

So what do I do with this?

Using assessment data to inform decision-making in a technically sound, defensible way

Colorado Application Workshop
BLM Royal Gorge Field Office, Cañon City, CO
23 January, 2017

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Assessment and Monitoring Branch
National Operations Center

CONTEXT!

Outline

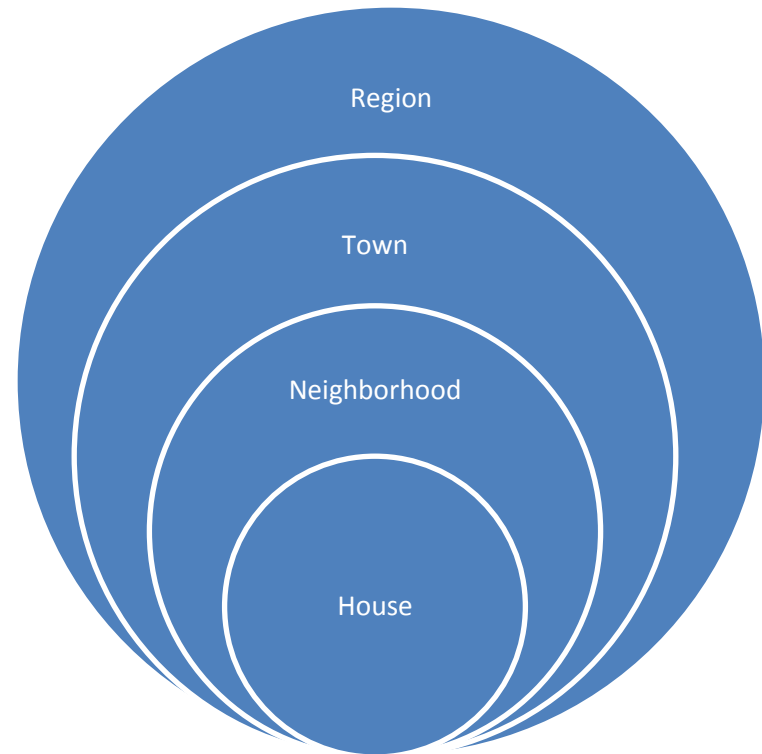
- Multi-scale decision making
- Other landscape-scale data
- Application examples
 - Colorado Plateau REA: Ecological Integrity—GSENM
 - Northwest Plains REA: Identify watersheds with high quality grass/shrub ecosystems
 - Northern Great Basin REA: Energy Development Suitability
 - Colorado Plateau REA: Aquatic Intactness
 - Dillon (Middle Rockies REA): Watershed assessments
 - Northern California (NGB and CBR REAs): Transportation planning and mule deer
 - San Luis Valley/Taos Plateau: Solar energy mitigation



Multi-scale decision making

■ Picking a Retirement Home

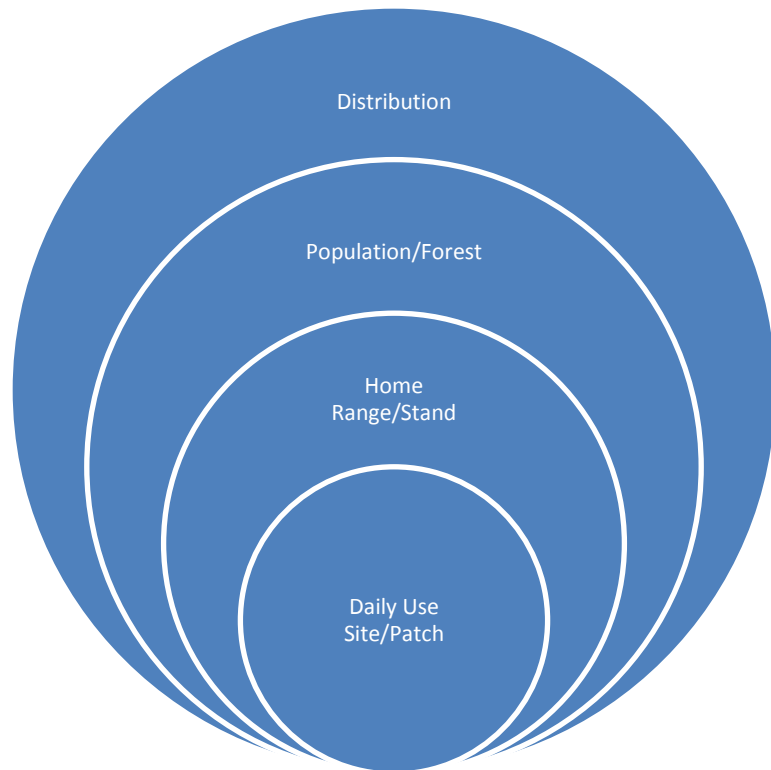
- Region: Mountains vs. Coast
 - Which mountain range?
 - East/West/Gulf coast?
- Town/Area: Rural/Urban
 - Population size
 - Proximity to ...?
- Neighborhood/Block:
 - Lakewood vs. Westminster
 - Opportunities
 - Recreation (trails/lakes/parks)
 - Schools
- House:
 - Ranch or Multi-level
 - # bedrooms/ # bathrooms



Increasing Detail

Multi-scale decisions

- Do you need macro or micro scale data to inform your decision?



Collecting/using the data depends on the question(s)

What is my question? – Include scale

- How will the range of sage-grouse shift with projected climate change in 2060?
- What restoration actions are needed to connect seasonal use areas for this population?
- How will prescribed grazing impact sage-grouse vital rates within this allotment?



Using REA Data

- How was status assessed in the REA?
 - Is this the same question?
 - Look at conceptual model and process models
- Are my assumptions the same?
- Conceptual & geospatial models provided to allow modifications and inclusion of other data
 - Caution in applying data at 30 m resolution of assessments



An important distinction

- Landscape scale
 - Often considered to be large geographic extent
 - regional/national datasets
 - largest spatial scale available for a given issues
 - landscape as biological hierarchy
- Landscape approach (systems)
 - focus on conservation elements (CEs) and change agents (CAs)
 - process/information flow at multiple spatial/temporal scales (extent and resolution)
 - resulting understanding provides context for management questions/issues



Appropriate Use

- Intended to be applied at landscape/watershed scale, providing context to sites, content less certain
 - Limitations in applying remotely-sensed, stressor-based CAs to determining CE status
 - Applied to assessment and planning questions, not fixing firm boundaries without site visits
- REAs look inward for ecoregions. Broader scale analyses can lean on approaches, but you cannot simply stitch REAs together



Broad-scale data sources

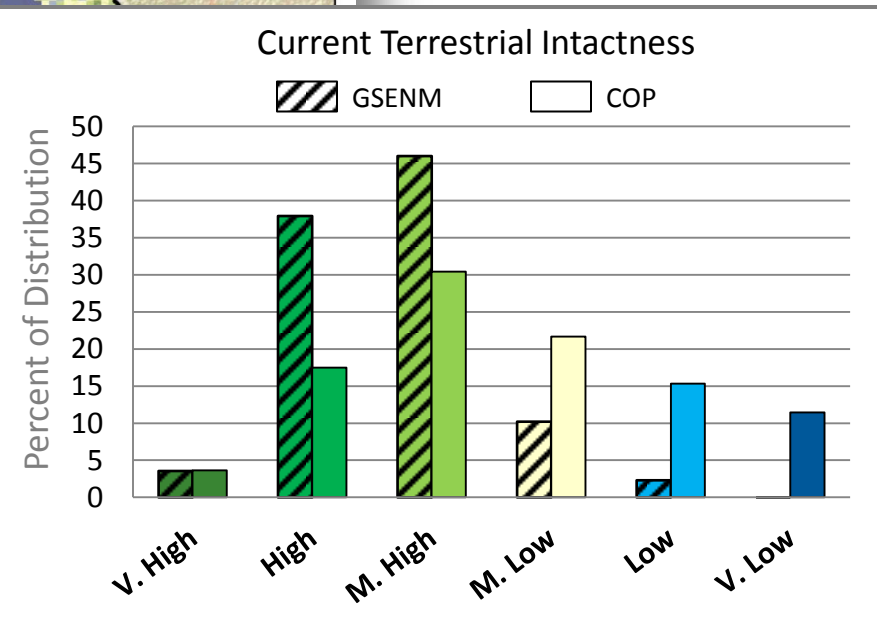
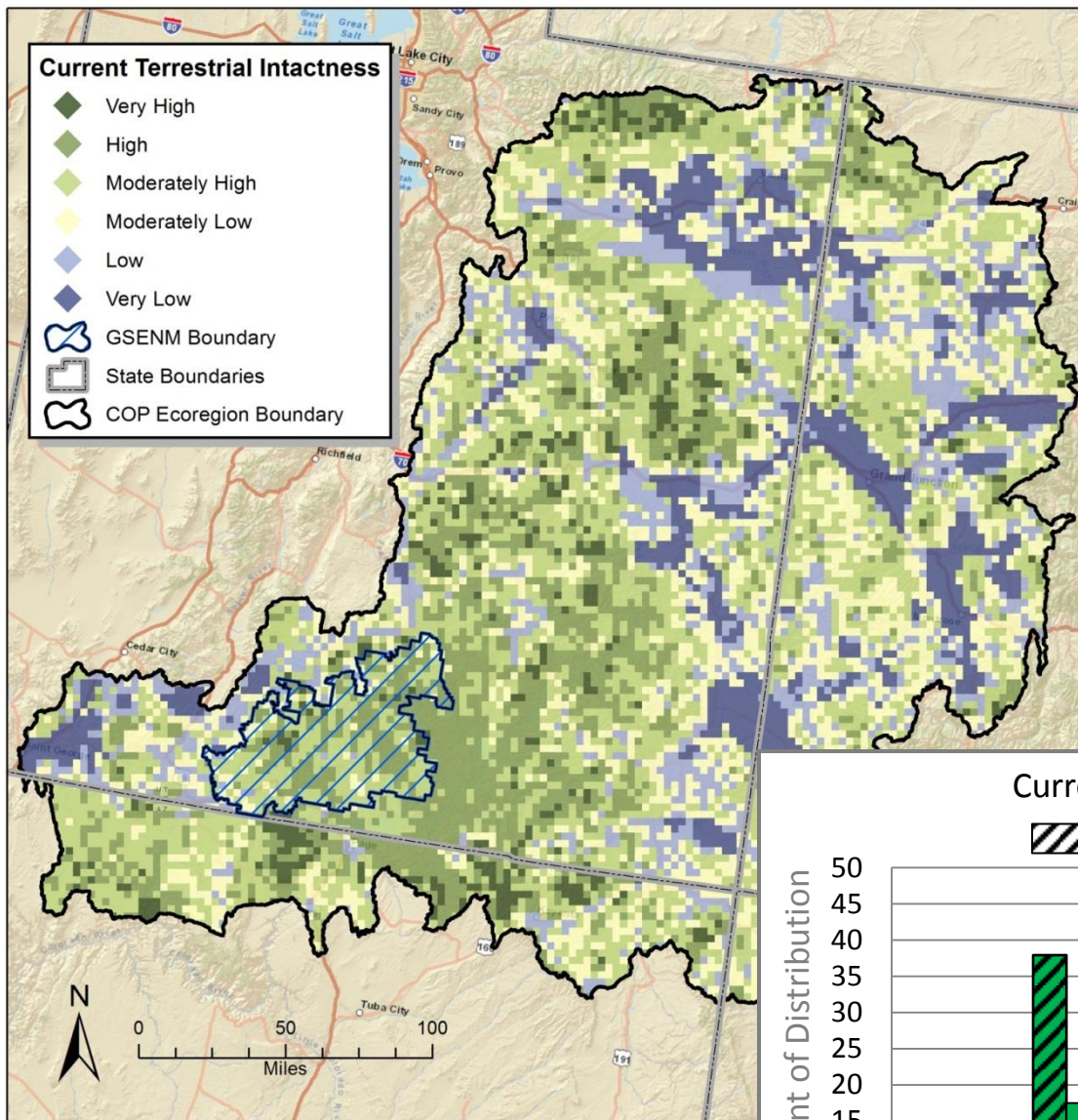
- Examples of other sources for broad-scale data (handout)



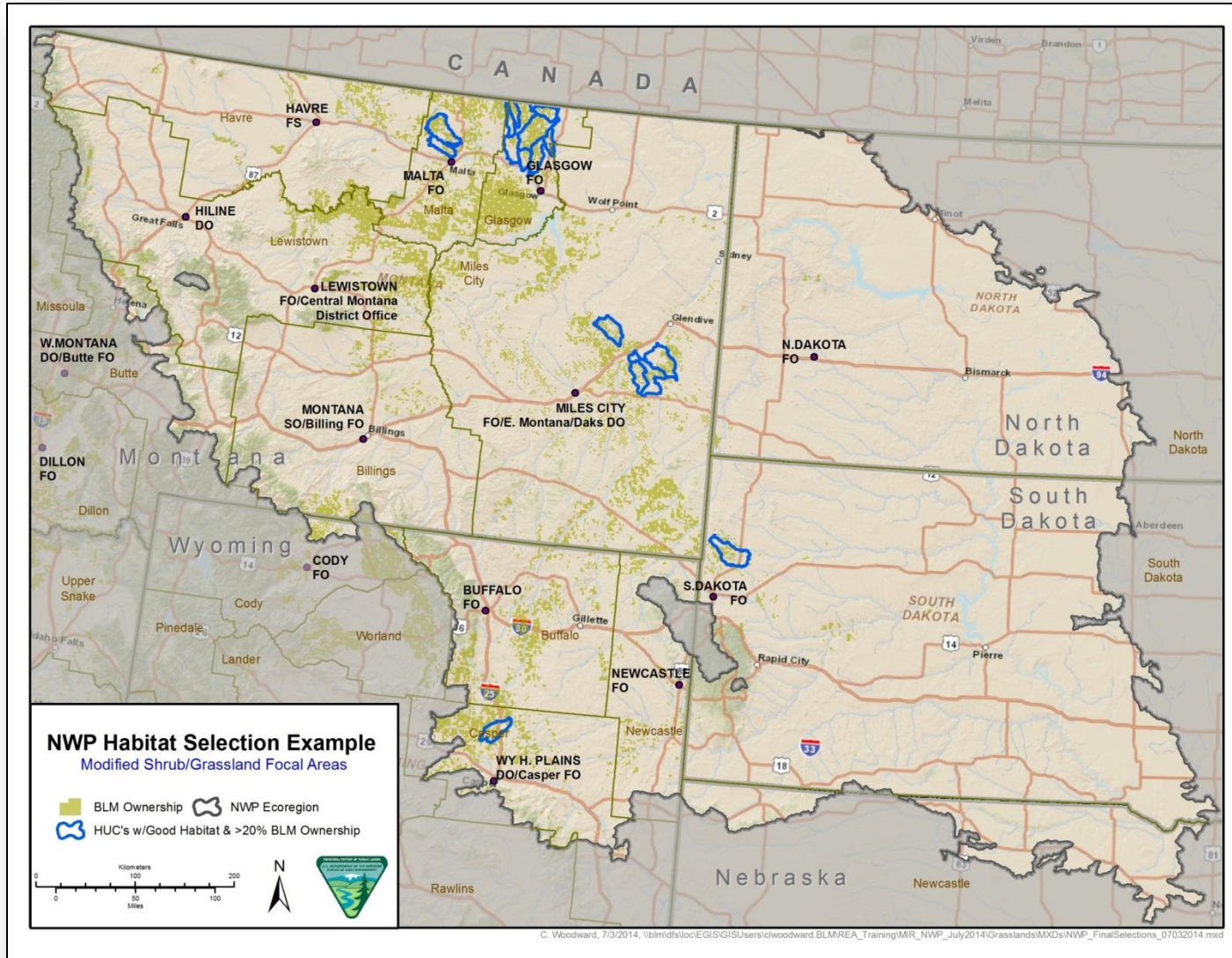
Examples of REA Applications



How does the landscape integrity of GSENM compare to the ecoregion?



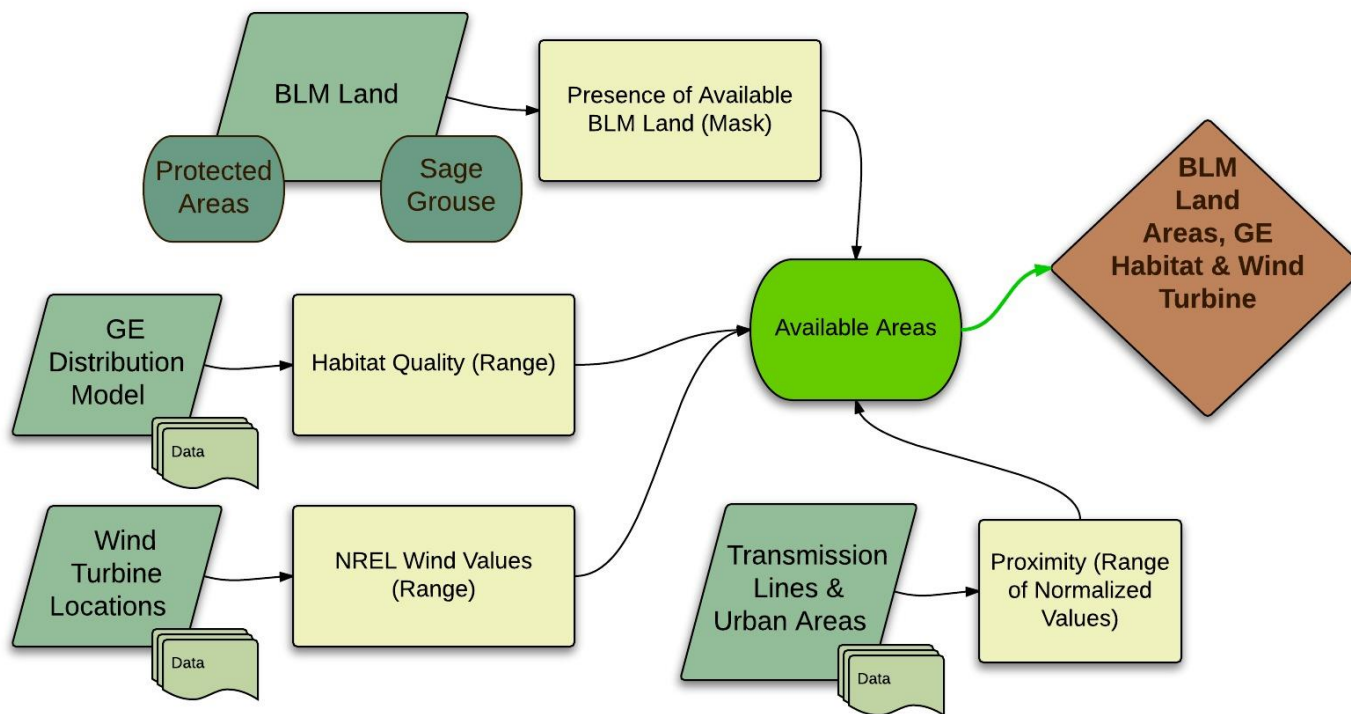
Where are watersheds with high quality grass/shrub and BLM management?



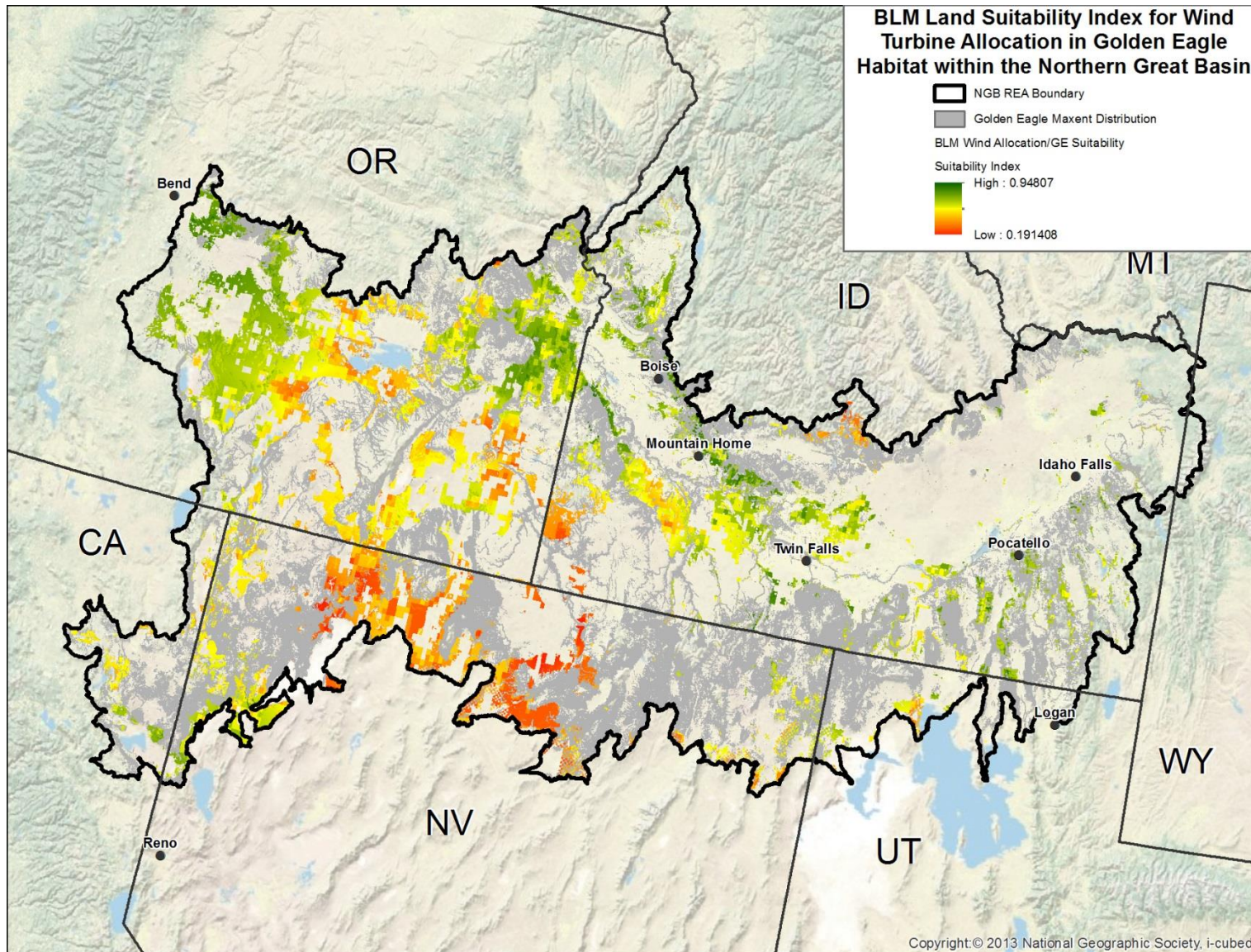
Suitability Index

Golden Eagle and Wind Turbine REA Application

Q. Can we evaluate areas of BLM land that are suitable for allocation of wind turbines and that will have a limited effect on golden eagles?



Suitability Index Result

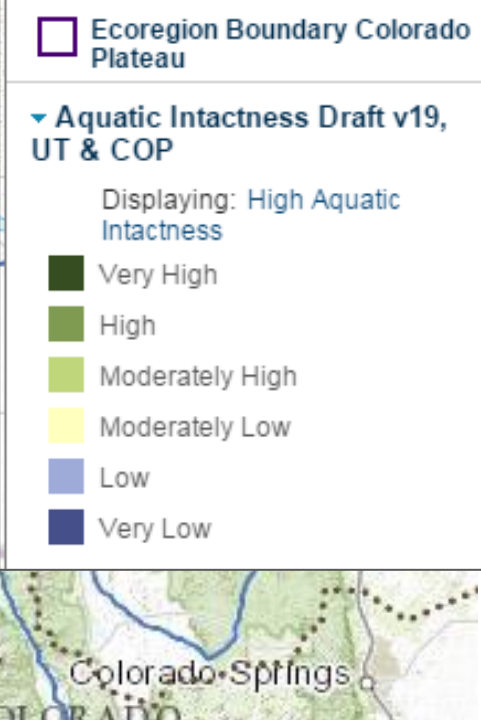
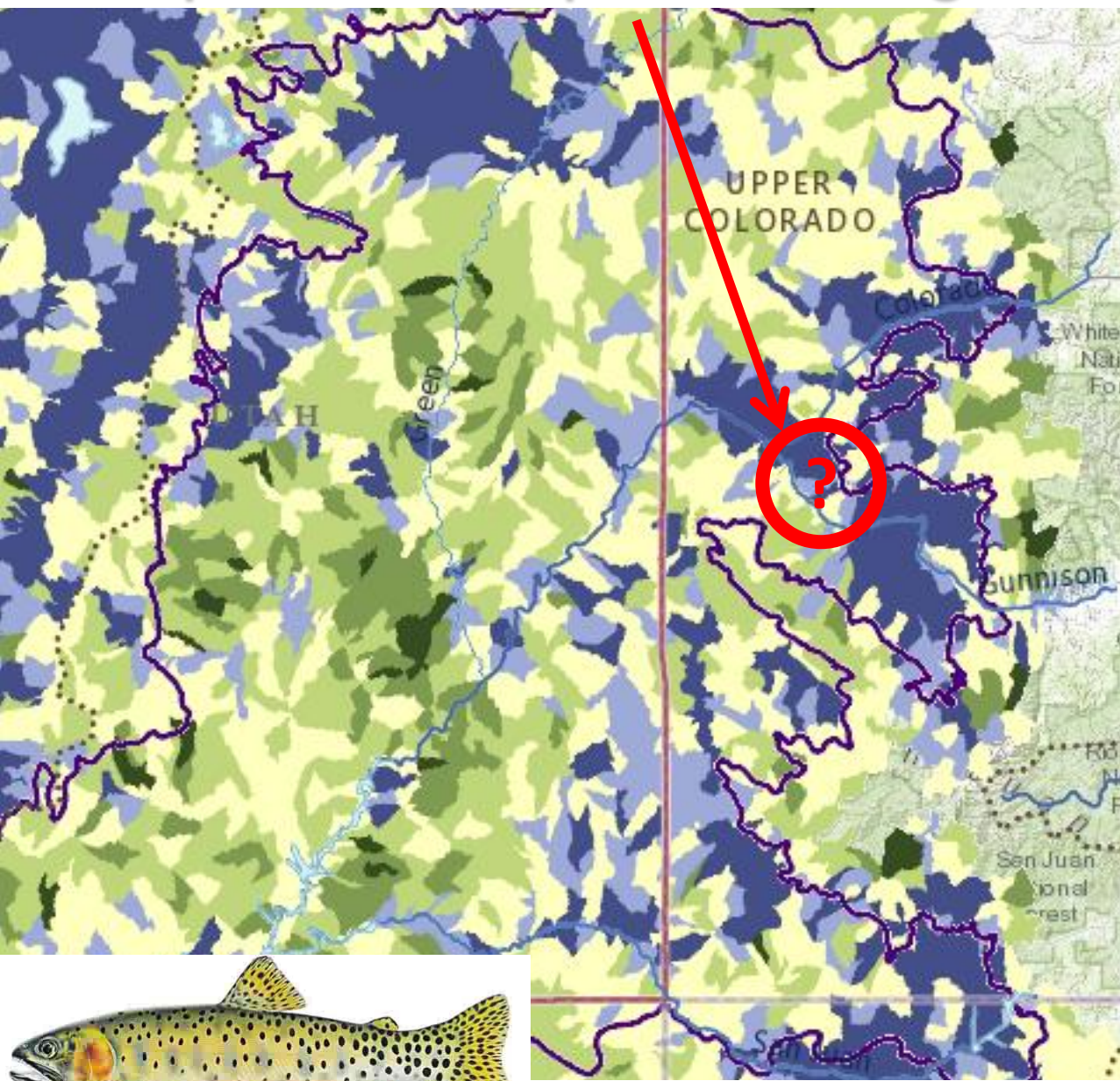


More detailed examples

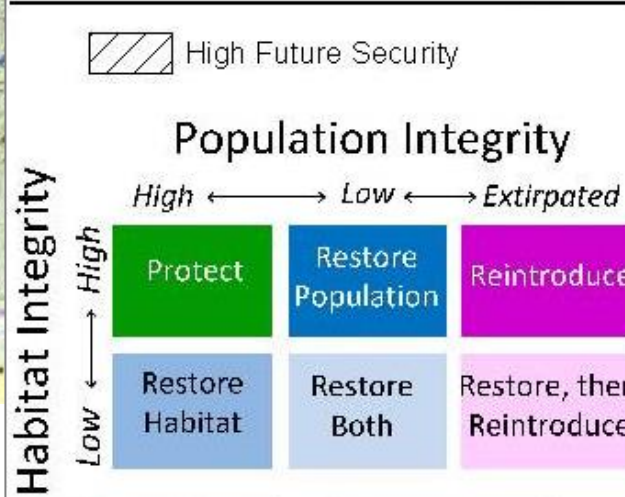
- Colorado Plateau REA
 - Identifying likely problems with Aquatic Intactness
- Dillon FO (Middle Rockies REA)
 - Watershed assessments in land-use planning
- Northern California (NGB and CBR REAs)
 - Transportation planning and mule deer
- San Luis Valley/Taos Plateau
 - Planning mitigation for solar energy development



Example: Land & species management

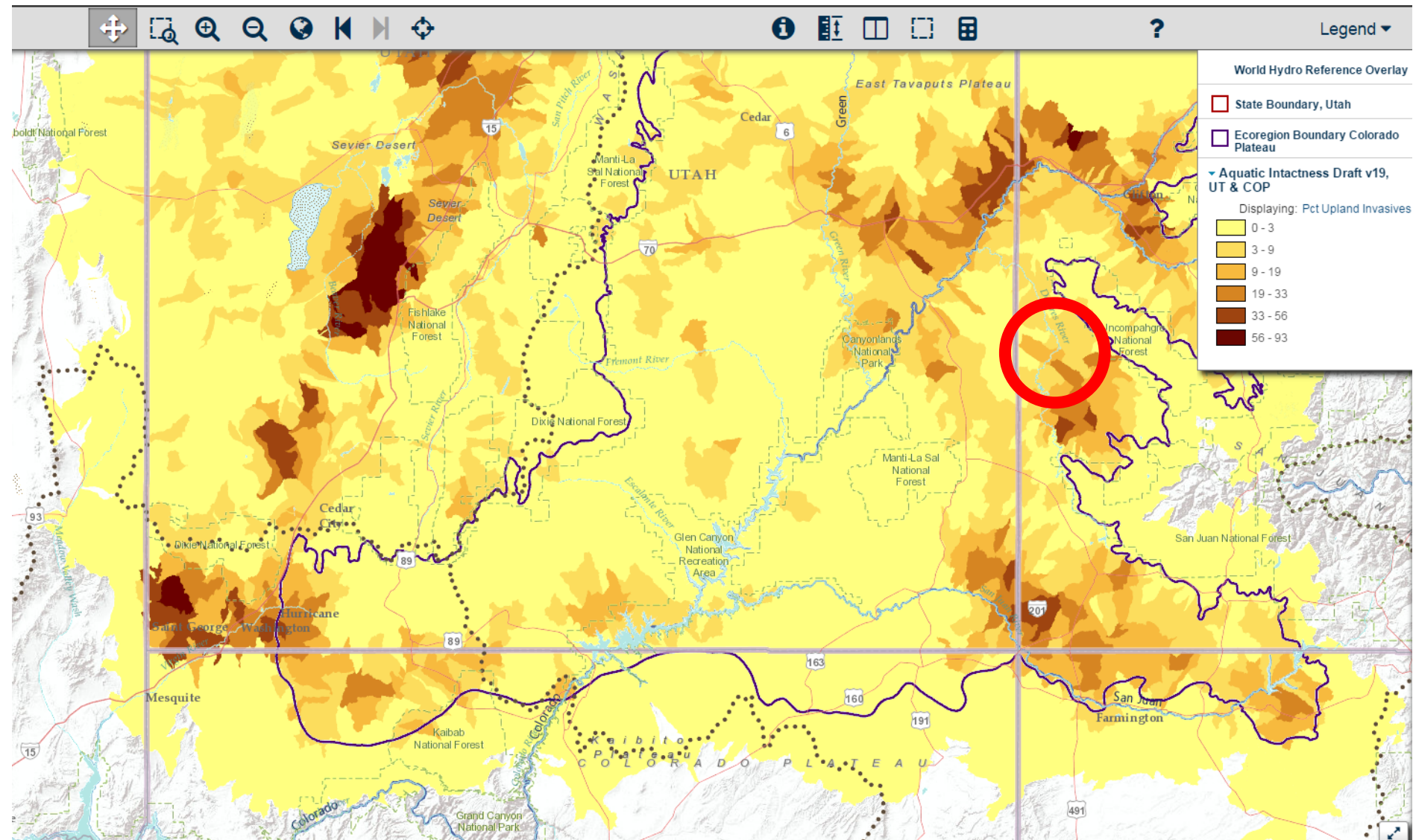


Colorado River Cutthroat Trout Conservation Success Index Conservation Strategy



Co. River Cutthroat Trout

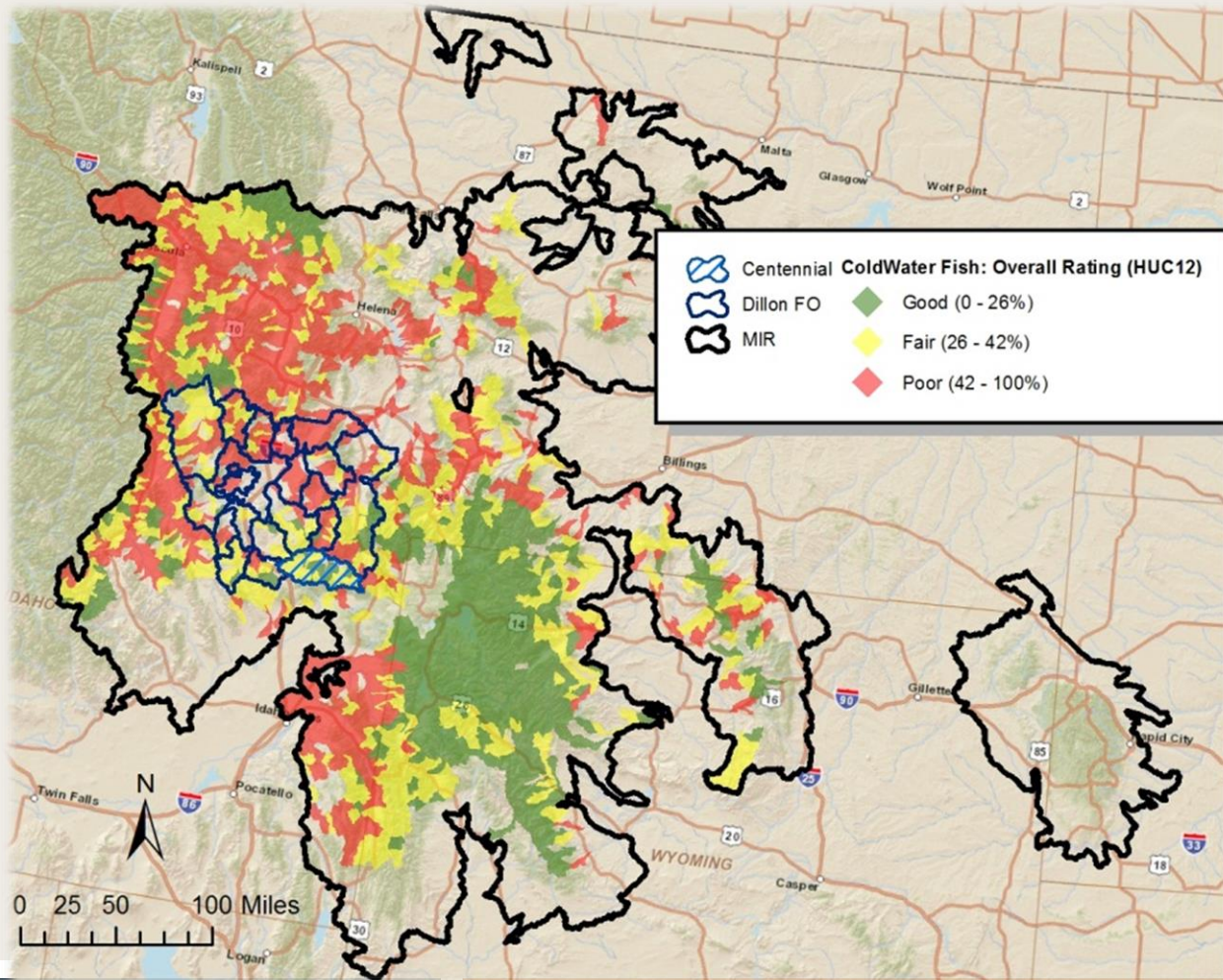
Upland invasives are a problem here!



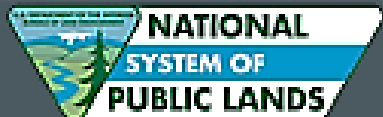
Use this to target management activities & do appropriate field work.

Coldwater Fish Assemblage Overall Rating

18



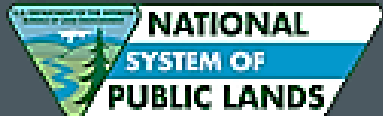
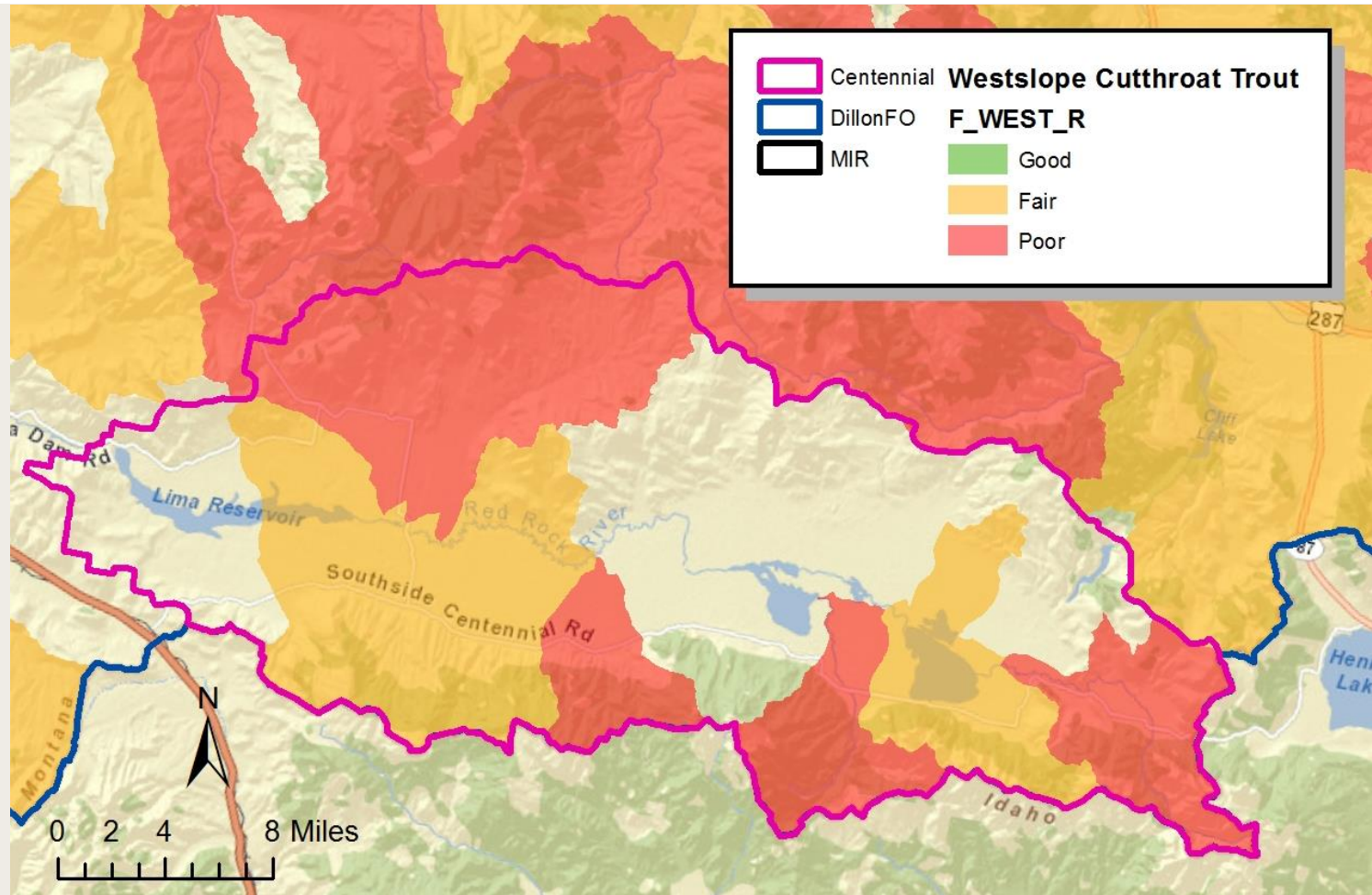
--based on the sum of indicator scores of HUCs within the ecoregion



Landscape Approach Implementation

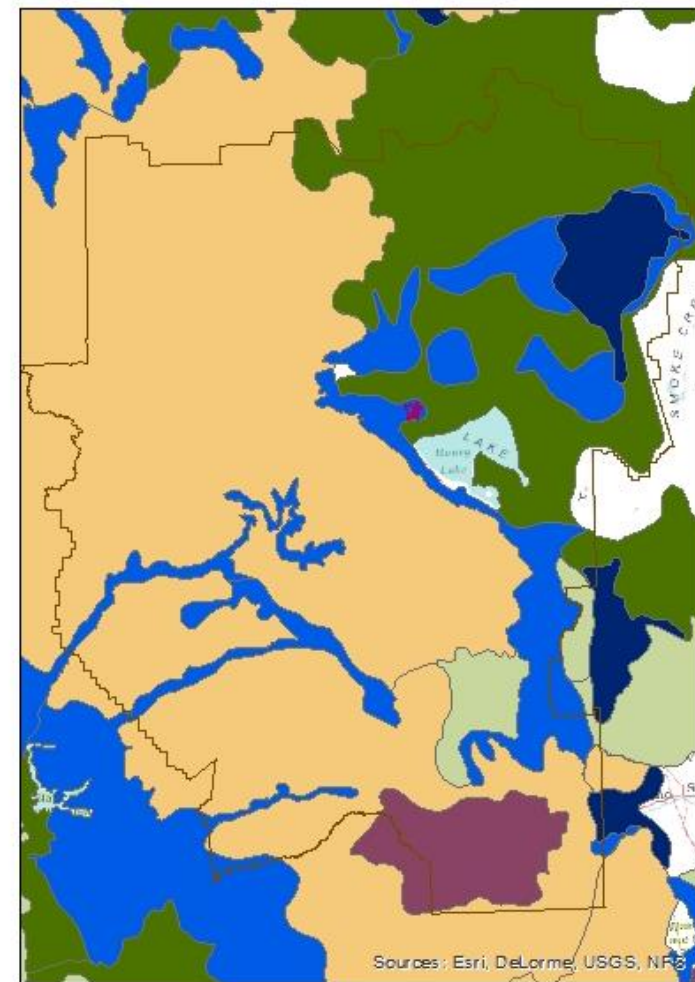
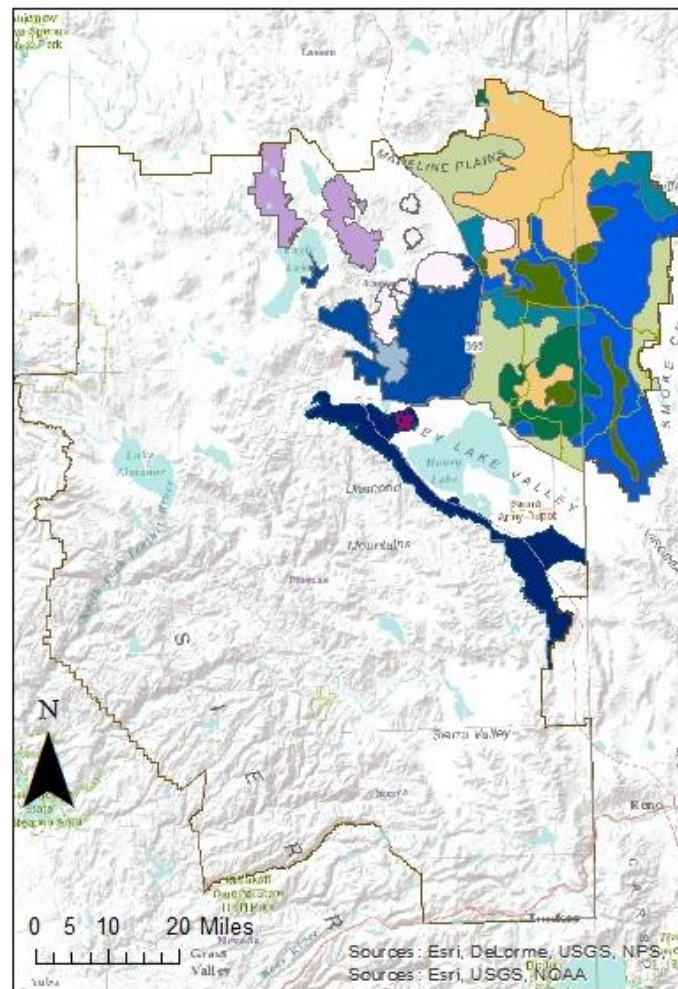
Current Rating – Westslope Cutthroat Trout Centennial Watershed Assessment Area

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Landscape Approach Implementation

Local scale
(left) and
Broad Scale
(right)
Mule Deer
Data at
ELFO

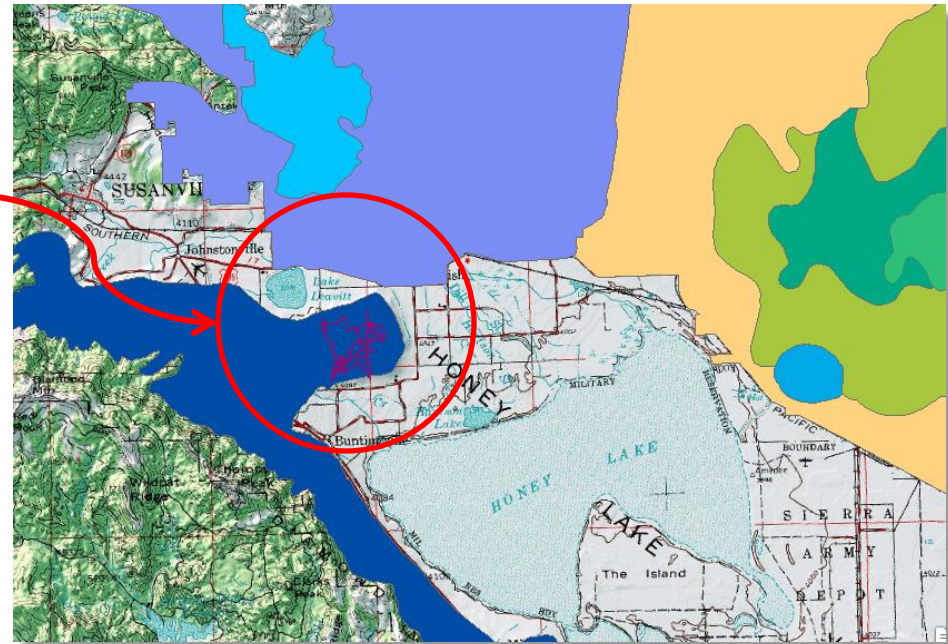


Bald Mountain Area Trails

- The trails are in mule deer priority winter habitat (103,000 acres)
- Priority winter habitat is 9% of the habitat map provided by ELFO
- The trails cover an area of roughly 4,800 acres or 5% of the priority winter habitat (0.5%)

BUT

- The area of Bald Mountain may provide an important link to the northern sections of mule deer habitat? (Min distance = 550m)
- Local knowledge of the linkage area (barriers?) and mule deer preferences are critical to determine the importance of this particular area.



San Luis Valley/Taos Plateau

Solar - Internet Explorer
http://www.blm.gov/co/st/en/fo/slvfo/solar.html

File Edit View Favorites Tools Help

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Updated 07/08/2015

**San Luis Valley/Taos Plateau Study:
Landscape Assessment and Solar Regional Mitigation Strategy**



PROJECT ANNOUNCEMENTS

***ATTENTION** - Public Webinar PowerPoint Posted (July 7, 2015)

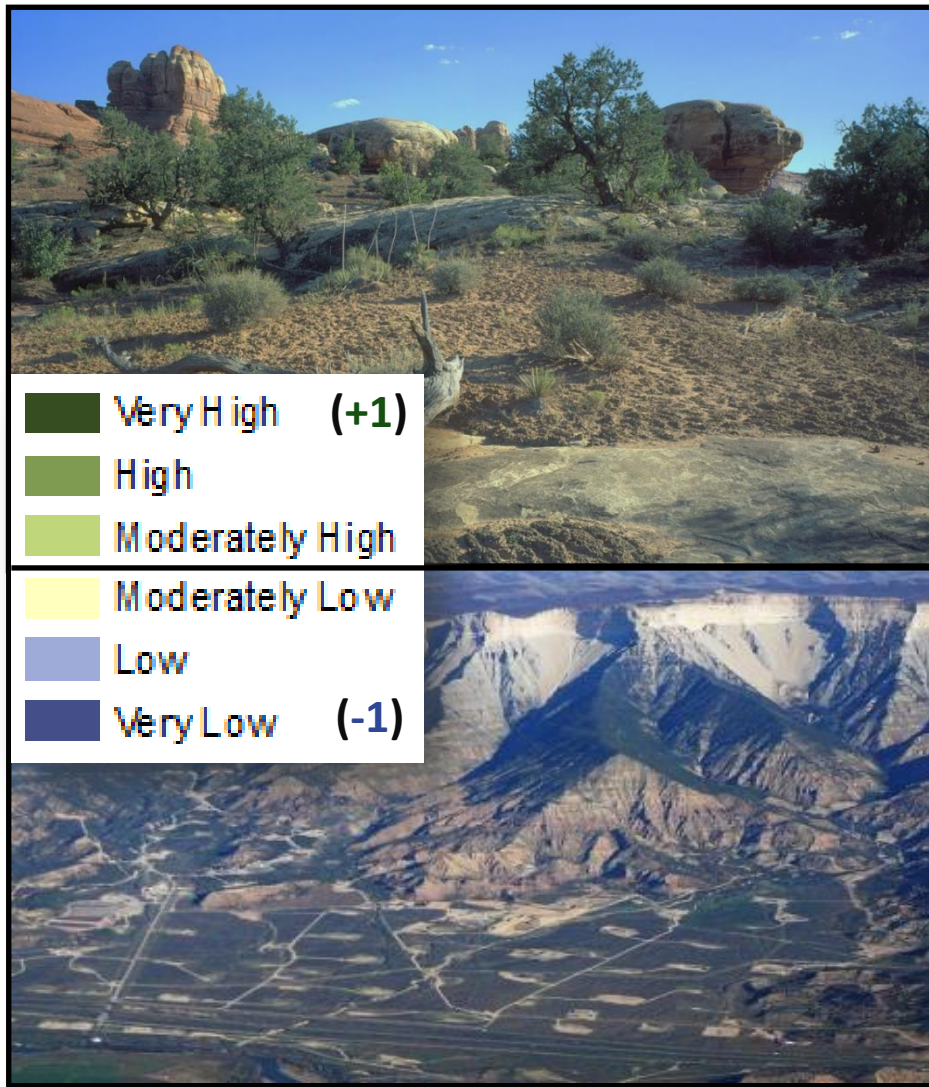
The San Luis Valley/Taos Plateau Study is intended to help BLM ensure environmentally responsible solar energy development on public lands through long-

Links of Interest

NATIONAL SYSTEM OF PUBLIC LANDS
U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Questions?





Measuring aquatic intactness:

A quantifiable estimate of **naturalness** measured on a gradient of anthropogenic influence and **based on available spatial data**.

Sites that are experiencing increasing levels of **disturbance** are considered to have **lower intactness**.

Prepare Data:
Summarize to
reporting units



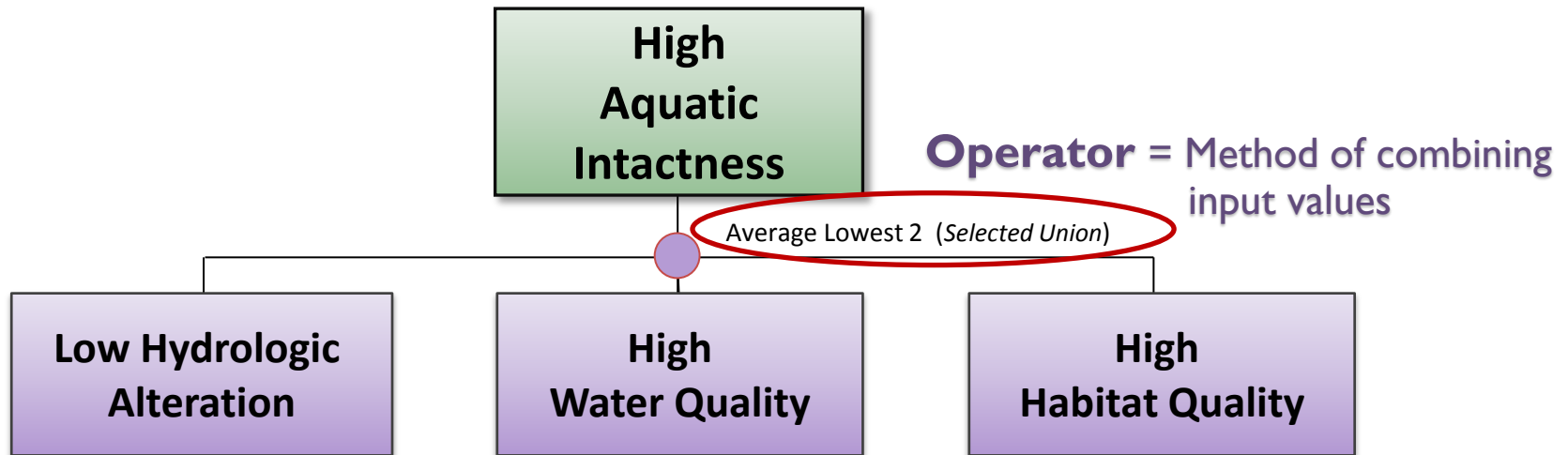
Create Model:
Structure, logic
operators,
weighting



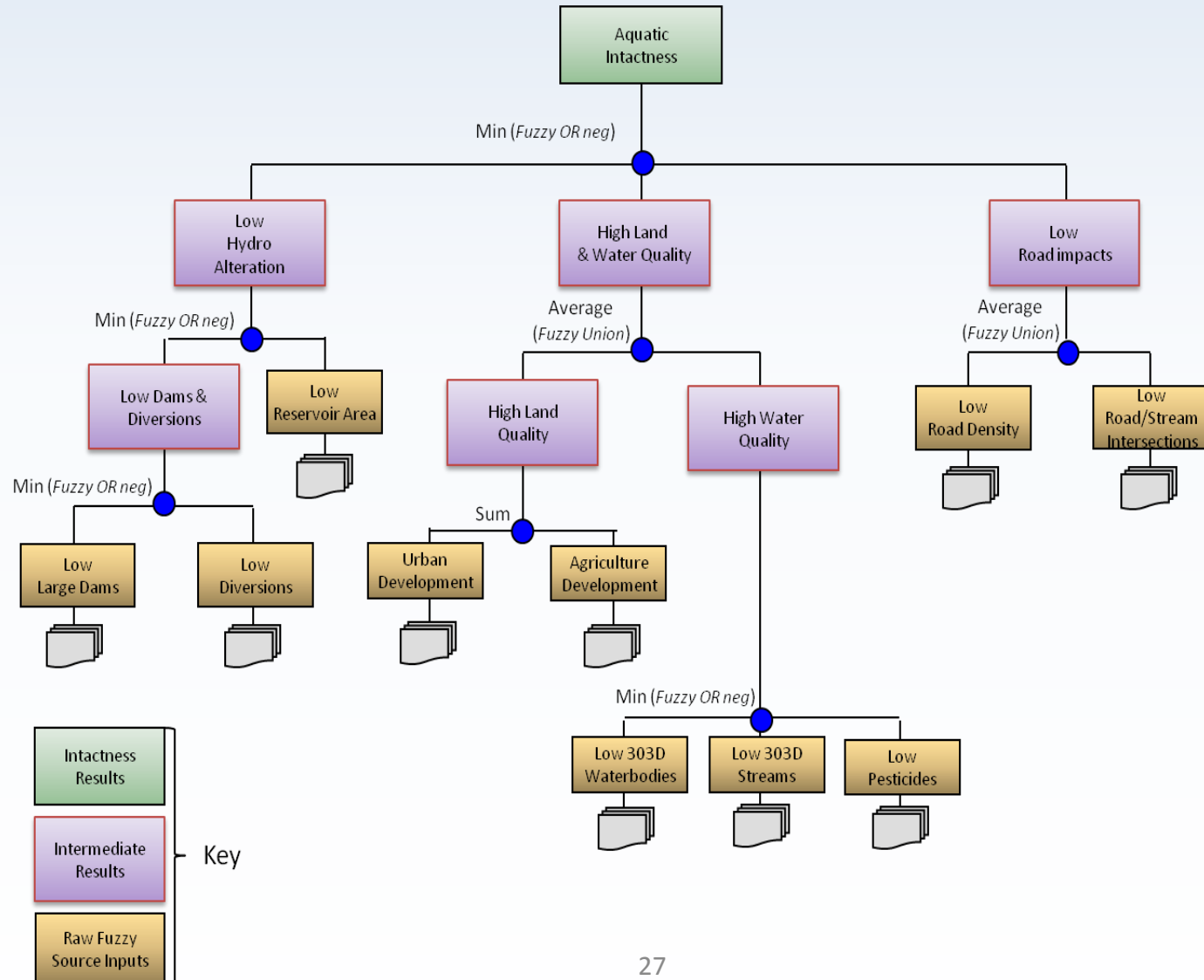
**Examine
Output:** Modify
based on expert &
user input

Extras

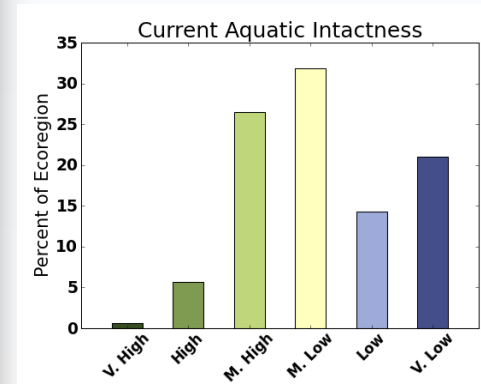
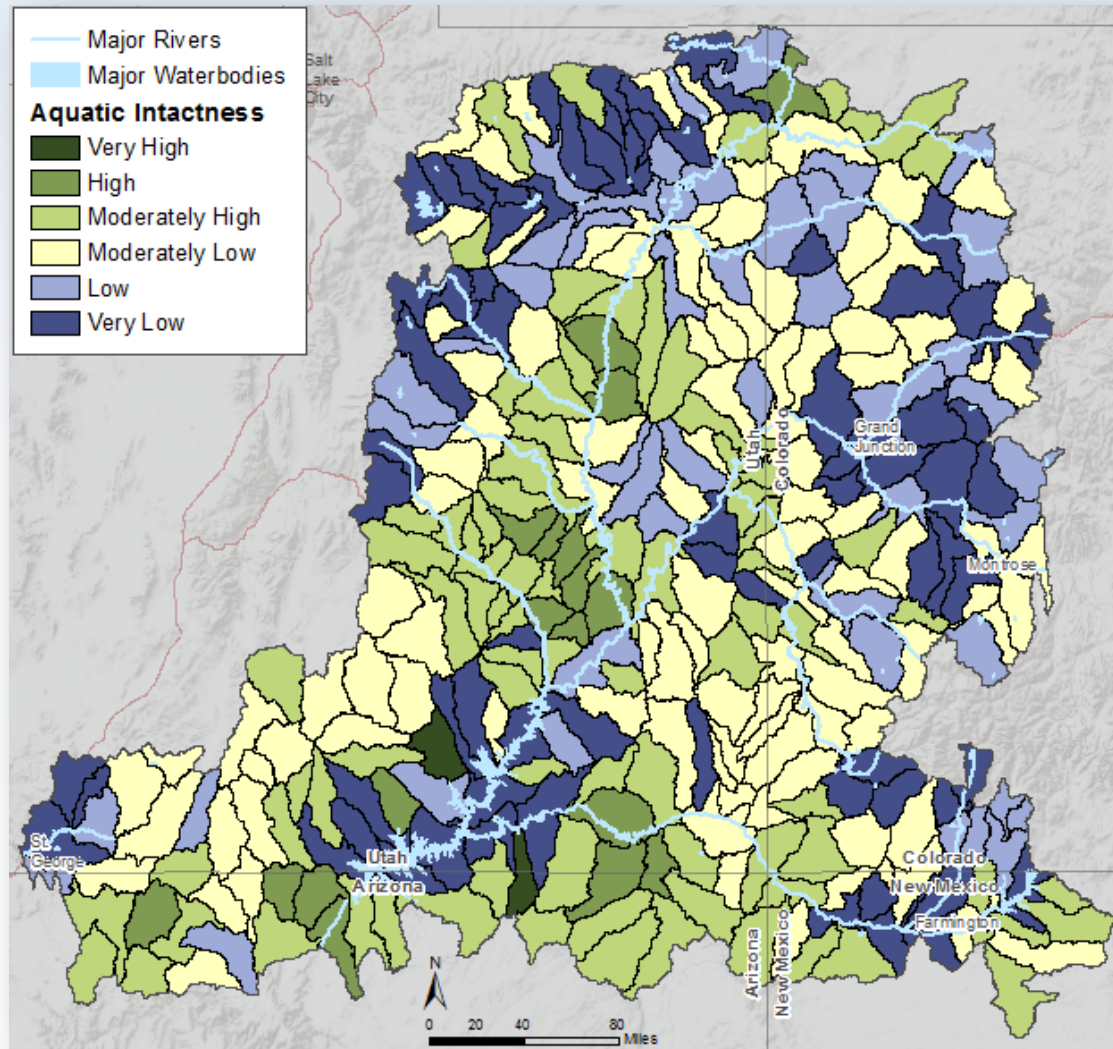
Aquatic Intactness Model Main Themes



COP: Original Aquatic Intactness model



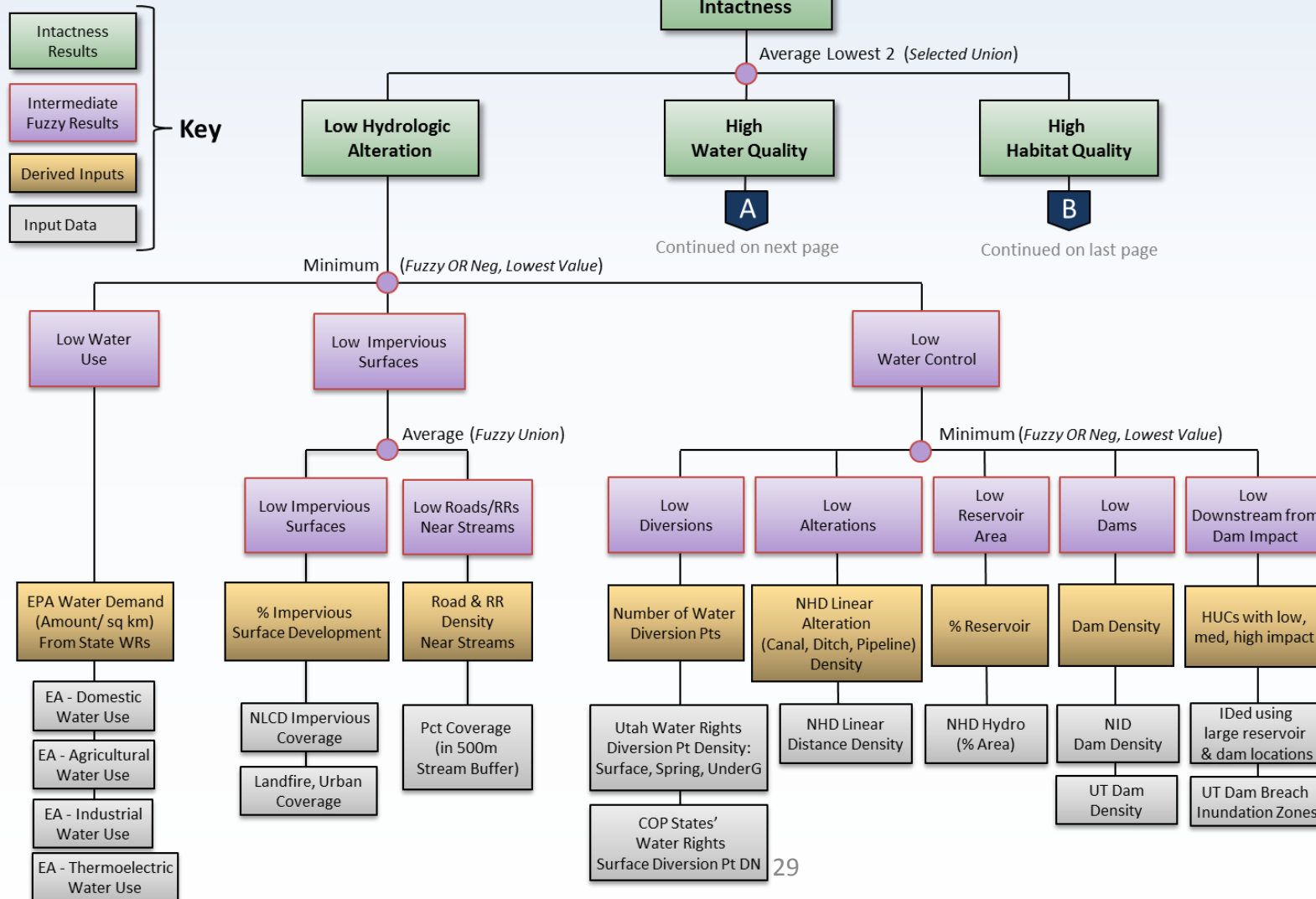
COP: Original Aquatic Intactness results



UT-COP: Revised Aquatic Intactness model

Utah & Colorado Plateau Aquatic Intactness Model, 12-Digit HUC

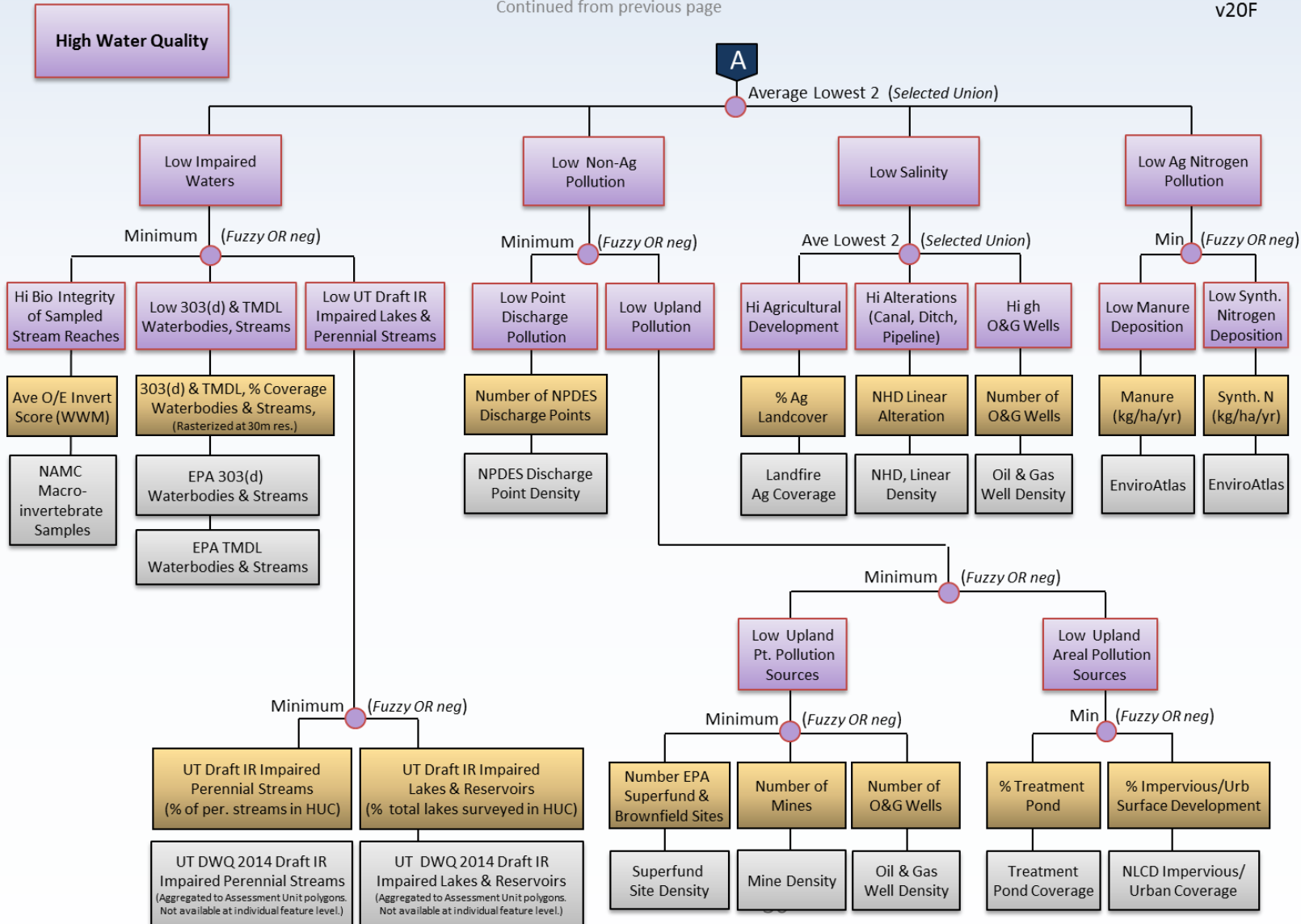
v20F



UT-COP: Revised Aquatic Intactness model

Continued from previous page

v20F

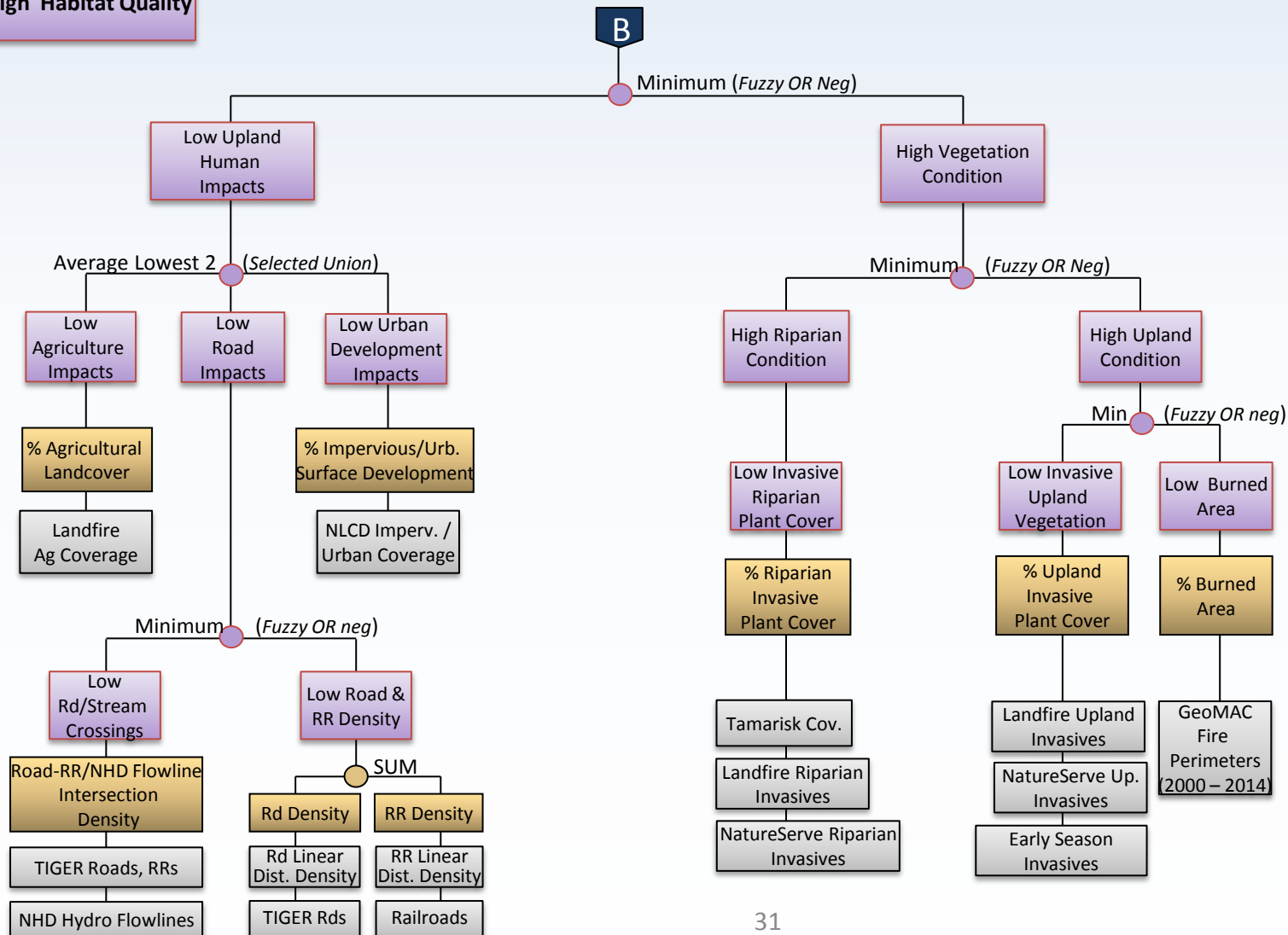


UT-COP: Revised Aquatic Intactness model

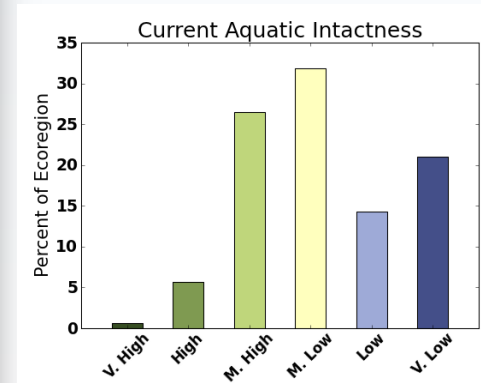
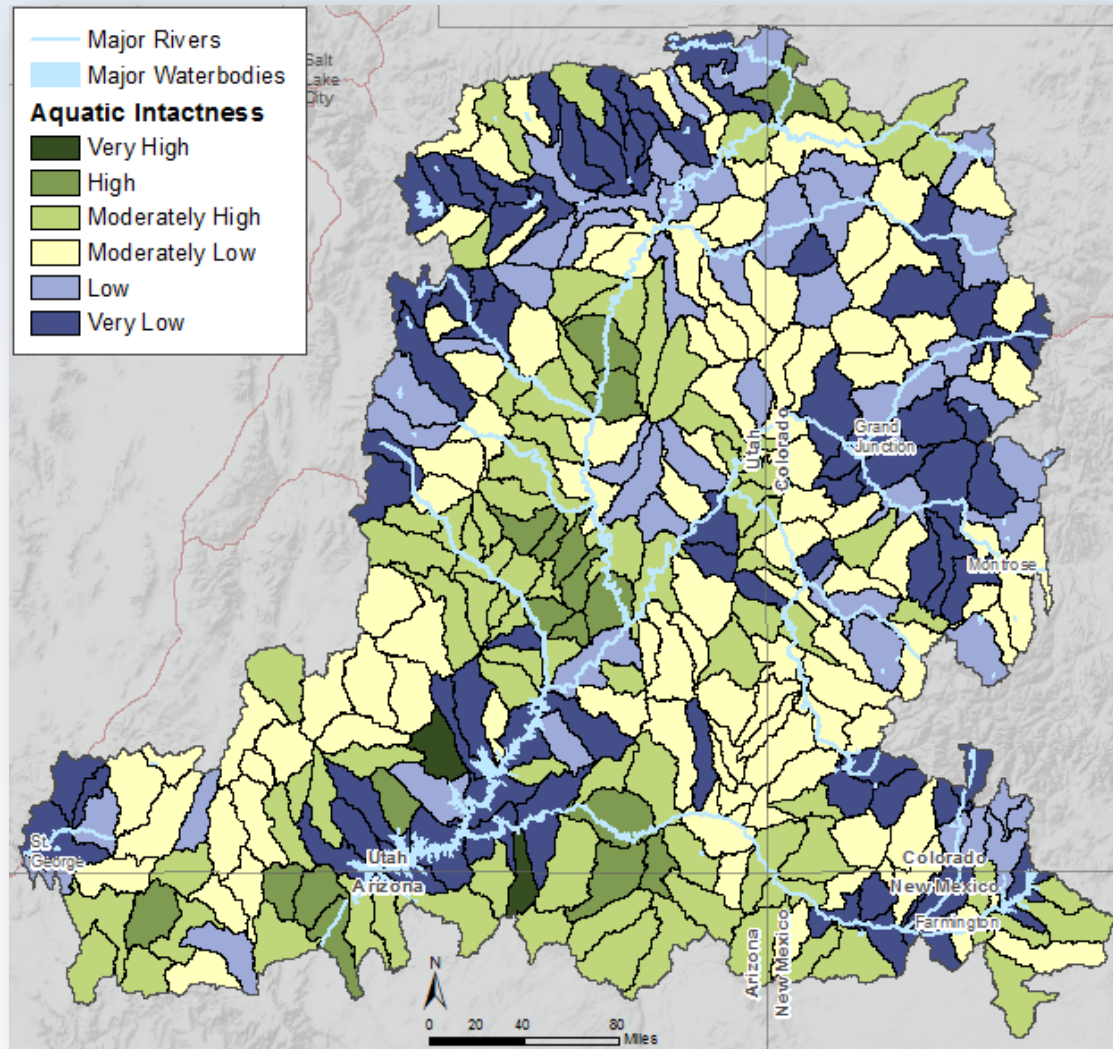
High Habitat Quality

Continued from page 1

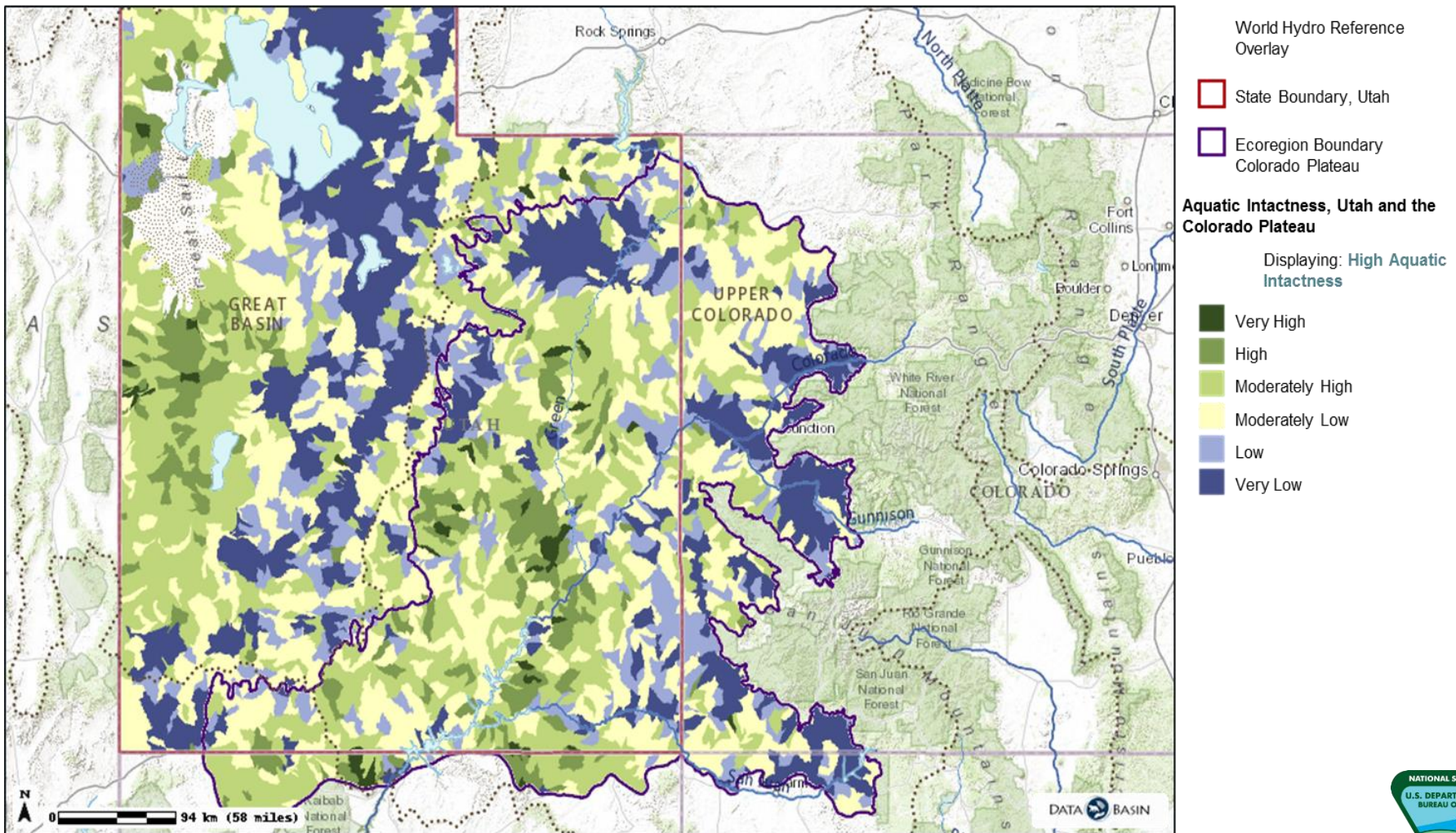
v20F

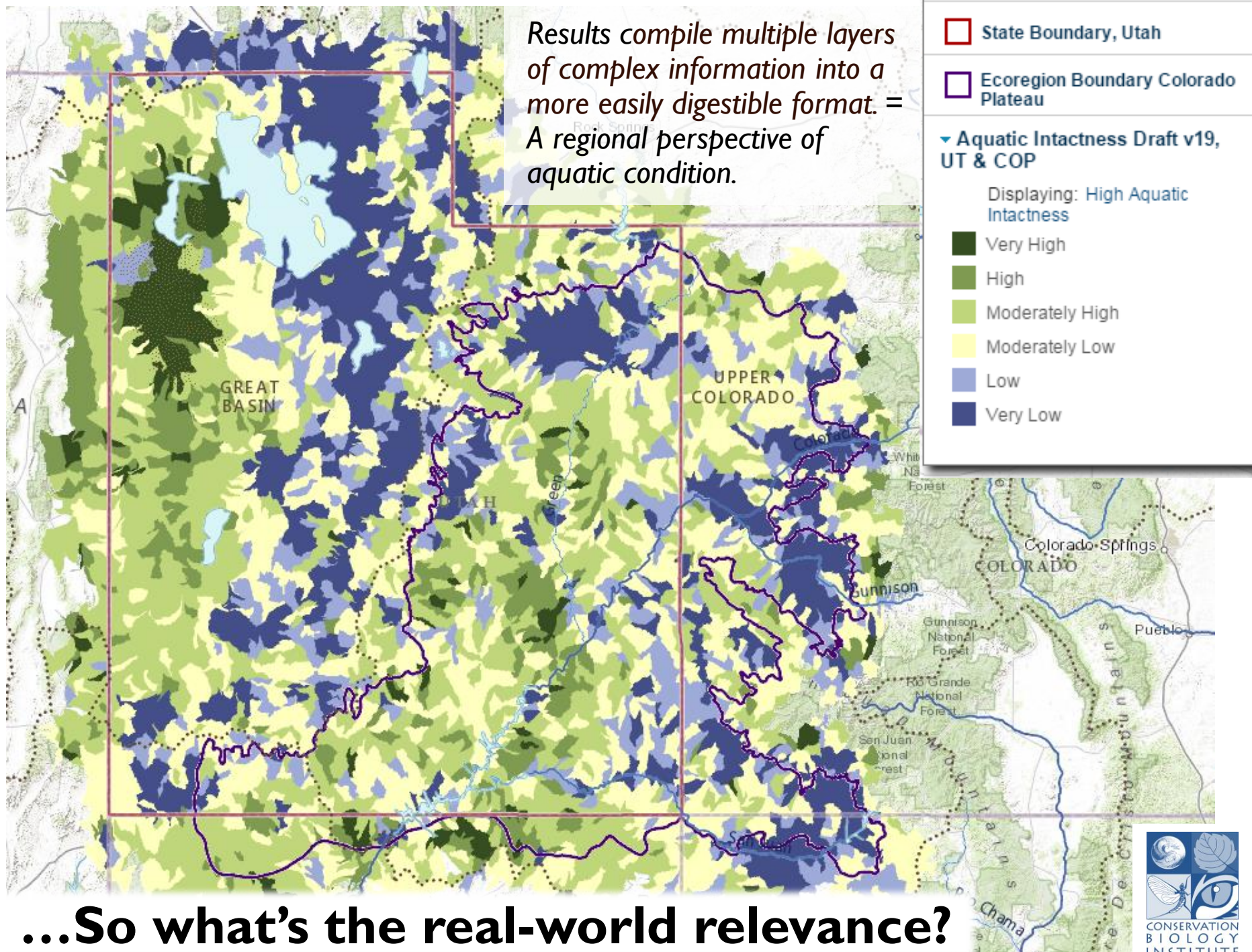


COP: Original Aquatic Intactness results



UT-COP: Revised Aquatic Intactness results





Applications & Advantages:

Process: Spatial data inventory & integration, gap analysis

Product: Increased accessibility of spatial data & expert knowledge

Interactive tool: Facilitates scientifically-sound, objective decision-making

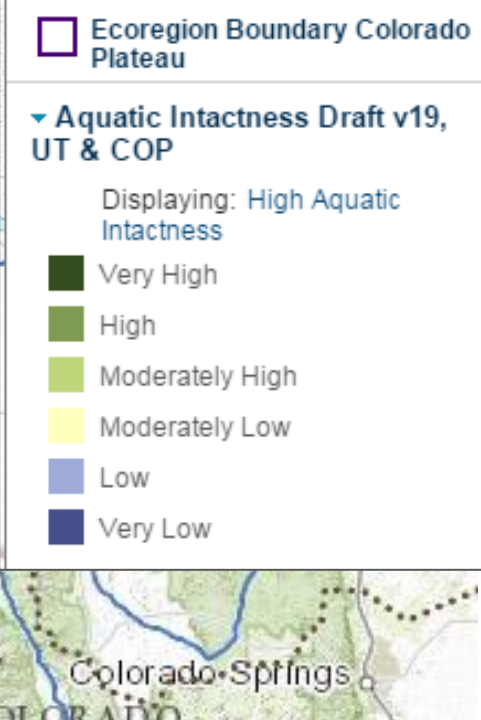
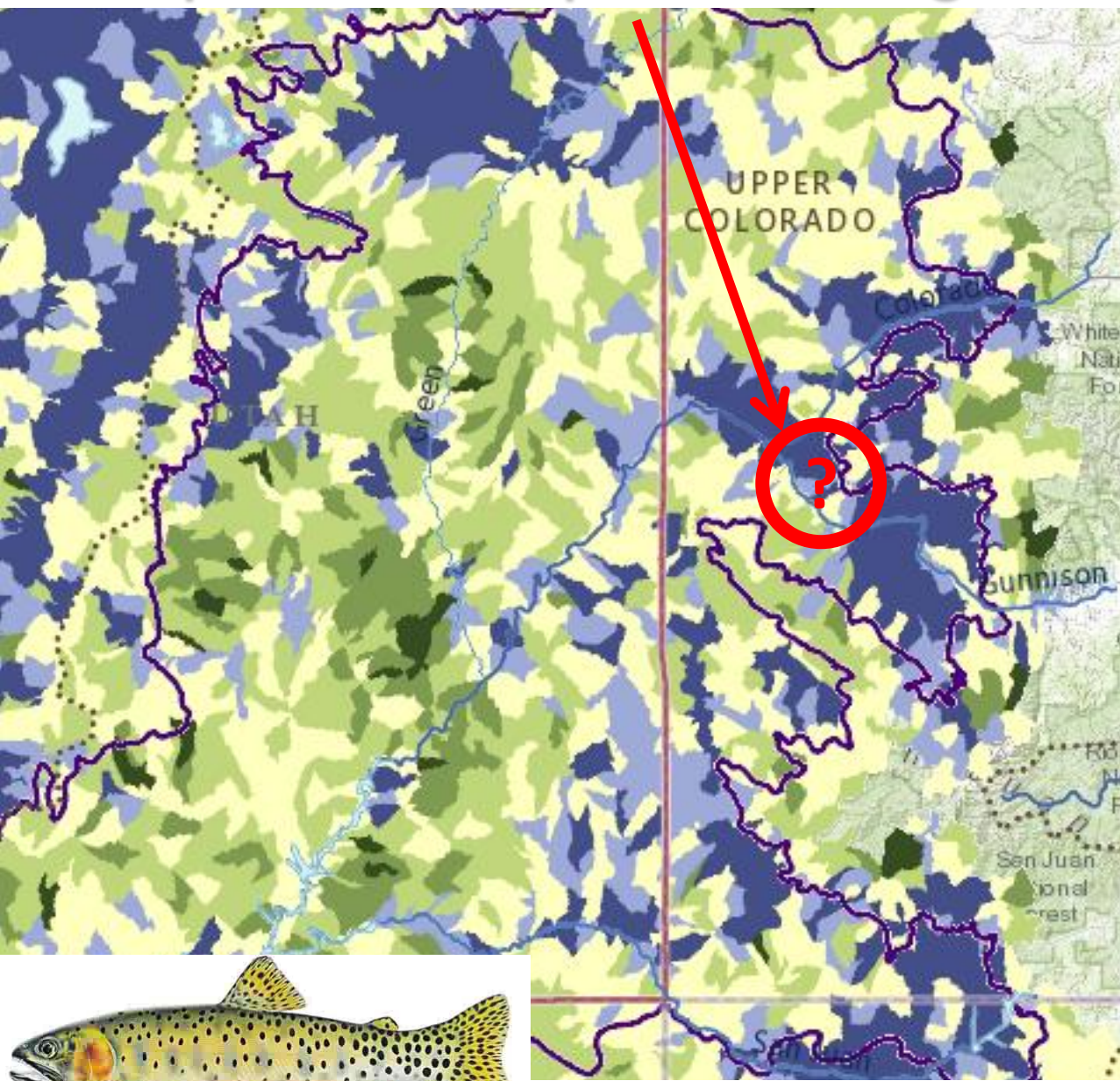
Framework: Participatory, transparent, adaptive management approach

Aquatic intactness map & results can be used...

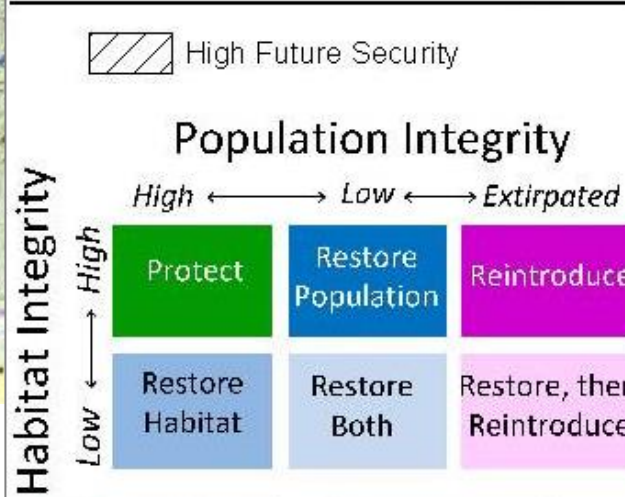
- a. To identify target areas for protection & restoration
- b. To establish baseline condition & measure management progress
- c. In combination with other data (climate, soil, species) to evaluate where to invest effort & funding
- d. To justify funding! – Data-driven, place-based approach, ability to integrate new data



Example: Land & species management



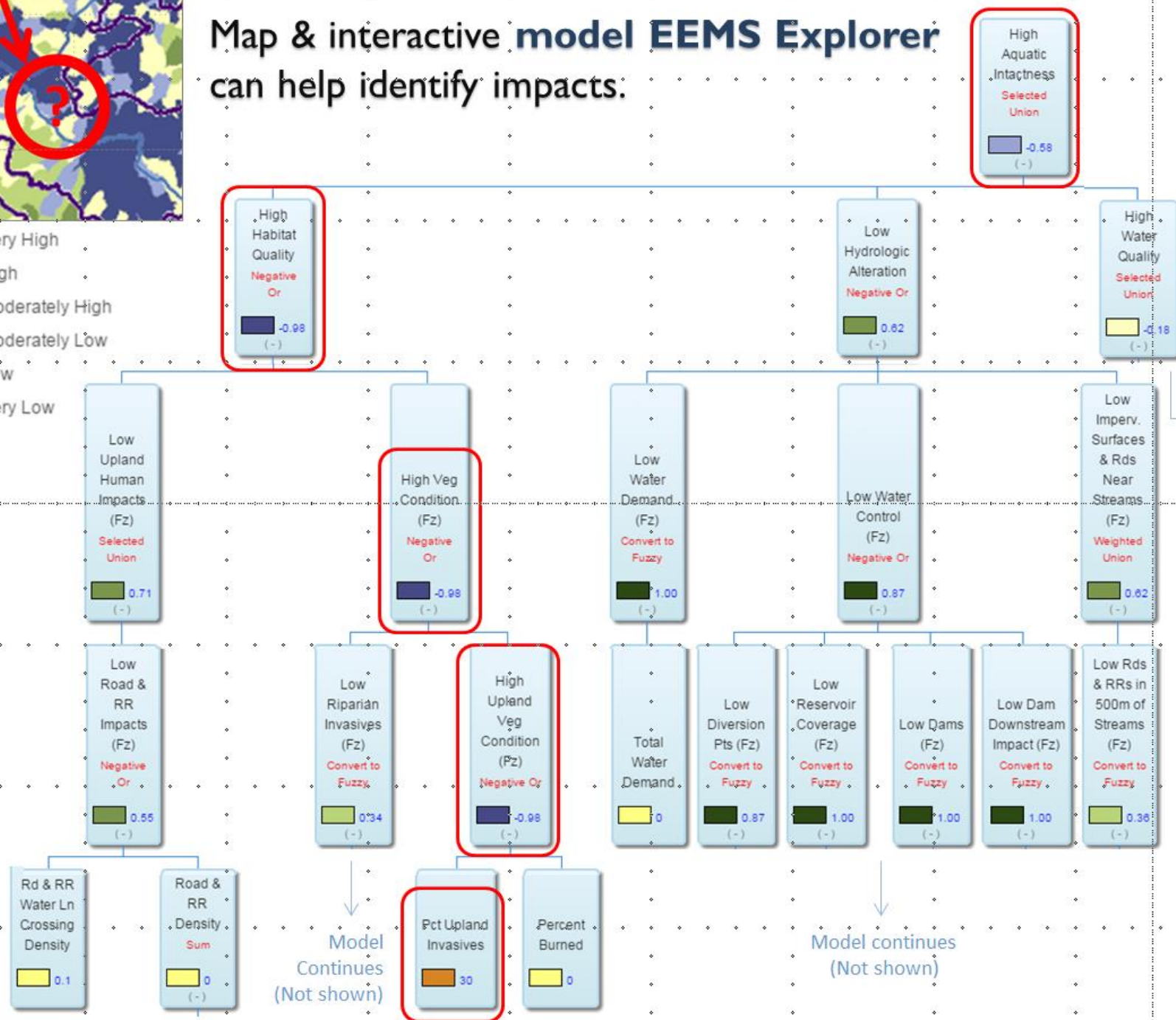
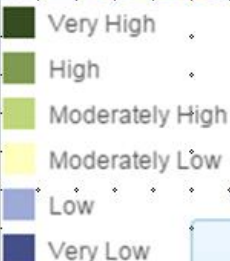
Colorado River Cutthroat Trout Conservation Success Index Conservation Strategy



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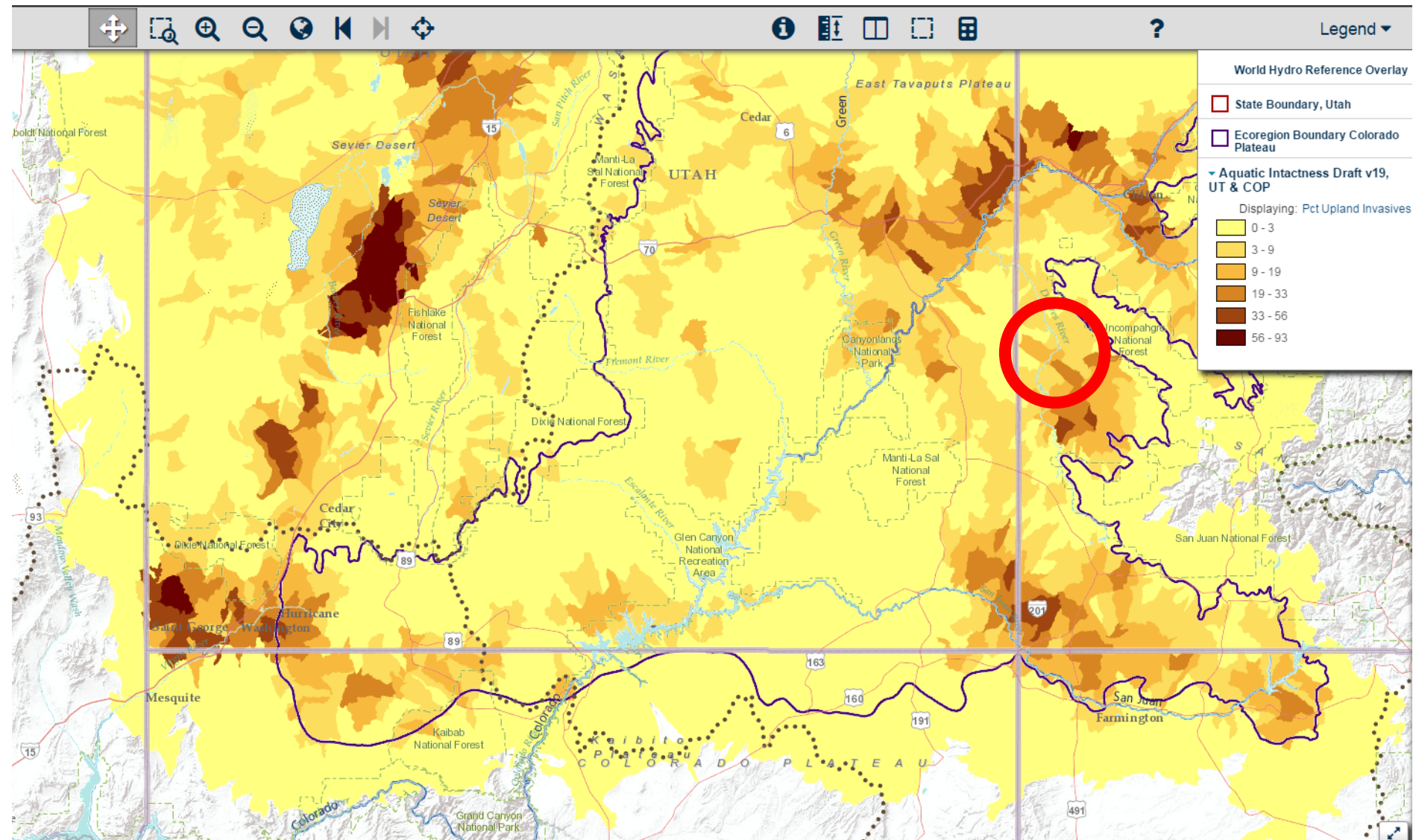
Map & interactive model EEMS Explorer can help identify impacts.



Model continues
(Not shown)

Model continues
(Not shown)

Upland invasives are a problem here!



Use this to target management activities & do appropriate field work.

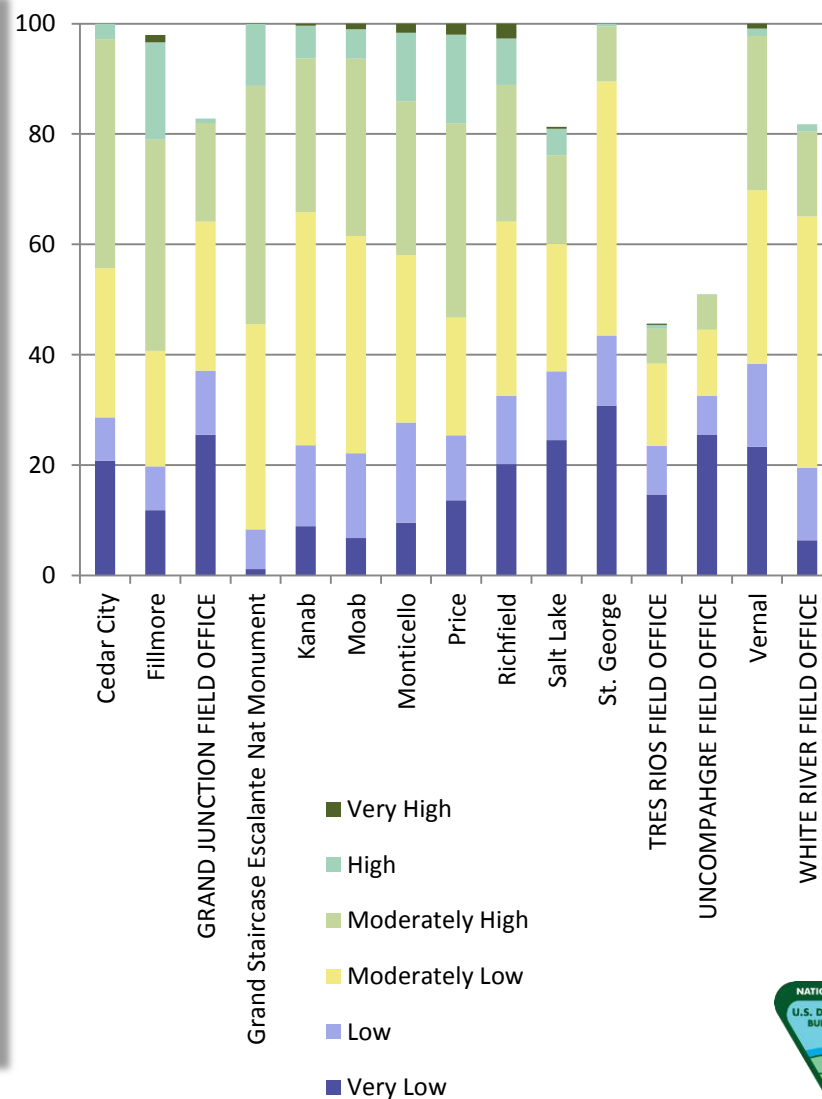
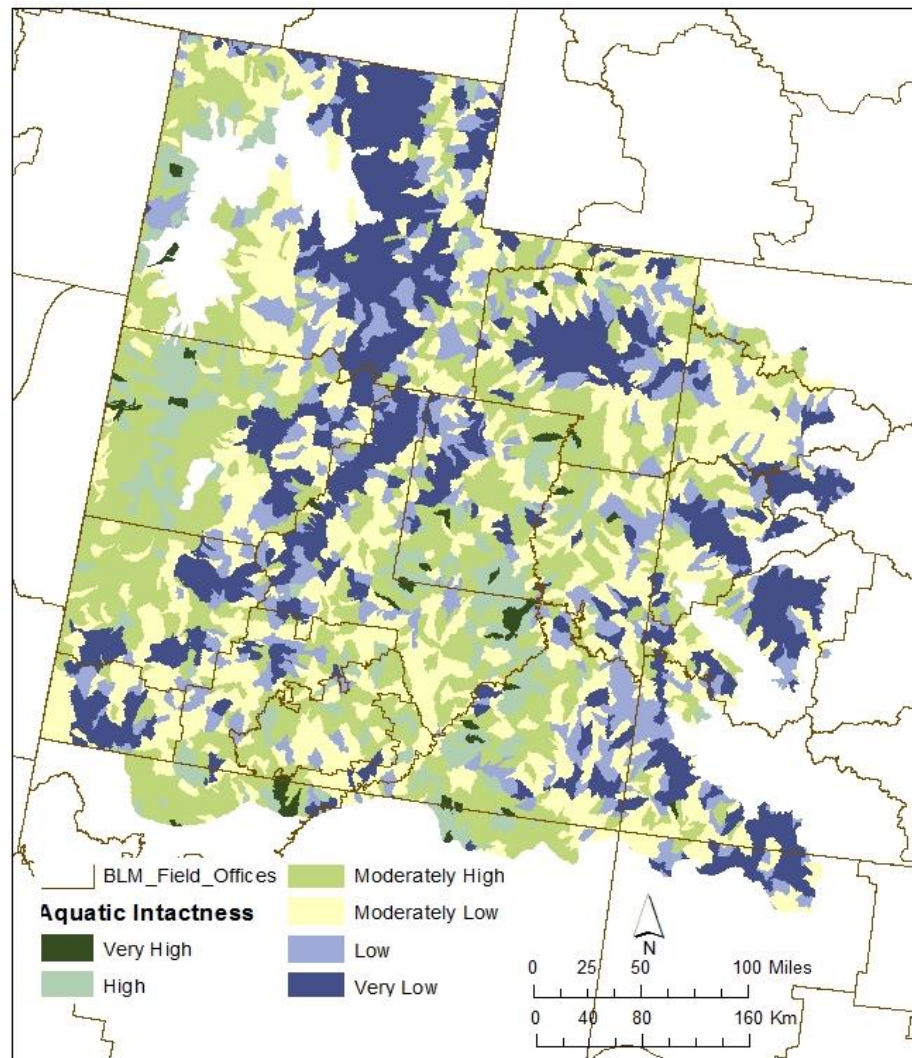
Future Goals

1. New geographies and process refinement
2. Update existing models with new & more-detailed datasets
3. Expand functionality of the logic modeling software
4. Improve interface of current EEMS Explorer in Data Basin
5. Develop an online logic modeling system where users can experiment with different data combinations on the fly

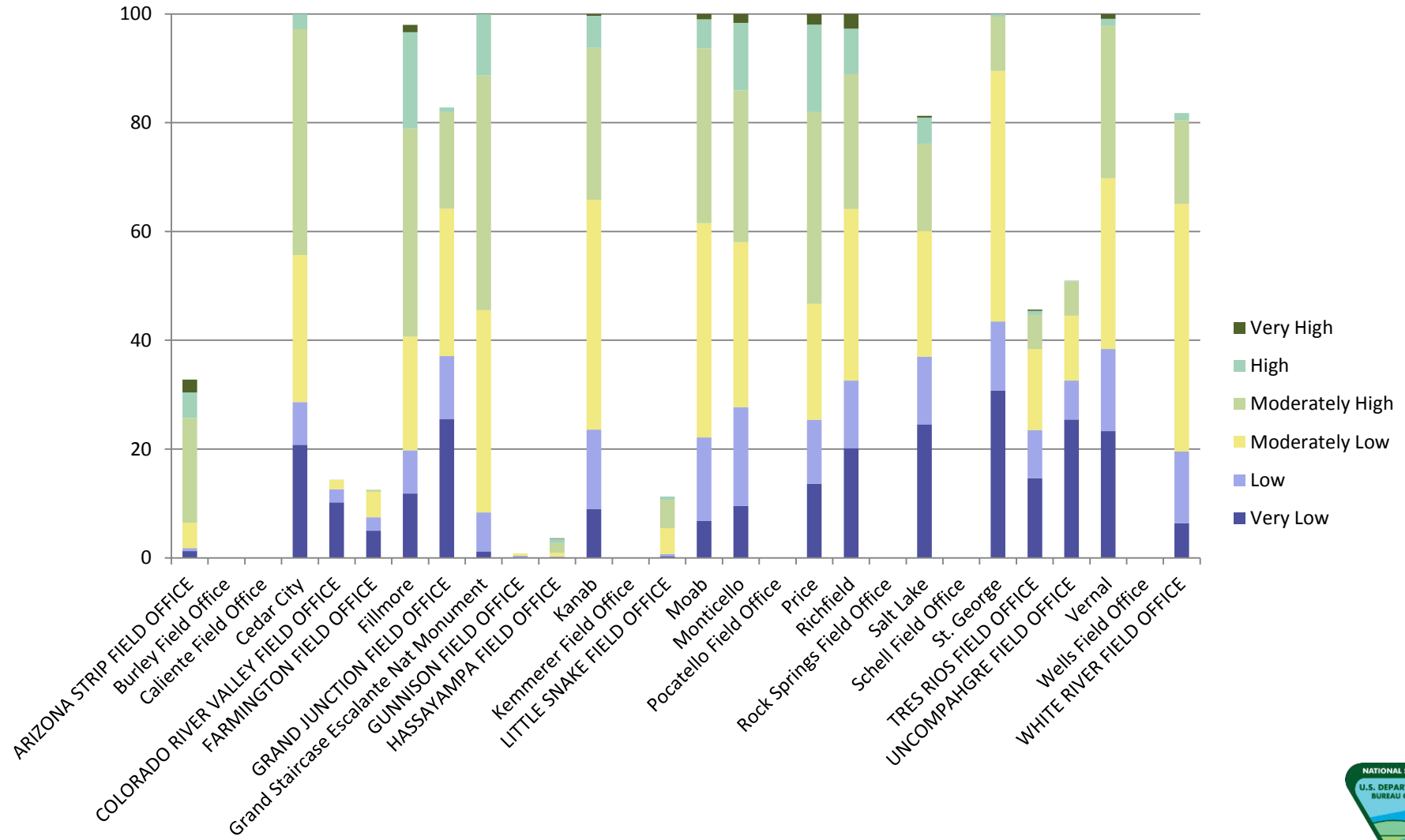


Context Tool: Aquatic Intactness

by Field Office, % (where assessment covers > 40% FO)



Aquatic Intactness by field office



Dillon (MT) FO

Centennial watershed assessment

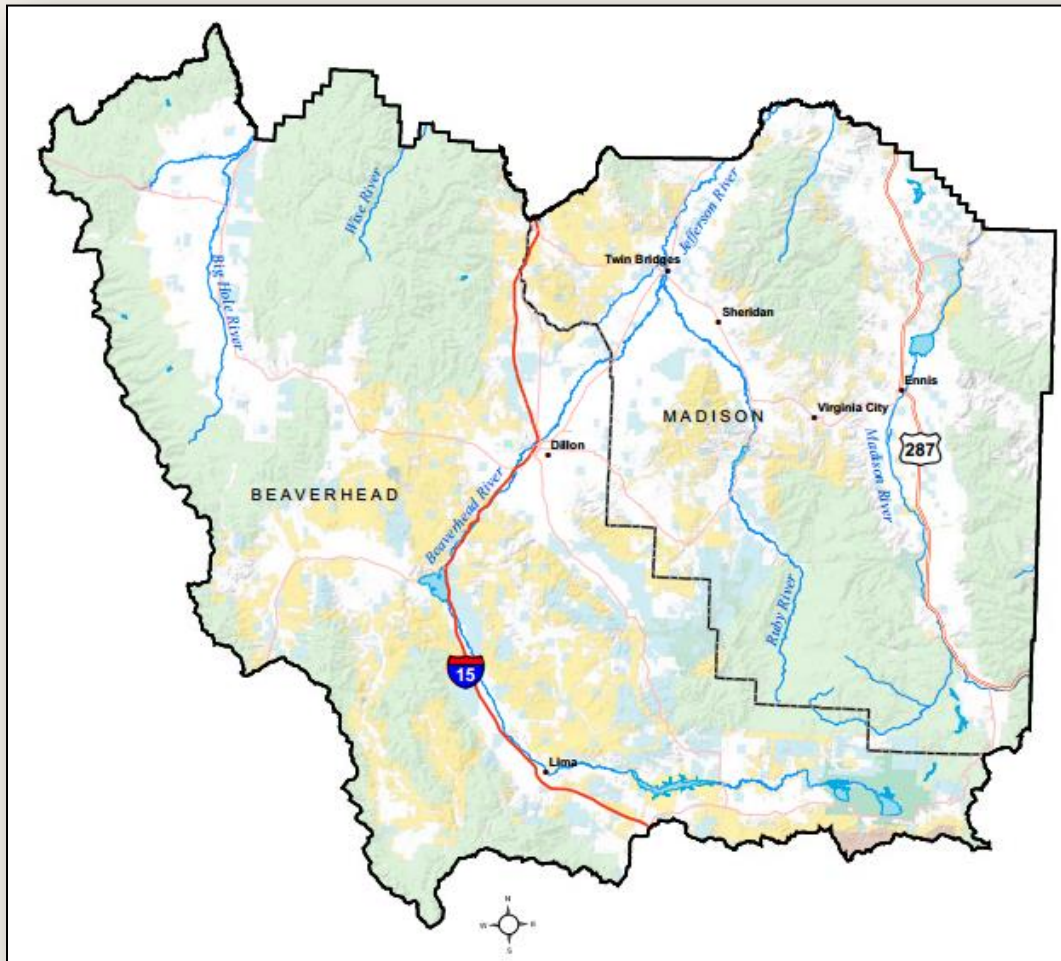
- “In addition*, the Dillon Field Office is using data from the Middle Rockies Rapid Ecoregional Assessment (REA) to look at resource concerns and issues at multiple scales. The goal is to better understand these issues in a cumulative sense in order to prioritize projects for implementation within the Centennial Watershed that will incrementally mitigate resource issues and concerns within the Middle Rockies ecoregion.”
 - Centennial Watershed Assessment Report, Jan 22, 2015. p. 6

*In addition to standard assessments conducted following BLM Manual H-4180-1 (“Rangeland Health Standards Handbook and Guidance for Conducting Watershed-Based Land Health Assessments”)

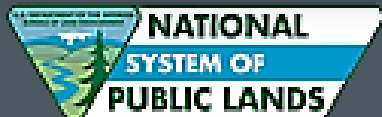
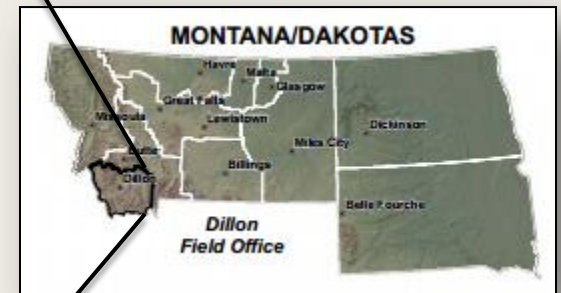


Taking a Regional Perspective

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Dillon Field Office in SW Montana

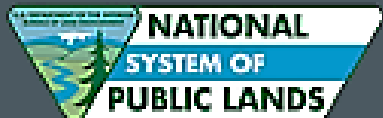


Landscape Approach Implementation

Watershed Assessments

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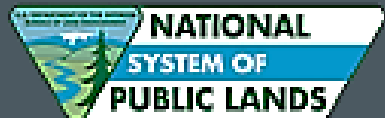
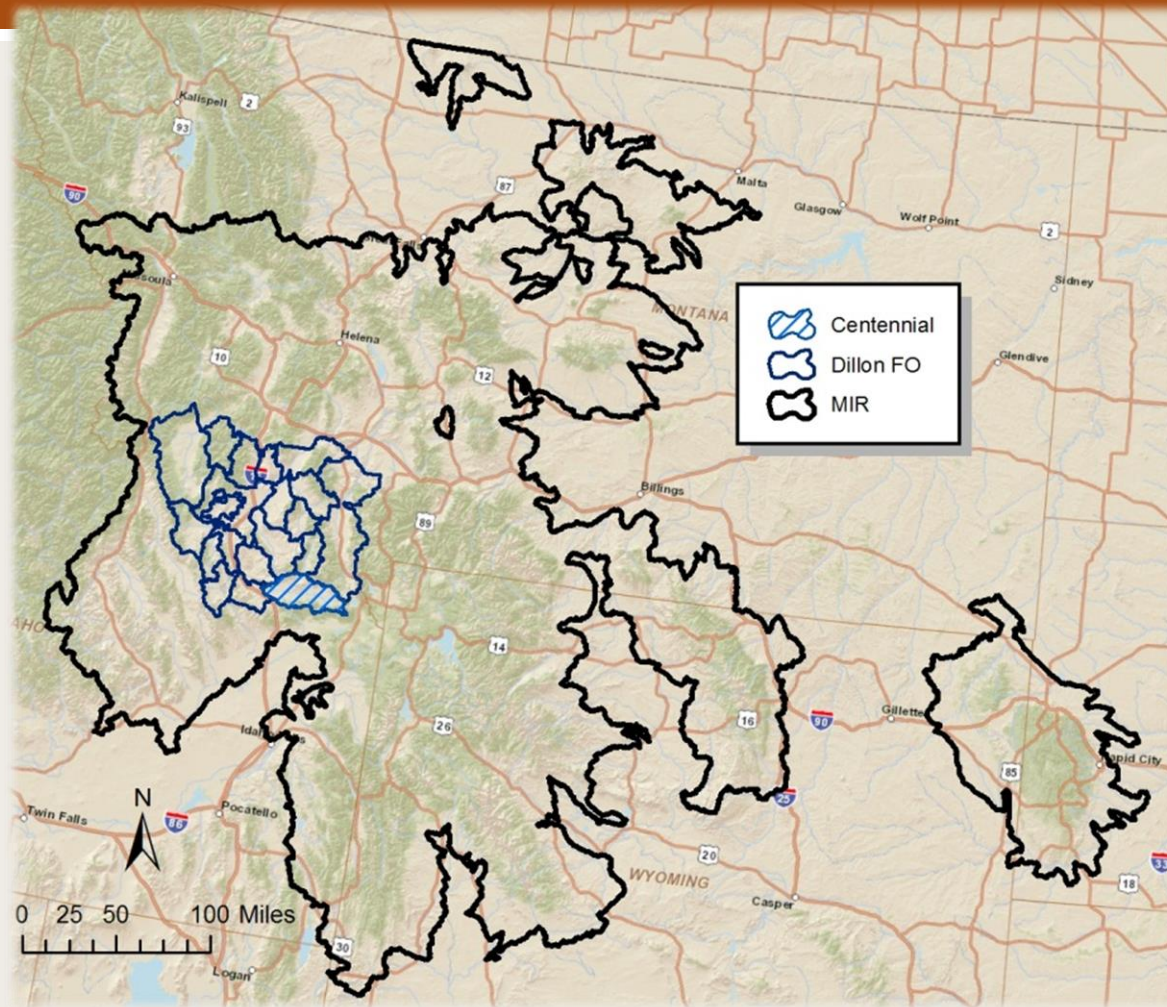
- An opportunity to investigate select regional trends within the ecoregion
 - ▣ Forest Health
 - ▣ Conifer Expansion
 - ▣ Terrestrial & Aquatic Wildlife
 - ▣ Riparian Areas
- Middle Rockies (MR) Rapid Ecoregional Assessment (REA) released in 2014



Landscape Approach Implementation

The Middle Rockies REA, Dillon and Centennial in Context

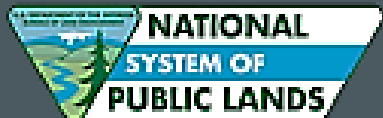
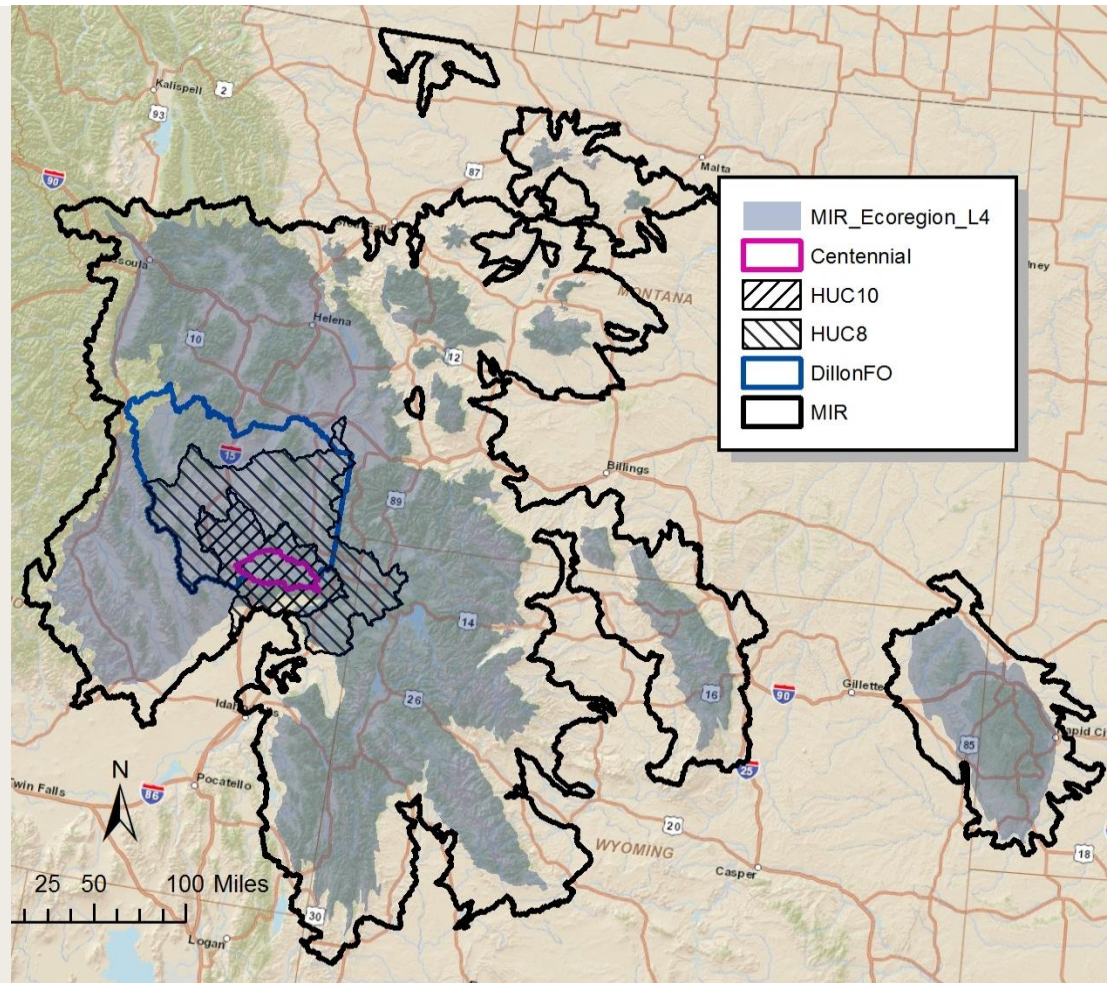
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Landscape Approach Implementation

Centennial within the Dillon FO and Middle Rockies REA --with intersecting HUC boundaries

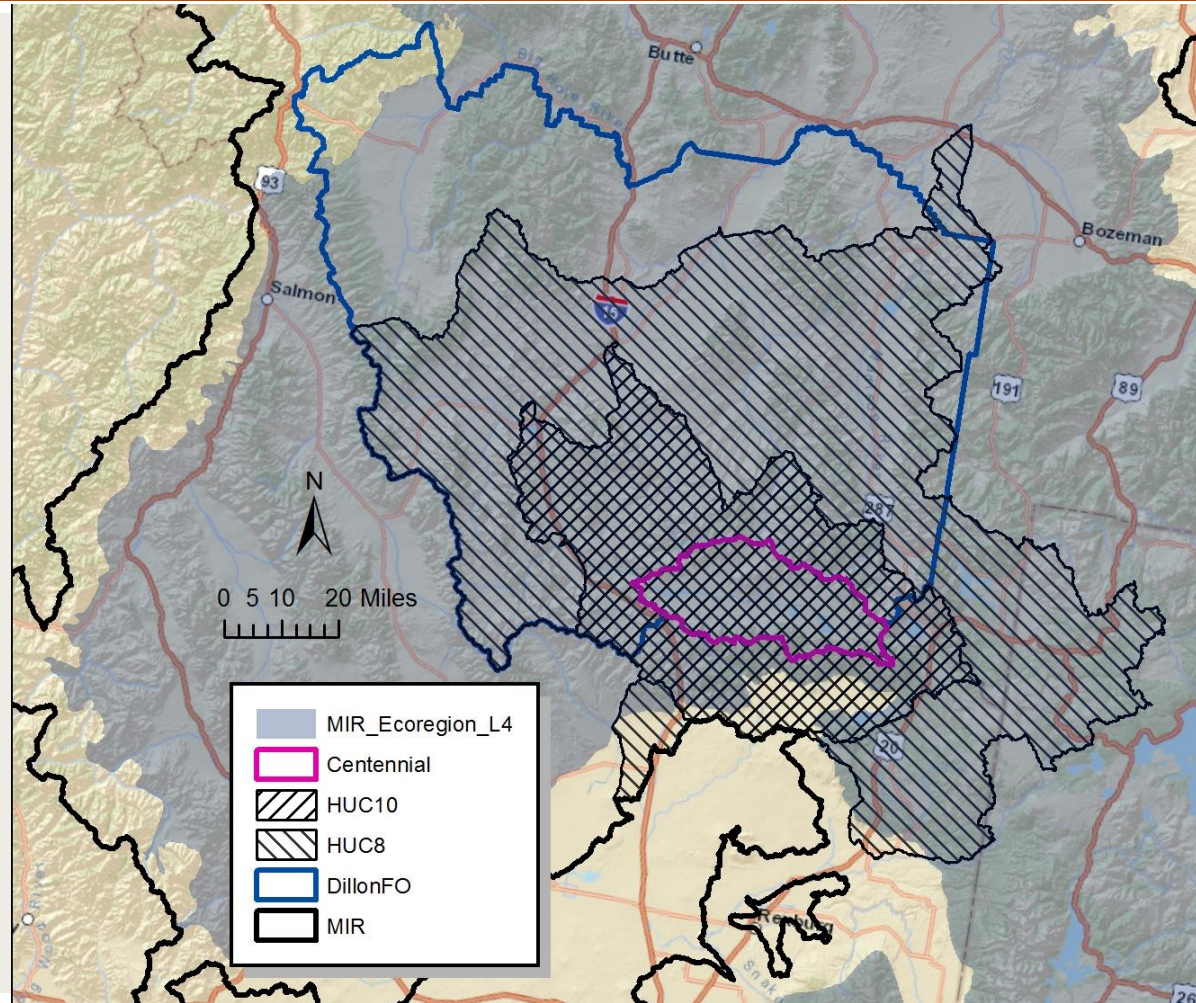
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Landscape Approach Implementation

Centennial with intersecting HUC boundaries

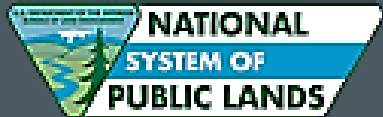
47



Terrestrial and Aquatic Wildlife

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- ☐ Golden Eagle
- ☐ Greater Sage-Grouse
- ☐ Grizzly Bear
- ☐ Arctic Grayling



Landscape Approach Implementation

Arctic Grayling Distribution

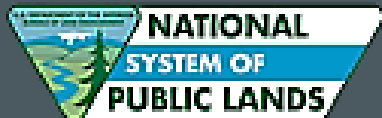
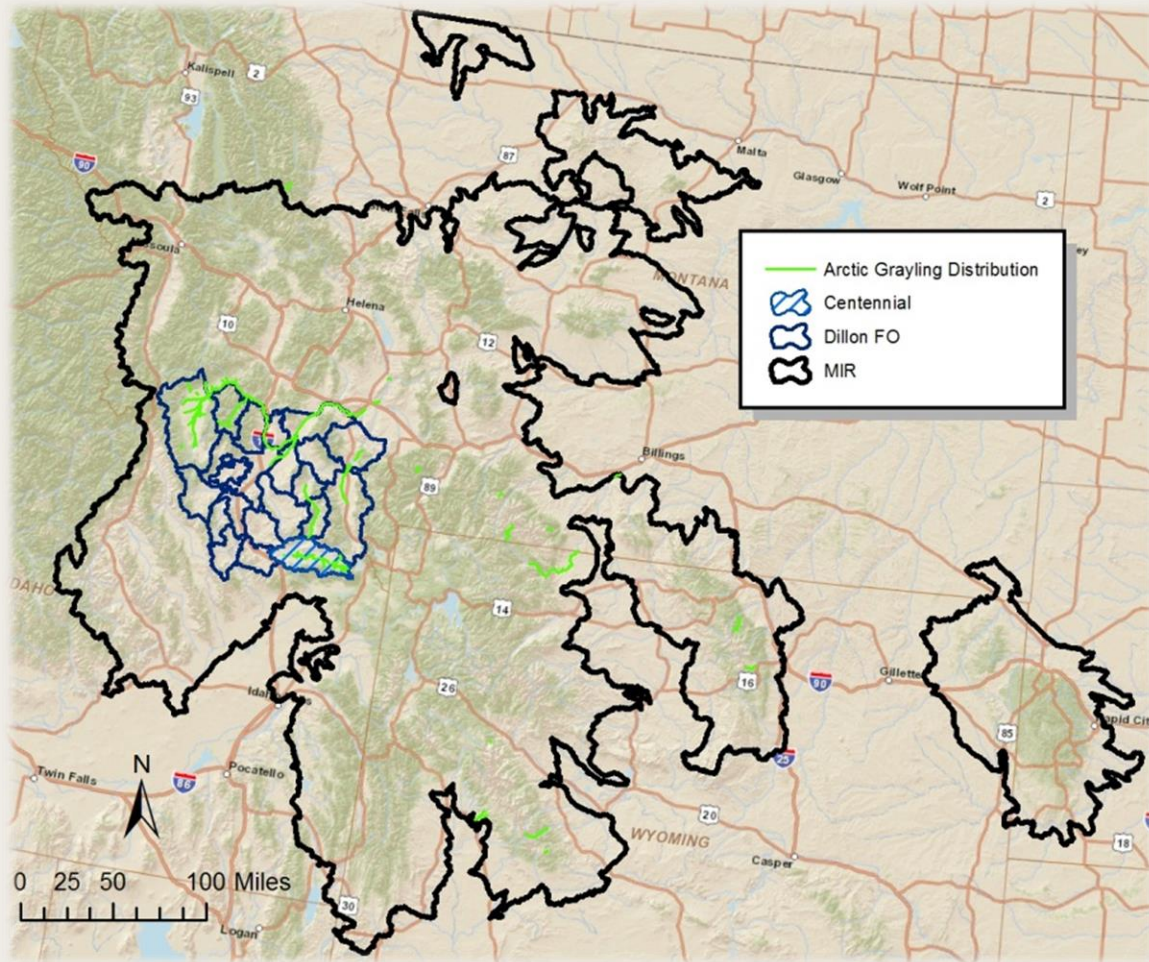
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Arctic Grayling Streams length (%
in area):

MIR: 1,057 km

Dillon FO: 651km (62%)

Centennial: 131km (12%)



Landscape Approach Implementation

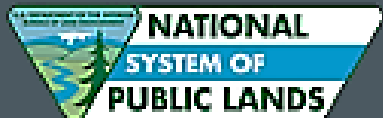
Westslope Cutthroat Trout (WCT) and Yellowstone Cutthroat Trout (YST)

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These slides show two kinds of mapped data that were sourced from the Middle Rockies REA:

- Distributions = streams where WCT or YST have been observed or measured
 - Fish data sources: StreamNet, Mfish, and Yellowstone Trout for WY
 - Density analysis: length of streams with trout (m)/ area (km²)
- Current habitat ratings by HUC12 are aggregated values from rated indicators – see the key ecological attributes (KEA) tables on next slides
 - Analysis: percent of rated area in each rating (Good, Fair, Poor)

http://www.blm.gov/wo/st/en/prog/more/Landscape_Approach/reas/midrockies.html



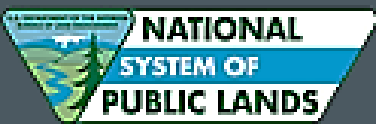
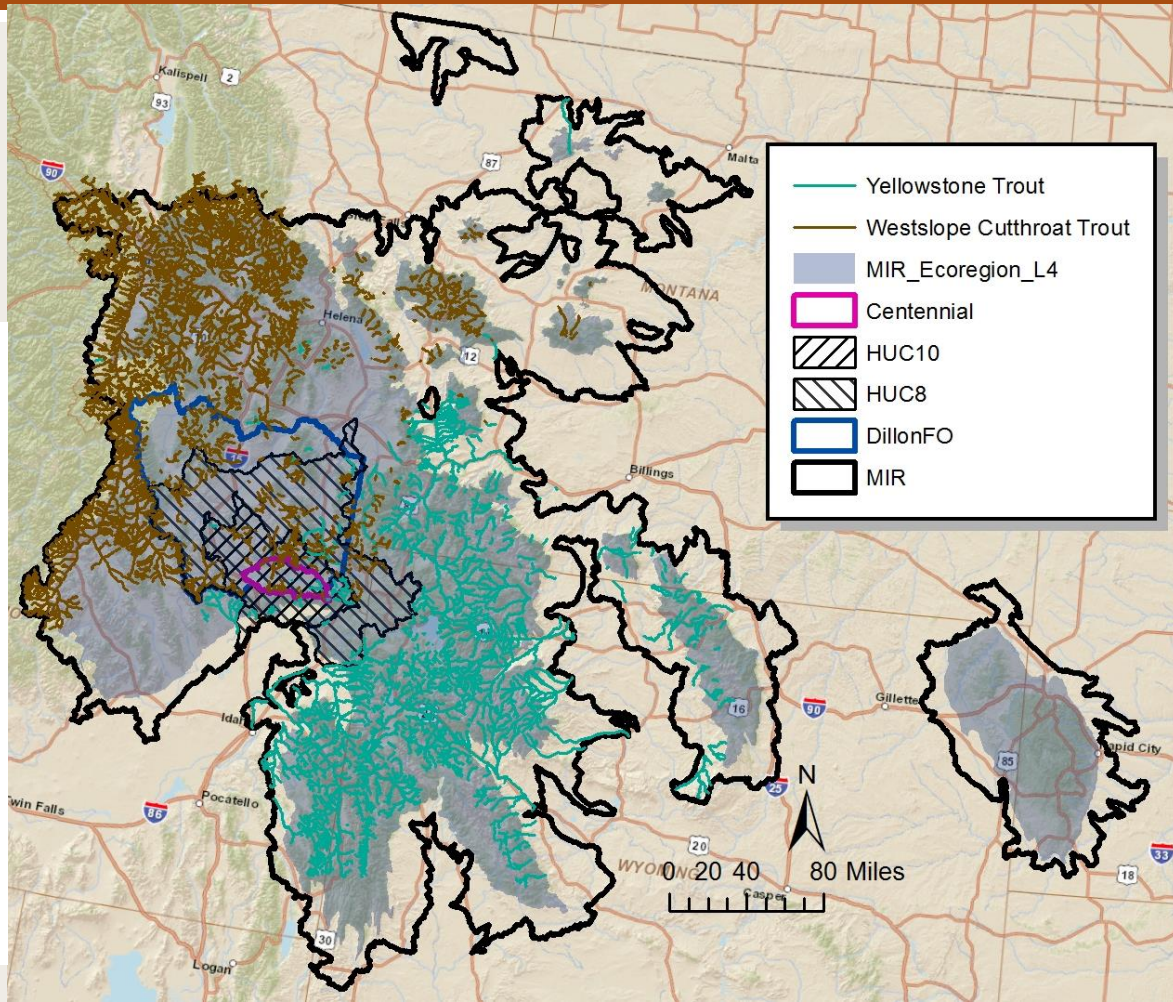
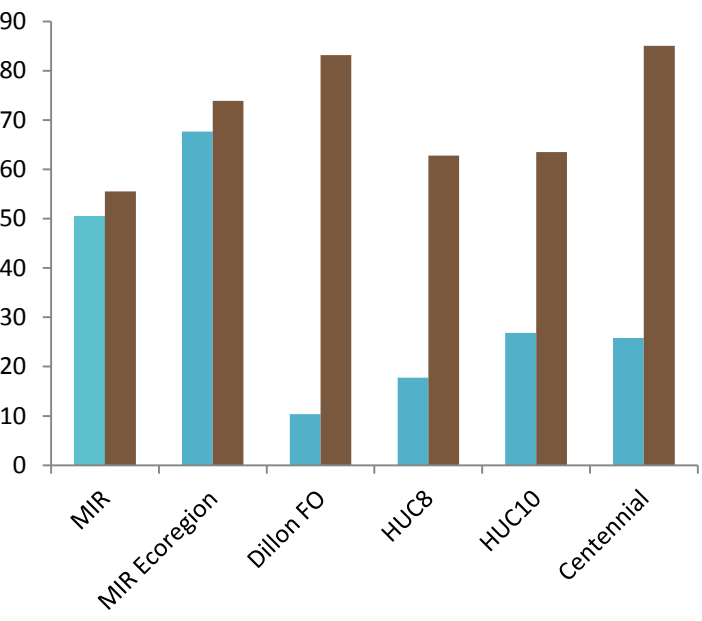
Landscape Approach Implementation

Westslope Cutthroat and Yellowstone Cutthroat Trout Distributions

Middle Rockies REA and Ecoregion

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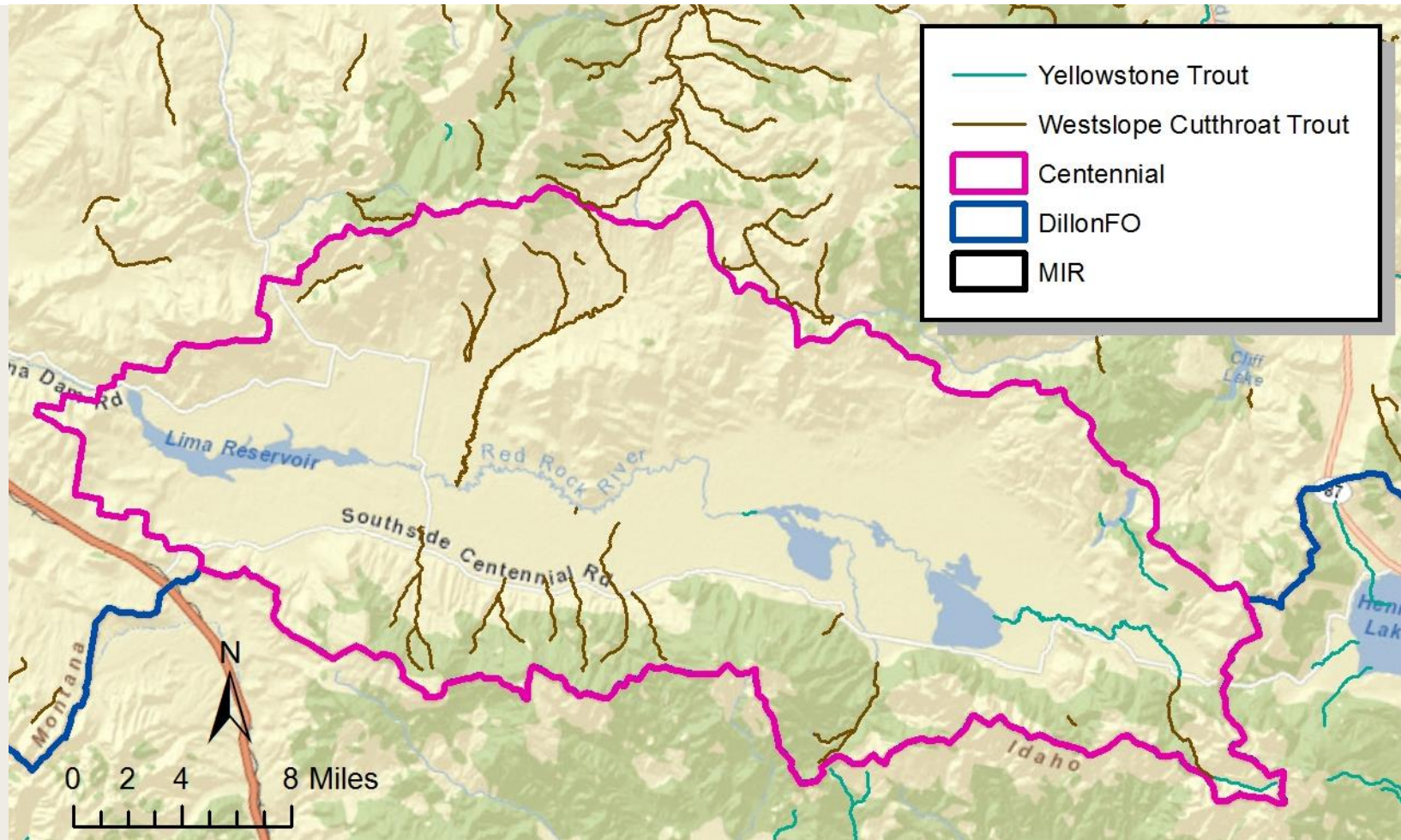
Trout stream distribution density
(length (m)/area (km²))



Landscape Approach Implementation

Westslope Cutthroat and Yellowstone Cutthroat Trout Distributions Centennial Watershed Assessment Area

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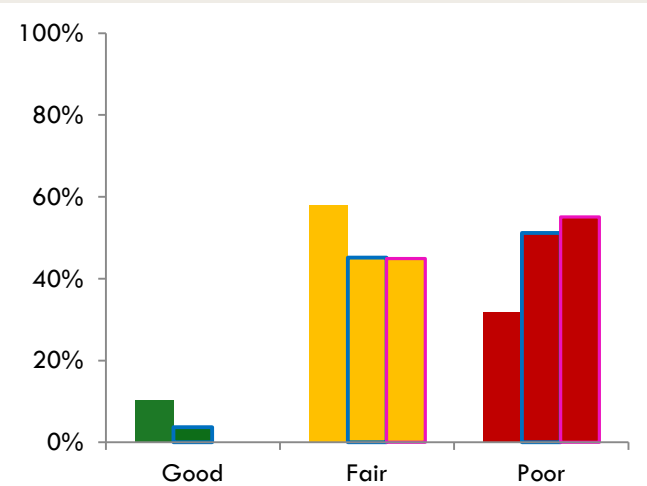


Current Rating by HUC 12

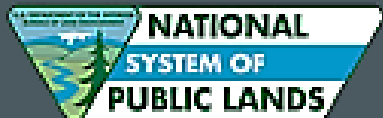
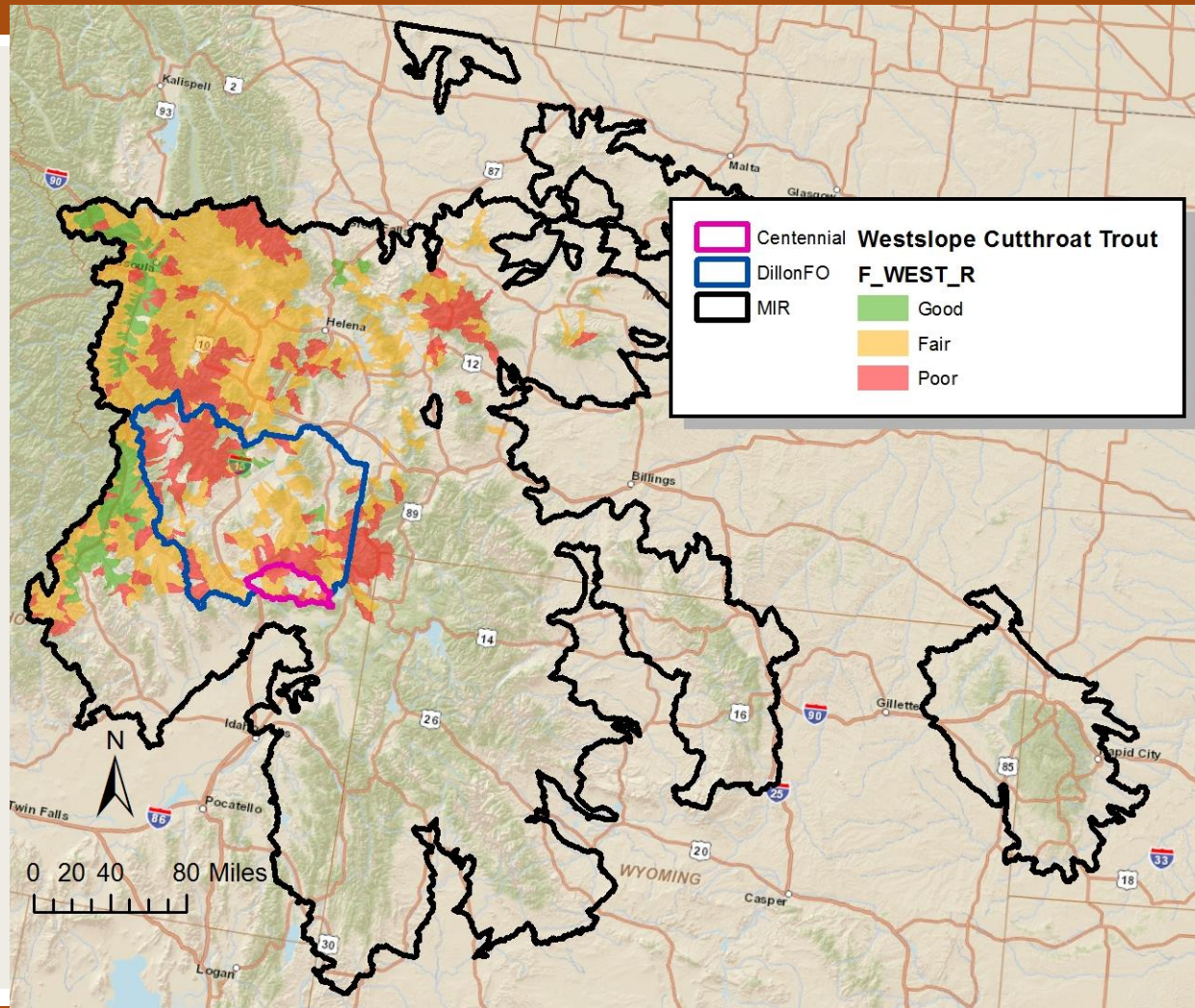
Westslope Cutthroat Trout

53

Percent of rated area



- MIR REA
- MIR Ecoregion
- Dillon FO
- HUC 8
- HUC 10
- Centennial

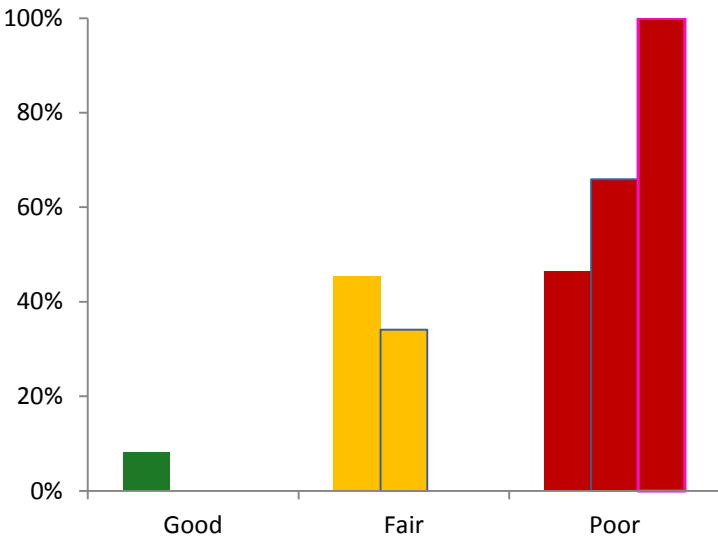


Landscape Approach Implementation

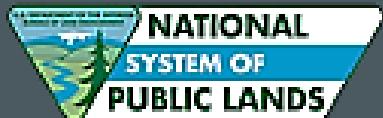
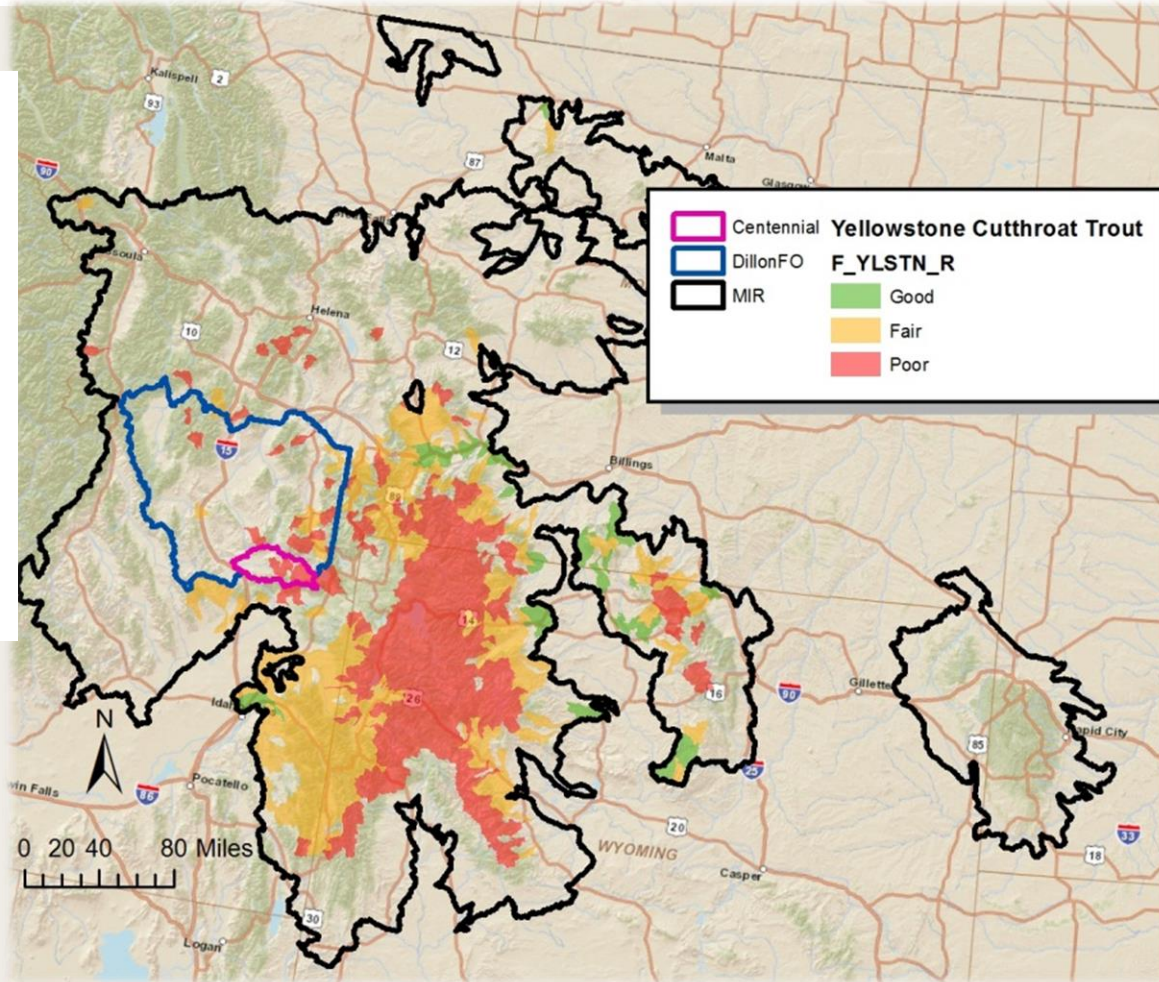
Current Rating by HUC 12 Yellowstone Cutthroat Trout

54

Percent of rated area



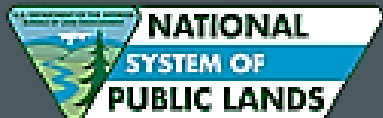
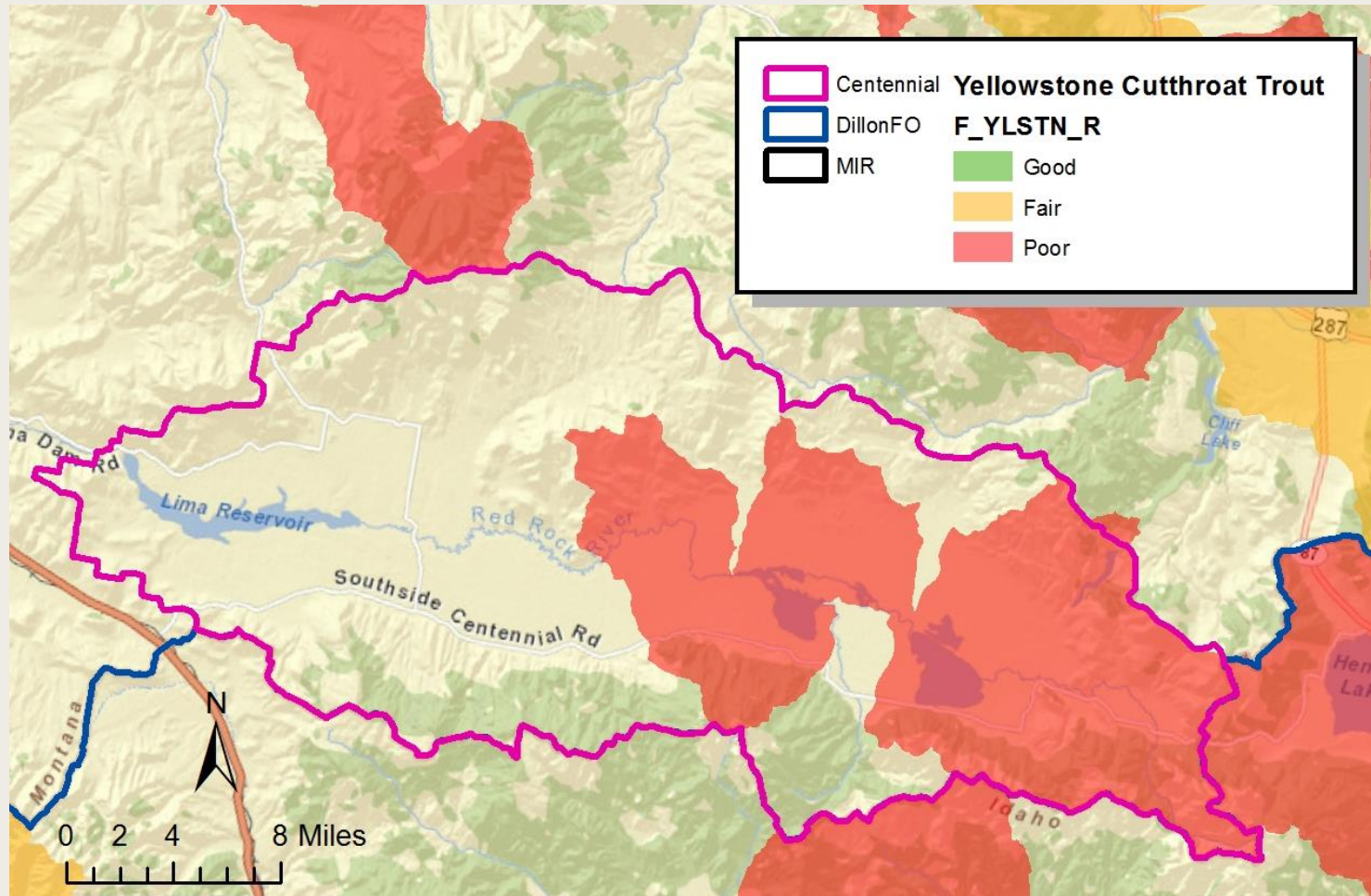
- MIR REA
- MIR Ecoregion
- Dillon FO
- HUC 8
- HUC 10
- Centennial



Landscape Approach Implementation

Current Rating – Yellowstone Cutthroat Trout Centennial Watershed Assessment Area

55



Landscape Approach Implementation

NorCal

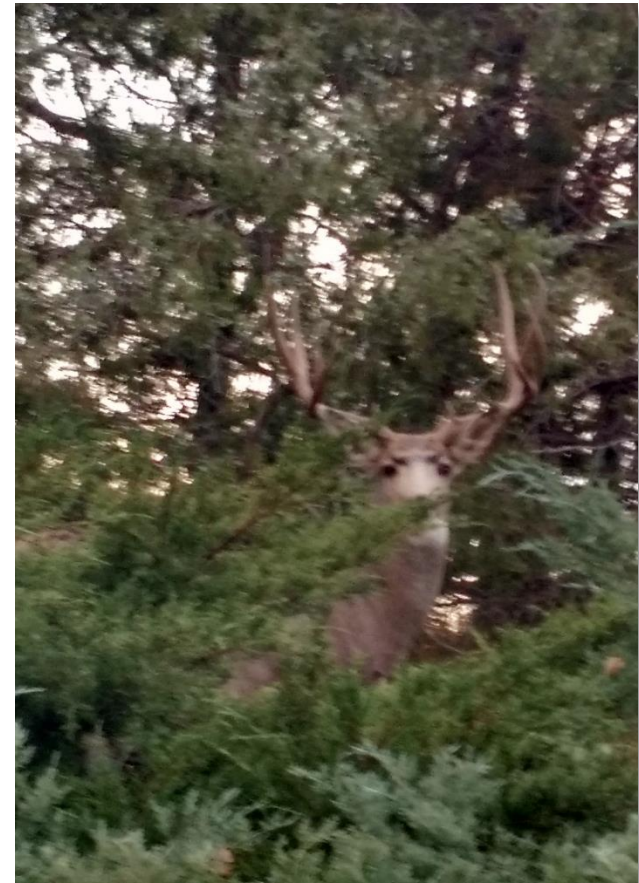
Mule Deer and Bald Mountain Trails



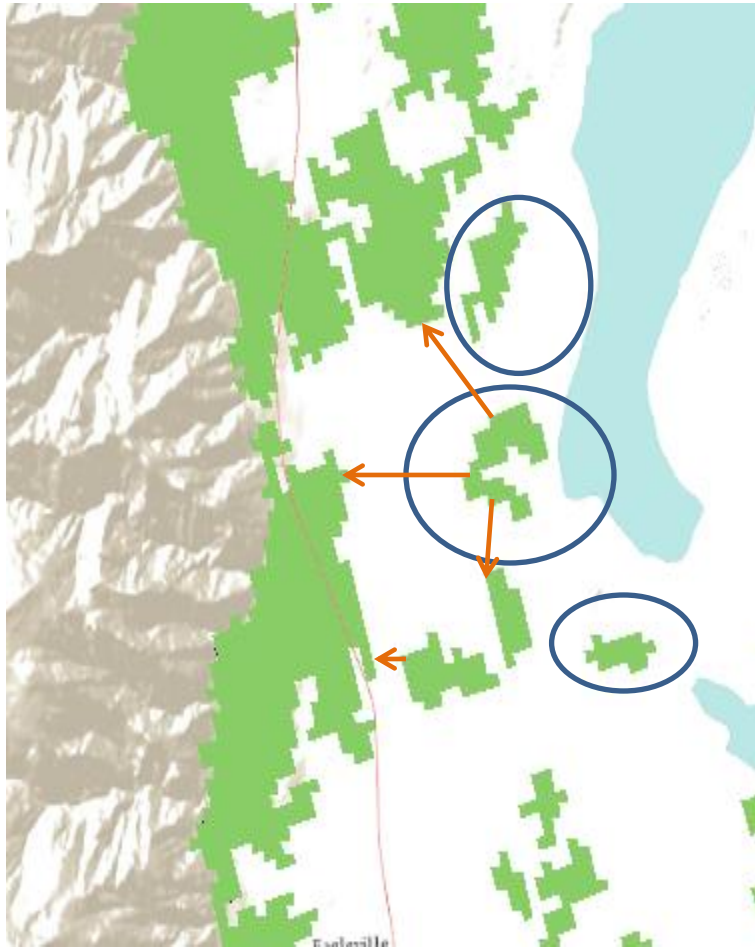
October 2016

Outline

- Terminology
- MQ: What are the impacts of 30 miles of non-motorized trail within Bald Mountain - an area of important mule deer habitat?
 - Broad Scale Boundaries
 - Data sets



Terminology: Broad Scale Indicators for the Biodiversity Land Health Standard



■ The **spatial distribution** of plant and animal species and their habitats allows for reproduction and recovery from localized catastrophic events



Habitat areas or patches should be large enough to support viable populations or are **connected** adequately with other similar habitat areas

- **Connectivity** distances can be dispersal or migration
- **Connectance** is the percentage of functional joins between all patches of the same type

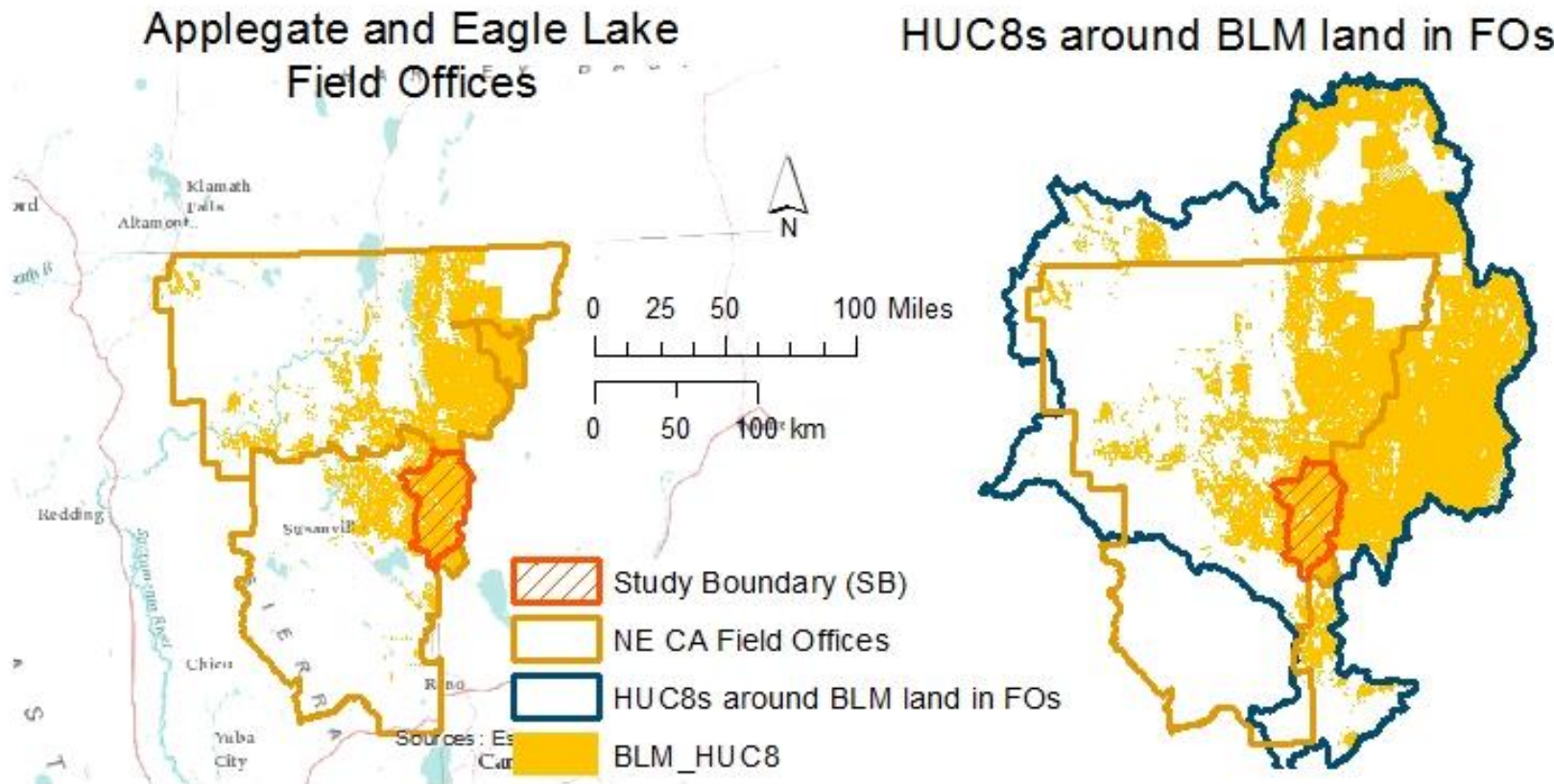
MQ: What are the impacts of 30 miles of non-motorized trail within Bald Mountain - an area of important mule deer habitat?

- Boundaries
- Data are available for local and broad scale
- The data, analyses, and assumptions are then quite different...
- Seasonal mule deer habitat data
 - **Broad scale**: data covering North America from Utah State U. (in NGB and CBR REAs)
 - **Local scale**: delineated by w(from ELFO-RMP)

Setting NorCal Boundaries (1 of 2)

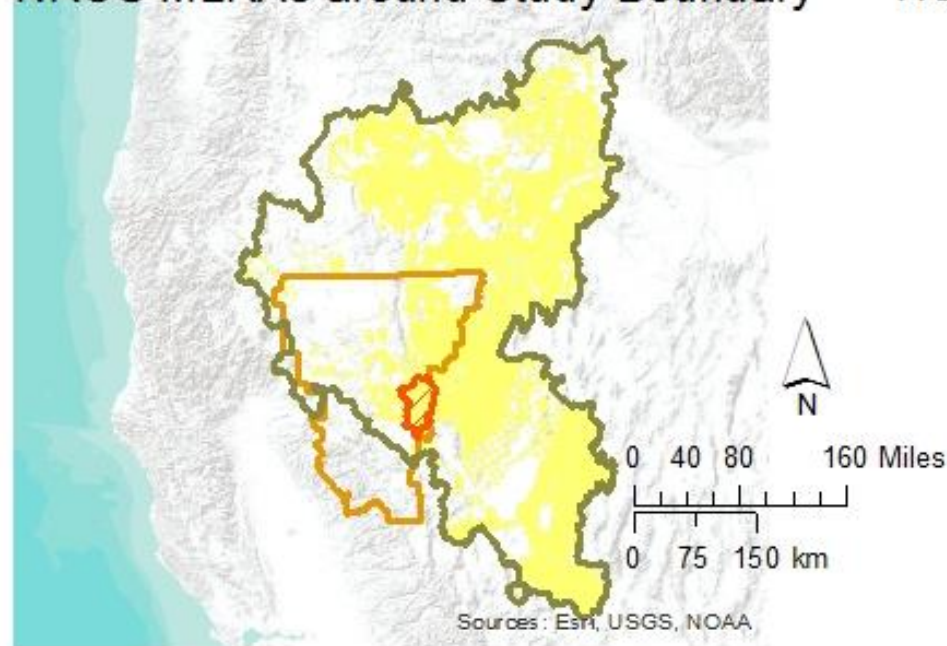
Complex geopolitical, ecological, physiographic region

NorCal: Suggested Boundaries for the Context Analysis

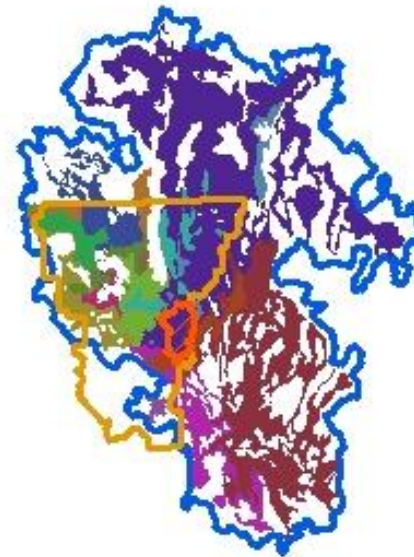


Setting NorCal Boundaries (2 of 2)

NRCS MLRAs around Study Boundary



HUC10s around level 4 ecoregions



- MLRA & HUC10s around study boundary
- Study Boundary (SB)
- NE CA Field Offices
- HUC8s around BLM land in FOs
- HUC 10s around L4 ecoregions
- BLM

Level 4 ecoregions

US_L4NAME

- Adin/Dixie Low Hills
- California Cascades Eastside Conifer Forest
- High Lava Plains
- Klamath Juniper Woodland/Devils Garden
- Klamath/Goose Lake Basins
- Lahontan Salt Shrub Basin
- Lahontan and Tonopah Playas

- Likely Tableland
- Modoc Lava Flows and Buttes
- Modoc/Lassen Juniper-Shrub Hills and Mountains
- Pit River Valleys
- Pluvial Lake Basins
- Semiarid Uplands
- Sierra Nevada-Influenced Semiarid Hills and Basins
- Sierra Valley

Broad Scale Data: Bald Mountain Trails and Mule Deer

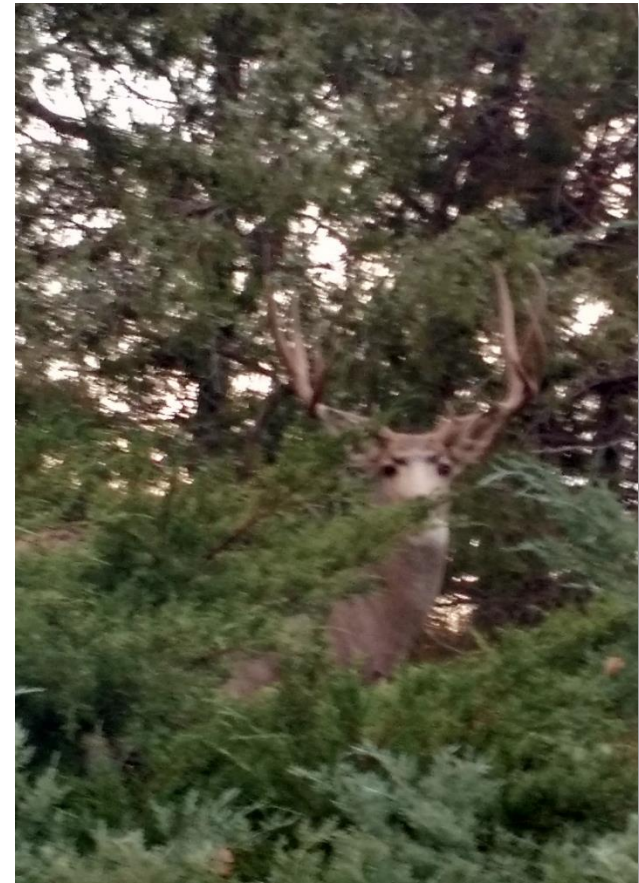
Probability of flushing a mule deer at 100 m from a trail:

- 70% for a single human on trail and
- 96% for a single human off trail
- whether hiking or mountain-biking

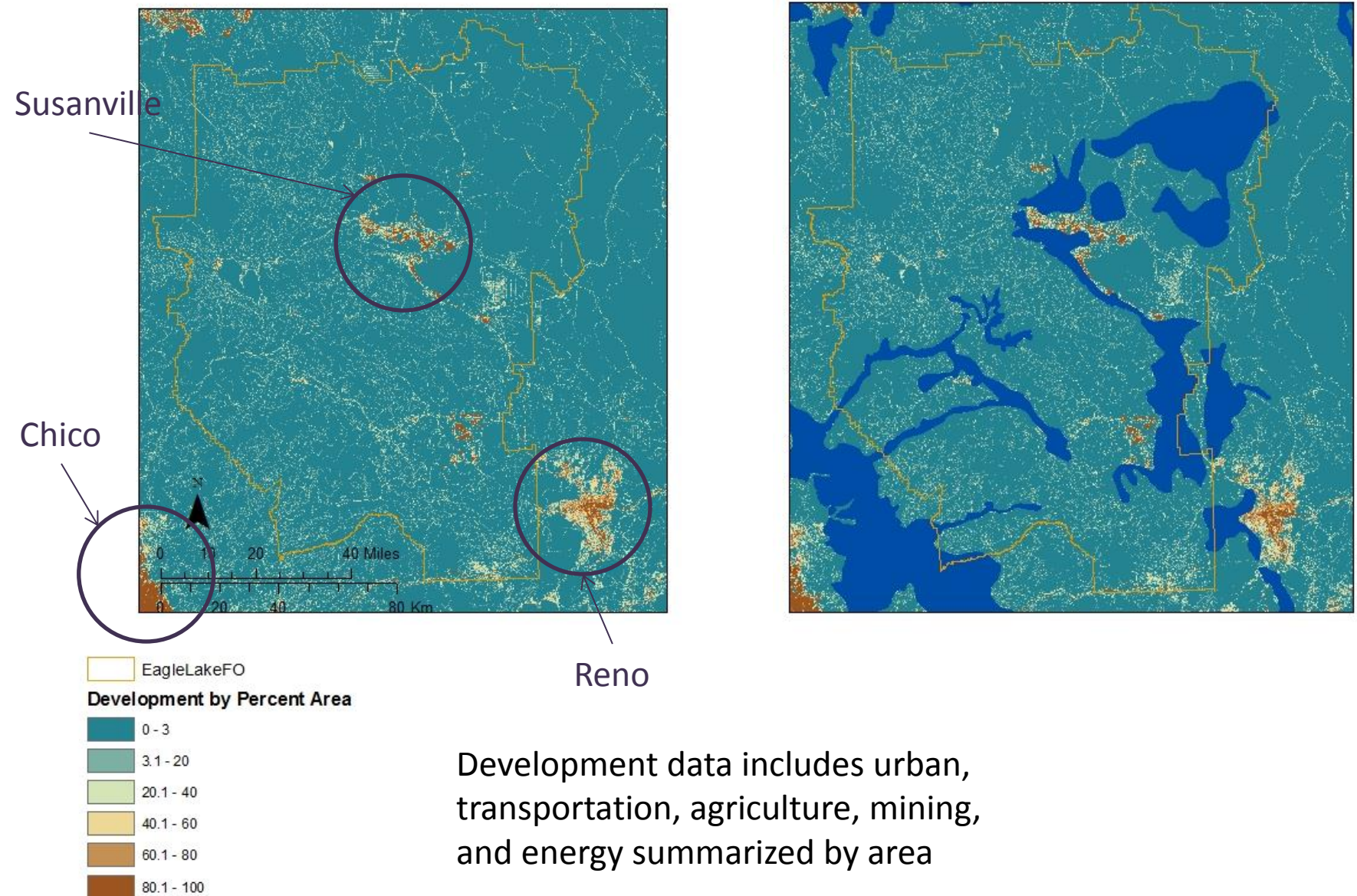
(Taylor and Knight, 2003)

Analysis:

- Buffered Bald Mountain Trails by 100 m and merged into development raster
- Excluded areas with $> 3\%$ development (WY F&G) and areas outside mule deer winter range and winter concentration



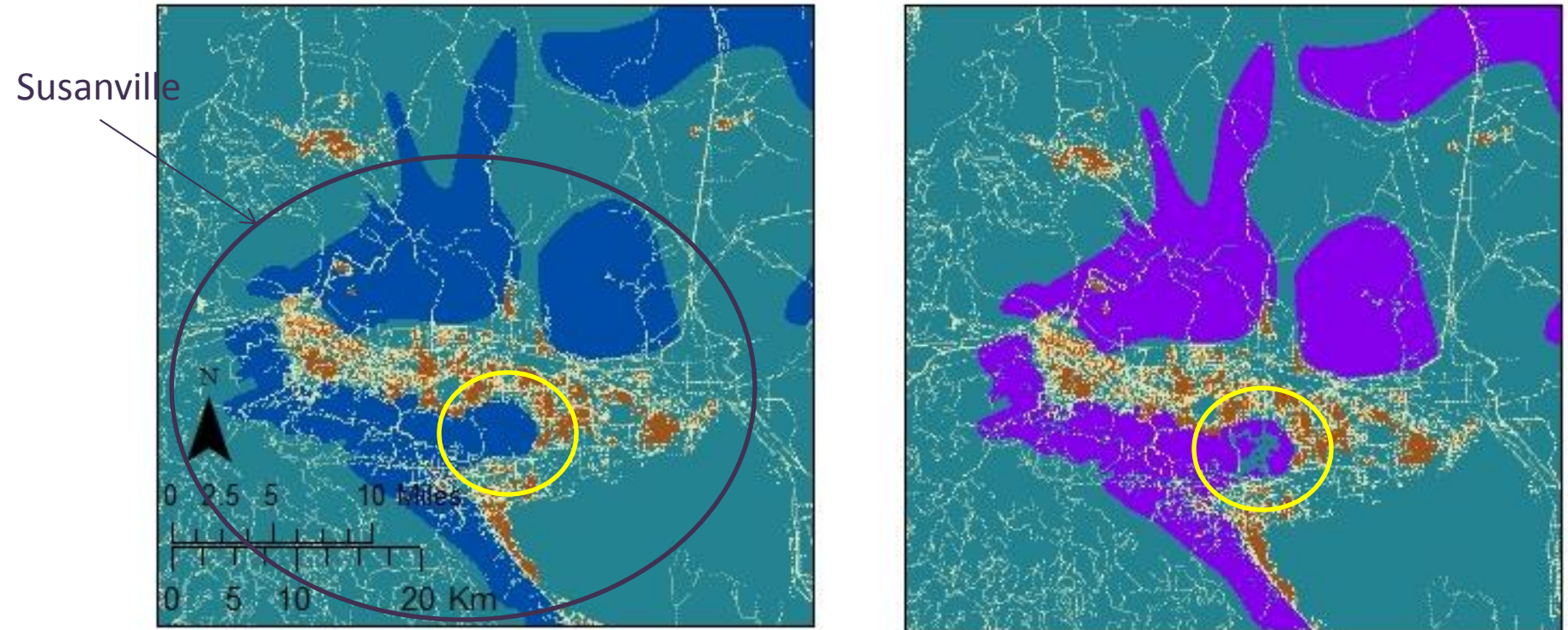
Broad Scale Development Data (left) and Mule Deer Winter Range and Winter Concentration (right - dark blue)



Zoom in to Susanville and Bald Mountain

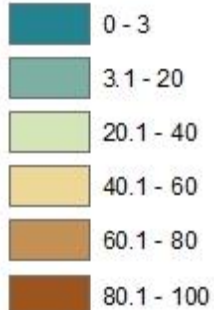
Development Data and Mule Deer Winter Habitat

○ Left: Without Bald Mtn. Trails, Right: With Bald Mtn. Trails



EagleLakeFO

Development by Percent Area



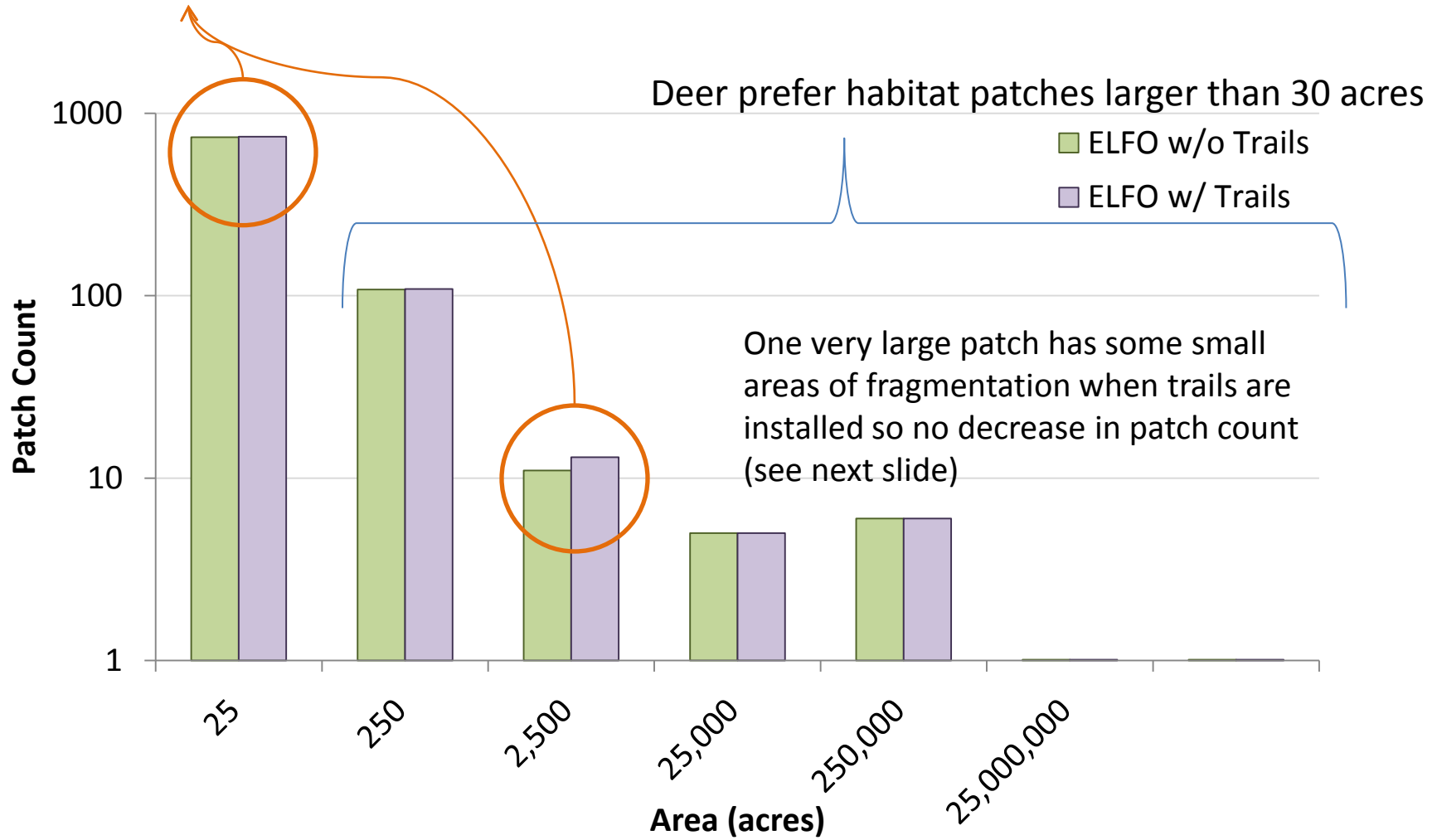
Winter Range/Concentration with $\leq 3\%$ Development



Buffered Bald Mountain Trails by 100 m, included with development data, excluded from winter habitat (right).
Are we missing other trails? Traffic counts?

Deer Habitat Patch Sizes Frequency for ELFO

Increase in small patches (n=6)

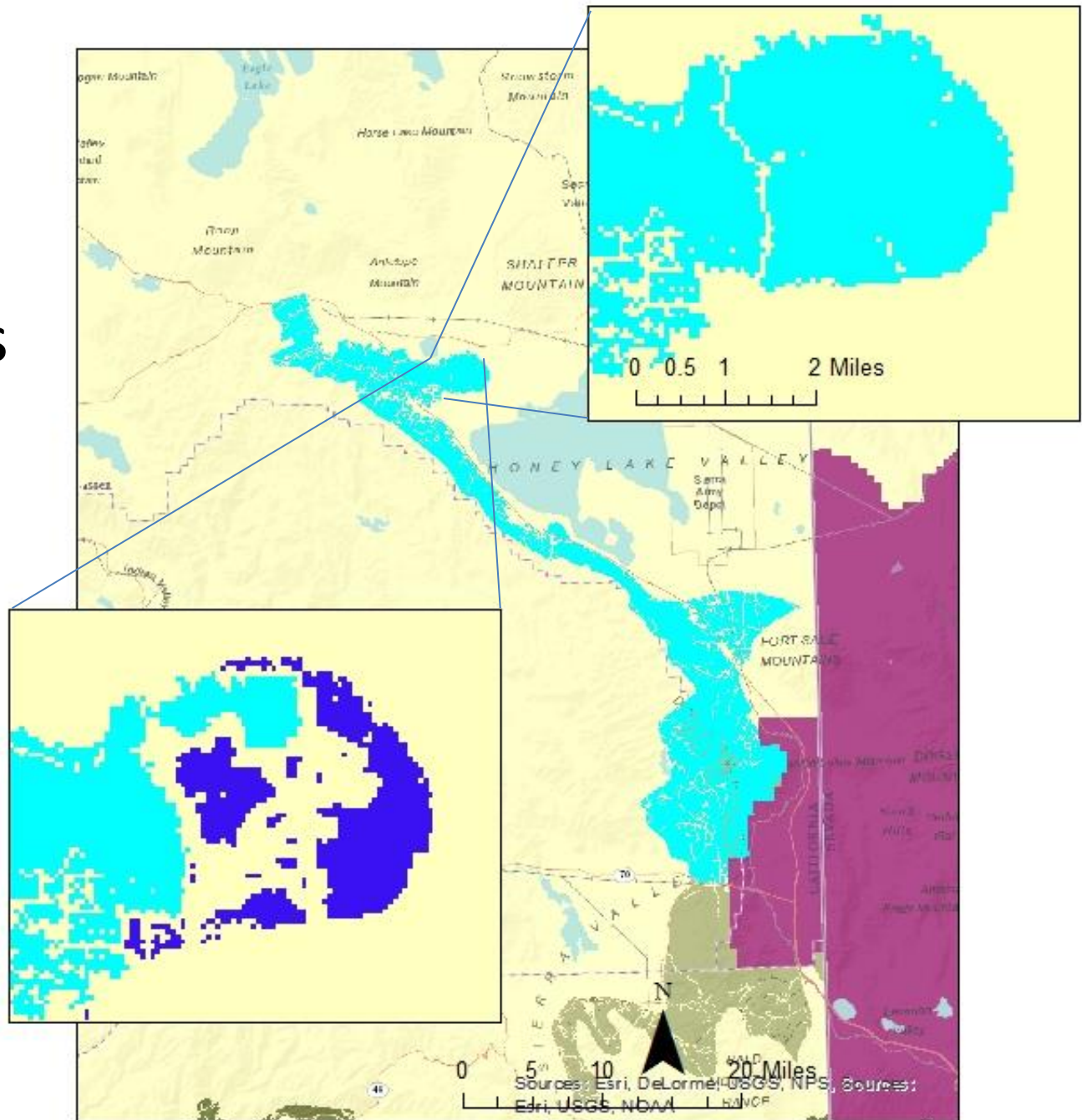


Fragmentation has occurred; is this enough to be a problem?

Other metrics available

Patch analysis without trails (upper right) and with trails (lower left)

The light blue patch is the very large patch that is partially fragmented when trails are overlaid (all maps). The dark blue patches are the result of trails fragmenting Bald Mountain (lower right).



Bald Mountain Trails

MultiScale Analyses summary

- Broad scale: Bald Mtn. Trails have a small effect on mule deer winter habitat metrics in the larger area.
- Local scale: Bald Mtn. Trails may create a pinch point limiting connectivity.
 - What are the barriers to mule deer crossing to the northern areas of habitat?
 - Only Field Office Staff can determine the importance of this effect on the ground.

Some Other Thoughts

- The Field Office has the local knowledge for decision-making for BLM
- Without getting too GIS-centric... we need to:
 - Examine the source and resulting data sets
 - Scale, accuracy, precision – REA “my favorite pixel” syndrome
 - Understand the reasoning behind question
 - Interpret the results

