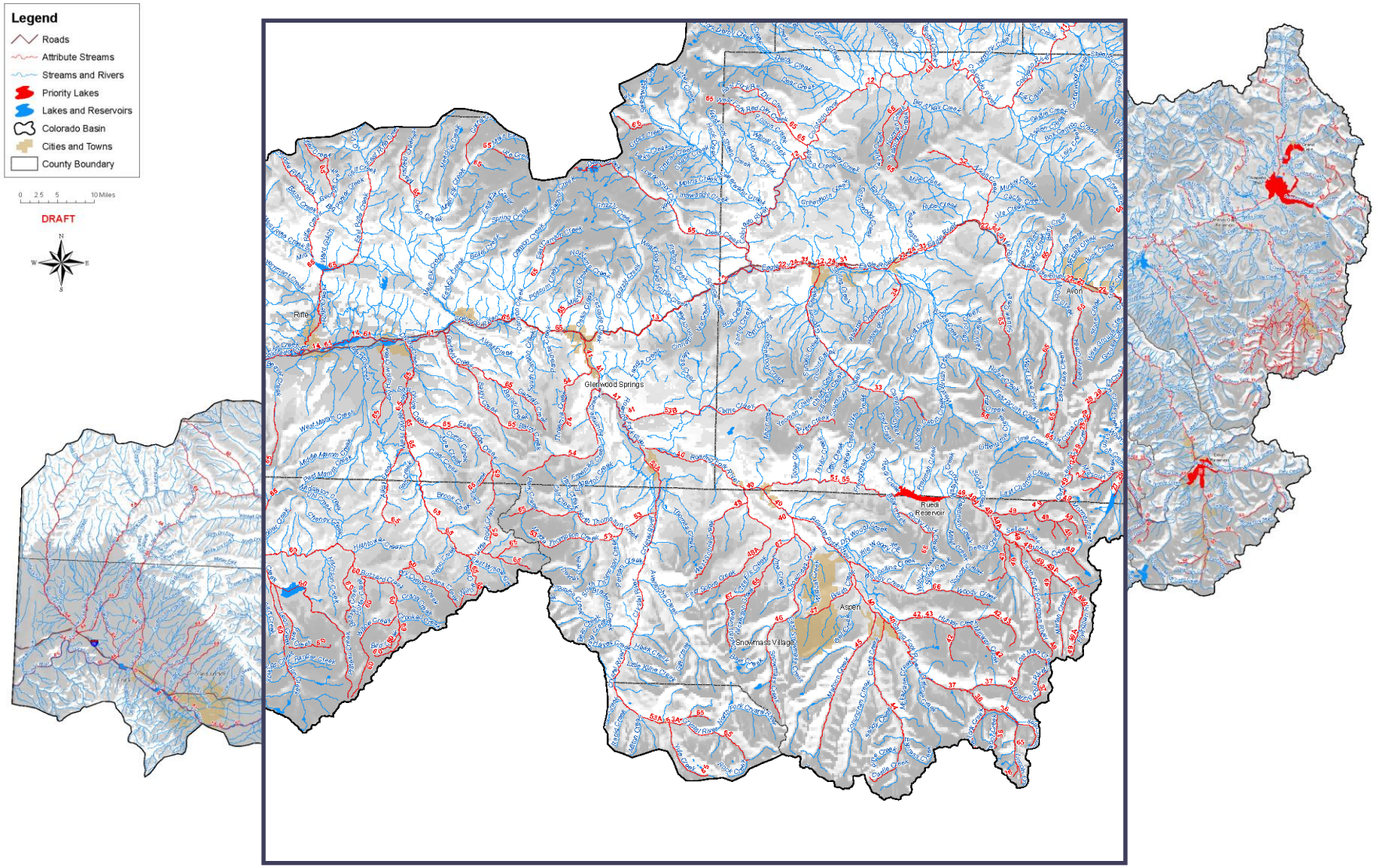
Arkansas Basin Attributes



Arkansas Basin Nonconsumptive Needs Assessment
Environmental and Recreational Priorities
HUC 12 Watershed Based Environmental and Recreational Attributes Prioritization



Colorado Basin Nonconsumptive Needs Assessment
Priority Streams and Lakes



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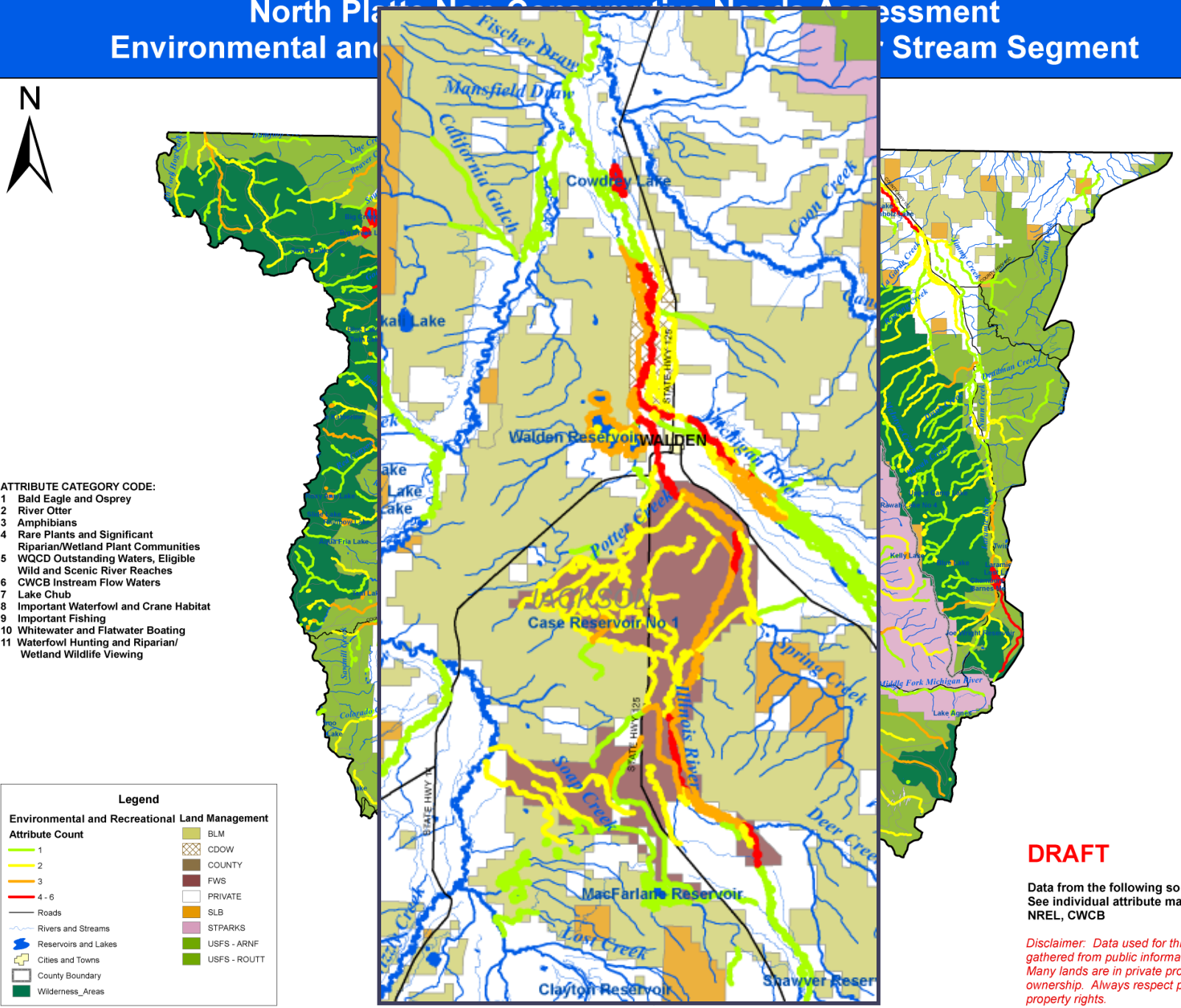
North Pla… Assessment
Environmental and … Stream Segment



ATTRIBUTE CATEGORY CODE:
1 Bald Eagle and Osprey
2 River Otter
3 Amphibians
4 Rare Plants and Significant Riparian/Wetland Plant Communities
5 WQCD Outstanding Waters, Eligible Wild and Scenic River Reaches
6 CWCB Instream Flow Waters
7 Lake Chub
8 Important Waterfowl and Crane Habitat
9 Important Fishing
10 Whitewater and Flatwater Boating
11 Waterfowl Hunting and Riparian/ Wetland Wildlife Viewing

Legend

Environmental and Recreational Attribute Count
- 1
- 2
- 3
- 4 - 6
- Roads
- Rivers and Streams
- Reservoirs and Lakes
- Cities and Towns
- County Boundary
- Wilderness_Areas

Land Management
- BLM
- CDOW
- COUNTY
- FWS
- PRIVATE
- SLB
- STPARKS
- USFS - ARNF
- USFS - ROUTT

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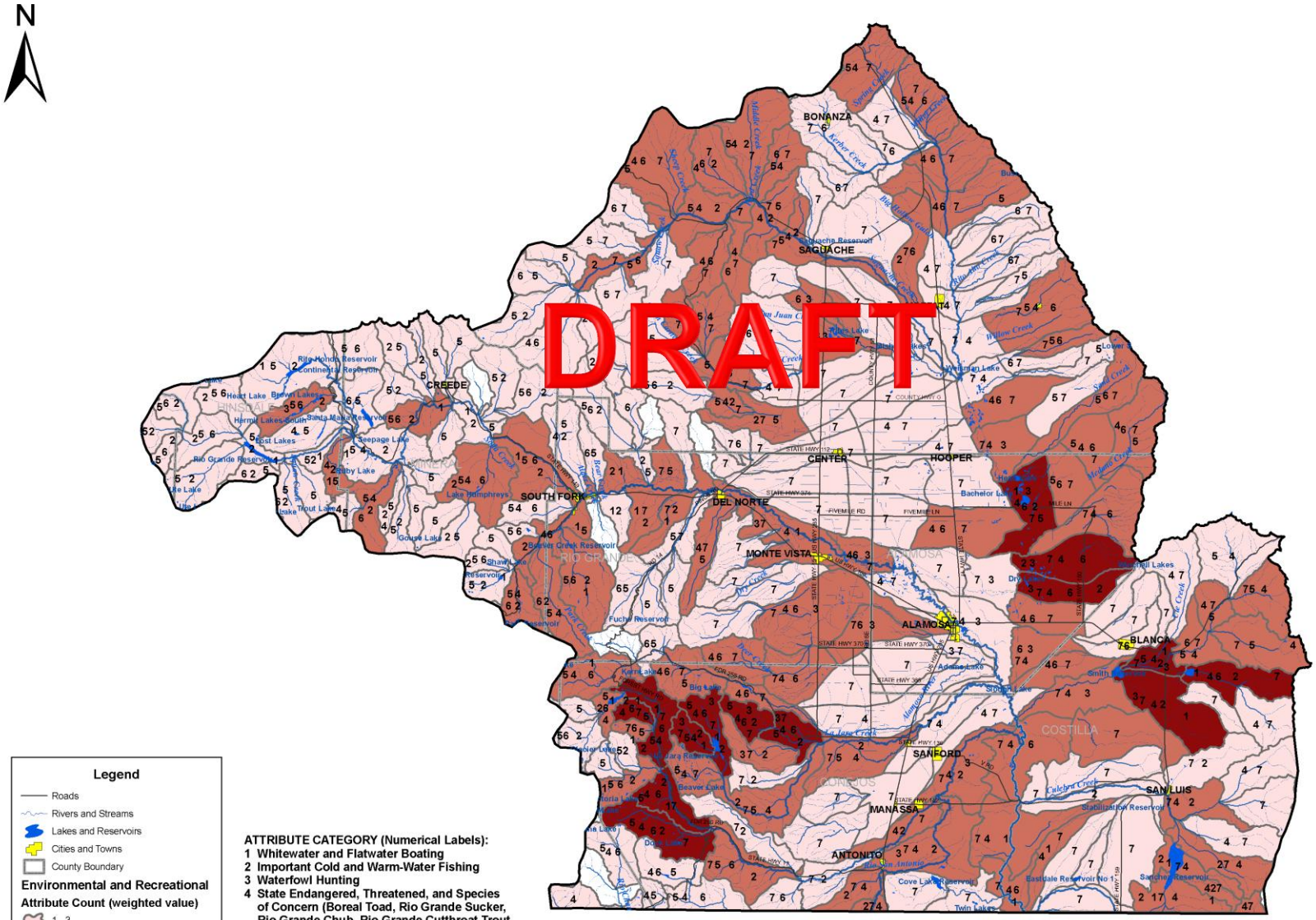
Data from the following sources:
See individual attribute maps,
NREL, CWCB

Disclaimer: Data used for this effort is gathered from public information sources. Many lands are in private property ownership. Always respect private property rights.

Rio Grande Basin Non-Consumptive Needs Assessment
Sample 12-Digit HUC Prioritization Based on Environmental and Recreational Attributes



Note: Wetlands were assigned a weighted value of 2. All other attribute categories had a weight of 1.

ATTRIBUTE CATEGORY (Numerical Labels):

1 Whitewater and Flatwater Boating
2 Important Cold and Warm-Water Fishing
3 Waterfowl Hunting
4 State Endangered, Threatened, and Species of Concern (Boreal Toad, Rio Grande Sucker, Rio Grande Chub, Rio Grande Cutthroat Trout, Southwestern Willow Flycatcher, Northern Leopard Frog)
5 Special Value Waters (CWCB Instream Flow Waters, Eligible/Suitable Wild and Scenic, WQCD Oustanding Waters)
6 Rare Plants and Significant Riparian Wetland Plant Communities
7 Wetlands (National Wetlands Inventory)

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Data from the following sources:
See Individual Attribute Maps,
USGS, CWCB

Status of Priority Mapping for Remainder of Roundtables

Basin	Status
Arkansas	• Approved mapping expected WSRA application
Colorado	• Approved mapping and submitted WSRA application
Gunnison	• Compiling comments on map, planning April 6 vote on mapping
North Platte	• Vote on mapping March 24
Rio Grande	• Vote on mapping April 14
South Platte	• Revising mapping
Metro	• Vote on mapingp April 8
Southwest	• Compiling Public Comments
Yampa/White	• Vote on mapping April 15

Integration of Nonconsumptive Needs

- Statewide map of priorities
- CWCB in process of identifying existing protections
- Priority areas addressed during strategy development
  - Qualitative need
  - Quantitative need
  - Non-flow related needs