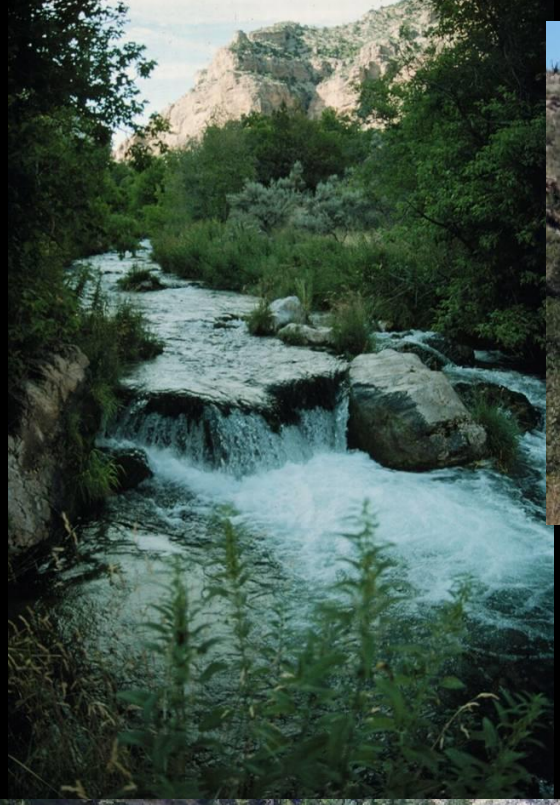


in·teg·ri·ty

/inˈtegrədē/

noun
noun: **integrity**

1. the quality of being honest and having strong moral principles; moral uprightness.
   "he is known to be a man of integrity"
   synonyms: honesty, probity, rectitude, honor, good character, principle(s), ethics, morals, righteousness, morality, virtue, decency, fairness, scrupulousness, sincerity, truthfulness, trustworthiness
   "I never doubted his integrity"
   antonyms: dishonesty
2. the state of being whole and undivided.
   "upholding territorial integrity and national sovereignty"
   synonyms: unity, unification, coherence, cohesion, togetherness, solidarity
   "the integrity of the federation"
   antonyms: division
   - the condition of being unified, unimpaired, or sound in construction.

de·sire

/dəˈzī(ə)r/

verb
past tense: **desired**; past participle: **desired**

strongly wish for or want (something).
"he never achieved the status he so desired"
synonyms: want, wish for, long for, yearn for, crave, hanker after, be desperate for, be bent on, covet, aspire to; More

con·di·tion

/kənˈdiSH(ə)n/

noun
noun: **condition**; plural noun: **conditions**

1. the state of something, especially with regard to its appearance, quality, or working order.
   "the wiring is in good condition"
   synonyms: state, shape, order
   "check the condition of your wiring"
   - a person's or animal's state of health or physical fitness.
     "he is in fairly good condition considering what he has has been through"
     synonyms: fitness, health, form, shape, trim, fettle
     "she was in top condition"
   - an illness or other medical problem.
     "a heart condition"


4

as·sess·ment

/əˈsesmənt/

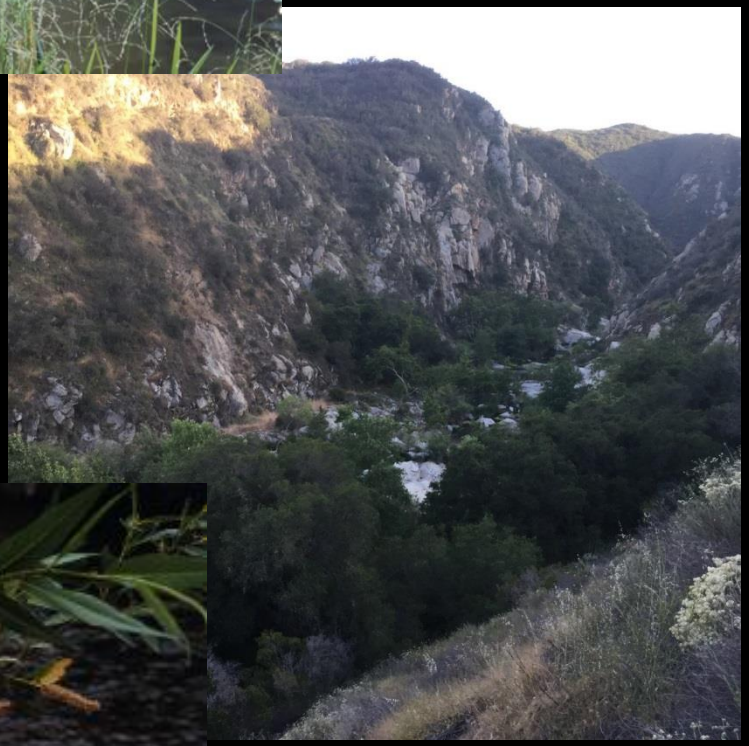
noun

noun: **assessment**; plural noun: **assessments**

the evaluation or estimation of the nature, quality, or ability of someone or something.
"the assessment of educational needs"
synonyms: evaluation, judgment, rating, estimation, appraisal, analysis, opinion More

Desired conditions?

How to quantify, monitor, and set measurable goals?



Need to identify reference or ‘desired condition’ sites and measure over time

Quantify reference conditions in a range of valley and channel types

Scale

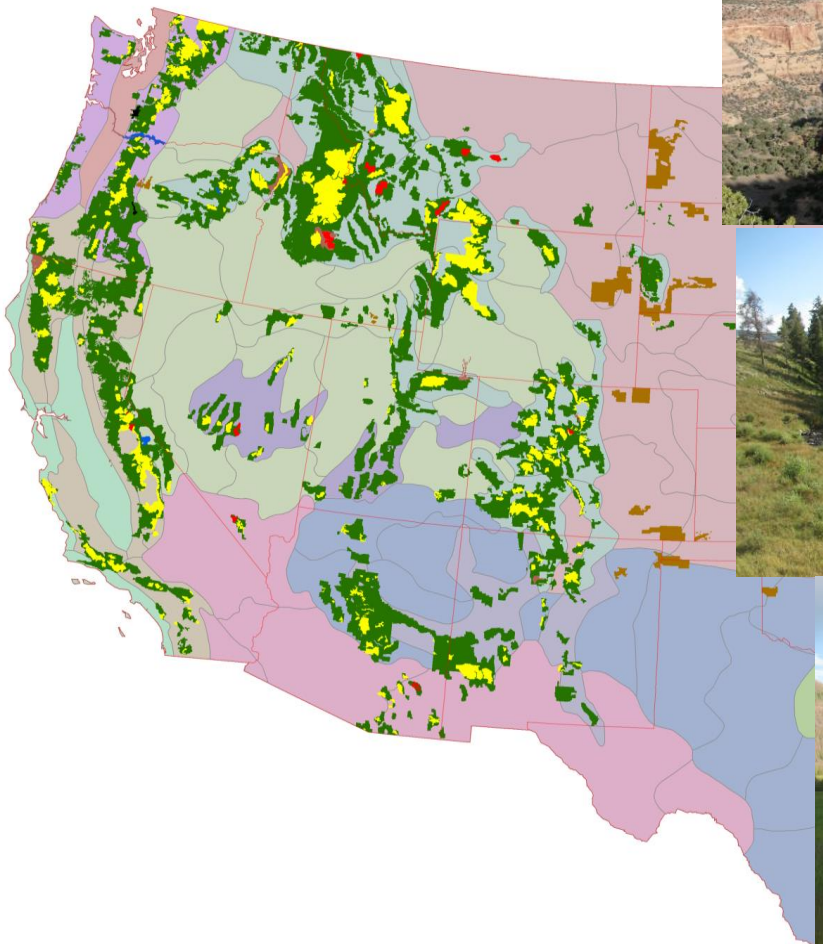
Region
↓
Segment
↓
Reach

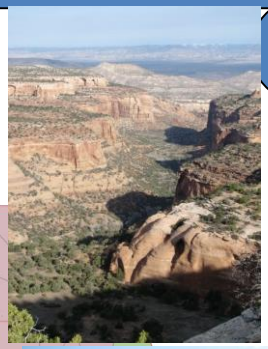
Ecoregion

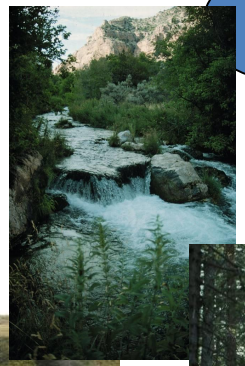
Valley Form

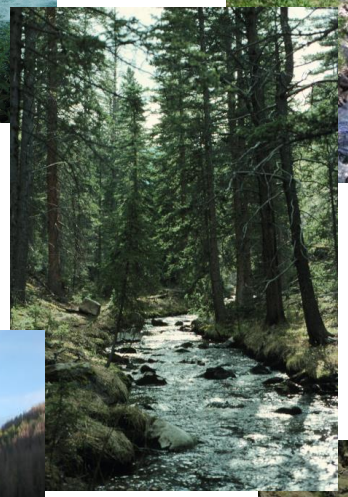
Channel Type

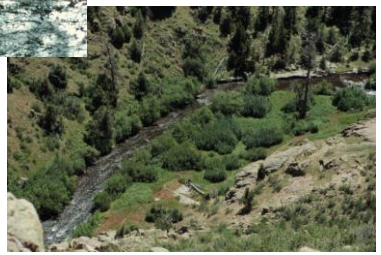
Riparian Area









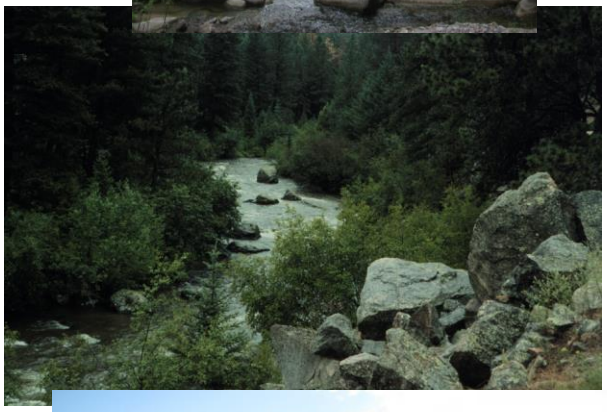


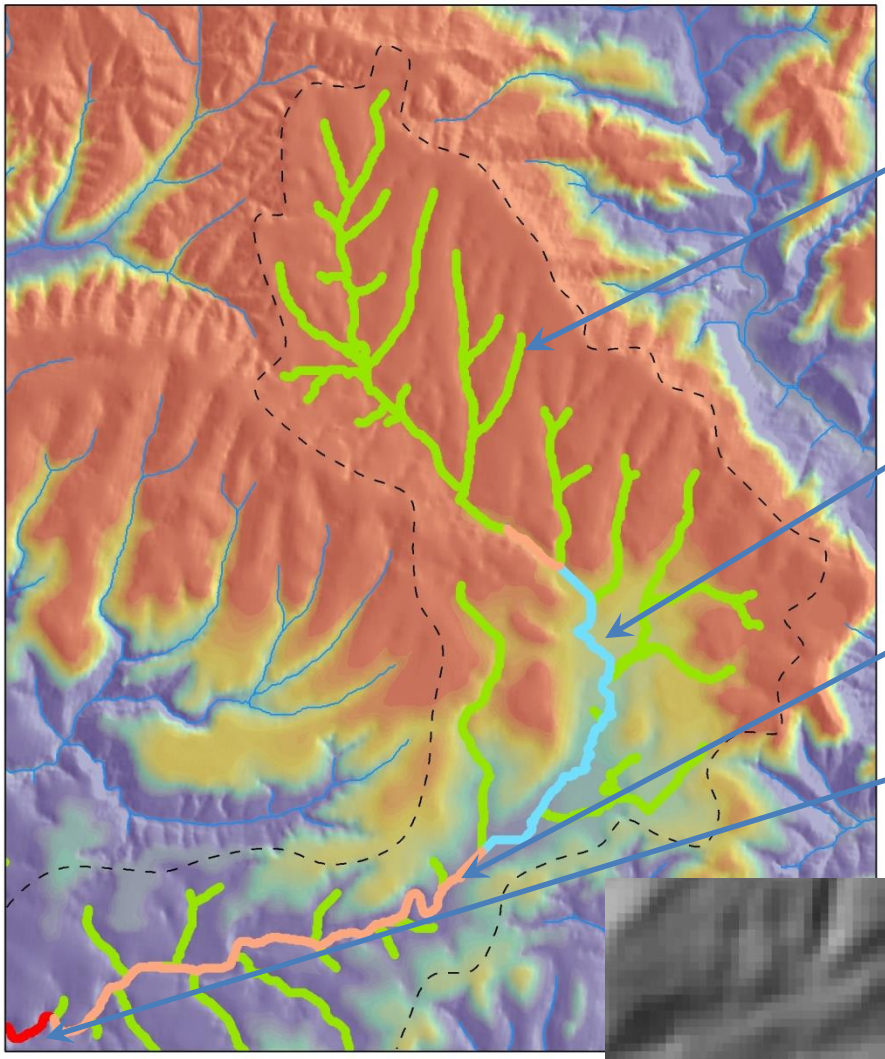
Geomorphic Valley Classification

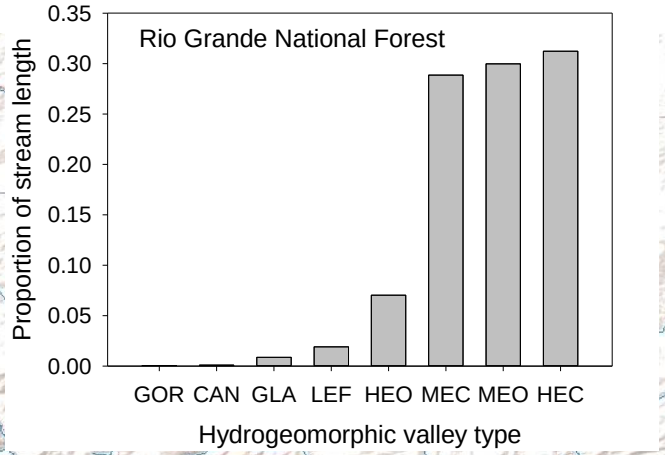
E. Carlson and B. Bledsoe

1) System energy
2) Valley confinement
3) Hillslope coupling

Headwater	> 4%	Confined	Steep
High-energy Coupled	> 4%	Confined	Steep
High-energy Open	> 4%	Unconfined	Steep
Moderate-energy Confined	0.1 - 4%	Confined	Low-Steep
Moderate-energy Unconfined	0.1 - 4%	Unconfined	Low-Steep
Canyon	Variable	Confined	Steep
Gorge	Variable	Confined	Steep
Glacial Trough	< 4%	Unconfined	Moderate-Steep
Low-energy Floodplain	< 0.1%	Unconfined	Low-Moderate




High energy coupled valley
Canyon
Moderate energy unconfined valley
Low energy floodplain
0 500 1,000 2,000 3,000 4,000
Meters
N



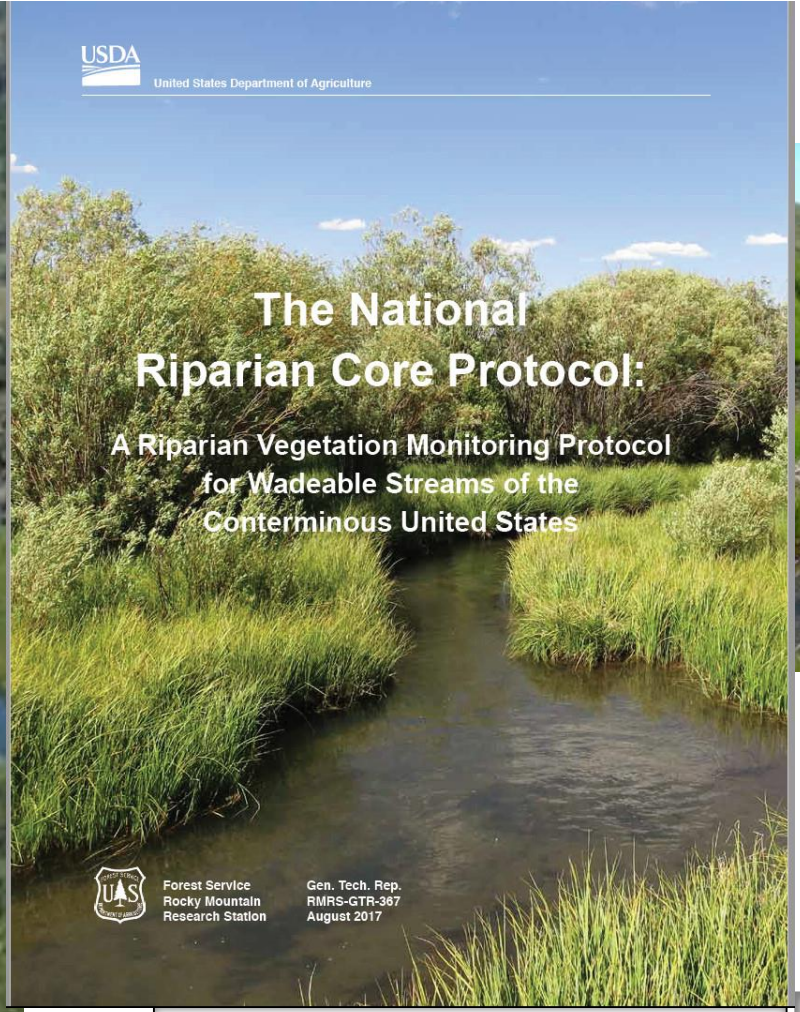
Hydrogeomorphic valley classification

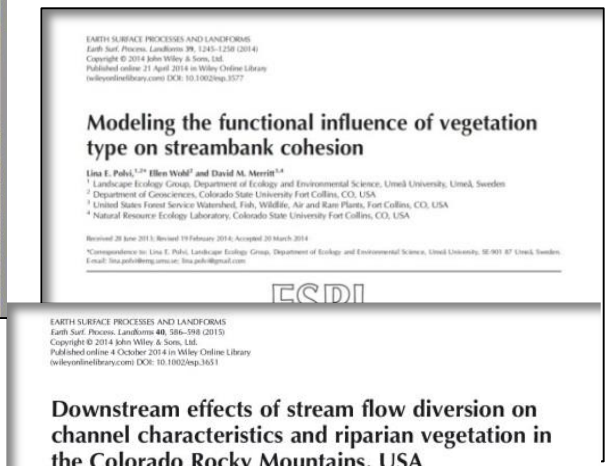
Erick Carlson and Brian Bledsoe
Colorado State University

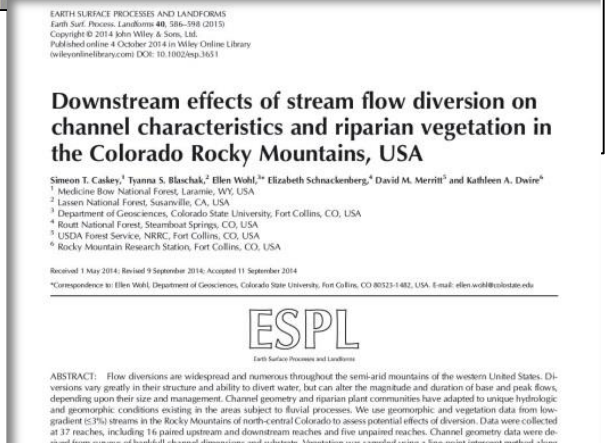
Project-level monitoring

Inference at different scales

Field data collection and analysis tools

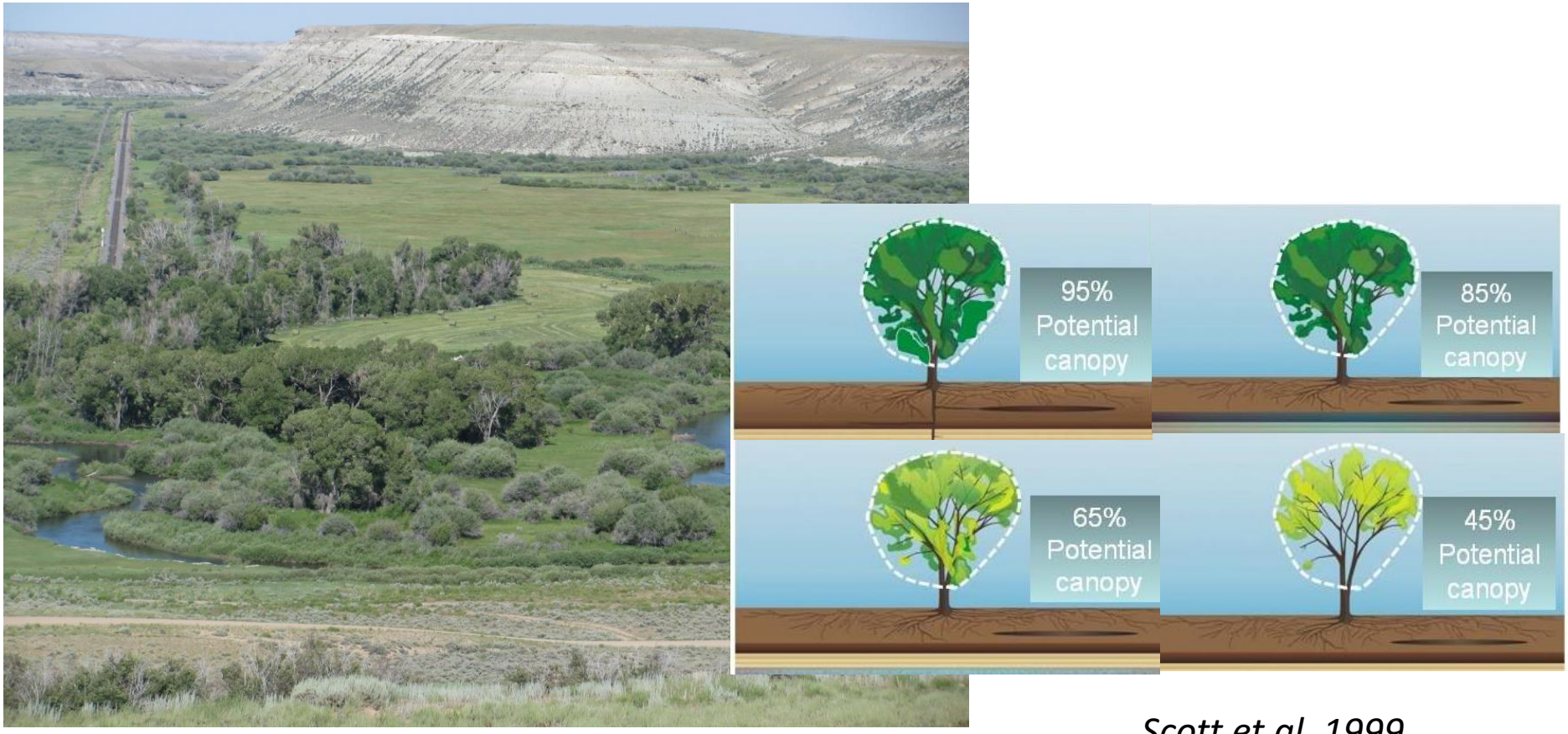






Riparian vegetation monitoring:

- Plant species composition and vertical structure
- Tree stem density, basal area, and condition



Scott et al. 1999

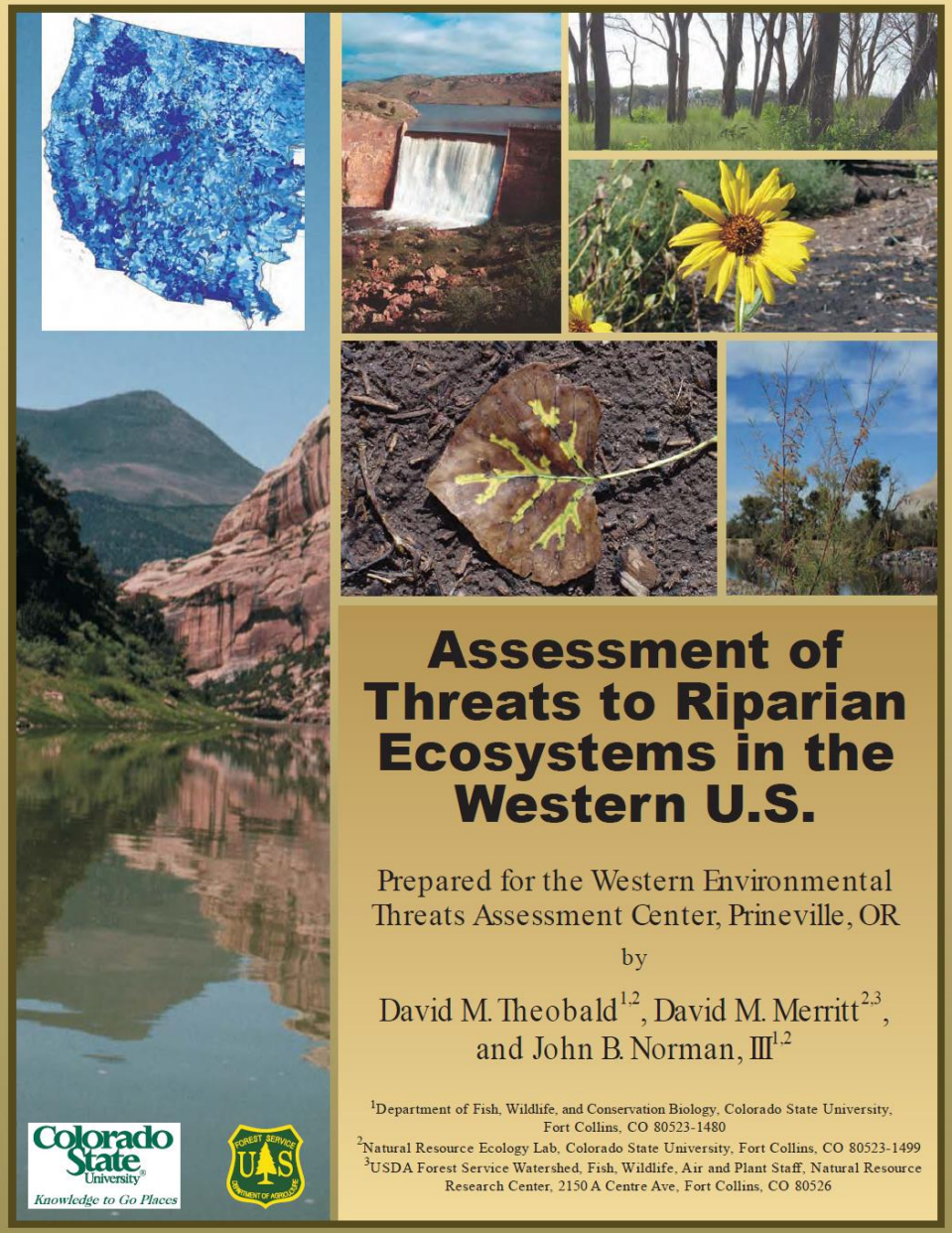
- Channel cross sections and fluvial
  - Classification
  - Width to depth
  - Form

- Reach longitudinal profile
  - Gradient
  - Longitudinal profile

- Substrate characterization
  - Bare soil, gravel, cobble, boulder, bedrock, water

Combined:

- Opportunity for trend monitoring
- Ability to hydraulically model to develop rating curves
- Measurable attributes of desired or reference conditions



Threats or stressors to riparian and wetland systems:

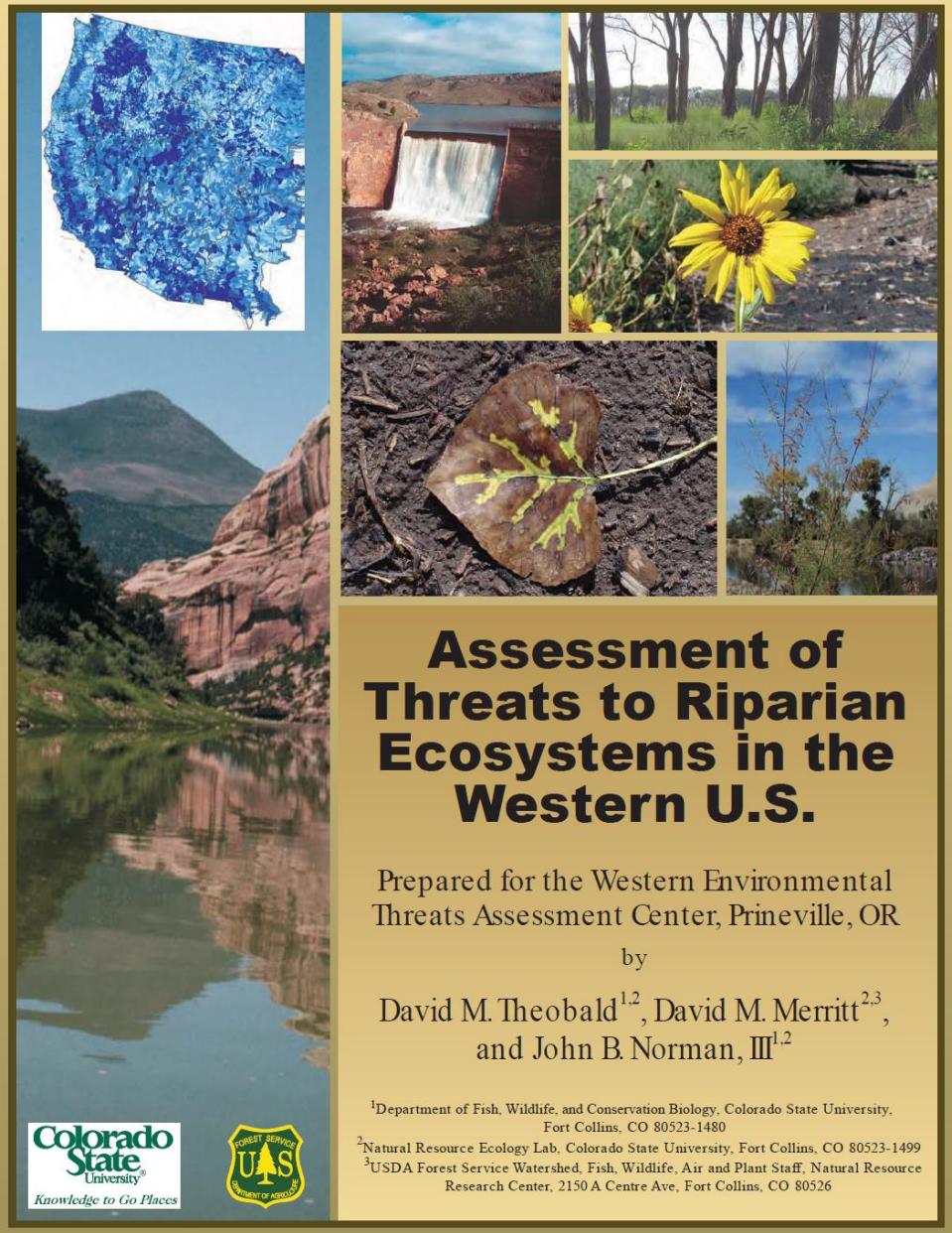
- Changes in flow regime and dewatering (supply and demand-driven)
- Channelization
- Invasive species
- Changes in sediment delivery to channel
- Herbivory
- Wildfire and fuels

http://www.fs.fed.us/wwetac/projects/theobald.html

Also see Poff et al. 2011. AWRA.

Table 2. Threats to western riparian ecosystems.

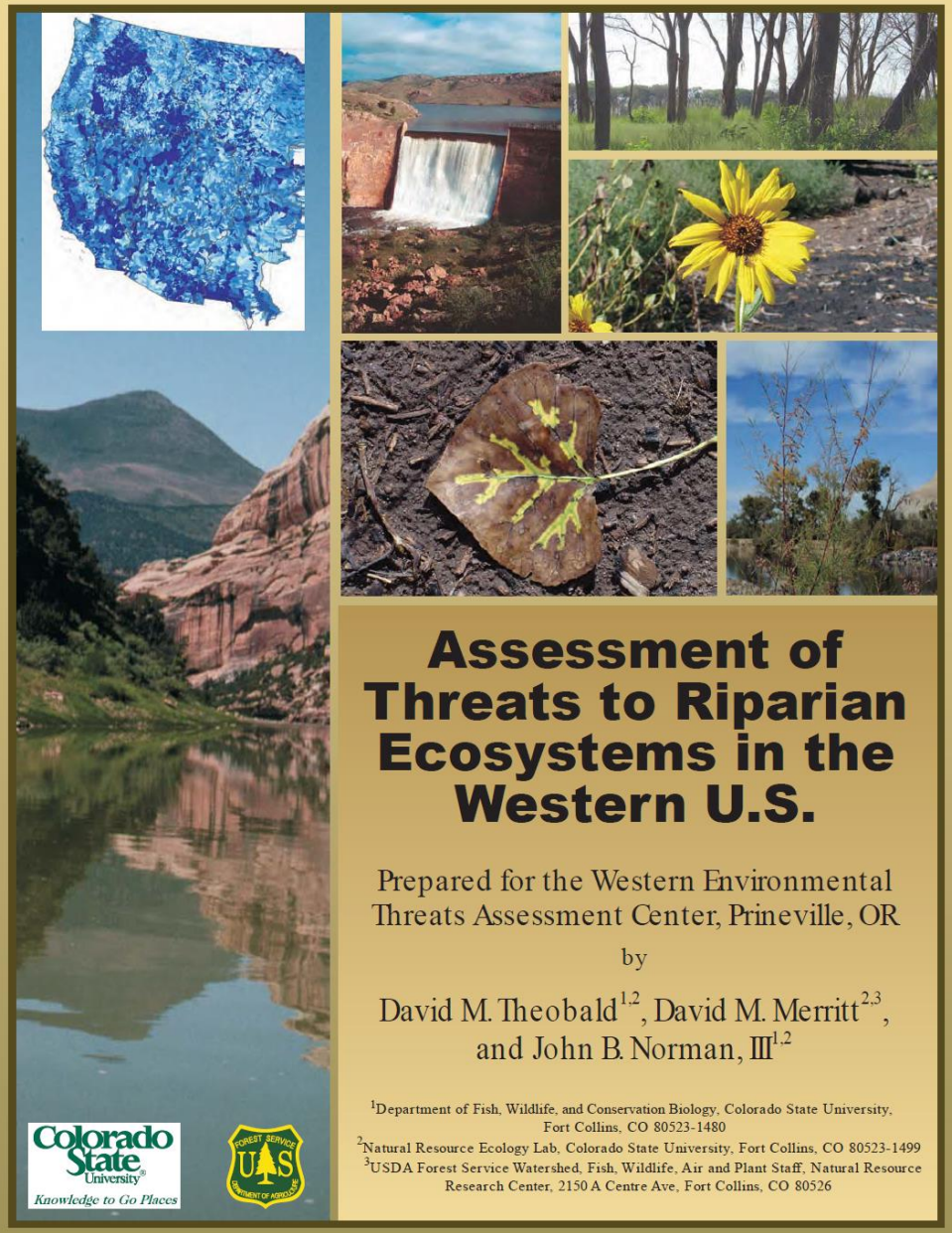
Threat	Examples of causes	Examples of effects
*Changes in flow regime† and dewatering	Surface water: dams, diversions, changes in land-use, climate change; groundwater: pumping, land use change, climate change	Water stress of vegetation, shifts in plant species composition, homogenization of riparian zone, simplification of biota, isolation of floodplain from stream, changes in stream-riparian organic matter exchange and trophic dynamics, alteration of floodplain biogeochemistry terrestrialization, secondary effects (fragmentation, channel change)
*Channelization	Bank hardening, levee construction, structural changes in channel - - deepening, berm development, meander cutoff	Isolation of floodplain from stream, changes in fluvial processes, changes in hydraulics (aquatic habitat and channel forms), alteration of floodplain biogeochemistry
Invasive species	Introduction, altered processes in system that facilitate establishment & spread (e.g., herbivory, changes in flow regime)	Displacement of native species, formation of monoculture, changes in site characteristics (e.g., biogeochemistry, soil characteristics, changes in water balance), shifts in community composition, changes in habitat structure
Changes in sediment delivery to channel	ORV use, roads (drainage, gravel application), livestock/herbivore trampling, changes in vegetative cover in watershed and/or along channel, direct mechanical impacts to channel, dams, and diversions	Shifts in channel and floodplain form (through increased or decreased sediment delivery to channel), changes in channel processes, incision/aggradation
Herbivory	Domestic grazing, wild herbivores (predator control)	Bank trampling, compaction, vegetation changes (cover, composition), stream capture, nutrient inputs
Wildfire and fuels	Fuel buildup from invasive species, fire suppression, decadent vegetation, flood suppression, lack of flooding-slower decomposition of organic material	Increases in frequency and intensity of fires, loss of fire intolerant taxa, changes in the structure of riparian vegetation and habitat quality and distribution, subsequent shifts in biota



Threats assessment considers factors that influence riparian and riverine functioning:

- Flow regime
- Sedimentation
- Lateral Connectivity

http://www.fs.fed.us/wwetac/projects/theobald.html

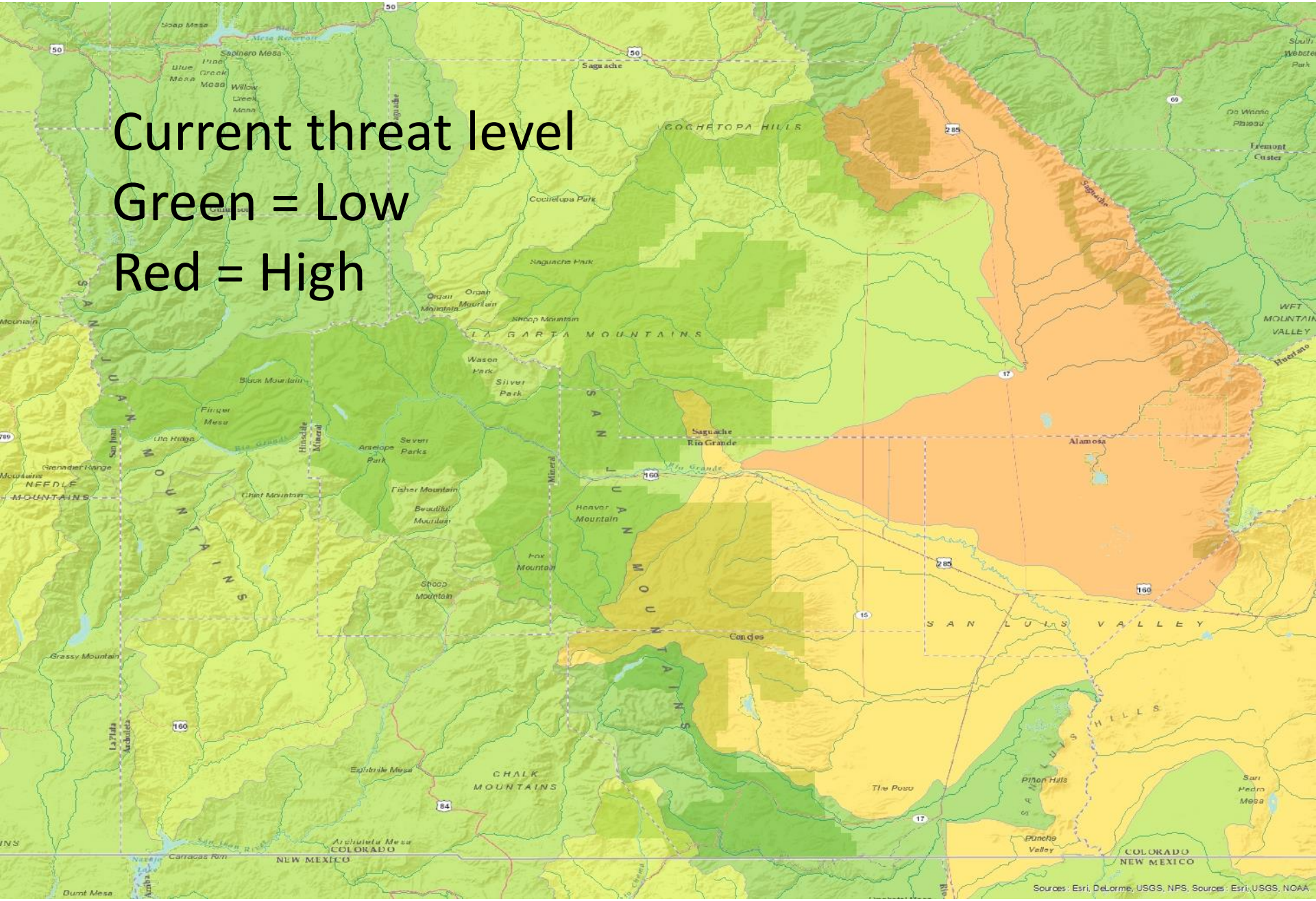


Modeled past, present, and projected future conditions

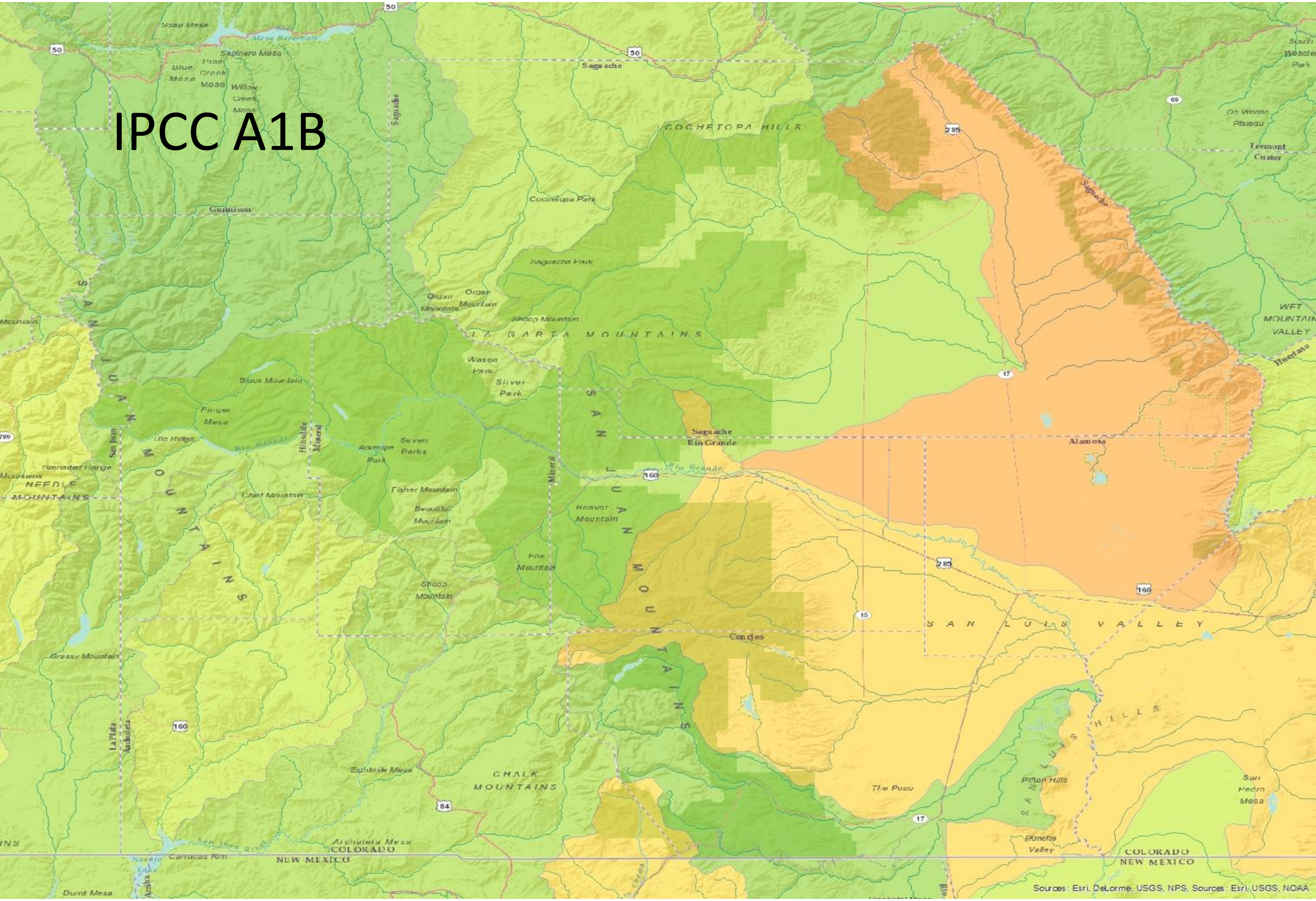
Examined the current status of streams relative to unaltered reference conditions

Evaluated those riparian areas most at risk of future change under various future scenarios of climate change and human caused land cover change.

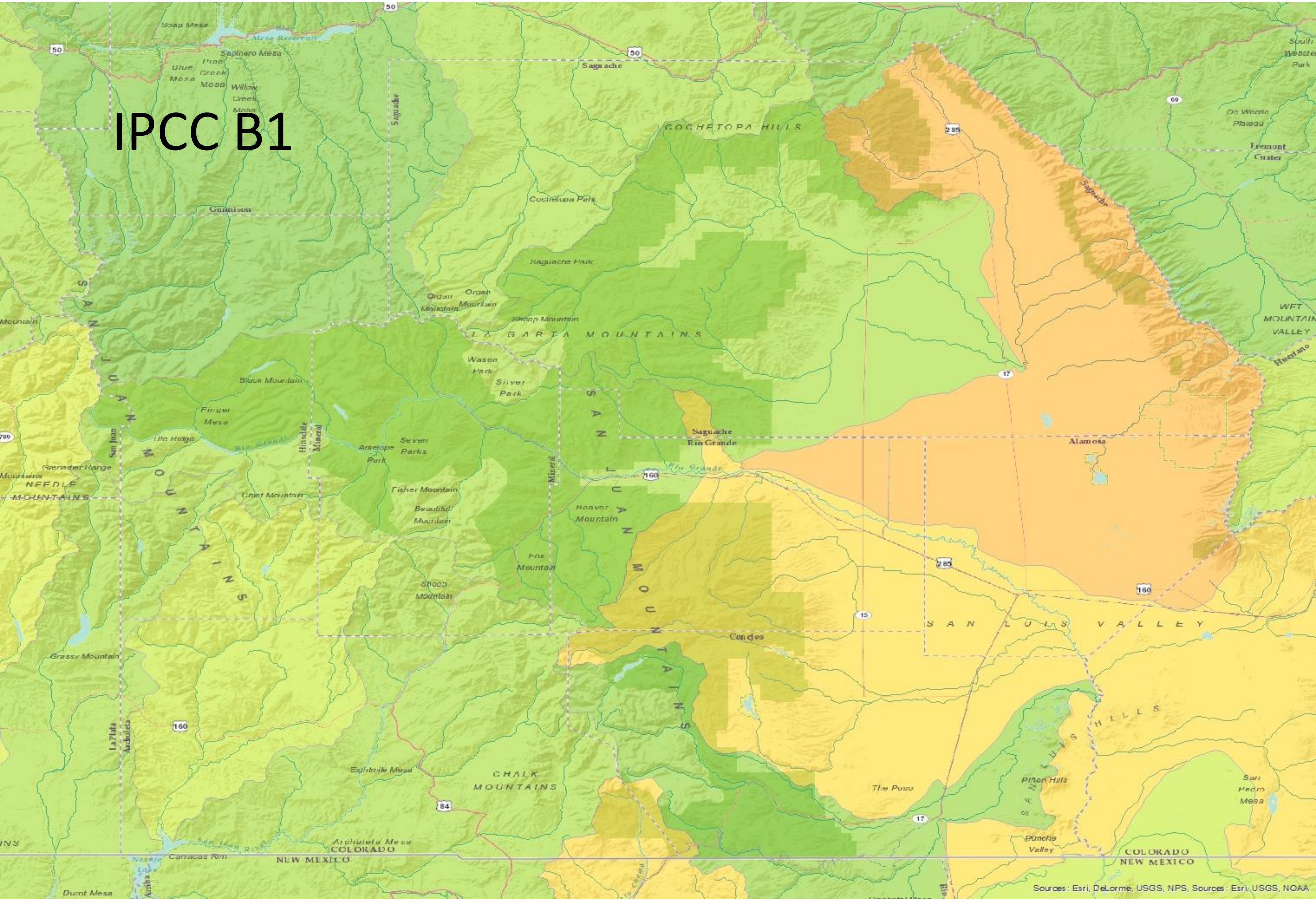
http://www.fs.fed.us/wwetac/projects/theobald.html


Current threat level
Green = Low
Red = High
COCHETOPA HILLS
LA GARITA MOUNTAINS
SAN LUIS MOUNTAINS
SAN LUIS VALLEY
SAN JUAN MOUNTAINS
NEEDLE MOUNTAINS
CHALK MOUNTAINS
Saguache
Alamosa
Conejos
Saguache Park
Cochetopa Park
Wason Park
Silver Park
Seven Parks
Antelope Park
Fisher Mountain
Beautiful Mountain
Heaver Mountain
Fox Mountain
Sheep Mountain
Organ Mountain
Black Mountain
Finger Mesa
Ute Ridge
Chief Mountain
Grassy Mountain
Saguache
Rio Grande
Hinsdale
Mineral
Conejos
Archuleta Mesa
Carracas Rim
Dunn Mesa
Explorer Mesa
The Poso
Pinon Hills
Punche Valley
San Pedro Mesa
COLORADO
NEW MEXICO
Sources: Esri, DeLorme, USGS, NPS, Sources: Esri, USGS, NOAA

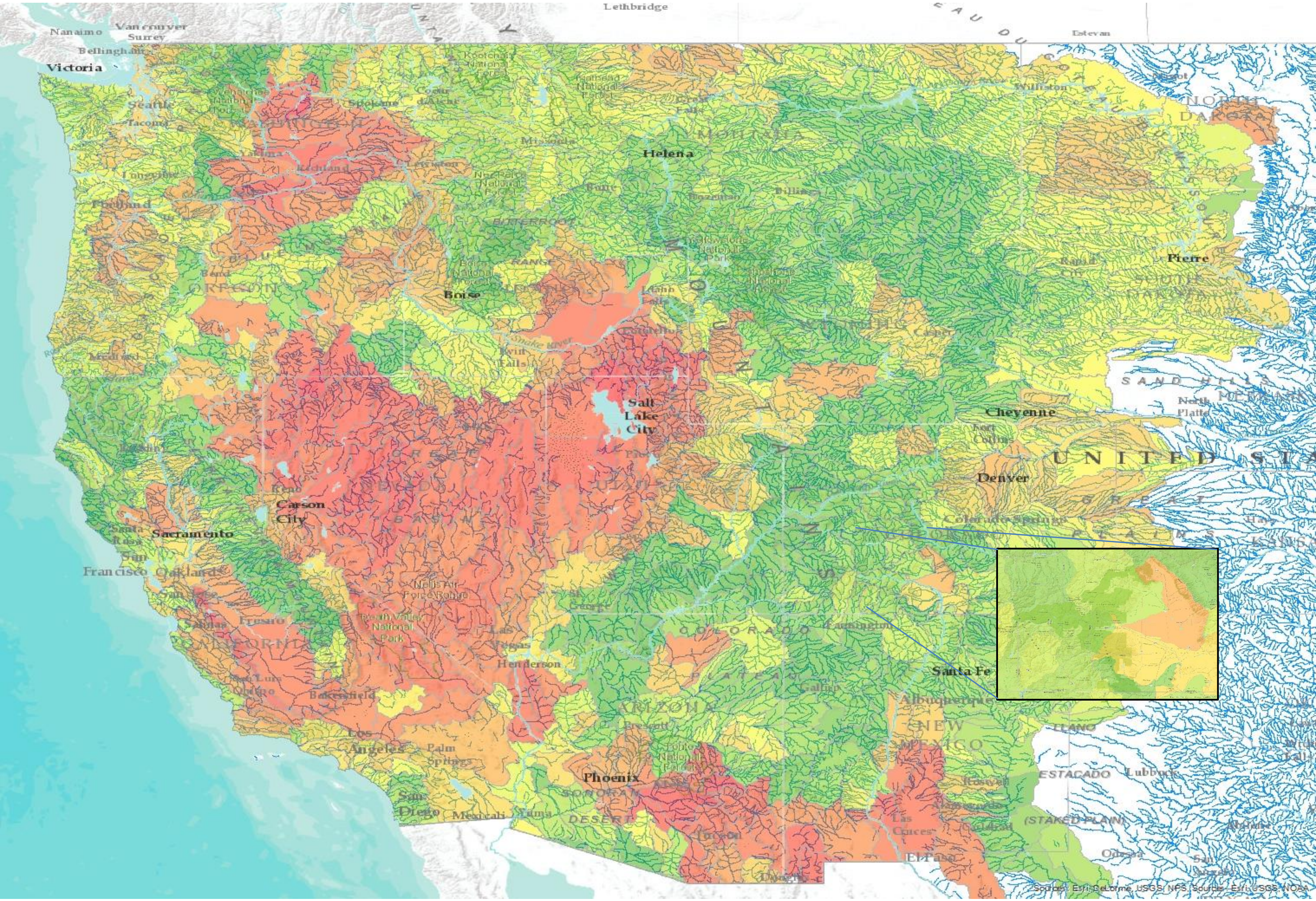
IPCC A1B


Saguache
Cochetopa Hills
Gunnison
Saguache Park
La Garita Mountains
San Juan Mountains
Alamosa
Rio Grande
Conejos
San Luis Valley
San Luis Hills
Wet Mountain Valley
Fremont
Custer
Huerfano
Mineral
Hinsdale
Archuleta
La Plata
Chalk Mountains
Needle Mountains
Colorado
New Mexico
Sources: Esri, DeLorme, USGS, NPS, Sources: Esri, USGS, NOAA

IPCC B1



Saguache
COCHETOPA HILLS
Gunnison
Saguache Park
LA GARITA MOUNTAINS
SAN JUAN MOUNTAINS
Alamosa
Rio Grande
Conejos
SAN LUIS VALLEY
CHALK MOUNTAINS
COLORADO
NEW MEXICO
Sources: Esri, DeLorme, USGS, NPS, Sources: Esri, USGS, NOAA



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Spokane
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Billings
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Cheyenne
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Bakersfield
Los Angeles
Palm Springs
Phoenix
San Diego
Mexicali
Yuma
Tucson
Las Cruces
El Paso
Lubbock
Odessa
Sources: Esri, DeLorme, USGS, NPS, Sources: Esri, USGS, NOAA