

Assessment of Bighorn Sheep, Domestic Sheep, and Change Agents (without the Risk of Contact Model)



Rocky Mountain District
REA and Broad Scale
Workshop

Cañon City, CO
23 January, 2017



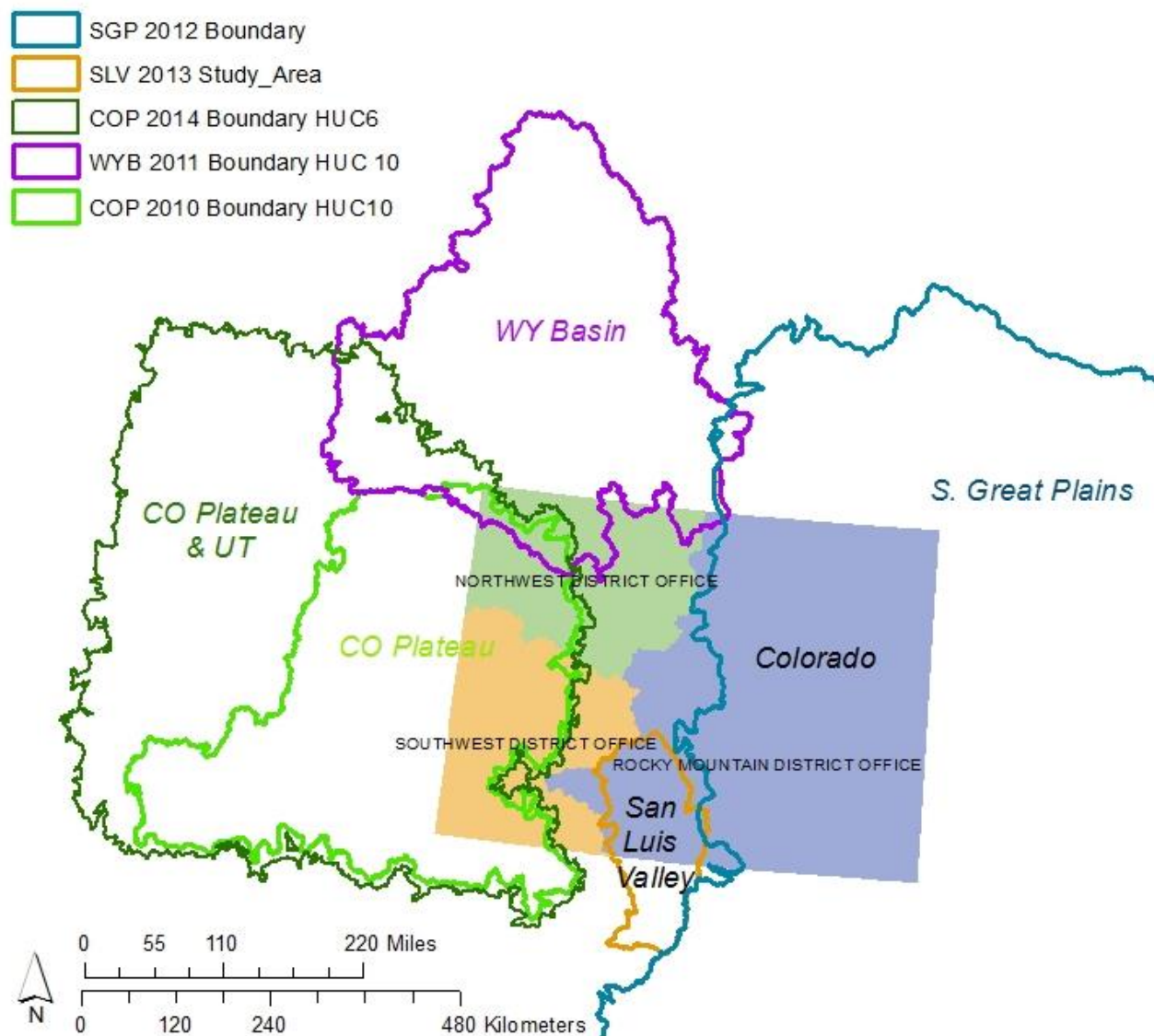
Background

- In the absence of REAs...
- Other broad scale data – science based, consistent and standardized, quantitative approach for objective decision-making
- How is this useful?
 - Quantitative context
 - Establish reference conditions
 - ID and target areas for protection or restoration (and funding)
 - Ensure transparency to stakeholders and other agencies (planning 2.0)



REA Data Coverage for Rocky Mountain DO

- RMDO is partially covered by the San Luis Valley Landscape Assessment (SLV LA).
- Eastern portions will be covered by SGP REA (2017).
- It is feasible to use broad scale data sets to fill in these gaps for some analyses.
- Southern Rockies Ecoregion?



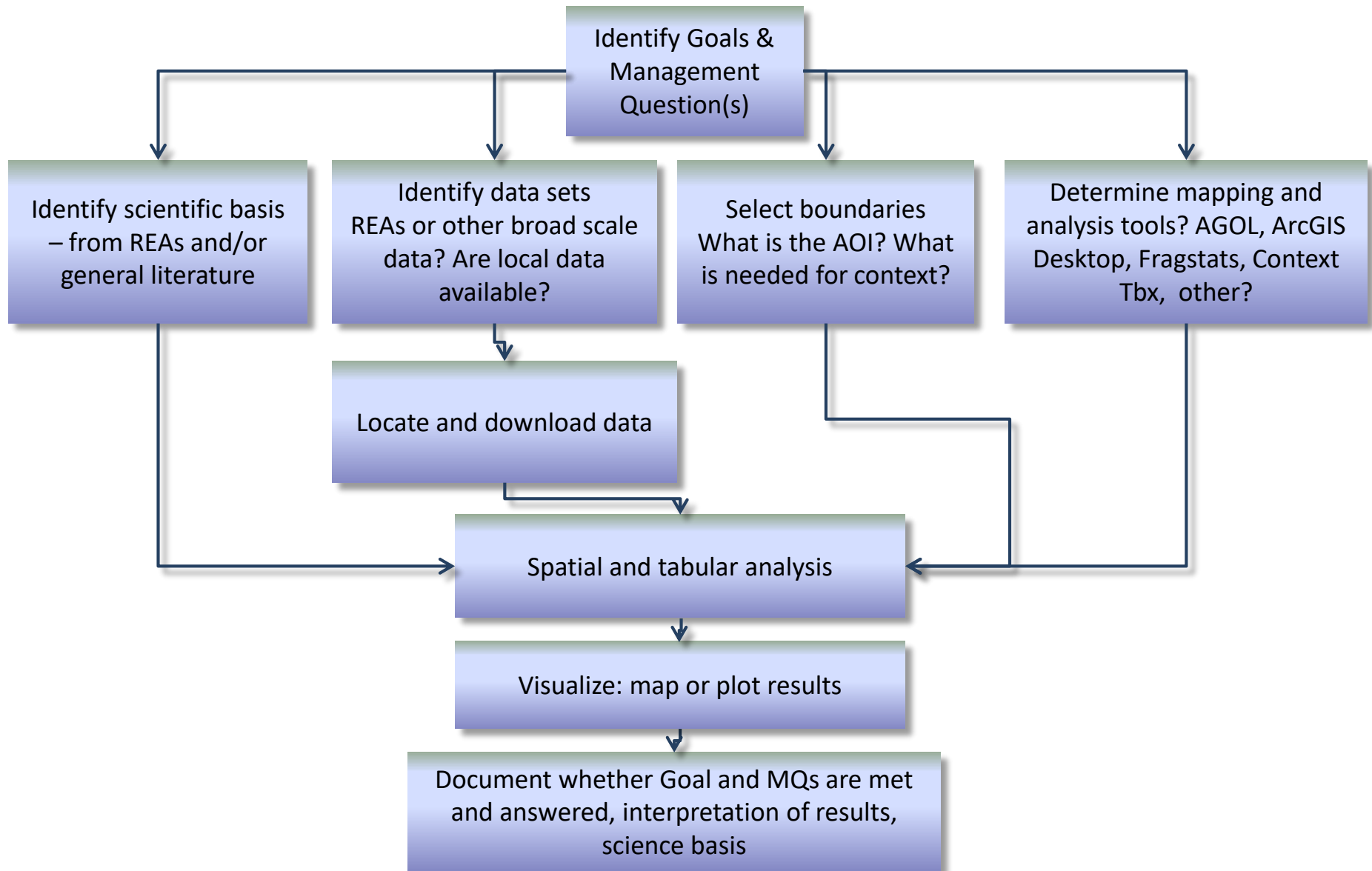
Background

- Rocky Mountain Bighorn sheep is a BLM special status species
- Contact between bighorn sheep (BHS) and domestic sheep (DS) carries the risk of spreading respiratory diseases such as lungworm and pneumonia which can be fatal to bighorn sheep



- Bighorn sheep habitat is limited and fragmented so the sheep are vulnerable to disease and competition
- Focus of this presentation is on the BHS-DS conflict, BHS and change agents, and how to use broad scale data

Broad Scale Analysis Road Map



Identify Goals & Management Question(s)

(1 of 2)

Goals:

- Explore the data: what data sets are available and useful. SLV v. other RMDO areas
- Quantify the spatial configuration of bighorn sheep habitat
- What is the risk of contact between BHS and DS?
 - Investigate the BHS Risk of Contact Model
- What are the seasonal variations in BHS range?
- What is the impact of development on BHS range?
- What are the climate change impacts?

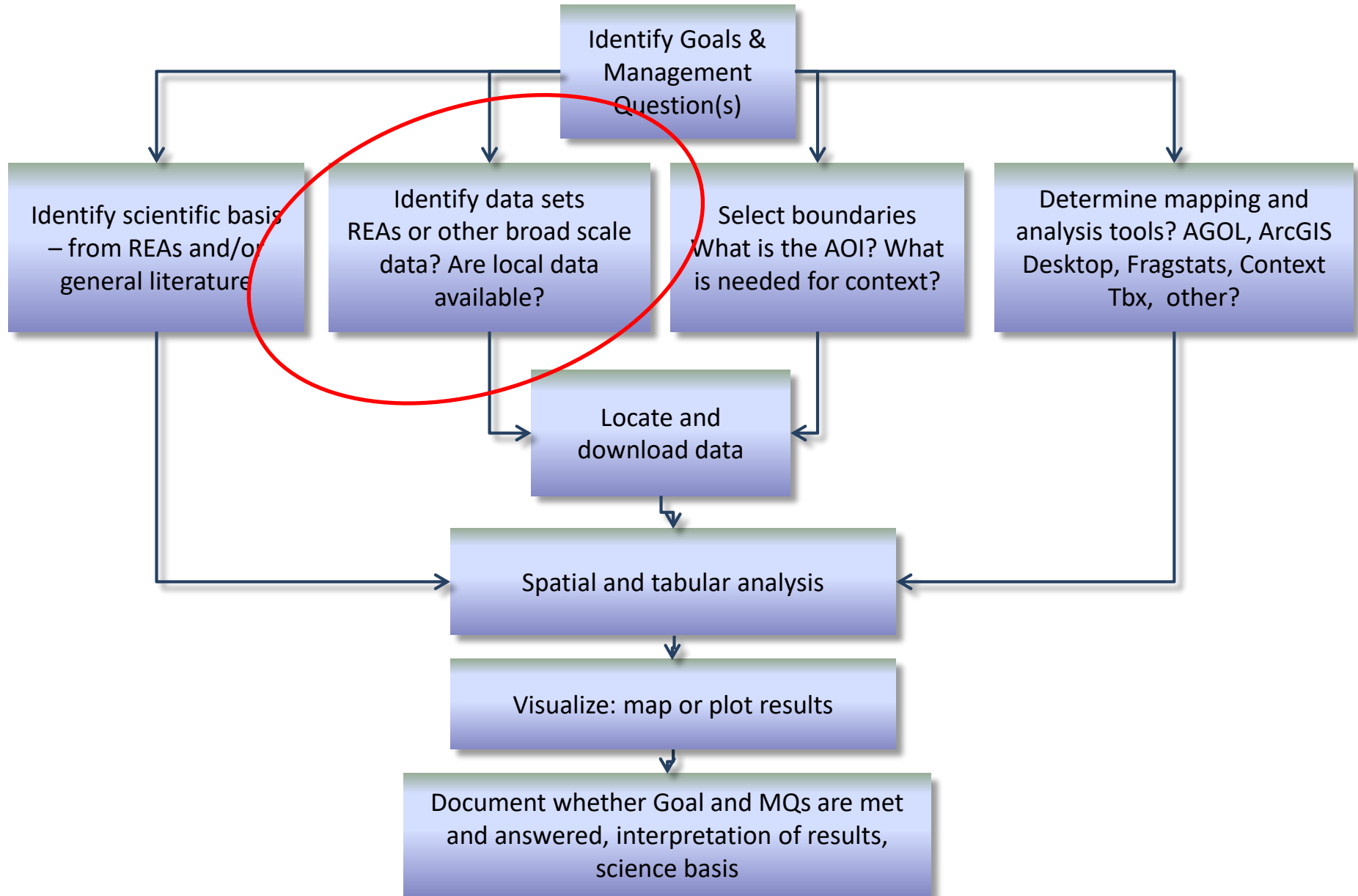
Identify Goals & Management Question(s)

(2 of 2)

MQs

1. Where are seasonal ranges of bighorn sheep (BHS)?
2. Where are domestic sheep (DS) allotments?
3. Where do BHS (overall and winter) range and DS allotments overlap?
4. Calculate the risk of contact between BHS and DS?
 - How do BHS foray distances impact the area of overlap between BHS and DS
5. Calculate how much of BHS production and winter habitat are impacted by development?
6. How might BHS overall range be impacted by climate change?

Broad Scale Analysis Road Map

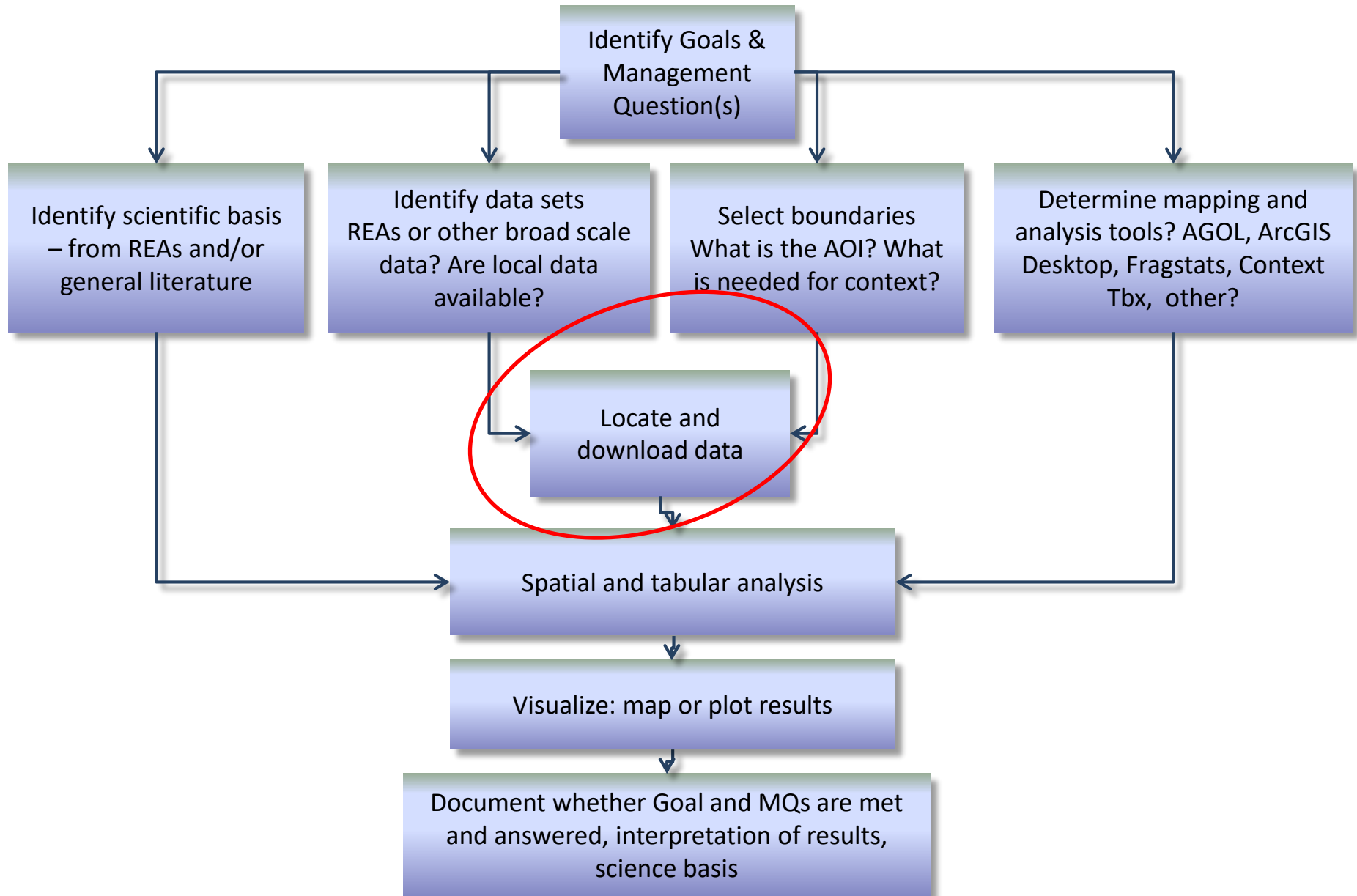


Identify data sets: REAs or other broad scale data? Are local data available/useful?

- CPW Bighorn Sheep seasonal and overall range
- SLV Landscape Assessment – BHS potential suitable habitat
- BLM: RAS authorized and billed DS allotments, Field and District Office boundaries
- SW ReGAP
- USGS Surface Disturbance (Landscape Intactness) (2016)



Broad Scale Analysis Road Map



Download BLM SMA, Administrative Units, REA data

The screenshot shows the 'Landscape Approach Data Portal' website. The header features the BLM logo, the title 'Landscape Approach Data Portal', and the subtitle 'Data, Maps, and Models from BLM's Landscape Approach Initiatives'. Navigation links include Home, Search All, Browse All, AIM, BLM National Data (highlighted), FIAT, Greater Sage-Grouse, REAs, Secretarial Order 3336, and How To. A 'News!' sticky note is on the right. The main content area is titled 'BLM National Data' and contains a paragraph about BLM National Data, examples of data, and a 'Map Viewer' section. A 'Resources' box on the right lists links for BLM Downloadable Data, BLM Dynamic Map Services, BLM Documents, and BLM Static Maps, along with a keyword search box and a 'Browse' link. The bottom of the page shows a 'Map Viewer' interface with a map of the United States and a legend.

Landscape Approach Data Portal
Data, Maps, and Models from BLM's Landscape Approach Initiatives

Help About Feedback

News!

Home Search All Browse All AIM **BLM National Data** FIAT Greater Sage-Grouse REAs Secretarial Order 3336 How To

BLM National Data

The BLM creates and maintains a variety of corporate and programmatic datasets that are collectively referred to as BLM National Data. These data help support BLM's mission to manage and conserve the public lands for the use and enjoyment of present and future generations under our mandate of multiple-use and sustained yield.

Examples of BLM National Data include: Administrative Units (BLM state, district and field office boundaries), National Monuments and Conservation Areas, and Surface Management Agency. Most of BLM's National Data are available to the public and many of them can be found in this data portal (more coming soon!). For a complete list of data sets that are currently available on this portal, including data update schedules, [click here](#).

Use the Map Viewer below to explore BLM National Data or click on the hyperlinks in the Resources box above to download data, documents and static (printable) maps or to view dynamic map services for individual data sets. You can also search by keywords using the Search Box.

Resources

- [BLM Downloadable Data](#)
- [BLM Dynamic Map Services](#)
- [BLM Documents](#)
- [BLM Static Maps](#)

Find data using a keyword search

Search

or [Browse](#) by BLM National Category

Map Viewer

BLM National Data

Legend

Download CPW Bighorn Sheep Data and USGS Surface Disturbance Data

ArcGIS Features Plans Gallery Map Scene Help

CPW Bighorn Sheep Shapefile Download

Overview



This is part of the Species Activity Mapping (SAM), which provides information on wildlife distributions to public and private agencies and individuals, for environmental assessment, land management resource planning and general scientific reference.

by [rsacco](#)

Last Modified: November 10, 2016

 Shapefile

Surface Disturbance Footprint from Development for the Western United States



NOC Wildlife Lab:

Queried for Authorized and Billed sheep pastures and allotments in the Rangeland Administration System (RAS) and related to GIS data representing allotments

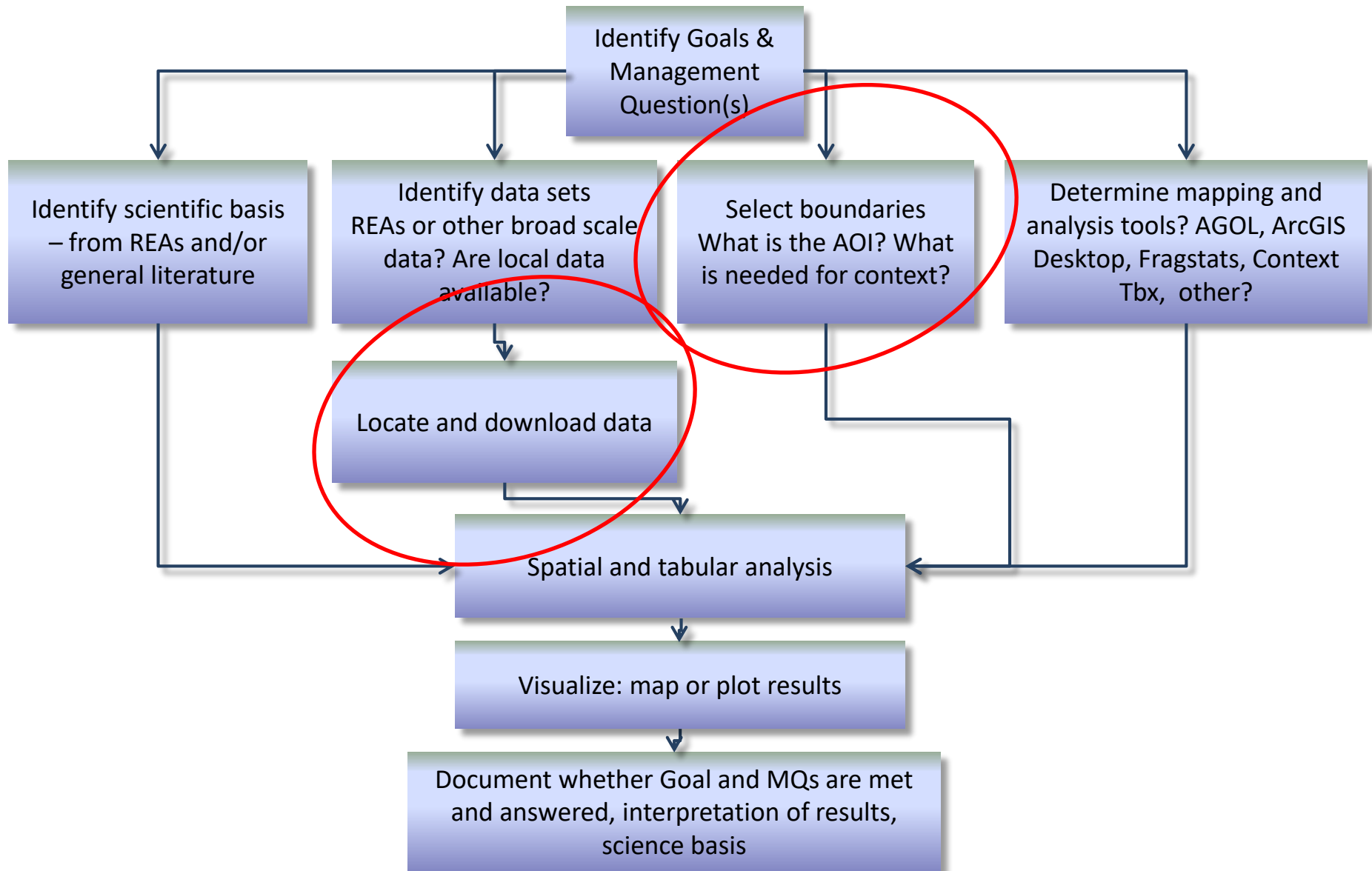
Download



Southwest Regional Gap Analysis Project

- Bighorn Sheep Wildlife Habitat Relationship model 2003-5
- Indicates potential suitable habitat where species may occur not abundance
- Elevation: 244-3660m
- 50 Ecological Systems (SWReGAP landcover) that include various veg types and landforms/terrain
 - Bedrock, scree, fell-field, canyon, cliff
 - Woodland
 - Shrubland, chaparral, grassland, savanna, scrub
 - Barren and recently burned
- Intended for use in areas > 1000 ha or 2470 acres (not site or stand scale projects)
- MMU = 0.4 ha or 1 acre
- Legend K34 indicates: Known occurrence, 3 = species occurs throughout year during breeding and non-breeding, 4 = species uses watershed during summer and winter seasons

Broad Scale Analysis Road Map

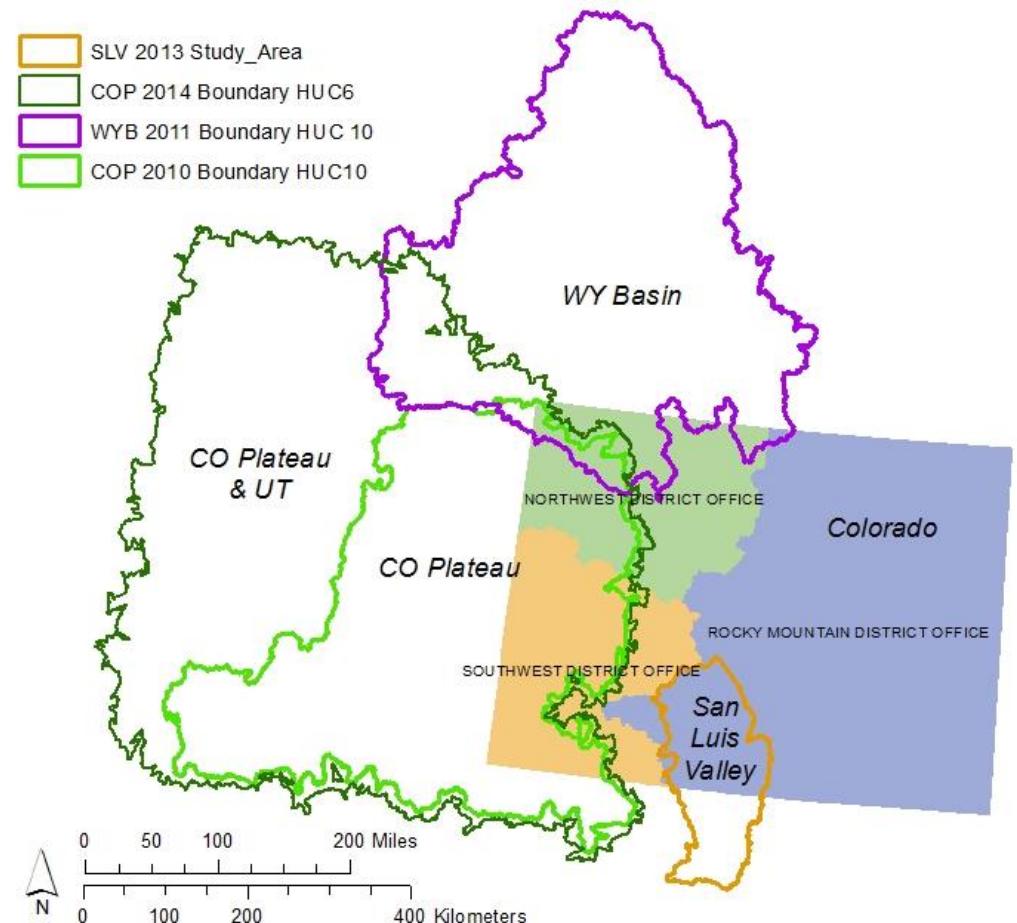


Select boundaries: What is the AOI? What is needed for context?

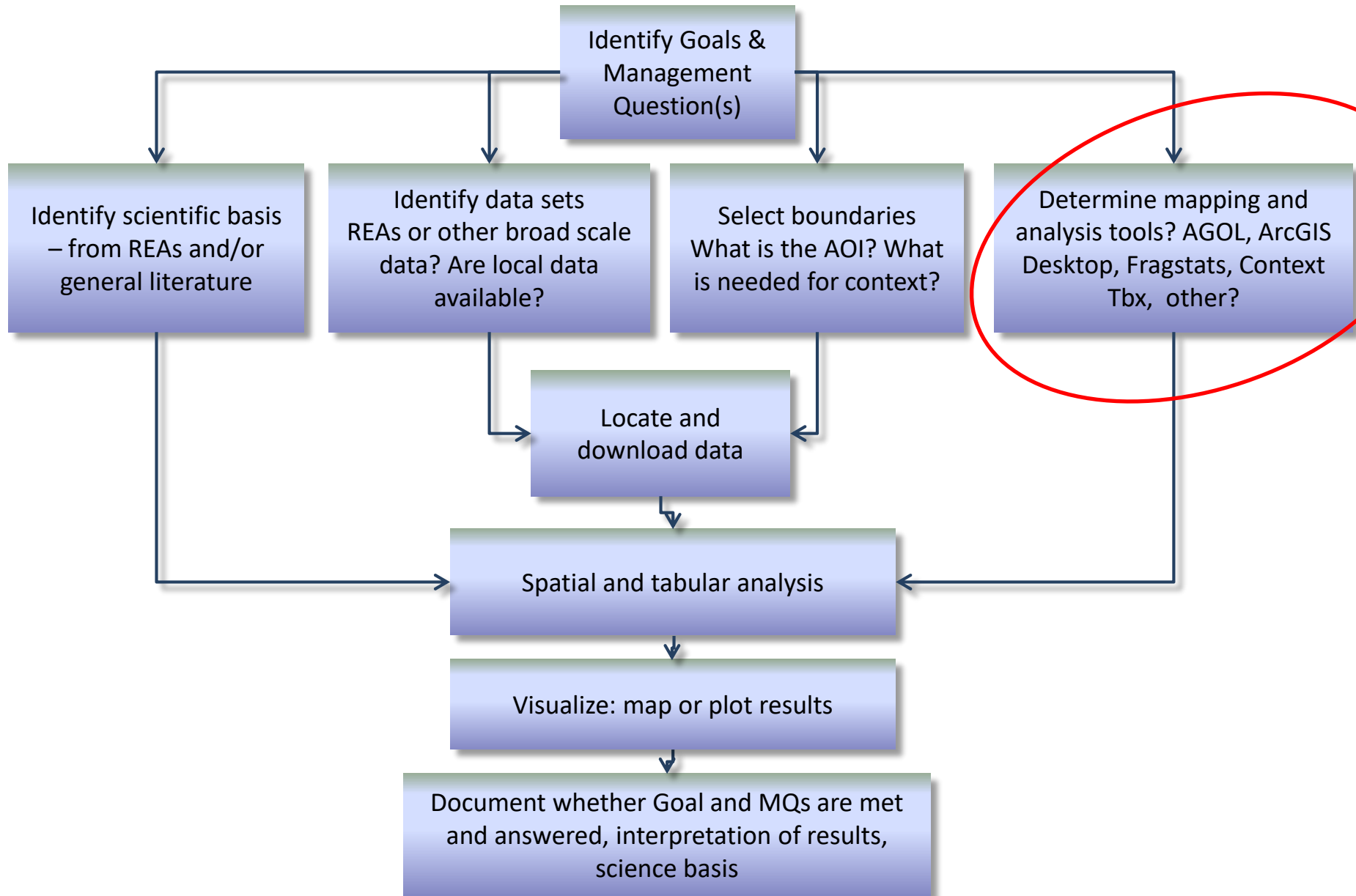
- REA boundaries
- FOs/DOs, HUCs
- Land ownership, protected areas

★ It's a good idea to union all the boundaries that you think you might need and download data based on that largest boundary because projects can

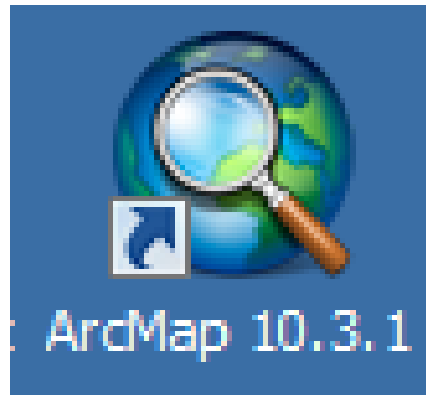
evolve...



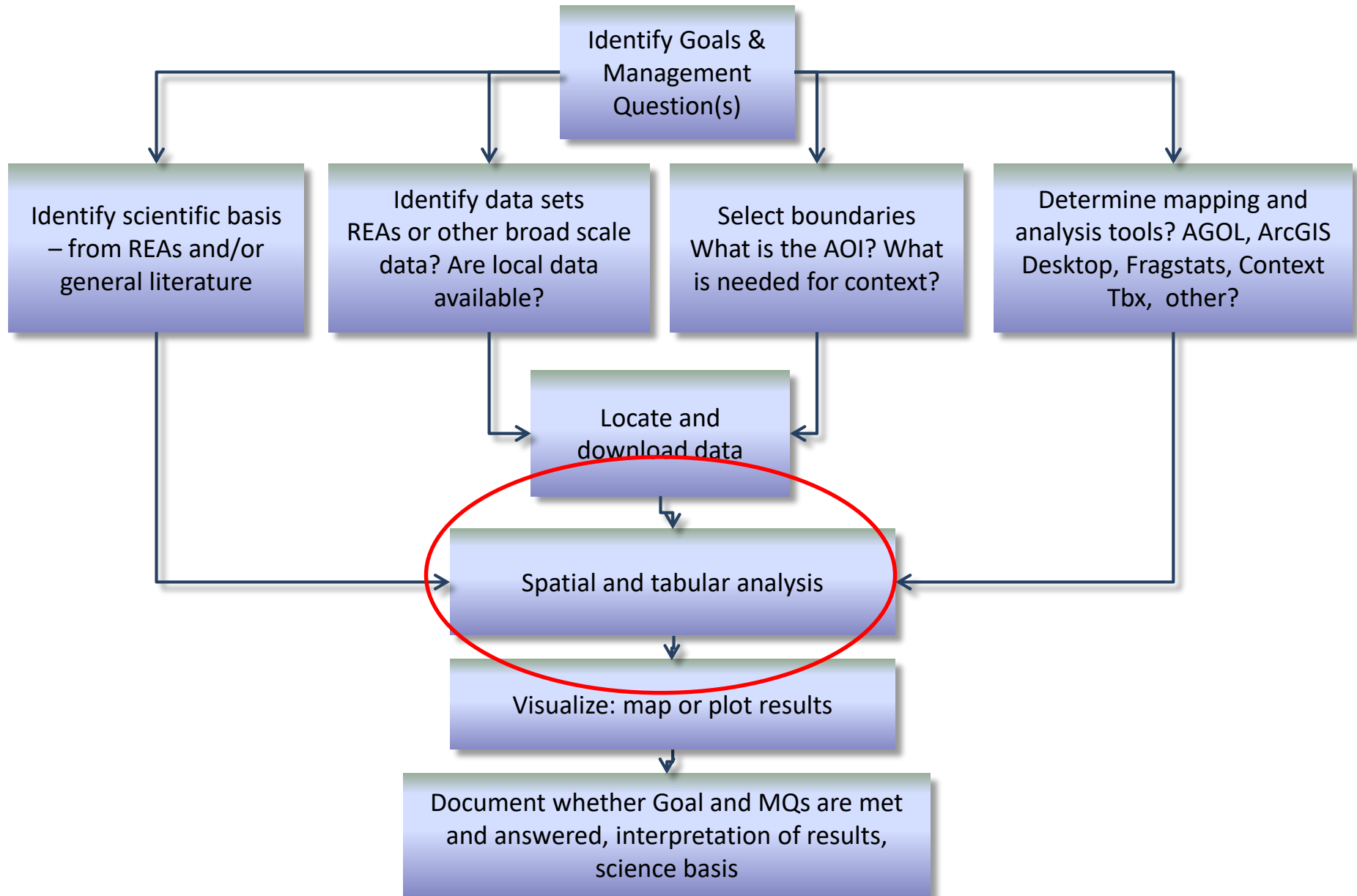
Broad Scale Analysis Road Map



Determine download, mapping, and analysis tools: AGOL, ArcGIS Desktop, Fragstats, Context Tbx, BHS RoC, other?



Broad Scale Analysis Road Map

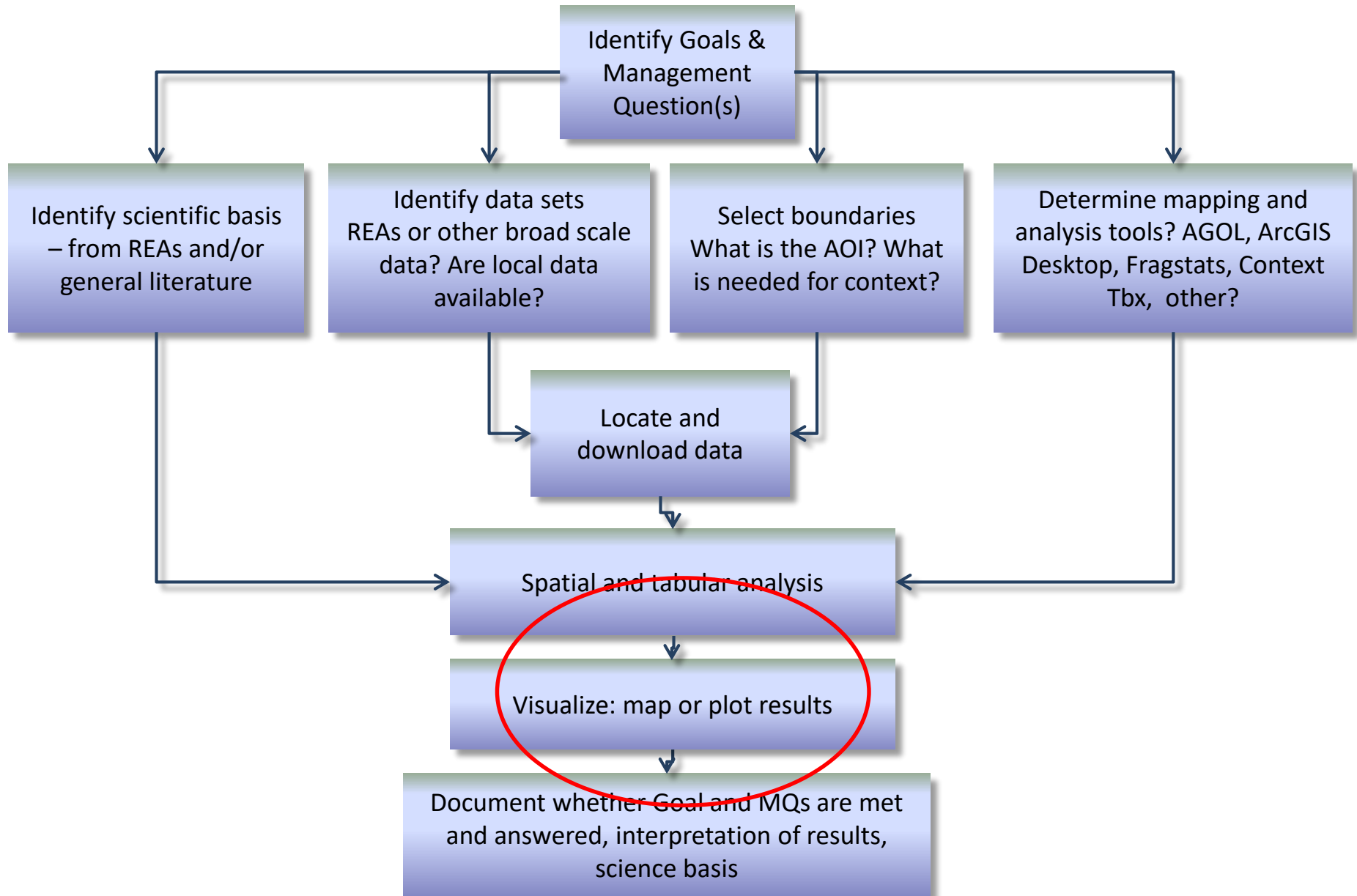


Spatial and tabular analysis for MQs

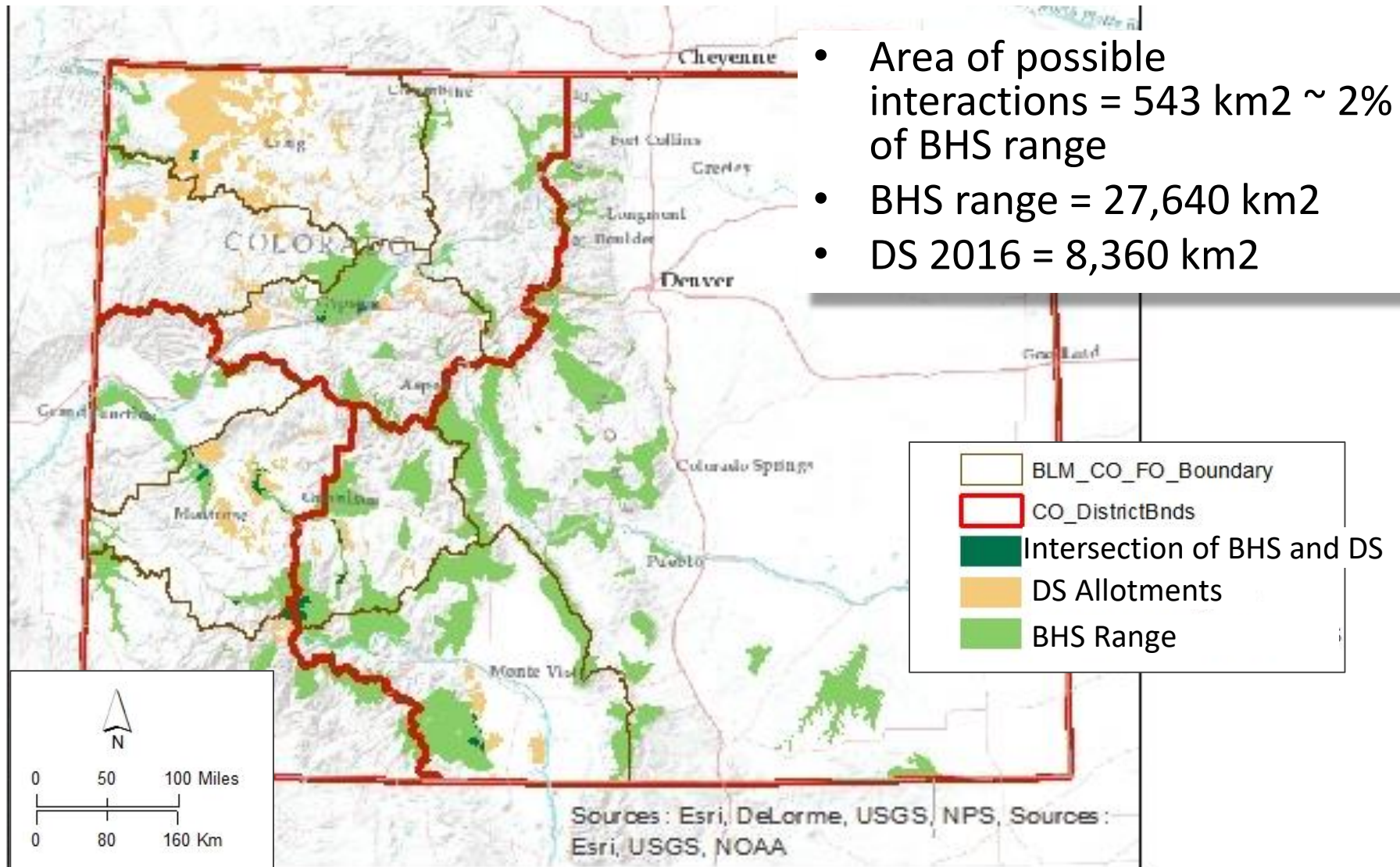
- Generally use flow charts and conceptual diagrams to document complex processes
- Much of the work here was simple overlays, union, intersections, and context analysis



Broad Scale Analysis Road Map

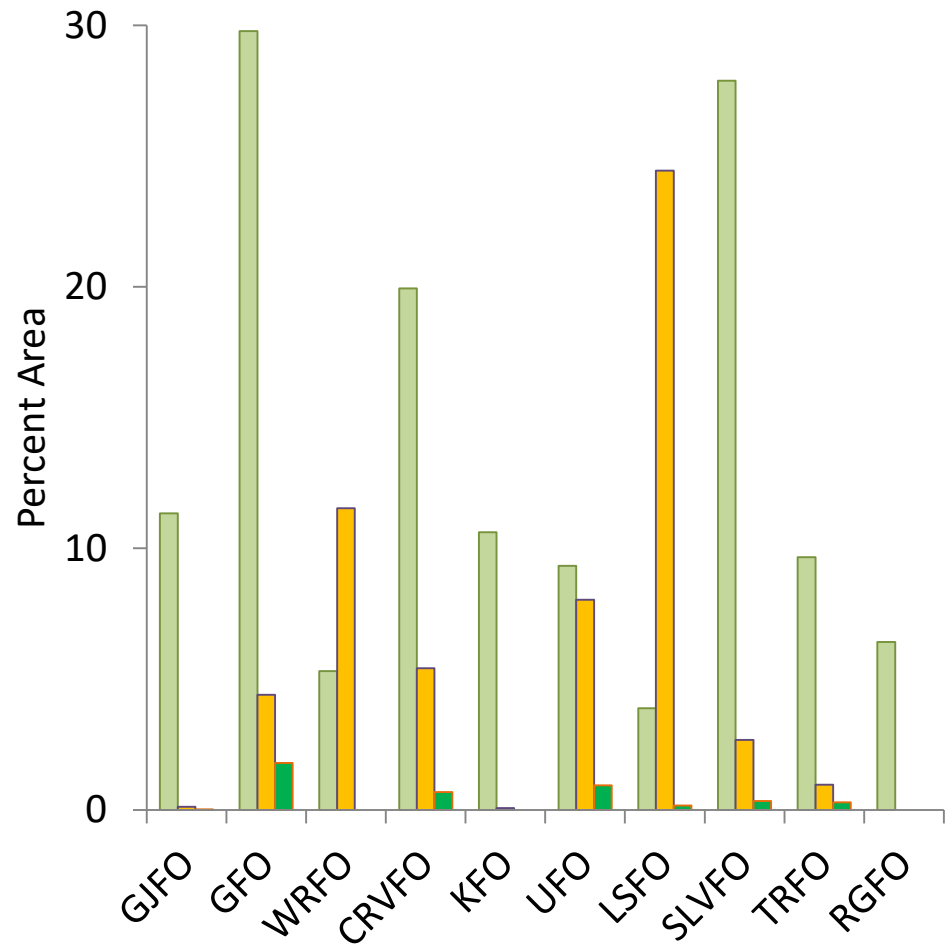
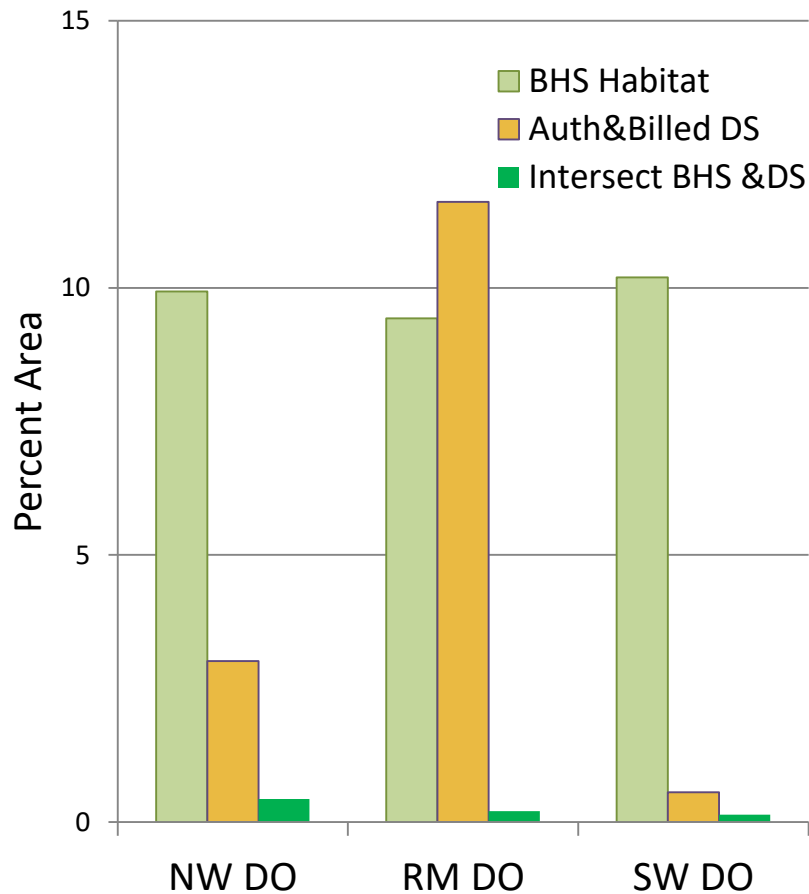


BHS overall range, DS allotments, and areas where BHS habitat intersects with DS allotments

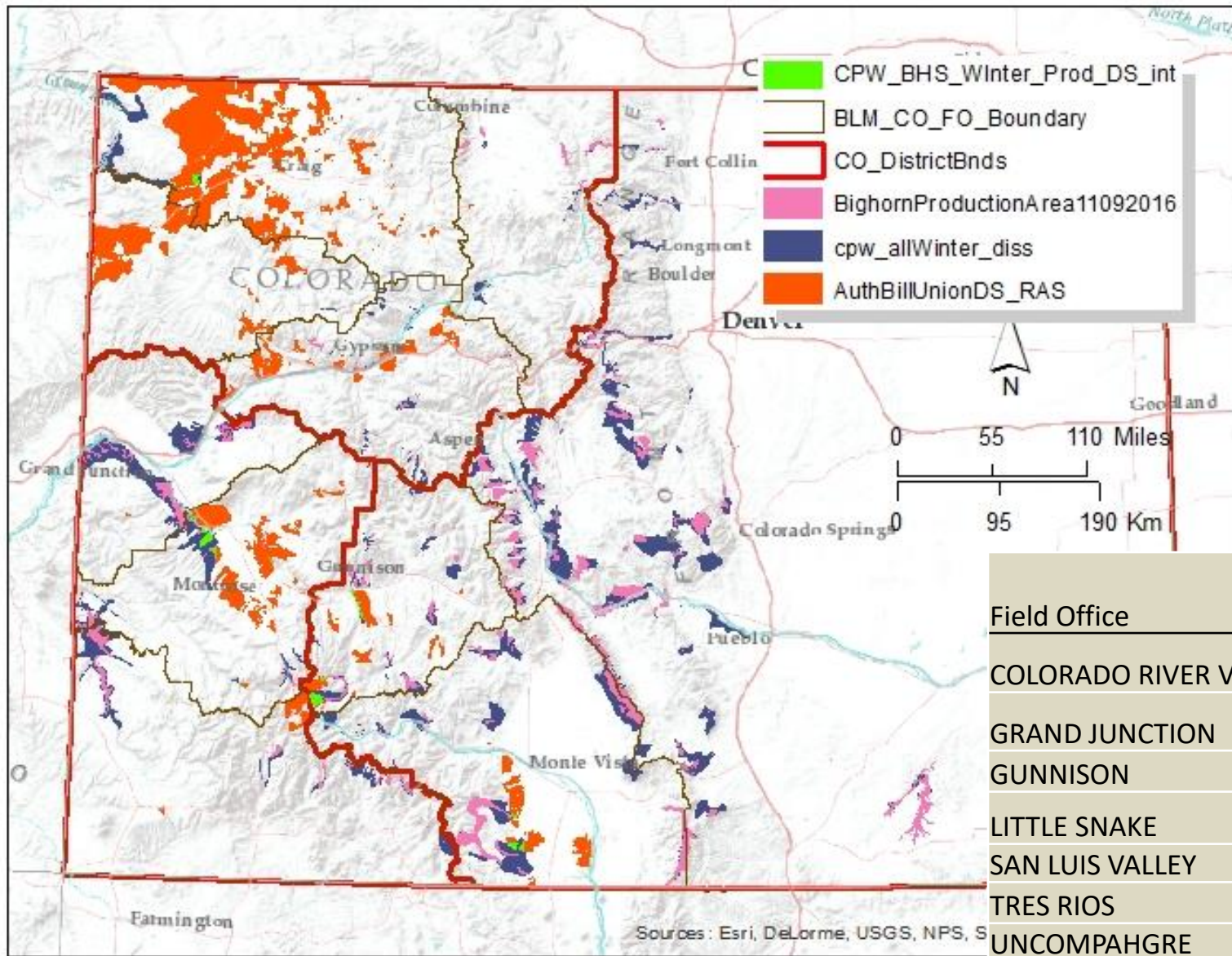


Visualize: map or plot results

Context: Comparison of BHS habitat, Domestic Sheep allotments, and the intersection of these 2 by CO DO (left) and FO (right).

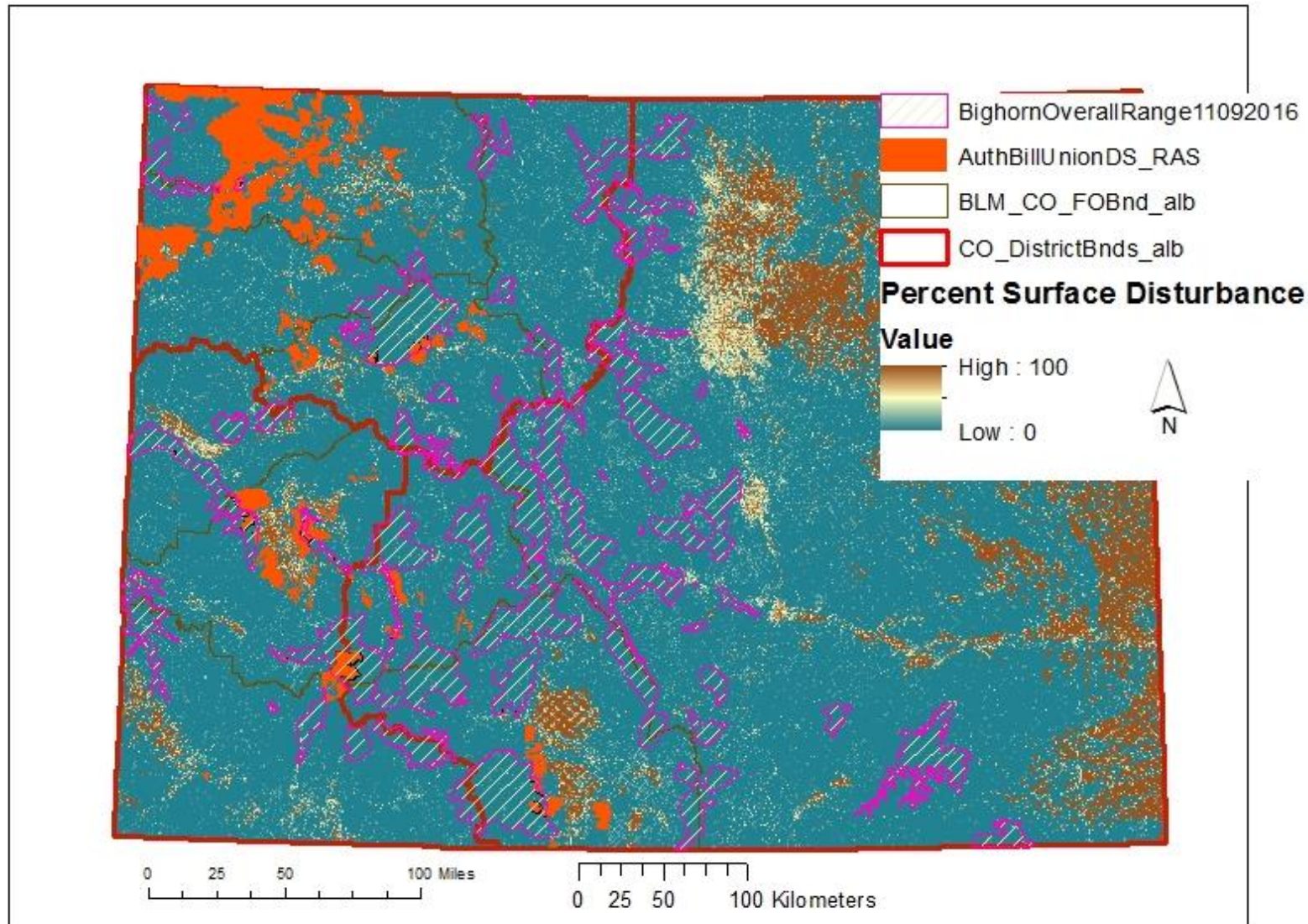


CPW Seasonal BHS Winter and Production Ranges

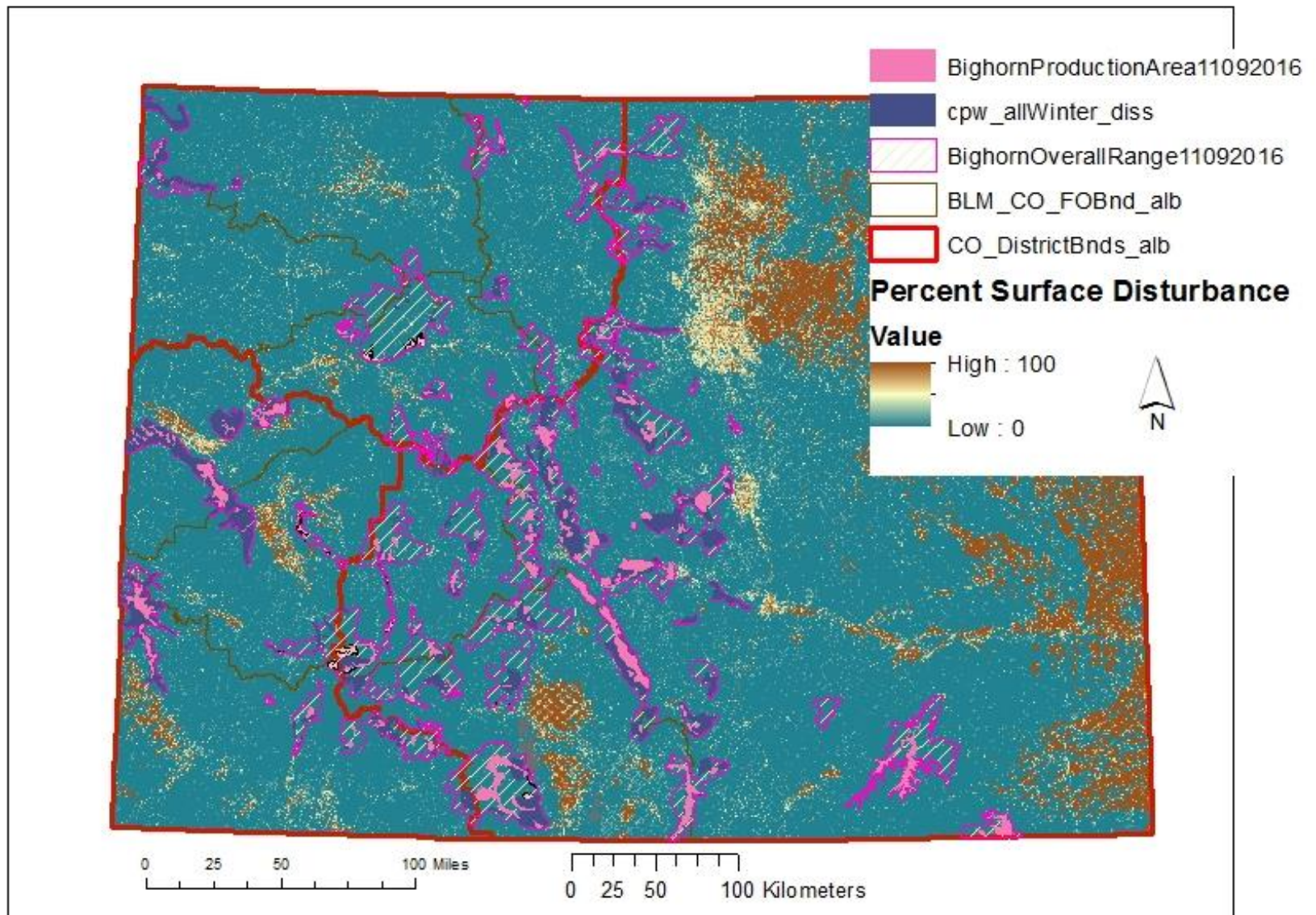


Field Office	Area (km2)
COLORADO RIVER VALLEY	5
GRAND JUNCTION	2
GUNNISON	64
LITTLE SNAKE	21
SAN LUIS VALLEY	34
TRES RIOS	0
UNCOMPAHGRE	70

Landscape Intactness, Surface Disturbance and BHS



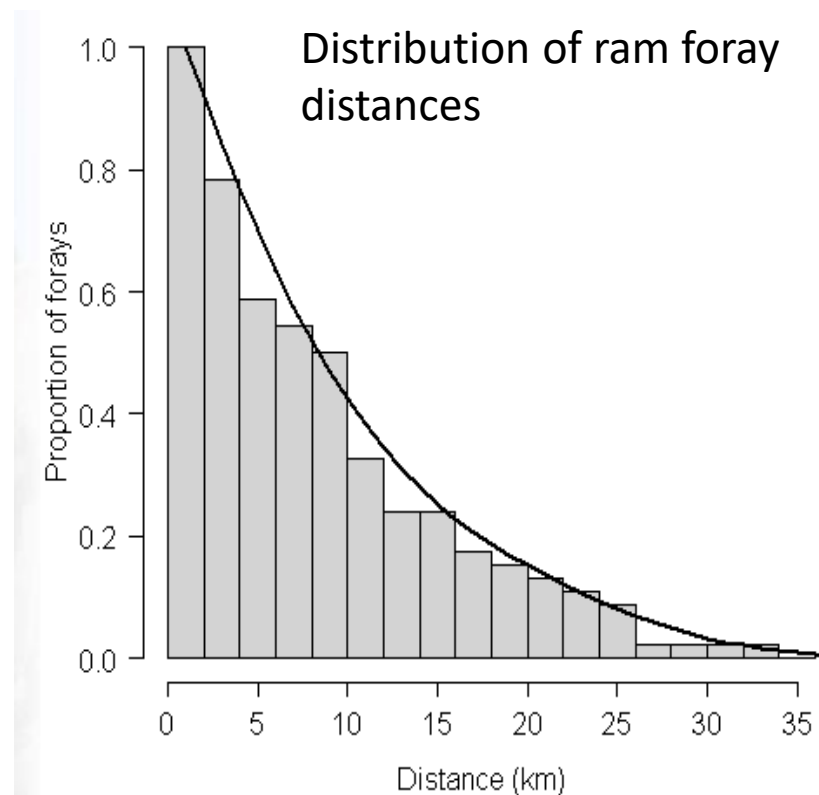
Surface Disturbance and BHS winter



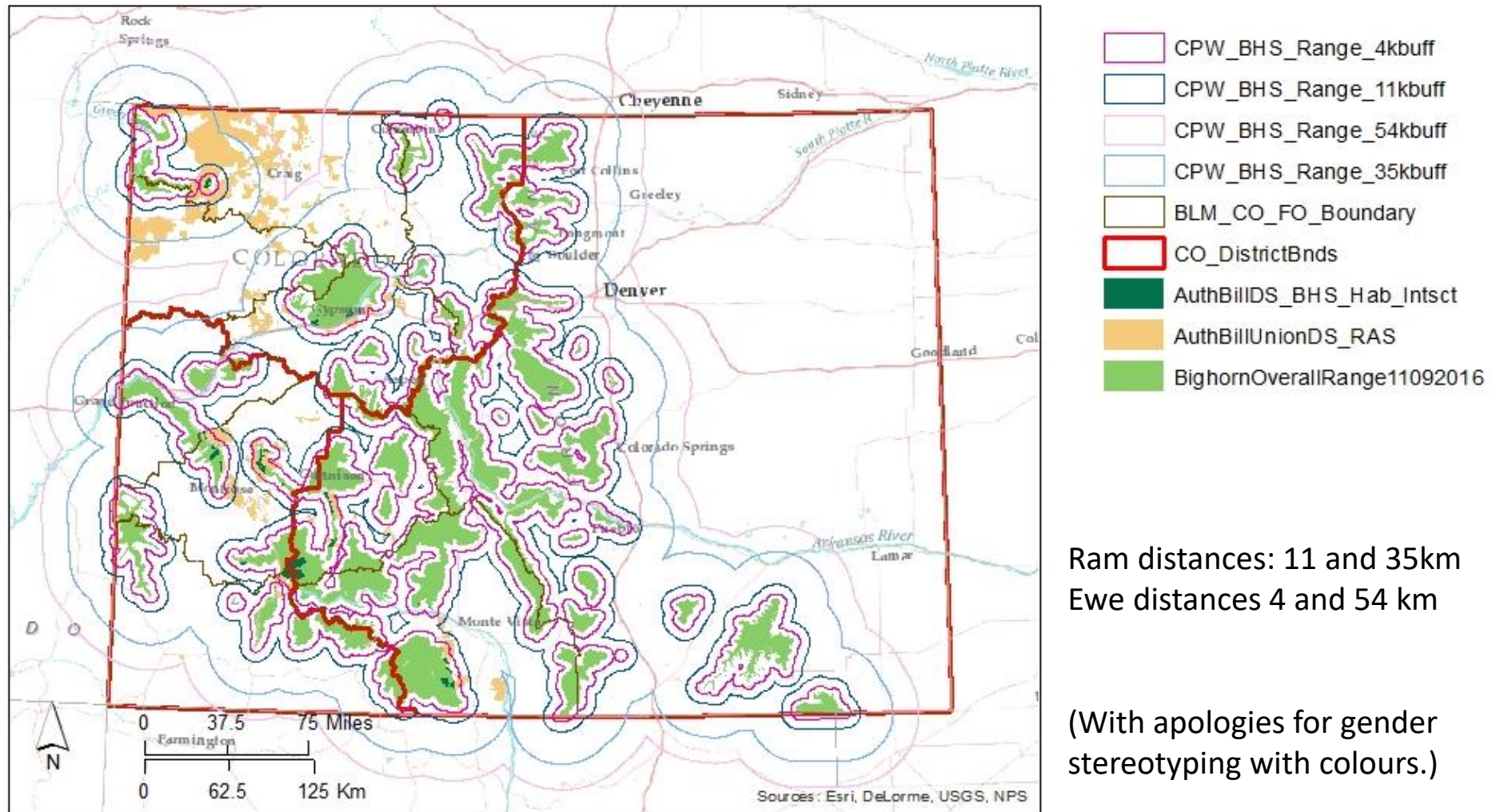
BHS Risk of Contact model

- Estimates the BHS home range, BHS empirical foray probability and distance distribution, and risk of contact between BHS and DS
- Based on telemetry data of BHS movements
- Originally developed for Payette NF, ID
- Probability of foray distances
 - Ram $P(50) = 11$ km
 - Ewe $P(50) = 4$ km
- Max Ram distance = 35 km
- Max Ewe distance = 54 km

Note: Due to technical reasons, I am not able to run the RoC model yet. The following analysis is a simplification of the model process.



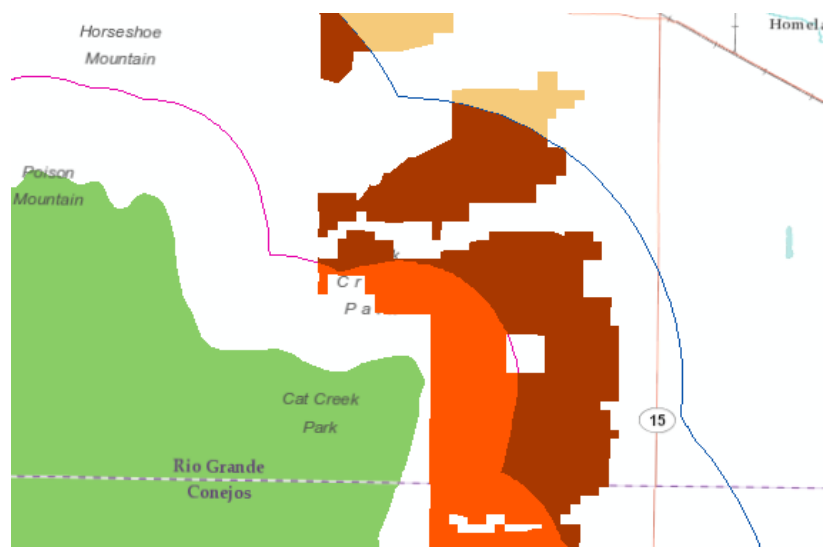
Foray distances travelled by rams (blue) and ewes (pink):
maximum and 50% likelihood (distances from ID used in CO)



Area (km2) of Colorado District and Field Offices within the intersection of BHS range + 50% likelihood foray distances and domestic sheep allotments 2016 (distance data from ID)

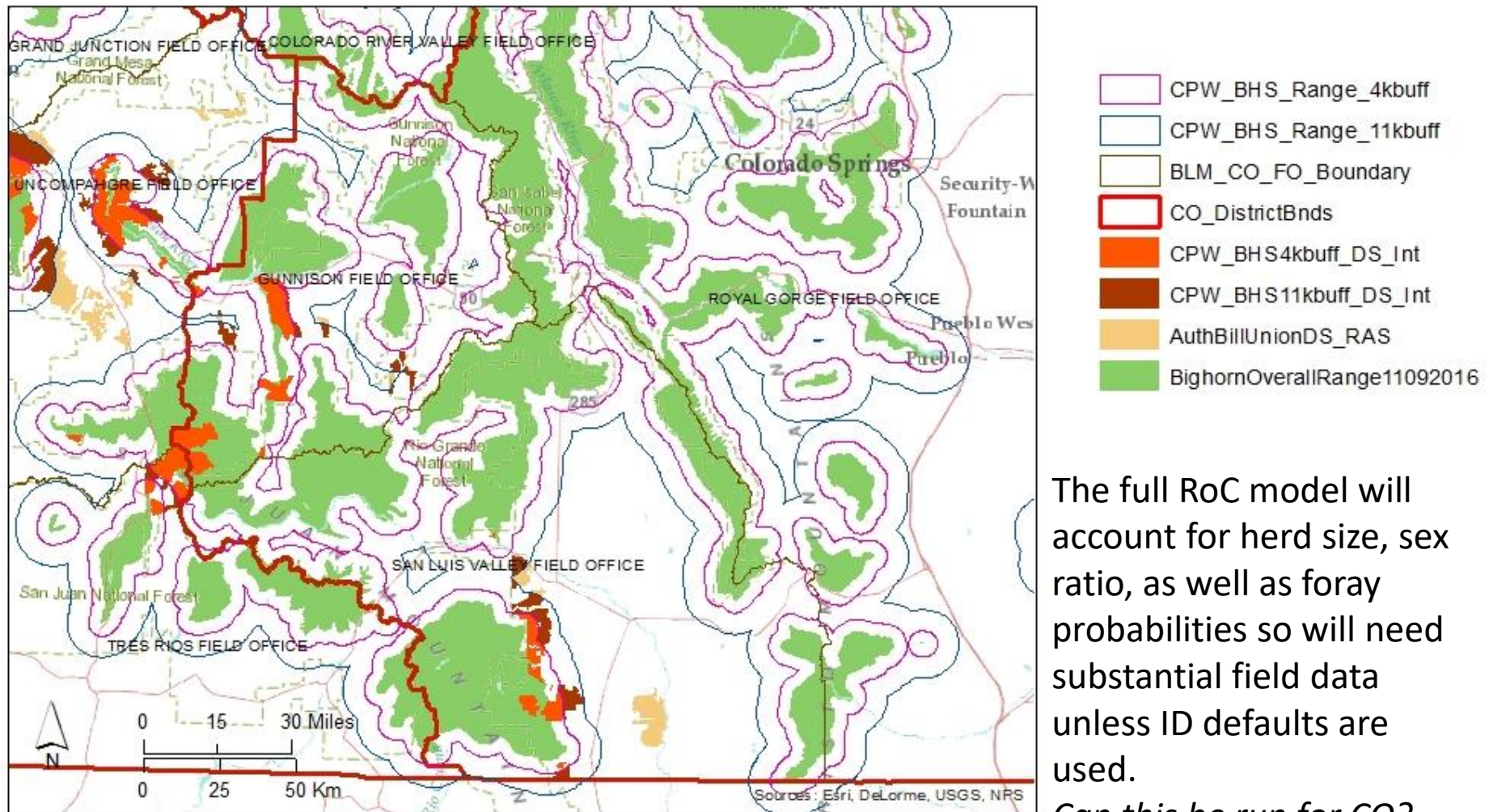
	Ewes 4k	Rams 11k
NWDO	380 (0.7%)	1101 (2.1%)
RMDO	493 (0.3%)	770 (0.4%)
SWDO	605 (1.4%)	975 (2.2%)
Total Area (km2)	1478	2846

Field Office	Ewes 4k	Rams 11k
COLORADO RIVER VALLEY	174	354
GRAND JUNCTION	6	6
GUNNISON	323	426
KREMMLING	0	3
LITTLE SNAKE	205	715
SAN LUIS VALLEY	170	344
TRES RIOS	145	181
UNCOMPAHGRE	455	788
WHITE RIVER	1	30



- CPW_BHS_Range_4kbuf
- CPW_BHS_Range_11kbuf
- CPW_BHS4kbuf_DS_Int
- CPW_BHS11kbuf_DS_Int
- AuthBillUnionDS_RAS
- BighornOverallRange11092016

Area of SLV and Gunnison Field Offices within the intersection of BHS range + 50% likelihood foray distances and domestic sheep allotments 2016 (distance data from ID)



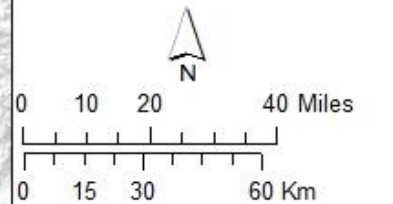
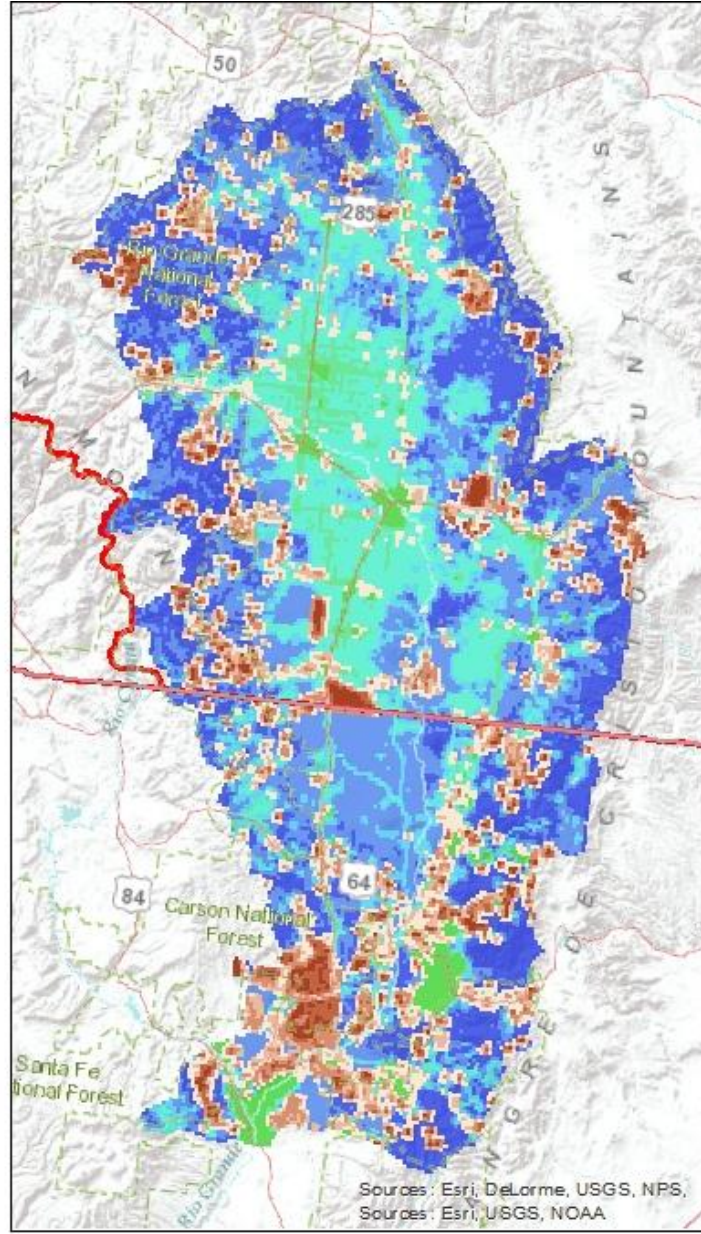
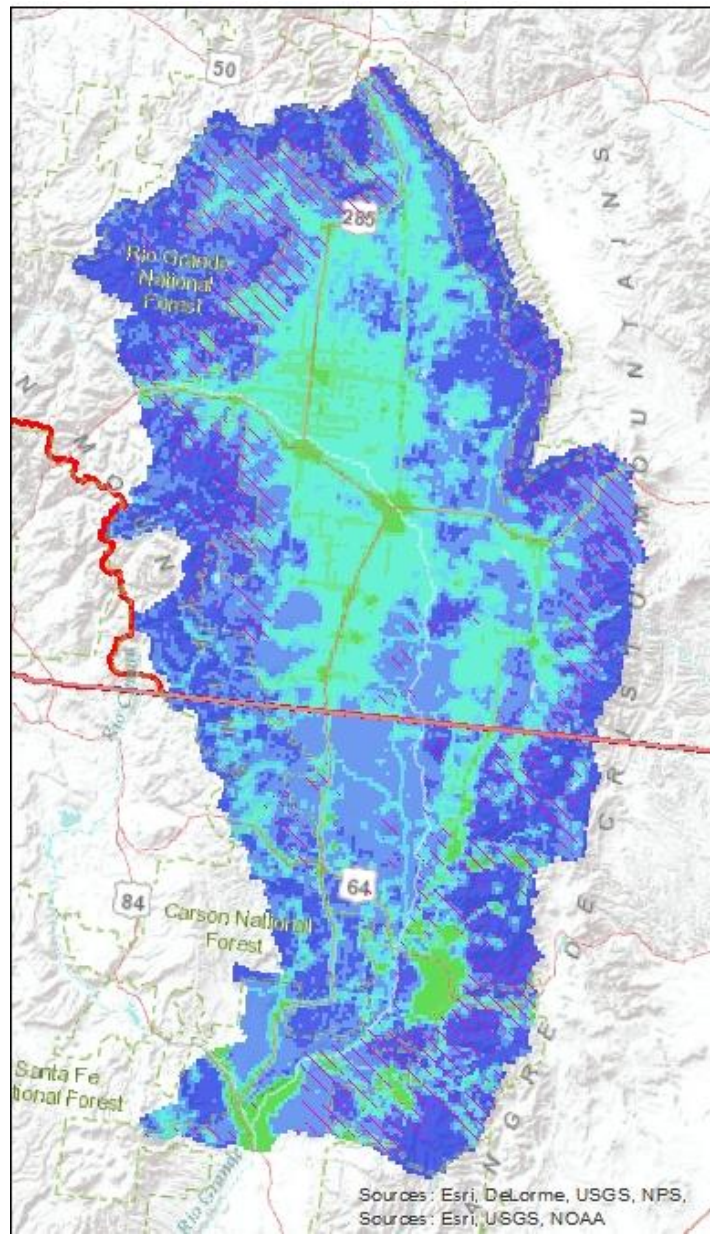
The full RoC model will account for herd size, sex ratio, as well as foray probabilities so will need substantial field data unless ID defaults are used.

Can this be run for CO?

Landscape Intactness Model for San Luis Valley LA (Landscape Condition Model-type)

- Used data for human development and land cover change to model intactness
- Site impact scores of human modification intensity and activity reflect relative level of ecological stress or impact
- Distance decay quantifies the impact of proximity to human development
- Current and near-term future (2015-2030)

Comparison of Current (left) and Changes for Near term(right) Landscape Intactness (LIM) and Bighorn Sheep Potential Suitable Habitat (PSH)



- Bighorn Sheep PSH
- CO_DistrictBnds_alb

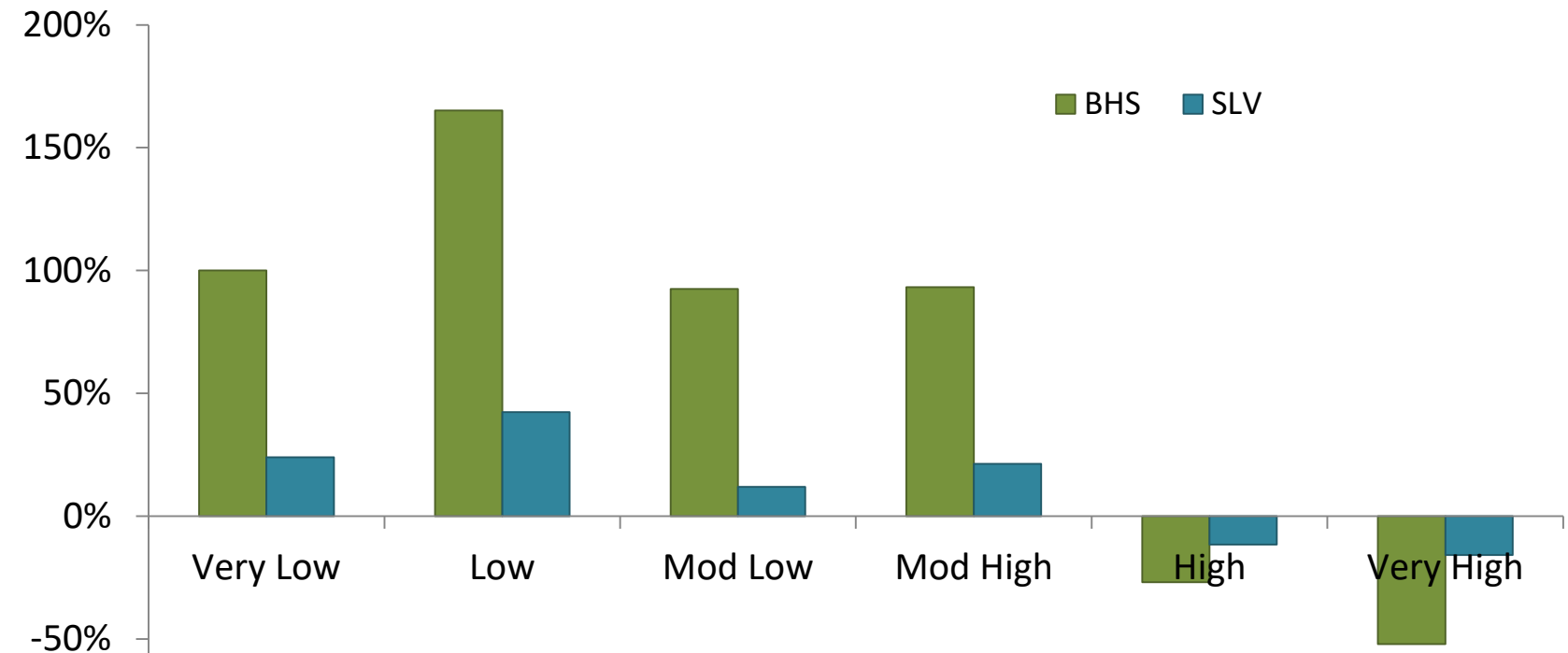
LIM C - N

- 0.000004 - 0.117896
- 0.117897 - 0.302518
- 0.302519 - 0.532149
- 0.532150 - 0.802030
- 0.802031 - 1.534241

LIM_C_fz

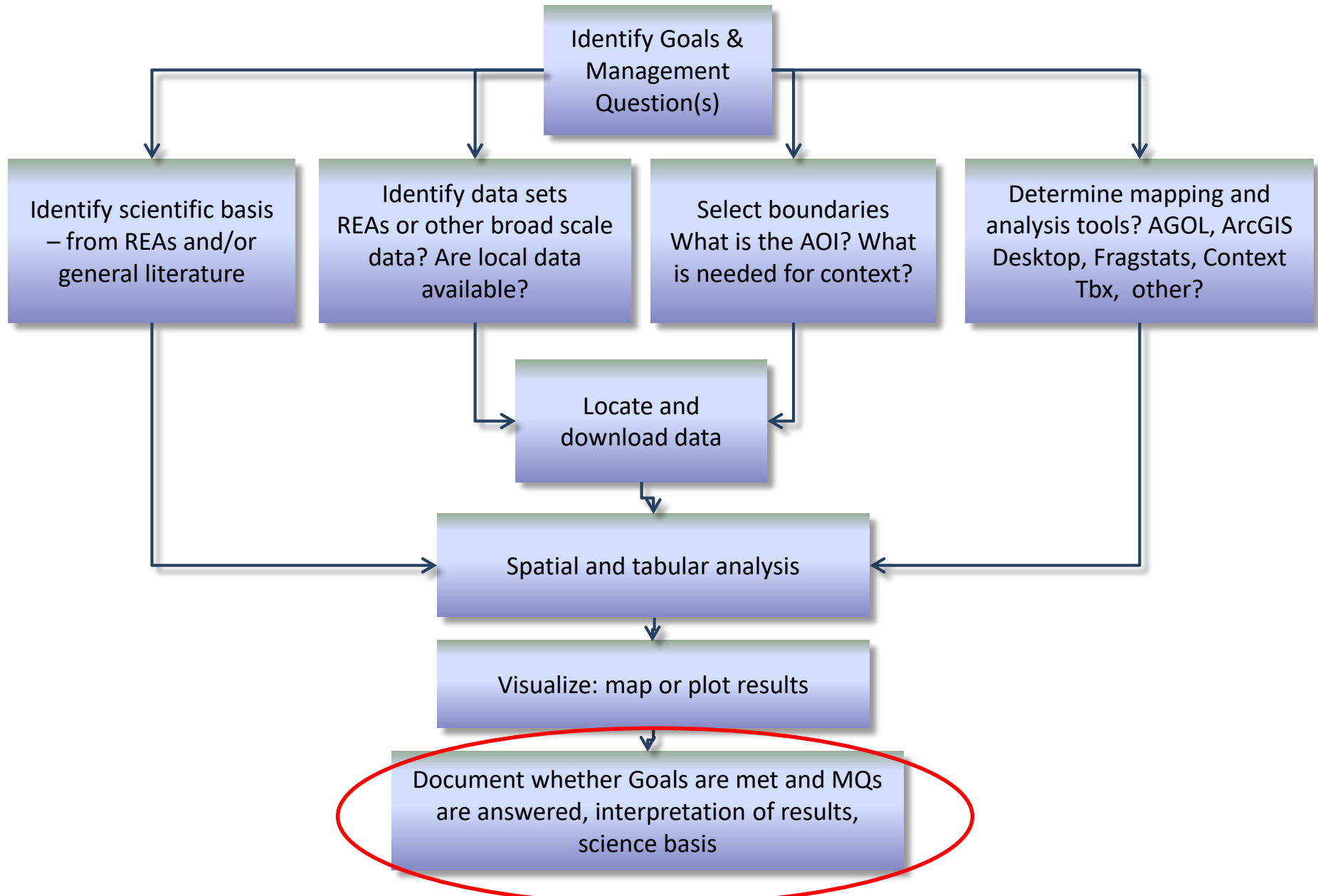
- Very Low (-1)
- Low
- Mod Low
- Mod High
- High
- Very High (+1)

Changes in Landscape Intactness from current times to near term future – comparison bighorn sheep range and all of San Luis Valley



- Both areas show a decrease in landscape intactness
- BHS habitat shows larger percent changes
- Further analysis would show the causes of these changes

Broad Scale Analysis Road Map



Document whether Goals are met and MQs are answered, interpretation of results, science basis

Revisit MQs

- ✓ Where are seasonal ranges of bighorn sheep (BHS)?
- ✓ Where are domestic sheep (DS) allotments?
- ✓ Where do BHS (overall and winter) range and DS allotments overlap?
- Calculate the Risk of Contact between BHS and DS?
- How do BHS foray distances impact the area of overlap between BHS and DS
- ✓ Calculate effects of changes in Landscape Intactness on BHS PSH
- Calculate how much of BHS production and winter habitat are impacted by development?
- How might BHS overall range be impacted by climate change?

Next Steps



We ran into a few issues:

- We can look at future landscape intactness for SLV but cannot yet run the model for RMDO
 - Is this useful? Would people like to have the NOC work on this?
 - Same issue for the multiscale landscape intactness – there are no future projections (yet?)
- We have more work to do to run the BHS RoC model which is out of date and not compatible with ArcGIS 10.3
 - I have some ideas to solve this. The CO SO is interested – are others interested or have other solutions?

Document whether Goal are met and MQs are answered, interpretation of results, science basis

- Keep documentation (like lab notes) of all sources, processes, thoughts along the way.
- Remember to note if the process changed, was a dead end, was not useful and why
- Did the analyses meet your expectations?
- Did the analyses meet the Goal and answer the MQs?
- How do you interpret the analyses?

- Some analysis questions remain...
- What are they?
- How can the NOC help?

Thanks!!

