



Climate Change & Aspen: An Assessment of Impacts and Potential Responses

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14 August 2013

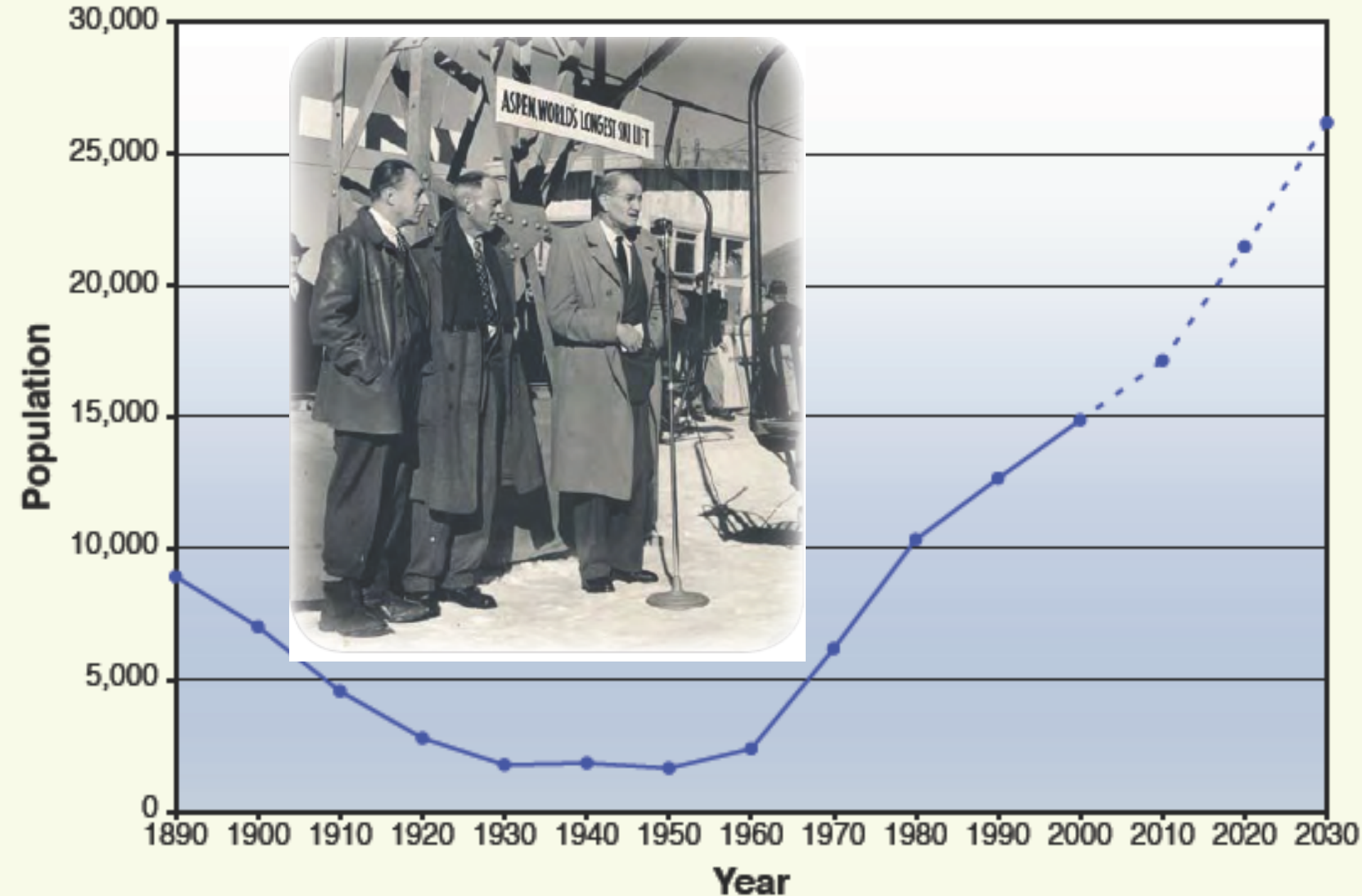
Adaptation to Climate Change In Mountain &
Coastal Areas: A Transatlantic Dialogue II

13-16 August 2013

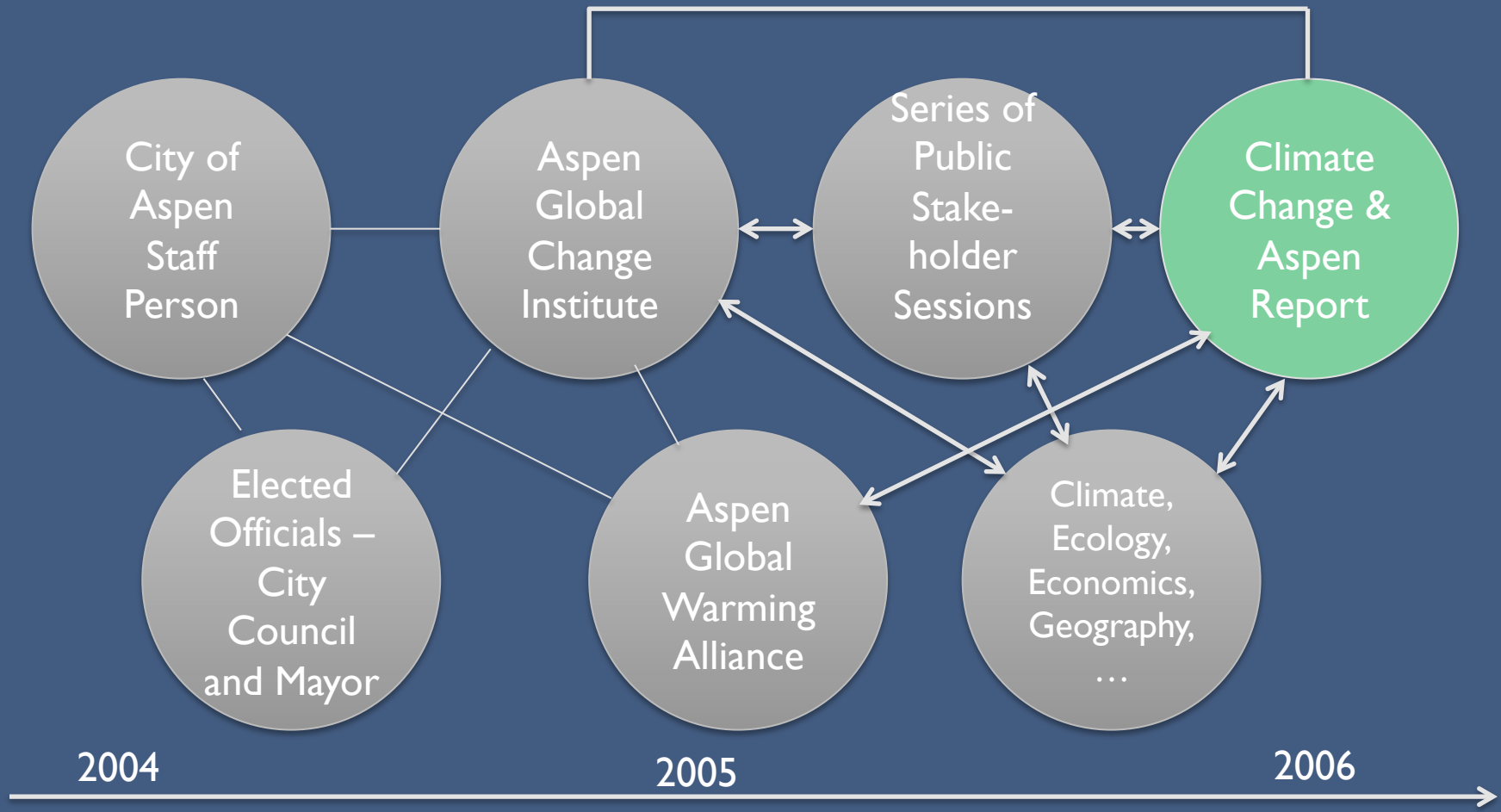
Aspen Global Change Institute

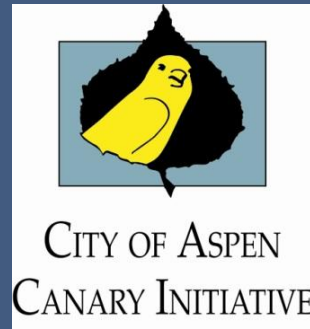
Aspen, Colorado

Aspen: Boom to Bust to Boom to ?



AGCI Report on Ecosystems, Climate, Socioeconomics

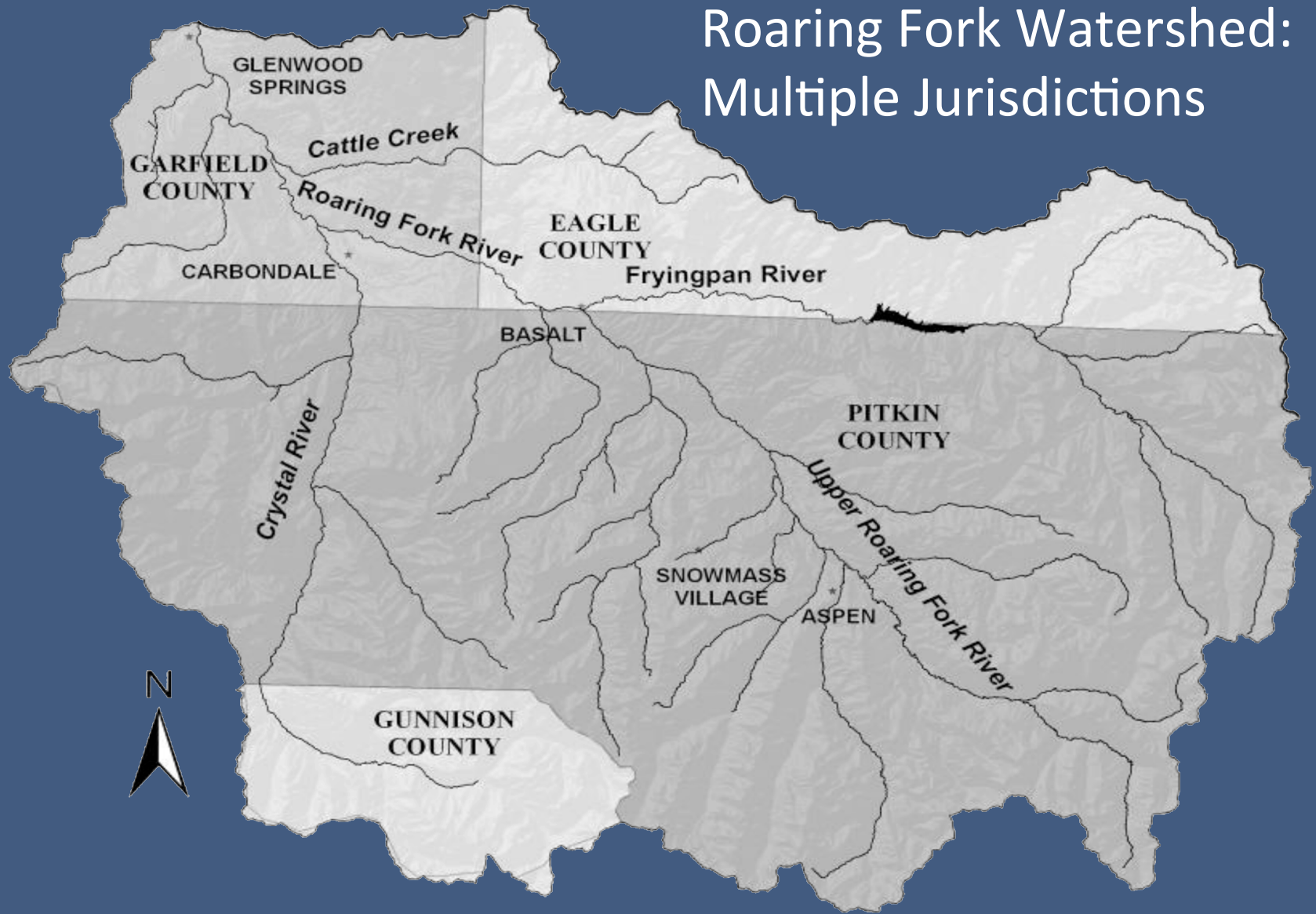




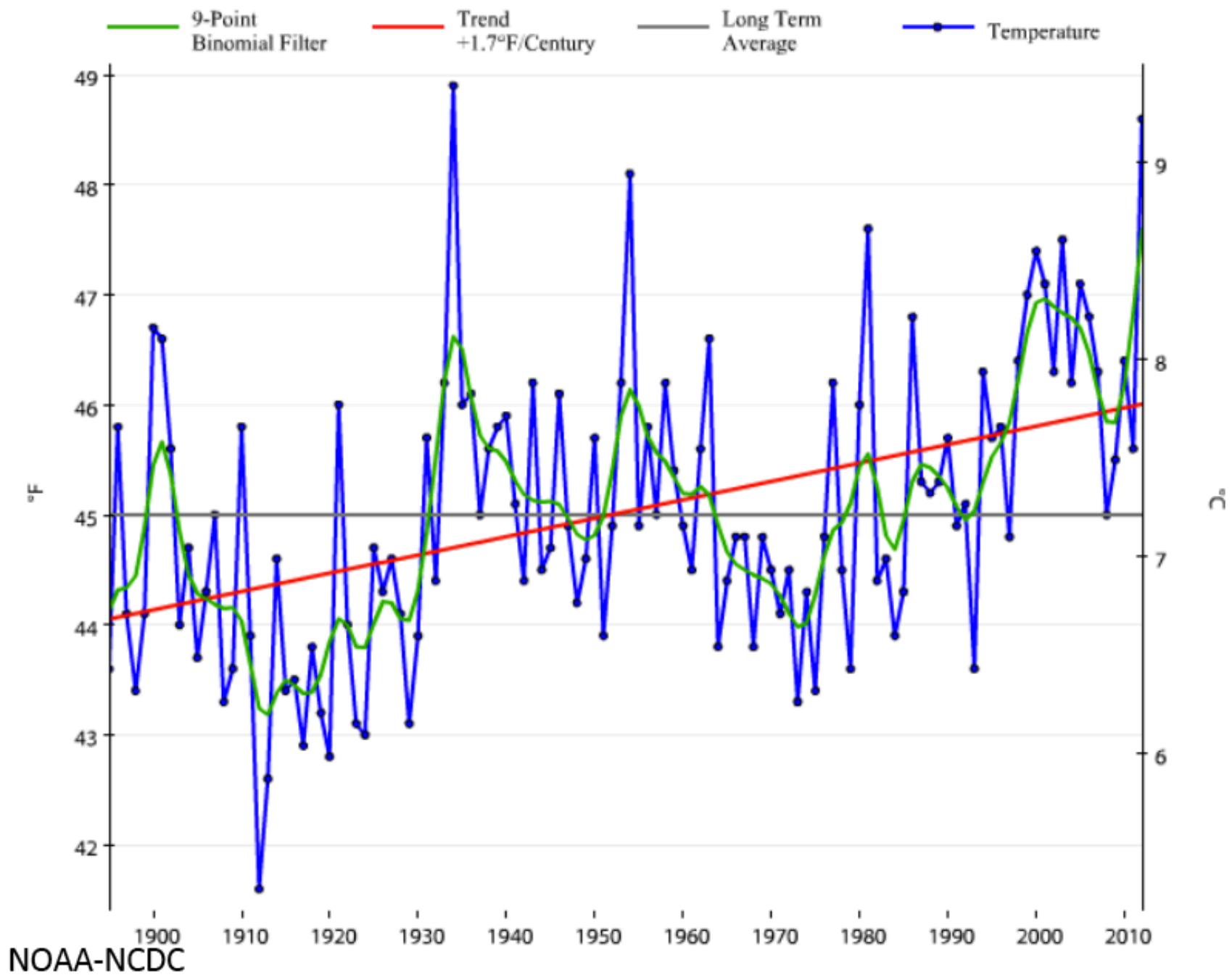
Canary Initiative Components

- Assessment of climate vulnerability & impacts
- Inventory of carbon emissions
- Development of an action plan
- Invited public interaction – stakeholder engagement
- Education and public outreach

Roaring Fork Watershed: Multiple Jurisdictions



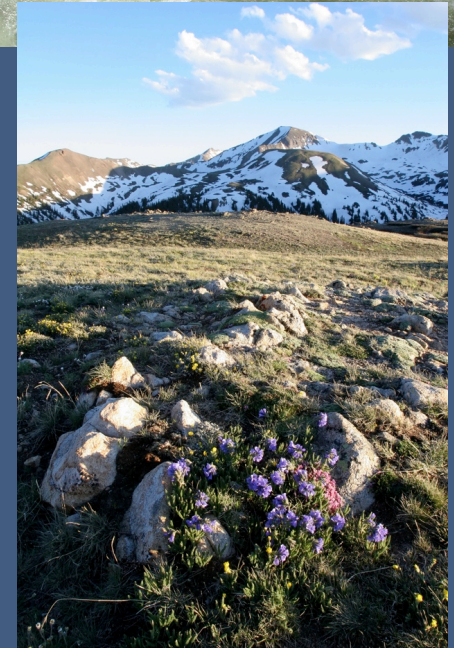
Colorado, Temperature, January-December



Public Concerns



Public Concerns



Stakeholder Interviews

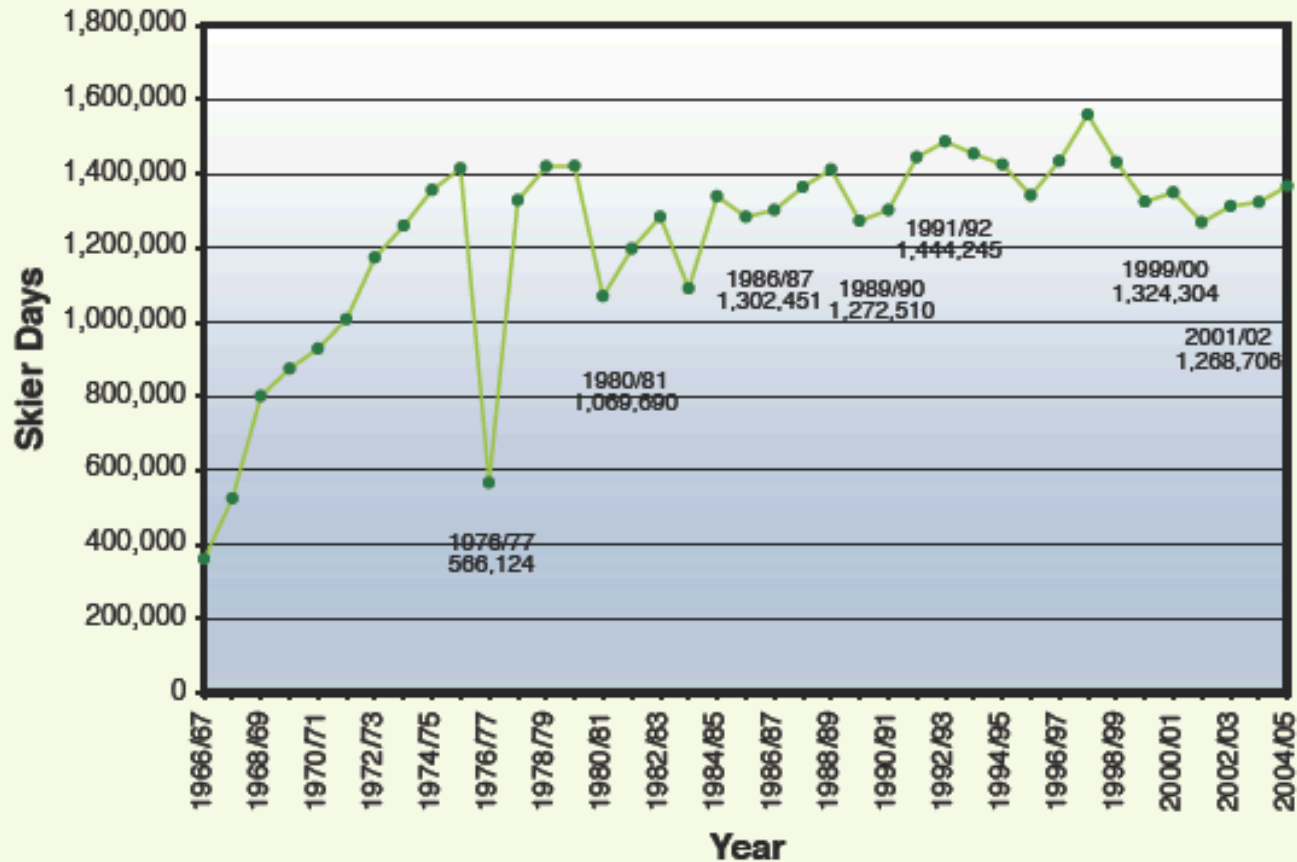
- Municipal utility director
- Irrigation ditch manager
- Rancher
- Golf club manager
- Ski area manager
- Whitewater rafting operator
- Fly fishing business owner

Stakeholder Interviews

- US Forest Service hydrologist
- Environmental scientist
- Conservation group leader
- Land steward

Adapting to Natural Variability

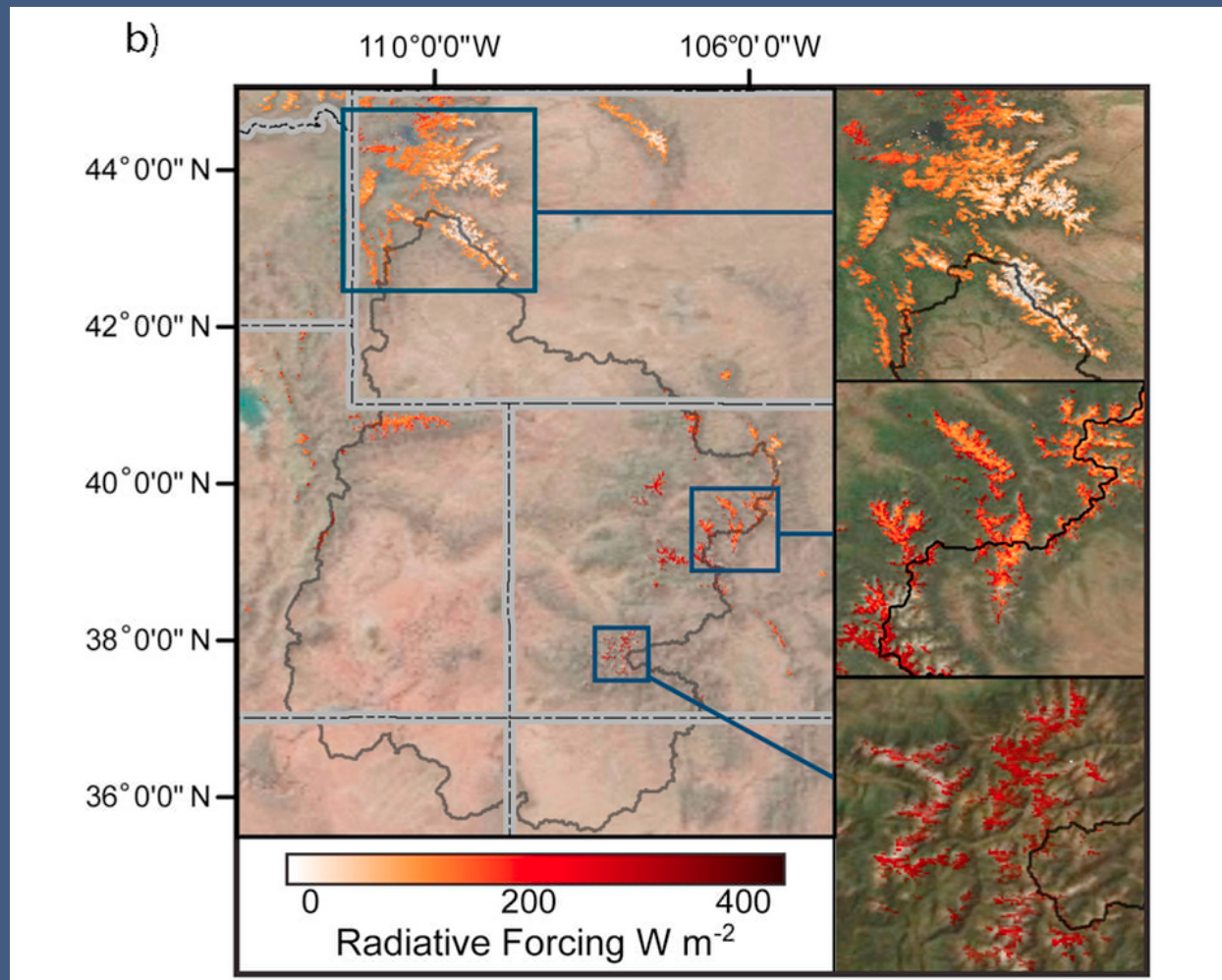
Skier Days at All 4 Mountains, 1966-2005





Key Findings: Climate

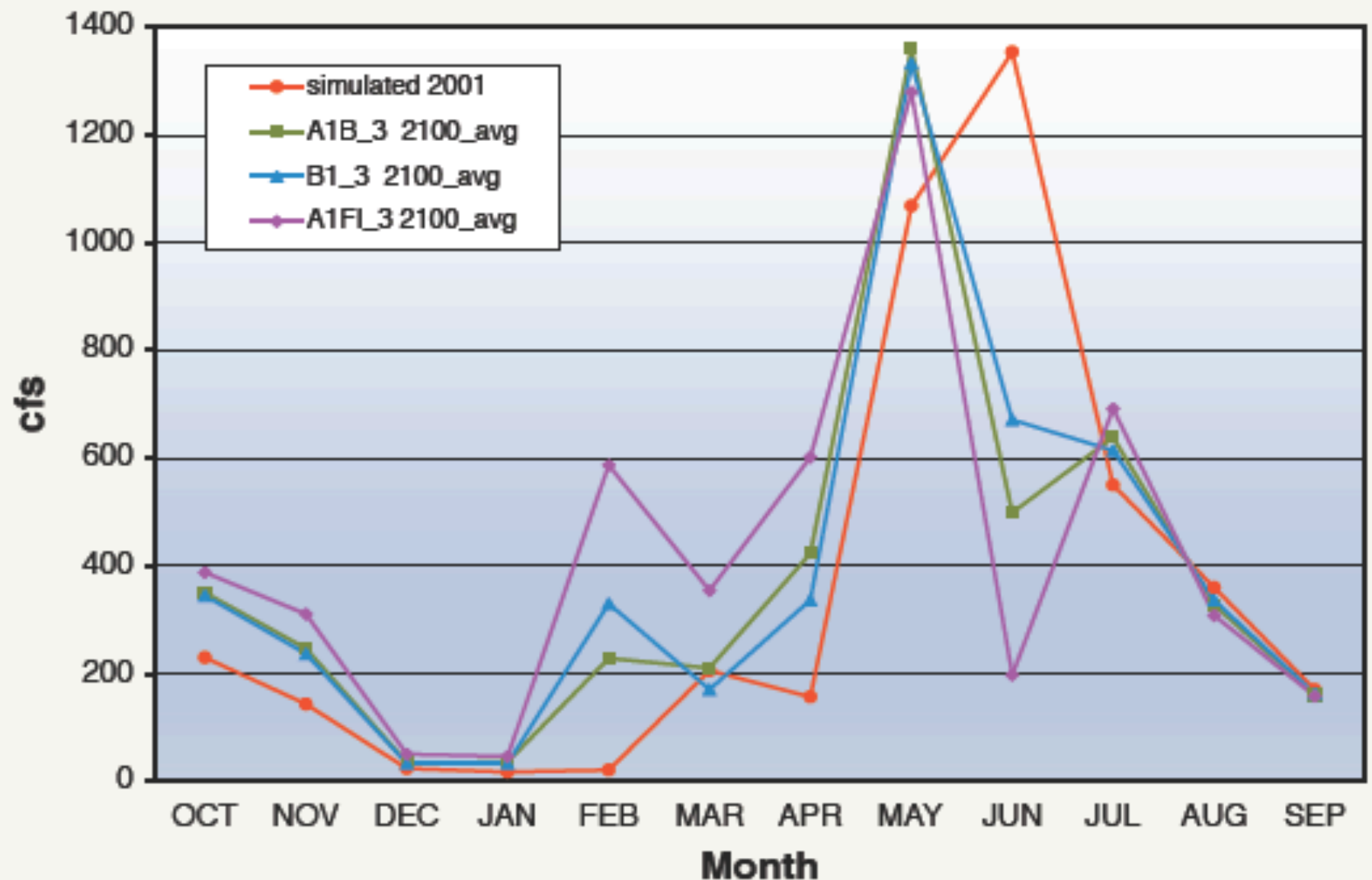
- By 2100:
 - An increase in the proportion of precipitation that will fall as rain
 - Possible mid to late winter thaws
 - Rain on snow events
 - Minimum streamflows threatened



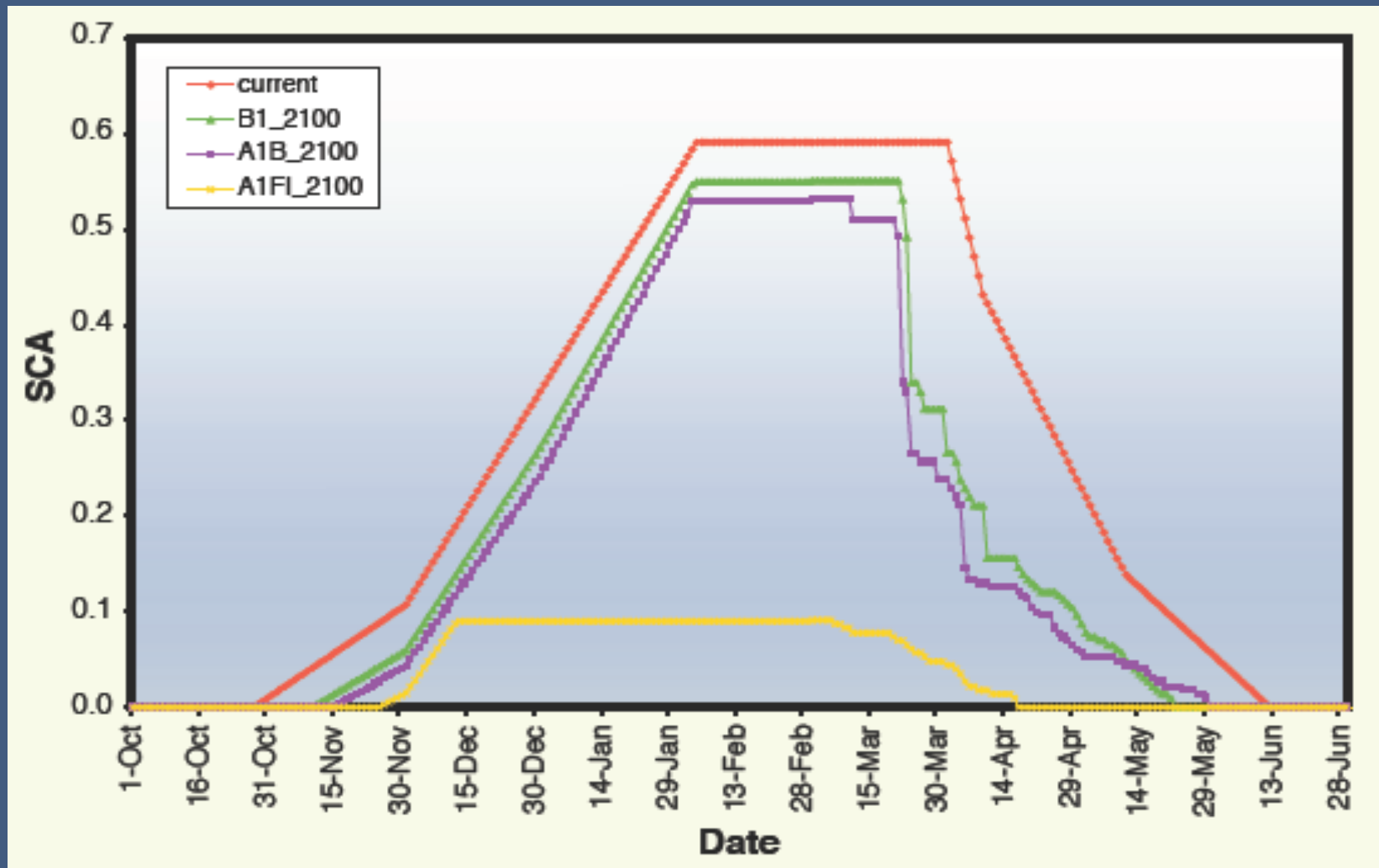
Dust radiative forcing in snow for eastern half of the Upper Colorado River Basin on 18 May 2009 at time of MODIS overpass, 17:55 UTC.

Painter et al, GRL 2012

2100 Projected Runoff in the Roaring Fork River



Snow Covered Area Mid-Mountain 2100



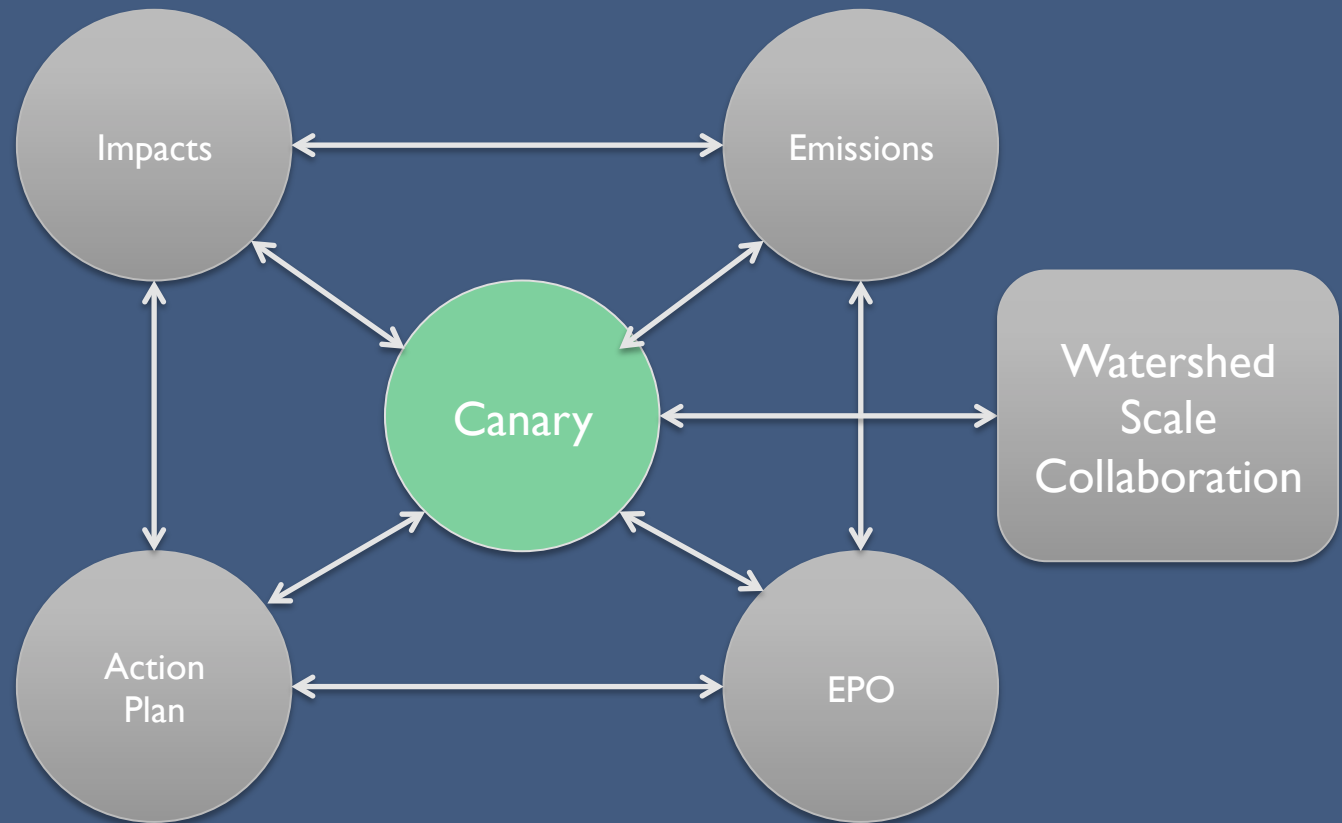
Examples of Habitat Specialists in the Roaring Fork Watershed

Species	Habitat
American pipit	Tundra
Black-throated gray warbler	Piñon-juniper woodland
Boreal owl	Spruce-fir forest
Brewer's sparrow	Sagebrush shrubland
Canada lynx	Spruce-fir forest
Golden-crowned kinglet	Spruce-fir forest
Horned lark	Montane grassland; Tundra
Juniper titmouse	Piñon-juniper woodland

Some Adaptations Suggested

- Sell cattle herds earlier in the season
- Place conservation easements to secure water rights
- Prioritize water-use in times of shortage
- Create more storage to capture peak flow
- Expand existing snowmaking

Ongoing Interplay & Expanding Community Beyond Aspen



Ongoing Valley Collaborations

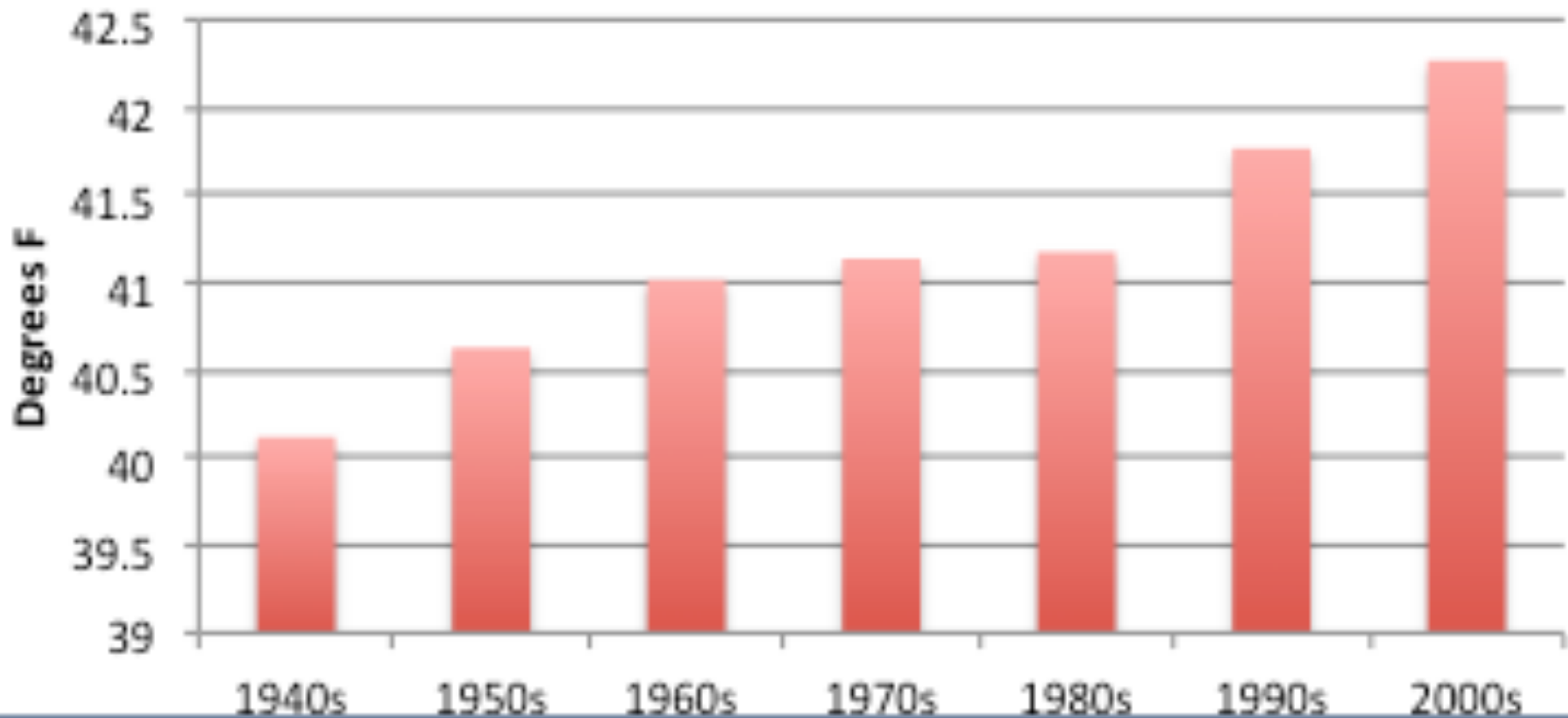
- Canary Initiative & Aspen Global Warming Alliance
 - Carbon Inventory
 - Climate Action Plan
 - Mitigation Goals
 - Development of Adaptation Plan
 - Guidance for the Canary Initiative
- Future Forest Roundtable
 - Restoration projects
 - Forest Health Index
 - Observation Network
- Roaring Fork Valley Watershed Collaborative
 - State of the Watershed Report 2008
 - Watershed Action Plan 2012

Designing a *Forest Health Index*

- Track local forest conditions over time
- Inform community dialogue
- Support resource management
- Incorporate scientific expertise input local planning & management



Average Annual Temperature by Decade in Aspen



Initial Project Partners



Some Trends

- Energy prospecting and extraction is growing rapidly
- In-stream users gaining voice
- Summer cultural & recreational activities are growing

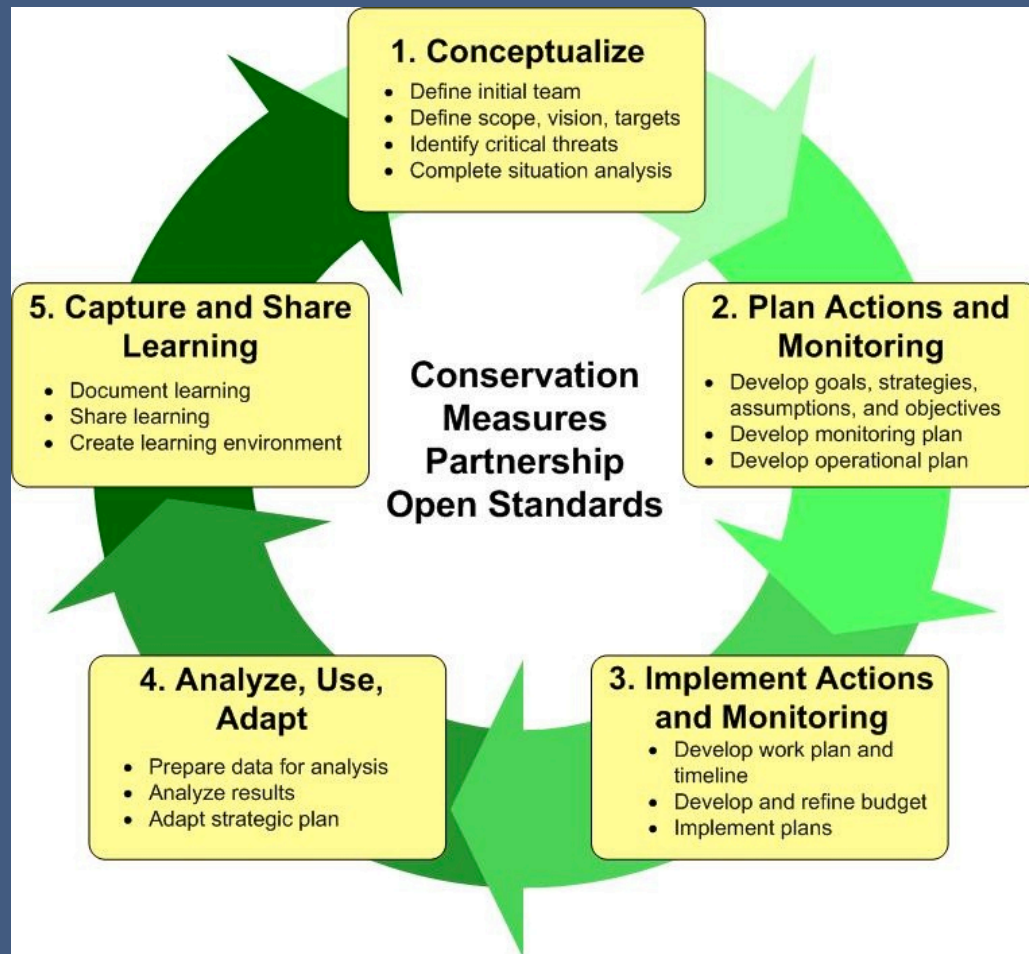


Possible Next Steps

- Build from this transatlantic experience
- Broaden valley participation in the dialog
- Explore more fully impacts, vulnerabilities, responses
- Build upon existing collaboratives,
- Explore what other communities are doing
- Integrate adaptation into action plans



Collaboration & Adaptive Management



Conceptual Model

