



Colorado Climate Plan

2015 Upper Colorado River Basin Water Forum

Taryn Finnessey

Climate Change Risk Management Specialist

Colorado Water Conservation Board



COLORADO
Department of Natural Resources

HB 13-1293



“The general assembly hereby declares that climate change presents serious, diverse, and ongoing issues for the state's people, economy, and environment...ensure that the state is apprised of the threats that climate change poses to Colorado and the progress made to mitigate and address those threats...”

- Development of a Plan
- Collaboration with other entities regarding climate change preparedness studies.
- Annual Report to legislature
 - Efforts to reduce emissions of gasses and to reform practices known to exacerbate climate change
 - Efforts (proposals) to prepare the state for the effects of climate change



Mutli-sectoral state level
policies and
recommendations

Includes mitigation and
adaptation

Collaborative effort by
state agencies



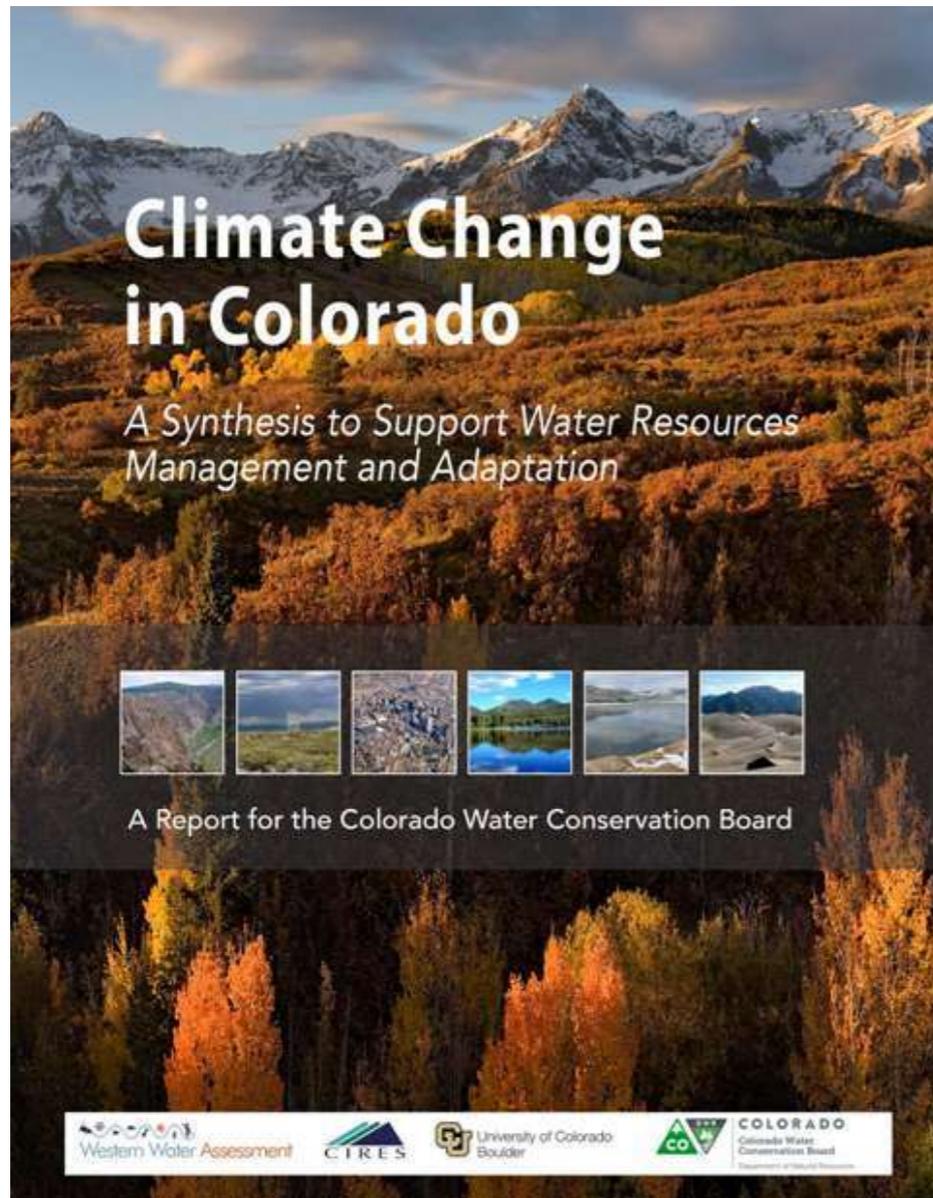
COLORADO **CLIMATE PLAN**

State Level Policies and Strategies to Mitigate and Adapt



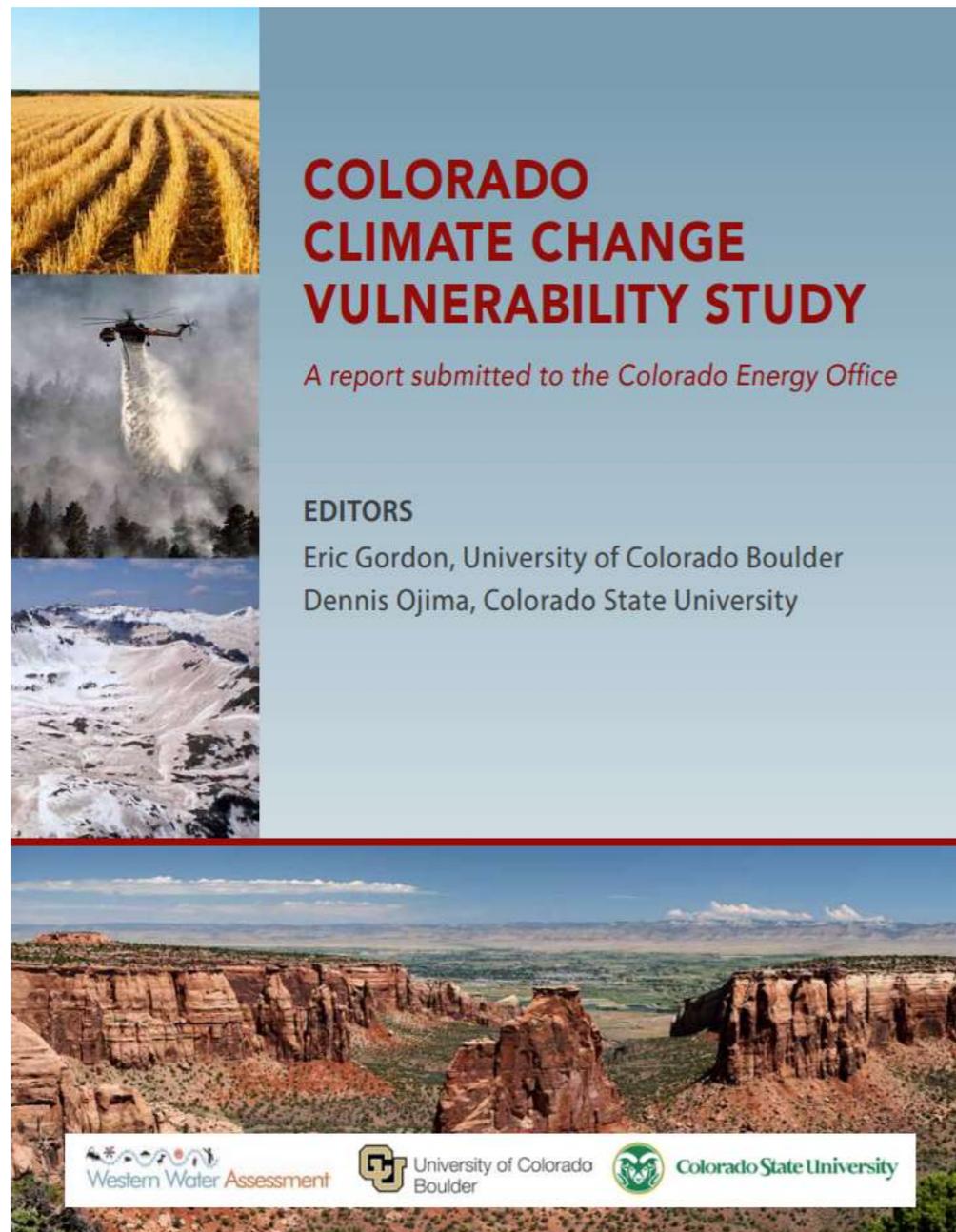
Climate Change in Colorado

A Synthesis to Support Water Resources Management and Adaptation



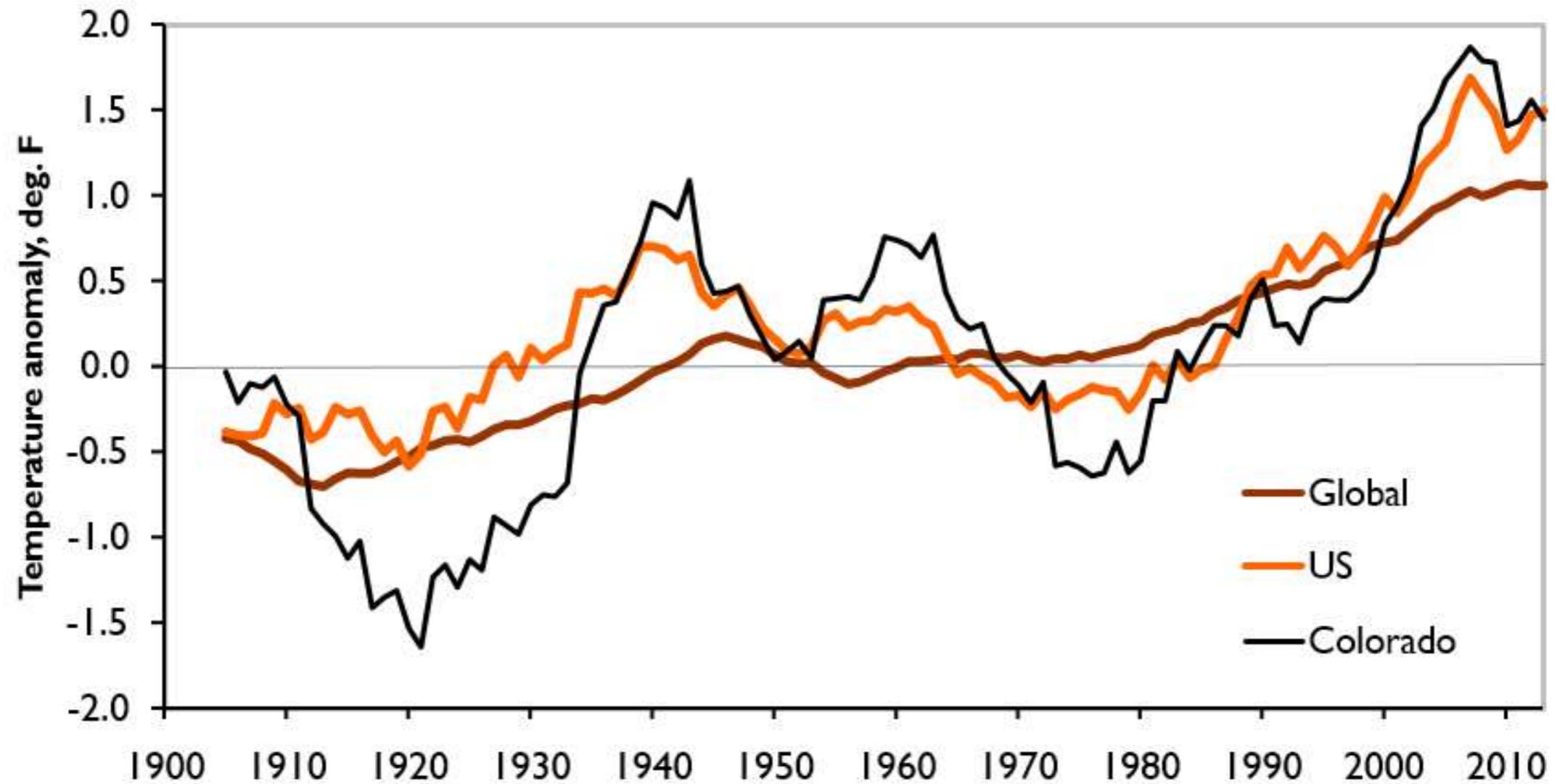
- A synthesis of climate change science important for Colorado's water supply.
- Observed trends, modeling, and projections of temperature, precipitation, snowmelt, and runoff.
- Colorado-specific findings from peer-reviewed regional studies.
- Presents new graphics derived from existing datasets.
- Released August 2014

Climate Change Vulnerability Study



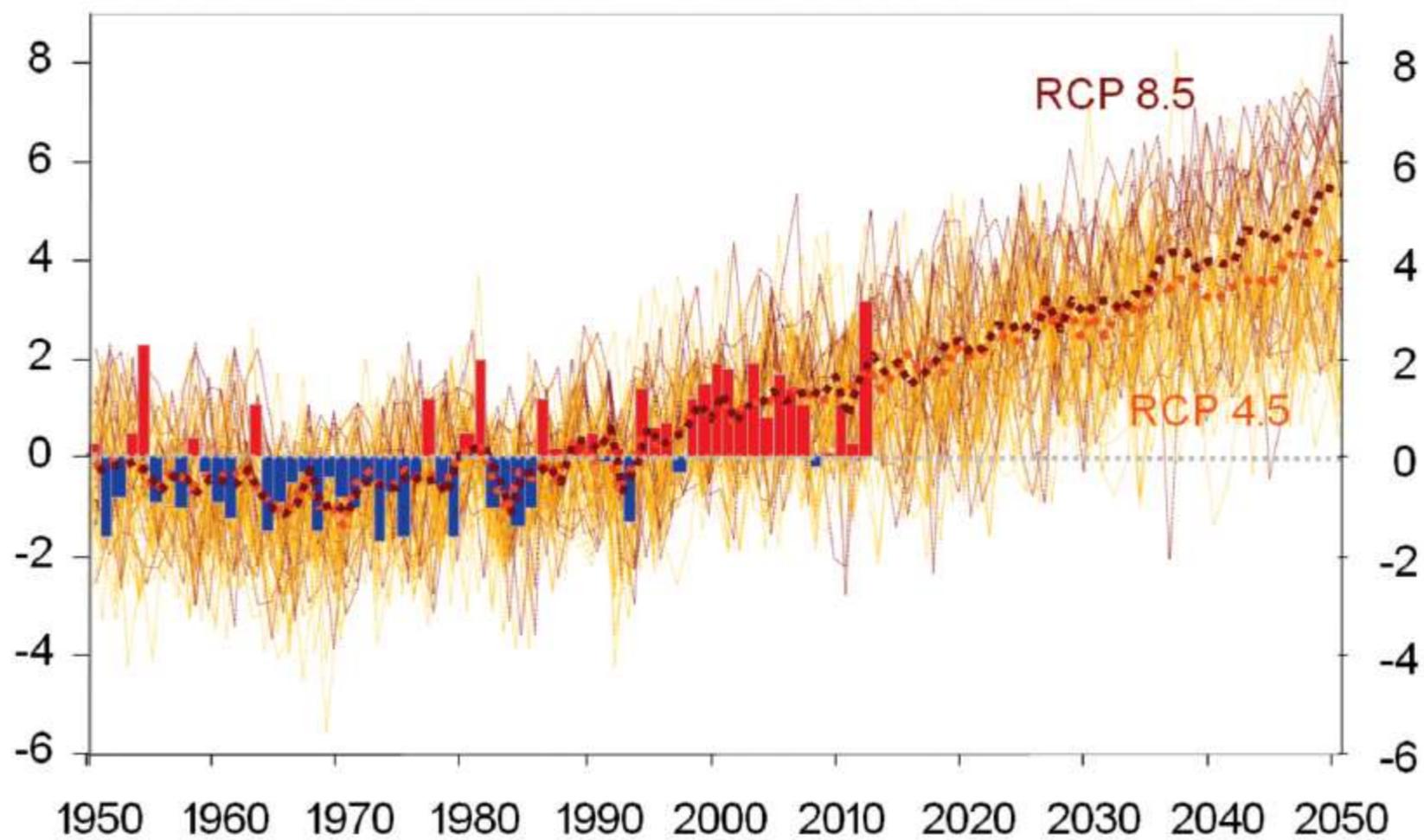
- Lead Agency: CEO
- Project Goal: To provide an assessment of the key climate change vulnerabilities facing Colorado's economy and resources.
- Qualitatively assesses vulnerabilities in the following sectors:
 - Water
 - Energy
 - Public Health
 - Transportation
 - Ecosystems
 - Agriculture
 - Tourism
- Conducted by researchers at CU & CSU
- Released February, 2015

Observed temperature departures for Colorado, the US, and globally, smoothed with a 10-year running mean



Climate variability is relatively larger at smaller scales, as seen in the US and Colorado time-series. You shouldn't judge the global trends from what is going on in Colorado. But all three records have followed a similar trajectory since 1900.

Observed & Projected Annual Temperatures



Source: Adapted from Lukas et.al, Climate Change in Colorado, 2014

2050 Temperature Projections in Context

2° F: Denver's seasonal temperature cycle will become more like Pueblo today



4° F: Denver's seasonal temperature cycle will become more like Lamar today



6° F: Denver's seasonal temperature cycle will become more like Albuquerque today



Water

Vulnerabilities: Changes in streamflow, peak runoff and crop demands. Decreases in Snowpack. Increases in drought. Increased water temperatures. Decreased water quality.



Projected climate and hydrology changes

Annual streamflow

decreases in majority of projections

Peak runoff timing

earlier in all projections

Crop water use

increases

April 1 snowpack

decreases in most projections

Palmer Drought Index

more drought

Heat waves

more frequent

Cold waves

less frequent

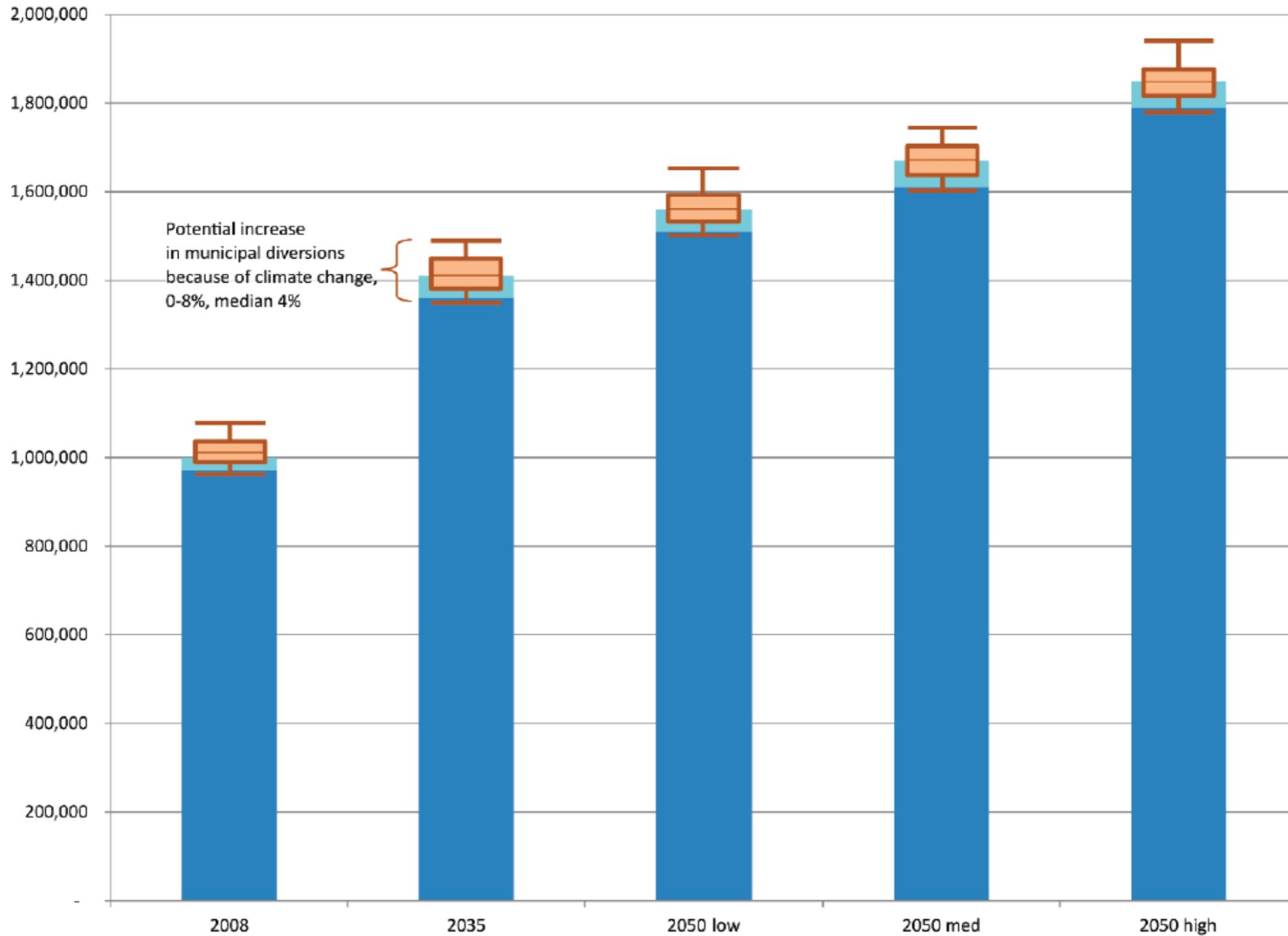
Frost-free season

longer

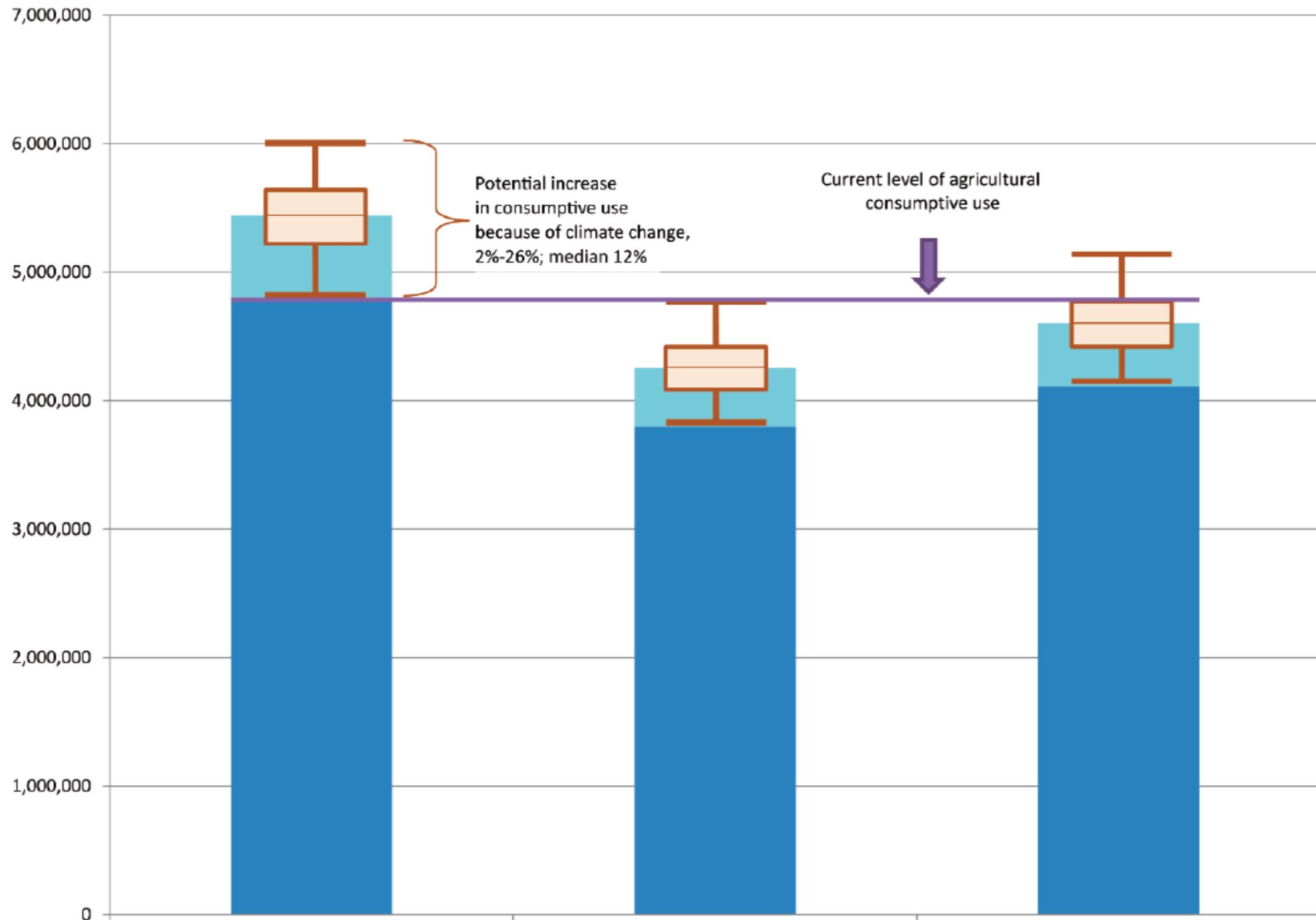
Wildfires

more frequent

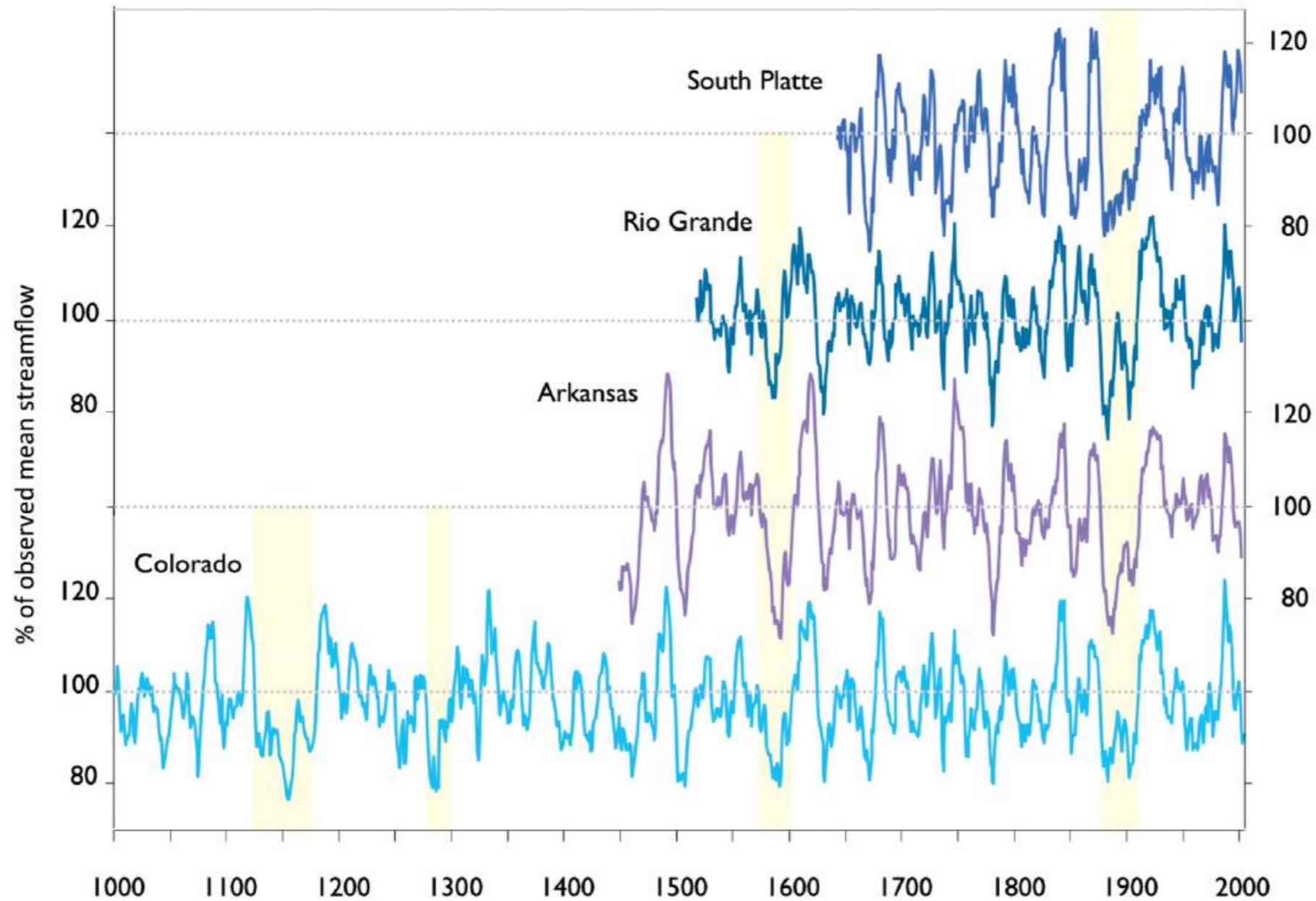
Projected change in municipal water diversions(AF) with range of climate change increases



Projected agricultural water demands (AF) with range of climate change increases



Tree-ring reconstructed streamflows for four major Colorado river basins



Source: Lukas, Climate Change in Colorado, 2014; Data: TreeFlow web resource; <http://treeflow.info>

STRATEGIES AND POLICY RECOMMENDATIONS

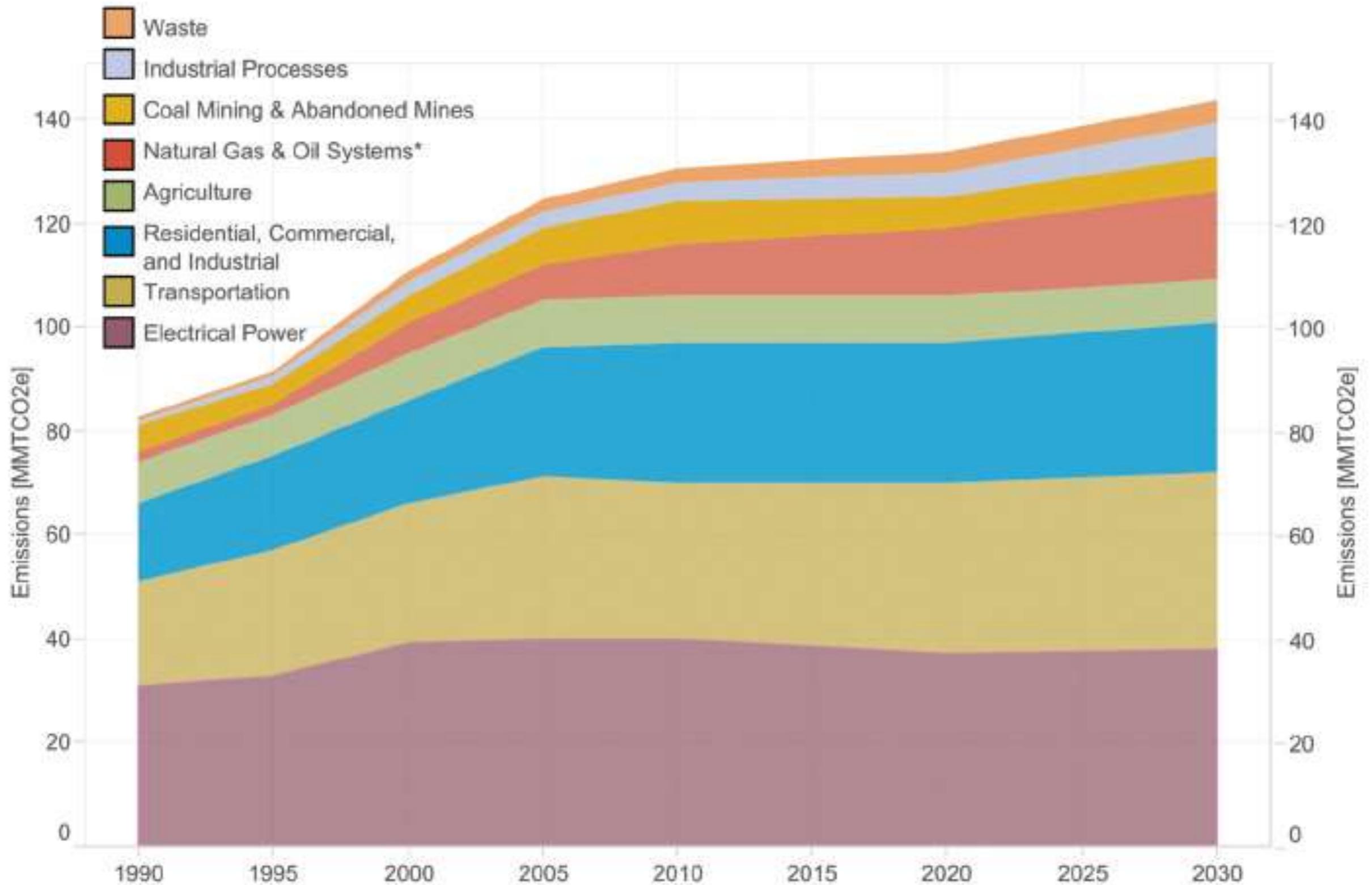
- ❖ Promote and encourage water efficiency and/or conservation at the local and state agency level.
- ❖ Encourage water providers to do comprehensive integrated water resource planning, geared toward implementing the best practices at the higher customer participation levels to achieve state endorsement of projects and financial assistance.
- ❖ Support water sharing agreements where feasible and cost effective.
- ❖ Explore options to increase reuse of fully consumable water.
- ❖ Encourage opportunities for reservoir enlargement statewide (where feasible and cost effective) that could be used for municipal, agricultural, recreational and environmental purposes.
- ❖ Support improvements in Colorado's water infrastructure system by providing low-interest loans and grants, and encourage partnerships and resource-sharing with federal agencies.
- ❖ Promote and encourage drought preparedness through comprehensive drought planning and mitigation implementation.
- ❖ Identify climate change risks related to integrated water quality and water quantity management.
- ❖ Incorporate climate variability and change into long-term, statewide water planning efforts.
- ❖ Work with regulators to modify existing water quality standards to factor in climatic change into regulations.
- ❖ Work with utilities and federal agencies to identify and address regulatory barriers to climate preparedness and adaptation.
- ❖ Assist local communities in building resilience through the development and implementation of regional and local resiliency plans.
- ❖ Collaborate across jurisdictions to protect and restore ecosystems associated with healthy watersheds Fund and enhance existing weather monitoring systems.
- ❖ Fund and enhance stream and lake quantity and quality monitoring.

Public Health

Vulnerabilities: decreased air quality, water quality, increased vector-borne disease, and frequency/intensity of extreme weather events



Summary of Colorado GHG Emissions by Sector (MMTCO₂e)



Clean Power Plan

Colorado must reduce CO₂ emissions from existing fossil fuel fired Electric Generating Units (EGUs) by 2030

- to 1,174 pounds of CO₂ per megawatt hour of electricity
- OR reduce the mass of carbon dioxide emissions to 29,900,397 short tons per year

represents a 38% reduction in the rate of CO₂ emissions or a 31% reduction in the mass of emissions



STRATEGIES AND POLICY RECOMMENDATIONS

- ❖ Coordinate with the Public Utilities Commission, the CEO, and additional stakeholders to develop and implement a Colorado-specific plan to substantially reduce carbon dioxide emissions from fossil fuel fired EGUs, in accordance with the EPA's Clean Power Plan.
- ❖ By 2016, adopt an ozone State Implementation Plan with sufficient control measures to demonstrate attainment of the current ozone standard by 2017.
- ❖ Fully implement Colorado's 2014 oil and gas emission regulations, evaluate the resulting reductions of methane and other pollutants, and evaluate potential refinements to those regulations.
- ❖ Continue to monitor and evaluate particulate matter levels and issue public health advisories as appropriate.
- ❖ Continue to assess potential correlations between vector borne diseases and climate factors, incorporate the results into public health guidance, and communicate any revised risk reduction measures to local governments and the public.
- ❖ Emphasize climate-related disaster preparedness in emergency response plans and exercises.



Energy

Vulnerabilities: reduced water availability and quality, shift in timing of water availability, increased energy demands, disruptions to operations, decreased reliability



Colorado Energy Efficiency Legislation (since 2005)

2005

SB05-143 Amendment 37 Renewable Energy Standards (adoption)
HB05-1162 Energy Efficiency Standards Appliances
HB05-1133 Energy Efficiency Program Funding
SB05-001 Optional Low Income Energy Assistance

2006

HB06-1200 Low-Income Energy Assistance Funding
HB06-1147 Gas Utility Energy Efficiency

2007

SB07-246 Create Clean Energy Fund
HB07-1281 Increase Renewable Energy Standard
HB07-1146 Energy Conservation Building Codes
SB07-051 High Performance State Buildings
HB07-1037 Natural Gas Utility Energy Efficiency
HB07-1309 Oil & Gas Interest School Energy Efficiency

2008

HB08-1387 Low-Income Energy Assistance Funding
HB08-1350 Facilitate Financing Renewable Energy Projects
SB08-184 Colorado Clean Energy Finance Program
SB08-147 Increase Energy Efficiency State Buildings
HB08-1270 CICs Allow Energy Efficiency Measures
SB08-078 Energy Efficiency Historical Preservation Grant

2009

HB09-1350 New Energy Jobs Creation Act
SB09-039 Conserve Energy Tiered Rates Incentive
HB09-1126 Encourage Solar Thermal Installations

2010

SB10-207 Finance State Energy Efficiency Projects
HB10-1365 Clean Air Clean Jobs
HB10-1331 Governors Energy Office Green Building Incentive Program
HB10-1328 New Energy Jobs Creation Act
HB10-1333 Green Job Colorado Training Pilot Program

2011

HB11-1160 Governors Energy Office Green Building Incentive Program

2012

HB12-1315 Reorganization of Governor's Energy Office
HB12-1028 Continue Low Income Energy Related Assistance

2013

SB13-279 K-12 School Energy Resource Efficiency
SB13-212 Energy District Private Financing Commercial Buildings
HB13-1105 Energy Savings Mortgage Program
SB13-028 Track Utility Data High Performance State Buildings

2014

SB14-202 Funding For Energy Efficiency In Schools
SB14-186 Efficient School & Community Performance Contract

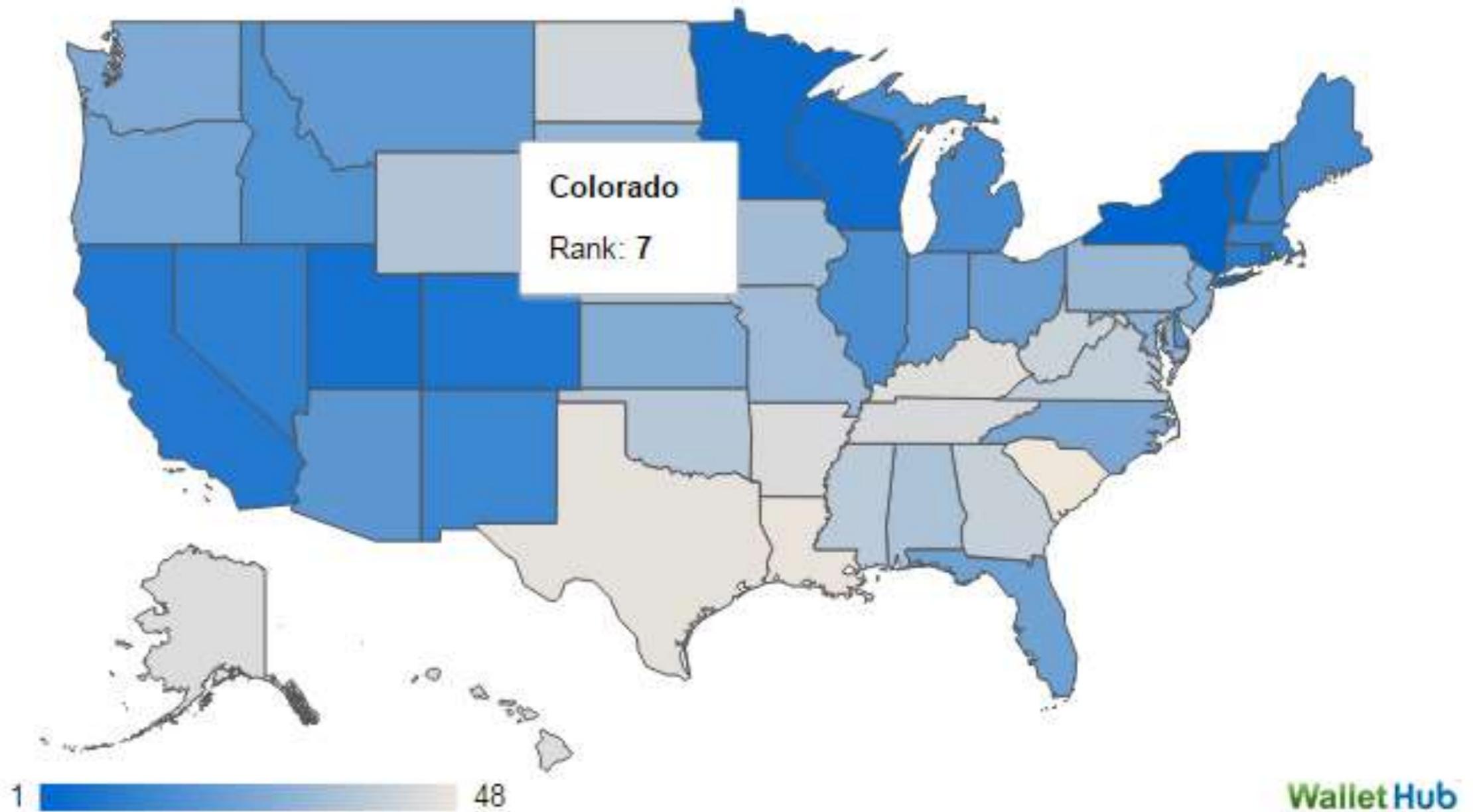
Xcel Energy CO₂ Emission Reductions in Colorado



Source: "2014 Carbon Dioxide (CO₂) Reporting Worksheet" accessed April 29, 2015.

How Energy-Efficient Is Your State?

A new report lists America's most and least energy-efficient states.



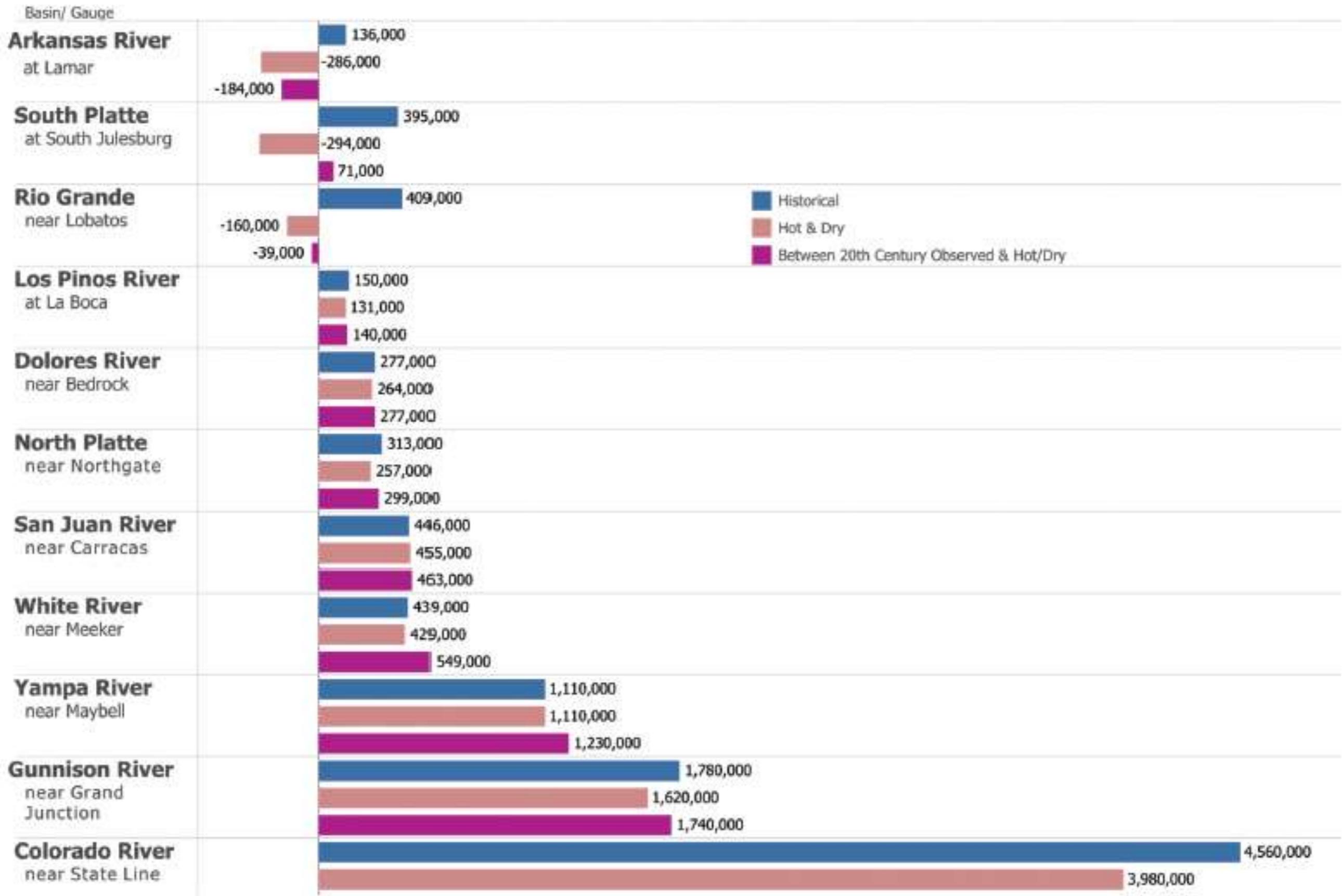
STRATEGIES AND POLICY RECOMMENDATIONS

- ❖ Assure the timely and complete attainment of the state's RES 2020 goals. Assist all utilities (investor-owned, municipal and cooperative) in identifying and implementing best practices for integrating cost-effective renewable resources, both utility-scale and distributed.
- ❖ Assist all electric utilities in incorporating all feasible energy efficiency activities into resource planning and EPA air quality compliance plans.
- ❖ Integrate cost-effective water savings into all energy efficiency programs administered by the state.
- ❖ Engage with energy companies to encourage and promote the most water-efficient technologies for energy extraction.
- ❖ Encourage energy companies to continue collaborating with agricultural and environmental interests when managing their water portfolio.
- ❖ Identify, test, and implement techniques to reduce water usage in the oil and gas industry through reuse of produced water. Focus specifically on options that yield both water and energy usage reductions.
- ❖ Aid in the commercialization of emerging electric generation technologies that reduce greenhouse gas emissions, such as coal mine methane capture, anaerobic digestion of agricultural waste, geothermal and small/micro hydro.
- ❖ Aid in the commercialization of clean technologies in the oil and gas development sector, such as methane capture, waste heat recovery and related technologies that increase efficiency and reduce adverse environmental impacts.
- ❖ Reduce market barriers to the development of all cost effective and technologically viable alternatives to gasoline and diesel fueled transportation.
- ❖ Increase access to capital for commercial, residential, agricultural and industrial customers seeking to improve the energy performance of their facilities.

Agriculture

Vulnerabilities: decreased water availability, increased drought, increased crop demands, increased heat stress, decreased crop yield, increased weeds & pests





Tourism and Recreation

Vulnerabilities: Warming in the shoulder seasons & decreased cold snaps may effect snow-making operations, earlier melt, temperature & seasonal shifts, occurrence of avalanches,



Transportation

Vulnerabilities: heat-related infrastructure stress & damage, higher winter snow removal, increased snow slides & mudslides, increased delays, degraded operations, increased washouts, increased wildfires/ closures, changes in air density, increased costs.



Ecosystems

Vulnerabilities: increased susceptibility to insect and pathogen invasions, phenology shifts, wildfire, decline in habitat suitability, drought stress



Moving Forward





What are your biggest concerns about climate change?

What information is most helpful to you?

What programs are most helpful to you?

What do you most want to see from the state?



COLORADO
Department of Natural Resources



Questions?

Taryn Finnessey

Colorado Water Conservation Board

303.866.3441 X3231

taryn.finnessey@state.co.us



COLORADO

Department of Natural Resources